

YASKAWA

GA800 DRIVE

MAINTENANCE & TROUBLESHOOTING

AC DRIVE FOR INDUSTRIAL APPLICATIONS

CATALOG CODE:

GA80Uxxxxxxxx

CAPACITIES:

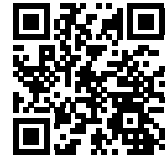
Three-Phase 200 V Class: 1 to 150 HP

Three-Phase 400 V Class: 1 to 1000 HP

6-Phase/12-Pulse 400 V Class: 75 to 600 HP

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DOCUMENT NUMBER: TOEPAIGA8001

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Table of Contents

i.	Preface and General Precautions	11
i.1	Receiving	12
	Glossary	12
	About Registered Trademarks	12
i.2	Using the Product Safely	14
	Explanation of Signal Words	14
	Section Safety	14
	Warning Label Content and Location	16
	Cybersecurity	16
i.3	Warranty Information	18
	Exclusion of Liability	18
1.	Periodic Inspection and Maintenance	19
1.1	Section Safety	20
1.2	Inspection	22
	Recommended Daily Inspection	22
	Recommended Periodic Inspection	22
1.3	Maintenance	25
	Replaceable Parts	25
	Part Replacement Guidelines	25
	Monitors that Display the Lifespan of Drive Components	26
	Alarm Outputs for Maintenance Monitors	26
	Related Parameters	26
1.4	Replace Cooling Fans and Circulation Fans	28
	Cooling Fans and Circulation Fans by Drive Model	28
	Fan Replacement (Procedure A)	28
	Fan Replacement (Procedure B)	30
	Fan Replacement (Procedure C)	33
	Fan Replacement (Procedure D)	35
	Fan Replacement (Procedure E)	37
	Fan Replacement (Procedure F)	40
	Fan Replacement (Procedure G)	46
	Fan Replacement (Procedure H)	54
	Fan Replacement (Procedure I)	62
1.5	Replace the Drive	70
	About the Control Circuit Terminal Block	70
	Replace the Drive	70
1.6	Replace the Keypad Battery	76
1.7	Storage Guidelines	78

2.	Troubleshooting	79
2.1	Section Safety	80
2.2	Types of Faults, Minor Faults, Alarms, and Errors	82
2.3	List of Fault, Minor Fault, Alarm, and Error Codes	83
2.4	Fault	89
2.5	Minor Faults/Alarms	120
2.6	Parameter Setting Errors	131
2.7	Auto-Tuning Errors	137
2.8	Backup Function Operating Mode Display and Errors	142
2.9	Diagnosing and Resetting Faults	144
	Fault and Power Loss Occur at the Same Time	144
	Fault Occurs Without Power Loss	144
	Fault Reset	144
2.10	Troubleshooting Without Fault Display	146
	Typical Problems	146
	The Parameter Settings Will Not Change	146
	The Motor Does Not Rotate After Entering Run Command	147
	The Motor Rotates in the Opposite Direction from the Run Command	148
	The Motor Rotates in Only One Direction	148
	The Motor Is Too Hot	148
	The Correct Auto-Tuning Mode Is Not Available	149
	The Motor Stalls during Acceleration or Accel/Decel Time Is Too Long	149
	The Drive Frequency Reference Is Different than the Controller Frequency Reference Command	150
	The Motor Speed Is Not Stable When Using a PM Motor	150
	There Is Too Much Motor Oscillation and the Rotation Is Irregular	150
	Deceleration Takes Longer Than Expected When Dynamic Braking Is Enabled	150
	There Is Audible Noise from the Drive or Motor Cables when You Energize the Drive	151
	The Ground Fault Circuit Interrupter (GFCI) Trips During Run	151
	Motor Rotation Causes Unexpected Audible Noise from Connected Machinery	151
	Motor Rotation Causes Oscillation or Hunting	152
	PID Output Fault	152
	The Starting Torque Is Not Sufficient	152
	The Motor Rotates after the Drive Output Is Shut Off	152
	The Output Frequency Is Lower Than the Frequency Reference	152
	The Motor Is Making an Audible Noise	153
	The Motor Will Not Restart after a Loss of Power	153
3.	Parameter List	155
3.1	Section Safety	156
3.2	How to Read the Parameter List	157
	Icons and Terms that Identify Parameters and Control Methods	157
3.3	Parameter Groups	158
3.4	A: Initialization Parameters	160
	A1: Initialization	160
	A2: User Parameters	161
3.5	b: Application	164
	b1: Operation Mode Selection	164
	b2: DC Injection Braking and Short Circuit Braking	165
	b3: Speed Search	166
	b4: Timer Function	168

	b5: PID Control	169
	b6: Dwell Function	173
	b7: Droop Control	173
	b8: Energy Saving	173
	b9: Zero Servo	175
3.6	C: Tuning	176
	C1: Accel & Decel Time	176
	C2: S-Curve Characteristics	176
	C3: Slip Compensation	177
	C4: Torque Compensation	178
	C5: Auto Speed Regulator (ASR)	179
	C6: Duty & Carrier Frequency	181
3.7	d: Reference Settings	182
	d1: Frequency Reference	182
	d2: Reference Limits	183
	d3: Jump Frequency	184
	d4: Frequency Ref Up/Down & Hold	184
	d5: Torque Control	185
	d6: Field Weakening /Forcing	185
	d7: Offset Frequency	186
3.8	E: Motor Parameters	187
	E1: V/f Pattern for Motor 1	187
	E2: Motor Parameters	188
	E3: V/f Pattern for Motor 2	189
	E4: Motor 2 Parameters	189
	E5: PM Motor Settings	190
	E9: Motor Setting	191
3.9	F: Options	192
	F1: PG Option Setup (Encoder)	192
	F2: Analog Input Option	195
	F3: Digital Input Option	195
	F4: Analog Monitor Option	196
	F5: Digital Output Option	197
	F6: Communication Options	198
	F7: Communication Options	202
3.10	H: Terminal Functions	207
	H1: Digital Inputs	207
	H2: Multi-function Digital Output	216
	H3: Analog Inputs	227
	H4: Analog Outputs	230
	H5: Modbus Communication	231
	H6: Pulse Train Input/Output	232
	H7: Virtual MFIO Selection	233
3.11	L: Protection Functions	235
	L1: Motor Protection	235
	L2: Power Loss Ride Through	236
	L3: Stall Prevention	237
	L4: Speed Detection	239
	L5: Fault Restart	239
	L6: Torque Detection	240
	L7: Torque Limit	241
	L8: Drive Protection	242
	L9: Drive Protection 2	244
3.12	n: Special Adjustment	245

n1: Hunting Prevention	245
n2: Auto Freq Regulator (AFR)	245
n3: High Slip/Overexcite Braking	246
n4: Adv Open Loop Vector Tune	246
n5: Feed Forward Control	247
n6: Online Tuning	248
n7: EZ Drive	248
n8: PM Motor Control Tuning	249
3.13 o: Keypad-Related Settings	253
o1: Keypad Display Selection	253
o2: Keypad Operation	255
o3: Copy Keypad Function	257
o4: Maintenance Monitors	257
o5: Log Function	258
3.14 q: DriveWorksEZ Parameters	261
q1-01 to qx-xx: Reserved for DriveWorksEZ	261
3.15 r: DWEZ Connection 1-20	262
r1-01 to r1-40: DriveWorksEZ Connection Parameters 1 to 20 (Upper / Lower)	262
3.16 T: Motor Tuning	263
T0: Tuning Mode Selection	263
T1: InductionMotor Auto-Tuning	263
T2: PM Motor Auto-Tuning	264
T3: ASR and Inertia Tuning	265
T4: EZ Tuning	266
3.17 U: Monitors	267
U1: Operation Status Monitors	267
U2: Fault Trace	269
U3: Fault History	272
U4: Maintenance Monitors	273
U5: PID Monitors	278
U6: Operation Status Monitors	279
U8: DriveWorksEZ Monitors	281
Ud: Control Monitors	284
3.18 Parameters that Change from the Default Settings with A1-02 [Control Method Selection]	285
3.19 Parameters that Change from the Default Settings with E3-01 [Motor 2 Control Mode Selection]	291
3.20 Parameters Changed by E1-03 [V/f Pattern Selection]	292
3.21 Defaults by Drive Model and Duty Rating ND/HD	295
Three-Phase 200 V Class	295
Three-Phase 400 V Class	303
6-Phase/12-Pulse 400 V Class	316
4. Mechanical Installation	323
4.1 Section Safety	324
4.2 Removing/Reattaching Covers	326
Removing/Reattaching the Cover Using Procedure A	326
Removing/Reattaching the Cover Using Procedure B	327
4.3 Remove and Reattach the Keypad	331
Remove the Keypad	331
Reattach the Keypad	331

4.4	Change the Drive Enclosure Type	332
5.	Electrical Installation	333
5.1	Section Safety	334
5.2	Electrical Installation	337
	Standard Connection Diagram	337
5.3	Main Circuit Wiring	342
	Motor and Main Circuit Connections	342
	Main Circuit Terminal Functions	343
5.4	Control Circuit Wiring	345
	Control Circuit Connection Diagram	345
	Control Circuit Terminal Block Functions	346
5.5	Control I/O Connections	352
	Set Sinking Mode/Sourcing Mode	352
	Pulse Train Output	352
	Set Input Signals for MFAI Terminals A1 to A3	353
	Set MFAI Terminal A3 to PTC Input	354
	Set Output Signals for MFAO Terminals FM, AM	354
	Switch ON Termination Resistor for MEMOBUS/Modbus Communications	355
5.6	Connect the Drive to a PC	356
6.	Startup Procedure and Test Run	357
6.1	Section Safety	358
6.2	Keypad Components and Functions	359
	LCD Display	361
	Indicator LEDs and Drive Status	362
	Keypad Mode and Menu Displays	363
6.3	LED Status Ring	365
6.4	Start-up Procedures	367
	Flowchart A: Connect and Run the Motor with Minimum Setting Changes	367
	Sub-Chart A-1: Induction Motor Auto-Tuning and Test Run Procedure	369
	Sub-Chart A-2: PM Motor Auto-Tuning and Test Run Procedure	370
	Subchart A-3: EZ Open Loop Vector Control Test Run Procedure	371
6.5	Items to Check before Starting Up the Drive	373
	Check before Energizing the Drive	373
	Check after You Energize the Drive	373
	Make the Initial Settings	374
6.6	Keypad Operation	375
	Home Screen Display Selection	375
	Show the Monitor	376
	Set Custom Monitors	377
	Show Custom Monitors	378
	Set the Monitors to Show as a Bar Graph	379
	Show Monitors as Bar Graphs	380
	Set the Monitors to Show as Analog Gauges	381
	Display Monitors as an Analog Gauge	382
	Set Monitoring Items to be Shown as a Trend Plot	382
	Show Monitor Items as a Trend Plot	386
	Change Parameter Setting Values	387
	Examine User Custom Parameters	388
	Save a Backup of Parameters	390
	Write Backed-up Parameters to the Drive	391

Verify Keypad Parameters and Drive Parameters	392
Delete Parameters Backed Up to the Keypad	393
Check Modified Parameters	394
Restore Modified Parameters to Defaults	396
Show Fault History	397
Auto-Tuning the Drive	398
Set the Keypad Language Display	400
Set the Date and Time	401
Set Parameters Using the Setup Wizard	403
Disable the Initial Setup Screen	405
Start Data Logging	406
Configuring the Data Log Content	407
Set Backlight to Automatically Turn OFF	414
Show Information about the Drive	415
Show Information about the Communication Option	416
Write Automatically Backed-up Parameters to the Drive	417
6.7 Automatic Parameter Settings Optimized for Specific Applications (Application Presets)	419
6.8 Auto-Tuning	421
Auto-Tuning for Induction Motors	421
Auto-Tuning for PM Motors	422
Auto-Tuning in EZ Open Loop Vector Control Method	424
Control Tuning	425
Precautions before Auto-Tuning	427
6.9 Test Run	430
No-Load Test Run	430
Do a No-Load Test Run	430
Actual-Load Test Run	430
Do an Actual-Load Test Run	431
6.10 Fine Tuning during Test Runs (Adjust the Control Function)	432
V/f Control and Closed Loop V/f Control	432
Open Loop Vector Control Method	433
Closed Loop Vector Control Method	435
Advanced Open Loop Vector Control Method	435
Open Loop Vector Control for PM Motors	437
Advanced Open Loop Vector Control Method for PM Motors	438
Closed Loop Vector Control Method for PM	438
EZ Open Loop Vector Control Method	439
6.11 Test Run Checklist	440
7. Specifications	443
7.1 Section Safety	444
7.2 Drive Duty Modes	445
7.3 Model-Specific Specifications (200 V Class)	446
7.4 Model-Specific Specifications (400 V Class)	448
7.5 Model-Specific Specifications (6-Phase/12-Pulse 400 V Class)	452
7.6 Drive Specifications	453
7.7 Drive Watt Loss	457
200 V Class	457
400 V Class	458
6-Phase/12-Pulse 400 V Class	459
7.8 Drive Derating	461

Carrier Frequency Settings and Rated Current Values	461
Derating Depending on Ambient Temperature	467
Altitude Derating	468
7.9 Drive Exterior and Mounting Dimensions	469
Drive Models and Exterior and Mounting Dimensions	469
IP00/IP20/UL Open Type	470
IP20/UL Type1	480
7.10 Knock-Out Hole Dimensions (IP20/UL Type 1)	488
Models and Dimensions of Knock-Out Hole	488
7.11 Peripheral Devices and Options	493
Index	494
Revision History	500

Preface and General Precautions

This chapter gives information about important safety precautions for the use of this product. Failure to obey these precautions can cause serious injury or death, or damage to the product or related devices and systems. Yaskawa must not be held responsible for any injury or equipment damage as a result of the failure to observe these precautions and instructions.

i.1	Receiving	12
i.2	Using the Product Safely	14
i.3	Warranty Information	18

i.1 Receiving










These instructions contain the information necessary to use the product correctly. Read and understand the safety information and precautions before you start to use the product.

◆ Glossary

Phrase	Definition
AOLV	Advanced Open Loop Vector Control
AOLV/PM	Advanced Open Loop Vector Control for Permanent Magnet Motors
CLV	Closed Loop Vector Control
CL-V/f	Closed Loop V/f Control
CLV/PM	Closed Loop Vector Control for Permanent Magnet Motors
Drive	YASKAWA AC Drive GA800
EDM	External Device Monitor
EZOLV	EZ Open Loop Vector Control
HD	Heavy Duty
IPM motor	Interior Permanent Magnet Motor
MFAI	Multi-Function Analog Input
MFAO	Multi-Function Analog Output
MFDI	Multi-Function Digital Input
MFDO	Multi-Function Digital Output
ND	Normal Duty
OLV	Open Loop Vector Control
OLV/PM	Open Loop Vector Control for Permanent Magnet Motors
PM motor	Permanent Magnet Synchronous Motor (generic name for IPM motors and SPM motors)
SIL	Safety Integrity Level
SPM motor	Surface Permanent Magnet Motor
V/f	V/f Control

■ Icons to Identify Screw Shapes

Table i.1 Icons to Identify Screw Shapes

Icon	Screw Shape	Icon	Screw Shape
	Phillips/slot combo (+/-)		Hex self-locking nut
	Slotted (-)		Hex socket cap (WAF: 5 mm)
	Minus (-)		Hex socket cap (WAF: 6 mm)
	Hex bolt (cross-slotted)		Hex socket cap (WAF: 8 mm)
	Hex bolt (slotted)		

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- CC-Link is a registered trademark of CC-Link Partner Association.
- DeviceNet is a registered trademark of Open DeviceNet Vendor Association, Inc. (ODVA).
- EtherCAT is a registered trademark of Beckhoff Automation GmbH.

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- PROFIBUS-DP and PROFINET are registered trademarks of PROFIBUS International.
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i.2 Using the Product Safely

◆ Explanation of Signal Words

⚠ WARNING

Read and understand this manual before you install, operate, or do maintenance on the drive. Install the drive as specified by this manual and local codes.

The symbols in this section identify safety messages in this manual. If you do not obey these safety messages, the hazards can cause serious injury, death, or damage to the products and related equipment and systems.

These identifier words categorize and emphasize important safety precautions in these instructions.

⚠ DANGER

This signal word identifies a hazard that will cause serious injury or death if you do not prevent it.

⚠ WARNING

This signal word identifies a hazard that can cause death or serious injuries if you do not prevent it.

⚠ CAUTION

This signal word identifies a hazard that can cause minor or moderate injuries if you do not prevent it.

NOTICE

This signal word identifies a property damage message that is not related to personal injury.

◆ Section Safety

General Precautions

- Some figures in the instructions include options and drives without covers or safety shields to more clearly show the inside of the drive. Replace covers and shields before operation. Use options and drives only as specified by the instructions.
- The figures in this manual are examples only. All figures do not apply to all products included in this manual.
- Yaskawa can change the products, specifications, and content of the instructions without notice to make the product and/or the instructions better.
- If you damage or lose these instructions, contact a Yaskawa representative or the nearest Yaskawa sales office on the rear cover of the manual, and tell them the document number on the front cover to order new copies.

⚠ DANGER

Do not ignore the safety messages in this manual.

If you ignore the safety messages in this manual, it will cause serious injury or death. The manufacturer is not responsible for injuries or damage to equipment.

Electrical Shock Hazard

Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, remove the covers before measuring for dangerous voltages to make sure that the drive is safe.

If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.

⚠ WARNING**Crush Hazard**

Test the system to make sure that the drive operates safely after you wire the drive and set parameters.

If you do not test the system, it can cause damage to equipment or serious injury or death.

Sudden Movement Hazard

Before you do a test run, make sure that the setting values for virtual input and output function parameters are correct. Virtual input and output functions can have different default settings and operation than wired input and output functions.

Incorrect function settings can cause serious injury or death.

Remove all personnel and objects from the area around the drive, motor, and machine and attach covers, couplings, shaft keys, and machine loads before you energize the drive.

If personnel are too close or if there are missing parts, it can cause serious injury or death.

Examine the I/O signals and internal sequence with the engineer who made the DriveWorksEZ program before you operate the drive.

If you do not know how the drive will operate, it can cause serious injury or death. When you use DriveWorksEZ to make custom programming, the drive I/O terminal functions change from factory settings and the drive will not operate as written in this manual.

Electrical Shock Hazard

Do not modify the drive body or drive circuitry.

Modifications to drive body and circuitry can cause serious injury or death, will cause damage to the drive, and will void the warranty. Yaskawa is not responsible for modifications of the product made by the user.

Only let approved personnel install, wire, maintain, examine, replace parts, and repair the drive.

If personnel are not approved, it can cause serious injury or death.

Do not remove covers or touch circuit boards while the drive is energized.

If you touch the internal components of an energized drive, it can cause serious injury or death.

After the drive blows a fuse or trips a GFCI, do not immediately energize the drive or operate peripheral devices. Wait for the time specified on the warning label at a minimum and make sure that all indicators are OFF. Then check the wiring and peripheral device ratings to find the cause of the problem. If you do not know the cause of the problem, contact Yaskawa before you energize the drive or peripheral devices.

If you do not fix the problem before you operate the drive or peripheral devices, it can cause serious injury or death.

Damage to Equipment

Do not apply incorrect voltage to the main circuit of the drive. Operate the drive in the specified range of the input voltage on the drive nameplate.

Voltages that are higher than the permitted nameplate tolerance can cause damage to the drive.

Fire Hazard

Install sufficient branch circuit short circuit protection as specified by applicable codes and this manual. The drive is suitable for circuits that supply not more than 100,000 RMS symmetrical amperes, 240 Vac maximum (200 V Class), 480 Vac maximum (400 V Class).

Incorrect branch circuit short circuit protection can cause serious injury or death.

⚠ CAUTION**Crush Hazard**

Tighten terminal cover screws and hold the case safely when you move the drive.

If the drive or covers fall, it can cause moderate injury.

NOTICE

Use an inverter-duty motor or vector-duty motor with reinforced insulation and windings applicable for use with an AC drive.

If the motor does not have the correct insulation, it can cause a short circuit or ground fault from insulation deterioration.

Damage to Equipment

When you touch the drive and circuit boards, make sure that you observe correct electrostatic discharge (ESD) procedures.

If you do not follow procedures, it can cause ESD damage to the drive circuitry.

Do not do a withstand voltage test or use a megohmmeter or megger insulation tester on the drive.

These tests can cause damage to the drive.

Do not operate a drive or connected equipment that has damaged or missing parts.

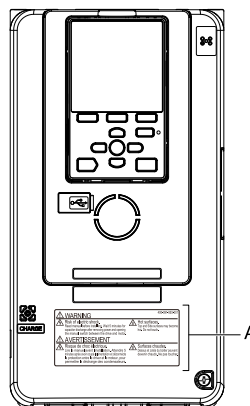
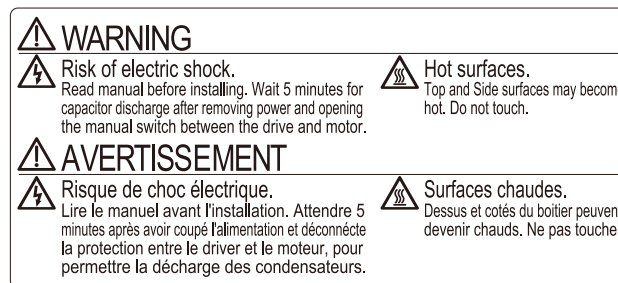
You can cause damage to the drive and connected equipment.

Do not use steam or other disinfectants to fumigate wood for packaging the drive. Use alternative methods, for example heat treatment, before you package the components.

Gas from wood packaging fumigated with halogen disinfectants, for example fluorine, chlorine, bromine, iodine or DOP gas (phthalic acid ester), can cause damage to the drive.

◆ **Warning Label Content and Location**

The drive warning label is in the location shown in [Figure i.1](#). Use the drive as specified by this information.



A - Warning label

Figure i.1 Warning Label Content and Location

◆ **Cybersecurity**

This product is designed to connect and communicate information and data through a network interface. It is the sole responsibility of the customer to provide and continuously guarantee a secure connection between the product and the

customer's network or if applicable, any other network. The customer must establish and maintain the appropriate measures (such as, but not limited to, the installation of firewalls, the application of authentication measures, the encryption of data, the installation of antivirus programs, etc.) to protect the product, the network, its system and the interface against all types of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. Yaskawa and its affiliates are not responsible for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

i.3 Warranty Information

◆ Exclusion of Liability

- This product is not designed and manufactured for use in life-support machines or systems.
- Contact a Yaskawa representative or your Yaskawa sales representative if you are considering the application of this product for special purposes, such as machines or systems used for passenger cars, medicine, airplanes and aerospace, nuclear power, electric power, or undersea relaying.

⚠ WARNING

Injury to Personnel

When you use this product in applications where its failure could cause the loss of human life, a serious accident, or physical injury, you must install applicable safety devices.

If you do not correctly install safety devices, it can cause serious injury or death.

Periodic Inspection and Maintenance

This chapter gives information about how to examine and maintain drives in use, how to replace cooling fans and other parts, and how to store drives.

1.1	Section Safety	20
1.2	Inspection.....	22
1.3	Maintenance	25
1.4	Replace Cooling Fans and Circulation Fans	28
1.5	Replace the Drive	70
1.6	Replace the Keypad Battery	76
1.7	Storage Guidelines	78

1.1 Section Safety

DANGER

Electrical Shock Hazard

Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, remove the covers before measuring for dangerous voltages to make sure that the drive is safe.

If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.

Disconnect all power to the drive and wait for the time specified on the warning label before you remove covers. Check the drive for dangerous voltages before servicing or repair work.

If you do work on the drive when it is energized and there is no cover over the electronic circuits, it will cause serious injury or death from electrical shock. The drive has internal capacitors that stay charged after you de-energize the drive.

WARNING

Electrical Shock Hazard

The motor will run after you de-energize the drive. PM motors can generate induced voltage to the terminal of the motor after you de-energize the drive.

If you touch a motor that is moving or energized, it can cause serious injury or death.

Do not operate the drive when covers are missing. Replace covers and shields before you operate the drive. Use the drive only as specified by the instructions.

Some figures in this section include drives without covers or safety shields to more clearly show the inside of the drive. If covers or safety shields are missing from the drive, it can cause serious injury or death.

Always ground the motor-side grounding terminal.

If you do not ground the equipment correctly, it can cause serious injury or death if you touch the motor case.

Only let approved personnel install, wire, maintain, examine, replace parts, and repair the drive.

If personnel are not approved, it can cause serious injury or death.

Do not wear loose clothing or jewelry when you do work on the drive. Tighten loose clothing and remove all metal objects, for example watches or rings.

Loose clothing can catch on the drive and jewelry can conduct electricity and cause serious injury or death.

Fire Hazard

Tighten all terminal screws to the correct tightening torque.

Connections that are too loose or too tight can cause incorrect operation and damage to the drive. Incorrect connections can also cause death or serious injury from fire.

Damage to Equipment

Do not apply incorrect voltage to the main circuit of the drive. Operate the drive in the specified range of the input voltage on the drive nameplate.

Voltages that are higher than the permitted nameplate tolerance can cause damage to the drive.

Fire Hazard

Do not put flammable or combustible materials on top of the drive and do not install the drive near flammable or combustible materials. Attach the drive to metal or other noncombustible material.

Flammable and combustible materials can start a fire and cause serious injury or death.

⚠ WARNING**Electrical Shock Hazard**

Do not modify the drive body or drive circuitry.

Modifications to drive body and circuitry can cause serious injury or death, will cause damage to the drive, and will void the warranty. Yaskawa is not responsible for modifications of the product made by the user.

Sudden Movement Hazard

Make sure that you align the phase order for the drive and motor when you connect the motor to drive output terminals U/T1, V/T2, and W/T3.

If the phase order is incorrect, it can cause the motor to run in reverse. If the motor accidentally runs in reverse, it can cause serious injury or death.

⚠ CAUTION**Burn Hazard**

Do not touch a hot drive heatsink. De-energize the drive, wait for a minimum of 15 minutes, then make sure that the heatsink is cool before you replace the cooling fans.

If you touch a hot drive heatsink, it can burn you.

NOTICE**Damage to Equipment**

When you touch the drive and circuit boards, make sure that you observe correct electrostatic discharge (ESD) procedures.

If you do not follow procedures, it can cause ESD damage to the drive circuitry.

Use the instructions in this manual to replace the cooling fans. When you do maintenance on the fans, replace all the fans to increase product life.

If you install the fans incorrectly, it can cause damage to the drive.

Make sure that all connections are correct after you install the drive and connect peripheral devices.

Incorrect connections can cause damage to the drive.

Do not energize and de-energize the drive more frequently than one time each 30 minutes.

If you frequently energize and de-energize the drive, it can cause drive failure.

Do not operate a drive or connected equipment that has damaged or missing parts.

You can cause damage to the drive and connected equipment.

Note:

Do not use unshielded cable for control wiring. Use shielded, twisted-pair wires and ground the shield to the ground terminal of the drive. Incorrect wiring can cause electrical interference and unsatisfactory system performance.

1.2 Inspection

Power electronics have limited life and can show changes in performance and deterioration of performance after years of use in usual conditions. To help prevent these problems, it is important to do preventive maintenance and regular inspection, and replace parts on the drive.

Drives contain different types of power electronics, for example power transistors, semiconductors, capacitors, resistors, fans, and relays. The electronics in the drive are necessary for correct motor control.

Follow the inspection lists in this chapter as a part of a regular maintenance program.

Note:

Examine the drive one time each year at a minimum.

The operating conditions, environmental conditions, and use conditions will have an effect on the examination frequency for connected equipment.

Examine the drive more frequently if you use the drive in bad conditions or in these conditions:

- High ambient temperatures
- Frequent starting and stopping
- Changes in the AC power supply or load
- Too much vibration or shock loading
- Dust, metal dust, salt, sulfuric acid, or chlorine atmospheres
- Unsatisfactory storage conditions.

◆ Recommended Daily Inspection

Table 1.1 gives information about the recommended daily inspection for Yaskawa drives. Examine the items in Table 1.1 each day to make sure that the components do not become unserviceable or fail. Make a copy of this checklist and put a check mark in the “Checked” column after each inspection.

Table 1.1 Daily Inspection Checklist

Inspection Area	Inspection Points	Corrective Action	Checked
Motor	Examine for unusual oscillation or noise coming from the motor.	<ul style="list-style-type: none"> • Check the load coupling. • Measure motor vibration. • Tighten all loose components. 	
Cooling System	Examine for unusual heat from the drive or motor and visible discoloration.	<ul style="list-style-type: none"> • Check for a load that is too heavy. • Tighten loose screws. • Check for a dirty heatsink or motor. • Measure the ambient temperature. 	
	Examine the cooling fans, circulation fans, and circuit board cooling fans.	<ul style="list-style-type: none"> • Check for a clogged or dirty fan. • Use the performance life monitor to check for correct fan operation. 	
Surrounding Environment	Make sure that the installation environment is applicable.	Remove the source of contamination or correct unsatisfactory environment.	
Load	Make sure that the drive output current is not more than the motor or drive rating for an extended period of time.	<ul style="list-style-type: none"> • Check for a load that is too heavy. • Check the correct motor parameter settings. 	
Power Supply Voltage	Examine main power supply and control voltages.	<ul style="list-style-type: none"> • Correct the voltage or power supply to agree with nameplate specifications. • Verify all main circuit phases. 	

◆ Recommended Periodic Inspection

Table 1.2 to Table 1.6 give information about the recommended periodic inspections for Yaskawa drives. Examine the drive one time each year at a minimum. The operating conditions, environmental conditions, and use conditions will have an effect on the examination frequency for connected equipment. You must use your experience with the application to select the correct inspection frequency for each drive installation. Periodic inspections will help to prevent performance deterioration and product failure. Make a copy of this checklist and put a check mark in the “Checked” column after each inspection.

DANGER! Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, remove the covers before measuring for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.

Table 1.2 Main Circuit Periodic Inspection Checklist

Inspection Area	Inspection Points	Corrective Action	Checked
General	<ul style="list-style-type: none"> Examine equipment for discoloration from too much heat or deterioration. Examine for damaged parts. 	<ul style="list-style-type: none"> Replace damaged components as necessary. The drive does not have many serviceable parts and it could be necessary to replace the drive. 	
	Examine for dirt, unwanted particles, or dust on components.	<ul style="list-style-type: none"> Examine enclosure door seal. Use a vacuum cleaner to remove unwanted particles and dust without touching the components. If you cannot remove unwanted particles and dust with a vacuum cleaner, replace the components. 	
Conductors and Wiring	<ul style="list-style-type: none"> Examine wiring and connections for discoloration or damage. Examine wiring and connections for discoloration from too much heat. Examine wire insulation and shielding for discoloration and wear. 	Repair or replace damaged wiring.	
Terminal Block	Examine terminals for stripped, damaged, or loose connections.	<ul style="list-style-type: none"> Tighten loose screws. Replace damaged screws or terminals. <p>Note: On drive models, 2056, 2070, 4031, and 4038, you cannot replace the hex screws.</p>	
Electromagnetic Contactors and Relays	<ul style="list-style-type: none"> Examine contactors and relays for too much noise during operation. Examine coils for signs of too much heat, such as melted or broken insulation. 	<ul style="list-style-type: none"> Check coil voltage for overvoltage or undervoltage conditions. Replace broken relays, contactors, or circuit boards that you can remove. 	
Dynamic Braking Option	Examine the insulation for discoloration from too much heat.	If there is discoloration in the option, check to make sure that the wiring is not damaged. A small quantity of discoloration is not a problem.	
Electrolytic Capacitor	<ul style="list-style-type: none"> Examine for leaks, discoloration, or cracks. Examine if the cap has come off, if there is swelling, or if there are leaks from broken sides. 	The drive does not have many serviceable parts and it could be necessary to replace the drive.	
Diodes, IGBT (Power Transistor)	Examine for dust or other unwanted material collected on the surface.	Use a vacuum cleaner to remove unwanted particles and dust without touching the components.	

Table 1.3 Motor Periodic Inspection Checklist

Inspection Area	Inspection Points	Corrective Action	Checked
Operation Check	Check for increased vibration or unusual noise.	Stop the motor and contact approved maintenance personnel as necessary.	

Table 1.4 Control Circuit Periodic Inspection Checklist

Inspection Area	Inspection Points	Corrective Action	Checked
General	<ul style="list-style-type: none"> Examine terminals for stripped, damaged, or loose connections. Make sure that all terminals have been correctly tightened. 	<ul style="list-style-type: none"> Tighten loose screws. Replace damaged screws or terminals. If terminals are integral to a circuit board, it could be necessary to replace the control board or the drive. 	
Circuit Boards	<ul style="list-style-type: none"> Check for odor, discoloration, or rust. Make sure that all connections are correctly fastened. Make sure that the surface of the circuit board does not have dust or oil mist. 	<ul style="list-style-type: none"> Tighten loose connections. Use a vacuum cleaner to remove unwanted particles and dust without touching the components. If you cannot remove unwanted particles and dust with a vacuum cleaner, replace the components. Do not use solvents to clean the board. The drive does not have many serviceable parts and it could be necessary to replace the drive. 	

Table 1.5 Cooling System Periodic Inspection Checklist

Inspection Area	Inspection Points	Corrective Action	Checked
Cooling fan	<ul style="list-style-type: none"> Check for unusual oscillation or unusual noise. Check for damaged or missing fan blades. 	Clean or replace the fans as necessary.	
Heatsink	<ul style="list-style-type: none"> Examine for dust or other unwanted material collected on the surface. Examine for dirt. 	Use a vacuum cleaner to remove unwanted particles and dust without touching the components.	
Air Duct	Examine air intake, exhaust openings and make sure that there are no unwanted materials on the surface.	Clear blockages and clean air duct as necessary.	

Table 1.6 Keypad Periodic Inspection Checklist

Inspection Area	Inspection Points	Corrective Action	Checked
General	<ul style="list-style-type: none"> • Make sure that the keypad shows the data correctly. • Examine for dust or other unwanted material that collected on components in the area. • Make sure that the expected lifespan of the battery has not passed. 	<ul style="list-style-type: none"> • If you have problems with the display or the keys, contact Yaskawa or your nearest sales representative. • Clean the keypad. • Replace the Battery. 	

1.3 Maintenance

The drive Maintenance Monitors keep track of component wear and tell the user when the end of the estimated performance life is approaching. The Maintenance Monitors prevent the need to shut down the full system for unexpected problems. Users can set alarm notifications for the maintenance periods for these drive components:

- Cooling fan
- Electrolytic Capacitor
- Soft charge bypass relay
- IGBT

Contact Yaskawa or your nearest sales representative for more information about part replacement.

◆ Replaceable Parts

DANGER! Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, remove the covers before measuring for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.

You can replace these parts of the drive:

- Control circuit terminal board
- Cooling fan, circulation fan
- Keypad

Note:

Make sure that you use a keypad that has a flash number of 1004 or later. Keypads that have a flash number of 1003 or earlier will not show characters correctly.

If there is a failure in the main circuit, replace the drive.

If the drive is in the warranty period, contact Yaskawa or your nearest sales representative before you replace parts. Yaskawa reserves the right to replace or repair the drive as specified by the Yaskawa warranty policy.

◆ Part Replacement Guidelines

Table 1.7 shows the standard replacement period for replacement parts. When you replace these parts, make sure that you use Yaskawa replacement parts for the applicable model and design revision number of your drive.

Table 1.7 Standard Replacement Period

Parts	Standard Replacement Period
Cooling Fan	10 years
Electrolytic Capacitor ^{*1}	10 years

*1 If there is damage to parts that you cannot repair or replace, replace the drive.

Note:

These conditions are provided for the purpose of replacing parts to maintain performance. Unsatisfactory conditions or heavy use will make it necessary for you to replace some parts more frequently than other parts. Performance life estimate is based on the yearly average of these use conditions.

- Ambient air temperature
 - IP00/UL Open Type: 40 °C (104 °F)
 - IP20/UL Open Type: 40 °C (104 °F)
 - IP20/UL Type 1: 30 °C (86 °F)
 - IP55/UL Type 12 Heatsink External Mounting; front side: 40 °C (104 °F)
 - IP55/UL Type 12 Heatsink External Mounting; back side: 30 °C (86 °F)
- Load factor
 - 80%
- Operating rate
 - 24 hours a day

◆ Monitors that Display the Lifespan of Drive Components

The drive keypad shows percentage values for the replacement parts to help you know when you must replace those components. Use the monitors in [Table 1.8](#) to check replacement periods. When the monitor value is 100%, the component is at the end of its useful life and there is an increased risk of drive malfunction. Yaskawa recommends that you check the maintenance period regularly to make sure that you get the maximum performance life of the drive.

Table 1.8 Performance Life Monitors

Monitor No.	Parts	Description
U4-03	Cooling fan	Shows the total operation time of fans as 0 to 99999 hours. After this value is 99999, the drive automatically resets it to 0.
U4-04		Shows the total fan operation time as a percentage of the specified maintenance period.
U4-05	Electrolytic Capacitor	Shows the total capacitor usage time as a percentage of the specified maintenance period.
U4-06	Soft charge bypass relay	Shows the number of times the drive is energized as a percentage of the performance life of the inrush circuit.
U4-07	IGBT	Shows the percentage of the maintenance period for the IGBTs.

◆ Alarm Outputs for Maintenance Monitors

You can use *H2-xx* [*MFDO Function Selection*] to send a message that tells you when a specified component is near the end of its performance life estimate. Set the applicable value to *H2-xx* as shown in [Table 1.9](#) for your component. When the specified component is near the end of its performance life estimate, the MFDO terminals set for *H2-xx* = *2F* [*Maintenance Notification*] will activate, and the keypad will show an alarm that identifies the component to replace.

Table 1.9 Maintenance Period Alarms

Display	Alarm Name	Cause	Possible Solutions	MFDO (Setting Value in H2-xx)
LT-1	Cooling Fan Maintenance Time	The cooling fan is at 90% of its expected performance life.	Replace the cooling fan, then set <i>o4-03</i> = 0 [<i>Fan Operation Time Setting = 0 h</i>] to reset the cooling fan operation time.	2F
LT-2	Capacitor Maintenance Time	The capacitors for the main circuit and control circuit are at 90% of expected performance life.	Replace the board or the drive. Contact Yaskawa or your nearest sales representative to replace the board.	
LT-3	SoftChargeBypassRelay MainteTime	The soft charge bypass relay is at 90% of its performance life estimate.	Replace the board or the drive. Contact Yaskawa or your nearest sales representative to replace the board.	
LT-4	IGBT Maintenance Time (50%)	The IGBT is at 50% of its expected performance life.	Check the load, carrier frequency, and output frequency.	
TrPC	IGBT Maintenance Time (90%)	The IGBT is at 90% of its expected performance life.	Replace the IGBT or the drive.	10

◆ Related Parameters

Replace the component, then set *o4-03*, *o4-05*, *o4-07*, and *o4-09* [*Maintenance Setting*] = 0 to reset the Maintenance Monitor. If these parameters are not reset after the corresponding parts have been replaced, the Maintenance Monitor function will continue to count down the performance life from the value that was reached with the old part. If the Maintenance Monitor is not reset, the drive will not have the correct value of the performance life for the new component.

Note:

The maintenance period changes for different operating environments.

Table 1.10 Maintenance Setting Parameters

No.	Name	Function
o4-03	Fan Operation Time Setting	Sets the value from which to start the cumulative drive cooling fan operation time in 10-hour units. Note: When <i>o4-03</i> = 30, the drive will count the operation time for the cooling fan from 300 hours and <i>U4-03</i> [<i>Cooling Fan Ope Time</i>] will show 300 h.
o4-05	Capacitor Maintenance Setting	Sets the value from which to start the count for the main circuit capacitor maintenance period as a percentage.

No.	Name	Function
o4-07	Softcharge Relay Maintenance Set	Sets as a percentage the value from which to start the count for the soft charge bypass relay maintenance time.
o4-09	IGBT Maintenance Setting	Sets the value from which to start the count for the IGBT maintenance period as a percentage.

1.4 Replace Cooling Fans and Circulation Fans

CAUTION! *Injury to Personnel. Some fan units are not easily accessible from a standing position. Make sure that you can safely and comfortably remove and replace the fan. If you try to remove a fan that you cannot easily access, the fan unit can fall and cause minor to moderate injury.*

NOTICE: *Use the instructions in this manual to replace the cooling fans. When you do maintenance on the fans, replace all the fans to increase product life. If you install the fans incorrectly, it can cause damage to the drive.*

◆ Cooling Fans and Circulation Fans by Drive Model

Table 1.11 Cooling Fans and Circulation Fans (Three-Phase 200 V Class)

Model	Cooling Fan	Circulation Fan	Procedure	Ref.
2004 - 2012	-	-	-	-
2018, 2021	1	-	Procedure A	28
2030, 2042	2	-	Procedure B	30
2056 - 2082	2	-	Procedure C	33
2110 - 2211	2	-	Procedure D	35
2257 - 2313	2	-	Procedure E	37
2360, 2415	3	1	Procedure F	40

Table 1.12 Cooling Fans and Circulation Fans (Three-Phase 400 V Class)

Model	Cooling Fan	Circulation Fan	Circuit Board Cooling Fan	Procedure	Ref.
4002 - 4005	-	-	-	-	-
4007 - 4012	1	-	-	Procedure A	28
4018, 4023	2	-	-	Procedure B	30
4031 - 4060	2	-	-	Procedure C	33
4075 - 4168 T103 - T168	2	-	-	Procedure D	35
4208 - 4302 T208 - T302	2	-	-	Procedure E	37
4371 T371	2	1	-	Procedure F	40
4414 T414	3	1	-	Procedure F	40
4477 - 4605 T477 - T605	2	1	2	Procedure G	46
4720 T720	3	1	2	Procedure H	54
4810 - 4H12	4	2	4	Procedure I	62

◆ Fan Replacement (Procedure A)

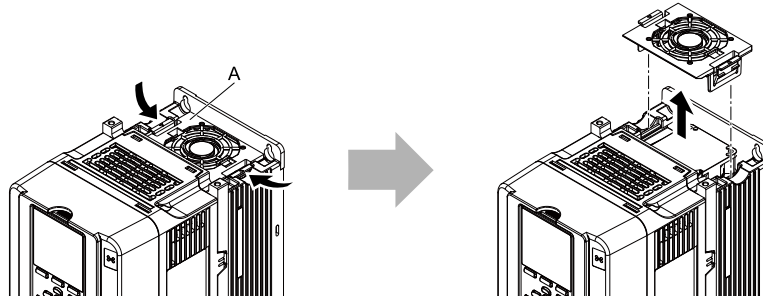
DANGER! *Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, remove the covers before measuring for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.*

CAUTION! *Burn Hazard. Do not touch a hot drive heatsink. De-energize the drive, wait for a minimum of 15 minutes, then make sure that the heatsink is cool before you replace the cooling fans. If you touch a hot drive heatsink, it can burn you.*

NOTICE: *Use the instructions in this manual to replace the cooling fans. When you do maintenance on the fans, replace all the fans to increase product life. If you install the fans incorrectly, it can cause damage to the drive.*

■ Fan Removal

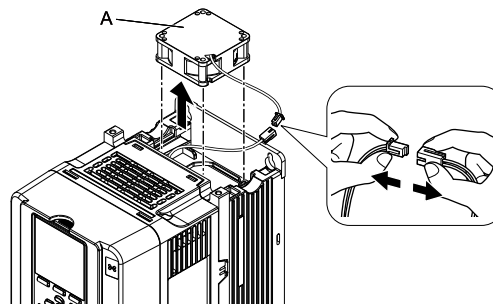
1. To remove the fan finger guard from the drive, push the hooks on the left and right sides of it and pull up.



A - Fan finger guard

Figure 1.1 Remove the Fan Finger Guard

2. Pull the cooling fan straight up from the drive. Disconnect the relay connector and remove the fan from the drive.



A - Cooling fan

Figure 1.2 Remove the Cooling Fan

■ Fan Installation

Reverse the removal procedure for fan installation.

1. Connect the relay connector between the drive and cooling fan.

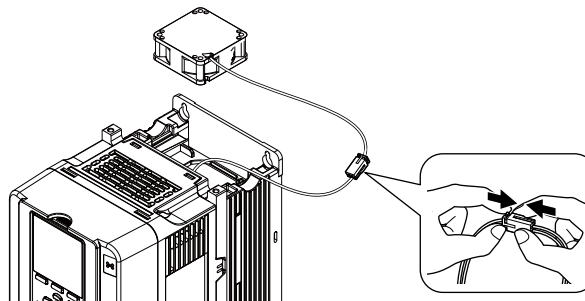


Figure 1.3 Connect the Relay Connector

- Align the notch on the fan with the pin on the drive and install the cooling fan in the drive.

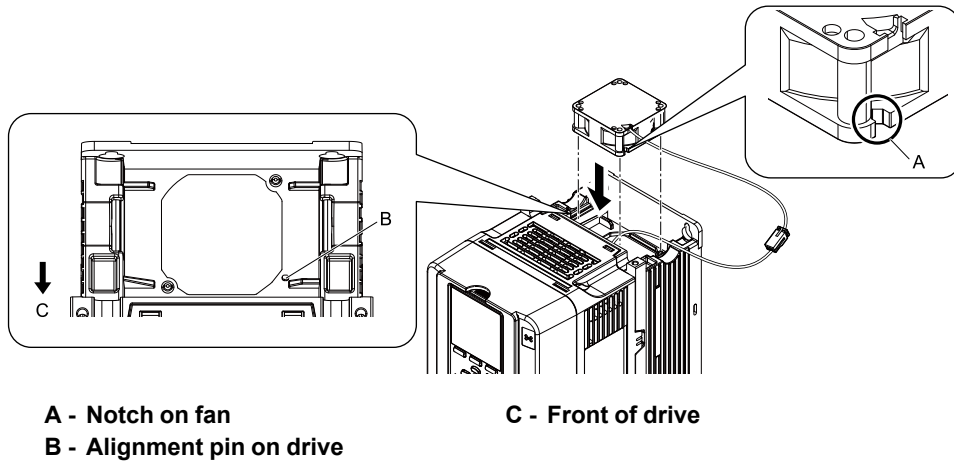


Figure 1.4 Install the Cooling Fan

- Put the cable and connector in the recess of the drive.

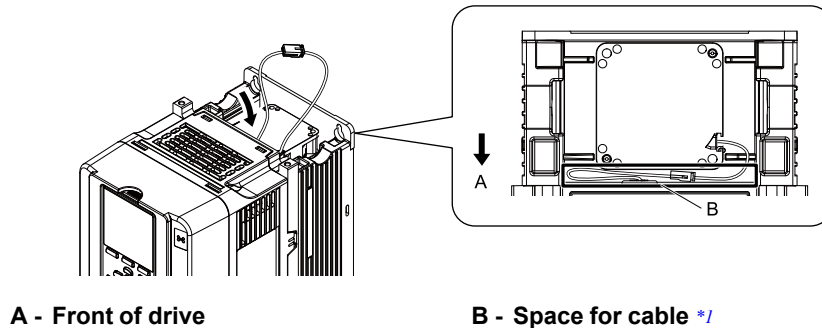


Figure 1.5 Put the Cable and Connector in the Drive Recess

*1 Make sure that the cable and connector are in the correct space.

- Insert the fan finger guard straight until the hooks click into place.

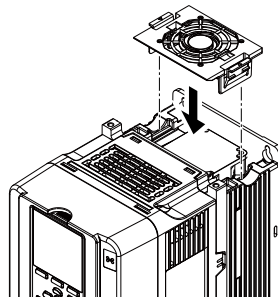


Figure 1.6 Reattach the Fan Finger Guard

- Energize the drive and set $\alpha 4-03 = 0$ [Fan Operation Time Setting = 0 h] to reset the fan operation time.

◆ Fan Replacement (Procedure B)

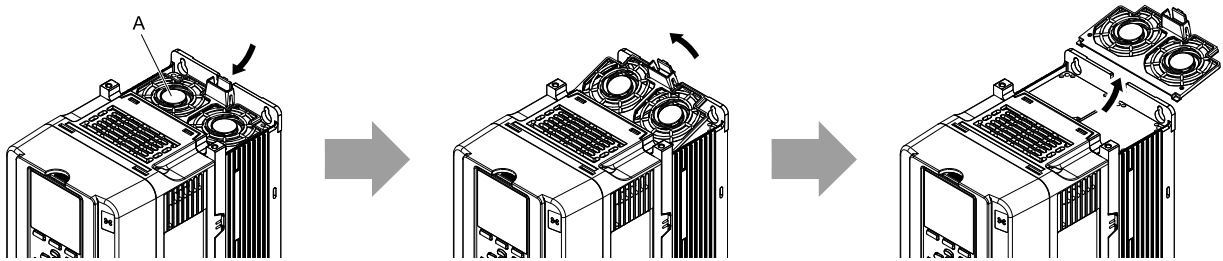
DANGER! Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, remove the covers before measuring for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.

CAUTION! Burn Hazard. Do not touch a hot drive heatsink. De-energize the drive, wait for a minimum of 15 minutes, then make sure that the heatsink is cool before you replace the cooling fans. If you touch a hot drive heatsink, it can burn you.

NOTICE: Use the instructions in this manual to replace the cooling fans. When you do maintenance on the fans, replace all the fans to increase product life. If you install the fans incorrectly, it can cause damage to the drive.

■ Fan Removal

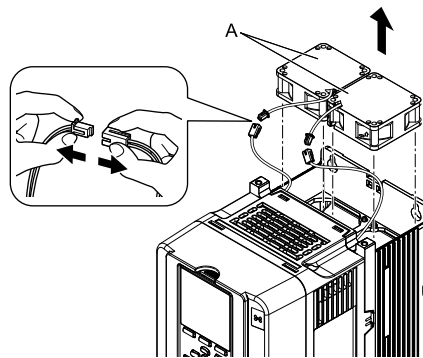
1. To remove the fan finger guard from the drive, push the hook on the back side of the fan finger guard and pull up.



A - Fan finger guard

Figure 1.7 Remove the Fan Finger Guard

2. Pull the cooling fans straight up from the drive. Disconnect the relay connectors and remove the fans from the drive.



A - Cooling fans

Figure 1.8 Remove the Cooling Fans

■ Fan Installation

Reverse the removal procedure for fan installation.

1. Connect the relay connectors between the drive and cooling fans.

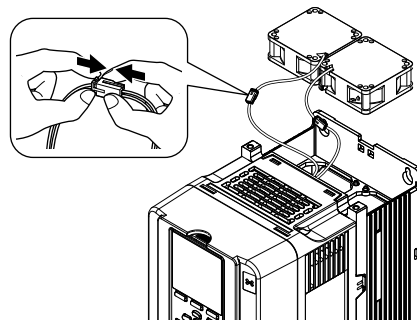
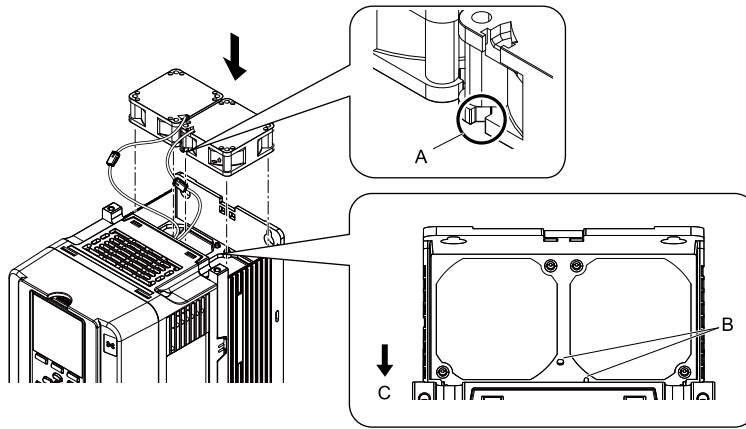


Figure 1.9 Connect the Relay Connectors

2. Align the notches on the fans with the pins on the drive and install the cooling fans in the drive.

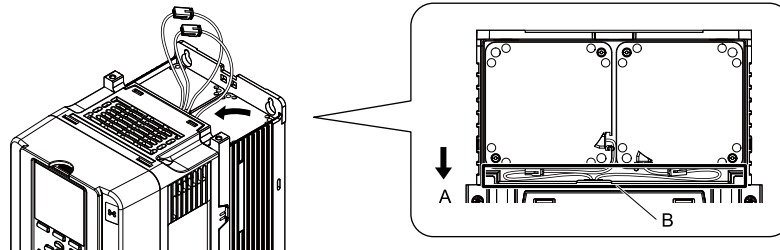


A - Notch on fan
B - Alignment pins on drive

C - Front of drive

Figure 1.10 Install the Cooling Fans

3. Put the cables in the recess of the drive.



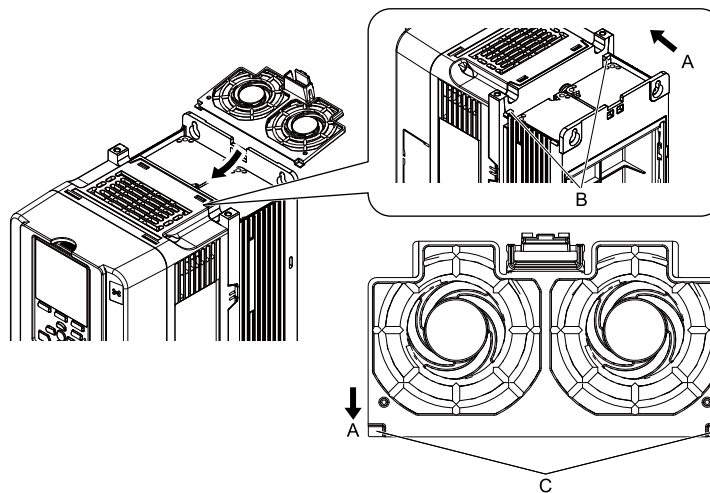
A - Front of drive

B - Space for cables *1

Figure 1.11 Put the Cables and Connectors in the Drive Recess

*1 Make sure that the cables and connectors are in the correct space.

4. Hold the fan finger guard at an angle and put the connector tabs on the fan finger guard into the holes on the drive.



A - Front of drive
B - Drive holes

C - Connector tabs

Figure 1.12 Reattach the Fan Finger Guard

5. Push the hook on the back side of the fan finger guard and click it into place on the drive.

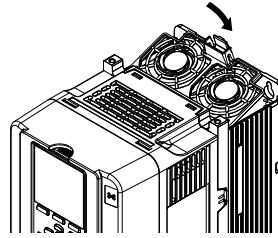


Figure 1.13 Reattach the Fan Finger Guard

6. Energize the drive and set $\alpha 4-03 = 0$ [Fan Operation Time Setting = 0 h] to reset the fan operation time.

◆ Fan Replacement (Procedure C)

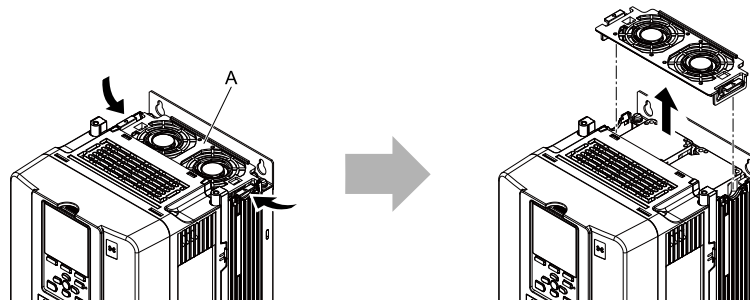
DANGER! Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, remove the covers before measuring for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.

CAUTION! Burn Hazard. Do not touch a hot drive heatsink. De-energize the drive, wait for a minimum of 15 minutes, then make sure that the heatsink is cool before you replace the cooling fans. If you touch a hot drive heatsink, it can burn you.

NOTICE: Use the instructions in this manual to replace the cooling fans. When you do maintenance on the fans, replace all the fans to increase product life. If you install the fans incorrectly, it can cause damage to the drive.

■ Fan Removal

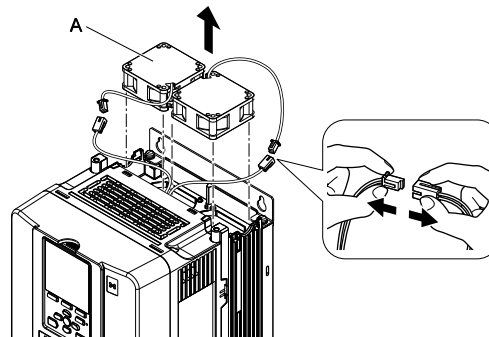
1. To remove the fan finger guard from the drive, push the hooks on the left and right sides of it and pull up.



A - Fan finger guard

Figure 1.14 Remove the Fan Finger Guard

2. Pull the cooling fans straight up from the drive. Disconnect the relay connectors and remove the fans from the drive.



A - Cooling fans

Figure 1.15 Remove the Cooling Fans

■ Fan Installation

Reverse the removal procedure for fan installation.

1. Connect the relay connectors between the drive and cooling fans.

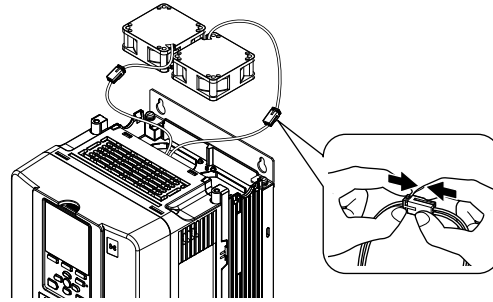
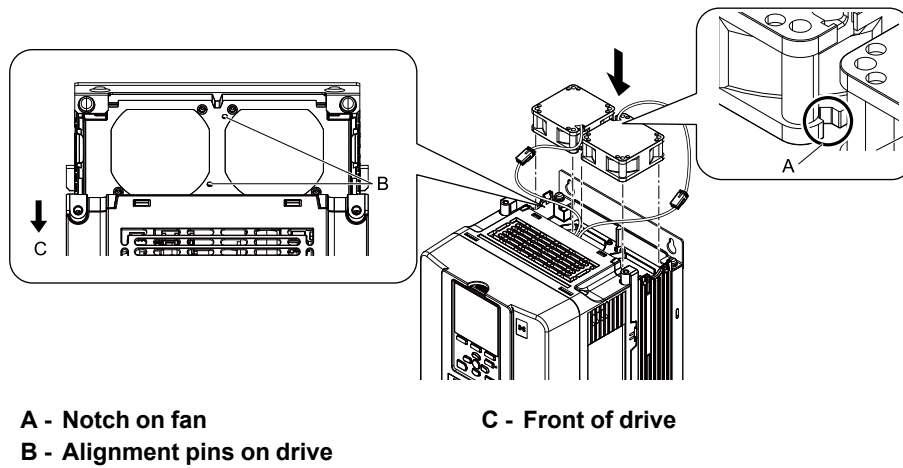


Figure 1.16 Connect the Relay Connectors

2. Align the notches on the fans with the pins on the drive and install the cooling fans in the drive.

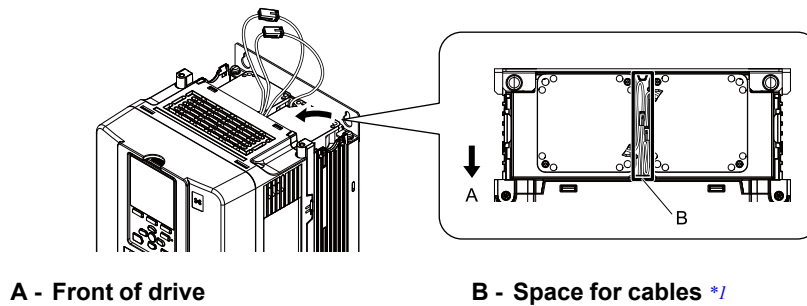


A - Notch on fan
B - Alignment pins on drive

C - Front of drive

Figure 1.17 Install the Cooling Fans

3. Put the cables and connectors in the recess of the drive.



A - Front of drive

B - Space for cables ^{*1}

Figure 1.18 Put the Cables and Connectors in the Drive Recess

*1 Make sure that the cables and connectors are in the correct space.

4. Insert the fan finger guard straight until the hooks click into place.

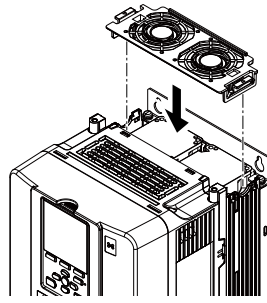


Figure 1.19 Reattach the Fan Finger Guard

5. Energize the drive and set o4-03 = 0 [Fan Operation Time Setting = 0 h] to reset the fan operation time.

◆ Fan Replacement (Procedure D)

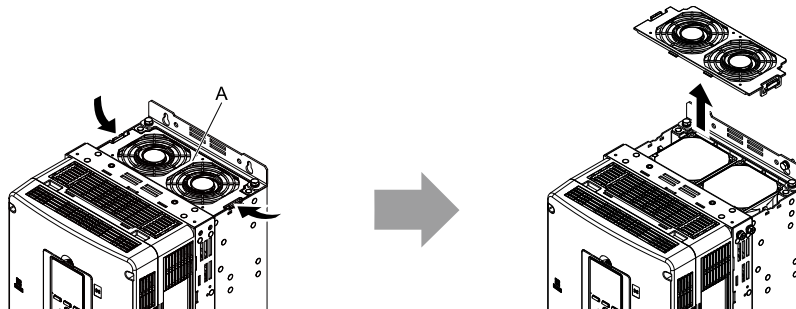
DANGER! Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, remove the covers before measuring for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.

CAUTION! Burn Hazard. Do not touch a hot drive heatsink. De-energize the drive, wait for a minimum of 15 minutes, then make sure that the heatsink is cool before you replace the cooling fans. If you touch a hot drive heatsink, it can burn you.

NOTICE: Use the instructions in this manual to replace the cooling fans. When you do maintenance on the fans, replace all the fans to increase product life. If you install the fans incorrectly, it can cause damage to the drive.

■ Fan Removal

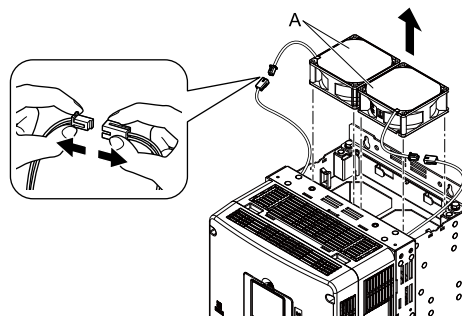
1. To remove the fan finger guard from the drive, push the hooks on the left and right sides of it and pull up.



A - Fan finger guard

Figure 1.20 Remove the Fan Finger Guard

2. Pull the cooling fans straight up from the drive. Disconnect the relay connectors and remove the fans from the drive.



A - Cooling fans

Figure 1.21 Remove the Cooling Fans

■ Fan Installation

Reverse the removal procedure for fan installation.

1. Connect the relay connectors between the drive and cooling fans.

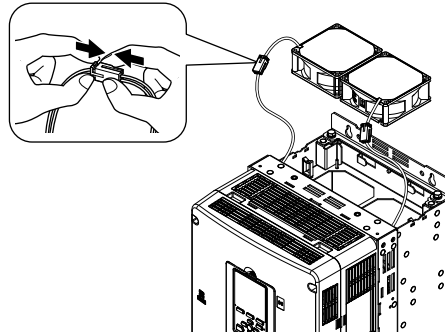
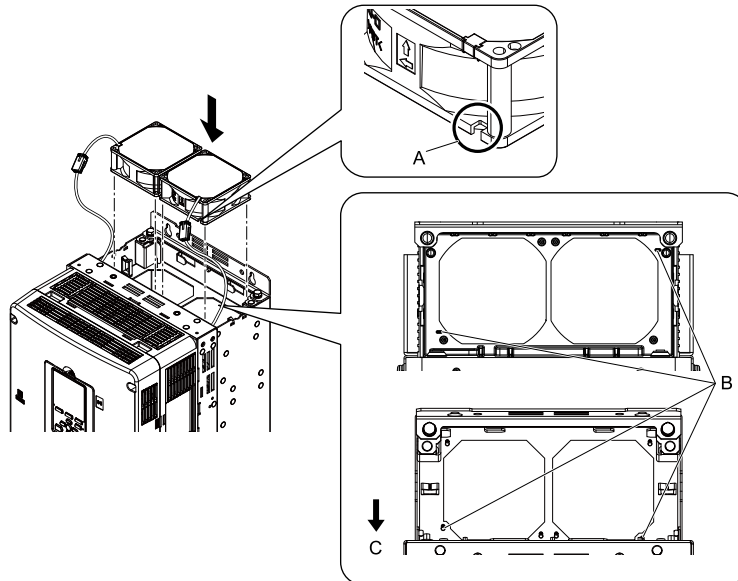


Figure 1.22 Connect the Relay Connectors

2. Align the notches on the fans with the pins on the drive and install the cooling fans in the drive.



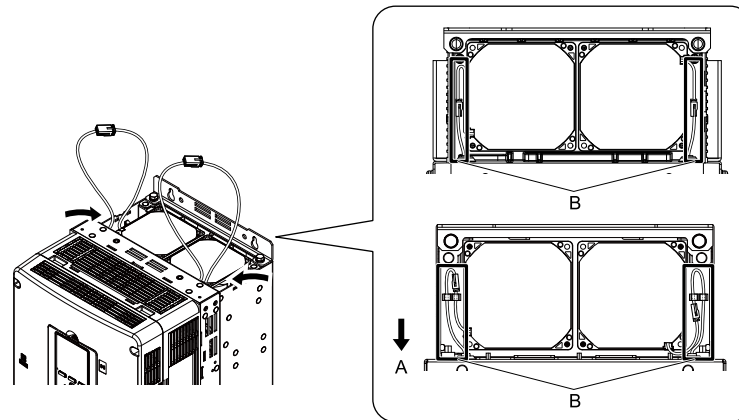
A - Notch on fan

B - Alignment pins on drive

C - Front of drive

Figure 1.23 Install the Cooling Fans

- Put the cables and connectors in the recess of the drive.



A - Front of drive

B - Space for cables *1

Figure 1.24 Put the Cables and Connectors in the Drive Recess

*1 Make sure that the cables and connectors are in the correct space.

- Push the hooks on the left and right sides of the fan finger guard and click it into place on the drive.

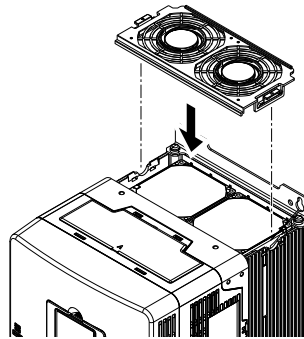


Figure 1.25 Reattach the Fan Finger Guard

- Energize the drive and set $\alpha 4-03 = 0$ [Fan Operation Time Setting = 0 h] to reset the fan operation time.

◆ Fan Replacement (Procedure E)

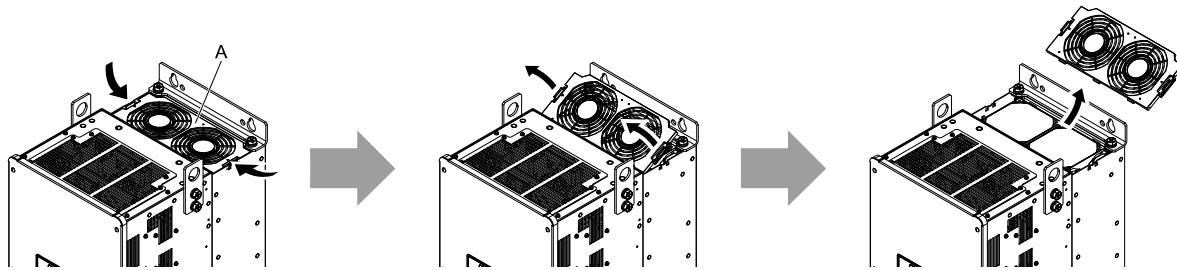
DANGER! Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, remove the covers before measuring for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.

CAUTION! Burn Hazard. Do not touch a hot drive heatsink. De-energize the drive, wait for a minimum of 15 minutes, then make sure that the heatsink is cool before you replace the cooling fans. If you touch a hot drive heatsink, it can burn you.

NOTICE: Use the instructions in this manual to replace the cooling fans. When you do maintenance on the fans, replace all the fans to increase product life. If you install the fans incorrectly, it can cause damage to the drive.

■ Fan Removal

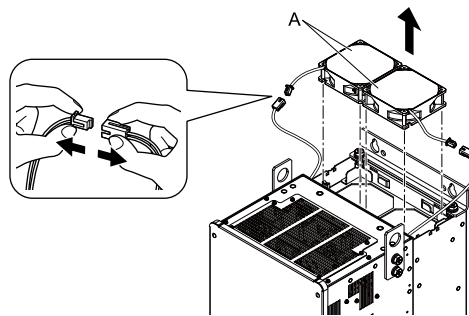
1. To remove the fan finger guard from the drive, push the tabs on the left and right sides of it and pull up the back side of the guard.



A - Fan finger guard

Figure 1.26 Remove the Fan Finger Guard

2. Pull the cooling fans straight up from the drive. Disconnect the relay connectors and remove the fans from the drive.



A - Cooling fans

Figure 1.27 Remove the Cooling Fans

■ Fan Installation

Reverse the removal procedure for fan installation.

1. Connect the relay connectors between the drive and cooling fans.

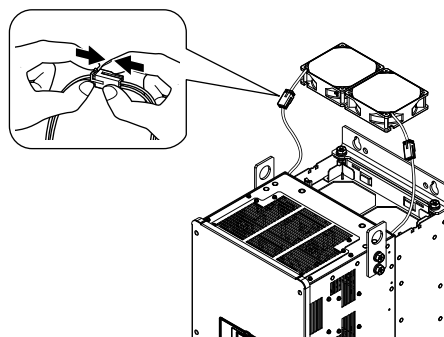
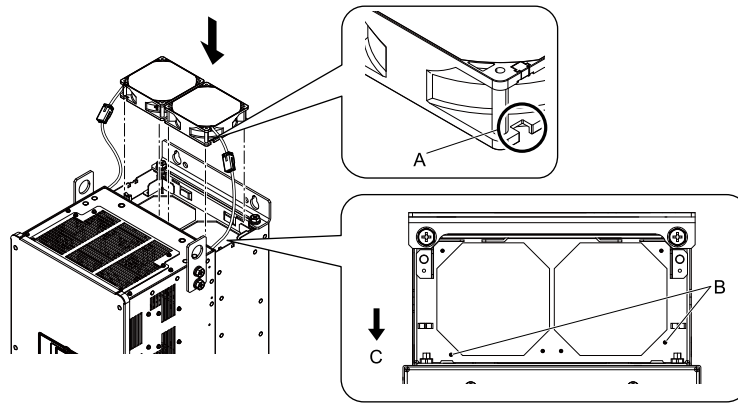


Figure 1.28 Connect the Relay Connectors

- Align the notches on the fans with the pins on the drive and install the cooling fans in the drive.

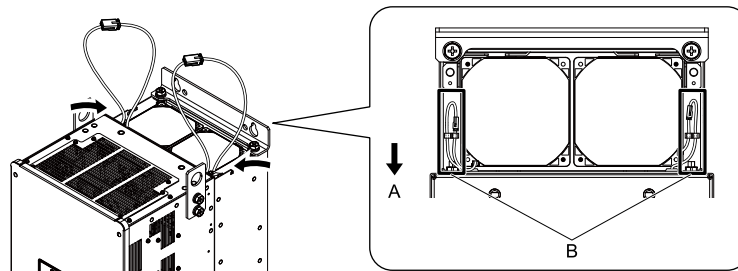


A - Notch on fan
B - Alignment pins on drive

C - Front of drive

Figure 1.29 Install the Cooling Fans

- Put the cables and connectors in the recess of the drive.



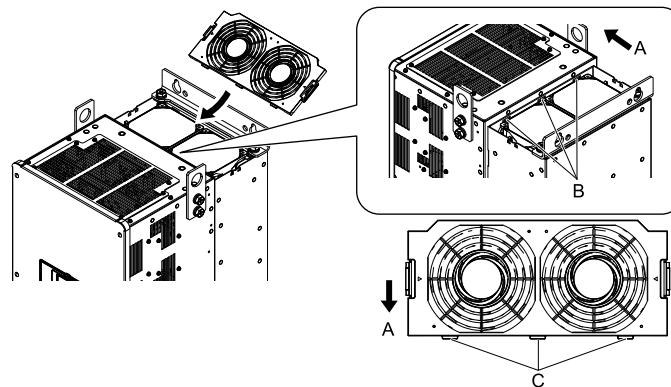
A - Front of drive

B - Space for cables *1

Figure 1.30 Put the Cables and Connectors in the Drive Recess

*1 Make sure that the cables and connectors are in the correct space.

- Hold the fan finger guard at an angle and put the connector tabs on the fan finger guard into the holes on the drive.



A - Front of drive
B - Drive holes

C - Connector tabs

Figure 1.31 Reattach the Fan Finger Guard

5. Push the hooks on the left and right sides of the fan finger guard and click it into place on the drive.

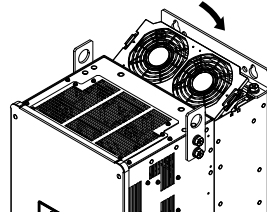


Figure 1.32 Reattach the Fan Finger Guard

6. Energize the drive and set $o4-03 = 0$ [Fan Operation Time Setting = 0 h] to reset the fan operation time.

◆ Fan Replacement (Procedure F)

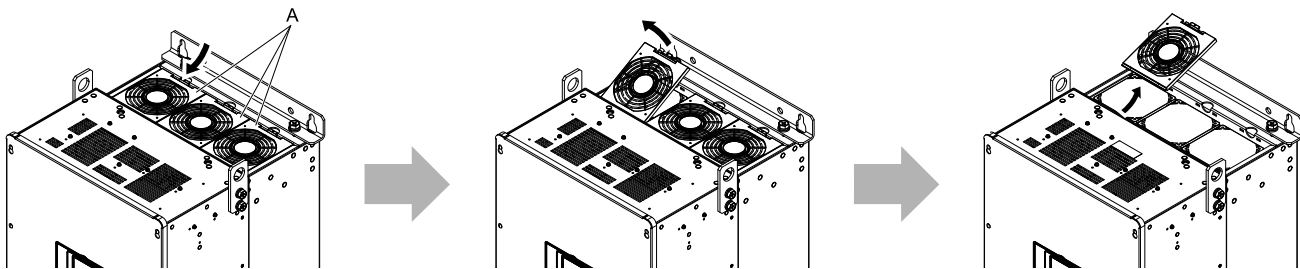
DANGER! Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, remove the covers before measuring for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.

CAUTION! Burn Hazard. Do not touch a hot drive heatsink. De-energize the drive, wait for a minimum of 15 minutes, then make sure that the heatsink is cool before you replace the cooling fans. If you touch a hot drive heatsink, it can burn you.

NOTICE: Use the instructions in this manual to replace the cooling fans. When you do maintenance on the fans, replace all the fans to increase product life. If you install the fans incorrectly, it can cause damage to the drive.

■ Fan Removal

1. To remove the fan finger guards from the drive, push the hook on the back side of each guard and pull up.



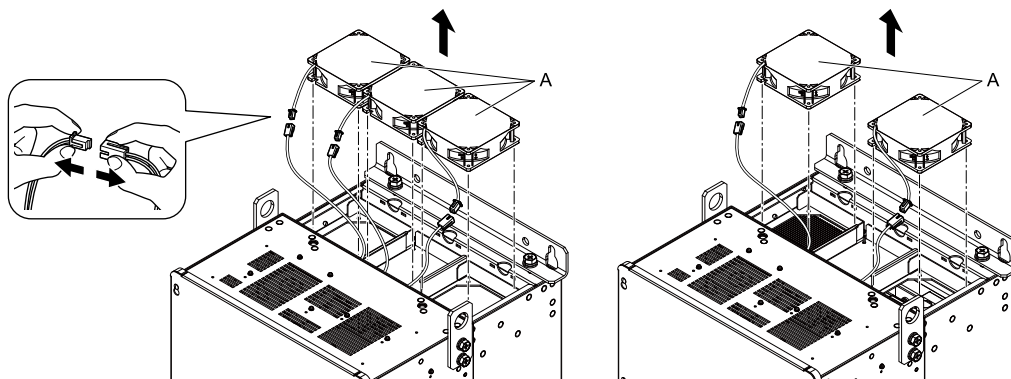
A - Fan finger guards

Figure 1.33 Remove the Fan Finger Guards

2. Pull the cooling fans straight up from the drive. Disconnect the relay connectors and remove the fans from the drive.

Note:

The number of fans is different for different drive models.



A - Cooling fans

Figure 1.34 Remove the Cooling Fans

■ Fan Installation

Reverse the removal procedure for fan installation.

1. Connect the relay connectors between the drive and cooling fans.

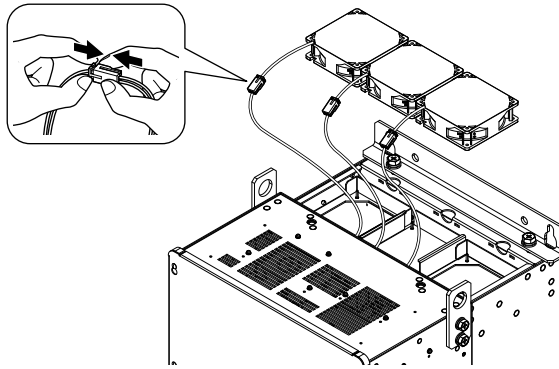
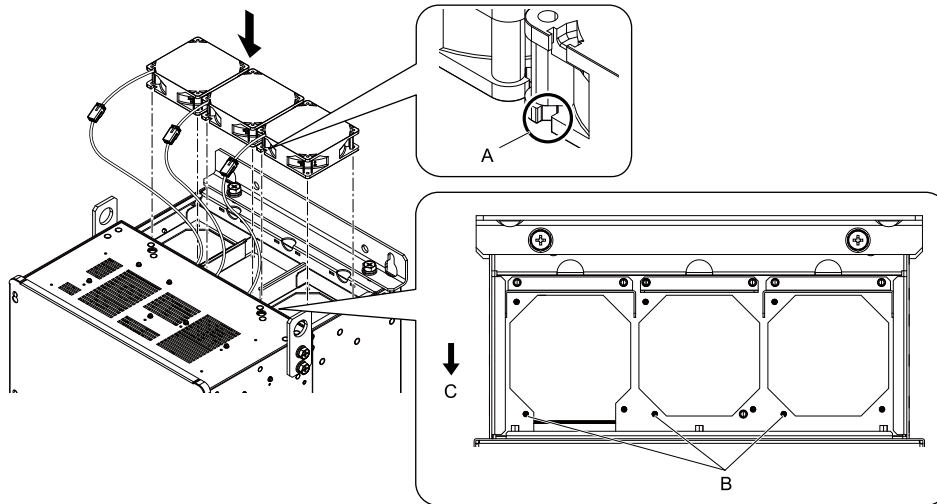


Figure 1.35 Connect the Relay Connectors

2. Align the notches on the fans with the pins on the drive and install the cooling fans in the drive.

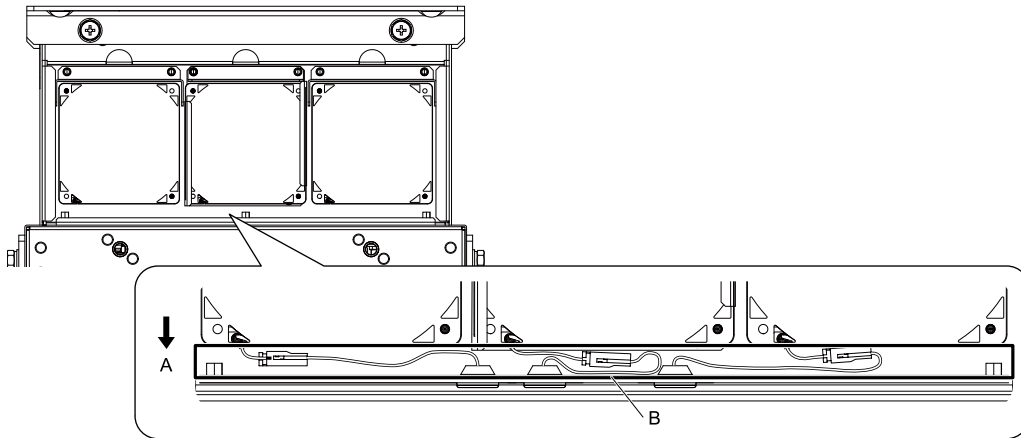


A - Notch on fan
B - Alignment pins on drive

C - Front of drive

Figure 1.36 Install the Cooling Fans

- Put the cables and connectors in the recess of the drive.



A - Front of drive

B - Space for cables ^{*1}

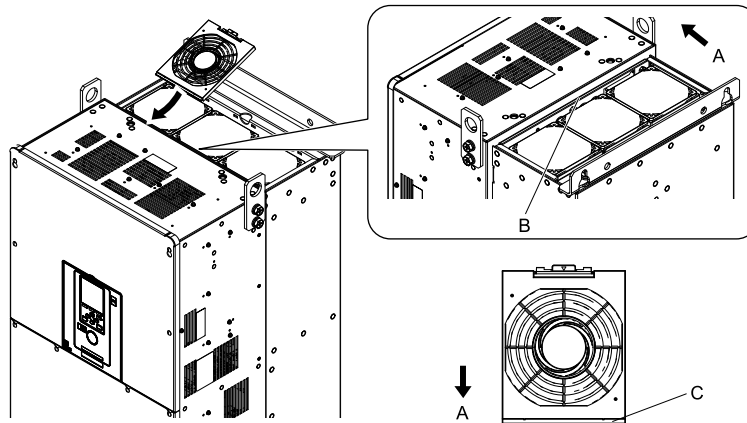
Figure 1.37 Put the Cables and Connectors in the Drive Recess

^{*1} Make sure that the cables and connectors are in the correct space.

- Hold the fan finger guards at an angle and put the connector tabs on the fan finger guards into the holes on the drive.

Note:

When you install the cooling fans, make sure that you do not pinch cables between the fan finger guards and the drive.



A - Front of drive

B - Insertion area

C - Connector tab

Figure 1.38 Reattach the Fan Finger Guards

5. Push the hooks on the back side of the fan finger guards and click them into place on the drive.

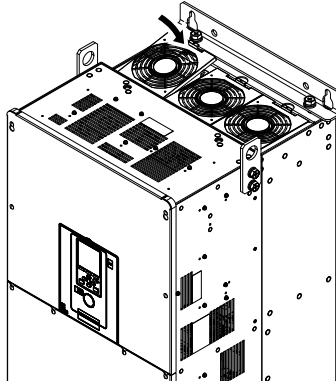


Figure 1.39 Reattach the Fan Finger Guards

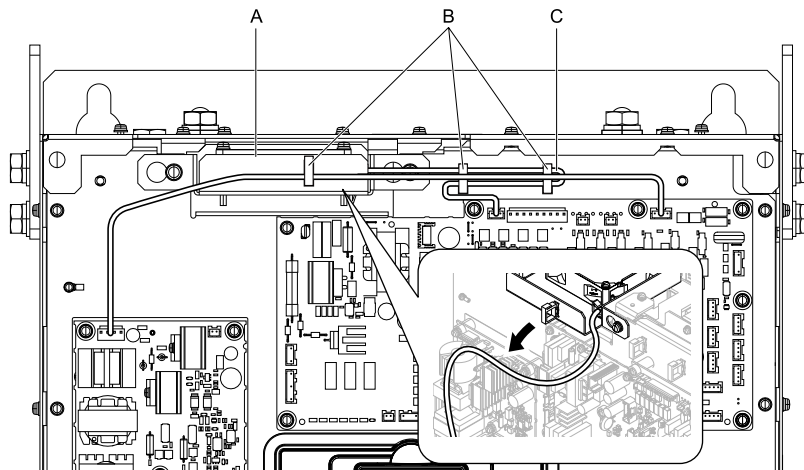
6. Energize the drive and set $\alpha 4-03 = 0$ [Fan Operation Time Setting = 0 h] to reset the fan operation time.

■ Circulation Fan Removal

Remove the drive cover before you start this procedure.

CAUTION! Crush Hazard. Loosen the cover screws. Do not fully remove them. If you fully remove the cover screws, the terminal cover can fall and cause moderate injury.

1. Remove the cable from the clamps.



A - Fan unit
B - Clamps

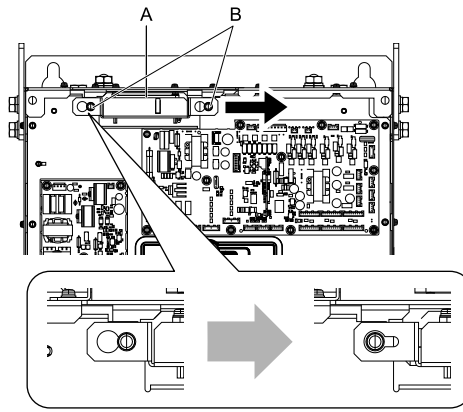
C - Fan cable

Figure 1.40 Remove the Fan Cable

2. Loosen the screws that safety the fan unit and slide the fan unit to the right.

Note:

To remove the fan unit, it is only necessary to loosen the screws.



A - Fan unit

B - Screws

Figure 1.41 Slide the Fan Unit

3. Disconnect the relay connector and remove the fan unit.

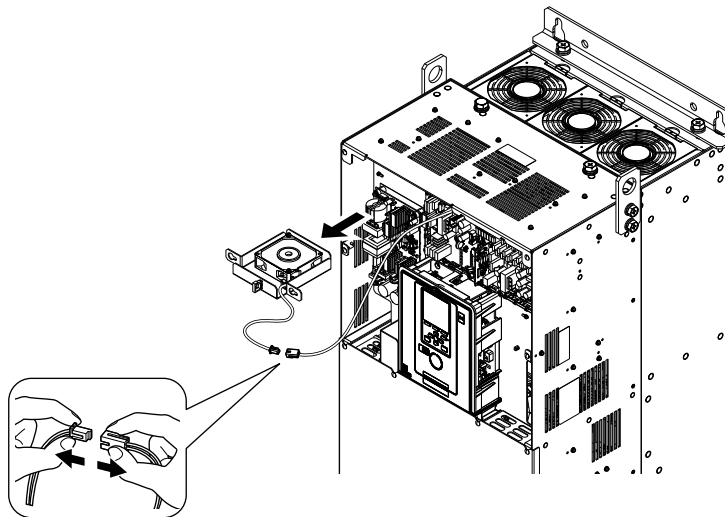
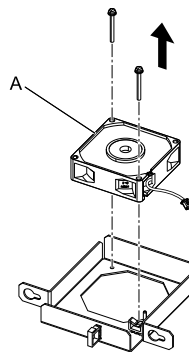


Figure 1.42 Remove the Fan Unit

4. Remove the screws that safety the circulation fan and remove the fan.



A - Circulation fan

Figure 1.43 Remove the Circulation Fan

■ Circulation Fan Installation

Reverse the removal procedure for fan installation.

1. Connect the relay connector between the drive and circulation fan.

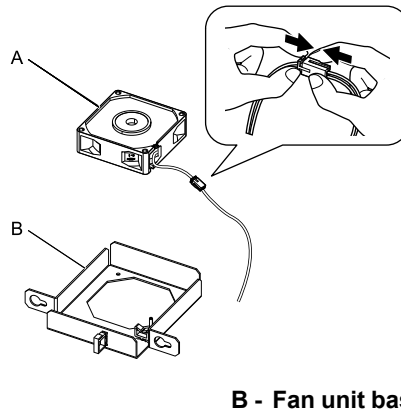


Figure 1.44 Connect the Relay Connector

2. Align the pin on the fan unit base with the notch on the fan and put the fan in the fan unit base, then use the screws to safety it.

Tighten the screws to a correct tightening torque:

- 0.98 N·m to 1.33 N·m (8.67 lbf·in to 11.77 lbf·in)

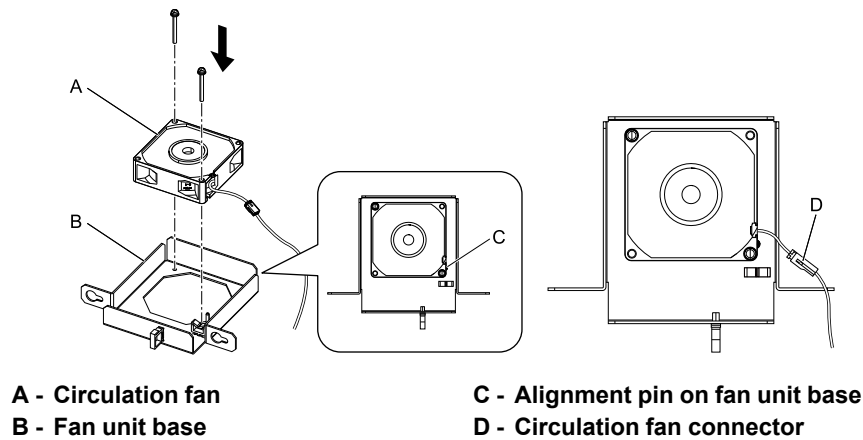


Figure 1.45 Install the Circulation Fan

3. Safety the fan cable through the clamp.

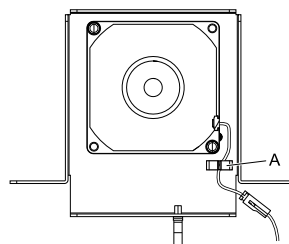


Figure 1.46 Safety the Fan Cable

4. Put the fan unit into the specified location and slide it to the left, then use screws to safety it to the drive.

Tighten the screws to a correct tightening torque:

- 0.98 N·m to 1.33 N·m (8.67 lbf·in to 11.77 lbf·in)

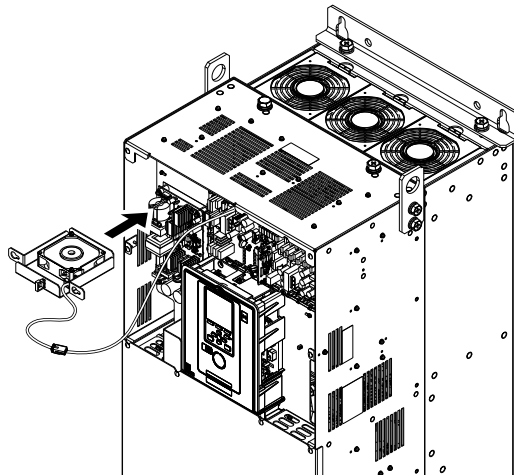
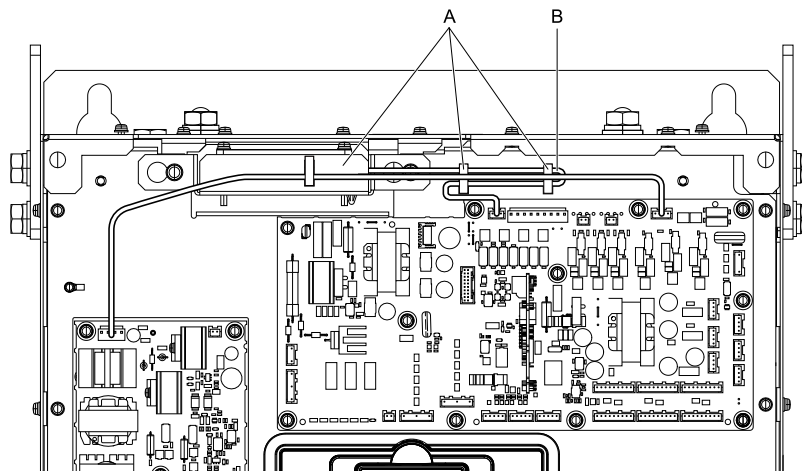


Figure 1.47 Install the Fan Unit

5. Safety the cable through the clamps.



A - Clamps

B - Fan cable

Figure 1.48 Safety the Fan Cable through the Clamps

6. Install the drive cover.
7. Energize the drive and set $\alpha 4-03 = 0$ [Fan Operation Time Setting = 0 h] to reset the fan operation time.

◆ Fan Replacement (Procedure G)

DANGER! *Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, remove the covers before measuring for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.*

CAUTION! *Burn Hazard. Do not touch a hot drive heatsink. De-energize the drive, wait for a minimum of 15 minutes, then make sure that the heatsink is cool before you replace the cooling fans. If you touch a hot drive heatsink, it can burn you.*

NOTICE: *Use the instructions in this manual to replace the cooling fans. When you do maintenance on the fans, replace all the fans to increase product life. If you install the fans incorrectly, it can cause damage to the drive.*

■ Fan Removal

1. Remove the drive cover.

CAUTION! *Crush Hazard. Loosen the cover screws. Do not fully remove them. If you fully remove the cover screws, the terminal cover can fall and cause moderate injury.*

2. Unplug the fan cable from the fan connectors.

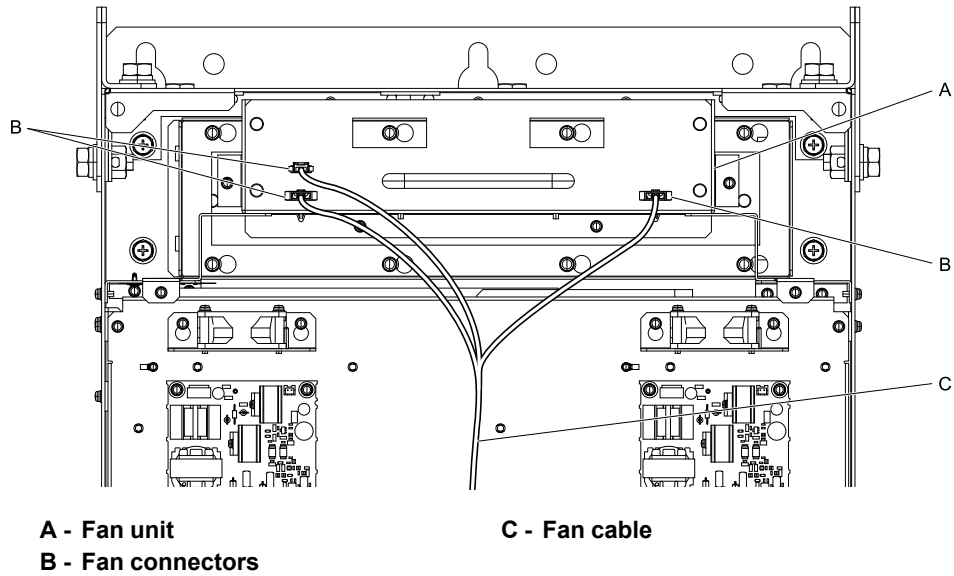


Figure 1.49 Remove the Fan Cable

3. Loosen the screws that safety the fan unit and slide the slide panel to the left.

Note:

To remove the fan unit, it is only necessary to loosen the screws in position B.
Remove the screws in position A.

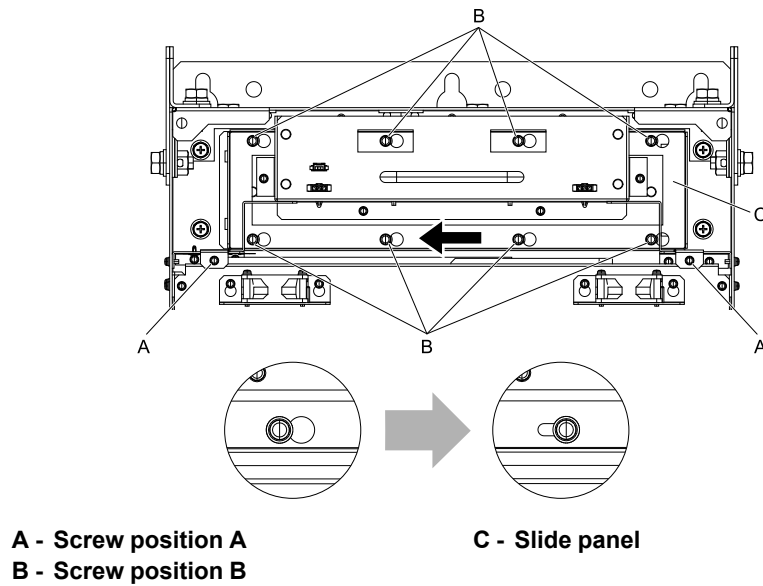


Figure 1.50 Slide the Slide Panel

4. Remove the fan unit and the slide panel at the same time.

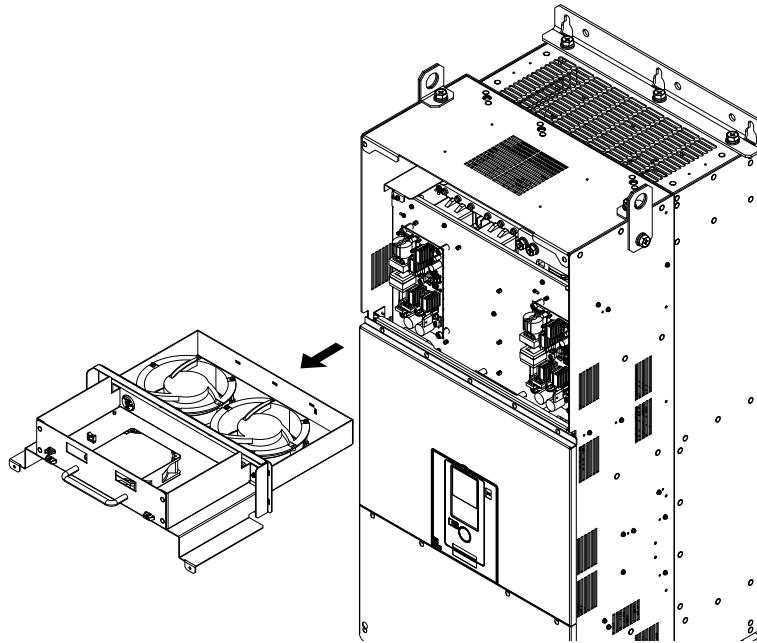
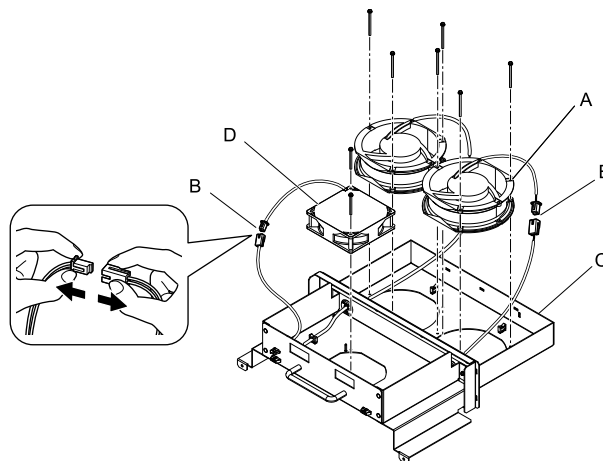


Figure 1.51 Remove the Fan Unit

5. Unplug the relay connectors, remove the screws that safety the cooling fans and circulation fan, and then remove the fans.



A - Cooling fans
B - Relay connectors

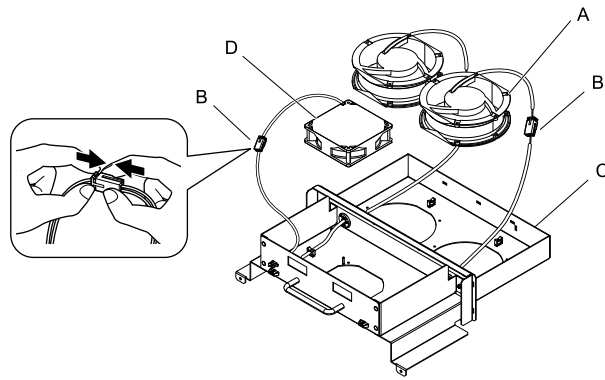
C - Fan unit base
D - Circulation fan

Figure 1.52 Remove the Cooling Fans and Circulation Fan

■ Fan Installation

Reverse the removal procedure for fan installation.

1. Connect the relay connectors on the fan unit base to the cooling fans and the circulation fan.



A - Cooling fans
 B - Relay connectors
 C - Fan unit base
 D - Circulation fan

Figure 1.53 Connect the Relay Connectors

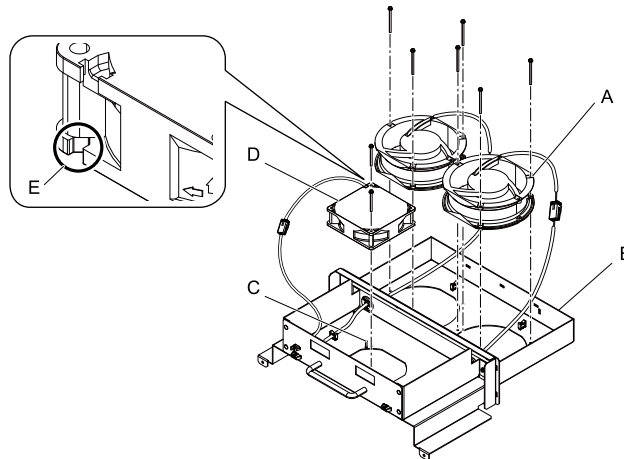
2. Align the pins on the fan unit base with the notches on the fans and put the fans in the fan unit base, then use the screws to safety them.

Tighten the screws to a correct tightening torque:

- 0.98 N·m to 1.33 N·m (8.67 lbf·in to 11.77 lbf·in)

Note:

Make sure that you do not pinch cables between the fans and the fan unit base.



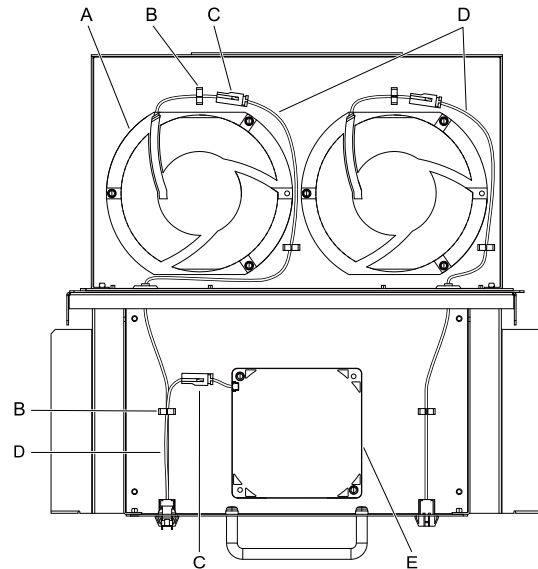
A - Cooling fans
 B - Fan unit base
 C - Alignment pin on fan unit base
 D - Circulation fan
 E - Notch on fan

Figure 1.54 Install the Cooling Fans and Circulation Fan

3. Put the cables and connectors in the recess of the drive.

Note:

Safety the relay cables to the hooks.



A - Cooling fans
B - Cable hooks
C - Relay connectors

D - Relay cables
E - Circulation fan

Figure 1.55 Put the Cables and Connectors in the Drive Recess

- Put the fan unit into the specified location.

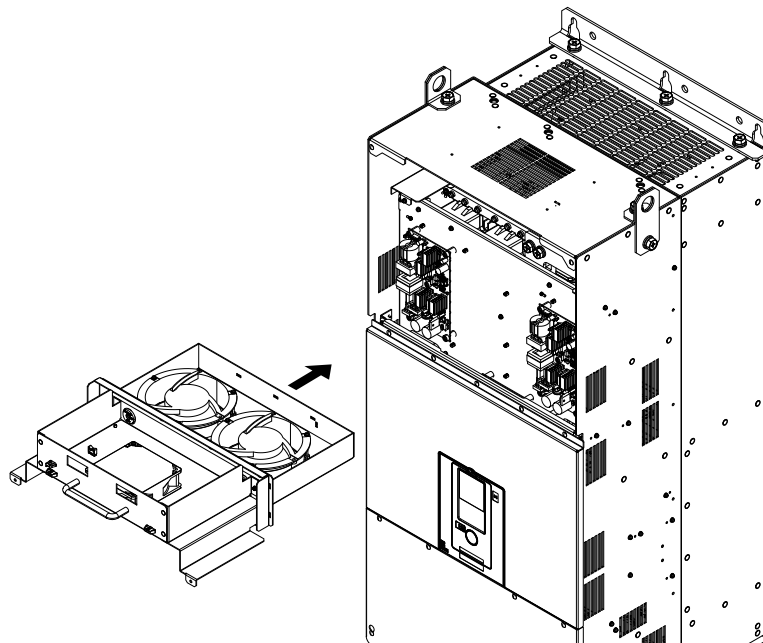


Figure 1.56 Install the Fan Unit

- Slide the fan unit to the right and use the screws to safety it to the drive.
Tighten the screws to a correct tightening torque:
 - Screws in Position A: 0.98 N·m to 1.33 N·m (8.67 lbf·in to 11.77 lbf·in)
 - Screws in Position B: 1.96 N·m to 2.53 N·m (17.35 lbf·in to 22.39 lbf·in)

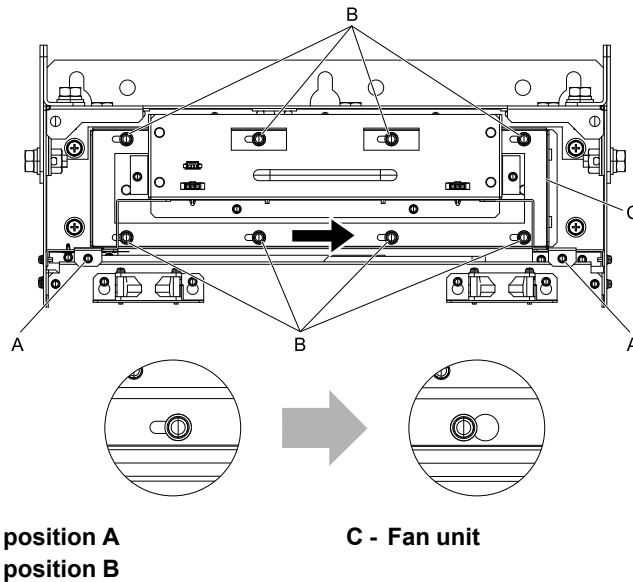


Figure 1.57 Slide the Fan Unit

6. Connect the fan cable to the fan connectors.

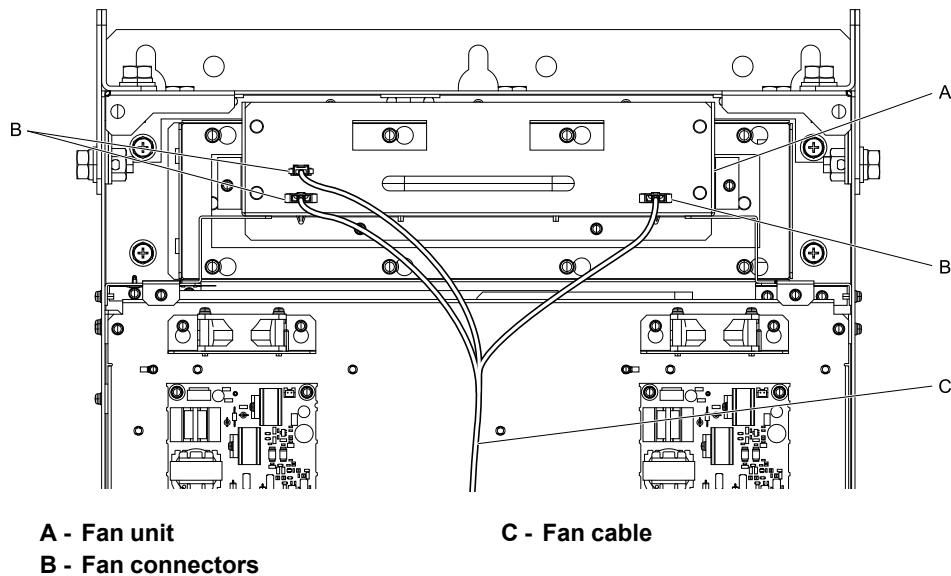


Figure 1.58 Connect Cooling Fan Connectors

7. Install the drive cover.
8. Energize the drive and set $\alpha 4-03 = 0$ [Fan Operation Time Setting = 0 h] to reset the fan operation time.

■ Circuit Board Cooling Fan Removal

Remove the drive cover before you start this procedure.

CAUTION! Crush Hazard. Loosen the cover screws. Do not fully remove them. If you fully remove the cover screws, the terminal cover can fall and cause moderate injury.

1.4 Replace Cooling Fans and Circulation Fans

1. Unplug the fan cables from the fan connectors.

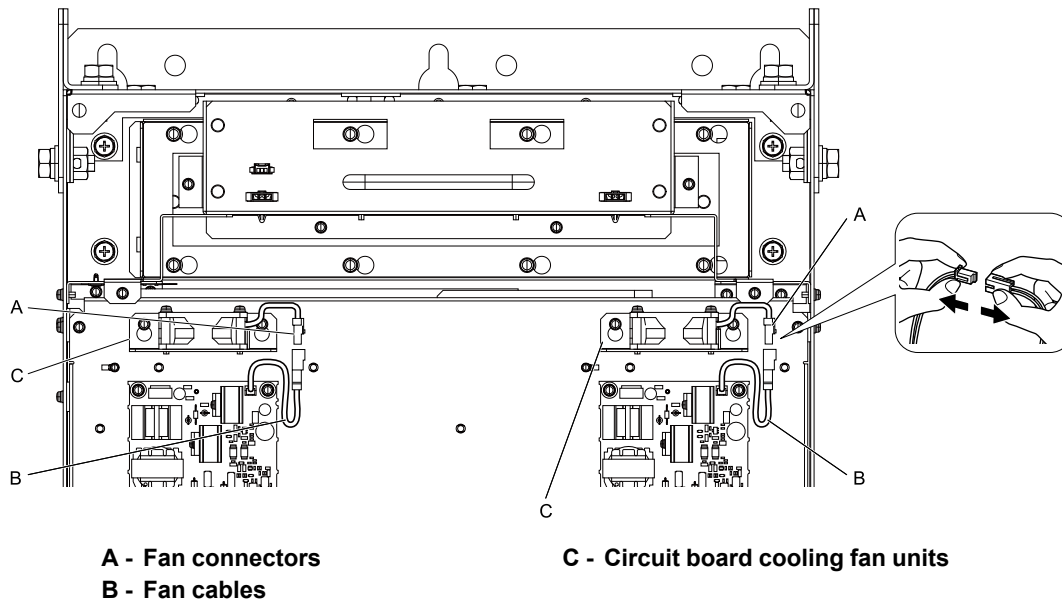


Figure 1.59 Unplug the Fan Cables

2. Loosen the screws that safety the circuit board cooling fan unit and slide the circuit board cooling fan unit up.

Note:

To remove the fan unit, it is only necessary to loosen the screws.

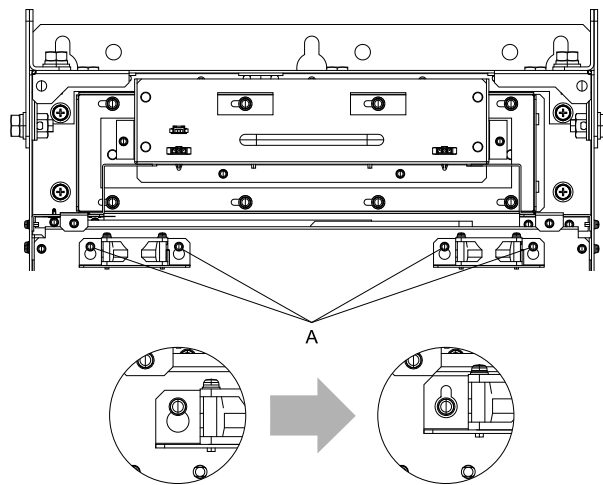


Figure 1.60 Slide the Circuit Board Cooling Fan Units

- Remove the circuit board cooling fan units.

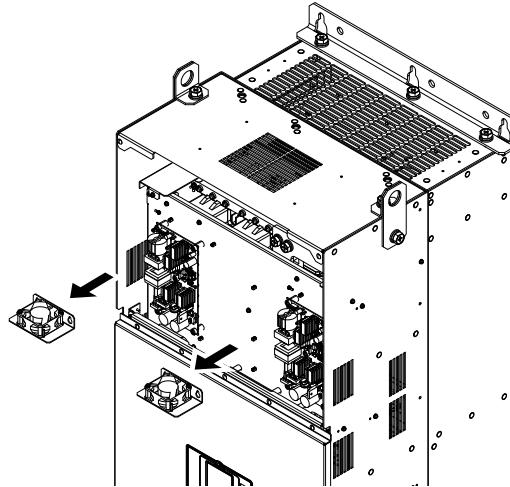
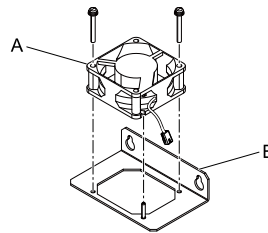


Figure 1.61 Remove the Circuit Board Cooling Fan Units

- Remove the screws that safety the circuit board cooling fans and remove the fans.



A - Circuit board cooling fan

B - Fan unit base

Figure 1.62 Remove the Circuit Board Cooling Fans

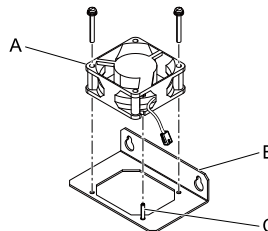
■ Circuit Board Cooling Fan Installation

Reverse the removal procedure for fan installation.

- Align the pin on the fan unit base with the notch on the fan and put the circuit board cooling fan in the fan unit, then use the screws to safety the circuit board cooling fan to the fan unit base.
Tighten the screws to a correct tightening torque:
 - 0.98 N·m to 1.33 N·m (8.67 lbf-in to 11.77 lbf-in)

Note:

Make sure that you do not pinch cables between the circuit board cooling fan and the fan unit base.



A - Circuit board cooling fan

B - Fan unit base

C - Alignment pin on fan unit base

Figure 1.63 Install the Circuit Board Cooling Fan

- Put the circuit board cooling fan unit into the specified location and slide it down, then use the screws to safety it to the drive.
Tighten the screws to a correct tightening torque:
 - 0.98 N·m to 1.33 N·m (8.67 lbf-in to 11.77 lbf-in)

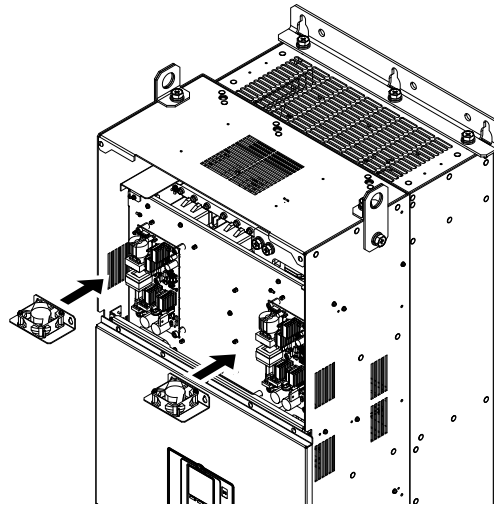
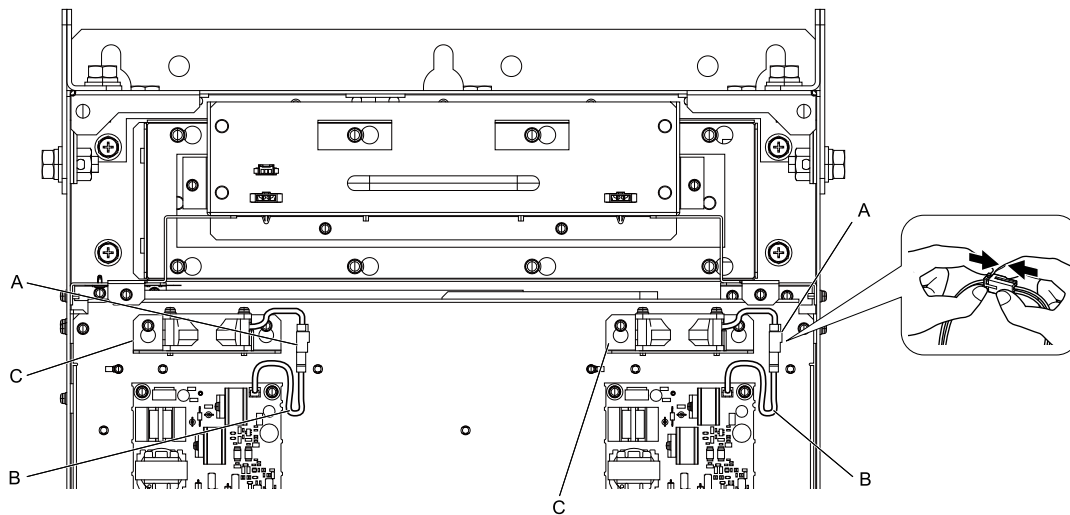


Figure 1.64 Install the Circuit Board Cooling Fan Unit

3. Connect the fan cable to the fan connectors.



A - Fan connectors
B - Fan cable

C - Circuit board cooling fan units

Figure 1.65 Fan Connect Cooling Fan Connectors

4. Install the drive cover.
5. Energize the drive and set $o4-03 = 0$ [Fan Operation Time Setting = 0 h] to reset the fan operation time.

◆ Fan Replacement (Procedure H)

DANGER! Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, remove the covers before measuring for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.

CAUTION! Burn Hazard. Do not touch a hot drive heatsink. De-energize the drive, wait for a minimum of 15 minutes, then make sure that the heatsink is cool before you replace the cooling fans. If you touch a hot drive heatsink, it can burn you.

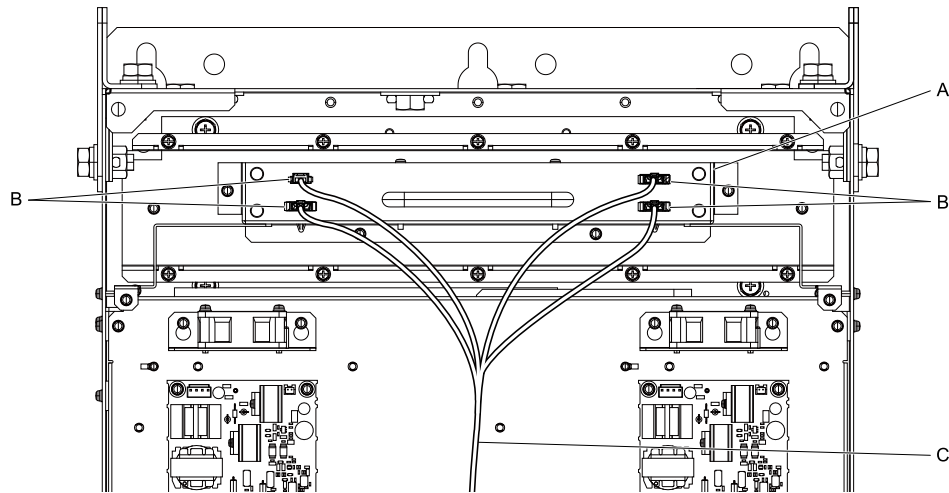
NOTICE: Use the instructions in this manual to replace the cooling fans. When you do maintenance on the fans, replace all the fans to increase product life. If you install the fans incorrectly, it can cause damage to the drive.

■ Fan Removal

1. Remove the drive cover.

CAUTION! *Crush Hazard. Loosen the cover screws. Do not fully remove them. If you fully remove the cover screws, the terminal cover can fall and cause moderate injury.*

2. Unplug the fan cables from the fan connectors.



A - Fan unit
B - Fan connectors

C - Fan cable

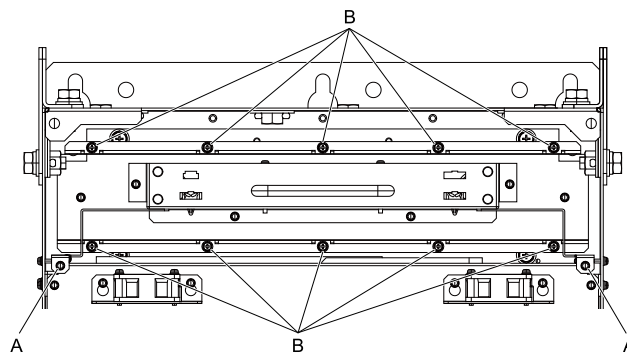
Figure 1.66 Unplug the Fan Cables

3. Loosen the screws that safety the fan unit.

Note:

To remove the fan unit, it is only necessary to loosen the screws in position B.

Remove the screws in position A.



A - Screw position A

B - Screw position B

Figure 1.67 Loosen the Screws

4. Remove the fan unit.

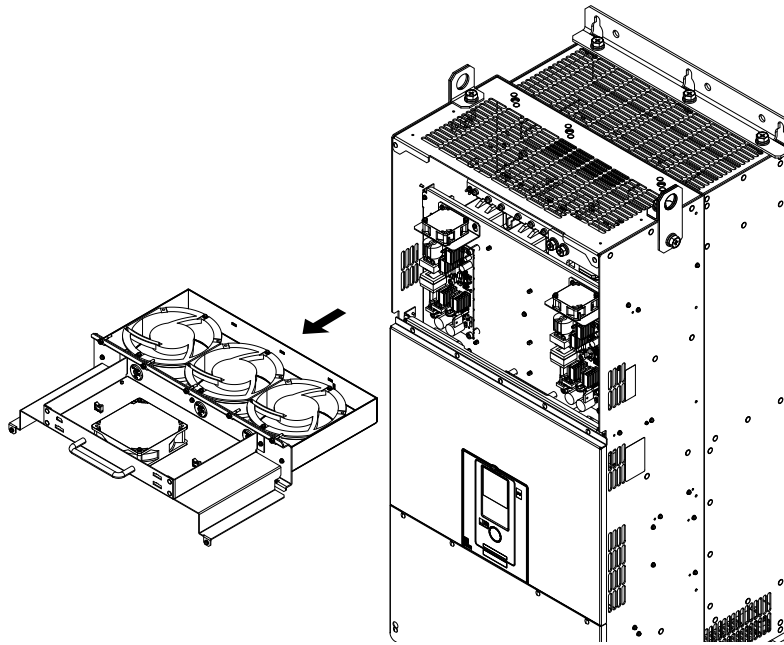
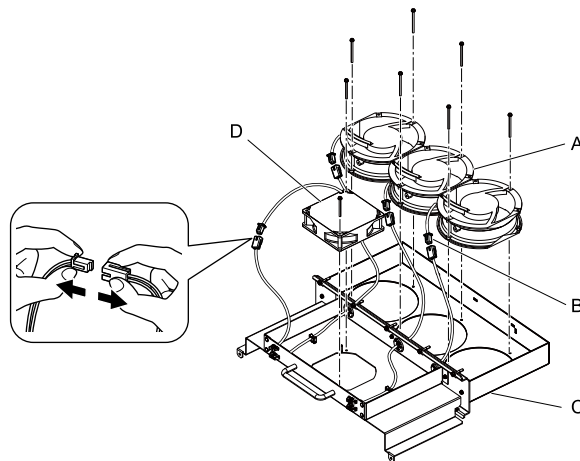


Figure 1.68 Remove the Fan Unit

5. Unplug the relay connector, remove the screws that safety the cooling fans and circulation fan, and then remove the fans.



A - Cooling fans
B - Relay connectors

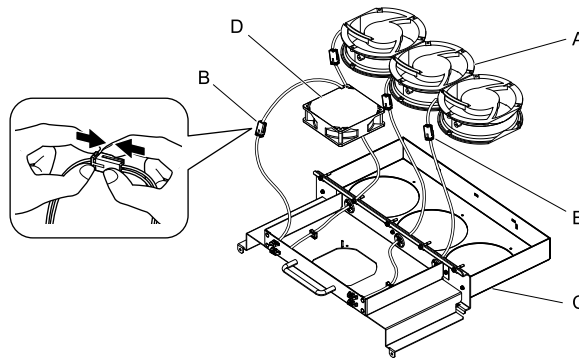
C - Fan unit base
D - Circulation fan

Figure 1.69 Remove the Cooling Fans and Circulation Fan

■ Fan Installation

Reverse the removal procedure for fan installation.

1. Connect the relay connectors on the fan unit base to the cooling fans and the circulation fan.



- A - Cooling fans
- B - Relay connectors
- C - Fan unit base
- D - Circulation fan

Figure 1.70 Connect the Relay Connectors

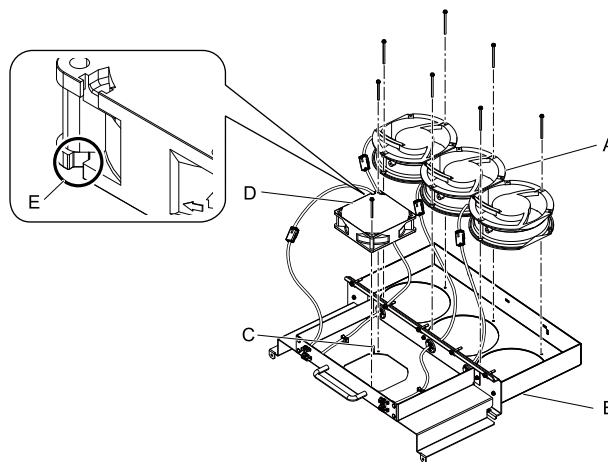
2. Align the pins on the fan unit base with the notches on the fans and put the fans in the fan unit base, then use the screws to safety them.

Tighten the screws to a correct tightening torque:

- 0.98 N·m to 1.33 N·m (8.67 lbf·in to 11.77 lbf·in)

Note:

Make sure that you do not pinch cables between the fans and the fan unit base.



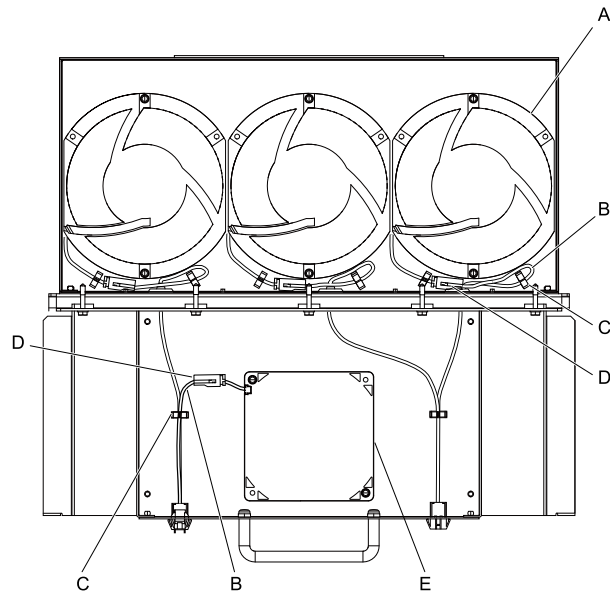
- A - Cooling fans
- B - Fan unit base
- C - Alignment pin on fan unit base
- D - Circulation fan
- E - Notch on fan

Figure 1.71 Install the Cooling Fans and Circulation Fan

3. Put the cables and connectors in the recess of the drive.

Note:

Safety the relay cables to the hooks.



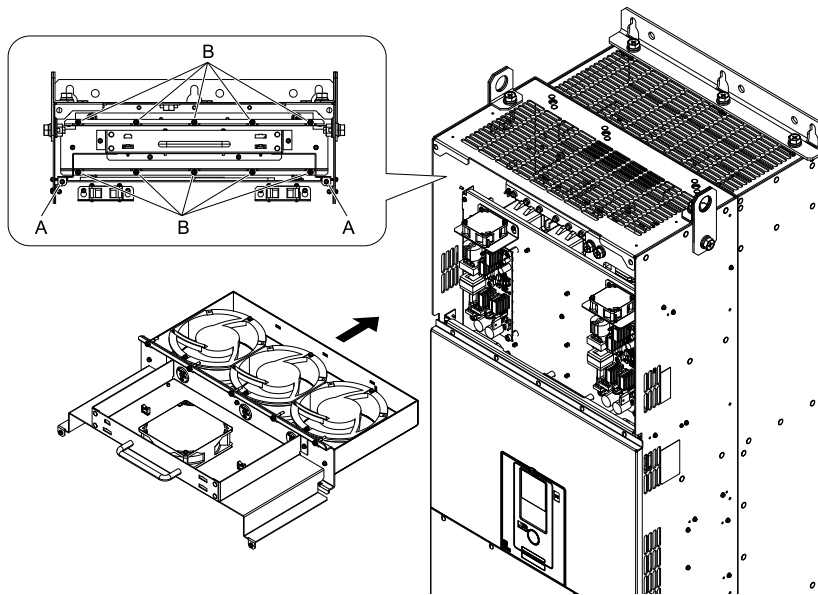
- A - Cooling fans**
- B - Relay cables**
- C - Cable hooks**
- D - Relay connectors**
- E - Circulation fan**

Figure 1.72 Put the Cables and Connectors in the Drive Recess

4. Put the fan unit into the specified location and use screws to safety it to the drive.

Tighten the screws to a correct tightening torque:

- Screws in Position A: 0.98 N·m to 1.33 N·m (8.67 lbf-in to 11.77 lbf-in)
- Screws in Position B: 1.96 N·m to 2.53 N·m (17.35 lbf-in to 22.39 lbf-in)



A - Screw position A

B - Screw position B

Figure 1.73 Install the Fan Unit

- Connect the fan cable to the fan connectors.

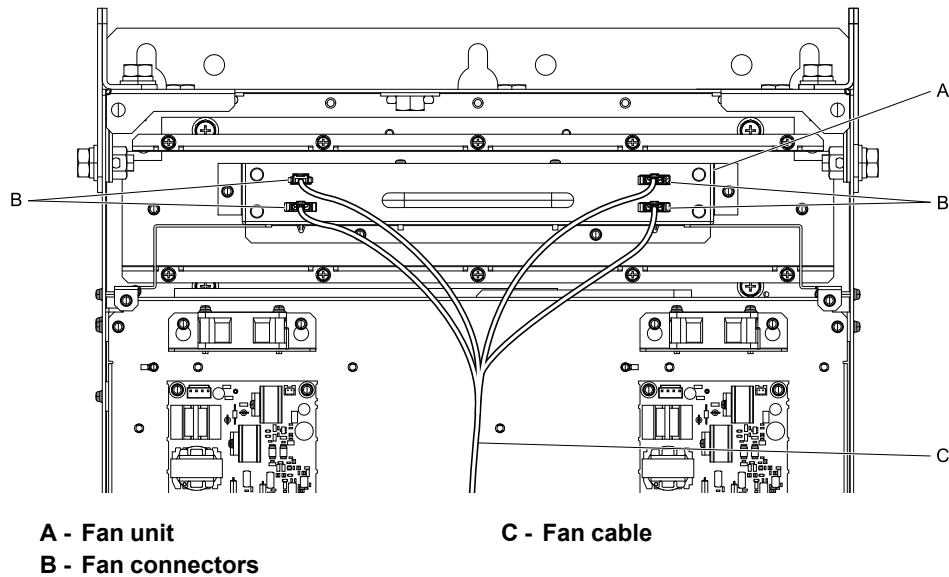


Figure 1.74 Connect Cooling Fan Connectors

- Install the drive cover.
- Energize the drive and set $o4-03 = 0$ [Fan Operation Time Setting = 0 h] to reset the fan operation time.

■ Circuit Board Cooling Fan Removal

Remove the drive cover before you start this procedure.

CAUTION! Crush Hazard. Loosen the cover screws. Do not fully remove them. If you fully remove the cover screws, the terminal cover can fall and cause moderate injury.

- Unplug the fan cables from the fan connectors.

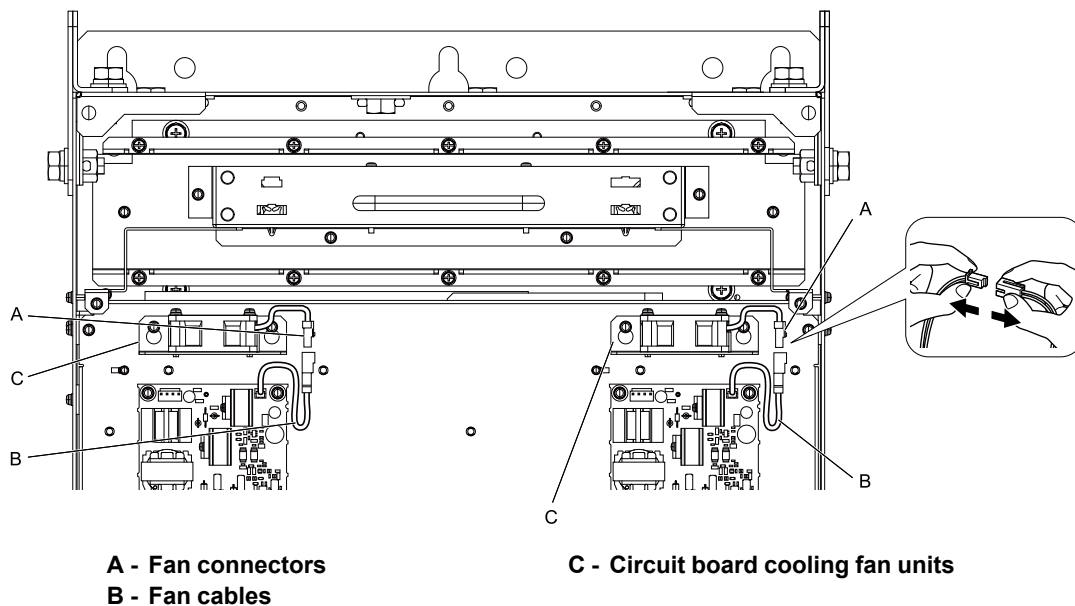
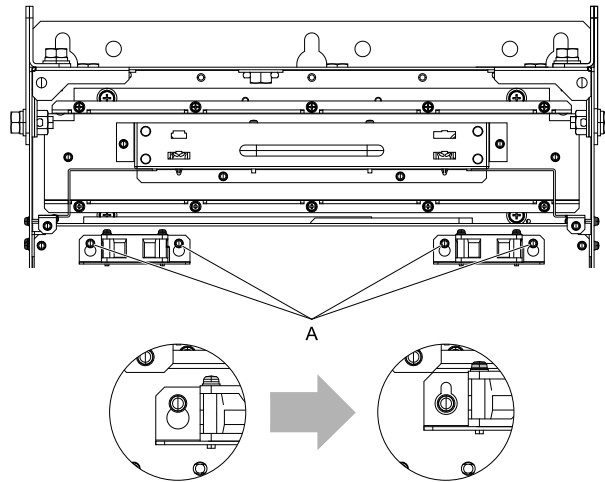


Figure 1.75 Unplug the Fan Cables

- Loosen the screws that safety the circuit board cooling fan unit and slide the circuit board cooling fan unit up.

Note:

To remove the fan unit, it is only necessary to loosen the screws.



A - Screws

Figure 1.76 Slide the Circuit Board Cooling Fan Unit

3. Remove the circuit board cooling fan units.

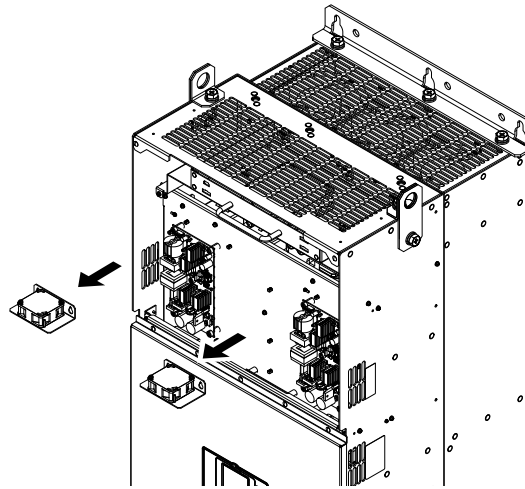
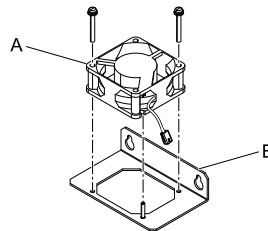


Figure 1.77 Remove the Circuit Board Cooling Fan Units

4. Remove the screws that safety the circuit board cooling fans and remove the fans.



A - Circuit board cooling fan

B - Fan unit base

Figure 1.78 Remove the Circuit Board Cooling Fans

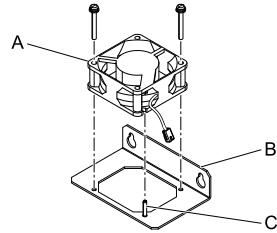
■ Circuit Board Cooling Fan Installation

Reverse the removal procedure to install a cooling fan.

1. Align the pin on the fan unit base with the notch on the fan and put the circuit board cooling fan in the fan unit, then use the screws to safety the circuit board cooling fan to the fan unit base.
Tighten the screws to a correct tightening torque:
 - 0.98 N·m to 1.33 N·m (8.67 lbf·in to 11.77 lbf·in)

Note:

Make sure that you do not pinch cables between the circuit board cooling fan and the fan unit base.



A - Circuit board cooling fan
B - Fan unit base

C - Alignment pin on fan unit base

Figure 1.79 Install the Circuit Board Cooling Fan

2. Put the circuit board cooling fan unit into the specified location and use screws to safety it to the drive.
 Tighten the screws to a correct tightening torque:
 - 0.98 N·m to 1.33 N·m (8.67 lbf·in to 11.77 lbf·in)

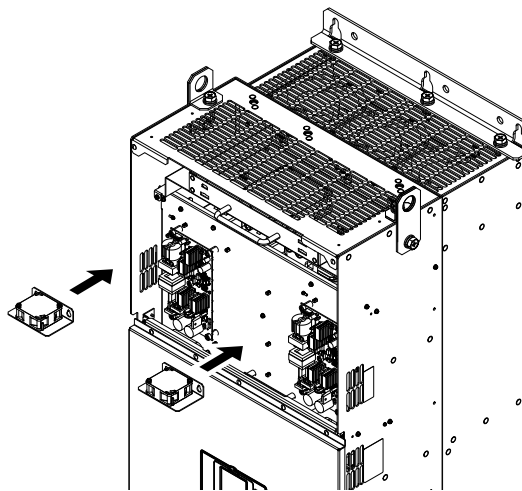
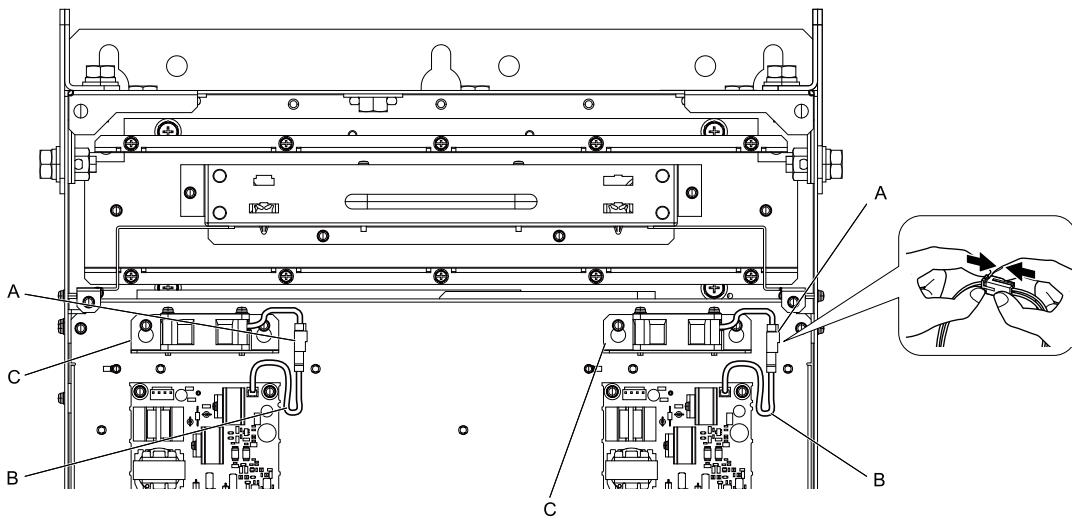


Figure 1.80 Install the Circuit Board Cooling Fan Unit

3. Connect the fan cables to the fan connectors.



A - Fan connectors
B - Fan cables

C - Circuit board cooling fan units

Figure 1.81 Connect the Fan Cables

1.4 Replace Cooling Fans and Circulation Fans

4. Install the drive cover.
5. Energize the drive and set $o4-03 = 0$ [Fan Operation Time Setting = 0 h] to reset the fan operation time.

◆ Fan Replacement (Procedure I)

DANGER! Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, remove the covers before measuring for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.

CAUTION! Burn Hazard. Do not touch a hot drive heatsink. De-energize the drive, wait for a minimum of 15 minutes, then make sure that the heatsink is cool before you replace the cooling fans. If you touch a hot drive heatsink, it can burn you.

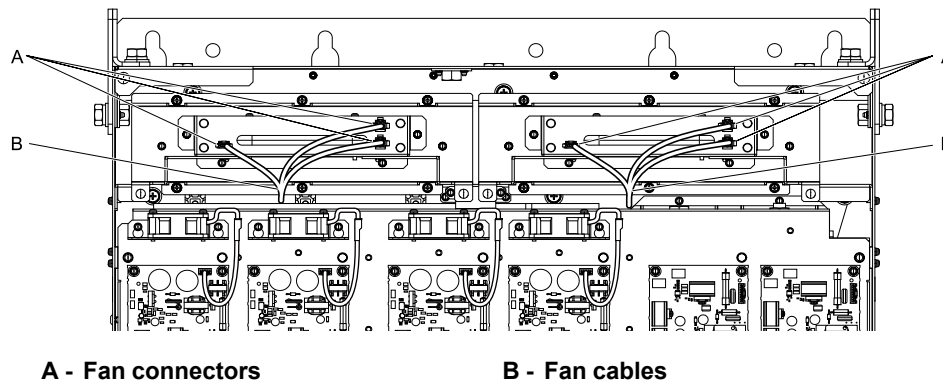
NOTICE: Use the instructions in this manual to replace the cooling fans. When you do maintenance on the fans, replace all the fans to increase product life. If you install the fans incorrectly, it can cause damage to the drive.

■ Fan Removal

1. Remove the drive cover.

CAUTION! Crush Hazard. Loosen the cover screws. Do not fully remove them. If you fully remove the cover screws, the terminal cover can fall and cause moderate injury.

2. Unplug the fan cables from the fan connectors.

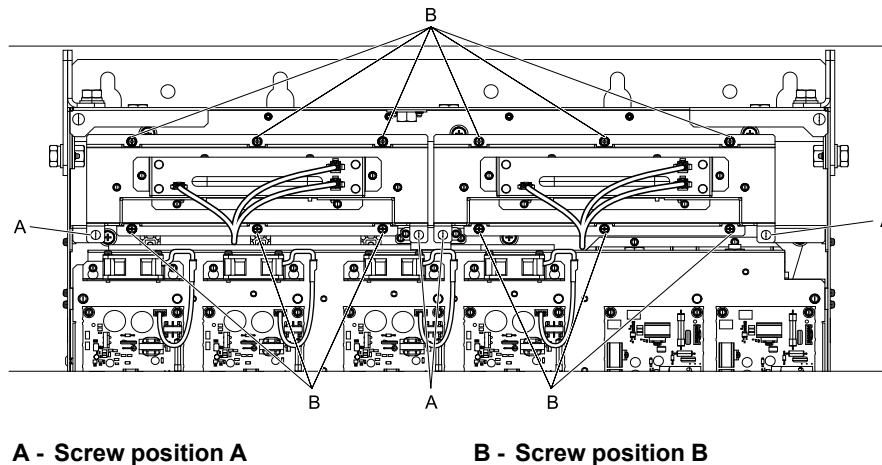


A - Fan connectors

B - Fan cables

Figure 1.82 Components

3. Loosen the screws that safety the fan unit.



A - Screw position A

B - Screw position B

Figure 1.83 Loosen the Screws

- Remove the fan unit.

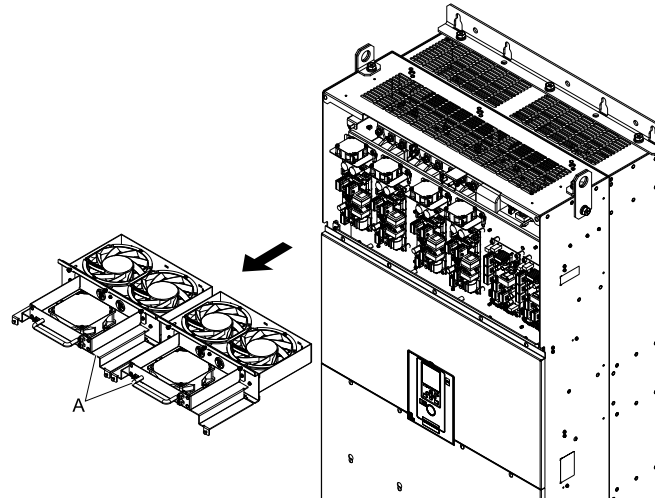
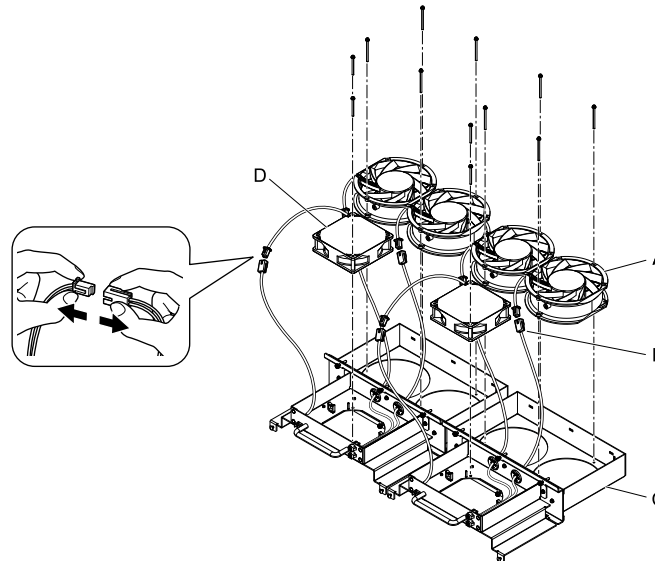


Figure 1.84 Remove the Fan Unit

- Unplug the relay connector, remove the screws that safety the cooling fans and circulation fan, and then remove the fans.



A - Cooling fan

B - Relay connectors

C - Fan unit base

D - Circulation fan

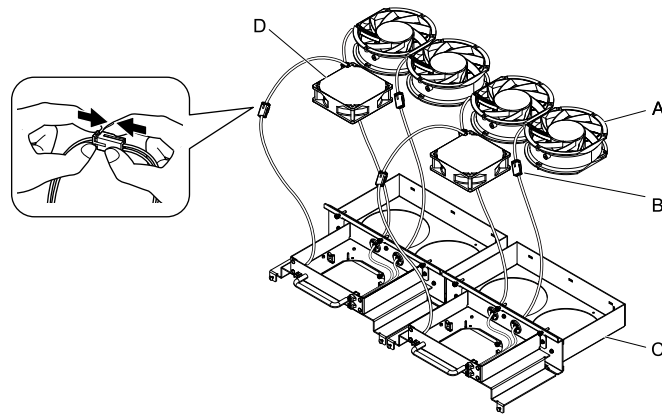
Figure 1.85 Remove the Cooling Fans and Circulation Fan

■ Fan Installation

Reverse the removal procedure for fan installation.

1.4 Replace Cooling Fans and Circulation Fans

1. Connect the relay connectors on the fan unit base to the cooling fans and the circulation fan.



A - Cooling fan
B - Relay connectors

C - Fan unit base
D - Circulation fan

Figure 1.86 Connect the Relay Connector

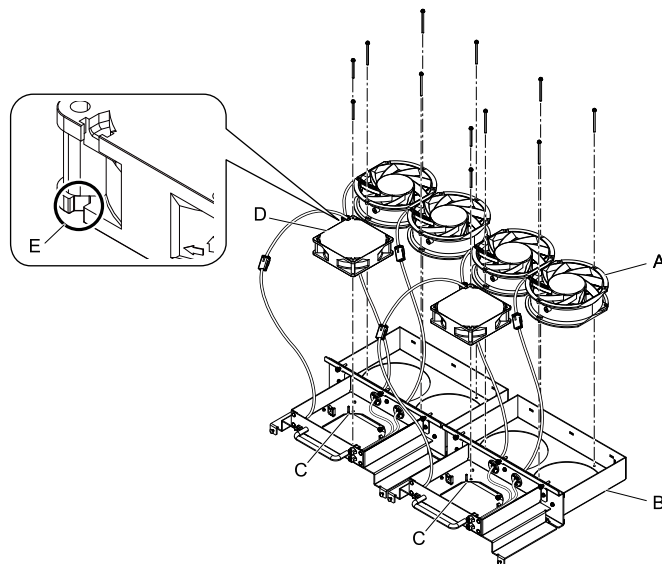
2. Align the pin on the fan unit base with the notch on the fan and put the fan in the fan unit base, then use the screws to safety it.

Tighten the screws to a correct tightening torque:

- 0.98 N·m to 1.33 N·m (8.67 lbf·in to 11.77 lbf·in)

Note:

Make sure that you do not pinch cables between the fans and the fan unit base.



A - Cooling fan
B - Fan unit base
C - Alignment pin on fan unit base

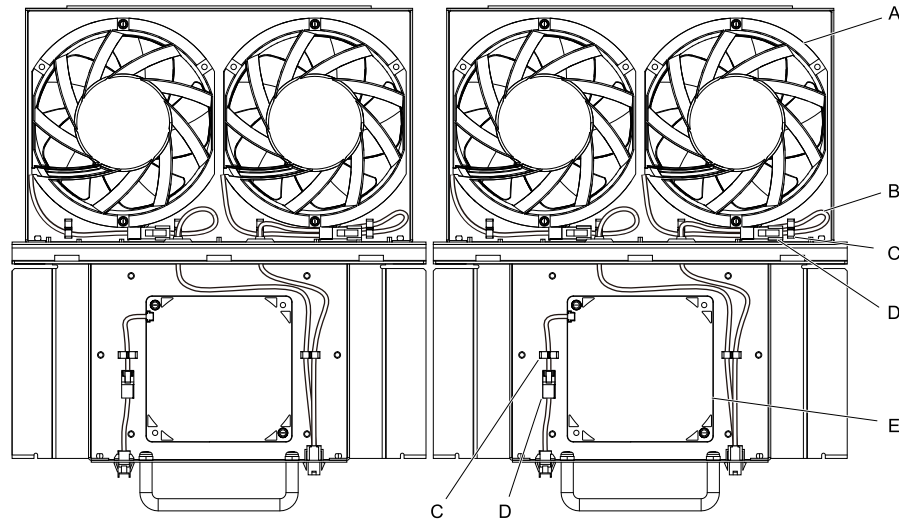
D - Circulation fan
E - Notch on fan

Figure 1.87 Install the Cooling Fans and Circulation Fan

3. Put the cables and connectors in the recess of the drive.

Note:

Safety the relay cables to the hooks.



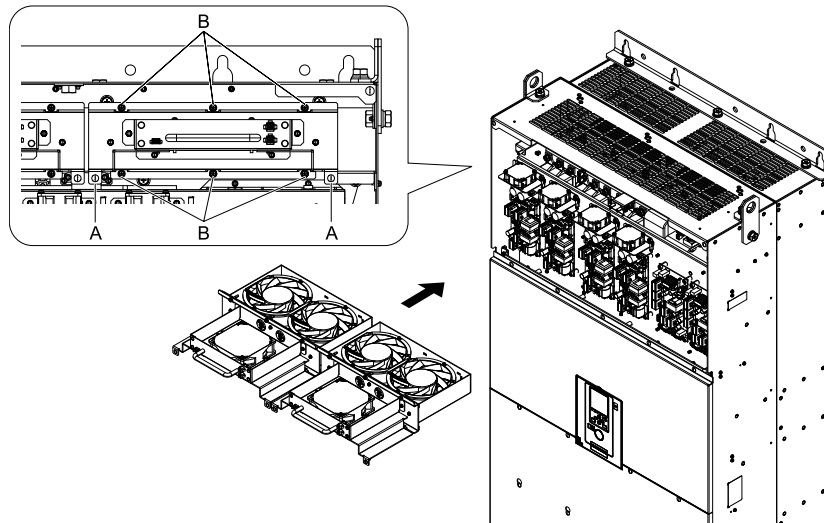
- A - Cooling fan
- B - Relay cables
- C - Cable hooks
- D - Relay connectors
- E - Circulation fan

Figure 1.88 Put the Cables and Connectors in the Drive Recess

4. Put the fan unit into the specified location and use screws to safety it to the drive.

Tighten the screws to a correct tightening torque:

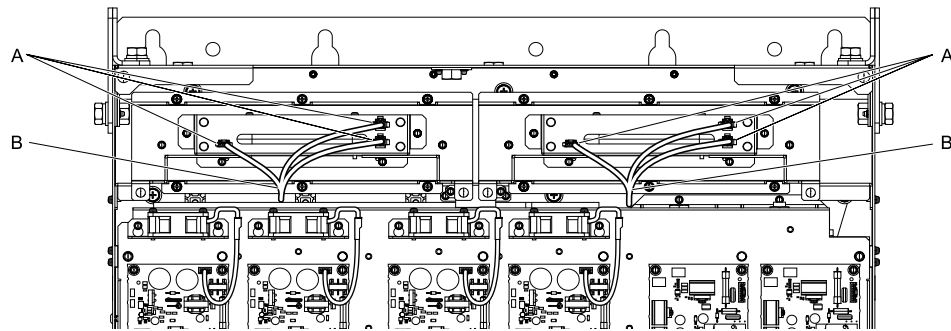
- Screws in Position A: 0.98 N·m to 1.33 N·m (8.67 lbf·in to 11.77 lbf·in)
- Screws in Position B: 1.96 N·m to 2.53 N·m (17.35 lbf·in to 22.39 lbf·in)



- A - Screw position A
- B - Screw position B

Figure 1.89 Install the Fan Unit

5. Connect the fan cable to the fan connectors.



A - Fan connectors

B - Fan cables

Figure 1.90 Connect Cooling Fan Connectors

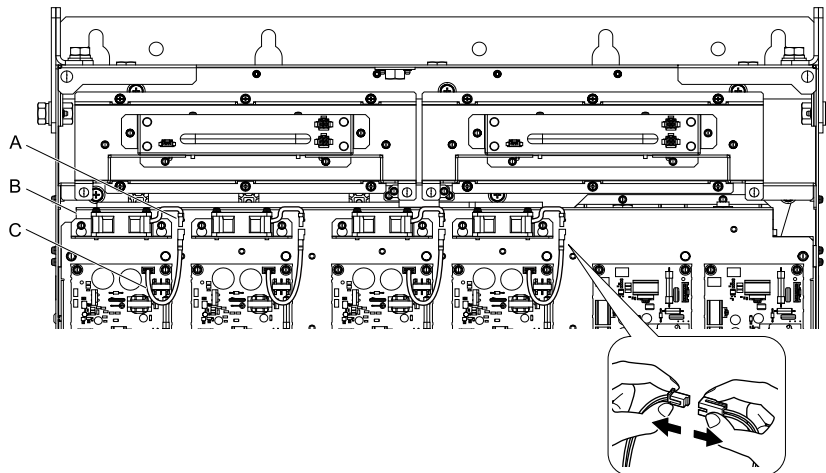
6. Install the drive cover.
7. Energize the drive and set $o4-03 = 0$ [Fan Operation Time Setting = 0 h] to reset the fan operation time.

■ Circuit Board Cooling Fan Removal

Remove the drive cover before you start this procedure.

CAUTION! Crush Hazard. Loosen the cover screws. Do not fully remove them. If you fully remove the cover screws, the terminal cover can fall and cause moderate injury.

1. Unplug the fan cables from the fan connectors.



A - Fan connectors

B - Fan cables

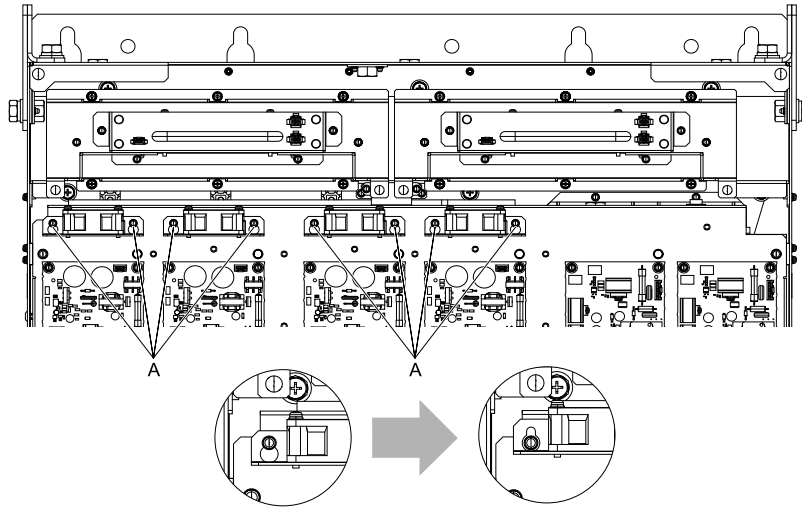
C - Circuit board cooling fan units

Figure 1.91 Unplug the Fan Cables

2. Loosen the screws that safety the circuit board cooling fan unit and slide the circuit board cooling fan unit up.

Note:

To remove the fan unit, it is only necessary to loosen the screws.



A - Screws

Figure 1.92 Slide the Circuit Board Cooling Fan Units

3. Remove the circuit board cooling fan units.

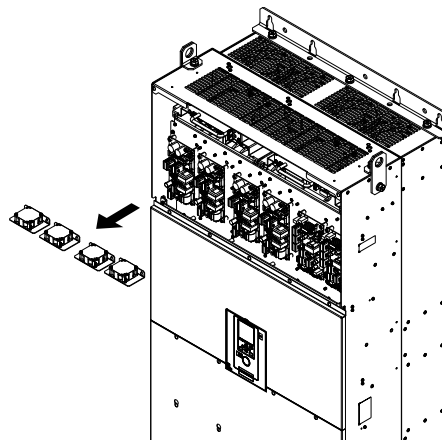
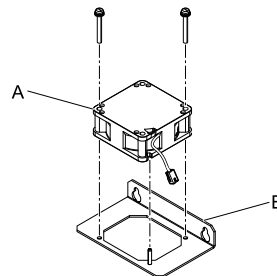


Figure 1.93 Remove the Circuit Board Cooling Fan Units

4. Remove the screws that safety the circuit board cooling fans and remove the fans.



A - Circuit board cooling fan

B - Fan unit base

Figure 1.94 Remove the Circuit Board Cooling Fans

■ Circuit Board Cooling Fan Installation

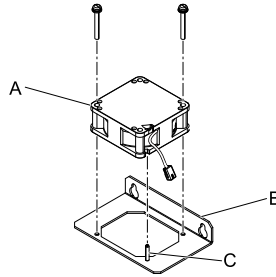
Reverse the removal procedure to install a cooling fan.

1. Align the pin on the fan unit base with the notch on the fan and put the circuit board cooling fan in the fan unit, then use the screws to safety the circuit board cooling fan to the fan unit base.
Tighten the screws to a correct tightening torque:
 - 0.98 N·m to 1.33 N·m (8.67 lbf-in to 11.77 lbf-in)

1.4 Replace Cooling Fans and Circulation Fans

Note:

Make sure that you do not pinch cables between the circuit board cooling fan and the fan unit base.



A - Circuit board cooling fan
B - Fan unit base

C - Alignment pin on fan unit base

Figure 1.95 Install the Circuit Board Cooling Fan

- Put the circuit board cooling fan unit into the specified location and use screws to safety it to the drive.
Tighten the screws to a correct tightening torque:
 - 0.98 N·m to 1.33 N·m (8.67 lbf·in to 11.77 lbf·in)

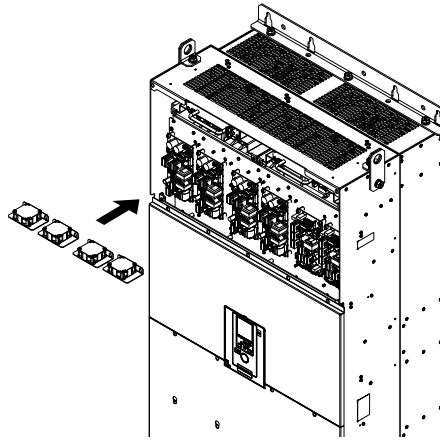
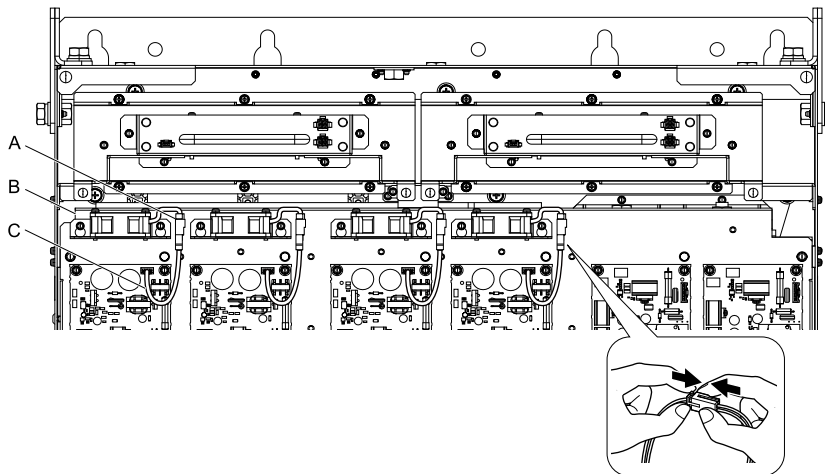


Figure 1.96 Install the Circuit Board Cooling Fan Unit

- Connect the fan cables to the fan connectors.



A - Fan connectors
B - Circuit board cooling fan units

C - Fan cables

Figure 1.97 Connect the Fan Cables

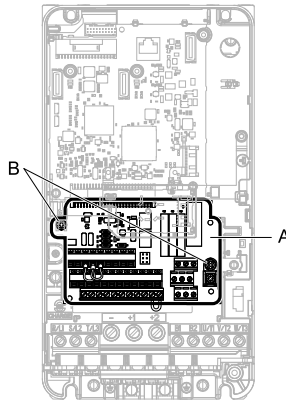
- Install the drive cover.

5. Energize the drive and set $o4-03 = 0$ [*Fan Operation Time Setting = 0 h*] to reset the fan operation time.

1.5 Replace the Drive

◆ About the Control Circuit Terminal Block

You can remove the control circuit terminal block of the drive and install a new terminal block. If there is a failure in the drive, you can use this feature to easily replace the control circuit terminal block.



A - Control circuit terminal block

B - Control circuit terminal block fastening screw

Figure 1.98 Control Circuit Terminal Block

◆ Replace the Drive

DANGER! *Electrical Shock Hazard. Disconnect all power to the drive and wait for the time specified on the warning label before you remove covers. Check the drive for dangerous voltages before servicing or repair work. If you do work on the drive when it is energized and there is no cover over the electronic circuits, it will cause serious injury or death from electrical shock. The drive has internal capacitors that stay charged after you de-energize the drive.*

WARNING! *Electrical Shock Hazard. Only let approved personnel install, wire, maintain, examine, replace parts, and repair the drive. If personnel are not approved, it can cause serious injury or death.*

DANGER! *Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, remove the covers before measuring for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.*

NOTICE: *Damage to Equipment. When you touch the drive and circuit boards, make sure that you observe correct electrostatic discharge (ESD) procedures. If you do not follow procedures, it can cause ESD damage to the drive circuitry.*

■ Notes on Wiring the Main Circuit Terminal Block

Read these notes before you wire the main circuit terminal block.

- Use UL-Listed, vinyl-coated insulated copper wires for operation with a continuous maximum permitted temperature of 75 °C at 600 V.
- Remove all unwanted objects that are near the terminal block connections.
- Remove the insulation from the connection wires to the wire stripping lengths shown in the manual.
- Do not use bent or crushed wires. Remove the damaged end of the wire before you use it. Incorrect connections can cause death or serious injury from fire.
- Do not solder stranded wire. Soldered wire connections can become loose over time and cause unsatisfactory drive performance.
- If you use stranded wire, make sure that all of the wire strands are in the connection. Also, do not twist the stranded wire too much. Incorrect connections can cause death or serious injury from fire.
- Put the wire all the way into the terminal block. Remove the insulation from the wire to the recommended wire stripping length to fit the wire with insulation in the plastic housing.
- Use a torque driver, torque ratchet, or torque wrench for the screws. A slotted driver or a hex tool will be necessary to wire the screw clamp terminal. Use applicable tools as specified by the recommended conditions in the product manual.

- If you use power tools to tighten the terminal screws, use a low speed setting (300 to 400 r/min). Failure to obey can cause damage to the terminal screws.
- Users can purchase wiring tools from Yaskawa. Contact Yaskawa or your nearest sales representative for more information.
- Wire gauges on the drive you are replacing may not match the wire gauge ranges on your new drive. Contact Yaskawa or your nearest sales representative for more information about the connection procedures.
- Do not tighten the terminal screws at an angle of 5 degrees or more. Failure to obey can cause damage to the terminal screws.
- If you damage a terminal screw, contact Yaskawa or your nearest sales representative.

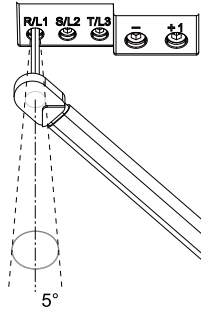


Figure 1.99 Permitted Angle

- Put the bit all the way into the hex socket to tighten the hex socket cap screw.
- When you tighten slotted screws, hold the straight-edge screwdriver perpendicularly to the screw. Make sure that you align the end of the straight-edge screwdriver with the screw groove.

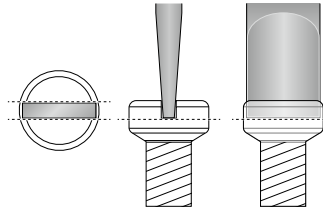
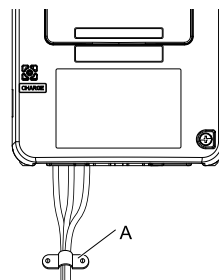


Figure 1.100 Tightening Slotted Screws

- After you connect the wires to the terminal block, lightly pull on the wires to make sure that they do not come out of the terminals.
- Remove the correct section of the wiring cover to make wiring easier.
- Do not let strain on the wiring cause damage. Use a strain relief near the wiring to release the tension. Refer to [Figure 1.101](#) for an example.



A - Cable clamp

Figure 1.101 Strain Relief Example

1.5 Replace the Drive

Table 1.13 Recommended Wiring Tools

Screw Size	Screw Shape	Adapter	Bit		Torque Driver Model (Tightening Torque)	Torque Wrench
			Model	Manufacturer		
M4		Bit	SF-BIT-SL 1,0X4,0-70	PHOENIX CONTACT	TSD-M 3NM (1.2 - 3 N·m (10.6 - 26.6 lbf·in))	N/A
M5 *1		Bit	SF-BIT-SL 1,2X6,5-70	PHOENIX CONTACT	Wire Gauge ≤ 25 mm ² (AWG 10): TSD-M 3NM (1.2 - 3 N·m (10.6 - 26.6 lbf·in))	Wire Gauge ≤ 25 mm ² (AWG 10): N/A
					Wire Gauge ≥ 30 mm ² (AWG 8): N/A	Wire Gauge ≥ 30 mm ² (AWG 8): 4.1 - 4.5 N·m (36.3 - 39.8 lbf·in) *2 *3
M6		Bit	SF-BIT-HEX 5-50	PHOENIX CONTACT	N/A	5 - 9 N·m (44.3 - 79.9 lbf·in) *2 *3
		Bit	SF-BIT-SL 1,2X6,5-70	PHOENIX CONTACT	N/A	3 - 3.5 N·m (26.6 - 31.0 lbf·in) *2 *3
M8		Bit	SF-BIT-HEX 6-50	PHOENIX CONTACT	N/A	8 - 12 N·m (70.8 - 106.2 lbf·in) *2 *3
M10		Bit	SF-BIT-HEX 8-50	PHOENIX CONTACT	N/A	12 - 14 N·m (106.2 - 123.9 lbf·in) *2 *3

*1 When wiring drive models 2056, 4089, and smaller, select the correct tools for the wire gauge.

*2 Use 6.35 mm (0.25 in) bit socket holder.

*3 Use a torque wrench that can apply this torque measurement range.

■ Remove the Control Circuit Terminal Block

Remove the keypad and the drive front cover before doing these steps.

1. Loosen the screws on the control circuit terminal block.

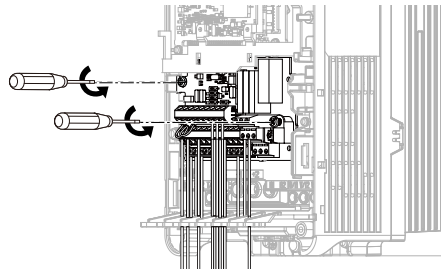


Figure 1.102 Loosen the Screws

2. Slide the wired control circuit terminal block down and remove it.

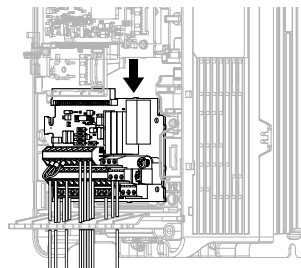


Figure 1.103 Remove the Control Circuit Terminal Block

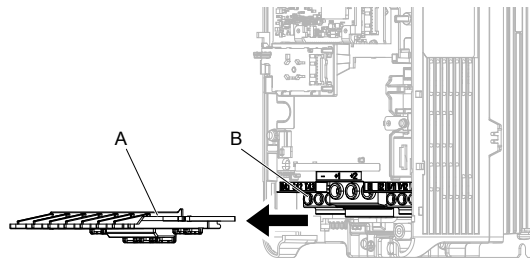
■ Wire a New Drive

Remove the keypad, front cover, and control circuit terminal block of the new drive. Wire the drive to the main circuit terminal block before you install a wired control circuit terminal block.

1. Pull the wiring cover away from the drive to remove it.

Note:

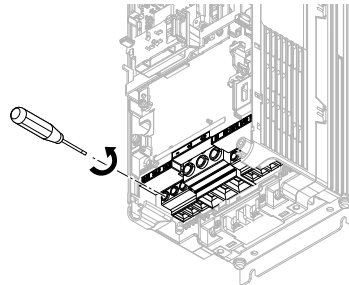
6-Phase/12-pulse drives (models: Txxx) do not have the wiring covers.

**A - Wiring cover****B - Main circuit terminal block****Figure 1.104 Remove the Wiring Cover**

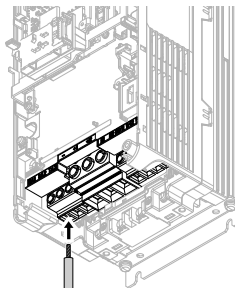
2. Loosen the main circuit terminal block screws to fully open the terminal block opening.

Note:

The terminal block openings ship from the factory as fully open.

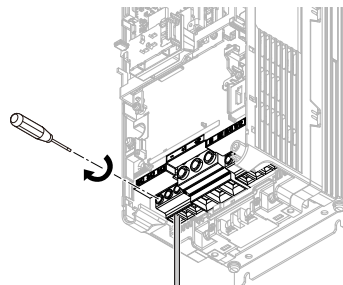
**Figure 1.105 Loosen Terminal Block Screws**

3. Put wires with prepared ends into the main circuit terminal block.

**Figure 1.106 Install the Electrical Wire****Note:**

If there is a jumper between terminals +1 and +2, loosen the terminal block screws to remove the jumper before you wire to terminals +1 and +2.

4. Tighten the screws to the specified torque.

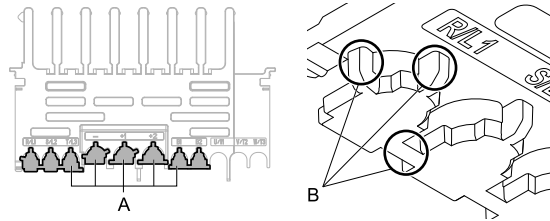
**Figure 1.107 Tighten Terminal Block Screws**

1.5 Replace the Drive

5. Check the terminal sign that you wired and use a nipper as shown in [Figure 1.108](#) to clip the specified cutaway section of the wiring cover.

Note:

6-Phase/12-pulse drives (models: Txxx) do not have the wiring covers.



A - Cutaway sections

B - Clip here with nippers

Figure 1.108 Clip the Cutaway Section of the Wiring Cover

Note:

- Different drive models have different wiring cover shapes.
- Only clip the section of the wiring cover that applies to the wired terminal. If you clip areas that do not apply to wired terminals, the protective enclosure will not keep its IP20 protective level.
- Be careful when clipping the cutaway section of the wiring cover, as the section may fly out in unpredictable directions.
- Make sure that the clipped section does not cause damage to the wires.
- If you use wires that are not specified by Yaskawa, the protective enclosure could lose its IP20 protective level, although the wiring cover is correct. Contact Yaskawa or your nearest sales representative for more information.

6. Put the wiring cover in its initial position. Put the cables through the holes that you cut out of the wiring cover.

Note:

6-Phase/12-pulse drives (models: Txxx) do not have the wiring covers.

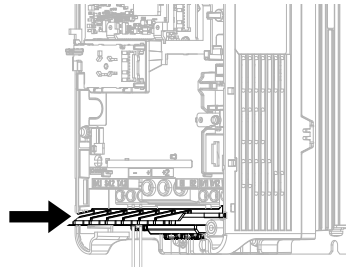
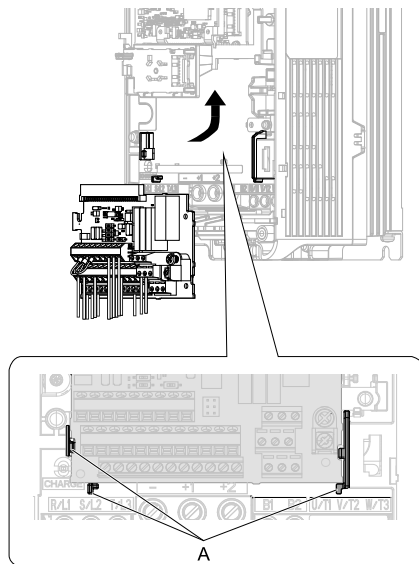


Figure 1.109 Reattach the Wiring Cover

■ Connect the Control Circuit Terminal Block

1. To put a wired control circuit terminal block in the drive, align it with the guides and move it straight up.



A - Guides

Figure 1.110 Put the Terminal Block into the Connector

2. Use M3 screws to safety the terminal block.
Tighten the screws to a correct tightening torque:
 - M3 screws: 0.5 N·m to 0.6 N·m (4.4 lbf-in to 5.3 lbf-in)

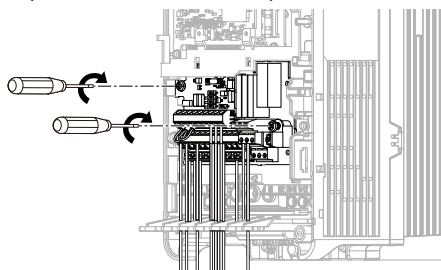


Figure 1.111 Safety the Terminal Block

3. Install the front cover and the keypad to their initial positions.
4. Check *o2-04 [Drive Model (KVA) Selection]*.

Note:

- When you save parameter information in a keypad that you installed before you replaced the terminal block, make sure that you use that keypad to restore the parameter data.
- To reset the performance life monitors for the components, set *o4-01 to o4-13 [Maintenance Period]*.

1.6 Replace the Keypad Battery

When the keypad battery is expired, the date and time go back to the default settings. Use this procedure to replace the battery.

WARNING! Fire Hazard. Handle keypad batteries properly. Do not charge the battery or disassemble the keypad. If the battery explodes, it can cause a fire.

To replace the battery, use a Hitachi Maxell “CR2016 Lithium Manganese Dioxide Lithium Battery” or an equivalent battery with these properties:

- Nominal voltage: 3 V
- Operating temperature range: -20°C to +85°C (-4°F to +185°F)

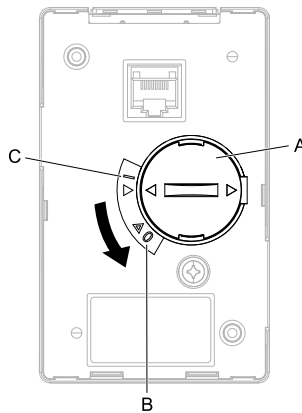
WARNING! Fire Hazard. Do not disassemble batteries. Do not expose batteries to heat or fire. If the battery explodes, it can cause a fire.

NOTICE: Damage to Equipment. The keypad battery stays in use after you de-energize the drive. When you will keep the drive de-energized for long periods of time, remove the battery from the keypad. When the expected life of the battery is complete, replace the battery immediately. A dead battery in the keypad can leak and cause damage to the keypad and drive.

The performance life estimate of a new battery is different for different keypad versions.

Refer to “REV” on the keypad nameplate for the keypad version.

- Keypad with REV: H and earlier or REV: J and later
 - 5 years (20 °C (68 °F))
 - 3.5 years (-10 °C to +50 °C (14 °F to 122 °F))
 - Keypad with REV: I
 - 2.5 years (20 °C (68 °F))
 - 1.8 years (-10 °C to +50 °C (14 °F to 122 °F))
1. De-energize the drive and remove the keypad.
 2. Use a slotted screwdriver to turn the battery cover counterclockwise and remove the cover.



A - Battery cover
B - Opened

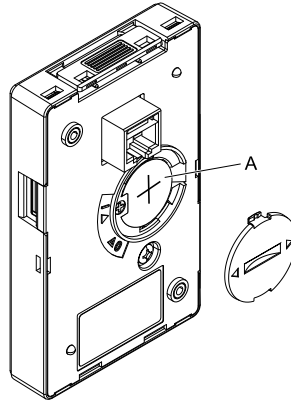
C - Closed

Figure 1.112 Remove the Battery Cover

3. Remove the used battery from the keypad.
4. Insert the new battery.

Note:

- The battery cover side is the positive pole. Make sure that the polarity is correct when you put the battery in the keypad.
- Discard the used battery as specified by local regulations.



A - Battery

Figure 1.113 Insert the New Battery

5. Put the battery cover on the keypad and use a slotted screwdriver to turn the battery cover clockwise to close it.
6. Install the keypad on the drive.

1.7 Storage Guidelines

The chemicals in the electrolytic capacitors and other electronic parts of the drive change over time. When you store the drive for long periods of time, use the information in this section to help keep the performance life estimates.

◆ Storage Location

- Temperature and Humidity

When you store the drive for approximately one month, for example during shipping, you can put the drive in a location where the temperature is $-20\text{ }^{\circ}\text{C}$ to $+70\text{ }^{\circ}\text{C}$ ($-4\text{ }^{\circ}\text{F}$ to $+158\text{ }^{\circ}\text{F}$). Correctly package and store the drive during shipping to prevent vibration and impact damage.

Do not put the drive in direct sunlight or where there will be condensation or ice. Put the drive in a location where the relative humidity is 95% or less.

- Dust and Oil Mist

Do not keep the drive locations with dust or oil mist. For example, cement factories and cotton mills.

- Corrosive Gas

Do not keep the drive in locations with corrosive gas. For example, chemical plants, refineries, and sewage plants.

- Salt Damage

Do not keep the drive in salty locations. For example, locations near the ocean, and salt damage-designated locations.

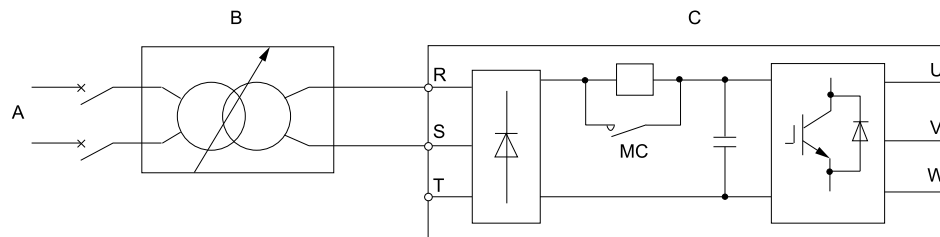
Do not keep the drive in unsatisfactory locations. Keep all drives in storage rooms that are safe from unsatisfactory elements.

◆ Regular Application of Power

To prevent deterioration of the capacitors, Yaskawa recommends that you apply power to the drive a minimum of one time each year for a minimum of 30 minutes.

If you store the drive for longer than two years and do not apply power, Yaskawa recommends that you use a variable power source and gradually increase the power from 0 V to the rated drive voltage over a period of 2 to 3 minutes.

Apply power for a minimum of 1 hour with no load to reform the main circuit electrolytic capacitor. When you operate the drive after you apply power, wire the drive correctly and check for drive faults, overcurrents, motor vibration, motor speed differences, and other defects during operation.



A - AC power supply

B - Variable power source

C - Drive

Figure 1.114 Power Distribution Method

Troubleshooting

2.1	Section Safety	80
2.2	Types of Faults, Minor Faults, Alarms, and Errors	82
2.3	List of Fault, Minor Fault, Alarm, and Error Codes	83
2.4	Fault	89
2.5	Minor Faults/Alarms	120
2.6	Parameter Setting Errors.....	131
2.7	Auto-Tuning Errors	137
2.8	Backup Function Operating Mode Display and Errors.....	142
2.9	Diagnosing and Resetting Faults	144
2.10	Troubleshooting Without Fault Display.....	146

2.1 Section Safety

DANGER

Electrical Shock Hazard

Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, remove the covers before measuring for dangerous voltages to make sure that the drive is safe.

If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.

WARNING

Electrical Shock Hazard

Do not operate the drive when covers are missing. Replace covers and shields before you operate the drive. Use the drive only as specified by the instructions.

Some figures in this section include drives without covers or safety shields to more clearly show the inside of the drive. If covers or safety shields are missing from the drive, it can cause serious injury or death.

Always ground the motor-side grounding terminal.

If you do not ground the equipment correctly, it can cause serious injury or death if you touch the motor case.

After the drive blows a fuse or trips a GFCI, do not immediately energize the drive or operate peripheral devices. Wait for the time specified on the warning label at a minimum and make sure that all indicators are OFF. Then check the wiring and peripheral device ratings to find the cause of the problem. If you do not know the cause of the problem, contact Yaskawa before you energize the drive or peripheral devices.

If you do not fix the problem before you operate the drive or peripheral devices, it can cause serious injury or death.

Only let approved personnel install, wire, maintain, examine, replace parts, and repair the drive.

If personnel are not approved, it can cause serious injury or death.

Do not wear loose clothing or jewelry when you do work on the drive. Tighten loose clothing and remove all metal objects, for example watches or rings.

Loose clothing can catch on the drive and jewelry can conduct electricity and cause serious injury or death.

Do not remove covers or touch circuit boards while the drive is energized.

If you touch the internal components of an energized drive, it can cause serious injury or death.

Do not modify the drive body or drive circuitry.

Modifications to drive body and circuitry can cause serious injury or death, will cause damage to the drive, and will void the warranty. Yaskawa is not responsible for modifications of the product made by the user.

Fire Hazard

Tighten all terminal screws to the correct tightening torque.

Connections that are too loose or too tight can cause incorrect operation and damage to the drive. Incorrect connections can also cause death or serious injury from fire.

Tighten screws at an angle in the specified range shown in this manual.

If you tighten the screws at an angle not in the specified range, you can have loose connections that can cause damage to the terminal block or start a fire and cause serious injury or death.

Damage to Equipment

Do not apply incorrect voltage to the main circuit of the drive. Operate the drive in the specified range of the input voltage on the drive nameplate.

Voltages that are higher than the permitted nameplate tolerance can cause damage to the drive.

⚠ WARNING**Fire Hazard**

Do not put flammable or combustible materials on top of the drive and do not install the drive near flammable or combustible materials. Attach the drive to metal or other noncombustible material.

Flammable and combustible materials can start a fire and cause serious injury or death.

Crush Hazard

Wear eye protection when you do work on the drive.

If you do not use correct safety equipment, it can cause serious injury or death.

Use a crane or hoist to move large drives when necessary.

If you try to move a large drive without a crane or hoist, it can cause serious injury or death.

NOTICE**Damage to Equipment**

When you touch the drive and circuit boards, make sure that you observe correct electrostatic discharge (ESD) procedures.

If you do not follow procedures, it can cause ESD damage to the drive circuitry.

Do not break the electrical connection between the drive and the motor when the drive is outputting voltage.

Incorrect equipment sequencing can cause damage to the drive.

Make sure that all connections are correct after you install the drive and connect peripheral devices.

Incorrect connections can cause damage to the drive.

Note:

Do not use unshielded wire for control wiring. Use shielded, twisted-pair wires and ground the shield to the ground terminal of the drive. Unshielded wire can cause electrical interference and unsatisfactory system performance.

2.2 Types of Faults, Minor Faults, Alarms, and Errors

If the drive or motor do not operate correctly, check the drive keypad for a code or message.



If problems occur that are not identified in this manual, contact the nearest Yaskawa representative with this information:

- Drive model
- Drive software version
- Date of purchase
- Description of the problem (such as failure conditions)

Table 2.1 contains descriptions of the different types of faults, minor faults, alarms, and errors that can occur during drive operation.

Contact Yaskawa if there is damage to the drive. Contact information is on the back cover of the manual.

Table 2.1 Types of Faults, Minor Faults, Alarms, and Errors

Type	Drive Response
Faults	<p>When the drive detects a fault, it will cause these conditions:</p> <ul style="list-style-type: none"> • The keypad shows the fault code and  and ALM/ERR of the LED Status Ring illuminate continuously. • The drive shuts off output, and the motor coasts to a stop. Some faults let the user select a motor stopping method. • Fault relay output MA-MC will turn ON, and MB-MC will turn OFF. <p>The drive will not operate until you clear the fault with a Fault Reset and the drive goes back to usual status.</p>
Minor Faults/Alarms	<p>When the drive detects a minor fault or an alarm, it will cause these conditions:</p> <ul style="list-style-type: none"> • The keypad shows the alarm code and  and ALM/ERR on the LED Status Ring flash. • The drive will continue to operate the motor. Some alarms let the user select a motor stopping method. • If the drive detects a minor fault, the terminal set to H2-01 to H2-03 = 10 [MFDO Function Select = Alarm] will switch ON. If you do not set parameters H2-01 to H2-03, the drive will not trigger MFDO terminals when it detects a minor fault. • The drive will not output a minor fault signal when it detects an alarm. <p>It is not necessary to do Fault Reset.</p>
Operation Errors	<p>An error occurs when parameter settings do not agree or a parameter combination is incorrect. The drive will not operate until you set the parameters correctly.</p> <p>When the drive detects an operation error, these conditions will result:</p> <ul style="list-style-type: none"> • The keypad shows the error code. • Multi-function outputs do not output an alarm signal. <p>Find the parameters that caused the error and correct the settings.</p>
Auto-Tuning Errors	<p>An error occurs during Auto-Tuning.</p> <p>When the drive detects a tuning error, it will cause these conditions:</p> <ul style="list-style-type: none"> • The keypad shows the error code. • Multi-function outputs do not output an alarm signal. • The motor coasts to stop. <p>Remove the cause of the error and do Auto-Tuning again.</p>
Copy Function Errors	<p>An error occurs when you use the keypad for a backup, restore, or verify operation.</p> <p>When the drive detects a copy function error, it will cause these conditions:</p> <ul style="list-style-type: none"> • The keypad shows the error code. • Multi-function outputs do not output an alarm signal. <p>Push a key on the keypad to clear the error. Remove the cause of the error and try the backup, restore, or verify operation again.</p>

2.3 List of Fault, Minor Fault, Alarm, and Error Codes

Table 2.2 shows the possible fault, minor fault, alarm, and error codes.

The display codes are in alphabetical order. Search the table for the code shown on the keypad, and identify its causes and possible solutions.

Note:

The number in parentheses adjacent to the code in the table identifies the fault code or minor fault code (hex. number) that was read during MEMOBUS/Modbus communications.

Example: AEr (0032)

Table 2.2 List of Fault, Minor Fault, Alarm, and Error Codes

Display (Hex.)	Name	ALM LED	Type	Ref.
AEr (0032)	Station Address Setting Error	Flashing	Alarm	120
bAT (0085)	Keypad Battery Low Voltage	Flashing	Alarm	120
bAT (0402)	Keypad Battery Low Voltage	Illuminated	Fault	89
bb (0008)	Baseblock	Flashing	Alarm	120
bCE (008A)	Bluetooth Communication Error	Flashing	Alarm	120
bCE (0416)	Bluetooth Communication Fault	Illuminated	Fault	89
boL (0045)	Braking Transistor Overload	Flashing	Alarm	120
boL (004F)	Braking Transistor Overload Fault	Illuminated	Fault	89
bUS (0015)	Option Communication Error	Flashing	Alarm	120
bUS (0022)	Option Communication Error	Illuminated	Fault	89
bUSy	Busy	-	Not an alarm.	121
CALL (001D)	Serial Comm Transmission Error	Flashing	Alarm	121
CE (0014)	Modbus Communication Error	Flashing	Alarm	121
CE (0021)	Modbus Communication Error	Illuminated	Fault	89
CF (0025)	Control Fault	Illuminated	Fault	90
CoF (0046)	Current Offset Fault	Illuminated	Fault	90
CP1 (0087)	Comparator 1 Limit Error	Flashing	Alarm	121
CP1 (0414)	Comparator 1 Limit Fault	Illuminated	Fault	90
CP2 (0088)	Comparator 2 Limit Error	Flashing	Alarm	122
CP2 (0415)	Comparator 2 Limit Fault	Illuminated	Fault	91
CPF00	Control Circuit Error	Illuminated	Fault	91
CPF01	Control Circuit Error	Illuminated	Fault	91
CPF02 (0083) CPF03 (0084)	Control Circuit Error	Illuminated	Fault	91, 91
CPF06 (0087)	Control Circuit Error (EEPROM Memory Data Error)	Illuminated	Fault	91
CPF07 (0088) CPF08 (0089)	Control Circuit Error	Illuminated	Fault	91, 92
CPF10 (008B) - CPF14 (008F)	Control Circuit Error	Illuminated	Fault	92 - 92
CPF16 (0091) - CPF23 (0098)	Control Circuit Error	Illuminated	Fault	92, 93
CPF24 (0099)	Control Circuit Error (Drive Unit Signal Fault)	Illuminated	Fault	93
CPF26 (009B) - CPF39 (00A8)	Control Circuit Error	Illuminated	Fault	93, 95
CPyE	Error Writing Data	-	Backup Function Runtime Error	142
CrST	Remove RUN Command to Reset	Flashing	Not an alarm.	122
CSEr	Control Mode Mismatch	-	Backup Function Runtime Error	142
CyC (0033)	MECHATROLINK CommCycleSettingErr	Flashing	Alarm	122

2.3 List of Fault, Minor Fault, Alarm, and Error Codes

Display (Hex.)	Name	ALM LED	Type	Ref.
CyPo (0029)	Cycle Power to Accept Changes	Flashing	Alarm	122
dEv (0011)	Speed Deviation	Flashing	Alarm	122
dEv (0019)	Speed Deviation	Illuminated	Fault	95
dFPS	Drive Model Mismatch	-	Backup Function Runtime Error	142
dnE (002A)	Drive Disabled	Flashing	Alarm	122
dv1 (0032)	Z Pulse Fault	Illuminated	Fault	95
dv2 (0033)	Z Pulse Noise Fault Detection	Illuminated	Fault	96
dv3 (0034)	Inversion Detection	Illuminated	Fault	96
dv4 (0035)	Inversion Prevention Detection	Illuminated	Fault	96
dv7 (005B)	Polarity Judge Timeout	Illuminated	Fault	97
dWA2 (004A)	DriveWorksEZ Alarm 2	Flashing	Alarm	122
dWA3 (004B)	DriveWorksEZ Alarm 3	Flashing	Alarm	122
dWAL (0049)	DriveWorksEZ Alarm	Flashing	Alarm	122
dWF1 (004A)	EEPROM Memory DWEZ Data Error	Illuminated	Fault	97
dWF2 (004B)	DriveWorksEZ Fault 2	Illuminated	Fault	97
dWF3 (004C)	DriveWorksEZ Fault 3	Illuminated	Fault	97
dWFL (0049)	DriveWorksEZ Fault	Illuminated	Fault	97
E5 (0031)	MECHATROLINK Watchdog Timer Err	Flashing	Alarm	123
E5 (0039)	MECHATROLINK Watchdog Timer Err	Illuminated	Fault	97
EF (0007)	FWD/REV Run Command Input Error	Flashing	Alarm	123
EF0 (001A)	Option Card External Fault	Flashing	Alarm	123
EF0 (0027)	Option Card External Fault	Illuminated	Fault	97
EF1 (0042)	External Fault (Terminal S1)	Illuminated	Fault	98
EF1 (0039)	External Fault (Terminal S1)	Flashing	Alarm	123
EF2 (003A)	External Fault (Terminal S2)	Flashing	Alarm	123
EF2 (0043)	External Fault (Terminal S2)	Illuminated	Fault	98
EF3 (0009)	External Fault (Terminal S3)	Flashing	Alarm	123
EF3 (0011)	External Fault (Terminal S3)	Illuminated	Fault	98
EF4 (000A)	External Fault (Terminal S4)	Flashing	Alarm	123
EF4 (0012)	External Fault (Terminal S4)	Illuminated	Fault	98
EF5 (000B)	External Fault (Terminal S5)	Flashing	Alarm	124
EF5 (0013)	External Fault (Terminal S5)	Illuminated	Fault	98
EF6 (000C)	External Fault (Terminal S6)	Flashing	Alarm	124
EF6 (0014)	External Fault (Terminal S6)	Illuminated	Fault	98
EF7 (000D)	External Fault (Terminal S7)	Flashing	Alarm	124
EF7 (0015)	External Fault (Terminal S7)	Illuminated	Fault	99
EF8 (000E)	External Fault (Terminal S8)	Flashing	Alarm	124
EF8 (0016)	External Fault (Terminal S8)	Illuminated	Fault	99
End1	Excessive Rated Voltage Setting	Flashing	Auto-Tuning Error	137
End2	Iron Core Saturation Coefficient	Flashing	Auto-Tuning Error	137
End3	Rated Current Setting Alarm	Flashing	Auto-Tuning Error	137
End4	Adjusted Slip Calculation Error	Flashing	Auto-Tuning Error	137
End5	Resistance Tuning Error	Flashing	Auto-Tuning Error	137

2.3 List of Fault, Minor Fault, Alarm, and Error Codes

Display (Hex.)	Name	ALM LED	Type	Ref.
End6	Leakage Inductance Alarm	Flashing	Auto-Tuning Error	137
End7	No-Load Current Alarm	Flashing	Auto-Tuning Error	137
End8	HFI Alarm	Flashing	Auto-Tuning Error	138
End9	Initial Pole Detection Alarm	Flashing	Auto-Tuning Error	138
EP24v (0081)	External Power 24V Supply	Flashing	Alarm	124
Er-01	Motor Data Error	Flashing	Auto-Tuning Error	138
Er-02	Drive in an Alarm State	Flashing	Auto-Tuning Error	138
Er-03	STOP Button was Pressed	Flashing	Auto-Tuning Error	138
Er-04	Line-to-Line Resistance Error	Flashing	Auto-Tuning Error	139
Er-05	No-Load Current Error	Flashing	Auto-Tuning Error	139
Er-08	Rated Slip Error	Flashing	Auto-Tuning Error	139
Er-09	Acceleration Error	Flashing	Auto-Tuning Error	139
Er-10	Motor Direction Error	Flashing	Auto-Tuning Error	139
Er-11	Motor Speed Error	Flashing	Auto-Tuning Error	139
Er-12	Current Detection Error	Flashing	Auto-Tuning Error	140
Er-13	Leakage Inductance Error	Flashing	Auto-Tuning Error	140
Er-14	Motor Speed Error 2	Flashing	Auto-Tuning Error	140
Er-15	Torque Saturation Error	Flashing	Auto-Tuning Error	140
Er-16	Inertia ID Error	Flashing	Auto-Tuning Error	140
Er-17	Reverse Prohibited Error	Flashing	Auto-Tuning Error	140
Er-18	Back EMF Error	Flashing	Auto-Tuning Error	140
Er-19	PM Inductance Error	Flashing	Auto-Tuning Error	140
Er-20	Stator Resistance Error	Flashing	Auto-Tuning Error	140
Er-21	Z Pulse Correction Error	Flashing	Auto-Tuning Error	140
Er-25	HighFreq Inject Param Tuning Err	Flashing	Auto-Tuning Error	141
Err (001F)	EEPROM Write Error	Illuminated	Fault	99
FAn (000F)	Internal Fan Fault	Flashing	Alarm	124
FAn (0017)	Internal Fan Fault	Illuminated	Fault	99
FAn1 (0413)	Drive Cooling Fan Fault	Illuminated	Fault	99
FbH (0028)	Excessive PID Feedback	Flashing	Alarm	124
FbH (0041)	Excessive PID Feedback	Illuminated	Fault	99
FbL (0027)	PID Feedback Loss	Flashing	Alarm	125
FbL (0028)	PID Feedback Loss	Illuminated	Fault	100
GF (0006)	Ground Fault	Illuminated	Fault	100
HCA (0034)	High Current Alarm	Flashing	Alarm	125
HLCE (0411)	High Level Communication Errors	Illuminated	Fault	100
iFEr	Communication Err	-	Backup Function Runtime Error	142
L24v (0021)	Loss of External Power 24 Supply	Flashing	Alarm	125
LF (001C)	Output Phase Loss	Illuminated	Fault	100
LF2 (0036)	Output Current Imbalance	Illuminated	Fault	100
LoG	Log Com Error	Flashing	Alarm	125
LSo (0051)	Low Speed Motor Step-Out	Illuminated	Fault	101
LT-1 (0035)	Cooling Fan Maintenance Time	Flashing	Alarm	126

2.3 List of Fault, Minor Fault, Alarm, and Error Codes

Display (Hex.)	Name	ALM LED	Type	Ref.
LT-2 (0036)	Capacitor Maintenance Time	Flashing	Alarm	126
LT-3 (0043)	SoftChargeBypassRelay MainteTime	Flashing	Alarm	126
LT-4 (0044)	IGBT Maintenance Time (50%)	Flashing	Alarm	126
ndAT	Model,VolClass,Capacity Mismatch	-	Backup Function Runtime Error	142
nSE (0052)	Node Setup Error	Illuminated	Fault	101
oC (0007)	Overcurrent	Illuminated	Fault	101
oFA00 (0101)	Option Not Compatible with Port	Illuminated	Fault	102
oFA01 (0102)	Option Fault/Connection Error	Illuminated	Fault	103
oFA02 (0103)	Duplicate Options	Illuminated	Fault	103
oFA03 (0104) - oFA06 (0107)	Option Card Error at Option Port (CN5-A)	Illuminated	Fault	103, 103
oFA10 (0111) oFA11 (0112)	Option Card Error at Option Port (CN5-A)	Illuminated	Fault	103, 103
oFA12 (0113) - oFA17 (0118)	Option Card Connection Error (CN5-A)	Illuminated	Fault	104 - 104
oFA30 (0131) - oFA43 (013E)	Communication Option Card Connection Error (CN5-A)	Illuminated	Fault	104 - 106
oFb00 (0201)	Option Not Compatible with Port	Illuminated	Fault	106
oFb01 (0202)	Option Fault/Connection Error	Illuminated	Fault	106
oFb02 (0203)	Duplicate Options	Illuminated	Fault	106
oFb03 (0204) - oFb11 (0212)	Option Card Error Occurred at Option Port (CN5-B)	Illuminated	Fault	106 - 107
oFb12 (0213) - oFb17 (0218)	Option Card Connection Error (CN5-B)	Illuminated	Fault	107 - 108
oFC00 (0301)	Option Not Compatible with Port	Illuminated	Fault	108
oFC01 (0302)	Option Fault/Connection Error	Illuminated	Fault	108
oFC02 (0303)	Duplicate Options	Illuminated	Fault	108
oFC03 (0304) - oFC11 (0312)	Option Card Error Occurred at Option Port (CN5-C)	Illuminated	Fault	108 - 109
oFC12 (0313) - oFC17 (0318)	Option Card Connection Error (CN5-C)	Illuminated	Fault	109 - 110
oFC50 (0351) - oFC55 (0356)	Option Card Error Occurred at Option Port (CN5-C)	Illuminated	Fault	110 - 110
oH (0003)	Heatsink Overheat	Flashing	Alarm	126
oH (0009)	Heatsink Overheat	Illuminated	Fault	110
oH1 (000A)	Heatsink Overheat	Illuminated	Fault	111
oH2 (0004)	External Overheat (H1-XX=B)	Flashing	Alarm	126
oH3 (001D)	Motor Overheat (PTC Input)	Illuminated	Fault	111
oH3 (0022)	Motor Overheat (PTC Input)	Flashing	Alarm	126
oH4 (0020)	Motor Overheat Fault (PTC Input)	Illuminated	Fault	111
oL1 (000B)	Motor Overload	Illuminated	Fault	111
oL2 (000C)	Drive Overload	Illuminated	Fault	112
oL3 (0005)	Overtorque 1	Flashing	Alarm	127
oL3 (000D)	Overtorque Detection 1	Illuminated	Fault	113
oL4 (0006)	Overtorque 2	Flashing	Alarm	127
oL4 (000E)	Overtorque Detection 2	Illuminated	Fault	113
oL5 (003D)	Mechanical Weakening Detection 1	Flashing	Alarm	127
oL5 (0044)	Mechanical Weakening Detection 1	Illuminated	Fault	113
oL7 (002B)	High Slip Braking Overload	Illuminated	Fault	113
oPE01	Drive Capacity Setting Fault	Flashing	Parameter Setting Error	131
oPE02	Parameter Range Setting Error	Flashing	Parameter Setting Error	131

2.3 List of Fault, Minor Fault, Alarm, and Error Codes

Display (Hex.)	Name	ALM LED	Type	Ref.
oPE03	Multi-Function Input Setting Err	Flashing	Parameter Setting Error	131
oPE05	Run Cmd/Freq Ref Source Sel Err	Flashing	Parameter Setting Error	132
oPE06	Control Method Selection Error	Flashing	Parameter Setting Error	133
oPE07	Analog Input Selection Error	Flashing	Parameter Setting Error	133
oPE08	Parameter Selection Error	Flashing	Parameter Setting Error	133
oPE09	PID Control Selection Fault	Flashing	Parameter Setting Error	134
oPE10	V/f Data Setting Error	Flashing	Parameter Setting Error	134
oPE11	Carrier Frequency Setting Error	Flashing	Parameter Setting Error	135
oPE13	Pulse Monitor Selection Error	Flashing	Parameter Setting Error	135
oPE15	Torque Control Setting Error	Flashing	Parameter Setting Error	135
oPE16	Energy Saving Constants Error	Flashing	Parameter Setting Error	135
oPE18	Online Tuning Param Setting Err	Flashing	Parameter Setting Error	135
oPE20	PG-F3 Setting Error	Flashing	Parameter Setting Error	135
oPE33	Digital Output Selection Error	Flashing	Parameter Setting Error	136
oPr (001E)	Keypad Connection Fault	Illuminated	Fault	114
oS (0010)	Overspeed	Flashing	Alarm	127
oS (0018)	Overspeed	Illuminated	Fault	114
ov (0002)	DC Bus Overvoltage	Flashing	Alarm	128
ov (0008)	Overvoltage	Illuminated	Fault	114
ovEr	Too Many Parameters Changed	-	Not an alarm.	128
PASS	Modbus Communication Test	Flashing	Not an alarm.	128
PE1 (0047)	PLC Fault 1	Illuminated	Fault	115
PE2 (0048)	PLC Fault 2	Illuminated	Fault	115
PF (0047)	Input Phase Loss	Flashing	Alarm	128
PF (001B)	Input Phase Loss	Illuminated	Fault	115
PGo (0012)	Encoder (PG) Feedback Loss	Flashing	Alarm	129
PGo (001A)	Encoder (PG) Feedback Loss	Illuminated	Fault	115
PGoH (002B)	Encoder (PG) Hardware Fault	Flashing	Alarm	129
PGoH (0038)	Encoder (PG) Hardware Fault	Illuminated	Fault	116
PSE (0437) ^{*1}	JOHB-SMP3 Protocol Set Error	Illuminated	Fault	116
PWEr	DWEZ Password Mismatch	-	Backup Function Runtime Error	142
rdEr	Error Reading Data	-	Backup Function Runtime Error	142
rF (004E)	Braking Resistor Fault	Illuminated	Fault	116
rH (0010)	Braking Resistor Overheat	Illuminated	Fault	116
rr (000F)	Dynamic Braking Transistor Fault	Illuminated	Fault	116
rUn (001B)	Motor Switch during Run	Flashing	Alarm	129
SC (0005)	Short Circuit/IGBT Failure	Illuminated	Fault	116
SCF (040F)	Safety Circuit Fault	Illuminated	Fault	117
SE (0020)	Modbus Test Mode Error	Flashing	Alarm	129
SEr (003B)	Speed Search Retries Exceeded	Illuminated	Fault	117
STo (003C)	Safe Torque OFF	-	Alarm	129
SToF (003B)	Safe Torque OFF	Flashing	Alarm	129
STPo (0037)	Motor Step-Out Detected	Illuminated	Fault	117

2.3 List of Fault, Minor Fault, Alarm, and Error Codes

Display (Hex.)	Name	ALM LED	Type	Ref.
SvE (0026)	Zero Servo Fault	Illuminated	Fault	117
TiM (0089)	Keypad Time Not Set	Flashing	Alarm	129
TiM (0401)	Keypad Time Not Set	Illuminated	Fault	117
TrPC (0042)	IGBT Maintenance Time (90%)	Flashing	Alarm	129
UL3 (001E)	Undertorque Detection 1	Flashing	Alarm	130
UL3 (0029)	Undertorque Detection 1	Illuminated	Fault	118
UL4 (001F)	Undertorque Detection 2	Flashing	Alarm	130
UL4 (002A)	Undertorque Detection 2	Illuminated	Fault	118
UL5 (003E)	Mechanical Weakening Detection 2	Flashing	Alarm	130
UL5 (0045)	Mechanical Weakening Detection 2	Illuminated	Fault	118
Uv (0001)	Undervoltage	Flashing	Alarm	130
Uv1 (0002)	DC Bus Undervoltage	Illuminated	Fault	118
Uv2 (0003)	Control Power Undervoltage	Illuminated	Fault	118
Uv3 (0004)	Soft Charge Answerback Fault	Illuminated	Fault	119
vAEr	Voltage Class, Capacity Mismatch	-	Backup Function Runtime Error	143
vFyE	Parameters do not Match	-	Backup Function Runtime Error	143

*1 This error occurs on drives with software versions PRG: 09018 and later. The “PRG” column on the nameplate on the right side of the drive identifies the software version. You can also use *U1-25 [SoftwareNumber FLASH]* to identify the software version.

2.4 Fault

This section gives information about some of the causes and possible solutions of faults. You must use the Fault Reset operation to remove the fault before you can operate the drive. Use the information in this table to remove the cause of the fault.

Code	Name	Causes	Possible Solutions
bAT	Keypad Battery Low Voltage	The keypad battery voltage is low.	Replace the keypad battery.
Note: Use o4-24 [bAT Detection Selection] to enable/disable bAT detection.			
Code	Name	Causes	Possible Solutions
bCE	Bluetooth Communication Fault	The smartphone or tablet with DriveWizard Mobile or DriveWizard installed is too far from the keypad.	Use the smartphone or tablet 10 m (32.8 ft) or nearer to the keypad. Note: bCE can occur when the smartphone or tablet is 10 m (32.8 ft) or nearer to the keypad depending on the specifications of the smartphone or tablet.
		Radio waves from a different device are causing interference with communications between the smartphone or tablet and keypad.	Make sure that no device around the keypad uses the same radio bandwidth (2400 MHz to 2480 MHz), and prevent radio interference.
Note: <ul style="list-style-type: none"> The drive detects this error when you use the Bluetooth LCD keypad to operate the drive from a smartphone or tablet. Do a Fault Reset to clear the fault. Set the stopping method for this fault in o2-27 [bCE Detection Selection]. 			
Code	Name	Causes	Possible Solutions
boL	Braking Transistor Overload Fault	The duty cycle of the braking transistor is high (the regeneration power or repetition frequency is high).	<ul style="list-style-type: none"> Install a braking unit (CDBR-series). Install a regenerative converter. Increase the deceleration time.
		You enabled the protective function for the braking transistor when you have a regenerative converter.	Set L8-55 = 0 [Internal DB Transistor Protection = Disable].
		The braking transistor in the drive is broken.	Replace the entire drive.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
bUS	Option Communication Error	The drive did not receive a signal from the controller.	Correct wiring errors.
		The communications cable wiring is incorrect.	
		There is a short-circuit in the communications cable or the communications cable is not connected.	<ul style="list-style-type: none"> Repair short circuits and connect cables. Replace the defective communications cable.
		Electrical interference caused a communication data error.	<ul style="list-style-type: none"> Examine the control circuit lines, main circuit lines, and ground wiring, and decrease the effects of electrical interference. Make sure that a magnetic contactor is not the source of the electrical interference, then use a Surge Protective Device if necessary. Use only the recommended cables or other shielded line. Ground the shield on the controller side or the drive input power side. Separate the communication wiring from drive power lines, and install a noise filter to the input side of the power supply for communication. Decrease the effects of electrical interference from the controller.
		The option is incorrectly installed to the drive.	Correctly install the option to the drive.
		The option is damaged.	If the fault continues and the wiring is correct, replace the option.
Note: <ul style="list-style-type: none"> The drive detects this error if the Run command or frequency reference is assigned to the option card. Do a Fault Reset to clear the fault. If the drive detects this error, the drive will operate the motor as specified by the stopping method set in F6-01 [Communication Error Selection]. 			
Code	Name	Causes	Possible Solutions
CE	Modbus Communication Error	The communications cable wiring is incorrect.	Correct wiring errors.
		There is a short circuit in the communications cable or the communications cable is not connected.	<ul style="list-style-type: none"> Repair short circuits and connect cables. Replace the defective communications cable.

2.4 Fault

Code	Name	Causes	Possible Solutions
		Electrical interference caused a communication data error.	<ul style="list-style-type: none"> Examine the control circuit lines, main circuit lines, and ground wiring, and decrease the effects of electrical interference. Make sure that a magnetic contactor is not the source of the electrical interference, then use a Surge Protective Device if necessary. Use only the recommended cables or other shielded line. Ground the shield on the controller side or the drive input power side. Separate the communication wiring from drive power lines, and install a noise filter to the input side of the power supply for communication. Decrease the effects of electrical interference from the controller.
Note: <ul style="list-style-type: none"> The drive detects this error if it does not correctly receive control data for the CE detection time set to H5-09 [CE Detection Time]. Do a Fault Reset to clear the fault. If the drive detects this error, the drive will operate the motor as specified by the stopping method set in H5-04 [Communication Error Stop Method]. 			
Code	Name	Causes	Possible Solutions
CF	Control Fault	Motor parameters are set incorrectly	Correctly set the motor parameters and do Auto-Tuning again.
		When A1-02 = 4 [Control Method Selection = Advanced Open Loop Vector], the drive takes long to ramp to stop because of these settings: <ul style="list-style-type: none"> The torque limit setting is too low. L3-11 = 1 [Overvoltage Suppression Select = Enabled]. d5-01 = 1 [Torque Control Selection = Torque Control]. 	When Rotational Auto-Tuning changes or the installation environment changes, make sure that you do Line-to-Line Resistance Tuning and set L8-20 = 0 [Control Fault & Step Out Detect = Disabled]. <p>Note: After you set L8-20 = 0, do test runs and examine the drive to make sure that it starts and stops correctly.</p>
		The torque limit setting is too low.	Adjust L7-01 to L7-04 [Torque Limit].
		The load inertia is too large.	<ul style="list-style-type: none"> Adjust C1-02, C1-04, C1-06, and C1-08 [Deceleration Times]. Set the frequency reference to the minimum output frequency, and stop the Run command when the drive stops deceleration.
		The drive is trying to ramp to stop a machine that cannot do ramp to stop or on a machine for which deceleration is not necessary.	Correctly set b1-03 [Stopping Method Selection].
		The motor and drive are connected incorrectly.	Correct wiring errors.
		Line-to-line Resistance Tuning is not done.	Do Stationary Auto-Tuning for Line-to-Line Resistance.
		The drive received a Run command while the motor was coasting.	<ul style="list-style-type: none"> Examine the sequence and input the Run command after the motor fully stops. Set b3-01 = 1 [Speed Search at Start Selection = Enabled].
Note: <ul style="list-style-type: none"> The drive detects this error if the torque reference is more than the torque limit for 3 seconds or longer while the drive ramps to stop. Do a Fault Reset to clear the fault. 			
Code	Name	Causes	Possible Solutions
CoF	Current Offset Fault	The drive starts operation while the induced voltage stays in the motor (during coasting to a stop or after fast deceleration).	<ul style="list-style-type: none"> Make a sequence that does not restart operation when induced voltage stays in the motor. Set b3-01 = 1 [Speed Search at Start Selection = Enabled]. Use Speed Search from Fmax or Fref [H1-xx = 61, 62] to do a speed search through one of the external terminals. <p>Note: When controlling the PM motor, External Speed Search commands 1 and 2 operate the same.</p>
		A drive hardware problem occurred.	<ul style="list-style-type: none"> Do a Fault Reset to clear the fault or de-energize the drive. If the fault stays, replace the drive.
Code	Name	Causes	Possible Solutions
CP1	Comparator 1 Limit Fault	The monitor value set in H2-20 [Comparator 1 Monitor Selection] was in the range of H2-21 [Comparator 1 Lower Limit] and H2-22 [Comparator 1 Upper Limit].	Examine the monitor value and remove the cause of the fault.
Note: <ul style="list-style-type: none"> The drive detects this error when the terminal is set to H2-01 to H2-03 = 66 [MFDO Function Selection = Comparator1]. Do a Fault Reset to clear the fault. Set the stopping method for this fault in H2-33 [Comparator1 Protection Selection]. 			

Code	Name	Causes	Possible Solutions
CP2	Comparator 2 Limit Fault	The monitor value set in H2-26 [Comparator 2 Monitor Selection] was outside the range of H2-27 [Comparator 2 Lower Limit] and H2-28 [Comparator 2 Upper Limit].	Examine the monitor value and remove the cause of the fault.
Note: <ul style="list-style-type: none"> The drive detects this error when the terminal is set to H2-01 to H2-03 = 67 [MFDO Function Selection = Comparator2]. Do a Fault Reset to clear the fault. Set the stopping method for this fault in H2-35 [Comparator2 Protection Selection]. 			
Code	Name	Causes	Possible Solutions
CPF00	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF01	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF02	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF03	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF06	Control Circuit Error (EEPROM memory Data Error)	The drive power supply was de-energized while a communication option entered a parameter Write command.	Set A1-03 = 2220, 3330 [Initialize Parameters = 2-Wire Initialization, 3-Wire Initialization] and initialize the drive.
		An EEPROM peripheral circuit error occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about how to replace the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> The drive detects this error if there is an error in the data written to the drive EEPROM. Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF07	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			

2.4 Fault

Code	Name	Causes	Possible Solutions
CPF08	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF10	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF11	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF12	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF13	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF14	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF16	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF17	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			

Code	Name	Causes	Possible Solutions
CPF18	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF19	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF20	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF21	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF22	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF23	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF24	Control Circuit Error (Drive Unit Signal Fault)	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF26	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			

2.4 Fault

Code	Name	Causes	Possible Solutions
CPF27	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF28	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF29	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF30	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF31	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF32	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF33	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF34	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			

Code	Name	Causes	Possible Solutions
CPF35	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF36	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF37	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF38	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
CPF39	Control Circuit Error	A drive hardware problem occurred.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
dEv	Speed Deviation	The load is too heavy.	Decrease the load.
		Acceleration and deceleration times are set too short.	Increase the values set in <i>C1-01 to C1-08 [Acceleration/Deceleration Time]</i> .
		The <i>dEv</i> detection level settings are incorrect.	Adjust <i>F1-10 [Speed Deviation Detection Level]</i> and <i>F1-11 [Speed Deviation Detect DelayTime]</i> .
		The load is locked up.	Examine the machine.
		The holding brake is stopping the motor.	Release the holding brake.
Note: <ul style="list-style-type: none"> The drive detects this error if the difference between the detected speed and the speed reference is more than the setting of <i>F1-10</i> for longer than <i>F1-11</i>. Do a Fault Reset to clear the fault. If the drive detects this error, the drive will operate the motor as specified by the stopping method set in <i>F1-04 [Speed Deviation Detection Select]</i>. 			
Code	Name	Causes	Possible Solutions
dv1	Z Pulse Fault	The encoder option card or the encoder on the motor side is damaged.	<ol style="list-style-type: none"> Repair wiring errors and connect disconnected wires. Correctly ground the shielded wire of the encoder cable. Re-energize the drive If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
		The encoder cable is disconnected or wired incorrectly.	
Note: <ul style="list-style-type: none"> The drive detects this error if it does not detect a Z pulse during one motor rotation. Do a Fault Reset to clear the fault. 			

2.4 Fault

Code	Name	Causes	Possible Solutions
dv2	Z Pulse Noise Fault Detection	Noise interference along the encoder cable.	Isolate the encoder cable from the drive output line or a different source of electrical interference.
		The encoder cable is disconnected or wired incorrectly.	Examine for wiring errors or disconnected wires in the encoder cable, and repair problems. Correctly ground the shielded wire of the encoder cable.
		The drive is operating a motor with 24 or more poles at zero speed.	<ul style="list-style-type: none"> Set $F1-46 = 1$ [<i>dv2 Detection Method Selection = MechanicalAngle Detection Method</i>]. Increase $F1-17$ [<i>Deviation 2 Detection Selection</i>]. Increase $F1-47$ [<i>Deviation 2 Detection Level</i>]. Note: If you change the setting of $F1-47$, the sensitivity of detection for $dv2$ can decrease.
		The PG option or the encoder on the motor side is damaged.	Repair the wiring and re-energize the drive, then replace the PG option or the encoder if the problem continues.
Note: <ul style="list-style-type: none"> The drive detects this error if it detects more than one Z pulse per rotation for the number of rotations set in $F1-17$ [<i>Deviation 2 Detection Selection</i>]. Do a Fault Reset to clear the fault. 			
Code	Name	Causes	Possible Solutions
dv3	Inversion Detection	$E5-11$ [<i>Encoder Z-Pulse Offset</i>] is set incorrectly.	Correctly set the value for $\Delta\theta$ to $E5-11$ as specified by the values on the motor nameplate.
		There is a new encoder or the motor rotation direction changed.	Do Z Pulse Offset Tuning.
		An external force on the load side rotated the motor.	<ul style="list-style-type: none"> Make sure that the motor is rotating in the correct direction. Find and repair problems on the load side that cause the motor to rotate from the load side.
		Noise interference along the encoder cable.	Correctly ground the shielded wire of the encoder cable.
		The encoder cable is disconnected or wired incorrectly.	Examine for wiring errors or disconnected wires in the encoder cable, and repair problems.
		The setting for $F1-05$ [<i>Encoder 1 Rotation Selection</i>] is the opposite of the direction of motor rotation.	Correctly connect the motor wiring for each phase (U, V, W).
		The drive incorrectly detected the motor magnetic pole position.	When $U6-57$ [<i>PolePolarityDeterVal</i>] < 819, increase $n8-84$ [<i>Polarity Detection Current</i>]. Consult the motor manufacturer for information about maximum setting values.
		$n8-84$ [<i>Polarity Detection Current</i>] is too low.	Increase $n8-84$ from the default. Consult the motor manufacturer for information about maximum setting values.
		Pole Position Detection failed.	If you are using an IPM motor, do High Frequency Injection Auto-Tuning.
		The PG option or the encoder on the motor side is damaged.	Repair the wiring and re-energize the drive, then replace the PG option card or the PG if the problem continues.
The drive incorrectly detected the motor magnetic pole position.	When $U6-57$ [<i>PolePolarityDeterVal</i>] < 819, set $n8-84$ [<i>Polarity Detection Current</i>] > default setting.		
Note: <ul style="list-style-type: none"> The drive detects this error if: <ul style="list-style-type: none"> the torque reference and acceleration are in opposite directions. the speed reference and actual motor speed are more than 30% different for the number of times set to $F1-18$ [<i>Deviation 3 Detection Selection</i>]. Do a Fault Reset to clear the fault. 			
Code	Name	Causes	Possible Solutions
dv4	Inversion Prevention Detection	An external force on the load side rotated the motor.	<ul style="list-style-type: none"> Make sure that the motor is rotating in the correct direction. Find and repair problems on the load side that cause the motor to rotate from the load side. Disable detection of this fault for applications that rotate the motor from the load side in the opposite direction of the speed reference. The drive will not detect this fault if $F1-19 = 0$ [<i>Deviation 4 Detection Selection = Disabled</i>].
		$E5-11$ [<i>Encoder Z-Pulse Offset</i>] is set incorrectly.	Correctly set the value for $\Delta\theta$ to $E5-11$ as specified by the values on the motor nameplate.
		There is a new encoder or the motor rotation direction changed.	Do Z Pulse Offset Tuning.
		Noise interference along the encoder cable.	Correctly ground the shielded wire of the encoder cable.
		The encoder cable is disconnected or wired incorrectly.	Examine for wiring errors or disconnected wires in the encoder cable, and repair problems.
		The drive incorrectly detected the motor magnetic pole position.	If the value for $U6-57$ [<i>PolePolarityDeterVal</i>] is lower than 819, increase the value set in $n8-84$ [<i>Polarity Detection Current</i>]. Consult the motor manufacturer for information about maximum setting values.

Code	Name	Causes	Possible Solutions
		The setting of <i>n8-84 [Polarity Detection Current]</i> is too low.	Increase the <i>n8-84</i> setting from the default. Consult the motor manufacturer for information about maximum setting values.
		Pole Position Detection failed.	If you are using an IPM motor, do High Frequency Injection Auto-Tuning.
		The PG option card or the encoder on the motor side is damaged.	Repair the wiring and re-energize the drive, then replace the PG option card or the PG if the problem continues.
Note: <ul style="list-style-type: none"> The drive detects this error if the pulses in the opposite direction of the speed reference are more than the value set in <i>F1-19</i>. Do a Fault Reset to clear the fault. 			
Code	Name	Causes	Possible Solutions
dv7	Polarity Judge Timeout	There is a disconnection in the motor coil winding.	Measure the motor line-to-line resistance and replace the motor if a coil is disconnected.
		The screws on the drive output terminals are loose.	Tighten the terminal screws to the correct tightening torque.
Note: <ul style="list-style-type: none"> The drive detects this error if it cannot detect polarity in a pre-set length of time. Do a Fault Reset to clear the fault. 			
Code	Name	Causes	Possible Solutions
dWF1	EEPROM Memory DWEZ Data Error	There is an error in the EEPROM peripheral circuit.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
		There is a problem with the EEPROM data.	Set <i>A1-03 = 2220, 3330 [Initialize Parameters = 2-Wire Initialization, 3-Wire Initialization]</i> to initialize the drive, then upload the DriveWorksEZ project to the drive again.
Note: <ul style="list-style-type: none"> The drive detects this error if there is an error in the DriveWorksEZ program that was saved to EEPROM. Do a Fault Reset to clear the fault. 			
Code	Name	Causes	Possible Solutions
dWF2	DriveWorksEZ Fault 2	There was a fault in the DriveWorksEZ program.	Examine the DriveWorksEZ program and remove the cause of the fault. This is not a drive fault.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
dWF3	DriveWorksEZ Fault 3	There was a fault in the DriveWorksEZ program.	Examine the DriveWorksEZ program and remove the cause of the fault. This is not a drive fault.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
dWFL	DriveWorksEZ Fault	There was a fault in the DriveWorksEZ program.	Examine the DriveWorksEZ program and remove the cause of the fault. This is not a drive fault.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
E5	MECHATROLINK Watchdog Timer Err	The drive detected a watchdog circuit exception while it received data from the controller.	Examine the MECHATROLINK cable connection. If this error occurs frequently, examine the wiring and decrease the effects of electrical interference as specified by these manuals: <ul style="list-style-type: none"> MECHATROLINK-II Installation Guide (MECHATROLINK Members Association, manual number MMATDEP011) MECHATROLINK-III Installation Manual (MECHATROLINK Members Association, publication number MMATDEP018)
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. If the drive detects this fault, it will operate the motor as specified by the stop method set in <i>F6-25 [MECHATROLINK Watchdog Error Sel]</i>. 			
Code	Name	Causes	Possible Solutions
EF0	Option Card External Fault	The communication option received an external fault from the controller.	<ol style="list-style-type: none"> Find the device that caused the external fault and remove the cause. Clear the external fault input from the controller.
		A programming error occurred on the controller side.	Examine the operation of the controller program.
Note: <ul style="list-style-type: none"> The drive detects this fault if the alarm function on the external device side is operating. Do a Fault Reset to clear the fault. If the drive detects this fault, it will operate the motor as specified by the stop method set in <i>F6-03 [Comm External Fault (EF0) Select]</i>. 			

2.4 Fault

Code	Name	Causes	Possible Solutions
EF1	External Fault (Terminal S1)	MFDI terminal S1 caused an external fault through an external device.	1. Find the device that caused the external fault and remove the cause. 2. Clear the external fault input in the MFDI.
		The wiring is incorrect.	Correctly connect the signal line to MFDI terminal S1.
		<i>External Fault [HI-01 = 20 to 2B]</i> is set to MFDI terminal S1, but the terminal is not in use.	Correctly set the MFDI.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
EF2	External Fault (Terminal S2)	MFDI terminal S2 caused an external fault through an external device.	1. Find the device that caused the external fault and remove the cause. 2. Clear the external fault input in the MFDI.
		The wiring is incorrect.	Correctly connect the signal line to MFDI terminal S2.
		<i>External Fault [HI-02 = 20 to 2B]</i> is set to MFDI terminal S2, but the terminal is not in use.	Correctly set the MFDI.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
EF3	External Fault (Terminal S3)	MFDI terminal S3 caused an external fault through an external device.	1. Find the device that caused the external fault and remove the cause. 2. Clear the external fault input in the MFDI.
		The wiring is incorrect.	Correctly connect the signal line to MFDI terminal S3.
		<i>External Fault [HI-03 = 20 to 2B]</i> is set to MFDI terminal S3, but the terminal is not in use.	Correctly set the MFDI.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
EF4	External Fault (Terminal S4)	MFDI terminal S4 caused an external fault through an external device.	1. Find the device that caused the external fault and remove the cause. 2. Clear the external fault input in the MFDI.
		The wiring is incorrect.	Correctly connect the signal line to MFDI terminal S4.
		<i>External Fault [HI-04 = 20 to 2B]</i> is set to MFDI terminal S4, but the terminal is not in use.	Correctly set the MFDI.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
EF5	External Fault (Terminal S5)	MFDI terminal S5 caused an external fault through an external device.	1. Find the device that caused the external fault and remove the cause. 2. Clear the external fault input in the MFDI.
		The wiring is incorrect.	Correctly connect the signal line to MFDI terminal S5.
		<i>External Fault [HI-05 = 20 to 2B]</i> is set to MFDI terminal S5, but the terminal is not in use.	Correctly set the MFDI.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
EF6	External Fault (Terminal S6)	MFDI terminal S6 caused an external fault through an external device.	1. Find the device that caused the external fault and remove the cause. 2. Clear the external fault input in the MFDI.
		The wiring is incorrect.	Correctly connect the signal line to MFDI terminal S6.
		<i>External Fault [HI-06 = 20 to 2B]</i> is set to MFDI terminal S6, but the terminal is not in use.	Correctly set the MFDI.
Note: Do a Fault Reset to clear the fault.			

Code	Name	Causes	Possible Solutions
EF7	External Fault (Terminal S7)	MFDI terminal S7 caused an external fault through an external device.	<ol style="list-style-type: none"> Find the device that caused the external fault and remove the cause. Clear the external fault input in the MFDI.
		The wiring is incorrect.	Correctly connect the signal line to MFDI terminal S7.
		<i>External Fault [H1-07 = 20 to 2B]</i> is set to MFDI terminal S7, but the terminal is not in use.	Correctly set the MFDI.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
EF8	External Fault (Terminal S8)	MFDI terminal S8 caused an external fault through an external device.	<ol style="list-style-type: none"> Find the device that caused the external fault and remove the cause. Clear the external fault input in the MFDI.
		The wiring is incorrect.	Correctly connect the signal line to MFDI terminal S8.
		<i>External Fault [H1-08 = 20 to 2B]</i> is set to MFDI terminal S8, but the terminal is not in use.	Correctly set the MFDI.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
Err	EEPROM Write Error	There was a problem with the EEPROM hardware.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. Contact Yaskawa or your nearest sales representative to replace the board.
		Electrical interference corrupted the data while it was writing to the EEPROM of the drive.	<ul style="list-style-type: none"> Push ENTER Key. Set the parameters again.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
FAn	Internal Fan Fault	The circulation fan stopped operating correctly.	<ul style="list-style-type: none"> Examine circulation fan operation. Re-energize the drive. Examine <i>U4-03 [Cooling Fan Ope Time]</i> and <i>U4-04 [Cool Fan Maintenance]</i>. If there is damage to the circulation fan or if the performance life of the fan is expired, replace the fan.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
FAn1	Drive Cooling Fan Fault	The cooling fan stopped operating correctly.	<ul style="list-style-type: none"> Examine cooling fan operation. Re-energize the drive. Examine <i>U4-03 [Cooling Fan Ope Time]</i> and <i>U4-04 [Cool Fan Maintenance]</i>. If the performance life of the cooling fan is expired or if there is damage to the fan, replace the fan.
		The circulation fan is damaged.	<ul style="list-style-type: none"> Examine circulation fan operation. Re-energize the drive. Examine <i>U4-03 [Cooling Fan Ope Time]</i> and <i>U4-04 [Cool Fan Maintenance]</i>. If there is damage to the circulation fan or if the performance life of the fan is expired, replace the fan.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
FbH	Excessive PID Feedback	The <i>FbH</i> detection level is set incorrectly.	Adjust <i>b5-36 [PID High Feedback Detection Lvl]</i> and <i>b5-37 [PID High Feedback Detection Time]</i> .
		There is a problem with the PID feedback wiring.	Correct errors with the PID control wiring.
		The feedback sensor is not operating correctly.	Examine the sensors on the control device side.
		A fault occurred in the feedback input circuit of the drive.	Replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> The drive detects this fault if the PID feedback input is more than the level set in <i>b5-36</i> for longer than <i>b5-37</i>. Do a Fault Reset to clear the fault. If the drive detects this fault, it will operate the motor as specified by the stop method set in <i>b5-12 [Feedback Loss Detection Select]</i>. 			

2.4 Fault

Code	Name	Causes	Possible Solutions
FbL	PID Feedback Loss	The <i>FbL</i> detection level is set incorrectly.	Adjust <i>b5-13</i> [<i>PID Feedback Loss Detection Lvl</i>] and <i>b5-14</i> [<i>PID Feedback Loss Detection Time</i>].
		There is a problem with the PID feedback wiring.	Correct errors with the PID control wiring.
		The feedback sensor is not operating correctly.	Examine the sensors on the control device side.
		A fault occurred in the feedback input circuit of the drive.	Replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> The drive detects this fault if the PID feedback input is more than the level set in <i>b5-13</i> for longer than <i>b5-14</i>. Do a Fault Reset to clear the fault. If the drive detects this fault, it will operate the motor as specified by the stop method set in <i>b5-12</i> [<i>Feedback Loss Detection Select</i>]. 			
Code	Name	Causes	Possible Solutions
GF	Ground Fault	Overheating caused damage to the motor or the motor insulation is not satisfactory.	Measure the motor insulation resistance, and replace the motor if there is electrical conduction or unserviceable insulation.
		The motor main circuit cable is contacting ground to make a short circuit.	<ul style="list-style-type: none"> Examine the motor main circuit cable for damage, and repair short circuits. Measure the resistance between the motor main circuit cable and the ground terminal. If there is electrical conduction, replace the cable.
		An increase in the stray capacitance of the cable and the ground terminal caused an increase in the leakage current.	<ul style="list-style-type: none"> If the wiring length of the cable is more than 100 m, decrease the carrier frequency. Decrease the stray capacitance.
		There was a problem with the drive hardware.	Replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> The drive detects this fault if a current short to ground was more than 50% of rated current on the output side of the drive. Do a Fault Reset to clear the fault. <i>L5-08</i> [<i>Fault Reset Enable Select Grp2</i>] disables the Auto Restart function. 			
Code	Name	Causes	Possible Solutions
HLCE	High Level Communication Errors	<p>Communication data error occurred between the option and the master drive when you use Gateway function.</p> <p>The master drive detects <i>oF:xxx</i> and the slave drive detects <i>HLCE</i>.</p>	Examine the wiring between the option and the master drive and remove the cause of the fault.
Code	Name	Causes	Possible Solutions
LF	Output Phase Loss	The motor main circuit cable is disconnected.	Connect motor main circuit cable wiring. Correct wiring errors in the main circuit drive input power.
		There is a disconnection in the motor coil winding.	If a coil is disconnected, measure the motor Line-to-Line Resistance and replace the motor.
		The screws on the drive output terminals are loose.	Tighten the terminal screws to the correct tightening torque.
		The rated output current of the motor is less than 5% of the drive rated current.	Examine the drive capacity or the motor output to be applied.
		You are trying to use a single-phase motor.	The drive cannot operate a single-phase motor.
		The output transistor in the drive is damaged.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> The drive detects this fault if phase loss occurs on the output side of the drive. Do a Fault Reset to clear the fault. Set <i>L8-07</i> [<i>Output Phase Loss Protection Sel</i>] to enable and disable <i>LF</i> detection. 			
Code	Name	Causes	Possible Solutions
LF2	Output Current Imbalance	There is phase loss in the wiring on the output side of the drive.	Examine for wiring errors or disconnected wires on the output side of the drive, and repair problems.
		The screws on the drive output terminals are loose.	Tighten the terminal screws to a correct tightening torque.
		There is not balance between the three phases of the PM motor impedance.	<ul style="list-style-type: none"> Measure the Line-to-Line Resistance for each motor phase and make sure that resistance is equal in the three phases, and that all wires are connected correctly. Replace the motor.

Code	Name	Causes	Possible Solutions
		The drive output circuit is broken.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
		The voltage compensation-related parameters are incorrect.	Set $C4-20 = 0$ [Voltage Compensation Adjust 1 = 0 Hz].
Note: <ul style="list-style-type: none"> The drive detects this fault if there is not balance between the three phases of the output current from the PM motor. Do a Fault Reset to clear the fault. 			
Code	Name	Causes	Possible Solutions
LSo	Low Speed Motor Step-Out	The motor code set incorrectly.	<ul style="list-style-type: none"> Set $E5-01$ [PM Motor Code Selection] correctly as specified by the motor. For specialized motors, refer to the motor test report and set $E5-xx$ correctly.
		The load is too large.	<ul style="list-style-type: none"> Decrease the load. Replace the drive and motor with larger capacity models.
		An external force on the load side caused the motor to move at start.	Find and repair problems on the load side that cause the motor to rotate from the load side.
		The drive incorrectly detected the motor magnetic pole position.	<ul style="list-style-type: none"> Set $b3-01 = 1$ [Speed Search at Start Selection = Enabled]. If the value for $U6-57$ [PolePolarityDeterVal] is lower than 819, increase the value set in $n8-84$ [Polarity Detection Current]. Consult the motor manufacturer for information about maximum setting values.
		The setting of $n8-84$ [Polarity Detection Current] is too low.	Increase the $n8-84$ setting from the default. Consult the motor manufacturer for information about maximum setting values.
		Incorrect values set in $L8-93$ [Low Speed Pull-out DetectionTime], $L8-94$ [Low Speed Pull-out Detect Level], and $L8-95$ [Low Speed Pull-out Amount].	Increase the values set in $L8-93$ to $L8-95$.
		The drive incorrectly detected the motor magnetic pole position.	If you are using an IPM motor, do High Frequency Injection Auto-Tuning.
Note: <ul style="list-style-type: none"> The drive detects this fault if it detects step-out while running at low speed. Do a Fault Reset to clear the fault. LSo is a protective function that stops the motor and stops the reverse run if a motor without a motor code incorrectly detects the initial polarity. To quickly detect motor reversal, decrease the values set in $L8-93$ to $L8-95$ to a range in which the drive does not malfunction. 			
Code	Name	Causes	Possible Solutions
nSE	Node Setup Error	The $H1-xx = 47$ [Node Setup (CANopen)] terminal was activated during run.	Stop the drive when the Node Setup function is in use.
		The drive received a Run command while the Node Setup function was active.	
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. 			
Code	Name	Causes	Possible Solutions
oC	Overcurrent	The load is too heavy.	<ul style="list-style-type: none"> Measure the current flowing into the motor. Replace the drive with a larger capacity model if the current value is more than the drive rated current. Decrease the load or replace with a larger drive to prevent sudden changes in the current level.
		Overheating caused damage to the motor or the motor insulation is not satisfactory.	Measure the motor insulation resistance, and replace the motor if there is electrical conduction or unserviceable insulation.
		The motor main circuit cable is contacting ground to make a short circuit.	<ul style="list-style-type: none"> Examine the motor main circuit cable for damage, and repair short circuits. Measure the resistance between the motor main circuit cable and the ground terminal. If there is electrical conduction, replace the cable.
		A short circuit or ground fault on the drive output side caused damage to the output transistor of the drive.	<ul style="list-style-type: none"> Make sure that there is not a short circuit in terminal B1 and terminals U/T1, V/T2, and W/T3. Make sure that there is not a short circuit in terminals - and terminals U/T1, V/T2, and W/T3. If there is a short circuit, contact Yaskawa or your nearest sales representative.
		The acceleration time is too short.	<ul style="list-style-type: none"> Calculate the torque necessary during acceleration related to the load inertia and the specified acceleration time. Increase the values set in $C1-01$, $C1-03$, $C1-05$, or $C1-07$ [Acceleration Times] to get the necessary torque. Increase the values set in $C2-01$ to $C2-04$ [S-Curve Characteristics] to get the necessary torque. Replace the drive with a larger capacity model.

2.4 Fault

Code	Name	Causes	Possible Solutions
		The drive is trying to operate a specialized motor or a motor that is larger than the maximum applicable motor output of the drive.	<ul style="list-style-type: none"> Examine the motor nameplate, the motor, and the drive to make sure that the drive rated current is larger than the motor rated current. Replace the drive with a larger capacity model.
		A magnetic contactor was switched at the output.	Set the operation sequence to not turn ON or OFF the magnetic contactor while the drive is outputting voltage.
		The V/f pattern settings are incorrect.	<ul style="list-style-type: none"> Examine the ratios between the V/f pattern frequency and voltage. Decrease the voltage if it is too high compared to the frequency. Adjust <i>E1-04</i> to <i>E1-10</i> [<i>V/f Pattern Parameters</i>]. For motor 2, adjust <i>E3-04</i> to <i>E3-10</i>.
		The torque compensation gain is too large.	Decrease the value set in <i>C4-01</i> [<i>Torque Compensation Gain</i>] to make sure that the motor does not stall.
		Electrical interference caused a problem.	Examine the control circuit lines, main circuit lines, and ground wiring, and decrease the effects of electrical interference.
		The gain during overexcitation operation is too large.	<ul style="list-style-type: none"> Find the time when the fault occurs. If the fault occurs at the same time as overexcitation operation, decrease the value set in <i>n3-13</i> [<i>OverexcitationBraking (OEB) Gain</i>] and consider the motor flux saturation.
		The drive received a Run command while the motor was coasting.	<ul style="list-style-type: none"> Examine the sequence and input the Run command after the motor fully stops. Set <i>b3-01</i> = 1 [<i>Speed Search at Start Selection = Enabled</i>] or set <i>H1-xx</i> = 61, 62 [<i>Speed Search from Fmax or Fref</i>] to input speed search commands from the MFDI terminals.
		In PM Control Methods, the setting of the motor code is incorrect.	<ul style="list-style-type: none"> Enter the correct motor code to <i>E5-01</i> [<i>PM Motor Code Selection</i>] as specified by the PM motor. For specialized motors, refer to the motor test report and set <i>E5-xx</i> [<i>PM Motor Settings</i>] correctly.
		If the drive detects the fault at start or in the low speed range (10% or less) and <i>n8-57</i> = 1 [<i>HFI Overlap Selection = Enabled</i>] for PM Control methods, the high frequency injection gain is too high.	<ul style="list-style-type: none"> Set <i>E5-xx</i> [<i>PM Motor Parameters</i>] correctly or do Rotational Auto-Tuning. Decrease the value of <i>n8-41</i> [<i>HFI P Gain</i>] in 0.5-unit increments. <p>Note: Set <i>n8-41</i> > 0.0 for IPM motors.</p>
		The current flowing in the motor is more than the value set in <i>L8-27</i> [<i>Overcurrent Detection Gain</i>] for PM Control Methods.	Correct the value set in <i>L8-27</i> .
		The control method is set incorrectly for the motor.	Set <i>A1-02</i> [<i>Control Method Selection</i>] correctly.
		The motor main circuit cable is too long.	Replace the drive with a larger capacity model.
		Speed search does not complete at start when you set <i>A1-02</i> = 8 [<i>EZ Vector Control</i>] and use an induction motor.	When <i>E9-01</i> = 0 [<i>Motor Type Selection = Induction (IM)</i>], set <i>b3-24</i> = 2 [<i>Speed Search Method Selection = Current Detection Speed Search</i>].
		An overcurrent occurred during overexcitation deceleration.	<ul style="list-style-type: none"> Decrease the value set in <i>n3-13</i> [<i>OverexcitationBraking (OEB) Gain</i>]. Decrease the value set in <i>n3-21</i> [<i>HSB Current Suppression Level</i>].
		When you use an IE3 premium efficiency motor.	Use these values to adjust the parameters. <ul style="list-style-type: none"> <i>b3-03</i> [<i>Speed Search Deceleration Time</i>] = default value × 2 <i>L2-03</i> [<i>Minimum Baseblock Time</i>] = default value × 2 <i>L2-04</i> [<i>Powerloss V/f Recovery Ramp Time</i>] = default value × 2
<p>Note:</p> <ul style="list-style-type: none"> This fault occurs if the drive sensors detect a drive output current more than the specified overcurrent detection level. Do a Fault Reset to clear the fault. 			
Code	Name	Causes	Possible Solutions
oFA00	Option Not Compatible with Port	The option connected to connector CN5-A is not compatible.	Connect the option to the correct connector. Note: Encoder options are not compatible with connector CN5-A.
<p>Note:</p> <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Fault trace is not available for these faults. 			

Code	Name	Causes	Possible Solutions
oFA01	Option Fault/Connection Error	The option card connected to connector CN5-A is not compatible.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Refer to the option card manual and correctly connect the option card to the connector on the drive.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFA02	Duplicate Options	The same option cards or the same type of option cards are connected to connectors CN5-A, B, and C.	Connect the option card to the correct connector. Note: Use connectors CN5-C and CN5-B to connect two encoder option cards.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFA03	Diagnostic Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFA04	Flash Write Mode	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFA05	Option A/D Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFA06	Option Communication Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFA10	Option RAM Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFA11	Option Ope Mode Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			

2.4 Fault

Code	Name	Causes	Possible Solutions
oFA12	Drive Receive CRC Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFA13	Drive Receive Frame Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFA14	Drive Receive Abort Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFA15	Option Receive CRC Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFA16	Option Receive Frame Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFA17	Option Receive Abort Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFA30	COM ID Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFA31	Type Code Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			

Code	Name	Causes	Possible Solutions
oFA32	SUM Check Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFA33	Option Receive Time Over	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFA34	Memobus Time Over	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFA35	Drive Receive Time Over 1	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFA36	CI Check Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFA37	Drive Receive Time Over 2	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFA38	Control Reference Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFA39	Drive Receive Time Over 3	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			

2.4 Fault

Code	Name	Causes	Possible Solutions
oFA40	CtrlResSel 1Err	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFA41	Drive Receive Time Over 4	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFA42	CtrlResSel 2Err	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFA43	Drive Receive Time Over 5	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFb00	Option Not Compatible with Port	The option connected to connector CN5-B is not compatible.	<p>Connect the option to the correct connector.</p> <p>Note: DO-A3, AO-A3, PG-B3, and PG-X3 options can connect to connector CN5-B. To connect only one PG option card, use the CN5-C connector.</p>
Note: <ul style="list-style-type: none"> • Do a Fault Reset to clear the fault. • Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
oFb01	Option Fault/Connection Error	The option card connected to connector CN5-B was changed during operation.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Refer to the option card manual and correctly connect the option card to the connector on the drive.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFb02	Duplicate Options	The same option cards or the same type of option cards are connected to connectors CN5-A, B, and C.	Connect the option card to the correct connector.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFb03	Diagnostic Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFb04	Flash Write Mode	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			

Code	Name	Causes	Possible Solutions
oFb05	Option A/D Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFb06	Option Communication Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFb10	Option RAM Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFb11	Option Ope Mode Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFb12	Drive Receive CRC Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFb13	Drive Receive Frame Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFb14	Drive Receive Abort Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFb15	Option Receive CRC Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			

2.4 Fault

Code	Name	Causes	Possible Solutions
oFb16	Option Receive Frame Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFb17	Option Receive Abort Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFC00	Option Not Compatible with Port	The option connected to connector CN5-C is not compatible.	Connect the option to the correct connector. Note: AI-A3, DI-A3, and communication options cannot be connected to the CN5-C connector.
Note: <ul style="list-style-type: none"> • Do a Fault Reset to clear the fault. • Fault trace is not available for these faults. 			
Code	Name	Causes	Possible Solutions
oFC01	Option Fault/Connection Error	The option card connected to connector CN5-C was changed during operation.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Refer to the option card manual and correctly connect the option card to the connector on the drive.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFC02	Duplicate Options	The same option cards or the same type of option cards are connected to connectors CN5-A, B, and C.	Connect the option card to the correct connector.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFC03	Diagnostic Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFC04	Flash Write Mode	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFC05	Option A/D Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			

Code	Name	Causes	Possible Solutions
oFC06	Option Card Error Occurred at Option Port (CN5-C)	A fault occurred in the option.	<ol style="list-style-type: none"> De-energize the drive. Make sure that the option is correctly connected to the connector. Re-energize the drive. If the problem continues, replace the option.
		You re-energized the drive when: <ul style="list-style-type: none"> There is an encoder option installed the drive The drive main circuit power supply is energized There is an external 24 V power supply connected to terminals PS-AC. 	<ol style="list-style-type: none"> De-energize the drive main circuit power supply and the external 24 V power supply to terminals PS-AC. After the keypad display goes out, energize the drive main circuit power supply again. Supply the external 24 V power to terminals PS-AC.
			When you use an encoder, de-energize the drive main circuit power supply.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFC10	Option RAM Error	A fault occurred in the option card.	<ol style="list-style-type: none"> De-energize the drive. Make sure that the option card is correctly connected to the connector. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFC11	Option Ope Mode Error	A fault occurred in the option card.	<ol style="list-style-type: none"> De-energize the drive. Make sure that the option card is correctly connected to the connector. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFC12	Drive Receive CRC Error	A fault occurred in the option card.	<ol style="list-style-type: none"> De-energize the drive. Make sure that the option card is correctly connected to the connector. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFC13	Drive Receive Frame Error	A fault occurred in the option card.	<ol style="list-style-type: none"> De-energize the drive. Make sure that the option card is correctly connected to the connector. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFC14	Drive Receive Abort Error	A fault occurred in the option card.	<ol style="list-style-type: none"> De-energize the drive. Make sure that the option card is correctly connected to the connector. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFC15	Option Receive CRC Error	A fault occurred in the option card.	<ol style="list-style-type: none"> De-energize the drive. Make sure that the option card is correctly connected to the connector. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			

2.4 Fault

Code	Name	Causes	Possible Solutions
oFC16	Option Receive Frame Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFC17	Option Receive Abort Error	A fault occurred in the option card.	<ol style="list-style-type: none"> 1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFC50	EncOp A/D CnvErr	A fault occurred in the option card.	Refer to the manual for the PG-RT3 or PG-F3 option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFC51	EncOpAnlgCrcErr	A fault occurred in the option card.	Refer to the manual for the PG-RT3 or PG-F3 option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFC52	Enc Com Timeout	A fault occurred in the option card.	Refer to the manual for the PG-RT3 or PG-F3 option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFC53	Enc Com Data Flt	A fault occurred in the option card.	Refer to the manual for the PG-RT3 or PG-F3 option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFC54	Encoder Error	A fault occurred in the option card.	Refer to the manual for the PG-RT3 or PG-F3 option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oFC55	Resolver Error	A fault occurred in the option card.	Refer to the manual for the PG-RT3 or PG-F3 option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oH	Heatsink Overheat	The ambient temperature is high and the heatsink temperature of the drive is more than the value set in L8-02 [Overheat Alarm Level].	<ul style="list-style-type: none"> • Measure the ambient temperature. • Increase the airflow in the control panel. • Install a cooling device (cooling fan or air conditioner) to lower the ambient temperature. • Remove objects near the drive that are producing too much heat.
		The load is too heavy.	<ul style="list-style-type: none"> • Measure the output current. • Decrease the load. • Decrease the value set in C6-02 [Carrier Frequency Selection].
		The internal cooling fan of the drive stopped.	<ol style="list-style-type: none"> 1. Use the procedures in this manual to replace the cooling fan. 2. Set o4-03 = 0 [Fan Operation Time Setting = 0 h].
Note: <ul style="list-style-type: none"> • The drive detects this fault if the heatsink temperature of the drive is more than the value set in L8-02. • Do a Fault Reset to clear the fault. • If the drive detects this fault, it will operate the motor as specified by the Stopping Method set in L8-03 [Overheat Pre-Alarm Selection]. 			

Code	Name	Causes	Possible Solutions
oH1	Heatsink Overheat	The ambient temperature is high and the heatsink temperature of the drive is more than the <i>oH1</i> detection level.	<ul style="list-style-type: none"> Measure the ambient temperature. Increase the airflow in the control panel. Install a cooling device (cooling fan or air conditioner) to lower the ambient temperature. Remove objects near the drive that are producing too much heat.
		The load is too heavy.	<ul style="list-style-type: none"> Measure the output current. Decrease the load. Decrease the value set in <i>C6-02</i> [<i>Carrier Frequency Selection</i>].
Note: <ul style="list-style-type: none"> The drive detects this fault if the heatsink temperature of the drive is more than the <i>oH1</i> detection level. <i>o2-04</i> [<i>Drive Model (KVA) Selection</i>] determines the <i>oH1</i> detection level. Do a Fault Reset to clear the fault. <i>L5-08</i> [<i>Fault Reset Enable Select Grp2</i>] disables the Auto Restart function. 			
Code	Name	Causes	Possible Solutions
oH3	Motor Overheat (PTC Input)	The thermistor wiring that detects motor temperature is defective.	Correct wiring errors.
		A fault occurred on the machine. Example: The machine is locked.	Examine the machine and remove the cause of the fault
		The motor has overheated.	<ul style="list-style-type: none"> Check the load level, acceleration/deceleration time, and motor start/stop frequency (cycle time). Decrease the load. Increase the values set in <i>C1-01</i> to <i>C1-08</i> [<i>Acceleration/Deceleration Times</i>]. Set <i>E2-01</i> [<i>Motor Rated Current (FLA)</i>] correctly to the value specified by the motor nameplate. Make sure that the motor cooling system is operating correctly, and repair or replace it if it is damaged. Adjust <i>E1-04</i> to <i>E1-10</i> [<i>V/f Pattern Parameters</i>]. For motor 2, adjust <i>E3-04</i> to <i>E3-10</i>. Decrease the values set in <i>E1-08</i> [<i>Mid Point A Voltage</i>] and <i>E1-10</i> [<i>Minimum Output Voltage</i>]. Note: If the values set in <i>E1-08</i> and <i>E1-10</i> are too low, the overload tolerance will decrease at low speeds.
Note: <ul style="list-style-type: none"> When <i>H3-02</i>, <i>H3-10</i>, or <i>H3-06</i> = <i>E</i> [<i>MFAI Function Selection = Motor Temperature (PTC Input)</i>], the drive detects this fault if the motor overheat signal entered to an analog input terminal A1, A2, or A3 is more than the alarm detection level. Do a Fault Reset to clear the fault. If the drive detects this fault, it will operate the motor as specified by the Stopping Method set in <i>L1-03</i> [<i>Motor Thermistor oH Alarm Select</i>]. 			
Code	Name	Causes	Possible Solutions
oH4	Motor Overheat Fault (PTC Input)	The motor has overheated.	<ul style="list-style-type: none"> Check the load level, acceleration/deceleration time, and motor start/stop frequency (cycle time). Decrease the load. Increase the values set in <i>C1-01</i> to <i>C1-08</i> [<i>Acceleration/Deceleration Times</i>]. Set <i>E2-01</i> [<i>Motor Rated Current (FLA)</i>] correctly to the value specified by the motor nameplate. Make sure that the motor cooling system is operating correctly, and repair or replace it if it is damaged. Adjust <i>E1-04</i> to <i>E1-10</i> [<i>V/f Pattern Parameters</i>]. For motor 2, adjust <i>E3-04</i> to <i>E3-10</i>. Decrease the values set in <i>E1-08</i> [<i>Mid Point A Voltage</i>] and <i>E1-10</i> [<i>Minimum Output Voltage</i>]. Note: If the values set in <i>E1-08</i> and <i>E1-10</i> are too low, the overload tolerance will decrease at low speeds.
Note: <ul style="list-style-type: none"> When <i>H3-02</i>, <i>H3-10</i>, or <i>H3-06</i> = <i>E</i> [<i>MFAI Function Selection = Motor Temperature (PTC Input)</i>], the drive detects this fault if the motor overheat signal entered to an analog input terminal A1, A2, or A3 is more than the alarm detection level. Do a Fault Reset to clear the fault. 			
Code	Name	Causes	Possible Solutions
oL1	Motor Overload	The load is too heavy.	Decrease the load. Note: Reset <i>oL1</i> when <i>U4-16</i> [<i>Motor oL1 Level</i>] < 100.
		The acceleration/deceleration times or cycle times are too short.	<ul style="list-style-type: none"> Examine the acceleration/deceleration times and the motor start/stop frequencies (cycle times). Increase the values set in <i>C1-01</i> to <i>C1-08</i> [<i>Acceleration/Deceleration Times</i>].

2.4 Fault

Code	Name	Causes	Possible Solutions
		Overload occurred while running at low speed.	<ul style="list-style-type: none"> Decrease the load when running at low speed. Increase the motor speed. If the motor is run frequently at low speeds, replace the motor with a larger motor or use a drive-dedicated motor. <p>Note: For general-purpose motors, overload can occur while running at low speed when operating at below the rated current.</p>
		<i>L1-01 [Motor Overload (oL1) Protection]</i> is set incorrectly.	Set <i>L1-01</i> in as specified by the motor qualities for a drive-dedicated motor.
		The V/f pattern does not fit the motor qualities.	<ul style="list-style-type: none"> Examine the ratios between the V/f pattern frequency and voltage. Decrease the voltage if it is too high compared to the frequency. Adjust <i>E1-04</i> to <i>E1-10 [V/f Pattern Parameters]</i>. For motor 2, adjust <i>E3-04</i> to <i>E3-10</i>. Decrease the values set in <i>E1-08 [Mid Point A Voltage]</i> and <i>E1-10 [Minimum Output Voltage]</i>. <p>Note: If the values set in <i>E1-08</i> and <i>E1-10</i> are too low, the overload tolerance will decrease at low speeds.</p>
		<i>E1-06 [Base Frequency]</i> is set incorrectly.	Set <i>E1-06</i> to the rated frequency shown on the motor nameplate.
		One drive is operating more than one motor.	Set <i>L1-01</i> = 0 [<i>Motor Overload (oL1) Protection = Disabled</i>], connect thermal overload relay to each motor to prevent damage to the motor.
		The electronic thermal protector qualities and the motor overload properties do not align.	<ul style="list-style-type: none"> Examine the motor qualities and set <i>L1-01 [Motor Overload (oL1) Protection]</i> correctly. Connect a thermal overload relay to the motor.
		The electronic thermal protector is operating at an incorrect level.	Set <i>E2-01 [Motor Rated Current (FLA)]</i> correctly to the value specified by the motor nameplate.
		There is increased motor loss from overexcitation operation.	<ul style="list-style-type: none"> Lower the value set in <i>n3-13 [OverexcitationBraking (OEB) Gain]</i>. Set <i>L3-04</i> ≠ 4 [<i>Stall Prevention during Decel ≠ Overexcitation/ High Flux</i>]. Set <i>n3-23</i> = 0 [<i>Overexcitation Braking Operation = Disabled</i>].
		The speed search-related parameters are set incorrectly.	<ul style="list-style-type: none"> Examine the settings for all speed search related parameters. Adjust <i>b3-03 [Speed Search Deceleration Time]</i>. Set <i>b3-24</i> = 1 [<i>Speed Search Method Selection = Speed Estimation</i>] after Auto-Tuning.
		Phase loss in the input power supply is causing the output current to change.	Make sure that there is no phase loss, and repair problems.
		Overload occurred during overexcitation deceleration.	<ul style="list-style-type: none"> Decrease the value set in <i>n3-13 [OverexcitationBraking (OEB) Gain]</i>. Decrease the value set in <i>n3-21 [HSB Current Suppression Level]</i>.
<p>Note:</p> <ul style="list-style-type: none"> The drive detects this fault if the electronic thermal protector of the drive started the motor overload protection. Do a Fault Reset to clear the fault. <i>L5-07 [Fault Reset Enable Select Grp1]</i> disables the Auto Restart function. 			
Code	Name	Causes	Possible Solutions
oL2	Drive Overload	The load is too large.	Decrease the load.
		The acceleration/deceleration times or cycle times are too short.	<ul style="list-style-type: none"> Examine the acceleration/deceleration times and the motor start/stop frequencies (cycle times). Increase the values set in <i>C1-01</i> to <i>C1-08 [Acceleration/Deceleration Times]</i>.
		The V/f pattern does not fit the motor qualities.	<ul style="list-style-type: none"> Examine the ratios between the V/f pattern frequency and voltage. Decrease the voltage if it is too high compared to the frequency. Adjust <i>E1-04</i> to <i>E1-10 [V/f Pattern Parameters]</i>. Decrease the values set in <i>E1-08 [Mid Point A Voltage]</i> and <i>E1-10 [Minimum Output Voltage]</i>. For motor 2, adjust <i>E3-04</i> to <i>E3-10</i>. <p>Note: If the values set in <i>E1-08</i> and <i>E1-10</i> are too low, the overload tolerance will decrease at low speeds.</p>
		The drive capacity is too small.	Replace the drive with a larger capacity model.
		Overload occurred while running at low speed.	<ul style="list-style-type: none"> Decrease the load when running at low speed. Replace the drive with a larger capacity model. Decrease the value set in <i>C6-02 [Carrier Frequency Selection]</i>.

Code	Name	Causes	Possible Solutions
		The torque compensation gain is too large.	Decrease the value set in C4-01 [Torque Compensation Gain] to make sure that the motor does not stall.
		The speed search-related parameters are set incorrectly.	<ul style="list-style-type: none"> Examine the settings for all speed search-related parameters. Adjust b3-03 [Speed Search Deceleration Time]. Set b3-24 = 1 [Speed Search Method Selection = Speed Estimation] after Auto-Tuning.
		Phase loss in the input power supply is causing the output current to change.	<ul style="list-style-type: none"> Correct errors with the wiring for main circuit drive input power. Make sure that there is no phase loss, and repair problems.
		Overload occurred during overexcitation deceleration.	<ul style="list-style-type: none"> Decrease the value set in n3-13 [OverexcitationBraking (OEB) Gain]. Decrease the value set in n3-21 [HSB Current Suppression Level].
Note: <ul style="list-style-type: none"> The drive detects this fault if the electronic thermal protector of the drive started the drive overload protection. Do a Fault Reset to clear the fault. L5-07 [Fault Reset Enable Select Grp1] disables the Auto Restart function. 			
Code	Name	Causes	Possible Solutions
oL3	Overtorque Detection 1	A fault occurred on the machine. Example: The machine is locked.	Examine the machine and remove the cause of the fault.
		The parameters are incorrect for the load.	Adjust L6-02 [Torque Detection Level 1] and L6-03 [Torque Detection Time 1] settings.
Note: <ul style="list-style-type: none"> The drive detects this fault if the drive output current is more than the level set in L6-02 for longer than L6-03. Do a Fault Reset to clear the fault. If the drive detects this fault, it will operate the motor as specified by the Stopping Method set in L6-01 [Torque Detection Selection 1]. L5-07 [Fault Reset Enable Select Grp1] disables the Auto Restart function. 			
Code	Name	Causes	Possible Solutions
oL4	Overtorque Detection 2	A fault occurred on the machine. Example: The machine is locked.	Examine the machine and remove the cause of the fault.
		The parameters are incorrect for the load.	Adjust L6-05 [Torque Detection Level 2] and L6-06 [Torque Detection Time 2] settings.
Note: <ul style="list-style-type: none"> The drive detects this fault if the drive output current is more than the level set in L6-05 for longer than L6-06. Do a Fault Reset to clear the fault. If the drive detects this fault, it will operate the motor as specified by the Stopping Method set in L6-04 [Torque Detection Selection 2]. L5-07 [Fault Reset Enable Select Grp1] disables the Auto Restart function. 			
Code	Name	Causes	Possible Solutions
oL5	Mechanical Weakening Detection 1	The drive detected overtorque as specified by the conditions for mechanical weakening detection set in L6-08 [Mechanical Fatigue Detect Select].	Do a deterioration diagnostic test on the machine side.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. If the drive detects this fault, it will operate the motor as specified by the Stopping Method set in L6-08. 			
Code	Name	Causes	Possible Solutions
oL7	High Slip Braking Overload	The load inertia is too large.	<ul style="list-style-type: none"> Decrease deceleration times in C1-02, C1-04, C1-06, and C1-08 [Deceleration Times] for applications that do not use High Slip Braking. Use a braking resistor to decrease the deceleration time.
		An external force on the load side rotated the motor.	
		Something is preventing deceleration on the load side.	<ul style="list-style-type: none"> Increase the value set in n3-04. Connect a thermal overload relay to the motor, and set n3-04 = 1200 s (maximum value).
		The value set in n3-04 [HSB Overload Time] is too small.	
Note: <ul style="list-style-type: none"> The drive detects this fault if the output frequency is constant for longer than n3-04. Do a Fault Reset to clear the fault. 			

2.4 Fault

Code	Name	Causes	Possible Solutions
oPr	Keypad Connection Fault	The keypad is not securely connected to the connector on the drive.	Examine the connection between the keypad and the drive.
		The connection cable between the drive and the keypad is disconnected.	<ul style="list-style-type: none"> Remove the keypad and then reconnect it. Replace the cable if damaged.
<p>Note:</p> <ul style="list-style-type: none"> The drive detects this fault if these conditions are correct: <ul style="list-style-type: none"> -o2-06 = 1 [Keypad Disconnect Detection = Enabled]. -b1-02 = 0 [Run Command Selection 1 = Keypad], or the drive is operating in LOCAL Mode with the keypad. Do a Fault Reset to clear the fault. 			
Code	Name	Causes	Possible Solutions
oS	Overspeed	There is overshoot.	<ul style="list-style-type: none"> Decrease C5-01 [ASR Proportional Gain 1] and increase C5-02 [ASR Integral Time 1]. Adjust the pulse train gain with H6-02 to H6-05 [Pulse Train Input Setting Parameters].
		There is an incorrect number of PG pulses set in the drive.	Set H6-02 [Terminal RP Frequency Scaling] to the pulse train frequency during 100% reference (maximum motor rotation speed).
		The oS detection level is set incorrectly.	Adjust F1-08 [Overspeed Detection Level] and F1-09 [Overspeed Detection Delay Time].
		If the drive detects the fault at start or in the low speed range (10% or less) and n8-57 = 1 [HFI Overlap Selection = Enabled] for PM Control methods, the high frequency injection gain is too high.	<ul style="list-style-type: none"> Set E5-xx [PM Motor Parameters] correctly or do Rotational Auto-Tuning. Decrease the value of n8-41 [HFI P Gain] in 0.5 unit increments. <p>Note: Set n8-41 > 0.0 for IPM motors.</p>
<p>Note:</p> <ul style="list-style-type: none"> The drive detects this fault if the motor speed is more than the value set in F1-08 for longer than F1-09. Do a Fault Reset to clear the fault. If the drive detects this fault, it will operate the motor as specified by the Stopping Method set in F1-03 [Overspeed Detection Selection]. 			
Code	Name	Causes	Possible Solutions
ov	Overvoltage	The deceleration time is too short and too much regenerative energy is flowing back into the drive.	<ul style="list-style-type: none"> Set L3-04 = 1 [Stall Prevention during Decel = General Purpose]. Increase the values set in C1-02, C1-04, C1-06, or C1-08 [Deceleration Times]. Connect a dynamic braking option to the drive. Perform Deceleration Rate Tuning.
		The acceleration time is too short.	<ul style="list-style-type: none"> Make sure that sudden drive acceleration does not cause the fault. Increase the values set in C1-01, C1-03, C1-05, or C1-07 [Acceleration Times]. Increase the value set in C2-02 [S-Curve Time @ End of Accel]. Set L3-11 = 1 [Overvoltage Suppression Select = Enabled].
		The braking load is too large.	Connect a dynamic braking option to the drive.
		There are surge voltages in the input power supply.	Connect a DC link choke to the drive. Note: If you turn the phase advancing capacitors ON and OFF and use thyristor converters in the same power supply system, there can be surge voltages that irregularly increase the input voltage.
		The drive output cable or motor is shorted to ground (the current short to ground is charging the main circuit capacitor of the drive through the power supply).	<ol style="list-style-type: none"> Examine the motor main circuit cable, terminals, and motor terminal box, and then remove ground faults. Re-energize the drive.
		If the drive detects ov in these conditions, the speed search-related parameters are incorrect: <ul style="list-style-type: none"> During speed search During momentary power loss recovery When the drive starts again automatically When you use a premium efficiency motor 	<ul style="list-style-type: none"> Examine the settings for all speed search related parameters. Set b3-19 ≠ 0 [Speed Search Restart Attempts ≠ 0 times]. Adjust b3-03 [Speed Search Deceleration Time]. Do Stationary Auto-Tuning for Line-to-Line Resistance and then set b3-24 = 1 [Speed Search Method Selection = Speed Estimation]. Use these values to adjust the parameters. <ul style="list-style-type: none"> b3-03 [Speed Search Deceleration Time] = default value × 2 L2-03 [Minimum Baseblock Time] = default value × 2 L2-04 [Powerloss V/f Recovery Ramp Time] = default value × 2
		The power supply voltage is too high.	Decrease the power supply voltage to match the drive rated voltage.
		The braking resistor or braking resistor unit wiring is incorrect.	Correct wiring errors in the connection to the braking resistor or braking resistor unit.
		The encoder cable is disconnected or wired incorrectly.	Examine for wiring errors or disconnected wires in the encoder cable, and repair problems.

Code	Name	Causes	Possible Solutions
		Noise interference along the encoder cable.	Isolate the encoder cable from the drive output line or a different source of electrical interference.
		Electrical interference caused a drive malfunction.	<ul style="list-style-type: none"> Examine the control circuit lines, main circuit lines, and ground wiring, and decrease the effects of electrical interference. Make sure that a magnetic contactor is not the source of the electrical interference, then use a Surge Protective Device if necessary.
		The load inertia is set incorrectly.	<ul style="list-style-type: none"> Examine the load inertia settings with KEB, overvoltage suppression, or stall prevention during deceleration. Adjust <i>L3-25 [Load Inertia Ratio]</i> to match the qualities of the machine.
		You used the Short Circuit Braking function when <i>A1-02 = 5 [Control Method Selection = OLV/PM]</i> .	Connect a braking resistor to the drive.
		There is motor hunting.	<ul style="list-style-type: none"> Adjust <i>n1-02 [Hunting Prevention Gain Setting]</i>. Adjust <i>n2-02 [Automatic Freq Regulator Time 1]</i> and <i>n2-03 [Automatic Freq Regulator Time 2]</i>. Adjust <i>n8-45 [Speed Feedback Detection Gain]</i> and <i>n8-47 [Pull-in Current Comp Filter Time]</i>.
		Speed Search at Start does not complete correctly when: <ul style="list-style-type: none"> <i>A1-02 = 8 [Control Method Selection = EZOLV]</i> <i>E9-01 = 0 [Motor Type Selection = Induction (IM)]</i> 	Set <i>b3-24 = 2 [Speed Search Method Selection = Current Detection 2]</i> .
Note: <ul style="list-style-type: none"> The drive detects this error if the DC bus voltage is more than the <i>ov</i> detection level while the drive is running. Do a Fault Reset to clear the fault. For 200 V class drives, the detection level of <i>ov</i> is approximately 410 V. For 400 V class drives, the detection level is approximately 820 V. <i>L5-08 [Fault Reset Enable Select Grp2]</i> disables the Auto Restart function. 			
Code	Name	Causes	Possible Solutions
PE1	PLC Fault 1	The communication option detected a fault.	Refer to the manual for the communication option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
PE2	PLC Fault 2	The communication option detected a fault.	Refer to the manual for the communication option card.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
PF	Input Phase Loss	There is a phase loss in the drive input power.	Correct errors with the wiring for main circuit drive input power.
		There is loose wiring in the drive input power terminals.	Tighten the terminal screws to the correct tightening torque.
		The drive input power voltage is changing too much.	<ul style="list-style-type: none"> Examine the input power for problems. Make the drive input power stable. If the input power supply is good, examine the magnetic contactor on the main circuit side for problems.
		There is unsatisfactory balance between voltage phases.	<ul style="list-style-type: none"> Examine the input power for problems. Make the drive input power stable. Set <i>L8-05 = 0 [Input Phase Loss Protection Sel = Disabled]</i>.
		The main circuit capacitors have become unserviceable.	<ul style="list-style-type: none"> Examine the capacitor maintenance time in monitor <i>U4-05 [Capacitor Maintenance]</i>. If <i>U4-05</i> is more than 90%, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative. If drive input power is correct and the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> The drive detects this error if the DC bus voltage changes irregularly without regeneration. Do a Fault Reset to clear the fault. Use <i>L8-05</i> to enable and disable <i>PF</i> detection. 			
Code	Name	Causes	Possible Solutions
PGo	Encoder (PG) Feedback Loss	The encoder cable is disconnected or wired incorrectly.	Examine for wiring errors or disconnected wires in the encoder cable, and repair problems.
		The encoder is not receiving power.	Examine the encoder power supply.

2.4 Fault

Code	Name	Causes	Possible Solutions
		The holding brake is stopping the motor.	Release the holding brake.
Note: <ul style="list-style-type: none"> The drive detects this error if it does not receive the speed detection pulse signal from the encoder in the detection time set in <i>F1-14 [Encoder Open-Circuit Detect Time]</i>. Do a Fault Reset to clear the fault. If the drive detects this error, it will operate the motor as specified by the Stopping Method set in <i>F1-02 [PG Open Circuit Detection Select]</i>. 			
Code	Name	Causes	Possible Solutions
PGoH	Encoder (PG) Hardware Fault	The encoder cable is disconnected.	Connect any disconnected wires in the encoder cable.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Parameter <i>F1-20 [Encoder 1 PCB Disconnect Detect]</i> or <i>F1-36 [Encoder 2 PCB Disconnect Detect]</i> enables and disables PGoH detection. If the drive detects this error, it will operate the motor as specified by the Stopping Method set in <i>F1-02 [PG Open Circuit Detection Select]</i>. 			
Code	Name	Causes	Possible Solutions
PSE	JOHB-SMP3 Protocol Set Error	<ul style="list-style-type: none"> The DIP switches on the JOHB-SMP3 are at their default setting. There is no protocol assigned to the JOHB-SMP3. 	Make sure that the power to the drive is OFF and the CHARGE LED light is OFF before you use the DIP switches on the JOHB-SMP3 to set the protocol. Refer to the JOHB-SMP3 manual for more information.
Note: <p>“PSE” error occurs on drives with software versions PRG: 09018 and later, and only when DIP switches are at their factory default setting. The “PRG” column on the nameplate on the right side of the drive identifies the software version. You can also use <i>U1-25 [SoftwareNumber FLASH]</i> to identify the software version.</p>			
Code	Name	Causes	Possible Solutions
rF	Braking Resistor Fault	<p>The resistance of the dynamic braking option that is connected to the drive is too low.</p> <p>A regenerative converter, regenerative unit, or braking unit is connected to the drive.</p>	<p>Use a dynamic braking option that fits the model and duty rating of the drive.</p> <p>Set <i>L8-55 = 0 [Internal DB TransistorProtection = Disable]</i>.</p>
Note: <p>Do a Fault Reset to clear the fault.</p>			
Code	Name	Causes	Possible Solutions
rH	Braking Resistor Overheat	The deceleration time is too short and excessive regenerative energy is flowing back into the drive.	<ul style="list-style-type: none"> Check the load level, deceleration time, and speed. Decrease the load. Increase the values set in <i>C1-02, C1-04, C1-06, or C1-08 [Deceleration Times]</i>. Use a dynamic braking option that lets you use more power.
		The duty cycle is too high.	<p>Examine the duty cycle.</p> <p>Note: When <i>L8-01 = 1 [3% ERF DB Resistor Protection = Enabled]</i>, the maximum braking duty cycle is 3%.</p>
		The braking load is too heavy.	<ul style="list-style-type: none"> Calculate the braking load and braking power again, and decrease the braking load. Use a braking resistor that improves braking power.
		The braking resistor is not sufficient.	Use the braking resistor specifications to select a sufficient braking resistor.
Note: <ul style="list-style-type: none"> The drive detects this error if the braking resistor overheat protective function is active. The magnitude of the braking load causes the braking resistor overheat alarm, NOT the surface temperature. If the duty cycle is higher than the braking resistor rating, the drive will show the alarm. Do a Fault Reset to clear the fault. Parameter <i>L8-01</i> enables and disables <i>rH</i> detection. 			
Code	Name	Causes	Possible Solutions
r	Dynamic Braking Transistor Fault	The drive control circuit is damaged.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
		There is a malfunction in the internal braking transistor of the drive.	
Note: <p>Do a Fault Reset to clear the fault.</p>			
Code	Name	Causes	Possible Solutions
SC	Short Circuit/IGBT Failure	Overheating caused damage to the motor or the motor insulation is not satisfactory.	Measure the motor insulation resistance, and replace the motor if there is electrical conduction or unserviceable insulation.
		The motor main circuit cable is contacting ground to make a short circuit.	<ul style="list-style-type: none"> Examine the motor main circuit cable for damage, and repair short circuits. Measure the resistance between the motor main circuit cable and the ground terminal. If there is electrical conduction, replace the cable.

Code	Name	Causes	Possible Solutions
		A short circuit or ground fault on the drive output side caused damage to the output transistor of the drive.	<ul style="list-style-type: none"> Make sure that there is not a short circuit in terminal B1 and terminals U/T1, V/T2, and W/T3. Make sure that there is not a short circuit in terminals - and terminals U/T1, V/T2, and W/T3. If there is a short circuit, contact Yaskawa or your nearest sales representative.
		When $A1-02 = 5, 6, 7$ [Control Method Selection = <i>OLV/PM, AOLV/PM, or CLV/PM</i>], the output current is more than the value set in $L8-27$ [Overcurrent Detection Gain].	Set $L8-27$ correctly.
Note: <ul style="list-style-type: none"> The drive detects this error if there is a short circuit or ground fault on the drive output side, or an IGBT failure. Do a Fault Reset to clear the fault. 			
Code	Name	Causes	Possible Solutions
SCF	Safety Circuit Fault	The safety circuit is broken.	Replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
SEr	Speed Search Retries Exceeded	The speed search-related parameters are set incorrectly.	<ul style="list-style-type: none"> Decrease $b3-10$ [Speed Estimation Detection Gain]. Increase $b3-17$ [Speed Est Retry Current Level]. Increase $b3-18$ [Speed Est Retry Detection Time]. Do Auto-Tuning again.
		The motor is coasting in the opposite direction of the Run command.	Set $b3-14 = 1$ [Bi-directional Speed Search = Enabled].
Note: <ul style="list-style-type: none"> The drive detects this error if the number of speed search restarts is more than $b3-19$ [Speed Search Restart Attempts]. Do a Fault Reset to clear the fault. 			
Code	Name	Causes	Possible Solutions
STPo	Motor Step-Out Detected	The motor code is set incorrectly for PM Control Methods.	<ul style="list-style-type: none"> Set $E5-01$ [PM Motor Code Selection] correctly as specified by the motor. For specialized motors, refer to the motor test report and set $E5-xx$ correctly.
		The load is too large.	<ul style="list-style-type: none"> Increase the value set in $n8-55$ [Motor to Load Inertia Ratio]. Increase the value set in $n8-51$ [Pull-in Current @ Acceleration]. If the drive detects $STPo$ during deceleration when increasing the value set in $n8-51$, set the value of $n8-79$ [Pull-in Current @ Deceleration] lower than $n8-51$. Decrease the load. Replace the drive and motor with larger capacity models.
		The load inertia is too large.	Increase the value set in $n8-55$.
		The acceleration/deceleration times are too short.	<ul style="list-style-type: none"> Increase the values set in $C1-01$ to $C1-08$ [Acceleration/Deceleration Times]. Increase the value set in $C2-01$ [S-Curve Time @ Start of Accel].
		Speed response is too slow.	Increase the value set in $n8-55$.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
SvE	Zero Servo Fault	The value set in the torque limit is too small.	Adjust torque limit-related parameters $L7-01$ to $L7-04$.
		The load torque is too large.	Decrease the load torque.
		Noise interference along the encoder cable	Isolate the encoder cable from the drive output line or a different source of electrical interference.
Note: <ul style="list-style-type: none"> The drive detects this error if motor rotation position moves during Zero Servo. Do a Fault Reset to clear the fault. 			
Code	Name	Causes	Possible Solutions
TiM	Keypad Time Not Set	There is a battery in the keypad, but the date and time are not set.	Use the keypad to set the date and time.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. Parameter $o4-24$ [bAT Detection Selection] enables and disables TiM detection. 			

2.4 Fault

Code	Name	Causes	Possible Solutions
UL3	Undertorque Detection 1	A fault occurred on the machine. Example: There is a broken pulley belt.	Examine the machine and remove the cause of the fault.
		The parameters are incorrect for the load.	Adjust L6-02 [Torque Detection Level 1] and L6-03 [Torque Detection Time 1] settings.
Note: <ul style="list-style-type: none"> The drive detects this error if the drive output current is less than the level set in L6-02 for longer than L6-03. Do a Fault Reset to clear the fault. If the drive detects this error, it will operate the motor as specified by the Stopping Method set in L6-01 [Torque Detection Selection 1]. 			
Code	Name	Causes	Possible Solutions
UL4	Undertorque Detection 2	A fault occurred on the machine. Example: There is a broken pulley belt.	Examine the machine and remove the cause of the fault.
		The parameters are incorrect for the load.	Adjust L6-05 [Torque Detection Level 2] and L6-06 [Torque Detection Time 2] settings.
Note: <ul style="list-style-type: none"> The drive detects this error if the drive output current is less than the level set in L6-05 for longer than L6-06. Do a Fault Reset to clear the fault. If the drive detects this error, it will operate the motor as specified by the Stopping Method set in L6-04 [Torque Detection Selection 2]. 			
Code	Name	Causes	Possible Solutions
UL5	Mechanical Weakening Detection 2	The drive detected undertorque as specified by the conditions for mechanical weakening detection set in L6-08 [Mechanical Fatigue Detect Select].	Examine the machine for deterioration.
Note: <ul style="list-style-type: none"> Do a Fault Reset to clear the fault. If the drive detects this error, it will operate the motor as specified by the Stopping Method set in L6-08. 			
Code	Name	Causes	Possible Solutions
Uv1	DC Bus Undervoltage	There is a phase loss in the drive input power.	Correct errors with the wiring for main circuit drive input power.
		There is loose wiring in the drive input power terminals.	Tighten the terminal screws to the correct tightening torque.
		The drive input power voltage is changing too much.	<ul style="list-style-type: none"> Examine the input power for problems. Make the drive input power stable. If the input power supply is good, examine the magnetic contactor on the main circuit side for problems.
		There was a loss of power.	Use a better power supply.
		The main circuit capacitors have become unserviceable.	Examine the capacitor maintenance time in monitor U4-05 [Capacitor Maintenance]. If U4-05 is more than 90%, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
		The relay or contactor on the soft-charge bypass relay is damaged.	U4-06 [PreChargeRelayMainte] shows the performance life of the soft-charge bypass relay. If U4-06 is more than 90%, replace the board or the drive. For information about replacing the board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> The drive detects this error if the DC bus voltage decreases below the level set in L2-05 [Undervoltage Detection Lvl (Uv1)] while the drive is running. The Uv1 detection level is approximately 190 V for a 200 V class drives. The detection level is approximately 380 V for 400 V class drives. The detection level is approximately 350 V when E1-01 [Input AC Supply Voltage] < 400. Do a Fault Reset to clear the fault. Fault trace is not available for this fault. L5-08 [Fault Reset Enable Select Grp2] disables the Auto Restart function. 			
Code	Name	Causes	Possible Solutions
Uv2	Control Power Undervoltage	The value set in L2-02 [Power Loss Ride Through Time] increased and the momentary power loss recovery unit is not connected to the drive.	Connect the momentary power loss recovery unit to the drive.
		There was a problem with the drive hardware.	<ul style="list-style-type: none"> Re-energize the drive. If the fault stays, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> The drive detects this error if the control power supply voltage decreases. Do a Fault Reset to clear the fault. Fault trace is not available for this fault. 			

Code	Name	Causes	Possible Solutions
Uv3	Soft Charge Answerback Fault	There is damage to the relay or contactor on the soft-charge bypass relay.	<ul style="list-style-type: none"> • Re-energize the drive. • If the fault stays, replace the control board or the drive. • Monitor <i>U4-06 [PreChargeRelayMainte]</i> shows the performance life of the soft-charge bypass relay. If <i>U4-06</i> is more than 90%, replace the board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
		Air inside the drive is too hot.	Decrease the ambient temperature of the drive.
Note: <ul style="list-style-type: none"> • Do a Fault Reset to clear the fault. • Fault trace is not available for these faults. 			

2.5 Minor Faults/Alarms

This section gives information about the causes and possible solutions when a minor fault or alarm occurs. Use the information in this table to remove the cause of the minor fault or alarm.

Code	Name	Causes	Possible Solutions
AEr	Station Address Setting Error	The node address for the communication option is not in the permitted setting range.	<ul style="list-style-type: none"> For CC-Link communication, set <i>F6-10 [CC-Link Node Address]</i> correctly. For MECHATROLINK communication, set <i>F6-20 [MECHATROLINK Station Address]</i> correctly. For CANopen communication, set <i>F6-35 [CANopen Node ID Selection]</i> correctly.
Note: If the drive detects this error, the terminal set to <i>H2-01 to H2-03 = 10 [MFDO Function Select = Alarm]</i> will activate.			
Code	Name	Causes	Possible Solutions
bAT	Keypad Battery Low Voltage	The keypad battery voltage is low.	Replace the keypad battery.
Note: <ul style="list-style-type: none"> If detected, the terminal assigned to <i>H2-01 to H2-03 = 10 [MFDO Function Select = Alarm]</i> will switch ON. Set <i>o4-24 [bAT Detection Selection]</i> to enable/disable <i>bAT</i> detection. 			
Code	Name	Causes	Possible Solutions
bb	Baseblock	An external baseblock command was entered through one of the MFDI terminals Sx, and the drive output stopped as shown by an external baseblock command.	Examine the external sequence and timing of the baseblock command input.
Note: The drive will not output a minor fault signal for this alarm.			
Code	Name	Causes	Possible Solutions
bCE	Bluetooth Communication Error	The smartphone or tablet with DriveWizard Mobile installed is too far from the keypad.	Use the smartphone or tablet 10 m (32.8 ft.) or nearer to the keypad. Note: <i>bCE</i> can occur when the smartphone or tablet is 10 m (32.8 ft) or nearer to the keypad depending on the specifications of the smartphone or tablet.
		Radio waves from a different device are causing interference with communications between the smartphone or tablet and keypad.	Make sure that no device around the keypad uses the same radio bandwidth (2400 MHz to 2480 MHz), and prevent radio interference.
Note: <ul style="list-style-type: none"> The drive detects this error when you use the Bluetooth LCD keypad to operate the drive from a smartphone or tablet. If the drive detects this error, the terminal set to <i>H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]</i> will activate. Parameter <i>o2-27 [bCE Detection Selection]</i> enables and disables <i>bCE</i> detection. 			
Code	Name	Causes	Possible Solutions
boL	Braking Transistor Overload	The duty cycle of the braking transistor is high (the regeneration power or repetition frequency is high).	<ul style="list-style-type: none"> Install a braking unit (CDBR series). Install a regenerative converter. Increase the deceleration time.
		You enabled the protective function for the braking transistor when you have a regenerative converter.	Set <i>L8-55 = 0 [Internal DB TransistorProtection = Disable]</i> .
		The braking transistor in the drive is broken.	Replace the drive.
Note: If the drive detects this error, the terminal assigned to <i>H2-01 to H2-03 = 10 [MFDO Function Select = Alarm]</i> will be ON.			
Code	Name	Causes	Possible Solutions
bUS	Option Communication Error	The communications cable wiring is incorrect.	Correct wiring errors.
		There is a short-circuit in the communications cable or the communications cable is not connected.	<ul style="list-style-type: none"> Repair short circuits and connect cables. Replace the defective communications cable.
		Electrical interference caused a communication data error.	<ul style="list-style-type: none"> Examine the control circuit lines, main circuit lines, and ground wiring, and decrease the effects of electrical interference. Make sure that a magnetic contactor is not the source of the electrical interference, then use a Surge Protective Device if necessary. Use only the recommended cables or other shielded line. Ground the shield on the controller side or the drive input power side. Separate the communication wiring from drive power lines, and install a noise filter to the input side of the power supply for communication. Decrease the effects of electrical interference from the controller.
		The option card is incorrectly installed to the drive.	Correctly install the option card to the drive.

Code	Name	Causes	Possible Solutions
		The option card is damaged.	If the alarm continues and the wiring is correct, replace the option card.

Note:

- The drive detects this error if the Run command or frequency reference is assigned to the option card.
- If the drive detects this error, the terminal set to H2-01 to H2-03 = 10 [MFDO Function Select = Alarm] will activate.
- If the drive detects this error, it will operate the motor as specified by the stopping method set in F6-01 [Communication Error Selection].

Code	Name	Causes	Possible Solutions
bUSy	Busy	You set the drive to use MEMOBUS/Modbus communications to change parameters, but you used the keypad to change parameters.	Use MEMOBUS/Modbus communications to enter the enter command, then use the keypad to change the parameter.
		You tried to change a parameter while the drive was changing setting.	Wait until the process is complete.

Code	Name	Causes	Possible Solutions
CALL	Serial Comm Transmission Error	The communications cable wiring is incorrect.	Correct wiring errors.
		There is a short circuit in the communications cable or the communications cable is not connected.	<ul style="list-style-type: none"> • Repair the short-circuited or disconnected portion of the cable. • Replace the defective communications cable.
		A programming error occurred on the controller side.	Examine communications at start-up and correct programming errors.
		There is damage to the communications circuitry.	<ul style="list-style-type: none"> • Do a self-diagnostics check. • If the problem continues, replace the control board or the drive. Contact Yaskawa or your nearest sales representative to replace the control board.
		The termination resistor setting for MEMOBUS/Modbus communications is incorrect.	On the last drive in a MEMOBUS/Modbus network, set DIP switch S2 to the ON position to enable the termination resistor.

Note:

- The drive detects this error if it does not correctly receive control data from the controller when energizing the drive.
- If the drive detects this error, the terminal assigned to H2-01 to H2-03 = 10 [MFDO Function Select = Alarm] will activate.

Code	Name	Causes	Possible Solutions
CE	Modbus Communication Error	The communications cable wiring is incorrect.	Correct wiring errors.
		There is a short circuit in the communications cable or the communications cable is not connected.	<ul style="list-style-type: none"> • Repair short circuits and connect cables. • Replace the defective communications cable.
		Electrical interference caused a communication data error.	<ul style="list-style-type: none"> • Examine the control circuit lines, main circuit lines, and ground wiring, and decrease the effects of electrical interference. • Make sure that a magnetic contactor is not the source of the electrical interference, then use a Surge Protective Device if necessary. • Use only the recommended cables or other shielded line. Ground the shield on the controller side or the drive input power side. • Separate the communication wiring from drive power lines, and install a noise filter to the input side of the power supply for communication. • Decrease the effects of electrical interference from the controller.
		The communication protocol is not compatible.	<ul style="list-style-type: none"> • Examine the values set in H5-xx. • Examine the settings on the controller side and correct the difference in communication conditions.
		The value set in H5-09 [CE Detection Time] is too small for the communications cycle.	<ul style="list-style-type: none"> • Change the controller software settings. • Increase the value set in H5-09.
		The controller software or hardware is causing a communication problem.	Examine the controller and remove the cause of the problem.

Note:

- The drive detects this error if it does not correctly receive control data for the CE detection time set to H5-09.
- If the drive detects this error, the terminal assigned to H2-01 to H2-03 = 10 [MFDO Function Select = Alarm] will be ON.
- If the drive detects this error, it will operate the motor as specified by the stopping method set in H5-04 [Communication Error Stop Method].

Code	Name	Causes	Possible Solutions
CP1	Comparator 1 Limit Error	The monitor value set in H2-20 [Comparator 1 Monitor Selection] was in the range of H2-21 [Comparator 1 Lower Limit] and H2-22 [Comparator 1 Upper Limit].	Examine the monitor value and remove the cause of the error.

Note:

- The drive detects this error when the terminal is assigned to H2-01 to H2-03 = 66 [MFDO Function Select = Comparator1].
- If the drive detects this error, the terminal assigned to H2-01 to H2-03 = 10 [MFDO Function Select = Alarm] will be ON.
- H2-33 [Comparator1 Protection Selection] enables and disables CP1 detection.

2.5 Minor Faults/Alarms

Code	Name	Causes	Possible Solutions
CP2	Comparator 2 Limit Error	The monitor value set in H2-26 [Comparator 2 Monitor Selection] was outside the range of H2-27 [Comparator 2 Lower Limit] and H2-28 [Comparator 2 Upper Limit].	Examine the monitor value and remove the cause of the error.
Note: <ul style="list-style-type: none"> The drive detects this error when the terminal is assigned to H2-01 to H2-03 = 67 [MFDO Function Select = Comparator2]. If the drive detects this error, the terminal assigned to H2-01 to H2-03 = 10 [MFDO Function Select = Alarm] will be ON. H2-35 [Comparator2 Protection Selection] enables and disables CP2 detection. 			
Code	Name	Causes	Possible Solutions
CrST	Cannot Reset	The drive received a fault reset command when a Run command was active.	Turn off the Run command then de-energize and re-energize the drive.
Code	Name	Causes	Possible Solutions
CyC	MECHATROLINK CommCycleSettingErr	The communications cycle setting of the controller is not in the permitted range of the MECHATROLINK interface option.	Set the communications cycle of the controller in the permitted range of the MECHATROLINK interface option.
Note: If the drive detects this error, the terminal set to H2-01 to H2-03 = 10 [MFDO Function Select = Alarm] will activate.			
Code	Name	Causes	Possible Solutions
CyPo	Cycle Power to Accept Changes	Although F6-15 = 1 [Comm. Option Parameters Reload = Reload Now], the drive does not update the communication option parameters.	Re-energize the drive to update the communication option parameters.
Code	Name	Causes	Possible Solutions
dEv	Speed Deviation	The load is too heavy	Decrease the load.
		Acceleration and deceleration times are set too short.	Increase the values set in C1-01 to C1-08 [Acceleration/Deceleration Time].
		The dEv detection level settings are incorrect.	Adjust F1-10 [Speed Deviation Detection Level] and F1-11 [Speed Deviation Detect DelayTime].
		The load is locked up.	Examine the machine.
		The holding brake is stopping the motor.	Release the holding brake.
Note: <ul style="list-style-type: none"> The drive detects this error if the difference between the detected speed and the speed reference is more than the setting of F1-10 for longer than F1-11. If the drive detects this error, the terminal assigned to H2-01 to H2-03 = 10 [MFDO Function Select = Alarm] will be ON. If the drive detects this error, the drive will operate the motor as specified by the stopping method set in F1-04 [Speed Deviation Detection Select]. 			
Code	Name	Causes	Possible Solutions
dnE	Drive Disabled	A terminal set for H1-xx = 6A [Drive Enable] turned OFF.	Examine the operation sequence.
Note: If the drive detects this error, the terminal assigned to H2-01 to H2-03 = 10 [MFDO Function Select = Alarm] will be ON.			
Code	Name	Causes	Possible Solutions
dWA2	DriveWorksEZ Alarm 2	There was an error in the DriveWorksEZ program.	Examine the DriveWorksEZ program and remove the cause of the error. This is not a drive fault.
Note: If the drive detects this error, the terminal assigned to H2-01 to H2-03 = 10 [MFDO Function Select = Alarm] will be ON.			
Code	Name	Causes	Possible Solutions
dWA3	DriveWorksEZ Alarm 3	There was an error in the DriveWorksEZ program.	Examine the DriveWorksEZ program and remove the cause of the error. This is not a drive fault.
Note: If the drive detects this error, the terminal assigned to H2-01 to H2-03 = 10 [MFDO Function Select = Alarm] will be ON.			
Code	Name	Causes	Possible Solutions
dWAL	DriveWorksEZ Alarm	There was an error in the DriveWorksEZ program.	Examine the DriveWorksEZ program and remove the cause of the error. This is not a drive fault.
Note: If the drive detects this error, the terminal assigned to H2-01 to H2-03 = 10 [MFDO Function Select = Alarm] will be ON.			

Code	Name	Causes	Possible Solutions
E5	MECHATROLINK Watchdog Timer Err	The drive detected a watchdog circuit exception while it received data from the controller.	Examine the MECHATROLINK cable connection. If this error occurs frequently, examine the wiring and decrease the effects of electrical interference as specified by these manuals: <ul style="list-style-type: none"> MECHATROLINK-II Installation Guide (MECHATROLINK Members Association, manual number MMATDEP011) MECHATROLINK-III Installation Manual (MECHATROLINK Members Association, publication number MMATDEP018)
Note: <ul style="list-style-type: none"> If the drive detects this error, the terminal assigned to <i>H2-01 to H2-03 = 10 [MFDO Function Select = Alarm]</i> will be ON. If the drive detects this error, it will operate the motor as specified by the stop method set in <i>F6-25 [MECHATROLINK Watchdog Error Sel]</i>. 			
Code	Name	Causes	Possible Solutions
EF	FWD/REV Run Command Input Error	A forward command and a reverse command were input at the same time for longer than 0.5 s.	Examine the forward and reverse command sequence and correct the problem.
Note: <ul style="list-style-type: none"> If the drive detects <i>EF</i>, the motor will ramp to stop. If the drive detects this error, the terminal assigned to <i>H2-01 to H2-03 = 10 [MFDO Function Select = Alarm]</i> will be ON. 			
Code	Name	Causes	Possible Solutions
EF0	Option Card External Fault	The communication option card received an external fault from the controller.	1. Find the device that caused the external fault and remove the cause. 2. Clear the external fault input from the controller.
		Programming error occurred on the controller side.	Examine the operation of the controller program.
Note: <ul style="list-style-type: none"> The drive detects this error if the alarm function on the external device side is operating. If the drive detects this error, the terminal assigned to <i>H2-01 to H2-03 = 10 [MFDO Function Select = Alarm]</i> will be ON. Set the stopping method for this fault in <i>F6-03 [Comm External Fault (EF0) Select]</i>. 			
Code	Name	Causes	Possible Solutions
EF1	External Fault (Terminal S1)	MFDI terminal S1 caused an external fault through an external device.	1. Find the device that caused the external fault and remove the cause. 2. Clear the external fault input in the MFDI.
		The wiring is incorrect.	Correctly connect the signal line to MFDI terminal S1.
		<i>External Fault [H1-01 = 2C to 2F]</i> is set to MFDI terminal S1, but the terminal is not in use.	Correctly set the MFDI.
Note: <ul style="list-style-type: none"> If the drive detects this error, the terminal assigned to <i>H2-01 to H2-03 = 10 [MFDO Function Select = Alarm]</i> will be ON. 			
Code	Name	Causes	Possible Solutions
EF2	External Fault (Terminal S2)	MFDI terminal S2 caused an external fault through an external device.	1. Find the device that caused the external fault and remove the cause. 2. Clear the external fault input in the MFDI.
		The wiring is incorrect.	Correctly connect the signal line to MFDI terminal S2.
		<i>External Fault [H1-02 = 2C to 2F]</i> is set to MFDI terminal S2, but the terminal is not in use.	Correctly set the MFDI.
Note: <ul style="list-style-type: none"> If the drive detects this error, the terminal assigned to <i>H2-01 to H2-03 = 10 [MFDO Function Select = Alarm]</i> will be ON. 			
Code	Name	Causes	Possible Solutions
EF3	External Fault (Terminal S3)	MFDI terminal S3 caused an external fault through an external device.	1. Find the device that caused the external fault and remove the cause. 2. Clear the external fault input in the MFDI.
		The wiring is incorrect.	Correctly connect the signal line to MFDI terminal S3.
		<i>External Fault [H1-03 = 2C to 2F]</i> is set to MFDI terminal S3, but the terminal is not in use.	Correctly set the MFDI.
Note: <ul style="list-style-type: none"> If the drive detects this error, the terminal assigned to <i>H2-01 to H2-03 = 10 [MFDO Function Select = Alarm]</i> will be ON. 			
Code	Name	Causes	Possible Solutions
EF4	External Fault (Terminal S4)	MFDI terminal S4 caused an external fault through an external device.	1. Find the device that caused the external fault and remove the cause. 2. Clear the external fault input in the MFDI.
		The wiring is incorrect.	Correctly connect the signal line to MFDI terminal S4.

2.5 Minor Faults/Alarms

Code	Name	Causes	Possible Solutions
		<i>External Fault [H1-04 = 2C to 2F]</i> is set to MFDI terminal S4, but the terminal is not in use.	Correctly set the MFDI.
Note: If the drive detects this error, the terminal assigned to <i>H2-01 to H2-03 = 10 [MFDO Function Select = Alarm]</i> will be ON.			
Code	Name	Causes	Possible Solutions
EF5	External Fault (Terminal S5)	MFDI terminal S5 caused an external fault through an external device.	1. Find the device that caused the external fault and remove the cause. 2. Clear the external fault input in the MFDI.
		The wiring is incorrect.	Correctly connect the signal line to MFDI terminal S5.
		<i>External Fault [H1-05 = 2C to 2F]</i> is set to MFDI terminal S5, but the terminal is not in use.	Correctly set the MFDI.
Note: If the drive detects this error, the terminal assigned to <i>H2-01 to H2-03 = 10 [MFDO Function Select = Alarm]</i> will be ON.			
Code	Name	Causes	Possible Solutions
EF6	External Fault (Terminal S6)	MFDI terminal S6 caused an external fault through an external device.	1. Find the device that caused the external fault and remove the cause. 2. Clear the external fault input in the MFDI.
		The wiring is incorrect.	Correctly connect the signal line to MFDI terminal S6.
		<i>External Fault [H1-06 = 2C to 2F]</i> is set to MFDI terminal S6, but the terminal is not in use.	Correctly set the MFDI.
Note: If the drive detects this error, the terminal assigned to <i>H2-01 to H2-03 = 10 [MFDO Function Select = Alarm]</i> will be ON.			
Code	Name	Causes	Possible Solutions
EF7	External Fault (Terminal S7)	MFDI terminal S7 caused an external fault through an external device.	1. Find the device that caused the external fault and remove the cause. 2. Clear the external fault input in the MFDI.
		The wiring is incorrect.	Correctly connect the signal line to MFDI terminal S7.
		<i>External Fault [H1-07 = 2C to 2F]</i> is set to MFDI terminal S7, but the terminal is not in use.	Correctly set the MFDI.
Note: If the drive detects this error, the terminal assigned to <i>H2-01 to H2-03 = 10 [MFDO Function Select = Alarm]</i> will be ON.			
Code	Name	Causes	Possible Solutions
EF8	External Fault (Terminal S8)	MFDI terminal S8 caused an external fault through an external device.	1. Find the device that caused the external fault and remove the cause. 2. Clear the external fault input in the MFDI.
		The wiring is incorrect.	Correctly connect the signal line to MFDI terminal S8.
		<i>External Fault [H1-08 = 2C to 2F]</i> is set to MFDI terminal S8, but the terminal is not in use.	Correctly set the MFDI.
Note: If the drive detects this error, the terminal assigned to <i>H2-01 to H2-03 = 10 [MFDO Function Select = Alarm]</i> will be ON.			
Code	Name	Causes	Possible Solutions
EP24v	External Power 24V Supply	The voltage of the main circuit power supply decreased, and the 24 V power supply is supplying power to the drive.	<ul style="list-style-type: none"> Examine the main circuit power supply. Turn ON the main circuit power supply to run the drive.
Note: <ul style="list-style-type: none"> Set <i>o2-26 [Ext. Power 24V Supply Display]</i> to enable or disable <i>EP24v</i> detection. The drive will not output an alarm signal for this alarm. 			
Code	Name	Causes	Possible Solutions
FAn	Internal Fan Fault	The circulation fan stopped operating correctly.	<ul style="list-style-type: none"> Examine circulation fan operation. Re-energize the drive. Examine <i>U4-03 [Cooling Fan Ope Time]</i> and <i>U4-04 [Cool Fan Maintenance]</i>. If there is damage to the circulation fan or if the performance life of the fan is expired, replace the fan.
Note: If the drive detects this error, the terminal set to <i>H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]</i> will activate.			
Code	Name	Causes	Possible Solutions
FbH	Excessive PID Feedback	The <i>FbH</i> detection level is set incorrectly.	Adjust <i>b5-36 [PID High Feedback Detection Lvl]</i> and <i>b5-37 [PID High Feedback Detection Time]</i> .
		There is a problem with the PID feedback wiring.	Correct errors with the PID control wiring.

Code	Name	Causes	Possible Solutions
		The feedback sensor is not operating correctly.	Examine the sensors on the control device side.
		A fault occurred in the feedback input circuit of the drive.	Replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> The drive detects this fault if the PID feedback input is more than the level set in <i>b5-36</i> for longer than <i>b5-37</i>. If detected, the terminal assigned to <i>H2-01</i> to <i>H2-03</i> = 10 [MFDO Function Select = Alarm] will be ON. If the drive detects this fault, it will operate the motor as specified by the stop method set in <i>b5-12</i> [Feedback Loss Detection Select]. 			
Code	Name	Causes	Possible Solutions
FbL	PID Feedback Loss	The <i>FbL</i> detection level is set incorrectly.	Adjust <i>b5-13</i> [PID Feedback Loss Detection Lvl] and <i>b5-14</i> [PID Feedback Loss Detection Time].
		There is a problem with the PID feedback wiring.	Correct errors with the PID control wiring.
		The feedback sensor is not operating correctly.	Examine the sensors on the control device side.
		A fault occurred in the feedback input circuit of the drive.	Replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> The drive detects this error if the PID feedback input is lower than the level set in <i>b5-13</i> for longer than <i>b5-14</i>. If the drive detects this error, the terminal assigned to <i>H2-01</i> to <i>H2-03</i> = 10 [MFDO Function Select = Alarm] will be ON. If the drive detects this error, it will operate the motor as specified by the stop method set in <i>b5-12</i> [Feedback Loss Detection Select]. 			
Code	Name	Causes	Possible Solutions
HCA	High Current Alarm	The load is too heavy.	<ul style="list-style-type: none"> Decrease the load for applications with repetitive starts and stops. Replace the drive with a larger capacity model.
		The acceleration time is too short.	<ul style="list-style-type: none"> Calculate the torque necessary during acceleration related to the load inertia and the specified acceleration time. Increase the values set in <i>C1-01</i>, <i>C1-03</i>, <i>C1-05</i>, or <i>C1-07</i> [Acceleration Times] until you get the necessary torque. Increase the values set in <i>C2-01</i> to <i>C2-04</i> [S-Curve Characteristics] until you get the necessary torque. Replace the drive with a larger capacity model.
		The drive is trying to operate a specialized motor or a motor that is larger than the maximum applicable motor output of the drive.	<ul style="list-style-type: none"> Examine the motor nameplate, the motor, and the drive to make sure that the drive rated current is larger than the motor rated current. Replace the drive with a larger capacity model.
		The current level temporarily increased because of speed search after a momentary power loss or while trying to Auto Restart.	If speed search or Auto Restart cause an increase in current, the drive can temporarily show this alarm. The time that the drive shows the alarm is short. No more steps are necessary to clear the alarm.
Note: <ul style="list-style-type: none"> The drive detects this error if the drive output current is more than the overcurrent alarm level (150% of the rated current). If the drive detects this error, the terminal assigned to <i>H2-01</i> to <i>H2-03</i> = 10 [MFDO Function Select = Alarm] will be ON. 			
Code	Name	Causes	Possible Solutions
L24v	Loss of External Power 24 Supply	The voltage of the backup 24 V power supply has decreased. The main circuit power supply is operating correctly.	<ul style="list-style-type: none"> Examine the external 24 V power supply for disconnected wires and wiring errors and repair the problems. Examine the external 24 V power supply for problems.
Note: <ul style="list-style-type: none"> Set <i>a2-23</i> [External 24V Powerloss Detection] to enable or disable <i>L24v</i> detection. The drive will not output an alarm signal for this alarm. 			
Code	Name	Causes	Possible Solutions
LoG	Log Com Error	There is not a micro SD card in the keypad.	Put a micro SD card in the keypad.
		<ul style="list-style-type: none"> The drive is connected to USB. The number of log communication files is more than 1000. The micro SD card does not have available memory space. The line number data in a log communication file was changed. There was a communication error between the keypad and drive during a log communication. 	Set <i>a5-01</i> = 0 [Log Start/Stop Selection = OFF].

2.5 Minor Faults/Alarms

Code	Name	Causes	Possible Solutions
		You used a keypad that does not support short-term data logging and started short-term data logging.	<ul style="list-style-type: none"> Use a keypad that supports short-term data logging. Set $o5-00 = 0$ [Log Type = Long Term Log]. Set $o5-01 = 0$ [Log Start/Stop Selection = OFF].
Note: <ul style="list-style-type: none"> If the drive detects this error, the terminal assigned to $H2-01$ to $H2-03 = 6A$ [MFDO Function Select = Data Logger Error] will be ON. You can use short-term data logging with an LCD keypad or a Bluetooth LCD Keypad version REV:H or later. Refer to "REV" on the keypad nameplate for the keypad version. 			
Code	Name	Causes	Possible Solutions
LT-1	Cooling Fan Maintenance Time	The cooling fan is at 90% of its expected performance life.	<ol style="list-style-type: none"> Replace the cooling fan. Set $o4-03 = 0$ [Fan Operation Time Setting = 0 h] to reset the cooling fan operation time.
Note: When the estimated performance life is expired, the terminal set to $H2-01$ to $H2-03 = 2F$ [MFDO Function Selection = Maintenance Notification] will activate.			
Code	Name	Causes	Possible Solutions
LT-2	Capacitor Maintenance Time	The capacitors for the main circuit and control circuit are at 90% of expected performance life.	Replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: When the estimated performance life is expired, the terminal assigned to $H2-01$ to $H2-03 = 2F$ [MFDO Function Select = Maintenance Notification] will be ON.			
Code	Name	Causes	Possible Solutions
LT-3	SoftChargeBypassRelay MainteTime	The soft charge bypass relay is at 90% of its expected performance life.	Replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: When the estimated performance life is expired, the terminal assigned to $H2-01$ to $H2-03 = 2F$ [MFDO Function Select = Maintenance Notification] will be ON.			
Code	Name	Causes	Possible Solutions
LT-4	IGBT Maintenance Time (50%)	The IGBT is at 50% of its expected performance life.	Check the load, carrier frequency, and output frequency.
Note: When the estimated performance life is expired, the terminal assigned to $H2-01$ to $H2-03 = 2F$ [MFDO Function Select = Maintenance Notification] will be ON.			
Code	Name	Causes	Possible Solutions
oH	Heatsink Overheat	The ambient temperature is high and the heatsink temperature is more than the $L8-02$ [Overheat Alarm Level].	<ul style="list-style-type: none"> Measure the ambient temperature. Increase the airflow around the drive. Install a cooling device (cooling fan or air conditioner) to lower the ambient temperature. Remove objects near the drive that are producing too much heat.
		There is not sufficient airflow around the drive.	<ul style="list-style-type: none"> Give the drive the correct installation space as shown in the manual. Make sure that there is sufficient circulation around the control panel. Examine the drive for dust or other unwanted materials that could clog the cooling fan. Remove unwanted materials that prevent air circulation.
		The internal cooling fan or fans have stopped.	<ol style="list-style-type: none"> Use the procedures in this manual to replace the cooling fan. Set $o4-03 = 0$ [Fan Operation Time Setting = 0 h] to reset the cooling fan operation time.
Note: <ul style="list-style-type: none"> The drive detects this error if the heatsink temperature of the drive is more than $L8-02$. If the drive detects this error, the terminal assigned to $H2-01$ to $H2-03 = 10$ [MFDO Function Select = Alarm] will be ON. Set the stopping method for this fault in $L8-03$ [Overheat Pre-Alarm Selection]. 			
Code	Name	Causes	Possible Solutions
oH2	External Overheat (H1-XX=B)	An external device sent an $oH2$.	<ol style="list-style-type: none"> Find the external device that output the overheat alarm. Remove the cause of the problem. Clear the <i>Overheat Alarm (oH2) [H1-xx = B]</i> that was set to MFDI terminals S1 to S6.
Note: If the drive detects this error, the terminal set to $H2-01$ to $H2-02 = 10$ [MFDO Function Selection = Alarm] will activate.			
Code	Name	Causes	Possible Solutions
oH3	Motor Overheat (PTC Input)	The thermistor wiring that detects motor temperature is defective.	Correct wiring errors.
		A fault occurred on the machine. Example: The machine is locked.	Examine the machine and remove the cause of the fault

Code	Name	Causes	Possible Solutions
		The motor has overheated.	<ul style="list-style-type: none"> Check the load level, acceleration/deceleration time, and motor start/stop frequency (cycle time). Decrease the load. Increase the values set in C1-01 to C1-08 [Acceleration/Deceleration Times]. Set E2-01 [Motor Rated Current (FLA)] correctly to the value specified by the motor nameplate. Make sure that the motor cooling system is operating correctly, and repair or replace it if it is damaged. Adjust E1-04 to E1-10 [V/f Pattern Parameters]. For motor 2, adjust E3-04 to E3-10. Decrease the values set in E1-08 [Mid Point A Voltage] and E1-10 [Minimum Output Voltage]. <p>Note: If the values set in E1-08 and E1-10 are too low, the overload tolerance will decrease at low speeds.</p>
<p>Note:</p> <ul style="list-style-type: none"> When H3-02, H3-10, or H3-06 = E [MFAI Function Selection = Motor Temperature (PTC Input)], the drive detects this fault if the motor overheat signal entered to an analog input terminal A1, A2, or A3 is more than the alarm detection level. If the drive detects this error, the terminal set to H2-01 to H2-03 = 10 [MFDO Function Select = Alarm] will activate. If the drive detects this error, it will operate the motor as specified by the stopping method set in L1-03 [Motor Thermistor oH Alarm Select]. 			
Code	Name	Causes	Possible Solutions
oL3	Overtorque 1	A fault occurred on the machine. Example: The machine is locked.	Examine the machine and remove the cause of the fault.
		The parameters are incorrect for the load.	Adjust L6-02 [Torque Detection Level 1] and L6-03 [Torque Detection Time 1] settings.
<p>Note:</p> <ul style="list-style-type: none"> The drive detects this fault if the drive output current is more than the level set in L6-02 for longer than L6-03. If the drive detects this error, the terminal assigned to H2-01 to H2-03 = 10 [MFDO Function Select = Alarm] will be ON. Set the conditions that trigger the minor fault using L6-01 [Torque Detection Selection 1]. 			
Code	Name	Causes	Possible Solutions
oL4	Overtorque 2	A fault occurred on the machine. Example: The machine is locked.	Examine the machine and remove the cause of the fault.
		The parameters are incorrect for the load.	Adjust L6-05 [Torque Detection Level 2] and L6-06 [Torque Detection Time 2] settings.
<p>Note:</p> <ul style="list-style-type: none"> The drive detects this error if the drive output current is more than the level set in L6-05 for longer than L6-06. If the drive detects this error, the terminal assigned to H2-01 to H2-03 = 10 [MFDO Function Select = Alarm] will be ON. Set the conditions that trigger the minor fault using L6-04 [Torque Detection Selection 2]. 			
Code	Name	Causes	Possible Solutions
oL5	Mechanical Weakening Detection 1	The drive detected overtorque as specified by the conditions for mechanical weakening detection set in L6-08 [Mechanical Fatigue Detect Select].	Do a deterioration diagnostic test on the machine side.
<p>Note:</p> <ul style="list-style-type: none"> If the drive detects this error, the terminal assigned to H2-01 to H2-03 = 10 [MFDO Function Select = Alarm] will be ON. If the drive detects this minor fault, it will operate the motor as specified by the Stopping Method set in L6-08. 			
Code	Name	Causes	Possible Solutions
oS	Overspeed	There is overshoot.	<ul style="list-style-type: none"> Decrease C5-01 [ASR Proportional Gain 1] and increase C5-02 [ASR Integral Time 1]. Use H6-02 to H6-05 [Pulse Train Input Setting Parameters] to adjust the pulse train gain.
		There is an incorrect number of PG pulses set in the drive.	Set H6-02 [Terminal RP Frequency Scaling] to the pulse train frequency during 100% reference (maximum motor rotation speed).
		The oS detection level is set incorrectly.	Adjust F1-08 [Overspeed Detection Level] and F1-09 [Overspeed Detection Delay Time].
<p>Note:</p> <ul style="list-style-type: none"> The drive detects this error if the motor speed is more than the value set in F1-08 for longer than F1-09. If the drive detects this error, the terminal set to H2-01 to H2-03 = 10 [MFDO Function Select = Alarm] will activate. If the drive detects this error, it will operate the motor as specified by the stopping method set in F1-03 [Overspeed Detection Selection]. 			

2.5 Minor Faults/Alarms

Code	Name	Causes	Possible Solutions
ov	Overvoltage	There are surge voltages in the input power supply.	Connect a DC link choke to the drive. Note: If you turn the phase advancing capacitors ON and OFF and use thyristor converters in the same power supply system, there can be surge voltages that irregularly increase the input voltage.
		The drive output cable or motor is shorted to ground. (The current short to ground is charging the main circuit capacitor of the drive through the power supply.)	1. Examine the motor main circuit cable, terminals, and motor terminal box, and then remove ground faults. 2. Re-energize the drive.
		The power supply voltage is too high.	Decrease the power supply voltage to match the drive rated voltage.
		Electrical interference caused a drive malfunction.	<ul style="list-style-type: none"> Examine the control circuit lines, main circuit lines, and ground wiring, and decrease the effects of electrical interference. Make sure that a magnetic contactor is not the source of the electrical interference, then use a Surge Protective Device if necessary. Set $L5-01 \neq 0$ [Number of Auto-Restart Attempts $\neq 0$ times].
		The drive detects <i>ov</i> [Overvoltage] when: <ul style="list-style-type: none"> The acceleration completes The deceleration starts The load changes suddenly 	<ul style="list-style-type: none"> Increase the value set in $n2-03$ [Automatic Freq Regulator Time 2] in 50 ms increments. Note: Make sure that you set $n2-02 \leq n2-03$. When you adjust $n2-03$, you must also increase the $C4-06$ [Motor 2 Torque Comp Delay Time] value by same ratio. <ul style="list-style-type: none"> Increase $C4-06$ in 10 ms increments. Note: Make sure that you set $C4-02 \leq C4-06$. When you adjust $C4-06$, you must also increase the $n2-03$ value by same ratio.
Note: <ul style="list-style-type: none"> The drive detects this error if the DC bus voltage is more than the <i>ov</i> detection level when there is no Run command (while the drive is stopped). The <i>ov</i> detection level is approximately 410 V with 200 V class drives. The detection level is approximately 820 V for 400 V class drives. If the drive detects this error, the terminal set to $H2-01$ to $H2-03 = 10$ [MFDO Function Select = Alarm] will activate. 			
Code	Name	Causes	Possible Solutions
ovEr	Too Many Parameters Changed	You tried to change more than 150 parameters.	Make sure that parameters that do not have an effect on drive operation are at their default settings. Note: <ul style="list-style-type: none"> You can change 150 parameters maximum. If you change parameters that have dependencies, the drive can detect <i>ovEr</i> when the number of changed parameters is fewer than 150.
Code	Name	Causes	Possible Solutions
PASS	Modbus Communication Test	The MEMOBUS/Modbus communications test is complete.	The <i>PASS</i> display will turn off after communications test mode is cleared.
Code	Name	Causes	Possible Solutions
PF	Input Phase Loss	There is a phase loss in the drive input power.	Correct all wiring errors with the main circuit power supply.
		Loose wiring in the input power terminals.	Tighten the screws to the correct tightening torque.
		The drive input power voltage is changing too much.	<ul style="list-style-type: none"> Examine the supply voltage for problems. Make the drive input power stable.
		Unsatisfactory balance between voltage phases.	<ul style="list-style-type: none"> Examine the supply voltage for problems. Make the drive input power stable. If the supply voltage is good, examine the magnetic contactor on the main circuit side for problems.
		The main circuit capacitors have become unserviceable.	<ul style="list-style-type: none"> Examine the capacitor maintenance time in monitor $U4-05$ [Capacitor Maintenance]. If $U4-05$ is more than 90%, replace the capacitor. Contact Yaskawa or your nearest sales representative for more information.
Note: <ul style="list-style-type: none"> The drive detects this error if the DC bus voltage changes irregularly without regeneration. If the drive detects this error, the terminal assigned to $H2-01$ to $H2-03 = 10$ [MFDO Function Select = Alarm] will be ON. Use $L8-05$ [Input Phase Loss Protection Sel] to enable and disable PF detection. 			


Code	Name	Causes	Possible Solutions
PGo	Encoder (PG) Feedback Loss	The encoder cable is disconnected or wired incorrectly.	Examine for wiring errors or disconnected wires in the encoder cable, and repair problems.
		The encoder is not receiving power.	Examine the encoder power supply.
		The holding brake is stopping the motor.	Release the holding brake.
Note: <ul style="list-style-type: none"> The drive detects this error if it does not receive the speed detection pulse signal from the encoder in the detection time set in <i>F1-14 [Encoder Open-Circuit Detect Time]</i>. If the drive detects this error, the terminal assigned to <i>H2-01 to H2-03 = 10 [MFDO Function Select = Alarm]</i> will be ON. If the drive detects this error, it will operate the motor as specified by the Stopping Method set in <i>F1-02 [PG Open Circuit Detection Select]</i>. 			
Code	Name	Causes	Possible Solutions
PGoH	Encoder (PG) Hardware Fault	The encoder cable is disconnected.	Correct any disconnected wires in the encoder cable.
Note: <ul style="list-style-type: none"> If the drive detects this error, the terminal set to <i>H2-01 to H2-03 = 10 [MFDO Function Select = Alarm]</i> will activate. Parameters <i>F1-20 [Encoder 1 PCB Disconnect Detect]</i> or <i>F1-36 [Encoder 2 PCB Disconnect Detect]</i> enable and disable <i>PGoH</i> detection. If the drive detects this error, it will operate the motor as specified by the stopping method set in <i>F1-02 [PG Open Circuit Detection Select]</i>. 			
Code	Name	Causes	Possible Solutions
rUn	Motor Switch during Run	The drive received a <i>Motor 2 Selection [H1-xx = 16]</i> during run.	Make sure that the drive receives the Motor 2 Selection while the drive is stopped.
Note: <ul style="list-style-type: none"> If the drive detects this error, the terminal assigned to <i>H2-01 to H2-03 = 10 [MFDO Function Select = Alarm]</i> will be ON. 			
Code	Name	Causes	Possible Solutions
SE	Modbus Test Mode Error	MEMOBUS/Modbus communications self-diagnostics [<i>H1-xx = 67</i>] was done while the drive was running.	Stop the drive and do MEMOBUS/Modbus communications self-diagnostics.
Note: <ul style="list-style-type: none"> If detected, the terminal assigned to <i>H2-01 to H2-03 = 10 [MFDO Function Select = Alarm]</i> will be ON. 			
Code	Name	Causes	Possible Solutions
STo	Safe Torque OFF	Safe Disable inputs H1-HC and H2-HC are open.	<ul style="list-style-type: none"> Make sure that the Safe Disable signal is input from an external source to terminal H1-HC and H2-HC. When the Safe Disable function is not in use, use a jumper to connect terminals H1-HC and H2-HC.
		There is internal damage to the two Safe Disable channels.	Replace the board or the drive. Contact Yaskawa or your nearest sales representative to replace the board.
Note: <ul style="list-style-type: none"> The drive will not output an alarm signal for this alarm. If the drive detects this error, the terminal set to <i>H2-01 to H2-03 = 21 [MFDO Function Select = Safe Torque OFF]</i> will activate. 			
Code	Name	Causes	Possible Solutions
SToF	Safe Torque OFF	One of the two terminals H1-HC or H2-HC received the Safe Disable input signal.	<ul style="list-style-type: none"> Make sure that the Safe Disable signal is input from an external source to terminals H1-HC or H2-HC. When the Safe Disable function is not in use, use a jumper to connect terminals H1-HC and H2-HC.
		The Safe Disable input signal is wired incorrectly.	
		There is internal damage to one Safe Disable channel.	Replace the board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> If the drive detects this error, the terminal set to <i>H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]</i> will activate. 			
Code	Name	Causes	Possible Solutions
TiM	Keypad Time Not Set	You put a battery in the keypad, but you have not set the date and time.	Set the date and time with the keypad.
Note: <ul style="list-style-type: none"> Parameter <i>o4-24 [bAT Detection Selection]</i> enables and disables <i>TiM</i> detection. If the drive detects this error, the terminal set to <i>H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]</i> will activate. 			
Code	Name	Causes	Possible Solutions
TrPC	IGBT Maintenance Time (90%)	The IGBT is at 90% of its expected performance life.	Replace the IGBT or the drive. Contact Yaskawa or your nearest sales representative for more information.
Note: <ul style="list-style-type: none"> If the drive detects this error, the terminal set to <i>H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]</i> will activate. 			

2.5 Minor Faults/Alarms

Code	Name	Causes	Possible Solutions
UL3	Undertorque Detection 1	A fault occurred on the machine. Example: There is a broken pulley belt.	Examine the machine and remove the cause of the fault.
		The parameters are incorrect for the load.	Adjust L6-02 [Torque Detection Level 1] and L6-03 [Torque Detection Time 1] settings.
Note: <ul style="list-style-type: none"> The drive detects this error if the drive output current is less than the level set in L6-02 for longer than L6-03. If the drive detects this error, the terminal assigned to H2-01 to H2-03 = 10 [MFDO Function Select = Alarm] will be ON. If the drive detects this error, it will operate the motor as specified by the Stopping Method set in L6-01 [Torque Detection Selection 1]. 			
Code	Name	Causes	Possible Solutions
UL4	Undertorque Detection 2	A fault occurred on the machine. Example: There is a broken pulley belt.	Examine the machine and remove the cause of the fault.
		The parameters are incorrect for the load.	Adjust L6-05 [Torque Detection Level 2] and L6-06 [Torque Detection Time 2] settings.
Note: <ul style="list-style-type: none"> The drive detects this error if the drive output current is less than the level set in L6-05 for longer than L6-06. If detected, the terminal assigned to H2-01 to H2-03 = 10 [MFDO Function Select = Alarm] will be ON. If the drive detects this error, it will operate the motor as specified by the Stopping Method set in L6-04 [Torque Detection Selection 2]. 			
Code	Name	Causes	Possible Solutions
UL5	Mechanical Weakening Detection 2	The drive detected undertorque as specified by the conditions for mechanical weakening detection set in L6-08 [Mechanical Fatigue Detect Select].	Examine the machine for deterioration.
Note: <ul style="list-style-type: none"> If the drive detects this error, the terminal assigned to H2-01 to H2-03 = 10 [MFDO Function Select = Alarm] will be ON. If the drive detects this error, it will operate the motor as specified by the Stopping Method set in L6-08. 			
Code	Name	Causes	Possible Solutions
Uv	Undervoltage	The drive input power voltage is changing too much.	<ul style="list-style-type: none"> Examine the input power for problems. Make the drive input power stable. If the input power supply is good, examine the magnetic contactor on the main circuit side for problems.
		There is a phase loss in the drive input power.	Correct errors with the wiring for main circuit drive input power.
		There is loose wiring in the drive input power terminals.	Tighten the terminal screws to the correct tightening torque.
		There was a loss of power.	Use a better power supply.
		The main circuit capacitors have become unserviceable.	Examine the capacitor maintenance time in monitor U4-05 [Capacitor Maintenance]. If U4-05 is more than 90%, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
		The drive input power transformer is too small and voltage drops when the power is switched on.	<ul style="list-style-type: none"> Check for an alarm when a molded-case circuit breaker, Leakage Breaker (ELCB, GFCL, or RCM/RCD) (with overcurrent protective function), or magnetic contactor is ON. Check the capacity of the drive power supply transformer.
		Air inside the drive is too hot.	Check the ambient temperature of the drive.
		The Charge LED is broken.	Replace the control board or the entire drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: <ul style="list-style-type: none"> The drive detects this error if one of these conditions is correct when the Run command has not been input (while the drive is stopped). <ul style="list-style-type: none"> The DC bus voltage < L2-05 [Undervoltage Detection Lvl (Uv1)]. The Contactor that prevents inrush current in the drive was opened. There is low voltage in the control drive input power. If the drive detects this error, the terminal assigned to H2-01 to H2-03 = 10 [MFDO Function Select = Alarm] will be ON. 			


2.6 Parameter Setting Errors

Parameter setting errors occur when multiple parameter settings do not agree, or when parameter setting values are not correct. Refer to the table in this section, examine the parameter setting that caused the error, and remove the cause of the error. You must first correct the parameter setting errors before you can operate the drive. The drive will not send notification signals for the faults and alarms when these parameter setting errors occur.

Code	Name	Causes	Possible Solutions
oPE01	Drive Capacity Setting Error	The value set in <i>o2-04 [Drive Model (KVA) Selection]</i> does not agree with the drive model.	Set <i>o2-04</i> to the correct value.
Code	Name	Causes	Possible Solutions
oPE02	Parameter Range Setting Error	Parameter settings are not in the applicable setting range.	<ol style="list-style-type: none"> Push  to show <i>U1-18 [oPE Fault Parameter]</i>, and find parameters that are not in the applicable setting range. Correct the parameter settings. <p>Note:</p> <ul style="list-style-type: none"> If more than one error occurs at the same time, other <i>oPExx</i> errors have priority over <i>oPE02</i>.
		Set <i>E2-01</i> ≤ <i>E2-03 [Motor Rated Current (FLA) ≤ Motor No-Load Current]</i> .	<p>Make sure that <i>E2-01</i> > <i>E2-03</i>.</p> <p>Note:</p> <p>If it is necessary to set <i>E2-01</i> < <i>E2-03</i>, first lower the value set in <i>E2-03</i>, and then set <i>E2-01</i>.</p>
Code	Name	Causes	Possible Solutions
oPE03	Multi-Function Input Setting Err	The settings for these parameters do not agree: <ul style="list-style-type: none"> <i>F3-10</i> to <i>F3-25 [Terminal D1 to DF Function Selection]</i> <i>H1-01</i> to <i>H1-08 [Terminals S1 to S8 Function Selection]</i> <i>H7-01</i> to <i>H7-04 [Virtual Multi-Function Inputs 1 to 4]</i> 	Correct the parameter settings.
		The settings for the standby mode function do not agree: <ul style="list-style-type: none"> <i>b8-50</i> = 0 [<i>Standby Mode Selection = Disabled</i>] and <i>H2-xx</i> = 65 [<i>MFDO Function Select = Standby Output</i>] <i>b8-50</i> = 1 [<i>Enabled</i>] and <i>H2-xx</i> ≠ 65 	Correct the parameter settings.
		The settings for MFDIs overlap. <p>Note:</p> <p>This does not include <i>H1-xx</i> = 20 to 2F [<i>MFDI Function Select = External Fault</i>] and [<i>Reserved</i>].</p>	Set the parameters correctly to prevent MFDI function overlap.
		These pairs of MFDI functions are not set to Digital Inputs (<i>H1-xx</i> , <i>F3-10</i> to <i>F3-25</i> , and <i>H7-01</i> to <i>H7-04</i>) at the same time: <ul style="list-style-type: none"> Setting values 10 [<i>Up Command</i>] and 11 [<i>Down Command</i>] Setting values 75 [<i>Up 2 Command</i>] and 76 [<i>Down 2 Command</i>] Setting values 42 [<i>Run Command (2-Wire Sequence 2)</i>] and 43 [<i>FWD/REV (2-Wire Sequence 2)</i>] 	Set the MFDI pairs.
		A minimum of two of these MFDI combinations are set to Digital Inputs (<i>H1-xx</i> , <i>F3-10</i> to <i>F3-25</i> , and <i>H7-01</i> to <i>H7-04</i>) at the same time: <ul style="list-style-type: none"> Setting values 10 [<i>Up Command</i>] and 11 [<i>Down Command</i>] Setting values 75 [<i>Up 2 Command</i>] and 76 [<i>Down 2 Command</i>] Setting value A [<i>Accel/Decel Ramp Hold</i>] Setting value 1E [<i>Reference Sample Hold</i>] Setting values 44 to 46 [<i>Add Offset Frequency 1 to 3 (d7-01 to d7-03)</i>] 	Remove the function settings that are not in use.
		The parameter settings are enabled at the same time. <ul style="list-style-type: none"> <i>b5-01</i> [<i>PID Mode Setting</i>] <i>H1-xx</i> = 10 [<i>Up Command</i>] <i>H1-xx</i> = 11 [<i>Down Command</i>] 	<ul style="list-style-type: none"> Set <i>b5-01</i> = 0 [<i>Disabled</i>]. Remove the function Up/Down command settings.

2.6 Parameter Setting Errors

Code	Name	Causes	Possible Solutions
		<p>These commands are set in Digital Inputs (H1-xx, F3-10 to F3-25, and H7-01 to H7-04) at the same time:</p> <ul style="list-style-type: none"> Setting values 61 [Speed Search from Fmax] and 62 [Speed Search from Fref] Setting values 65, 66, 7A, 7B [KEB Ride-Thru 1 or 2 Activate] and 68 [High Slip Braking (HSB) Activate] Setting values 16 [Motor 2 Selection] and 1A [Accel/Decel Time Selection 2] Setting values 65, 66 [KEB Ride-Thru 1 Activate] and 7A, 7B [KEB Ride-Thru 2 Activate] Setting values 40, 41 [Forward RUN (2-Wire), Reverse RUN (2-Wire)] and 42, 43 [Run Command (2-Wire Sequence 2), FWD/REV (2-Wire Sequence 2)] Setting values 60 [DC Injection Braking Command] and 6A [Drive Enable] Setting values 16 [Motor 2 Selection] and 75, 76 [Up 2 Command, Down 2 Command] 	Remove the function settings that are not in use.
		<p>Settings for N.C. and N.O. input [H1-xx] for these functions were selected at the same time:</p> <ul style="list-style-type: none"> Setting value 15 [Fast Stop (N.O.)] Setting value 17 [Fast Stop (N.C.)] 	Remove one of the function settings.
		<p>These settings were entered while H1-xx = 2 [External Reference 1/2 Selection]:</p> <ul style="list-style-type: none"> b1-15 = 4 [Frequency Reference Selection 2 = Pulse Train Input] H6-01 ≠ 0 [Terminal RP Pulse Train Function ≠ Frequency Reference] 	Set H6-01 = 0.
		<p>These settings were entered while H1-xx = 2 [External Reference 1/2 Selection]:</p> <ul style="list-style-type: none"> b1-15 = 3 [Option PCB] or b1-16 = 3 [Run Command Selection 2 = Option PCB] No option card is connected to the drive. 	Connect an input option card to the drive.
		<p>These settings were entered while H1-xx = 2 [External Reference 1/2 Selection]:</p> <ul style="list-style-type: none"> b1-15 = 1 [Analog Input] H3-02 ≠ 0 [Terminal A1 Function Selection ≠ Frequency Reference] or H3-10 ≠ 0 [Terminal A2 Function Selection ≠ Frequency Reference] 	Set H3-02 = 0 or H3-10 = 0.
		<p>These parameters are set at the same time:</p> <ul style="list-style-type: none"> H1-xx ≠ 6A [Drive Enable] H2-xx = 38 [Drive Enabled] 	Correct the parameter settings.
		<p>These parameters are set at the same time:</p> <ul style="list-style-type: none"> H6-01 ≠ 3 [PG Speed Feedback (V/F Control)] H1-xx = 7E [Reverse Rotation Identifier] 	Correct the parameter settings.
		<p>These parameters are set at the same time:</p> <ul style="list-style-type: none"> H1-xx = 75/76 [Up 2 /Down 2 Command] H3-01, H3-05, H3-09 = 1 [Terminal A1, A2, A3 Signal Level Select = -10 to +10V (Bipolar Reference)] 	Remove one of the function settings.
		<p>These parameters are set at the same time:</p> <ul style="list-style-type: none"> H1-xx = 62 [Speed Search from Fref] H5-22 = 1 [Speed Search from MODBUS = Enabled] 	Remove one of the function settings.
		<p>These settings do not agree:</p> <ul style="list-style-type: none"> A PG-RT3 option is connected to the drive. H1-xx = 16 [Motor 2 Selection] is set. 	<p>Correct the parameter settings.</p> <p>Note: The Motor Switch function is not available with the PG-RT3 option.</p>
Code	Name	Causes	Possible Solutions
oPE05	Run Cmd/Freq Ref Source Sel Err	<p>The setting to assign the Run command or frequency reference to an option card or the pulse train input is incorrect.</p>	Correct the parameter settings.
		<p>b1-01 = 3 [Frequency Reference Selection 1 = Option PCB] is set, but there is no option card connected to the drive.</p>	Connect an option card to the drive.
		<p>b1-02 = 3 [Run Command Selection 1 = Option PCB] is set, but there is no option card connected to the drive.</p>	

Code	Name	Causes	Possible Solutions
		The following parameters are set at the same time: <ul style="list-style-type: none"> $b1-01 = 4$ [Pulse Train Input] $H6-01 \neq 0$ [Terminal RP Pulse Train Function \neq Frequency Reference] 	Set $H6-01 = 0$.
		The following parameters are set at the same time: <ul style="list-style-type: none"> $F3-01 = 6$ [Digital Input Function Selection = BCD (5-digit), 0.01 Hz] $F3-03 = 0, 1$ [Digital Input Data Length Select = 8-bit, 12-bit] 	Set $F3-03 = 2$ [16-bit].
		These parameters are set and there is an AI-A3 option card connected to the drive: <ul style="list-style-type: none"> $H1-xx = 2$ [External Reference 1/2 Selection] $b1-15 = 3$ [Frequency Reference Selection 2 = Option PCB] $F2-01 = 0$ [Analog Input Function Selection = 3 Independent Channels] 	Correct the parameter settings.
Code	Name	Causes	Possible Solutions
oPE06	Control Method Selection Error	$A1-02 = 1, 3, \text{ or } 7$ [Control Method Selection = CLV/f, CLV, CLV/PM], but there is no encoder option connected the drive.	<ul style="list-style-type: none"> Connect an encoder option the drive. Set $A1-02$ correctly.
		You supplied external 24 V power to terminals PS-AC when: <ul style="list-style-type: none"> There is an encoder option installed the drive The drive main circuit power supply is de-energized 	<ol style="list-style-type: none"> De-energize the drive main circuit power supply and the external 24 V power supply to terminals PS-AC. After the keypad display goes out, energize the drive main circuit power supply again. Supply the external 24 V power to terminals PS-AC.
			When you use an encoder option, energize the drive main circuit power supply.
Code	Name	Causes	Possible Solutions
oPE07	Analog Input Selection Error	The settings for $H3-02, H3-06, \text{ and } H3-10$ [MFAI Function Select] and $H7-30$ [Virtual Analog Input Selection] overlap.	Set $H3-02, H3-06, H3-10, \text{ and } H7-30$ correctly to prevent overlap. Note: It is possible to set these functions to multiple analog input terminals at the same time: <ul style="list-style-type: none"> Setting value 0 [Frequency Reference] Setting values F and $1F$ [Not Used]
		The following parameters are set at the same time: <ul style="list-style-type: none"> $H3-02, H3-06, H3-10, H7-30 = B$ [PID Feedback] $H6-01 = 1$ [Terminal RP Pulse Train Function = PID Feedback Value] 	Remove the function settings that are not in use.
		The following parameters are set at the same time: <ul style="list-style-type: none"> $H3-02, H3-06, H3-10, H7-30 = C$ [PID Setpoint] $H6-01 = 2$ [PID Setpoint Value] 	
		The following parameters are set at the same time: <ul style="list-style-type: none"> $H3-02, H3-06, H3-10, H7-30 = C$ $b5-18 = 1$ [b5-19 PID Setpoint Selection = Enabled] 	
		The following parameters are set at the same time: <ul style="list-style-type: none"> $H6-01 = 2$ $b5-18 = 1$ 	
Code	Name	Causes	Possible Solutions
oPE08	Parameter Selection Error	You set a function that is not compatible with the control method set in $A1-02$ [Control Method Selection].	<ol style="list-style-type: none"> Push  to show $U1-18$ [oPE Fault Parameter], and find parameters that are not in the applicable setting range. Correct the parameter settings. Note: If more than one error occurs at the same time, other oPExx errors have priority over oPE02.
		When $A1-02 = 2$ [Control Method Selection = OLV], you used these parameter settings: <ul style="list-style-type: none"> $n2-02 > n2-03$ [Automatic Freq Regulator Time 1 > Automatic Freq Regulator Time 2] $C4-02 > C4-06$ [Torque Compensation Delay Time > Motor 2 Torque Comp Delay Time] 	<ul style="list-style-type: none"> Set $n2-02 < n2-03$. Set $C4-02 < C4-06$.

2.6 Parameter Setting Errors

Code	Name	Causes	Possible Solutions
		<p>When $A1-02 = 0$ [Control Method Selection = V/f], you used these parameter settings:</p> <ul style="list-style-type: none"> H6-01 = 3 [Terminal RP Pulse Train Function = Speed Feedback (V/F Control)] H1-xx = 16 [MFDI Function Select = Motor 2 Selection] 	<p>Correct the parameter settings.</p> <p>Note: You cannot use Speed Feedback (V/F Control) with the Motor Switch function.</p>
		<p>When $A1-02 = 5$ [PM Open Loop Vector], you set $E5-02$ to $E5-07$ [PM Motor Parameters] = 0.</p>	<ul style="list-style-type: none"> Set $E5-01$ [PM Motor Code Selection] correctly as specified by the motor. For specialized motors, refer to the motor test report and set $E5-xx$ correctly.
		<p>When $A1-02 = 5$ to 7 [Control Methods for PM Motors], you used these parameter settings:</p> <ul style="list-style-type: none"> $E5-09 = 0.0$ [PM Back-EMF Vpeak (mV/(rad/s)) = 0.0 mV/(rad/s)] $E5-24 = 0.0$ [PM Back-EMF L-L Vrms (mV/rpm) = 0.0 mV/min⁻¹] 	Set $E5-09$ or $E5-24$ to the correct value.
		<p>When $A1-02 = 5$ to 7, you set $E5-09 \neq 0$ and $E5-24 \neq 0$.</p>	Set $E5-09 = 0$ or $E5-24 = 0$.
		<p>When $A1-02 = 6$ [PM Advanced Open Loop Vector], you used these parameter settings:</p> <ul style="list-style-type: none"> $n8-57 = 0$ [HFI Overlap Selection = Disabled] You set $E1-09$ [Minimum Output Frequency] < the 5% value of $E1-06$. 	Correct the parameter settings.
		<p>When $A1-02 = 6$, you set these parameters:</p> <ul style="list-style-type: none"> $n8-35 = 0$ [Initial Pole Detection Method = Pull-in] $n8-57 = 1$ [Enabled] 	Correct the parameter settings.
		<p>When $A1-02 = 8$ [EZOLV], you used these parameter settings:</p> <ul style="list-style-type: none"> $E9-01 = 1, 2$ [Motor Type Selection = Permanent Magnet (PM), Synchronous Reluctance (SynRM)] $b3-24 = 2$ [Speed Search Method Selection = Current Detection 2] 	When $E9-01 = 1$ or 2 , set $b3-24 = 1$ [Speed Estimation].
Code	Name	Causes	Possible Solutions
oPE09	PID Control Selection Fault	<p>These parameters are set at the same time:</p> <ul style="list-style-type: none"> $b5-15 \neq 0.0$ [PID Sleep Function Start Level $\neq 0.0$ Hz] $b1-03 = 2, 3$ [Stopping Method Selection = DC Injection Braking to Stop, Coast to Stop with Timer] 	<ul style="list-style-type: none"> Set $b5-15 \neq 0.0$. Set $b1-03 = 0, 1$ [Ramp to Stop, Coast to Stop].
		<p>These parameters are set at the same time:</p> <ul style="list-style-type: none"> $b5-01 = 1, 2$ [Enabled (Standard), Enabled (D = Feedforward)] $d2-02 \neq 0.0$ [Frequency Reference Lower Limit $\neq 0.0\%$] $b5-11 = 1$ [PID Output Reverse Selection = Negative Output Accepted] 	Correct the parameter settings.
		<p>These parameters are set at the same time:</p> <ul style="list-style-type: none"> $b5-01 = 3, 4$ [Trim (Fref+PID Out, D = Fdbk), Trim (Fref+PID Out, D = FeedFwd)] $d2-02 \neq 0.0$ has been set. 	Correct the parameter settings.
<p>Note: The drive detects this error if the PID control function selection is incorrect. (When $b5-01 = 1$ to 4 [PID Mode Setting = PID Control Enabled])</p>			
Code	Name	Causes	Possible Solutions
oPE10	V/f Data Setting Error	<p>The parameters that set the V/f pattern do not satisfy these conditions:</p> <ul style="list-style-type: none"> For motor 1: $E1-09 \leq E1-07 < E1-06 \leq E1-11 \leq E1-04$ [Minimum Output Frequency \leq Mid Point A Frequency < Base Frequency \leq Mid Point B Frequency \leq Maximum Output Frequency] For motor 2: $E3-09 \leq E3-07 < E3-06 \leq E3-11 \leq E3-04$ [Minimum Output Frequency \leq Mid Point A Frequency < Base Frequency \leq Mid Point B Frequency \leq Maximum Output Frequency] 	Set the parameters correctly to satisfy the conditions.

Code	Name	Causes	Possible Solutions
oPE11	Carrier Frequency Setting Error	These parameters are set at the same time: <ul style="list-style-type: none"> • $C6-05 > 6$ [Carrier Freq Proportional Gain > 6] • $C6-04 > C6-03$ [Carrier Frequency Lower Limit > Carrier Frequency Upper Limit] <p>Note: When $C6-05 < 7$, $C6-04$ becomes disabled. The drive sets the carrier frequency to the value set to $C6-03$.</p>	Set $C6-02$ to $C6-05$ correctly.
		$C6-02$ to $C6-05$ settings are not in the applicable setting range.	
Code	Name	Causes	Possible Solutions
oPE13	Pulse Monitor Selection Error	$H6-06 = 101, 102, 105, \text{ or } 116$ [Terminal MP Monitor Selection = Frequency Reference, Output Frequency, Motor Speed, Output Frequency after Soft Starter] has not been set when $H6-07 = 0$ [Terminal MP Frequency Scaling = 0 Hz].	Set $H6-06$ correctly.
Code	Name	Causes	Possible Solutions
oPE15	Torque Control Setting Error	More than one parameter is selecting torque control at the same time. <ul style="list-style-type: none"> • $d5-01 = 1$ [Torque Control Selection = Torque Control] • $H1-xx = 71$ [MFDI Function Select = Torque Control] 	Correct the parameter settings.
		Droop control and Feed Forward control are enabled at the same time that torque control is selected. <ul style="list-style-type: none"> • $d5-01 = 1$ or $H1-xx = 71$ • $b7-01 \neq 0.0$ [Droop Control Gain $\neq 0.0\%$] or $n5-01 = 1$ [Feed Forward Control Selection = Enabled] 	Correct the parameter settings.
		KEB Ride-Thru 2 (N.O., N.C.) is enabled at the same time that torque control is selected. <ul style="list-style-type: none"> • $d5-01 = 1$ or $H1-xx = 71$ • $H1-xx = 7A$ [KEB Ride-Thru 2 Activate (N.C.)] or $H1-xx = 7b$ [KEB Ride-Thru 2 Activate (N.O.)] 	Correct the parameter settings.
		After a momentary power loss, drive operation will enable KEB when torque control is selected. <ul style="list-style-type: none"> • $d5-01 = 1$ or $H1-xx = 71$ • $L2-01 = 3, 4, 5$ [Power Loss Ride Through Select = Kinetic Energy Backup: L2-02, Kinetic Energy Backup: CPU Power, or Kinetic Energy Backup: DecelStop] 	Correct the parameter settings.
		Optimal deceleration or overexcitation deceleration 2 is enabled at the same time that torque control is selected. <ul style="list-style-type: none"> • $d5-01 = 1$ or $H1-xx = 71$ • $L3-04 = 2, 5$ [Stall Prevention during Decel = Intelligent (Ignore Decel Ramp), Overexcitation/ High Flux 2] 	Correct the parameter settings.
Code	Name	Causes	Possible Solutions
oPE16	Energy Saving Constants Error	The Energy Saving parameters are not set in the applicable setting range.	Make sure that $E5-xx$ is set correctly as specified by the motor nameplate data.
Code	Name	Causes	Possible Solutions
oPE18	Online Tuning Param Setting Err	The parameters that control online tuning are set incorrectly. In OLV control, one of these parameters was set when $n6-01 = 2$ [Online Tuning Selection = Voltage Correction Tuning]: <ul style="list-style-type: none"> • $E2-02$ [Motor Rated Slip] is set to 30% of the default setting or lower. • $E2-06$ [Motor Leakage Inductance] is set to 50% of the default setting or lower. • $E2-03 = 0$ [Motor No-Load Current = 0 A] has been set. 	Set $E2-02$, $E2-03$, and $E2-06$ correctly.
Code	Name	Causes	Possible Solutions
oPE20	PG-F3 Setting Error	The value set in $F1-01$ [Encoder 1 Pulse Count (PPR)] does not agree with the number of encoder pulses.	<ul style="list-style-type: none"> • Examine the $F1-01$ value and the number of encoder pulses. • Set $F1-01$ correctly.
		The calculation encoder signal frequency at maximum speed is more than 20 kHz.	Decrease the value set for $E1-04$ [Maximum Output Frequency] and make sure that the output frequency of the encoder is not more than 20 kHz.

2.6 Parameter Setting Errors

Code	Name	Causes	Possible Solutions
oPE33	Digital Output Selection Error	These two parameters are set at the same time: <ul style="list-style-type: none"> • $H2-60 \neq F$ [Term M1-M2 Secondary Function \neq Not Used] • $H2-01 = 1xx$ [Term M1-M2 Function Selection = Inverse output of xx] 	Clear the $H2-01$ to $H2-03 = 1xx$ [Inverse output of xx] settings. Note: It is not possible to set $H2-01$ to $H2-03 = 1xx$ [Inverse output of xx] when using output functions for logic operations ($H2-60$, $H2-63$, $H2-66 \neq F$).
		These two parameters are set at the same time: <ul style="list-style-type: none"> • $H2-63 \neq F$ [Term M3-M4 Secondary Function \neq Not Used] • $H2-02 = 1xx$ [Term M3-M4 Function Selection = Inverse output of xx] 	
		These two parameters are set at the same time: <ul style="list-style-type: none"> • $H2-66 \neq F$ [Term M5-M6 Secondary Function \neq Not Used] • $H2-03 = 1xx$ [Term M5-M6 Function Selection = Inverse output of xx] 	
		These parameter pairs are set incorrectly: <ul style="list-style-type: none"> • $H2-21$ [Comparator 1 Lower Limit] $>$ $H2-22$ [Comparator 1 Upper Limit] • $H2-27$ [Comparator 2 Lower Limit] $>$ $H2-28$ [Comparator 2 Upper Limit] 	<ul style="list-style-type: none"> • Set parameters $H2-21 \leq H2-22$. • Set parameters $H2-27 \leq H2-28$.

2.7 Auto-Tuning Errors


This table gives information about errors detected during Auto-Tuning. If the drive detects an Auto-Tuning error, the keypad will show the error and the motor will coast to stop. The drive will not send notification signals for faults and alarms when Auto-Tuning errors occur.

Two types of Auto-Tuning errors are: *Endx* and *Erx*. *Endx* identifies that Auto-Tuning has successfully completed with calculation errors. Find and repair the cause of the error and do Auto-Tuning again, or set the motor parameters manually. You can use the drive in the application if you cannot find the cause of the *Endx* error.

Erx identifies that Auto-Tuning was not successful. Find and repair the cause of the error and do Auto-Tuning again.

Code	Name	Causes	Possible Solutions
End1	Excessive Rated Voltage Setting	The torque reference was more than 20% during Auto-Tuning or the no-load current that was measured after Auto-Tuning is more than 80%.	<ul style="list-style-type: none"> Make sure that the input motor nameplate data is correct. Do Auto-Tuning again and correctly set the motor nameplate data. If you can uncouple the motor and load, remove the motor from the machine and do Rotational Auto-Tuning again. If you cannot uncouple the motor and load, use the results from Auto-Tuning.
Code	Name	Causes	Possible Solutions
End2	Iron Core Saturation Coefficient	The motor nameplate data entered during Auto-Tuning is incorrect.	<ul style="list-style-type: none"> Make sure that the input motor nameplate data is correct. Do Auto-Tuning again and correctly set the motor nameplate data.
		Auto-Tuning results were not in the applicable parameter setting range, and <i>E2-07</i> or <i>E2-08</i> [<i>Motor Saturation Coefficient 2</i>] have temporary values.	<ul style="list-style-type: none"> Examine and repair damaged motor wiring. If you can uncouple the motor and load, remove the motor from the machine and do Rotational Auto-Tuning again.
Code	Name	Causes	Possible Solutions
End3	Rated Current Setting Alarm	The rated current value is incorrect.	Do Auto-Tuning again and set the correct rated current shown on the motor nameplate.
Code	Name	Causes	Possible Solutions
End4	Adjusted Slip Calculation Error	The Auto-Tuning results were not in the applicable parameter setting range.	<ul style="list-style-type: none"> Make sure the input motor nameplate data is correct. Do Rotational Auto-Tuning again and correctly set the motor nameplate data. If you cannot uncouple the motor and load, do Stationary Auto-Tuning 2.
		The motor rated slip that was measured after Stationary Auto-Tuning was 0.2 Hz or lower.	
		The motor rated slip that was measured after compensation with <i>E2-08</i> [<i>Motor Saturation Coefficient 2</i>] is not in the applicable range.	
		The secondary resistor measurement results were not in the applicable range.	
Code	Name	Causes	Possible Solutions
End5	Resistance Tuning Error	The Auto-Tuning results of the Line-to-Line Resistance were not in the applicable range.	<ul style="list-style-type: none"> Make sure that the input motor nameplate data is correct. Examine and repair damaged motor wiring.
Code	Name	Causes	Possible Solutions
End6	Leakage Inductance Alarm	The Auto-Tuning results were not in the applicable parameter setting range.	Make sure that the input motor nameplate data is correct, and do Auto-Tuning again.
		<i>A1-02</i> [<i>Control Method Selection</i>] setting is not applicable.	<ul style="list-style-type: none"> Examine the value set in <i>A1-02</i>. Make sure that the input motor nameplate data is correct, and do Auto-Tuning again.
Code	Name	Causes	Possible Solutions
End7	No-Load Current Alarm	The Auto-Tuning results of the motor no-load current value were not in the applicable range.	Examine and repair damaged motor wiring.
		Auto-Tuning results were less than 5% of the motor rated current.	Make sure that the input motor nameplate data is correct, and do Auto-Tuning again.

2.7 Auto-Tuning Errors

Code	Name	Causes	Possible Solutions
End8	HFI Alarm	<ul style="list-style-type: none"> Inductance saliency ratio (<i>E5-07/E5-06</i>) is too small. The drive cannot find the <i>n8-36</i> [<i>HFI Frequency Level for L Tuning</i>] value. 	<ul style="list-style-type: none"> Set the correct value on the motor nameplate <i>E5-xx</i> [<i>IPM motor parameters</i>] or do Stationary/Rotational Auto-Tuning, and then do High Frequency Injection Tuning again. When it is necessary to set <i>n8-35 = 1</i> [<i>Initial Pole Detection Method = High Frequency Injection</i>] or <i>n8-57 = 1</i> [<i>HFI Overlap Selection = Enabled</i>], make sure that there is no unusual noise in the low speed range (10% or less) and that the motor does not rotate in reverse at start. <p>If there is unusual noise in the low speed range (10% or less), increase <i>n8-41</i> in increments of 0.5. Set <i>n8-41 > 0.0</i> for IPM motors.</p> <p>Note: If the drive detects <i>End8</i>, it will automatically set <i>n8-35 = 0</i> [<i>Pull-in</i>] and <i>n8-57 = 0</i> [<i>Disabled</i>]. Do not change the settings unless necessary.</p>
End9	Initial Pole Detection Alarm	The drive cannot calculate the correct value for <i>n8-84</i> [<i>Polarity Detection Current</i>] during High Frequency Injection Tuning.	<ul style="list-style-type: none"> Set the correct value on the motor nameplate <i>E5-xx</i> [<i>IPM motor parameters</i>] or do Stationary/Rotational Auto-Tuning, and then do High Frequency Injection Tuning again. When <i>n8-35 = 1</i> [<i>Initial Pole Detection Method = High Frequency Injection</i>] or <i>n8-57 = 1</i> [<i>HFI Overlap Selection = Enabled</i>], make sure that the motor does not rotate in reverse at start. <p>If there is unusual noise in the low speed range (10% or less), increase <i>n8-41</i> in increments of 0.5. Set <i>n8-41 > 0.0</i> for IPM motors.</p> <p>Note: If the drive detects <i>End9</i>, it will automatically set <i>n8-35 = 0</i> [<i>Pull-in</i>] and <i>n8-57 = 0</i> [<i>Disabled</i>]. Do not change the settings unless necessary.</p>
Er-01	Motor Data Error	<p>The motor nameplate data entered during Auto-Tuning is incorrect.</p> <p>The combination of the motor rated power and motor rated current do not match.</p> <p>The combination of the motor rated current that was entered during Auto-Tuning and <i>E2-03</i> [<i>Motor No-Load Current</i>] do not match.</p> <p>The combination of the setting values of Motor Base Frequency and Motor Base Speed do not match.</p>	<ul style="list-style-type: none"> Make sure that the motor nameplate data is correct. Do Auto-Tuning again and correctly set the motor nameplate data. Examine the combination of drive capacity and motor output. Do Auto-Tuning again, and correctly set the motor rated power and motor rated current. Examine the motor rated current and the no-load current. Set <i>E2-03</i> correctly. Do Auto-Tuning again, and correctly set the motor rated current. <p>Do Auto-Tuning again, and correctly set the Motor Base Frequency and Motor Base Speed.</p>
Er-02	Drive in an Alarm State	<p>The motor nameplate data entered during Auto-Tuning is incorrect.</p> <p>You did Auto-Tuning while the drive had a minor fault or alarm.</p> <p>There is a defective motor cable or cable connection.</p> <p>The load is too large.</p> <p>The drive detected a minor fault during Auto-Tuning.</p>	<ul style="list-style-type: none"> Make sure that the motor nameplate data entered in Auto-Tuning is correct. Do Auto-Tuning again and correctly set the motor nameplate data. <p>Clear the minor fault or alarm and do Auto-Tuning again.</p> <p>Examine and repair motor wiring.</p> <ul style="list-style-type: none"> Decrease the load. Examine the machine area to see if, for example, the motor shaft is locked. <ol style="list-style-type: none"> Stop Auto-Tuning. Examine the minor fault code and remove the cause of the problem. Do Auto-Tuning again.
Er-03	STOP Button was Pressed	During Auto-Tuning,  was pushed.	Auto-Tuning did not complete correctly. Do Auto-Tuning again.

Code	Name	Causes	Possible Solutions
Er-04	Line-to-Line Resistance Error	The Auto-Tuning results were not in the applicable parameter setting range.	<ul style="list-style-type: none"> Examine and repair motor wiring. Disconnect the machine from the motor and do Rotational Auto-Tuning again.
		Auto-Tuning did not complete in a pre-set length of time.	
		There is a defective motor cable or cable connection.	<ul style="list-style-type: none"> Make sure that the input motor nameplate data is correct. Do Auto-Tuning again and correctly set the motor nameplate data.
		The motor nameplate data entered during Auto-Tuning is incorrect.	
Code	Name	Causes	Possible Solutions
Er-05	No-Load Current Error	The Auto-Tuning results were not in the applicable parameter setting range.	<ul style="list-style-type: none"> Examine and repair motor wiring. Disconnect the machine from the motor and do Rotational Auto-Tuning again.
		Auto-Tuning did not complete in a pre-set length of time.	
		The motor nameplate data entered during Auto-Tuning is incorrect.	<ul style="list-style-type: none"> Make sure that the input motor nameplate data is correct. Do Auto-Tuning again and correctly set the motor nameplate data.
		Rotational Auto-Tuning was done with a load that was more than 30% of the rating connected to the motor.	
Code	Name	Causes	Possible Solutions
Er-08	Rated Slip Error	The motor nameplate data entered during Auto-Tuning is incorrect.	<ul style="list-style-type: none"> Make sure that the input motor nameplate data is correct. Do Auto-Tuning again and correctly set the motor nameplate data.
		Auto-Tuning did not complete in a pre-set length of time.	
		The Auto-Tuning results were not in the applicable parameter setting range.	<ul style="list-style-type: none"> Examine and repair the motor wiring. If the motor and machine are connected during Rotational Auto-Tuning, decouple the motor from the machinery.
		Rotational Auto-Tuning was done with a load that was more than 30% of the rating connected to the motor.	
Code	Name	Causes	Possible Solutions
Er-09	Acceleration Error	The motor did not accelerate for the specified acceleration time.	<ol style="list-style-type: none"> Increase the value set in <i>CI-01 [Acceleration Time 1]</i>. Disconnect the machine from the motor and do Rotational Auto-Tuning again.
		The value of <i>L7-01</i> or <i>L7-02 [Forward/Reverse Torque Limit]</i> is small.	Increase the value set in <i>L7-01</i> or <i>L7-02</i> .
		Rotational Auto-Tuning was done with a load that was more than 30% of the rating connected to the motor.	<ul style="list-style-type: none"> Disconnect the machine from the motor and do Rotational Auto-Tuning again. If you cannot uncouple the motor and load, make sure that the load is less than 30% of the motor rating. If a mechanical brake is installed in the motor, release the brake during Rotational Auto-Tuning.
Code	Name	Causes	Possible Solutions
Er-10	Motor Direction Error	There is defective drive and motor wiring.	Examine and repair motor wiring.
		There is defective drive and encoder wiring.	Examine and repair the wiring to the encoder.
		The direction of the motor and the setting of <i>F1-05 [PG 1 Rotation Selection]</i> are opposite.	Set <i>F1-05</i> correctly.
		The machine pulled the motor to rotate in the opposite direction.	Disconnect the machine from the motor and do Rotational Auto-Tuning again.
		When the torque reference is 100% or higher, the sign of the speed reference was opposite of the detected speed.	
Code	Name	Causes	Possible Solutions
Er-11	Motor Speed Error	The torque reference during acceleration is too high (100%).	<ul style="list-style-type: none"> Increase the value set in <i>CI-01 [Acceleration Time 1]</i>. Disconnect the machine from the motor and do Rotational Auto-Tuning again.

2.7 Auto-Tuning Errors

Code	Name	Causes	Possible Solutions
Er-12	Current Detection Error	There is a phase loss in the drive input power. (U/T1, V/T2, W/T3)	Examine and repair motor wiring.
		The current exceeded the current rating of the drive.	<ul style="list-style-type: none"> Check the motor wiring for any short circuits between the wires. Check and turn ON any magnetic contactors used between motors. Replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
		The output current is too low.	
		You tried Auto-Tuning without a motor connected to the drive.	Connect the motor and do Auto-Tuning.
		There was a current detection signal error.	Replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Code	Name	Causes	Possible Solutions
Er-13	Leakage Inductance Alarm	The motor rated current value is incorrect.	Correctly set the rated current indicated on the motor nameplate and perform Auto-Tuning again.
		The drive could not complete tuning for leakage inductance in fewer than 300 seconds.	Examine and repair motor wiring.
Code	Name	Causes	Possible Solutions
Er-14	Motor Speed Error 2	The motor speed was more than two times the amplitude of speed reference during Inertia Tuning.	Decrease the value set in <i>C5-01 [ASR Proportional Gain 1]</i> .
Code	Name	Causes	Possible Solutions
Er-15	Torque Saturation Error	During Inertia Tuning, the output torque was more than the value set in <i>L7-01 to L7-04 [Torque Limit]</i> .	<ul style="list-style-type: none"> Increase the value set in <i>L7-01 to L7-04 [Torque Limit]</i> as much as possible. Decrease the values set for the frequency and amplitude of the test signals used when doing inertia tuning. First, decrease the test signal amplitude, and then do Inertia Tuning. If the error continues, decrease the test signal frequency and do Inertia Tuning again.
Code	Name	Causes	Possible Solutions
Er-16	Inertia ID Error	The inertia found by the drive was too small or too large during Inertia Tuning (10% or less, or 50000% or more).	<ul style="list-style-type: none"> Decrease the values set for the frequency and amplitude of the test signals used when doing inertia tuning. First, decrease the test signal amplitude, and then do Inertia Tuning. If the error continues, decrease the test signal frequency and do Inertia Tuning again. Correctly set the motor inertia as specified by the motor, and do Inertia Tuning again.
Code	Name	Causes	Possible Solutions
Er-17	Reverse Prohibited Error	<i>b1-04 = 1 [Reverse Operation Selection = Reverse Disabled]</i> Note: You cannot do Inertia Tuning if the drive cannot rotate the motor in reverse.	<ol style="list-style-type: none"> Enable reverse in the target machine. Set <i>b1-04 = 0 [Reverse Enabled]</i>. Do Inertia Tuning again.
Code	Name	Causes	Possible Solutions
Er-18	Back EMF Error	The result of the induced voltage tuning was not in the applicable range.	<ol style="list-style-type: none"> Make sure that the input motor nameplate data is correct. Do Auto-Tuning again and correctly set the motor nameplate data.
Code	Name	Causes	Possible Solutions
Er-19	PM Inductance Error	The Auto-Tuning results of the PM motor inductance were not in the applicable range.	<ol style="list-style-type: none"> Make sure that the input motor nameplate data is correct. Do Auto-Tuning again and correctly set the motor nameplate data.
Code	Name	Causes	Possible Solutions
Er-20	Stator Resistance Error	The Auto-Tuning results of the PM Motor Stator Resistance were not in the applicable range.	<ol style="list-style-type: none"> Make sure that the input motor nameplate data is correct. Do Auto-Tuning again and correctly set the motor nameplate data.
Code	Name	Causes	Possible Solutions
Er-21	Z Pulse Correction Error	The motor is wired incorrectly.	<ol style="list-style-type: none"> Repair motor and encoder wiring errors. Do Z Pulse Offset Tuning again.
		The encoder is wired incorrectly.	
		You did Auto-Tuning on a coasting motor.	<ol style="list-style-type: none"> Wait for the motor to fully stop. Do Z Pulse Offset Tuning again.

Code	Name	Causes	Possible Solutions
		The setting for the direction of the encoder motor rotation is incorrect.	<ol style="list-style-type: none"> Set the direction of motor rotation of the encoder in <i>F1-05 [Encoder 1 Rotation Selection]</i> correctly. Do Z Pulse Offset Tuning again.
		The number of encoder pulses is incorrect.	<ol style="list-style-type: none"> Set the number of encoder pulses in <i>F1-01 [Encoder 1 Pulse Count (PPR)]</i> correctly. Do Z Pulse Offset Tuning again.
		The motor Inertia is too large.	Increase the value set in <i>n8-02 [Pole Alignment Current Level]</i> .
		Parameter <i>b1-04 = 1 [Reverse Operation Selection = Reverse Disabled]</i> and you did Z Pulse Offset Tuning.	<ul style="list-style-type: none"> If the machine prevents reverse rotation, disconnect the motor from the machinery, set <i>b1-04 = 0 [Reverse Enabled]</i>, then do Z Pulse Offset Tuning. When tuning is complete, set <i>b1-04 = 1 [Reverse Disabled]</i>. If the machine does not prevent reverse rotation, set <i>b1-04 = 0</i> and do Z Pulse Offset Tuning.
		The motor vibrates during tuning.	<ul style="list-style-type: none"> Increase the values set in <i>n8-03 [Pole Position Detection Time]</i> and <i>n8-04 [Pole Alignment Time]</i>. Decrease the value set in <i>n8-02 [Pole Alignment Current Level]</i>.
		The encoder is damaged.	<ul style="list-style-type: none"> Examine the signal output from the encoder. Replace the encoder.
Code	Name	Causes	Possible Solutions
Er-25	HighFreq Inject Param Tuning Err	The motor data is incorrect.	<p>Do Stationary Auto-Tuning again.</p> <p>Note: If the drive detects <i>Er-25</i> after doing Stationary Auto-Tuning, the motor may not be able to use high frequency injection control. Contact Yaskawa or your nearest sales representative for more information.</p>

2.8 Backup Function Operating Mode Display and Errors

◆ Operating Mode Display

When you use the backup function from the LCD keypad, the keypad shows messages according to the current operation. These indicators do not show that an error has occurred.

Keypad Display	Name	Display	Status
Drive and Keypad mismatch. Should the parameters be restored?	Detection of inconsistency between the drive and keypad	Normally displayed	The drive detected the connection of a keypad from a different drive. Select [Yes] to copy parameters backed up in the keypad to the connected drive.
Restore Restore from keypad	Restoring parameters	Flashing	The parameters stored in the keypad have been restored to the drive.
End	Backup/restore/verify operation ended normally	Normally displayed	The parameter backup, restore, or verify operation ended normally.
Backup Backup from Drive	Backing up parameters	Flashing	The parameters stored in the drive are being backed up to the keypad.
Verify Keypad & Drive	Verifying parameters	Flashing	The parameter settings stored in the keypad and the parameter settings in the drive match or are being compared.

◆ Backup Function Runtime Errors

When an error occurs, the keypad shows a code to identify the error.

The table in this section show the error codes. Refer to these tables to remove the cause of the errors.

Note:

Push any key on the keypad to clear an error.

Code	Name	Causes	Possible Solutions
CPyE	Error Writing Data	Parameter restore did not end correctly.	Restore the parameters.
Code	Name	Causes	Possible Solutions
CSEr	Control Mode Mismatch	The keypad is broken.	Replace the keypad.
Code	Name	Causes	Possible Solutions
dFPS	Drive Model Mismatch	You tried to restore parameters to a different drive model than the one that you backed up.	<ol style="list-style-type: none"> Examine the drive model that you used to back up the parameters. Restore the parameters.
Code	Name	Causes	Possible Solutions
iFEr	Keypad Communication Error	There was a communications error between the keypad and the drive.	Examine the connector or cable connection.
Code	Name	Causes	Possible Solutions
ndAT	Error Received Data	The parameter settings for model and specifications (power supply voltage and capacity) are different between the keypad and the drive.	<ol style="list-style-type: none"> Make sure that drive model and the value set in <i>o2-04 [Drive Model (KVA) Selection]</i> agree. Restore the parameters.
		The parameters are not stored in the keypad.	<ol style="list-style-type: none"> Connect a keypad that has the correct parameters. Restore the parameters.
Code	Name	Causes	Possible Solutions
PWEr	DWEZ Password Mismatch	The password set in the backup operation with <i>qx-xx [DriveWorksEZ Parameters]</i> and <i>rx-xx [DriveWorksEZ Connections]</i> is incorrect.	Set the DWEZ PC software password supplied by Yaskawa for the DWEZ program user ID downloaded to the drive.
Note: <i>U8-11 and U8-12 [DWEZ Versions 1 and 2]</i> show the user ID of the DWEZ program.			
Code	Name	Causes	Possible Solutions
rdEr	Error Reading Data	You tried to back up the data when <i>o3-02 = 0 [Copy Allowed Selection = Disabled]</i> .	Set <i>o3-02 = 1 [Enabled]</i> and back up again.

Code	Name	Causes	Possible Solutions
vAEr	Voltage Class, Capacity Mismatch	The power supply specifications or drive capacity parameter settings are different between the keypad and the drive.	<ol style="list-style-type: none"> 1. Make sure that drive model and the value set in <i>o2-04 [Drive Model (KVA) Selection]</i> agree. 2. Restore the parameters.
Code	Name	Causes	Possible Solutions
vFyE	Parameters do not Match	The parameters that are backed up in the keypad and the parameters in the drive are not the same.	<ol style="list-style-type: none"> 1. Restore or backup the parameter again. 2. Verify the parameters.

2.9 Diagnosing and Resetting Faults

When a fault occurs and the drive stops, do the procedures in this section to remove the cause of the fault, then re-energize the drive.

◆ Fault and Power Loss Occur at the Same Time

WARNING! Crush Hazard. Wear eye protection when you do work on the drive. If you do not use correct safety equipment, it can cause serious injury or death.

WARNING! Electrical Shock Hazard. After the drive blows a fuse or trips a GFCI, do not immediately energize the drive or operate peripheral devices. Wait for the time specified on the warning label at a minimum and make sure that all indicators are OFF. Then check the wiring and peripheral device ratings to find the cause of the problem. If you do not know the cause of the problem, contact Yaskawa before you energize the drive or peripheral devices. If you do not fix the problem before you operate the drive or peripheral devices, it can cause serious injury or death.

1. Supply power to the control circuit from the external 24 V input.
2. Use monitor parameters U2-xx [Fault Trace] to show the fault code and data about the operating status of the drive immediately before the fault occurred.
3. Use the information in the Troubleshooting tables to remove the fault.

Note:

1. To find the faults that were triggered, check the fault history in U2-02 [Previous Fault]. To find information about drive status (such as frequency, current, and voltage) when the faults were triggered, check U2-03 to U2-20.
2. If the fault display stays after you re-energize the drive, remove the cause of the fault and reset.


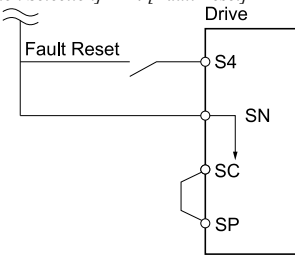
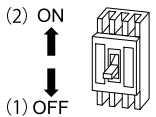
◆ Fault Occurs Without Power Loss

1. Examine the fault code shown on the keypad.
2. Use the information in the Troubleshooting tables to remove the fault.
3. Do a fault reset.

◆ Fault Reset

If a fault occurs, you must remove the cause of the fault and re-energize the drive. Table 2.3 lists the different methods to reset the drive after a fault.

Table 2.3 Fault Reset Methods

Methods	Description
Method 1	While the keypad is showing the fault or alarm code, push F1 (Reset) or  on the keypad.
Method 2	<p>Switch ON the MFDI terminal set to H1-xx = 14 [MFDI Function Select = Fault Reset].</p> <p>Note: The default setting for H1-04 [Terminal S4 Function Selection] is 14 [Fault Reset].</p> 
Method 3	<ol style="list-style-type: none"> 1. De-energize the drive main circuit power supply. 2. Energize the drive again after the keypad display goes out. 

Note:

If the drive receives a Run command from a communication option or control circuit terminal, the drive will not reset the fault. Remove the Run command then try to clear the fault. If you do a fault reset when the drive has a Run command, the keypad will show minor fault *CrST* [*Remove RUN Command to Reset*].

2.10 Troubleshooting Without Fault Display

Note:

Make sure that you use a keypad that has a flash number of 1004 or later. Keypads that have a flash number of 1003 or earlier will not show characters correctly.

If the drive or motor operate incorrectly, but the keypad does not show a fault or error code, refer to the items this section.

- Motor hunting and oscillation
- Unsatisfactory motor torque
- Unsatisfactory speed precision
- Unsatisfactory motor torque and speed response
- Motor noise

◆ Typical Problems







Symptom	Ref.
The Parameter Settings Will Not Change	146
The Motor Does Not Rotate after You Enter a Run Command	147
The Motor Rotates in the Opposite Direction from the Run Command	148
The Motor Rotates in Only One Direction	148
The Motor Is Too Hot	148
The Correct Auto-Tuning Mode Is Not Available	149
The Motor Stalls during Acceleration or Accel/Decel Time Is Too Long	149
The Drive Frequency Reference Is Different than the Controller Frequency Reference Command	150
The Motor Is Not Stable When Using a PM Motor	150
There Is Too Much Motor Oscillation and the Rotation Is Irregular	150
Deceleration Takes Longer than Expected when You Enable Dynamic Braking	150
There Is Audible Noise from the Drive or Motor Cables when You Energize the Drive	151
The Ground Fault Circuit Interrupter (GFCI) Trips During Run	151
Motor Rotation Causes Unexpected Audible Noise from Connected Machinery	151
Motor Rotation Causes Oscillation or Hunting	152
PID Output Fault	152
The Starting Torque Is Not Sufficient	152
The Motor Rotates after You Shut Off Drive Output	152
The Output Frequency Is Lower Than the Frequency Reference	152
The Motor Is Making an Audible Noise	153
The Motor Will Not Restart after Power Loss	153

◆ The Parameter Settings Will Not Change

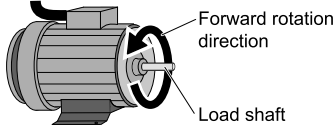
Causes	Possible Solutions
The drive is operating the motor (the drive is in Drive Mode).	Stop the drive and change to Programming Mode.
Parameter $A1-01 = 0$ [Access Level Selection = Operation Only].	Set $A1-01 = 2$ [Access Level Selection = Advanced Level] or $A1-01 = 3$ [Expert Level].
Parameter $H1-xx = 1B$ [MFDI Function Select = Programming Lockout].	Activate the terminals to which $H1-xx = 1B$ is set, and then change the parameters.

Causes	Possible Solutions
You entered an incorrect password in A1-04 [Password].	<ul style="list-style-type: none"> Enter the correct password to A1-04 again. If you forgot the password, set the password again with A1-04 and A1-05 [Password Setting]. <p>Note: If you set the password, you cannot change these parameters until the password aligns:</p> <ul style="list-style-type: none"> A1-01 [Access Level Selection] A1-02 [Control Method Selection] A1-03 [Initialize Parameters] A1-06 [Application Preset] A1-07 [DriveWorksEZ Function Selection] A2-01 to A2-32 [User Parameter 1 to User Parameter 32]
The drive detected Uv [Undervoltage].	<ul style="list-style-type: none"> View U1-07 [DC Bus Voltage] to see the power supply voltage. Examine the main circuit wiring.

◆ The Motor Does Not Rotate After Entering Run Command

Causes	Possible Solutions
The drive is not in Drive Mode.	<ol style="list-style-type: none"> Make sure that the keypad shows [Rdy]. If the keypad does not show [Rdy], go back to the Home screen.
The drive stopped,  was pushed, and changed the Run command source to the keypad.	<p>Do one of these two:</p> <ul style="list-style-type: none"> Push . Re-energize the drive. <p>Note: Set o2-01 = 0 [LO/RE Key Function Selection = Disabled] to prevent changing the Run command source with .</p>
Auto-Tuning completed.	<p>Go back to the Home screen on the keypad.</p> <p>Note: When Auto-Tuning completes, the drive changes to Programming Mode. The drive will not accept a Run command unless the drive is in Drive Mode.</p>
The drive received a fast stop command.	Turn off the fast stop input signal.
The settings for the source that supplies the Run command are incorrect.	Set b1-02 [Run Command Selection 1] correctly.
The frequency reference source is set incorrectly.	Set b1-01 [Frequency Reference Selection 1] correctly.
There is defective wiring in the control circuit terminals.	<ul style="list-style-type: none"> Correctly wire the drive control circuit terminals. View U1-10 [Input Terminal Status] for input terminal status.
The settings for voltage input and current input of the master frequency reference are incorrect.	<p>Examine these analog input terminal signal level settings:</p> <ul style="list-style-type: none"> Terminal A1: DIP switch S1-1 and H3-01 [Terminal A1 Signal Level Select] Terminal A2: DIP switch S1-2 and H3-09 [Terminal A2 Signal Level Select] Terminal A3: DIP switch S4, S1-3 and H3-05 [Terminal A3 Signal Level Select]
The selection for the sinking/sourcing mode and the internal/external power supply is incorrect.	<ul style="list-style-type: none"> For sinking mode, close the circuit between terminals SC-SP with a wire jumper. For sourcing mode, close the circuit between terminals SC-SN with a wire jumper. For external power supply, remove the wire jumper.
The frequency reference is too low.	<ul style="list-style-type: none"> View U1-01 [Freq Reference]. Increase the frequency reference to a value higher than E1-09 [Minimum Output Frequency].
The MFAI setting is incorrect.	<ul style="list-style-type: none"> Make sure that the functions set to the MFAI are correct. The frequency reference is 0 when H3-02, H3-10, H3-06 = 1 [MFAI Function Select = Frequency Gain] and voltage (current) is not input. View U1-13 to U1-15 [Terminal A1, A2, A3 Input Voltage] to see if the analog input values set to terminals A1, A2, and A3 are applicable.
 was pushed.	<p>Turn the Run command OFF then ON from an external input.</p> <p>Note: When you push  during operation, the drive will ramp to stop. Set o2-02 = 0 [STOP Key Function Selection = Disabled] to disable the  function.</p>
The 2-wire sequence and 3-wire sequence are set incorrectly.	<ul style="list-style-type: none"> Set one of the parameters H1-03 to H1-08 [Terminals S3 to S8 Function Select] to 0 [3-Wire Sequence] to enable the 3-wire sequence. If a 2-wire sequence is necessary, make sure that H1-03 to H1-08 ≠ 0.

◆ The Motor Rotates in the Opposite Direction from the Run Command

Causes	Possible Solutions
The phase wiring between the drive and motor is incorrect.	<ul style="list-style-type: none"> Examine the wiring between the drive and motor. Connect drive output terminals U/T1, V/T2, and W/T3 in the correct sequence to agree with motor terminals U, V, and W. Switch two motor cables U, V, and W to reverse motor direction.
The forward direction for the motor is set incorrectly.	<ul style="list-style-type: none"> Connect drive output terminals U/T1, V/T2, and W/T3 in the correct sequence to agree with motor terminals U, V, and W. Switch two motor cables U, V, and W to reverse motor direction. <div style="text-align: center;">  <p>Figure 2.1 Forward Rotating Motor</p> <p>Note:</p> <ul style="list-style-type: none"> For Yaskawa motors, the forward direction is counterclockwise when looking from the motor shaft side. Refer to the motor specifications, and make sure that the forward rotation direction is correct for the application. The forward rotation direction of motors can be different for different motor manufacturers and types. </div>
The signal connections for forward run and reverse run on the drive control circuit terminals and control panel side are incorrect.	Correctly wire the control circuit.
The motor is running at almost 0 Hz and the Speed Search estimated the speed to be in the opposite direction.	Set $b3-14 = 0$ [<i>Bi-directional Speed Search = Disabled</i>], then the drive will only do speed search in the specified direction.

◆ The Motor Rotates in Only One Direction

Causes	Possible Solutions
The drive will not let the motor rotate in reverse.	Set $b1-04 = 0$ [<i>Reverse Operation Selection = Reverse Enabled</i>].
The drive did not receive a Reverse run signal and 3-Wire sequence is selected.	Activate the terminals to which $H1-xx = 0$ [<i>3-Wire Sequence</i>] is set, and then enable reverse operation.

◆ The Motor Is Too Hot

Causes	Possible Solutions
The load is too heavy.	<ul style="list-style-type: none"> Decrease the load. Increase the acceleration and deceleration times. Examine the values set in $L1-01$ [<i>Motor Overload (oL1) Protection</i>], $L1-02$ [<i>Motor Overload Protection Time</i>], and $E2-01$ [<i>Motor Rated Current (FLA)</i>]. Use a larger motor. <p>Note: The motor also has a short-term overload rating. Examine this rating carefully before setting drive parameters.</p>
The motor is running continuously at a very low speed.	<ul style="list-style-type: none"> Change the run speed. Use a drive-dedicated motor.
The drive is operating in a vector control mode, but Auto-Tuning has not been done.	<ul style="list-style-type: none"> Do Auto-Tuning. Calculate motor parameter and set motor parameters. Set $A1-02 = 0$ [<i>Control Method Selection = V/f Control</i>].
The voltage insulation between motor phases is not sufficient.	<ul style="list-style-type: none"> Use a motor with a voltage tolerance that is higher than the maximum voltage surge. Use a drive-dedicated motor that is rated for use with AC drives for applications that use a motor on drives rated higher than 400 V class. Install an AC reactor on the output side of the drive and set $C6-02 = 1$ [<i>Carrier Frequency Selection = 2.0 kHz</i>]. <p>Note: When the motor is connected to the drive output terminals U/T1, V/T2, and W/T3, surges occur between the drive switching and the motor coils. These surges can be three times the drive input power supply voltage (600 V for a 200 V class drive, 1200 V for a 400 V class drive).</p>
The air around the motor is too hot.	<ul style="list-style-type: none"> Measure the ambient temperature. Decrease the temperature in the area until it is in the specified temperature range.
The motor fan stopped or is clogged.	<ul style="list-style-type: none"> Clean the motor fan. Make the drive environment better.

◆ The Correct Auto-Tuning Mode Is Not Available

Causes	Possible Solutions
The desired Auto-Tuning mode is not available for the selected control mode.	Change the motor control method with parameter <i>A1-02</i> [Control Method Selection].

◆ The Motor Stalls during Acceleration or Accel/Decel Time Is Too Long

Causes	Possible Solutions
The drive and motor system reached the torque limit or current suppression will not let the drive accelerate.	<ul style="list-style-type: none"> Decrease the load. Use a larger motor. <p>Note: Although the drive has a Stall Prevention function and a Torque Compensation Limit function, accelerating too fast or trying to drive a load that is too large can exceed the limits of the motor.</p>
Torque limit is set incorrectly.	Set the torque limit correctly.
The acceleration time setting is too short.	Check the values set in <i>C1-01</i> , <i>C1-03</i> , <i>C1-05</i> , or <i>C1-07</i> [Acceleration Time] and set them to applicable values.
The load is too heavy.	<ul style="list-style-type: none"> Increase the acceleration time. Examine the mechanical brake and make sure that it is fully releasing. Decrease the load to make sure that the output current stays less than the motor rated current. Use a larger motor. <p>Note: • In extruder and mixer applications, the load can increase as the temperature decreases. • Although the drive has a Stall Prevention function and a Torque Compensation Limit function, accelerating too fast or trying to drive a load that is too large can exceed the limits of the motor.</p>
The frequency reference is low.	<ul style="list-style-type: none"> Examine <i>E1-04</i> [Maximum Output Frequency] and increase the setting if it is set too low. Examine <i>U1-01</i> [Frequency Reference] for the correct frequency reference. Examine the multi-function input terminals to see if a frequency reference signal switch has been set. Examine the low gain level set in <i>H3-03</i>, <i>H3-11</i>, <i>H3-07</i> [Terminal A1, A2, A3 Gain Setting] if you use MFAL.
The frequency reference is set incorrectly.	<p>When <i>H3-02</i>, <i>H3-10</i>, <i>H3-06</i> = 1 [MFAL Function Select = Frequency Gain] are set, see if voltage (current) has been set.</p> <ul style="list-style-type: none"> Check the values set in <i>H3-02</i>, <i>H3-10</i>, and <i>H3-06</i>. Use <i>U1-13</i> to <i>U1-15</i> [Terminal A1, A2, A3 Input Voltage] to make sure that the analog input values set to terminals A1, A2, and A3 are applicable.
The motor characteristics and drive parameter settings are not compatible.	<ul style="list-style-type: none"> Set the correct V/f pattern to agree with the characteristics of the motor. Examine the V/f pattern set in <i>E1-03</i> [V/f Pattern Selection]. Perform Rotational Auto-Tuning.
The drive is operating in vector control mode, but Auto-Tuning is not completed.	<ul style="list-style-type: none"> Do Auto-Tuning. Calculate motor data and reset motor parameters. Set <i>A1-02</i> = 0 [Control Method Selection = V/f Control].
Parameter <i>A1-02</i> = 4 [Control Method Selection = Advanced Open Loop Vector] and the speed estimation response is too slow.	Increase the value set in <i>n4-65</i> [Flux Estimate Response@High Freq] in 0.1-unit increments.
The Stall Prevention level during acceleration setting is too low.	<p>Increase the value set in <i>L3-02</i> [Stall Prevent Level during Accel].</p> <p>Note: If the <i>L3-02</i> value is too low, the acceleration time can be unsatisfactorily long.</p>
The Stall Prevention level during run setting is too low.	<p>Increase the value set in <i>L3-06</i> [Stall Prevent Level during Run].</p> <p>Note: If the <i>L3-06</i> value is too low, speed will decrease while the drive outputs torque.</p>
Drive reached the limitations of the V/f motor control method.	<ul style="list-style-type: none"> When the motor cable is longer than 50 m (164 ft.), do Auto-Tuning for line-to-line resistance. Set the V/f pattern to "High Starting Torque". Use a Vector Control method. <p>Note: V/f control method does not provide high torque at low speeds.</p>

◆ The Drive Frequency Reference Is Different than the Controller Frequency Reference Command

Causes	Possible Solutions
The analog input gain and bias for the frequency reference input are set incorrectly.	Examine the gain and bias settings for the analog inputs that set the frequency reference. <ul style="list-style-type: none"> Terminal A1: H3-03 [Terminal A1 Gain Setting], H3-04 [Terminal A1 Bias Setting] Terminal A2: H3-11 [Terminal A2 Gain Setting], H3-12 [Terminal A2 Bias Setting] Terminal A3: H3-07 [Terminal A3 Gain Setting], H3-08 [Terminal A3 Bias Setting]
The drive is receiving frequency bias signals from analog input terminals A1 to A3 and the sum of all signals makes the frequency reference.	<ul style="list-style-type: none"> Examine parameters H3-02, H3-10, H3-06 [MFAI Function Select]. If two or more of these parameters are set to 0, change the settings. Use U1-13 to U1-15 [Terminal A1, A2, A3 Input Voltage] to make sure that the analog input values set to terminals A1, A2, and A3 are applicable.
The motor rotates faster than the frequency reference at low speed.	<ul style="list-style-type: none"> Decrease the value set in n4-70 [Speed Command Comp @ Low Freq] in increments of 0.1 Hz. <p>Note: If you set the value too low, the motor can rotate in reverse.</p> Set E1-09 > 0 [Minimum Output Frequency]. <p>Note: • The recommended setting for E1-09 is 0.5 Hz. • When frequency reference < E1-09, the drive output will turn OFF.</p>
PID control is enabled.	<p>If PID control is not necessary, set b5-01 = 0 [PID Mode Setting = Disabled].</p> <p>Note: When PID control is enabled, the drive adjusts the output frequency as specified by the target value. The drive will only accelerate to the maximum output frequency set in E1-04 [Maximum Output Frequency] while PID control is active.</p>

◆ The Motor Speed Is Not Stable When Using a PM Motor

Causes	Possible Solutions
E5-01 [PM Motor Code Selection] is set incorrectly.	Refer to "Motor Performance Fine-Tuning" in the technical manual.
The drive is operating the motor at more than the specified speed control range.	Examine the speed control range and adjust the speed.
The motor is hunting.	Adjust these parameters to have the largest effect: <ul style="list-style-type: none"> n8-55 [Motor to Load Inertia Ratio] n8-45 [Speed Feedback Detection Gain] C4-02 [Torque Compensation Delay Time]
Hunting occurs at start.	Increase the value set in C2-01 [S-Curve Time @ Start of Accel].
Too much current is flowing through the drive.	Set E5-01 [PM Motor Code Selection] correctly as specified by the motor. For special-purpose motors, enter the correct value to E5-xx as specified by the motor test report.
Operation is not stable when n8-57 = 1 [HFI Overlap Selection = Enabled].	<ul style="list-style-type: none"> Do High Frequency Injection Auto-Tuning. Decrease the value set in n8-41 [HFI P Gain] in increments of 0.5. <p>Note: Set n8-41 > 0.0 for IPM motors.</p>

◆ There Is Too Much Motor Oscillation and the Rotation Is Irregular

Causes	Possible Solutions
Unsatisfactory balance of motor phases.	<ul style="list-style-type: none"> Make sure that the drive input power voltage supplies stable power. Set L8-05 = 0 [Input Phase Loss Protect Select = Disabled].
The motor is hunting.	<ul style="list-style-type: none"> Set n1-01 = 1 [Hunting Prevention Selection = Enabled]. Increase the value of n2-01 [SpdFeedbackDetectCtr (AFR) Gain] or n2-02 [SpdFeedbackDetCtr (AFR)TimeConst1].

◆ Deceleration Takes Longer Than Expected When Dynamic Braking Is Enabled

Causes	Possible Solutions
The stall prevention during deceleration setting is incorrect.	<ul style="list-style-type: none"> Examine the setting for L3-04 [Decel Stall Prevention Selection]. When the drive has a dynamic braking option installed, set L3-04 = 0 [Disabled]. If the drive detects ov [Overvoltage], set L3-04 = 3 [General Purpose w/ DB resistor].
The deceleration time setting is too long.	Set C1-02, C1-04, C1-06, or C1-08 [Deceleration Times] to applicable values.

Causes	Possible Solutions
The motor torque is not sufficient.	Use a larger motor. Note: If these items are correct, the demand on the motor is more than the motor capacity: • Parameter settings are correct. • The drive does not detect <i>ov</i> [Overvoltage].
The drive and motor system reached the torque limit.	<ul style="list-style-type: none"> Examine the values set in L7-01 to L7-04 [Torque Limit] and increase them if necessary. Note: If the torque limit is enabled, deceleration time can increase because the drive cannot output more torque than the limit. <ul style="list-style-type: none"> If H3-02, H3-10, H3-06 = 10, 11, 12, 15 [MFAI Function Select = Torque Limit] has been set, examine the settings for the MFAs. <ul style="list-style-type: none"> Examine the values set in H3-02, H3-10, and H3-06. Use U1-13 to U1-15 [Terminal A1, A2, A3 Input Voltage] to make sure that the analog input values set to terminals A1, A2, and A3 are applicable.
The load is more than the internal torque limit as specified by the drive rated current.	Replace the drive with a larger capacity model.

◆ There Is Audible Noise from the Drive or Motor Cables when You Energize the Drive

Causes	Possible Solutions
The relay switching in the drive is making too much noise.	<ul style="list-style-type: none"> Use C6-02 [Carrier Frequency Selection] to decrease the carrier frequency. Connect a noise filter to the input side of the drive power supply. Connect a noise filter to the output side of the drive. Isolate the control circuit wiring from the main circuit wiring. Use a metal cable gland to wire the drive. Shield the periphery of the drive with metal. Make sure that the drive and motor are grounded correctly. Make sure that ground faults have not occurred in the wiring or motor.

◆ The Ground Fault Circuit Interrupter (GFCI) Trips During Run

Causes	Possible Solutions
There is too much leakage current from the drive.	<ul style="list-style-type: none"> Increase the GFCI sensitivity or use GFCI with a higher threshold. Use C6-02 [Carrier Frequency Selection] to decrease the carrier frequency. Decrease the length of the cable used between the drive and the motor. Install a noise filter or AC reactor on the output side of the drive. Set C6-02 = 1 [2.0 kHz] when connecting an AC reactor. Disable the internal EMC filter.

◆ Motor Rotation Causes Unexpected Audible Noise from Connected Machinery

Causes	Possible Solutions
The carrier frequency and the resonant frequency of the connected machinery are the same.	<ul style="list-style-type: none"> Adjust C6-02 to C6-05 [Carrier Frequency]. Set C6-02 = 1 to 6 [Carrier Frequency Selection = Frequency other than Swing PWM]. Note: If C6-02 = 7 to A [Carrier Frequency Selection = Swing PWM], the drive will not know if the noise comes from the drive or the machine.
The drive output frequency and the resonant frequency of the connected machinery are the same.	<ul style="list-style-type: none"> Adjust d3-01 to d3-04 [Jump Frequency]. Put the motor on a rubber pad to decrease vibration.

◆ Motor Rotation Causes Oscillation or Hunting

Causes	Possible Solutions
The frequency reference is assigned to an external source, and there is electrical interference in the signal.	Make sure that electrical interference does not have an effect on the signal lines. <ul style="list-style-type: none"> Isolate control circuit wiring from main circuit wiring. Use twisted-pair cables or shielded wiring for the control circuit. Increase the value of H3-13 [Analog Input FilterTime Constant].
The cable between the drive and motor is too long.	<ul style="list-style-type: none"> Do Auto-Tuning. Make the wiring as short as possible.
The PID parameters are not sufficiently adjusted.	Adjust b5-xx [PID control].

◆ PID Output Fault

Causes	Possible Solutions
There is no PID feedback input.	<ul style="list-style-type: none"> Examine the MFAI terminal settings. See if H3-02, H3-10, H3-06 = B [MFAI Function Select = PID Feedback] is set. Make sure that the MFAI terminal settings agree with the signal inputs. Examine the connection of the feedback signal. Make sure that b5-xx [PID Control] is set correctly. <p>Note: If there is no PID feedback input to the terminal, the detected value is 0, which causes a PID fault and also causes the drive to operate at maximum frequency.</p>
The detection level and the target value do not agree.	Use H3-03, H3-11, H3-07 [Terminal A1, A2, A3 Gain Setting] to adjust PID target and feedback signal scaling. <p>Note: PID control keeps the difference between the target value and detection value at 0. Set the input level for the values relative to each other.</p>
Reverse drive output frequency and speed detection. When output frequency increases, the sensor detects a speed decrease.	Set b5-09 = 1 [PID Output Level Selection = Reverse output (reverse acting)].

◆ The Starting Torque Is Not Sufficient

Causes	Possible Solutions
Auto-Tuning has not been done in vector control method.	Do Auto-Tuning.
The control method was changed after doing Auto-Tuning.	Do Auto-Tuning again.
Stationary Auto-Tuning for Line-to-Line Resistance was done.	Do Rotational Auto-Tuning.

◆ The Motor Rotates after the Drive Output Is Shut Off

Causes	Possible Solutions
DC Injection Braking is too low and the drive cannot decelerate correctly.	<ul style="list-style-type: none"> Increase the value set in b2-02 [DC Injection Braking Current]. Increase the value set in b2-04 [DC Inject Braking Time at Stop].
The stopping method makes the drive coast to stop.	Set b1-03 = 0 or 2 [Stopping Method Selection = Ramp to Stop, DC Injection Braking to Stop].

◆ The Output Frequency Is Lower Than the Frequency Reference

Causes	Possible Solutions
The frequency reference is in the Jump frequency range.	Adjust d3-01 to d3-03 [Jump Frequency 1 to 3] and d3-04 [Jump Frequency Width]. <p>Note: Enabling the Jump frequency prevents the drive from outputting the frequencies specified in the Jump range.</p>
The upper limit for the frequency reference has been exceeded.	Set E1-04 [Maximum Output Frequency] and d2-01 [Frequency Reference Upper Limit] to the best values for the application. <p>Note: This calculation supplies the upper value for the output frequency: $E1-04 \times d2-01 / 100$</p>
A large load triggered Stall Prevention function during acceleration.	<ul style="list-style-type: none"> Decrease the load. Adjust L3-02 [Stall Prevent Level during Accel].

Causes	Possible Solutions
<i>L3-01 = 3 [Stall Prevent Select during Accel = ILim Mode]</i> has been set.	<ol style="list-style-type: none"> 1. Check whether the V/f pattern and motor parameter settings are appropriate, and set them correctly. 2. If this does not solve the problem, and it is not necessary to limit the current level of stall during acceleration, adjust <i>L3-02</i>. 3. If this does not solve the problem, set <i>L3-01 = 1 [Enabled]</i>.
The motor is rotating at this speed: <i>b2-01 [DC Injection/Zero SpeedThreshold] ≤ Motor Speed < E1-09 [Minimum Output Frequency]</i>	<ul style="list-style-type: none"> • Set <i>b1-21 = 1 [CLV Start Selection = Accept Run command at any speed]</i>. • Set <i>E1-09 < b2-01</i>.

◆ The Motor Is Making an Audible Noise

Causes	Possible Solutions
100% of the rated output current of the drive was exceeded while operating at low speeds.	<ul style="list-style-type: none"> • If the sound is coming from the motor, set <i>L8-38 = 0 [Carrier Frequency Reduction = Disabled]</i>. • If <i>oL2 [Drive Overloaded]</i> occurs frequently after setting <i>L8-38 = 0</i>, replace the drive with a high-capacity drive.

◆ The Motor Will Not Restart after a Loss of Power

Causes	Possible Solutions
The drive did not receive a Run command after applying power.	<ul style="list-style-type: none"> • Examine the sequence and wiring that enters the Run command. • Set up a relay to make sure that the Run command stays enabled during a loss of power.
For applications that use 3-wire sequence, the momentary power loss continued for a long time, and the relay that keeps the Run command has been switched off.	Examine the wiring and circuitry for the relay that keeps the Run command enabled during the momentary power loss ride-thru time.

Parameter List

3.1	Section Safety	156
3.2	How to Read the Parameter List	157
3.3	Parameter Groups	158
3.4	A: Initialization Parameters	160
3.5	b: Application	164
3.6	C: Tuning	176
3.7	d: Reference Settings	182
3.8	E: Motor Parameters	187
3.9	F: Options	192
3.10	H: Terminal Functions	207
3.11	L: Protection Functions	235
3.12	n: Special Adjustment	245
3.13	o: Keypad-Related Settings	253
3.14	q: DriveWorksEZ Parameters	261
3.15	r: DWEZ Connection 1-20	262
3.16	T: Motor Tuning	263
3.17	U: Monitors	267
3.18	Parameters that Change from the Default Settings with A1-02 [Control Method Selection]	285
3.19	Parameters that Change from the Default Settings with E3-01 [Motor 2 Control Mode Selection]	291
3.20	Parameters Changed by E1-03 [V/f Pattern Selection]	292
3.21	Defaults by Drive Model and Duty Rating ND/HD	295

3.1 Section Safety










 **DANGER**

Do not ignore the safety messages in this manual.

If you ignore the safety messages in this manual, it will cause serious injury or death. The manufacturer is not responsible for injuries or damage to equipment.

3.2 How to Read the Parameter List

◆ Icons and Terms that Identify Parameters and Control Methods

Icon	Description
	The parameter is available when operating the drive with V/f Control.
	The parameter is available when operating the drive with Closed Loop V/f Control.
	The parameter is available when operating the drive with Open Loop Vector Control.
	The parameter is available when operating the drive with Closed Loop Vector Control.
	The parameter is available when operating the drive with Advanced Open Loop Vector Control.
	The parameter is available when operating the drive with Open Loop Vector Control for PM.
	The parameter is available when operating the drive with Advanced Open Loop Vector Control for PM.
	The parameter is available when operating the drive with Closed Loop Vector Control for PM.
	The parameter is available when operating the drive with EZ Open Loop Vector Control.
Hex.	Hexadecimal numbers that represent MEMOBUS addresses to change parameters over network communication.
RUN	You can change the parameter setting during Run.
Expert	The parameter that is available in Expert Mode only. ^{*1}

*1 Set $A1-01 = 3$ [Access Level Selection = Expert Level] to show and set Expert Mode parameters on the keypad.

Note:

Gray icons identify parameters that are not available in the specified control method.

3.3 Parameter Groups

Represents the type of product parameters.

Parameters	Name
A1	Initialization
A2	User Parameters
b1	Operation Mode Selection
b2	DC Injection Braking and Short Circuit Braking
b3	Speed Search
b4	Timer Function
b5	PID Control
b6	Dwell Function
b7	Droop Control
b8	Energy Saving
b9	Zero Servo
C1	Accel & Decel Time
C2	S-Curve Characteristics
C3	Slip Compensation
C4	Torque Compensation
C5	Auto Speed Regulator (ASR)
C6	Duty & Carrier Frequency
d1	Frequency Reference
d2	Reference Limits
d3	Jump Frequency
d4	Frequency Ref Up/Down & Hold
d5	Torque Control
d6	Field Weakening /Forcing
d7	Offset Frequency
E1	V/f Pattern for Motor 1
E2	Motor Parameters
E3	V/f Pattern for Motor 2
E4	Motor 2 Parameters
E5	PM Motor Settings
E9	Motor Setting
F1	PG Option Setup (Encoder)
F2	Analog Input Option
F3	Digital Input Option
F4	Analog Output Option
F5	Digital Output Option
F6	Communication Options
F7	Ethernet Options
H1	Digital Inputs
H2	Digital Outputs

Parameters	Name
H3	Analog Inputs
H4	Analog Outputs
H5	Modbus Communication
H6	Pulse Train Input/Output
H7	Virtual Inputs / Outputs
L1	Motor Protection
L2	Power Loss Ride Through
L3	Stall Prevention
L4	Speed Detection
L5	Fault Restart
L6	Torque Detection
L7	Torque Limit
L8	Drive Protection
L9	Drive Protection 2
n1	Hunting Prevention
n2	Auto Freq Regulator (AFR)
n3	High Slip/Overexcite Braking
n4	Adv Open Loop Vector Tune
n5	Feed Forward Control
n6	Online Tuning
n7	EZ Drive
n8	PM Motor Control Tuning
o1	Keypad Display
o2	Keypad Operation
o3	Copy Keypad Function
o4	Maintenance Monitors
o5	Log Function
q	DriveWorksEZ Parameters
r	DriveWorksEZ Connections
T0	Tuning Mode Selection
T1	InductionMotor Auto-Tuning
T2	PM Motor Auto-Tuning
T3	ASR and Inertia Tuning
T4	EZ Tuning
U1	Operation Status Monitors
U2	Fault Trace
U3	Fault History
U4	Maintenance Monitors
U5	PID Monitors

Parameters	Name
U6	Operation Status Monitors

Parameters	Name
U8	DriveWorksEZ Monitors

3.4 A: Initialization Parameters

◆ A1: Initialization

No. (Hex.)	Name	Description	Default (Range)
A1-00 (0100) RUN	Language Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the language for the LCD keypad.</p> <p>Note: When you use <i>A1-03 [Initialize Parameters]</i> to initialize the drive, the drive will not reset this parameter.</p> <p>0 : English 1 : Japanese 2 : German 3 : French 4 : Italian 5 : Spanish 6 : Portuguese 7 : Chinese 8 : Czech 9 : Russian 10 : Turkish 11 : Polish 12 : Greek</p>	0 (0 - 12)
A1-01 (0101) RUN	Access Level Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets user access to parameters. The access level controls which parameters the keypad will display, and which parameters the user can set.</p> <p>0 : Operation Only 1 : User Parameters 2 : Advanced Level 3 : Expert Level</p>	2 (0 - 3)
A1-02 (0102)	Control Method Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the control method for the drive application and the motor.</p> <p>0 : V/f Control 1 : V/f Control with Encoder 2 : Open Loop Vector 3 : Closed Loop Vector 4 : Advanced Open Loop Vector 5 : PM Open Loop Vector 6 : PM Advanced Open Loop Vector 7 : PM Closed Loop Vector 8 : EZ Vector Control</p>	2 (0 - 8)
A1-03 (0103)	Initialize Parameters	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets parameters to default values.</p> <p>0 : No Initialization 1110 : User Initialization 2220 : 2-Wire Initialization 3330 : 3-Wire Initialization</p>	0 (0 - 3330)
A1-04 (0104)	Password	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Entry point for the password set in <i>A1-05 [Password Setting]</i>. The user can view the settings of parameters that are locked without entering the password. Enter the correct password in this parameter to change parameter settings.</p>	0000 (0000 - 9999)
A1-05 (0105)	Password Setting	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Set the password to lock parameters and prevent changes to parameter settings. Enter the correct password in <i>A1-04 [Password]</i> to unlock parameters and accept changes.</p>	0000 (0000 - 9999)
A1-06 (0127)	Application Preset	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the drive to operate in selected application conditions.</p> <p>0 : General-purpose 1 : Water Supply Pump 2 2 : Conveyor 3 : Exhaust Fan 4 : HVAC Fan 5 : Air Compressor</p>	0 (0 - 5)

No. (Hex.)	Name	Description	Default (Range)
A1-07 (0128)	DriveWorksEZ Function Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the drive to operate with DriveWorksEZ. 0 : DWEZ Disabled 1 : DWEZ Enabled 2 : Enabled/Disabled wDigital Input</p>	0 (0 - 2)
A1-11 (111D) Expert	Firmware Update Lock	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Protects the drive firmware. When you enable the protection, you cannot update the drive firmware. 0 : Disabled 1 : Enabled</p>	0 (0, 1)
A1-12 (1564)	Bluetooth ID	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the password necessary to use Bluetooth to control the drive with a smartphone or tablet.</p>	- (0000 - 9999)

◆ A2: User Parameters

No. (Hex.)	Name	Description	Default (Range)
A2-01 (0106)	User Parameter 1	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the parameter number to be shown for number 1 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32.</p>	A1-02 (Determined by A1-06)
A2-02 (0107)	User Parameter 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the parameter number to be shown for number 2 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32.</p>	b1-01 (Determined by A1-06)
A2-03 (0108)	User Parameter 3	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the parameter number to be shown for number 3 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32.</p>	b1-02 (Determined by A1-06)
A2-04 (0109)	User Parameter 4	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the parameter number to be shown for number 4 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32.</p>	b1-03 (Determined by A1-06)
A2-05 (010A)	User Parameter 5	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the parameter number to be shown for number 5 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32.</p>	C1-01 (Determined by A1-06)
A2-06 (010B)	User Parameter 6	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the parameter number to be shown for number 6 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32.</p>	C1-02 (Determined by A1-06)
A2-07 (010C)	User Parameter 7	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the parameter number to be shown for number 7 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32.</p>	C6-01 (Determined by A1-06)
A2-08 (010D)	User Parameter 8	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the parameter number to be shown for number 8 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32.</p>	C6-02 (Determined by A1-06)
A2-09 (010E)	User Parameter 9	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the parameter number to be shown for number 9 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32.</p>	d1-01 (Determined by A1-06)
A2-10 (010F)	User Parameter 10	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the parameter number to be shown for number 10 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32.</p>	d1-02 (Determined by A1-06)
A2-11 (0110)	User Parameter 11	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the parameter number to be shown for number 11 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32.</p>	d1-03 (Determined by A1-06)
A2-12 (0111)	User Parameter 12	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the parameter number to be shown for number 12 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32.</p>	d1-04 (Determined by A1-06)

3.4 A: Initialization Parameters

No. (Hex.)	Name	Description	Default (Range)
A2-13 (0112)	User Parameter 13	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the parameter number to be shown for number 13 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32.	d1-17 (Determined by A1-06)
A2-14 (0113)	User Parameter 14	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the parameter number to be shown for number 14 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32.	E1-01 (Determined by A1-06)
A2-15 (0114)	User Parameter 15	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the parameter number to be shown for number 15 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32.	E1-03 (Determined by A1-06)
A2-16 (0115)	User Parameter 16	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the parameter number to be shown for number 16 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32.	E1-04 (Determined by A1-06)
A2-17 (0116)	User Parameter 17	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the parameter number to be shown for number 17 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32. You can set A2-17 to A2-32 when A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required].	E1-05 (Determined by A1-06)
A2-18 (0117)	User Parameter 18	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the parameter number to be shown for number 18 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32. You can set A2-17 to A2-32 when A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required].	E1-06 (Determined by A1-06)
A2-19 (0118)	User Parameter 19	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the parameter number to be shown for number 19 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32. You can set A2-17 to A2-32 when A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required].	E1-09 (Determined by A1-06)
A2-20 (0119)	User Parameter 20	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the parameter number to be shown for number 20 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32. You can set A2-17 to A2-32 when A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required].	E1-13 (Determined by A1-06)
A2-21 (011A)	User Parameter 21	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the parameter number to be shown for number 21 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32. You can set A2-17 to A2-32 when A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required].	E2-01 (Determined by A1-06)
A2-22 (011B)	User Parameter 22	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the parameter number to be shown for number 22 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32. You can set A2-17 to A2-32 when A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required].	E2-04 (Determined by A1-06)
A2-23 (011C)	User Parameter 23	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the parameter number to be shown for number 23 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32. You can set A2-17 to A2-32 when A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required].	E2-11 (Determined by A1-06)
A2-24 (011D)	User Parameter 24	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the parameter number to be shown for number 24 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32. You can set A2-17 to A2-32 when A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required].	H4-02 (Determined by A1-06)
A2-25 (011E)	User Parameter 25	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the parameter number to be shown for number 25 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32. You can set A2-17 to A2-32 when A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required].	L1-01 (Determined by A1-06)
A2-26 (011F)	User Parameter 26	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the parameter number to be shown for number 26 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32. You can set A2-17 to A2-32 when A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required].	L3-04 (Determined by A1-06)
A2-27 (0120)	User Parameter 27	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the parameter number to be shown for number 27 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32. You can set A2-17 to A2-32 when A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required].	- (Determined by A1-06)

No. (Hex.)	Name	Description	Default (Range)
A2-28 (0121)	User Parameter 28	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the parameter number to be shown for number 28 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32. You can set A2-17 to A2-32 when A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required].	- (Determined by A1-06)
A2-29 (0122)	User Parameter 29	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the parameter number to be shown for number 29 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32. You can set A2-17 to A2-32 when A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required].	- (Determined by A1-06)
A2-30 (0123)	User Parameter 30	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the parameter number to be shown for number 30 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32. You can set A2-17 to A2-32 when A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required].	- (Determined by A1-06)
A2-31 (0124)	User Parameter 31	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the parameter number to be shown for number 31 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32. You can set A2-17 to A2-32 when A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required].	- (Determined by A1-06)
A2-32 (0125)	User Parameter 32	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the parameter number to be shown for number 32 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters A2-01 to A2-32. You can set A2-17 to A2-32 when A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required].	- (Determined by A1-06)
A2-33 (0126)	User Parameter Auto Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the automatic save feature for changes to parameters A2-17 to A2-32 [User Parameters 17 to 32]. 0 : Disabled: Manual Entry Required 1 : Enabled: Auto Save Recent Parm	Determined by A1-06 (0, 1)

3.5 b: Application

◆ b1: Operation Mode Selection

No. (Hex.)	Name	Description	Default (Setting Range)
b1-01 (0180)	Frequency Reference Selection 1	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the input method for the frequency reference. 0 : Keypad 1 : Analog Input 2 : Memobus/Modbus Communications 3 : Option PCB 4 : Pulse Train Input</p>	1 (0 - 4)
b1-02 (0181)	Run Command Selection 1	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the input method for the Run command. 0 : Keypad 1 : Digital Input 2 : Memobus/Modbus Communications 3 : Option PCB</p>	1 (0 - 3)
b1-03 (0182)	Stopping Method Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the method to stop the motor after removing a Run command or entering a Stop command. Note: When A1-02 = 3, 4, 5, 6, 7, 8 [Control Method Selection = CLV, AOLV, OLV/PM, AOLV/PM, CLV/PM, EZOLV], the setting range is 0, 1, 3. 0 : Ramp to Stop 1 : Coast to Stop 2 : DC Injection Braking to Stop 3 : Coast to Stop with Timer</p>	0 (0 - 3)
b1-04 (0183)	Reverse Operation Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the reverse operation function. Disable reverse operation in fan or pump applications where reverse rotation is dangerous. 0 : Reverse Enabled 1 : Reverse Disabled</p>	0 (0, 1)
b1-05 (0184)	Operation Below Minimum Freq	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the drive operation when the frequency reference decreases to less than the value set in E1-09 [Minimum Output Frequency]. 0 : Operate at Frequency Reference 1 : Baseblock (Motor Coasts) 2 : Operate at Minimum Frequency 3 : Operate at Zero Speed</p>	0 (0 - 3)
b1-06 (0185)	Digital Input Reading	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the number of times that the drive reads the sequence input command to prevent malfunction because of electrical interference. 0 : Single Scan 1 : Double Scan</p>	1 (0, 1)
b1-07 (0186)	LOCAL/REMOTE Run Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets drive response to an existing Run command when the drive receives a second Run command from a different location. 0 : Disregard Existing RUN Command 1 : Accept Existing RUN Command</p>	0 (0, 1)
b1-08 (0187)	Run Command Select in PRG Mode	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the conditions for the drive to accept a Run command entered from an external source when using the keypad to set parameters. 0 : Disregard RUN while Programming 1 : Accept RUN while Programming 2 : Allow Programming Only at Stop</p>	0 (0 - 2)
b1-09 (0188) Expert	LOCAL/REMOTE Select during RUN	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function that lets you use the LO/RE during operation to switch between LOCAL and REMOTE Modes. 0 : Disabled 1 : Enabled</p>	0 (0, 1)

No. (Hex.)	Name	Description	Default (Setting Range)
b1-14 (01C3)	Phase Order Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the phase order for output terminals U/T1, V/T2, and W/T3. This parameter can align the Forward Run command from the drive and the forward direction of the motor without changing wiring.</p> <p>0 : Standard 1 : Switch Phase Order</p>	0 (0, 1)
b1-15 (01C4)	Frequency Reference Selection 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the input method for frequency reference 2.</p> <p>0 : Keypad 1 : Analog Input 2 : Memobus/Modbus Communications 3 : Option PCB 4 : Pulse Train Input</p>	0 (0 - 4)
b1-16 (01C5)	Run Command Selection 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the input method for Run Command 2 when the user switches the control circuit terminals ON/OFF to change the Run command source.</p> <p>0 : Keypad 1 : Digital Input 2 : Memobus/Modbus Communications 3 : Option PCB</p>	0 (0 - 3)
b1-17 (01C6)	Run Command at Power Up	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets drive response when the CPU changes from de-energized to energized and there is an active Run command. Set this parameter in applications where energizing or de-energizing the drive enables the Run command. When the CPU stays energized during loss of power, <i>L2-01 [Power Loss Ride Through Select]</i> sets operation.</p> <p>0 : Disregard Existing RUN Command 1 : Accept Existing RUN Command</p>	0 (0, 1)
b1-21 (0748) Expert	CLV Start Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the conditions for the drive to accept a Run command when <i>A1-02 = 3, 7 [Control Method Selection = CLV, CLV/PM]</i>. Usually it is not necessary to change this setting.</p> <p>0 : Reject RUN if $b2-01 < U1-05 < E1-09$ 1 : Accept RUN Command at Any Speed</p>	0 (0, 1)
b1-35 (1117) Expert	Digital Input Deadband Time	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the deadband time for MFDIs.</p>	0.0 ms (0.0 to 100.0 ms)

◆ b2: DC Injection Braking and Short Circuit Braking

No. (Hex.)	Name	Description	Default (Range)
b2-01 (0189)	DC Injection/Zero SpeedThreshold	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the frequency to start DC Injection Braking, Short Circuit Braking, or Zero Servo near the end of a stop ramp.</p> <p>Note: This parameter is available when <i>b1-03 = 0 [Stopping Method Selection = Ramp to Stop]</i>.</p>	Determined by A1-02 (0.0 - 10.0 Hz)
b2-02 (018A)	DC Injection Braking Current	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the DC Injection Braking current as a percentage of the drive rated current.</p>	50% (0 - 100%)
b2-03 (018B)	DC Inject Braking Time at Start	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the DC Injection Braking Time at stop. Sets the time of Zero Speed Control at start when <i>A1-02 = 3, 7 [Control Method Selection = CLV, CLV/PM]</i>.</p>	A1-02 = 4: 0.30 s Other than A1-02 = 4: 0.00 s (0.00 - 10.00 s)
b2-04 (018C)	DC Inject Braking Time at Stop	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the DC Injection Braking Time at stop. Sets the time of Zero Speed Control at stop when <i>A1-02 = 3, 7 [Control Method Selection = CLV, CLV/PM]</i>.</p>	Determined by A1-02 (0.00 - 10.00 s)
b2-08 (0190)	Magnetic Flux Compensation Value	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets how much current the drive injects when DC Injection Braking at Start starts (Initial Excitation) as a percentage of <i>E2-03 [Motor No-Load Current]</i>.</p>	0% (0 - 1000%)
b2-12 (01BA)	Short Circuit Brake Time @ Start	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the Short Circuit Braking time at start.</p>	0.00 s (0.00 - 25.50 s)

3.5 b: Application

No. (Hex.)	Name	Description	Default (Range)
b2-13 (01BB)	Short Circuit Brake Time @ Stop	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input checked="" type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the Short Circuit Braking time at stop.</p>	A1-02 = 8: 0.00 s Other than A1-02 = 8: 0.50 s (0.00 - 25.50 s)
b2-18 (0177)	Short Circuit Braking Current	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input checked="" type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the Short Circuit Braking Current as a percentage of the motor rated current.</p> <p>Note: Parameter A1-02 [Control Method Selection] selects which parameter is the motor rated current. • A1-02 = 5, 6 [OLV/PM, AOLV/PM]: E5-03 [PM Motor Rated Current (FLA)] • A1-02 = 8 [EZOLV]: E9-06 [Motor Rated Current (FLA)]</p>	100.0% (0.0 - 200.0%)

◆ b3: Speed Search

No. (Hex.)	Name	Description	Default (Range)
b3-01 (0191)	Speed Search at Start Selection	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input checked="" type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the Speed Search at Start function so the drive will do Speed Search with each Run command. 0 : Disable 1 : Enabled</p>	Determined by A1-02 (0, 1)
b3-02 (0192)	SpeedSearch Deactivation Current	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input checked="" type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the current level that stops Speed Search as a percentage of the drive rated output current. Usually it is not necessary to change this setting.</p>	Determined by A1-02 (0 - 200%)
b3-03 (0193)	Speed Search Deceleration Time	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input checked="" type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the deceleration time during Speed Search operation. Set the length of time to decelerate from the maximum output frequency to the minimum output frequency.</p> <p>Note: When A1-02 = 8 [Control Method Selection = EZOLV], this parameter takes effect only in Expert Mode.</p>	2.0 s (0.1 - 10.0 s)
b3-04 (0194)	V/f Gain during Speed Search	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the ratio used to reduce the V/f during searches to reduce the output current during speed searches.</p>	Determined by o2-04 (10 - 100)
b3-05 (0195)	Speed Search Delay Time	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input checked="" type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the Speed Search delay time to activate a magnetic contactor installed between the drive and motor.</p>	0.2 s (0.0 - 100.0 s)
b3-06 (0196) Expert	Speed Estimation Current Level 1	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input checked="" type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the level of current that flows to the motor during Speed Estimation Speed Search as a coefficient of the motor rated current. Usually it is not necessary to change this setting.</p>	Determined by o2-04 (0.0 - 2.0)
b3-07 (0197) Expert	Speed Estimation Current Level 2	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input checked="" type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the level of current that flows to the motor during Speed Estimation Speed Search as a coefficient of E2-03 [Motor No-Load Current] or E4-03 [Motor 2 Rated No-Load Current]. Usually it is not necessary to change this setting.</p>	1.0 (0.0 - 3.0)
b3-08 (0198)	Speed Estimation ACR P Gain	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input checked="" type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the proportional gain for the automatic current regulator during Speed Estimation Speed Search. Also adjusts speed search responsiveness. Usually it is not necessary to change this setting.</p>	Determined by A1-02 and o2-04 (0.00 - 6.00)
b3-09 (0199)	Speed Estimation ACR I Time	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input checked="" type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the integral time for the automatic current regulator during Speed Estimation Speed Search. Also adjusts speed search responsiveness. Usually it is not necessary to change this setting.</p>	Determined by A1-02 when A1-02 ≠ 5 20.0 when A1-02 = 5 (0.0 - 1000.0 ms)
b3-10 (019A) Expert	Speed Estimation Detection Gain	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input checked="" type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the gain to correct estimated frequencies from Speed Estimation Speed Search.</p>	1.05 (1.00 - 1.20)

No. (Hex.)	Name	Description	Default (Range)
b3-14 (019E)	Bi-directional Speed Search	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the direction of Speed Search to the direction of the frequency reference or in the motor rotation direction as detected by the drive.</p> <p>0 : Disable 1 : Enabled</p> <p>Note:</p> <ul style="list-style-type: none"> The initial value of <i>b3-14</i> is different for different <i>A1-02</i> [Control Method Selection] settings when you set these parameters: <ul style="list-style-type: none"> <i>-A1-02 = 0, 2, 8</i> [V/f, OLV, EZOLV] <i>-E9-01 = 0</i> [Motor Type Selection = Induction (IM)] <i>-b3-24 = 1</i> [Speed Search Method Selection = Speed Estimation]. The initial value of <i>b3-14</i> is different for different <i>A1-02</i> [Control Method Selection] settings when you set these parameters: <ul style="list-style-type: none"> <i>-A1-02 = 1, 4, 8</i> [CL-V/f, AOLV, EZOLV] <i>-E9-01 = 1, 2</i> [Permanent Magnet (PM), Synchronous Reluctance (SynRM)] The initial value of <i>b3-14</i> is 0 when you set these parameters: <ul style="list-style-type: none"> <i>-A1-02 = 0, 2, 8</i> <i>-E9-01 = 0</i> <i>-b3-24 = 2</i> [Current Detection 2] When you set <i>A1-02</i>, <i>b3-24</i>, and <i>E9-01</i>, set <i>b3-14</i>. 	Determined by A1-02, b3-24, and E9-01 (0, 1)
b3-17 (01F0) Expert	Speed Est Retry Current Level	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the current level for the search retry function in Speed Estimation Speed Search as a percentage where drive rated current is a setting value of 100%.</p>	150% (0 - 200%)
b3-18 (01F1) Expert	Speed Est Retry Detection Time	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the length of time that the drive will wait to retry Speed Estimation Speed Search when too much current flow stopped the Speed Search.</p>	0.10 s (0.00 - 1.00 s)
b3-19 (01F2)	Speed Search Restart Attempts	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the number of times to restart Speed Search if Speed Search does not complete.</p>	3 times (0 - 10 times)
b3-24 (01C0)	Speed Search Method Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the Speed Search method when you start the motor or when you restore power after a momentary power loss.</p> <p>Note:</p> <ul style="list-style-type: none"> When <i>A1-02 = 8</i> [Control Method Selection = EZOLV], the default setting changes when the setting for <i>E9-01</i> [Motor Type Selection] and the drive model change. <ul style="list-style-type: none"> <i>-E9-01 = 0</i> [Induction (IM)] <ul style="list-style-type: none"> -2004 - 2313, 4002 - 4302, T103 - T302: 1 -2360, 2415, 4371 - 4H12, T371 - T720: 2 <i>-E9-01 = 1, 2</i> [Permanent Magnet (PM), Synchronous Reluctance (SynRM)]: 1 When you set <i>A1-02 = 8</i> and <i>E9-01 = 1 or 2</i>, also set <i>b3-24 = 1</i>. If <i>b3-24 = 2</i>, the drive will detect <i>oPE08</i> [Parameter Selection Error]. When you set <i>b3-24</i>, it will trigger the drive to initialize <i>b3-14</i> [Bi-directional Speed Search]. After you set <i>b3-24</i>, set <i>b3-14</i>. When <i>A1-02 = 4</i> [AOLV], the default setting is 1 [Speed Estimation]. <p>1 : Speed Estimation 2 : Current Detection 2</p>	Determined by A1-02 (1, 2)
b3-25 (01C8) Expert	Speed Search Wait Time	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the length of time the drive will wait to start the Speed Search Retry function.</p>	0.5 s (0.0 - 30.0 s)
b3-26 (01C7) Expert	Direction Determination Level	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the level to find the motor rotation direction. Increase the value if the drive cannot find the direction.</p>	1000 (40 to 60000)
b3-27 (01C9) Expert	Speed Search RUN/BB Priority	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the conditions necessary to start Speed Search.</p> <p>0 : SS Only if RUN Applied Before BB 1 : SS Regardless of RUN/BB Sequence</p>	0 (0, 1)
b3-29 (077C) Expert	Speed Search Back-EMF Threshold	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the induced voltage for motors that use Speed Search. The drive will start Speed Search when the motor induced voltage level is the same as the setting value. Usually it is not necessary to change this setting.</p>	10% (0 - 10%)
b3-31 (0BC0) Expert	Spd Search Current Reference Lvl	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the current level that decreases the output current during Current Detection Speed Search.</p>	1.50 (1.50 - 3.50)
b3-32 (0BC1) Expert	Spd Search Current Complete Lvl	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the current level that completes Speed Search.</p>	1.20 (0.00 - 1.49)

3.5 b: Application

No. (Hex.)	Name	Description	Default (Range)
b3-33 (0B3F) Expert	Speed Search during Uv Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function that starts Speed Search at start-up if the drive detects a Uv [Undervoltage] when it receives a Run command. 0 : Disabled 1 : Enabled	1 (0, 1)
b3-35 (0BC3) Expert	Low Back EMF Detection Level	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the Low Back EMF Detection Level. Usually it is not necessary to change this setting.	10% (5 - 50%)
b3-36 (0BC4) Expert	High Back EMF Detection Level	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the voltage level for Speed Search restart. Usually it is not necessary to change this setting.	0.970 (0.500 - 1.000)
b3-39 (1B8F) Expert	Regen Judgment Lv of Spd Search	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the level to determine the regenerative state during speed search. Usually it is not necessary to change this setting.	15% (0 - 50%)
b3-54 (3123)	Search Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the length of time that the drive will run Speed Search.	400 ms (10 - 2000 ms)
b3-55 (3124) Expert	Current Increment Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the length of time that the drive will increase the current from zero current to the setting value of b3-06 [Speed Estimation Current Level 1].	10 ms (10 - 2000 ms)
b3-56 (3126)	InverseRotationSearch WaitTime	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the wait time until the drive starts inverse rotation search after it completes forward search when you do inverse rotation search during Current Detection Speed Search.	Determined by o2-04 (0.1 - 5.0 s)
b3-61 (1B96) Expert	Init Magnet Pole Estimation Gain	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the responsiveness for initial motor magnetic pole calculation when A1-02 = 6 [Control Method Selection = AOLV/PM]. Set b3-61 > 0.0 for an ordinary IPM motor. When you use High Frequency Injection Auto-Tuning, the drive will automatically set this value. Note: • Set n8-35 = 1 [Initial Pole Calculation Method = High Frequency Injection] to enable this parameter. • When A1-02 = 6 [AOLV/PM] and you do High Frequency Injection Auto-Tuning, the drive automatically sets this parameter. • Set n8-41 [HFI P Gain] to adjust the responsiveness for initial motor magnetic pole calculation when A1-02 = 5, 7 [OLV/PM, CLV/PM].	5.0 (-20.0 - +20.0)

◆ b4: Timer Function

No. (Hex.)	Name	Description	Default (Range)
b4-01 (01A3)	Timer Function ON-Delay Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the ON-delay time for the timer input.	0.0 s (0.0 - 3000.0 s)
b4-02 (01A4)	Timer Function OFF-Delay Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the OFF-delay time for the timer input.	0.0 s (0.0 - 3000.0 s)
b4-03 (0B30) Expert	Terminal M1-M2 ON-Delay Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the delay time to activate the contact after the function set in H2-01 activates.	0 ms (0 - 65000 ms)
b4-04 (0B31) Expert	Terminal M1-M2 OFF-Delay Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the delay time to deactivate the contact after the function set in H2-01 deactivates.	0 ms (0 - 65000 ms)
b4-05 (0B32) Expert	Terminal M3-M4 ON-Delay Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the delay time to activate the contact after the function set in H2-02 activates.	0 ms (0 - 65000 ms)
b4-06 (0B33) Expert	Terminal M3-M4 OFF-Delay Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the delay time to deactivate the contact after the function set in H2-02 deactivates.	0 ms (0 - 65000 ms)
b4-07 (0B34) Expert	Terminal M5-M6 ON-Delay Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the delay time to activate the contact after the function set in H2-03 activates.	0 ms (0 - 65000 ms)
b4-08 (0B35) Expert	Terminal M5-M6 OFF-Delay Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the delay time to deactivate the contact after the function set in H2-03 deactivates.	0 ms (0 - 65000 ms)

◆ b5: PID Control

No. (Hex.)	Name	Description	Default (Range)
b5-01 (01A5)	PID Mode Setting	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the type of PID control.</p> <p>0 : Disabled 1 : Standard 2 : Standard (D on feedback) 3 : Fref + PID Trim 4 : Fref + PID Trim (D on feedback) 5 : Same as 7series & prior, b5-01=1 6 : Same as 7series & prior, b5-01=2 7 : Same as 7series & prior, b5-01=3 8 : Same as 7series & prior, b5-01=4</p> <p>Note: Use settings 5 to 8 instead of settings 1 to 4 when the drive is a replacement for Varispeed F7.</p>	0 (0 - 8)
b5-02 (01A6) RUN	Proportional Gain (P)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the proportional gain (P) that is applied to PID input.</p>	1.00 (0.00 - 25.00)
b5-03 (01A7) RUN	Integral Time (I)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the integral time (I) that is applied to PID input.</p>	1.0 s (0.0 - 360.0 s)
b5-04 (01A8) RUN	Integral Limit	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the upper limit for integral control (I) as a percentage of the Maximum Output Frequency.</p> <p>Note: Parameter A1-02 [Control Method Selection] selects which parameter is the maximum output frequency. • A1-02 ≠ 8 [EZOLV]: E1-04 [Maximum Output Frequency] • A1-02 = 8: E9-02 [Maximum Speed]</p>	100.0% (0.0 - 100.0%)
b5-05 (01A9) RUN	Derivative Time (D)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the derivative time (D) for PID control. This parameter adjusts system responsiveness.</p>	0.00 s (0.00 - 10.00 s)
b5-06 (01AA) RUN	PID Output Limit	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the maximum possible output from the PID controller as a percentage of the Maximum Output Frequency.</p> <p>Note: Parameter A1-02 [Control Method Selection] selects which parameter is the maximum output frequency. • A1-02 ≠ 8 [EZOLV]: E1-04 [Maximum Output Frequency] • A1-02 = 8: E9-02 [Maximum Speed]</p>	100.0% (0.0 - 100.0%)
b5-07 (01AB) RUN	PID Offset Adjustment	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the offset for the PID control output as a percentage of the Maximum Output Frequency.</p> <p>Note: Parameter A1-02 [Control Method Selection] selects which parameter is the maximum output frequency. • A1-02 ≠ 8 [EZOLV]: E1-04 [Maximum Output Frequency] • A1-02 = 8: E9-02 [Maximum Speed]</p>	0.0% (-100.0 - +100.0%)
b5-08 (01AC) RUN Expert	PID Primary Delay Time Constant	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the primary delay time constant for the PID control output. Usually it is not necessary to change this setting.</p>	0.00 s (0.00 - 10.00 s)
b5-09 (01AD)	PID Output Level Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the polarity of the PID output.</p> <p>0 : Normal Output (Direct Acting) 1 : Reverse Output (Reverse Acting)</p>	0 (0, 1)
b5-10 (01AE) RUN	PID Output Gain Setting	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the amount of gain to apply to the PID output.</p>	1.00 (0.00 - 25.00)
b5-11 (01AF)	PID Output Reverse Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function that enables and disables reverse motor rotation for negative PID control output.</p> <p>0 : Lower Limit is Zero 1 : Negative Output Accepted</p>	0 (0, 1)

3.5 b: Application

No. (Hex.)	Name	Description	Default (Range)
b5-12 (01B0)	Feedback Loss Detection Select	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the drive response to PID Feedback Low/High. Sets drive operation after the drive detects PID feedback Low/High.</p> <p>0 : Digital Out Only, Always Detect 1 : Alarm + Digital Out, Always Det 2 : Fault + Digital Out, Always Det 3 : Digital Out Only, @ PID Enable 4 : Alarm + Digital Out, @PID Enable 5 : Fault + Digital Out, @PID Enable</p>	0 (0 - 5)
b5-13 (01B1)	PID Feedback Loss Detection Lvl	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the level that triggers <i>PID Feedback Loss [FbL]</i> detection as a percentage of the Maximum Output Frequency.</p> <p>Note: Parameter <i>A1-02 [Control Method Selection]</i> selects which parameter is the maximum output frequency. • <i>A1-02 ≠ 8 [EZOLV]: E1-04 [Maximum Output Frequency]</i> • <i>A1-02 = 8: E9-02 [Maximum Speed]</i></p>	0% (0 - 100%)
b5-14 (01B2)	PID Feedback Loss Detection Time	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the length of time that PID Feedback must be less than <i>b5-13 [PID Feedback Loss Detection Lvl]</i> to detect <i>PID Feedback Loss [FbL]</i>.</p>	1.0 s (0.0 - 25.5 s)
b5-15 (01B3)	PID Sleep Function Start Level	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the output level that triggers the PID Sleep function.</p>	Determined by A1-02 (0.0 - 590.0)
b5-16 (01B4)	PID Sleep Delay Time	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets a delay time to start or stop the PID Sleep function.</p>	0.0 s (0.0 - 25.5 s)
b5-17 (01B5) RUN	PID Accel/Decel Time	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Raises or lowers the PID setpoint using the acceleration and deceleration times set to the drive. This is a soft-starter for the PID setpoint.</p>	0.0 s (0.0 - 6000.0 s)
b5-18 (01DC)	b5-19 PID Setpoint Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function that enables and disables <i>b5-19 [PID Setpoint Value]</i>.</p> <p>0 : Disabled 1 : Enabled</p>	0 (0, 1)
b5-19 (01DD) RUN	PID Setpoint Value	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the PID setpoint when <i>b5-18 = 1 [b5-19 PID Setpoint Selection = Enabled]</i>.</p>	0.00% (0.00 - 100.00%)
b5-20 (01E2)	PID Unit Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the number of digits to set and show the PID setpoint.</p> <p>0 : 0.01Hz units 1 : 0.01% units 2 : rev/min 3 : User Units</p>	1 (0 - 3)
b5-34 (019F) RUN	PID Output Lower Limit Level	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the lower limit level for the PID control as a percentage of <i>E1-04 [Maximum Output Frequency]</i>.</p> <p>When you use <i>b5-34</i>, set <i>b5-91 = 0 [EZ Sleep Minimum Speed = 0 (Disabled)]</i>.</p> <p>Note: Parameter <i>A1-02 [Control Method Selection]</i> selects which parameter is the maximum output frequency. • <i>A1-02 ≠ 8 [EZOLV]: E1-04 [Maximum Output Frequency]</i> • <i>A1-02 = 8: E9-02 [Maximum Speed]</i></p>	0.0% (-100.0 - +100.0%)
b5-35 (01A0) RUN	PID Input Limit Level	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the output upper limit for the PID control as a percentage of the Maximum Output Frequency.</p> <p>Note: Parameter <i>A1-02 [Control Method Selection]</i> selects which parameter is the maximum output frequency. • <i>A1-02 ≠ 8 [EZOLV]: E1-04 [Maximum Output Frequency]</i> • <i>A1-02 = 8: E9-02 [Maximum Speed]</i></p>	1000.0% (0.0 - 1000.0%)
b5-36 (01A1)	PID High Feedback Detection Lvl	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the level that triggers <i>Excessive PID Feedback [FbH]</i> as a percentage of the Maximum Output Frequency.</p> <p>Note: Parameter <i>A1-02 [Control Method Selection]</i> selects which parameter is the maximum output frequency. • <i>A1-02 ≠ 8 [EZOLV]: E1-04 [Maximum Output Frequency]</i> • <i>A1-02 = 8: E9-02 [Maximum Speed]</i></p>	100% (0 - 100%)

No. (Hex.)	Name	Description	Default (Range)
b5-37 (01A2)	PID High Feedback Detection Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the length of time that the PID feedback signal must be more than the level set in <i>b5-36 [PID Feedback High Detection Lvl]</i> to cause <i>Excessive PID Feedback [FbH]</i> .	1.0 s (0.0 - 25.5 s)
b5-38 (01FE)	PID User Unit Display Scaling	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the value that the drive sets or shows as the PID setpoint when at the maximum output frequency.	Determined by b5-20 (1 - 60000)
b5-39 (01FF)	PID User Unit Display Digits	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the number of digits to set and show the PID setpoint. 0 : No Decimal Places (XXXXX) 1 : One Decimal Places (XXXX.X) 2 : Two Decimal Places (XXX.XX) 3 : Three Decimal Places (XX.XXX)	Determined by b5-20 (0 - 3)
b5-40 (017F)	Frequency Reference Monitor @PID	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the contents for monitor <i>U1-01 [Frequency Reference]</i> in PID control. 0 : U1-01 Includes PID Output 1 : U1-01 Excludes PID Output	0 (0, 1)
b5-47 (017D)	PID Trim Mode Output Reverse Sel	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets reverse motor rotation when the PID control output is negative. 0 : Lower Limit is Zero 1 : Negative Output Accepted	1 (0, 1)
b5-53 (0B8F) RUN	PID Integrator Ramp Limit	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the responsiveness of PID control when the PID feedback changes quickly.	0.0 Hz (0.0 - 10.0 Hz)
b5-55 (0BE1)	PID Feedback Monitor Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the monitor (<i>Ux-xx</i>) used as the PID Feedback. Note: Set the <i>x-xx</i> part of the <i>Ux-xx [Monitor]</i> . For example, set <i>b5-55 = 102</i> to monitor <i>U1-02 [Output Frequency]</i> . When the <i>x</i> part of <i>Ux</i> is a letter, replace the letter (hexadecimal number) with a decimal number. For example, set <i>b5-55 = 1301</i> to monitor <i>Ud-01</i> .	000 (000 - 9999)
b5-56 (0BE2)	PID Feedback Monitor Gain	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the gain for the monitor set in <i>b5-55 [PID Feedback Monitor Selection]</i> .	1.00 (0.00 - 10.00)
b5-57 (11DD)	PID Feedback Monitor Bias	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the bias for the monitor specified in <i>b5-55 [PID Feedback Monitor Selection]</i> .	0.00 (-10.00 - +10.00)
b5-58 (1182) RUN	PID Setpoints 2	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the PID setpoint when <i>H1-xx = 3E</i> or <i>3F [MFDI Function Select = PID Setpoint Selection 1/2]</i> . This value is a percentage of the maximum output frequency. Note: Parameter <i>A1-02 [Control Method Selection]</i> selects which parameter is the maximum output frequency. • <i>A1-02 ≠ 8 [EZOLV]: E1-04 [Maximum Output Frequency]</i> • <i>A1-02 = 8: E9-02 [Maximum Speed]</i>	0.00% (0.00 - 100.00%)
b5-59 (1183) RUN	PID Setpoints 3	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the PID setpoint when <i>H1-xx = 3E</i> or <i>3F [MFDI Function Select = PID Setpoint Selection 1/2]</i> . This value is a percentage of the maximum output frequency. Note: Parameter <i>A1-02 [Control Method Selection]</i> selects which parameter is the maximum output frequency. • <i>A1-02 ≠ 8 [EZOLV]: E1-04 [Maximum Output Frequency]</i> • <i>A1-02 = 8: E9-02 [Maximum Speed]</i>	0.00% (0.00 - 100.00%)
b5-60 (1184) RUN	PID Setpoints 4	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the PID setpoint when <i>H1-xx = 3E</i> or <i>3F [MFDI Function Select = PID Setpoint Selection 1/2]</i> . This value is a percentage of the maximum output frequency. Note: Parameter <i>A1-02 [Control Method Selection]</i> selects which parameter is the maximum output frequency. • <i>A1-02 ≠ 8 [EZOLV]: E1-04 [Maximum Output Frequency]</i> • <i>A1-02 = 8: E9-02 [Maximum Speed]</i>	0.00% (0.00 - 100.00%)
b5-61 (119A)	PID Trim Mode Lower Limit Sel	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function that adjusts the PID output in relation to the frequency reference. 0 : Disabled 1 : Enabled	0 (0, 1)

3.5 b: Application

No. (Hex.)	Name	Description	Default (Range)
b5-62 (119B)	PID Trim Mode Lower Limit Value	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the PID Trim Mode Lower Limit Value as a percentage of the maximum output frequency.</p> <p>Note: Parameter <i>A1-02</i> [Control Method Selection] selects which parameter is the maximum output frequency. • <i>A1-02</i> ≠ 8 [EZOLV]: <i>E1-04</i> [Maximum Output Frequency] • <i>A1-02</i> = 8: <i>E9-02</i> [Maximum Speed]</p>	0.00% (0.00 - 100.00%)
b5-63 (119C)	PID Differential FB Monitor Sel	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Selects the monitor (<i>Ux-xx</i>) used as the PID Differential Feedback.</p> <p>Note: Set the <i>x-xx</i> part of the <i>Ux-xx</i> [Monitor]. For example, set <i>b5-63</i> = 103 to monitor <i>U1-03</i> [Output Current]. When the <i>x</i> part of <i>Ux</i> is a letter, replace the letter (hexadecimal number) with a decimal number. For example, set <i>b5-63</i> = 1301 to monitor <i>Ud-01</i>.</p>	000 (000 - 9999)
b5-64 (119D)	PID Differential FB Monitor Gain	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the gain for the monitor specified in <i>b5-63</i> [PID Differential FB Monitor Sel].</p>	1.00 (0.00 - 10.00)
b5-65 (119F)	PID Differential FB Monitor Bias	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the bias for the monitor specified in <i>b5-63</i> [PID Differential FB Monitor Sel].</p>	0.00 (-10.00 - +10.00)
b5-66 (11DE)	PID Feedback Monitor Level	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the signal level for the monitor specified in <i>b5-55</i> [PID Feedback Monitor Selection]. 0 : Absolute 1 : Bi-directional (+/-)</p>	0 (0, 1)
b5-67 (11DF)	PID Differential FB Monitor Lvl	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the signal level for the monitor specified in <i>b5-63</i> [PID Differential FB Monitor Sel]. 0 : Absolute 1 : Bi-directional (+/-)</p>	0 (0, 1)
b5-89 (0B89) RUN	Sleep Method Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets sleep and wake up operation when using PID. 0 : Standard 1 : EZ Sleep/Wake-up</p>	0 (0, 1)
b5-90 (0B90)	EZ Sleep Unit	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the measurement units for <i>b5-91</i> [EZ Sleep Minimum Speed] and <i>b5-92</i> [EZ Sleep Level]. 0 : 0.1Hz units 1 : rev/min</p>	0 (0, 1)
b5-91 (0B91) RUN	EZ Sleep Minimum Speed	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the output lower limit level for the PID control as Hz units or min⁻¹ (r/min) units. When you use <i>b5-91</i>, set <i>b5-34</i> = 0.0 [PID Output Lower Limit Level = 0.0 (disabled)].</p>	0.0 Hz or 0 min ⁻¹ (r/min) (0.0 to 590.0 Hz or 0 to 35400 min ⁻¹ (r/min))
b5-92 (0B92) RUN	EZ Sleep Level	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the value that the output frequency or motor speed must be less than for longer than <i>b5-93</i> [EZ Sleep Time] to enter Sleep Mode.</p>	0.0 Hz or 0 min ⁻¹ (r/min) (0.0 to 590.0 Hz or 0 to 35400 min ⁻¹ (r/min))
b5-93 (0B93) RUN	EZ Sleep Time	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the length of time that the output frequency or motor speed must be less than <i>b5-92</i> [EZ Sleep Level] to enter Sleep Mode.</p>	5.0 s (0.0 - 1000.0 s)
b5-94 (0B94) RUN	EZ Sleep Wake-up Level	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the level at which the drive resumes operation when exiting Sleep Mode.</p>	0.00% (0.00 - 600.00%)
b5-95 (0B95)	EZ Sleep Wake-up Mode	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the wake-up mode to use when exiting Sleep Mode. 0 : Absolute 1 : Setpoint Delta</p>	0 (0, 1)
b5-96 (0B96) RUN	EZ Sleep Wake-up Time	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the EZ Wake-up time.</p>	1.0 s (0.0 - 1000.0 s)

◆ b6: Dwell Function

No. (Hex.)	Name	Description	Default (Range)
b6-01 (01B6)	Dwell Reference at Start	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the output frequency that the drive will hold momentarily when the motor starts.	0.0 (Determined by A1-02)
b6-02 (01B7)	Dwell Time at Start	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the length of time that the drive will hold the output frequency when the motor starts.	0.0 s (0.0 - 10.0 s)
b6-03 (01B8)	Dwell Reference at Stop	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the output frequency that the drive will hold momentarily when ramping to stop the motor.	0.0 (Determined by A1-02)
b6-04 (01B9)	Dwell Time at Stop	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the length of time for the drive to hold the output frequency when ramping to stop the motor.	0.0 s (0.0 - 10.0 s)

◆ b7: Droop Control

No. (Hex.)	Name	Description	Default (Range)
b7-01 (01CA) RUN	Droop Control Gain	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the amount of deceleration when the torque reference is at 100% as a percentage of <i>E1-04 [Maximum Output Frequency]</i> .	0.0% (0.0 - 100.0%)
b7-02 (01CB) RUN	Droop Control Delay Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the responsiveness of Droop control. Decrease this setting when drive response is slow. Increase this setting when hunting or oscillation occur.	0.05 s (0.03 - 2.00 s)
b7-03 (017E)	Droop Control Limit Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the Droop control limit function. 0 : Disabled 1 : Enabled	1 (0, 1)

◆ b8: Energy Saving

No. (Hex.)	Name	Description	Default (Range)
b8-01 (01CC)	Energy Saving Control Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the Energy-saving control function. 0 : Disabled 1 : Enabled 2 : Automatic Optimization Note: Setting 2 is available only when <i>A1-02 = 6, 7 [Control Method Selection = AOLV/PM, CLV/PM]</i> and in Expert Mode.	0 (0 - 2)
b8-02 (01CD) RUN Expert	Energy Saving Gain	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the gain for Energy-saving control.	Determined by A1-02 (0.0 - 10.0)
b8-03 (01CE) RUN Expert	Energy Saving Filter Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the responsiveness for Energy-saving control.	Determined by A1-02, C6-01 and o2-04 (0.00 - 10.00 s)
b8-04 (01CF) Expert	Energy Saving Coefficient Value	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the Energy-saving control coefficient to maintain maximum motor efficiency. The default setting is for Yaskawa motors.	Determined by C6-01, E2-11, and o2-04 (0.00 - 655.00)
b8-05 (01D0) Expert	Power Detection Filter Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the time constant to measure output power.	20 ms (0 - 2000 ms)
b8-06 (01D1) Expert	Search Operation Voltage Limit	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the voltage limit for Search Operation as a percentage of the motor rated voltage.	0% (0 - 100%)

3.5 b: Application

No. (Hex.)	Name	Description	Default (Range)
b8-16 (01F8) Expert	PM E-Save Coefficient Ki	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input checked="" type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets torque linearity. This parameter uses the Ki value from the motor nameplate. Usually it is not necessary to change this setting.	1.00 (0.00 - 3.00)
b8-17 (01F9) Expert	PM E-Save Coefficient Kt	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input checked="" type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets torque linearity. This parameter uses the Kt value from the motor nameplate. Usually it is not necessary to change this setting.	1.00 (0.00 - 3.00)
b8-18 (01FA) Expert	E-Save d-axis Current FilterTime	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input checked="" type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the d-axis current reference filter time constant.	0.100 s (0.000 - 5.000 s)
b8-19 (0B40) Expert	E-Save Search Frequency	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input checked="" type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the frequency of Energy-saving control search operations. Usually it is not necessary to change this setting.	Determined by A1-02 (10 - 300 Hz)
b8-20 (0B41) Expert	E-Save Search Width	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input checked="" type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the amplitude of Energy-saving control search operations.	1.0 degrees (0.1 - 5.0 degrees)
b8-21 (0B42) Expert	PM E-Save Search Gain	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input checked="" type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the gain of Energy-saving control search operations.	0.3Hz (0.1 - 20.0 Hz)
b8-22 (0B43) Expert	PM E-Save Search LPF Cutoff Freq	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input checked="" type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the frequency of the filter used to extract the high-efficiency phase from search operations. Usually it is not necessary to change this setting.	10.0 Hz (1.0 - 30.0 Hz)
b8-23 (0B44) Expert	PM E-Save Search Limit	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input checked="" type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the search operations output limit. Usually it is not necessary to change this setting.	15.0 degrees (0.0 - 30.0 degrees)
b8-24 (0B45) Expert	PM E-Save High Freq ACR Gain	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input checked="" type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the gain for high-frequency current control.	200.0 Hz (100.0 - 1000.0 Hz)
b8-25 (0B46) Expert	PM E-Save Search Start Level	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input checked="" type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the start level for search operations.	10.0% (0.0 - 100.0%)
b8-26 (0B47) Expert	PM E-Save Power Setpoint	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input checked="" type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets a value to increase torque accuracy.	0.0% (-10.0 - +10.0%)
b8-28 (0B8B) Expert	Over Excitation Action Selection	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input checked="" type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the function for excitation operation. 0 : Disabled 1 : Enabled	0 (0, 1)
b8-29 (0B8C)	Energy Saving Priority Selection	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input checked="" type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the priority of drive response between changes to the load or Energy-saving control. Enable this to prioritize energy-saving control. Disable this to prioritize tracking related to fast load changes, and prevent motor stall. 0 : Priority: Drive Response 1 : Priority: Energy Savings	0 (0, 1)
b8-50 (0B0D)	Standby Mode Selection	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input checked="" type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the Standby Mode function. 0 : Disabled 1 : Enabled	0 (0, 1)
b8-51 (0B01)	Standby Mode Wait Time	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input checked="" type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the delay time before turning off the electromagnetic contactor after the drive stops.	600 s (0 - 6000 s)

◆ b9: Zero Servo

No. (Hex.)	Name	Description	Default (Range)
b9-01 (01DA)	Zero Servo Gain	<div style="display: flex; justify-content: space-between; margin-bottom: 5px;"> V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV </div> Sets the responsiveness for the Zero Servo function.	5 (0 - 100)
b9-02 (01DB)	Zero Servo Completion Window	<div style="display: flex; justify-content: space-between; margin-bottom: 5px;"> V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV </div> Sets the range to trigger an output terminal set for "Zero Servo Complete" during Zero Servo operation. Be sure to set the deviation from the Zero Servo start position.	10 (0 - 16383)

3.6 C: Tuning

◆ C1: Accel & Decel Time

No. (Hex.)	Name	Description	Default (Range)
C1-01 (0200) RUN	Acceleration Time 1	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the length of time to accelerate from zero to maximum output frequency.	10.0 s (0.0 - 6000.0 s)
C1-02 (0201) RUN	Deceleration Time 1	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the length of time to decelerate from maximum output frequency to zero.	10.0 s (0.0 - 6000.0 s)
C1-03 (0202) RUN	Acceleration Time 2	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the length of time to accelerate from zero to maximum output frequency.	10.0 s (0.0 - 6000.0 s)
C1-04 (0203) RUN	Deceleration Time 2	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the length of time to decelerate from maximum output frequency to zero.	10.0 s (0.0 - 6000.0 s)
C1-05 (0204) RUN	Acceleration Time 3	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the length of time to accelerate from zero to maximum output frequency.	10.0 s (0.0 - 6000.0 s)
C1-06 (0205) RUN	Deceleration Time 3	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the length of time to decelerate from maximum output frequency to zero.	10.0 s (0.0 - 6000.0 s)
C1-07 (0206) RUN	Acceleration Time 4	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the length of time to accelerate from zero to maximum output frequency.	10.0 s (0.0 - 6000.0 s)
C1-08 (0207) RUN	Deceleration Time 4	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the length of time to decelerate from maximum output frequency to zero.	10.0 s (0.0 - 6000.0 s)
C1-09 (0208) RUN	Fast Stop Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the length of time that the drive will decelerate to zero for a Fast Stop. Note: • Decelerating too quickly can cause an <i>ov</i> [Overvoltage] fault that shuts off the drive while the motor to coasts to a stop. Set a Fast Stop time in <i>C1-09</i> that prevents motor coasting and makes sure that the motor stops quickly and safely. • When <i>L2-29 = 0</i> [Kinetic Energy Backup Method = Single Drive KEB Ride-Thru 1] and you do KEB Auto-Tuning, the drive will automatically set <i>C1-09</i> . If you must not change the Fast Stop time, do not do KEB Tuning.	10.0 s (0.0 - 6000.0 s)
C1-10 (0209)	Accel/Decel Time Setting Units	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the setting units for <i>C1-01</i> to <i>C1-08</i> [Accel/Decel Times 1 to 4], <i>C1-09</i> [Fast Stop Time], <i>L2-06</i> [Kinetic Energy Backup Decel Time], and <i>L2-07</i> [Kinetic Energy Backup Accel Time]. 0 : 0.01 s (0.00 to 600.00 s) 1 : 0.1 s (0.0 to 6000.0 s)	1 (0, 1)
C1-11 (020A)	Accel/Decel Time Switching Frequency	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the frequency at which the drive will automatically change acceleration and deceleration times.	Determined by A1-02 (0.0 - 590.0 Hz)
C1-14 (0264) RUN	Accel/Decel Rate Frequency	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the base frequency used to calculate acceleration and deceleration rates.	0.0 Hz (0.0 - 590.0 Hz)

◆ C2: S-Curve Characteristics

No. (Hex.)	Name	Description	Default (Range)
C2-01 (020B)	S-Curve Time @ Start of Accel	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the S-curve acceleration time at start.	Determined by A1-02 (0.00 - 10.00 s)
C2-02 (020C)	S-Curve Time @ End of Accel	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the S-curve acceleration time at completion.	0.20 s (0.00 - 10.00 s)

No. (Hex.)	Name	Description	Default (Range)
C2-03 (020D)	S-Curve Time @ Start of Decel	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the S-curve deceleration time at start.	0.20 s (0.00 - 10.00 s)
C2-04 (020E)	S-Curve Time @ End of Decel	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the S-curve deceleration time at completion.	0.00 s (0.00 - 10.00 s)

◆ C3: Slip Compensation

No. (Hex.)	Name	Description	Default (Range)
C3-01 (020F) RUN	Slip Compensation Gain	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the gain for the slip compensation function. Usually it is not necessary to change this setting. Note: • When $A1-02 = 4 [AOLV]$, you cannot change the setting while the drive is running. • Correctly set these parameters before you change the slip compensation gain: –E2-01 [Motor Rated Current (FLA)] –E2-02 [Motor Rated Slip] –E2-03 [Motor No-Load Current]	Determined by A1-02 (0 - 2.5)
C3-02 (0210) RUN	Slip Compensation Delay Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the slip compensation delay time when speed is unstable or when the slip compensation response is too slow. Usually it is not necessary to change this setting.	Determined by A1-02 (0 - 10000 ms)
C3-03 (0211)	Slip Compensation Limit	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the upper limit for the slip compensation function as a percentage of the motor rated slip.	200% (0 - 250%)
C3-04 (0212)	Slip Compensation at Regen	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the slip compensation function during regeneration. 0 : Disabled 1 : Enabled Above 6Hz 2 : Enabled Above Defined Range	0 (0 - 2)
C3-05 (0213)	Output Voltage Limit Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the automatic reduction of motor magnetic flux when the output voltage is saturated. 0 : Disabled 1 : Enabled	0 (0, 1)
C3-16 (0261) Expert	Vout Modulation Limit Start Lvl	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the modulation factor that starts the output voltage limit operation when $C3-05 = 1$ [Output Voltage Limit Selection = Enabled].	90.0% (70.0 - 90.0%)
C3-17 (0262) Expert	Vout Modulation Limit Max Level	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the modulation factor used with $C3-18$ [Output Voltage Limit Level] for the output voltage limit operation when $C3-05 = 1$ [Output Voltage Limit Selection = Enabled].	100.0% (85.0 - 100.0%)
C3-18 (0263) Expert	Output Voltage Limit Level	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the maximum drop width of the voltage reference when $C3-05 = 1$ [Output Voltage Limit Selection = Enabled].	90.0% (50.0 - 100.0%)
C3-21 (033E) RUN	Motor 2 Slip Compensation Gain	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the gain for the motor 2 slip compensation function. Usually it is not necessary to change this setting. Note: Correctly set these parameters before changing the slip compensation gain: • E4-01 [Motor 2 Rated Current] • E4-02 [Motor 2 Rated Slip] • E4-03 [Motor 2 Rated No-Load Current]	Determined by E3-01 (0.0 - 2.5)
C3-22 (0241) RUN	Motor 2 Slip Comp Delay Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the slip compensation delay time for motor 2 when speed is unstable or when the slip compensation response is too slow. Usually it is not necessary to change this setting.	Determined by E3-01 (0 - 10000 ms)
C3-23 (0242)	Motor 2 Slip Compensation Limit	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the upper limit for the slip compensation function as a percentage of the motor 2 rated slip.	200% (0 - 250%)

3.6 C: Tuning

No. (Hex.)	Name	Description	Default (Range)
C3-24 (0243)	Motor 2 Slip Comp during Regen	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input checked="" type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the slip compensation during regenerative operation function for motor 2.</p> <p>0 : Disabled 1 : Enabled Above 6Hz 2 : Enabled Above Defined Range</p>	0 (0 - 2)
C3-28 (1B5B) Expert	Adaptive Slip Control Mode	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the slip compensation function mode.</p> <p>0 : Normal 1 : Advanced</p>	0 (0, 1)

◆ C4: Torque Compensation

No. (Hex.)	Name	Description	Default (Range)
C4-01 (0215) RUN	Torque Compensation Gain	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the gain for the torque compensation function. Use this parameter value for motor 1 when operating multiple motors.</p> <p>Note: If $A1-02 = 8$ [Control Method Selection = EZOLV], you cannot change the setting while the drive is running.</p>	Determined by A1-02 (0.00 - 2.50)
C4-02 (0216) RUN	Torque Compensation Delay Time	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the torque compensation delay time. Usually it is not necessary to change this setting.</p> <p>Note:</p> <ul style="list-style-type: none"> When $A1-02 = 5$ [Control Method Selection = OLV/PM], you cannot change the setting while the drive is running. When $A1-02 = 8$ [EZOLV], you cannot change the setting while the drive is running. 	Determined by A1-02 (0 - 60000 ms)
C4-03 (0217)	Torque Compensation @ FWD Start	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input checked="" type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Set the amount of torque reference for forward start as a percentage of the motor rated torque.</p>	0.0% (0.0 - 200.0%)
C4-04 (0218)	Torque Compensation @ REV Start	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input checked="" type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the amount of torque reference for reverse start as a percentage of the motor rated torque.</p>	0.0% (-200.0 - 0.0%)
C4-05 (0219)	Torque Compensation Time	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input checked="" type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the starting torque constant to use with C4-03 and C4-04 [Torque Compensation @ FWD/REV Start].</p>	10 ms (0 - 200 ms)
C4-06 (021A)	Motor 2 Torque Comp Delay Time	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input checked="" type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the value if <i>ov</i> [Overvoltage] occurs with sudden changes in the load, at the end of acceleration, or at the start of deceleration.</p>	150 ms (0 - 10000 ms)
C4-07 (0341) RUN	Motor 2 Torque Compensation Gain	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the gain for motor 2 torque compensation function when using the Motor Switch function.</p>	1.00 (0.00 - 2.50)
C4-19 (0B8D) Expert	Torque Ripple Suppress Min Freq	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>If there is slow oscillation at low speeds, adjust this setting. Usually it is not necessary to change this setting.</p> <p>Increase this parameter in 1.0 Hz increments when current ripples and torque ripples occur during low-speed operation. Set this parameter to 0.0 to disable the function if increasing the value does not fix the problem.</p> <p>Note: Set C4-20 [Voltage Compensation Adjust 1] $\neq 0$ to enable this parameter.</p>	0.1 Hz (0.0 - 10.0 Hz)
C4-20 (0BCB) Expert	Voltage Compensation Adjust 1	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets voltage precision compensation. Usually it is not necessary to change this setting.</p>	120 Hz (0 - 200 Hz)
C4-21 (0BCC) Expert	Voltage Compensation Adjust 2	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets voltage precision compensation. Usually it is not necessary to change this setting.</p>	5 (0 - 10)

No. (Hex.)	Name	Description	Default (Range)
C4-23 (1583) Expert	Current Control Gain	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the Current control gain. Usually it is not necessary to change this parameter.	1.00 (0.50 - 2.50)
C4-25 (1BF4) Expert	High-Speed Voltage Compensation	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the voltage compensation function for high-speed operation. Usually it is not necessary to change this setting. Note: • This parameter is available on drives with software versions PRG: 09018 and later. The "PRG" column on the nameplate on the right side of the drive identifies the software version. You can also use U1-25 [SoftwareNumber FLASH] to identify the software version. • Set C4-25 = 0 when there is audible noise or motor vibration during high-speed operation. 0 : Disabled 1 : Enabled	Determined by A1-02 (0, 1)

◆ C5: Auto Speed Regulator (ASR)

No. (Hex.)	Name	Description	Default (Range)
C5-01 (021B) RUN	ASR Proportional Gain 1	<input type="checkbox"/> V/f <input checked="" type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the gain to adjust ASR response. Note: If A1-02 = 0 [Control Method Selection = V/f], you must set H6-01 = 3 [Terminal RP Pulse Train Function = Speed Feedback (V/F Control)] to enable this parameter.	Determined by A1-02 (0.00 - 300.00)
C5-02 (021C) RUN	ASR Integral Time 1	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the ASR integral time. Note: If A1-02 = 0 [Control Method Selection = V/f], you must set H6-01 = 3 [Terminal RP Pulse Train Function = Speed Feedback (V/F Control)] to enable this parameter.	Determined by A1-02 (0.000 - 60.000 s)
C5-03 (021D) RUN	ASR Proportional Gain 2	<input type="checkbox"/> V/f <input checked="" type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the gain to adjust ASR response. Note: If A1-02 = 0 [Control Method Selection = V/f], you must set H6-01 = 3 [Terminal RP Pulse Train Function = Speed Feedback (V/F Control)] to enable this parameter.	Determined by A1-02 (0.00 - 300.00)
C5-04 (021E) RUN	ASR Integral Time 2	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the ASR integral time. Note: If A1-02 = 0 [Control Method Selection = V/f], you must set H6-01 = 3 [Terminal RP Pulse Train Function = Speed Feedback (V/F Control)] to enable this parameter.	Determined by A1-02 (0.000 - 60.000 s)
C5-05 (021F)	ASR Limit	<input type="checkbox"/> V/f <input checked="" type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Set the ASR output limit as a percentage of E1-04 [Maximum Output Frequency].	5.0% (0.0 - 20.0%)
C5-06 (0220)	ASR Delay Time	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the filter time constant of the torque reference output from the speed loop. Usually it is not necessary to change this setting.	Determined by A1-02 (0.000 - 0.500 s)
C5-07 (0221)	ASR Gain Switchover Frequency	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the frequency where the drive will switch between these parameters: C5-01 and C5-03 [ASR Proportional Gain 1/2] C5-02 and C5-04 [ASR Integral Time 1/2]	Determined by A1-02 (Determined by A1-02)
C5-08 (0222)	ASR Integral Limit	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Set the upper limit of the ASR integral amount as a percentage of the rated load.	400% (0 - 400%)
C5-12 (0386)	Integral Operation @ Accel/Decel	<input type="checkbox"/> V/f <input checked="" type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets ASR integral operation during acceleration and deceleration. 0 : Disabled 1 : Enabled Note: If A1-02 = 0 [Control Method Selection = V/f], you must set H6-01 = 3 [Terminal RP Pulse Train Function = Speed Feedback (V/F Control)] to enable this parameter.	0 (0, 1)

3.6 C: Tuning

No. (Hex.)	Name	Description	Default (Range)
C5-17 (0276) Expert	Motor Inertia	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the motor inertia.</p> <p>Note: The display units for the default setting and setting range are different for different models:</p> <ul style="list-style-type: none"> • 0.0001 kgm² units (setting range: 0.0001 kgm² to 6.0000 kgm²): 2004 to 2021, 4002 to 4012 • 0.001 kgm² units (setting range: 0.001 kgm² to 60.000 kgm²): 2030 to 2211, 4018 to 4103, T103 • 0.01 kgm² units (setting range: 0.01 kgm² to 600.00 kgm²): 2257 to 2415, 4140 to 4H12, T140 to T720 	Determined by o2-04, C6-01, and E5-01 (0.0001 - 600.00 kgm ²)
C5-18 (0277) Expert	Load Inertia Ratio	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the load inertia ratio for the motor inertia.</p>	1.0 (0.0 - 6000.0)
C5-21 (0356) RUN	Motor 2 ASR Proportional Gain 1	<p><input type="checkbox"/> V/f <input checked="" type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the gain to adjust ASR response for motor 2.</p>	Determined by E3-01 (0.00 - 300.00)
C5-22 (0357) RUN	Motor 2 ASR Integral Time 1	<p><input type="checkbox"/> V/f <input checked="" type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the ASR integral time for motor 2.</p>	Determined by E3-01 (0.000 - 60.000 s)
C5-23 (0358) RUN	Motor 2 ASR Proportional Gain 2	<p><input type="checkbox"/> V/f <input checked="" type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the gain to adjust ASR response for motor 2.</p>	Determined by E3-01 (0.00 - 300.00)
C5-24 (0359) RUN	Motor 2 ASR Integral Time 2	<p><input type="checkbox"/> V/f <input checked="" type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the ASR integral time for motor 2.</p>	Determined by E3-01 (0.000 - 60.000 s)
C5-25 (035A)	Motor 2 ASR Limit	<p><input type="checkbox"/> V/f <input checked="" type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Set the motor 2 ASR output limit as a percentage of E1-04 [Maximum Output Frequency].</p>	5.0% (0.0 - 20.0%)
C5-26 (035B)	Motor 2 ASR Delay Time	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the motor 2 filter time constant of the torque reference output from the speed loop. Usually it is not necessary to change this setting.</p>	Determined by E3-01 (0.000 - 0.500 s)
C5-27 (035C)	Motor 2 ASR Gain Switchover Freq	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the frequency where the drive will switch between these parameters: C5-21 and C5-23 [Motor 2 ASR Proportional Gain 1/2] C5-22 and C5-24 [Motor 2 ASR Integral Time 1/2]</p>	0.0 (0.0 - 400.0)
C5-28 (035D)	Motor 2 ASR Integral Limit	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Set the upper limit of the motor 2 ASR integral amount as a percentage of the rated load.</p>	400% (0 - 400%)
C5-29 (0B18) Expert	Speed Control Response	<p><input checked="" type="checkbox"/> V/f <input checked="" type="checkbox"/> CL-V/f <input checked="" type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input checked="" type="checkbox"/> EZOLV</p> <p>Sets the level of speed control responsiveness. Usually it is not necessary to change this setting. 0 : Standard 1 : High Performance 1</p>	0 (0, 1)
C5-32 (0361)	Motor 2 Integral Oper at Acc/Dec	<p><input type="checkbox"/> V/f <input checked="" type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets ASR integral operation during acceleration and deceleration for motor 2. 0 : Disabled 1 : Enabled</p>	0 (0, 1)
C5-37 (0278) Expert	Motor 2 Inertia	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the motor inertia for motor 2.</p> <p>Note: The display units for the default setting and setting range are different for different models:</p> <ul style="list-style-type: none"> • 0.0001 kgm² units (setting range: 0.0001 kgm² to 6.0000 kgm²): 2004 to 2021, 4002 to 4012 • 0.001 kgm² units (setting range: 0.001 kgm² to 60.000 kgm²): 2030 to 2211, 4018 to 4103, T103 • 0.01 kgm² units (setting range: 0.01 kgm² to 600.00 kgm²): 2257 to 2415, 4140 to 4H12, T140 to T720 	Determined by o2-04, C6-01 (0.0001 - 600.00 kgm ²)
C5-38 (0279) Expert	Motor 2 Load Inertia Ratio	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the load inertia ratio for the motor 2 inertia.</p>	1.0 (0.0 - 6000.0)
C5-39 (030D)	ASR Primary Delay Time Const 2	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/PM <input type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the filter time constant used when the torque reference is output from ASR. Usually it is not necessary to change this parameter.</p>	0.000 s (0.000 - 0.500 s)

No. (Hex.)	Name	Description	Default (Range)
C5-50 (0B14) Expert	Notch Filter Frequency	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the machine resonance frequency.</p> <p>Note: Set <i>C5-50 = 0 [0 Hz]</i> to disable the notch filter.</p>	0 Hz (0, or 2 to 100 Hz)
C5-51 (0B15) Expert	Notch Filter Bandwidth	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the notch width of the notch filter.</p> <p>Note: Set <i>C5-50 = 0 [Notch Filter Frequency = 0 Hz]</i> to disable the notch filter.</p>	1.0 (0.5 - 5.0)

◆ C6: Duty & Carrier Frequency

No. (Hex.)	Name	Description	Default (Range)
C6-01 (0223)	Normal / Heavy Duty Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the drive duty rating.</p> <p>0 : Heavy Duty Rating 1 : Normal Duty Rating</p>	1 (0, 1)
C6-02 (0224)	Carrier Frequency Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the carrier frequency for the transistors in the drive.</p> <p>1 : 2.0 kHz 2 : 5.0 kHz (4.0 kHz for AOLV/PM) 3 : 8.0 kHz (6.0 kHz for AOLV/PM) 4 : 10.0 kHz (8.0 kHz for AOLV/PM) 5 : 12.5 kHz (10.0 kHz for AOLV/PM) 6 : 15.0 kHz (12.0 kHz for AOLV/PM) 7 : Swing PWM4 (Audible Sound 1) 8 : Swing PWM4 (Audible Sound 2) 9 : Swing PWM4 (Audible Sound 3) A : Swing PWM4 (Audible Sound 4) F : User Defined (C6-03 to C6-05)</p> <p>Note: The carrier frequency for Swing PWM 1 to 4 is equivalent to 2.0 kHz.</p>	Determined by A1-02, C6-01, and o2-04 (Determined by A1-02)
C6-03 (0225)	Carrier Frequency Upper Limit	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the upper limit of the carrier frequency. Set <i>C6-02 = F [Carrier Frequency Selection = User Defined (C6-03 to C6-05)]</i> to set this parameter.</p>	Determined by C6-02 (1.0 - 15.0 kHz)
C6-04 (0226)	Carrier Frequency Lower Limit	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the lower limit of the carrier frequency. Set <i>C6-02 = F [Carrier Frequency Selection = User Defined (C6-03 to C6-05)]</i> to set this parameter.</p>	Determined by C6-02 (1.0 - 15.0 kHz)
C6-05 (0227)	Carrier Freq Proportional Gain	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the proportional gain for the carrier frequency. Set <i>C6-02 = F [Carrier Frequency Selection = User Defined (C6-03 to C6-05)]</i> to set this parameter.</p>	Determined by C6-02 (0 - 99)
C6-09 (022B)	Carrier Freq at Rotational Tune	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the Auto-Tuning carrier frequency. Usually it is not necessary to change this setting.</p> <p>0 : 5kHz 1 : use C6-03</p>	0 (0, 1)

3.7 d: Reference Settings

◆ d1: Frequency Reference

No. (Hex.)	Name	Description	Default (Range)
d1-01 (0280) RUN	Reference 1	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the frequency reference in the units from o1-03 [Frequency Display Unit Selection].</p> <p>Note: When A1-02 = 6, 7 [Control Method Selection = AOLV/PM, CLV/PM], the drive changes o1-03 = 1 [0.01% (100% = E1-04)].</p>	0.00 Hz (0.00 - 590.00 Hz)
d1-02 (0281) RUN	Reference 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the frequency reference in the units from o1-03 [Frequency Display Unit Selection].</p> <p>Note: When A1-02 = 6, 7 [Control Method Selection = AOLV/PM, CLV/PM], the drive changes o1-03 = 1 [0.01% (100% = E1-04)].</p>	0.00 Hz (0.00 - 590.00 Hz)
d1-03 (0282) RUN	Reference 3	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the frequency reference in the units from o1-03 [Frequency Display Unit Selection].</p> <p>Note: When A1-02 = 6, 7 [Control Method Selection = AOLV/PM, CLV/PM], the drive changes o1-03 = 1 [0.01% (100% = E1-04)].</p>	0.00 Hz (0.00 - 590.00 Hz)
d1-04 (0283) RUN	Reference 4	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the frequency reference in the units from o1-03 [Frequency Display Unit Selection].</p> <p>Note: When A1-02 = 6, 7 [Control Method Selection = AOLV/PM, CLV/PM], the drive changes o1-03 = 1 [0.01% (100% = E1-04)].</p>	0.00 Hz (0.00 - 590.00 Hz)
d1-05 (0284) RUN	Reference 5	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the frequency reference in the units from o1-03 [Frequency Display Unit Selection].</p> <p>Note: When A1-02 = 6, 7 [Control Method Selection = AOLV/PM, CLV/PM], the drive changes o1-03 = 1 [0.01% (100% = E1-04)].</p>	0.00 Hz (0.00 - 590.00 Hz)
d1-06 (0285) RUN	Reference 6	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the frequency reference in the units from o1-03 [Frequency Display Unit Selection].</p> <p>Note: When A1-02 = 6, 7 [Control Method Selection = AOLV/PM, CLV/PM], the drive changes o1-03 = 1 [0.01% (100% = E1-04)].</p>	0.00 Hz (0.00 - 590.00 Hz)
d1-07 (0286) RUN	Reference 7	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the frequency reference in the units from o1-03 [Frequency Display Unit Selection].</p> <p>Note: When A1-02 = 6, 7 [Control Method Selection = AOLV/PM, CLV/PM], the drive changes o1-03 = 1 [0.01% (100% = E1-04)].</p>	0.00 Hz (0.00 - 590.00 Hz)
d1-08 (0287) RUN	Reference 8	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the frequency reference in the units from o1-03 [Frequency Display Unit Selection].</p> <p>Note: When A1-02 = 6, 7 [Control Method Selection = AOLV/PM, CLV/PM], the drive changes o1-03 = 1 [0.01% (100% = E1-04)].</p>	0.00 Hz (0.00 - 590.00 Hz)
d1-09 (0288) RUN	Reference 9	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the frequency reference in the units from o1-03 [Frequency Display Unit Selection].</p> <p>Note: When A1-02 = 6, 7 [Control Method Selection = AOLV/PM, CLV/PM], the drive changes o1-03 = 1 [0.01% (100% = E1-04)].</p>	0.00 Hz (0.00 - 590.00 Hz)
d1-10 (028B) RUN	Reference 10	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the frequency reference in the units from o1-03 [Frequency Display Unit Selection].</p> <p>Note: When A1-02 = 6, 7 [Control Method Selection = AOLV/PM, CLV/PM], the drive changes o1-03 = 1 [0.01% (100% = E1-04)].</p>	0.00 Hz (0.00 - 590.00 Hz)
d1-11 (028C) RUN	Reference 11	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the frequency reference in the units from o1-03 [Frequency Display Unit Selection].</p> <p>Note: When A1-02 = 6, 7 [Control Method Selection = AOLV/PM, CLV/PM], the drive changes o1-03 = 1 [0.01% (100% = E1-04)].</p>	0.00 Hz (0.00 - 590.00 Hz)

No. (Hex.)	Name	Description	Default (Range)
d1-12 (028D) RUN	Reference 12	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the frequency reference in the units from <i>o1-03</i> [Frequency Display Unit Selection].</p> <p>Note: When <i>A1-02</i> = 6, 7 [Control Method Selection = AOLV/PM, CLV/PM], the drive changes <i>o1-03</i> = 1 [0.01% (100% = E1-04)].</p>	0.00 Hz (0.00 - 590.00 Hz)
d1-13 (028E) RUN	Reference 13	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the frequency reference in the units from <i>o1-03</i> [Frequency Display Unit Selection].</p> <p>Note: When <i>A1-02</i> = 6, 7 [Control Method Selection = AOLV/PM, CLV/PM], the drive changes <i>o1-03</i> = 1 [0.01% (100% = E1-04)].</p>	0.00 Hz (0.00 - 590.00 Hz)
d1-14 (028F) RUN	Reference 14	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the frequency reference in the units from <i>o1-03</i> [Frequency Display Unit Selection].</p> <p>Note: When <i>A1-02</i> = 6, 7 [Control Method Selection = AOLV/PM, CLV/PM], the drive changes <i>o1-03</i> = 1 [0.01% (100% = E1-04)].</p>	0.00 Hz (0.00 - 590.00 Hz)
d1-15 (0290) RUN	Reference 15	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the frequency reference in the units from <i>o1-03</i> [Frequency Display Unit Selection].</p> <p>Note: When <i>A1-02</i> = 6, 7 [Control Method Selection = AOLV/PM, CLV/PM], the drive changes <i>o1-03</i> = 1 [0.01% (100% = E1-04)].</p>	0.00 Hz (0.00 - 590.00 Hz)
d1-16 (0291) RUN	Reference 16	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the frequency reference in the units from <i>o1-03</i> [Frequency Display Unit Selection].</p> <p>Note: When <i>A1-02</i> = 6, 7 [Control Method Selection = AOLV/PM, CLV/PM], the drive changes <i>o1-03</i> = 1 [0.01% (100% = E1-04)].</p>	0.00 Hz (0.00 - 590.00 Hz)
d1-17 (0292) RUN	Jog Reference	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the Jog frequency reference in the units from <i>o1-03</i> [Frequency Display Unit Selection]. Set <i>H1-xx</i> = 6 [MFDI Function Select = Jog Reference Selection] to use the Jog frequency reference.</p> <p>Note: When <i>A1-02</i> = 6, 7 [Control Method Selection = AOLV/PM, CLV/PM], the drive sets <i>o1-03</i> = 1 [0.01% (100% = E1-04)].</p>	6.00 Hz (0.00 - 590.00 Hz)

◆ d2: Reference Limits

No. (Hex.)	Name	Description	Default (Range)
d2-01 (0289)	Frequency Reference Upper Limit	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets maximum limit for all frequency references. The maximum output frequency is 100%.</p> <p>Note: Parameter <i>A1-02</i> [Control Method Selection] selects which parameter is the maximum output frequency.</p> <ul style="list-style-type: none"> • <i>A1-02</i> ≠ 8 [EZOLV]: <i>E1-04</i> [Maximum Output Frequency] • <i>A1-02</i> = 8: <i>E9-02</i> [Motor Max Revolutions] 	100.0% (0.0 - 110.0%)
d2-02 (028A)	Frequency Reference Lower Limit	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets minimum limit for all frequency references. The maximum output frequency is 100%.</p> <p>Note: Parameter <i>A1-02</i> [Control Method Selection] selects which parameter is the maximum output frequency.</p> <ul style="list-style-type: none"> • <i>A1-02</i> ≠ 8 [EZOLV]: <i>E1-04</i> [Maximum Output Frequency] • <i>A1-02</i> = 8: <i>E9-02</i> [Motor Max Revolutions] 	0.0% (0.0 - 110.0%)
d2-03 (0293)	Analog Frequency Ref Lower Limit	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the lower limit for the master frequency reference (the first frequency of the multi-step speed reference) as a percentage. The maximum output frequency is 100%.</p> <p>Note: Parameter <i>A1-02</i> [Control Method Selection] selects which parameter is the maximum output frequency.</p> <ul style="list-style-type: none"> • <i>A1-02</i> ≠ 8: <i>E1-04</i> [Maximum Output Frequency] • <i>A1-02</i> = 8: <i>E9-02</i> [Maximum Speed] 	0.0% (0.0 - 110.0%)

◆ d3: Jump Frequency

No. (Hex.)	Name	Description	Default (Range)
d3-01 (0294)	Jump Frequency 1	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the median value of the frequency band that the drive will avoid.	0.0 Hz (Determined by A1-02)
d3-02 (0295)	Jump Frequency 2	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the median value of the frequency band that the drive will avoid.	0.0 Hz (Determined by A1-02)
d3-03 (0296)	Jump Frequency 3	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the median value of the frequency band that the drive will avoid.	0.0 Hz (Determined by A1-02)
d3-04 (0297)	Jump Frequency Width	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the width of the frequency band that the drive will avoid.	1.0 Hz (Determined by A1-02)

◆ d4: Frequency Ref Up/Down & Hold

No. (Hex.)	Name	Description	Default (Range)
d4-01 (0298)	Freq Reference Hold Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function that saves the frequency reference or the frequency bias (Up/Down 2) after a Stop command or when de-energizing the drive. Set <i>H1-xx</i> [MFDI Function Selection] to one of these values to enable this parameter: <ul style="list-style-type: none"> • <i>A</i> [Accel/Decel Ramp Hold] • <i>10/11</i> [Up/Down Command] • <i>75/76</i> [Up/Down 2 Command] 0 : Disabled 1 : Enabled	0 (0, 1)
d4-03 (02AA) RUN	Up/Down 2 Bias Step Frequency	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the bias that the Up/Down 2 function adds to or subtracts from the frequency reference.	0.00 Hz (0.00 - 99.99 Hz)
d4-04 (02AB) RUN	Up/Down 2 Ramp Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the acceleration and deceleration times for the Up/Down 2 function to apply the bias to the frequency reference. 0 : Use Selected Accel/Decel Time 1 : Use Accel/Decel Time 4	0 (0, 1)
d4-05 (02AC) RUN	Up/Down 2 Bias Mode Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function that saves the bias value to the drive when you open or close the two Up/Down 2 Commands [<i>H1-xx</i> = 75, 76]. Set <i>d4-03</i> [Up/Down 2 Bias Step Frequency] = 0.00 before you set this parameter. 0 : Hold when Neither Up/Down Closed 1 : Reset when Neither / Both Closed	0 (0, 1)
d4-06 (02AD)	Frequency Ref Bias (Up/Down 2)	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Saves the bias value from the Up/Down 2 Command where the Maximum Output Frequency is 100%. Note: Parameter <i>A1-02</i> [Control Method Selection] selects which parameter is the maximum output frequency. <ul style="list-style-type: none"> • <i>A1-02</i> ≠ 8 [EZOLV]: <i>E1-04</i> [Maximum Output Frequency] • <i>A1-02</i> = 8: <i>E9-02</i> [Maximum Speed] 	0.0% (-99.9 - +100.0%)
d4-07 (02AE) RUN	Analog Freq Ref Fluctuate Limit	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV If the frequency reference changes for more than the level set to this parameter, then the bias value will be held. The value is set as a percentage of the Maximum Output Frequency. Note: Parameter <i>A1-02</i> [Control Method Selection] selects which parameter is the maximum output frequency. <ul style="list-style-type: none"> • <i>A1-02</i> ≠ 8 [EZOLV]: <i>E1-04</i> [Maximum Output Frequency] • <i>A1-02</i> = 8: <i>E9-02</i> [Maximum Speed] 	1.0% (0.1 - 100.0%)
d4-08 (02AF) RUN	Up/Down 2 Bias Upper Limit	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the upper limit of the Up/Down 2 bias as a percentage of the Maximum Output Frequency. Note: Parameter <i>A1-02</i> [Control Method Selection] selects which parameter is the maximum output frequency. <ul style="list-style-type: none"> • <i>A1-02</i> ≠ 8 [EZOLV]: <i>E1-04</i> [Maximum Output Frequency] • <i>A1-02</i> = 8: <i>E9-02</i> [Maximum Speed] 	100.0% (0.0 - 100.0%)

No. (Hex.)	Name	Description	Default (Range)
d4-09 (02B0) RUN	Up/Down 2 Bias Lower Limit	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the lower limit of the Up/Down 2 bias as a percentage of the Maximum Output Frequency.</p> <p>Note: Parameter A1-02 [Control Method Selection] selects which parameter is the maximum output frequency.</p> <ul style="list-style-type: none"> A1-02 ≠ 8 [EZOLV]: E1-04 [Maximum Output Frequency] A1-02 = 8: E9-02 [Maximum Speed] 	0.0% (-99.9 - 0.0%)
d4-10 (02B6)	Up/Down Freq Lower Limit Select	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the lower frequency limit for the Up/Down function.</p> <p>0 : Greater of d2-02 or Analog 1 : d2-02</p>	0 (0, 1)

◆ d5: Torque Control

No. (Hex.)	Name	Description	Default (Range)
d5-01 (029A)	Torque Control Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the drive for torque control or speed control.</p> <p>0 : Speed Control 1 : Torque Control</p>	0 (0, 1)
d5-02 (029B)	Torque Reference Delay Time	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the primary delay time constant for the torque reference filter.</p>	Determined by A1-02 (0 - 1000 ms)
d5-03 (029C)	Speed Limit Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the torque control speed limit method.</p> <p>1 : Active Frequency Reference 2 : d5-04 Setting</p>	1 (1, 2)
d5-04 (029D)	Speed Limit	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the speed limit during Torque Control as a percentage of E1-04 [Maximum Output Frequency]. Set d5-03 = 2 [Speed Limit Selection = d5-04 Setting] before you set this parameter.</p>	0% (-120 - +120%)
d5-05 (029E)	Speed Limit Bias	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the speed limit bias value as a percentage of E1-04 [Maximum Output Frequency].</p>	10% (0 - 120%)
d5-06 (029F)	Speed/Torque Changeover Time	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the delay time to switch between Speed Control and Torque Control. Set H1-xx = 71 [MFDI Function Selection = Torque Control] before you set this parameter.</p>	0 ms (0 - 1000 ms)
d5-08 (02B5)	Uni-directional Speed Limit Bias	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the direction of the speed limit reference to which Speed Limit Bias [d5-05] applies.</p> <p>0 : Disabled 1 : Enabled</p>	1 (0, 1)

◆ d6: Field Weakening /Forcing

No. (Hex.)	Name	Description	Default (Range)
d6-01 (02A0)	Field Weakening Level	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the drive output voltage as a percentage of E1-05 [Maximum Output Voltage] when H1-xx = 63 [Field Weakening] is activated.</p>	80% (0 - 100%)
d6-02 (02A1)	Field Weakening Frequency Limit	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the minimum output frequency to start field weakening.</p>	0.0 Hz (0.0 - 590.0 Hz)
d6-03 (02A2)	Field Forcing Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the field forcing function.</p> <p>0 : Disabled 1 : Enabled</p>	0 (0, 1)
d6-06 (02A5)	Field Forcing Limit	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the limit value for field forcing to increase the motor excitation current reference as a percentage of E2-03 [Motor No-Load Current]. Usually it is not necessary to change this setting.</p>	400% (100 - 400%)

◆ d7: Offset Frequency

No. (Hex.)	Name	Description	Default (Range)
d7-01 (02B2) RUN	Offset Frequency 1	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Uses $H1-xx = 44$ [MFDI Function Select = Add Offset Frequency 1 (d7-01)] as a percentage of the Maximum Output Frequency to add or subtract the set frequency to/from the frequency reference.</p> <p>Note: Parameter $A1-02$ [Control Method Selection] selects which parameter is the maximum output frequency. <ul style="list-style-type: none"> • $A1-02 \neq 8$ [EZOLV]: $E1-04$ [Maximum Output Frequency] • $A1-02 = 8$: $E9-02$ [Maximum Speed] </p>	0.0% (-100.0 - +100.0%)
d7-02 (02B3) RUN	Offset Frequency 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Uses $H1-xx = 45$ [MFDI Function Select = Add Offset Frequency 2 (d7-02)] as a percentage of the Maximum Output Frequency to add or subtract the set frequency to/from the frequency reference.</p> <p>Note: Parameter $A1-02$ [Control Method Selection] selects which parameter is the maximum output frequency. <ul style="list-style-type: none"> • $A1-02 \neq 8$ [EZOLV]: $E1-04$ [Maximum Output Frequency] • $A1-02 = 8$: $E9-02$ [Maximum Speed] </p>	0.0% (-100.0 - +100.0%)
d7-03 (02B4) RUN	Offset Frequency 3	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Uses $H1-xx = 46$ [MFDI Function Select = Add Offset Frequency 3 (d7-03)] as a percentage of the Maximum Output Frequency to add or subtract the set frequency to/from the frequency reference.</p> <p>Note: Parameter $A1-02$ [Control Method Selection] selects which parameter is the maximum output frequency. <ul style="list-style-type: none"> • $A1-02 \neq 8$ [EZOLV]: $E1-04$ [Maximum Output Frequency] • $A1-02 = 8$: $E9-02$ [Maximum Speed] </p>	0.0% (-100.0 - +100.0%)

3.8 E: Motor Parameters

◆ E1: V/f Pattern for Motor 1

No. (Hex.)	Name	Description	Default (Range)
E1-01 (0300)	Input AC Supply Voltage	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the drive input voltage.</p> <p>NOTICE: Damage to Equipment. Set E1-01 [Input AC Supply Voltage] to align with the drive input voltage (not motor voltage). If this parameter is incorrect, the protective functions of the drive will not operate correctly and it can cause damage to the drive.</p>	200 V Class: 240 V, 400 V Class: 480 V (200 V Class: 155 to 255 V, 400 V Class: 310 to 510 V)
E1-03 (0302)	V/f Pattern Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the V/f pattern for the drive and motor. You can use one of the preset patterns or you can make a custom pattern.</p> <p>0 : Const Trq, 50Hz base, 50Hz max 1 : Const Trq, 60Hz base, 60Hz max 2 : Const Trq, 50Hz base, 60Hz max 3 : Const Trq, 60Hz base, 72Hz max 4 : VT, 50Hz, 65% Vmid reduction 5 : VT, 50Hz, 50% Vmid reduction 6 : VT, 60 Hz, 65% Vmid reduction 7 : VT, 60Hz, 50% Vmid reduction 8 : High Trq, 50Hz, 25% Vmin boost 9 : High Trq, 50Hz, 65% Vmin boost A : High Trq, 60Hz, 25% Vmin boost B : High Trq, 60Hz, 65% Vmin boost C : High Freq, 60Hz base, 90Hz max D : High Freq, 60Hz base, 120Hz max E : High Freq, 60Hz base, 180Hz max F : Custom</p> <p>Note:</p> <ul style="list-style-type: none"> When A1-02 = 2 [Control Method Selection = OLV], settings 0 to E are not available. Set the correct V/f pattern for the application and operation area. An incorrect V/f pattern can decrease motor torque and increase current from overexcitation. 	F (Determined by A1-02)
E1-04 (0303)	Maximum Output Frequency	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the maximum output frequency for the V/f pattern.</p>	Determined by A1-02 and E5-01 (Determined by A1-02 and E5-01)
E1-05 (0304)	Maximum Output Voltage	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the maximum output voltage for the V/f pattern.</p>	200 V Class: 230.0 V, 400 V: 460.0 V (200 V Class: 0.0 - 255.0 V, 400 V Class: 0.0 - 510.0 V)
E1-06 (0305)	Base Frequency	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the base frequency for the V/f pattern.</p>	Determined by A1-02 and E5-01 (0.0 - E1-04)
E1-07 (0306)	Mid Point A Frequency	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets a middle output frequency for the V/f pattern.</p>	Determined by A1-02 (0.0 - E1-04)
E1-08 (0307)	Mid Point A Voltage	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets a middle output voltage for the V/f pattern.</p>	Determined by A1-02, C6-01 and o2-04 (200 V Class: 0.0 - 255.0 V, 400 V Class: 0.0 - 510.0 V)
E1-09 (0308)	Minimum Output Frequency	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the minimum output frequency for the V/f pattern.</p>	Determined by A1-02 and E5-01 (Determined by A1-02, E1-04, and E5-01)
E1-10 (0309)	Minimum Output Voltage	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the minimum output voltage for the V/f pattern.</p>	Determined by A1-02 (200 V Class: 0.0 to 255.0 V, 400 V Class: 0.0 to 510.0 V)
E1-11 (030A) Expert	Mid Point B Frequency	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets a middle output frequency for the V/f pattern.</p>	0.0 Hz (0.0 - E1-04)

3.8 E: Motor Parameters

No. (Hex.)	Name	Description	Default (Range)
E1-12 (030B) Expert	Mid Point B Voltage	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets a middle point voltage for the V/f pattern.</p>	0.0 V (200 V Class: 0.0 to 255.0 V, 400 V Class: 0.0 to 510.0 V)
E1-13 (030C) Expert	Base Voltage	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the base voltage for the V/f pattern.</p>	0.0 V (200 V Class: 0.0 - 255.0 V, 400 V Class: 0.0 - 510.0 V)

◆ E2: Motor Parameters

No. (Hex.)	Name	Description	Default (Range)
E2-01 (030E)	Motor Rated Current (FLA)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the motor rated current in amps.</p>	Determined by o2-04, C6-01 (10% to 200% of the drive rated current)
E2-02 (030F)	Motor Rated Slip	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets motor rated slip.</p>	Determined by o2-04, C6-01 (0.000 - 20.000 Hz)
E2-03 (0310)	Motor No-Load Current	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the no-load current for the motor in amps when operating at the rated frequency and the no-load voltage.</p>	Determined by o2-04, C6-01 (0 to E2-01)
E2-04 (0311)	Motor Pole Count	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the number of motor poles.</p> <p>Note:</p> <ul style="list-style-type: none"> When A1-02 = 0, 1, 3 [Control Method Selection = V/f, CL-V/f, CLV], the maximum value is 120. When A1-02 = 2, 4 [OLV, AOLV], the maximum value is 48. 	4 (2 - 120)
E2-05 (0312)	Motor Line-to-Line Resistance	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the line-to-line resistance for the motor stator windings.</p> <p>Note:</p> <p>On drive models 4810 to 4H12, the unit is mΩ, and the setting range is 0.000 mΩ to 65.000 mΩ.</p>	Determined by o2-04, C6-01 (0.000 - 65.000 Ω)
E2-06 (0313)	Motor Leakage Inductance	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the voltage drop from motor leakage inductance when the motor is operating at the rated frequency and rated current. This value is a percentage of Motor Rated Voltage.</p>	Determined by o2-04, C6-01 (0.0 - 60.0%)
E2-07 (0314)	Motor Saturation Coefficient 1	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the motor iron-core saturation coefficient at 50% of the magnetic flux.</p>	0.50 (0.00 - 0.50)
E2-08 (0315)	Motor Saturation Coefficient 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the motor iron-core saturation coefficient at 75% of the magnetic flux.</p>	0.75 (E2-07 - 0.75)
E2-09 (0316) Expert	Motor Mechanical Loss	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the mechanical loss of the motor. It is set as a percentage of E2-11 [Motor Rated Power]. Usually it is not necessary to change this setting.</p>	0.0% (0.0 - 10.0%)
E2-10 (0317)	Motor Iron Loss	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the motor iron loss.</p>	Determined by o2-04, C6-01 (0 - 65535 W)
E2-11 (0318)	Motor Rated Power	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the motor rated output in the units from o1-58 [Motor Power Unit Selection].</p> <p>Note:</p> <p>On drive models 2xxx, and 4002 to 4720, the setting unit is 0.01 kW. The setting range is 0.00 kW to 650.00 kW (0.00 HP to 650.00 HP).</p> <p>On drive models 4810 to 4H12, the setting unit is 0.1 kW. The setting range is 0.0 kW to 1000.0 kW (0.0 HP to 1340.5 HP).</p>	Determined by o2-04, C6-01 (0.00 - 1000.0)

◆ E3: V/f Pattern for Motor 2

No. (Hex.)	Name	Description	Default (Range)
E3-01 (0319)	Motor 2 Control Mode Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the control method for motor 2.</p> <p>Note: When you change this setting, the drive will set all parameters that are dependent on this parameter to their default settings.</p> <p>0 : V/f Control 1 : V/f Control with Encoder 2 : Open Loop Vector 3 : Closed Loop Vector</p>	0 (0 - 3)
E3-04 (031A)	Motor 2 Maximum Output Frequency	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Set the maximum output frequency for the motor 2 V/f pattern.</p>	Determined by E3-01 (40.0 - 590.0 Hz)
E3-05 (031B)	Motor 2 Maximum Output Voltage	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the maximum output voltage for the motor 2 V/f pattern.</p>	Determined by E3-01 (200 V Class: 0.0 - 255.0 V, 400 V Class: 0.0 - 510.0 V)
E3-06 (031C)	Motor 2 Base Frequency	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the base frequency for the motor 2 V/f pattern.</p>	Determined by E3-01 (0.0 - E3-04)
E3-07 (031D)	Motor 2 Mid Point A Frequency	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets a middle output frequency for the motor 2 V/f pattern.</p>	Determined by E3-01 (0.0 - E3-04)
E3-08 (031E)	Motor 2 Mid Point A Voltage	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets a middle output voltage for the motor 2 V/f pattern.</p>	Determined by E3-01 (200 V Class: 0.0 - 255.0 V, 400 V Class: 0.0 - 510.0 V)
E3-09 (031F)	Motor 2 Minimum Output Frequency	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the minimum output frequency for the motor 2 V/f pattern.</p>	Determined by E3-01 (0.0 - E3-04)
E3-10 (0320)	Motor 2 Minimum Output Voltage	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the minimum output voltage for the motor 2 V/f pattern.</p>	Determined by E3-01 (200 V Class: 0.0 - 255.0 V, 400 V Class: 0.0 - 510.0 V)
E3-11 (0345) Expert	Motor 2 Mid Point B Frequency	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets a middle output frequency for the motor 2 V/f pattern. Set this parameter to adjust the V/f pattern for the constant output range. Usually it is not necessary to change this parameter.</p>	0.0 Hz (0.0 - E3-04)
E3-12 (0346) Expert	Motor 2 Mid Point B Voltage	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets a middle output voltage for the motor 2 V/f pattern. Set this parameter to adjust the V/f pattern for the constant output range. Usually it is not necessary to change this parameter.</p>	0.0 V (200 V Class: 0.0 to 255.0 V, 400 V Class: 0.0 to 510.0 V)
E3-13 (0347) Expert	Motor 2 Base Voltage	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the base voltage for the motor 2 V/f pattern. Set this parameter to adjust the V/f pattern for the constant output range. Usually it is not necessary to change this parameter.</p>	0.0 V (200 V Class: 0.0 to 255.0 V, 400 V Class: 0.0 to 510.0 V)

◆ E4: Motor 2 Parameters

No. (Hex.)	Name	Description	Default (Range)
E4-01 (0321)	Motor 2 Rated Current	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the motor rated current for motor 2 in amps.</p>	Determined by o2-04, C6-01 (10% to 200% of the drive rated current)
E4-02 (0322)	Motor 2 Rated Slip	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the motor rated slip for motor 2.</p>	Determined by o2-04, C6-01 (0.000 - 20.000 Hz)
E4-03 (0323)	Motor 2 Rated No-Load Current	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the no-load current for motor 2 in amps when operating at the rated frequency and the no-load voltage.</p>	Determined by o2-04, C6-01 (Less than 0 - E4-01)
E4-04 (0324)	Motor 2 Motor Poles	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the number of poles for motor 2.</p>	4 (2 - 120)
E4-05 (0325)	Motor 2 Line-to-Line Resistance	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the line-to-line resistance for the motor 2 stator windings.</p> <p>Note: On drive models 4810 to 4H12, the unit is mΩ, and the setting range is 0.000 mΩ to 65.000 mΩ.</p>	Determined by o2-04, C6-01 (0.000 - 65.000 Ω)
E4-06 (0326)	Motor 2 Leakage Inductance	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the voltage drop from motor 2 leakage inductance as a percentage of Motor Rated Voltage when motor 2 operates at the rated frequency and rated current.</p>	Determined by o2-04, C6-01 (0.0 - 60.0%)

3.8 E: Motor Parameters

No. (Hex.)	Name	Description	Default (Range)
E4-07 (0343)	Motor 2 Saturation Coefficient 1	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input checked="" type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the motor 2 iron-core saturation coefficient at 50% of the magnetic flux.	0.50 (0.00 - 0.50)
E4-08 (0344)	Motor 2 Saturation Coefficient 2	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input checked="" type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the motor 2 iron-core saturation coefficient at 75% of the magnetic flux.	0.75 (E4-07 - 0.75)
E4-09 (033F) Expert	Motor 2 Mechanical Loss	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input checked="" type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the mechanical loss of motor 2. It is set as a percentage of E4-11 [Motor 2 Rated Power]. Usually it is not necessary to change this setting.	0.0% (0.0 - 10.0%)
E4-10 (0340)	Motor 2 Iron Loss	<input checked="" type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the motor iron loss for motor 2.	Determined by o2-04, C6-01 (0 - 65535 W)
E4-11 (0327)	Motor 2 Rated Power	<input checked="" type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the motor rated output in the units from o1-58 [Motor Power Unit Selection]. Note: On drive models 2xxx, and 4002 to 4720, the setting unit is 0.01 kW. The setting range is 0.00 kW to 650.00 kW (0.00 HP to 650.00 HP). On drive models 4810 to 4H12, the setting unit is 0.1 kW. The setting range is 0.0 kW to 1000.0 kW (0.0 HP to 1340.5 HP).	Determined by o2-04, C6-01 (0.00 - 1000.0)

◆ E5: PM Motor Settings

No. (Hex.)	Name	Description	Default (Range)
E5-01 (0329)	PM Motor Code Selection	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input checked="" type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the motor code for Yaskawa PM motors. The drive uses the motor code to automatically set some parameters to their correct settings.	FFFF (0000 - FFFF)
E5-02 (032A)	PM Motor Rated Power	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input checked="" type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the PM motor rated output in the units from o1-58 [Motor Power Unit Selection]. Note: On drive models 2xxx, and 4002 to 4720, the setting unit is 0.01 kW. The setting range is 0.10 kW to 650.00 kW (0.10 HP to 650.00 HP). On drive models 4810 to 4H12, the setting unit is 0.1 kW. The setting range is 0.1 kW to 1000.0 kW (0.1 HP to 1340.5 HP).	Determined by E5-01 (0.10 - 1000.0)
E5-03 (032B)	Motor Rated Current (FLA)	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input checked="" type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the PM motor rated current (FLA).	Determined by E5-01 (10% to 200% of the drive rated current)
E5-04 (032C)	PM Motor Pole Count	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input checked="" type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the number of PM motor poles. Note: • When A1-02 = 7 [Control Method Selection = CLV/PM], the maximum value is 120. • When A1-02 = 5, 6 or 8 [OLV/PM, AOLV/PM or EZOLV], the maximum value is 48.	4 (2 - 120)
E5-05 (032D)	PM Motor Resistance (ohm/phase)	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input checked="" type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the resistance per phase of a PM motor. Set 50% of the line-to-line resistance. Note: On drive models 4810 to 4H12, the unit is mΩ, and the setting range is 0.000 mΩ to 65.000 mΩ.	0.100 Ω (0.000 - 65.000 Ω)
E5-06 (032E)	PM d-axis Inductance (mH/phase)	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input checked="" type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the PM motor d-axis inductance.	1.00 mH (0.00 - 300.00 mH)
E5-07 (032F)	PM q-axis Inductance (mH/phase)	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input checked="" type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the PM motor q-axis inductance.	1.00 mH (0.00 - 600.00 mH)
E5-09 (0331)	PM Back-EMF V _{peak} (mV/(rad/s))	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input checked="" type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the peak value of PM motor induced voltage.	0.0 mV/(rad/sec) (0.0 - 2000.0 mV/(rad/s))
E5-11 (0333)	Encoder Z-Pulse Offset	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the encoder Z-pulse offset.	0.0 degrees (-180.0 - +180.0 degrees)

No. (Hex.)	Name	Description	Default (Range)
E5-24 (0353)	PM Back-EMF L-L Vrms (mV/rpm)	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the RMS value for PM motor line voltage.	200 V Class: 100.0 mV/min ⁻¹ 400 V Class: 200.0 mV/min ⁻¹ (0.0 - 6500.0 mV/min ⁻¹)
E5-25 (035E) Expert	Polarity Estimation Timeout	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the function that switches polarity for initial polarity estimation. Usually it is not necessary to change this setting. 0 : Disabled 1 : Enabled	0 (0, 1)

◆ E9: Motor Setting

No. (Hex.)	Name	Description	Default (Range)
E9-01 (11E4)	Motor Type Selection	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input checked="" type="checkbox"/> EZOLV Sets the type of motor. 0 : Induction (IM) 1 : Permanent Magnet (PM) 2 : Synchronous Reluctance (SynRM)	0 (0 - 2)
E9-02 (11E5)	Maximum Speed	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input checked="" type="checkbox"/> EZOLV Sets the maximum speed of the motor.	Determined by E9-01 (40.0 - 120.0 Hz)
E9-03 (11E6)	Rated Speed	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input checked="" type="checkbox"/> EZOLV Sets the rated rotation speed of the motor.	Determined by E9-01 (100 - 7200 min ⁻¹)
E9-04 (11E7)	Base Frequency	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input checked="" type="checkbox"/> EZOLV Sets the rated frequency of the motor.	Determined by E9-01 (40.0 - 120.0 Hz)
E9-05 (11E8)	Motor Rated Voltage	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input checked="" type="checkbox"/> EZOLV Sets the rated voltage of the motor.	200 V Class: 230.0 V, 400 V Class: 460.0 V (200 V Class: 0.0 - 255.0 V, 400 V Class: 0.0 - 510.0 V)
E9-06 (11E9)	Motor Rated Current (FLA)	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input checked="" type="checkbox"/> EZOLV Sets the motor rated current in amps.	Determined by E9-01 and o2-04 (10% to 200% of the drive rated current)
E9-07 (11EA)	PM Motor Rated Power	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input checked="" type="checkbox"/> EZOLV Sets the motor rated output in the units from o1-58 [Motor Power Unit Selection]. Note: On drive models 2xxx, and 4002 to 4720, the setting unit is 0.01 kW. The setting range is 0.00 kW to 650.00 kW (0.00 HP to 650.00 HP). On drive models 4810 to 4H12, the setting unit is 0.1 kW. The setting range is 0.0 kW to 1000.0 kW (0.0 HP to 1340.5 HP).	Determined by E9-02 and o2-04 (0.00 - 1000.0)
E9-08 (11EB)	Motor Pole Count	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input checked="" type="checkbox"/> EZOLV Sets the number of motor poles.	4 (2 to 120)
E9-09 (11EC)	Motor Rated Slip	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input checked="" type="checkbox"/> EZOLV Sets the motor rated slip.	0.000 Hz (0.000 - 20.000 Hz)
E9-10 (11ED)	Motor Line-to-Line Resistance	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input checked="" type="checkbox"/> EZOLV Sets the line-to-line resistance for the motor stator windings. Note: On drive models 4810 to 4H12, the unit is mΩ, and the setting range is 0.000 mΩ to 65.000 mΩ.	Determined by o2-04 (0.000 - 65.000 Ω)

3.9 F: Options

◆ F1: PG Option Setup (Encoder)

No. (Hex.)	Name	Description	Default (Range)
F1-01 (0380)	Encoder 1 Pulse Count (PPR)	<p>V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV <input type="checkbox"/></p> <p>Sets the number of output pulses for each motor revolution.</p>	1024 ppr (1 - 60000 ppr)
F1-02 (0381)	Encoder Signal Loss Detect Sel	<p>V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV <input type="checkbox"/></p> <p>Sets the method to stop the motor or let the motor continue operating when the drive detects <i>PGO</i> [Encoder (PG) Feedback Loss].</p> <p>0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) 3 : Alarm Only 4 : No Alarm Display</p>	1 (0 - 4)
F1-03 (0382)	Overspeed Detection Selection	<p>V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV <input type="checkbox"/></p> <p>Sets the method to stop the motor or let the motor continue operating when the drive detects <i>oS</i> [Overspeed].</p> <p>0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) 3 : Alarm Only</p>	1 (0 - 3)
F1-04 (0383)	Speed Deviation Detection Select	<p>V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV <input type="checkbox"/></p> <p>Sets the method to stop the motor or let the motor continue operating when the drive detects <i>dEv</i> [Speed Deviation].</p> <p>0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) 3 : Alarm Only</p>	3 (0 - 3)
F1-05 (0384)	Encoder 1 Rotation Selection	<p>V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV <input type="checkbox"/></p> <p>Sets the output sequence for the A and B pulses from the encoder, assuming that the motor is operating in the forward direction.</p> <p>0 : Pulse A leads in FWD Direction 1 : Pulse B leads in FWD Direction</p>	Determined by A1-02 (0, 1)
F1-06 (0385)	Encoder 1 Pulse Monitor Scaling	<p>V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV <input type="checkbox"/></p> <p>Sets the ratio between the pulse input and the pulse output of the encoder as a 3-digit number. The first digit is the numerator and the second and third digits set the denominator. The dividing ratio = $(1 + x)/yz$ when the setting value is a 3-digit value (xyz).</p>	001 (001 - 032, 102 - 132 (1 - 1/32))
F1-08 (0387)	Overspeed Detection Level	<p>V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV <input type="checkbox"/></p> <p>Sets the detection level of <i>oS</i> [Overspeed] as a percentage when the maximum output frequency is 100%.</p> <p>Note:</p> <ul style="list-style-type: none"> Parameter A1-02 [Control Method Selection] selects which parameter is the maximum output frequency. <ul style="list-style-type: none"> -A1-02 ≠ 8 [EZOLV]: E1-04 [Maximum Output Frequency] -A1-02 = 8: E9-02 [Maximum Speed] If A1-02 = 0 [Control Method Selection = V/f], you must set H6-01 = 3 [Terminal RP Pulse Train Function = Speed Feedback (V/F Control)] to enable this parameter. 	115% (0 - 120%)
F1-09 (0388)	Overspeed Detection Delay Time	<p>V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV <input type="checkbox"/></p> <p>Sets the length of time that the speed feedback must be more than the F1-08 level to cause <i>oS</i> [Overspeed].</p> <p>Note:</p> <p>If A1-02 = 0 [Control Method Selection = V/f], you must set H6-01 = 3 [Terminal RP Pulse Train Function = Speed Feedback (V/F Control)] to enable this parameter.</p>	Determined by A1-02 (0.0 - 2.0 s)
F1-10 (0389)	Speed Deviation Detection Level	<p>V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV <input type="checkbox"/></p> <p>Sets the detection level of <i>dEv</i> [Speed Deviation] as a percentage when the maximum output frequency is 100%.</p> <p>Note:</p> <ul style="list-style-type: none"> Parameter A1-02 [Control Method Selection] selects which parameter is the maximum output frequency. <ul style="list-style-type: none"> -A1-02 ≠ 8 [EZOLV]: E1-04 [Maximum Output Frequency] -A1-02 = 8: E9-02 [Maximum Speed] If A1-02 = 0 [Control Method Selection = V/f], you must set H6-01 = 3 [Terminal RP Pulse Train Function = Speed Feedback (V/F Control)] to enable this parameter. 	10% (0 - 50%)

No. (Hex.)	Name	Description	Default (Range)
F1-11 (038A)	Speed Deviation Detect DelayTime	<input type="checkbox"/> V/f <input checked="" type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the length of time that the difference between the frequency reference and speed feedback must be more than the level in F1-10 to cause <i>dEv</i> [Speed Deviation]. Note: If <i>A1-02</i> = 0 [Control Method Selection = V/f], you must set <i>H6-01</i> = 3 [Terminal RP Pulse Train Function = Speed Feedback (V/F Control)] to enable this parameter.	0.5 s (0.0 - 10.0 s)
F1-12 (038B)	Encoder 1 Gear Teeth 1	<input type="checkbox"/> V/f <input checked="" type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the number of gear teeth on the motor side. This parameter and F1-13 [Encoder 1 Gear Teeth 2] set the gear ratio between the motor and encoder.	0 (0 - 1000)
F1-13 (038C)	Encoder 2 Gear Teeth 1	<input type="checkbox"/> V/f <input checked="" type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the number of gear teeth on the load side. This parameter and F1-12 [Encoder 1 Gear Teeth 1] set the gear ratio between the motor and encoder.	0 (0 - 1000)
F1-14 (038D)	Encoder Open-Circuit Detect Time	<input type="checkbox"/> V/f <input checked="" type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the length of time that the drive must not receive a pulse signal to cause <i>PGo</i> [Encoder (PG) Feedback Loss]. Note: Motor speed and load conditions can cause <i>ov</i> [Overvoltage] and <i>oC</i> [Overcurrent] faults. If <i>A1-02</i> = 0 [Control Method Selection = V/f], you must set <i>H6-01</i> = 3 [Terminal RP Pulse Train Function = Speed Feedback (V/F Control)] to enable this parameter.	2.0 s (0.0 - 10.0 s)
F1-16 (03AB) Expert	Deviation 1 Detection Selection	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the function that enables and disables Deviation 1 Detection Selection. When <i>A1-02</i> = 7 [Control Method Selection = CLV/PM], this function is always enabled. Note: This parameter is available on drives with software versions PRG: 09018 and later. The "PRG" column on the nameplate on the right side of the drive identifies the software version. You can also use <i>U1-25</i> [SoftwareNumber FLASH] to identify the software version. 0 : Disabled 1 : Enabled	0 (0, 1)
F1-17 (03AC)	Deviation 2 Detection Selection	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Usually it is not necessary to change this setting. Sets the number of motor rotations that the drive will detect more than one Z pulse per rotation to detect <i>dv2</i> .	10 (0 - 100)
F1-18 (03AD)	Deviation 3 Detection Selection	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the number of rotations necessary to detect conditions that invert the torque reference and rate of acceleration and cause <i>dv3</i> [Inversion Detection].	10 (0 - 10)
F1-19 (03AE)	Deviation 4 Detection Selection	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the number of pulses necessary to cause <i>dv4</i> [Inversion Prevention Detection].	128 (0 - 5000)
F1-20 (03B4)	Encoder 1 PCB Disconnect Detect	<input type="checkbox"/> V/f <input checked="" type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the function that enables and disables detection of a disconnected encoder connection cable to cause <i>PGoH</i> [Encoder (PG) Hardware Fault]. 0 : Disabled 1 : Enabled	1 (0, 1)
F1-21 (03BC)	Encoder 1 Signal Selection	<input type="checkbox"/> V/f <input checked="" type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the number of channels for the signal to the encoder option card. 0 : A Pulse Detection 1 : AB Pulse Detection	0 (0, 1)
F1-30 (03AA)	Motor 2 Encoder PCB Port Select	<input type="checkbox"/> V/f <input checked="" type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the drive port to install the motor 2 encoder option card. 0 : CN5-C 1 : CN5-B	1 (0, 1)
F1-31 (03B0)	Encoder 2 Pulse Count (PPR)	<input type="checkbox"/> V/f <input checked="" type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the number of output pulses for each motor revolution for motor 2. Note: When <i>A1-02</i> = 3, 7 [Control Method Selection = CLV, CLV/PM], you can set the number of output pulses without setting <i>H1-xx</i> = 16 [Motor 2 Selection].	1024 ppr (1 - 60000 ppr)
F1-32 (03B1)	Encoder 2 Rotation Selection	<input type="checkbox"/> V/f <input checked="" type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the output sequence for the A and B pulses from the encoder for motor 2. This parameter assumes that the motor is operating in the forward direction. Note: When <i>A1-02</i> = 3, 7 [Control Method Selection = CLV, CLV/PM], you can set this parameter without setting <i>H1-xx</i> = 16 [Motor 2 Selection]. 0 : Pulse A leads in FWD Direction 1 : Pulse B leads in FWD Direction	0 (0, 1)
F1-33 (03B2)	Encoder 2 Gear Teeth 1	<input type="checkbox"/> V/f <input checked="" type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the number of gear teeth on the motor side for motor 2. This parameter and F1-34 [Encoder 2 Gear Teeth 2] set the gear ratio between the motor and encoder.	0 (0 - 1000)

3.9 F: Options

No. (Hex.)	Name	Description	Default (Range)
F1-34 (03B3)	Encoder 2 Gear Teeth 2	<p>V/f <input checked="" type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/M <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the number of gear teeth on the load side for motor 2. This parameter and <i>F1-33 [Encoder 2 Gear Teeth 1]</i> set the gear ratio between the motor and encoder.</p>	0 (0 - 1000)
F1-35 (03BE)	Encoder 2 Pulse Monitor Scaling	<p>V/f <input checked="" type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/M <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the ratio between the pulse input and the pulse output of the encoder as a 3-digit number for motor 2. The first digit is the numerator and the second and third digits are the denominator. The dividing ratio = (1 + x)/yz when the setting value is a 3-digit value (xyz).</p> <p>Note: When <i>A1-02 = 3, 7 [Control Method Selection = CLV, CLV/PM]</i>, you can set this parameter without setting <i>H1-xx = 16 [Motor 2 Selection]</i>.</p>	001 (001 - 032, 102 - 132 (1 - 1/32))
F1-36 (03B5)	Encoder 2 PCB Disconnect Detect	<p>V/f <input checked="" type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/M <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the function that enables and disables detection of a disconnected encoder connection cable that causes <i>PGoH [Encoder (PG) Hardware Fault]</i> for motor 2.</p> <p>Note: When <i>A1-02 = 3, 7 [Control Method Selection = CLV, CLV/PM]</i>, you can set this parameter without setting <i>H1-xx = 16 [Motor 2 Selection]</i>.</p> <p>0 : Disabled 1 : Enabled</p>	1 (0, 1)
F1-37 (03BD)	Encoder 2 Signal Selection	<p>V/f <input checked="" type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/M <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the number of channels for the signal to the encoder option for motor 2.</p> <p>Note: When <i>A1-02 = 3, 7 [Control Method Selection = CLV, CLV/PM]</i>, you can set this parameter without setting <i>H1-xx = 16 [Motor 2 Selection]</i>.</p> <p>0 : A Pulse Detection 1 : AB Pulse Detection</p>	0 (0, 1)
F1-46 (1B98)	dv2 Detection Method Selection	<p>V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/M <input type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Usually it is not necessary to change this setting. Sets the detection method for <i>dv2 [Z Pulse Noise Fault Detection]</i>.</p> <p>0 : ElectricalAngle Detection Method 1 : MechanicalAngle Detection Method</p>	0 (0, 1)
F1-47 (1B99)	Deviation 2 Detection Selection	<p>V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/M <input type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Usually it is not necessary to change this setting. Sets the sensitivity of detection for <i>dv2 [Z Pulse Noise Fault Detection]</i>. Increase the value to decrease the sensitivity.</p>	15° (0 - 180°)
F1-50 (03D2)	PG-F3 Option Encoder Type	<p>V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/M <input type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the type of encoder connected to the PG-F3 option.</p> <p>0 : EnDat Sin/Cos 1 : EnDat Serial Only 2 : HIPERFACE</p>	0 (0 - 2)
F1-51 (03D3)	PG-F3 PGoH Detection Level	<p>V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/M <input type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>The drive will detect <i>PGoH [Encoder (PG) Hardware Fault]</i> if the value of this parameter is smaller than the value of $\sqrt{\sin^2\theta + \cos^2\theta}$.</p> <p>Note: This function is enabled when <i>F1-20 = 1 [Encoder 1 PCB Disconnect Detect = Enabled]</i>.</p>	80% (1 - 100%)
F1-52 (03D4)	Serial Encoder Comm Speed	<p>V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/M <input type="checkbox"/> AOLV/PM <input checked="" type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the communication speed between the PG-F3 option and the serial encoder.</p> <p>0 : 1M/9600bps 1 : 500k/19200bps 2 : 1M/38400bps</p>	0 (0 - 2)

◆ F2: Analog Input Option

No. (Hex.)	Name	Description	Default (Range)
F2-01 (038F)	Analog Input Function Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the input method for the analog reference used with AI-A3. 0 : 3 Independent Channels 1 : 3 Channels Added Together</p>	0 (0, 1)
F2-02 (0368) RUN	Analog Input Option Card Gain	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the analog reference gain as a percentage when the maximum output frequency is 100%. Note: • Set F2-01 = 1 [Analog Input Function Selection = 3 Channels Added Together] to enable this function. • Parameter A1-02 [Control Method Selection] selects which parameter is the maximum output frequency. –A1-02 ≠ 8 [EZOLV]: E1-04 [Maximum Output Frequency] –A1-02 = 8: E9-02 [Maximum Speed]</p>	100.0% (-999.9 - +999.9%)
F2-03 (0369) RUN	Analog Input Option Card Bias	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the analog reference bias as a percentage when the maximum output frequency is 100%. Note: • Set F2-01 = 1 [Analog Input Function Selection = 3 Channels Added Together] to enable this function. • Parameter A1-02 [Control Method Selection] selects which parameter is the maximum output frequency. –A1-02 ≠ 8 [EZOLV]: E1-04 [Maximum Output Frequency] –A1-02 = 8: E9-02 [Maximum Speed]</p>	0.0% (-999.9 - +999.9%)

◆ F3: Digital Input Option

No. (Hex.)	Name	Description	Default (Range)
F3-01 (0390)	Digital Input Function Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the data format of digital input signals. This parameter is enabled when o1-03 = 0 or 1 [Frequency Display Unit Selection = 0.01 Hz or 0.01% (100% = E1-04)]. Note: When o1-03 = 2 or 3 [Revolutions Per Minute (RPM) or User Units (o1-10 & o1-11)], the input signal will be BCD. The o1-03 value sets the setting units. 0 : BCD, 1% units 1 : BCD, 0.1% units 2 : BCD, 0.01% units 3 : BCD, 1 Hz units 4 : BCD, 0.1 Hz units 5 : BCD, 0.01 Hz units 6 : BCD (5-digit), 0.02 Hz 7 : Binary input 8 : Multi-Function Digital Input</p>	8 (0 - 8)
F3-03 (03B9)	Digital Input Data Length Select	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the number of bits to set the frequency reference with DI-A3. 0 : 8-bit 1 : 12-bit 2 : 16-bit</p>	2 (0 - 2)
F3-10 (0BE3) Expert	Terminal D0 Function Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function for terminal D0 of the DI-A3 option when F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input].</p>	F (1 - 19F)
F3-11 (0BE4) Expert	Terminal D1 Function Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function for terminal D1 of the DI-A3 option when F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input].</p>	F (1 - 19F)
F3-12 (0BE5) Expert	Terminal D2 Function Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function for terminal D2 of the DI-A3 option when F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input].</p>	F (1 - 19F)
F3-13 (0BE6) Expert	Terminal D3 Function Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function for terminal D3 of the DI-A3 option when F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input].</p>	F (1 - 19F)

No. (Hex.)	Name	Description	Default (Range)
F3-14 (0BE7) Expert	Terminal D4 Function Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function for terminal D4 of the DI-A3 option when F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input].	F (1 - 19F)
F3-15 (0BE8) Expert	Terminal D5 Function Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function for terminal D5 of the DI-A3 option when F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input].	F (1 - 19F)
F3-16 (0BE9) Expert	Terminal D6 Function Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function for terminal D6 of the DI-A3 option when F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input].	F (1 - 19F)
F3-17 (0BEA) Expert	Terminal D7 Function Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function for terminal D7 of the DI-A3 option when F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input].	F (1 - 19F)
F3-18 (0BEB) Expert	Terminal D8 Function Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function for terminal D8 of the DI-A3 option when F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input].	F (1 - 19F)
F3-19 (0BEC) Expert	Terminal D9 Function Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function for terminal D9 of the DI-A3 option when F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input].	F (1 - 19F)
F3-20 (0BED) Expert	Terminal DA Function Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function for terminal DA of the DI-A3 option when F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input].	F (1 - 19F)
F3-21 (0BEE) Expert	Terminal DB Function Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function for terminal DB of the DI-A3 option when F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input].	F (1 - 19F)
F3-22 (0BEF) Expert	Terminal DC Function Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function for terminal DC of the DI-A3 option when F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input].	F (1 - 19F)
F3-23 (0BF0) Expert	Terminal DD Function Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function for terminal DD of the DI-A3 option when F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input].	F (1 - 19F)
F3-24 (0BF1) Expert	Terminal DE Function Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function for terminal DE of the DI-A3 option when F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input].	F (1 - 19F)
F3-25 (0BF2) Expert	Terminal DF Function Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function for terminal DF of the DI-A3 option when F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input].	F (1 - 19F)

◆ F4: Analog Monitor Option

No. (Hex.)	Name	Description	Default (Range)
F4-01 (0391)	Terminal V1 Function Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the monitor signal (Ux-xx) output from terminal V1. Note: Set the x-xx part of the Ux-xx [Monitor]. For example, set F4-01 = 102 to monitor U1-02 [Output Frequency]. When the x part of Ux is a letter, replace the letter (hexadecimal number) with a decimal number. For example, set F4-01 = 1301 to monitor Ud-01.	102 (000 - 9999)
F4-02 (0392) RUN	Terminal V1 Gain	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the gain of the monitor signal that is sent from terminal V1. Sets the analog signal output level from the terminal V1 at 10 V or 20 mA as 100% when an output for monitoring items is 100%.	100.0% (-999.9 - +999.9%)
F4-03 (0393)	Terminal V2 Function Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the monitor signal (Ux-xx) output from terminal V2. Note: Set the x-xx part of the Ux-xx [Monitor]. For example, set F4-03 = 103 to monitor U1-03 [Output Current]. When the x part of Ux is a letter, replace the letter (hexadecimal number) with a decimal number. For example, set F4-03 = 1301 to monitor Ud-01.	103 (000 - 9999)

No. (Hex.)	Name	Description	Default (Range)
F4-04 (0394) RUN	Terminal V2 Gain	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the gain of the monitor signal that is sent from terminal V2. Sets the analog signal output level from terminal V2 at 10 V or 20 mA as 100% when an output for monitoring items is 100%.	50.0% (-999.9 - +999.9%)
F4-05 (0395) RUN	Terminal V1 Bias	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the bias of the monitor signal that is sent from terminal V1. When an output for monitoring items is 0%, this parameter sets the analog signal output level from the V1 terminal as a percentage of 10 V or 20 mA.	0.0% (-999.9 - +999.9%)
F4-06 (0396) RUN	Terminal V2 Bias	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the bias of the monitor signal that is sent from terminal V2. Set the level of the analog signal sent from the V2 terminal at 10 V or 20 mA as 100% when an output for monitoring items is 0%.	0.0% (-999.9 - +999.9%)
F4-07 (0397)	Terminal V1 Signal Level	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the output signal level for terminal V1. 0 : 0 to 10 V 1 : -10 to 10 V	0 (0, 1)
F4-08 (0398)	Terminal V2 Signal Level	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the output signal level for terminal V2. 0 : 0 to 10 V 1 : -10 to 10 V	0 (0, 1)

◆ F5: Digital Output Option

No. (Hex.)	Name	Description	Default (Range)
F5-01 (0399)	Terminal P1-PC Function Select	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the function of terminal P1-PC on the DO-A3 option. Set <i>F5-09 = 2 [DO-A3 Output Mode Selection = Programmable (F5-01 to F5-08)]</i> to enable this function.	0 (0 - 1A7)
F5-02 (039A)	Terminal P2-PC Function Select	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the function of terminal P2-PC on the DO-A3 option. Set <i>F5-09 = 2 [DO-A3 Output Mode Selection = Programmable (F5-01 to F5-08)]</i> to enable this function.	1 (0 - 1A7)
F5-03 (039B)	Terminal P3-PC Function Select	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the function of terminal P3-PC on the DO-A3 option. Set <i>F5-09 = 2 [DO-A3 Output Mode Selection = Programmable (F5-01 to F5-08)]</i> to enable this function.	2 (0 - 1A7)
F5-04 (039C)	Terminal P4-PC Function Select	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the function of terminal P4-PC on the DO-A3 option. Set <i>F5-09 = 2 [DO-A3 Output Mode Selection = Programmable (F5-01 to F5-08)]</i> to enable this function.	4 (0 - 1A7)
F5-05 (039D)	Terminal P5-PC Function Select	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the function of terminal P5-PC on the DO-A3 option. Set <i>F5-09 = 2 [DO-A3 Output Mode Selection = Programmable (F5-01 to F5-08)]</i> to enable this function.	6 (0 - 1A7)
F5-06 (039E)	Terminal P6-PC Function Select	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the function of terminal P6-PC on the DO-A3 option. Set <i>F5-09 = 2 [DO-A3 Output Mode Selection = Programmable (F5-01 to F5-08)]</i> to enable this function.	37 (0 - 1A7)
F5-07 (039F)	Terminal M1-M2 Function Select	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the function of terminal M3-M2 on the DO-A3 option. Set <i>F5-09 = 2 [DO-A3 Output Mode Selection = Programmable (F5-01 to F5-08)]</i> to enable this function.	F (0 - 1A7)
F5-08 (03A0)	Terminal M3-M4 Function Select	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the function of terminal M3-M4 on the DO-A3 option. Set <i>F5-09 = 2 [DO-A3 Output Mode Selection = Programmable (F5-01 to F5-08)]</i> to enable this function.	F (0 - 1A7)
F5-09 (03A1)	DO-A3 Output Mode Selection	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the output mode of signals from the DO-A3 option. 0 : Predefined Individual Outputs 1 : Binary Output 2 : Programmable (F5-01 to F5-08)	0 (0 - 2)

◆ F6: Communication Options

No. (Hex.)	Name	Description	Default (Range)
F6-01 (03A2)	Communication Error Selection	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the method to stop the motor or let the motor continue operating when the drive detects <i>bUS</i> [Option Communication Error].</p> <p>0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) 3 : Alarm Only 4 : Alarm (Run at d1-04) 5 : Alarm - Ramp Stop</p>	1 (0 - 5)
F6-02 (03A3)	Comm External Fault (EF0) Detect	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the conditions at which <i>EF0</i> [Option Card External Fault] is detected.</p> <p>0 : Always Detected 1 : Detected during RUN Only</p>	0 (0, 1)
F6-03 (03A4)	Comm External Fault (EF0) Select	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the method to stop the motor or let the motor continue operating when the drive detects an <i>EF0</i> [Option Card External Fault].</p> <p>0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) 3 : Alarm Only</p>	1 (0 - 3)
F6-04 (03A5)	bUS Error Detection Time	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the delay time for the drive to detect <i>bUS</i> [Option Communication Error].</p> <p>Note: When you install an option card in the drive, the parameter value changes to 0.0 s.</p>	2.0 s (0.0 - 5.0 s)
F6-06 (03A7)	Torque Reference/Limit by Comm	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the function that enables and disables the torque reference and torque limit received from the communication option.</p> <p>0 : Disabled 1 : Enabled</p>	0 (0, 1)
F6-07 (03A8)	Multi-Step Ref @ NetRef/ ComRef	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the function that enables and disables the multi-step speed reference when the frequency reference source is NetRef or ComRef (communication option card or MEMOBUS/Modbus communications).</p> <p>0 : Disable Multi-Step References 1 : Enable Multi-Step References</p>	0 (0, 1)
F6-08 (036A)	Comm Parameter Reset @Initialize	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the function to initialize <i>F6-xx</i> and <i>F7-xx</i> parameters when the drive is initialized with <i>A1-03</i> [Initialize Parameters].</p> <p>0 : No Reset - Parameters Retained 1 : Reset Back to Factory Default</p>	0 (0, 1)
F6-10 (03B6)	CC-Link Node Address	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the node address for CC-Link communication. Restart the drive after you change the parameter setting.</p> <p>Note: Be sure to set a node address that is different than all other node addresses. Do not set this parameter to 0. Incorrect parameter settings will cause <i>AEr</i> [Station Address Setting Error] errors and the L.ERR LED on the option will come on.</p>	0 (0 - 64)
F6-11 (03B7)	CC-Link Communication Speed	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the communication speed for CC-Link communication. Restart the drive after you change the parameter setting.</p> <p>0 : 156 kbps 1 : 625 kbps 2 : 2.5 Mbps 3 : 5 Mbps 4 : 10 Mbps</p>	0 (0 - 4)
F6-14 (03BB)	BUS Error Auto Reset	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the automatic reset function for <i>bUS</i> [Option Communication Errors].</p> <p>0 : Disable 1 : Enabled</p>	0 (0, 1)

No. (Hex.)	Name	Description	Default (Range)
F6-15 (0B5B)	Comm. Option Parameters Reload	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the update method when you change F6-xx, F7-xx [Communication Options]. 0 : Reload at Next Power Cycle 1 : Reload Now 2 : Cancel Reload Request</p>	0 (0 - 2)
F6-16 (0B8A)	Gateway Mode	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the gateway mode operation and the number of connected slave drives. 0 : Disabled 1 : Enabled: 1 Slave Drives 2 : Enabled: 2 Slave Drives 3 : Enabled: 3 Slave Drives 4 : Enabled: 4 Slave Drives</p>	0 (0 to 4)
F6-20 (036B)	MECHATROLINK Station Address	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the station address for MECHATROLINK communication. Restart the drive after you change the parameter setting.</p> <p>Note:</p> <ul style="list-style-type: none"> The setting range changes if using MECHATROLINK-II or MECHATROLINK-III: –MECHATROLINK-II (SI-T3) range: 20 - 3F –MECHATROLINK-III (SI-ET3) range: 03 - EF Be sure to set a node address that is different than all other node addresses. Incorrect parameter settings will cause AEr [Station Address Setting Error] errors and the L.ERR LED on the option will come on. When the station address is 20 or 3F, the drive detects AEr errors. 	0021h (MECHATROLINK-II: 0020h - 003Fh, MECHATROLINK-III: 0003h - 00EFh)
F6-21 (036C)	MECHATROLINK Frame Size	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the frame size for MECHATROLINK communication. Restart the drive after you change the parameter setting. 0 : 32byte (M-2) / 64byte (M-3) 1 : 17byte (M-2) / 32byte (M-3)</p>	0 (0, 1)
F6-22 (036D)	MECHATROLINK Link Speed	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the communications speed for MECHATROLINK-II. Restart the drive after you change the parameter setting.</p> <p>Note:</p> <p>This parameter is only available with the MECHATROLINK-II option. 0 : 10 Mbps 1 : 4 Mbps</p>	0 (0, 1)
F6-23 (036E)	MECHATROLINK Monitor Select (E)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the MEMOBUS register used for the monitor functions of INV_CTL (drive operation control command) and INV_I/O (drive I/O control command). Restart the drive after you change the parameter setting.</p>	0000h (0000h - FFFFh)
F6-24 (036F)	MECHATROLINK Monitor Select (F)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the MEMOBUS register used for the monitor functions of INV_CTL (drive operation control command) and INV_I/O (drive I/O control command). Restart the drive after you change the parameter setting.</p>	0000h (0000h - FFFFh)
F6-25 (03C9)	MECHATROLINK Watchdog Error Sel	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the method to stop the motor or let the motor continue operating when the drive detects an E5 [MECHATROLINK Watchdog Timer Err]. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) 3 : Alarm Only</p>	1 (0 - 3)
F6-26 (03CA)	MECHATROLINK Allowable No of Err	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the number of times that the option must detect a bUS alarm to cause a bUS [Option Communication Error].</p>	2 (2 - 10 times)
F6-30 (03CB)	PROFIBUS-DP Node Address	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the node address for PROFIBUS-DP communication. Restart the drive after you change the parameter setting.</p> <p>Note:</p> <p>Be sure to set an address that is different than all other node addresses. Do not set this parameter to 0.</p>	0 (0 - 125)
F6-31 (03CC)	PROFIBUS-DP Clear Mode Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets what the drive will do after it receives the Clear Mode command. 0 : Reset 1 : Hold Previous State</p>	0 (0, 1)

3.9 F: Options

No. (Hex.)	Name	Description	Default (Range)
F6-32 (03CD)	PROFIBUS-DP Data Format Select	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/M <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the data format of PROFIBUS-DP communication. Restart the drive after you change the parameter setting.</p> <p>0 : PPO Type 1 : Conventional 2 : PPO (bit0) 3 : PPO (Enter) 4 : Conventional (Enter) 5 : PPO (bit0, Enter)</p>	0 (0 - 5)
F6-35 (03D0)	CANopen Node ID Selection	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/M <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the node address for CANopen communication. Restart the drive after you change the parameter setting.</p> <p>Note: Be sure to set an address that is different than all other node addresses. Do not set this parameter to 0. Incorrect parameter settings will cause <i>AEr [Station Address Setting Error]</i> errors and the L.ERR LED on the option will come on.</p>	0 (0 - 126)
F6-36 (03D1)	CANopen Communication Speed	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/M <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the CANopen communications speed. Restart the drive after you change the parameter setting.</p> <p>0 : Auto-detection 1 : 10 kbps 2 : 20 kbps 3 : 50 kbps 4 : 125 kbps 5 : 250 kbps 6 : 500 kbps 7 : 800 kbps 8 : 1 Mbps</p>	6 (0 - 8)
F6-45 (02FB)	BACnet Node Address	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/M <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the node address for BACnet communication.</p> <p>Note: Be sure to set an address that is different than all other node addresses. Do not set this parameter to 0.</p>	1 (0 - 127)
F6-46 (02FC)	BACnet Baud Rate	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/M <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the BACnet communications speed.</p> <p>0 : 1200 bps 1 : 2400 bps 2 : 4800 bps 3 : 9600 bps 4 : 19.2 kbps 5 : 38.4 kbps 6 : 57.6 kbps 7 : 76.8 kbps 8 : 115.2 kbps</p>	3 (0 - 8)
F6-47 (02FD)	Rx to Tx Wait Time	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/M <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the wait time for the drive to receive and send BACnet communication.</p>	5 ms (5 - 65 ms)
F6-48 (02FE)	BACnet Device Object Identifier0	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/M <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the last word of BACnet communication addresses.</p>	0 (0 - FFFF)
F6-49 (02FF)	BACnet Device Object Identifier1	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/M <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the last word of BACnet communication addresses.</p>	0 (0 - 3F)
F6-50 (03C1)	DeviceNet MAC Address	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/M <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the MAC address for DeviceNet communication. Restart the drive after you change the parameter setting.</p> <p>Note: Be sure to set a MAC address that is different than all other node addresses. Do not set this parameter to 0. Incorrect parameter settings will cause <i>AEr [Station Address Setting Error]</i> errors and the MS LED on the option will flash.</p>	64 (0 - 64)
F6-51 (03C2)	DeviceNet Baud Rate	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLVP/M <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the DeviceNet communications speed. Restart the drive after you change the parameter setting.</p> <p>0 : 125 kbps 1 : 250 kbps 2 : 500 kbps 3 : Adjustable from Network 4 : Detect Automatically</p>	4 (0 - 4)

No. (Hex.)	Name	Description	Default (Range)
F6-52 (03C3)	DeviceNet PCA Setting	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the format of data that the DeviceNet communication master sends to the drive.	21 (0 - 255)
F6-53 (03C4)	DeviceNet PPA Setting	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the format of data that the drive sends to the DeviceNet communication master.	71 (0 - 255)
F6-54 (03C5)	DeviceNet Idle Fault Detection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV If the drive does not receive data from the DeviceNet or EtherNet/IP master, this parameter sets the function to detect <i>EF0</i> [Option Card External Fault]. 0 : Enabled 1 : Disabled, No Fault Detection 2 : Vendor Specific 3 : RUN Forward 4 : RUN Reverse	0 (0 - 4)
F6-55 (03C6)	DeviceNet Baud Rate Monitor	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function to see the actual DeviceNet communications speed using the keypad. This parameter functions as a monitor only. 0 : 125 kbps 1 : 250 kbps 2 : 500 kbps	0 (0 - 2)
F6-56 (03D7)	DeviceNet Speed Scaling	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the speed scale for DeviceNet communication.	0 (-15 - +15)
F6-57 (03D8)	DeviceNet Current Scaling	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the current scale of the DeviceNet communication master.	0 (-15 - +15)
F6-58 (03D9)	DeviceNet Torque Scaling	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the torque scale of the DeviceNet communication master.	0 (-15 - +15)
F6-59 (03DA)	DeviceNet Power Scaling	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the power scale of the DeviceNet communication master.	0 (-15 - +15)
F6-60 (03DB)	DeviceNet Voltage Scaling	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the voltage scale of the DeviceNet communication master.	0 (-15 - +15)
F6-61 (03DC)	DeviceNet Time Scaling	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the time scale of the DeviceNet communication master.	0 (-15 - +15)
F6-62 (03DD)	DeviceNet Heartbeat Interval	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the heartbeat for DeviceNet communication. Set this parameter to 0 to disable the heartbeat function.	0 (0 - 10)
F6-63 (03DE)	DeviceNet Network MAC ID	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function to see the actual DeviceNet MAC address using the keypad. This parameter functions as a monitor only.	63 (0 - 63)
F6-64 (03DF)	Dynamic Out Assembly 109 Param1	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets Configurable Output 1 written to the MEMOBUS register.	0000H (0000H - FFFFH)
F6-65 (03E0)	Dynamic Out Assembly 109 Param2	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets Configurable Output 2 written to the MEMOBUS register.	0000H (0000H - FFFFH)
F6-66 (03E1)	Dynamic Out Assembly 109 Param3	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets Configurable Output 3 written to the MEMOBUS register.	0000H (0000H - FFFFH)
F6-67 (03E2)	Dynamic Out Assembly 109 Param4	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets Configurable Output 4 written to the MEMOBUS register.	0000H (0000H - FFFFH)
F6-68 (03E3)	Dynamic In Assembly 159 Param 1	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets Configurable Input 1 read from the MEMOBUS register.	0000H (0000H - FFFFH)
F6-69 (03E4)	Dynamic In Assembly 159 Param 2	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets Configurable Input 2 read from the MEMOBUS register.	0000H (0000H - FFFFH)
F6-70 (03C7)	Dynamic In Assembly 159 Param 3	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets Configurable Input 3 read from the MEMOBUS register.	0000H (0000H - FFFFH)
F6-71 (03C8)	Dynamic In Assembly 159 Param 4	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets Configurable Input 4 read from the MEMOBUS register.	0000H (0000H - FFFFH)
F6-72 (081B)	PowerLink Node Address	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the node ID for PowerLink communication. Note: Be sure to set an address that is different than all other node addresses. Do not set this parameter to 0.	0 (0 - 255)

◆ F7: Communication Options

No. (Hex.)	Name	Description	Default (Range)
F7-01 (03E5)	IP Address 1	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the first octet of the IP Address for the device that is connecting to the network. Restart the drive after you change this parameter.</p> <p>Note: When $F7-13 = 0$ [Address Mode at Startup = Static]:</p> <ul style="list-style-type: none"> Use parameters $F7-01$ to $F7-04$ [IP Address 1 to 4] to set the IP Address. Be sure to set a different IP address for each drive on the network. Also set parameters $F7-05$ to $F7-12$ [Subnet Mask 1 to 4, Gateway Address 1 to 4]. 	192 (0 - 255)
F7-02 (03E6)	IP Address 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the second octet of the IP Address for the device that is connecting to the network. Restart the drive after you change this parameter.</p> <p>Note: When $F7-13 = 0$ [Address Mode at Startup = Static]:</p> <ul style="list-style-type: none"> Use parameters $F7-01$ to $F7-04$ [IP Address 1 to 4] to set the IP Address. Be sure to set a different IP address for each drive on the network. Also set parameters $F7-05$ to $F7-12$ [Subnet Mask 1 to 4, Gateway Address 1 to 4]. 	168 (0 - 255)
F7-03 (03E7)	IP Address 3	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the third octet of the IP Address for the device that is connecting to the network. Restart the drive after you change this parameter.</p> <p>Note: When $F7-13 = 0$ [Address Mode at Startup = Static]:</p> <ul style="list-style-type: none"> Use parameters $F7-01$ to $F7-04$ [IP Address 1 to 4] to set the IP Address. Be sure to set a different IP address for each drive on the network. Also set parameters $F7-05$ to $F7-12$ [Subnet Mask 1 to 4, Gateway Address 1 to 4]. 	1 (0 - 255)
F7-04 (03E8)	IP Address 4	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the fourth octet of the IP Address for the device that is connecting to the network. Restart the drive after you change this parameter.</p> <p>Note: When $F7-13 = 0$ [Address Mode at Startup = Static]:</p> <ul style="list-style-type: none"> Use parameters $F7-01$ to $F7-04$ [IP Address 1 to 4] to set the IP Address. Be sure to set a different IP address for each drive on the network. Also set parameters $F7-05$ to $F7-12$ [Subnet Mask 1 to 4, Gateway Address 1 to 4]. 	20 (0 - 255)
F7-05 (03E9)	Subnet Mask 1	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the first octet of the subnet mask of the connected network.</p> <p>Note: Set this parameter when $F7-13 = 0$ [Address Mode at Startup = Static].</p>	255 (0 - 255)
F7-06 (03EA)	Subnet Mask 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the second octet of the subnet mask of the connected network.</p> <p>Note: Set this parameter when $F7-13 = 0$ [Address Mode at Startup = Static].</p>	255 (0 - 255)
F7-07 (03EB)	Subnet Mask 3	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the third octet of the subnet mask of the connected network.</p> <p>Note: Set this parameter when $F7-13 = 0$ [Address Mode at Startup = Static].</p>	255 (0 - 255)
F7-08 (03EC)	Subnet Mask 4	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the fourth octet of the subnet mask of the connected network.</p> <p>Note: Set this parameter when $F7-13 = 0$ [Address Mode at Startup = Static].</p>	0 (0 - 255)
F7-09 (03ED)	Gateway Address 1	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the first octet of the gateway address of the connected network.</p> <p>Note: Set this parameter when $F7-13 = 0$ [Address Mode at Startup = Static].</p>	192 (0 - 255)
F7-10 (03EE)	Gateway Address 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the second octet of the gateway address of the connected network.</p> <p>Note: Set this parameter when $F7-13 = 0$ [Address Mode at Startup = Static].</p>	168 (0 - 255)
F7-11 (03EF)	Gateway Address 3	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the third octet of the gateway address of the connected network.</p> <p>Note: Set this parameter when $F7-13 = 0$ [Address Mode at Startup = Static].</p>	1 (0 - 255)

No. (Hex.)	Name	Description	Default (Range)
F7-12 (03F0)	Gateway Address 4	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>Sets the fourth octet of the gateway address of the connected network.</p> <p>Note: Set this parameter when $F7-13 = 0$ [Address Mode at Startup = Static].</p>	1 (0 - 255)
F7-13 (03F1)	Address Mode at Startup	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>Sets the method to set option card IP addresses.</p> <p>0 : Static 1 : BOOTP 2 : DHCP</p> <p>Note:</p> <ul style="list-style-type: none"> The following setting values are available when using the PROFINET communication option card (SI-EP3). -0: Static -2: DHCP When $F7-13 = 0$, set parameters $F7-01$ to $F7-12$ [IP Address 1 to Gateway Address 4] to set the IP Address. Be sure to set a different IP address for each drive on the network. 	2 (0 - 2)
F7-14 (03F2)	Duplex Mode Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>Sets the duplex mode setting method.</p> <p>0 : Half/Half 1 : Auto/Auto 2 : Full/Full 3 : Half/Auto 4 : Half/Full 5 : Auto/Half 6 : Auto/Full 7 : Full/Half 8 : Full/Full</p>	1 (0 - 8)
F7-15 (03F3)	Communication Speed Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>Sets the communications speed.</p> <p>10 : 10/10 Mbps 100 : 100/100 Mbps 101 : 10/100 Mbps 102 : 100/10 Mbps</p>	10 (10, 100 - 102)
F7-16 (03F4)	Timeout Value	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>Sets the detection time for a communications timeout.</p> <p>Note: Set this parameter to 0.0 to disable the connection timeout function.</p>	0.0 s (0.0 - 30.0 s)
F7-17 (03F5)	EtherNet/IP Speed Scaling Factor	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>Sets the scaling factor for the speed monitor in the EtherNet/IP Class ID 2AH Object.</p>	0 (-15 - +15)
F7-18 (03F6)	EtherNet/IP Current Scale Factor	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>Sets the scaling factor for the output current monitor in the EtherNet/IP Class ID 2AH Object.</p>	0 (-15 - +15)
F7-19 (03F7)	EtherNet/IP Torque Scale Factor	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>Sets the scaling factor for the torque monitor in the EtherNet/IP Class ID 2AH Object.</p>	0 (-15 - +15)
F7-20 (03F8)	EtherNet/IP Power Scaling Factor	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>Sets the scaling factor for the power monitor in the EtherNet/IP Class ID 2AH Object.</p>	0 (-15 - +15)
F7-21 (03F9)	EtherNet/IP Voltage Scale Factor	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>Sets the scaling factor for the voltage monitor in the EtherNet/IP Class ID 2AH Object.</p>	0 (-15 - +15)
F7-22 (03FA)	EtherNet/IP Time Scaling	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>Sets the scaling factor for the time monitor in the EtherNet/IP Class ID 2AH Object.</p>	0 (-15 - +15)
F7-23 (03FB)	Dynamic Out Param 1 for CommCard	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>When you use an Ethernet/IP option, sets Output Assembly 116. The drive writes the values from Output Assembly 116 to the MEMOBUS/Modbus address register that is stored for each parameter. The drive will not write the values from Output Assembly 116 to the registers when the MEMOBUS/Modbus address is 0. When you use a PROFINET option, set this parameter to set to configurable output 1.</p>	0
F7-24 (03FC)	Dynamic Out Param 2 for CommCard	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>When you use an Ethernet/IP option, sets Output Assembly 116. The drive writes the values from Output Assembly 116 to the MEMOBUS/Modbus address register that is stored for each parameter. The drive will not write the values from Output Assembly 116 to the registers when the MEMOBUS/Modbus address is 0. When you use a PROFINET option, set this parameter to set to configurable output 2.</p>	0

3.9 F: Options

No. (Hex.)	Name	Description	Default (Range)
F7-25 (03FD)	Dynamic Out Param 3 for CommCard	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When you use an Ethernet/IP option, sets Output Assembly 116. The drive writes the values from Output Assembly 116 to the MEMOBUS/Modbus address register that is stored for each parameter. The drive will not write the values from Output Assembly 116 to the registers when the MEMOBUS/Modbus address is 0. When you use a PROFINET option, set this parameter to set to configurable output 3.</p>	0
F7-26 (03FE)	Dynamic Out Param 4 for CommCard	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets Output Assembly 116 when you use an Ethernet/IP option. The drive writes the values from Output Assembly 116 to the MEMOBUS/Modbus address register that is stored for each parameter. The drive will not write the values from Output Assembly 116 to the registers when the MEMOBUS/Modbus address is 0. When you use a ProfiNet option, set this parameter to set to configurable output 4.</p>	0
F7-27 (03FF)	Dynamic Out Param 5 for CommCard	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When you use an Ethernet/IP option, sets Output Assembly 116. The drive writes the values from Output Assembly 116 to the MEMOBUS/Modbus address register that is stored for each parameter. The drive will not write the values from Output Assembly 116 to the registers when the MEMOBUS/Modbus address is 0. When you use a PROFINET option, set this parameter to set to configurable output 5.</p>	0
F7-28 (0370)	Dynamic Out Param 6 for CommCard	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When you use an Ethernet/IP option, sets Output Assembly 116. The drive writes the values from Output Assembly 116 to the MEMOBUS/Modbus address register that is stored for each parameter. The drive will not write the values from Output Assembly 116 to the registers when the MEMOBUS/Modbus address is 0.</p>	0
F7-29 (0371)	Dynamic Out Param 7 for CommCard	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When you use an Ethernet/IP option, sets Output Assembly 116. The drive writes the values from Output Assembly 116 to the MEMOBUS/Modbus address register that is stored for each parameter. The drive will not write the values from Output Assembly 116 to the registers when the MEMOBUS/Modbus address is 0.</p>	0
F7-30 (0372)	Dynamic Out Param 8 for CommCard	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When you use an Ethernet/IP option, sets Output Assembly 116. The drive writes the values from Output Assembly 116 to the MEMOBUS/Modbus address register that is stored for each parameter. The drive will not write the values from Output Assembly 116 to the registers when the MEMOBUS/Modbus address is 0.</p>	0
F7-31 (0373)	Dynamic Out Param 9 for CommCard	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When you use an Ethernet/IP option, sets Output Assembly 116. The drive writes the values from Output Assembly 116 to the MEMOBUS/Modbus address register that is stored for each parameter. The drive will not write the values from Output Assembly 116 to the registers when the MEMOBUS/Modbus address is 0.</p>	0
F7-32 (0374)	Dynamic Out Param 10 for CommCard	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When you use an Ethernet/IP option, sets Output Assembly 116. The drive writes the values from Output Assembly 116 to the MEMOBUS/Modbus address register that is stored for each parameter. The drive will not write the values from Output Assembly 116 to the registers when the MEMOBUS/Modbus address is 0.</p>	0
F7-33 (0375)	Dynamic In Param 1 for CommCard	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets Input Assembly 166 when you use an Ethernet/IP option. The drive sends the values from the MEMOBUS/Modbus address registers stored for each parameter to Input Assembly 166. The drive returns the default register value for the option card when the MEMOBUS/Modbus address is 0 and the value sent to Input Assembly 166 is not defined. When you use a ProfiNet option, set this parameter to set to configurable input 1.</p>	0
F7-34 (0376)	Dynamic In Param 2 for CommCard	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets Input Assembly 166 when you use an Ethernet/IP option. The drive sends the values from the MEMOBUS/Modbus address registers stored for each parameter to Input Assembly 166. The drive returns the default register value for the option card when the MEMOBUS/Modbus address is 0 and the value sent to Input Assembly 166 is not defined. When you use a ProfiNet option, set this parameter to set to configurable input 2.</p>	0
F7-35 (0377)	Dynamic In Param 3 for CommCard	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets Input Assembly 166 when you use an Ethernet/IP option. The drive sends the values from the MEMOBUS/Modbus address registers stored for each parameter to Input Assembly 166. The drive returns the default register value for the option card when the MEMOBUS/Modbus address is 0 and the value sent to Input Assembly 166 is not defined. When you use a ProfiNet option, set this parameter to set to configurable input 3.</p>	0
F7-36 (0378)	Dynamic In Param 4 for CommCard	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets Input Assembly 166 when you use an Ethernet/IP option. The drive sends the values from the MEMOBUS/Modbus address registers stored for each parameter to Input Assembly 166. The drive returns the default register value for the option card when the MEMOBUS/Modbus address is 0 and the value sent to Input Assembly 166 is not defined. When you use a ProfiNet option, set this parameter to set to configurable input 4.</p>	0
F7-37 (0379)	Dynamic In Param 5 for CommCard	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets Input Assembly 166 when you use an Ethernet/IP option. The drive sends the values from the MEMOBUS/Modbus address registers stored for each parameter to Input Assembly 166. The drive returns the default register value for the option card when the MEMOBUS/Modbus address is 0 and the value sent to Input Assembly 166 is not defined. When you use a ProfiNet option, set this parameter to set to configurable input 5.</p>	0

No. (Hex.)	Name	Description	Default (Range)
F7-38 (037A)	Dynamic In Param 6 for CommCard	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets Input Assembly 166 when you use an Ethernet/IP option. The drive sends the values from the MEMOBUS/Modbus address registers stored for each parameter to Input Assembly 166. The drive returns the default register value for the option card when the MEMOBUS/Modbus address is 0 and the value sent to Input Assembly 166 is not defined.	0
F7-39 (037B)	Dynamic In Param 7 for CommCard	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets Input Assembly 166 when you use an Ethernet/IP option. The drive sends the values from the MEMOBUS/Modbus address registers stored for each parameter to Input Assembly 166. The drive returns the default register value for the option card when the MEMOBUS/Modbus address is 0 and the value sent to Input Assembly 166 is not defined.	0
F7-40 (037C)	Dynamic In Param 8 for CommCard	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets Input Assembly 166 when you use an Ethernet/IP option. The drive sends the values from the MEMOBUS/Modbus address registers stored for each parameter to Input Assembly 166. The drive returns the default register value for the option card when the MEMOBUS/Modbus address is 0 and the value sent to Input Assembly 166 is not defined.	0
F7-41 (037D)	Dynamic In Param 9 for CommCard	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets Input Assembly 166 when you use an Ethernet/IP option. The drive sends the values from the MEMOBUS/Modbus address registers stored for each parameter to Input Assembly 166. The drive returns the default register value for the option card when the MEMOBUS/Modbus address is 0 and the value sent to Input Assembly 166 is not defined.	0
F7-42 (037E)	Dynamic In Param 10 for CommCard	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets Input Assembly 166 when you use an Ethernet/IP option. The drive sends the values from the MEMOBUS/Modbus address registers stored for each parameter to Input Assembly 166. The drive returns the default register value for the option card when the MEMOBUS/Modbus address is 0 and the value sent to Input Assembly 166 is not defined.	0
F7-60 (0780)	PZD1 Write (Control Word)	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV When you use a Profibus option, set the MEMOBUS/Modbus address for PZD1 (PPO output). PZD1 (PPO output) functions as the STW when <i>F7-60 = 0 to 2</i> .	0
F7-61 (0781)	PZD2 Write (Frequency Reference)	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD2 (PPO output). PZD2 (PPO output) functions as the HSW when <i>F7-61 = 0 to 2</i> .	0
F7-62 (0782)	PZD3 Write	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD3 (PPO output). A value of 0, 1, or 2 will disable the PZD3 (PPO output) write operation to the MEMOBUS/Modbus register.	0
F7-63 (0783)	PZD4 Write	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD4 (PPO output). A value of 0, 1, or 2 will disable the PZD4 (PPO output) write operation to the MEMOBUS/Modbus register.	0
F7-64 (0784)	PZD5 Write	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD5 (PPO output). A value of 0, 1, or 2 will disable the PZD5 (PPO output) write operation to the MEMOBUS/Modbus register.	0
F7-65 (0785)	PZD6 Write	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD6 (PPO output). A value of 0, 1, or 2 will disable the PZD6 (PPO output) write operation to the MEMOBUS/Modbus register.	0
F7-66 (0786)	PZD7 Write	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD7 (PPO output). A value of 0, 1, or 2 will disable the PZD7 (PPO output) write operation to the MEMOBUS/Modbus register.	0
F7-67 (0787)	PZD8 Write	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD8 (PPO output). A value of 0, 1, or 2 will disable the PZD8 (PPO output) write operation to the MEMOBUS/Modbus register.	0
F7-68 (0788)	PZD9 Write	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD9 (PPO output). A value of 0, 1, or 2 will disable the PZD9 (PPO output) write operation to the MEMOBUS/Modbus register.	0
F7-69 (0789)	PZD10 Write	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD10 (PPO output). A value of 0, 1, or 2 will disable the PZD10 (PPO output) write operation to the MEMOBUS/Modbus register.	0
F7-70 (078A)	PZD1 Read (Status Word)	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD1 (PPO input). PZD1 (PPO input) functions as the ZSW when <i>F7-70 = 0</i> .	0
F7-71 (078B)	PZD2 Read (Output Frequency)	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD2 (PPO input). PZD2 (PPO input) functions as the HIW when <i>F7-71 = 0</i> .	0

3.9 F: Options

No. (Hex.)	Name	Description	Default (Range)
F7-72 (078C)	PZD3 Read	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD3 (PPO input). A value of 0 will disable the PZD3 (PPO input) load operation from the MEMOBUS/Modbus register.</p>	0
F7-73 (078D)	PZD4 Read	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD4 (PPO input). A value of 0 will disable the PZD4 (PPO input) load operation from the MEMOBUS/Modbus register.</p>	0
F7-74 (078E)	PZD5 Read	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD5 (PPO input). A value of 0 will disable the PZD5 (PPO input) load operation from the MEMOBUS/Modbus register.</p>	0
F7-75 (078F)	PZD6 Read	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD6 (PPO input). A value of 0 will disable the PZD6 (PPO input) load operation from the MEMOBUS/Modbus register.</p>	0
F7-76 (0790)	PZD7 Read	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD7 (PPO input). A value of 0 will disable the PZD7 (PPO input) load operation from the MEMOBUS/Modbus register.</p>	0
F7-77 (0791)	PZD8 Read	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD8 (PPO input). A value of 0 will disable the PZD8 (PPO input) load operation from the MEMOBUS/Modbus register.</p>	0
F7-78 (0792)	PZD9 Read	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD9 (PPO input). A value of 0 will disable the PZD9 (PPO input) load operation from the MEMOBUS/Modbus register.</p>	0
F7-79 (0793)	PZD10 Read	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD10 (PPO input). A value of 0 will disable the PZD10 (PPO input) load operation from the MEMOBUS/Modbus register.</p>	0

3.10 H: Terminal Functions

◆ H1: Digital Inputs

No. (Hex.)	Name	Description	Default (Range)
H1-01 (0438)	Terminal S1 Function Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function for MFDI terminal S1.</p> <p>Note: The default setting is <i>F</i> when you initialize the drive for <i>3-Wire Initialization</i> [A1-03 = 3330].</p>	40 (1 - 1FF)
H1-02 (0439)	Terminal S2 Function Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function for MFDI terminal S2.</p> <p>Note: The default setting is <i>F</i> when you initialize the drive for <i>3-Wire Initialization</i> [A1-03 = 3330].</p>	41 (1 - 1FF)
H1-03 (0400)	Terminal S3 Function Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function for MFDI terminal S3.</p>	24 (0 - 1FF)
H1-04 (0401)	Terminal S4 Function Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function for MFDI terminal S4.</p>	14 (0 - 1FF)
H1-05 (0402)	Terminal S5 Function Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function for MFDI terminal S5.</p> <p>Note: The default setting is <i>0</i> when the drive is initialized for <i>3-Wire Initialization</i> [A1-03 = 3330].</p>	3 (0 - 1FF)
H1-06 (0403)	Terminal S6 Function Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function for MFDI terminal S6.</p> <p>Note: The default setting is <i>3</i> when the drive is initialized for <i>3-Wire Initialization</i> [A1-03 = 3330].</p>	4 (0 - 1FF)
H1-07 (0404)	Terminal S7 Function Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function for MFDI terminal S7.</p> <p>Note: The default setting is <i>4</i> when the drive is initialized for <i>3-Wire Initialization</i> [A1-03 = 3330].</p>	6 (0 - 1FF)
H1-08 (0405)	Terminal S8 Function Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function for MFDI terminal S8.</p>	8 (0 - 1FF)
H1-21 (0B70)	Terminal S1 Function Selection 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the second function for MFDI terminal S1.</p>	F (1 - 19F)
H1-22 (0B71)	Terminal S2 Function Selection 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the second function for MFDI terminal S2.</p>	F (1 - 19F)
H1-23 (0B72)	Terminal S3 Function Selection 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the second function for MFDI terminal S3.</p>	F (1 - 19F)
H1-24 (0B73)	Terminal S4 Function Selection 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the second function for MFDI terminal S4.</p>	F (1 - 19F)
H1-25 (0B74)	Terminal S5 Function Selection 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the second function for MFDI terminal S5.</p>	F (1 - 19F)
H1-26 (0B75)	Terminal S6 Function Selection 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the second function for MFDI terminal S6.</p>	F (1 - 19F)
H1-27 (0B76)	Terminal S7 Function Selection 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the second function for MFDI terminal S7.</p>	F (1 - 19F)
H1-28 (0B77)	Terminal S8 Function Selection 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the second function for MFDI terminal S8.</p>	F (1 - 19F)
H1-40 (0B54)	Mbus Reg 15C0h bit0 Input Func	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets MFDI function to set to <i>bit 0</i> of the MEMOBUS register <i>15C0</i> (Hex.).</p>	F (1 - 19F)
H1-41 (0B55)	Mbus Reg 15C0h bit1 Input Func	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets MFDI function to set to <i>bit 1</i> of the MEMOBUS register <i>15C0</i> (Hex.).</p>	F (1 - 19F)
H1-42 (0B56)	Mbus Reg 15C0h bit2 Input Func	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets MFDI function to set to <i>bit 2</i> of the MEMOBUS register <i>15C0</i> (Hex.).</p>	F (1 - 19F)

■ H1-xx: Multi-Function Digital Input Setting Values

Setting Value	Function	Description
0	3-Wire Sequence	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the direction of motor rotation for 3-wire sequence.</p>
1	LOCAL/REMOTE Selection	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets drive control for the keypad (LOCAL) or an external source (REMOTE). ON : LOCAL OFF : REMOTE</p>
2	External Reference 1/2 Selection	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the drive to use Run command source 1/2 or Reference command source 1/2 when in REMOTE Mode. ON : b1-15 [Frequency Reference Selection 2], b1-16 [Run Command Selection 2] OFF : b1-01 [Frequency Reference Selection 1], b1-02 [Run Command Selection 1]</p>
3	Multi-Step Speed Reference 1	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Uses speed references d1-01 to d1-16 to set a multi-step speed reference.</p>
4	Multi-Step Speed Reference 2	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Uses speed references d1-01 to d1-16 to set a multi-step speed reference.</p>
5	Multi-Step Speed Reference 3	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Uses speed references d1-01 to d1-16 to set a multi-step speed reference.</p>
6	Jog Reference Selection	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the drive to use the JOG Frequency Reference (JOG command) set in d1-17. The JOG Frequency Reference (JOG command) overrides Frequency References 1 to 16 (d1-01 to d1-16).</p>
7	Accel/Decel Time Selection 1	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the drive to use C1-01 [Acceleration Time 1] and C1-02 [Deceleration Time 1] or C1-03 [Acceleration Time 2] and C1-04 [Deceleration Time 2].</p>
8	Baseblock Command (N.O.)	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the command that stops drive output and coasts the motor to stop when the input is ON. ON : Baseblock (drive output stop) OFF : Normal operation</p>
9	Baseblock Command (N.C.)	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the command that stops drive output and coasts the motor to stop when the input terminal is OFF. ON : Normal operation OFF : Baseblock (drive output stop)</p>
A	Accel/Decel Ramp Hold	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Momentarily pauses motor acceleration and deceleration when the terminal is turned ON, retains the output frequency that was stored in the drive at the time of the pause, and restarts motor operation.</p>
B	Overheat Alarm (oH2)	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the drive to show an oH2 [External Overheat (H1-XX=B)] alarm when the input terminal is ON. The alarm does not have an effect on drive operation.</p>
C	Analog Terminal Enable Selection	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the command that enables or disables the terminals selected in H3-14 [Analog Input Terminal Enable Sel]. ON : Terminal selected with H3-14 is enabled OFF : Terminal selected with H3-14 is disabled</p>
D	Ignore Speed Fdbk (V/f w/o Enc)	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the command to disable speed feedback control and run the drive in V/f control or use speed feedback from the encoder. ON : Speed feedback control disable (V/f Control) OFF : Speed feedback control enable (Closed Loop V/f Control)</p>
E	ASR Integral Reset	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the command to reset the integral value and use PI control or P control for the speed control loop. ON : P control OFF : PI control</p>
F	Not Used	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Use this setting for unused terminals or to use terminals in through mode.</p>
10	Up Command	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the command to use a push button switch to increase the drive frequency reference. You must also set Setting 11 [Down Command]. ON : Increases the frequency reference. OFF : Holds the current frequency reference.</p>

Setting Value	Function	Description
11	Down Command	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the command to use a push button switch to decrease the drive frequency reference. You must also set <i>Setting 10 [Up Command]</i>. ON : Decreases the frequency reference. OFF : Holds the current frequency reference.</p>
12	Forward Jog	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the command to operate the motor in the forward direction at the Jog Frequency set in <i>d1-17 [Jog Reference]</i>.</p>
13	Reverse Jog	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the command to operate the motor in the reverse direction at the Jog Frequency set in <i>d1-17 [Jog Reference]</i>.</p>
14	Fault Reset	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the command to reset the current fault when the Run command is inactive. Note: The drive ignores the fault reset command when the Run command is active. Remove the Run command before trying to reset a fault.</p>
15	Fast Stop (N.O.)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the command to ramp to stop in the deceleration time set in <i>C1-09 [Fast Stop Time]</i> when the input terminal is ON while the drive is operating.</p>
16	Motor 2 Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the command for the drive to operate motor 1 or motor 2. Stop the motors before switching. ON : Selects motor 2 OFF : Selects motor 1</p>
17	Fast Stop (N.C.)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the command to ramp to stop in the deceleration time set in <i>C1-09 [Fast Stop Time]</i> when the input terminal is ON while the drive is operating.</p>
18	Timer Function	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the command to start the timer function. Use this setting with <i>Timer Output [H2-xx = 12]</i>.</p>
19	PID Disable	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the command to disable PID control when <i>b5-01 = 1 to 8 [PID Mode Setting = Enabled]</i>. ON : PID control disabled OFF : PID control enabled</p>
1A	Accel/Decel Time Selection 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Set this function and <i>H1-xx = 7 [Accel/Decel Time Selection 1]</i> together. Sets the drive to use <i>C1-05 [Acceleration Time 3]</i> and <i>C1-06 [Deceleration Time 3]</i> or <i>C1-07 [Acceleration Time 4]</i> and <i>C1-08 [Deceleration Time 4]</i>.</p>
1B	Programming Lockout	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the command to prevent parameter changes when the terminal is OFF. ON : Programming Lockout OFF : Parameter Write Prohibit</p>
1E	Reference Sample Hold	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the command to sample the frequency reference at terminals A1, A2, or A3 and hold the frequency reference at that frequency.</p>
20	External Fault (NO-Always-Ramp)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When the terminal activates, the drive ramps to stop in the selected deceleration time. Fault relay output terminal MA-MC will turn ON, and MB-MC will turn OFF. The drive always detects external faults whether the drive is stopped or running.</p>
21	External Fault (NC-Always-Ramp)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When the terminal deactivates, the drive ramps to stop in the selected deceleration time. Fault relay output terminal MA-MC will turn ON, and MB-MC will turn OFF. The drive always detects external faults whether the drive is stopped or running.</p>
22	External Fault (NO-@Run-Ramp)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When the terminal activates during run, the drive ramps to stop in the selected deceleration time. Fault relay output terminal MA-MC will turn ON, and MB-MC will turn OFF. The drive does not detect external faults while the drive is stopped.</p>
23	External Fault (NC-@Run-Ramp)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When the terminal deactivates during run, the drive ramps to stop in the selected deceleration time. Fault relay output terminal MA-MC will turn ON, and MB-MC will turn OFF. The drive does not detect external faults while the drive is stopped.</p>
24	External Fault (NO-Always-Coast)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When the terminal activates, the drive shuts off the output and the motor coasts to stop. Fault relay output terminal MA-MC will turn ON, and MB-MC will turn OFF. The drive always detects external faults whether the drive is stopped or running.</p>
25	External Fault (NC-Always-Coast)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When the terminal deactivates, the drive shuts off the output and the motor coasts to stop. Fault relay output terminal MA-MC will turn ON, and MB-MC will turn OFF. The drive always detects external faults whether the drive is stopped or running.</p>
26	External Fault (NO-@Run-Coast)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When the terminal activates during run, the drive shuts off the output and the motor coasts to stop. Fault relay output terminal MA-MC will turn ON, and MB-MC will turn OFF. The drive does not detect external faults while the drive is stopped.</p>

3.10 H: Terminal Functions

Setting Value	Function	Description
27	External Fault (NC-@Run-Coast)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When the terminal deactivates during run, the drive shuts off the output and the motor coasts to stop. Fault relay output terminal MA-MC will turn ON, and MB-MC will turn OFF. The drive does not detect external faults while the drive is stopped.</p>
28	External Fault (NO-Always-FStop)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When the terminal activates, the drive stops the motor in the deceleration time set to <i>C1-09 [Fast Stop Time]</i>. Fault relay output terminal MA-MC turns ON, and MB-MC turns OFF. Stopped drives and running drives will detect external faults.</p>
29	External Fault (NC-Always-FStop)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When the terminal deactivates, the drive stops the motor in the deceleration time set to <i>C1-09 [Fast Stop Time]</i>. Fault relay output terminal MA-MC turns ON, and MB-MC turns OFF. Stopped drives and running drives will detect external faults.</p>
2A	External Fault (NO-@Run-FStop)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When the terminal activates during run, the drive stops the motor in the deceleration time set to <i>C1-09 [Fast Stop Time]</i>. Fault relay output terminal MA-MC turns ON, and MB-MC turns OFF. Stopped drives will not detect external faults.</p>
2B	External Fault (NC-@Run-FStop)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When the terminal deactivates during run, the drive stops the motor in the deceleration time set to <i>C1-09 [Fast Stop Time]</i>. Fault relay output terminal MA-MC turns ON, and MB-MC turns OFF. Stopped drives will not detect external faults.</p>
2C	External Fault (NO-Always-Alarm)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When the terminal activates, the keypad shows <i>EFx [External Fault (Input Terminal Sx)]</i> and the output terminal set for <i>Alarm [H2-01 to H2-03 = 10]</i> activates. The drive continues operation. Stopped drives and running drives will detect external faults.</p>
2D	External Fault (NC-Always-Alarm)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When the terminal deactivates, the keypad shows <i>EFx [External Fault (Input Terminal Sx)]</i> and the output terminal set for <i>Alarm [H2-01 to H2-03 = 10]</i> activates. The drive continues operation. Stopped drives and running drives will detect external faults.</p>
2E	External Fault (NO-@Run-Alarm)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When the terminal activates during run, the keypad shows <i>EFx [External Fault (Input Terminal Sx)]</i> and the output terminal set for <i>Alarm [H2-01 to H2-03 = 10]</i> activates. The drive continues operation. Stopped drives will not detect external faults.</p>
2F	External Fault (NC-@Run-Alarm)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When the terminal deactivates during run, the keypad shows <i>EFx [External Fault (Input Terminal Sx)]</i> and the output terminal set for <i>Alarm [H2-01 to H2-03 = 10]</i> activates. The drive continues operation. Stopped drives will not detect external faults.</p>
30	PID Integrator Reset	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the command to reset and hold the PID control integral to 0 when the terminal is ON.</p>
31	PID Integrator Hold	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the command to hold the integral value of the PID control while the terminal is activated.</p>
32	Multi-Step Speed Reference 4	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Uses speed references <i>d1-01 to d1-16</i> to set a multi-step speed reference.</p>
34	PID Soft Starter Disable	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the PID soft starter function. ON : Disable OFF : Enabled</p>
35	PID Input (Error) Invert	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the command to turn the terminal ON and OFF to switch the PID input level (polarity).</p>
3E	PID Setpoint Selection 1	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Set this function and <i>H1-xx = 3F [PID Setpoint Selection 2]</i> together. Sets the function to switch the PID setpoint to <i>b5-58 to b5-60 [PID Setpoint 2 to 4]</i>.</p>
3F	PID Setpoint Selection 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Set this function and <i>H1-xx = 3E [PID Setpoint Selection 1]</i> at the same time. Sets the function to switch the PID setpoint to <i>b5-58 to b5-60 [PID Setpoint 2 to 4]</i>.</p>
40	Forward RUN (2-Wire)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the Forward Run command for 2-wire sequence 1. Set this function and <i>H1-xx = 41 [Reverse RUN (2-Wire)]</i> together. ON : Forward Run OFF : Stop</p> <p>Note:</p> <ul style="list-style-type: none"> If you turn ON the Forward Run command terminal and the Reverse Run command terminal, it will cause an <i>EF [FWD/REV Run Command Input Error]</i> alarm and the motor will ramp to stop. Initialize the drive with a 2-wire sequence to set the Forward Run command to terminal S1. This function will not operate at the same time as <i>H1-xx = 42, 43 [Run Command (2-Wire Sequence 2), FWD/REV (2-Wire Sequence 2)]</i>.

Setting Value	Function	Description
41	Reverse RUN (2-Wire)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the Forward Run command for 2-wire sequence 1. Set this function and $H1-xx = 40$ [Forward RUN (2-Wire)] together. ON : Reverse Run OFF : Stop Note: • If you turn ON the Forward Run command terminal and the Reverse Run command terminal, it will cause an <i>EF [FWD/REV Run Command Input Error]</i> alarm and the motor will ramp to stop. • Initialize the drive with a 2-wire sequence to set the Reverse Run command to terminal S2. • This function will not operate at the same time as $H1-xx = 42, 43$ [Run Command (2-Wire Sequence 2), FWD/REV (2-Wire Sequence 2)].</p>
42	Run Command (2-Wire Sequence 2)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the Run command for 2-wire sequence 2. Set this function and $H1-xx = 43$ [FWD/REV (2-Wire Sequence 2)] together. ON : Run OFF : Stop Note: This function will not operate at the same time as $H1-xx = 40, 41$ [Forward RUN (2-Wire), Reverse RUN (2-Wire)].</p>
43	FWD/REV (2-Wire Sequence 2)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the direction of motor rotation for 2-wire sequence 2. Set this function and $H1-xx = 42$ [Run Command (2-Wire Sequence 2)] together. ON : Reverse Run OFF : Forward Run Note: • You must input the Run command to rotate the motor. • This function will not operate at the same time as $H1-xx = 40, 41$ [Forward RUN (2-Wire), Reverse RUN (2-Wire)].</p>
44	Add Offset Frequency 1 (d7-01)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function to add the offset frequency set in $d7-01$ [Offset Frequency 1] to the frequency reference when the terminal activates.</p>
45	Add Offset Frequency 2 (d7-02)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function to add the offset frequency set in $d7-02$ [Offset Frequency 2] to the frequency reference when the terminal activates.</p>
46	Add Offset Frequency 3 (d7-03)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function to add the offset frequency set in $d7-03$ [Offset Frequency 3] to the frequency reference when the terminal activates.</p>
47	Node Setup (CANopen)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function in CANopen communications to start the Node Setup function to set the drive node address from the host controller.</p>
60	DC Injection Braking Command	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the command to use DC Injection Braking to stop the motor. Note: When $A1-02 = 8$ [Control Method Selection = EZOLV], this function is available with a PM motor.</p>
61	Speed Search from Fmax	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function to use an external reference to start speed search although $b3-01 = 0$ [Speed Search Selection at Start = Disabled] to not allow speed search at start. Note: The drive will detect <i>oPE03 [Multi-Function Input Setting Err]</i> when $H1-xx = 61$ [Speed Search from Fmax] and $H1-xx = 62$ [Speed Search from Fref] are set at the same time.</p>
62	Speed Search from Fref	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function to use an external reference to start speed search although $b3-01 = 0$ [Speed Search Selection at Start = Disabled] to not allow speed search at start. Note: The drive will detect <i>oPE03 [Multi-Function Input Setting Err]</i> when $H1-xx = 61$ [Speed Search from Fmax] and $H1-xx = 62$ [Speed Search from Fref] are set at the same time.</p>
63	Field Weakening	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function to send the Field Weakening Level and Field Weakening Frequency Limit commands set in $d6-01$ [Field Weakening Level] and $d6-02$ [Field Weakening Frequency Limit] when the input terminal is activated.</p>
65	KEB Ride-Thru 1 Activate (N.C.)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets operation of the KEB1 function through the KEB Ride-Thru 1 (N.C.). ON : Normal operation OFF : Deceleration during momentary power loss</p>
66	KEB Ride-Thru 1 Activate (N.O.)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets operation of the KEB1 function through the KEB Ride-Thru 1 (N.O.). ON : Deceleration during momentary power loss OFF : Normal operation</p>
67	Communications Test Mode	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Set the function for the drive to self-test RS-485 serial communications operation.</p>

3.10 H: Terminal Functions

Setting Value	Function	Description
68	High Slip Braking (HSB) Activate	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the command to use high-slip braking to stop the motor.</p>
6 A	Drive Enable	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the function to show <i>dnE [Drive Disabled]</i> on the keypad and ignore Run commands when the terminal is OFF.</p>
71	Torque Control	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the function to switch between torque control and speed control. ON : Torque control OFF : Speed control</p>
72	Zero Servo	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the function to hold a stopped motor.</p>
75	Up 2 Command	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the function to increase the frequency reference bias value to accelerate the motor when the terminal is activated. Set this function and <i>H1-xx = 76 [Down 2 Command]</i> together.</p> <p>Note: When you use this function, set the optimal bias limit values with <i>d4-08</i> and <i>d4-09 [Up/Down 2 Bias Upper Limit/Lower Limit]</i>.</p>
76	Down 2 Command	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the function to decrease the frequency reference bias value to decelerate the motor when the terminal is activated. Set this function and <i>H1-xx = 75 [Up 2 Command]</i> together.</p> <p>Note: When you use this function, set the optimal bias limit values with <i>d4-08</i> and <i>d4-09 [Up/Down 2 Bias Upper Limit/Lower Limit]</i>.</p>
77	ASR Gain (C5-03) Select	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the function to switch the ASR proportional gain to <i>C5-01 [ASR Proportional Gain 1]</i> or <i>C5-03 [ASR Proportional Gain 2]</i>. ON : C5-03 OFF : C5-01</p>
78	Analog TorqueRef Polarity Invert	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the rotation direction of the external torque reference. ON : External torque reference reverse direction OFF : External torque reference forward direction</p>
7A	KEB Ride-Thru 2 Activate (N.C.)	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets operation of the KEB2 function through the KEB Ride-Thru 2 (N.C.). ON : Normal operation OFF : Deceleration during momentary power loss</p>
7B	KEB Ride-Thru 2 Activate (N.O.)	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets operation of the KEB2 function through the KEB Ride-Thru 2 (N.O.). ON : Deceleration during momentary power loss OFF : Normal operation</p>
7C	Short Circuit Braking (N.O.)	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets operation of Short Circuit Braking (N.O.). ON : Short Circuit Braking is enabled. OFF : Normal operation</p> <p>Note: When <i>A1-02 = 8 [Control Method Selection = EZOLV]</i>, this function is available only when you use a PM motor.</p>
7D	Short Circuit Braking (N.C.)	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets operation of Short Circuit Braking (N.C.). ON : Normal operation OFF : Short Circuit Braking is enabled.</p> <p>Note: When <i>A1-02 = 8 [Control Method Selection = EZOLV]</i>, this function is available only when you use a PM motor.</p>
7E	Reverse Rotation Identifier	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the rotation direction of the motor when in Simple Closed Loop V/f Control method and <i>F1-21, F1-37 = 0 [Encoder Option Function Selection = A pulse detection]</i>, or when in Closed Loop V/f Control method. ON : Reverse run OFF : Forward run</p>
90	DWEZ Digital Input 1	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the DriveWorksEZ digital input 1. Refer to the DriveWorksEZ online manual for more information.</p>
91	DWEZ Digital Input 2	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the DriveWorksEZ digital input 2. Refer to the DriveWorksEZ online manual for more information.</p>
92	DWEZ Digital Input 3	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the DriveWorksEZ digital input 3. Refer to the DriveWorksEZ online manual for more information.</p>

Setting Value	Function	Description
93	DWEZ Digital Input 4	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the DriveWorksEZ digital input 4. Refer to the DriveWorksEZ online manual for more information.
94	DWEZ Digital Input 5	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the DriveWorksEZ digital input 5. Refer to the DriveWorksEZ online manual for more information.
95	DWEZ Digital Input 6	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the DriveWorksEZ digital input 6. Refer to the DriveWorksEZ online manual for more information.
96	DWEZ Digital Input 7	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the DriveWorksEZ digital input 7. Refer to the DriveWorksEZ online manual for more information.
97	DWEZ Digital Input 8	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the DriveWorksEZ digital input 8. Refer to the DriveWorksEZ online manual for more information.
9F	DWEZ Disable	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets operation of the DriveWorksEZ program saved in the drive. ON : Disabled OFF : Enabled Note: Set <i>A1-07 = 2</i> [DriveWorksEZ Function Selection = Enabled/Disabled wDigital Input] to use this function.
101	!LOCAL/REMOTE Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets drive control for the keypad (LOCAL) or an external source (REMOTE). ON : REMOTE OFF : LOCAL
102	!External Reference 1/2 Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the drive to use Run command source 1/2 or Reference command source 1/2 when in REMOTE Mode. ON : <i>b1-01 = [Frequency Reference Selection 1], b1-02 [Run Command Selection 1]</i> OFF : <i>b1-15 = [Frequency Reference Selection 2], b1-16 [Run Command Selection 2]</i>
103	!Multi-Step Speed Reference 1	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Uses a combination of multi-step speed references 1, 2 and 3 (N.C.) to set <i>d1-01 to d1-08 [Multi-Step Speed Reference]</i> .
104	!Multi-Step Speed Reference 2	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Uses a combination of multi-step speed references 1, 2 and 3 (N.C.) to set <i>d1-01 to d1-08 [Multi-Step Speed Reference]</i> .
105	!Multi-Step Speed Reference 3	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Uses a combination of multi-step speed references 1, 2 and 3 (N.C.) to set <i>d1-01 to d1-08 [Multi-Step Speed Reference]</i> .
106	!Jog Reference Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the drive to use the JOG Frequency Reference (JOG command) set in <i>d1-17 [Jog Reference]</i> . The JOG Frequency Reference (JOG command) overrides the <i>d1-01 to d1-16 [References 1 to 16]</i> .
107	!Accel/Decel Time Selection 1	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the drive to use <i>C1-01, C1-02 [Acceleration/Deceleration Time 1]</i> or <i>C1-03, C1-04 [Acceleration/Deceleration Time 2]</i> .
10 A	!Accel/Decel Ramp Hold	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Momentarily pauses motor acceleration and deceleration when the terminal deactivates, retains the output frequency that was stored in the drive at the time of the pause, and restarts motor operation.
10B	!Overheat Alarm (oH2)	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the drive to display an <i>oH2 [Drive Overheat Warning]</i> alarm when the input terminal deactivates. The alarm does not have an effect on drive operation.
10C	!Analog Terminal Enable Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Enables and disables the terminal selected with the <i>H3-14 [Analog Input Term Enable Select]</i> function. ON : Input to the terminal selected with <i>H3-14</i> is disabled OFF : Input to the terminal selected with <i>H3-14</i> is enabled
10D	!Ignore Speed Fdbk (V/f w/o Enc)	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV When the terminal deactivates, the drive ignores the feedback control from the encoder and operates in V/f control. When the terminal activates, the drive uses the feedback from the encoder to control the motor speed again. ON : Speed feedback control enable (Closed Loop V/f Control) OFF : Speed feedback control disable (V/f Control)
10E	!ASR Integral Reset	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the command to reset the integral value and use PI control or P control for the speed control loop. ON : PI control OFF : P control
110	!Up Command	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Set this function and <i>111 [! Down Command]</i> together. Sets the Up command and Down command to use the two push button switches to increase and decrease the drive frequency reference. ON : Holds the current frequency reference. OFF : Increases the frequency reference.

3.10 H: Terminal Functions

Setting Value	Function	Description
111	!Down Command	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Set this function and <i>H10</i> [!Up Command] together. Sets the Up command and Down command to use the two push button switches to increase and decrease the drive frequency reference. ON : Holds the current frequency reference. OFF : Decreases the frequency reference.</p>
114	!Fault Reset	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the command to reset the current fault when the Run command is not active. Note: The drive ignores the fault reset command when the Run command is active. Remove the Run command before you try to reset a fault.</p>
116	!Motor 2 Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Switches between motor 1 or motor 2. Switch the motor while the motor is stopped. ON : Selects motor 1 OFF : Selects motor 2</p>
118	!Timer Function	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the command to start the timer function. Use this setting with <i>H2-xx = 112</i> [!Timer Output].</p>
119	!PID Disable	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the command to disable PID control with an external input when <i>b5-01 = 1 to 8</i> [PID Function Setting = Enabled]. ON : PID control enabled OFF : PID control disabled</p>
11 A	!Accel/Decel Time Selection 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Set this function and <i>H1-xx = 107</i> [!Accel/Decel Time Selection 1] together. Sets the drive to use <i>C1-01 to C1-08</i> [Acceleration/Deceleration Times 1 to 4].</p>
11B	!Programming Lockout	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the command to prevent parameter changes when the terminal is OFF. You can continue to view parameter setting values when the terminal is ON [Parameter Write Prohibit]. ON : Parameter Write Prohibit OFF : Programming Lockout</p>
11E	!Reference Sample Hold	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Samples the analog frequency reference input to the terminals A1, A2, or A3, and continues operation at the sampled frequency.</p>
130	!PID Integrator Reset	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the command to reset and hold the PID control integral to 0 when the terminal deactivates.</p>
131	!PID Integrator Hold	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the command to hold the integral value of the PID control while the terminal deactivates.</p>
132	!Multi-Step Speed Reference 4	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Uses a combination of multi-step speed references 1, 2 and 3 (N.C.) to switch <i>d1-09 to d1-16</i> [Reference 9 to 16].</p>
134	!PID Soft Starter Disable	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the PID soft starter function. ON : Enabled OFF : Disable</p>
135	!PID Input (Error) Invert	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the command to turn the terminal ON and OFF to switch the PID input level (polarity).</p>
13E	!PID Setpoint Selection 1	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Set this function and <i>H1-xx = 13F</i> [!PID Setpoint Selection 2] together. Sets the function to use the PID setpoint set in <i>b5-58 to b5-60</i> [PID setpoint2 to 4].</p>
13F	!PID Setpoint Selection 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Set this function and <i>H1-xx = 13E</i> [!PID Setpoint Selection 1] together. Sets the function to use the PID setpoint set in <i>b5-58 to b5-60</i> [PID setpoint2 to 4].</p>
144	!Add Offset Frequency 1 (d7-01)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function to add the offset frequency set in <i>d7-01</i> to the frequency reference when the terminal deactivates.</p>
145	!Add Offset Frequency 2 (d7-02)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function to add the offset frequency set in <i>d7-02</i> to the frequency reference when the terminal deactivates.</p>
146	!Add Offset Frequency 3 (d7-03)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function to add the offset frequency set in <i>d7-03</i> to the frequency reference when the terminal deactivates.</p>
147	!Node Setup (CANopen)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function in CANopen communications to start the Node Setup function to set the drive node address from the host controller.</p>

Setting Value	Function	Description
160	!DC Injection Braking Command	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the command to use DC Injection Braking to stop the motor.</p> <p>Note: When $A1-02 = 8$ [Control Method Selection = EZ Vector Control], this function is available if you use a PM motor.</p>
161	!Speed Search from Fmax	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the function to use an external reference to start speed search although $b3-01 = 0$ [Speed Search Selection at Start = Disabled] to not allow speed search at start.</p> <p>Note: The drive will detect $oPE03$ [Multi-Function Input Setting Err] when $H1-xx = 161$ [!Speed Search from Fmax] and $H1-xx = 162$ [!Speed Search from Fref] are set at the same time.</p>
162	!Speed Search from Fref	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the function to use an external reference to start speed search although $b3-01 = 0$ [Speed Search Selection at Start = Disabled] to not allow speed search at start.</p> <p>Note: The drive will detect $oPE03$ [Multi-Function Input Setting Err] when $H1-xx = 161$ [!Speed Search from Fmax] and $H1-xx = 162$ [!Speed Search from Fref] are set at the same time.</p>
163	!Field Weakening	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the function to send the Field Weakening Level and Field Weakening Frequency Limit commands set in $d6-01$ and $d6-02$ when the input terminal deactivates.</p>
167	!Communications Test Mode	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Set the function for the drive to self-test RS-485 serial communications operation.</p>
168	!High Slip Braking (HSB) Activate	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the command to use high-slip braking to stop the motor.</p>
16 A	!Drive Enable	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the function to show dnE [Drive Enabled] on the keypad and ignore Run commands when the terminal activates.</p>
171	!Torque Control	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Switches between the speed control and the torque control. ON : Speed Control OFF : Torque Control</p>
172	!Zero Servo	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Holds a stopped motor.</p>
175	!Up 2 Command	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>When the terminal deactivates, the motor accelerates by increasing the frequency reference bias value. Set !Up 2 Command and !Down 2 Command together.</p> <p>Note: When you use the functions, set the optimal bias limit values with $d4-08$ and $d4-09$ [Up/Down 2 Bias Upper Limit/Lower Limit (Up/Down 2)].</p>
176	!Down 2 Command	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>When the terminal deactivates, the motor decelerates by decreasing the frequency reference bias value. Set !Up 2 Command and !Down 2 Command together.</p> <p>Note: When you use the functions, set the optimal bias limit values with $d4-08$ and $d4-09$ [Up/Down 2 Bias Upper Limit/Lower Limit (Up/Down 2)].</p>
177	!ASR Gain (C5-03) Select	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the function to switch the ASR proportional gain to $C5-01$ [ASR Proportional Gain 1] or $C5-03$ [ASR Proportional Gain 2]. ON : C5-01 OFF : C5-03</p>
178	!Analog TorqueRef Polarity Invert	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Switches the rotation direction of the external torque reference. ON : External torque reference forward direction OFF : External torque reference reverse direction</p>
17E	!Reverse Rotation Identifier	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Lets you set the rotation direction of the motor when $F1-21, F1-37 = 0$ [Encoder Option Function Selection = A pulse detection] for Simple Closed Loop V/f Control method and Closed Loop V/f Control method. ON : Forward run OFF : Reverse run</p>

3.10 H: Terminal Functions

Setting Value	Function	Description
17F	!PID Bi-Directional Enable	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Switches the PID Bi-Directional output to enable or disable. ON : Disable OFF : Enabled</p>
19F	!DWEZ Disable	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Switches the DriveWorksEZ program saved in the drive to enable or disable. ON : Enabled OFF : Disable</p> <p>Note: Set A1-07 = 2 [DriveWorksEZ Function Selection = Digital input] to use this function.</p>

◆ H2: Multi-function Digital Output

No. (Hex.)	Name	Description	Default (Range)
H2-01 (040B)	Term M1-M2 Function Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function for MFDO terminal M1-M2. Note: When you do not use the terminal or when you use the terminal in through mode, set this parameter to <i>F</i>.</p>	0 (0 - 1FF)
H2-02 (040C)	Term M3-M4 Function Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function for MFDO terminal M3-M4. Note: When you do not use the terminal or when you use the terminal in through mode, set this parameter to <i>F</i>.</p>	1 (0 - 1FF)
H2-03 (040D)	Term M5-M6 Function Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function for MFDO terminal M5-M6. Note: When you do not use the terminal or when you use the terminal in through mode, set this parameter to <i>F</i>.</p>	2 (0 - 1FF)
H2-06 (0437)	Watt Hour Output Unit Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the unit for the output signal when H2-01 to H2-03 = 39 [MFDO Function Selection = Watt Hour Pulse Output]. 0 : 0.1 kWh units 1 : 1 kWh units 2 : 10 kWh units 3 : 100 kWh units 4 : 1000 kWh units</p>	0 (0 - 4)
H2-07 (0B3A)	Modbus Register 1 Address Select	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the address of the MEMOBUS/Modbus register output to the MFDO terminal.</p>	0001 (0001 - 1FFF)
H2-08 (0B3B)	Modbus Register 1 Bit Select	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the bit of the MEMOBUS/Modbus register output to the MFDO terminal.</p>	0000 (0000 - FFFF)
H2-09 (0B3C)	Modbus Register 2 Address Select	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the address of the MEMOBUS/Modbus register output to the MFDO terminal.</p>	0001 (0001 - 1FFF)
H2-10 (0B3D)	Modbus Register 2 Bit Select	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the bit of the MEMOBUS/Modbus register output to the MFDO terminal.</p>	0000 (0000 - FFFF)
H2-20 (1540)	Comparator 1 Monitor Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the monitor number (<i>Ux-xx</i>) for comparator 1. Note: Set the <i>x-xx</i> part of the <i>Ux-xx</i> [Monitor]. For example, set H2-20 = 102 to monitor U1-02 [Output Frequency]. When the <i>x</i> part of <i>Ux</i> is a letter, replace the letter (hexadecimal number) with a decimal number. For example, set H2-20 = 1301 to monitor Ud-01.</p>	102 (000 - 9999)
H2-21 (1541)	Comparator 1 Lower Limit	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the lower limit detection level for comparator 1 when the full scale analog output for the monitor selected in H2-20 [Comparator 1 Monitor Selection] is the 100% value.</p>	0.0% (0.0 - 300.0%)
H2-22 (1542)	Comparator 1 Upper Limit	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the upper limit detection level for comparator 1 when the full scale analog output for the monitor selected in H2-20 [Comparator 1 Monitor Selection] is the 100% value.</p>	0.0% (0.0 - 300.0%)
H2-23 (1543)	Comparator 1 Hysteresis	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the hysteresis level for comparator 1 as a percentage of the full scale analog output for the monitor selected in H2-20 [Comparator 1 Monitor Selection].</p>	0.0% (0.0 - 10.0%)

No. (Hex.)	Name	Description	Default (Range)
H2-24 (1544)	Comparator 1 On-Delay Time	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the on-delay time for comparator 1.	0.0 s (0.0 - 600.0 s)
H2-25 (1545)	Comparator 1 Off-Delay Time	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the off-delay time for comparator 1.	0.0 s (0.0 - 600.0 s)
H2-26 (1546)	Comparator 2 Monitor Selection	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the monitor number (<i>Ux-xx</i>) for comparator 2. Note: Set the <i>x-xx</i> part of the <i>Ux-xx</i> [Monitor]. For example, set <i>H2-26 = 103</i> to monitor <i>U1-03</i> [Output Current]. When the <i>x</i> part of <i>Ux</i> is a letter, replace the letter (hexadecimal number) with a decimal number. For example, set <i>H2-26 = 1301</i> to monitor <i>Ud-01</i> .	103 (000 - 9999)
H2-27 (1547)	Comparator 2 Lower Limit	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the lower limit detection level for comparator 2 as a percentage of the full scale analog output for the monitor selected in <i>H2-26</i> [Comparator 2 Monitor Selection].	0.0% (0.0 - 300.0%)
H2-28 (1548)	Comparator 2 Upper Limit	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the upper limit detection level for comparator 2 as a percentage of the full scale analog output for the monitor selected in <i>H2-26</i> [Comparator 2 Monitor Selection].	0.0% (0.0 - 300.0%)
H2-29 (1549)	Comparator 2 Hysteresis	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the hysteresis level for comparator 2 as a percentage of the full scale analog output for the monitor selected in <i>H2-26</i> [Comparator 2 Monitor Selection].	0.0% (0.0 - 10.0%)
H2-30 (154A)	Comparator 2 On-Delay Time	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the on-delay time for comparator 2.	0.0 s (0.0 - 600.0 s)
H2-31 (154B)	Comparator 2 Off-Delay Time	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the off-delay time for comparator 2.	0.0 s (0.0 - 600.0 s)
H2-32 (159A)	Comparator 1 Filter Time	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the time constant that is applied to the primary delay filter used for the analog output of the monitor selected with <i>H2-20</i> [Comparator 1 Monitor Selection].	0.0s (0.0 - 10.0 s)
H2-33 (159B)	Comparator1 Protection Selection	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets drive operation when it detects <i>CP1</i> [Comparator1 Limit Fault]. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) 3 : Alarm Only 4 : Digital Output Only	4 (0 - 4)
H2-34 (159C)	Comparator 2 Filter Time	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the time constant that is applied to the primary delay filter used for the analog output of the monitor selected with <i>H2-26</i> [Comparator 2 Monitor Selection].	0.0s (0.0 - 10.0 s)
H2-35 (159D)	Comparator2 Protection Selection	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets drive operation when it detects <i>CP2</i> [Comparator2 Limit Fault]. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) 3 : Alarm Only 4 : Digital Output Only	4 (0 - 4)
H2-36 (159E)	Comparator 1 Ineffective Time	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the length of time that <i>CP1</i> [Comparator1 Limit Fault] is disabled.	0.0 s (0.0 - 1000.0 s)
H2-37 (159F)	Comparator 2 Ineffective Time	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the length of time that <i>CP2</i> [Comparator2 Limit Fault] is disabled.	0.0 s (0.0 - 1000.0 s)
H2-40 (0B58)	Mbus Reg 15E0h bit0 Output Func	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the MFDO for bit 0 of MEMOBUS register 15E0 (Hex.).	F (0 - 1FF)
H2-41 (0B59)	Mbus Reg 15E0h bit1 Output Func	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the MFDO for bit 1 of MEMOBUS register 15E0 (Hex.).	F (0 - 1FF)
H2-42 (0B5A)	Mbus Reg 15E0h bit2 Output Func	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the MFDO for bit 2 of MEMOBUS register 15E0 (Hex.).	F (0 - 1FF)
H2-60 (1B46) Expert	Term M1-M2 Secondary Function	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the second function for terminal M1-M2. Outputs the logical calculation results of the terminals assigned to functions by <i>H2-01</i> [Term M1-M2 Function Selection].	F (0 - FF)
H2-61 (1B47) Expert	Terminal M1-M2 Logical Operation	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Sets the logical operation for the functions set in <i>H2-01</i> [Term M1-M2 Function Selection] and <i>H2-60</i> [Term M1-M2 Secondary Function].	0 (0 - 8)

3.10 H: Terminal Functions

No. (Hex.)	Name	Description	Default (Range)
H2-62 (1B48) Expert	Terminal M1-M2 Delay Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the minimum on time used to output the logical calculation results from terminal M1-M2.	0.1 s (0.0 - 25.0 s)
H2-63 (1B49) Expert	Term M3-M4 Secondary Function	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the second function for terminal M3-M4. Outputs the logical calculation results of the terminals assigned to functions by H2-02 [Term M3-M4 Function Selection].	F (0 - FF)
H2-64 (1B4A) Expert	Terminal M3-M4 Logical Operation	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the logical operation for the functions set in H2-02 [Term M3-M4 Function Selection] and H2-63 [Term M3-M4 Secondary Function].	0 (0 - 8)
H2-65 (1B4B) Expert	Terminal M3-M4 Delay Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the minimum on time used to output the logical calculation results from terminal M3-M4.	0.1 s (0.0 - 25.0 s)
H2-66 (1B4C) Expert	Term M5-M6 Secondary Function	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the second function for terminal M5-M6. Outputs the logical calculation results of the terminals assigned to functions by H2-03 [Terminal M5-M6 Function Select].	F (0 - FF)
H2-67 (1B4D) Expert	Terminal M5-M6 Logical Operation	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the logical operation for the functions set in H2-03 [Term M5-M6 Function Selection] and H2-66 [Term M5-M6 Secondary Function].	0 (0 - 8)
H2-68 (1B4E) Expert	Terminal M5-M6 Delay Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the minimum on time used to output the logical calculation results from terminal M5-M6.	0.1 s (0.0 - 25.0 s)

■ H2-xx: MFDO Setting Values

Setting Value	Function	Description																														
0	During Run	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV The terminal activates when you input a Run command and when the drive is outputting voltage. ON : Drive is running OFF : Drive is stopping																														
1	Zero Speed	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV The terminal activates when the output frequency < E1-09 [Minimum Output Frequency] or b2-01 [DC Injection/Zero SpeedThreshold]. Note: Parameter A1-02 [Control Method Selection] selects which parameter is the reference. <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>A1-02 Setting</th> <th>Control method selection</th> <th>Parameter Used as the Reference</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>V/f</td> <td>E1-09</td> </tr> <tr> <td>1</td> <td>CL-V/f</td> <td>E1-09</td> </tr> <tr> <td>2</td> <td>OLV</td> <td>b2-01</td> </tr> <tr> <td>3</td> <td>CLV</td> <td>E1-09</td> </tr> <tr> <td>4</td> <td>AOLV</td> <td>E1-09</td> </tr> <tr> <td>5</td> <td>OLV/PM</td> <td>E1-09</td> </tr> <tr> <td>6</td> <td>AOLV/PM</td> <td>E1-09</td> </tr> <tr> <td>7</td> <td>CLV/PM</td> <td>b2-01</td> </tr> <tr> <td>8</td> <td>EZOLV</td> <td>E1-09</td> </tr> </tbody> </table> ON : Output frequency < value of E1-09 or b2-01. OFF : Output frequency ≥ value of E1-09 or b2-01.	A1-02 Setting	Control method selection	Parameter Used as the Reference	0	V/f	E1-09	1	CL-V/f	E1-09	2	OLV	b2-01	3	CLV	E1-09	4	AOLV	E1-09	5	OLV/PM	E1-09	6	AOLV/PM	E1-09	7	CLV/PM	b2-01	8	EZOLV	E1-09
A1-02 Setting	Control method selection	Parameter Used as the Reference																														
0	V/f	E1-09																														
1	CL-V/f	E1-09																														
2	OLV	b2-01																														
3	CLV	E1-09																														
4	AOLV	E1-09																														
5	OLV/PM	E1-09																														
6	AOLV/PM	E1-09																														
7	CLV/PM	b2-01																														
8	EZOLV	E1-09																														
2	Speed Agree 1	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV The terminal turns on when the output frequency is in the range of the frequency reference ± L4-02 [Speed Agree Detection Width]. Note: • The detection function operates in the two motor rotation directions. • The drive outputs the motor speed status when A1-02 = 3, 7 [CLV, CLV/PM]. It also outputs the motor speed status when A1-02 = 4 and n4-72 = 1. ON : The output frequency is in the range of "frequency reference ± L4-02". OFF : The output frequency does not align with the frequency reference although the drive is running.																														

Setting Value	Function	Description
3	User-Set Speed Agree 1	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when the output frequency is in the range of $L4-01$ [Speed Agree Detection Level] \pm $L4-02$ [Speed Agree Detection Width] and in the range of the frequency reference \pm $L4-02$.</p> <p>Note:</p> <ul style="list-style-type: none"> The detection function operates in the two motor rotation directions. The drive uses the $L4-01$ value as the forward/reverse detection level. The drive outputs the motor speed status when $A1-02 = 3, 7$ [Control Method Selection = CLV, CLV/PM]. It also outputs the motor speed status when $A1-02 = 4$ and $n4-72 = 1$. <p>ON : The output frequency is in the range of "$L4-01 \pm L4-02$" and the range of frequency reference \pm $L4-02$.</p> <p>OFF : The output frequency is not in the range of "$L4-01 \pm L4-02$" or the range of frequency reference \pm $L4-02$.</p>
4	Frequency Detection 1	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the output frequency $>$ "$L4-01$ [Speed Agree Detection Level] + $L4-02$ [Speed Agree Detection Width]". After the terminal deactivates, the terminal stays deactivated until the output frequency is at the value of $L4-01$.</p> <p>Note:</p> <ul style="list-style-type: none"> The detection function operates in the two motor rotation directions. The drive uses the $L4-01$ value as the forward/reverse detection level. The drive outputs the motor speed status when $A1-02 = 3, 7$ [Control Method Selection = CLV, CLV/PM]. It also outputs the motor speed status when $A1-02 = 4$ [AOLV] and $n4-72 = 1$ [Speed Feedback Mode = With Encoder]. <p>ON : The output frequency $<$ $L4-01$, or the output frequency \leq "$L4-01 + L4-02$".</p> <p>OFF : The output frequency $>$ "$L4-01 + L4-02$".</p>
5	Frequency Detection 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when the output frequency $>$ $L4-01$ [Speed Agree Detection Level]. After the terminal activates, the terminal stays activated until the output frequency is at the value of "$L4-01 - L4-02$".</p> <p>Note:</p> <ul style="list-style-type: none"> The detection function operates in the two motor rotation directions. The drive uses the $L4-01$ value as the forward/reverse detection level. The drive outputs the motor speed status when $A1-02 = 3, 7$ [Control Method Selection = CLV, CLV/PM]. It also outputs the motor speed status when $A1-02 = 4$ [AOLV] and $n4-72 = 1$ [Speed Feedback Mode = With Encoder]. <p>ON : The output frequency $>$ $L4-01$</p> <p>OFF : The output frequency $<$ "$L4-01 - L4-02$", or the output frequency \leq $L4-01$</p>
6	Drive Ready	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when the drive is ready and running.</p>
7	DC Bus Undervoltage	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when the DC bus voltage or control circuit power supply is at the voltage set in $L2-05$ [Undervoltage Detection Lvl (Uv1)] or less. The terminal also activates when there is a fault with the DC bus voltage.</p> <p>ON : The DC bus voltage \leq $L2-05$</p> <p>OFF : The DC bus voltage $>$ $L2-05$</p>
8	During Baseblock (N.O.)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates during baseblock. When the drive is in baseblock, the drive output transistor stops switching and does not make DC bus voltage.</p> <p>ON : During baseblock</p> <p>OFF : The drive is not in baseblock.</p>
9	Frequency Reference from Keypad	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the selected frequency reference source.</p> <p>ON : The keypad is the frequency reference source.</p> <p>OFF : Parameter $b1-01$ or $b1-15$ [Frequency Reference Selection 1 or 2] is the frequency reference source.</p>
A	Run Command Source	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the selected Run command source.</p> <p>ON : The keypad is the Run command source.</p> <p>OFF : Parameter $b1-02$ or $b1-16$ [Run Command Selection 1 or 2] is the Run command source.</p>
B	Torque Detection 1 (N.O.)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when the drive detects overtorque or undertorque.</p> <p>ON : The output current/torque $>$ $L6-02$ [Torque Detection Level 1], or the output current/torque $<$ $L6-02$ for longer than the time set in $L6-03$ [Torque Detection Time 1].</p>
C	Frequency Reference Loss	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when the drive detects a loss of frequency reference.</p>
D	Braking Resistor Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when the mounting-type braking resistor is overheating or when there is a braking transistor fault.</p>
E	Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when the drive detects a fault.</p> <p>Note:</p> <p>The terminal will not activate for $CPF00$ and $CPF01$ [Control Circuit Error] faults.</p>
F	Not Used	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Use this setting for unused terminals or to use terminals in through mode. Also use this setting as the PLC contact output via MEMOBUS/Modbus or the communication option. This signal does not function if you do not configure signals from the PLC.</p>

3.10 H: Terminal Functions

Setting Value	Function	Description
10	Alarm	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when the drive detects a minor fault.</p>
11	Fault Reset Command Active	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when the drive receives the Reset command from the control circuit terminal, serial communications, or the communication option.</p>
12	Timer Output	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the terminal as the timer output. Use this setting with the timer input set in $H1-xx = 18$ [MFDI Function Selection = Timer Function].</p>
13	Speed Agree 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when the output frequency is in the range of the frequency reference $\pm L4-04$ [Speed Agree Detection Width (+/-)].</p> <p>Note:</p> <ul style="list-style-type: none"> The detection function operates in the two motor rotation directions. The drive outputs the motor speed status when $A1-02 = 3, 7$ [Control Method Selection = CLV, CLV/PM]. <p>ON : The output frequency is in the range of "frequency reference $\pm L4-04$".</p> <p>OFF : The output frequency is not in the range of "frequency reference $\pm L4-04$".</p>
14	User-Set Speed Agree 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when the output frequency is in the range of $L4-03$ [Speed Agree Detection Level (+/-)] $\pm L4-04$ [Speed Agree Detection Width (+/-)] and in the range of the frequency reference $\pm L4-04$.</p> <p>Note:</p> <ul style="list-style-type: none"> The detection level set in $L4-03$ is a signed value. The drive will only detect in one direction. The drive outputs the motor speed status when $A1-02 = 3, 7$ [Control Method Selection = CLV, CLV/PM]. <p>ON : The output frequency is in the range of "$L4-03 \pm L4-04$" and the range of frequency reference $\pm L4-04$".</p> <p>OFF : The output frequency is not in the range of "$L4-03 \pm L4-04$" or the range of frequency reference $\pm L4-04$".</p>
15	Frequency Detection 3	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the output frequency $> L4-03$ [Speed Agree Detection Level (+/-)] + $L4-04$ [Speed Agree Detection Width (+/-)]. After the terminal deactivates, the terminal stays deactivated until the output frequency is at the value of $L4-03$.</p> <p>Note:</p> <ul style="list-style-type: none"> The detection level set in $L4-03$ is a signed value. The drive will only detect in one direction. The drive outputs the motor speed status when $A1-02 = 3, 7$ [Control Method Selection = CLV, CLV/PM]. <p>ON : The output frequency $< L4-03$, or the output frequency $\leq L4-03 + L4-04$</p> <p>OFF : The output frequency $> L4-03 + L4-04$</p>
16	Frequency Detection 4	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when the output frequency $> L4-03$ [Speed Agree Detection Level (+/-)]. After the terminal activates, the terminal stays activated until the output frequency is at the value of "$L4-03 - L4-04$".</p> <p>Note:</p> <ul style="list-style-type: none"> The detection level set in $L4-03$ is a signed value. The drive will only detect in one direction. The drive outputs the motor speed status when $A1-02 = 3, 7$ [Control Method Selection = CLV, CLV/PM]. <p>ON : The output frequency $> L4-03$</p> <p>OFF : The output frequency $< L4-03 - L4-04$, or the output frequency $\leq L4-03$</p>
17	Torque Detection 1 (N.C.)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the drive detects overtorque or undertorque.</p> <p>OFF : The output current/torque $> L6-02$ [Torque Detection Level 1], or the output current/torque $< L6-02$ for longer than the time set in $L6-03$ [Torque Detection Time 1].</p>
18	Torque Detection 2 (N.O.)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when the drive detects overtorque or undertorque.</p> <p>ON : The output current/torque $> L6-05$ [Torque Detection Level 2], or the output current/torque $< L6-05$ for longer than the time set in $L6-06$ [Torque Detection Time 2].</p>
19	Torque Detection 2 (N.C.)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the drive detects overtorque or undertorque.</p> <p>OFF : The output current/torque $> L6-05$ [Torque Detection Level 2], or the output current/torque $< L6-05$ for longer than the time set in $L6-06$ [Torque Detection Time 2].</p>
1A	During Reverse	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when the motor operates in the reverse direction.</p> <p>ON : The motor is operating in the reverse direction.</p> <p>OFF : The motor is operating in the forward direction or the motor stopped.</p>
1B	During Baseblock (N.C.)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates during baseblock. When the drive is in baseblock, the drive output transistor stops switching and does not make DC bus voltage.</p> <p>ON : The drive is not in baseblock.</p> <p>OFF : During baseblock</p>
1C	Motor 2 Selected	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when you select motor 2.</p> <p>ON : Motor 2 Selected</p> <p>OFF : Motor 1 Selected</p>

Setting Value	Function	Description
1D	During Regeneration	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>The terminal activates on when the motor is regenerating. ON : Motor is regenerating. OFF : Motor is operating or stopped.</p>
1E	Executing Auto-Restart	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>The terminal activates when the Auto Restart function is trying to restart after a fault.</p>
1F	Motor Overload Alarm (oL1)	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>The terminal activates when the electronic thermal protection value of the motor overload protective function is a minimum of 90% of the detection level.</p>
20	Drive Overheat Pre-Alarm (oH)	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>The terminal activates when the drive heatsink temperature is at the level set with L8-02 [Overheat Alarm Level].</p>
21	Safety Monitor Output Status	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>The terminal activates (safety stop state) when the safety circuit and safety diagnosis circuit are operating correctly and when terminals H1-HC and H2-HC are OFF (Open). ON : Safety stop state OFF : Safety circuit fault or RUN/READY</p>
22	Mechanical Weakening Detection	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>The terminal activates when the drive detects mechanical weakening.</p>
2F	Maintenance Notification	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>The terminal activates when drive components are at their estimated maintenance period. Tells you about the maintenance period for these items:</p> <ul style="list-style-type: none"> • IGBT • Cooling Fan • Capacitor • Soft charge bypass relay
30	During Torque Limit	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>The terminal activates when the torque reference is the torque limit set with L7 parameters, H3-02, H3-06, or H3-10 [MFAI Function Selection].</p>
31	During Speed Limit	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>The terminal activates when the speed limit is active.</p>
32	In Speed Limit During Trq Ctrl	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>The motor accelerates in the forward direction or the reverse direction after enabling torque control and the externally input torque reference is disproportionate to the load. The output terminal activates when this speed is not higher than a constant speed and the motor speed is at the speed limit. This does not include operation when the drive is stopped.</p>
33	Zero Servo Complete	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>The terminal activates when positioning in the range set with b9-02 [Zero Servo Completion Window] completes after sending the Zero-Servo command.</p>
37	During Frequency Output	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>The terminal activates when the drive outputs frequency. ON : The drive is outputting frequency. OFF : The drive is not outputting frequency.</p>
38	Drive Enabled	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>This terminal activates when the H1-xx = 6A [Drive Enable] terminal activates.</p>
39	Watt Hour Pulse Output	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>Outputs the pulse that shows the watt hours.</p>
3C	LOCAL Control Selected	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>The terminal activates when the Run command source or frequency reference source is LOCAL. ON : LOCAL OFF : REMOTE</p>
3D	During Speed Search	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>The terminal activates when the drive is doing speed search.</p>
3E	PID Feedback Low	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>The terminal activates when the drive detects FbL [PID Feedback Loss].</p>
3F	PID Feedback High	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>The terminal activates when the drive detects FbH [Excessive PID Feedback].</p>
4 A	During KEB Ride-Thru	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>The activates during KEB Ride-Thru.</p>

3.10 H: Terminal Functions

Setting Value	Function	Description
4B	During Short Circuit Braking	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates during Short Circuit Braking.</p> <p>Note: When $A1-02 = 8$ [Control Method Selection = EZOLV], this function is available only when you use a PM motor.</p>
4C	During Fast Stop	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when the fast stop is in operation.</p>
4D	oH Pre-Alarm Time Limit	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when $L8-03 = 4$ [Overheat Pre-Alarm Selection = Operate at Reduced Speed (L8-19)] and oH [Heatsink Overheat] does not clear after the drive decreases the frequency for 10 cycles.</p>
4E	Braking Transistor Fault (rr)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when the internal braking transistor overheats and the drive detects an rr [Dynamic Braking Transistor Fault] fault.</p>
4F	Braking Resistor Overheat (rH)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when the braking resistor overheats and the drive detects an rH [Braking Resistor Overheat] fault.</p>
60	Internal Cooling Fan Failure	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when the drive detects a cooling fan failure in the drive.</p>
61	Pole Position Detection Complete	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when drive receives a Run command and the drive detects the motor magnetic pole position of the PM motor.</p>
62	Modbus Reg 1 Status Satisfied	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when the bit specified by H2-08 [Modbus Register 1 Bit Select] for the MEMOBUS register address set with H2-07 [Modbus Register 1 Address Select] activates.</p>
63	Modbus Reg 2 Status Satisfied	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when the bit specified by H2-10 [Modbus Register 2 Bit Select] for the MEMOBUS register address set with H2-09 [Modbus Register 2 Address Select] activates.</p>
65	Standby Output	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates after the drive stops operating and after the time set with b8-51 [Standby Mode Wait Time].</p> <p>ON : The Run command turns on and the magnetic contactor on the input side turns on.</p> <p>OFF : The Run command turns off and the drive stops operating. Then, the magnetic contactor on the input side turns off after the time set in b8-51 [Standby Mode Wait Time] elapses.</p>
66	Comparator1	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates if the monitor value set with H2-20 [Comparator 1 Monitor Selection] is in range of the values of H2-21 [Comparator 1 Lower Limit] and H2-22 [Comparator 1 Upper Limit] for the time set in H2-24 [Comparator 1 On-Delay Time].</p>
67	Comparator2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates if the monitor value set with H2-26 [Comparator 2 Monitor Selection] is not in the range of the values of H2-27 [Comparator 2 Lower Limit] and H2-28 [Comparator 2 Upper Limit] for the time set in H2-30 [Comparator 2 On-Delay Time].</p>
69	External Power 24V Supply	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when there is an external 24V power supply between terminals PS-AC.</p> <p>ON : The external 24V power supply is supplying power.</p> <p>OFF : The external 24V power supply is not supplying power.</p>
6 A	Data Logger Error	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when the drive detects a LoG [Com Error / Abnormal SD card].</p>
90	DWEZ Digital Output 1	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the DriveWorksEZ digital output 1. Refer to the DriveWorksEZ online manual for more information.</p>
91	DWEZ Digital Output 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the DriveWorksEZ digital output 2. Refer to the DriveWorksEZ online manual for more information.</p>
92	DWEZ Digital Output 3	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the DriveWorksEZ digital output 3. Refer to the DriveWorksEZ online manual for more information.</p>
93	DWEZ Digital Output 4	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the DriveWorksEZ digital output 4. Refer to the DriveWorksEZ online manual for more information.</p>
A0	DWEZ Extended Digital Output 1	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the DriveWorksEZ digital output 1. Refer to the DriveWorksEZ online manual for more information.</p>
A1	DWEZ Extended Digital Output 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the DriveWorksEZ digital output 2. Refer to the DriveWorksEZ online manual for more information.</p>
A2	DWEZ Extended Digital Output 3	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the DriveWorksEZ digital output 3. Refer to the DriveWorksEZ online manual for more information.</p>
A3	DWEZ Extended Digital Output 4	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the DriveWorksEZ digital output 4. Refer to the DriveWorksEZ online manual for more information.</p>
A4	DWEZ Extended Digital Output 5	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the DriveWorksEZ digital output 5. Refer to the DriveWorksEZ online manual for more information.</p>

Setting Value	Function	Description																														
A5	DWEZ Extended Digital Output 6	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the DriveWorksEZ digital output 6. Refer to the DriveWorksEZ online manual for more information.</p>																														
A6	DWEZ Extended Digital Output 7	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the DriveWorksEZ digital output 7. Refer to the DriveWorksEZ online manual for more information.</p>																														
A7	DWEZ Extended Digital Output 8	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the DriveWorksEZ digital output 8. Refer to the DriveWorksEZ online manual for more information.</p>																														
100	!During Run	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when you input a Run command and when the drive is outputting voltage. ON : Drive is stopping OFF : Drive is running</p>																														
101	!Zero Speed	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the output frequency is less than <i>E1-09</i> [Minimum Output Frequency] or <i>b2-01</i> [DC Injection/Zero SpeedThreshold].</p> <p>Note: Parameter <i>A1-02</i> [Control Method Selection] selects which parameter is the reference.</p> <table border="1"> <thead> <tr> <th>A1-02 Setting</th> <th>Description</th> <th>Parameter Used as the Reference</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Open Loop V/f Control</td> <td><i>E1-09</i></td> </tr> <tr> <td>1</td> <td>V/f Control with Encoder</td> <td><i>E1-09</i></td> </tr> <tr> <td>2</td> <td>Open Loop Vector</td> <td><i>b2-01</i></td> </tr> <tr> <td>3</td> <td>Closed Loop Vector</td> <td><i>E1-09</i></td> </tr> <tr> <td>4</td> <td>Advanced OpenLoop Vector Control</td> <td><i>E1-09</i></td> </tr> <tr> <td>5</td> <td>PM Open Loop Vector Control</td> <td><i>E1-09</i></td> </tr> <tr> <td>6</td> <td>PM Advanced Open Loop Vector</td> <td><i>E1-09</i></td> </tr> <tr> <td>7</td> <td>PM Closed Loop Vector Control</td> <td><i>b2-01</i></td> </tr> <tr> <td>8</td> <td>EZ Open Loop Vector Control</td> <td><i>E1-09</i></td> </tr> </tbody> </table> <p>ON : The output frequency is the value of <i>E1-09</i> or more, or <i>b2-01</i> or more. OFF : The output frequency is less than the value of <i>E1-09</i> or <i>b2-01</i>.</p>	A1-02 Setting	Description	Parameter Used as the Reference	0	Open Loop V/f Control	<i>E1-09</i>	1	V/f Control with Encoder	<i>E1-09</i>	2	Open Loop Vector	<i>b2-01</i>	3	Closed Loop Vector	<i>E1-09</i>	4	Advanced OpenLoop Vector Control	<i>E1-09</i>	5	PM Open Loop Vector Control	<i>E1-09</i>	6	PM Advanced Open Loop Vector	<i>E1-09</i>	7	PM Closed Loop Vector Control	<i>b2-01</i>	8	EZ Open Loop Vector Control	<i>E1-09</i>
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7	PM Closed Loop Vector Control	<i>b2-01</i>																														
8	EZ Open Loop Vector Control	<i>E1-09</i>																														
102	!Speed Agree 1	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the output frequency is in the range of the frequency reference $\pm L4-02$ [Speed Agree Detection Width].</p> <p>Note: In CLV, the motor speed is the reference. ON : The output frequency does not align with the frequency reference although the drive is running. OFF : The output frequency is in the range of "frequency reference $\pm L4-02$".</p>																														
103	!User-Set Speed Agree 1	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the output frequency is in the range of <i>L4-01</i> [Speed Agree Detection Level] $\pm L4-02$ [Speed Agree Detection Width] and in the range of the frequency reference $\pm L4-02$.</p> <p>Note:</p> <ul style="list-style-type: none"> The detection function operates in the two motor rotation directions. The drive uses the <i>L4-01</i> value as the forward/reverse detection level. When using Closed Loop Vector Control, this is the value of "Motor Speed $\pm L4-02$". <p>ON : The output frequency is not in the range of "<i>L4-01</i> $\pm L4-02$" nor the range of frequency reference $\pm L4-02$. OFF : The output frequency is in the range of "<i>L4-01</i> $\pm L4-02$" and the range of frequency reference $\pm L4-02$.</p>																														
104	!Frequency Detection 1	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the output frequency is higher than the value of <i>L4-01</i> [Speed Agree Detection Level] + <i>L4-02</i> [Speed Agree Detection Width]. When the terminal activates, it stays activated until the output frequency = <i>L4-01</i>.</p> <p>Note:</p> <ul style="list-style-type: none"> The detection function operates in the two motor rotation directions. The drive uses the <i>L4-01</i> value as the forward/reverse detection level. In CLV, the motor speed is the reference. <p>ON : The output frequency is higher than <i>L4-01</i> + <i>L4-02</i>. OFF : The output frequency is less than <i>L4-01</i> or is not more than <i>L4-01</i> + <i>L4-02</i>.</p>																														
105	!Frequency Detection 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the output frequency is higher than the value of <i>L4-01</i> [Speed Agree Detection Level]. When the terminal deactivates, it stays deactivated until the output frequency = <i>L4-01</i> - <i>L4-02</i>.</p> <p>ON : The output frequency is less than "<i>L4-01</i> - <i>L4-02</i>," or it is not more than <i>L4-01</i>. OFF : The output frequency is more than <i>L4-01</i>.</p>																														
106	!Drive Ready	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the drive is ready and running.</p>																														

3.10 H: Terminal Functions

Setting Value	Function	Description
107	!DC Bus Undervoltage	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the DC bus voltage or control circuit power supply is at or below the voltage set in L2-05 [Undervoltage Detection Lvl (Uv1)]. The terminal also deactivates when there is a fault with the DC bus voltage. ON : The DC bus voltage is more than the setting value of L2-05. OFF : The DC bus voltage is less than the setting value of L2-05.</p>
108	During Baseblock (N.C.)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates during baseblock. When the drive is in baseblock, the drive output transistor stops switching and does not make DC bus voltage. ON : The drive is not in baseblock. OFF : During baseblock</p>
109	!Frequency Reference from Keypad	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the selected frequency reference source. ON : b1-01 [Frequency Reference Selection 1] or b1-15 [Frequency Reference Selection 2] is the frequency reference source. OFF : The keypad is the frequency reference source.</p>
10A	!Run Command from Keypad	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the selected Run command source. ON : b1-02 [Run Command Selection 1] or b1-16 [Run Command Selection 2] is the Run command source. OFF : The keypad is the Run command source.</p>
10B	Torque Detection 1 (N.C.)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the drive detects overtorque or undertorque. OFF : The output current/torque exceeds the torque value set with L6-02 [Torque Detection Level 1], or the level has dropped and remained in this state longer than the time set with L6-03 [Torque Detection Time 1].</p>
10C	!Frequency Reference Loss	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the drive detects a loss of frequency reference.</p>
10D	!Braking Resistor Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the mounting-type braking resistor is overheating or when there is a braking transistor fault.</p>
10E	!Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the drive detects a fault. Note: Faults CPF00 and CPF01 [Control Circuit Error] are excluded.</p>
110	!Alarm	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the drive detects a minor fault.</p>
111	!Fault Reset Command Active	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the drive receives the Reset command from the control circuit terminal, serial communications, or the communication option.</p>
112	!Timer Output	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the terminal as the timer output. Use this setting with the timer input set in H1-xx = 118 [MFDI Function Selection = !Timer Function].</p>
113	!Speed Agree 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the output frequency is in the range of the frequency reference \pm L4-04 [Speed Agree Detection Width(+/-)]. Note: The drive uses the motor speed as the reference in CLV and CLV/PM. ON : The output frequency is not in the range of "frequency reference \pm L4-04". OFF : The output frequency is in the range of "frequency reference \pm L4-04".</p>
114	!User-Set Speed Agree 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the output frequency is in the range of L4-03 [Speed Agree Detection Level(+/-)] \pm L4-04 [Speed Agree Detection Width(+/-)] and in the range of the frequency reference \pm L4-04. ON : The output frequency is not in the range of "L4-03 \pm L4-04" nor the range of frequency reference \pm L4-04. OFF : The output frequency is in the range of "L4-03 \pm L4-04" and the range of frequency reference \pm L4-04.</p>
115	!Frequency Detection 3	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when the output frequency is higher than "L4-03 [Speed Agree Detection Level(+/-)] + L4-04 [Speed Agree Detection Width(+/-)]". When the terminal activates, it stays activated until the output frequency = L4-03. Note: • The detection level set in L4-03 is a signed value. Detections only occur one specific orientation. • The drive uses the motor speed as the reference in CLV and CLV/PM. ON : The output frequency is higher than L4-03 + L4-04. OFF : The output frequency is less than L4-03 or is not more than L4-03 + L4-04.</p>
116	!Frequency Detection 4	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the output frequency is higher than the value of L4-03 [Speed Agree Detection Level(+/-)]. After the terminal deactivates, the terminal stays deactivated until the output frequency = L4-03 - L4-04. ON : The output frequency is less than "L4-03 - L4-04," or it is not more than L4-03. OFF : The output frequency is more than L4-03.</p>

Setting Value	Function	Description
117	Torque Detection 1 (N.O.)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when the drive detects overtorque or undertorque. ON : The output current/torque exceeds the torque value set with L6-02 [Torque Detection Level 1], or the level has dropped and remained in this state longer than the time set with L6-03 [Torque Detection Time 1].</p>
118	Torque Detection 2 (N.C.)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the drive detects overtorque or undertorque. OFF : The output current/torque exceeds the torque value set with L6-05 [Torque Detection Level 2], or the level has dropped and remained in this state longer than the time set with L6-06 [Torque Detection Time 2].</p>
119	Torque Detection 2 (N.O.)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates when the drive detects overtorque or undertorque. ON : The output current/torque exceeds the torque value set with L6-05 [Torque Detection Level 2], or the level has dropped and remained in this state longer than the time set with L6-06 [Torque Detection Time 2].</p>
11A	!During Reverse	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the motor operates in the reverse direction. ON : The motor is operating in the forward direction or the motor stopped. OFF : The motor is operating in the reverse direction.</p>
11B	During Baseblock (N.O.)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activates during baseblock. When the drive is in baseblock, the drive output transistor stops switching and does not make DC bus voltage. ON : During baseblock OFF : The drive is not in baseblock.</p>
11C	!Motor 2 Selected	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when motor 2 is selected. ON : Motor 1 Selection OFF : Motor 2 Selection</p>
11D	!During Regeneration	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the motor is regenerating. ON : Motor is operating or stopped. OFF : Motor is regenerating.</p>
11E	!Executing Auto-Restart	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the Auto Restart function is trying to restart after a fault.</p>
11F	!Motor Overload Alarm (oL1)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the electronic thermal protection value of the motor overload protective function is a minimum of 90% of the detection level.</p>
120	!Drive Overheat Pre-Alarm (oH)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the drive heatsink temperature is at the level set with L8-02 [Overheat Alarm Level].</p>
121	!Safe Torque OFF	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates (safety stop state) when the safety circuit and safety diagnosis circuit are operating correctly and when terminals H1-HC and H2-HC are OFF (Open). ON : Safety circuit fault or RUN/READY OFF : Safety stop state</p>
122	!Mechanical Weakening Detection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the drive detects mechanical weakening.</p>
12F	!Maintenance Notification	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when drive components are at their estimated maintenance period. Tells you about the maintenance period for these items:</p> <ul style="list-style-type: none"> • IGBT • Cooling Fan • Capacitor • Soft charge bypass relay
130	!During Torque Limit	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the torque reference is the torque limit set with L7 parameters, H3-02, H3-06, or H3-10 [MFAI Function Selection].</p>
131	!During Speed Limit	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the speed limit is active.</p>
132	!In Speed Limit During Trq Ctrl	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The motor accelerates in the forward direction or the reverse direction after enabling torque control and the externally-input torque reference is disproportionate to the load. The output terminal deactivates when this speed is not higher than a constant speed and the motor speed is at the speed limit. This does not include operation when the drive is stopped.</p>
133	!Zero Servo Complete	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when positioning in the range set with b9-02 [Zero Servo Completion Window] completes after sending the Zero-Servo command.</p>

3.10 H: Terminal Functions

Setting Value	Function	Description
137	!During Frequency Output	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the drive outputs frequency. ON : The drive is not outputting frequency. OFF : The drive is outputting frequency.</p>
138	!Drive Enabled	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>This terminal deactivates when the <i>HI-xx = 16A [Drive Enable]</i> terminal deactivates.</p>
139	!Watt Hour Pulse Output	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Outputs the pulse that shows the watt hours.</p>
13C	!LOCAL Control Selected	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the Run command source or frequency reference source is LOCAL. ON : REMOTE OFF : LOCAL</p>
13D	!During Speed Search	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the drive does speed search.</p>
13E	!PID Feedback Low	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the drive detects <i>FbL [PID Feedback Loss]</i>.</p>
13F	!PID Feedback High	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the drive detects <i>FbH [Excessive PID Feedback]</i>.</p>
14A	!During KEB Ride-Thru	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the drive executes the KEB Ride-Thru function.</p>
14B	!During Short Circuit Braking	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates during Short Circuit Braking. Note: When <i>AI-02 = 8 [Control Method Selection = EZ Vector Control]</i>, this function is available when you use a PM motor.</p>
14C	!During Fast Stop	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the fast stop is in operation.</p>
14D	!oH Pre-Alarm Reduction Limit	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when <i>L8-03 = 4 [Overheat Pre-Alarm Selection = Operate at Reduced Speed (L8-19)]</i> and <i>oH [Heatsink Overheat]</i> does not clear after the drive decreases the frequency for 10 cycles.</p>
14E	!Braking Transistor Fault (rr)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the internal braking transistor overheats and the drive detects an <i>rr [Dynamic Braking Transistor Fault]</i> fault.</p>
14F	!Braking Resistor Overheat (rH)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the braking resistor overheats and the drive detects an <i>rH [Braking Resistor Overheat]</i> fault.</p>
160	!Internal Cooling Fan Failure	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the drive detects a cooling fan failure in the drive.</p>
161	!RotorPositionDetection Complete	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when drive receives a Run command and the drive detects the motor magnetic pole position of the PM motor.</p>
162	!Modbus Reg 1 Status Satisfied	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the bit specified by <i>H2-07</i> turns on regarding the MEMOBUS register address configured with <i>H2-08</i>.</p>
163	!Modbus Reg 2 Status Satisfied	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the bit specified by <i>H2-10</i> turns on regarding the MEMOBUS register address configured with <i>H2-09</i>.</p>
165	!Standby Output	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal activated after the drive stops operating and after the time set with <i>b8-51 [Standby Mode Wait Time]</i>. ON : The Run command turns off and the drive stops operating. When time set in <i>b8-51 [Standby Mode Wait Time]</i> is expired, the magnetic contactor on the input side turns off. OFF : The Run command turns on and the magnetic contactor on the input side turns on.</p>
166	!Comparator 1	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the monitor value set with <i>H2-20</i> is within range of <i>H2-21 and H2-22</i> for the time set in <i>H2-24</i>.</p>
167	!Comparator 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when the when the monitor value set with <i>H2-26</i> is outside the range of <i>H2-27 and H2-28</i> for the time set in <i>H2-30</i>.</p>
169	!External Power 24V Supply	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>The terminal deactivates when there is an external 24V power supply between terminals PS-AC. ON : The external 24V power supply is not supplying power. OFF : The external 24V power supply is supplying power.</p>

Setting Value	Function	Description
16A	!Data Logger Error	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV The terminal deactivates when the drive detects a <i>LoG [Com Error / Abnormal SD card]</i> .
190	!DWEZ Digital Output 1	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the DriveWorksEZ digital output 1. Refer to the DriveWorksEZ online manual for more information.
191	!DWEZ Digital Output 2	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the DriveWorksEZ digital output 2. Refer to the DriveWorksEZ online manual for more information.
192	!DWEZ Digital Output 3	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the DriveWorksEZ digital output 3. Refer to the DriveWorksEZ online manual for more information.
193	!DWEZ Digital Output 4	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the DriveWorksEZ digital output 4. Refer to the DriveWorksEZ online manual for more information.
1A0	!DWEZ Extended Digital Output 1	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the digital output 1 for the DriveWorksEZ DO-A3 option. Refer to the DriveWorksEZ online manual for more information.
1A1	!DWEZ Extended Digital Output 2	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the digital output 2 for the DriveWorksEZ DO-A3 option. Refer to the DriveWorksEZ online manual for more information.
1A2	!DWEZ Extended Digital Output 3	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the digital output 3 for the DriveWorksEZ DO-A3 option. Refer to the DriveWorksEZ online manual for more information.
1A3	!DWEZ Extended Digital Output 4	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the digital output 4 for the DriveWorksEZ DO-A3 option. Refer to the DriveWorksEZ online manual for more information.
1A4	!DWEZ Extended Digital Output 5	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the digital output 5 for the DriveWorksEZ DO-A3 option. Refer to the DriveWorksEZ online manual for more information.
1A5	!DWEZ Extended Digital Output 6	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the digital output 6 for the DriveWorksEZ DO-A3 option. Refer to the DriveWorksEZ online manual for more information.
1A6	!DWEZ Extended Digital Output 7	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the digital output 7 for the DriveWorksEZ DO-A3 option. Refer to the DriveWorksEZ online manual for more information.
1A7	!DWEZ Extended Digital Output 8	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the digital output 8 for the DriveWorksEZ DO-A3 option. Refer to the DriveWorksEZ online manual for more information.

◆ H3: Analog Inputs

No. (Hex.)	Name	Description	Default (Range)
H3-01 (0410)	Terminal A1 Signal Level Select	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the input signal level for MFAI terminal A1. 0 : 0-10V (Lower Limit at 0) 1 : -10 to +10V (Bipolar Reference) 2 : 4 to 20 mA 3 : 0 to 20 mA	0 (0 - 3)
H3-02 (0434)	Terminal A1 Function Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function for MFAI terminal A1.	0 (0 - 32)
H3-03 (0411) RUN	Terminal A1 Gain Setting	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the gain of the analog signal input to MFAI terminal A1.	100.0% (-999.9 - +999.9%)
H3-04 (0412) RUN	Terminal A1 Bias Setting	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the bias of the analog signal input to MFAI terminal A1.	0.0% (-999.9 - +999.9%)
H3-05 (0413)	Terminal A3 Signal Level Select	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the input signal level for MFAI terminal A3. 0 : 0-10V (Lower Limit at 0) 1 : -10 to +10V (Bipolar Reference) 2 : 4 to 20 mA 3 : 0 to 20 mA	0 (0 - 3)
H3-06 (0414)	Terminal A3 Function Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function for MFAI terminal A3.	2 (0 - 32)
H3-07 (0415) RUN	Terminal A3 Gain Setting	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the gain of the analog signal input to MFAI terminal A3.	100.0% (-999.9 - +999.9%)

3.10 H: Terminal Functions

No. (Hex.)	Name	Description	Default (Range)
H3-08 (0416) RUN	Terminal A3 Bias Setting	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the bias of the analog signal input to MFAI terminal A3.	0.0% (-999.9 - +999.9%)
H3-09 (0417)	Terminal A2 Signal Level Select	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the input signal level for MFAI terminal A2. 0 : 0-10V (Lower Limit at 0) 1 : -10 to +10V (Bipolar Reference) 2 : 4 to 20 mA 3 : 0 to 20 mA	2 (0 - 3)
H3-10 (0418)	Terminal A2 Function Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function for MFAI terminal A2.	0 (0 - 32)
H3-11 (0419) RUN	Terminal A2 Gain Setting	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the gain of the analog signal input to MFAI terminal A2.	100.0% (-999.9 - +999.9%)
H3-12 (041A) RUN	Terminal A2 Bias Setting	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the bias of the analog signal input to MFAI terminal A2.	0.0% (-999.9 - +999.9%)
H3-13 (041B)	Analog Input FilterTime Constant	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the time constant for primary delay filters on MFAI terminals.	0.03 s (0.00 - 2.00 s)
H3-14 (041C)	Analog Input Terminal Enable Sel	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the enabled terminal or terminals when $H1-xx = C$ [MFDI Function Select = Analog Terminal Enable Selection] is ON. 1 : Terminal A1 only 2 : Terminal A2 only 3 : Terminals A1 and A2 4 : Terminal A3 only 5 : Terminals A1 and A3 6 : Terminals A2 and A3 7 : Terminals A1, A2, and A3	7 (1 - 7)
H3-16 (02F0)	Terminal A1 Offset	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the offset level for analog signals input to terminal A1. Usually it is not necessary to change this setting.	0 (-500 - +500)
H3-17 (02F1)	Terminal A2 Offset	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the offset level for analog signals input to terminal A2. Usually it is not necessary to change this setting.	0 (-500 - +500)
H3-18 (02F2)	Terminal A3 Offset	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the offset level for analog signals input to terminal A3. Usually it is not necessary to change this setting.	0 (-500 - +500)
H3-40 (0B5C)	Mbus Reg 15C1h Input Function	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the MEMOBUS AI1 function.	F (4 - 2F)
H3-41 (0B5F)	Mbus Reg 15C2h Input Function	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the MEMOBUS AI2 function.	F (4 - 2F)
H3-42 (0B62)	Mbus Reg 15C3h Input Function	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the MEMOBUS AI3 function.	F (4 - 2F)
H3-43 (117F)	Mbus Reg Inputs FilterTime Const	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the time constant to apply a primary delay filter to the MEMOBUS analog input register values.	0.00 s (0.00 - 2.00 s)

■ H3-xx: MFAI Function Selections

Setting Value	Function	Description
0	Frequency Reference	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV The input value from the MFAI terminal set with this function becomes the master frequency reference.
1	Frequency Gain	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV The drive multiplies the analog frequency reference with the input value from the MFAI set with this function.

Setting Value	Function	Description
2	Auxiliary Frequency Reference 1	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets Reference 2 through multi-step speed reference to enable the command reference (Auxiliary Frequency Reference 1) from the analog input terminal set here. This value is a percentage where the Maximum Output Frequency setting is a setting value of 100%.</p> <p>Note: Parameter <i>A1-02</i> [Control Method Selection] selects which parameter is the maximum output frequency. • <i>A1-02</i> ≠ 8 [EZOLV]: <i>E1-04</i> [Maximum Output Frequency] • <i>A1-02</i> = 8: <i>E9-02</i> [Maximum Speed]</p>
3	Auxiliary Frequency Reference 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets Reference 3 through multi-step speed reference to enable the command reference (Auxiliary Frequency Reference 2) from the analog input terminal set here. This value is a percentage where the Maximum Output Frequency setting is a setting value of 100%.</p> <p>Note: Parameter <i>A1-02</i> [Control Method Selection] selects which parameter is the maximum output frequency. • <i>A1-02</i> ≠ 8 [EZOLV]: <i>E1-04</i> [Maximum Output Frequency] • <i>A1-02</i> = 8: <i>E9-02</i> [Maximum Speed]</p>
4	Output Voltage Bias	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Set this parameter to input a bias signal and amplify the output voltage.</p>
5	Accel/Decel Time Gain	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Enters a signal to adjust the gain used for <i>C1-01</i> to <i>C1-08</i> [Acceleration/Deceleration Times 1 to 4] and <i>C1-09</i> [Fast Stop Time] when the full scale analog signal (10 V or 20 mA) is 100%.</p>
6	DC Injection Braking Current	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Enters a signal to adjust the current level used for DC Injection Braking when the drive rated output current is 100%.</p>
7	Torque Detection Level	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Enters a signal to adjust the overtorque/undertorque detection level.</p> <p>Note: Use this function with <i>L6-01</i> [Torque Detection Selection 1]. This parameter functions as an alternative to <i>L6-02</i> [Torque Detection Level 1].</p>
8	Stall Prevent Level During Run	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Enters a signal to adjust the stall prevention level during run if the drive rated current is 100%.</p>
9	Output Frequency Lower Limit	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Enters a signal to adjust the output frequency lower limit level as a percentage of the maximum output frequency.</p> <p>Note: Parameter <i>A1-02</i> [Control Method Selection] selects which parameter is the maximum output frequency. • <i>A1-02</i> ≠ 8 [EZOLV]: <i>E1-04</i> [Maximum Output Frequency] • <i>A1-02</i> = 8: <i>E9-02</i> [Maximum Speed]</p>
B	PID Feedback	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Enter the PID feedback value as a percentage of the maximum output frequency.</p> <p>Note: Parameter <i>A1-02</i> [Control Method Selection] selects which parameter is the maximum output frequency. • <i>A1-02</i> ≠ 8 [EZOLV]: <i>E1-04</i> [Maximum Output Frequency] • <i>A1-02</i> = 8: <i>E9-02</i> [Maximum Speed]</p>
C	PID Setpoint	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Enters the PID setpoint as a percentage of the maximum output frequency.</p> <p>Note: Parameter <i>A1-02</i> [Control Method Selection] selects which parameter is the maximum output frequency. • <i>A1-02</i> ≠ 8 [EZOLV]: <i>E1-04</i> [Maximum Output Frequency] • <i>A1-02</i> = 8: <i>E9-02</i> [Maximum Speed]</p>
D	Frequency Bias	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Enters the bias value added to the frequency reference as a percentage of the maximum output frequency.</p> <p>Note: Parameter <i>A1-02</i> [Control Method Selection] selects which parameter is the maximum output frequency. • <i>A1-02</i> ≠ 8 [EZOLV]: <i>E1-04</i> [Maximum Output Frequency] • <i>A1-02</i> = 8: <i>E9-02</i> [Maximum Speed]</p>
E	Motor Temperature (PTC Input)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Uses the motor Positive Temperature Coefficient (PTC) thermistor to prevent heat damage to the motor as a percentage of the current value when the 10 V analog signal is input.</p>
F	Not Used	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Use this setting for unused terminals or to use terminals in through mode.</p>
10	Forward Torque Limit	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Enters the forward torque limit if the motor rated torque is 100%.</p>
11	Reverse Torque Limit	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Enters the load torque limit if the motor rated torque is 100%.</p>
12	Regenerative Torque Limit	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Enters the regenerative torque limit if the motor rated torque is 100%.</p>

3.10 H: Terminal Functions

Setting Value	Function	Description
13	Torque Reference / Torque Limit	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Enters the torque reference if the motor rated torque is 100%. This setting is the torque limit for speed control.
14	Torque Compensation	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Enters the torque compensation value if the motor rated torque is 100%.
15	General Torque Limit	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Enters the torque limit that is the same for all quadrants for forward, reverse, and regenerative operation if the motor rated torque is 100%.
16	Differential PID Feedback	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Enters the PID differential feedback value if the full scale analog signal (10 V or 20 mA) is 100%.
1F	Not Used	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Use this setting for unused terminals or to use terminals in through mode.
30	DWEZ Analog Input 1	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Use with DriveWorksEZ. Refer to the DriveWorksEZ online manual for more information.
31	DWEZ Analog Input 2	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Use with DriveWorksEZ. Refer to the DriveWorksEZ online manual for more information.
32	DWEZ Analog Input 3	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Use with DriveWorksEZ. Refer to the DriveWorksEZ online manual for more information.

◆ H4: Analog Outputs

No. (Hex.)	Name	Description	Default (Range)
H4-01 (041D)	Terminal FM Analog Output Select	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the monitoring number (<i>Ux-xx</i>) to be output from MFAO terminal FM. Note: Set the <i>x-xx</i> part of the <i>Ux-xx</i> [Monitors]. For example, set <i>H4-01 = 102</i> to monitor <i>U1-02</i> [Output Frequency]. If the <i>x</i> part of <i>Ux</i> is a letter, replace the letter (hexadecimal number) with a decimal number. For example, set <i>H4-01 = 1301</i> to monitor <i>Ud-01</i> .	102 (000 - 9999)
H4-02 (041E) RUN	Terminal FM Analog Output Gain	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the gain of the monitor signal that is sent from MFAO terminal FM. Sets the analog signal output level from the terminal FM at 10 V or 20 mA as 100% when an output for monitoring items is 100%.	100.0% (-999.9 - +999.9%)
H4-03 (041F) RUN	Terminal FM Analog Output Bias	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the bias of the monitor signal that is sent from MFAO terminal FM. Set the level of the analog signal sent from terminal FM at 10 V or 20 mA as 100% when an output for monitoring items is 0%.	0.0% (-999.9 - +999.9%)
H4-04 (0420)	Terminal AM Analog Output Select	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the monitoring number (<i>Ux-xx</i>) to be output from MFAO terminal AM. Note: Set the <i>x-xx</i> part of the <i>Ux-xx</i> [Monitor]. For example, set <i>H4-04 = 103</i> to monitor <i>U1-03</i> [Output Current]. If the <i>x</i> part of <i>Ux</i> is a letter, replace the letter (hexadecimal number) with a decimal number. For example, set <i>H4-04 = 1301</i> to monitor <i>Ud-01</i> .	103 (000 - 9999)
H4-05 (0421) RUN	Terminal AM Analog Output Gain	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the gain of the monitor signal that is sent from MFAO terminal AM. When an output for monitoring items is 0%, this parameter sets the analog signal output level from the AM terminal at 10 V or 20 mA as 100%.	50.0% (-999.9 - +999.9%)
H4-06 (0422) RUN	Terminal AM Analog Output Bias	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the bias of the monitor signal that is sent from MFAO terminal AM. When an output for monitoring items is 0%, this parameter sets the analog signal output level from the AM terminal at 10 V or 20 mA as 0%.	0.0% (-999.9 - +999.9%)
H4-07 (0423)	Terminal FM Signal Level Select	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the MFAO terminal FM output signal level. Note: Set jumper S5 on the control circuit terminal block accordingly when changing these parameters. 0 : 0-10V (Lower Limit at 0) 1 : -10 to +10V (Bipolar Reference) 2 : 4 to 20 mA	0 (0 - 2)

No. (Hex.)	Name	Description	Default (Range)
H4-08 (0424)	Terminal AM Signal Level Select	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>Sets the MFAO terminal AM output signal level.</p> <p>Note: Set jumper S5 on the control circuit terminal block accordingly when changing these parameters. 0 : 0 to 10 Vdc 1 : -10 to +10 Vdc 2 : 4 to 20 mA</p>	0 (0 - 2)
H4-20 (0B53)	Analog Power Monitor 100% Level	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>Sets the level at 10 V when U1-08 [Output Power] is set for analog output.</p> <p>Note: On drive models 2xxx, and 4002 to 4720, the setting unit is 0.01 kW. The setting range is 0.00 kW to 650.00 kW. On drive models 4810 to 4H12, the setting unit is 0.1 kW. The setting range is 0.0 kW to 1000.0 kW.</p>	0.00 kW (0.00 - 1000.0 kW)

◆ H5: Modbus Communication

No. (Hex.)	Name	Description	Default (Range)
H5-01 (0425)	Drive Node Address	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>Sets the communication slave address for drives.</p> <p>Note: • Re-energize the drive or set H5-20 = 1 [Communication Parameters Reload = Reload Now] after you change the parameter setting. • Setting 0 will not let the drive respond to MEMOBUS/Modbus communications.</p>	1FH (0 - FFH)
H5-02 (0426)	Communication Speed Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>Sets the communications speed for MEMOBUS/Modbus communications.</p> <p>Note: Re-energize the drive or set H5-20 = 1 [Communication Parameters Reload = Reload Now] after you change the parameter setting. 0 : 1200 bps 1 : 2400 bps 2 : 4800 bps 3 : 9600 bps 4 : 19.2 kbps 5 : 38.4 kbps 6 : 57.6 kbps 7 : 76.8 kbps 8 : 115.2 kbps</p>	3 (0 - 8)
H5-03 (0427)	Communication Parity Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>Sets the communications parity used for MEMOBUS/Modbus communications.</p> <p>Note: Re-energize the drive or set H5-20 = 1 [Communication Parameters Reload = Reload Now] after you change the parameter setting. 0 : No parity 1 : Even parity 2 : Odd parity</p>	0 (0 - 2)
H5-04 (0428)	Communication Error Stop Method	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>Sets the motor Stopping Method when the drive detects CE [Modbus Communication Error] issues.</p> <p>0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) 3 : Alarm Only</p>	3 (0 - 3)
H5-05 (0429)	Comm Fault Detection Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>Sets the function that detects CE [Modbus Communication Error] issues during MEMOBUS/Modbus communications.</p> <p>0 : Disabled 1 : Enabled</p>	1 (0, 1)
H5-06 (042A)	Drive Transmit Wait Time	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>Sets the time to wait to send a response message after the drive receives a command message from the master.</p> <p>Note: Restart the drive after changing the parameter setting.</p>	5 ms (0 - 65 ms)

3.10 H: Terminal Functions

No. (Hex.)	Name	Description	Default (Range)
H5-09 (0435)	CE Detection Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the detection time for CE [Modbus Communication Error] issues when communication stops.	2.0 s (0.0 - 10.0 s)
H5-10 (0436)	Modbus Register 0025H Unit Sel	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the unit of measure used for the MEMOBUS/Modbus communications monitor register 0025H (output voltage reference monitor). 0 : 0.1 V units 1 : 1 V units	0 (0, 1)
H5-11 (043C)	Comm ENTER Command Mode	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function to make the Enter command necessary to change parameters through MEMOBUS/Modbus communications. 0 : ENTER Command Required 1 : ENTER Command Not Required	0 (0, 1)
H5-12 (043D)	Run Command Method Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the input method for the Run command when b1-02 = 2 [Run Command Selection 1 = Memobus/Modbus Communications] or b1-16 = 2 [Run Command Selection 2 = Memobus/Modbus Communications]. 0 : FWD/Stop, REV/Stop 1 : Run/Stop, FWD/REV	0 (0, 1)
H5-17 (11A1) Expert	ENTER command response @CPU BUSY	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets operation when the EEPROM write command is sent without EEPROM write available. Usually it is not necessary to change this setting. 0 : Ignore Command(No ROM/RAM Write) 1 : Write to RAM Only	0 (0, 1)
H5-18 (11A2)	Motor Speed Filter over Comms	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the filter time constant used when monitoring motor speed during MEMOBUS/Modbus communications or with a communication option.	0 ms (0 - 100 ms)
H5-20 (0B57)	Communication Parameters Reload	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function to immediately enable updated MEMOBUS/Modbus communications parameters. 0 : Reload at Next Power Cycle 1 : Reload Now	0 (0, 1)
H5-22 (11CF)	Speed Search from MODBUS	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Enables the MEMOBUS/Modbus communication register Speed Search function (bit0 of 15DFH). 0 : Disabled 1 : Enabled	0 (0, 1)
H5-25 (1589) RUN	Function 5A Register 1 Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Returns the contents of the specified MEMOBUS/Modbus communications register when responding to the master device.	0044H (U1-05) (0000H - FFFFH)
H5-26 (158A) RUN	Function 5A Register 2 Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Returns the contents of the specified MEMOBUS/Modbus communications register when responding to the master device.	0045H (U1-06) (0000H - FFFFH)
H5-27 (158B) RUN	Function 5A Register 3 Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Returns the contents of the specified MEMOBUS/Modbus communications register when responding to the master device.	0042H (U1-03) (0000H - FFFFH)
H5-28 (158C) RUN	Function 5A Register 4 Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Returns the contents of the specified MEMOBUS/Modbus communications register when responding to the master device.	0049H (U1-10) (0000H - FFFFH)

◆ H6: Pulse Train Input/Output

No. (Hex.)	Name	Description	Default (Range)
H6-01 (042C)	Terminal RP Pulse Train Function	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function for pulse train input terminal RP. 0 : Frequency Reference 1 : PID Feedback Value 2 : PID Setpoint Value 3 : Speed Feedback (V/F Control)	0 (0 - 3)
H6-02 (042D) RUN	Terminal RP Frequency Scaling	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the frequency of the pulse train input signal used when the item selected with H6-01 [Terminal RP Pulse Train Function] is input at 100%.	1440 Hz (100 - 32000 Hz)

No. (Hex.)	Name	Description	Default (Range)
H6-03 (042E) RUN	Terminal RP Function Gain	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the gain used when the function in H6-01 [Terminal RP Pulse Train Function] is input to terminal RP.	100.0% (0.0 - 1000.0%)
H6-04 (042F) RUN	Terminal RP Function Bias	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the bias used when the function in H6-01 [Terminal RP Pulse Train Function] is input to terminal RP. Sets a value at the time when the pulse train is 0 Hz.	0.0% (-100.0 - 100.0%)
H6-05 (0430) RUN	Terminal RP Filter Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the time constant for the pulse train input primary delay filters.	0.10 s (0.00 - 2.00 s)
H6-06 (0431) RUN	Terminal MP Monitor Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets a function for pulse train monitor output terminal MP. Sets the "x-xx" part of the Ux-xx monitor.	102 (000, 031, 101, 102, 105, 116, 501, 502, 801 - 809, 821 - 825, 831 - 839, 851 - 855)
H6-07 (0432) RUN	Terminal MP Frequency Scaling	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the frequency of the pulse train output signal used when the monitor set with H6-06 [Terminal MP Monitor Selection] is 100%.	1440 Hz (0 - 32000 Hz)
H6-08 (043F)	Terminal RP Minimum Frequency	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the minimum frequency of the pulse train signal that terminal RP can detect.	0.5 Hz (0.1 - 1000.0 Hz)
H6-09 (156E)	Voltage Phase Sync MP Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Set whether to output the pulse synchronized with drive output voltage phase from the pulse train monitor output terminal MP. This parameter is only enabled when H6-06 = 102 [Terminal MP Monitor Selection = Output Frequency] and H6-07 = 0 [Terminal MP Frequency Scaling = 0 Hz]. 0 : Disabled 1 : Enabled	0 (0, 1)

◆ H7: Virtual MFIO Selection

No. (Hex.)	Name	Description	Default (Range)
H7-00 (116F) Expert	Virtual MFIO selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function to enable and disable the virtual I/O function. Set this parameter to 1 to operate the virtual I/O function. 0 : Disabled 1 : Enabled	0 (0, 1)
H7-01 (1185) Expert	Virtual Multi-Function Input 1	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function that enters the virtual input set in H7-10 [Virtual Multi-Function Output 1]. Note: 1B [Programming Lockout] and 11B [Inverse Input of 1B] are not available.	F (1 - 19F)
H7-02 (1186) Expert	Virtual Multi-Function Input 2	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function that enters the virtual input set in H7-12 [Virtual Multi-Function Output 2]. Note: 1B [Programming Lockout] and 11B [Inverse Input of 1B] are not available.	F (1 - 19F)
H7-03 (1187) Expert	Virtual Multi-Function Input 3	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function that enters the virtual input set in H7-14 [Virtual Multi-Function Output 3]. Note: 1B [Programming Lockout] and 11B [Inverse Input of 1B] are not available.	F (1 - 19F)
H7-04 (1188) Expert	Virtual Multi-Function Input 4	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function that enters the virtual input set in H7-16 [Virtual Multi-Function Output 4]. Note: 1B [Programming Lockout] and 11B [Inverse Input of 1B] are not available.	F (1 - 19F)
H7-10 (11A4) Expert	Virtual Multi-Function Output 1	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function for virtual digital output 1.	F (0 - 1A7)
H7-11 (11A5) Expert	Virtual Output 1 Delay Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the minimum ON time for virtual digital output 1.	0.1 s (0.0 - 25.0 s)
H7-12 (11A6) Expert	Virtual Multi-Function Output 2	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function for virtual digital output 2.	F (0 - 1A7)

3.10 H: Terminal Functions

No. (Hex.)	Name	Description	Default (Range)
H7-13 (11A7) Expert	Virtual Output 2 Delay Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the minimum ON time for virtual digital output 2.	0.1 s (0.0 - 25.0 s)
H7-14 (11A8) Expert	Virtual Multi-Function Output 3	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function for virtual digital output 3.	F (0 - 1A7)
H7-15 (11A9) Expert	Virtual Output 3 Delay Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the minimum ON time for virtual digital output 3.	0.1 s (0.0 - 25.0 s)
H7-16 (11AA) Expert	Virtual Multi-Function Output 4	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function for virtual digital output 4.	F (0 - 1A7)
H7-17 (11AB) Expert	Virtual Output 4 Delay Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the minimum ON time for virtual digital output 4.	0.1 s (0.0 - 25.0 s)
H7-30 (1177) Expert	Virtual Analog Input Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the virtual analog input function.	F (0 - 32)
H7-31 (1178) RUN Expert	Virtual Analog Input Gain	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the virtual analog input gain.	100.0% (-999.9 - 999.9%)
H7-32 (1179) RUN Expert	Virtual Analog Input Bias	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the virtual analog input bias.	0.0% (-999.9 - 999.9%)
H7-40 (1163)	Virtual Analog Out Signal Select	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the signal level of the virtual analog output. 0 : 0 to 100% (Absolute Value) 1 : -100 to 100% 2 : 0 to 100% (Lower Limit at 0)	0 (0 - 2)
H7-41 (1164)	Virtual Analog Output Function	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the monitor (<i>Ux-xx</i>) to be output from the virtual analog output. Note: Set the <i>x-xx</i> part of the <i>Ux-xx</i> [Monitor]. For example, set <i>H7-41 = 102</i> to monitor <i>U1-02</i> [Output Frequency]. When the <i>x</i> part of <i>Ux</i> is a letter, replace the letter (hexadecimal number) with a decimal number. For example, set <i>H7-41 = 1301</i> to monitor <i>Ud-01</i> .	102 (0 - 9999)
H7-42 (1165)	Virtual Analog Output FilterTime	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the time constant for a primary filter of the virtual analog output.	0.00 s (0.00 - 2.00 s)

3.11 L: Protection Functions

◆ L1: Motor Protection

No. (Hex.)	Name	Description	Default (Range)
L1-01 (0480)	Motor Overload (oL1) Protection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the motor overload protection with electronic thermal protectors.</p> <p>0 : Disable 1 : Variable Torque 2 : Constant Torque 10:1 Speed Range 3 : Constant Torque 100:1 SpeedRange 4 : PM Variable Torque 5 : PM Constant Torque 6 : Variable Torque (50Hz)</p> <p>Note: When only one motor is connected to a drive, set <i>L1-01 = 1 to 6 [Enabled]</i>. External thermal relays are not necessary in these conditions.</p>	Determined by A1-02 (0 - 6)
L1-02 (0481)	Motor Overload Protection Time	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the operation time for the electronic thermal protector of the drive to prevent damage to the motor. Usually it is not necessary to change this setting.</p>	1.0 min (0.1 - 5.0 min)
L1-03 (0482)	Motor Thermistor oH Alarm Select	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets drive operation when the PTC input signal entered into the drive is at the oH3 [Motor Overheat Alarm] detection level.</p> <p>0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) 3 : Alarm Only</p>	3 (0 - 3)
L1-04 (0483)	Motor Thermistor oH Fault Select	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the drive operation when the PTC input signal to the drive is at the oH4 [Motor Overheat Fault (PTC Input)] detection level.</p> <p>0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09)</p>	1 (0 - 2)
L1-05 (0484)	Motor Thermistor Filter Time	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the primary delay time constant for the PTC input signal entered to the drive. This parameter prevents accidental motor overheat faults.</p>	0.20 s (0.00 - 10.00 s)
L1-08 (1103)	oL1 Current Level	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the reference current for the motor 1 thermal overload detection. When the current level > 0.0 A, you cannot set this value < 10% of drive rated current.</p>	0.0 A (0.0 A or 10% to 150% of the drive rated current)
L1-09 (1104)	oL1 Current Level for Motor 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the reference current for the motor 2 thermal overload detection. When the current level > 0.0 A, you cannot set this value < 10% of drive rated current.</p>	0.0 A (0.0 A or 10 to 150% of the drive rated current)
L1-13 (046D)	Motor Overload Memory Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function that keeps the current electronic thermal protector value when the drive stops receiving power.</p> <p>0 : Disabled 1 : Enabled</p>	1 (0, 1)

◆ L2: Power Loss Ride Through

No. (Hex.)	Name	Description	Default (Range)
L2-01 (0485)	Power Loss Ride Through Select	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the drive operation after a momentary power loss.</p> <p>0 : Disable 1 : Enabled 2 : Enabled while CPU Power Active 3 : Kinetic Energy Backup: L2-02 4 : Kinetic Energy Backup: CPU Power 5 : Kinetic Energy Backup: DecelStop</p> <p>Note: When the CPU is inactive, <i>b1-17 [Run Command at Power Up]</i> sets operation at power up.</p>	0 (0 - 5)
L2-02 (0486)	Power Loss Ride Through Time	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the length of time that the drive will wait before it tries to restart if the DC bus voltage is less than <i>L2-05 [Undervoltage Detection Lvl (Uv1)]</i> after a momentary power loss.</p>	Determined by o2-04, C6-01 (0.0 - 25.5 s)
L2-03 (0487)	Minimum Baseblock Time	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the minimum time to continue the drive output block (baseblock) after a baseblock.</p>	Determined by o2-04, C6-01 (0.1 - 5.0 s)
L2-04 (0488)	Powerloss V/f Recovery Ramp Time	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the time for the drive output voltage to go back to correct voltage after completing speed searches.</p>	Determined by o2-04, C6-01 (0.0 - 5.0 s)
L2-05 (0489)	Undervoltage Detection Lvl (Uv1)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the voltage at which a <i>Uv1 [DC Bus Undervoltage]</i> fault is triggered or at which the KEB function is activated. Usually it is not necessary to change this setting.</p> <p>NOTICE: Damage to Equipment. When you set this parameter to a value lower than the default, you must install an AC reactor on the input side of the power supply. If you do not install an AC reactor, it will cause damage to the drive circuitry.</p>	Determined by o2-04 and E1-01 (200 V Class: 150 - 210 V, 400 V Class: 300 - 420 V)
L2-06 (048A) Expert	Kinetic Energy Backup Decel Time	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the deceleration time during KEB operation used to decrease the maximum output frequency to 0.</p> <p>Note: When <i>L2-29 = 1, 2, or 3 [Kinetic Energy Backup Method = Single Drive KEB Ride-Thru 2, System KEB Ride-Thru 1, or System KEB Ride-Thru 2]</i> and you do KEB Auto-Tuning, the drive will automatically set this value.</p>	0.0 s (0.0 - 6000.0 s)
L2-07 (048B) Expert	Kinetic Energy Backup Accel Time	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the acceleration time to return the frequency to the frequency reference before a power loss after canceling KEB operation.</p>	0.0 s (0.0 - 6000.0 s)
L2-08 (048C) Expert	Frequency Gain at KEB Start	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the quantity of output frequency reduction used when KEB operation starts as a percentage of the motor rated slip before starting KEB operation.</p>	100% (0 - 300%)
L2-09 (048D) Expert	KEB Minimum Frequency Level	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the quantity of output frequency reduction used as a percentage of <i>E2-02 [Motor Rated Slip]</i> when KEB operation starts.</p>	20% (0 - 100%)
L2-10 (048E) Expert	Minimum KEB Time	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the minimum length of time to operate the KEB after the drive detects a momentary power loss.</p>	50 ms (0 - 25500 ms)
L2-11 (0461) Expert	KEB DC Bus Voltage Setpoint	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the target value that controls the DC bus voltage to a constant level in Single Drive KEB Ride-Thru 2. Sets the DC bus voltage level that completes the KEB operation for all other KEB methods.</p>	Determined by E1-01 (Determined by E1-01)
L2-29 (0475) Expert	Kinetic Energy Backup Method	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the KEB function operation mode.</p> <p>0 : Single Drive KEB Ride-Thru 1 1 : Single Drive KEB Ride-Thru 2 2 : System KEB Ride-Thru 1 3 : System KEB Ride-Thru 2</p>	0 (0 - 3)

No. (Hex.)	Name	Description	Default (Range)
L2-30 (045E) Expert	KEB Zero Speed Operation	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the operation when the output frequency decreases below the zero level (DC braking injection starting frequency) during KEB deceleration when L2-01 = 3 to 5 [Power Loss Ride Through Select = Kinetic Energy Backup: L2-02, Kinetic Energy Backup: CPU Power, or Kinetic Energy Backup: DecelStop].</p> <p>0 : Baseblock 1 : DC/SC Braking</p>	0 (0, 1)
L2-31 (045D) Expert	KEB Start Voltage Offset Level	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the KEB start voltage offset.</p>	Determined by A1-02 (200 V Class: 0 - 100 V, 400 V Class: 0 - 200 V)

◆ L3: Stall Prevention

No. (Hex.)	Name	Description	Default (Range)
L3-01 (048F)	Stall Prevention during Accel	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the method of the Stall Prevention During Acceleration.</p> <p>0 : Disable 1 : Enabled 2 : Intelligent (Ignore Accel Ramp) 3 : Current Limit Acceleration</p>	1 (0 - 3)
L3-02 (0490)	Stall Prevent Level during Accel	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the output current level to activate the Stall Prevention function during acceleration as a percentage of the drive rated output current.</p> <p>Note: The upper limit of the setting range changes when C6-01 [Normal / Heavy Duty Selection] changes.</p> <ul style="list-style-type: none"> • 150% when C6-01 = 0 [Heavy Duty Rating]. • 110% when C6-01 = 1 [Normal Duty Rating]. 	Determined by C6-01 and L8-38 (0 - 150%)
L3-03 (0491)	Stall Prevent Limit during Accel	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the lower limit for the stall prevention level used in the constant output range as a percentage of the drive rated output current.</p>	50% (0 - 100%)
L3-04 (0492)	Stall Prevention during Decel	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the method that the drive will use to prevent overvoltage faults when decelerating.</p> <p>Note:</p> <ol style="list-style-type: none"> To connect a dynamic braking option (braking resistor or braking resistor unit) to the drive, set this parameter to 0 or 3. Parameter values 1, 2, 4, and 5 will enable Stall Prevention function during deceleration, and the dynamic braking option will not function. The setting range changes when the A1-02 [Control Method Selection] value changes: <ul style="list-style-type: none"> • When A1-02 = 5 [OLV/PM], the setting range is 0 to 2. • When A1-02 = 6, 7, 8 [AOLV/PM, CLV/PM, EZOLV], the setting range is 0, 1. <p>0 : Disabled 1 : General Purpose 2 : Intelligent (Ignore Decel Ramp) 3 : General Purpose w/ DB resistor 4 : Overexcitation/High Flux 1 5 : Overexcitation/High Flux 2</p>	1 (Determined by A1-02)
L3-05 (0493)	Stall Prevention during RUN	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function to enable and disable Stall Prevention During Run.</p> <p>Note:</p> <ol style="list-style-type: none"> An output frequency lower than 6 Hz will disable Stall Prevention during Run. The L3-05 and L3-06 [Stall Prevent Level during Run] settings do not have an effect. The setting range changes when the A1-02 [Control Method] value changes: <ul style="list-style-type: none"> • A1-02 = 0, 1, 5 [V/f, CL-V/f, OLV/PM]: 0 to 2 • A1-02 = 8 [EZOLV]: 0, 3 <p>0 : Disabled 1 : Deceleration Time 1 (C1-02) 2 : Deceleration Time 2 (C1-04) 3 : Intelligent (Ignore Decel Ramp)</p>	2 (0 - Determined by A1-02)

3.11 L: Protection Functions

No. (Hex.)	Name	Description	Default (Range)
L3-06 (0494)	Stall Prevent Level during Run	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the output current level to enable the Stall Prevention function during operation as a percentage of the drive rated output current.</p> <p>Note:</p> <ul style="list-style-type: none"> This parameter is applicable when L3-05 = 1, 2 [Stall Prevention during RUN = Deceleration Time 1 (C1-02), Deceleration Time 2 (C1-04)]. The upper limit of the setting range changes when C6-01 [Normal / Heavy Duty Selection] changes. <ul style="list-style-type: none"> -150% when C6-01 = 0 [Heavy Duty Rating 1 (HD1) for Constant Torque Applications]. -110% when C6-01 = 1 [Normal Duty Rating 1 (ND1) for Variable Torque Applications]. 	Determined by C6-01 and L8-38 (5 - 150%)
L3-11 (04C7)	Overvoltage Suppression Select	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the overvoltage suppression function.</p> <p>0 : Disabled 1 : Enabled</p>	0 (0, 1)
L3-17 (0462)	DC Bus Regulation Level	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the target value for the DC bus voltage when the overvoltage suppression function and the Decel Stall Prevention function (Intelligent Stall Prevention) are active.</p>	200 V Class: 375 V, 400 V Class: 750 V (200 V Class: 150 to 400 V, 400 V Class: 300 to 800 V)
L3-20 (0465) Expert	DC Bus Voltage Adjustment Gain	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the proportional gain used to control the DC bus voltage.</p>	Determined by A1-02 (0.00 - 5.00)
L3-21 (0466) Expert	OVSuppression Accel/Decel P Gain	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the proportional gain to calculate acceleration and deceleration rates.</p>	Determined by A1-02 (0.10 - 10.00)
L3-22 (04F9)	PM Stall Prevention Decel Time	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the momentary deceleration time that the drive will use when it tries to accelerate a PM motor and detected motor stalls. This function is applicable when L3-01 = 1 [Stall Prevention during Accel = Enabled].</p>	0.0 s (0.0 - 6000.0 s)
L3-23 (04FD)	Stall P Reduction at Constant HP	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function to automatically decrease the Stall Prevention Level during Run for Constant Horse Power (CHP) part of the speed range.</p> <p>0 : Use L3-06 for Entire Speed Range 1 : Automatic Reduction @ CHP Region</p>	0 (0, 1)
L3-24 (046E) Expert	Motor Accel Time @ Rated Torque	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the motor acceleration time to reach the maximum frequency at the motor rated torque for stopped single-drive motors.</p>	Determined by o2-04, C6-01, E2-11, and E5-01 (0.001 - 10.000 s)
L3-25 (046F) Expert	Load Inertia Ratio	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the ratio between motor inertia and machine inertia.</p>	1.0 (0.1 - 1000.0)
L3-26 (0455) Expert	Additional DC Bus Capacitors	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the capacity for external main circuit capacitors. Usually it is not necessary to change this setting. Sets this parameter when you use the KEB Ride-Thru function.</p>	0 μF (0 to 65000 μF)
L3-27 (0456)	Stall Prevention Detection Time	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets a delay time between reaching the Stall Prevention level and starting the Stall Prevention function.</p>	50 ms (0 - 5000 ms)
L3-34 (016F) Expert	Torque Limit Delay Time	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the filter time constant that returns the torque limit to its initial value when KEB operation operates in Single Drive KEB Ride-Thru mode.</p>	Determined by A1-02 (0.000 - 1.000 s)
L3-35 (0747) Expert	Speed Agree Width for Auto Decel	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the width for speed agreement when L3-04 = 2 [Stall Prevention during Decel = Intelligent (Ignore Decel Ramp)]. Usually it is not necessary to change this setting.</p>	0.00 Hz (0.00 - 1.00 Hz)
L3-36 (11D0)	Current Suppression Gain@Accel	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the gain to suppress current and motor speed hunting during operation when L3-01 = 3 [Stall Prevention during Accel = Current Limit Method]. Usually it is not necessary to change this setting.</p>	Determined by A1-02 (0.0 - 100.0)
L3-37 (11D1) Expert	Current Limit P Gain @Accel	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Suppresses current hunting during acceleration. Usually it is not necessary to change this setting.</p>	5 ms (0 - 100 ms)
L3-38 (11D2) Expert	Current Limit I Time @ Accel	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Suppresses current hunting and overshooting that occurs when the drive stalls during acceleration. Usually it is not necessary to change this setting.</p>	10.0 (0.0 - 100.0)

No. (Hex.)	Name	Description	Default (Range)
L3-39 (11D3)	Current Limit Filter Time@Accel	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the time constant to adjust the acceleration rate when L3-01 = 3 [Stall Prevention during Accel = Current Limit Acceleration]. Usually it is not necessary to change this setting.	100.0 ms (1.0 - 1000.0 ms)
L3-40 (11D4)	Current Limit S-Curve @ Acc/Dec	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function to enable and disable the best S-curve characteristic used for current-limited acceleration. 0 : Disable 1 : Enabled	0 (0, 1)

◆ L4: Speed Detection

No. (Hex.)	Name	Description	Default (Range)
L4-01 (0499)	Speed Agree Detection Level	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the level to detect speed agree or motor speed when H2-01 to H2-03 = 2, 3, 4, 5 [MFDO Function Selection = Speed Agree 1, User-set Speed Agree 1, Frequency Detection 1, Frequency Detection 2].	Determined by A1-02 (Determined by A1-02)
L4-02 (049A)	Speed Agree Detection Width	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the width to detect speed agree or motor speed. Sets the width to detect speed agree or motor speed when H2-01 to H2-03 = 2, 3, 4, 5 [MFDO Function Selection = Speed Agree 1, User-set Speed Agree 1, Frequency Detection 1, Frequency Detection 2].	Determined by A1-02 (Determined by A1-02)
L4-03 (049B)	Speed Agree Detection Level (+/-)	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the level to detect speed agree or motor speed. Sets the speed agree detection level or motor speed detection level when H2-01 to H2-03 = 13, 14, 15, 16 [MFDO Function Selection = Speed Agree 2, User-set Speed Agree 2, Frequency Detection 3, Frequency Detection 4].	Determined by A1-02 (Determined by A1-02)
L4-04 (049C)	Speed Agree Detection Width (+/-)	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the width to detect speed agree or motor speed. Sets the width to detect speed agree or motor speed when H2-01 to H2-03 = 13, 14, 15, 16 [MFDO Function Selection = Speed Agree 2, User-set Speed Agree 2, Frequency Detection 3, Frequency Detection 4].	Determined by A1-02 (Determined by A1-02)
L4-05 (049D)	Fref Loss Detection Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the operation when the drive detects a loss of frequency reference. 0 : Stop 1 : Run at (L4-06 x Last Reference)	0 (0, 1)
L4-06 (04C2)	Frequency Reference @Loss of Ref	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the frequency reference as a percentage to continue drive operation after it detects a frequency reference loss. The value is a percentage of the frequency reference before the drive detected the loss.	80.0% (0.0 - 100.0%)
L4-07 (0470)	Speed Agree Detection Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the condition that activates speed detection. 0 : No Detection during Baseblock 1 : Detection Always Enabled	0 (0, 1)

◆ L5: Fault Restart

No. (Hex.)	Name	Description	Default (Range)
L5-01 (049E)	Number of Auto-Restart Attempts	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the number of times that the drive will try to restart.	0 (0 - 10 times)
L5-02 (049F)	Fault Contact at Restart Select	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function that sends signals to the MFDO terminal set for Fault [H2-xx = E] while the drive is automatically restarting. 0 : Active Only when Not Restarting 1 : Always Active	0 (0, 1)
L5-03 (04A0)	Continuous Method Max Restart T	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the time for which the drive will try to restart. If the drive cannot restart in the time set in L5-03, the drive detects a fault. This is available when L5-05 = 0 [Auto-Restart Method = Continuous/Immediate Attempts].	10.0 s (0.5 - 180.0 s)
L5-04 (046C)	Interval Method Restart Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the time interval between each Auto Restart attempt. This function is enabled when L5-05 = 1 [Auto Restart Operation Selection = Use L5-04 Time].	10.0 s (0.5 - 600.0 s)

No. (Hex.)	Name	Description	Default (Range)
L6-03 (04A3)	Torque Detection Time 1	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the detection time for Overtorque/Undertorque Detection 1.	0.1 s (0.0 - 10.0 s)
L6-04 (04A4)	Torque Detection Selection 2	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the speed range that detects overtorque and undertorque and the operation of drives (operation status) after detection. 0 : Disabled 1 : oL @ Speed Agree - Alarm only 2 : oL @ RUN - Alarm only 3 : oL @ Speed Agree - Fault 4 : oL @ RUN - Fault 5 : UL @ Speed Agree - Alarm only 6 : UL @ RUN - Alarm only 7 : UL @ Speed Agree - Fault 8 : UL @ RUN - Fault	0 (0 - 8)
L6-05 (04A5)	Torque Detection Level 2	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the detection level for Overtorque/Undertorque Detection 2. In V/f control, drive rated output current = 100% value. In vector control, motor rated torque = 100% value.	150% (0 - 300%)
L6-06 (04A6)	Torque Detection Time 2	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the detection time for Overtorque/Undertorque Detection 2.	0.1 s (0.0 - 10.0 s)
L6-07 (04E5)	Torque Detection Filter Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the time constant for a primary filter to the torque reference or to the output current used to detect overtorque/undertorque.	0 ms (0 - 1000 ms)
L6-08 (0468)	Mechanical Fatigue Detect Select	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the speed where the drive detects mechanical deterioration and how the drive operates (operation status) after detection. 0 : Disabled 1 : oL5 @ Speed > L6-09 - Alarm 2 : oL5 @ Speed > L6-09 - Alarm 3 : oL5 @ Speed > L6-09 - Fault 4 : oL5 @ Speed > L6-09 - Fault 5 : UL5 @ Speed < L6-09 - Alarm 6 : UL5 @ Speed < L6-09 - Alarm 7 : UL5 @ Speed < L6-09 - Fault 8 : UL5 @ Speed < L6-09 - Fault	0 (0 - 8)
L6-09 (0469)	Mech Fatigue Detect Speed Level	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the speed level where the drive will operate the mechanical deterioration detection function, as a percentage of the Maximum Output Frequency. Note: Parameter A1-02 [Control Method Selection] selects which parameter is the maximum output frequency. • A1-02 ≠ 8 [EZOLV]: E1-04 [Maximum Output Frequency] • A1-02 = 8: E9-02 [Maximum Speed]	110.0% (-110.0 - 110.0%)
L6-10 (046A)	Mech Fatigue Detect Delay Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the time for mechanical deterioration detection.	0.1 s (0.0 - 10.0 s)
L6-11 (046B)	Mech Fatigue Hold Off Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the time that the drive will start mechanical deterioration detection triggered by the cumulative operation time of the drive.	0 h (0 - 65535 h)

◆ L7: Torque Limit

No. (Hex.)	Name	Description	Default (Range)
L7-01 (04A7) RUN	Forward Torque Limit	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the torque limit value for forward motoring as a percentage, where motor rated torque is the 100% value.	200% (0 - 300%)
L7-02 (04A8) RUN	Reverse Torque Limit	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the torque limit value for reversed motoring as a percentage, where motor rated torque is the 100% value.	200% (0 - 300%)
L7-03 (04A9) RUN	Forward Regenerative Trq Limit	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the torque limit value for forward regenerative conditions as a percentage of the motor rated torque.	200% (0 - 300%)

3.11 L: Protection Functions

No. (Hex.)	Name	Description	Default (Range)
L7-04 (04AA) RUN	Reverse Regenerative Trq Limit	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input checked="" type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the torque limit value for reversed regenerative conditions as a percentage of the motor rated torque.	200% (0 - 300%)
L7-06 (04AC)	Torque Limit Integral Time	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input checked="" type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the integral time constant for the torque limit function.	200 ms (5 - 10000 ms)
L7-07 (04C9)	Torque Limit during Accel/ Decel	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input checked="" type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the torque limit function during acceleration and deceleration. 0 : Proportional only 1 : Proportional & Integral control	0 (0, 1)
L7-16 (044D)	Torque Limit Process at Start	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input checked="" type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Assigns a time filter to allow the torque limit to build at start. 0 : Disabled 1 : Enabled	1 (0, 1)
L7-35 (1B57) Expert	Low Freq Regen Torque Limit Lvl	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input checked="" type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the torque limit used during low-speed regeneration. Usually it is not necessary to change this setting.	50.0% (0.0 - 200.0%)
L7-36 (1B58) Expert	Regen Torque Limit Derate Freq	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input checked="" type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the frequency width at which L7-35 [Low Freq Regen Torque Limit Lvl] operates.	6.0 Hz (0.0 - 30.0 Hz)

◆ L8: Drive Protection

No. (Hex.)	Name	Description	Default (Range)
L8-01 (04AD)	3% ERF DB Resistor Protection	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the function to enable braking resistor protection with a Yaskawa ERF series braking resistor (3% ED) installed on the heatsink. 0 : Disabled 1 : Enabled	0 (0, 1)
L8-02 (04AE)	Overheat Alarm Level	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the oH detection level in temperature.	Determined by o2-04, C6-01 (50 - 150 °C)
L8-03 (04AF)	Overheat Pre-Alarm Selection	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the operation of drives when an oH alarm is detected. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) 3 : Alarm Only 4 : Operate at Reduced Speed (L8-19)	3 (0 - 4)
L8-05 (04B1)	Input Phase Loss Protection Sel	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the function to enable and disable input phase loss detection. Note: The default setting and setting range is different for different drive input power supplies. • Three-phase 200 V and 400 V Input Default setting: 1 Setting range: Determined by the drive model -2xxx, 4002 - 4720: 0, 1 -4810 - 4H12: 0 - 4 • 6-Phase/12-Pulse 400 V Input Default setting: 4 Setting range: 0 - 4 0 : Disabled 1 : Enabled 4 : Enabled, with Hardware Detection	Determined by o2-04 (0 - 4)
L8-07 (04B3)	Output Phase Loss Protection Sel	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the function to enable and disable output phase loss detection. The drive starts output phase loss detection when the output current decreases to less than 5% of the drive rated current. Note: The drive can incorrectly start output phase loss detection in these conditions: • The motor rated current is very small compared to the drive rating. • The drive is operating a PM motor with a small load. 0 : Disabled 1 : Fault when one phase is lost 2 : Fault when two phases are lost	1 (0 - 2)

No. (Hex.)	Name	Description	Default (Range)
L8-09 (04B5)	Output Ground Fault Detection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function to enable and disable ground fault protection. 0 : Disabled 1 : Enabled	Determined by o2-04 (0, 1)
L8-10 (04B6)	Heatsink Fan Operation Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets operation of the heatsink cooling fan. 0 : During Run, w/ L8-11 Off-Delay 1 : Always On 2 : Temperature-Dependent Fan Ctrl.	0 (0 - 2)
L8-11 (04B7)	Heatsink Fan Off-Delay Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the length of time that the drive will wait before it stops the cooling fan after it cancels the Run command when <i>L8-10 = 0</i> [<i>Heatsink Fan Operation Selection = During Run, w/ L8-11 Off-Delay</i>].	60 s (0 - 300 s)
L8-12 (04B8)	Ambient Temperature Setting	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the ambient temperature of the drive installation area.	40 °C (-10 °C - +50 °C)
L8-15 (04BB)	Drive oL2 @ Low Speed Protection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function to decrease the drive overload level at which the drive will trigger <i>oL2</i> [<i>Drive Overload</i>] during low speed operation (6 Hz or slower) to prevent damage to the main circuit transistors. Note: • Contact Yaskawa or your nearest sales representative before disabling this function at low speeds. If you frequently operate drives with high output current in low speed ranges, it can cause heat stress and decrease the life span of drive IGBTs. • When you use drive models 4810 to 4H12, you cannot set <i>L8-15 = 0</i> . 0 : Disabled (No Additional Derate) 1 : Enabled (Reduced oL2 Level)	1 (0, 1)
L8-18 (04BE)	Software Current Limit Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Set the software current limit selection function to prevent damage to the main circuit transistor caused by too much current. 0 : Disabled 1 : Enabled	0 (0, 1)
L8-19 (04BF)	Freq Reduction @ oH Pre-Alarm	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the ratio at which the drive derates the frequency reference during an <i>oH</i> alarm.	0.8 (0.1 - 0.9)
L8-20 (04C0) Expert	Control Fault & Step Out Detect	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets operation after the drive detects a <i>CF</i> fault when <i>A1-02 = 4</i> [<i>Control Method Selection = Advanced Open Loop Vector</i>]. 0 : Disabled 1 : CF/STP _o Detection Enabled 2 : CF ALM/Stop	1 (0 - 2)
L8-27 (04DD)	Overcurrent Detection Gain	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the PM motor overcurrent detection level as a percentage of the motor rated current value. Note: Parameter <i>A1-02</i> [<i>Control Method Selection</i>] selects which parameter is the motor rated current. • <i>A1-02 = 8</i> [<i>EZOLV</i>]: <i>E5-03</i> [<i>PM Motor Rated Current (FLA)</i>] • <i>A1-02 = 8</i> : <i>E9-06</i> [<i>Motor Rated Current (FLA)</i>]	300.0% (0.0 - 1000.0%)
L8-29 (04DF)	Output Unbalance Detection Sel	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function to detect <i>LF2</i> [<i>Output Current Imbalance</i>]. 0 : Disabled 1 : Enabled	1 (0, 1)
L8-31 (04E1)	LF2 Detection Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the <i>LF2</i> [<i>Output Current Imbalance</i>] detection time.	3 (1 - 100)
L8-35 (04EC)	Installation Method Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the type of drive installation. 0 : IP00/IP20/UL Open Type/Ex Heatsink 1 : Side-by-Side Mounting 2 : IP20/UL Type 1 3 : Finless	Determined by the drive (0 - 3)
L8-38 (04EF)	Carrier Frequency Reduction	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the carrier frequency reduction function. The drive reduces the carrier frequency when the output current is more than a specified level. 0 : Disabled 1 : Enabled below 6 Hz 2 : Enabled for All Speeds	Determined by A1-02, C6-01 and o2-04 (0 - 2)

3.11 L: Protection Functions

No. (Hex.)	Name	Description	Default (Range)
L8-40 (04F1)	Carrier Freq Reduction Off-Delay	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the length of time until the automatically reduced carrier frequency returns to the condition before the reduction.	Determined by A1-02 (0.00 - 2.00 s)
L8-41 (04F2)	High Current Alarm Selection	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the function to cause an <i>HCA</i> [Current Alarm] when the output current is more than 150% of the drive rated current. 0 : Disabled 1 : Enabled	0 (0, 1)
L8-51 (0471) Expert	STPo I Detection Level	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the <i>STPo</i> [Motor Step-Out Detected] detection level as a percentage of the motor rated current. Note: Parameter <i>A1-02</i> [Control Method Selection] selects which parameter is the motor rated current. • <i>A1-02</i> = 5 [OLV/PM]: <i>E5-03</i> [PM Motor Rated Current (FLA)] • <i>A1-02</i> = 8 [EZOLV]: <i>E9-06</i> [Motor Rated Current (FLA)]	0.0% (0.0 - 300.0%)
L8-52 (0472) Expert	STPo Integration Level	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the detection level for <i>STPo</i> [Motor Step-Out Detected] related to the ACR integral value.	1.0 (0.1 - 2.0)
L8-53 (0473) Expert	STPo Integration Time	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the length of time until the drive detects <i>STPo</i> after it is more than the value of <i>L8-51</i> [<i>STPo</i> I Detection Level].	1.0 s (1.0 - 10.0 s)
L8-54 (0474) Expert	STPo Id Diff Detection	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the Id deviation detection function for <i>STPo</i> [Motor Step-Out Detected]. 0 : Disabled 1 : Enabled	1 (0, 1)
L8-55 (045F)	Internal DB Transistor Protection	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the protection function for the internal braking transistor. 0 : Disable 1 : Protection Enabled	1 (0, 1)
L8-56 (047D) Expert	Stall P @ Accel Activation Time	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the length time that the acceleration stall prevention function can continue to operate before the drive detects an <i>STPo</i> [Motor Step-Out Detected].	5000 ms (100 - 5000 ms)
L8-57 (047E) Expert	Stall Prevention Retry Counts	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the number of times the acceleration stall prevention function can operate until speeds agree before the drive detects an <i>STPo</i> [Motor Step-Out Detected].	10 (1 - 10 times)
L8-90 (0175) Expert	STPo Detection Level (Low Speed)	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the detection level that the control fault must be equal to or more than to cause an <i>STPo</i> [Motor Step-Out Detected].	Determined by A1-02 (0 - 5000 times)
L8-93 (073C) Expert	Low Speed Pull-out Detection Time	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the length of time the drive will wait to start baseblock after detecting <i>LSo</i> [Low Speed Motor Step-Out].	1.0 s (0.0 - 10.0 s)
L8-94 (073D) Expert	Low Speed Pull-out Detect Level	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the detection level for <i>LSo</i> [Low Speed Motor Step-Out] as a percentage of <i>E1-04</i> [Maximum Output Frequency].	3% (0 - 10%)
L8-95 (077F) Expert	Low Speed Pull-out Amount	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the average count of <i>LSo</i> [Low Speed Motor Step-Out] detections.	10 (1 - 50 times)

◆ L9: Drive Protection 2

No. (Hex.)	Name	Description	Default (Range)
L9-16 (11DC) Expert	FAn1 Detect Time	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the detection time for <i>FAn1</i> [Drive Cooling Fan Fault]. Yaskawa recommends that you do not change this parameter value.	4.0 s (0.0 - 30.0 s)

3.12 n: Special Adjustment

◆ n1: Hunting Prevention

No. (Hex.)	Name	Description	Default (Range)
n1-01 (0580)	Hunting Prevention Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function to prevent hunting. 0 : Disabled 1 : Enabled (Normal) 2 : Enabled (High Carrier Frequency)</p>	Determined by o2-04 (0 to 2)
n1-02 (0581) Expert	Hunting Prevention Gain Setting	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the performance of the hunting prevention function. Usually it is not necessary to change this parameter.</p>	1.00 (0.00 - 2.50)
n1-03 (0582) Expert	Hunting Prevention Time Constant	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the primary delay time constant of the hunting prevention function. Usually it is not necessary to change this parameter.</p>	Determined by o2-04 (0 - 500 ms)
n1-05 (0530) Expert	Hunting Prevent Gain in Reverse	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the performance of the hunting prevention function. This parameter adjusts Reverse run. Usually it is not necessary to change this parameter.</p>	0.00 (0.00 - 2.50)
n1-08 (1105) Expert	Current Detection Method	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets how the drive decreases the motor vibration that is caused by leakage current. Usually it is not necessary to change this parameter. 0 : 2-Phases 1 : 3-Phases</p>	0 (0, 1)
n1-13 (1B59) Expert	DC Bus Stabilization Control	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the oscillation suppression function for the DC bus voltage. 0 : Disabled 1 : Enabled</p>	0 (0, 1)
n1-14 (1B5A) Expert	DC Bus Stabilization Time	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Adjusts the responsiveness of the oscillation suppression function for the DC bus voltage. Set <i>n1-13 = 1 [DC Bus Stabilization Control = Enabled]</i> to enable this parameter.</p>	100.0 ms (50.0 - 500.0 ms)
n1-15 (0BF8) Expert	PWM Voltage Offset Calibration	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the calibration method that the drive uses to decrease torque/current ripple. 0 : No Calibration 1 : One Time Calibrate at Next Start 2 : Calibrate Every Time at Start</p>	Determined by A1-02 (0 - 2)
n1-16 (0BFB) Expert	Hunting Prevention High Fc Gain	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the gain for the hunting prevention function. This parameter functions best with a high carrier frequency. Usually it is not necessary to change this parameter.</p>	Determined by o2-04 (0.00 - 2.50)
n1-17 (0BFC) Expert	Hunting Prevent High Fc Filter	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the responsiveness of the hunting prevention function. Usually it is not necessary to change this parameter.</p>	500 ms (0 - 1000 ms)
n1-20 (1588) Expert	Voltage Calibration Duration	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the calibration time at start. Usually it is not necessary to change this parameter.</p>	50 ms (10 - 500 ms)

◆ n2: Auto Freq Regulator (AFR)

No. (Hex.)	Name	Description	Default (Range)
n2-01 (0584)	Automatic Freq Regulator Gain	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the gain of the AFR function as a magnification value. Usually it is not necessary to change this setting.</p>	1.00 (0.00 - 10.00)
n2-02 (0585)	Automatic Freq Regulator Time 1	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the time constant that sets the rate of change for the AFR function. Usually it is not necessary to change this setting.</p>	50 ms (0 - 2000 ms)
n2-03 (0586)	Automatic Freq Regulator Time 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the time constant that sets the speed difference of the AFR function. Use this parameter for speed searches or regeneration. Usually it is not necessary to change this setting.</p>	750 ms (0 - 2000 ms)

◆ n3: High Slip/Overexcite Braking

No. (Hex.)	Name	Description	Default (Range)
n3-01 (0588) Expert	HSB Deceleration Frequency Width	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the amount by which the output frequency is to be lowered during high-slip braking, as a percentage of <i>E1-04 [Maximum Output Frequency]</i>, which represents the 100% value.</p>	5% (1 - 20%)
n3-02 (0589) Expert	HSB Current Limit Level	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the maximum current output during high-slip braking as a percentage, where <i>E2-01 [Motor Rated Current (FLA)]</i> is 100%. Also set the current suppression to prevent exceeding drive overload tolerance.</p> <p>Note: The upper limit to the setting range changes when the setting for <i>C6-01 [Normal / Heavy Duty Selection]</i> changes.</p> <ul style="list-style-type: none"> • 150% when <i>C6-01 = 0 [Heavy Duty Rating]</i> • 110% when <i>C6-01 = 1 [Normal Duty Rating]</i> 	Determined by C6-01 and L8-38 (0 - 150%)
n3-03 (058A) Expert	HSB Dwell Time at Stop	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the dwell time, a length of time when high-slip braking is ending and during which the motor speed decreases and runs at a stable speed. For a set length of time, the drive will hold the actual output frequency at the minimum output frequency set in <i>E1-09</i>.</p>	1.0 s (0.0 - 10.0 s)
n3-04 (058B) Expert	HSB Overload Time	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the time used to detect <i>oL7 [High Slip Braking Overload]</i>, which occurs when the output frequency does not change during high-slip braking. Usually it is not necessary to change this parameter.</p>	40 s (30 - 1200 s)
n3-13 (0531)	OverexcitationBraking (OEB) Gain	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the gain value that the drive multiplies by the V/f pattern output value during overexcitation deceleration to calculate the overexcitation level.</p>	1.10 (1.00 - 1.40)
n3-14 (0532) Expert	OEB High Frequency Injection	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the function that injects harmonic signals during overexcitation deceleration.</p> <p>0 : Disabled 1 : Enabled</p>	0 (0, 1)
n3-21 (0579)	HSB Current Suppression Level	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the upper limit of the current that is suppressed at the time of overexcitation deceleration as a percentage of the drive rated current.</p>	100% (0 - 150%)
n3-23 (057B)	Overexcitation Braking Operation	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the direction of motor rotation where the drive will enable overexcitation.</p> <p>0 : Disabled 1 : Enabled Only when Rotating FWD 2 : Enabled Only when Rotating REV</p>	0 (0 - 2)

◆ n4: Adv Open Loop Vector Tune

No. (Hex.)	Name	Description	Default (Range)
n4-60 (1B80)	Motoring Low Speed Comp Gain	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets a compensation gain to improve the control qualities for motoring loads in the low speed range.</p>	100.0 % (50.0 - 200.0%)
n4-61 (1B81)	Low Speed Comp Frequency Level	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets a frequency at which the settings <i>n4-60 [Motoring Low Speed Comp Gain]</i> and <i>n4-62 [Regen Low Speed Comp Gain]</i> are enabled. When the output frequency < <i>n4-61</i>, the drive adjusts the torque to agree with the settings for <i>n4-60</i> and <i>n4-62</i>. Usually it is not necessary to change this setting.</p>	6.00 Hz (0.50 - 12.00 Hz)
n4-62 (1B82)	Regen Low Speed Comp Gain	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets a compensation gain to improve the control qualities for regenerative loads in the low speed range.</p>	100.0 % (50.0 - 500.0%)
n4-63 (1B83)	Speed EstimateResponse@High Freq	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the responsiveness of the speed estimation in high speed ranges, where the output frequency is ≥ <i>n4-67 [Estimate Gain Switchover Freq]</i>.</p>	60.0 (0.1 - 300.0)
n4-64 (1B84)	Speed Estimate Response@Low Freq	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the responsiveness of the speed estimation in low speed ranges, where 0 ≤ the output frequency, which is < <i>n4-67 [Estimate Gain Switchover Freq]</i>.</p>	60.0 (0.1 - 300.0)
n4-65 (1B85)	Flux Estimate Response@High Freq	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the responsiveness of the magnetic flux estimation in high speed ranges, where the output frequency is ≥ <i>n4-67 [Estimate Gain Switchover Freq]</i>. Usually it is not necessary to change this setting.</p>	1.00 (0.50 - 3.00)

No. (Hex.)	Name	Description	Default (Range)
n4-66 (1B86)	Flux Estimate Response @Low Freq	V/f CL-V/f OLV CLV AOLV OLVP/M AOLVP/M CLVP/M EZOLV Sets the responsiveness of the magnetic flux estimation in low speed ranges, where $0 \leq$ the output frequency, which is $< n4-67$ [Estimate Gain Switchover Freq]. Usually it is not necessary to change this setting.	1.50 (0.50 - 3.00)
n4-67 (1B87)	Estimate Gain Switchover Freq	V/f CL-V/f OLV CLV AOLV OLVP/M AOLVP/M CLVP/M EZOLV Sets the switching frequency for estimation gain for these parameters: n4-63 [Speed EstimateResponse@High Freq] n4-64 [Speed Estimate Response@Low Freq] n4-65 [Flux Estimate Response@High Freq] n4-66 [Flux Estimate Response @Low Freq] Usually it is not necessary to change this setting.	6.00 Hz (0.00 - E1-04 setting)
n4-68 (1B88)	Speed Estimation Filter Time	V/f CL-V/f OLV CLV AOLV OLVP/M AOLVP/M CLVP/M EZOLV Sets the primary delay time constant for the speed estimation value. Usually it is not necessary to change this setting.	0.001 s (0.001 - 0.010 s)
n4-69 (1B89)	Flux Control Response	V/f CL-V/f OLV CLV AOLV OLVP/M AOLVP/M CLVP/M EZOLV Unifies control of magnetic flux to make motor vibrations more stable.	1.00 (0.00 - 60.00)
n4-70 (1B8A)	Speed Command Comp @ Low Freq	V/f CL-V/f OLV CLV AOLV OLVP/M AOLVP/M CLVP/M EZOLV Sets the function to make the drive more stable when operating at low speeds. Usually it is not necessary to change this setting.	1.00 Hz (0.00 - 6.00 Hz)
n4-71 (1B8B) Expert	Flux Estimation Method	V/f CL-V/f OLV CLV AOLV OLVP/M AOLVP/M CLVP/M EZOLV Sets the flux estimation method. Usually it is not necessary to change this setting. 0 : Method 1 1 : Method 2	0 (0, 1)
n4-72 (1B8C)	Speed Feedback Mode	V/f CL-V/f OLV CLV AOLV OLVP/M AOLVP/M CLVP/M EZOLV Sets the requirement for an encoder option when A1-02 = 4 [Control Method Selection = Advanced Open Loop Vector]. 0 : Without Encoder 1 : With Encoder	0 (0, 1)
n4-73 (1B8D)	PGo Recovery Selection	V/f CL-V/f OLV CLV AOLV OLVP/M AOLVP/M CLVP/M EZOLV Sets the restart mode to Without Encoder Mode or the With Encoder Mode when an encoder is disconnected. 0 : Without Encoder 1 : With Encoder	0 (0, 1)
n4-74 (1B8E)	Limit of Flux Loop	V/f CL-V/f OLV CLV AOLV OLVP/M AOLVP/M CLVP/M EZOLV Sets the control level for flux loop control output.	250% (100 - 500%)

◆ n5: Feed Forward Control

No. (Hex.)	Name	Description	Default (Range)
n5-01 (05B0)	Feed Forward Control Selection	V/f CL-V/f OLV CLV AOLV OLVP/M AOLVP/M CLVP/M EZOLV Sets the feed forward function. 0 : Disabled 1 : Enabled	0 (0, 1)
n5-02 (05B1)	Motor Inertia Acceleration Time	V/f CL-V/f OLV CLV AOLV OLVP/M AOLVP/M CLVP/M EZOLV Sets the length of time for the motor to accelerate from the stopped to the maximum frequency with a single motor at the rated torque. Inertia Tuning automatically sets the motor acceleration time.	Determined by C6-01, E5-01, and o2-04 (0.001 - 10.000 s)
n5-03 (05B2)	Feed Forward Control Gain	V/f CL-V/f OLV CLV AOLV OLVP/M AOLVP/M CLVP/M EZOLV Sets the ratio between load inertia and motor inertia. Inertia Tuning automatically sets the Feedforward Control Gain value.	1.00 (0.00 - 100.00)
n5-04 (05B3) RUN Expert	Speed Response Frequency	V/f CL-V/f OLV CLV AOLV OLVP/M AOLVP/M CLVP/M EZOLV Sets the response frequency for the speed reference. Usually it is not necessary to change this parameter.	Determined by A1-02 (0.00 - 500.00 Hz)

◆ n6: Online Tuning

No. (Hex.)	Name	Description	Default (Range)
n6-01 (0570)	Online Tuning Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the type of motor data that Online Tuning uses for OLV control.</p> <p>0 : Disabled 1 : Line-to-Line Resistance Tuning 2 : Voltage Correction Tuning</p>	0 (0 - 2)
n6-05 (05C7) Expert	Online Tuning Gain	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the compensation gain when $n6-01 = 2$ [Online Tuning Selection = Voltage Correction Tuning]. Usually it is not necessary to change this parameter.</p>	1.0 (0.1 - 50.0)
n6-11 (1B56) Expert	Online Resistance Tuning	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the responsiveness for online resistor tuning. Set this parameter to approximately 1.000 to enable the function. The function is disabled when the value is 0.000.</p>	0.000 (0.000 - 1.000)

◆ n7: EZ Drive

No. (Hex.)	Name	Description	Default (Range)
n7-01 (3111) Expert	Damping Gain for Low Frequency	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the oscillation suppression gain for the low speed range.</p>	1.0 (0.1 - 10.0)
n7-05 (3115) Expert	Response Gain for Load Changes	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the response gain related to changes in the load.</p>	100 (10 - 1000)
n7-07 (3117) Expert	Speed Calculation Gain1	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the speed calculation gain during usual operation. Usually it is not necessary to change this setting.</p>	15.0 (1.0 - 50.0)
n7-08 (3118) Expert	Speed Calculation Gain2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the speed calculation gain during a speed search.</p>	25.0 (1.0 - 50.0)
n7-10 (311A) Expert	Pull-in Current Switching Speed	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the speed range to operate with the pull-in current command. Drive rated frequency = 100% value. If there is a large quantity of oscillation when you operate in the low speed range, increase the setting value.</p>	10.0% (0.0 - 100.0%)
n7-11 (311B) Expert	Drv Mode Switch Hysteresis Band	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Usually it is not necessary to change this setting. Sets the hysteresis level for Switching Speed set in $n7-10$ [Pull-in Current Switching Speed]. When the speed is lower than $n7-10 + n7-11$ during acceleration, the drive enables pull-in current.</p> <p>Note:</p> <ul style="list-style-type: none"> When the drive accelerates, it enables these settings: <ul style="list-style-type: none"> Motor speed $\leq n7-10 + n7-11$: $n8-51$ [Pull-in Current @ Acceleration] Motor speed $> n7-10 + n7-11$: $b8-01$ [Energy Saving Control Selection] If there is a large quantity of oscillation when you operate in the low speed range, increase the setting value. When it is most important to save energy in the low speed range, decrease the setting value. 	5.0% (1.0 - 20.0%)
n7-13 (311D) Expert	Driving Method Switching Time	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets a time to enable the pull-in current commands. If there is a large quantity of oscillation at speeds around $n7-10$ [Pull-in Current Switching Speed], decrease the setting in 20 ms decrements.</p>	100 ms (0 - 1000 ms)
n7-17 (3122)	Resistance TemperatureCorrection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function to adjust for changes in the motor resistance value caused by changes in the temperature.</p> <p>0 : Invalid 1 : Valid (Only 1 time) 2 : Valid (Every time)</p>	1 (0 to 2)

◆ n8: PM Motor Control Tuning

No. (Hex.)	Name	Description	Default (Range)
n8-01 (0540)	Pole Position Detection Current	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the Initial Rotor Position Estimated Current as a percentage where <i>E5-03 [PM Motor Rated Current (FLA)] = 100%</i> . Usually it is not necessary to change this setting.	50% (0 - 100%)
n8-02 (0541) Expert	Pole Alignment Current Level	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the current at the time of polar attraction as a percentage where <i>E5-03 [PM Motor Rated Current (FLA)] = 100%</i> . Usually it is not necessary to change this setting.	80% (0 - 150%)
n8-03 (0542)	Pole Position Detection Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the length of the Current Starting Time, which is used for Z Pulse Offset Tuning. Usually it is not necessary to change this setting.	1.5 s (1.5 - 5.0 s)
n8-04 (0543) Expert	Pole Alignment Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the length of the Polar Attraction Time, which is used for Z Pulse Offset Tuning. Usually it is not necessary to change this setting.	1.5 s (1.5 - 5.0 s)
n8-11 (054A)	Observer Calculation Gain 2	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the gain for speed estimation. Usually it is not necessary to change this setting.	Determined by n8-72 (0.0 - 1000.0)
n8-14 (054D) Expert	Polarity Compensation Gain 3	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the gain for speed estimation. Usually it is not necessary to change this setting.	1.000 (0.000 - 10.000)
n8-15 (054E) Expert	Polarity Compensation Gain 4	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the gain for speed estimation. Usually it is not necessary to change this setting.	0.500 (0.000 - 10.000)
n8-21 (0554) Expert	Motor Back-EMF (Ke) Gain	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the gain for speed estimation. Usually it is not necessary to change this setting.	0.90 (0.80 - 1.00)
n8-23 (0556) Expert	ACR q Gain @PoleEst	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the proportional gain for current regulator q-axis control when the drive estimates the initial pole. Usually it is not necessary to change this setting.	0 (0 - 2000)
n8-24 (0557) Expert	ACR q Integral Time @PoleEst	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the integral time for current regulator q-axis control when the drive estimates the initial pole. Usually it is not necessary to change this setting.	0.0 ms (0.0 - 100.0 ms)
n8-25 (0558) Expert	ACR q Limit @PoleEst	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the q-axis limit of the current regulator when the drive estimates the initial pole. Usually it is not necessary to change this setting.	0% (0 - 150%)
n8-26 (0559) Expert	ACR d Gain @PoleEst	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the proportional gain for current regulator d-axis control when the drive estimates the initial pole. Usually it is not necessary to change this setting.	500 (0 - 2000)
n8-27 (055A) Expert	ACR d Integral Time @PoleEst	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the integral time for current regulator d-axis control when the drive estimates the initial pole. Usually it is not necessary to change this setting.	0.0 ms (0.0 - 100.0 ms)
n8-28 (055B) Expert	ACR d Lim @PoleEst	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the d-axis limit of the current regulator when the drive estimates the initial pole. Usually it is not necessary to change this setting.	100% (0 - 150%)
n8-35 (0562)	Initial Pole Detection Method	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets how the drive detects the position of the rotor at start. Note: • When you operate an SPM motor, set <i>n8-35 = 0</i> . When you operate an IPM motor, you can set <i>n8-35 = 0 to 2</i> . • When you set <i>n8-35 = 1</i> , doHigh Frequency Injection Auto-Tuning. 0 : Pull-in 1 : High Frequency Injection 2 : Pulse Injection	Determined by A1-02 (0 - 2)
n8-36 (0563)	HFI Frequency Level for L Tuning	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the injection frequency for high frequency injection. Note: • Set <i>n8-35 = 1 [Initial Pole Detection Method = High Frequency Injection]</i> or <i>n8-57 = 1 [HFI Overlap Selection = Enabled]</i> to enable this parameter. • The drive automatically calculates this value when High Frequency Injection Auto-Tuning completes successfully.	500 Hz (200 - 1000 Hz)

3.12 n: Special Adjustment

No. (Hex.)	Name	Description	Default (Range)
n8-37 (0564) Expert	HFI Voltage Amplitude Level	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the high frequency injection amplitude as a percentage where 200 V = 100% for 200 V class drives and 400 V = 100% for a 400 V class drives. Usually it is not necessary to change this setting.</p> <p>Note:</p> <ul style="list-style-type: none"> Set n8-35 = 1 [Initial Pole Detection Method = High Frequency Injection] or n8-57 = 1 [HFI Overlap Selection = Enabled] to enable this parameter. The drive automatically calculates this value when High Frequency Injection Auto-Tuning completes successfully. 	20.0% (0.0 - 50.0%)
n8-39 (0566)	HFI L.PF Cutoff Freq	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the low-pass filter shut-off frequency for high frequency injection.</p> <p>Note:</p> <ul style="list-style-type: none"> Set n8-35 = 1 [Initial Pole Detection Method = High Frequency Injection] or n8-57 = 1 [HFI Overlap Selection = Enabled] to enable this parameter. The drive automatically calculates this value when High Frequency Injection Auto-Tuning completes successfully. 	250 Hz (0 - 1000 Hz)
n8-41 (0568) Expert	HFI P Gain	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the response gain for the high frequency injection speed estimation.</p> <p>Note:</p> <ul style="list-style-type: none"> Set n8-35 = 1 [Initial Pole Detection Method = High Frequency Injection] or n8-57 = 1 [HFI Overlap Selection = Enabled] to enable this parameter. When A1-02 = 6 [Control Method Selection = AOLV/PM] and you do High Frequency Injection Auto-Tuning, the drive automatically sets this parameter. 	2.5 (-10.0 - +10.0)
n8-42 (0569) Expert	HFI I Time	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the integral time constant for the high frequency injection speed estimation. Usually it is not necessary to change this setting.</p>	0.10 s (0.00 - 9.99 s)
n8-45 (0538)	Speed Feedback Detection Gain	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the internal speed feedback detection reduction unit gain as a magnification value. Usually it is not necessary to change this setting.</p>	0.80 (0.00 - 10.00)
n8-46 (0539) Expert	PM Phase Compensation Gain	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the gain to compensate for phase differences. Usually it is not necessary to change this setting.</p>	0.3 (0.0 - 10.0)
n8-47 (053A)	Pull-in Current Comp Filter Time	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the time constant the drive uses to align the pull-in current reference value with the actual current value. Usually it is not necessary to change this setting.</p>	5.0 s (0.0 - 100.0 s)
n8-48 (053B)	Pull-in/Light Load Id Current	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the d-axis current that flows to the motor during run at constant speed as a percentage where E5-03 [PM Motor Rated Current (FLA)] = 100%.</p>	30% (0 - 200%)
n8-49 (053C)	Heavy Load Id Current	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the d-axis current to that the drive will supply to the motor to run it at a constant speed with a heavy load. Considers E5-03 [PM Motor Rated Current (FLA)] to be 100%. Usually it is not necessary to change this setting.</p>	Determined by E5-01 (-200.0 - +200.0%)
n8-50 (053D)	Medium Load Iq Level (High)	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the load current level to start high efficiency control as a percentage of E5-03 [PM Motor Rated Current (FLA)]. Usually it is not necessary to change this setting.</p>	80% (50 - 255%)
n8-51 (053E)	Pull-in Current @ Acceleration	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the pull-in current allowed to flow during acceleration/deceleration as a percentage of the motor rated current.</p> <p>Note:</p> <p>Parameter A1-02 [Control Method Selection] selects which parameter is the motor rated current.</p> <ul style="list-style-type: none"> A1-02 = 5 [OLV/PM]: E5-03 [PM Motor Rated Current (FLA)] A1-02 = 8 [EZOLV]: E9-06 [Motor Rated Current (FLA)] 	Determined by A1-02 (0 - 200%)
n8-52 (053F) Expert	ACR P Gain	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the proportional gain of the current regulator. Usually it is not necessary to change this setting.</p>	10.0 (-100.0 - 100.0)
n8-54 (056D) Expert	Voltage Error Compensation Time	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the time constant that the drive uses when adjusting for voltage errors.</p>	1.00 s (0.00 - 10.00 s)
n8-55 (056E)	Motor to Load Inertia Ratio	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV</p> <p>Sets the ratio between motor inertia and machine inertia.</p> <p>0 : Below 1:10 1 : Between 1:10 and 1:30 2 : Between 1:30 and 1:50 3 : Beyond 1:50</p>	0 (0 - 3)

No. (Hex.)	Name	Description	Default (Range)
n8-56 (056F) Expert	PM High Performance Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Usually it is not necessary to change this setting. Sets the high efficiency control method for IPM motor. 0 : Disabled 1 : Enabled (Vd) 2 : Enabled (Vd & Vq)	1 (0 - 2)
n8-57 (0574)	HFI Overlap Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function that detects motor speed with high frequency injection. Note: When you set n8-57 = 1, do High Frequency Injection Auto-Tuning. 0 : Disabled 1 : Enabled	0 (0, 1)
n8-62 (057D) Expert	Output Voltage Limit Level	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the output voltage limit to prevent saturation of the output voltage. Usually it is not necessary to change this parameter. Note: • When A1-02 = 7, 8 [Control Method Selection = CLV/PM EZOLV], this parameter is available in Expert mode. • When A1-02 = 8 [Control Method Selection = EZOLV], the default settings are: • 200 V Class: 230.0 V • 400 V Class: 460.0 V	200 V Class: 200.0 V, 400 V Class: 400.0 V (200 V Class: 0.0 to 240.0 V, 400 V Class: 0.0 to 480.0 V)
n8-63 (057E) Expert	Output Voltage Limit P Gain	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the proportional gain for output voltage control. Usually it is not necessary to change this setting.	1.00 (0.00 - 100.00)
n8-64 (057F) Expert	Output Voltage Limit I Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the integral time for output voltage control. Usually it is not necessary to change this setting.	0.040 s (0.000 - 5.000)
n8-65 (065C) Expert	Speed Fdbk Gain @ oV Suppression	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the gain of internal speed feedback detection suppression while the overvoltage suppression function is operating as a magnification value. Usually it is not necessary to change this parameter.	1.50 (0.00 - 10.00)
n8-66 (0235) Expert	Output Voltage Limit Filter Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the filter time constant for output voltage control. Usually it is not necessary to change this setting.	0.020 s (0.000 - 5.000)
n8-69 (065D) Expert	Speed Observer Control P Gain	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Usually it is not necessary to change this setting. Sets the Proportional gain that the drive uses for speed estimation.	1.00 (0.00 - 20.00)
n8-70 (065E) Expert	Speed Observer Control I Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the speed estimator integral time constant. This parameter is available when n8-72 = 1 [Speed Estimation Method Select = Method 2]. Usually it is not necessary to change this setting.	0.0 s (0.0 - 100.0)
n8-71 (065F) Expert	Speed Observer Control D Gain	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Set the speed estimator differential gain. This parameter is available when n8-72 = 1 [Speed Estimation Method Select = Method 2]. Usually it is not necessary to change this setting.	5.00 (0.00 - 50.00)
n8-72 (0655) Expert	Speed Estimation Method Select	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Selects the speed estimation method. Usually it is not necessary to change this setting. 0 : Method 1 1 : Method 2	1 (0, 1)
n8-73 (0656) Expert	Observer Mode Switch-Over Speed	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the speed level for pull-in current control at motor start as a percentage of E1-06 [Base Frequency]. Usually it is not necessary to change this setting.	10% (0 - 100)
n8-74 (05C3)	Light Load Iq Level	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Set n8-48 [Pull-in/Light Load Id Current] to the percentage of load current (q-axis current) that you will apply, where E5-03 [PM Motor Rated Current (FLA)] = a setting value of 100%.	30% (0 - 255%)
n8-75 (05C4)	Medium Load Iq Level (low)	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Set n8-78 [Medium Load Id Current] to the percentage of load current (q-axis current) that you will apply, where E5-03 [PM Motor Rated Current (FLA)] = a setting value of 100%.	50% (0 - 255%)
n8-76 (05CD) Expert	Id Switching Filter Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the filter time constant for d-axis current reference. Usually it is not necessary to change this setting.	200 ms (0 - 5000 ms)
n8-77 (05CE)	Heavy Load Iq Level	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Set n8-49 [Heavy Load Id Current] to the percentage of load current (q-axis current) that you will apply, where E5-03 [PM Motor Rated Current (FLA)] = a setting value of 100%.	90% (0 - 255%)

3.12 n: Special Adjustment

No. (Hex.)	Name	Description	Default (Range)
n8-78 (05F4)	Medium Load Id Current	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the level of the pull-in current for mid-range loads.</p>	0% (-200 - +200%)
n8-79 (05FE)	Pull-in Current @ Deceleration	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the pull-in current that can flow during deceleration as a percentage of the <i>E5-03 [PM Motor Rated Current (FLA)]</i>.</p> <p>Note: When <i>n8-79 = 0</i>, the drive will use the value set in <i>n8-51 [Pull-in Current @ Acceleration]</i>.</p>	50% (0 - 200%)
n8-84 (02D3) Expert	Polarity Detection Current	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the current that the drive uses to estimate the initial motor magnetic pole as a percentage where <i>E5-03 [PM Motor Rated Current (FLA)] = 100%</i>.</p> <p>Note: The drive automatically calculates this value when High Frequency Injection Auto-Tuning completes successfully.</p>	100% (0 - 150%)
n8-94 (012D) Expert	Flux Position Estimation Method	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the criteria that the drive uses to find changes in speed or load. Usually it is not necessary to change this setting.</p> <p>0 : Softstarter 1 : Speed Feedback</p>	Determined by d5-01 (0, 1)
n8-95 (012E) Expert	Flux Position Est Filter Time	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the time constant of the filter used for the recognition criteria value for speed and load changes. Usually it is not necessary to change this setting.</p>	30 ms (0 - 100 ms)

3.13 o: Keypad-Related Settings

◆ o1: Keypad Display Selection


No. (Hex.)	Name	Description	Default (Range)
o1-01 (0500) RUN	User Monitor Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the <i>U</i> monitor for the Drive Mode. This parameter is only available with an LED keypad.	106 (104 - 855)
o1-02 (0501) RUN	Monitor Selection at Power-up	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the monitor item that the keypad screen shows after you energize the drive. Refer to "U: Monitors" for information about the monitor items that the keypad screen can show. This parameter is only available with an LED keypad. 1 : Frequency Reference (U1-01) 2 : Direction 3 : Output Frequency (U1-02) 4 : Output Current (U1-03) 5 : User Monitor (o1-01)	1 (1 - 5)
o1-03 (0502)	Frequency Display Unit Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the display units for the frequency reference and output frequency. 0 : 0.01 Hz 1 : 0.01% (100% = E1-04) 2 : min ⁻¹ (r/min) units 3 : User Units (o1-10 & o1-11)	Determined by A1-02 (0 - 3)
o1-04 (0503)	V/f Pattern Display Unit	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the setting unit for parameters that set the V/f pattern frequency. 0 : Hz 1 : min ⁻¹ (r/min) units	Determined by A1-02 (0, 1)
o1-05 (0504) RUN	LCD Contrast Adjustment	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the contrast of the LCD display on the keypad.	5 (0 - 10)
o1-10 (0520)	User Units Maximum Value	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the value that the drive shows as the maximum output frequency.	Determined by o1-03 (1 - 60000)
o1-11 (0521)	User Units Decimal Position	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the number of decimal places for frequency reference and monitor values. 0 : No Decimal Places (XXXXX) 1 : One Decimal Places (XXXX.X) 2 : Two Decimal Places (XXX.XX) 3 : Three Decimal Places (XX.XXX)	Determined by o1-03 (0 - 3)
o1-24 (11AD) RUN	Custom Monitor 1	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV You can select a maximum of 12 monitors as user monitors and set them to parameters o1-24 to o1-35. This parameter sets the user monitor to show on the first line. The registered monitor is also used for different monitor displays of bar graph, analog meter, and waveform.	101 (0,101 - 9999)
o1-25 (11AE) RUN	Custom Monitor 2	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV You can select a maximum of 12 monitors as user monitors and set them to parameters o1-24 to o1-35. This parameter sets the user monitor to show on the second line. The registered monitor is also used for different monitor displays of bar graph and waveform.	102 (0,101 - 9999)
o1-26 (11AF) RUN	Custom Monitor 3	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV You can select a maximum of 12 monitors as user monitors and set them to parameters o1-24 to o1-35. This parameter sets the user monitor to show on the third line. The registered monitor is also used for the monitor display of the bar graph.	103 (0,101 - 9999)
o1-27 (11B0) RUN	Custom Monitor 4	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV You can select a maximum of 12 monitors as user monitors and set them to parameters o1-24 to o1-35. This parameter sets the user monitor to show on the fourth line.	0 (0,101 - 9999)
o1-28 (11B1) RUN	Custom Monitor 5	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV You can select a maximum of 12 monitors as user monitors and set them to parameters o1-24 to o1-35. This parameter sets the user monitor to show on the fifth line.	0 (0,101 - 9999)
o1-29 (11B2) RUN	Custom Monitor 6	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV You can select a maximum of 12 monitors as user monitors and set them to parameters o1-24 to o1-35. This parameter sets the user monitor to show on the sixth line.	0 (0,101 - 9999)

3.13 o: Keypad-Related Settings


No. (Hex.)	Name	Description	Default (Range)
o1-30 (11B3) RUN	Custom Monitor 7	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV You can select a maximum of 12 monitors as user monitors and set them to parameters o1-24 to o1-35. This parameter sets the user monitor to show on the seventh line.	0 (0,101 - 9999)
o1-31 (11B4) RUN	Custom Monitor 8	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV You can select a maximum of 12 monitors as user monitors and set them to parameters o1-24 to o1-35. This parameter sets the user monitor to show on the eighth line.	0 (0,101 - 9999)
o1-32 (11B5) RUN	Custom Monitor 9	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV You can select a maximum of 12 monitors as user monitors and set them to parameters o1-24 to o1-35. This parameter sets the user monitor to show on the ninth line.	0 (0,101 - 9999)
o1-33 (11B6) RUN	Custom Monitor 10	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV You can select a maximum of 12 monitors as user monitors and set them to parameters o1-24 to o1-35. This parameter sets the user monitor to show on the 10th line.	0 (0,101 - 9999)
o1-34 (11B7) RUN	Custom Monitor 11	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV You can select a maximum of 12 monitors as user monitors and set them to parameters o1-24 to o1-35. This parameter sets the user monitor to show on the 11th line.	0 (0,101 - 9999)
o1-35 (11B8) RUN	Custom Monitor 12	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV You can select a maximum of 12 monitors as user monitors and set them to parameters o1-24 to o1-35. This parameter sets the user monitor to show on the 12th line.	0 (0,101 - 9999)
o1-36 (11B9) RUN	LCD Backlight Brightness	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the intensity of the LCD keypad backlight.	5 (1 - 5)
o1-37 (11BA) RUN	LCD Backlight ON/OFF Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the automatic shut off function for the LCD backlight. 0 : OFF 1 : ON	1 (0, 1)
o1-38 (11BB) RUN	LCD Backlight Off-Delay	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the time until the LCD backlight automatically turns off.	60 s (10 - 300 s)
o1-39 (11BC) RUN	Show Initial Setup Screen	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function to show the LCD keypad initial setup screen each time you energize the drive. This parameter is only available with an LCD keypad. 0 : No 1 : Yes	1 (0, 1)
o1-40 (11BD) RUN	Home Screen Display Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the monitor display mode for the Home screen. This parameter is only available with an LCD keypad. 0 : Custom Monitor 1 : Bar Graph 2 : Analog Gauge 3 : Trend Plot	0 (0 - 3)
o1-41 (11C1) RUN	1st Monitor Area Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the horizontal axis value used to display the monitor set in o1-24 [Custom Monitor 1] as a bar graph. This parameter is only available with an LCD keypad. 0 : +/- Area (- o1-42 ~ o1-42) 1 : + Area (0 ~ o1-42)	0 (0 - 1)
o1-42 (11C2) RUN	1st Monitor Area Setting	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the horizontal axis value used to display the monitor set in o1-24 [Custom Monitor 1] as a bar graph. This parameter is only available with an LCD keypad.	100.0% (0.0 - 100.0%)
o1-43 (11C3) RUN	2nd Monitor Area Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Selects the horizontal range used to display the monitor set in o1-25 [Custom Monitor 2] as a bar graph. This parameter is only available with an LCD keypad. 0 : +/- Area (- o1-44 ~ o1-44) 1 : + Area (0 ~ o1-44)	0 (0 - 1)
o1-44 (11C4) RUN	2nd Monitor Area Setting	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the horizontal axis value used to display the monitor set in o1-25 [Custom Monitor 2] as a bar graph. This parameter is only available with an LCD keypad.	100.0% (0.0 - 100.0%)

No. (Hex.)	Name	Description	Default (Range)
o1-45 (11C5) RUN	3rd Monitor Area Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the horizontal axis value used to display the monitor set in o1-26 [Custom Monitor 3] as a bar graph. This parameter is only available with an LCD keypad. 0 : +/- Area (- o1-46 ~ o1-46) 1 : + Area (0 ~ o1-46)	0 (0 - 1)
o1-46 (11C6) RUN	3rd Monitor Area Setting	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the horizontal axis value used to display the monitor set in o1-26 [Custom Monitor 3] as a bar graph. This parameter is only available with an LCD keypad.	100.0% (0.0 - 100.0%)
o1-47 (11C7) RUN	Trend Plot 1 Scale Minimum Value	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the horizontal axis minimum value used to display the monitor set in o1-24 [Custom Monitor 1] as a trend plot. This parameter is only available with an LCD keypad.	-100.0% (-300.0 - +299.9%)
o1-48 (11C8) RUN	Trend Plot 1 Scale Maximum Value	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the maximum value for the vertical axis used to display the monitor that was set in o1-24 [Custom Monitor 1] as a trend plot. This parameter is only available with an LCD keypad.	100.0% (-299.9 - +300.0%)
o1-49 (11C9) RUN	Trend Plot 2 Scale Minimum Value	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the horizontal axis minimum value used to display the monitor set in o1-25 [Custom Monitor 2] as a trend plot. This parameter is only available with an LCD keypad.	-100.0% (-300.0 - +299.9%)
o1-50 (11CA) RUN	Trend Plot 2 Scale Maximum Value	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the maximum value for the vertical axis used to display the monitor that was set in o1-25 [Custom Monitor 2] as a trend plot. This parameter is only available with an LCD keypad.	100.0% (-299.9 - +300.0%)
o1-51 (11CB) RUN	Trend Plot Time Scale Setting	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the time scale (horizontal axis) to display the trend plot. When you change this setting, the drive automatically adjusts the data sampling time. This parameter is only available with an LCD keypad.	300 s (1 - 3600 s)
o1-55 (11EE) RUN	Analog Gauge Area Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the range used to display the monitor set in o1-24 [Custom Monitor 1] as an analog gauge. This parameter is only available with an LCD keypad. 0 : +/- Area (- o1-56 ~ o1-56) 1 : + Area (0 ~ o1-56)	1 (0, 1)
o1-56 (11EF) RUN	Analog Gauge Area Setting	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the value used to display the monitor set in o1-24 [Custom Monitor 1] as an analog meter. This parameter is only available with an LCD keypad.	100.0% (0.0 - 100.0%)
o1-58 (3125)	Motor Power Unit Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the setting unit for parameters that set the motor rated power. 0 : kW 1 : HP	1 (0, 1)

◆ o2: Keypad Operation

No. (Hex.)	Name	Description	Default (Range)
o2-01 (0505)	LO/RE Key Function Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function that lets you use LO/RE to switch between LOCAL and REMOTE Modes. 0 : Disabled 1 : Enabled	1 (0, 1)
o2-02 (0506)	STOP Key Function Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function to use  on the keypad to stop the drive when the Run command source for the drive is REMOTE (external) and not assigned to the keypad. 0 : Disabled 1 : Enabled	1 (0, 1)
o2-03 (0507)	User Parameter Default Value	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the function to keep the settings of changed parameters as user parameter defaults to use during initialization. 0 : No change 1 : Set defaults 2 : Clear all	0 (0 - 2)
o2-04 (0508)	Drive Model (KVA) Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the Drive Model code. Set this parameter after replacing the control board.	Determined by the drive (-)

3.13 o: Keypad-Related Settings

No. (Hex.)	Name	Description	Default (Range)
o2-05 (0509)	Home Mode Freq Ref Entry Mode	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function that makes it necessary to push  to use the keypad to change the frequency reference value while in Drive Mode. 0 : ENTER Key Required 1 : Immediate / MOP-style</p>	0 (0, 1)
o2-06 (050A)	Keypad Disconnect Detection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function that stops the drive if you disconnect the keypad connection cable from the drive or if you damage the cable while the keypad is the Run command source. 0 : Disabled 1 : Enabled</p>	1 (0, 1)
o2-07 (0527)	Keypad RUN Direction @ Power-up	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the direction of motor rotation when the drive is energized and the keypad is the Run command source. 0 : Forward 1 : Reverse</p>	0 (0, 1)
o2-09 (050D)	Reserved	-	-
o2-23 (11F8) RUN	External 24V Powerloss Detection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function to give a warning if the backup external 24 V power supply turns off when the main circuit power supply is in operation. 0 : Disabled 1 : Enabled</p>	0 (0, 1)
o2-24 (11FE)	LED Light Function Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function to show the LED status rings and keypad LED lamps. Note: When you initialize the drive with parameter <i>A1-03 [Initialize Parameters]</i>, the drive will not reset this parameter. 0 : Enable Status Ring & Keypad LED 1 : LED Status Ring Disable 2 : Keypad LED Light Disable</p>	2 (0 - 2)
o2-26 (1563)	Alarm Display at Ext. 24V Power	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>When you connect a backup external 24 V power supply, this parameter sets the function to trigger an alarm when the main circuit power supply voltage decreases. Note: The drive will not run when it is operating from one 24-V external power supply. 0 : Disabled 1 : Enabled</p>	1 (0, 1)
o2-27 (1565)	bCE Detection Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets drive operation if the Bluetooth device is disconnected when you operate the drive in Bluetooth Mode. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use <i>C1-09</i>) 3 : Alarm Only 4 : No Alarm Display</p>	3 (0 - 4)
o2-33 (1BB6) Expert	Initial Pole Detection (External 24 V Power Supply)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets initial pole detection during the first run after an external 24 V power supply energizes the main circuit. While the main circuit is energized, the drive does not do initial pole detection from the second Run command. Usually it is not necessary to change this setting. Note: This parameter is available on drives with software versions PRG: 09018 and later. The "PRG" column on the nameplate on the right side of the drive identifies the software version. You can also use <i>U1-25 [SoftwareNumber FLASH]</i> to identify the software version. 0 : Initial pole detection disabled 1 : Initial pole detection enabled</p>	1 (0, 1)

◆ o3: Copy Keypad Function

No. (Hex.)	Name	Description	Default (Range)
o3-01 (0515)	Copy Keypad Function Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function that saves and copies drive parameters to a different drive with the keypad.</p> <p>0 : Copy Select 1 : Backup (drive → keypad) 2 : Restore (keypad → drive) 3 : Verify (check for mismatch) 4 : Erase (backup data of keypad)</p>	0 (0 - 4)
o3-02 (0516)	Copy Allowed Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the copy function when o3-01 = 1 [Copy Keypad Function Selection = Backup (drive → keypad)].</p> <p>0 : Disabled 1 : Enabled</p>	0 (0, 1)
o3-04 (0B3E)	Select Backup/Restore Location	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the storage location for drive parameters when you back up and restore parameters. This parameter is only available when using an LCD keypad.</p> <p>0 : Memory Location 1 1 : Memory Location 2 2 : Memory Location 3 3 : Memory Location 4</p>	0 (0 - 3)
o3-05 (0BDA)	Select Items to Backup/Restore	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets which parameters are backed up, restored, and referenced. This parameter is only available when using an LCD keypad.</p> <p>0 : Standard Parameters 1 : Standard + DWEZ Parameters</p>	1 (0, 1)
o3-06 (0BDE)	Auto Parameter Backup Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function that automatically backs up parameters. This parameter is only available when using an LCD keypad.</p> <p>0 : Disabled 1 : Enabled</p>	1 (0, 1)
o3-07 (0BDF)	Auto Parameter Backup Interval	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the interval at which the automatic parameter backup function saves parameters from the drive to the keypad.</p> <p>Note: This parameter is only available when using an LCD keypad.</p> <p>0 : Every 10 minutes 1 : Every 30 minutes 2 : Every 60 minutes 3 : Every 12 hours</p>	1 (0 - 3)

◆ o4: Maintenance Monitors

No. (Hex.)	Name	Description	Default (Range)
o4-01 (050B)	Elapsed Operating Time Setting	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the initial value of the cumulative drive operation time in 10-hour units.</p>	0 h (0 - 9999 h)
o4-02 (050C)	Elapsed Operating Time Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the condition that counts the cumulative operation time.</p> <p>0 : U4-01 Shows Total Power-up Time 1 : U4-01 Shows Total RUN Time</p>	0 (0, 1)
o4-03 (050E)	Fan Operation Time Setting	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the value from which to start the cumulative drive cooling fan operation time in 10-hour units.</p>	0 h (0 - 9999 h)
o4-05 (051D)	Capacitor Maintenance Setting	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the U4-05 [Capacitor Maintenance] monitor value.</p>	0% (0 - 150%)
o4-07 (0523)	Softcharge Relay Maintenance Set	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the U4-06 [PreChargeRelayMainte] monitor value.</p>	0% (0 - 150%)
o4-09 (0525)	IGBT Maintenance Setting	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the U4-07 [IGBT Maintenance] monitor value.</p>	0% (0 - 150%)

3.13 o: Keypad-Related Settings

No. (Hex.)	Name	Description	Default (Range)
o4-11 (0510)	Fault Trace/History Init (U2/U3)	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Resets the records of Monitors U2-xx [Fault Trace] and U3-xx [Fault History]. 0 : Disabled 1 : Enabled	0 (0, 1)
o4-12 (0512)	kWh Monitor Initialization	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Resets the monitor values for U4-10 [kWh, Lower 4 Digits] and U4-11 [kWh, Upper 5 Digits]. 0 : No Reset 1 : Reset	0 (0, 1)
o4-13 (0528)	RUN Command Counter @ Initialize	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Resets the monitor values for U4-02 [Num of Run Commands], U4-24 [Number of Runs (Low)], and U4-25 [Number of Runs (High)]. 0 : No Reset 1 : Reset	0 (0, 1)
o4-22 (154F) RUN	Time Format	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the time display format. This parameter is only available when using an LCD keypad. 0 : 24 Hour Clock 1 : 12 Hour Clock 2 : 12 Hour JP Clock	1 (0 - 2)
o4-23 (1550) RUN	Date Format	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the date display format. This parameter is only available when using an LCD keypad. 0 : YYYY/MM/DD 1 : DD/MM/YYYY 2 : MM/DD/YYYY	2 (0 - 2)
o4-24 (310F) RUN	bAT Detection Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets operation when the drive detects bAT [Keypad Battery Low Voltage] and TiM [Keypad Time Not Set]. 0 : Disable 1 : Enable (Alarm Detected) 2 : Enable (Fault Detected)	0 (0 - 2)

◆ o5: Log Function

No. (Hex.)	Name	Description	Default (Range)
o5-00 (1E81) RUN	Log Type	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the type of data log function. This parameter is only available when you use an LCD keypad. Note: This parameter is available on drives with software versions PRG: 09018 and later. The "PRG" column on the nameplate on the right side of the drive identifies the software version. You can also use U1-25 [SoftwareNumber FLASH] to identify the software version. 0 : Long Term Log 1 : Short Term Log	0 (0, 1)
o5-01 (1551) RUN	Log Start/Stop Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the data log function. This parameter is only available when using an LCD keypad. 0 : OFF 1 : ON	0 (0 - 1)
o5-02 (1552) RUN	Log Sampling Interval	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the data log sampling cycle. This parameter is only available when you use an LCD keypad. Note: The default setting and setting range change when o5-00 [Normal / Heavy Duty Selection] changes. • o5-00 = 0 [Long Term Log] –Default setting: 100 ms –Setting range: 100 - 60000 ms • o5-00 = 1 [Short Term Log] –Default setting: 10 ms –Setting range: 1 - 99 ms	Determined by o5-00 (Determined by o5-00)
o5-03 (1553) RUN	Log Monitor Data 1	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the data log monitor (Ux-xx). This parameter is only available when you use an LCD keypad. Note: Set the x-xx part of the Ux-xx [Monitor]. For example, set o5-03 = 101 to monitor U1-01 [Frequency Reference]. When the x part of Ux is a letter, replace the letter (hexadecimal number) with a decimal number. For example, set o5-03 = 1301 to monitor Ud-01.	101 (000, 101 - 9999)

No. (Hex.)	Name	Description	Default (Range)
o5-04 (1554) RUN	Log Monitor Data 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the data log monitor (<i>Ux-xx</i>). This parameter is only available when you use an LCD keypad.</p> <p>Note: Set the <i>x-xx</i> part of the <i>Ux-xx</i> [Monitor]. For example, set <i>o5-04</i> = 102 to monitor <i>U1-02</i> [Output Frequency]. When the <i>x</i> part of <i>Ux</i> is a letter, replace the letter (hexadecimal number) with a decimal number. For example, set <i>o5-04</i> = 1301 to monitor <i>Ud-01</i>.</p>	102 (000, 101 - 9999)
o5-05 (1555) RUN	Log Monitor Data 3	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the data log monitor (<i>Ux-xx</i>). This parameter is only available when you use an LCD keypad.</p> <p>Note: Set the <i>x-xx</i> part of the <i>Ux-xx</i> [Monitor]. For example, set <i>o5-05</i> = 103 to monitor <i>U1-03</i> [Output Current]. When the <i>x</i> part of <i>Ux</i> is a letter, replace the letter (hexadecimal number) with a decimal number. For example, set <i>o5-05</i> = 1301 to monitor <i>Ud-01</i>.</p>	103 (000, 101 - 9999)
o5-06 (1556) RUN	Log Monitor Data 4	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the data log monitor (<i>Ux-xx</i>). This parameter is only available when you use an LCD keypad.</p> <p>Note: Set the <i>x-xx</i> part of the <i>Ux-xx</i> [Monitor]. For example, set <i>o5-06</i> = 107 to monitor <i>U1-07</i> [Output Current]. When the <i>x</i> part of <i>Ux</i> is a letter, replace the letter (hexadecimal number) with a decimal number. For example, set <i>o5-06</i> = 1301 to monitor <i>Ud-01</i>.</p>	107 (000, 101 - 9999)
o5-07 (1557) RUN	Log Monitor Data 5	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the data log monitor (<i>Ux-xx</i>). This parameter is only available when you use an LCD keypad.</p> <p>Note: Set the <i>x-xx</i> part of the <i>Ux-xx</i> [Monitor]. For example, set <i>o5-07</i> = 108 to monitor <i>U1-08</i> [Output Current]. When the <i>x</i> part of <i>Ux</i> is a letter, replace the letter (hexadecimal number) with a decimal number. For example, set <i>o5-07</i> = 1301 to monitor <i>Ud-01</i>.</p>	108 (000, 101 - 9999)
o5-08 (1558) RUN	Log Monitor Data 6	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the data log monitor (<i>Ux-xx</i>). This parameter is only available when you use an LCD keypad.</p> <p>Note:</p> <ul style="list-style-type: none"> When <i>A1-02</i> = 0 or 5 [Control Method Selection = <i>V/f</i>, <i>OLV/PM</i>], the default setting is 0. Set the <i>x-xx</i> part of the <i>Ux-xx</i> [Monitor]. For example, set <i>o5-08</i> = 101 to monitor <i>U1-01</i> [Frequency Reference]. <p>When the <i>x</i> part of <i>Ux</i> is a letter, replace the letter (hexadecimal number) with a decimal number. For example, set <i>o5-08</i> = 1301 to monitor <i>Ud-01</i>.</p>	105 (000, 101 - 9999)
o5-09 (1559) RUN	Log Monitor Data 7	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the data log monitor (<i>Ux-xx</i>). This parameter is only available when you use an LCD keypad.</p> <p>Note: Set the <i>x-xx</i> part of the <i>Ux-xx</i> [Monitor]. For example, set <i>o5-09</i> = 101 to monitor <i>U1-01</i> [Frequency Reference]. When the <i>x</i> part of <i>Ux</i> is a letter, replace the letter (hexadecimal number) with a decimal number. For example, set <i>o5-09</i> = 1301 to monitor <i>Ud-01</i>.</p>	110 (000, 101 - 9999)
o5-10 (155A) RUN	Log Monitor Data 8	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the data log monitor (<i>Ux-xx</i>). This parameter is only available when you use an LCD keypad.</p> <p>Note: Set the <i>x-xx</i> part of the <i>Ux-xx</i> [Monitor]. For example, set <i>o5-10</i> = 101 to monitor <i>U1-01</i> [Frequency Reference]. When the <i>x</i> part of <i>Ux</i> is a letter, replace the letter (hexadecimal number) with a decimal number. For example, set <i>o5-10</i> = 1301 to monitor <i>Ud-01</i>.</p>	112 (000, 101 - 9999)
o5-11 (155B) RUN	Log Monitor Data 9	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the data log monitor (<i>Ux-xx</i>). This parameter is only available when you use an LCD keypad.</p> <p>Note: Set the <i>x-xx</i> part of the <i>Ux-xx</i> [Monitor]. For example, set <i>o5-11</i> = 101 to monitor <i>U1-01</i> [Frequency Reference]. When the <i>x</i> part of <i>Ux</i> is a letter, replace the letter (hexadecimal number) with a decimal number. For example, set <i>o5-11</i> = 1301 to monitor <i>Ud-01</i>.</p>	000 (000, 101 - 9999)
o5-12 (155C) RUN	Log Monitor Data 10	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the data log monitor (<i>Ux-xx</i>). This parameter is only available when you use an LCD keypad.</p> <p>Note: Set the <i>x-xx</i> part of the <i>Ux-xx</i> [Monitor]. For example, set <i>o5-12</i> = 101 to monitor <i>U1-01</i> [Frequency Reference]. When the <i>x</i> part of <i>Ux</i> is a letter, replace the letter (hexadecimal number) with a decimal number. For example, set <i>o5-12</i> = 1301 to monitor <i>Ud-01</i>.</p>	000 (000, 101 - 9999)

3.13 o: Keypad-Related Settings

No. (Hex.)	Name	Description	Default (Range)
o5-15 (1E82) RUN	Trigger Type Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the type of trigger for the short-term data log. This parameter is only available when you use an LCD keypad.</p> <p>Note: This parameter is available on drives with software versions PRG: 09018 and later. The "PRG" column on the nameplate on the right side of the drive identifies the software version. You can also use <i>UI-25 [SoftwareNumber FLASH]</i> to identify the software version.</p> <p>0 : Digital Trigger 1 : Analog Trigger</p>	0 (0, 1)
o5-16 (1E83) RUN	Digital Trigger Object	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the function for the digital trigger target from the setting values for multi-function digital outputs. This parameter is only available when you use an LCD keypad.</p> <p>Note: This parameter is available on drives with software versions PRG: 09018 and later. The "PRG" column on the nameplate on the right side of the drive identifies the software version. You can also use <i>UI-25 [SoftwareNumber FLASH]</i> to identify the software version.</p>	E (0 - FF)
o5-17 (1E84) RUN	Analog Trigger Object	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the monitor for the analog trigger target. This parameter is only available when you use an LCD keypad.</p> <p>Note:</p> <ul style="list-style-type: none"> This parameter is available on drives with software versions PRG: 09018 and later. The "PRG" column on the nameplate on the right side of the drive identifies the software version. You can also use <i>UI-25 [SoftwareNumber FLASH]</i> to identify the software version. Set the <i>x-xx</i> part of the <i>Ux-xx [Monitor]</i>. For example, set <i>o5-17 = 101</i> to monitor <i>UI-01 [Frequency Reference]</i>. When the <i>x</i> part of <i>Ux</i> is a letter, replace the letter (hexadecimal number) with a decimal number. For example, set <i>o5-17 = 1301</i> to monitor <i>Ud-01</i>. When it is not necessary to set a data log monitor, set this parameter to <i>000</i>. 	102 (0 - 9999)
o5-18 (1E85) RUN	Analog Trigger Level	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the level to compare with the analog trigger target. This parameter is only available when you use an LCD keypad.</p> <p>Note: This parameter is available on drives with software versions PRG: 09018 and later. The "PRG" column on the nameplate on the right side of the drive identifies the software version. You can also use <i>UI-25 [SoftwareNumber FLASH]</i> to identify the software version.</p>	0.0% (-999.9% - +999.9%)
o5-19 (1E86) RUN	Trigger Condition	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the condition with which to detect the trigger. This parameter is only available when you use an LCD keypad.</p> <p>Note: This parameter is available on drives with software versions PRG: 09018 and later. The "PRG" column on the nameplate on the right side of the drive identifies the software version. You can also use <i>UI-25 [SoftwareNumber FLASH]</i> to identify the software version.</p> <p>0 : Rising Edge 1 : Falling Edge</p>	0 (0, 1)
o5-20 (1E87) RUN	Pre-Trigger Setting	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the percentage of data to save before the drive detects the trigger for the short-term data log. This parameter is only available when you use an LCD keypad.</p> <p>Note: This parameter is available on drives with software versions PRG: 09018 and later. The "PRG" column on the nameplate on the right side of the drive identifies the software version. You can also use <i>UI-25 [SoftwareNumber FLASH]</i> to identify the software version.</p>	90% (0% - 100%)
o5-21 (1E88) RUN	Trend Log Sampling Time Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the sampling cycle for the trend log to save data before the drive detects the trigger. The trend log works at the same time as the short-term data log. This parameter is only available when you use an LCD keypad.</p> <p>Note: This parameter is available on drives with software versions PRG: 09018 and later. The "PRG" column on the nameplate on the right side of the drive identifies the software version. You can also use <i>UI-25 [SoftwareNumber FLASH]</i> to identify the software version.</p> <p>0 : Trend Log Disabled 1 : 0.1 s (About 1 hour) 2 : 1 s (About 10 hours) 3 : 10 s (About 100 hours) 4 : 60 s (About 600 hours)</p>	0 (0 - 4)

3.14 q: DriveWorksEZ Parameters

◆ q1-01 to qx-xx: Reserved for DriveWorksEZ

No. (Hex.)	Name	Description	Default (Range)
q1-01 to qx-xx (1600 - xxxx)	Reserved for DriveWorksEZ	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV These parameters are reserved for use with DriveWorksEZ.	Refer to "DriveWorksEZ Operation Manual".

3.15 r: DWEZ Connection 1-20

◆ r1-01 to r1-40: DriveWorksEZ Connection Parameters 1 to 20 (Upper / Lower)

No. (Hex.)	Name	Description	Default (Range)
r1-01 to r1-40: (1840 - 1867)	DriveWorksEZ Connection Parameters 1 to 20 (Upper / Lower)	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV DriveWorksEZ Connection Parameters 1 to 20 (Upper / Lower)	0 (0 - FFFFH)

3.16 T: Motor Tuning

◆ T0: Tuning Mode Selection

No. (Hex.)	Name	Description	Default (Range)
T0-00 (1197)	Tuning Mode Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the type of Auto-Tuning. 0 : Motor Parameter Tuning 1 : Control Tuning</p>	0 (0, 1)

◆ T1: InductionMotor Auto-Tuning

No. (Hex.)	Name	Description	Default (Range)
T1-00 (0700)	Motor 1/Motor 2 Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets which motor to tune when motor 1/2 switching is enabled. You can only use the keypad to set this parameter. You cannot use external input terminals to set it. Note: This parameter is enabled when $H1-xx = 16$ [Motor 2 Selection] is set. When $H1-xx \neq 16$ the keypad will not show this parameter. 1 : Motor 1 (sets E1-xx, E2-xx) 2 : Motor 2 (sets E3-xx, E4-xx)</p>	1 (1, 2)
T1-01 (0701)	Auto-Tuning Mode Selection	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the type of Auto-Tuning. 0 : Rotational Auto-Tuning 1 : Stationary Auto-Tuning 1 2 : Stationary Line-Line Resistance</p>	Determined by A1-02 (Determined by A1-02)
T1-02 (0702)	Motor Rated Power	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the motor rated output in the units from $o1-58$ [Motor Power Unit Selection]. Note: On drive models 2xxx, and 4002 to 4720, the setting unit is 0.01 kW. The setting range is 0.00 kW to 650.00 kW (0.00 HP to 650.00 HP). On drive models 4810 to 4H12, the setting unit is 0.1 kW. The setting range is 0.0 kW to 1000.0 kW (0.0 HP to 1340.5 HP).</p>	Determined by o2-04, C6-01 (0.00 - 1000.0)
T1-03 (0703)	Motor Rated Voltage	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the rated voltage (V) of the motor. Enter the base speed voltage for constant output motors.</p>	Determined by o2-04, C6-01 (200 V Class: 0.0 - 255.5 V, 400 V Class: 0.0 - 511.0 V)
T1-04 (0704)	Motor Rated Current	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the rated current (A) of the motor.</p>	Determined by o2-04 (10% to 200% of the drive rated current)
T1-05 (0705)	Motor Base Frequency	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the base frequency (Hz) of the motor.</p>	60.0 Hz (0.0 - 590.0 Hz)
T1-06 (0706)	Number of Motor Poles	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the number of motor poles.</p>	4 (2 to 120)
T1-07 (0707)	Motor Base Speed	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the motor base speed for Auto-Tuning (min^{-1} (r/min)).</p>	1750 min^{-1} (r/min) (0 - 35400 min^{-1} (r/min))
T1-08 (0708)	Encoder Pulse Count (PPR)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the number of PG (pulse generator, encoder) pulses.</p>	1024 ppr (0 - 60,000 ppr)
T1-09 (0709)	Motor No-Load Current	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the no-load current of the motor.</p>	- (0 A - T1-04; max. of 2999.9)
T1-10 (070A)	Motor Rated Slip Frequency	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets motor rated slip.</p>	- (0.000 - 20.000 Hz)
T1-11 (070B)	Motor Iron Loss	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the iron loss to calculate the energy-saving coefficient.</p>	Determined by E2-10 or E4-10 (0 - 65535 W)

3.16 T: Motor Tuning

No. (Hex.)	Name	Description	Default (Range)
T1-12 (0BDB)	Test Mode Selection	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input checked="" type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input checked="" type="checkbox"/> AOLV <input type="checkbox"/> OLVP/M <input type="checkbox"/> AOLVP/M <input type="checkbox"/> CLVP/M <input type="checkbox"/> EZOLV</p> <p>Sets the function to enable Test Mode after Stationary Auto-Tuning. When you can operate the motor with a light load attached after Stationary Auto-Tuning is complete, enable this parameter.</p> <p>Note: You must first set $T1-10 = 0$ [Motor Rated Slip Frequency = 0 Hz] to enable this parameter.</p> <p>0 : No 1 : Yes</p>	0 (0, 1)
T1-13 (0BDC)	No-load voltage	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input checked="" type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input checked="" type="checkbox"/> AOLV <input type="checkbox"/> OLVP/M <input type="checkbox"/> AOLVP/M <input type="checkbox"/> CLVP/M <input type="checkbox"/> EZOLV</p> <p>Sets the no-load voltage of the motor. When the no-load voltage at rated speed is available, for example on the motor test report, set the voltage in this parameter. If the no-load voltage is not available, do not change this parameter.</p> <p>Note:</p> <ul style="list-style-type: none"> To get the same qualities as a Yaskawa 1000-series drive or previous series drive, set this parameter = $T1-03$ [Motor Rated Voltage]. The default setting is different for different models. <ul style="list-style-type: none"> -2004 - 2006, 4002 - 4004: $T1-03 \times 0.85$ -2010 - 2415, 4005 - 4250, T103 - T250: $T1-03 \times 0.90$ -4296 - 4H12, T296 - T720: $T1-03 \times 0.95$ 	$T1-03 \times 0.85$ (200 V Class: 0.0 - 255.0 V, 400 V Class: 0.0 - 510.0 V)

◆ T2: PM Motor Auto-Tuning

No. (Hex.)	Name	Description	Default (Range)
T2-01 (0750)	PM Auto-Tuning Selection	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLVP/M <input checked="" type="checkbox"/> AOLVP/M <input checked="" type="checkbox"/> CLVP/M <input type="checkbox"/> EZOLV</p> <p>Sets the type of Auto-Tuning for PM motors.</p> <p>0 : Manual Entry w/ Motor Data Sheet 1 : Stationary (Ld, Lq, R) 2 : Stationary (R Only) 3 : Z-Pulse Offset (Pole Position) 4 : Rotational (Ld, Lq, R, back-EMF) 5 : High Frequency Injection</p>	0 (Determined by A1-02)
T2-02 (0751)	PM Motor Code Selection	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLVP/M <input checked="" type="checkbox"/> AOLVP/M <input checked="" type="checkbox"/> CLVP/M <input type="checkbox"/> EZOLV</p> <p>Enter the PM motor code as specified by the rotation speed and motor output.</p>	FFFF (0000 - FFFF)
T2-03 (0752)	PM Motor Type	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLVP/M <input checked="" type="checkbox"/> AOLVP/M <input checked="" type="checkbox"/> CLVP/M <input type="checkbox"/> EZOLV</p> <p>Sets the type of PM motor the drive will operate.</p> <p>0 : IPM motor 1 : SPM motor</p>	1 (0, 1)
T2-04 (0730)	PM Motor Rated Power	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLVP/M <input checked="" type="checkbox"/> AOLVP/M <input checked="" type="checkbox"/> CLVP/M <input type="checkbox"/> EZOLV</p> <p>Sets the PM motor rated output in the units from $01-58$ [Motor Power Unit Selection].</p> <p>Note:</p> <ul style="list-style-type: none"> On drive models 2xxx, and 4002 to 4720, the setting unit is 0.01 kW. The setting range is 0.00 kW to 650.00 kW (0.00 HP to 650.00 HP). On drive models 4810 to 4H12, the setting unit is 0.1 kW. The setting range is 0.0 kW to 1000.0 kW (0.0 HP to 1340.5 HP). 	Determined by o2-04, C6-01 (0.00 - 1000.0)
T2-05 (0732)	PM Motor Rated Voltage	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLVP/M <input checked="" type="checkbox"/> AOLVP/M <input checked="" type="checkbox"/> CLVP/M <input type="checkbox"/> EZOLV</p> <p>Sets the rated voltage (V) of the motor.</p>	200 V Class: 230.0 V, 400 V Class: 460.0 V (200 V Class: 0.0 - 255.0 V, 400 V Class: 0.0 - 510.0 V)
T2-06 (0733)	PM Motor Rated Current	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLVP/M <input checked="" type="checkbox"/> AOLVP/M <input checked="" type="checkbox"/> CLVP/M <input type="checkbox"/> EZOLV</p> <p>Sets the rated current (A) of the motor.</p>	Determined by o2-04 (10% to 200% of the drive rated current)
T2-07 (0753)	PM Motor Base Frequency	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLVP/M <input checked="" type="checkbox"/> AOLVP/M <input checked="" type="checkbox"/> CLVP/M <input type="checkbox"/> EZOLV</p> <p>Sets the base frequency (Hz) of the motor.</p>	60.0 Hz (0.0 - 590.0 Hz)
T2-08 (0734)	Number of PM Motor Poles	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLVP/M <input checked="" type="checkbox"/> AOLVP/M <input checked="" type="checkbox"/> CLVP/M <input type="checkbox"/> EZOLV</p> <p>Sets the number of motor poles.</p>	4 (2 - 120)
T2-09 (0731)	PM Motor Base Speed	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLVP/M <input checked="" type="checkbox"/> AOLVP/M <input checked="" type="checkbox"/> CLVP/M <input type="checkbox"/> EZOLV</p> <p>Sets the motor base speed (min^{-1} (r/min)).</p>	1750 min^{-1} (r/min) (0 - 3450 min^{-1} (r/min))
T2-10 (0754)	PM Motor Stator Resistance	<p><input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLVP/M <input checked="" type="checkbox"/> AOLVP/M <input checked="" type="checkbox"/> CLVP/M <input type="checkbox"/> EZOLV</p> <p>Sets the stator resistance for each motor phase.</p> <p>Note:</p> <ul style="list-style-type: none"> This parameter does not set line-to-line resistance. On drive models 4810 to 4H12, the unit is $\text{m}\Omega$, and the setting range is 0.000 $\text{m}\Omega$ to 65.000 $\text{m}\Omega$. 	Determined by T2-02 (0.000 - 65.000 Ω)

No. (Hex.)	Name	Description	Default (Range)
T2-11 (0735)	PM Motor d-Axis Inductance	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the d-axis inductance of the motor on a per phase basis.	Determined by T2-02 (0.00 - 600.00 mH)
T2-12 (0736)	PM Motor q-Axis Inductance	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the q-Axis inductance of the motor on a per phase basis.	Determined by T2-02 (0.00 - 600.00 mH)
T2-13 (0755)	Back-EMF Units Selection	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the units that the drive uses to set the induced voltage constant. 0 : mV/(rev/min) 1 : mV/(rad/sec)	0 (0, 1)
T2-14 (0737)	Back-EMF Voltage Constant (Ke)	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the motor induced voltage constant (Ke).	Determined by T2-13 (0.0 - 2000.0)
T2-15 (0756)	Pull-In Current Level	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the level of the pull-in current as a percentage of E5-03 [PM Motor Rated Current (FLA)]. Usually it is not necessary to change this setting.	30% (0 - 120%)
T2-16 (0738)	Encoder Pulse Count (PPR)	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the number of PG (pulse generator, encoder) pulses.	1024 ppr (1 - 15000 ppr)
T2-17 (0757)	Encoder Z-Pulse Offset	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the encoder Z-pulse offset ($\Delta\theta$) (pulse generator, encoder) that is listed on the motor nameplate.	0.0 ° (-180.0 - +180.0°)

◆ T3: ASR and Inertia Tuning

No. (Hex.)	Name	Description	Default (Range)
T3-00 (1198)	Control Loop Tuning Selection	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input type="checkbox"/> CLV <input type="checkbox"/> AOLV <input checked="" type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the type of Control Auto-Tuning. 0 : Inertia Tuning 1 : ASR (Speed Regulator) 2 : Deceleration Rate Tuning 3 : KEB Tuning Note: Settings 0 and 1 are available only when A1-02 = 3, 7 [Control Method Selection = CLV, CLV/PM].	0 (0 - 3)
T3-01 (0760)	Test Signal Frequency	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the frequency of the test signal applied to the motor during Inertia Tuning. Usually it is not necessary to change this setting.	3.0 Hz (0.1 - 20.0 Hz)
T3-02 (0761)	Test Signal Amplitude	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the amplitude of the test signal applied to the motor during Inertia Tuning. Usually it is not necessary to change this setting.	0.5 rad (0.1 - 10.0 rad)
T3-03 (0762)	Motor Inertia	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV Sets the inertia of the motor. This value uses the test signal response to calculate the load inertia. Note: The display units for the default setting and setting range are different for different models: • 0.0001 kgm ² units (setting range: 0.0001 kgm ² to 6.0000 kgm ²): 2004 to 2021, 4002 to 4012 • 0.001 kgm ² units (setting range: 0.001 kgm ² to 60.000 kgm ²): 2030 to 2211, 4018 to 4103, T103 • 0.01 kgm ² units (setting range: 0.01 kgm ² to 600.00 kgm ²): 2257 to 2415, 4140 to 4H12, T140 to T720	Determined by o2-04, C6-01, and E5-01 (0.0001 - 600.00 kgm ²)
T3-04 (0763)	System Response Frequency	<input type="checkbox"/> V/f <input type="checkbox"/> CL-V/f <input type="checkbox"/> OLV <input checked="" type="checkbox"/> CLV <input type="checkbox"/> AOLV <input type="checkbox"/> OLV/PM <input type="checkbox"/> AOLV/PM <input type="checkbox"/> CLV/PM <input type="checkbox"/> EZOLV This parameter uses the load inertia value from the Inertia Tuning process to automatically calculate and set C5-01 [ASR Proportional Gain 1].	10.0 Hz (0.1 - 50.0 Hz)

◆ T4: EZ Tuning

No. (Hex.)	Name	Description	Default (Range)
T4-01 (3130)	EZ Tuning Mode Selection	<p>V/f CL-V/f OLV CLV AOLV OLVP/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the type of Auto-Tuning for EZOLV control. 0 : Motor Parameter Setting 1 : Line-to-Line Resistance</p>	0 (0, 1)
T4-02 (3131)	Motor Type Selection	<p>V/f CL-V/f OLV CLV AOLV OLVP/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the type of motor. 0 : Induction (IM) 1 : Permanent Magnet (PM) 2 : Synchronous Reluctance (SynRM)</p>	0 (0, 1, 2)
T4-04 (3133)	Motor Rated Revolutions	<p>V/f CL-V/f OLV CLV AOLV OLVP/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets rated rotation speed (min⁻¹) of the motor.</p>	- ((40 Hz to 120 Hz) × 60 × 2/ E9-08)
T4-05 (3134)	Motor Rated Frequency	<p>V/f CL-V/f OLV CLV AOLV OLVP/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the rated frequency (Hz) of the motor.</p>	Determined by E9-01 and o2-04 (40.0 - 120.0 Hz)
T4-06 (3135)	Motor Rated Voltage	<p>V/f CL-V/f OLV CLV AOLV OLVP/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the rated voltage (V) of the motor.</p>	200 V Class: 230.0 V, 400 V Class: 460.0 V (200 V Class: 0.0 - 255.0 V, 400 V Class: 0.0 - 510.0 V)
T4-07 (3136)	Motor Rated Current	<p>V/f CL-V/f OLV CLV AOLV OLVP/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the rated current (A) of the motor.</p>	Determined by o2-04, C6-01 (10% to 200% of the drive rated current)
T4-08 (3137)	PM Motor Rated Power	<p>V/f CL-V/f OLV CLV AOLV OLVP/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the motor rated output in the units from o1-58 [Motor Power Unit Selection]. Note: On drive models 2xxx, and 4002 to 4720, the setting unit is 0.01 kW. The setting range is 0.10 kW to 650.00 kW (0.10 HP to 650.00 HP). On drive models 4810 to 4H12, the setting unit is 0.1 kW. The setting range is 0.1 kW to 1000.0 kW (0.1 HP to 1340.5 HP).</p>	Determined by E9-10 (0.10 - 1000.0)
T4-09 (3138)	Number of Poles	<p>V/f CL-V/f OLV CLV AOLV OLVP/PM AOLV/PM CLV/PM EZOLV</p> <p>Sets the number of motor poles.</p>	Determined by E9-01 (2 - 120)

3.17 U: Monitors

◆ U1: Operation Status Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
U1-01 (0040)	Frequency Reference	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the frequency reference value. Parameter <i>o1-03</i> [Keypad Display Unit Selection] sets the display units. Unit: 0.01 Hz</p>	10 V = Maximum frequency (0 V to +10 V)
U1-02 (0041)	Output frequency	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the output frequency. Parameter <i>o1-03</i> [Keypad Display Unit Selection] sets the display units. Unit: 0.01 Hz</p>	10 V = Maximum frequency (0 V to +10 V)
U1-03 (0042)	Output current	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the output current. The keypad shows the value of <i>U1-03</i> in amperes (A). When you use MEMOBUS/Modbus communications to show the monitor, the current is "8192 = drive rated current (A)". Use the formula: "Numerals being displayed / 8192 × drive rated current (A)" to use the MEMOBUS/Modbus communication current value shown in the monitor. Unit: When the drive model changes, the display units for this parameter also change.</p> <ul style="list-style-type: none"> • 0.01 A: 2004 - 2042, 4002 - 4023 • 0.1 A: 2056 - 2415, 4031 - 4720, T103 - T720 • 1 A: 4810 - 4H12 	10 V = Drive rated current
U1-04 (0043)	Control Method	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the drive control method.</p> <p>0 : V/f Control 1 : V/f Control with Encoder 2 : Open Loop Vector 3 : Closed Loop Vector 4 : Advanced Open Loop Vector 5 : PM Open Loop Vector 6 : PM Advanced Open Loop Vector 7 : PM Closed Loop Vector 8 : EZ Vector Control</p>	No signal output available
U1-05 (0044)	Motor Speed	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the detected motor speed. Parameter <i>o1-03</i> [Keypad Display Unit Selection] sets the display units. Unit: 0.01 Hz</p>	10 V = Maximum frequency (0 V to +10 V)
U1-06 (0045)	Output Voltage Ref	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the output voltage reference. Unit: 0.1 V</p>	200 V Class: 10 V = 200 Vrms 400 V Class: 10 V = 400 Vrms
U1-07 (0046)	DC Bus Voltage	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the DC bus voltage. Unit: 1 V</p>	200 V Class: 10 V = 400 V 400 V Class: 10 V = 800 V
U1-08 (0047)	Output Power	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the internally-calculated output power. When you change <i>A1-02</i> [Control Method Selection], it will also change the signal level of the analog output.</p> <ul style="list-style-type: none"> • <i>A1-02</i> = 0, 1: Drive capacity (kW) • <i>A1-02</i> = 2, 3, 4: PM Motor Rated Power [E2-11] (kW) • <i>A1-02</i> = 5, 6, 7: PM Motor Rated Power [E5-02] (kW) • <i>A1-02</i> = 8: Motor Rated Power [E9-07] (kW) <p>Unit: The display units are different for different models:</p> <ul style="list-style-type: none"> • 0.01 kW: 2004 - 2042, 4002 - 4023 • 0.1 kW: 2056 - 2415, 4031 - 4H12, T103 - T720 	10 V: Drive capacity (motor rated power) kW (-10 V to +10 V)
U1-09 (0048)	Torque Reference	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the internal torque reference value. Unit: 0.1%</p>	10 V = Motor rated torque (0 V to +10 V)

3.17 U: Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
U1-10 (0049)	Input Terminal Status	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the status of the MFDI terminal where 1 = ON, 0 = OFF. For example, U1-10 shows "00000011" when terminals S1 and S2 are ON. bit0 : Terminal S1 (MFDI 1) bit1 : Terminal S2 (MFDI 2) bit2 : Terminal S3 (MFDI 3) bit3 : Terminal S4 (MFDI 4) bit4 : Terminal S5 (MFDI 5) bit5 : Terminal S6 (MFDI 6) bit6 : Terminal S7 (MFDI 7) bit7 : Terminal S8 (MFDI 8)</p>	No signal output available
U1-11 (004A)	Output Terminal Status	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the status of the MFDO terminal where 1 = ON and 0 = OFF. For example, U1-11 shows "00000011" when terminals M1 and M3 are ON. Note: When H2-xx = 100 to 1A7 [Inverse Output of Function], U1-11 does not show the status in inverse. bit0 : Terminal M1-M2 bit1 : Terminal M3-M4 bit2 : Terminal M5-M6 bit3 : Not used (normal value of 0). bit4 : Not used (normal value of 0). bit5 : Not used (normal value of 0). bit6 : Not used (normal value of 0). bit7 : Fault relay MA/MB-MC</p>	No signal output available
U1-12 (004B)	Drive Status	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows drive status where 1 = ON and 0 = OFF. For example, U1-12 shows "00000101" during run with the Reverse Run command. bit0 : During Run bit1 : During zero-speed bit2 : During reverse bit3 : During fault reset signal input bit4 : During speed agreement bit5 : Drive ready bit6 : During minor fault detection bit7 : During fault detection</p>	No signal output available
U1-13 (004E)	Terminal A1 Level	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the signal level of terminal A1. Unit: 0.1%</p>	10 V = 100% (0 V to +10 V)
U1-14 (004F)	Terminal A2 Level	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the signal level of terminal A2. Unit: 0.1%</p>	10 V = 100% (0 V to +10 V)
U1-15 (0050)	Terminal A3 Level	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the signal level of terminal A3. Unit: 0.1%</p>	10 V = 100% (-10 V to +10 V)
U1-16 (0053)	SFS Output Frequency	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the output frequency after soft start. Shows the frequency with acceleration and deceleration times and S-curves. Parameter o1-03 [Keypad Display Unit Selection] sets the display units. Unit: 0.01 Hz</p>	10 V = Maximum frequency (0 V to +10 V)
U1-17 (0058)	DI-A3 Input Status	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the reference value input from DI-A3 option. Shows the input signal for DI-A3 in hexadecimal as set in F3-01 [Digital Input Function Selection]. 3FFFF: Set (1 bit) + Sign (1 bit) + 16 bit</p>	No signal output available
U1-18 (0061)	oPE Fault Parameter	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the parameter number that caused the oPE02 [Parameter Range Setting Error] or oPE08 [Parameter Selection Error].</p>	No signal output available

No. (Hex.)	Name	Description	MFAO Signal Level
U1-19 (0066)	MEMOBUS/Modbus Error Code	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the contents of the MEMOBUS/Modbus communication error where 1 = "error" and 0 = "no error". For example, <i>U1-19</i> shows "00000001" when there is a CRC error. bit0 : CRC Error bit1 : Data Length Error bit2 : Not used (normal value of 0). bit3 : Parity Error bit4 : Overrun Error bit5 : Framing Error bit6 : Timed Out bit7 : Not used (normal value of 0).</p>	No signal output available
U1-21 (0077)	AI-A3 Term V1 Level	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the analog reference of terminal V1 on analog input option card AI-A3. Unit: 0.1%</p>	10 V = 100% (-10 V to +10 V)
U1-22 (072A)	AI-A3 Term V2 Level	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the analog reference of terminal V2 on analog input option card AI-A3. Unit: 0.1%</p>	10 V = 100% (-10 V to +10 V)
U1-23 (072B)	AI-A3 Term V3 Level	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the analog reference of terminal V3 on analog input option card AI-A3. Unit: 0.1%</p>	10 V = 100% (-10 V to +10 V)
U1-24 (007D)	Input Pulse Monitor	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the frequency to pulse train input terminal RP. Unit: 1 Hz</p>	Determined by H6-02
U1-25 (004D)	SoftwareNumber Flash	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the FLASH ID.</p>	No signal output available
U1-26 (005B)	SoftwareNumber ROM	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the ROM ID.</p>	No signal output available
U1-50 (1199) Expert	Virtual Analog Input	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the virtual analog input value.</p>	Determined by H7-40
U1-91 (154E) Expert	Output Voltage	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the drive internal output voltage reference. Unit: 0.1 V</p>	200 V Class: 10 V = 200 Vrms 400 V Class: 10 V = 400 Vrms

◆ U2: Fault Trace

No. (Hex.)	Name	Description	MFAO Signal Level
U2-01 (0080)	Current Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the fault that the drive has when viewing the monitor.</p>	No signal output available
U2-02 (0081)	Previous Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the fault that occurred most recently.</p>	No signal output available
U2-03 (0082)	Freq Reference@Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the frequency reference at the fault that occurred most recently. Use <i>U1-01 [Frequency Reference]</i> to monitor the frequency reference value. Unit: 0.01 Hz</p>	No signal output available
U2-04 (0083)	Output Freq @ Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the output frequency at the fault that occurred most recently. Use <i>U1-02 [Output Frequency]</i> to monitor the actual output frequency. Unit: 0.01 Hz</p>	No signal output available

3.17 U: Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
U2-05 (0084)	Output Current@Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the output current at the fault that occurred most recently. Use <i>U1-03 [Output Current]</i> to monitor the output current. The keypad shows the value of <i>U1-03</i> in amperes (A). When you use MEMOBUS/Modbus communications to show the monitor, the current is "8192 = drive rated current (A)". Use the formula: "Numerals being displayed / 8192 × drive rated current (A)" to use the MEMOBUS/Modbus communication current value shown in the monitor. Unit: When the drive model changes, the display units for this parameter also change. • 0.01 A: 2004 - 2042, 4002 - 4023 • 0.1 A: 2056 - 2415, 4031 - 4720, T103 - T720 • 1 A: 4810 - 4H12</p>	No signal output available
U2-06 (0085)	Motor Speed @ Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the motor speed at the fault that occurred most recently. Use <i>U1-05 [Motor Speed]</i> to monitor the motor speed. Unit: 0.01 Hz</p>	No signal output available
U2-07 (0086)	Output Voltage@Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the output voltage reference at the fault that occurred most recently. Use <i>U1-06 [Output Voltage Ref]</i> to monitor the output voltage reference. Unit: 0.1 V</p>	No signal output available
U2-08 (0087)	DC Bus Voltage@Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the DC bus voltage at the fault that occurred most recently. Use <i>U1-07 [DC Bus Voltage]</i> to monitor the DC bus voltage. Unit: 1 V</p>	No signal output available
U2-09 (0088)	Output Power @ Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the output power at the fault that occurred most recently. Use <i>U1-08 [Output Power]</i> to monitor the output power. Unit: 0.1 kW</p>	No signal output available
U2-10 (0089)	Torque Ref @ Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the torque reference at the fault that occurred most recently as a percentage of the motor rated torque. Use <i>U1-09 [Torque Reference]</i> to monitor the torque reference. Unit: 0.1%</p>	No signal output available
U2-11 (008A)	Input Terminal Status @ Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the status of the MFDI terminals at the most recent fault where 1 = (ON) and 0 = (OFF). For example, <i>U2-11</i> shows "00000011" when terminals S1 and S2 are ON. Use <i>U1-10 [Input Terminal Status]</i> to monitor the MFDI terminal status. bit0 : Terminal S1 bit1 : Terminal S2 bit2 : Terminal S3 bit3 : Terminal S4 bit4 : Terminal S5 bit5 : Terminal S6 bit6 : Terminal S7 bit7 : Terminal S8</p>	No signal output available
U2-12 (008B)	Output Terminal Status @ Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the status of the MFDO terminals at the most recent fault where 1 = (ON) and 0 = (OFF). For example, <i>U2-12</i> shows "00000011" when terminals M1 and M3 are ON. Use <i>U1-11 [Output Terminal Status]</i> to monitor the MFDO terminal status. bit0 : Terminal M1-M2 bit1 : Terminal M3-M4 bit2 : Terminal M5-M6 bit3 : Not used (normal value of 0). bit4 : Not used (normal value of 0). bit5 : Not used (normal value of 0). bit6 : Not used (normal value of 0). bit7 : Fault relay MA/MB-MC</p>	No signal output available

No. (Hex.)	Name	Description	MFAO Signal Level
U2-13 (008C)	Operation Status @ Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the status of the MFDO terminals at the most recent fault where 1 = (ON) and 0 = (OFF). For example, U2-13 shows "00000001" during run. Use U1-12 [Drive Status] to monitor the MFDO terminal status.</p> <p>bit0 : During Run bit1 : During zero-speed bit2 : During reverse bit3 : During fault reset signal input bit4 : During speed agreement bit5 : Drive ready bit6 : During minor fault detection bit7 : During fault detection</p>	No signal output available
U2-14 (008D)	Elapsed Time @ Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the cumulative operation time of the drive at the fault that occurred most recently. Use U4-01 [Cumulative Ope Time] to monitor the cumulative operation time. Unit: 1 h</p>	No signal output available
U2-15 (07E0)	SFS Output @ Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the output frequency after soft start at the fault that occurred most recently. Use U1-16 [SFS Output Frequency] to monitor the output frequency after soft start. Unit: 0.01 Hz</p>	No signal output available
U2-16 (07E1)	q-Axis Current@Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the q-Axis current of the motor at the fault that occurred most recently. Use U6-01 [Iq Secondary Current] to monitor the q-Axis current of the motor. Unit: 0.1 %</p>	No signal output available
U2-17 (07E2)	d-Axis Current@Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the d-Axis current of the motor at the fault that occurred most recently. Use U6-02 [Id ExcitationCurrent] to monitor the d-Axis current of the motor. Unit: 0.1%</p>	No signal output available
U2-19 (07E4)	ControlDeviation@Flt	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the amount of control axis deviation ($\Delta\theta$) at the fault that occurred most recently. Use U6-10 [ContAxisDeviation $\Delta\theta$] to monitor the actual amount of control axis deviation ($\Delta\theta$). Unit: 0.1 °</p>	No signal output available
U2-20 (008E)	Heatsink Temp @Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the heatsink temperature at the fault that occurred most recently. Use U4-08 [Heatsink Temperature] to monitor the temperature of the heatsink. Unit: 1 °C</p>	No signal output available
U2-21 (1166) Expert	STPo Detect @ Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Monitors conditions to detect STPo [Motor Step-Out Detected] faults. The bit for each condition is shown as ON or OFF.</p> <p>bit0 : Excessive current bit1 : Induced voltage deviation bit2 : d-axis current deviation bit3 : Motor lock at startup bit4 : Acceleration stall continue bit5 : Acceleration stall repeat bit6 : Not used (normal value of 0). bit7 : Not used (normal value of 0).</p>	No signal output available

◆ U3: Fault History


No. (Hex.)	Name	Description	MFAO Signal Level
U3-01 (0090)	1st MostRecent Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the fault history of the most recent fault.</p> <p>Note: The drive saves this fault history to two types of registers at the same time for the MEMOBUS/Modbus communications.</p>	No signal output available
U3-02 (0091)	2nd MostRecent Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the fault history of the second most recent fault.</p> <p>Note: The drive saves this fault history to two types of registers at the same time for the MEMOBUS/Modbus communications.</p>	No signal output available
U3-03 (0092)	3rd MostRecent Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the fault history of the third most recent fault.</p> <p>Note: The drive saves this fault history to two types of registers at the same time for the MEMOBUS/Modbus communications.</p>	No signal output available
U3-04 (0093)	4th MostRecent Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the fault history of the fourth most recent fault.</p> <p>Note: The drive saves this fault history to two types of registers at the same time for the MEMOBUS/Modbus communications.</p>	No signal output available
U3-05 (0804)	5th MostRecent Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the fault history of the fifth most recent fault.</p>	No signal output available
U3-06 (0805)	6th MostRecent Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the fault history of the sixth most recent fault.</p>	No signal output available
U3-07 (0806)	7th MostRecent Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the fault history of the seventh most recent fault.</p>	No signal output available
U3-08 (0807)	8th MostRecent Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the fault history of the eighth most recent fault.</p>	No signal output available
U3-09 (0808)	9th MostRecent Fault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the fault history of the ninth most recent fault.</p>	No signal output available
U3-10 (0809)	10th MostRecentFault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the fault history of the tenth most recent fault.</p>	No signal output available
U3-11 (0094)	ElapsedTime@1stFault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the cumulative operation time when the most recent fault occurred.</p> <p>Note: The drive saves this cumulative operation time to two types of registers at the same time for the MEMOBUS/Modbus communications. Unit: 1 h</p>	No signal output available
U3-12 (0095)	ElapsedTime@2ndFault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the cumulative operation time when the second most recent fault occurred.</p> <p>Note: The drive saves this cumulative operation time to two types of registers at the same time for the MEMOBUS/Modbus communications. Unit: 1 h</p>	No signal output available
U3-13 (0096)	ElapsedTime@3rdFault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the cumulative operation time when the third most recent fault occurred.</p> <p>Note: The drive saves this cumulative operation time to two types of registers at the same time for the MEMOBUS/Modbus communications. Unit: 1 h</p>	No signal output available
U3-14 (0097)	ElapsedTime@4thFault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the cumulative operation time when the fourth most recent fault occurred.</p> <p>Note: The drive saves this cumulative operation time to two types of registers at the same time for the MEMOBUS/Modbus communications. Unit: 1 h</p>	No signal output available
U3-15 (080E)	ElapsedTime@5thFault	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the cumulative operation time when the fifth most recent fault occurred. Unit: 1 h</p>	No signal output available

No. (Hex.)	Name	Description	MFAO Signal Level
U3-16 (080F)	ElapsedTime@6thFault	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Shows the cumulative operation time when the sixth most recent fault occurred. Unit: 1 h	No signal output available
U3-17 (0810)	ElapsedTime@7thFault	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Shows the cumulative operation time when the seventh most recent fault occurred. Unit: 1 h	No signal output available
U3-18 (0811)	ElapsedTime@8thFault	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Shows the cumulative operation time when the eighth most recent fault occurred. Unit: 1 h	No signal output available
U3-19 (0812)	ElapsedTime@9thFault	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Shows the cumulative operation time when the ninth most recent fault occurred. Unit: 1 h	No signal output available
U3-20 (0813)	ElapsedTime@10 Fault	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Shows the cumulative operation time when the tenth most recent fault occurred. Unit: 1 h	No signal output available

◆ U4: Maintenance Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
U4-01 (004C)	Cumulative Ope Time	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Shows the cumulative operation time of the drive. Use parameter <i>o4-01 [Elapsed Operating Time Setting]</i> to reset this monitor. Use parameter <i>o4-02 [Elapsed Operating Time Selection]</i> to select the cumulative operation times from: <ul style="list-style-type: none"> The time from when the drive is energized until it is de-energized. The time at which the Run command is turned ON. The maximum value that the monitor will show is 99999. After this value is more than 99999, the drive automatically resets it and starts to count from 0 again. Unit: 1 h Note: The MEMOBUS/Modbus communication data is shown in 10 h units. Use register 0099H for data in 1 h units.	10 V: 99999 h
U4-02 (0075)	Num of Run Commands	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Shows how many times that the drive has received a Run command. Use parameter <i>o4-13 [RUN Command Counter @ Initialize]</i> to reset this monitor. The maximum value that the monitor will show is 65535. After this value is more than 65535, the drive automatically resets it and starts to count from 0 again. Unit: 1	10 V: 65535 times
U4-03 (0067)	Cooling Fan Ope Time	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Shows the cumulative operation time of the cooling fans. Use parameter <i>o4-03 [Fan Operation Time Setting]</i> to reset this monitor. The maximum value that the monitor will show is 99999. After this value is more than 99999, the drive automatically resets it and starts to count from 0 again. Unit: 1 h Note: The MEMOBUS/Modbus communication data is shown in 10 h units. Use register 009BH for data in 1 h units.	10 V: 99999 h
U4-04 (007E)	Cool Fan Maintenance	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Shows the cumulative operation time of the cooling fans as a percentage of the estimated performance life of the cooling fans. The default value is 0. The value counts up from 0. Use <i>o4-03 [Fan Operation Time Setting]</i> to reset this monitor. Unit: 1% Note: Replace the cooling fans when this monitor is at 90%.	10 V: 100%
U4-05 (007C)	CapacitorMaintenance	V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV Shows the operation time of the electrolytic capacitors for the main circuit and control circuit as a percentage of the estimated performance life of the electrolytic capacitors. The default value is 0. The value counts up from 0. Use <i>o4-05 [Capacitor Maintenance Setting]</i> to reset this monitor. Unit: 1% Note: Replace the electrolytic capacitor when this monitor is at 90%.	10 V: 100%

3.17 U: Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
U4-06 (07D6)	PreChargeRelayMainte	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the operation time of the soft charge bypass relay as a percentage of the estimated performance life of the soft charge bypass relay. The default value is 0. The value counts up from 0. Use <i>o4-07 [Softcharge Relay Maintenance Set]</i> to reset this monitor. Unit: 1% Note: Replace the drive when this monitor is at 90%.</p>	10 V: 100%
U4-07 (07D7)	IGBT Maintenance	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the operation time of the IGBTs as a percentage of the estimated performance life of the IGBTs. The default value is 0. The value counts up from 0. Use <i>o4-09 [IGBT Maintenance Setting]</i> to reset this monitor. Unit: 1% Note: Replace the drive when this monitor is at 90%.</p>	10 V: 100%
U4-08 (0068)	Heatsink Temperature	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the heatsink temperature of the drive. Unit: 1 °C</p>	10 V: 100 °C
U4-09 (005E)	LED Check	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Turns on the LED Status Ring and all of the keypad LEDs to make sure that the LEDs operate correctly. Note: A damaged LED Status Ring board will prevent an accurate estimate of the internal status of the drive. Do not use only the LED Status Ring to estimate the status of the drive and motors. 1. Set <i>o2-24 = 0 [LED Light Function Selection = Enable Status Ring & Keypad LED]</i>. 2. Push  when <i>U4-09</i> is the top monitor shown on the keypad. All LEDs on the keypad and LED Status Ring will turn on. Note: When Safety input 2 CH is open (STo), READY will flash.</p>	No signal output available
U4-10 (005C)	kWh, Lower 4 Digits	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the lower 4 digits of the watt hour value for the drive. Unit: 1 kWh Note: The watt hour is displayed in 9 digits. Monitor <i>U4-11 [kWh, Upper 5 Digits]</i> shows the upper 5 digits and <i>U4-10</i> shows the lower 4 digits. Example for 12345678.9 kWh: <i>U4-10</i>: 678.9 kWh <i>U4-11</i>: 12345 MWh</p>	No signal output available
U4-11 (005D)	kWh, Upper 5 Digits	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the upper 5 digits of the watt hour value for the drive. Unit: 1 MWh Note: Monitor <i>U4-11</i> shows the upper 5 digits and <i>U4-10 [kWh, Lower 4 Digits]</i> shows the lower 4 digits. Example for 12345678.9 kWh: <i>U4-10</i>: 678.9 kWh <i>U4-11</i>: 12345 MWh</p>	No signal output available
U4-13 (07CF)	Peak Hold Current	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the hold value of the peak value (rms) for the drive output current. Use <i>U4-14 [PeakHold Output Freq]</i> to show the drive output frequency at the time that the drive holds the output current. The drive will hold the peak hold current at the next start up and restart of the power supply. The drive keeps the value that was under hold during baseblock (during stop). The keypad shows the value of <i>U4-13</i> in amperes (A). When you use MEMOBUS/Modbus communications to show the monitor, the current is "8192 = drive rated current (A)". Use the formula: "Numerals being displayed / 8192 × drive rated current (A)" to use the MEMOBUS/Modbus communication current value shown in the monitor. Unit: When the drive model changes, the display units for this parameter also change. • 0.01 A: 2004 - 2042, 4002 - 4023 • 0.1 A: 2056 - 2415, 4031 - 4720, T103 - T720 • 1 A: 4810 - 4H12</p>	No signal output available

No. (Hex.)	Name	Description	MFAO Signal Level
U4-14 (07D0)	PeakHold Output Freq	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>Shows the output frequency at which the peak value (rms) of the drive output current is held. The peak hold current can be monitored by U4-13 [Peak Hold Current]. The peak hold output frequency will be cleared at the next startup and restart of the power supply. The drive keeps the value that was under hold during baseblock (during stop). Unit: 0.01 Hz</p>	No signal output available
U4-16 (07D8)	Motor oL1 Level	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>Shows the integrated value of oL1 [Motor Overload] as a percentage of oL1 detection level. Unit: 0.1%</p>	10 V: 100%
U4-18 (07DA)	Reference Source	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>Shows the selected frequency reference source. The keypad shows the frequency reference source as "XY-nn" as specified by these rules: X: External Reference 1/2 Selection [H1-xx = 2] selection status <ul style="list-style-type: none"> 1: b1-01 [Frequency Reference Selection 1] 2: b1-15 [Frequency Reference Selection 2] Y-nn: Frequency reference source <ul style="list-style-type: none"> 0-01: Keypad (d1-01 [Reference 1]) 1-00: Analog input (unassigned) 1-01: MFAI terminal A1 1-02: MFAI terminal A2 1-03: MFAI terminal A3 2-02 to 2-17: Multi-step speed reference (d1-02 to d1-17 [Reference 2 to 16, Jog Reference]) 3-01: MEMOBUS/Modbus communications 4-01: Communication option card 5-01: Pulse train input 7-01: DriveWorksEZ 9-01: Up/Down command </p>	No signal output available
U4-19 (07DB)	Modbus FreqRef (dec)	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>Shows the frequency reference sent to the drive from the MEMOBUS/Modbus communications as a decimal. Unit: 0.01%</p>	10 V: Maximum frequency (0 V to +10 V)
U4-20 (07DC)	Option Freq Ref(dec)	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>Shows the frequency reference sent to the drive from the communication option as a decimal. Unit: 0.01 %</p>	10 V: Maximum frequency (0 V to +10 V)
U4-21 (07DD)	Run Command Source	<p>V/f CL-V/f OLV CLV AOLV OLV/IPM AOLV/IPM CLV/IPM EZOLV</p> <p>Shows the selected Run command source. The keypad shows the Run command source as "XY-nn" as specified by these rules: X: External Reference 1/2 Selection [H1-xx = 2] selection status <ul style="list-style-type: none"> 1: b1-02 [Run Command Selection 1] 2: b1-16 [Run Command Selection 2] Y: Run command source <ul style="list-style-type: none"> 0: Keypad 1: Control circuit terminal 3: MEMOBUS/Modbus communications 4: Communication option card 7: DriveWorksEZ nn: Run command limit status data <ul style="list-style-type: none"> 00: No limit status. 01: The Run command was left ON when the drive stopped in the Programming Mode. 02: The Run command was left ON when switching from LOCAL Mode to REMOTE Mode. 03: The Run command is in standby after the drive was energized until the soft charge bypass contactor turns ON. Note: The drive will detect Uv1 [DC Bus Undervoltage] or Uv [Undervoltage] if the soft charge bypass contactor does not turn ON after 10 s. <ul style="list-style-type: none"> 04: Restart after run stop is prohibited. 05: Fast stop has been executed using the MFDI terminal. Or, the motor has ramped to stop by pressing the STOP key on the keypad. 06: b1-17 = 0 [Run Command at Power Up = Disregard Existing RUN Command] is set. 07: During baseblock while coast to stop with timer. 08: Frequency reference is below E1-09 [Minimum Output Frequency] during baseblock. 09: Waiting for the Enter command from PLC. </p>	No signal output The keypad shows the Run command source as "XY-nn" as specified by these rules: available

3.17 U: Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
U4-22 (07DE)	Modbus CmdData (hex)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the operation signal (register 0001H) sent to the drive from MEMOBUS/Modbus communications as a 4-digit hexadecimal number (zero suppress). The keypad shows the operation signal as specified by these rules: bit0 : Forward run/Stop bit1 : Reverse run/Stop bit2 : External fault bit3 : Fault Reset bit4 : Multi-function input 1 bit5 : Multi-function input 2 bit6 : Multi-function input 3 bit7 : Multi-function input 4 bit8 : Multi-function input 5 bit9 : Multi-function input 6 bitA : Multi-function input 7 bitB : Multi-function input 8 bitC : Not used (normal value of 0). bitD : Not used (normal value of 0). bitE : Not used (normal value of 0). bitF : Not used (normal value of 0).</p>	No signal output available
U4-23 (07DF)	Option CmdData (hex)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the operation signal (register 0001H) sent to the drive from MEMOBUS/Modbus communications as a 4-digit hexadecimal number. The keypad shows the operation signal as specified by these rules: bit 0 : Forward run/Stop bit 1 : Reverse run/Stop bit 2 : External fault bit 3 : Fault Reset bit 4 : Multi-function input 1 bit 5 : Multi-function input 2 bit 6 : Multi-function input 3 bit 7 : Multi-function input 4 bit 8 : Multi-function input 5 bit 9 : Multi-function input 6 bit A : Multi-function input 7 bit B : Multi-function input 8 bit C : Not used (normal value of 0). bit D : Not used (normal value of 0). bit E : Not used (normal value of 0). bit F : Not used (normal value of 0).</p>	No signal output available
U4-24 (07E6)	Number of Runs (Low)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the lower 4 digits of the drive run count. Note: The drive run count is an 8-digit number. Monitor <i>U4-25 [Number of Runs(High)]</i> shows the upper 4 digits and <i>U4-24</i> shows the lower 4 digits.</p>	No signal output available
U4-25 (07E7)	Number of Runs(High)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the upper 4 digits of the drive run count. Note: The drive run count is an 8-digit number. Monitor <i>U4-25</i> shows the upper 4 digits and <i>U4-24 [Number of Runs (Low)]</i> shows the lower 4 digits.</p>	No signal output available
U4-52 (1592)	Torque Ref from Comm	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the torque reference that the drive received from a serial communication option card or from MEMOBUS/Modbus communications as a decimal number. Unit: 0.1%</p>	10 V: 100% (0 V to +10 V)

No. (Hex.)	Name	Description	MFAO Signal Level
U4-75 (1BC4)	Comm Option Type	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the protocol of the communication option currently connected to the drive.</p> <p>Note: This monitor is available on drives with software versions PRG: 09018 and later. The "PRG" column on the nameplate on the right side of the drive identifies the software version. You can also use <i>U1-25 [SoftwareNumber FLASH]</i> to identify the software version.</p> <p>1 : Modbus TCP/IP (SI-EM3) 2 : EtherNet/IP (SI-EN3) or PROFINET (SI-EP3) 4 : EtherCAT (SI-ES3) 8 : CC-Link (SI-C3) 9 : DeviceNet (SI-N3) A : PROFIBUS-DP (SI-P3) B : CANopen (SI-S3) D : MECHATROLINK-II (SI-T3) 11 : LONWORKS (SI-W3) 12 : MECHATROLINK-III (SI-ET3) 70 : Protocol not set (JOHB-SMP3) 71 : Modbus TCP/IP (JOHB-SMP3) 72 : EtherNet/IP (JOHB-SMP3) 74 : EtherCAT (JOHB-SMP3) 78 : PROFINET (JOHB-SMP3) FF : Communication Option not Connected</p>	No signal output available
U4-76 (1BC5)	MAC Address 1 1, 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the first and second octets of MAC address 1.</p> <p>Note:</p> <ul style="list-style-type: none"> This monitor is available on drives with software versions PRG: 09018 and later. The "PRG" column on the nameplate on the right side of the drive identifies the software version. You can also use <i>U1-25 [SoftwareNumber FLASH]</i> to identify the software version. This monitor is for JOHB-SMP3. When you connect a communication option that is not a JOHB-SMP3, the drive shows "00-00". 	No signal output available
U4-77 (1BC6)	MAC Address 1 3, 4	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the third and fourth octets of MAC address 1.</p> <p>Note:</p> <ul style="list-style-type: none"> This monitor is available on drives with software versions PRG: 09018 and later. The "PRG" column on the nameplate on the right side of the drive identifies the software version. You can also use <i>U1-25 [SoftwareNumber FLASH]</i> to identify the software version. This monitor is for JOHB-SMP3. When you connect a communication option that is not a JOHB-SMP3, the drive shows "00-00". 	No signal output available
U4-78 (1BC7)	MAC Address 1 5, 6	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the fifth and sixth octets of MAC address 1.</p> <p>Note:</p> <ul style="list-style-type: none"> This monitor is available on drives with software versions PRG: 09018 and later. The "PRG" column on the nameplate on the right side of the drive identifies the software version. You can also use <i>U1-25 [SoftwareNumber FLASH]</i> to identify the software version. This monitor is for JOHB-SMP3. When you connect a communication option that is not a JOHB-SMP3, the drive shows "00-00". 	No signal output available
U4-79 (1BC8) Expert	MAC Address 2 1, 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the first and second octets of MAC address 2.</p> <p>Note:</p> <ul style="list-style-type: none"> This monitor is available on drives with software versions PRG: 09018 and later. The "PRG" column on the nameplate on the right side of the drive identifies the software version. You can also use <i>U1-25 [SoftwareNumber FLASH]</i> to identify the software version. This monitor is for JOHB-SMP3. When you connect a communication option that is not a JOHB-SMP3, the drive shows "00-00". 	No signal output available
U4-80 (1BC9) Expert	MAC Address 2 3, 4	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the third and fourth octets of MAC address 2.</p> <p>Note:</p> <ul style="list-style-type: none"> This monitor is available on drives with software versions PRG: 09018 and later. The "PRG" column on the nameplate on the right side of the drive identifies the software version. You can also use <i>U1-25 [SoftwareNumber FLASH]</i> to identify the software version. This monitor is for JOHB-SMP3. When you connect a communication option that is not a JOHB-SMP3, the drive shows "00-00". 	No signal output available
U4-81 (1BCA) Expert	MAC Address 2 5, 6	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the fifth and sixth octets of MAC address 2.</p> <p>Note:</p> <ul style="list-style-type: none"> This monitor is available on drives with software versions PRG: 09018 and later. The "PRG" column on the nameplate on the right side of the drive identifies the software version. You can also use <i>U1-25 [SoftwareNumber FLASH]</i> to identify the software version. This monitor is for JOHB-SMP3. When you connect a communication option that is not a JOHB-SMP3, the drive shows "00-00". 	No signal output available

3.17 U: Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
U4-82 (1BCB) Expert	MAC Address 3 1, 2	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the first and second octets of MAC address 3.</p> <p>Note:</p> <ul style="list-style-type: none"> This monitor is available on drives with software versions PRG: 09018 and later. The "PRG" column on the nameplate on the right side of the drive identifies the software version. You can also use <i>U1-25 [SoftwareNumber FLASH]</i> to identify the software version. This monitor is for JOHB-SMP3. When you connect a communication option that is not a JOHB-SMP3, the drive shows "00-00". 	No signal output available
U4-83 (1BCC) Expert	MAC Address 3 3, 4	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the third and fourth octets of MAC address 3.</p> <p>Note:</p> <ul style="list-style-type: none"> This monitor is available on drives with software versions PRG: 09018 and later. The "PRG" column on the nameplate on the right side of the drive identifies the software version. You can also use <i>U1-25 [SoftwareNumber FLASH]</i> to identify the software version. This monitor is for JOHB-SMP3. When you connect a communication option that is not a JOHB-SMP3, the drive shows "00-00". 	No signal output available
U4-84 (1BCD) Expert	MAC Address 3 5, 6	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the fifth and sixth octets of MAC address 3.</p> <p>Note:</p> <ul style="list-style-type: none"> This monitor is available on drives with software versions PRG: 09018 and later. The "PRG" column on the nameplate on the right side of the drive identifies the software version. You can also use <i>U1-25 [SoftwareNumber FLASH]</i> to identify the software version. This monitor is for JOHB-SMP3. When you connect a communication option that is not a JOHB-SMP3, the drive shows "00-00". 	No signal output available

◆ U5: PID Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
U5-01 (0057)	PID Feedback	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the PID control feedback value. Parameter <i>b5-20 [PID Unit Selection]</i> sets the display units. Unit: 0.01%</p>	10 V: Maximum frequency (0 V to +10 V)
U5-02 (0063)	PID Input	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the change between the PID setpoint and PID feedback (the quantity of PID input) as a percentage of the maximum output frequency. Unit: 0.01%</p>	10 V: Maximum frequency (0 V to +10 V)
U5-03 (0064)	PID Output	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the PID control output as a percentage of the maximum output frequency. Unit: 0.01%</p>	10 V: Maximum frequency (0 V to +10 V)
U5-04 (0065)	PID Setpoint	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the PID setpoint. Parameter <i>b5-20 [PID Unit Selection]</i> sets the display units. Unit: 0.01%</p>	10 V: Maximum frequency (0 V to +10 V)
U5-05 (07D2)	PID DifferentialFdbk	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the PID differential feedback value as a percentage of the maximum output frequency. This monitor is available after you set <i>H3-02, H3-10, or H3-06 = 16 [MFAI Function Selection = Differential PID Feedback]</i>. Unit: 0.01%</p>	10 V = Maximum frequency (-10 V to +10 V)
U5-06 (07D3)	PID Fdbk-Diff PID Fdbk	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the difference from calculating <i>U5-05 - U5-01 [PID DifferentialFdbk] - [PID Feedback]</i>. Unit: 0.01%</p> <p>Note:</p> <p><i>U5-01 [PID Feedback] = U5-06 when H3-02, H3-10, or H3-06 ≠ 16 [MFAI Function Selection ≠ Differential PID Feedback]</i>.</p>	10 V = Maximum frequency (-10 V to +10 V)
U5-21 (0872) Expert	Energy Save Coeff Ki	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the energy-saving coefficient Ki value for PM. Unit: 0.01</p>	No signal output available
U5-22 (0873) Expert	Energy Save Coeff Kt	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the energy-saving coefficient Kt value for PM. Unit: 0.01</p>	No signal output available
U5-99 (1599)	PID Setpoint Command	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the PID setpoint command. Parameter <i>b5-20 [PID Unit Selection]</i> sets the display units. Unit: 0.01%</p>	10 V: Maximum frequency (0 V to +10 V)

◆ U6: Operation Status Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
U6-01 (0051)	Iq Secondary Current	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the value calculated for the motor secondary current (q-Axis) as a percentage of the motor rated secondary current. Unit: 0.1%</p>	10 V: Motor secondary rated current (0 V to +10 V)
U6-02 (0052)	Id ExcitationCurrent	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the value calculated for the motor excitation current (d-Axis) as a percentage of the motor rated secondary current. Unit: 0.1%</p>	10 V: Motor secondary rated current (0 V to +10 V)
U6-03 (0054)	ASR Input	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the ASR input value as a percentage of the maximum frequency. Unit: 0.01%</p>	10 V: Maximum frequency (0 V to +10 V)
U6-04 (0055)	ASR Output	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the ASR output value as a percentage of the motor rated secondary current. Unit: 0.01%</p>	10 V: Motor secondary rated current (0 V to +10 V)
U6-05 (0059)	OutputVoltageRef: Vq	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the drive internal voltage reference for motor secondary current control (q-Axis). Unit: 0.1 V</p>	200 V Class: 10 V = 200 Vrms 400 V Class: 10 V = 400 Vrms (0 V to +10 V)
U6-06 (005A)	OutputVoltageRef: Vd	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the drive internal voltage reference for motor excitation current control (d-Axis). Unit: 0.1 V</p>	200 V Class: 10 V = 200 Vrms 400 V Class: 10 V = 400 Vrms (0 V to +10 V)
U6-07 (005F) Expert	q-Axis ACR Output	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the output value for current control related to motor secondary current (q axis). Unit: 0.1 %</p>	200 V Class: 10 V = 200 Vrms 400 V Class: 10 V = 400 Vrms (0 V to +10 V)
U6-08 (0060) Expert	d-Axis ACR Output	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the output value for current control related to motor excitation current (d axis). Unit: 0.1 %</p>	200 V Class: 10 V = 200 Vrms 400 V Class: 10 V = 400 Vrms (0 V to +10 V)
U6-09 (07C0) Expert	AdvPhase Compen Δθcmp	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Displays the data on forward phase compensation for the calculation results of the amount of control axis deviation. Unit: 1 °</p>	5 V: 180 ° (-10 V to +10 V)
U6-10 (07C1) Expert	ContAxisDeviation Δθ	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the deviation between the γδ-Axis that the drive uses for motor control and the dq-Axis. Unit: 0.1 °</p>	5 V: 180 ° (-10 V to +10 V)
U6-13 (07CA) Expert	MagPolePosition(Enc)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the value of the flux position detection. Unit: 0.1 °</p>	10 V: 180 ° (-10 V to +10 V)
U6-14 (07CB) Expert	MagPolePosition(Obs)	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the value of the flux position estimation. Unit: 0.1 °</p>	10 V: 180 ° (-10 V to +10 V)
U6-17 (07D1) Expert	Energy Save Coeff	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the total time of direction of motor rotation detections for Speed Estimation Speed Searches. This value adjusts b3-26 [Direction Determination Level]. Note: Upper limit is +32767 and lower limit is -32767.</p>	No signal output available
U6-18 (07CD)	Enc 1 Pulse Counter	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the number of pulses for speed detection (PG1). Unit: 1 pulse</p>	10 V: 65536
U6-19 (07E5)	Enc 2 Pulse Counter	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the number of pulses for speed detection (PG2). Unit: 1 pulse</p>	10 V: 65536

3.17 U: Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
U6-20 (07D4)	UP/DOWN 2 Bias Value	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the bias value used to adjust the frequency reference. Unit: 0.1%	10 V: Maximum Frequency
U6-21 (07D5)	Offset Frequency	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the total value of d7-01 to d7-03 [Offset Frequency 1 to 3] selected with <i>Add Offset Frequency 1 to 3</i> [H1-xx = 44 to 46]. Unit: 0.1%	10 V: Maximum Frequency
U6-22 (0062)	ZeroServo Pulse Move	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the distance that the rotor moved from its last position when Zero Servo is available. The value shown in this monitor = 4 X [No. of PG pulses]. Unit: 1 pulse	10 V = Number of pulses per revolution (-10 V to +10 V)
U6-25 (006B) Expert	ASR Output Level	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the primary delay filter input value of the ASR (speed control loop). Unit: 0.01%	10 V = Motor secondary rated current (-10 V to +10 V)
U6-26 (006C) Expert	Feed Fwd Cont Output	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the Feed Forward control output. Unit: 0.01%	10 V = Motor secondary rated current (-10 V to +10 V)
U6-27 (006D) Expert	FeedFwd Estimate Spd	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the feed forward estimated speed. Unit: 0.01%	10 V = Maximum frequency (-10 V to +10 V)
U6-31 (007B)	TorqueDetect Monitor	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Monitors the torque reference or the output current after applying the filter set to L6-07 [Torque Detection Filter Time]. Unit: 0.1%	10 V:100%
U6-36 (0720) Expert	Comm Errors-Host	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the number of inter-CPU communication errors. When you de-energize the drive, this value resets to 0.	No signal output available
U6-37 (0721) Expert	Comm Errors-Sensor	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the number of inter-CPU communication errors. When you de-energize the drive, this value resets to 0.	No signal output available
U6-48 (072E) Expert	ASIC Comm Errors	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the number of inter-ASIC communication errors detected by the ASIC. When you de-energize the drive, this value resets to 0.	No signal output available
U6-57 (07C4)	PolePolarityDeterVal	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the change from the integrated current when the drive finds the polarity. Unit: 1 Note: If the change from the integrated current is less than 819, increase n8-84 [Polarity Detection Current]. U6-57 = 8192 is equivalent to the motor rated current.	No signal output available
U6-80 (07B0)	Option IP Address 1	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the currently available local IP Address (1st octet).	No signal output available
U6-81 (07B1)	Option IP Address 2	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the currently available local IP Address (2nd octet).	No signal output available
U6-82 (07B2)	Option IP Address 3	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the currently available local IP Address (3rd octet).	No signal output available
U6-83 (07B3)	Option IP Address 4	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the currently available local IP Address (4th octet).	No signal output available
U6-84 (07B4)	Online Subnet 1	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the currently available subnet mask (1st octet).	No signal output available
U6-85 (07B5)	Online Subnet 2	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the currently available subnet mask (2nd octet).	No signal output available
U6-86 (07B6)	Online Subnet 3	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the currently available subnet mask (3rd octet).	No signal output available
U6-87 (07B7)	Online Subnet 4	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the currently available subnet mask (4th octet).	No signal output available
U6-88 (07B8)	Online Gateway 1	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the currently available Gateway address (1st octet).	No signal output available

No. (Hex.)	Name	Description	MFAO Signal Level
U6-89 (07B9)	Online Gateway 2	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the currently available Gateway address (2nd octet).	No signal output available
U6-90 (07F0)	Online Gateway 3	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the currently available Gateway address (3rd octet).	No signal output available
U6-91 (07F1)	Online Gateway 4	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the currently available Gateway address (4th octet).	No signal output available
U6-92 (07F2)	Online Speed	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the currently available communications speed. 10: 10 Mbps 100: 100 Mbps	No signal output available
U6-93 (07F3)	Online Duplex	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the currently available Duplex setting.	No signal output available
U6-98 (07F8)	First Fault	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the contents of the most recent communication options fault (DeviceNet, Modbus TCP/IP, EtherNet/IP).	No signal output available
U6-99 (07F9)	Current Fault	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the contents of current fault from communication options (DeviceNet, Modbus TCP/IP, EtherNet/IP).	No signal output available

◆ U8: DriveWorksEZ Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
U8-01 (1950)	DWEZ Monitor 1	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 1. (Display range: 0.00% to 999.99%) Unit: 0.01%	10 V = 100%
U8-02 (1951)	DWEZ Monitor 2	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 2. (Display range: 0.00% to 999.99%) Unit: 0.01%	10 V = 100%
U8-03 (1952)	DWEZ Monitor 3	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 3. (Display range: 0.00% to 999.99%) Unit: 0.01%	10 V = 100%
U8-04 (1953)	DWEZ Monitor 4	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 4. (Display range: 0.00% to 999.99%) Unit: 0.01%	10 V = 100%
U8-05 (1954)	DWEZ Monitor 5	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 5. (Display range: 0.00% to 999.99%) Unit: 0.01%	10 V = 100%
U8-06 (1955)	DWEZ Monitor 6	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 6. (Display range: 0.00% to 999.99%) Unit: 0.01%	10 V = 100%
U8-07 (1956)	DWEZ Monitor 7	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 7. (Display range: -999.9% to +999.99%) Unit: 0.01%	10 V = 100%
U8-08 (1957)	DWEZ Monitor 8	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 8. (Display range: -999.9% to +999.99%) Unit: 0.01%	10 V = 100%
U8-09 (1958)	DWEZ Monitor 9	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 9. (Display range: -999.9% to +999.99%) Unit: 0.01%	10 V = 100%
U8-10 (1959)	DWEZ Monitor 10	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 10.	No signal output available
U8-11 (195A)	DWEZ Version 1	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the Upper three digits of the user ID. When you click the setting button on the title bar of the PC tool to open the setting screen, you can confirm the user ID with the primary user ID display.	No signal output available
U8-12 (195B)	DWEZ Version 2	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the lower five digits of the user ID. When you click the setting button on the title bar of the PC tool to open the setting screen, you can confirm the user ID with the primary user ID display.	No signal output available

3.17 U: Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
U8-13 (195C)	DWEZ Version 3	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the software ID.	No signal output available
U8-18 (1961)	DWEZ Platform Ver	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the DriveWorksEZ platform version.	No signal output available
U8-21 (1964)	DWEZ Monitor 21	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 21. (Display range: -999.9% to +999.99%) Unit: 0.01%	10 V = 100%
U8-22 (1965)	DWEZ Monitor 22	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 22. Unit: The number of decimal points shown is set with Q2-21.	10 V = 100%
U8-23 (1966)	DWEZ Monitor 23	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 23. Unit: The number of decimal points shown is set with Q2-22.	10 V = 100%
U8-24 (1967)	DWEZ Monitor 24	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 24. Unit: The number of decimal points shown is set with Q2-23.	10 V = 100%
U8-25 (1968)	DWEZ Monitor 25	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 25. Unit: The number of decimal points shown is set with Q2-24.	10 V = 100%
U8-31 (196E)	DWEZ Monitor 31	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 31. (Display range: 0.00% to 999.99%) Unit: 0.01%	10 V = 100%
U8-32 (196F)	DWEZ Monitor 32	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 32. (Display range: 0.00% to 999.99%) Unit: 0.01%	10 V = 100%
U8-33 (1970)	DWEZ Monitor 33	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 33. (Display range: 0.00% to 999.99%) Unit: 0.01%	10 V = 100%
U8-34 (1971)	DWEZ Monitor 34	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 34. (Display range: 0.00% to 999.99%) Unit: 0.01%	10 V = 100%
U8-35 (1972)	DWEZ Monitor 35	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 35. (Display range: 0.00% to 999.99%) Unit: 0.01%	10 V = 100%
U8-36 (1973)	DWEZ Monitor 36	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 36. (Display range: 0.00% to 999.99%) Unit: 0.01%	10 V = 100%
U8-37 (1974)	DWEZ Monitor 37	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 37. (Display range: -999.9% to +999.99%) Unit: 0.01%	10 V = 100%
U8-38 (1975)	DWEZ Monitor 38	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 38. (Display range: -999.9% to +999.99%) Unit: 0.01%	10 V = 100%
U8-39 (1976)	DWEZ Monitor 39	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 39. (Display range: -999.9% to +999.99%) Unit: 0.01%	10 V = 100%
U8-40 (1977)	DWEZ Monitor 40	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 40.	No signal output available
U8-51 (1982)	DWEZ Monitor 51	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 51. (Display range: -999.9% to +999.99%) Unit: 0.01%	10 V = 100%
U8-52 (1983)	DWEZ Monitor 52	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 52. Unit: The number of decimal points shown is set with Q2-41.	10 V = 100%
U8-53 (1984)	DWEZ Monitor 53	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows DWEZ Monitor 53. Unit: The number of decimal points shown is set with Q2-42.	10 V = 100%

No. (Hex.)	Name	Description	MFAO Signal Level
U8-54 (1985)	DWEZ Monitor 54	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows DWEZ Monitor 54. Unit: The number of decimal points shown is set with Q2-43.</p>	10 V = 100%
U8-55 (1986)	DWEZ Monitor 55	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows DWEZ Monitor 55. Unit: The number of decimal points shown is set with Q2-44.</p>	10 V = 100%
U8-60 (198B)	RemoteIO Status	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the operation status of Remote IO as 1 (ON) and 0 (OFF). If the DriveWorksEZ MEMOBUS master active signal is ON, for example, the monitor shows <i>U8-60 = 00000001</i>. bit 0 : Bit 0: DriveWorksEZ MEMOBUS Master Active bit 1 : Not used (normal value of 0) bit 2 : Not used (normal value of 0) bit 3 : Not used (normal value of 0) bit 4 : Not used (normal value of 0) bit 5 : Not used (normal value of 0) bit 6 : Not used (normal value of 0) bit 7 : Not used (normal value of 0)</p>	No signal output available
U8-61 (198C)	RemoteDI Monitor 0-7bit	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the operation status of Remote DI1 to DI8 as 1 (ON) and 0 (OFF). If Remote DI1 and DI2 are ON, for example, the monitor shows <i>U8-61 = 00000011</i>. bit 0 : Remote DI1 bit 1 : Remote DI2 bit 2 : Remote DI3 bit 3 : Remote DI4 bit 4 : Remote DI5 bit 5 : Remote DI6 bit 6 : Remote DI7 bit 7 : Remote DI8</p>	No signal output available
U8-62 (198D)	RemoteDI Monitor 8-Fbit	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the operation status of Remote DI9 to DI16 as 1 (ON) and 0 (OFF). If Remote DI9 and DI10 are ON, for example, the monitor shows <i>U8-62 = 00000011</i>. bit 0 : Remote DI9 bit 1 : Remote DI10 bit 2 : Remote DI11 bit 3 : Remote DI12 bit 4 : Remote DI13 bit 5 : Remote DI14 bit 6 : Remote DI15 bit 7 : Remote DI16</p>	No signal output available
U8-63 (198E)	RemoteDO Monitor 0-7bit	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the operation status of Remote DO1 to DO8 as 1 (ON) and 0 (OFF). If Remote DO1 and DO2 are ON, for example, the monitor shows <i>U8-63 = 00000011</i>. bit 0 : Remote DO1 bit 1 : Remote DO2 bit 2 : Remote DO3 bit 3 : Remote DO4 bit 4 : Remote DO5 bit 5 : Remote DO6 bit 6 : Remote DO7 bit 7 : Remote DO8</p>	No signal output available
U8-64 (198F)	RemoteDO Monitor 8-Fbit	<p>V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV</p> <p>Shows the operation status of Remote DO9 to DO16 as 1 (ON) and 0 (OFF). If Remote DO9 and DO10 are ON, for example, the monitor shows <i>U8-64 = 00000011</i>. bit 0 : Remote DO9 bit 1 : Remote DO10 bit 2 : Remote DO11 bit 3 : Remote DO12 bit 4 : Remote DO13 bit 5 : Remote DO14 bit 6 : Remote DO15 bit 7 : Remote DO16</p>	No signal output available

◆ Ud: Control Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
Ud-01 (1BF2)	ASR Integral Output	<p>V/f CL-V/f OLV CLV AOLV OLVP/M AOLV/P/M CLV/P/M EZOLV</p> <p>Shows the ASR output value of the integrated component as a percentage of the motor rated secondary current.</p> <p>Unit: 0.01%</p> <p>Note: This monitor is available on drives with software versions PRG: 09018 and later. The "PRG" column on the nameplate on the right side of the drive identifies the software version. You can also use <i>U1-25 [SoftwareNumber FLASH]</i> to identify the software version.</p>	10 V = Motor secondary rated current (-10 V to +10 V)

3.18 Parameters that Change from the Default Settings with A1-02 [Control Method Selection]

The values for the parameters in these tables depend on the values for A1-02. When you change A1-02, the default settings will change.

◆ A1-02 = 0 to 4 [Induction Motor Control Methods]

No.	Name	Range	Unit	Control Method (A1-02 Setting)				
				V/f (0)	CL-V/f (1)	OLV (2)	CLV (3)	AOLV (4)
b2-01	DC Injection/Zero Speed Threshold	0.0 - 10.0	0.1 Hz	0.5	0.5	0.5	0.5	0.5
b2-04	DC Inject Braking Time at Stop	0.00 - 10.00	0.01 s	0.50	0.50	0.50	0.50	0.50
b3-01	Speed Search at Start Selection	0, 1	1	0	1	0	-	0
b3-02	SpeedSearch Deactivation Current	0 - 200	1%	120	-	100	-	-
b3-08	Speed Estimation ACR P Gain	0.00 - 6.00	0.01	0.50 *1	0.50 *1	0.50 *1	0.50 *1	0.50 *1
b3-09	Speed Estimation ACR I Time	0.0 - 1000.0	0.1 ms	2.0	2.0	2.0	2.0	2.0
b3-14	Bi-directional Speed Search	0, 1	1	0	0	0	-	1
b5-15	PID Sleep Function Start Level	0.0 - 400.0	0.1 Hz	0.0	0.0	0.0	0.0	0.0
b6-01	Dwell Reference at Start	0.0 - 400.0	0.1 Hz	0.0	0.0	0.0	0.0	0.0
b6-03	Dwell Reference at Stop	0.0 - 400.0	0.1 Hz	0.0	0.0	0.0	0.0	0.0
b8-02	Energy Saving Gain	0.0 - 10.0	0.1	-	-	0.7	1.0	1.0
b8-03	Energy Saving Filter Time	0.00 - 10.00	0.01 s	-	-	0.50 *2	0.01 *2	0.01 *2
b8-19	E-Save Search Injection Freq	10 - 300	1 Hz	-	-	-	-	-
C1-11	Accel/Decel Time Switchover Freq	0.0 - 400.0	0.1 Hz	0.0	0.0	0.0	0.0	0.0
C2-01	S-Curve Time @ Start of Accel	0.00 - 10.00	0.01 s	0.20	0.20	0.20	0.20	0.20
C3-01	Slip Compensation Gain	0.0 - 2.5	0.1	0.0	-	1.0	1.0	0.0
C3-02	Slip Compensation Delay Time	0 - 10000	1 ms	2000	-	200	-	-
C4-01	Torque Compensation Gain	0.00 - 2.50	0.01	1.00	1.00	1.00	-	-
C4-02	Torque Compensation Delay Time	0 - 60000	1 ms	200	200	20	-	-
C4-25	High-Speed Voltage Compensation	0, 1	1	0	1	1	1	1
C5-01	ASR Proportional Gain 1	0.00 - 300.00	0.01	-	0.20	-	20.00	10.00
C5-02	ASR Integral Time 1	0.000 - 60.000	0.001 s	-	0.200	-	0.500	0.500

3.18 Parameters that Change from the Default Settings with A1-02 [Control Method Selection]

No.	Name	Range	Unit	Control Method (A1-02 Setting)				
				V/f (0)	CL-V/f (1)	OLV (2)	CLV (3)	AOLV (4)
C5-03	ASR Proportional Gain 2	0.00 - 300.00	0.01	-	0.02	-	20.00	20.00
C5-04	ASR Integral Time 2	0.000 - 60.000	0.001 s	-	0.050	-	0.500	0.500
C5-06	ASR Delay Time	0.000 - 0.500	0.001 s	-	-	-	0.004	0.004
C5-07	ASR Gain Switchover Frequency	0.0 - 400.0	0.1 Hz	-	-	-	0.0	0.0
C6-02	Carrier Frequency Selection	1 - F	1	1 *3	1 *3	1 *3	1	1
d3-01	Jump Frequency 1	0.0 - 400.0	0.1 Hz	0.0	0.0	0.0	0.0	0.0
d3-02	Jump Frequency 2	0.0 - 400.0	0.1 Hz	0.0	0.0	0.0	0.0	0.0
d3-03	Jump Frequency 3	0.0 - 400.0	0.1 Hz	0.0	0.0	0.0	0.0	0.0
d3-04	Jump Frequency Width	0.0 - 20.0	0.1 Hz	1.0	1.0	1.0	1.0	1.0
d5-02	Torque Reference Delay Time	0 - 1000	1 ms	-	-	-	0	0
E1-04	Maximum Output Frequency	40.0 - 590.0 *3 *4	0.1 Hz	60.0 *5	60.0 *5	60.0	60.0	60.0
E1-05	Maximum Output Voltage	0.0 - 255.0 *6	0.1 V	200.0 *5	200.0 *5	200.0	200.0	200.0
E1-06	Base Frequency	0.0 - 590.0 *4	0.1 Hz	60.0 *5	60.0 *5	60.0	60.0	60.0
E1-07	Mid Point A Frequency	0.0 - 590.0 *7	0.1 Hz	3.0 *5	3.0 *5	3.0	-	0.0
E1-08	Mid Point A Voltage	0.0 - 255.0 *6	0.1 V	15.0 *5	15.0 *5	11.0	-	0.0
E1-09	Minimum Output Frequency	0.0 - 590.0 *4	0.1 Hz	1.5 *5	1.5 *5	0.5	0.0	0.0
E1-10	Minimum Output Voltage	0.0 - 255.0 *6	0.1 V	9.0 *5	9.0 *5	2.0	-	0.0
E1-11	Mid Point B Frequency	0.0 - 400.0	0.1 Hz	0.0	0.0	0.0	0.0	0.0
E1-12	Mid Point A Voltage	0.0 - 255.0 *6	0.1 V	0.0	0.0	0.0	0.0	0.0
E1-13	Base Voltage	0.0 - 255.0 *6	0.1 V	0.0	0.0	0.0	0.0	0.0
F1-01	Encoder 1 Pulse Count (PPR)	0 - 60000	1 ppr	-	600	-	600	600
F1-05	Encoder 1 Rotation Selection	0, 1	1	-	0	-	0	0
F1-09	Overspeed Detection Delay Time	0.0 - 2.0	0.1 s	-	1.0	-	0.0	0.1
L1-01	Motor Overload (oL1) Protection	0 - 6	1	2	2	2	2	2
L2-31	KEB Start Voltage Offset Level	0 - 100 *6	1 V	0	0	0	0	0
L3-05	Stall Prevention during RUN	0 - 3	1	2	2	-	-	-
L3-20	DC Bus Voltage Adjustment Gain	0.00 - 5.00	0.01	1.00	1.00	0.30	0.30	0.30
L3-21	OVSUPPRESSION Accel/Decel P Gain	0.10 - 10.00	0.01	1.00	1.00	1.00	1.00	1.00
L3-36	Current Suppression Gain@Accel	0.0 - 100.0	0.1	10.0	10.0	20.0	-	-

3.18 Parameters that Change from the Default Settings with A1-02 [Control Method Selection]

No.	Name	Range	Unit	Control Method (A1-02 Setting)				
				V/f (0)	CL-V/f (1)	OLV (2)	CLV (3)	AOLV (4)
L4-01	Speed Agree Detection Level	0.0 - 590.0 *4	0.1	0.0 Hz	0.0 Hz	0.0 Hz	0.0 Hz	0.0 Hz
L4-02	Speed Agree Detection Width	0.0 - 20.0	0.1	2.0 Hz	2.0 Hz	2.0 Hz	2.0 Hz	2.0 Hz
L4-03	Speed Agree Detection Level (+/-)	-590.0 - +590.0 *4 *8	0.1	0.0 Hz	0.0 Hz	0.0 Hz	0.0 Hz	0.0 Hz
L4-04	Speed Agree Detection Width (+/-)	0.0 - 20.0	0.1	2.0 Hz	2.0 Hz	2.0 Hz	2.0 Hz	2.0 Hz
L8-38	Carrier Frequency Reduction	0 - 2	1	*3	*3	*3	*3	-
L8-40	Carrier Freq Reduction Off-Delay	0.00 - 2.00	0.01 s	0.50	0.50	0.50	0.50	-
L8-90	STPo Detection Level (Low Speed)	0 - 5000	1	-	-	-	-	-
n1-15	PWM Voltage Offset Calibration	0 - 2	1	1	1	1	1	2
n5-04	Speed Response Frequency	0.00 - 500.00	0.01 Hz	-	-	-	50.00	50.00
n8-35	Initial Pole Detection Method	0 - 2	1	-	-	-	-	-
n8-51	Pull-in Current @ Acceleration	0 - 200	1%	-	-	-	-	-
o1-03	Frequency Display Unit Selection	0 - 3	1	0	0	0	0	0
o1-04	V/f Pattern Display Unit	0, 1	1	-	-	-	0	0

*1 The default setting changes when the setting for o2-04 [Drive Model Selection] changes.

*2 Models 2211 to 2415, 4103 to 4H12, and T103 to T720 use these default settings when C6-01 = 1 [Normal / Heavy Duty Selection = Normal Duty Rating]. Models 2257 to 2415, 4140 to 4H12, and T103 to T720 use these default settings when C6-01 = 0 [Heavy Duty Rating].

- A1-02 = 2 [Open Loop Vector]: 2.00
- A1-02 = 3, 4 [Closed Loop Vector, Advanced Open Loop Vector]: 0.05

*3 The default setting changes when C6-01 [Normal / Heavy Duty Selection] changes.

*4 The maximum value changes when A1-02 changes:

- When A1-02 = 0, 2 [V/f Control, Open Loop Vector], the maximum value is 590.0 Hz.
- When A1-02 = 1, 3 [V/f Control with Encoder, Closed Loop Vector], the maximum value is 400.0 Hz.
- When A1-02 = 4 [Advanced Open Loop Vector], the maximum value is 120.0 Hz.

*5 The default setting changes when the drive model and E1-03 [V/f Pattern Selection] change.

*6 This is the value for 200 V class drives. Double the value for 400 V class drives.

*7 The maximum value changes when A1-02 changes:

- When A1-02 = 0, 2 [V/f Control, Open Loop Vector], the maximum value is 590.0 Hz.
- When A1-02 = 1 [V/f Control with Encoder], the maximum value is 400.0 Hz.
- When A1-02 = 4 [Advanced Open Loop Vector], the maximum value is 120.0 Hz.

*8 The minimum value changes when A1-02 changes:

- When A1-02 = 0, 2 [V/f Control, Open Loop Vector], the minimum value is -590.0 Hz.
- When A1-02 = 1, 3 [V/f Control with Encoder, Closed Loop Vector], the minimum value is -400.0 Hz.
- When A1-02 = 4 [Advanced Open Loop Vector], the minimum value is -120.0 Hz.

◆ A1-02 = 5 to 8 [Control Method for PM Motors and EZ Vector Control]

No.	Name	Range	Unit	Control Method (A1-02 Setting)			
				OLV/PM (5)	AOLV/PM (6)	CLV/PM (7)	EZOLV (8)
b2-01	DC Injection/Zero SpeedThreshold	0.0 - 10.0	0.1	0.5 Hz	1.0%	0.5%	0.5 Hz
b2-04	DC Inject Braking Time at Stop	0.00 - 10.00	0.01 s	0.00	0.00	0.00	0.00
b3-01	Speed Search at Start Selection	0, 1	1	0	0	-	0
b3-02	SpeedSearch Deactivation Current	0 - 200	1%	-	-	-	-
b3-08	Speed Estimation ACR P Gain	0.00 - 6.00	0.01	0.30	0.30	-	0.60 *1
b3-09	Speed Estimation ACR I Time	0.0 - 1000.0	0.1 ms	2.0	4.0	-	10.0
b3-14	Bi-directional Speed Search	0, 1	1	-	-	-	0
b5-15	PID Sleep Function Start Level	0.0 - 400.0 *3	0.1	0.0 Hz	0.0%	0.0%	0.0 Hz
b6-01	Dwell Reference at Start	0.0 - 400.0 *3	0.1	0.0 Hz	0.0%	0.0%	0.0 Hz
b6-03	Dwell Reference at Stop	0.0 - 400.0 *3	0.1	0.0 Hz	0.0%	0.0%	0.0 Hz
b8-02	Energy Saving Gain	0.0 - 10.0	0.1	-	-	-	-
b8-03	Energy Saving Filter Time	0.00 - 10.00	0.01 s	-	-	-	-
b8-19	E-Save Search Injection Freq	10 - 300	1 Hz	-	100	100	20
C1-11	Accel/Decel Time Switchover Freq	0.0 - 400.0 *3	0.1	0.0 Hz	0.0%	0.0%	0.0 Hz
C2-01	S-Curve Time @ Start of Accel	0.00 - 10.00	0.01 s	1.00	0.20	0.20	1.00
C3-01	Slip Compensation Gain	0.0 - 2.5	0.1	-	-	-	0.0
C3-02	Slip Compensation Delay Time	0 - 10000	1 ms	-	-	-	200
C4-01	Torque Compensation Gain	0.00 - 2.50	0.01	0.00	-	-	0.00
C4-02	Torque Compensation Delay Time	0 - 60000	1 ms	100	-	-	200
C4-25	High-Speed Voltage Compensation	0, 1	1	1	1	-	1
C5-01	ASR Proportional Gain 1	0.00 - 300.00	0.01	-	10.00	20.00	10.00
C5-02	ASR Integral Time 1	0.000 - 60.000	0.001 s	-	0.500	0.500	0.500
C5-03	ASR Proportional Gain 2	0.00 - 300.00	0.01	-	10.00	20.00	10.00
C5-04	ASR Integral Time 2	0.000 - 60.000	0.001 s	-	0.500	0.500	0.500
C5-06	ASR Delay Time	0.000 - 0.500	0.001 s	-	0.016	0.004	0.004
C5-07	ASR Gain Switchover Frequency	0.0 - 400.0 *3	0.1	-	0.0%	0.0%	0.0 Hz
C6-02	Carrier Frequency Selection	1 - F	1	2	2	2	2
d3-01	Jump Frequency 1	0.0 - 400.0 *3	0.1	0.0 Hz	0.0%	0.0%	0.0 Hz
d3-02	Jump Frequency 2	0.0 - 400.0 *3	0.1	0.0 Hz	0.0%	0.0%	0.0 Hz
d3-03	Jump Frequency 3	0.0 - 400.0 *3	0.1	0.0 Hz	0.0%	0.0%	0.0 Hz
d3-04	Jump Frequency Width	0.0 - 20.0 *4	0.1	1.0 Hz	1.0%	1.0%	1.0 Hz

3.18 Parameters that Change from the Default Settings with A1-02 [Control Method Selection]

No.	Name	Range	Unit	Control Method (A1-02 Setting)			
				OLV/PM (5)	AOLV/PM (6)	CLV/PM (7)	EZOLV (8)
d5-02	Torque Reference Delay Time	0 - 1000	1 ms	-	0	0	-
E1-04	Maximum Output Frequency	40.0 - 590.0 *5 *6	0.1 Hz	Determined by E5-01	Determined by E5-01	Determined by E5-01	-
E1-05	Maximum Output Voltage	0.0 - 255.0 *7	0.1 V	Determined by E5-01	Determined by E5-01	Determined by E5-01	-
E1-06	Base Frequency	0.0 - 590.0 *6	0.1 Hz	Determined by E5-01	Determined by E5-01	Determined by E5-01	-
E1-07	Mid Point A Frequency	0.0 - 590.0	0.1 Hz	-	-	-	-
E1-08	Mid Point A Voltage	0.0 - 255.0 *7	0.1 V	-	-	-	-
E1-09	Minimum Output Frequency	0.0 - 590.0 *6	0.1 Hz	Determined by E5-01	Determined by E5-01	Determined by E5-01	-
E1-10	Minimum Output Voltage	0.0 - 255.0 *7	0.1 V	-	-	-	-
E1-11	Mid Point B Frequency	0.0 - 590.0 *6	0.1 Hz	-	-	-	-
E1-12	Mid Point A Voltage	0.0 - 255.0 *7	0.1 V	-	-	-	-
E1-13	Base Voltage	0.0 - 255.0 *7	0.1 V	-	-	-	-
F1-01	Encoder 1 Pulse Count (PPR)	0 - 60000	1 ppr	-	-	1024	-
F1-05	Encoder 1 Rotation Selection	0, 1	1	-	-	1	-
F1-09	Overspeed Detection Delay Time	0.0 - 2.0	0.1 s	-	0.0	0.0	0.0
L1-01	Motor Overload (oL1) Protection	0 - 6	1	4	4	5	1 *8
L2-31	KEB Start Voltage Offset Level	0 - 100 *7	1 V	50	50	50	50
L3-05	Stall Prevention during RUN	0 - 3	1	2	-	-	3
L3-20	DC Bus Voltage Adjustment Gain	0.00 - 5.00	0.01	0.65	0.65	0.65	0.65
L3-21	OVSUPPRESSION ACCEL/ DECEL P GAIN	0.10 - 10.00	0.01	1.00	1.00	1.00	1.00
L3-36	Current Suppression Gain@Accel	0.0 - 100.0	0.1	-	-	-	-
L4-01	Speed Agree Detection Level	0.0 - 590.0 *10	0.1	0.0 Hz	0.0%	0.0%	0.0 Hz
L4-02	Speed Agree Detection Width	0.0 - 20.0 *4	0.1	2.0 Hz	4.0%	4.0%	2.0 Hz
L4-03	Speed Agree Detection Level(+/-)	-590.0 - +590.0 *10 *11	0.1	0.0 Hz	0.0%	0.0%	0.0 Hz
L4-04	Speed Agree Detection Width(+/-)	0.0 - 20.0 *4	0.1	2.0 Hz	4.0%	4.0%	2.0 Hz
L8-38	Carrier Frequency Reduction	0 - 2	1	0	-	0	0
L8-40	Carrier Freq Reduction Off-Delay	0.00 - 2.00	0.01 s	0.00	-	0.00	0.00
L8-90	STPo Detection Level (Low Speed)	0 - 5000	1	0	80	-	0
n1-15	PWM Voltage Offset Calibration	0 - 2	1	1	1	1	1
n5-04	Speed Response Frequency	0.00 - 500.00	0.01 Hz	-	20.00	50.00	-
n8-35	Initial Pole Detection Method	0 - 2	1	0	1	1	-
n8-51	Pull-in Current @ Acceleration	0 - 200	1%	50%	-	-	80%

3.18 Parameters that Change from the Default Settings with A1-02 [Control Method Selection]

No.	Name	Range	Unit	Control Method (A1-02 Setting)			
				OLV/PM (5)	AOLV/PM (6)	CLV/PM (7)	EZOLV (8)
o1-03	Frequency Display Unit Selection	0 - 3	1	2	2	2	0 *9
o1-04	V/f Pattern Display Unit	0, 1	1	-	1	1	0 *9

- *1 The default setting is different for different models.
- 2138 - 2415, 4089 - 4H12, T103 - T720: 0.30
- *2 The default setting changes when the setting for o2-04 [Drive Model Selection] changes.
- *3 The setting range is 0.0 to 100.0 when A1-02 = 6 or 7 [PM Advanced Open Loop Vector or PM Closed Loop Vector].
- *4 The setting range is 0.0 to 40.0 when A1-02 = 6 or 7 [PM Advanced Open Loop Vector or PM Closed Loop Vector].
- *5 The default setting changes when C6-01 [Normal / Heavy Duty Selection] changes.
- *6 The maximum value changes when A1-02 changes:
- When A1-02 = 5 [PM Open Loop Vector], the maximum value is 590.0 Hz. The maximum value of the setting range changes when E5-01 [PM Motor Code Selection] changes. When E5-01 = FFFF [PM Motor Code Selection = FFFF], the maximum value is 590.0 Hz.
 - When A1-02 = 6 or 7 [PM Advanced Open Loop Vector or PM Closed Loop Vector], the maximum value is 400.0 Hz. The maximum value of the setting range changes when E5-01 changes. When E5-01 = FFFF, the maximum value is 400.0 Hz.
- *7 This is the value for 200 V class drives. Double the value for 400 V class drives.
- *8 The default setting changes when E9-01 [Motor Type Selection] changes.
- E9-01 = 0 [Induction (IM)]: 1
 - E9-01 = 1, 2 [Permanent Magnet (PM), Synchronous Reluctance (SynRM)]: 4
- *9 The default setting changes when E9-01 [Motor Type Selection] changes.
- E9-01 = 0 [Induction (IM)]: 0
 - E9-01 = 1, 2 [Permanent Magnet (PM), Synchronous Reluctance (SynRM)]: 1
- *10 The maximum value changes when A1-02 changes:
- When A1-02 = 5 [PM Open Loop Vector], the maximum value is 590.0 Hz.
 - When A1-02 = 6 or 7 [PM Advanced Open Loop Vector or PM Closed Loop Vector], the maximum value is 100.0%.
 - When A1-02 = 8 [EZ Vector Control], the maximum value is 120.0 Hz.
- *11 The minimum value changes when A1-02 changes:
- When A1-02 = 5 [PM Open Loop Vector], the minimum value is -590.0 Hz.
 - When A1-02 = 6 or 7 [PM Advanced Open Loop Vector or PM Closed Loop Vector], the minimum value is -100.0%.
 - When A1-02 = 8 [EZ Vector Control], the minimum value is -120.0 Hz.

3.19 Parameters that Change from the Default Settings with E3-01 [Motor 2 Control Mode Selection]

The values for the parameters in these tables depend on the values for parameter *E3-01*. When you change the setting for *E3-01*, the default settings will change.

No.	Name	Range	Unit	Motor 2 Control Method (setting value of E3-01)			
				V/f (0)	CL-V/f (1)	OLV (2)	CLV (3)
C3-21	Motor 2 Slip Compensation Gain	0.0 - 2.50	0.1	0.0	-	1.0	1.0
C3-22	Motor 2 Slip Comp Delay Time	0 - 10000	1 ms	2000	-	200	-
C5-21	Motor 2 ASR Proportional Gain 1 (P)	0.00 - 300.00	0.01	-	0.20	-	20.00
C5-22	Motor 2 ASR Integral Time 1 (I)	0.000 - 10.000	0.001 s	-	0.200	-	0.500
C5-23	Motor 2 ASR Proportional Gain 2 (P)	0.00 - 300.00	0.01	-	0.02	-	20.00
C5-24	Motor 2 ASR Integral Time 2 (I)	0.000 - 10.000	0.001 s	-	0.050	-	0.500
C5-26	Motor 2 ASR Delay Time	0.000 - 0.500	0.001 s	-	-	-	0.004
E3-04	Motor 2 Maximum Output Frequency	40.0 - 590.0	0.1 Hz	60.0	60.0	60.0	60.0
E3-05	Motor 2 Maximum Output Voltage	0.0 - 255.0 */	0.1 V	200.0	200.0	200.0	200.0
E3-06	Motor 2 Base Frequency	0.0 - 590.0	0.1 Hz	60.0	60.0	60.0	60.0
E3-07	Motor 2 Mid Point A Frequency	0.0 - 590.0	0.1 Hz	3.0	3.0	3.0	-
E3-08	Motor 2 Mid Point A Voltage	0.0 - 255.0 */	0.1 V	15.0	15.0	11.0	-
E3-09	Motor 2 Minimum Output Frequency	0.0 - 590.0	0.1 Hz	1.5	1.5	0.5	0.0
E3-10	Motor 2 Minimum Output Voltage	0.0 - 255.0 */	0.1 V	9.0	9.0	2.0	-
E3-11	Motor 2 Mid Point B Frequency	0.0 - 590.0	Determined by o1-04	0.0	0.0	0.0	0.0
E3-12	Motor 2 Mid Point B Voltage	0.0 - 255.0 */	0.1 V	0.0	0.0	0.0	0.0
E3-13	Motor 2 Base Voltage	0.0 - 255.0 */	0.1 V	0.0	0.0	0.0	0.0

*1 This is the value for 200 V class drives. Double the value for 400 V class drives.

3.20 Parameters Changed by E1-03 [V/f Pattern Selection]

The values for parameters *A1-02* [Control Method Selection] and *E1-03* [V/f Pattern Selection] change the default settings for the parameters in these tables:

Table 3.1 Parameters Changed by E1-03: 2004 to 2021 (HD), 2002 to 2018 (ND), 4002 to 4012 (HD), and 4002 to 4009 (ND)

No.	E1-03	E1-04	E1-05 *1	E1-06	E1-07	E1-08 *1	E1-09	E1-10 *1
Unit	-	Hz	V	Hz	Hz	V	Hz	V
Setting Value	0	50.0	230.0	50.0	2.5	17.3	1.3	10.4
	1	60.0	230.0	60.0	3.0	17.3	1.5	10.4
	2	60.0	230.0	50.0	3.0	17.3	1.5	10.4
	3	72.0	230.0	60.0	3.0	17.3	1.5	10.4
	4	50.0	230.0	50.0	25.0	40.3	1.3	9.2
	5	50.0	230.0	50.0	25.0	57.5	1.3	10.4
	6	60.0	230.0	60.0	30.0	40.3	1.5	9.2
	7	60.0	230.0	60.0	30.0	57.5	1.5	10.4
	8	50.0	230.0	50.0	2.5	21.9	1.3	12.7
	9	50.0	230.0	50.0	2.5	27.6	1.3	15.0
	A	60.0	230.0	60.0	3.0	21.9	1.5	12.7
	B	60.0	230.0	60.0	3.0	27.6	1.5	17.3
	C	90.0	230.0	60.0	3.0	17.3	1.5	10.4
	D	120.0	230.0	60.0	3.0	17.3	1.5	10.4
	E	180.0	230.0	60.0	3.0	17.3	1.5	10.4
	F	60.0 *2	230.0 *2	60.0 *2	3.0 *2	17.3 *2	1.5 *2	10.2 *2
Control Method Selection (A1-02 Setting)	OLV (2)	60.0	230.0	60.0	3.0	13.8	0.5	2.9
	CLV (3)	60.0	230.0	60.0	0.0	0.0	0.0	0.0
	OLV/PM (5)	*3	*3	*3	-	-	*3	-
	AOLV/PM (6)	*3	*3	*3	-	-	*3	-
	CLV/PM (7)	*3	*3	*3	-	-	0.0	-

*1 This is the value for 200 V class drives. Double the value for 400 V class drives.

*2 These values are the default settings for *E1-04* to *E1-10* and *E3-04* to *E3-10* [V/f Pattern for Motor 2]. These settings are the same as those for the V/f pattern when *E1-03* = 1 [Const Trq, 60Hz base, 60Hz max].

*3 The default setting varies depending on the setting of *E5-01* [PM Motor Code Selection].

Table 3.2 Parameters Changed by E1-03: 2030 to 2211 (HD), 2021 to 2169 (ND), 4018 to 4103 (HD), 4012 to 4089 (ND), and T103 (HD)

No.	E1-03	E1-04	E1-05 ^{*1}	E1-06	E1-07	E1-08 ^{*1}	E1-09	E1-10 ^{*1}
Unit	-	Hz	V	Hz	Hz	V	Hz	V
Setting Value	0	50.0	230.0	50.0	2.5	16.1	1.3	8.1
	1	60.0	230.0	60.0	3.0	16.1	1.5	8.1
	2	60.0	230.0	50.0	3.0	16.1	1.5	8.1
	3	72.0	230.0	60.0	3.0	16.1	1.5	8.1
	4	50.0	230.0	50.0	25.0	40.3	1.3	6.9
	5	50.0	230.0	50.0	25.0	57.5	1.3	8.1
	6	60.0	230.0	60.0	30.0	40.3	1.5	6.9
	7	60.0	230.0	60.0	30.0	57.5	1.5	8.1
	8	50.0	230.0	50.0	2.5	20.7	1.3	10.4
	9	50.0	230.0	50.0	2.5	26.5	1.3	12.7
	A	60.0	230.0	60.0	3.0	20.7	1.5	10.4
	B	60.0	230.0	60.0	3.0	26.5	1.5	15.0
	C	90.0	230.0	60.0	3.0	16.1	1.5	8.1
	D	120.0	230.0	60.0	3.0	16.1	1.5	8.1
	E	180.0	230.0	60.0	3.0	16.1	1.5	8.1
	F	60.0 ^{*2}	230.0 ^{*2}	60.0 ^{*2}	3.0 ^{*2}	16.1 ^{*2}	1.5 ^{*2}	8.1 ^{*2}
Control Method Selection (A1-02 Setting)	OLV (2)	60.0	230.0	60.0	3.0	12.7	0.5	2.3
	CLV (3)	60.0	230.0	60.0	0.0	0.0	0.0	0.0
	OLV/PM (5)	^{*3}	^{*3}	^{*3}	-	-	^{*3}	-
	AOLV/PM (6)	^{*3}	^{*3}	^{*3}	-	-	^{*3}	-
	CLV/PM (7)	^{*3}	^{*3}	^{*3}	-	-	0.0	-

*1 This is the value for 200 V class drives. Double the value for 400 V class drives.

*2 These values are the default settings for E1-04 to E1-10 and E3-04 to E3-10 [V/f Pattern for Motor 2]. These settings are the same as those for the V/f pattern when E1-03 = 1 [Const Trq, 60Hz base, 60Hz max].

*3 The default setting varies depending on the setting of E5-01 [PM Motor Code Selection].

3.20 Parameters Changed by E1-03 [V/f Pattern Selection]

Table 3.3 Parameters Changed by E1-03: 2257 to 2415 (HD), 2211 to 2415 (ND), 4140 to 4H12 (HD), 4103 to 4H12 (ND), and T140 to T720 (HD), T103 to T720 (ND)

No.	E1-03	E1-04	E1-05 ^{*1}	E1-06	E1-07	E1-08 ^{*1}	E1-09	E1-10 ^{*1}
Unit	-	Hz	V	Hz	Hz	V	Hz	V
Setting Value	0	50.0	230.0	50.0	2.5	13.8	1.3	6.9
	1	60.0	230.0	60.0	3.0	13.8	1.5	6.9
	2	60.0	230.0	50.0	3.0	13.8	1.5	6.9
	3	72.0	230.0	60.0	3.0	13.8	1.5	6.9
	4	50.0	230.0	50.0	25.0	40.3	1.3	5.8
	5	50.0	230.0	50.0	25.0	57.5	1.3	6.9
	6	60.0	230.0	60.0	30.0	40.3	1.5	5.8
	7	60.0	230.0	60.0	30.0	57.5	1.5	6.9
	8	50.0	230.0	50.0	2.5	17.3	1.3	8.1
	9	50.0	230.0	50.0	2.5	23.0	1.3	10.4
	A	60.0	230.0	60.0	3.0	17.3	1.5	8.1
	B	60.0	230.0	60.0	3.0	23.0	1.5	12.7
	C	90.0	230.0	60.0	3.0	13.8	1.5	6.9
	D	120.0	230.0	60.0	3.0	13.8	1.5	6.9
	E	180.0	230.0	60.0	3.0	13.8	1.5	6.9
	F	60.0 ^{*2}	230.0 ^{*2}	60.0 ^{*2}	3.0 ^{*2}	13.8 ^{*2}	1.5 ^{*2}	6.9 ^{*2}
Control Method Selection (A1-02 Setting)	OLV (2)	60.0	230.0	60.0	3.0	12.7	0.5	2.3
	CLV (3)	60.0	230.0	60.0	0.0	0.0	0.0	0.0
	OLV/PM (5)	^{*3}	^{*3}	^{*3}	-	-	^{*3}	-
	AOLV/PM (6)	^{*3}	^{*3}	^{*3}	-	-	^{*3}	-
	CLV/PM (7)	^{*3}	^{*3}	^{*3}	-	-	0.0	-

*1 This is the value for 200 V class drives. Double the value for 400 V class drives.

*2 These values are the default settings for E1-04 to E1-10 and E3-04 to E3-10 [V/f Pattern for Motor 2]. These settings are the same as those for the V/f pattern when E1-03 = 1 [Const Trq, 60Hz base, 60Hz max].

*3 The default setting varies depending on the setting of E5-01 [PM Motor Code Selection].

3.21 Defaults by Drive Model and Duty Rating ND/HD

The values for the parameters in these tables depend on the values for parameters *o2-04* and *C6-01*. Changing the settings for *o2-04* and *C6-01* will change the default settings.

◆ Three-Phase 200 V Class

No. */	Name	Unit	Default							
			2004		2006		2008		2010	
-	Drive Model	-	HD	ND	HD	ND	HD	ND	HD	ND
C6-01	Normal / Heavy Duty Selection	-	0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	0062		0063		0064		0065	
E2-11 (E4-11)	Motor Rated Power	kW	0.4	0.75	0.75	1.1	1.1	1.5	1.5	2.2
b3-04	V/f Gain during Speed Search	%	100	100	100	100	100	100	100	100
b3-06	Speed Estimation Current Level 1	-	1	1	0.5	0.5	0.5	0.5	0.5	0.5
b3-07	Speed Estimation Current Level 2	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
b3-08	Speed Estimation ACR P Gain	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
b3-26	Direction Determination Level	-	1000	1000	1000	1000	1000	1000	1000	1000
b8-03	Energy Saving Filter Time	s	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
b8-04	Energy Saving Coefficient Value	-	288.2	223.7	223.7	196.6	196.6	169.4	169.4	156.8
C5-17 (C5-37)	Motor Inertia	kgm ²	0.0015	0.0028	0.0028	0.0068	0.0068	0.0068	0.0068	0.0088
C6-02	Carrier Frequency Selection	-	1	7	1	7	1	7	1	7
E2-01 (E4-01)	Motor Rated Current (FLA)	A	1.9	3.3	3.3	4.9	4.9	6.2	6.2	8.5
E2-02 (E4-02)	Motor Rated Slip	Hz	2.9	2.5	2.5	2.6	2.6	2.6	2.6	2.9
E2-03 (E4-03)	Motor No-Load Current	A	1.2	1.8	1.8	2.3	2.3	2.8	2.8	3
E2-05 (E4-05)	Motor Line-to-Line Resistance	$\Omega/m\Omega$ *2	9.842	5.156	5.156	3.577	3.577	1.997	1.997	1.601
E2-06 (E4-06)	Motor Leakage Inductance	%	18.2	13.8	13.8	18.5	18.5	18.5	18.5	18.4
E2-10 (E4-10)	Motor Iron Loss	W	14	26	26	38	38	53	53	77
E5-01	PM Motor Code Selection	-	1202	1202	1203	1203	FFFF	FFFF	1205	1205
L2-02	Power Loss Ride Through Time	s	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.3

3.21 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default							
			2004		2006		2008		2010	
-	Drive Model	-	HD	ND	HD	ND	HD	ND	HD	ND
C6-01	Normal / Heavy Duty Selection	-	0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	0062		0063		0064		0065	
E2-11 (E4-11)	Motor Rated Power	kW	0.4	0.75	0.75	1.1	1.1	1.5	1.5	2.2
L2-03	Minimum Baseblock Time	s	0.2	0.3	0.3	0.4	0.4	0.4	0.4	0.5
L2-04	Powerloss V/f Recovery Ramp Time	s	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
L2-05	Undervoltage Detection Lvl (Uv1)	-	190	190	190	190	190	190	190	190
L3-24	Motor Accel Time @ Rated Torque	s	0.178	0.142	0.142	0.142	0.142	0.166	0.166	0.145
L8-02	Overheat Alarm Level	°C	115	115	115	115	115	115	115	115
L8-09	Output Ground Fault Detection	-	1	1	1	1	1	1	1	1
L8-38	Carrier Frequency Reduction	-	2	2	2	2	2	2	2	2
n1-01	Hunting Prevention Selection	-	1	1	1	1	1	1	1	1
n1-03	Hunting Prevention Time Constant	ms	10	10	10	10	10	10	10	10
n1-16	Hunting Prevention High Fc Gain	-	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
n5-02	Motor Inertia Acceleration Time	s	0.178	0.142	0.142	0.142	0.142	0.166	0.166	0.145

*1 Parameters in parentheses are for motor 2.

*2 The display units are different for different models: The units are Ω for models 2004 to 2415, 4002 to 4720, T103 to T720 and mΩ for models 4810 to 4H12.

No. */	Name	Unit	Default							
			2012		2018		2021		2030	
-	Drive Model	-	HD	ND	HD	ND	HD	ND	HD	ND
C6-01	Normal / Heavy Duty Selection	-	0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	0066		0067		0068		006A	
E2-11 (E4-11)	Motor Rated Power	kW	2.2	3.0	3.0	3.7	3.7	5.5	5.5	7.5
b3-04	V/f Gain during Speed Search	%	100	100	100	100	100	100	100	100
b3-06	Speed Estimation Current Level 1	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
b3-07	Speed Estimation Current Level 2	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

3.21 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default							
			2012		2018		2021		2030	
-	Drive Model	-	HD	ND	HD	ND	HD	ND	HD	ND
C6-01	Normal / Heavy Duty Selection	-	0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	0066		0067		0068		006A	
E2-11 (E4-11)	Motor Rated Power	kW	2.2	3.0	3.0	3.7	3.7	5.5	5.5	7.5
b3-08	Speed Estimation ACR P Gain	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
b3-26	Direction Determination Level	-	1000	1000	1000	1000	1000	1000	1000	1000
b8-03	Energy Saving Filter Time	s	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
b8-04	Energy Saving Coefficient Value	-	156.8	136.4	136.4	122.9	122.9	94.75	94.75	72.69
C5-17 (C5-37)	Motor Inertia	kgm ²	0.0088	0.0158	0.0158	0.0158	0.0158	0.0255	0.026	0.037
C6-02	Carrier Frequency Selection	-	1	7	1	7	1	7	1	7
E2-01 (E4-01)	Motor Rated Current (FLA)	A	8.5	11.4	11.4	14	14	19.6	19.6	26.6
E2-02 (E4-02)	Motor Rated Slip	Hz	2.9	2.7	2.7	2.73	2.73	1.5	1.5	1.3
E2-03 (E4-03)	Motor No-Load Current	A	3	3.7	3.7	4.5	4.5	5.1	5.1	8
E2-05 (E4-05)	Motor Line-to-Line Resistance	Ω/mΩ *2	1.601	1.034	1.034	0.771	0.771	0.399	0.399	0.288
E2-06 (E4-06)	Motor Leakage Inductance	%	18.4	19	19	19.6	19.6	18.2	18.2	15.5
E2-10 (E4-10)	Motor Iron Loss	W	77	91	91	112	112	172	172	262
E5-01	PM Motor Code Selection	-	1206	1206	FFFF	FFFF	1208	1208	120A	120A
L2-02	Power Loss Ride Through Time	s	0.5	0.5	1	1	1	1	1	1
L2-03	Minimum Baseblock Time	s	0.5	0.5	0.5	0.6	0.6	0.7	0.7	0.8
L2-04	Powerloss V/f Recovery Ramp Time	s	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
L2-05	Undervoltage Detection Lvl (Uv1)	-	190	190	190	190	190	190	190	190
L3-24	Motor Accel Time @ Rated Torque	s	0.145	0.145	0.145	0.154	0.154	0.168	0.168	0.175
L8-02	Overheat Alarm Level	°C	124	124	110	110	110	110	110	110
L8-09	Output Ground Fault Detection	-	1	1	1	1	1	1	1	1
L8-38	Carrier Frequency Reduction	-	2	2	2	2	2	2	2	2

3.21 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default							
			2012		2018		2021		2030	
-	Drive Model	-								
C6-01	Normal / Heavy Duty Selection	-	HD	ND	HD	ND	HD	ND	HD	ND
			0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	0066		0067		0068		006A	
E2-11 (E4-11)	Motor Rated Power	kW	2.2	3.0	3.0	3.7	3.7	5.5	5.5	7.5
n1-01	Hunting Prevention Selection	-	1	1	1	1	1	1	1	1
n1-03	Hunting Prevention Time Constant	ms	10	10	10	10	10	10	10	10
n1-16	Hunting Prevention High Fc Gain	-	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
n5-02	Motor Inertia Acceleration Time	s	0.145	0.145	0.145	0.154	0.154	0.168	0.168	0.175

*1 Parameters in parentheses are for motor 2.

*2 The display units are different for different models: The units are Ω for models 2004 to 2415, 4002 to 4720, T103 to T720 and mΩ for models 4810 to 4H12.

No. */	Name	Unit	Default							
			2042		2056		2070		2082	
-	Drive Model	-								
C6-01	Normal / Heavy Duty Selection	-	HD	ND	HD	ND	HD	ND	HD	ND
			0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	006B		006D		006E		006F	
E2-11 (E4-11)	Motor Rated Power	kW	7.5	11	11	15	15	18.5	18.5	22
b3-04	V/f Gain during Speed Search	%	100	100	100	100	100	100	100	100
b3-06	Speed Estimation Current Level 1	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
b3-07	Speed Estimation Current Level 2	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
b3-08	Speed Estimation ACR P Gain	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
b3-26	Direction Determination Level	-	1000	1000	1000	1000	1000	1000	1000	1000
b8-03	Energy Saving Filter Time	s	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
b8-04	Energy Saving Coefficient Value	-	72.69	70.44	70.44	63.13	63.13	57.87	57.87	51.79
C5-17 (C5-37)	Motor Inertia	kgm ²	0.037	0.053	0.053	0.076	0.076	0.138	0.138	0.165
C6-02	Carrier Frequency Selection	-	1	7	1	7	1	7	1	7
E2-01 (E4-01)	Motor Rated Current (FLA)	A	26.6	39.7	39.7	53	53	65.8	65.8	77.2

3.21 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default							
			2042		2056		2070		2082	
-	Drive Model	-								
C6-01	Normal / Heavy Duty Selection	-	HD	ND	HD	ND	HD	ND	HD	ND
			0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	006B		006D		006E		006F	
E2-11 (E4-11)	Motor Rated Power	kW	7.5	11	11	15	15	18.5	18.5	22
E2-02 (E4-02)	Motor Rated Slip	Hz	1.3	1.7	1.7	1.6	1.6	1.67	1.67	1.7
E2-03 (E4-03)	Motor No-Load Current	A	8	11.2	11.2	15.2	15.2	15.7	15.7	18.5
E2-05 (E4-05)	Motor Line-to-Line Resistance	$\Omega/m\Omega$ *2	0.288	0.23	0.23	0.138	0.138	0.101	0.101	0.079
E2-06 (E4-06)	Motor Leakage Inductance	%	15.5	19.5	19.5	17.2	17.2	15.7	20.1	19.5
E2-10 (E4-10)	Motor Iron Loss	W	262	245	245	272	272	505	505	538
E5-01	PM Motor Code Selection	-	120B	120B	120D	120D	120E	120E	120F	120F
L2-02	Power Loss Ride Through Time	s	1	1	2	2	2	2	2	2
L2-03	Minimum Baseblock Time	s	0.8	0.9	0.9	1	1	1	1	1
L2-04	Powerloss V/f Recovery Ramp Time	s	0.3	0.3	0.3	0.6	0.6	0.6	0.6	0.6
L2-05	Undervoltage Detection Lvl (Uv1)	-	190	190	190	190	190	190	190	190
L3-24	Motor Accel Time @ Rated Torque	s	0.175	0.265	0.265	0.244	0.244	0.317	0.317	0.355
L8-02	Overheat Alarm Level	°C	110	110	115	115	120	120	133	130
L8-09	Output Ground Fault Detection	-	1	1	1	1	1	1	1	1
L8-38	Carrier Frequency Reduction	-	2	2	2	2	2	2	2	2
n1-01	Hunting Prevention Selection	-	1	1	2	2	2	2	2	2
n1-03	Hunting Prevention Time Constant	ms	10	10	10	10	10	10	10	10
n1-16	Hunting Prevention High Fc Gain	-	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
n5-02	Motor Inertia Acceleration Time	s	0.175	0.265	0.265	0.244	0.244	0.317	0.317	0.355

*1 Parameters in parentheses are for motor 2.

*2 The display units are different for different models: The units are Ω for models 2004 to 2415, 4002 to 4720, T103 to T720 and $m\Omega$ for models 4810 to 4H12.

3.21 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default							
			2110		2138		2169		2211	
-	Drive Model	-	HD	ND	HD	ND	HD	ND	HD	ND
C6-01	Normal / Heavy Duty Selection	-	0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	0070		0072		0073		0074	
E2-11 (E4-11)	Motor Rated Power	kW	22	30	30	37	37	45	45	55
b3-04	V/f Gain during Speed Search	%	100	80	80	80	80	80	80	80
b3-06	Speed Estimation Current Level 1	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
b3-07	Speed Estimation Current Level 2	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
b3-08	Speed Estimation ACR P Gain	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
b3-26	Direction Determination Level	-	1000	1000	1000	1000	1000	1000	1000	1000
b8-03	Energy Saving Filter Time	s	0.50	0.50	0.50	0.50	0.50	0.50	0.50	2.00
b8-04	Energy Saving Coefficient Value	-	51.79	46.27	46.27	38.16	38.16	35.78	35.78	31.35
C5-17 (C5-37)	Motor Inertia	kgm ²	0.165	0.220	0.220	0.273	0.273	0.333	0.333	0.490
C6-02	Carrier Frequency Selection	-	1	7	1	7	1	7	1	7
E2-01 (E4-01)	Motor Rated Current (FLA)	A	77.2	105	105	131	131	160	160	190
E2-02 (E4-02)	Motor Rated Slip	Hz	1.7	1.8	1.8	1.33	1.33	1.6	1.6	1.43
E2-03 (E4-03)	Motor No-Load Current	A	18.5	21.9	21.9	38.2	38.2	44	44	45.6
E2-05 (E4-05)	Motor Line-to-Line Resistance	Ω/mΩ *2	0.079	0.064	0.064	0.039	0.039	0.03	0.03	0.022
E2-06 (E4-06)	Motor Leakage Inductance	%	19.5	20.8	20.8	18.8	18.8	20.2	20.2	20.5
E2-10 (E4-10)	Motor Iron Loss	W	538	699	699	823	823	852	852	960
E5-01	PM Motor Code Selection	-	1210	1210	1212	1212	1213	1213	1214	1214
L2-02	Power Loss Ride Through Time	s	2	2	2	2	2	2	2	2
L2-03	Minimum Baseblock Time	s	1	1.1	1.1	1.1	1.1	1.2	1.2	1.3
L2-04	Powerloss V/f Recovery Ramp Time	s	0.6	0.6	0.6	0.6	0.6	1	1	1
L2-05	Undervoltage Detection Lvl (Uv1)	-	190	190	190	190	190	190	190	190

3.21 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default							
			2110		2138		2169		2211	
-	Drive Model	-	HD	ND	HD	ND	HD	ND	HD	ND
C6-01	Normal / Heavy Duty Selection	-	0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	0070		0072		0073		0074	
E2-11 (E4-11)	Motor Rated Power	kW	22	30	30	37	37	45	45	55
L3-24	Motor Accel Time @ Rated Torque	s	0.355	0.323	0.323	0.32	0.32	0.387	0.387	0.317
L8-02	Overheat Alarm Level	°C	105	105	115	115	105	105	105	105
L8-09	Output Ground Fault Detection	-	1	1	1	1	1	1	1	1
L8-38	Carrier Frequency Reduction	-	2	2	2	2	2	2	2	2
n1-01	Hunting Prevention Selection	-	2	2	2	2	2	2	2	2
n1-03	Hunting Prevention Time Constant	ms	10	10	10	10	10	10	10	10
n1-16	Hunting Prevention High Fc Gain	-	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
n5-02	Motor Inertia Acceleration Time	s	0.355	0.323	0.323	0.32	0.32	0.387	0.387	0.317

*1 Parameters in parentheses are for motor 2.

*2 The display units are different for different models: The units are Ω for models 2004 to 2415, 4002 to 4720, T103 to T720 and mΩ for models 4810 to 4H12.

No. */	Name	Unit	Default							
			2257		2313		2360		2415	
-	Drive Model	-	HD	ND	HD	ND	HD	ND	HD	ND
C6-01	Normal / Heavy Duty Selection	-	0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	0075		0076		0077		0078	
E2-11 (E4-11)	Motor Rated Power	kW	55	75	75	90	90	110	110	110
b3-04	V/f Gain during Speed Search	%	80	80	80	80	80	80	80	80
b3-06	Speed Estimation Current Level 1	-	0.5	0.7	0.7	0.7	0.7	0.7	0.7	0.7
b3-07	Speed Estimation Current Level 2	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
b3-08	Speed Estimation ACR P Gain	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
b3-26	Direction Determination Level	-	1000	1000	1000	1000	1000	1000	1000	1000
b8-03	Energy Saving Filter Time	s	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00

3.21 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default							
			2257		2313		2360		2415	
-	Drive Model	-	HD	ND	HD	ND	HD	ND	HD	ND
C6-01	Normal / Heavy Duty Selection	-	0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	0075		0076		0077		0078	
E2-11 (E4-11)	Motor Rated Power	kW	55	75	75	90	90	110	110	110
b8-04	Energy Saving Coefficient Value	-	31.35	23.1	23.1	20.65	20.65	18.12	18.12	18.12
C5-17 (C5-37)	Motor Inertia	kgm ²	0.49	0.90	0.90	1.10	1.10	1.90	1.90	1.90
C6-02	Carrier Frequency Selection	-	1	7	1	7	1	7	1	7
E2-01 (E4-01)	Motor Rated Current (FLA)	A	190	260	260	260	260	260	260	260
E2-02 (E4-02)	Motor Rated Slip	Hz	1.43	1.39	1.39	1.39	1.39	1.39	1.39	1.39
E2-03 (E4-03)	Motor No-Load Current	A	45.6	72	72	72	72	72	72	72
E2-05 (E4-05)	Motor Line-to-Line Resistance	$\Omega/m\Omega *2$	0.022	0.023	0.023	0.023	0.023	0.023	0.023	0.023
E2-06 (E4-06)	Motor Leakage Inductance	%	20.5	20	20	20	20	20	20	20
E2-10 (E4-10)	Motor Iron Loss	W	960	1200	1200	1200	1200	1200	1200	1200
E5-01	PM Motor Code Selection	-	1215	1215	1216	1216	FFFF	FFFF	FFFF	FFFF
L2-02	Power Loss Ride Through Time	s	2	2	2	2	2	2	2	2
L2-03	Minimum Baseblock Time	s	1.3	1.5	1.5	1.5	1.5	1.7	1.7	1.7
L2-04	Powerloss V/f Recovery Ramp Time	s	1	1	1	1	1	1	1	1
L2-05	Undervoltage Detection Lvl (Uv1)	-	190	190	190	190	190	190	190	190
L3-24	Motor Accel Time @ Rated Torque	s	0.317	0.533	0.533	0.592	0.592	0.646	0.646	0.646
L8-02	Overheat Alarm Level	°C	105	105	105	105	105	105	105	105
L8-09	Output Ground Fault Detection	-	1	1	1	1	1	1	1	1
L8-38	Carrier Frequency Reduction	-	2	2	2	2	2	2	2	2
n1-01	Hunting Prevention Selection	-	2	2	2	2	2	2	2	2
n1-03	Hunting Prevention Time Constant	ms	10	10	10	10	100	100	100	100

No. */	Name	Unit	Default							
			2257		2313		2360		2415	
-	Drive Model	-								
C6-01	Normal / Heavy Duty Selection	-	HD	ND	HD	ND	HD	ND	HD	ND
			0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	0075		0076		0077		0078	
E2-11 (E4-11)	Motor Rated Power	kW	55	75	75	90	90	110	110	110
n1-16	Hunting Prevention High Fc Gain	-	0.50	0.50	0.50	0.50	1.00	1.00	1.00	1.00
n5-02	Motor Inertia Acceleration Time	s	0.317	0.533	0.533	0.592	0.592	0.646	0.646	0.646

*1 Parameters in parentheses are for motor 2.

*2 The display units are different for different models: The units are Ω for models 2004 to 2415, 4002 to 4720, T103 to T720 and m Ω for models 4810 to 4H12.

◆ Three-Phase 400 V Class

No. */	Name	Unit	Default							
			4002		4004		4005		4007	
-	Drive Model	-								
C6-01	Normal / Heavy Duty Selection	-	HD	ND	HD	ND	HD	ND	HD	ND
			0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	0092		0093		0094		0095	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	0.75 (0.4)	1 (0.75)	1 (1.1)	2 (1.5)	2 (1.5)	3 (2.2)	3 (2.2)	4 (3.0)
b3-04	V/f Gain during Speed Search	%	100	100	100	100	100	100	100	100
b3-06	Speed Estimation Current Level 1	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
b3-07	Speed Estimation Current Level 2	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
b3-08	Speed Estimation ACR P Gain	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
b3-26	Direction Determination Level	-	1000	1000	1000	1000	1000	1000	1000	1000
b8-03	Energy Saving Filter Time	s	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
b8-04	Energy Saving Coefficient Value	-	576.4	447.4	447.4	338.8	338.8	313.6	313.6	265.7
C5-17 (C5-37)	Motor Inertia	kgm ²	0.0015	0.0028	0.0028	0.0068	0.0068	0.0088	0.0088	0.0158
C6-02	Carrier Frequency Selection	-	1	7	1	7	1	7	1	7
E2-01 (E4-01)	Motor Rated Current (FLA)	A	1	1.6	1.6	3.1	3.1	4.2	4.2	5.7
E2-02 (E4-02)	Motor Rated Slip	Hz	2.9	2.6	2.6	2.5	2.5	3	3	2.7

3.21 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default							
			4002		4004		4005		4007	
-	Drive Model	-	HD	ND	HD	ND	HD	ND	HD	ND
C6-01	Normal / Heavy Duty Selection	-	0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	0092		0093		0094		0095	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	0.75 (0.4)	1 (0.75)	1 (1.1)	2 (1.5)	2 (1.5)	3 (2.2)	3 (2.2)	4 (3.0)
E2-03 (E4-03)	Motor No-Load Current	A	0.6	0.8	0.8	1.4	1.4	1.5	1.5	1.9
E2-05 (E4-05)	Motor Line-to-Line Resistance	$\Omega/m\Omega$ *2	38.198	22.459	22.459	10.1	10.1	6.495	6.495	4.360
E2-06 (E4-06)	Motor Leakage Inductance	%	18.2	14.3	14.3	18.3	18.3	18.7	18.7	19
E2-10 (E4-10)	Motor Iron Loss	W	14	26	26	53	53	77	77	105
E5-01	PM Motor Code Selection	-	1232	1232	1233	1233	1235	1235	1236	1236
L2-02	Power Loss Ride Through Time	s	0.1	0.1	0.2	0.2	0.3	0.3	0.5	0.5
L2-03	Minimum Baseblock Time	s	0.2	0.3	0.3	0.4	0.4	0.5	0.5	0.5
L2-04	Powerloss V/f Recovery Ramp Time	s	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
L2-05	Undervoltage Detection Lvl (Uv1)	-	380	380	380	380	380	380	380	380
L3-24	Motor Accel Time @ Rated Torque	s	0.178	0.142	0.142	0.166	0.166	0.145	0.145	0.145
L8-02	Overheat Alarm Level	°C	100	100	105	105	112	112	100	100
L8-09	Output Ground Fault Detection	-	1	1	1	1	1	1	1	1
L8-38	Carrier Frequency Reduction	-	2	2	2	2	2	2	2	2
n1-01	Hunting Prevention Selection	-	1	1	1	1	1	1	1	1
n1-03	Hunting Prevention Time Constant	ms	10	10	10	10	10	10	10	10
n1-16	Hunting Prevention High Fc Gain	-	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
n5-02	Motor Inertia Acceleration Time	s	0.178	0.142	0.142	0.166	0.166	0.145	0.145	0.145

*1 Parameters in parentheses are for motor 2.

*2 The display units are different for different models: The units are Ω for models 2004 to 2415, 4002 to 4720, T103 to T720 and $m\Omega$ for models 4810 to 4H12.

No. */	Name	Unit	Default							
			4009		4012		4018		4023	
-	Drive Model	-	HD	ND	HD	ND	HD	ND	HD	ND
C6-01	Normal / Heavy Duty Selection	-	0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	0096		0097		0099		009A	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	4 (3.0)	5 (4.0)	5 (4.0)	7.5 (5.5)	7.5 (5.5)	10 (7.5)	10 (7.5)	15 (11)
b3-04	V/f Gain during Speed Search	%	100	100	100	100	100	100	100	100
b3-06	Speed Estimation Current Level 1	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
b3-07	Speed Estimation Current Level 2	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
b3-08	Speed Estimation ACR P Gain	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
b3-26	Direction Determination Level	-	1000	1000	1000	1000	1000	1000	1000	1000
b8-03	Energy Saving Filter Time	s	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
b8-04	Energy Saving Coefficient Value	-	265.7	245.8	245.8	189.5	189.5	145.38	145.38	140.88
C5-17 (C5-37)	Motor Inertia	kgm ²	0.0158	0.0158	0.0158	0.0255	0.026	0.037	0.037	0.053
C6-02	Carrier Frequency Selection	-	1	7	1	7	1	7	1	7
E2-01 (E4-01)	Motor Rated Current (FLA)	A	5.7	7	7	9.8	9.8	13.3	13.3	19.9
E2-02 (E4-02)	Motor Rated Slip	Hz	2.7	2.7	2.7	1.5	1.5	1.3	1.3	1.7
E2-03 (E4-03)	Motor No-Load Current	A	1.9	2.3	2.3	2.6	2.6	4	4	5.6
E2-05 (E4-05)	Motor Line-to-Line Resistance	$\Omega/m\Omega$ *2	4,360	3,333	3,333	1,595	1,595	1,152	1,152	0,922
E2-06 (E4-06)	Motor Leakage Inductance	%	19	19.3	19.3	18.2	18.2	15.5	15.5	19.6
E2-10 (E4-10)	Motor Iron Loss	W	105	130	130	193	193	263	263	385
E5-01	PM Motor Code Selection	-	FFFF	FFFF	1238	1238	123A	123A	123B	123B
L2-02	Power Loss Ride Through Time	s	0.5	0.5	0.5	0.5	0.8	0.8	1	1
L2-03	Minimum Baseblock Time	s	0.5	0.6	0.6	0.7	0.7	0.8	0.8	0.9
L2-04	Powerloss V/f Recovery Ramp Time	s	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
L2-05	Undervoltage Detection Lvl (Uv1)	-	380	380	380	380	380	380	380	380

3.21 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default							
			4009		4012		4018		4023	
-	Drive Model	-	HD	ND	HD	ND	HD	ND	HD	ND
C6-01	Normal / Heavy Duty Selection	-	0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	0096		0097		0099		009A	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	4 (3.0)	5 (4.0)	5 (4.0)	7.5 (5.5)	7.5 (5.5)	10 (7.5)	10 (7.5)	15 (11)
L3-24	Motor Accel Time @ Rated Torque	s	0.145	0.154	0.154	0.168	0.168	0.175	0.175	0.265
L8-02	Overheat Alarm Level	°C	100	100	100	100	105	105	105	105
L8-09	Output Ground Fault Detection	-	1	1	1	1	1	1	1	1
L8-38	Carrier Frequency Reduction	-	2	2	2	2	2	2	2	2
n1-01	Hunting Prevention Selection	-	1	1	1	1	1	1	1	1
n1-03	Hunting Prevention Time Constant	ms	10	10	10	10	10	10	10	10
n1-16	Hunting Prevention High Fc Gain	-	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
n5-02	Motor Inertia Acceleration Time	s	0.145	0.154	0.154	0.168	0.168	0.175	0.175	0.265

*1 Parameters in parentheses are for motor 2.

*2 The display units are different for different models: The units are Ω for models 2004 to 2415, 4002 to 4720, T103 to T720 and mΩ for models 4810 to 4H12.

No. */	Name	Unit	Default							
			4031		4038		4044		4060	
-	Drive Model	-	HD	ND	HD	ND	HD	ND	HD	ND
C6-01	Normal / Heavy Duty Selection	-	0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	009C		009D		009E		009F	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	15 (11)	20 (15)	20 (15)	25 (18.5)	25 (18.5)	30 (22)	30 (22)	40 (30)
b3-04	V/f Gain during Speed Search	%	100	100	100	100	100	100	100	100
b3-06	Speed Estimation Current Level 1	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
b3-07	Speed Estimation Current Level 2	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
b3-08	Speed Estimation ACR P Gain	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
b3-26	Direction Determination Level	-	1000	1000	1000	1000	1000	1000	1000	1000
b8-03	Energy Saving Filter Time	s	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50

3.21 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default							
			4031		4038		4044		4060	
-	Drive Model	-	HD	ND	HD	ND	HD	ND	HD	ND
C6-01	Normal / Heavy Duty Selection	-	0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	009C		009D		009E		009F	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	15 (11)	20 (15)	20 (15)	25 (18.5)	25 (18.5)	30 (22)	30 (22)	40 (30)
b8-04	Energy Saving Coefficient Value	-	140.88	126.26	126.26	115.74	115.74	103.58	103.58	92.54
C5-17 (C5-37)	Motor Inertia	kgm ²	0.053	0.076	0.076	0.138	0.138	0.165	0.165	0.220
C6-02	Carrier Frequency Selection	-	1	7	1	7	1	7	1	7
E2-01 (E4-01)	Motor Rated Current (FLA)	A	19.9	26.5	26.5	32.9	32.9	38.6	38.6	52.3
E2-02 (E4-02)	Motor Rated Slip	Hz	1.7	1.6	1.6	1.67	1.67	1.7	1.7	1.8
E2-03 (E4-03)	Motor No-Load Current	A	5.6	7.6	7.6	7.8	7.8	9.2	9.2	10.9
E2-05 (E4-05)	Motor Line-to-Line Resistance	Ω/mΩ *2	0.922	0.55	0.55	0.403	0.403	0.316	0.316	0.269
E2-06 (E4-06)	Motor Leakage Inductance	%	19.6	17.2	17.2	20.1	20.1	23.5	23.5	20.7
E2-10 (E4-10)	Motor Iron Loss	W	385	440	440	508	508	586	586	750
E5-01	PM Motor Code Selection	-	123D	123D	123E	123E	123F	123F	1240	1240
L2-02	Power Loss Ride Through Time	s	2	2	2	2	2	2	2	2
L2-03	Minimum Baseblock Time	s	0.9	1	1	1	1	1	1	1.1
L2-04	Powerloss V/f Recovery Ramp Time	s	0.3	0.6	0.6	0.6	0.6	0.6	0.6	0.6
L2-05	Undervoltage Detection Lvl (Uv1)	-	380	380	380	380	380	380	380	380
L3-24	Motor Accel Time @ Rated Torque	s	0.265	0.244	0.244	0.317	0.317	0.355	0.355	0.323
L8-02	Overheat Alarm Level	°C	115	115	120	120	120	120	130	137
L8-09	Output Ground Fault Detection	-	1	1	1	1	1	1	1	1
L8-38	Carrier Frequency Reduction	-	2	2	2	2	2	2	2	2
n1-01	Hunting Prevention Selection	-	2	2	2	2	2	2	2	2
n1-03	Hunting Prevention Time Constant	ms	10	10	10	10	10	10	10	10

3.21 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default							
			4031		4038		4044		4060	
-	Drive Model	-	HD	ND	HD	ND	HD	ND	HD	ND
C6-01	Normal / Heavy Duty Selection	-	0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	009C		009D		009E		009F	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	15 (11)	20 (15)	20 (15)	25 (18.5)	25 (18.5)	30 (22)	30 (22)	40 (30)
n1-16	Hunting Prevention High Fc Gain	-	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
n5-02	Motor Inertia Acceleration Time	s	0.265	0.244	0.244	0.317	0.317	0.355	0.355	0.323

*1 Parameters in parentheses are for motor 2.

*2 The display units are different for different models: The units are Ω for models 2004 to 2415, 4002 to 4720, T103 to T720 and mΩ for models 4810 to 4H12.

No. */	Name	Unit	Default							
			4075		4089		4103		4140	
-	Drive Model	-	HD	ND	HD	ND	HD	ND	HD	ND
C6-01	Normal / Heavy Duty Selection	-	0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	00A1		00A2		00A3		00A4	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	40 (30)	50 (37)	50 (37)	60 (45)	60 (45)	75 (55)	75 (55)	100 (75)
b3-04	V/f Gain during Speed Search	%	100	100	100	100	100	80	80	60
b3-06	Speed Estimation Current Level 1	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.7
b3-07	Speed Estimation Current Level 2	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
b3-08	Speed Estimation ACR P Gain	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.8
b3-26	Direction Determination Level	-	1000	1000	1000	1000	1000	1000	1000	1000
b8-03	Energy Saving Filter Time	s	0.50	0.50	0.50	0.50	0.50	2.00	2.00	2.00
b8-04	Energy Saving Coefficient Value	-	92.54	76.32	76.32	71.56	71.56	67.2	67.2	46.2
C5-17 (C5-37)	Motor Inertia	kgm ²	0.220	0.273	0.273	0.333	0.333	0.490	0.49	0.90
C6-02	Carrier Frequency Selection	-	1	7	1	7	1	7	1	7
E2-01 (E4-01)	Motor Rated Current (FLA)	A	52.3	65.6	65.6	79.7	79.7	95	95	130
E2-02 (E4-02)	Motor Rated Slip	Hz	1.8	1.33	1.33	1.6	1.6	1.46	1.46	1.39
E2-03 (E4-03)	Motor No-Load Current	A	10.9	19.1	19.1	22	22	24	24	36

3.21 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default							
			4075		4089		4103		4140	
-	Drive Model	-	HD	ND	HD	ND	HD	ND	HD	ND
C6-01	Normal / Heavy Duty Selection	-	0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	00A1		00A2		00A3		00A4	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	40 (30)	50 (37)	50 (37)	60 (45)	60 (45)	75 (55)	75 (55)	100 (75)
E2-05 (E4-05)	Motor Line-to-Line Resistance	$\Omega/m\Omega$ *2	0.269	0.155	0.155	0.122	0.122	0.088	0.088	0.092
E2-06 (E4-06)	Motor Leakage Inductance	%	20.7	18.8	18.8	19.9	19.9	20	20	20
E2-10 (E4-10)	Motor Iron Loss	W	750	925	925	1125	1125	1260	1260	1600
E5-01	PM Motor Code Selection	-	1242	1242	1243	1243	1244	1244	1245	1245
L2-02	Power Loss Ride Through Time	s	2	2	2	2	2	2	2	2
L2-03	Minimum Baseblock Time	s	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.3
L2-04	Powerloss V/f Recovery Ramp Time	s	0.6	0.6	0.6	0.6	0.6	1	1	1
L2-05	Undervoltage Detection Lvl (Uv1)	-	380	380	380	380	380	380	380	380
L3-24	Motor Accel Time @ Rated Torque	s	0.323	0.32	0.32	0.387	0.387	0.317	0.317	0.533
L8-02	Overheat Alarm Level	°C	120	120	115	115	126	120	120	120
L8-09	Output Ground Fault Detection	-	1	1	1	1	1	1	1	1
L8-38	Carrier Frequency Reduction	-	2	2	2	2	2	2	2	2
n1-01	Hunting Prevention Selection	-	2	2	2	2	2	2	2	2
n1-03	Hunting Prevention Time Constant	ms	10	10	10	10	10	10	30	30
n1-16	Hunting Prevention High Fc Gain	-	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
n5-02	Motor Inertia Acceleration Time	s	0.323	0.32	0.32	0.387	0.387	0.317	0.317	0.533

*1 Parameters in parentheses are for motor 2.

*2 The display units are different for different models: The units are Ω for models 2004 to 2415, 4002 to 4720, T103 to T720 and $m\Omega$ for models 4810 to 4H12.

3.21 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default							
			4168		4208		4250		4302	
-	Drive Model	-	HD	ND	HD	ND	HD	ND	HD	ND
C6-01	Normal / Heavy Duty Selection	-	0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	00A5		00A6		00A7		00A8	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	100 (75)	125 (90)	125 (90)	150 (110)	150 (110)	200 (150)	200 (150)	250 (185)
b3-04	V/f Gain during Speed Search	%	60	60	60	60	60	60	60	60
b3-06	Speed Estimation Current Level 1	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
b3-07	Speed Estimation Current Level 2	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
b3-08	Speed Estimation ACR P Gain	-	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
b3-26	Direction Determination Level	-	1000	1000	1000	1000	1000	1000	1000	1000
b8-03	Energy Saving Filter Time	s	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
b8-04	Energy Saving Coefficient Value	-	46.2	38.91	38.91	36.23	36.23	32.79	32.79	30.13
C5-17 (C5-37)	Motor Inertia	kgm ²	0.90	1.10	1.10	1.90	1.90	2.10	2.10	3.30
C6-02	Carrier Frequency Selection	-	1	7	1	7	1	7	1	7
E2-01 (E4-01)	Motor Rated Current (FLA)	A	130	156	156	190	190	223	223	270
E2-02 (E4-02)	Motor Rated Slip	Hz	1.39	1.4	1.4	1.4	1.4	1.38	1.38	1.35
E2-03 (E4-03)	Motor No-Load Current	A	36	40	40	49	49	58	58	70
E2-05 (E4-05)	Motor Line-to-Line Resistance	$\Omega/m\Omega$ *2	0.092	0.056	0.056	0.046	0.046	0.035	0.035	0.029
E2-06 (E4-06)	Motor Leakage Inductance	%	20	20	20	20	20	20	20	20
E2-10 (E4-10)	Motor Iron Loss	W	1600	1760	1760	2150	2150	2350	2350	2850
E5-01	PM Motor Code Selection	-	1246	1246	1247	1247	1248	1248	1249	1249
L2-02	Power Loss Ride Through Time	s	2	2	2	2	2	2	2	2
L2-03	Minimum Baseblock Time	s	1.3	1.5	1.5	1.7	1.7	1.7	1.7	1.8
L2-04	Powerloss V/f Recovery Ramp Time	s	1	1	1	1	1	1	1	1
L2-05	Undervoltage Detection Lvl (Uv1)	-	380	380	380	380	380	380	380	380

3.21 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default							
			4168		4208		4250		4302	
C6-01	Normal / Heavy Duty Selection	-	HD	ND	HD	ND	HD	ND	HD	ND
			0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	00A5		00A6		00A7		00A8	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	100 (75)	125 (90)	125 (90)	150 (110)	150 (110)	200 (150)	200 (150)	250 (185)
L3-24	Motor Accel Time @ Rated Torque	s	0.533	0.592	0.592	0.646	0.646	0.673	0.673	0.777
L8-02	Overheat Alarm Level	°C	110	110	105	105	120	120	120	120
L8-09	Output Ground Fault Detection	-	1	1	1	1	1	1	1	1
L8-38	Carrier Frequency Reduction	-	2	2	2	2	2	2	2	2
n1-01	Hunting Prevention Selection	-	2	2	2	2	2	2	2	2
n1-03	Hunting Prevention Time Constant	ms	30	30	30	30	30	30	30	30
n1-16	Hunting Prevention High Fc Gain	-	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
n5-02	Motor Inertia Acceleration Time	s	0.533	0.592	0.592	0.646	0.646	0.673	0.673	0.777

*1 Parameters in parentheses are for motor 2.

*2 The display units are different for different models: The units are Ω for models 2004 to 2415, 4002 to 4720, T103 to T720 and mΩ for models 4810 to 4H12.

No. */	Name	Unit	Default							
			4371		4414		4477		4568	
C6-01	Normal / Heavy Duty Selection	-	HD	ND	HD	ND	HD	ND	HD	ND
			0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	00A9		00AA		00AC		00AD	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	250 (185)	300 (220)	300 (220)	350 (260)	350 (260)	400 (300)	400 (300)	450 (335)
b3-04	V/f Gain during Speed Search	%	60	60	60	60	60	60	60	60
b3-06	Speed Estimation Current Level 1	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
b3-07	Speed Estimation Current Level 2	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
b3-08	Speed Estimation ACR P Gain	-	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
b3-26	Direction Determination Level	-	1000	1000	1000	1000	1000	1000	1000	1000
b8-03	Energy Saving Filter Time	s	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00

3.21 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default							
			4371		4414		4477		4568	
-	Drive Model	-	HD	ND	HD	ND	HD	ND	HD	ND
C6-01	Normal / Heavy Duty Selection	-	0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	00A9		00AA		00AC		00AD	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	250 (185)	300 (220)	300 (220)	350 (260)	350 (260)	400 (300)	400 (300)	450 (335)
b8-04	Energy Saving Coefficient Value	-	30.13	30.57	30.57	27.13	27.13	21.76	21.76	21.76
C5-17 (C5-37)	Motor Inertia	kgm ²	3.30	3.60	3.60	4.10	4.10	6.50	6.50	11.00
C6-02	Carrier Frequency Selection	-	1	7	1	7	1	7	1	7
E2-01 (E4-01)	Motor Rated Current (FLA)	A	270	310	310	370	370	500	500	500
E2-02 (E4-02)	Motor Rated Slip	Hz	1.35	1.3	1.3	1.3	1.3	1.25	1.25	1.25
E2-03 (E4-03)	Motor No-Load Current	A	70	81	81	96	96	130	130	130
E2-05 (E4-05)	Motor Line-to-Line Resistance	Ω/mΩ *2	0.029	0.025	0.025	0.02	0.02	0.014	0.014	0.014
E2-06 (E4-06)	Motor Leakage Inductance	%	20	20	20	20	20	20	20	20
E2-10 (E4-10)	Motor Iron Loss	W	2850	3200	3200	3700	3700	4700	4700	4700
E5-01	PM Motor Code Selection	-	124A	124A	124A	124A	124A	124A	124A	124A
L2-02	Power Loss Ride Through Time	s	2	2	2	2	2	2	2	2
L2-03	Minimum Baseblock Time	s	1.8	1.9	1.9	2	2	2.1	2.1	2.1
L2-04	Powerloss V/f Recovery Ramp Time	s	1	1	1.8	1.8	1.8	2	2	2
L2-05	Undervoltage Detection Lvl (Uv1)	-	380	380	380	380	380	380	380	380
L3-24	Motor Accel Time @ Rated Torque	s	0.777	0.864	0.864	0.91	0.91	1.392	1.392	1.392
L8-02	Overheat Alarm Level	°C	125	125	125	125	110	110	125	115
L8-09	Output Ground Fault Detection	-	1	1	1	1	1	1	1	1
L8-38	Carrier Frequency Reduction	-	2	2	2	2	2	2	2	2
n1-01	Hunting Prevention Selection	-	2	2	2	2	2	2	2	2
n1-03	Hunting Prevention Time Constant	ms	30	30	100	100	100	100	100	100

3.21 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default							
			4371		4414		4477		4568	
-	Drive Model	-								
C6-01	Normal / Heavy Duty Selection	-	HD	ND	HD	ND	HD	ND	HD	ND
			0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	00A9		00AA		00AC		00AD	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	250 (185)	300 (220)	300 (220)	350 (260)	350 (260)	400 (300)	400 (300)	450 (335)
n1-16	Hunting Prevention High Fc Gain	-	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
n5-02	Motor Inertia Acceleration Time	s	0.777	0.864	0.864	0.91	0.91	1.392	1.392	1.392

*1 Parameters in parentheses are for motor 2.

*2 The display units are different for different models: The units are Ω for models 2004 to 2415, 4002 to 4720, T103 to T720 and mΩ for models 4810 to 4H12.

No. */	Name	Unit	Default							
			4605		4720		4810		4930	
-	Drive Model	-								
C6-01	Normal / Heavy Duty Selection	-	HD	ND	HD	ND	HD	ND	HD	ND
			0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	00AE		00AF		00B0		00B1	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	450 (335)	500 (370)	500 (370)	600 (450)	600 (450)	700 (525)	700 (525)	800 (600)
b3-04	V/f Gain during Speed Search	%	60	60	60	60	40	40	40	40
b3-06	Speed Estimation Current Level 1	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
b3-07	Speed Estimation Current Level 2	-	1.0	1.0	1.0	1.0	3.0	2.0	3.0	2.0
b3-08	Speed Estimation ACR P Gain	-	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
b3-26	Direction Determination Level	-	1000	1000	1000	1000	1000	1000	1000	1000
b8-03	Energy Saving Filter Time	s	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
b8-04	Energy Saving Coefficient Value	-	21.76	23.84	21.76	23.84	23.84	21.4	21.4	20.26
C5-17 (C5-37)	Motor Inertia	kgm ²	11.00	12.00	11.00	12.00	12.00	13.00	13.00	14.00
C6-02	Carrier Frequency Selection	-	1	7	1	7	1	1	1	1
E2-01 (E4-01)	Motor Rated Current (FLA)	A	500	650	500	650	650	800	800	900
E2-02 (E4-02)	Motor Rated Slip	Hz	1.25	1	1.25	1	1	1	1	0.9
E2-03 (E4-03)	Motor No-Load Current	A	130	130	130	130	130	160	160	180

3.21 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default							
			4605		4720		4810		4930	
-	Drive Model	-	HD	ND	HD	ND	HD	ND	HD	ND
C6-01	Normal / Heavy Duty Selection	-	0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	00AE		00AF		00B0		00B1	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	450 (335)	500 (370)	500 (370)	600 (450)	600 (450)	700 (525)	700 (525)	800 (600)
E2-05 (E4-05)	Motor Line-to-Line Resistance	$\Omega/m\Omega$ *2	0.014	0.012	0.014	0.012	12.000	10.000	10.000	9.000
E2-06 (E4-06)	Motor Leakage Inductance	%	20	20	20	20	20	20	20	20
E2-10 (E4-10)	Motor Iron Loss	W	4700	5560	4700	5560	5560	7050	7050	7833
E5-01	PM Motor Code Selection	-	FFFF	FFFF	FFFF	FFFF	-	-	-	-
L2-02	Power Loss Ride Through Time	s	2	2	2	2	2	2	2	2
L2-03	Minimum Baseblock Time	s	2.1	2.3	2.1	2.3	2.3	2.8	2.8	3.1
L2-04	Powerloss V/f Recovery Ramp Time	s	2	2.2	2	2.2	2.2	2.6	2.6	3
L2-05	Undervoltage Detection Lvl (Uv1)	-	380	380	380	380	380	380	380	380
L3-24	Motor Accel Time @ Rated Torque	s	1.392	1.667	1.392	1.667	1.667	2	2	2.222
L8-02	Overheat Alarm Level	°C	133	133	125	125	120	120	120	120
L8-09	Output Ground Fault Detection	-	1	1	1	1	1	1	1	1
L8-38	Carrier Frequency Reduction	-	2	2	2	2	2	2	2	2
n1-01	Hunting Prevention Selection	-	2	2	2	2	2	2	2	2
n1-03	Hunting Prevention Time Constant	ms	100	100	100	100	100	100	100	100
n1-16	Hunting Prevention High Fc Gain	-	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
n5-02	Motor Inertia Acceleration Time	s	1.392	1.667	1.392	1.667	1.667	2	2	2.222

*1 Parameters in parentheses are for motor 2.

*2 The display units are different for different models: The units are Ω for models 2004 to 2415, 4002 to 4720, T103 to T720 and $m\Omega$ for models 4810 to 4H12.

No. */	Name	Unit	Default			
			4H11		4H12	
-	Drive Model	-	HD	ND	HD	ND
C6-01	Normal / Heavy Duty Selection	-	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	00B2		00B3	
E2-11 (E4-11)	Motor Rated Power	HP (kW)	800 (600)	900 (675)	900 (675)	1000 (750)
b3-04	V/f Gain during Speed Search	%	40	40	40	40
b3-06	Speed Estimation Current Level 1	-	0.7	0.7	0.7	0.7
b3-07	Speed Estimation Current Level 2	-	3.0	2.0	3.0	2.0
b3-08	Speed Estimation ACR P Gain	-	0.8	0.8	0.8	0.8
b3-26	Direction Determination Level	-	1000	1000	1000	1000
b8-03	Energy Saving Filter Time	s	2.00	2.00	2.00	2.00
b8-04	Energy Saving Coefficient Value	-	20.26	18.12	18.12	17.06
C5-17 (C5-37)	Motor Inertia	kgm ²	14.00	18.00	18.00	18.00
C6-02	Carrier Frequency Selection	-	1	1	1	1
E2-01 (E4-01)	Motor Rated Current (FLA)	A	900	1090	1090	1200
E2-02 (E4-02)	Motor Rated Slip	Hz	0.9	0.8	0.8	0.7
E2-03 (E4-03)	Motor No-Load Current	A	180	218	218	240
E2-05 (E4-05)	Motor Line-to-Line Resistance	$\Omega/m\Omega$ *2	9.000	7.000	7.000	6.000
E2-06 (E4-06)	Motor Leakage Inductance	%	20	20	20	20
E2-10 (E4-10)	Motor Iron Loss	W	7833	9870	9870	11123
E5-01	PM Motor Code Selection	-	-	-	-	-
L2-02	Power Loss Ride Through Time	s	2	2	2	2
L2-03	Minimum Baseblock Time	s	3.1	4	4	4.6
L2-04	Powerless V/f Recovery Ramp Time	s	3	3.8	3.8	4.5
L2-05	Undervoltage Detection Lvl (Uv1)	-	380	380	380	380
L3-24	Motor Accel Time @ Rated Torque	s	2.222	2.857	2.857	3.333
L8-02	Overheat Alarm Level	°C	120	120	120	120
L8-09	Output Ground Fault Detection	-	1	1	1	1
L8-38	Carrier Frequency Reduction	-	2	2	2	2
n1-01	Hunting Prevention Selection	-	2	2	2	2
n1-03	Hunting Prevention Time Constant	ms	100	100	100	100

3.21 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default			
			4H11		4H12	
-	Drive Model	-				
C6-01	Normal / Heavy Duty Selection	-	HD	ND	HD	ND
			0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	00B2		00B3	
E2-11 (E4-11)	Motor Rated Power	HP (kW)	800 (600)	900 (675)	900 (675)	1000 (750)
n1-16	Hunting Prevention High Fc Gain	-	0.50	0.50	0.50	0.50
n5-02	Motor Inertia Acceleration Time	s	2.222	2.857	2.857	3.333

*1 Parameters in parentheses are for motor 2.

*2 The display units are different for different models: The units are Ω for models 2004 to 2415, 4002 to 4720, T103 to T720 and mΩ for models 4810 to 4H12.

◆ 6-Phase/12-Pulse 400 V Class

No. */	Name	Unit	Default							
			T103		T140		T168		T208	
-	Drive Model	-								
C6-01	Normal / Heavy Duty Selection	-	HD	ND	HD	ND	HD	ND	HD	ND
			0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	01A3		01A4		01A5		01A6	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	60 (45)	75 (55)	75 (55)	100 (75)	100 (75)	125 (90)	125 (90)	150 (110)
b3-04	V/f Gain during Speed Search	%	100	80	80	60	60	60	60	60
b3-06	Speed Estimation Current Level 1	-	0.5	0.5	0.5	0.7	0.7	0.7	0.7	0.7
b3-07	Speed Estimation Current Level 2	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
b3-08	Speed Estimation ACR P Gain	-	0.5	0.5	0.5	0.8	0.8	0.8	0.8	0.8
b3-26	Direction Determination Level	-	1000	1000	1000	1000	1000	1000	1000	1000
b8-03	Energy Saving Filter Time	s	0.50	2.00	2.00	2.00	2.00	2.00	2.00	2.00
b8-04	Energy Saving Coefficient Value	-	71.56	67.2	67.2	46.2	46.2	38.91	38.91	36.23
C5-17 (C5-37)	Motor Inertia	kgm ²	0.333	0.490	0.49	0.90	0.90	1.10	1.10	1.90
C6-02	Carrier Frequency Selection	-	1	7	1	7	1	7	1	7
E2-01 (E4-01)	Motor Rated Current (FLA)	A	79.7	95	95	130	130	156	156	190
E2-02 (E4-02)	Motor Rated Slip	Hz	1.6	1.46	1.46	1.39	1.39	1.4	1.4	1.4
E2-03 (E4-03)	Motor No-Load Current	A	22	24	24	36	36	40	40	49

3.21 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default							
			T103		T140		T168		T208	
-	Drive Model	-	HD	ND	HD	ND	HD	ND	HD	ND
C6-01	Normal / Heavy Duty Selection	-	0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	01A3		01A4		01A5		01A6	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	60 (45)	75 (55)	75 (55)	100 (75)	100 (75)	125 (90)	125 (90)	150 (110)
E2-05 (E4-05)	Motor Line-to-Line Resistance	$\Omega/m\Omega$ *2	0.122	0.088	0.088	0.092	0.092	0.056	0.056	0.046
E2-06 (E4-06)	Motor Leakage Inductance	%	19.9	20	20	20	20	20	20	20
E2-10 (E4-10)	Motor Iron Loss	W	1125	1260	1260	1600	1600	1760	1760	2150
E5-01	PM Motor Code Selection	-	1244	1244	1245	1245	1246	1246	1247	1247
L2-02	Power Loss Ride Through Time	s	2	2	2	2	2	2	2	2
L2-03	Minimum Baseblock Time	s	1.2	1.2	1.2	1.3	1.3	1.5	1.5	1.7
L2-04	Powerloss V/f Recovery Ramp Time	s	0.6	1	1	1	1	1	1	1
L2-05	Undervoltage Detection Lvl (Uv1)	-	380	380	380	380	380	380	380	380
L3-24	Motor Accel Time @ Rated Torque	s	0.387	0.317	0.317	0.533	0.533	0.592	0.592	0.646
L8-02	Overheat Alarm Level	°C	126	120	120	120	110	110	105	105
L8-09	Output Ground Fault Detection	-	1	1	1	1	1	1	1	1
L8-38	Carrier Frequency Reduction	-	2	2	2	2	2	2	2	2
n1-01	Hunting Prevention Selection	-	2	2	2	2	2	2	2	2
n1-03	Hunting Prevention Time Constant	ms	10	10	30	30	30	30	30	30
n1-16	Hunting Prevention High Fc Gain	-	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
n5-02	Motor Inertia Acceleration Time	s	0.387	0.317	0.317	0.533	0.533	0.592	0.592	0.646

*1 Parameters in parentheses are for motor 2.

*2 The display units are different for different models: The units are Ω for models 2004 to 2415, 4002 to 4720, T103 to T720 and $m\Omega$ for models 4810 to 4H12.

3.21 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default							
			T250		T302		T371		T414	
-	Drive Model	-	HD	ND	HD	ND	HD	ND	HD	ND
C6-01	Normal / Heavy Duty Selection	-	0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	01A7		01A8		01A9		01AA	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	150 (110)	200 (150)	200 (150)	250 (185)	250 (185)	300 (220)	300 (220)	350 (260)
b3-04	V/f Gain during Speed Search	%	60	60	60	60	60	60	60	60
b3-07	Speed Estimation Current Level 2	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
b3-06	Speed Estimation Current Level 1	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
b3-08	Speed Estimation ACR P Gain	-	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
b3-26	Direction Determination Level	-	1000	1000	1000	1000	1000	1000	1000	1000
b8-03	Energy Saving Filter Time	s	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
b8-04	Energy Saving Coefficient Value	-	36.23	32.79	32.79	30.13	30.13	30.57	30.57	27.13
C5-17 (C5-37)	Motor Inertia	kgm ²	1.90	2.10	2.10	3.30	3.30	3.60	3.60	4.10
C6-02	Carrier Frequency Selection	-	1	7	1	7	1	7	1	7
E2-01 (E4-01)	Motor Rated Current (FLA)	A	190	223	223	270	270	310	310	370
E2-02 (E4-02)	Motor Rated Slip	Hz	1.4	1.38	1.38	1.35	1.35	1.3	1.3	1.3
E2-03 (E4-03)	Motor No-Load Current	A	49	58	58	70	70	81	81	96
E2-05 (E4-05)	Motor Line-to-Line Resistance	$\Omega/m\Omega$ *2	0.046	0.035	0.035	0.029	0.029	0.025	0.025	0.02
E2-06 (E4-06)	Motor Leakage Inductance	%	20	20	20	20	20	20	20	20
E2-10 (E4-10)	Motor Iron Loss	W	2150	2350	2350	2850	2850	3200	3200	3700
E5-01	PM Motor Code Selection	-	1248	1248	1249	1249	124A	124A	124A	124A
L2-02	Power Loss Ride Through Time	s	2	2	2	2	2	2	2	2
L2-03	Minimum Baseblock Time	s	1.7	1.7	1.7	1.8	1.8	1.9	1.9	2
L2-04	Powerloss V/f Recovery Ramp Time	s	1	1	1	1	1	1	1.8	1.8
L2-05	Undervoltage Detection Lvl (Uv1)	-	380	380	380	380	380	380	380	380

3.21 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default							
			T250		T302		T371		T414	
-	Drive Model	-								
C6-01	Normal / Heavy Duty Selection	-	HD	ND	HD	ND	HD	ND	HD	ND
			0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	01A7		01A8		01A9		01AA	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	150 (110)	200 (150)	200 (150)	250 (185)	250 (185)	300 (220)	300 (220)	350 (260)
L3-24	Motor Accel Time @ Rated Torque	s	0.646	0.673	0.673	0.777	0.777	0.864	0.864	0.91
L8-02	Overheat Alarm Level	°C	120	120	120	120	125	125	125	125
L8-09	Output Ground Fault Detection	-	1	1	1	1	1	1	1	1
L8-38	Carrier Frequency Reduction	-	2	2	2	2	2	2	2	2
n1-01	Hunting Prevention Selection	-	2	2	2	2	2	2	2	2
n1-03	Hunting Prevention Time Constant	ms	30	30	30	30	30	30	100	100
n1-16	Hunting Prevention High Fc Gain	-	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
n5-02	Motor Inertia Acceleration Time	s	0.646	0.673	0.673	0.777	0.777	0.864	0.864	0.91

*1 Parameters in parentheses are for motor 2.

*2 The display units are different for different models: The units are Ω for models 2004 to 2415, 4002 to 4720, T103 to T720 and mΩ for models 4810 to 4H12.

No. */	Name	Unit	Default							
			T477		T568		T605		T720	
-	Drive Model	-								
C6-01	Normal / Heavy Duty Selection	-	HD	ND	HD	ND	HD	ND	HD	ND
			0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	01AC		01AD		01AE		01AF	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	350 (260)	400 (300)	400 (300)	450 (335)	450 (335)	500 (370)	500 (370)	600 (450)
b3-04	V/f Gain during Speed Search	%	60	60	60	60	60	60	60	60
b3-06	Speed Estimation Current Level 1	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
b3-07	Speed Estimation Current Level 2	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
b3-08	Speed Estimation ACR P Gain	-	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
b3-26	Direction Determination Level	-	1000	1000	1000	1000	1000	1000	1000	1000
b8-03	Energy Saving Filter Time	s	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00

3.21 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default							
			T477		T568		T605		T720	
-	Drive Model	-	HD	ND	HD	ND	HD	ND	HD	ND
C6-01	Normal / Heavy Duty Selection	-	0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	01AC		01AD		01AE		01AF	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	350 (260)	400 (300)	400 (300)	450 (335)	450 (335)	500 (370)	500 (370)	600 (450)
b8-04	Energy Saving Coefficient Value	-	27.13	21.76	21.76	21.76	21.76	23.84	21.76	23.84
C5-17 (C5-37)	Motor Inertia	kgm ²	4.10	6.50	6.50	11.00	11.00	12.00	11.00	12.00
C6-02	Carrier Frequency Selection	-	1	7	1	7	1	7	1	7
E2-01 (E4-01)	Motor Rated Current (FLA)	A	370	500	500	500	500	650	500	650
E2-02 (E4-02)	Motor Rated Slip	Hz	1.3	1.25	1.25	1.25	1.25	1	1.25	1
E2-03 (E4-03)	Motor No-Load Current	A	96	130	130	130	130	130	130	130
E2-05 (E4-05)	Motor Line-to-Line Resistance	Ω/mΩ *2	0.02	0.014	0.014	0.014	0.014	0.012	0.014	0.012
E2-06 (E4-06)	Motor Leakage Inductance	%	20	20	20	20	20	20	20	20
E2-10 (E4-10)	Motor Iron Loss	W	3700	4700	4700	4700	4700	5560	4700	5560
E5-01	PM Motor Code Selection	-	124A	124A	124A	124A	FFFF	FFFF	FFFF	FFFF
L2-02	Power Loss Ride Through Time	s	2	2	2	2	2	2	2	2
L2-03	Minimum Baseblock Time	s	2	2.1	2.1	2.1	2.1	2.3	2.1	2.3
L2-04	Powerloss V/f Recovery Ramp Time	s	1.8	2	2	2	2	2.2	2	2.2
L2-05	Undervoltage Detection Lvl (Uv1)	-	380	380	380	380	380	380	380	380
L3-24	Motor Accel Time @ Rated Torque	s	0.91	1.392	1.392	1.392	1.392	1.667	1.392	1.667
L8-02	Overheat Alarm Level	°C	110	110	125	115	133	133	125	125
L8-09	Output Ground Fault Detection	-	1	1	1	1	1	1	1	1
L8-38	Carrier Frequency Reduction	-	2	2	2	2	2	2	2	2
n1-01	Hunting Prevention Selection	-	2	2	2	2	2	2	2	2
n1-03	Hunting Prevention Time Constant	ms	100	100	100	100	100	100	100	100

No. */	Name	Unit	Default							
			T477		T568		T605		T720	
-	Drive Model	-	HD	ND	HD	ND	HD	ND	HD	ND
C6-01	Normal / Heavy Duty Selection	-	0	1	0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	01AC		01AD		01AE		01AF	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	350 (260)	400 (300)	400 (300)	450 (335)	450 (335)	500 (370)	500 (370)	600 (450)
n1-16	Hunting Prevention High Fc Gain	-	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
n5-02	Motor Inertia Acceleration Time	s	0.91	1.392	1.392	1.392	1.392	1.667	1.392	1.667

*1 Parameters in parentheses are for motor 2.

*2 The display units are different for different models: The units are Ω for models 2004 to 2415, 4002 to 4720, T103 to T720 and m Ω for models 4810 to 4H12.

Mechanical Installation

This chapter gives information about the correct environment and clearances to install the drive.

4.1	Section Safety	324
4.2	Removing/Reattaching Covers	326
4.3	Remove and Reattach the Keypad.....	331
4.4	Change the Drive Enclosure Type.....	332

4.1 Section Safety

WARNING

Electrical Shock Hazard

Only let approved personnel install, wire, maintain, examine, replace parts, and repair the drive.

If personnel are not approved, it can cause serious injury or death.

Do not modify the drive body or drive circuitry.

Modifications to drive body and circuitry can cause serious injury or death, will cause damage to the drive, and will void the warranty. Yaskawa is not responsible for modifications of the product made by the user.

Fire Hazard

Do not put flammable or combustible materials on top of the drive and do not install the drive near flammable or combustible materials. Attach the drive to metal or other noncombustible material.

Flammable and combustible materials can start a fire and cause serious injury or death.

When you install the drive in an enclosure, use a cooling fan or cooler to decrease the temperature around the drive. Make sure that the intake air temperature to the drive is 50 °C (122 °F) or less for IP00/UL Open Type or IP20/UL Open Type drives, and 40 °C (104 °F) or less for IP20/UL Type 1 drives.

If the air temperature is too hot, the drive can become too hot and cause a fire and serious injury or death.

Crush Hazard

Only approved personnel can operate a crane or hoist to move the drive.

If unapproved personnel operate a crane or hoist, it can cause serious injury or death from falling equipment.

Before you hang the drive vertically, use screws to correctly attach the drive front cover and other drive components.

If you do not secure the front cover, it can fall and cause minor injury.

When you use a crane or hoist to lift the drive during installation or removal, prevent more than 1.96 m/s² (0.2 G) vibration or impact.

Too much vibration or impact can cause serious injury or death from falling equipment.

When you lift the drive during installation or removal, do not try to turn the drive over and do not ignore the hanging drive.

If you move a hanging drive too much or if you ignore it, the drive can fall and cause serious injury or death.

Use a crane or hoist to move large drives when necessary.

If you try to move a large drive without a crane or hoist, it can cause serious injury or death.

CAUTION

Crush Hazard

Tighten terminal cover screws and hold the case safely when you move the drive.

If the drive or covers fall, it can cause moderate injury.

NOTICE

Do not let unwanted objects, for example metal shavings or wire clippings, fall into the drive during drive installation. Put a temporary cover over the drive during installation. Remove the temporary cover before start-up.

Unwanted objects inside of the drive can cause damage to the drive.

Damage to Equipment

When you touch the drive and circuit boards, make sure that you observe correct electrostatic discharge (ESD) procedures.

If you do not follow procedures, it can cause ESD damage to the drive circuitry.

Install vibration-proof rubber on the base of the motor or use the frequency jump function in the drive to prevent specific frequencies that vibrate the motor.

Motor or system resonant vibration can occur in fixed speed machines that are converted to variable speed. Too much vibration can cause damage to equipment.

You can use the drive with an explosion-proof motor, but the drive is not explosion-proof. Install the drive only in the environment shown on the nameplate.

If you install the drive in a dangerous environment, it can cause damage to the drive.

Do not lift the drive with the covers removed.

If the drive does not have covers, you can easily cause damage to the internal parts of the drive.

4.2 Removing/Reattaching Covers

This section gives information about how to remove and reattach the front cover and terminal cover for wiring and inspection.

Different drive models have different procedures to remove and reattach the covers. Refer to [Table 4.1](#) for more information.

Table 4.1 Procedures to Remove Covers by Drive Model

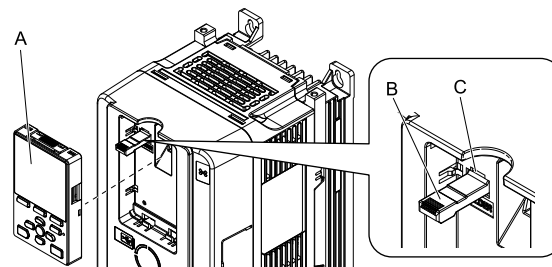
Model	Procedure	Ref.
2004 - 2211 4002 - 4168, T103 - T168	Procedure A	326
2257 - 2415 4208 - 4H12 T208 - T720	Procedure B	327

◆ Removing/Reattaching the Cover Using Procedure A

DANGER! Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, remove the covers before measuring for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.

■ Remove the Front Cover

1. Remove the keypad and the keypad connector, then insert the end of the keypad connector that has the tab into the keypad connector holder on the front cover.



A - Keypad
B - Keypad connector

C - Holder

Figure 4.1 Remove the Keypad and Keypad Connector

2. Loosen the front cover screws.

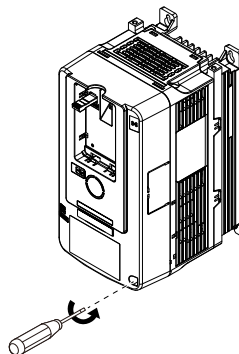


Figure 4.2 Loosen the Front Cover Screws

3. Push on the tab in the side of the front cover then pull the front cover forward to remove it from the drive.

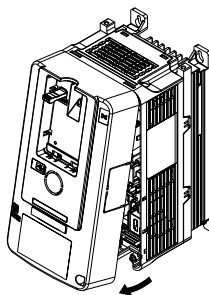


Figure 4.3 Remove the Front Cover

■ Install the Front Cover

1. Wire the drive and other peripheral devices.
2. Reverse the steps to reattach the cover.

Note:

- Wire the grounding terminals first, main circuit terminals next, and control circuit terminals last.
- Make sure that you do not pinch wires or signal lines between the front cover and the drive before you reattach the cover.
- Tighten the screws to a tightening torque of 0.98 N·m to 1.33 N·m (8.67 lbf·in to 11.77 lbf·in).

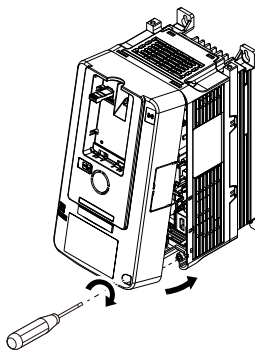


Figure 4.4 Install the Front Cover

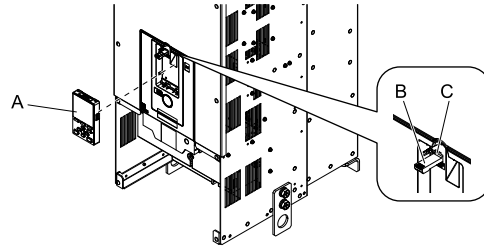
3. Reattach the keypad to the original position.

◆ Removing/Reattaching the Cover Using Procedure B

DANGER! Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, remove the covers before measuring for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.

■ **Remove the Front Cover**

1. Remove the terminal cover, keypad, and keypad connector, then insert the end of the keypad connector that has the tab into the keypad connector holder on the front cover.



A - Keypad
 B - Keypad connector
 C - Connector holder

Figure 4.5 Remove the Terminal Cover, Keypad, and Keypad Connector

2. Loosen the front cover screws.

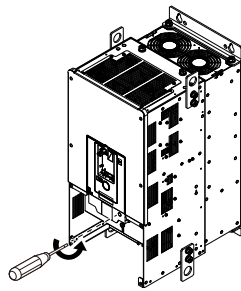
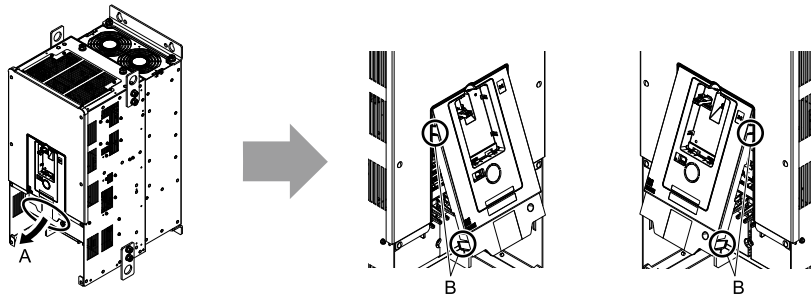


Figure 4.6 Loosen the Front Cover Screws

3. Push on the four tabs found on each side of the front cover, then pull the front cover forward to remove it from the drive.



A - Pull forward to remove the front cover.
 B - Unhook the tabs found on the sides of the front cover.

Figure 4.7 Pull Forward to Remove the Front Cover

4. Remove the front cover from the drive.

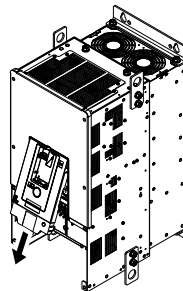


Figure 4.8 Remove the Front Cover

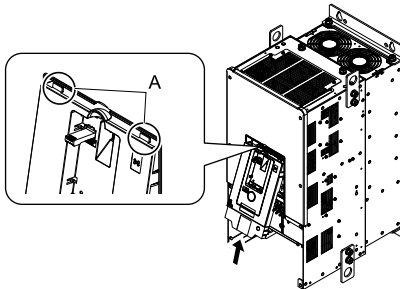
■ Reattach the Front Cover

Wire the drive and other peripheral devices then reattach the front cover.

Note:

Wire the grounding terminals first, main circuit terminals next, and control circuit terminals last.

1. Move the front cover to connect the hooks at the top of the front cover to the drive.



A - Hooks

Figure 4.9 Reattach the Front Cover

2. Move the front cover until it clicks into position while pushing on the hooks on the left and right sides of the front cover.

Note:

Make sure that you do not pinch wires or signal lines between the front cover and the drive before you reattach the cover.

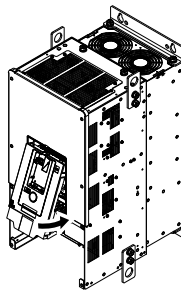


Figure 4.10 Reattach the Front Cover

3. Reattach the keypad to the original position.

■ Remove the Terminal Cover

1. Loosen the screws on the terminal cover, then pull down on the cover.

CAUTION! *Crush Hazard. Loosen the cover screws. Do not fully remove them. If you fully remove the cover screws, the terminal cover can fall and cause moderate injury.*

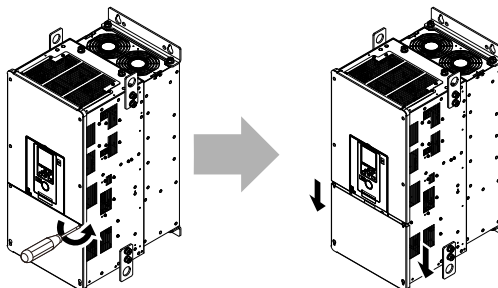


Figure 4.11 Loosen the Terminal Cover Mounting Screws

2. Pull the terminal cover away from the drive.

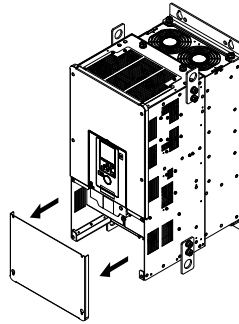


Figure 4.12 Remove the Terminal Cover

■ Reattach the Terminal Cover

Wire the drive and other peripheral devices then reattach the terminal cover.

Note:

- Wire the grounding terminals first, main circuit terminals next, and control circuit terminals last.
- Make sure that you do not pinch wires or signal lines between the wiring cover and the drive before you reattach the cover.
- Tighten the screws to a correct tightening torque:
 - Models 2257 to 2415: 0.98 N·m to 1.33 N·m (8.67 lbf-in to 11.77 lbf-in)
 - Models 4208 to 4675: 0.98 N·m to 1.33 N·m (8.67 lbf-in to 11.77 lbf-in)
 - Models 4810 to 4H12: 1.96 N·m to 2.53 N·m (17.35 lbf-in to 22.39 lbf-in)
 - Models T208 to T720: 0.98 N·m to 1.33 N·m (8.67 lbf-in to 11.77 lbf-in)

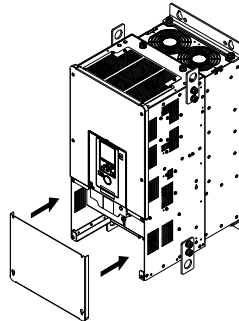


Figure 4.13 Reattach the Terminal Cover

4.3 Remove and Reattach the Keypad

NOTICE: You must remove the keypad before you remove or reattach the front cover. Before you reattach the keypad, make sure that you attach the front cover into position. If you keep the keypad connected to the drive when you remove the front cover, it can cause an unsatisfactory connection and incorrect operation.

◆ Remove the Keypad

1. Push down the tab on the top of the keypad, then pull the keypad forward and remove it from the drive.

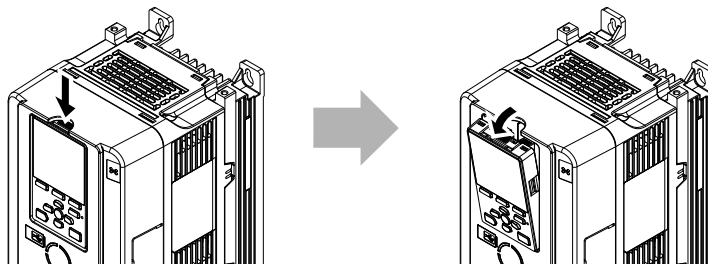
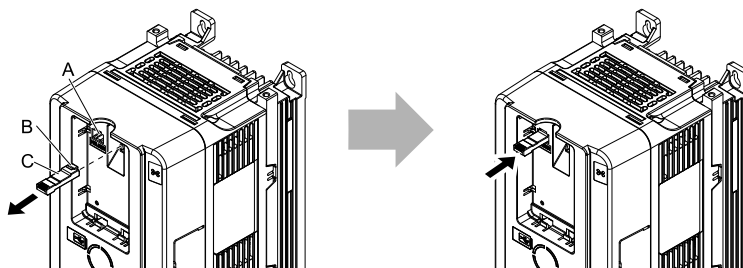


Figure 4.14 Remove the Keypad

2. Pull the keypad connector out from the drive horizontally, then put it in the holder.

Note:

Insert the end of the keypad connector that has the tab.



A - Holder
B - Hook

C - Keypad connector

Figure 4.15 Move the Keypad Connector to the Holder

◆ Reattach the Keypad

Insert the keypad connector to its initial position. Put the bottom of the keypad into position first, then carefully push on the top of the keypad until the hook clicks into place.

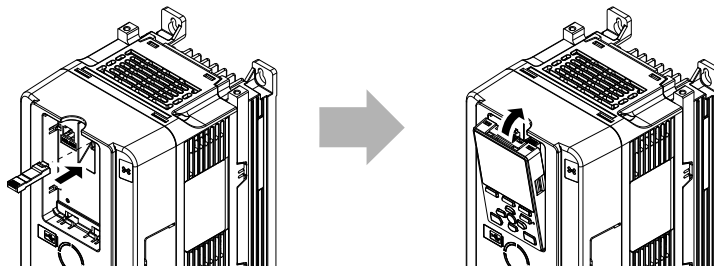


Figure 4.16 Reattach the Keypad

4.4 Change the Drive Enclosure Type

The enclosure type of the drive is IP20/UL Open Type. You must install a UL Type 1 kit to change the enclosure type to an enclosed, IP20/UL Type 1.

You cannot install a UL Type 1 kit to models T103 to T720.

Install the kit before you wire the drive.

Different drives use different UL Type 1 kits. Refer to to find the kit for your drive. Contact Yaskawa or your nearest sales representative for more information about UL Type 1 kits.

Table 4.2 UL Type 1 Kits by Drive Model

Model	Option Model
2004, 2006, 2008, 2010, 2012, 2018, 2021, 2030, 2042 4002, 4004, 4005, 4007, 4009, 4012, 4018, 4023	900-192-121-001
2056 4031, 4038	900-192-121-002
2070 4044, 4060	900-192-121-003
2082	900-192-121-004
2110 4075	900-192-121-005
2138 4089, 4103	900-192-121-006
2169 4140, 4168	900-192-121-007
2211	900-192-121-008
2257, 2313 4208, 4250, 4302	900-192-121-009
2360, 2415	900-192-121-010
4371, 4414	UUX001700
4477, 4568, 4605, 4720	UUX001701

Electrical Installation

This chapter gives how to wire the control circuit terminals, motor, and power supply of the drive.

5.1	Section Safety	334
5.2	Electrical Installation	337
5.3	Main Circuit Wiring	342
5.4	Control Circuit Wiring	345
5.5	Control I/O Connections	352
5.6	Connect the Drive to a PC	356

5.1 Section Safety

DANGER

Electrical Shock Hazard

Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, remove the covers before measuring for dangerous voltages to make sure that the drive is safe.

If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.

WARNING

Electrical Shock Hazard

Do not operate the drive when covers are missing. Replace covers and shields before you operate the drive. Use the drive only as specified by the instructions.

Some figures in this section include drives without covers or safety shields to more clearly show the inside of the drive. If covers or safety shields are missing from the drive, it can cause serious injury or death.

Ground the neutral point on the power supply of drive models 2xxxB/C and 4xxxB/C to comply with the EMC Directive before you turn on the EMC filter.

If you turn ON the EMC filter, but you do not ground the neutral point, it can cause serious injury or death.

Make sure that the protective ground wire complies with technical standards and local safety regulations. The IEC/EN 61800-5-1 standard specifies that you must wire the power supply to automatically de-energize when the protective ground wire disconnects. You can also connect a protective ground wire that has a minimum cross-sectional area of 10 mm² (copper wire) or 16 mm² (aluminum wire). The leakage current of the drive will be more than 3.5 mA in drive models;

- 2xxxB
- 2xxxC
- 4002B to 4371B
- 4002C to 4371C (with built-in EMC filter turned ON)
- 4414 to 4H12
- T414 to T720

If you do not obey the standards and regulations, it can cause serious injury or death.

When there is a DC component in the protective earthing conductor, the drive can cause a residual current. When a residual current operated protective or monitoring device prevents direct or indirect contact, always use a type B Ground Fault Circuit Interrupter (GFCI) as specified by IEC/EN 60755.

If you do not use the correct GFCI, it can cause serious injury or death.

Do not wear loose clothing or jewelry when you do work on the drive. Tighten loose clothing and remove all metal objects, for example watches or rings.

Loose clothing can catch on the drive and jewelry can conduct electricity and cause serious injury or death.

Do not remove covers or touch circuit boards while the drive is energized.

If you touch the internal components of an energized drive, it can cause serious injury or death.

Only let approved personnel install, wire, maintain, examine, replace parts, and repair the drive.

If personnel are not approved, it can cause serious injury or death.

Do not modify the drive body or drive circuitry.

Modifications to drive body and circuitry can cause serious injury or death, will cause damage to the drive, and will void the warranty. Yaskawa is not responsible for modifications of the product made by the user.

⚠ WARNING**Fire Hazard**

Tighten all terminal screws to the correct tightening torque.

Connections that are too loose or too tight can cause incorrect operation and damage to the drive. Incorrect connections can also cause death or serious injury from fire.

Tighten screws at an angle in the specified range shown in this manual.

If you tighten the screws at an angle not in the specified range, you can have loose connections that can cause damage to the terminal block or start a fire and cause serious injury or death.

Damage to Equipment

Do not apply incorrect voltage to the main circuit of the drive. Operate the drive in the specified range of the input voltage on the drive nameplate.

Voltages that are higher than the permitted nameplate tolerance can cause damage to the drive.

Fire Hazard

When you install a dynamic braking option, wire the components as specified by the wiring diagrams.

Incorrect wiring can cause damage to braking components or serious injury or death.

NOTICE

Do not let unwanted objects, for example metal shavings or wire clippings, fall into the drive during drive installation. Put a temporary cover over the drive during installation. Remove the temporary cover before start-up.

Unwanted objects inside of the drive can cause damage to the drive.

Damage to Equipment

When you touch the drive and circuit boards, make sure that you observe correct electrostatic discharge (ESD) procedures.

If you do not follow procedures, it can cause ESD damage to the drive circuitry.

Select a motor that is compatible with the load torque and speed range. When 100% continuous torque is necessary at low speed, use an inverter-duty motor or vector-duty motor. When you use a standard fan-cooled motor, decrease the motor torque in the low-speed range.

If you operate a standard fan-cooled motor at low speed and high torque, it will decrease the cooling effects and can cause heat damage.

Obey the speed range specification of the motor as specified by the manufacturer. When you must operate the motor outside of its specifications, contact the motor manufacturer.

If you continuously operate oil-lubricated motors outside of the manufacturer specifications, it can cause damage to the motor bearings.

When the input voltage is 440 V or higher or the wiring distance is longer than 100 m (328 ft), make sure that the motor insulation voltage is sufficient or use an inverter-duty motor or vector-duty motor with reinforced insulation.

Motor winding and insulation failure can occur.

Before you connect a dynamic braking option to the drive, make sure that qualified personnel read and obey the Braking Unit and Braking Resistor Unit Installation Manual (TOBPC72060001).

If you do not read and obey the manual or if personnel are not qualified, it can cause damage to the drive and braking circuit.

Make sure that all connections are correct after you install the drive and connect peripheral devices.

Incorrect connections can cause damage to the drive.

Note:

- Torque characteristics are different than when you operate the motor directly from line power. Make sure that you understand the load torque characteristics for the application.
- The current rating of submersible motors is usually higher than the current rating of standard motors for a given motor power. Make sure that the rated output current of the drive is equal to or more than the current rating of the motor. If the motor wire length is longer than 100 m (328 ft), select the correct wire gauge to adjust for a loss in voltage and prevent loss of motor torque.
- Do not use unshielded wire for control wiring. Use shielded, twisted-pair wires and ground the shield to the ground terminal of the drive. Unshielded wire can cause electrical interference and unsatisfactory system performance.

5.2 Electrical Installation

DANGER! *Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, remove the covers before measuring for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.*

WARNING! *Electrical Shock Hazard. De-energize the drive and wait 5 minutes minimum until the Charge LED turns off. Remove the front cover and terminal cover to do work on wiring, circuit boards, and other parts. Use terminals for their correct function only. Incorrect wiring, incorrect ground connections, and incorrect repair of protective covers can cause death or serious injury.*

WARNING! *Electrical Shock Hazard. Correctly ground the drive before you turn on the EMC filter switch. If you touch electrical equipment that is not grounded, it can cause serious injury or death.*

WARNING! *Electrical Shock Hazard. Use the terminals for the drive only for their intended purpose. Refer to the technical manual for more information about the I/O terminals. Wiring and grounding incorrectly or modifying the cover may damage the equipment or cause injury.*

◆ Standard Connection Diagram

Wire the drive as specified by [Standard Drive Connection Diagram on page 338](#).

WARNING! *Sudden Movement Hazard. Set the MFDI parameters before you close control circuit switches. Incorrect Run/Stop circuit sequence settings can cause serious injury or death from moving equipment.*

WARNING! *Sudden Movement Hazard. Correctly wire the start/stop and safety circuits before you energize the drive. If you momentarily close a digital input terminal, it can start a drive that is programmed for 3-Wire control and cause serious injury or death from moving equipment.*

WARNING! *Sudden Movement Hazard. When you use a 3-Wire sequence, set A1-03 = 3330 [Initialize Parameters = 3-Wire Initialization] and make sure that b1-17 = 0 [Run Command at Power Up = Disregard Existing RUN Command] (default). If you do not correctly set the drive parameters for 3-Wire operation before you energize the drive, the motor can suddenly rotate when you energize the drive.*

WARNING! *Sudden Movement Hazard. Check the I/O signals and the external sequences for the drive before you set the Application Preset function. When you set the Application Preset function (A1-06 ≠ 0), it changes the I/O terminal functions for the drive and it can cause equipment to operate unusually. This can cause serious injury or death.*

WARNING! *Fire Hazard. Install sufficient branch circuit short circuit protection as specified by applicable codes and this manual. The drive is suitable for circuits that supply not more than 100,000 RMS symmetrical amperes, 240 Vac maximum (200 V Class), 480 Vac maximum (400 V Class). Incorrect branch circuit short circuit protection can cause serious injury or death.*

NOTICE: *When the input voltage is 440 V or higher or the wiring distance is longer than 100 m (328 ft), make sure that the motor insulation voltage is sufficient or use an inverter-duty motor or vector-duty motor with reinforced insulation. Motor winding and insulation failure can occur.*

Note:

Do not connect the AC control circuit ground to the drive enclosure. Failure to obey can cause incorrect control circuit operation.

Standard Drive Connection Diagram

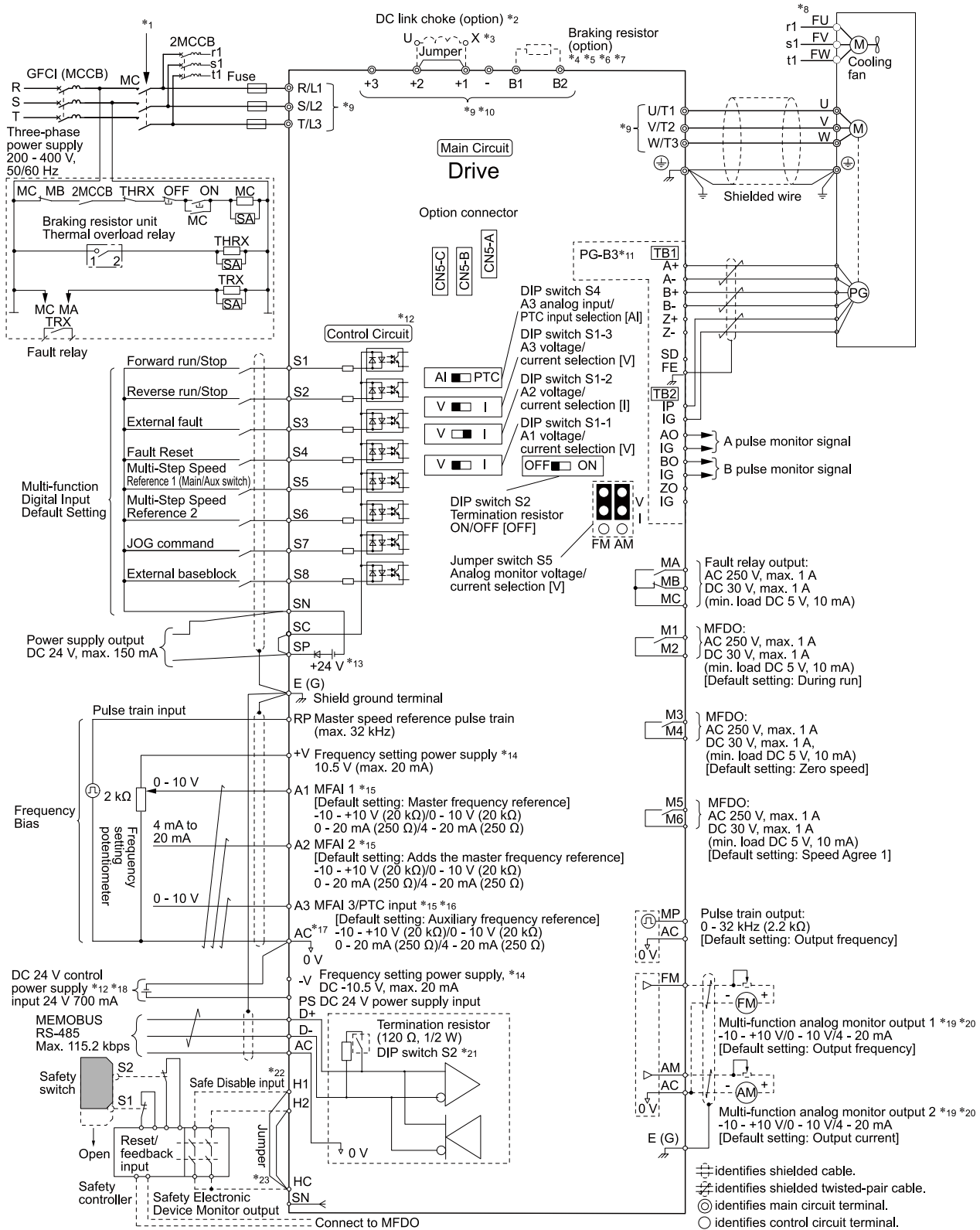


Figure 5.1 Standard Drive Connection Diagram

*1 Set the wiring sequence to de-energize the drive with the fault relay output. If the drive outputs a fault during fault restart when you use the fault restart function, set L5-02 = 1 [Fault Contact at Restart Select = Always Active] to de-energize the drive. Be careful when you use a cut-off sequence. The default setting for L5-02 is 0 [Active Only when Not Restarting].

- *2 When you install a DC link choke, you must remove the jumper between terminals +1 and +2. Ground the DC link choke (option) on the back of the mounting base. Remove all paint from the mounting surface of the control panel.
- *3 Models 2110 to 2415 and 4060 to 4H12 have a DC link choke.
- *4 When you use a regenerative converter, regenerative unit, or braking unit, set $L8-55 = 0$ [*Internal DB TransistorProtection = Disable*]. If $L8-55 = 1$ [*Protection Enabled*], the drive will detect rF [*Braking Resistor Fault*].
- *5 When you use a regenerative converter, regenerative unit, braking unit, braking resistor, or braking resistor unit, set $L3-04 = 0$ [*Stall Prevention during Decel = Disabled*]. If $L3-04 = 1$ [*General Purpose*], the drive could possibly not stop in the specified deceleration time.
- *6 When you use an ERF-type braking resistor, set $L8-01 = 1$ [*3% ERF DB Resistor Protection = Enabled*] and set a wiring sequence to de-energize the drive with the fault relay output.
- *7 When you connect a braking unit (CDBR series) or a braking resistor unit (LKEB series) to drive models 2110, 2138, and 4103, make sure that you use wires that are in the range of the applicable gauges for the drive. A junction terminal is necessary to connect wires that are less than the applicable gauge to the drive. Contact Yaskawa or your nearest sales representative for more information about selection and installation of the junction terminal.
- *8 Cooling fan wiring is not necessary for self-cooling motors.
- *9 The number of terminals is different for different models.
- Terminals R/L1, S/L2, T/L3, U/T1, V/T2, W/T3: There are two screws for each terminal block on models 4477 to 4720. There are four screws for each terminal block on models 4810 to 4H12.
 - Terminal +3: Models 2169 to 2415 and 4208 to 4H12 only. There are two screws for each terminal block on models 4477 to 4720. There are four screws for each terminal block on models 4810 to 4H12.
 - Terminal +2: Models 2004 to 2082 and 4002 to 4044 only.
 - Terminals +1, -: There are two screws for each terminal block on models 2169, 2211, 4140, 4168, and 4477 to 4720. There are four screws for each terminal block on models 4810 to 4H12.
 - Terminal B1, B2: Models 2004 to 2138 and 4002 to 4168 only.
- *10 Connect peripheral options to terminals -, +1, +2, B1, and B2.
- WARNING! Fire Hazard.** Only connect factory-recommended devices or circuits to drive terminals B1, B2, -, +1, +2, and +3. Do not connect AC power supply lines to these terminals. Incorrect wiring can cause damage to the drive and serious injury or death from fire.
- *11 Encoder circuit wiring (wiring to PG-B3 option) is not necessary for applications that do not use motor speed feedback.
- *12 Connect a 24 V power supply to terminals PS-AC to operate the control circuit while the main circuit power supply is OFF.
- *13 To set the MFDI power supply (Sinking/Sourcing Mode or internal/external power supply), install or remove a jumper between terminals SC-SP or SC-SN depending on the application.
- NOTICE: Damage to Equipment.** Do not close the circuit between terminals SP-SN. If you close the circuits between terminals SC-SP and terminals SC-SN at the same time, it will cause damage to the drive.
- Sinking Mode, Internal power supply: Install the jumper to close the circuit between terminals SC-SP.

NOTICE: Damage to Equipment. Do not close the circuit between terminals SC-SN. If you close the circuits between terminals SC-SP and terminals SC-SN at the same time, it will cause damage to the drive.
 - Sourcing Mode, Internal power supply: Install the jumper to close the circuit between terminals SC-SN.

NOTICE: Damage to Equipment. Do not close the circuit between terminals SC-SP. If you close the circuits between terminals SC-SP and terminals SC-SN at the same time, it will cause damage to the drive.
 - External power supply: Remove the jumper from the MFDI terminals. It is not necessary to close the circuit between terminals SC-SP and terminals SC-SN.
- *14 The maximum output current capacity for terminals +V and -V on the control circuit is 20 mA.
- NOTICE: Do not install a jumper between terminals +V, -V, and AC. A closed circuit between these terminals will cause damage to the drive.**
- *15 DIP switches S1-1 to S1-3 set terminals A1 to A3 for voltage or current input. The default setting for S1-1 and S1-3 is voltage input ("V" side). The default setting for S1-2 is current input ("I" side).
- *16 DIP switch S4 sets terminal A3 for analog or PTC input. Set DIP switch S1-3 to the "V" side, and set $H3-05 = 0$ [*Terminal A3 Signal Level Select = 0 to 10V (Lower Limit at 0)*] to set terminal A3 for PTC input with DIP switch S4.
- *17 Do not ground control circuit terminal AC or connect it to the drive chassis.
- NOTICE: Do not ground the AC control circuit terminals and only connect the AC terminals as specified by the product instructions. If you connect the AC terminals incorrectly, it can cause damage to the drive.**
- *18 Connect the positive lead from an external 24 Vdc power supply to terminal PS and the negative lead to terminal AC.
- NOTICE: Connect terminals PS and AC correctly for the 24 V power supply. If you connect the wires to the incorrect terminals, it will cause damage to the drive.**
- *19 Use multi-function analog monitor outputs with analog frequency meters, ammeters, voltmeters, and wattmeters. Do not use monitor outputs with feedback-type signal devices.
- *20 Jumper switch S5 sets terminals FM and AM for voltage or current output. The default setting for S5 is voltage output ("V" side).
- *21 Set DIP switch S2 to "ON" to enable the termination resistor in the last drive in a MEMOBUS/Modbus network.
- *22 Use only Sourcing Mode for Safe Disable input.
- *23 Disconnect the wire jumpers between H1 and HC and H2 and HC to use the Safe Disable input.

■ Standard Connection Diagram for 6-Phase/12-Pulse Drives

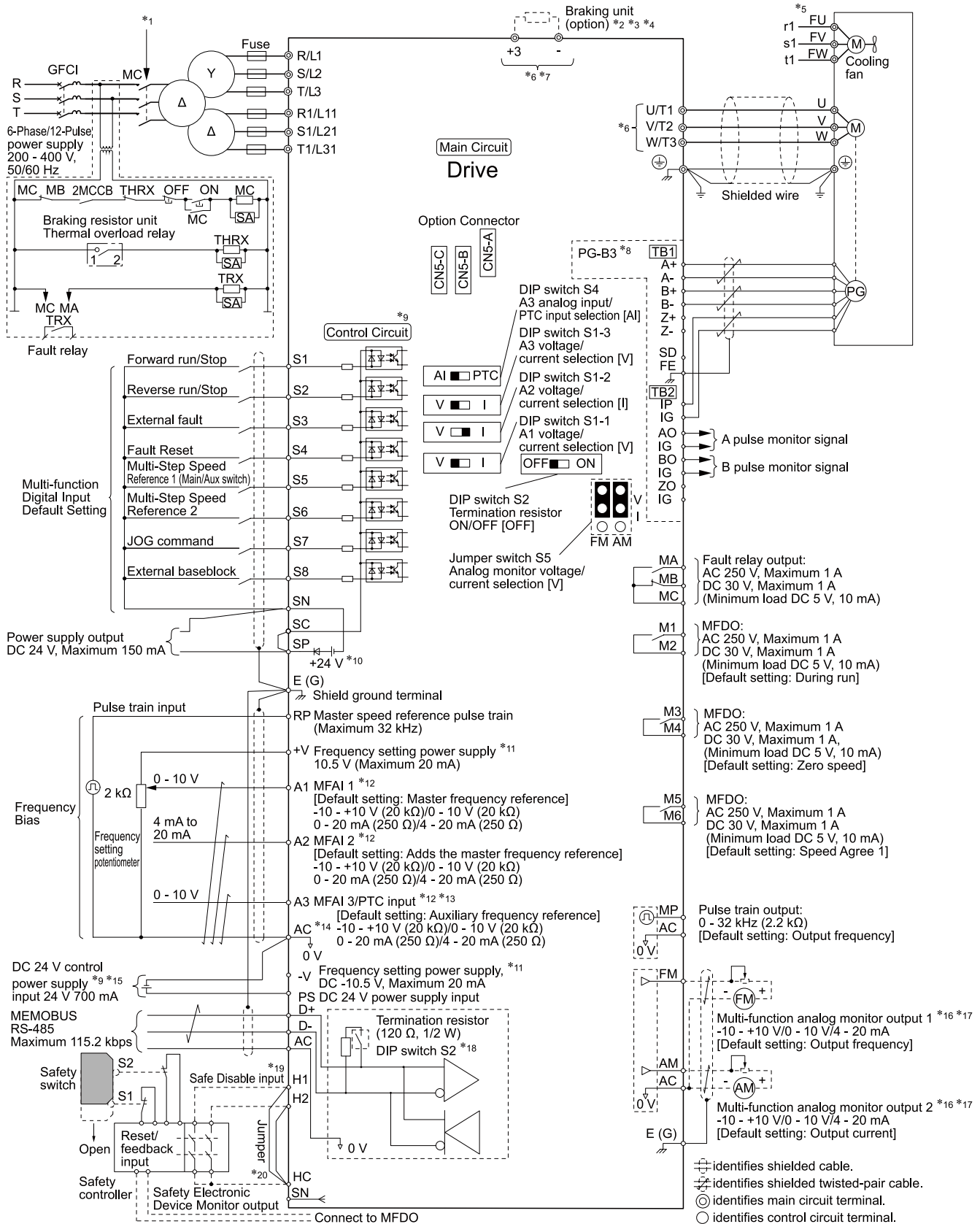


Figure 5.2 Standard Drive Connection Diagram: 6-Phase/12-Pulse Drives

- *1 Set the wiring sequence so the fault relay output de-energizes the drive. If the drive outputs a fault during fault restart when you use the fault restart function, set $L5-02 = 1$ [*Fault Contact at Restart Select = Always Active*] to de-energize the drive. Be careful when you use a cut-off sequence. The default setting for $L5-02$ is 0 [*Active Only when Not Restarting*].
- *2 When you use a braking unit, set $L8-55 = 0$ [*Internal DB Transistor Protection = Disable*]. If $L8-55 = 1$ [*Protection Enabled*], the drive will detect rF [*Braking Resistor Fault*].
- *3 When you use a braking unit, set $L3-04 = 0$ [*Stall Prevention during Decel = Disabled*]. If $L3-04 = 1$ [*General Purpose*], the drive could possibly not stop in the specified deceleration time.
- *4 When you connect a braking unit (CDBR-series) to drive models T140 and T168, make sure that you use wires that are in the range of the applicable gauges for the drive. A junction terminal is necessary to connect wires that are less than the applicable gauge to the drive. Contact Yaskawa or your nearest sales representative for more information about selection and installation of the junction terminal.
- *5 Cooling fan wiring is not necessary for self-cooling motors.
- *6 The number of terminals is different for different models.
 - Terminals U/T1, V/T2, W/T3: There are two screws for each terminal block on models T477 to T720. There are two terminals for each phase on the terminal block and there are two screws on each terminal (four screws total for each phase) on models 4810 to 4H12.
 - Terminals +3, -: There are two screws for each terminal block on models T477 to T720. There are four screws for each terminal block on models 4810 to 4H12.
- *7 Use terminals - and +3 to connect options to the drive.

WARNING! Fire Hazard. Only connect factory-recommended devices or circuits to drive terminals - and +3. Do not connect AC power supply lines to these terminals. Incorrect wiring can cause damage to the drive and serious injury or death from fire.
- *8 Encoder circuit wiring (wiring to PG-B3 option) is not necessary for applications that do not use motor speed feedback.
- *9 Connect a 24 V power supply to terminals PS-AC to operate the control circuit while the main circuit power supply is OFF.
- *10 To set the MFDI power supply (Sinking/Sourcing Mode or internal/external power supply), install or remove a jumper between terminals SC-SP or SC-SN depending on the application.

NOTICE: Damage to Equipment. Do not close the circuit between terminals SP-SN. If you close the circuits between terminals SC-SP and terminals SC-SN at the same time, it will cause damage to the drive.

 - Sinking Mode, Internal power supply: Install the jumper to close the circuit between terminals SC-SP.

NOTICE: Damage to Equipment. Do not close the circuit between terminals SC-SN. If you close the circuits between terminals SC-SP and terminals SC-SN at the same time, it will cause damage to the drive.
 - Sourcing Mode, Internal power supply: Install the jumper to close the circuit between terminals SC-SN.

NOTICE: Damage to Equipment. Do not close the circuit between terminals SC-SP. If you close the circuits between terminals SC-SP and terminals SC-SN at the same time, it will cause damage to the drive.
 - External power supply: Remove the jumper from the MFDI terminals. It is not necessary to close the circuit between terminals SC-SP and terminals SC-SN.
- *11 The maximum output current capacity for terminals +V and -V on the control circuit is 20 mA.

NOTICE: Do not install a jumper between terminals +V, -V, and AC. A closed circuit between these terminals will cause damage to the drive.
- *12 DIP switches S1-1 to S1-3 set terminals A1 to A3 for voltage or current input. The default setting for S1-1 and S1-3 is voltage input (“V” side). The default setting for S1-2 is current input (“I” side).
- *13 DIP switch S4 sets terminal A3 for analog or PTC input. Set DIP switch S1-3 to the “V” side, and set $H3-05 = 0$ [*Terminal A3 Signal Level Select = 0 to 10V (Lower Limit at 0)*] to set terminal A3 for PTC input with DIP switch S4.
- *14 Do not ground control circuit terminal AC or connect it to the drive chassis.

NOTICE: Do not ground the AC control circuit terminals and only connect the AC terminals as specified by the product instructions. If you connect the AC terminals incorrectly, it can cause damage to the drive.
- *15 Connect the positive lead from an external 24 Vdc power supply to terminal PS and the negative lead to terminal AC.

NOTICE: Connect terminals PS and AC correctly for the 24 V power supply. If you connect the wires to the incorrect terminals, it will cause damage to the drive.
- *16 Use multi-function analog monitor outputs with analog frequency meters, ammeters, voltmeters, and wattmeters. Do not use monitor outputs with feedback-type signal devices.
- *17 Jumper switch S5 sets terminals FM and AM for voltage or current output. The default setting for S5 is voltage output (“V” side).
- *18 Set DIP switch S2 to “ON” to enable the termination resistor in the last drive in a MEMOBUS/Modbus network.
- *19 Use only Sourcing Mode for Safe Disable input.
- *20 Disconnect the wire jumpers between H1 and HC and H2 and HC to use the Safe Disable input.

5.3 Main Circuit Wiring

This section gives information about the functions, specifications, and procedures necessary to safely and correctly wire the main circuit in the drive.

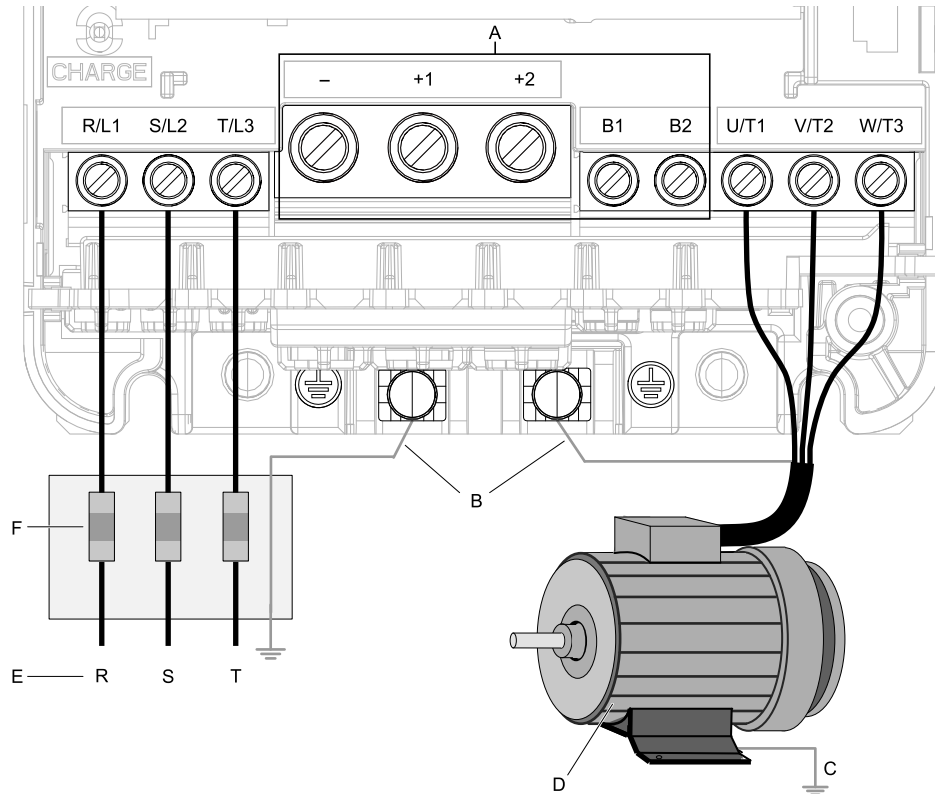
NOTICE: Damage to Equipment. Do not energize and de-energize the drive more frequently than one time each 30 minutes. If you frequently energize and de-energize the drive, it can cause drive failure.

Note:

Soldered wire connections can become loose over time and cause unsatisfactory drive performance.

◆ Motor and Main Circuit Connections

WARNING! Electrical Shock Hazard. Do not connect terminals R/L1, S/L2, T/L3, U/T1, V/T2, W/T3, -, +1, +2, +3, B1, or B2 to the ground terminal. If you connect these terminals to earth ground, it can cause damage to the drive or serious injury or death.

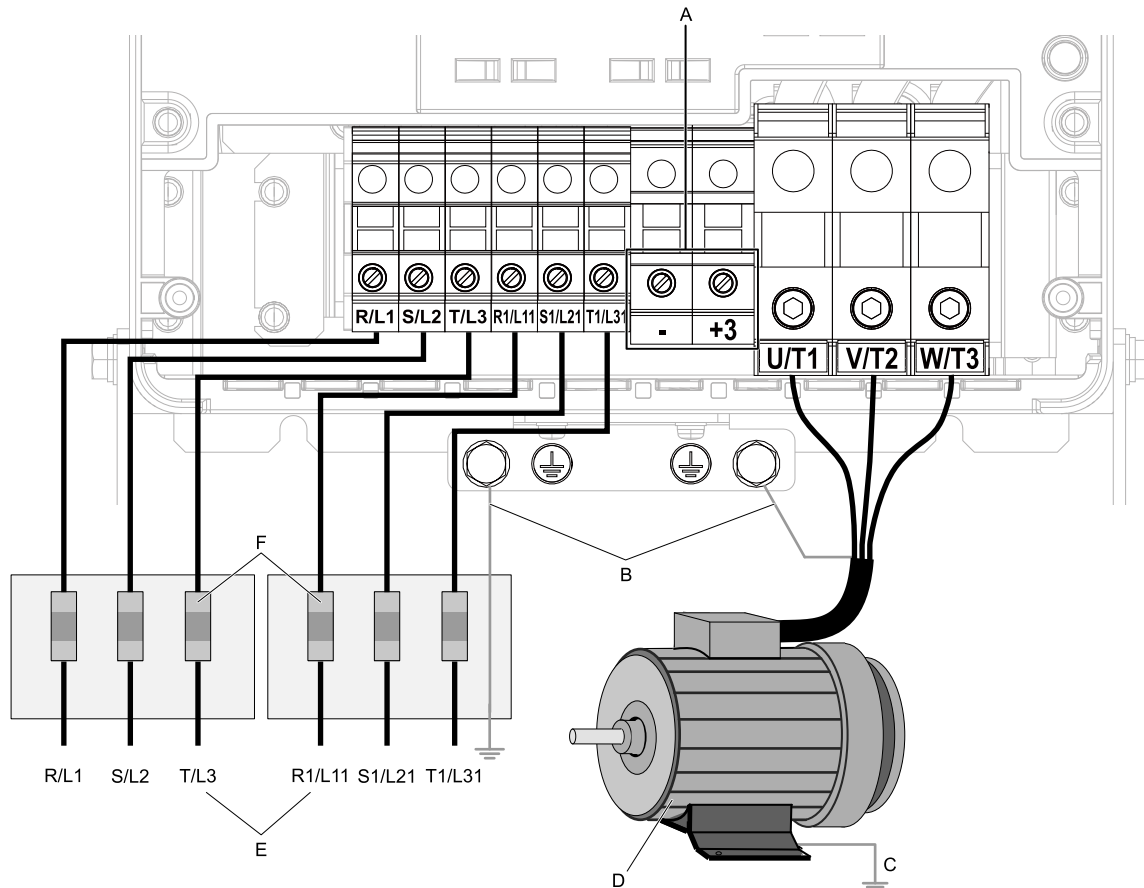


Note:

The location of terminals are different for different drive models.

- | | |
|--|---|
| A - DC bus terminal | D - Three-Phase Motor |
| B - Connect to the drive ground terminal. | E - Use R, S, T for input power supply. |
| C - Ground the motor case. | F - Input Protection (Fuses or Circuit Breakers) |

Figure 5.3 Main Circuit Terminal and Motor Wiring

**Note:**

The location of terminals are different for different drive models.

- | | |
|--|--|
| A - DC bus terminal | D - Three-Phase Motor |
| B - Connect to the drive ground terminal. | E - Use terminals R/L1, S/L2, T/L3, R1/L11, S1/L21, and T1/L31. |
| C - Ground the motor case. | F - Input Protection (Fuses or Circuit Breakers) |

Figure 5.4 Main Circuit Terminal Functions: 6-Phase/12-Pulse Drives

◆ Main Circuit Terminal Functions

Refer to [Table 5.1](#) for the functions of drive main circuit terminals.

Table 5.1 Main Circuit Terminal Functions

Terminal	Name				Function
Model	2004 - 2082	2110 - 2138	2169 - 2415	-	
	4002 - 4044	4060 - 4168	4208 - 4675	4810 - 4H12	
R/L1	Main circuit power supply input				To connect a commercial power supply.
S/L2					
T/L3					
R1/L11	-		Main circuit power supply input		
S1/L21					
T1/L31					
U/T1	Drive output				To connect a motor.
V/T2					
W/T3					
B1	Braking resistor connection		-		To connect a braking resistor or braking resistor unit.
B2					
+2	<ul style="list-style-type: none"> DC power supply input (+1 and -) DC reactor connection (+1 and +2) 	-		To connect peripheral devices, for example: <ul style="list-style-type: none"> DC power input Braking Unit DC Link Choke Note: Remove the jumper between terminals +1 and +2 to connect a DC link choke.	
+1					
-					
+3	-		<ul style="list-style-type: none"> DC power supply input (+1 and -) Braking unit connection (+3 and -) 		
\oplus	<ul style="list-style-type: none"> 200 V: D class grounding (ground to 100 Ω or less) 400 V: C class grounding (ground to 10 Ω or less) 				To ground the drive.

Note:

Use terminals - and B1 to connect a CDBR-type control unit to drive models 2004 to 2138 and 4002 to 4168 that have built-in braking transistors.

Table 5.2 Main Circuit Terminal Functions (6-Phase/12-Pulse Drives)

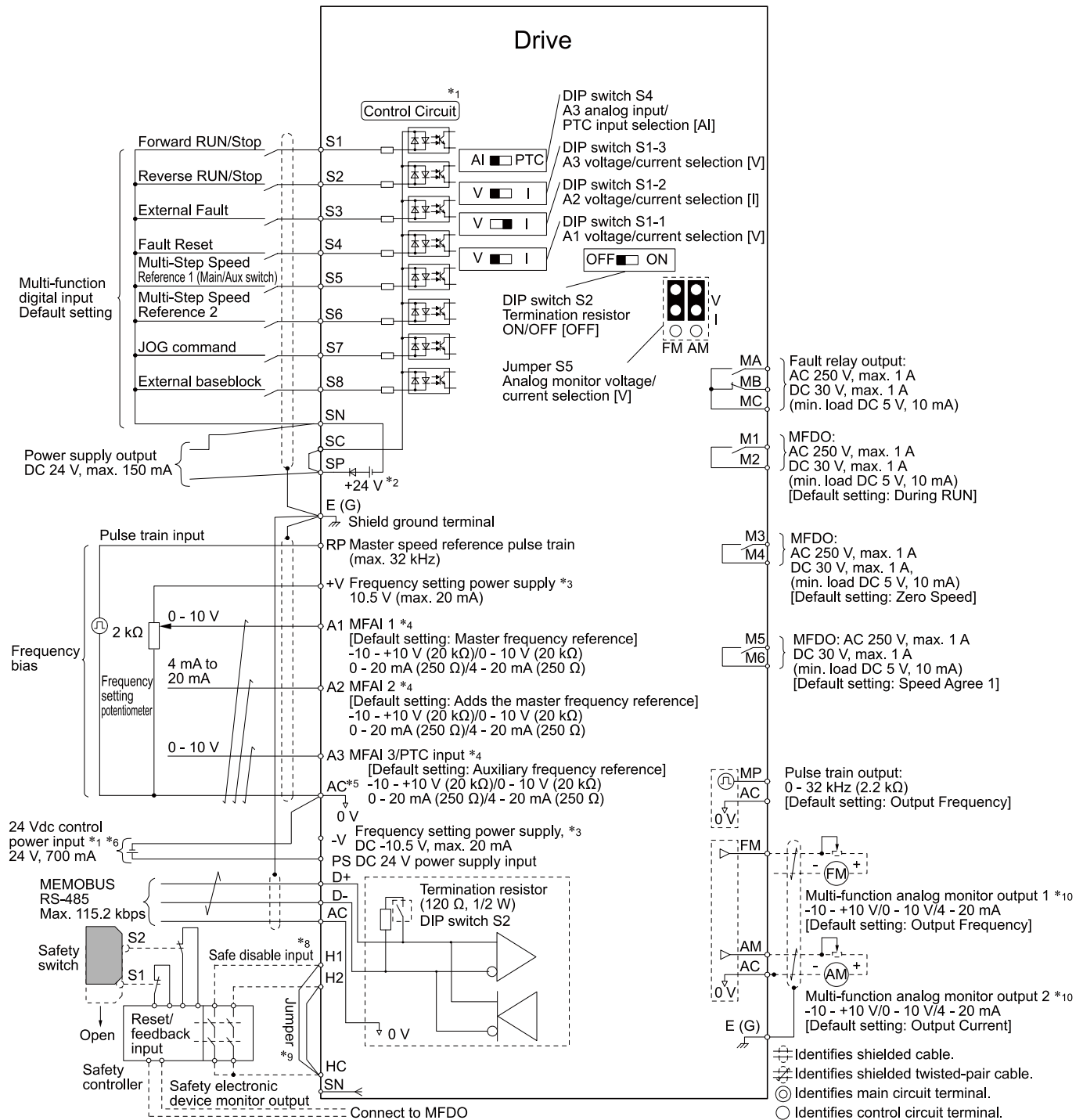
Terminal	Name	Function
Model	T103 - T720	
R/L1, R1/L11	Main circuit power supply input	To connect a commercial power supply.
S/L2, S1/L21		
T/L3, T1/L31		
U/T1	Drive output	To connect a motor.
V/T2		
W/T3		
-	Braking unit connection	To connect a braking resistor unit (option).
+3		
\oplus	C class grounding (ground to 10 Ω or less)	To ground the drive.

5.4 Control Circuit Wiring

This section gives information about how to correctly wire the control circuit.

◆ Control Circuit Connection Diagram

Wire the drive control circuit as shown in Figure 5.5.



Electrical Installation

5.4 Control Circuit Wiring

- *2 To set the MFDI power supply (Sinking/Sourcing Mode or internal/external power supply), install or remove a jumper between terminals SC-SP or SC-SN depending on the application.
- NOTICE: Damage to Equipment.** Do not close the circuit between terminals SP-SN. If you close the circuits between terminals SC-SP and terminals SC-SN at the same time, it will cause damage to the drive.
- Sinking Mode, Internal power supply: Install the jumper to close the circuit between terminals SC-SP.
NOTICE: Damage to Equipment. Do not close the circuit between terminals SC-SN. If you close the circuits between terminals SC-SP and terminals SC-SN at the same time, it will cause damage to the drive.
 - Sourcing Mode, Internal power supply: Install the jumper to close the circuit between terminals SC-SN.
NOTICE: Damage to Equipment. Do not close the circuit between terminals SC-SP. If you close the circuits between terminals SC-SP and terminals SC-SN at the same time, it will cause damage to the drive.
 - External power supply: Remove the jumper from the MFDI terminals. It is not necessary to close the circuit between terminals SC-SP and terminals SC-SN.
- *3 The output current capacity of the +V and -V terminals on the control circuit is 20 mA.
- NOTICE: Do not install a jumper between terminals +V, -V, and AC. A closed circuit between these terminals will cause damage to the drive.**
- *4 Set DIP switches S1-1 to S1-3 to select between a voltage or current input signal to terminals A1 to A3. The default setting for S1-1 and S1-3 is voltage input ("V" side). The default setting for S1-2 is current input ("I" side).
- *5 Do not ground control circuit terminal AC or connect it to the drive chassis.
- NOTICE: Do not ground the AC control circuit terminals and only connect the AC terminals as specified by the product instructions. If you connect the AC terminals incorrectly, it can cause damage to the drive.**
- *6 Do not connect terminals PS and AC inversely. If you connect the wires to the incorrect terminals, it will cause damage to the drive.
- *7 Set DIP switch S2 to the ON position to enable the termination resistor in the last drive when you use MEMOBUS/Modbus communications.
- *8 To use the internal power supply with the Safe Disable input, use sourcing mode.
- *9 Disconnect the wire jumpers between H1 and HC and H2 and HC to use the Safe Disable input.
- *10 Use multi-function analog monitor outputs with analog frequency meters, ammeters, voltmeters, and wattmeters. Do not use monitor outputs with feedback-type signal devices.

◆ Control Circuit Terminal Block Functions

Hx-xx parameters set functions for the multi-function input and output terminals.

WARNING! Sudden Movement Hazard. Correctly wire and test all control circuits to make sure that the control circuits operate correctly. If you use a drive that has incorrect control circuit wiring or operation, it can cause death or serious injury.

WARNING! Sudden Movement Hazard. Check the I/O signals and the external sequences for the drive before you set the Application Preset function. When you set the Application Preset function (A1-06 ≠ 0), it changes the I/O terminal functions for the drive and it can cause equipment to operate unusually. This can cause serious injury or death.

NOTICE: Damage to Equipment. Do not energize and de-energize the drive more frequently than one time each 30 minutes. If you frequently energize and de-energize the drive, it can cause drive failure.

■ Input Terminals

Refer to [Table 5.3](#) for a list of input terminals and functions.

Table 5.3 Multi-function Input Terminals

Type	Terminal	Name (Default)	Function (Signal Level)	
Digital Inputs	S1	MFDI selection 1 (ON: Forward run OFF: Stop)	<ul style="list-style-type: none"> • Photocoupler • 24 V, 6 mA <p>Note: Install the wire jumpers between terminals SC-SP and SC-SN to set the MFDI power supply (sinking/sourcing mode or internal/external power supply). • Sinking Mode: Install a jumper between terminals SC and SP.</p> <p>NOTICE: Damage to Equipment. Do not close the circuit between terminals SC-SN. If you close the circuits between terminals SC-SP and terminals SC-SN at the same time, it will cause damage to the drive.</p> <ul style="list-style-type: none"> • Sourcing Mode: Install a jumper between terminals SC and SN. <p>NOTICE: Damage to Equipment. Do not close the circuit between terminals SC-SP. If you close the circuits between terminals SC-SP and terminals SC-SN at the same time, it will cause damage to the drive.</p> <ul style="list-style-type: none"> • External power supply: No jumper necessary between terminals SC-SN and terminals SC-SP. 	
	S2	MFDI selection 2 (ON: Reverse run OFF: Stop)		
	S3	MFDI selection 3 (External fault (N.O.))		
	S4	MFDI selection 4 (Fault reset)		
	S5	MFDI selection 5 (Multi-step speed reference 1)		
	S6	MFDI selection 6 (Multi-step speed reference 2)		
	S7	MFDI selection 7 (Jog command)		
	S8	MFDI selection 8 (Baseblock command (N.O.))		
	SN	MFDI power supply 0 V		MFDI power supply, 24 V (maximum 150 mA)
	SC	MFDI selection common		NOTICE: Damage to Equipment. Do not close the circuit between terminals SP-SN. If you close the circuits between terminals SC-SP and terminals SC-SN at the same time, it will cause damage to the drive.
SP	MFDI power supply +24 Vdc			
Safe Disable Input	H1	Safe Disable input 1	Remove the jumper between terminals H1-HC and H2-HC to use the Safe Disable input.	
	H2	Safe Disable input 2	<ul style="list-style-type: none"> • 24 V, 6 mA • ON: Normal operation • OFF: Coasting motor • Internal impedance 4.7 kΩ • OFF Minimum OFF time of 2 ms. 	
	HC	Safe Disable function common	Safe Disable function common NOTICE: Do not close the circuit between terminals HC and SN. A closed circuit between these terminals will cause damage to the drive.	
Master Frequency Reference	RP	Master frequency reference pulse train input (Master frequency reference)	<ul style="list-style-type: none"> • Response frequency: 0 Hz to 32 kHz • H level duty: 30% to 70% • H level voltage: 3.5 V to 13.2 V • L level voltage: 0.0 V to 0.8 V • Input impedance: 3 kΩ 	
	+V	Power supply for frequency setting	10.5 V (allowable current 20 mA maximum)	
	-V	Power supply for frequency setting	-10.5 V (allowable current 20 mA maximum)	
	A1	MFAI1 (Master frequency reference)	Voltage input or current input Select terminal A1 with DIP switch S1-1 and H3-01 [Terminal A1 Signal Level Select], Select terminal A2 with DIP switch S1-2 and H3-09 [Terminal A2 Signal Level Select]	
	A2	MFAI2 (Combined to terminal A1)	<ul style="list-style-type: none"> • -10 V to +10 V/-100% to +100% (input impedance: 20 kΩ) • 0 V to 10 V/100% (input impedance: 20 kΩ) • 4 mA to 20 mA/100%, 0 mA to 20 mA/100% (input impedance: 250 Ω) 	
	A3	MFAI3/PTC input (Auxiliary frequency reference)	<ul style="list-style-type: none"> • Voltage input or current input Use DIP switch S1-3 and H3-05 [Terminal A3 Signal Level Select] to select the input. <ul style="list-style-type: none"> – -10 V to +10 V/-100% to +100% (input impedance: 20 kΩ) – 0 V to 10 V/100% (input impedance: 20 kΩ) – 4 mA to 20 mA/100%, 0 mA to 20 mA/100% (input impedance: 250 Ω) • PTC input (Motor Overheat Protection) Set DIP switch S4 to "PTC" and set DIP switch S1-3 to "V" to set terminal A3 for PTC input. 	
	AC	Frequency reference common	0 V	
	E (G)	Connecting shielded cable	-	

■ Output Terminals

Refer to [Table 5.4](#) and [Table 5.5](#) for a list of Output terminals and functions.

Table 5.4 Control Circuit Output Terminals

Type	Terminal	Name (Default)	Function (Signal Level)
Fault Relay Output	MA	N.O. output (Fault)	<ul style="list-style-type: none"> Relay output 30 Vdc, 10 mA to 1 A 250 Vac, 10 mA to 1 A Minimum load: 5 V, 10 mA (Reference value)
	MB	N.C. output (Fault)	
	MC	Digital output common	
MFDO	M1	MFDO	<ul style="list-style-type: none"> Relay output 30 Vdc, 10 mA to 1 A 250 Vac, 10 mA to 1 A Minimum load: 5 V, 10 mA (Reference value) <p>Note: Do not set functions that frequently switch ON/OFF to MFDO (M1 to M6) because this will decrease the performance life of the relay contacts. Yaskawa estimates switching life at 200,000 times (assumes 1 A, resistive load).</p>
	M2	(During Run)	
	M3	MFDO	
	M4	(Zero Speed)	
	M5	MFDO	
	M6	(Speed Agree 1)	

Table 5.5 Control Circuit Monitor Output Terminals

Type	Terminal	Name (Default)	Function (Signal Level)
Monitor Output	MP	Pulse train output (Output frequency)	32 kHz (maximum) Refer to "Pulse Train Output" (page 352) for more information.
	FM	Analog monitor output 1 (Output frequency)	Select voltage or current output. <ul style="list-style-type: none"> 0 V to 10 V/0% to 100% -10 V to +10 V/-100% to +100% 4 mA to 20 mA (Receiver recommended impedance: 250 Ω)
	AM	Analog monitor output 2 (Output current)	<p>Note: Select with jumper switch S5 and H4-07 [Terminal FM Signal Level Select] or H4-08 [Terminal AM Signal Level Select].</p>
	AC	Monitor common	0 V

■ External Power Supply Input Terminals

Refer to Table 5.6 for a list of the functions of the external power supply input terminals.

Table 5.6 External Power Supply Input Terminals

Type	Terminal	Name (Default)	Function
External Power Supply Input Terminals	PS	External 24 V power supply input	Supplies backup power to the drive control circuit, keypad, and option board. 21.6 VDC to 26.4 VDC, 700 mA
	AC	External 24 V power supply ground	0 V

Alarm Display When You Use External 24 V Power Supply

When you use an external 24 V power supply, the drive detects an alarm as shown in Table 5.7 if you set o2-23 [External 24V Powerloss Detection] and o2-26 [Alarm Display at Ext. 24V Power] for the main circuit power supply. Set the alarm display as necessary.

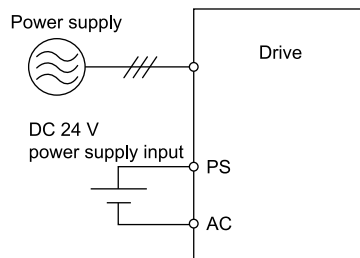


Table 5.7 Power Supply and Alarm Display

Main Circuit Power Supply	External 24 V Power Supply	o2-23 [External 24V Powerloss Detection]	o2-26 [Alarm Display at Ext. 24V Power]	Alarm Display
ON	ON	-	-	-
ON	OFF	0 [Disabled]	-	-
		1 [Enabled]	-	L24v [Loss of External Power 24 Supply]
OFF	ON	-	0 [Disabled]	"Ready" LED light flashes quickly
		-	1 [Enabled]	EP24v [External Power 24V Supply]

Operation When Using External 24 V Power Supply

To operate the drive, de-energize the main circuit power supply and connect an external 24 V power supply to terminals PS-AC.

Function	Operation	Solution
Keypad	The keypad operates the same as when the main circuit power supply is ON. The drive will not detect oPr [Keypad Connection Fault].	-
Data Log	The data log function operates the same as when the main circuit power supply is ON. The operation is different for different drive software versions. *1	-
Communications by Communication Option or MEMOBUS/Modbus Communication Terminals	Communication operates the same as when the main circuit power supply is ON.	-
MFAI	MFAI operates the same as when the main circuit power supply is ON.	-
MFAO	MFAO operates the same as when the main circuit power supply is ON.	-
MFDI	MFDI does not operate when the main circuit power supply of the drive is OFF.	Connect the external 24 V power supply to the MFDI selection common terminal (SC). *2
MFDO Multi-Function Photocoupler Output Fault Relay Output Terminal	MFDO operates the same as when the main circuit power supply is ON. The operations of MFDO terminals and fault relay output terminals set for H2-xx = E [Fault] are different for different drive software versions. *3	-
Pulse Train Input	Pulse train input operates the same as when the main circuit power supply is ON.	-
Pulse train output	Pulse train output operates the same as when the main circuit power supply is ON.	-
Encoder Option Speed Detection (PG-B3, PG-X3, PG-F3, PG-RT3)	Encoder options do not operate when the main circuit power supply of the drive is OFF. The operation to detect encoder option-related faults is different for different software versions.	When you use an encoder, make sure that the drive main circuit power supply is ON. *4
Analog Input Option (AI-A3)	Analog input options operate the same as when the main circuit power supply is ON.	-
Analog Output Option (AO-A3)	Analog output options operate the same as when the main circuit power supply is ON. The operation is different for different drive software versions. *5	-
Digital Input Option (DI-A3)	Digital input options do not operate when the main circuit power supply of the drive is OFF.	Connect the external 24 V power supply to the Input signal common terminal (SC). *2
Digital Output Option (DO-A3)	Digital output options operate the same as when the main circuit power supply is ON.	-

*1 When you use an external 24 V power supply, the operation of the data log function is different for different drive software versions. On drives with software versions PRG: 09015 and later, you can continue the data log function.

Note:

The "PRG" column on the nameplate on the right side of the drive identifies the software version. You can also use U1-25 [SoftwareNumber FLASH] to identify the software version.

*2 When you use MFDI and a Digital Input option (DI-A3), wire the terminals as shown in [Wiring MFDI Terminals on page 350](#) or [Wiring Digital Input Option \(DI-A3\) on page 350](#).

5.4 Control Circuit Wiring

*3 When you use an external 24 V power supply, the operation of the MFDO terminals are different for different drive software versions.

Note:

The "PRG" column on the nameplate on the right side of the drive identifies the software version. You can also use *U1-25 [SoftwareNumber FLASH]* to identify the software version.

- Drive software versions PRG: 09012 and later
When the main circuit power supply of the drive turns off, and you remove the cause of a fault and do a fault reset from the keypad, the fault relay output terminals and the MFDO terminals set for $H2-xx = E, 10E [Fault]$ will change status.
 - Drive software versions PRG: 09011 and earlier
When the main circuit power supply of the drive turns off, and you remove the cause of a fault and do a fault reset from the keypad, the fault relay output terminals and the MFDO terminals set for $H2-xx = E, 10E [Fault]$ will keep the same status as before the main circuit power supply of the drive turned off, but the fault code shown on the keypad will disappear.
- *4 If the motor shaft can rotate while the 24 V control power supply is energized and the main circuit power supply is de-energized, re-energize the 24 V control power supply and energize the main circuit power supply.
- *5 When you use an external 24 V power supply, the operation of the Analog Output option is different for different drive software versions. On drives with software versions PRG:09015 and later, the Analog Output option (AO-A3) can output the analog signals.

Note:

The "PRG" column on the nameplate on the right side of the drive identifies the software version. You can also use *U1-25 [SoftwareNumber FLASH]* to identify the software version.

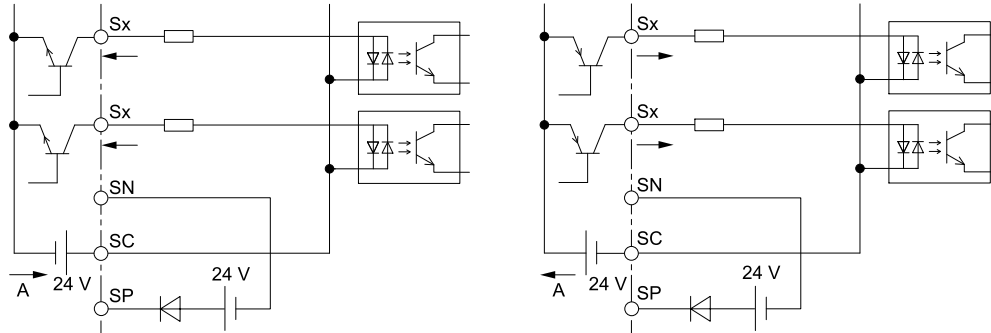
When you use an external 24 V power supply, if you de-energize the main circuit power supply, the encoder option will not operate, even when you connect the external 24 V power supply to terminals PS-AC. When you use an encoder option, energize the drive main circuit power supply.

Note:

Yaskawa recommends that you use different external power supplies for the external power supply input terminals (PS-AC) and MFDI selection common terminal (SC) / Input signal common terminal (SC).

Wiring MFDI Terminals

If you de-energize the main circuit power supply, the MFDI terminals will not operate, even when you connect the external 24 V power supply to terminals PS-AC. When you set N.O. functions to $H1-xx [MFDI Function Select]$, MFDI terminals always deactivate. When you set N.C. functions, MFDI terminals always activate. Connect the external 24 V power supply to the MFDI selection common terminal (SC).

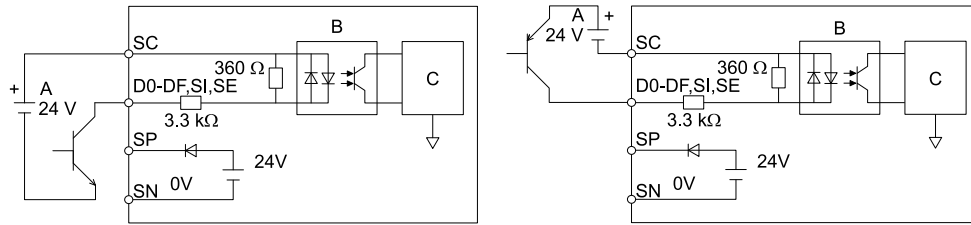


A - External power supply

Figure 5.6 Wiring MFDI Terminals

Wiring Digital Input Option (DI-A3)

If you de-energize the main circuit power supply, the Digital Input Option terminals will not operate, even when you connect the external 24 V power supply to terminals PS-AC. When you set N.O. functions to $F3-xx [Terminal Dx Function Selection]$, the input terminals on the digital input option always deactivate. When you set N.C. functions, the input terminals on the digital input option always activate. Connect the external 24 V power supply to the Input signal common terminal (SC).



A - External power supply
B - Photocoupler

C - Signal processor

Figure 5.7 Wiring Digital Input Option (DI-A3)

Serial Communication Terminals

Refer to [Table 5.8](#) for a list of serial communication terminals and functions.

Table 5.8 Serial Communication Terminals

Type	Terminal	Terminal Name	Function (Signal Level)	
Modbus Communication	D+	Communication input/output (+)	MEMOBUS/Modbus communications Use an RS-485 cable to connect the drive. Note: Set DIP switch S2 to ON to enable the termination resistor in the last drive in a MEMOBUS/Modbus network.	<ul style="list-style-type: none"> RS-485 MEMOBUS/Modbus communication protocol Maximum 115.2 kbps
	D-	Communication output (-)		
	AC	Shield ground	0 V	

5.5 Control I/O Connections

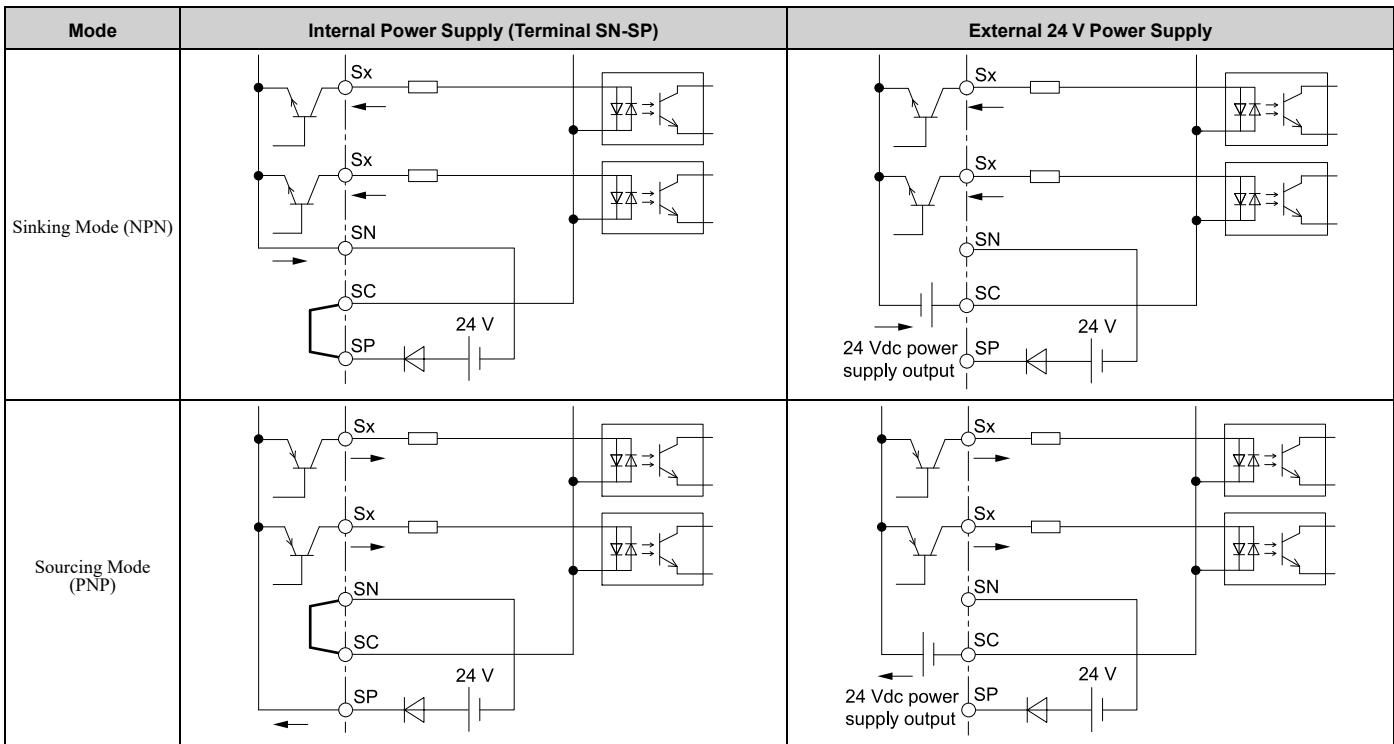
This section gives information about the settings for the listed control circuit I/O signals.

- MFDI (terminals S1 to S8)
- Pulse train output (terminal MP)
- MFAI (terminals A1 to A3)
- PTC input (terminal A3)
- MFAO (terminals FM, AM)
- MEMOBUS/Modbus communications (terminals D+, D-, AC)

◆ Set Sinking Mode/Sourcing Mode

Close the circuit between terminals SC-SP and SC-SN to set the sinking mode/sourcing mode and the internal/external power supply for the MFDI terminals. The default setting for the drive is internal power supply sinking mode.

NOTICE: Damage to Equipment. Do not close the circuit between terminals SP-SN. If you close the circuits between terminals SC-SP and terminals SC-SN at the same time, it will cause damage to the drive.



◆ Pulse Train Output

You can use pulse train monitor output terminal MP for sourcing mode or for sinking mode.

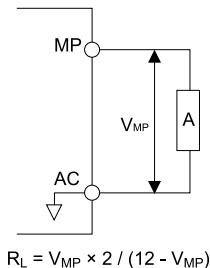
NOTICE: Correctly connect peripheral devices. Incorrect installation can cause damage to the drive and connected circuits.

- Use for sourcing mode
The load impedance changes the voltage level of the pulse train output signal.

Load Impedance $R_L(k\Omega)$	Output Voltage $V_{MP}(V)$
1.5 k Ω or more	5 V or more
4.0 k Ω or more	8 V or more
10 k Ω or more	10 V or more

Note:

Use the formula in [Figure 5.8](#) to calculate the necessary load resistance (kΩ) to increase output voltage $V_{MP}(V)$.

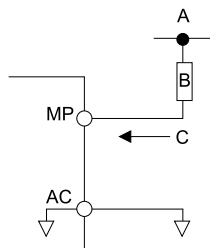


A - Load Impedance

Figure 5.8 Wiring to Use Pulse Train Output in Sourcing Mode

- Use in sinking mode
The external power supply changes the voltage level of the pulse train output signal. Keep the voltage from an external source between 10.8 Vdc to 16.5 Vdc. Adjust the load impedance to keep the current at 16 mA or lower.

External Power Supply (V)	Load Impedance (kΩ)	Sinking current (mA)
10.8 Vdc to 16.5 Vdc	1.0 kΩ or more	16 mA maximum



A - External power supply
B - Load Impedance

C - Sinking current

Figure 5.9 Wiring to Use Pulse Train Output in Sinking Mode

◆ **Set Input Signals for MFAI Terminals A1 to A3**

Use terminals A1 to A3 to input a voltage or a current signal. Set the signal type as shown in [Table 5.9](#).

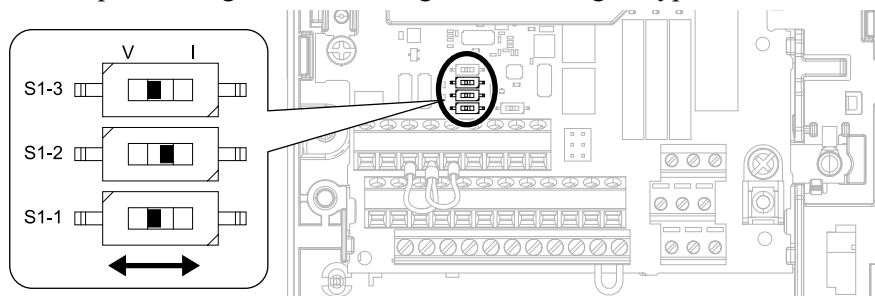


Figure 5.10 Location of DIP Switch S1

Table 5.9 MFAI Terminals A1 to A3 Signal Settings

Terminal	Input Signal	DIP Switch Settings		Parameter	
		Switch	Setting	No.	Signal Level
A1	Voltage input	S1-1	V (Default)	H3-01	0: 0 V to 10 V/0% to 100% (input impedance: 20 kΩ) 1: -10 V to +10 V/-100% to 100% (input impedance: 20 kΩ)
	Current input		I		2: 4 mA to 20 mA/0% to 100% (input impedance: 250 Ω) 3: 0 mA to 20 mA/0% to 100% (input impedance: 250 Ω)
A2	Voltage input	S1-2	V	H3-09	0: 0 V to 10 V/0% to 100% (input impedance: 20 kΩ) 1: -10 V to +10 V/-100% to 100% (input impedance: 20 kΩ)
	Current input		I (Default)		2: 4 mA to 20 mA/0% to 100% (input impedance: 250 Ω) 3: 0 mA to 20 mA/0% to 100% (input impedance: 250 Ω)
A3	Voltage input	S1-3	V (Default)	H3-05	0: 0 V to 10 V/0% to 100% (input impedance: 20 kΩ) 1: -10 V to +10 V/-100% to 100% (input impedance: 20 kΩ)
	Current input		I		2: 4 mA to 20 mA/0% to 100% (input impedance: 250 Ω) 3: 0 mA to 20 mA/0% to 100% (input impedance: 250 Ω)

Note:

- Set $H3-02, H3-10 = 0$ [Terminal A1 Function Selection, Terminal A2 Function Selection = Frequency Reference] to set A1 and A2 to frequency reference. The drive will add the analog input values together to make the frequency reference.
- Use tweezers or a jig with a tip width of approximately 0.8 mm (0.03 in) to set DIP switches.
- Set DIP switch S4 to "AI" to use terminal A3 as an analog input (voltage/current) terminal. The default setting for DIP switch S4 is "AI".

◆ Set MFAI Terminal A3 to PTC Input

Set terminal A3 as an MFAI or as the PTC input for motor overload protection.

Use DIP switch S4 to set the input function.

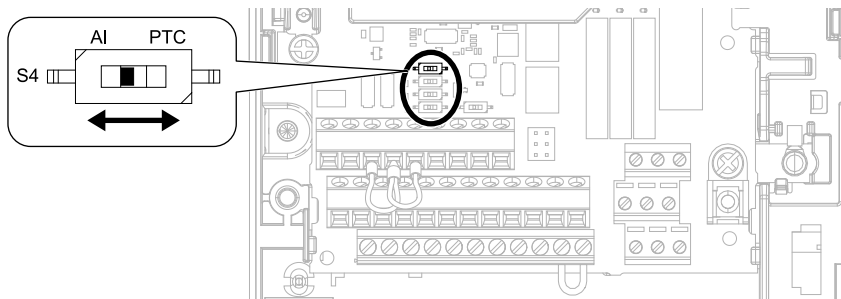


Figure 5.11 Location of DIP Switch S4

Terminal	DIP switch S4	Description
A3	AI (Default)	Functions as an MFAI terminal. Set $H3-06$ [Terminal A3 Function Selection] to set the input function.
	PTC	Functions as the PTC input terminal. Set $H3-06 = E$ [Motor Temperature (PTC Input)]. Set S1-3 to "V" for voltage input.

◆ Set Output Signals for MFAO Terminals FM, AM

Set the signal type for terminals AM and FM to voltage or current output. Use jumper switch S5 and $H4-07, H4-08$ [Terminal FM Signal Level Select, Terminal AM Signal Level Select] to set the signal type.

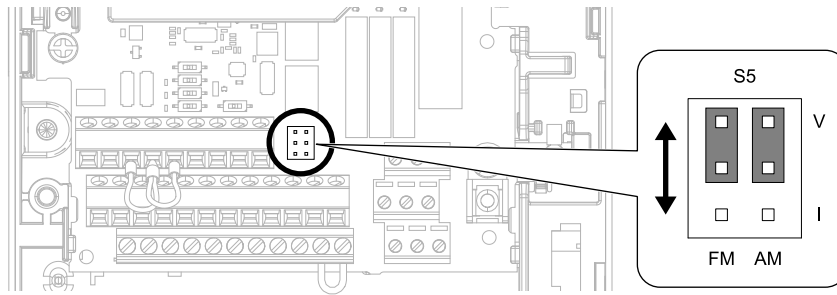
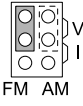
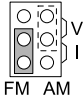
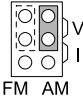
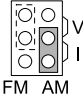


Figure 5.12 Location of Jumper Switch S5

Terminal	Types of Output Signals	Jumper Switch S5	Parameter	
			No.	Signal Level
FM	Voltage output (Default)		H4-07	0: 0 V to 10 V 1: -10 V to +10 V
	Current output			2: 4 mA to 20 mA
AM	Voltage output (Default)		H4-08	0: 0 V to 10 V 1: -10 V to +10 V
	Current output			2: 4 mA to 20 mA

◆ Switch ON Termination Resistor for MEMOBUS/Modbus Communications

When the drive is the last slave in a MEMOBUS/Modbus communications, set DIP switch S2 to the ON position. This drive has a built-in termination resistor for the RS-485 interface.

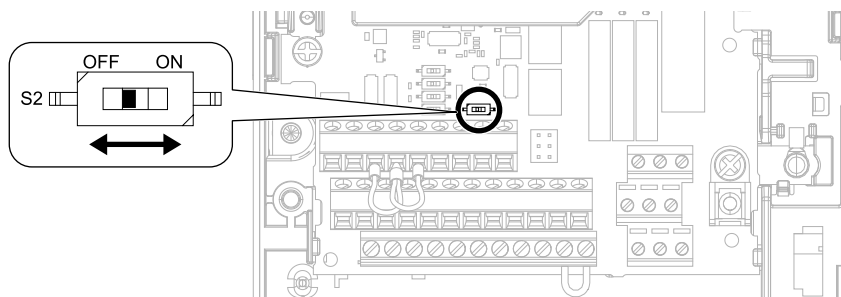


Figure 5.13 Location of DIP Switch S2

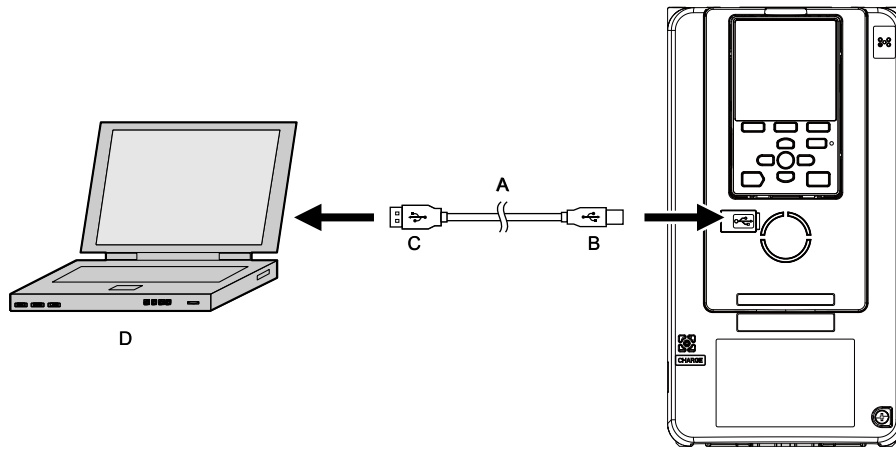
Table 5.10 MEMOBUS/Modbus Communications Termination Resistor Setting

DIP Switch S2	Description
ON	The built-in termination resistor is ON.
OFF (Default)	The built-in termination resistor is OFF.

5.6 Connect the Drive to a PC

The drive has a mini-B type USB port.

You can use a USB cable (USB 2.0, type: A - mini-B) to connect the drive to a type-A USB port on a PC. After you connect the drive to the PC, you can use Yaskawa DriveWizard software to monitor drive performance and manage parameter settings.



A - USB 2.0, type A - mini-B cable **C - Type-A connector**
B - Mini-B type connector **D - PC**

Figure 5.14 Connect to a PC (USB)

Yaskawa recommends that you use a USB cable with connectors connected with shielded wires.

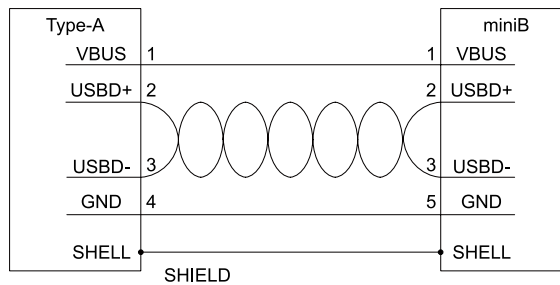


Figure 5.15 Recommended USB Cable

Startup Procedure and Test Run

6.1	Section Safety	358
6.2	Keypad Components and Functions.....	359
6.3	LED Status Ring.....	365
6.4	Start-up Procedures	367
6.5	Items to Check before Starting Up the Drive.....	373
6.6	Keypad Operation	375
6.7	Automatic Parameter Settings Optimized for Specific Applications (Application Presets).....	419
6.8	Auto-Tuning	421
6.9	Test Run	430
6.10	Fine Tuning during Test Runs (Adjust the Control Function).....	432
6.11	Test Run Checklist	440

6.1 Section Safety

DANGER

Electrical Shock Hazard

Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, remove the covers before measuring for dangerous voltages to make sure that the drive is safe.

If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.

WARNING

Electrical Shock Hazard

Do not operate the drive when covers are missing. Replace covers and shields before you operate the drive. Use the drive only as specified by the instructions.

Some figures in this section include drives without covers or safety shields to more clearly show the inside of the drive. If covers or safety shields are missing from the drive, it can cause serious injury or death.

Do not remove covers or touch circuit boards while the drive is energized.

If you touch the internal components of an energized drive, it can cause serious injury or death.

NOTICE

Sudden Movement Hazard

Deactivate the Run command before you switch from Programming Mode to Drive Mode.

If you switch from Programming Mode to Drive Mode and there is an active Run command, the motor will rotate and the equipment can suddenly start.

6.2 Keypad Components and Functions

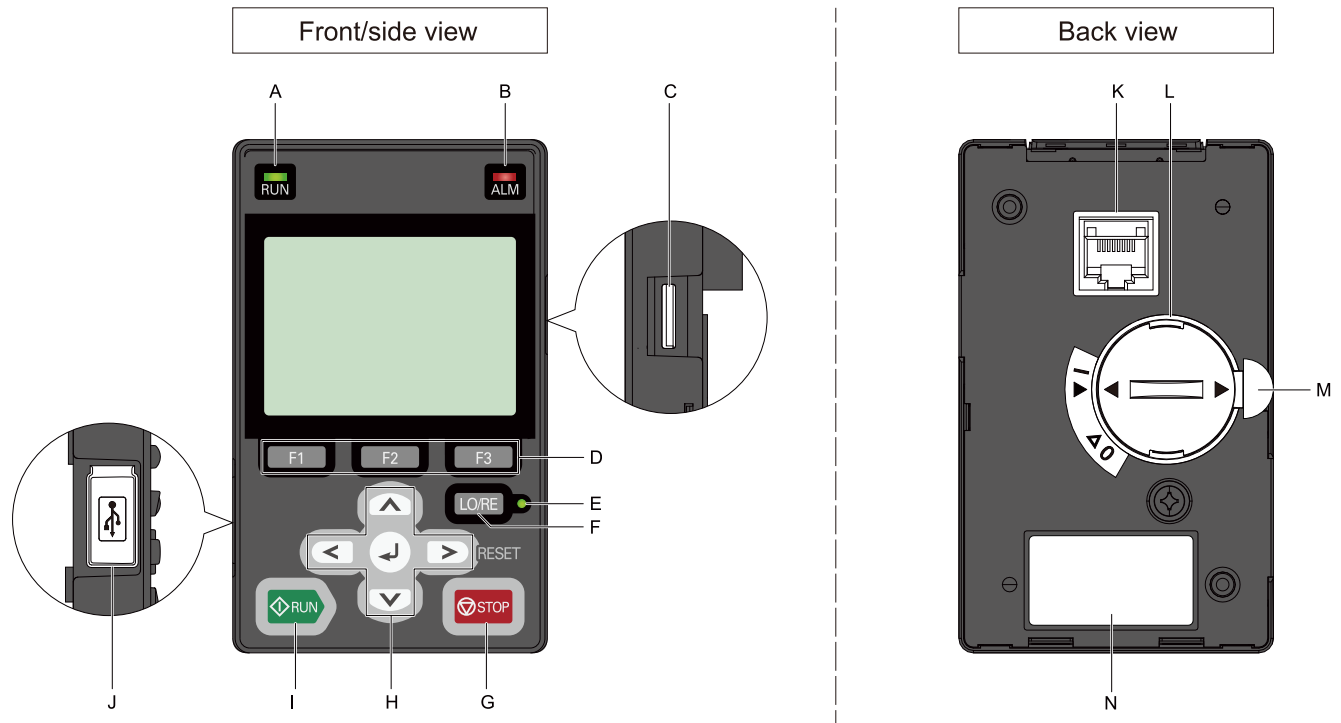



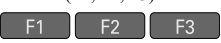














Figure 6.1 Keypad

Table 6.1 Keypad Components and Functions

Symbol	Name	Function
A	RUN LED 	<p>Illuminates to show that the drive is operating the motor. The LED turns OFF when the drive stops. Flashes to show that:</p> <ul style="list-style-type: none"> The drive is decelerating to stop. The drive received a Run command with a frequency reference of 0 Hz, but the drive is not set for zero speed control. <p>Flashes quickly to show that:</p> <ul style="list-style-type: none"> The drive received a Run command from the MFDI terminals and is switching to REMOTE Mode while the drive is in LOCAL Mode. The drive received a Run command from the MFDI terminals when the drive is not in Drive Mode. The drive received a Fast Stop command. The safety function shut off the drive output. <ul style="list-style-type: none"> You pushed  on the keypad while the drive is operating in REMOTE Mode. The drive is energized with an active Run command and $b1-17 = 0$ [Run Command at Power Up = Disregard Existing RUN Command].
B	ALM LED 	<p>Illuminates when the drive detects a fault. Flashes when the drive detects:</p> <ul style="list-style-type: none"> Alarm Operation Errors A fault or alarm during Auto-Tuning <p>The light turns off during regular drive operation. There are no alarms or faults.</p>
C	microSD Card Slot	The insertion point for a microSD card.
D	Function Keys (F1, F2, F3) 	The menu shown on the keypad sets the functions for function keys. The name of each function is in the lower half of the display window.
E	LO/RE LED 	<p>Illuminated: The keypad controls the Run command (LOCAL Mode). OFF: The control circuit terminal or serial transmission device controls the Run command (REMOTE Mode).</p> <p>Note:</p> <ul style="list-style-type: none"> LOCAL: Use the keypad to operate the drive. Use the keypad to enter Run/Stop commands and the frequency reference command. REMOTE: Use the control circuit terminals or serial transmission to operate the drive. Use the frequency reference source entered in $b1-01$ and the Run command source selected in $b1-02$.

6.2 Keypad Components and Functions

Symbol	Name	Function
F	LO/RE Selection Key 	Switches drive control for the Run command and frequency reference between the keypad (LOCAL) and an external source (REMOTE). Note: • The LOCAL/REMOTE Selection Key continuously stays enabled after the drive stops in Drive Mode. If the application must not switch from REMOTE to LOCAL because it will have a negative effect on system performance, set $o2-01 = 0$ [LO/RE Key Function Selection = Disabled] to disable  • The drive will not switch between LOCAL and REMOTE when it is receiving a Run command from an external source.
G	STOP Key 	Stops drive operation. Note: Push  to stop the motor. This will also apply when a Run command (REMOTE Mode) is active at an external Run command source. To disable  priority, set $o2-02 = 0$ [STOP Key Function Selection = Disabled].
H	Left Arrow Key 	<ul style="list-style-type: none"> Moves the cursor to the left. Goes back to the previous screen.
	Up Arrow Key/Down Arrow Key 	<ul style="list-style-type: none"> Scrolls up or down to show the next item or the previous item. Selects parameter numbers, and increments or decrements setting values.
	Right Arrow Key (RESET) 	<ul style="list-style-type: none"> Moves the cursor to the right. Continues to the next screen. Resets the drive to clear a fault.
	ENTER Key 	<ul style="list-style-type: none"> Enters parameter values and settings. Selects menu items to move between keypad displays. Selects each mode, parameter, and set value.
I	RUN Key 	Starts the drive in LOCAL Mode. Starts the operation in Auto-Tuning Mode. Note: Before you use the keypad to operate the motor, push  on the keypad to set the drive to LOCAL Mode.
J	USB Terminal	For factory adjustment
K	RJ-45 Connector	Connects to the drive using an RJ-45 8-pin straight through UTP CAT5e extension cable or keypad connector.
L	Clock Battery Cover	Remove this cover to install or replace the clock battery. Note: • The battery included with the keypad is to check for correct operation. This battery life can be less than the expected battery life described in the manual. • Refer to the "Maintenance & Troubleshooting Manual (TOEPYAIGA8001)" for more information about the replacement procedure. To replace the battery, use a Hitachi Maxell "CR2016 Lithium Manganese Dioxide Lithium Battery" or an equivalent battery with these properties: • Nominal voltage: 3 V • Operating temperature range: -20 °C to +85 °C (-4 °F to +185 °F)
M	Insulation Sheet	An insulating sheet is attached to the keypad battery to prevent battery drain. Remove the insulation sheet before you use the keypad for the first time.
N	Nameplate	Shows the model number of the keypad and other information Note: • "REV" identifies the hardware and software version of the keypad. • "FLASH" identifies the version of the flash memory. • Make sure that you use a keypad that has a flash memory version of 1004 or later. Keypads that have a flash memory version of 1003 or earlier will not show characters correctly.

WARNING! Sudden Movement Hazard. If you change the control source when $b1-07 = 1$ [LOCAL/REMOTE Run Selection = Accept Existing RUN Command], the drive can start suddenly. Before you change the control source, remove all personnel from the area around the drive, motor, and load. Sudden starts can cause serious injury or death.

◆ LCD Display

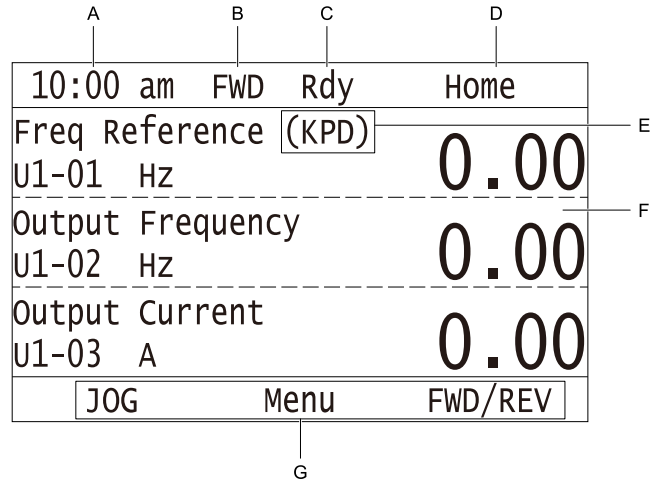








Figure 6.2 LCD Display Indications

Table 6.2 LCD Display Indications and Meanings

Symbol	Name	Description
A	Time display area	Shows the current time. Set the time on the default settings screen. Note: The time display flashes when you use the data log function.
B	Forward run/Reverse indication	Shows direction of motor rotation. • FWD: Shown when set to Forward run. • REV: Shown when set to Reverse run. Note: In DriveWorksEZ operation, FWD or REV flash.
C	Ready	The screen will show Rdy when the drive is ready for operation or when the drive is running.
D	Mode display area	Shows the name of the current mode or screen.
E	Frequency reference source indicator	Shows the current frequency reference source. • KPD: keypad • AI: analog input terminal (terminals A1 to A3) • COM: MEMOBUS/Modbus communications • OPT: option card • RP: pulse train input terminal (terminal RP)
F	Data display area	Shows parameter values, monitor values, and details of the results of operations.
G	Function keys 1 to 3 (F1 to F3)	The function names shown in this area will change when the selected screen changes. Push one of the function keys  to  on the keypad to do the function.

◆ Indicator LEDs and Drive Status

LED	Display	Drive Status
RUN LED 	Illuminated	The drive is operating the motor.
	Flashing	<ul style="list-style-type: none"> The drive is decelerating to stop. The drive received a Run command with a frequency reference of 0 Hz, but the drive is not set for zero speed control. The drive received a DC Injection Braking command.
	Flashing Quickly	<ul style="list-style-type: none"> The drive received a Run command from the MFDI terminals and is switching to REMOTE Mode while the drive is in LOCAL Mode. The drive received a Run command from an external source and the drive is not in Drive Ready (READY) condition. The drive received a Fast Stop command. The safety function shut off the drive output. You pushed  on the keypad while the drive is operating in REMOTE Mode. The drive is energized with an active Run command and $b1-17 = 0$ [Run Command at Power Up = Disregard Existing RUN Command]. When $b1-03 = 3$ [Stopping Method Selection = Coast to Stop with Timer], the Run command is disabled then enabled during the Run wait time. The drive received a DC Injection Braking command. The voltage of the main circuit power supply decreased, and the 24 V power supply is supplying power only the the drive.
	OFF	The motor is stopped.
ALM LED 	Illuminated	The drive detects a fault.
	Flashing	The drive detected one of the following: <ul style="list-style-type: none"> An alarm An oPE parameter setting error A fault or error during Auto-Tuning Note: The digital characters displayed on the keypad will also flash.
	OFF	There are no drive faults or alarms.
LO/RE LED 	Illuminated	The keypad controls the Run command (LOCAL Mode).
	OFF	The control circuit terminal or serial transmission device controls the Run command (REMOTE Mode).

■ LED Flashing Statuses

Refer to [Figure 6.3](#) for information about the differences between flashing and “flashing quickly”.

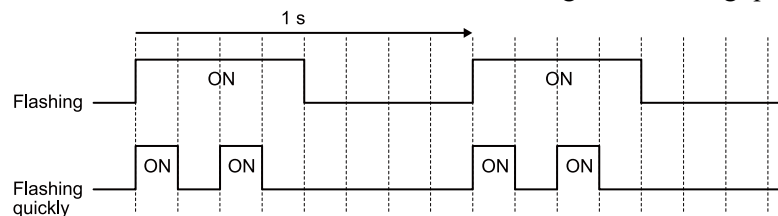


Figure 6.3 LED Flashing Statuses

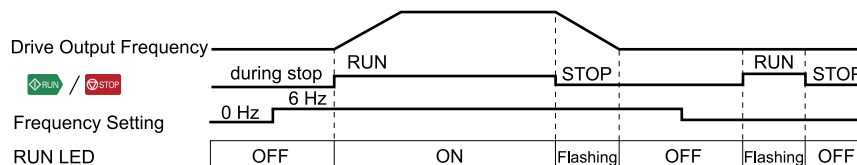
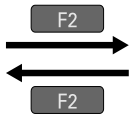


Figure 6.4 Relation between RUN indicator and Drive Operation

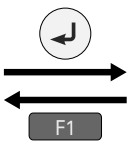
◆ Keypad Mode and Menu Displays

10:00 am	FWD	Rdy	Home
Freq Reference (AI)			
U1-01 Hz		0.00	
Output Frequency			
U1-02 Hz		0.00	
Output Current			
U1-03 A		0.00	
Menu			

HOME



10:00 am	FWD	Rdy	Menu
Monitors			
Parameters			
User Custom Parameters			
Parameter Backup/Restore			
Modified Param / Fault Log			
Auto-Tuning			
Home			

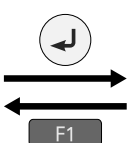


10:00 am	FWD	Rdy	Monitor
Standard Monitor			
Custom Monitor			
Bar Graph			
Analog Gauge			
Trend Plot			
Back		Home	

Monitors

Drive Mode

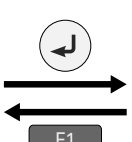
10:00 am	FWD		Menu
Monitors			
Parameters			
User Custom Parameters			
Parameter Backup/Restore			
Modified Param / Fault Log			
Auto-Tuning			
Home			



10:00 am	FWD		Parameters
Initialization Parameters			
Application			
Tuning			
References			
Motor Parameters			
Options			
Back		Home	

Parameters

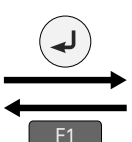
10:00 am	FWD		Menu
Monitors			
Parameters			
User Custom Parameters			
Parameter Backup/Restore			
Modified Param / Fault Log			
Auto-Tuning			
Home			



10:00 am	FWD		Parameters
Application Preset			
A1-06	0	(0)	
Control Method Selection			
A1-02	2	(2)	
Frequency Reference Selection 1			
b1-01	1	(1)	
Back		Home	

User Custom Parameters

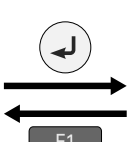
10:00 am	FWD		Menu
Monitors			
Parameters			
User Custom Parameters			
Parameter Backup/Restore			
Modified Param / Fault Log			
Auto-Tuning			
Home			



10:00 am	FWD		Backup
Select Items to Backup/Restore			
Standard Parameters			
Back		Home	

Parameter Backup/Restore

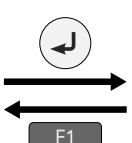
10:00 am	FWD		Menu
Monitors			
Parameters			
User Custom Parameters			
Parameter Backup/Restore			
Modified Param / Fault Log			
Auto-Tuning			
Home			



10:00 am	FWD		History
Modified Parameters			
Fault Log			
Back		Home	

Modified Parameters/Fault Log

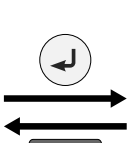
10:00 am	FWD		Menu
Parameters			
User Custom Parameters			
Parameter Backup/Restore			
Modified Param / Fault Log			
Auto-Tuning			
Initial Setup			
Home			



10:00 am	FWD		Auto Tuning
Select Auto-Tuning mode			
Motor Parameter Tuning			
Back		Home	

Auto-Tuning

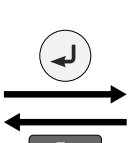
10:00 am	FWD		Menu
User Custom Parameters			
Parameter Backup/Restore			
Modified Param / Fault Log			
Auto-Tuning			
Initial Setup			
Diagnostic Tools			
Home			



10:00 am	FWD		Init Setup
Language Selection			
Set Date/Time			
Setup Wizard			
Show Initial Setup Screen			
Back		Home	

Initial Setup

10:00 am	FWD		Menu
User Custom Parameters			
Parameter Backup/Restore			
Modified Param / Fault Log			
Auto-Tuning			
Initial Setup			
Diagnostic Tools			
Home			



10:00 am	FWD		Tools
Data Logger			
Backlight			
Drive Information			
Back		Home	Setup

Diagnostic Tools

Programming Mode

Startup Procedure and Test Run

Figure 6.5 Keypad Functions and Display Levels

Note:



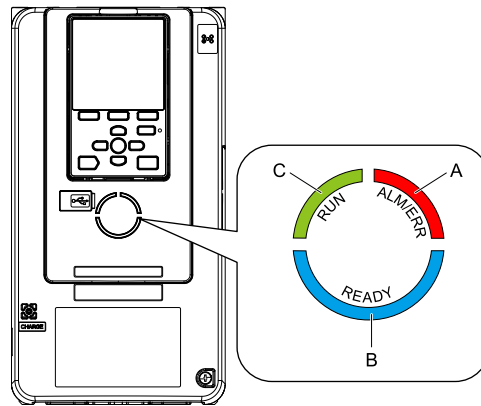
- Energize the drive with factory defaults to show the Initial Setup screen. Push **F2** [Home] to show the HOME screen.
–Select [No] from the [Show Initial Setup Screen] setting to not display the Initial Setup screen.
- Push  from the Home screen to show drive monitors.
- Push  to set *d1-01 [Reference 1]* when the Home screen shows *U1-01 [Frequency Reference]* in LOCAL Mode.
- The keypad will show [Rdy] when the drive is in Drive Mode. The drive is prepared to accept a Run command.
- Set *b1-08 [Run Command Select in PRG Mode]* to accept or reject a Run command from an external source while in Programming Mode.
–Set *b1-08 = 0 [Disregard RUN while Programming]* to reject the Run command from an external source while in Programming Mode (default).
–Set *b1-08 = 1 [Accept RUN while Programming]* to accept the Run command from an external source while in Programming Mode.
–Set *b1-08 = 2 [Allow Programming Only at Stop]* to prevent changes from Drive Mode to Programming Mode while the drive is operating.

Table 6.3 Drive Mode Screens and Functions

Mode	Keypad Screen	Function
Drive Mode	Monitors	Sets monitor items to display.
Programming Mode	Parameters	Changes parameter settings.
	User Custom Parameters	Shows the User Parameters.
	Parameter Backup/Restore	Saves parameters to the keypad as backup.
	Modified Parameters/Fault Log	Shows modified parameters and fault history.
	Auto-Tuning	Auto-Tunes the drive.
	Initial Setup Screen	Changes initial settings.
	Diagnostic Tools	Sets data logs and backlight.


6.3 LED Status Ring

The LED Status Ring on the drive cover shows the drive operating status.



A - ALM/ERR
B - Ready

C - RUN

LED	Status	Description	
A	ALM/ERR	<ul style="list-style-type: none"> Illuminated: The drive detects a fault. Flashing ^{*1}: The drive detects: <ul style="list-style-type: none"> An alarm An oPE parameter setting error An Auto-Tuning error <p>Note: The LED will illuminate to identify a fault if the drive detects a fault and an alarm at the same time.</p> OFF: There are no drive faults or alarms. 	
	B	Ready	<ul style="list-style-type: none"> Illuminated: The drive is operating or is prepared for operation. Flashing ^{*1}: The drive is in <i>STo</i> [<i>Safe Torque OFF</i>] condition. Flashing Quickly ^{*1}: The voltage of the main circuit power supply dropped, and only the external 24 V power supply provides the power to the drive. OFF: <ul style="list-style-type: none"> The drive detects a fault. There is no fault and the drive received a Run command, but the drive cannot operate. For example, in Programming Mode or when  is flashing.
		C	RUN

*1 Refer to [Figure 6.6](#) for the difference between “flashing” and “flashing quickly”.

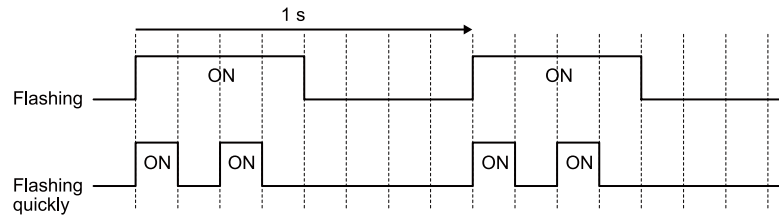


Figure 6.6 LED Flashing Statuses

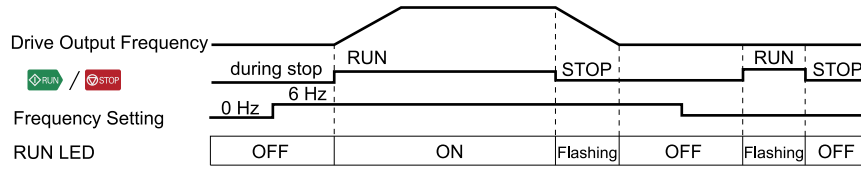


Figure 6.7 Relation between RUN LED and Drive Operation

6.4 Start-up Procedures

This section gives the basic steps necessary to start up the drive.

Use the flowcharts in this section to find the most applicable start-up method for your application.

This section gives information about only the most basic settings.

Note:

Refer to the *A1-06* section to use an Application Preset to set up the drive.

◆ Flowchart A: Connect and Run the Motor with Minimum Setting Changes

Flowchart A shows a basic start-up sequence to connect and run a motor with a minimum of setting changes. Settings can change when the application changes.

Use the drive default parameter settings for basic applications where high precision is not necessary.

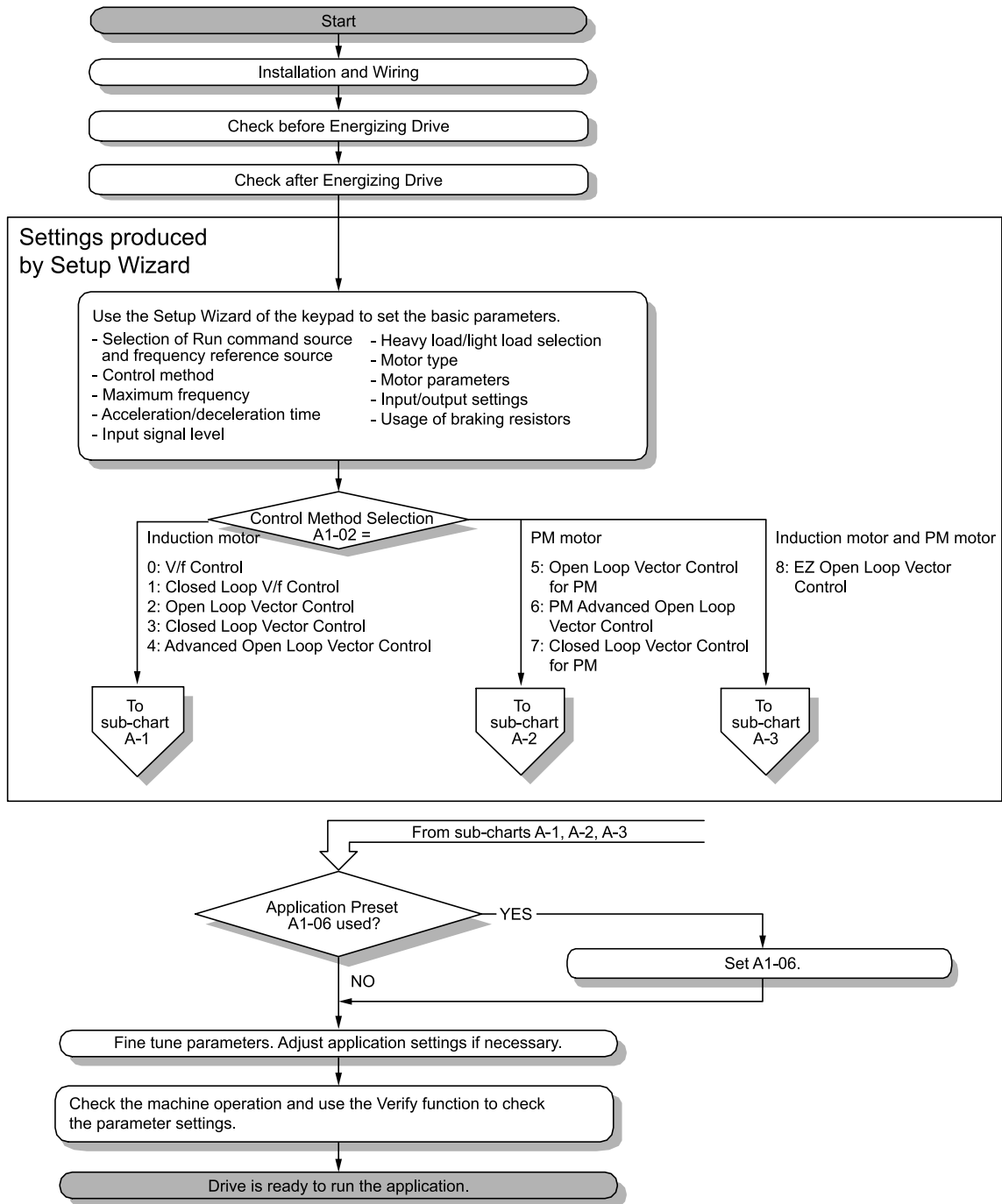


Figure 6.8 Basic Steps before Startup

◆ Sub-Chart A-1: Induction Motor Auto-Tuning and Test Run Procedure

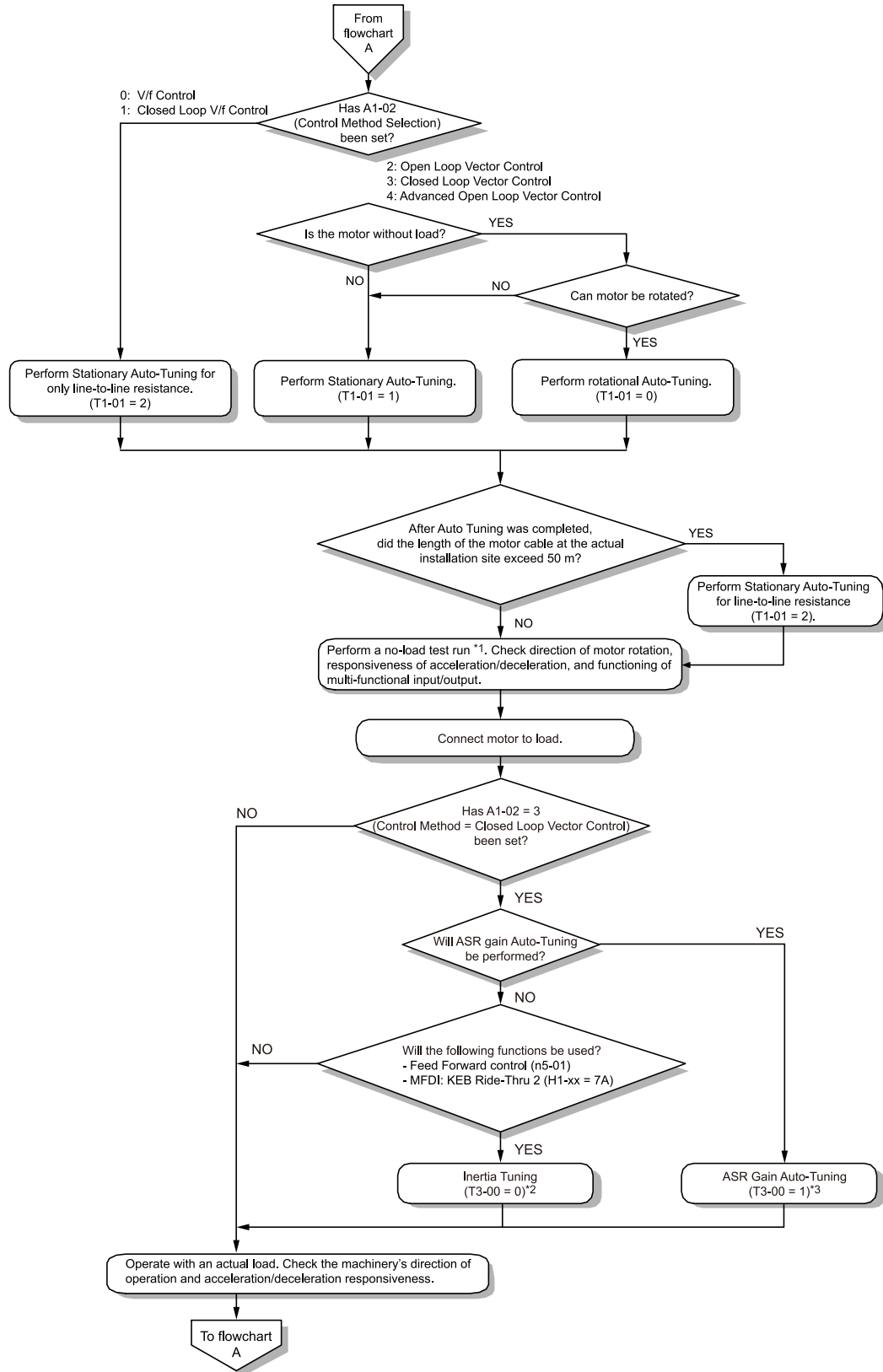


Figure 6.9 Induction Motor Auto-Tuning and Test Run Procedure

6.4 Start-up Procedures

- *1 When $A1-02 = 4$ [Control Method Selection = AOLV], If you operate the drive at a frequency lower than $n4-70$ [Speed Command Comp @ Low Freq] (default setting: 1.00 Hz), the motor can rotate at a frequency about 1/2 of $n4-70$. When you do a test run, set $E1-09 > 0$ [Minimum Output Frequency > 0]. The recommended setting for $E1-09$ is 0.5 Hz.
 - *2 Be sure to release the holding brake before doing Inertia Tuning.
 - *3 In ASR Tuning, the drive will automatically tune Feed Forward control and KEB Ride-Thru 2 parameters.
-

◆ Sub-Chart A-2: PM Motor Auto-Tuning and Test Run Procedure

Sub-Chart A-2 gives the basic steps to start up the drive for a PM motor.

Note:

1. Although Auto-Tuning will set parameters for speed control with an encoder, set $F1-05$ [PG 1 Rotation Selection] before starting Auto-Tuning.
2. If you replace the encoder, do Z Pulse Offset Tuning.

WARNING! *Crush Hazard. Test the system to make sure that the drive operates safely after you wire the drive and set parameters. If you do not test the system, it can cause damage to equipment or serious injury or death.*

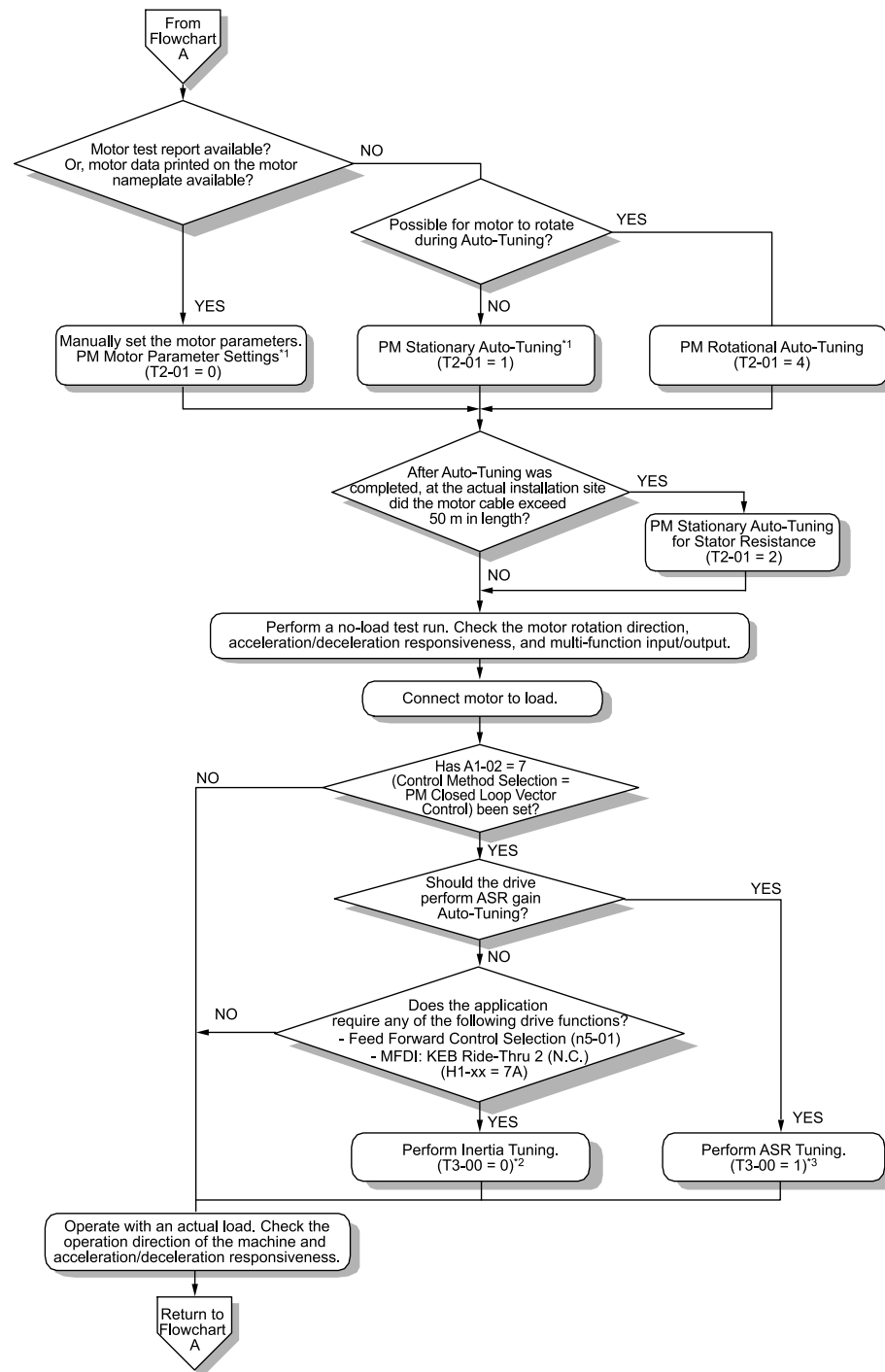


Figure 6.10 PM Motor Auto-Tuning and Test Run Procedure

- *1 For Yaskawa PM motors (SMRA-series, SSR1-series, or SST4-series), set *E5-01* [PM Motor Code Selection]. For PM motors from a different manufacturer, set *E5-01* = *FFFF*.
- *2 Be sure to release the holding brake before doing Inertia Tuning.
- *3 In ASR Tuning, the drive will automatically tune Feed Forward control and KEB Ride-Thru 2 parameters.

◆ Subchart A-3: EZ Open Loop Vector Control Test Run Procedure

Subchart A-3 gives the setup procedure to run a PM motor in EZ Open Loop Vector Control.

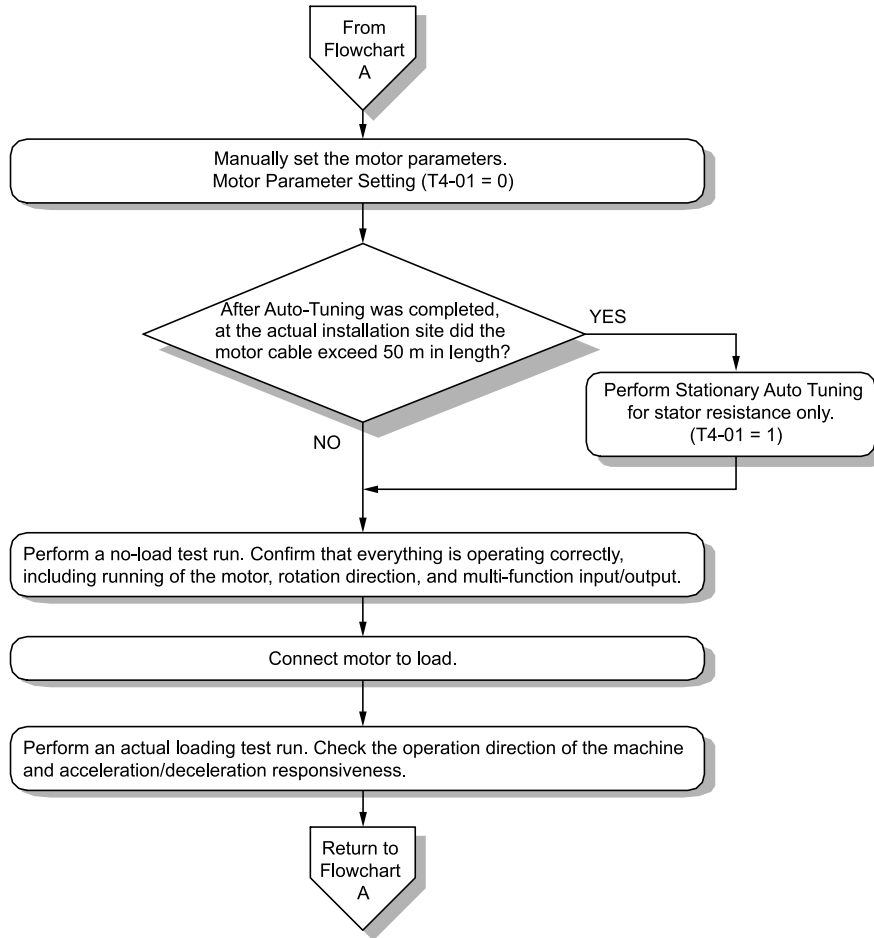


Figure 6.11 Procedure for Test Run of EZ Open Loop Vector Control Method

6.5 Items to Check before Starting Up the Drive

◆ Check before Energizing the Drive

Examine the items in [Table 6.4](#) before you energize the drive.

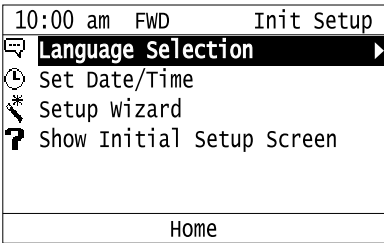
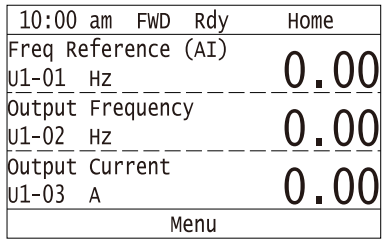
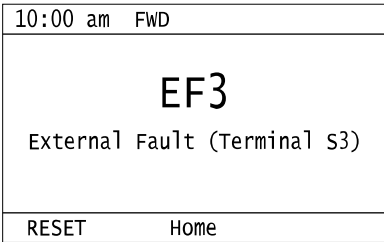



Table 6.4 Items to Check before Energizing the Drive

Items to Check	Description
Input Power Supply Voltage	The voltage of the input power supply must be: 200 V class: three-phase 200 Vac to 240 Vac 50/60 Hz, 270 Vdc to 340 Vdc 400 V class: three-phase 380 Vac to 480 Vac 50/60 Hz, 510 Vdc to 680 Vdc
	Correctly and safely wire power supply input terminals R/L1, S/L2, T/L3.
	Correctly ground the drive and motor.
Connection between Drive Output Terminals and Motor Terminals	Make sure that you connected drive output terminals U/T1, V/T2, and W/T3 in the correct sequence to agree with motor terminals U, V, and W without loosened screws.
Control Circuit Terminal Wiring	Make sure that you connected the drive control circuit terminals in the correct sequence to agree with devices and switches without loosened screws.
Control Circuit Terminal Status	Turn OFF the inputs from all devices and switches connected to the drive control circuit terminals.
Connection between Machinery and Motor	Disengage all couplings and belts that connect the motor and machinery.

◆ Check after You Energize the Drive

Check the items in [Table 6.5](#) after you energize the drive. The keypad display is different depending on drive status.

Table 6.5 Display Status after You Energize the Drive

Status	Display	Description
During Usual Operation	 <p>Initial Setup Screen or</p>  <p>HOME Screen</p>	<ul style="list-style-type: none"> The data display area will show the Initial Setup screen or the HOME screen Energize the drive with factory defaults to show the Initial Setup screen. Select [No] from the [Show Initial Setup Screen] settings to show the HOME screen without showing the Initial Setup screen.
When the Drive Detects a Fault		<p>The display is different for different faults. Refer to "Troubleshooting" to remove the cause of the fault.  will illuminate.</p> <p>Note: If the screen shows a different screen, do these steps to show the fault content again:</p> <ol style="list-style-type: none"> Push  from the HOME screen. Push  (Home) from a different screen than the HOME screen.

Note:

Make sure that you use a keypad that has a flash number of 1004 or later. Keypads that have a flash number of 1003 or earlier will not show characters correctly.

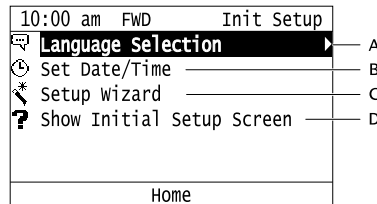
◆ Make the Initial Settings

The keypad will show the Initial Setup screen when you energize the drive for the first time. You can set the date and time and the keypad language. The Setup Wizard prepares the drive for operation, including setting the basic parameters and doing Auto-Tuning. Refer to *Set Parameters Using the Setup Wizard on page 403* for more information.

Note:

If the keypad does not show the Initial Setup screen, select [Initial Setup] from the Main Menu to show the Initial Setup screen.

1. Make the initial settings for each item.



A - Language Selection
B - Set Date/Time

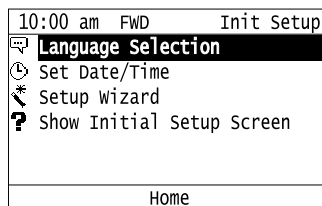
C - Setup Wizard
D - Show Initial Setup Screen

Note:

If you select [Yes] from the [Show Initial Setup Screen] setting, the keypad will show the Initial Setup screen each time the drive is energized.

If you select [NO], the keypad will not show the Initial Setup screen each time the drive is energized, starting with the next time.

2.  Push [Home].



The display shows the HOME screen.

6.6 Keypad Operation

Note:

Make sure that you use a keypad that has a flash number of 1004 or later. Keypads that have a flash number of 1003 or earlier will not show characters correctly.

◆ Home Screen Display Selection

This section gives information about the content shown on the HOME screen and the functions that you can control from the HOME screen.



10:00 am	FWD Rdy	Home
Freq Reference(KPD)		0.00
U1-01	Hz	0.00
Output Frequency		0.00
U1-02	Hz	0.00
Output Current		0.00
U1-03	A	0.00
JOG	Menu	FWD/REV

■ View Monitors Shown in Home Screen





This figure shows monitor data in the data display area of the HOME screen.

10:00 am	FWD Rdy	Home
Freq Reference (KPD)		0.00
U1-01	Hz	0.00
Output Frequency		0.00
U1-02	Hz	0.00
Output Current		0.00
U1-03	A	0.00
JOG	Menu	FWD/REV

Monitor

- To change what the screen shows, change the setting for *o1-40 [Home Screen Display Selection]*.
- When *o1-40 = 0 [Custom Monitor]*, and there is more than one screen, use  or  to switch between screens.

■ JOG Operation

Push  to illuminate . Push and hold  (JOG) to run the motor. Release  (JOG) to stop the motor.



■ Change Motor between Forward/Reverse Run

You can change the direction of motor rotation when operating the drive from the keypad. Push  to illuminate





Push and hold  (FWD/REV) to toggle the direction of motor rotation between forward and reverse.

■ Show the Standard Monitor

Push  to show the standard monitor (*Ux-xx*). When you push  (Home), the keypad goes back to the home screen.

Note:

When a fault, minor fault, or an error occurs, push  to show the content of the fault. Push  again to show the standard monitor (*Ux-xx*).

Change the Frequency Reference Value

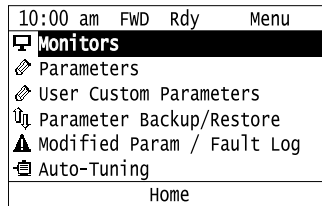
1. Push to access the screen to change the frequency.
2. Push or to select the digit to change, then push or to change the value.
3. Push to keep the changes.

Note:

The HOME screen must show *U1-01 [Frequency Reference]* or you must set the keypad as the Run command source (REMOTE) to use this function.

Show the Main Menu

Push to show the main menu. Push (Home) to go back to the HOME screen.



Show the Monitor

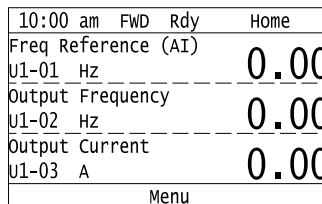
This section shows how to show the standard monitors (*Ux-xx*).

1. Push (Home) to show the HOME screen.

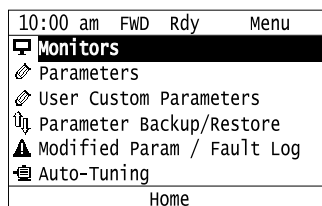
Note:

- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If [Home] is not shown on , push (Back) to show [Home] on .

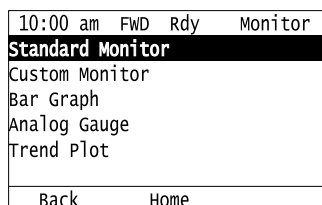
2. Push (Menu).






3. Push or to select [Monitors], then push .





4. Push or to select [Standard Monitor], then push .




5. Push  or  to select monitor group, then push .

10:00 am	FWD	Rdy	Monitor
U1 Operation Status Monitors ▶			
U2 Fault Trace			
U3 Fault History			
U4 Maintenance Monitors			
U5 PID Monitors			
U6 Operation Status Monitors			
Back		Home	

6. Push  or  to change the monitor number to show the monitor item.


Note:

Push  to go back to the previous page.




10:00 am	FWD	Rdy	Monitor
Terminal A1 Input Lv			0.0
U1-13 %			0.0
Terminal A2 Input Lv			0.0
U1-14 %			0.0
Terminal A3 Input Lv			0.0
U1-15 %			0.0
Home			

◆ Set Custom Monitors

You can select and register a maximum of 12 monitoring items to regularly show on the keypad. This procedure shows how to set the motor speed to [Custom Monitor 1].

1. Push  (Home) to show the HOME screen.

Note:

- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If the keypad does not show [Home] on , push  (Back) to show [Home] on .

2. Push  (Menu).




10:00 am	FWD	Rdy	Home
Freq Reference (AI)			0.00
U1-01 Hz			0.00
Output Frequency			0.00
U1-02 Hz			0.00
Output Current			0.00
U1-03 A			0.00
Menu			

3. Push  or  to select [Monitors], then push .

10:00 am	FWD	Rdy	Menu
Monitors ▶			
Parameters			
User Custom Parameters			
Parameter Backup/Restore			
Modified Param / Fault Log			
Auto-Tuning			
Home			

4. Push  or  to select [Custom Monitor], then push  (Setup).

10:00 am	FWD	Rdy	Monitor
Standard Monitor			
Custom Monitor ▶			
Bar Graph			
Analog Gauge			
Trend Plot			
Back		Home Setup	

5. Push  or  to select [Custom Monitor 1], then push .

10:00 am	FWD	Setup
Custom Monitor 1		
Custom Monitor 2		
Custom Monitor 3		
Custom Monitor 4		
Custom Monitor 5		
Custom Monitor 6		
Back	Home	

6. Push  or  to select the monitor number to register, then push .


Set the x-xx part of monitor *Ux-xx*. For example, to show monitor *U1-05*, set it to “105” as shown in this figure.

10:00 am	FWD	Parameters
Custom Monitor 1		
01-24	105	
Motor Speed		
Default : 101		
Back	Default	




The configuration procedure is complete.

◆ Show Custom Monitors

The procedure in this section shows how to show the registered custom monitors.

1. Push  [Home] to show the HOME screen.

Note:




- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on , push  [Back] to show [Home] on .

2. Push  [Menu].

10:00 am	FWD	Rdy	Home
Freq Reference (AI)			
U1-01	Hz	0.00	
Output Frequency			
U1-02	Hz	0.00	
Output Current			
U1-03	A	0.00	
Menu			

3. Push  or  to select [Monitors], then push .



10:00 am	FWD	Rdy	Menu
Monitors			
Parameters			
User Custom Parameters			
Parameter Backup/Restore			
Modified Param / Fault Log			
Auto-Tuning			
Home			

4. Push  or  to select [Custom Monitor], then push .

10:00 am	FWD	Rdy	Monitor
Standard Monitor			
Custom Monitor			
Bar Graph			
Analog Gauge			
Trend Plot			
Back	Home	Setup	


The keypad shows the selected monitor as shown in this figure.

10:00 am	FWD	Rdy	Monitor
Motor Speed			20.00
U1-05 Hz			
Output Power			15.0
U1-08 kw			
Terminal A1 Level			30.0
U1-13 %			
Home			




- When there are a minimum of two screens, push  or  to switch between screens.
- If you registered only one custom monitor to [Custom Monitor 1], the screen will show only one monitor. If you registered custom monitors only to [Custom Monitor 1] and [Custom Monitor 2], the screen will show only two monitors.

◆ Set the Monitors to Show as a Bar Graph

The procedure in this section shows how to show the frequency reference monitor as a bar graph.

1. Push  [Home] to show the HOME screen.







Note:

- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on , push  [Back] to show [Home] on .

2. Push  [Menu].

10:00 am	FWD	Rdy	Home
Freq Reference (AI)			0.00
U1-01 Hz			
Output Frequency			0.00
U1-02 Hz			
Output Current			0.00
U1-03 A			
Menu			

3. Push  or  to select [Monitors], then push .

10:00 am	FWD	Rdy	Menu
 Monitors			
 Parameters			
 User Custom Parameters			
 Parameter Backup/Restore			
 Modified Param / Fault Log			
 Auto-Tuning			
Home			

4. Push  or  to select [Bar Graph], then push  [Setup].

10:00 am	FWD	Rdy	Monitor
Standard Monitor			
Custom Monitor			
Bar Graph			
Analog Gauge			
Trend Plot			
Back	Home	Setup	

5. Push  or  to select the location to store the monitor, then push .

10:00 am	FWD		Setup
Custom Monitor 1			
Custom Monitor 2			
Custom Monitor 3			
Back	Home		

6. Push .

10:00 am FWD	Setup
Custom Monitor 1	
o1-24	101 (101)
1st Monitor Area Selection	
o1-41	0 (0)
Back	Home

7. Push  or  to select the monitor number to register, then push .


Set the x-xx part of monitor *Ux-xx*. For example, to show monitor *U1-01* [Frequency Reference], set it to "101" as shown in this figure.

10:00 am FWD	Parameters
Custom Monitor 1	
o1-24	101
Frequency Reference	
Default : 101	
Back	Default




The configuration procedure is complete.

◆ Show Monitors as Bar Graphs

The procedure in this section shows how to show a specific monitor as a bar graph. You can show a maximum of three.

1. Push  (Home) to show the HOME screen.








Note:




- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If the screen does not show [Home] for , push  (Back), and then push  to show [Home].


2. Push  (Menu).

10:00 am FWD Rdy	Home
Freq Reference (AI)	
U1-01 Hz	0.00
Output Frequency	
U1-02 Hz	0.00
Output Current	
U1-03 A	0.00
Menu	

3. Push  or  to select [Monitors], then push .

10:00 am FWD Rdy	Menu
 Monitors	
 Parameters	
 User Custom Parameters	
 Parameter Backup/Restore	
 Modified Param / Fault Log	
 Auto-Tuning	
Home	

4. Push  or  to select [Display Bar Graph], then push .

10:00 am FWD Rdy	Monitor
Standard Monitor	
Custom Monitor	
Bar Graph	
Analog Gauge	
Trend Plot	
Back	Home Setup

The screen will show the monitors as shown in this figure.

10:00 am	FWD	Rdy	Monitor
U1-01	██████████	██████████	██████████
40.00Hz	-100%	0%	100%
U1-02	██████████	██████████	██████████
40.00Hz	-100%	0%	100%
U1-03	██████████	██████████	██████████
3.0A	-100%	0%	100%
Home			

◆ Set the Monitors to Show as Analog Gauges

The procedure in this section shows how to show the frequency reference monitor as an analog gauge.

1. Push **F2** [Home] to show the HOME screen.







Note:



- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on **F2**, push **F1** [Back] to show [Home] on **F2**.

2. Push **F2** [Menu].

10:00 am	FWD	Rdy	Home
Freq Reference (AI)			
U1-01 Hz	-----		0.00
Output Frequency			
U1-02 Hz	-----		0.00
Output Current			
U1-03 A	-----		0.00
Menu			

3. Push  or  to select [Monitors], then push .

10:00 am	FWD	Rdy	Menu
 Monitors			
 Parameters			
 User Custom Parameters			
 Parameter Backup/Restore			
 Modified Param / Fault Log			
 Auto-Tuning			
Home			

4. Push  or  to select [Analog Gauge], then push **F3** [Setup].

10:00 am	FWD	Rdy	Monitor
Standard Monitor			
Custom Monitor			
Bar Graph			
Analog Gauge			
Trend Plot			
Back		Home Setup	

5. Push .

10:00 am	FWD	Setup
Analog Gauge		
Custom Monitor 1		
o1-24	101	(101)
Analog Gauge Area Selection		
o1-55	1	(1)
Back		Home

6. Push  or  to select the monitor number to register, then push .

Set the x-xx part of monitor U_x-xx . For example, to show monitor $U1-01$ [Frequency Reference], set it to "101" as shown in this figure.

10:00 am FWD	Parameters
Custom Monitor 1	
01-24	101
Frequency Reference	
Default : 101	
Back	Default

The configuration procedure is complete.

◆ Display Monitors as an Analog Gauge

The following explains how to display the contents selected for a monitor as an analog gauge.

1. Push **F2** [Home] to show the HOME screen.

Note:

- The keypad will [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on **F2**, push **F1** [Back] to show [Home] on **F2**.

2. Push **F2** [Menu].

10:00 am FWD Rdy	Home
Freq Reference (AI)	
U1-01 Hz	0.00
Output Frequency	
U1-02 Hz	0.00
Output Current	
U1-03 A	0.00
	Menu

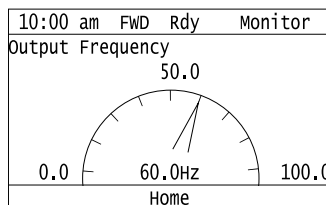
3. Push **▲** or **▼** to select [Monitors], then push **↵**.

10:00 am FWD Rdy	Menu
Monitors	
Parameters	
User Custom Parameters	
Parameter Backup/Restore	
Modified Param / Fault Log	
Auto-Tuning	
	Home

4. Push **▲** or **▼** to select [Analog Gauge], then push **↵**.

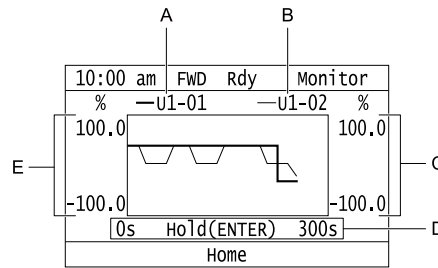
10:00 am FWD Rdy	Monitor
Standard Monitor	
Custom Monitor	
Bar Graph	
Analog Gauge	
Trend Plot	
Back	Home Setup

It will be displayed as follows.



◆ Set Monitoring Items to be Shown as a Trend Plot

You must set the items in this figure to display as a trend plot.



- A - Monitor Parameter 1 (set with [Custom Monitor 1])**
- B - Monitor Parameter 2 (set with [Custom Monitor 2])**
- C - Trend Plot 2 Scale Maximum/Minimum Value**
- D - Trend Plot Time Scale**
- E - Trend Plot 1 Scale Maximum/Minimum Value**

■ Select Monitor Items to Show as a Trend Plot

The procedure in this section shows how to show the frequency reference monitor as a trend plot.

1. Push **F2** [Home] to show the HOME screen.

Note:

- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on **F2**, push **F1** [Back] to show [Home] on **F2**.

2. Push **F2** [Menu].

10:00 am	FWD	Rdy	Home
Freq Reference (AI)			
U1-01	Hz		0.00
Output Frequency			
U1-02	Hz		0.00
Output Current			
U1-03	A		0.00
Menu			

3. Push **▲** or **▼** to select [Monitors], then push **↵**.


10:00 am	FWD	Rdy	Menu
Monitors			
Parameters			
User Custom Parameters			
Parameter Backup/Restore			
Modified Param / Fault Log			
Auto-Tuning			
Home			

4. Push **▲** or **▼** to select [Trend Plot], then push **F3** [Setup].

10:00 am	FWD	Rdy	Monitor
Standard Monitor			
Custom Monitor			
Bar Graph			
Analog Gauge			
Trend Plot			
Back Home Setup			

5. Push **▲** or **▼** to select [Custom Monitor 1], then push **↵**.

10:00 am	FWD		Setup
Custom Monitor 1			
Custom Monitor 2			
Trend Plot Time Scale Setting			
Back Home			

6. Push .

10:00 am FWD	Setup
Custom Monitor 1	
o1-24	101 (101)
Trend Plot 1 Scale Minimum Value	
o1-47	-100.0 (-100.0)%
Back	Home





7. Push  or  to select the monitor number to register, then push .

Set the x-xx part of monitor *Ux-xx*. For example, to show monitor *U1-01* [*Frequency Reference*], set it to "101" as shown in this figure.



10:00 am FWD	Parameters
Custom Monitor 1	
o1-24	101
Frequency Reference	
Default : 101	
Back	Default


8. Push  or  to select [Trend Plot 1 Scale Minimum Value], then push .

10:00 am FWD	Setup
Custom Monitor 1	
Trend Plot 1 Scale Minimum Value	
o1-47	-100.0 (-100.0)%
Trend Plot 1 Scale Maximum Value	
o1-48	100.0 (100.0)%
Back	Home




9. Push  or  to select the specified digit, then push  or  to select the correct number.

10:00 am FWD	Parameters
Trend Plot 1 Scale Minimum Value	
o1-47	1 00.0 %
Default : -100.0%	
Range : -300.0~ 99.9	
Back	Default Min/Max

- Push  [Default] to set the parameters to factory defaults.
- Push  [Min/Max] to move between the minimum value and maximum value.

10. Push  to keep the changes.

10:00 am FWD	Parameters
Trend Plot 1 Scale Minimum Value	
o1-47	00 2 0.0 %
Default : -100.0%	
Range : -300.0~ 99.9	
Back	Default Min/Max

11. Push  or  to select [Trend Plot 1 Scale Maximum Value], then push .

10:00 am FWD	Setup
Custom Monitor 1	
Trend Plot 1 Scale Minimum Value	
o1-47	100.0 (-100.0)%
Trend Plot 1 Scale Maximum Value	
o1-48	100.0 (100.0)%
Back	Home

12. Push or to select the specified digit, then push or to select the correct number.

10:00 am	FWD	Parameters
Trend Plot 1 Scale Maximum Value		
01-48	0	100.0 %
Default : 100.0%		
Range : 20.1~ 300.0		
Back	Default	Min/Max

- Push [Default] to set the parameters to factory defaults.
- Push [Min/Max] to move between the minimum value and maximum value.

13. Push to keep the changes.

10:00 am	FWD	Parameters
Trend Plot 1 Scale Maximum Value		
01-48	00	80.0 %
Default : 100.0%		
Range : 20.1~ 300.0		
Back	Default	Min/Max

14. Push [Back].

If necessary, use the same procedure to set [Custom Monitor 2].

■ Set the Time Scale for the Trend Plot Monitor

The procedure in this section shows how to set the time scale for the trend plot monitor.

1. Push (Home) to show the HOME screen.

Note:

- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on , push (Back) to show [Home] on .

2. Push (Menu).

10:00 am	FWD	Rdy	Home
Freq Reference (AI)			
U1-01	Hz		0.00
Output Frequency			
U1-02	Hz		0.00
Output Current			
U1-03	A		0.00
Menu			

3. Push or to select [Monitors], then push .

10:00 am	FWD	Rdy	Menu
Monitors			
Parameters			
User Custom Parameters			
Parameter Backup/Restore			
Modified Param / Fault Log			
Auto-Tuning			
Home			

4. Push or to select [Trend Plot], then push (Setup).

10:00 am	FWD	Rdy	Monitor
Standard Monitor			
Custom Monitor			
Bar Graph			
Analog Gauge			
Trend Plot			
Back Home Setup			

5. Push or to select [Trend Plot Time Scale Setting], then push .

10:00 am	FWD	Setup
1st Monitor Setting		
2nd Monitor Setting		
Trend Plot Time Scale Setting ▶		
Back	Home	

6. Push or to select the specified digit, then push or to select the correct number.

10:00 am	FWD	Parameters
Trend Plot Time Scale Setting		
01-51	0 300	sec
Default : 300sec		
Range : 1~3600		
Back	Default	Min/Max

- Push (Default) to set the parameters to the factory default.
- Push (Min/Max) to move between the minimum value and maximum value.

7. Push to keep the changes.

10:00 am	FWD	Parameters
Trend Plot Time Scale Setting		
01-51	1 300	sec
Default : 300sec		
Range : 1~3600		
Back	Default	Min/Max

The configuration procedure is complete.

◆ Show Monitor Items as a Trend Plot

The procedure in this section shows how to show the selected monitor data as a trend plot.

1. Push [Home] to show the HOME screen.

Note:


- The keypad will [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on , push [Back] to show [Home] on .

2. Push [Menu].

10:00 am	FWD	Rdy	Home
Freq Reference (AI)			
U1-01	Hz	0.00	
Output Frequency			
U1-02	Hz	0.00	
Output Current			
U1-03	A	0.00	
Menu			

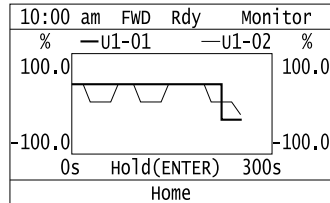
3. Push or to select [Monitors], then push .

10:00 am	FWD	Rdy	Menu
Monitors ▶			
Parameters			
User Custom Parameters			
Parameter Backup/Restore			
Modified Param / Fault Log			
Auto-Tuning			
Home			


4. Push  or  to select [Trend Plot], then push .

10:00 am FWD Rdy Monitor
Standard Monitor
Custom Monitor
Bar Graph
Analog Gauge
Trend Plot
Back Home Setup

The screen will show the monitors as shown in this figure.




Note:



Push  [Hold] to switch between Pause and Restart for the monitor display. The “Hold (ENTER)” message flashes while you pause monitoring.

◆ Change Parameter Setting Values

This example shows how to change the setting value for *C1-01 [Acceleration Time 1]*. Do the steps in this procedure to set parameters for the application.

1. Push  (Home) to show the HOME screen.

Note:

- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If [Home] is not shown above the , push  (Back).

2. Push  (Menu).




10:00 am FWD Rdy Home
Freq Reference (AI)
U1-01 Hz 0.00
Output Frequency
U1-02 Hz 0.00
Output Current
U1-03 A 0.00
Menu

3. Push  or  to select [Parameters], then push .




10:00 am FWD Menu
Monitors
Parameters
User Custom Parameters
Parameter Backup/Restore
Modified Param / Fault Log
Auto-Tuning
Home

4. Push  or  to select [C Tuning], then push .





10:00 am FWD Parameters
A Initialization Parameters
b Application
C Tuning
d References
E Motor Parameters
F Options
Back Home

5. Push  or  to select [C1 Accel & Decel Time], then push .



10:00 am	FWD	Parameters
C1 Accel & Decel Time ▶		
C2 S-Curve Characteristics		
C3 Slip Compensation		
C4 Torque Compensation		
C6 Duty & Carrier Frequency		
Back	Home	


6. Push  or  to select C1-01, then push .

10:00 am	FWD	Parameters
Acceleration Time 1		
C1-01	10.0	(10.0)sec
Deceleration Time 1		
C1-02	10.0	(10.0)sec
Acceleration Time 2		
C1-03	10.0	(10.0)sec
Back	Home	



7. Push  or  to select the specified digit, then push  or  to select the correct number.

10:00 am	FWD	Parameters
Acceleration Time 1		
C1-01	0010.0sec	
Default : 10.0sec		
Range : 0.0~6000.0		
Back	Default	Min/Max

- Push  (Default) to set the parameter to factory default.
- Push  (Min/Max) to show the minimum value or the maximum value on the display.

8. Push  to keep the changes.

10:00 am	FWD	Parameters
Acceleration Time 1		
C1-01	0020.0 sec	
Default : 10.0 sec		
Range : 0.0~6000.0		
Back	Default	Min/Max


9. Continue to change parameters, then push  (Back),  (Home) to go back to the home screen after you change all the applicable parameters.

◆ Examine User Custom Parameters




The User Custom Parameters show the parameters set in A2-01 to A2-32 [User Parameter 1 to User Parameter 32]. This lets users to quickly access and change settings to these parameters.

Note:

The User Custom Parameters always show A1-06 [Application Selection] at the top of the list. The A2-01 to A2-32 settings change when the A1-06 setting changes, which makes it easier to set and reference the necessary parameter settings.

1. Push  (Home) to show the HOME screen.







Note:



- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If [Home] is not shown on , push  (Back) to show [Home] on .

2. Push **F2** (Menu).

10:00 am	FWD	Rdy	Home
Freq Reference (AI)			
U1-01	Hz		0.00
Output Frequency			
U1-02	Hz		0.00
Output Current			
U1-03	A		0.00
Menu			

3. Push  or  to select [User Custom Parameters], then push .





10:00 am	FWD	Menu
 Monitors		
 Parameters		
 User Custom Parameters		
 Parameter Backup/Restore		
 Modified Param / Fault Log		
 Auto-Tuning		
Home		

4. Push  or  to show the parameter to examine.


10:00 am	FWD	Parameters
Application Preset		
A1-06	0	(0)
Control Method Selection		
A1-02	2	(2)
Frequency Reference Selection 1		
b1-01	1	(1)
Back	Home	

5. To re-edit a parameter, push  or , select the parameter to edit, then push .

10:00 am	FWD	Parameters
Application Preset		
A1-06	0	(0)
Control Method Selection		
A1-02	2	(2)
Frequency Reference Selection 1		
b1-01	1	(1)
Back	Home	

6. Push  or  to select the digit, then push  or  to change the value.

10:00 am	FWD	Parameters
Control Method Selection		
A1-02	2	
Open Loop Vector Control		
Default : 2		
Back	Default	

7. When you are done changing the value, push .

10:00 am	FWD	Parameters
Control Method Selection		
A1-02	0	
V/f Control		
Default : 2		
Back	Default	

The parameter setting procedure is complete.

◆ Save a Backup of Parameters

You can save a backup of the drive parameters to the keypad. The keypad can store parameter setting values for a maximum of four drives in different storage areas. Backups of the parameter settings can save time when you set parameters after you replace a drive. When you set up more than one drive, you can copy the parameter settings from a drive that completed a test run to the other drives.

Note:

- Stop the motor before you back up parameters.
- The drive will not accept a Run command while it makes a backup.
- The DriveWorksEZ PC software password is necessary to back up *qx-xx* [DriveWorksEZ Parameter] and *rx-xx* [DWEZ Connection Parameter]. If you enter an incorrect password, the drive detects *PWEr* [DWEZ Password Mismatch].

1. Push **F2** (Home) to show the HOME screen.

Note:




- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If [Home] is not shown on **F2**, push **F1** (Back) to show [Home] on **F2**.

2. Push **F2** (Menu).


10:00 am FWD Rdy	Home
Freq Reference (AT)	0.00
U1-01 Hz	-----
Output Frequency	0.00
U1-02 Hz	-----
Output Current	0.00
U1-03 A	-----
Menu	

3. Push  or  to select [Parameter Backup/Restore], then push .




10:00 am FWD	Menu
Monitors	
Parameters	
User Custom Parameters	
Parameter Backup/Restore	▶
Modified Param / Fault Log	
Auto-Tuning	
Home	

4. Push  or  to select the items to back up, then push .

10:00 am FWD	Backup
Select Items to Backup/Restore	
Standard Parameters	▶
Back	Home

5. Push  or  to select [Backup (drive → keypad)], then push .

10:00 am FWD	Backup
Select Desired Action	
Backup (drive → keypad)	▶
Restore (keypad → drive)	
Verify (check for mismatch)	
Erase (backup data of keypad)	
Back	Home

6. Push  or  to select a memory location, then push .

10:00 am	FWD	Backup
Select Backup/Restore Location		
#1	No Data	▶
#2	No Data	
#3	No Data	
#4	No Data	
Back		Home


The keypad shows “End” when the backup procedure completes successfully.

◆ Write Backed-up Parameters to the Drive




You can back up parameters on the keypad and write them to different drives.

Note:

- Always stop the drive before you start to restore the parameter backups.
- While you verify parameters, the drive will not accept Run commands.

1. Push  (Home) to show the HOME screen.

Note:




- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If the screen does not show [Home] for , push  (Back), and then push  to show [Home].

2. Push  (Menu).

10:00 am	FWD	Rdy	Home
Freq Reference (AI)			
U1-01	Hz	-----	0.00
Output Frequency			
U1-02	Hz	-----	0.00
Output Current			
U1-03	A	-----	0.00
Menu			

3. Push  or  to select [Parameter Backup/Restore], then push .

10:00 am	FWD	Menu
Monitors		
Parameters		
User Custom Parameters		
Parameter Backup/Restore	▶	
Modified Param / Fault Log		
Auto-Tuning		
Home		

4. Push  or  to select the item to restore, then push .

10:00 am	FWD	Backup
Select Items to Backup/Restore		
Standard Parameters ▶		
Back		Home

5. Push  or  to select [Restore (keypad → drive)], then push .

10:00 am	FWD	Backup
Select Desired Action		
Backup (drive → keypad)		
Restore (keypad → drive) ▶		
Verify (check for mismatch)		
Erase (backup data of keypad)		
Back		Home

6. Push or to select the backed-up parameter data, then push .

10:00 am FWD	Backup
Select Backup/Restore Location	
#1 2016/01/01 13:00	0-62 ▶
#2 No Data	
#3 No Data	
#4 No Data	
Back	Home

The keypad will show the “End” message when the write process is complete.

Note:

The keypad display changes when the settings and conditions change.

		A	B	C
	10:00 am FWD			Backup
	Select Backup/Restore Location			
F	#1	2016/01/01 14:10	0-62	▶
	#2	2016/01/01 02:10pm	1-62	*
E	#3	----/--/-- --:--	2-62	*
D	#4	No Data		
	Back	Home		

- A - A1-02 [Control Method Selection] settings
- B - o2-04 [Drive Model (KVA) Selection] settings (2 or 3 digits)
- C - Presence of DriveWorksEZ parameter backup
- D - Parameter backup data is not registered
- E - Backup data does not contain the date information
- F - Backup date

◆ Verify Keypad Parameters and Drive Parameters

This procedure makes sure that the parameter setting values that you backed up in the keypad agree with the parameter setting values in the drive.

Note:

- Always stop the drive before you start to verify the parameters.
- While you restore parameters, the drive will not accept Run commands.

1. Push (Home) to show the HOME screen.

Note:




- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If the screen does not show [Home] for , push (Back), and then push to show [Home].

2. Push (Menu).

10:00 am FWD Rdy	Home
Freq Reference (AI)	0.00
U1-01 Hz	
Output Frequency	0.00
U1-02 Hz	
Output Current	0.00
U1-03 A	
Menu	

3. Push or to select [Parameter Backup/Restore], then push .




10:00 am FWD	Menu
Monitors	
Parameters	
User Custom Parameters	
Parameter Backup/Restore	▶
Modified Param / Fault Log	
Auto-Tuning	
Home	

4. Push  or  to select the item to verify, then push .

10:00 am	FWD	Backup
Select Items to Backup/Restore		
Standard Parameters ▶		
Back	Home	

5. Push  or  to select [Verify (drive → keypad)], then push .

10:00 am	FWD	Backup
Select desired action.		
Backup (drive → keypad)		
Restore (keypad → drive)		
Verify (check for mismatch) ▶		
Erase (backup data of keypad)		
Back	Home	

6. Push  or  to select the data to verify, then push .

10:00 am	FWD	Backup
Select Backup/Restore Location		
#1 2016/01/01 13:00 0-62 ▶		
#2 No Data		
#3 No Data		
#4 No Data		
Back	Home	


The keypad shows “End” when the parameter settings backed up in the keypad agree with the parameter settings copied to the drive.

Note:




The keypad shows *vFyE [Parameters do not Match]* when the parameter settings backed up in the keypad do not agree with the parameter settings copied to the drive. Push one of the keys to return to the screen in Step 6.

◆ Delete Parameters Backed Up to the Keypad

This procedure deletes the parameters that you backed up to the keypad.


1. Push  (Home) to show the HOME screen.








Note:




- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If the screen does not show [Home] for , push  (Back), and then push  to show [Home].


2. Push  (Menu).




10:00 am	FWD	Rdy	Home
Freq Reference (AI)			
U1-01	Hz	0.00	
Output Frequency			
U1-02	Hz	0.00	
Output Current			
U1-03	A	0.00	
Menu			

3. Push  or  to select [Parameter Backup/Restore], then push .


10:00 am FWD	Menu
 Monitors	
 Parameters	
 User Custom Parameters	
 Parameter Backup/Restore	
 Modified Param / Fault Log	
 Auto-Tuning	
Home	




4. Push  or  to select the item to delete, then push .


10:00 am FWD	Backup
Select Items to Backup/Restore	
Standard Parameters	
Back Home	

5. Push  or  to select [Erase (backup data of keypad)], then push .

10:00 am FWD	Backup
Select desired action.	

Backup (drive → keypad)	
Restore (keypad → drive)	
Verify (check for mismatch)	
Erase (backup data of keypad)	
Back Home	


6. Push  or  to select the data to delete, then push .

10:00 am FWD	Backup
Select Backup/Restore Location	
#1 2016/01/01 14:10 0-62	
#2 2016/01/01 02:10pm 1-62	
#3 ----/--/-- --:-- 2-62	
#4 No Data	
Back Home	




The keypad will show the “End” message when the write process is complete.

◆ Check Modified Parameters

This procedure will show all parameters that are not at their default values. This is very useful when you replace a drive. This lets you quickly access and re-edit changed parameters. When all parameters are at their default values, the keypad will show “0 Parameters”.

1. Push  (Home) to show the HOME screen.

Note:

- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If [Home] is not shown on , push  (Back) to show [Home] on .








2. Push  (Menu).

10:00 am FWD Rdy	Home
Freq Reference (AI)	
U1-01 Hz	0.00




Output Frequency	
U1-02 Hz	0.00

Output Current	
U1-03 A	0.00
Menu	

3. Push  or  to select [Modified Param / Fault Log], then push .



10:00 am	FWD	Menu
	Monitors	
	Parameters	
	User Custom Parameters	
	Parameter Backup/Restore	
	Modified Param / Fault Log	
	Auto-Tuning	
Home		

4. Push  or  to select [Modified Parameters], then push .

10:00 am	FWD	History
	Modified Parameters	
	Fault Log	
Back Home		

5. Push .





10:00 am	FWD	Modified
User Modified Parameters		
Standard Parameters		
2 Parameters		
Back Home		

6. Push  or  to show the parameter to examine.


10:00 am	FWD	Modified
Acceleration Time 1		
C1-01	20.0	(10.0)sec
Motor Rated Current (FLA)		
E2-01	97.2	(77.2)A
Back Home		

7. To re-edit a parameter, push  or , select the parameter to edit, then push .

10:00 am	FWD	Modified
Acceleration Time 1		
C1-01	20.0	(10.0)sec
Motor Rated Current (FLA)		
E2-01	97.2	(77.2)A
Back Home		

8. Push  or  to select the digit, then push  or  to change the value.

10:00 am	FWD	Parameters
Acceleration Time 1		
C1-01	00 20.0	sec
Default : 10.0sec		
Range : 0.0~6000.0		
Back	Default	Min/Max


9. When you are done changing the value, push .

10:00 am	FWD	Parameters
Acceleration Time 1		
C1-01	0030.0	sec
Default : 10.0sec		
Range : 0.0~6000.0		
Back	Default	Min/Max




The parameter revision procedure is complete.

◆ Restore Modified Parameters to Defaults

This procedure will set all parameters with changed values to their default settings.

1. Push  (Home) to show the HOME screen.








Note:

- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on , push  (Back) to show [Home] on .




2. Push  (Menu).

10:00 am	FWD	Rdy	Home
Freq Reference (AI)			
U1-01	Hz		0.00
Output Frequency			
U1-02	Hz		0.00
Output Current			
U1-03	A		0.00
Menu			

3. Push  or  to select [Modified Param / Fault Log], then push .




10:00 am	FWD	Menu
	Monitors	
	Parameters	
	User Custom Parameters	
	Parameter Backup/Restore	
	Modified Param / Fault Log	
	Auto-Tuning	
Home		

4. Push  or  to select [Modified Parameters], then push .

10:00 am	FWD	History
	Modified Parameters	
	Fault Log	
Back Home		

5. Push .

10:00 am	FWD	Modified
User Modified Parameters		
Standard Parameters		
2 Parameters		
Back Home		

6. Push  or  to select the parameters to return to their default settings, then push .

10:00 am	FWD	Modified
Acceleration Time 1		
C1-01	20.0	(10.0)sec
Motor Rated Current (FLA)		
E2-01	97.2	(77.2)A
Back	Home	

7. Push  (Default).

10:00 am	FWD	Parameters
Acceleration Time 1		
C1-01	0020.0	sec
Default : 10.0sec		
Range : 0.0~6000.0		
Back	Default	Min/Max

8. Push .

10:00 am	FWD	Parameters
Acceleration Time 1		
C1-01	0010.0	sec
Default : 10.0sec		
Range : 0.0~6000.0		
Back	Default	Min/Max


The modified parameters are now set to default values.

◆ Show Fault History




You can examine a maximum of 10 fault codes and dates and times that the faults occurred.

Note:

- To monitor the date and time of faults, you must first set the date and time on the keypad.
- If the keypad does not have a clock battery, you must set the date and time each time you energize the drive.

1. Push  (Home) to show the HOME screen.

Note:

- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on , push  (Back) to show [Home] on .

2. Push  (Menu).

10:00 am	FWD	Rdy	Home
Freq Reference (AI)			
U1-01	Hz		0.00
Output Frequency			
U1-02	Hz		0.00
Output Current			
U1-03	A		0.00
Menu			

3. Push  or  to select [Modified Param / Fault Log], then push .

10:00 am	FWD	Menu
Monitors		
Parameters		
User Custom Parameters		
Parameter Backup/Restore		
Modified Param / Fault Log		
Auto-Tuning		
Home		

4. Push or to select [Fault Log], then push .

10:00 am	FWD	History
Modified Parameters		
▲ Fault Log		
Back Home		

5. Push or to show the fault history you will examine.

10:00 am	FWD	History
Fault History Log		
01 ov	2016/01/01 14:00	Overvoltage
02 oc	2016/01/01 14:00	Overcurrent
Back Home		

◆ Auto-Tuning the Drive

Auto-Tuning uses motor characteristics to automatically set drive parameters.

Refer to the motor nameplate or the motor test report for the necessary information for Auto-Tuning.

VARTSPEED									
3-PHASE PERMANENT MAGNET MOTOR									
TYPE SST4-					POLES E5-04				
PROTECTION					COOLING				
kW	V	Hz	RATING	A	r/min	r _i	E5-05		
E5-02	E1-05			E5-03	E1-04, 06	Ld	E5-06		
						Lq	E5-07		
						Ke	E5-09		
INS.	COOLANT TEMP.	°C	ALTITUDE	m	Δθ'	E5-11			
STD			MASS	kg	Δθ''				
BRG NO	DRIVE	END	OPP	END	Ki				
SER NO			YEAR		Kt				
YASKAWA ELECTRIC CORPORATION JAPAN									
						Si			

Figure 6.12 Motor Nameplate (Example)

WARNING! Sudden Movement Hazard. Before you do Auto-Tuning, remove all personnel and objects from the area around the drive, motor, and load. The drive and motor can start suddenly during Auto-Tuning and cause serious injury or death.

WARNING! Electrical Shock Hazard. During Auto-Tuning, the motor will receive high voltage when the motor is stopped. Do not touch the motor until Auto-Tuning is complete. If you touch a motor that is energized, it can cause serious injury or death.

WARNING! Sudden Movement Hazard. Before you do Rotational Auto-Tuning, disconnect the load from the motor. The load can move suddenly and cause serious injury or death.

This procedure shows how to do Rotational Auto-Tuning.




1. Push (Home) to show the HOME screen.

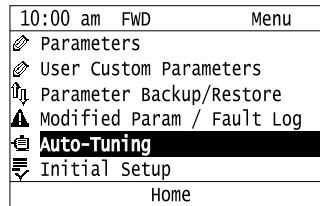
Note:

- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If the screen does not show [Home] for , push (Back), and then push to show [Home].

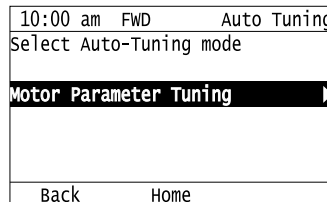
2. Push (Menu).


10:00 am	FWD	Rdy	Home
Freq Reference (AI)			
U1-01	Hz	0.00	
Output Frequency			
U1-02	Hz	0.00	
Output Current			
U1-03	A	0.00	
Menu			

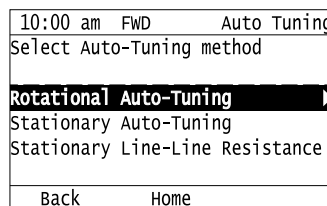
3. Push  or  to select [Auto-Tuning], then push .








4. Push .

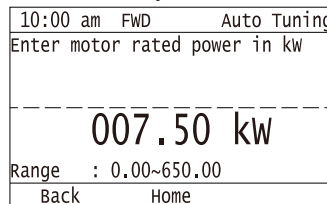


5. Push  or  to select [Rotational Auto-Tuning], then push .



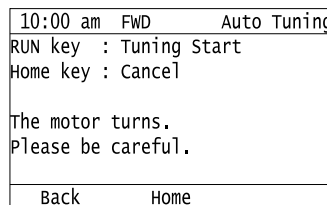
6. Follow the messages shown on the keypad to input the necessary Auto-Tuning data.

Example: Push  or  to select the specified digit, then push  or  to change the number. Push  to save the change and move to the next entry field.





7. Follow the messages shown on the keypad to do the next steps.

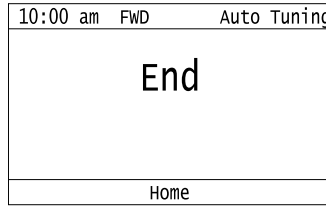
8. When the keypad shows the Auto-Tuning start screen, push .






Auto-Tuning starts.

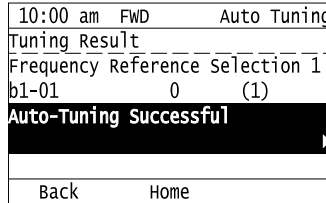
When doing Rotational Auto-Tuning, the motor will stay stopped for approximately one minute with power energized and then the motor will start to rotate.




9. When the keypad shows this screen after Auto-Tuning is complete for 1 or 2 minutes, push  or .



The keypad will show a list of the changed parameters as the result of Auto-Tuning.


10. Push  or  in the parameter change confirmation screen to check the changed parameters, then select [Auto-Tuning Successful] at the bottom of the screen and push .

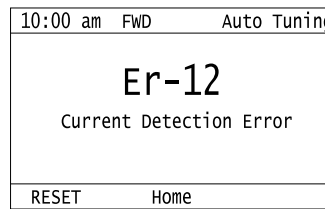
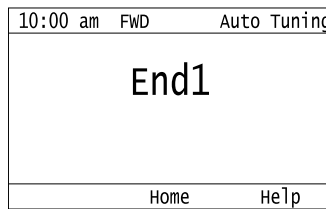


To change a parameter again, push  or  to select the parameter to change, then push  to show the parameter setting screen.

Auto-Tuning is complete.


Note:

If the drive detects an error or you push  before Auto-Tuning is complete, Auto-Tuning will stop and the keypad will show an error code. *Endx* identifies that Auto-Tuning was successful with calculation errors. Find and repair the cause of the error and do Auto-Tuning again, or set the motor parameters manually. You can use the drive in the application if you cannot find the cause of the *Endx* error. *Er-xx* identifies that Auto-Tuning was not successful. Find and repair the cause of the error and do Auto-Tuning again.






◆ Set the Keypad Language Display

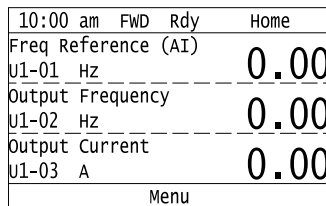
The procedure in this section shows how to set the language shown on the keypad.




1. Push  (Home) to show the HOME screen.








Note:

- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on , push  (Back), to show [Home] on .






2. Push  (Menu).






3. Push  or  to select [Initial Settings], then push .

10:00 am	FWD	Menu
	User Custom Parameters	
	Parameter Backup/Restore	
	Modified Param / Fault Log	
	Auto-Tuning	
	Initial Setup	
	Diagnostic Tools	
	Home	

4. Push  or  to select [Language Selection], then push .

10:00 am	FWD	Init Setup
	Language Selection	
	Set Date/Time	
	Setup Wizard	
	Show Initial Setup Screen	
	Back	Home

5. Push  or  to select the language, then push .

10:00 am	FWD	Init Setup
	Language Selection	
	English	
	Japanese	
	Deutsch	
	Frangais	
	Italiano	
	Back	Home


The procedure to set the keypad language is complete.

◆ Set the Date and Time




The procedure in this section shows how to set the date and time.

Note:

- Refer to [Replace the Keypad Battery on page 76](#) for information about the battery installation procedure.
- To set the drive to detect an alarm when the battery is dead or when the clock is not set, install the battery then set $o4-24 = 1$ [*bAT Detection selection = Enable (Alarm Detected)*].
- If the keypad does not have a clock battery, you must set the date and time each time you energize the drive.

- Push  (Home) to show the HOME screen.

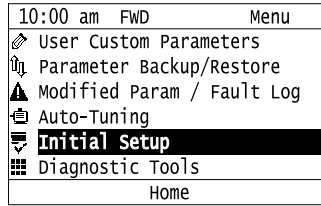
Note:




- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If [Home] is not shown on , push  (Back) to show [Home] on .

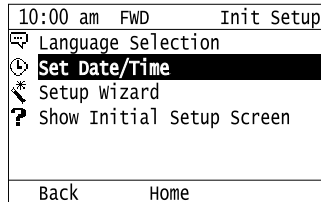
- Push  (Menu).




10:00 am	FWD	Rdy	Home
	Freq Reference (AI)		
	U1-01	Hz	0.00
	Output Frequency		
	U1-02	Hz	0.00
	Output Current		
	U1-03	A	0.00
			Menu

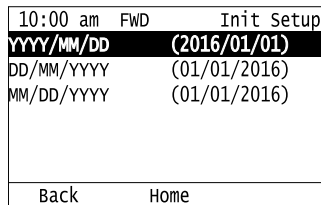
3. Push  or  to select [Initial Setup], then push .






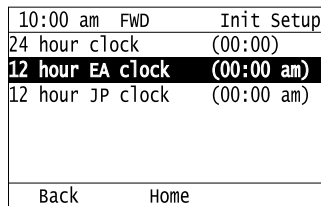
4. Push  or  to select [Set Date/Time], and push .



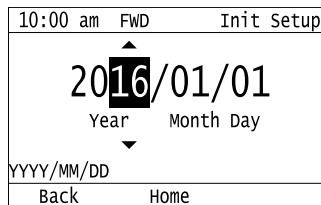
5. Push  or  to select the format of date display, then push .




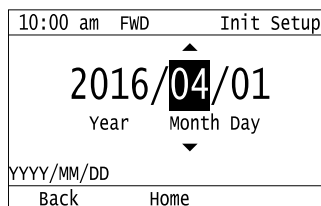
6. Push  or  to select the format of time display, then push .







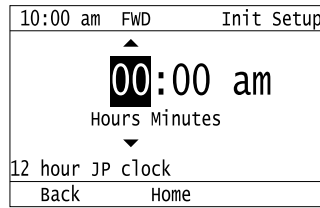
7. Push  or  to select the Year/Month/Day, then push  or  to change the value.




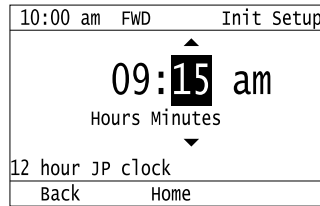
8. When you are done changing the value, push .



9. Push  or  to select the hour or minute, then push  or  to change the value.



10. When you are done setting the time, push .



The procedure for setting the date and time is complete.


◆ Set Parameters Using the Setup Wizard

The Setup Wizard lets users follow simple messages on the keypad to set these basic parameters:



- Frequency Reference Source
- Input signal level
- Run command source
- Duty Rating
- Motor type
- Control Method Selection
- Maximum frequency
- Input/output settings

Note:

The Setup Wizard function will initialize all parameters before it sets the basic parameters.

1. Push  [Home] to show the HOME screen.







Note:




- The keypad will [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on , push  [Back] to show [Home] on .

2. Push  [Menu].




10:00 am FWD Rdy	Home
Freq Reference (AI)	
U1-01 Hz	0.00
Output Frequency	
U1-02 Hz	0.00
Output Current	
U1-03 A	0.00
Menu	

3. Push  or  to select [Initial Setup], then push .

10:00 am FWD	Menu
 User Custom Parameters	
 Parameter Backup/Restore	
 Modified Param / Fault Log	
 Auto-Tuning	
 Initial Setup	
 Diagnostic Tools	
Home	

4. Push  or  to select [Setup Wizard], then push .




10:00 am FWD	Init Setup
Language Selection	
Set Date/Time	
Setup Wizard	
Show Initial Setup Screen	
Back	Home

5. Push  or  to select [Yes], then push .

Note:

This operation will initialize all parameters.




10:00 am FWD	wizard
The setup wizard will reset all parameters to factory defaults. Continue?	
No	
Yes	
Back	Home

6. Push  or  to select the item to set, then push .

10:00 am FWD	wizard
Select speed reference source	
Keypad	
Analog Input	
Memobus/Modbus Communications	
Option PCB	
Back	Home




7. For the next steps, follow the instructions shown on the keypad until the “Parameter Change Confirmation Screen” is shown.




10:00 am FWD	wizard
Pending Parameter Changes	
Control Method Selection	
A1-02	0 (2)
Frequency Reference Selection 1	
b1-01	0 (1)
Back	Home

8. In the parameter change confirmation screen, push  or  to examine the changed parameter, then select [Apply of each parameter] at the bottom of the screen and push .

10:00 am FWD	wizard
Pending Parameter Changes	
Frequency Reference Selection 1	
b1-01	0 (1)
Apply Parameter Changes	
Back	Home

Note:

To change a parameter again, push  or  to select the parameter to change, then push  to show the parameter setting screen.


9. Push  or  to select [Yes], then push .

10:00 am	FWD	Wizard
Should the parameter settings be applied ?		
No		
Yes		
Back	Home	




The Setup Wizard procedure is complete.

◆ Disable the Initial Setup Screen

Do the steps in this procedure to not show the initial start-up screen when the drive is energized.




1. Push  (Home) to show the HOME screen.

Note:




- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If the screen does not show [Home] for , push  (Back), and then push  to show [Home].

2. Push  (Menu).




10:00 am	FWD	Rdy	Home
Freq Reference (AI)			
U1-01	Hz	0.00	
Output Frequency			
U1-02	Hz	0.00	
Output Current			
U1-03	A	0.00	
Menu			

3. Push  /  to select [Initial Setup], then push .

10:00 am	FWD	Menu
User Custom Parameters		
Parameter Backup/Restore		
Modified Param / Fault Log		
Auto-Tuning		
Initial Setup		
Diagnostic Tools		
Home		

4. Push  /  to select [Show Initial Setup Screen], then push .

10:00 am	FWD	Init Setup
Language Selection		
Set Date/Time		
Setup Wizard		
Show Initial Setup Screen		
Back		
Home		

5. Push  /  to select [No], then push .

10:00 am	FWD	Init Setup
Show Initial Setup Screen		
No		
Yes		
Back		
Home		

- [No]: The keypad will not show the Initial Setup Screen when the drive is energized.
- [Yes]: The keypad will show the Initial Setup Screen when the drive is energized.

◆ Start Data Logging

The data log function saves drive status information. Monitors *Ux-xx* are the source of log information. The procedure in this section shows how to start logging data.

There are two types of data log functions:

- Long-term data log: Saves data continuously over an extended time period. You can record a maximum of 10 monitors.
- Short-term data log: Saves data over a set length of time before and after the drive detects a trigger event with a short sampling cycle. You can record a maximum of 4 monitors.




1. Make sure that a microSD card is inserted in the keypad.
2. Push **F2** (Home) to show the HOME screen.







Note:




- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If the screen does not show [Home] for **F2**, push **F1** (Back) and then push **F2** to show [Home].

3. Push **F2** (Menu).

10:00 am FWD Rdy	Home
Freq Reference (AI)	U1-01 Hz 0.00
Output Frequency	U1-02 Hz 0.00
Output Current	U1-03 A 0.00
Menu	

4. Push  or  to select [Diagnostic Tools], then push .

10:00 am FWD	Menu
 User Custom Parameters	
 Parameter Backup/Restore	
 Modified Param / Fault Log	
 Auto-Tuning	
 Initial Setup	
 Diagnostic Tools	
Home	

5. Push  or  to select [Data Logger], then push .

10:00 am FWD	Tools
Data Logger	
Backlight	
Drive Information	
Back Home Setup	

6. Push  or  to select [Yes] or [No], then push .

10:00 am FWD	Tools
Begin Data Logging?	
No	
Yes	
Back Home	

- [Yes]: Data logging starts.
- [No]: Data logging will not start.

If the drive was logging data when you entered the command, the keypad look like this:

- Long-term data log:
 - Start time of the data log

- Elapsed time of the data log

10:00 am FWD	Tools
End Data Logging?	
No	▶
Yes	
Start Time : 2016/01/01 00:00	
Period : 00:10:00	
Back	Home

- Short-term data log:
 - Data log start time or trigger detection time
 - Trigger detection count and the log processing status (Sampling or Recording)

10:00 am FWD	Tools
End Data Logging?	
No	
Yes	▶
Triggered : 2016/01/01 00:00	
Short Log : 1/Sampling	
Back	Home

◆ Configuring the Data Log Content

■ Set Type of Data Log

The procedure in this section shows how to set the type of data log.

1. Push **F2** (Home) to show the HOME screen.

Note:

- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If the screen does not show [Home] for **F2**, push **F1** (Back) and then push **F2** to show [Home].

2. Push **F2** (Menu).

10:00 am FWD Rdy	Home
Freq Reference (AI)	
U1-01 Hz	0.00
Output Frequency	
U1-02 Hz	0.00
Output Current	
U1-03 A	0.00
Menu	

3. Push  or  to select [Diagnostic Tools], then push .




10:00 am FWD	Menu
User Custom Parameters	
Parameter Backup/Restore	
Modified Param / Fault Log	
Auto-Tuning	
Initial Setup	
Diagnostic Tools ▶	
Home	

4. Push  or  to select [Data Logger], then push **F3** (Setup).

10:00 am FWD	Tools
Data Logger ▶	
Backlight	
Drive Information	
Back	Home Setup

5. Push  or  to select [Log Type], then push .

10:00 am	FWD	Setup
Log Type		
Log Sampling Interval		
Log Monitor		
Back	Home	


6. Push  or  to select the type of data log, then push .

10:00 am	FWD	Parameters
Log Type		
05-00	1	
Short Term Log		
Default : 0		
Back	Default	




The procedure to set the type of data log is complete.

■ Set the Sampling Time

The procedure in this section shows how to set the sampling time for data logging.

1. Push  (Home) to show the HOME screen.

Note:

- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If the screen does not show [Home] for , push  (Back) and then push  to show [Home].

2. Push  (Menu).




10:00 am	FWD	Rdy	Home
Freq Reference (AI)			
U1-01	Hz	0.00	
Output Frequency			
U1-02	Hz	0.00	
Output Current			
U1-03	A	0.00	
Menu			

3. Push  or  to select [Diagnostic Tools], then push .

10:00 am	FWD	Menu
User Custom Parameters		
Parameter Backup/Restore		
Modified Param / Fault Log		
Auto-Tuning		
Initial Setup		
Diagnostic Tools		
Home		

4. Push  or  to select [Data Logger], then push  (Setup).

10:00 am	FWD	Tools
Data Logger		
Backlight		
Drive Information		
Back	Home	Setup

5. Push  or  to sselect [Trend Log Sampling Selection], then push .


10:00 am	FWD	Setup
Log Type		
Log Sampling Interval		
Log Monitor		
Back	Home	

6. Push  or  then push  or  to change the value.

10:00 am	FWD	Parameters
Log Sampling Interval		
05-02	1000 ms	
Default : 1000ms		
Range : 100~60000		
Back	Default	Min/Max

Note:

The available sampling times are different for different data log types.

7. After you change the value, push .

10:00 am	FWD	Parameters
Log Sampling Interval		
05-02	20000 ms	
Default : 1000ms		
Range : 100~60000		
Back	Default	Min/Max


The procedure to set the sampling time is complete.

■ Set the Sampling Time for a Trend Log




The procedure in this section shows how to set the sampling time for a trend log. When a trend log is set, it works concurrently with the short-term data log to save the data before the trigger is detected.

Note:

This setting is displayed only when short-term data log is selected for the data log type.

1. Push  (Home) to show the HOME screen.







Note:



- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on , push  (Back) to show [Home] on .

2. Push  (Menu).




10:00 am	FWD	Rdy	Home
Freq Reference (AI)			
U1-01	Hz	0.00	
Output Frequency			
U1-02	Hz	0.00	
Output Current			
U1-03	A	0.00	
Menu			

3. Push  or  to select [Diagnostic Tools], then push .

10:00 am FWD	Menu
 User Custom Parameters	
 Parameter Backup/Restore	
 Modified Param / Fault Log	
 Auto-Tuning	
 Initial Setup	
 Diagnostic Tools	
	Home

4. Push  or  to select [Data Logger], then push  (Setup).

10:00 am FWD	Tools
Data Logger	
Backlight	
Drive Information	
Back	Home Setup

5. Push  or  to sselect [Trend Log Sampling Selection], then push .

10:00 am FWD	Setup
Log Type	
Log Sampling Interval	
Trend Log Sampling Selection	
Log Monitor	
Log Trigger	
Back	Home


6. Push  or  to select the sampling time for the trend log, then push .

10:00 am FWD	Parameters
Trend Log Sampling Selection	
05-21	1
0.1 s (About 1 hour)	
Default : 0	
Back	Default




The procedure to set the sampling time for the trend log is complete.

■ Set Monitor to Log

The procedure in this section shows how to set the monitor for which to log data.




1. Push  (Home) to show the HOME screen.








Note:




- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If the screen does not show [Home] for , push  (Back), and then push  to show [Home].


2. Push  (Menu).

10:00 am FWD Rdy	Home
Freq Reference (AI)	
U1-01 Hz	0.00
Output Frequency	
U1-02 Hz	0.00
Output Current	
U1-03 A	0.00
	Menu


3. Push  or  to select [Diagnostic Tools], then push .




10:00 am	FWD	Menu
	User Custom Parameters	
	Parameter Backup/Restore	
	Modified Param / Fault Log	
	Auto-Tuning	
	Initial Setup	
	Diagnostic Tools	
	Home	

4. Push  or  to select [Data Logger], then push  (Setup).

10:00 am	FWD	Tools
	Data Logger	
	Backlight	
	Drive Information	
	Back	Home Setup

5. Push  or  to select [Log Monitor], then push .

10:00 am	FWD	Setup
	Log Monitor	
	Log Sampling Interval	
	Back	Home

6. Push  or  to select the save-destination monitor parameter, then push .

10:00 am	FWD	Setup
	Log Monitor	
	Log Monitor Data 1	
	o5-03	101 (101)
	Log Monitor Data 2	
	o5-04	102 (102)
	Back	Home

7. Push  or  to select the monitor number to be logged, then push .

10:00 am	FWD	Parameters
	Log Monitor Data 1	
	o5-03	101
	Frequency Reference	
	Default : 101	
	Back	Default


The configuration procedure is complete.

■ Set the Trigger




The procedure in this section shows how to set the trigger for data logging.

Note:

This setting is available only when you select short-term data log as the data log type.




1. Push  (Home) to show the HOME screen.

Note:

- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If the screen does not show [Home] for , push  (Back) and then push  to show [Home].

2. Push **F2** (Menu).

10:00 am FWD Rdy	Home
Freq Reference (AI)	0.00
U1-01 Hz	0.00
Output Frequency	0.00
U1-02 Hz	0.00
Output Current	0.00
U1-03 A	0.00
Menu	

3. Push  or  to select [Diagnostic Tools], then push .

10:00 am FWD	Menu
⚙ User Custom Parameters	
📁 Parameter Backup/Restore	
⚠ Modified Param / Fault Log	
🔧 Auto-Tuning	
📄 Initial Setup	
🔧 Diagnostic Tools	▶
Home	

4. Push  or  to select [Data Logger], then push **F3** (Setup).




10:00 am FWD	Tools
Data Logger	▶
Backlight	
Drive Information	
Back Home Setup	

5. Push  or  to select [Log Trigger], then push .

10:00 am FWD	Setup
Log Type	
Log Sampling Interval	
Trend Log Sampling Selection	
Log Monitor	
Log Trigger	▶
Back Home	

6. Push  or  to select [Trigger Type Selection], then push .




10:00 am FWD	Setup
Trigger Type Selection	▶
Trigger Object	
Trigger Condition	
Pre-Trigger Setting	
Back Home	

7. Push  or  to select the type of trigger, then push .




10:00 am FWD	Parameters
Trigger Type Selection	
o5-15	0
Digital Trigger	
Default : 0	
Back Default	

Note:

There are no detection width or detection time settings for the analog trigger in the data log function. If variations in the analog signal are a problem, select the digital trigger and use o5-16 = 66/67 [Digital Trigger Object = Comparator 1/2]. Use H2-20 [Comparator 1 Monitor Selection] to H2-32 [Comparator 1 Filter Time] to set the conditions for the comparator function.

8. Push  or  to select [Trigger Object], then push .




10:00 am	FWD	Setup
Trigger Type Selection		
Trigger Object		
Trigger Condition		
Pre-Trigger Setting		
Back	Home	

9. Push  or  to select the trigger target, then push .




10:00 am	FWD	Parameters
Digital Trigger Object		
o5-16		
E		
Fault		
Default : E		
Back	Default	

Note:

If analog trigger is the trigger type, set the trigger target and trigger level.

10. Push  or  to select [Trigger Condition], then push .

10:00 am	FWD	Setup
Trigger Type Selection		
Trigger Object		
Trigger Condition		
Pre-Trigger Setting		
Back	Home	

11. Push  or  to select the trigger detections, then push .


10:00 am	FWD	Parameters
Trigger Condition		
o5-19		
0		
Rising Edge		
Default : 0		
Back	Default	

12. Push  or  to select [Pre-Trigger Setting], then push .

10:00 am	FWD	Setup
Trigger Type Selection		
Trigger Object		
Trigger Condition		
Pre-Trigger Setting		
Back	Home	

13. Push  or  then push  or  to change the value.

10:00 am	FWD	Parameters
Pre-Trigger Setting		
o5-20		
090 %		
Default : 90%		
Range : 0-100		
Back	Default	Min/Max


14. After you change the value, push .

10:00 am	FWD	Parameters
Pre-Trigger Setting		
05-20		
070 %		
Default : 90%		
Range : 0-100		
Back	Default	Min/Max




The procedure to set the trigger is complete.

◆ Set Backlight to Automatically Turn OFF

You can set the backlight of the keypad screen to automatically turn OFF after a set length of time since the last key operation on the keypad. The procedure in this section shows how to turn ON and turn OFF the backlight.

1. Push  (Home) to show the HOME screen.

Note:

- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on , push  (Back) to show [Home] on .

2. Push  (Menu).




10:00 am	FWD	Rdy	Home
Freq Reference (AI)			
U1-01	Hz		0.00
Output Frequency			
U1-02	Hz		0.00
Output Current			
U1-03	A		0.00
Menu			

3. Push  or  to select [Diagnostic Tools], then push .

10:00 am	FWD	Menu
User Custom Parameters		
Parameter Backup/Restore		
Modified Param / Fault Log		
Auto-Tuning		
Initial Setup		
Diagnostic Tools		
Home		

4. Push  or  to select [Backlight], then push .

10:00 am	FWD	Tools
Data Logger		
Backlight		
Drive Information		
Back	Home	Setup

5. Push  or  to select [ON] or [OFF], then push .

10:00 am	FWD	Tools
LCD backlight ON/OFF Selection		
OFF		
ON		
Back	Home	





- [ON]: Backlight is always ON
- [OFF]: Backlight turns OFF after set length of time.

6. Push **F3** (Setup).


10:00 am	FWD	Tools
Data Logger		
Backlight ▶		
Drive Information		
Back	Home	Setup

7. Push .

10:00 am	FWD	Setup
Energy Saving		
LCD Backlight Off-Delay		
01-38	60	(60)sec
Back	Home	

8. Push  or  to select the digit, then push  or  to change the value.

10:00 am	FWD	Parameters
LCD Backlight Off-Delay		
01-38		
	060	sec
Default : 60sec		
Range : 10~300		
Back	Default	Min/Max

9. When you are done changing the value, push .

10:00 am	FWD	Parameters
LCD Backlight off-Delay		
01-38		
	030	sec
Default : 60sec		
Range : 10~300		
Back	Default	Min/Max

The procedure to set the backlight to turn OFF automatically is complete.

◆ Show Information about the Drive

The procedure in this section shows how to show the drive model, maximum applicable motor output (HD/ND), rated output current (HD/ND), software version, and the serial number on the keypad.

1. Push **F2** [Home] to show the HOME screen.

Note:

- The keypad will [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on **F2**, push **F1** [Back] to show [Home] on **F2**.

2. Push **F2** [Menu].

10:00 am	FWD	Rdy	Home
Freq Reference (AI)			
U1-01	Hz		0.00
Output Frequency			
U1-02	Hz		0.00
Output Current			
U1-03	A		0.00
Menu			

3. Push or to select [Diagnostic Tools], then push .

10:00 am	FWD	Menu
	User Custom Parameters	
	Parameter Backup/Restore	
	Modified Param / Fault Log	
	Auto-Tuning	
	Initial Setup	
	Diagnostic Tools	
	Home	

4. Push or to select [Drive Information], then push .

10:00 am	FWD	Tools
	Data Logger	
	Backlight	
	Drive Information	
	Back	Home

The keypad will show the drive information.

10:00 am	FWD	Tools	
	GA800		A
	200V, 22.0/30.0kW		B
	88.00/110.0A		C
	<VSA09010>		D
	S/N: J0065F575310100		E
	Back	Home	

- A - Drive Series
- B - Maximum Applicable Motor Output (HD/ND)
- C - Rated Output Current (HD/ND)
- D - Drive software version
- E - Serial number

◆ Show Information about the Communication Option

When you install a JOHB-SMP3, Multi-protocol EtherNet option, the keypad can show information about the option.

1. Push (Home) to show the HOME screen.

Note:

- The keypad will [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on , push (Back) to show [Home] on .

2. Push (Menu).

10:00 am	FWD	Rdy	Home
	Freq Reference (AI)		0.00
	U1-01 Hz		0.00
	Output Frequency		0.00
	U1-02 Hz		0.00
	Output Current		0.00
	U1-03 A		0.00
			Menu

3. Push or to select [Diagnostic Tools], then push .

10:00 am	FWD	Menu
	User Custom Parameters	
	Parameter Backup/Restore	
	Modified Param / Fault Log	
	Auto-Tuning	
	Initial Setup	
	Diagnostic Tools	
	Home	

4. Push  or  to select [Comm. Option Information], then push .

10:00 am	FWD	Tools
Data Logger		
Backlight		
Drive Information		
Comm. Option Information ▶		
Back	Home	

The keypad shows the selected monitor as shown in this example figure.

10:00 am	FWD	Tools	
JOHB-SMP3			A
Ethernet / IP			B
MAC: 00:20:B5:24:3A:D7			C
IP: 192.168.001.020			D
Subnet: 255.255.255.000			E
Gateway: 192.168.001.001			F
Back	Home		




Symbol	Name	Description
A	Station Name	PROFINET protocol shows the station name. All other protocols show "JOHB-SMP3". Note: With PROFINET, the screen shows the station name set on the PLC. If you do not set the station name, the screen shows "No Station Name".
B	Protocol	Shows the protocol set using the DIP switches on the JOHB-SMP3 option.
C	MAC Address	Shows the main MAC address of the JOHB-SMP3 option. Shows the same content as U4-76 to U4-78.
D	IP Address	Shows the IP (Internet Protocol) address assigned to the JOHB-SMP3 option. Shows the same content as U6-80 to U6-83. If there is no IP address assigned to the JOHB-SMP3 option, this will show "000.000.000.000".
E	Subnet Mask	Shows the subnet mask assigned to the JOHB-SMP3 option. Shows the same content as U6-84 to U6-87. If there is no subnet mask assigned to the JOHB-SMP3 option, this will show "000.000.000.000".
F	Gateway Address	Shows the gateway address assigned to the JOHB-SMP3 option. Shows the same content as U6-88 to U6-91. If there is no gateway address assigned to the JOHB-SMP3 option, this will show "000.000.000.000".

◆ Write Automatically Backed-up Parameters to the Drive




You can automatically back up parameters to the keypad connected to the drive and write those parameters to a drive from the same drive series as specified by the settings of o3-06 [Auto Parameter Backup Selection] and o3-07 [Auto Parameter Backup Interval].

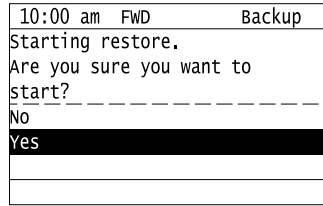
Note:

- Set o3-06 = 1 [Auto Parameter Backup Selection = Enabled] in each drive to which you will write the parameters.
- This operation is not available when the parameters in the keypad and the parameters on the other drives are set to the same values.

1. Connect the keypad to the drive.
2. Push  or  to select [Yes], then push .

10:00 am	FWD	Backup
Drive and Keypad mismatch, Should the parameters be restored? _____		
No		
Yes ▶		

3. Push  or  to select [Yes], then push .



The keypad will show the “End” message when the write process is complete.

6.7 Automatic Parameter Settings Optimized for Specific Applications (Application Presets)

The drive has application presets to set the necessary parameters for different applications to their best values. Use *A1-06* from [User Custom Parameters] on the Main menu to check the parameters that were automatically changed by the application preset function.

Note:

Make sure that you set *A1-03* = 2220, 3330 [Initialize Parameters = 2-Wire Initialization, 3-Wire Initialization] to initialize parameters before you set *A1-06*.

This section shows the procedure to set an application preset.

1. Push **F2** (Home) to show the HOME screen.

Note:

- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on **F2**, push **F1** (Back) to show [Home] on **F2**.

2. Push **F2** (Menu).




10:00 am	FWD	Rdy	Home
Freq Reference (AI)			0.00
U1-01	Hz		0.00
Output Frequency			0.00
U1-02	Hz		0.00
Output Current			0.00
U1-03	A		0.00
Menu			

3. Push  or  to select [Parameters], then push .




10:00 am	FWD		Menu
Monitors			
Parameters			
User Custom Parameters			
Parameter Backup/Restore			
Modified Param / Fault Log			
Auto-Tuning			
Home			

4. Push  or  to select [A Initialization Parameters], then push .




10:00 am	FWD		Parameters
A Initialization Parameters			
b Application			
C Tuning			
d References			
E Motor Parameters			
F Options			
Back		Home	

5. Push  or  to select [A1 Initialization], then push .

10:00 am	FWD		Parameters
A1 Initialization			
A2 User Parameters			
Back		Home	

6. Push  or  to select A1-06, then push .

10:00 am	FWD	Parameters
Password		
A1-04	0	(0)
Application Preset		
A1-06	1	(0)
DriveworksEZ Function Selection		
A1-07	0	(0)
Back	Home	

7. Push  or  to change the value, then push .

10:00 am	FWD	Parameters
Application Preset		
A1-06		3
Exhaust fan		
Default : 0		
Back	Default	

The parameter setting procedure is complete.

Note:

- You cannot change the value set in A1-06. To select an application preset, first set A1-03 = 2220 to initialize parameters and then make a selection to A1-06. If initializing all parameters will cause a problem, it is not necessary to change settings.
- When the drive changes to the A1-06 setting, it will also reset the parameters automatically registered to A2-17 to A2-32 [User Parameters 17 to 32] when A2-33 = 1 [User Parameter Auto Selection = Enabled: Auto Save Recent Params].

6.8 Auto-Tuning

Auto-Tuning uses motor characteristics to automatically set drive parameters for vector control. Think about the type of motor, drive control method, and the motor installation environment and select the best Auto-Tuning method.

The keypad will show the messages with prompts to input the necessary parameter information. These prompts are specified by the selected Auto-Tuning method and the control method setting in *A1-02*.

◆ Auto-Tuning for Induction Motors

This section gives information about Auto-Tuning for induction motors. Auto-Tuning sets these parameters:

- Motor parameters *E1-xx*, *E2-xx* (*E3-xx*, *E4-xx* for motor 2)
- Speed feedback detection-use *F1-xx* (only with CLV)

Note:

Do Stationary Auto-Tuning if you cannot do Rotational Auto-Tuning. There can be large differences between the measured results and the motor characteristics when Auto-Tuning is complete. Examine the parameters for the measured motor characteristics after you do Stationary Auto-Tuning.

Table 6.6 Types of Auto-Tuning for Induction Motors

Mode	Parameter Settings	Application Conditions and Benefits	Applicable Control Method (A1-02 Setting)				
			V/f (0)	CL-V/f (1)	OLV (2)	CLV (3)	AOLV (4)
Rotational Auto-Tuning	T1-01 = 0	<ul style="list-style-type: none"> • When you can decouple the motor and load the motor can rotate freely while Auto-Tuning. • When operating motors that have fixed output characteristics. • When it is necessary to use motors that have high-precision control. • When you cannot decouple the motor and load, but the motor load is less than 30%. 	x	x	x	x	x
Stationary Auto-Tuning 1	T1-01 = 1	<ul style="list-style-type: none"> • When you cannot decouple the motor and load, but the motor load is more than 30%. • When the information from the motor test report or motor nameplate is not available. With Stationary Auto-Tuning, the energized drive stays stopped for approximately 1 minute. During this time, the drive automatically measures the necessary motor parameters. • When operating the motor with a light load after Auto-Tuning. The drive can automatically calculate the motor parameter settings necessary for torque control. Set <i>T1-12 = 1</i> [<i>Test Mode Selection = Yes</i>] to do a test run after Auto-Tuning. 	-	-	x	x	x
Line-to-Line Resistance	T1-01 = 2	<ul style="list-style-type: none"> • After Auto-Tuning, the wiring distance between the drive and motor changed by 50 m or more. • When the wiring distance is 50 m or more in the V/f Control mode. • When the motor output and drive capacity are different. 	x	x	x	x	x

■ Input Data for Induction Motor Auto-Tuning

To do Auto-Tuning, input data for the items in [Table 6.7](#) that have an "x". Before starting Auto-Tuning, prepare the motor test report or record the information on the motor nameplate as a reference.

Table 6.7 Input Data for Induction Motor Auto-Tuning

Input Data	Parameter	Unit	Auto-Tuning Mode (T1-01 Setting)		
			Rotational Auto-Tuning (0)	Stationary Auto-Tuning 1 (1)	Line-to-Line Resistance (2)
Motor Rated Power	T1-02	kW	x	x	x
Motor Rated Voltage	T1-03	V	x	x	-
Motor Rated Current	T1-04	A	x	x	x

6.8 Auto-Tuning

Input Data	Parameter	Unit	Auto-Tuning Mode (T1-01 Setting)		
			Rotational Auto-Tuning (0)	Stationary Auto-Tuning 1 (1)	Line-to-Line Resistance (2)
Motor Base Frequency	T1-05	Hz	x	x	-
Number of Motor Poles	T1-06	-	x	x	-
Motor Base Speed	T1-07	min ⁻¹	x	x	-
Encoder Pulse Count (PPR)	T1-08	-	o *1	o *1	-
Motor No-Load Current	T1-09	A	-	x	-
Motor Rated Slip Frequency	T1-10	Hz	-	o *2	-
Motor Iron Loss	T1-11	W	o *3	-	-
Test Mode Selection *4	T1-12	-	-	o *5	-
No-load voltage	T1-13	V	o *6	o *6	-

*1 Input this value when $A1-02 = 3$ [Control Method Selection = Closed Loop Vector].

*2 Shows 0 Hz as the default value. If you do not know the Motor Rated Slip Frequency, keep the setting at 0 Hz.

*3 Input this value when $A1-02 = 0$ or 1 [Control Method Selection = V/f Control or V/f Control w/ PG].

*4 If $T1-12 = 1$ [Test Mode Selection = Yes], when you run the motor in Drive Mode for the first time after Auto-Tuning, the drive will automatically set $E2-02$ [Motor Rated Slip] and $E2-03$ [Motor No-Load Current].

*5 Input this value when $T1-10$ [Motor Rated Slip Frequency] = 0 Hz.

*6 Set the same value to No-Load Voltage as $T1-03$ [Motor Rated Voltage] to get the same characteristics using Yaskawa 1000-Series drives or other legacy models.

◆ Auto-Tuning for PM Motors

This section gives information about Auto-Tuning for PM motors. Auto-Tuning sets these parameters:

- Motor parameters $E1-xx$, $E5-xx$
- Speed feedback detection uses $F1-xx$ (only with CLV/PM)

Table 6.8 Auto-Tuning for PM Motors

Mode	Parameter Settings	Application Conditions and Benefits	Applicable Control Method (A1-02 Setting)		
			OLV/PM (5)	AOLV/PM (6)	CLV/PM (7)
Manual Entry w/ Motor Data Sheet	T2-01 = 0	<ul style="list-style-type: none"> • When the information from the motor test report or motor nameplate is available. • Rotational/Stationary Auto-Tuning that energizes the motor is not done. Manually input the necessary motor parameters. 	x	x	x
PM Stationary Auto-Tuning	T2-01 = 1	<ul style="list-style-type: none"> • When the information from the motor test report or motor nameplate is not available. <p>Note: With Stationary Auto-Tuning, the energized drive stays stopped for approximately 1 minute. During this time, the drive automatically measures the necessary motor parameters.</p>	x	x	x
PM Stationary Auto-Tuning for Stator Resistance	T2-01 = 2	<ul style="list-style-type: none"> • After Auto-Tuning, the wiring distance between the drive and motor changed by 50 m (164 ft) or more. • When the motor output and drive capacity are different. 	x	x	x
Z-Pulse Offset (Pole Position)	T2-01 = 3	<ul style="list-style-type: none"> • When you do not know the encoder Z-pulse offset. • When the encoder was replaced • If you have compensated for the deviation from Z phase ($\Delta\theta$). <p>Note: The motor will rotate slowly while the drive measures the encoder base position.</p>	-	-	x

Mode	Parameter Settings	Application Conditions and Benefits	Applicable Control Method (A1-02 Setting)		
			OLV/PM (5)	AOLV/PM (6)	CLV/PM (7)
Rotational (Ld, Lq, R, back-EMF)	T2-01 = 4	<ul style="list-style-type: none"> When the information from the motor test report or motor nameplate is not available. When you can decouple the motor and load and the motor can rotate freely while Auto-Tuning. The drive will automatically set the values measured during Auto-Tuning to the motor parameters. 	x	x	x
High Frequency Injection	T2-01 = 5	<ul style="list-style-type: none"> Automatically sets the control parameters that are necessary to set $n8-35 = 1$ [Initial Pole Detection Method = High Frequency Injection] or $n8-57 = 1$ [HFI Overlap Selection = Enabled]. Applicable to IPM motors only. Do Auto-Tuning with the motor connected to the drive. <p>Note: When you set $n8-35 = 1$ or $n8-57 = 1$, do High Frequency Injection Auto-Tuning. Set the data on the motor nameplate to the drive before you do High Frequency Injection Auto-Tuning. In High Frequency Injection Auto-Tuning, the drive energizes the stopped motor and automatically adjusts the parameters.</p>	x	x	x

■ Input Data for PM Motor Auto-Tuning

To do Auto-Tuning, input data for the items in [Table 6.9](#) and [Table 6.10](#) that have an "x". Before you start Auto-Tuning, prepare the motor test report or record the information from the motor nameplate as a reference.

Table 6.9 Input Data for PM Motor Auto-Tuning

Input Data	Parameter	Unit	Auto-Tuning Mode (T2-01 Setting)					
			Manual Entry w/ Motor Data Sheet (0)			PM Stationary Auto-Tuning (1)		PM Stationary Auto- Tuning for Stator Resistance (2)
Control Method Selection	A1-02	-	5, 6, 7	5	6, 7	5	6, 7	5, 6, 7
PM Motor Code Selection	T2-02	-	Motor code of Yaskawa motor *1	FFFF *2	FFFF *2	-	-	-
PM Motor Type	T2-03	-	-	-	-	x	x	-
PM Motor Rated Power	T2-04	kW	-	x	x	x	x	-
PM Motor Rated Voltage	T2-05	V	-	x	x	x	x	-
PM Motor Rated Current	T2-06	A	-	x	x	x	x	x
PM Motor Base Frequency	T2-07	Hz	-	x	-	x	-	-
Number of PM Motor Poles	T2-08	-	-	x	x	x	x	-
PM Motor Base Speed	T2-09	min ⁻¹	-	-	x	-	x	-
PM Motor Stator Resistance	T2-10	Ω/mΩ	x	x	x	-	-	-
PM Motor d-Axis Inductance	T2-11	mH	x	x	x	-	-	-
PM Motor q-Axis Inductance	T2-12	mH	x	x	x	-	-	-
Back-EMF Units Selection	T2-13	-	x	x	x	-	-	-
Back-EMF Voltage Constant (Ke)	T2-14	*3	x	x	x	-	-	-
Pull-In Current Level	T2-15	%	-	-	-	x	x	-
Encoder Pulse Count (PPR)	T2-16	-	*4	-	*4	-	*4	-
Encoder Z-Pulse Offset for PM Motor	T2-17	Degrees	*4	-	*4	-	*4	-

*1 Set the motor code for a Yaskawa PM motor.

*2 Set the motor code to FFFF for a PM motor from a different manufacturer.

*3 Changes when the value set in T2-13 changes.

6.8 Auto-Tuning

*4 Input this value when $A1-02 = 7$ [Control Method Selection = PM Closed Loop Vector Control].

Table 6.10 Input Data for PM Motor Auto-Tuning

Input Data	Parameter	Unit	Auto-Tuning Mode (T2-01 Setting)				
			Z-Pulse Offset (Pole Position) (3)	Rotational (Ld, Lq, R, back-EMF) (4)			High Frequency Injection (5)
Control Method Selection	A1-02	-	7	5	6	7	5, 6, 7
PM Motor Code Selection	T2-02	-	-	-	-	-	-
PM Motor Type	T2-03	-	-	x	x	x	-
PM Motor Rated Power	T2-04	kW	-	x	x	x	-
PM Motor Rated Voltage	T2-05	V	-	x	x	x	-
PM Motor Rated Current	T2-06	A	-	x	x	x	-
PM Motor Base Frequency	T2-07	Hz	-	x	-	-	-
Number of PM Motor Poles	T2-08	-	-	x	x	x	-
PM Motor Base Speed	T2-09	min ⁻¹	-	-	x	x	-
PM Motor Stator Resistance	T2-10	Ω/mΩ	-	-	-	-	-
PM Motor d-Axis Inductance	T2-11	mH	-	-	-	-	-
PM Motor q-Axis Inductance	T2-12	mH	-	-	-	-	-
Back-EMF Units Selection	T2-13	-	-	-	-	-	-
Back-EMF Voltage Constant (Ke)	T2-14	*I	-	-	-	-	-
Pull-In Current Level	T2-15	%	-	x	x	x	-
Encoder Pulse Count (PPR)	T2-16	-	-	-	-	x	-
Encoder Z-Pulse Offset for PM Motor	T2-17	Degrees	-	-	-	-	-

*1 Changes when the value set in T2-13 changes.

◆ Auto-Tuning in EZ Open Loop Vector Control Method

This section gives information about the Auto-Tuning mode for EZ Open Loop Vector Control. Auto-Tuning will set the E9-xx parameters.

Table 6.11 EZ Tuning Mode Selection

Mode	Parameter Settings	Application Conditions and Benefits	Applicable Control Method (A1-02 Setting)
Motor Parameter Setting	T4-01 = 0	<ul style="list-style-type: none"> Applicable when driving an induction motor or a PM motor Suitable for derating torque applications, for example fans and pumps. 	EZOLV (8)
Line-to-Line Resistance	T4-01 = 1	<ul style="list-style-type: none"> After Auto-Tuning, the wiring distance between the drive and motor changed by 50 m or more. When the motor output and drive capacity are different. 	EZOLV (8)

■ Auto-Tuning Input Data in EZ Open Loop Vector Control Method

To do Auto-Tuning, input data for the items in Table 6.12 that have an "x". Before you start Auto-Tuning, prepare the motor test report or record the information from the motor nameplate as a reference.

Table 6.12 Auto-Tuning Input Data in EZ Open Loop Vector Control Method

Input Data	Parameter	Unit	Auto-Tuning Mode (T4-01 Setting)	
			Motor Parameter Setting (0)	Line-to-Line Resistance (1)
Motor Type Selection	T4-02	-	x	-
Motor Max Revolutions	T4-03	min ⁻¹	x	-
Motor Rated Revolutions	T4-04	min ⁻¹	x	-
Motor Rated Frequency	T4-05	Hz	x	-
Motor Rated Voltage	T4-06	V	x	-
Motor Rated Current (FLA)	T4-07	A	x	x
PM Motor Rated Power (kW)	T4-08	kW	x	x
Number of Motor Poles	T4-09	-	x	-

◆ Control Tuning

To increase drive responsiveness and prevent hunting, use Auto-Tuning to automatically adjust the control-related parameters.

These types of Auto-Tuning are available for the control system:

- Inertia Tuning
- ASR Tuning
- Deceleration Rate Tuning
- KEB Tuning

Note:

If you do Control Tuning, you cannot set $H1-xx = 16$ [Motor 2 Selection]. Do not do Control Tuning for applications that switch between motor 1 and motor 2.

Table 6.13 Control Loop Tuning Selection

Mode	T3-00	Application Conditions and Benefits	Applicable Control Method (A1-02 Value)								
			V/f (0)	CL-V/f (1)	OLV (2)	CLV (3)	AOLV (4)	OLV/PM (5)	AOLV/ PM (6)	CLV/PM (7)	EZOLV (8)
Inertia Tuning	0	<ul style="list-style-type: none"> • For Feed Forward Control • When $L2-29 = 1$ [Kinetic Energy Backup Method = Single Drive KEB Ride-Thru 2]. • When MFDI $H1-xx = 7A$ [KEB Ride-Thru 2 Activate (N.C.)]. 	-	-	-	x	-	-	-	x	-
ASR Tuning	1	To let the set response frequency (including Inertia Tuning) automatically adjust the ASR gain.	-	-	-	x	-	-	-	x	-
Deceleration Rate Tuning	2	To automatically adjust the deceleration rate to prevent an <i>ov</i> [Overvoltage] fault.	x	x	x	x	x	x	x	x	x
KEB Tuning	3	<ul style="list-style-type: none"> • To automatically adjust parameter settings to prevent an <i>ov</i> [Overvoltage] fault with the KEB Ride-Thru function. • When $L3-11 = 1$ [Overvoltage Suppression Select = Enabled]. 	x	x	x	x	x	x	x	x	x

Table 6.14 Input Data for Control Tuning

Input Data	Parameters	Unit	Auto-Tuning Mode (T3-00 Value)			
			Inertia Tuning (0)	ASR (Speed Regulator) (1)	Dec Rate Tuning (2)	KEB Tuning (3)
Test Signal Frequency	T3-01	Hz	x	x	-	-
Test Signal Amplitude	T3-02	Rad	x	x	-	-
Motor Inertia	T3-03	Kg·m ²	x	x	-	-
System Response Frequency	T3-04	Hz	-	x	-	-

■ Inertia Tuning

Inertia Tuning uses the motor speed and torque reference to estimate the system inertia and automatically sets the drive parameters related to the inertia ratio of the machinery and motor. Use Inertia Tuning for Feed Forward control or when $H1-xx = 7A$ [MFDI Function Select = KEB Ride-Thru 2 Activate (N.C.)].

Inertia tuning identifies the load inertia and optimizes the speed loop gain and feed forward gain to get a high level of control capability. You can set the speed response without thinking about the load, which increases the precision when synchronizing multiple drives. Since the motor can continue to operate during a power outage, Inertia Tuning keeps the best ramp to stop deceleration curve for KEB Ride-Thru.

■ ASR Tuning

ASR Tuning estimates the motor load inertia and automatically sets the parameters. ASR Tuning also uses the measured load inertia value to do an automatic adjustment after calculating the proportional gain of speed control (ASR).

■ Deceleration Rate Tuning

Deceleration Rate Tuning automatically sets the deceleration rate to prevent an *ov* [Overvoltage] fault during motor deceleration. Set $C1-11$ [Accel/Decel Time Switchover Freq] first to automatically set parameters $C1-02$ [Deceleration Time 1] (high speed range) and $C1-08$ [Deceleration Time 4] (low speed range).

■ KEB Tuning

KEB Tuning automatically sets parameters used for the KEB Ride-Thru function and for the overvoltage suppression function.

Control Tuning automatically sets the parameters in [Table 6.15](#) to the best values.

Table 6.15 Parameters set in Control Tuning

Parameters Automatically Set	Inertia Tuning	ASR Tuning	Deceleration Rate Tuning	KEB Tuning
C1-02 [Deceleration Time 1]	-	-	x	-
C1-08 [Deceleration Time 4]	-	-	x *1	-
C1-09 [Fast Stop Time]	-	-	-	x *2
C5-01 [ASR Proportional Gain 1]	-	x	-	-
C5-17 [Motor Inertia]	x	x	-	-
C5-37 [Motor 2 Inertia]	x	x	-	-
C5-18 [Load Inertia Ratio]	x	x	-	-
C5-38 [Motor 2 Load Inertia Ratio]	x	x	-	-
L2-06 [Kinetic Energy Backup Decel Time]	-	-	-	x *3
L3-24 [Motor Accel Time @ Rated Torque]	x	x	-	-
L3-25 [Load Inertia Ratio]	x	x	-	x

Parameters Automatically Set	Inertia Tuning	ASR Tuning	Deceleration Rate Tuning	KEB Tuning
n5-02 [Motor Inertia Acceleration Time]	x	x	-	-
n5-03 [Feed Forward Control Gain]	x	x	-	-

- *1 The drive automatically sets C1-08 [Deceleration Time 4] only when C1-11 [Accel/Decel Time Switchover Freq] $\neq 0$.
- *2 When L2-29 = 0 [Kinetic Energy Backup Method = Single Drive KEB Ride-Thru 1], the drive will automatically adjust C1-09 [Fast Stop Time] and will not adjust L2-06 [Kinetic Energy Backup Decel Time]. If the Fast Stop time must not change, do not do KEB Tuning.
- *3 When L2-29 = 1, 2, or 3 [Kinetic Energy Backup Method = Single Drive KEB Ride-Thru 2, System KEB Ride-Thru 1, or System KEB Ride-Thru 2], the drive will automatically adjust L2-06 [Kinetic Energy Backup Decel Time].

◆ Precautions before Auto-Tuning

Examine the topics in this section before you start Auto-Tuning.

■ Prepare for Basic Auto-Tuning

- You must input data from the motor nameplate or motor test report to do Auto-Tuning. Make sure that this data is available before you do Auto-Tuning.
- For best performance, make sure that the drive input supply voltage is equal to or more than the motor rated voltage.

Note:

Better performance is possible when you use a motor with a rated voltage that is less than the input supply voltage (by 20 V for 200 V class models or by 40 V for 400 V class models). This is very important when you operate the motor at more than 90% of base speed, where high torque precision is necessary. If the input power supply is equal to the motor rated voltage, the drive output voltage will not be sufficient and performance will decrease.


- Push  on the keypad to cancel Auto-Tuning.
- If a Safe Disable input signal is input to the drive during Auto-Tuning, Auto-Tuning measurements will not complete successfully. If this occurs, cancel Auto-Tuning, then do it again.
- Table 6.16 shows the status of multi-function input/output terminals during Auto-Tuning.

Table 6.16 Status of Input/Output Terminals during Auto-Tuning

Auto-Tuning Type	Mode	Multi-Function Input	Digital Output	
Induction Motor Auto-Tuning	Rotational	Rotational Auto-Tuning	Disabled	Functions the same as during usual operation.
	Stationary	Stationary Auto-Tuning 1	Disabled	Keeps the status at the start of Auto-Tuning.
		Line-to-Line Resistance	Disabled	Keeps the status at the start of Auto-Tuning.
PM Motor Auto-Tuning	Rotational	Z-Pulse Offset (Pole Position)	Disabled	<ul style="list-style-type: none"> PRG: 09012 and earlier: Keeps the status at the start of Auto-Tuning. PRG: 09013 and later: Functions the same as during usual operation.
		Rotational (Ld, Lq, R, back-EMF)	Disabled	Functions the same as during usual operation.
	Stationary	Manual Entry w/ Motor Data Sheet	Disabled	Keeps the status at the start of Auto-Tuning.
		PM Stationary Auto-Tuning	Disabled	Keeps the status at the start of Auto-Tuning.
		PM Stationary Auto-Tuning for Stator Resistance	Disabled	Keeps the status at the start of Auto-Tuning.
EZ Tuning	Stationary	Motor Parameter Setting	Disabled	Keeps the status at the start of Auto-Tuning.
		Line-to-Line Resistance	Disabled	Keeps the status at the start of Auto-Tuning.

Auto-Tuning Type	Mode	Multi-Function Input	Digital Output
ASR and Inertia Tuning	Inertia Tuning	Disabled	Functions the same as during usual operation.
	ASR (Speed Regulator)	Disabled	Functions the same as during usual operation.
	Deceleration Rate Tuning	Disabled	Functions the same as during usual operation.
	KEB Tuning	Disabled	Functions the same as during usual operation.

WARNING! Crush Hazard. Wire a sequence that will not let a multi-function output terminal open the holding brake during Stationary Auto-Tuning. If the holding brake is open during Stationary Auto-Tuning, it can cause serious injury or death.

WARNING! Sudden Movement Hazard. Before you do Rotational Auto-Tuning, disconnect the load from the motor. The load can move suddenly and cause serious injury or death.

WARNING! Injury to Personnel. Rotational Auto-Tuning rotates the motor at 50% or more of the motor rated frequency. Make sure that there are no issues related to safety in the area around the drive and motor. Increased motor frequency can cause serious injury or death.

WARNING! Electrical Shock Hazard. During Auto-Tuning, the motor will receive high voltage when the motor is stopped. Do not touch the motor until Auto-Tuning is complete. If you touch a motor that is energized, it can cause serious injury or death.

■ Precautions before Rotational Auto-Tuning

WARNING! Electrical Shock Hazard. During Auto-Tuning, the motor will receive high voltage when the motor is stopped. Do not touch the motor until Auto-Tuning is complete. If you touch a motor that is energized, it can cause serious injury or death.

- Before you do Rotational Auto-Tuning to prevent drive malfunction, uncouple the motor from the load. If you do Rotational Auto-Tuning with the motor connected to a load that is more than 30% of the motor duty rating, the drive will not correctly calculate the motor parameters and the motor can operate incorrectly.
- When the load is 30% or less of the motor duty rating, you can do Auto-Tuning with the motor connected to a load.
- Make sure that the motor magnetic brake is released.
- Make sure that external force from the machine will not cause the motor to rotate.

■ Precautions before Stationary Auto-Tuning

- Make sure that the motor magnetic brake is not open.
- Make sure that external force from the machine will not cause the motor to rotate.

WARNING! Electrical Shock Hazard. During Auto-Tuning, the motor will receive high voltage when the motor is stopped. Do not touch the motor until Auto-Tuning is complete. If you touch a motor that is energized, it can cause serious injury or death.

Automatically Set E2-02 [Motor Rated Slip] and E2-03 [Motor No-Load Current]

If $T1-12 = 1$ [Test Mode Selection = Yes] when selecting Stationary Auto-Tuning, the drive will automatically set motor parameters E2-02 [Motor Rated Slip] and E2-03 [Motor No-Load Current] after Auto-Tuning is complete when you use the motor for the first time in Drive Mode.

After Stationary Auto-Tuning is complete, use this procedures to do the operation in test mode:

1. Check the E2-02 and E2-03 values on the “Modified Parameters/Fault Log” screen or the “Parameters” screen.
2. Operate the motor in Drive Mode with these conditions:
 - Make sure that you connect all wiring between the drive and motor
 - Make sure that a mechanical brake on the motor shaft is not locked
 - The maximum motor load must be 30% of the rated load.
 - Keep a constant speed of 30% of E1-06 [Base Frequency] (default value = maximum frequency) or more for 1 second or longer.
3. After the motor stops, check the E2-02 and E2-03 values on the “Modified Parameters/Fault Log” screen or the “Parameters” screen again.
4. Make sure that the input data is correct.
When the settings in E2-02 and E2-03 are different than in step 1, the drive set the values automatically.

Note:

- If you cannot operate the motor with the conditions in step 2 for the first test run and if the values set in *E2-02* and *E2-03* are much different than data in the official test report for the motor and the data listed in *Defaults by Drive Model and Duty Rating ND/HD on page 295*, these problems can occur:
 - Motor vibrations or hunting
 - Not sufficient torque
 - Overcurrent

In elevator applications, there is a risk of the cage falling and causing personal injury.

Do one of these precautions to decrease the risk:

- After doing Stationary Auto-Tuning, operate the drive as specified by the conditions and procedure above.
- Set $T1-12 = 0$ [*Test Mode Selection = No*].
- Do Rotational Auto-Tuning.
- If you initialize the drive after completing Step 1, do the procedure beginning from Step 1 again.
- For general-purpose motors, the target value for *E2-02* is 1 Hz to 3 Hz, and the target rated current for *E2-03* is 30% to 65%. Larger capacity motors have a lower rated slip, and a smaller ratio for the no-load current rated current. Refer to *Defaults by Drive Model and Duty Rating ND/HD on page 295*.

■ Precautions before Stationary Auto-Tuning for Line-to-Line Resistance and Stator Resistance Auto-Tuning

In V/f control, when the motor cable is 50 meters (164 feet) or longer, do Stationary Auto-Tuning for Line-to-Line Resistance.

WARNING! *Electrical Shock Hazard. During Auto-Tuning, the motor will receive high voltage when the motor is stopped. Do not touch the motor until Auto-Tuning is complete. If you touch a motor that is energized, it can cause serious injury or death.*

■ Precautions before Inertia Tuning and ASR Tuning

Before Inertia Tuning or ASR Tuning, check these items:

WARNING! *Electrical Shock Hazard. During Auto-Tuning, the motor will receive high voltage when the motor is stopped. Do not touch the motor until Auto-Tuning is complete. If you touch a motor that is energized, it can cause serious injury or death.*

- Do rotational motor parameter tuning or look at the motor test report or nameplate to enter the values manually.
- Make sure that the motor magnetic brake is released.
- Connect the motor and load.
- Make sure that external force from the machine will not cause the motor to rotate.
- Make sure that the machine does not prevent reverse rotation. You cannot do Inertia Tuning or ASR Tuning with machines that prevent reverse rotation.
- When the motor can rotate during Auto-Tuning, check for safety issues near the drive, motor, and machine.

Note:

If there are gears between the machine and motor shaft, Inertia Tuning or ASR Tuning are possibly not applicable.

■ Precautions before Using Deceleration Rate Tuning and KEB Tuning

Before Deceleration Rate Tuning or KEB Tuning, check these items:

Note:

- Do not do Deceleration Rate Tuning if you use a braking resistor unit or a regenerative converter.
- Do Deceleration Rate Tuning and KEB Tuning with the load attached to the motor.
- Do not do Deceleration Rate Tuning or KEB Tuning for these applications:
 - In Deceleration Rate Tuning and KEB Tuning, the drive will automatically rotate the motor forward and accelerate and decelerate the motor again and again.
 - On a machine that does not let the motor rotate forward
 - In applications with a small range of operation (trolleys and other such applications that can only move linearly)
 - Applications where sudden acceleration and sudden deceleration are not applicable.
- To do KEB Tuning with the external main circuit capacitors connected to the drive, set *L3-26 [Additional DC Bus Capacitors]* then do KEB Tuning.
- Do not do KEB Tuning or Deceleration Rate Tuning if the drive is set to use $H1-xx = 16$ [*MFDI Function Select = Motor 2 Selection*]. Failure to obey can cause an *ov [Overvoltage]* fault.

6.9 Test Run

After you use the Setup Wizard to set the basic parameters and Auto-Tune the drive, the next step is to do a test run.

WARNING! Crush Hazard. Test the system to make sure that the drive operates safely after you wire the drive and set parameters. If you do not test the system, it can cause damage to equipment or serious injury or death.

◆ No-Load Test Run

Before connecting the motor to the machine, make sure that you check the operation status of the motor.

■ Precautions before Operation

Before rotating the motor, check these items:

- Check for safety issues near the drive, motor, and machine.
- Make sure that all emergency stop circuits and machine safety mechanisms are operating correctly.

■ Items to Check before Operation

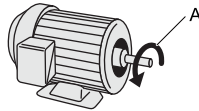
Check these items before operation:

- Is the motor rotating in the forward direction?
- Is the motor rotating smoothly (no unusual sounds or unusual vibrations)?
- Does the motor accelerate/decelerate smoothly?

◆ Do a No-Load Test Run

Do these steps for a no-load test run:

1. Energize the drive, or push **F2** to show the HOME screen.
If [Home] is not shown on **F2**, push **F1** (Back) to show [Home] on **F2**.
2. Push **LO/RE** to illuminate the LOCAL/REMOTE indicator.
3. Push **↻** to show *d1-01 [Reference 1]*, and set it to 6.00 Hz.
4. Push **▶RUN**.
The RUN indicator illuminates, and the motor runs at 6.00 Hz in the forward direction.
5. Make sure that the motor is rotating in the correct direction and that the drive does not show a fault.
If the drive detects a fault, remove the cause.



A - Forward Rotation of Motor (Counter Clockwise Direction as Seen from Load Shaft)


6. Push **▲** to increase the frequency reference value.
Change the setting value in increments of 10 Hz if necessary and examine the response.
7. Each time you increase the setting value, use *U1-03 [Output Current]* to check the drive output current.
When the output current of the drive is not more than the motor rated current, the status is correct.
Ex.: 6 Hz → 20 Hz → 30 Hz → 40 Hz → 50 Hz → 60 Hz
8. Make sure that the motor rotates correctly, then push **STOP**.
The RUN indicator will flash. When the motor stops, the indicator will go out.

◆ Actual-Load Test Run

Test the operation without a load, then connect the motor and machine to do a test run.

■ Precautions before Operation

Before rotating the motor, check these items:









- Check for safety issues near the drive, motor, and machine.
- Make sure that all emergency stop circuits and machine safety mechanisms are operating correctly.
- Make sure that the motor is fully stopped.
- Connect the motor with the machine.
Make sure that there are no loose installation screws and that the motor load shafts and machine junctions are correctly secured.
- Keep the keypad near you to push  immediately if there is unusual or incorrect operation.

■ Items to Check before Operation

- Make sure that the direction of the machine operation is correct (The motor must rotate in the correct direction).
- Make sure that the motor accelerates and decelerates smoothly.

◆ Do an Actual-Load Test Run

Connect the motor and machine, then do the test run with the same procedure you used for the no-load test run.

- Make sure that *U1-03 [Output Current]* is not too high.
 1. Energize the drive, or push  (Home) to show the HOME screen.
If [Home] is not shown on , push  (Back) to show [Home] on .
 2. Set *d1-01 [Reference 1]* to 6.00 Hz.
 3. Push  to illuminate the LOCAL/REMOTE indicator.
 4. Push .
The RUN indicator illuminates, and the motor runs at 6.00 Hz in the forward direction.
 5. Make sure that the motor is rotating in the correct direction and that the drive does not show a fault.
If the drive detects a fault, remove the cause.
 6. Push  to increase the frequency reference value.
Change the setting value in increments of 10 Hz if necessary and examine the response.
 7. Each time you increase the setting value, use *U1-03 [Output Current]* to check the drive output current.
When the output current of the drive is not more than the motor rated current, the status is correct.
Ex.: 6 Hz → 20 Hz → 30 Hz → 40 Hz → 50 Hz → 60 Hz
 8. Make sure that the motor rotates correctly, then push .
The RUN indicator will flash. When the motor stops, the indicator will go out.
 9. Change the frequency reference and direction of motor rotation, and make sure that there are no unusual sounds or vibrations.
 10. If there are hunting or oscillation errors caused by control function, adjust the settings to stop the errors.

6.10 Fine Tuning during Test Runs (Adjust the Control Function)

This section gives information about the adjustment procedures to stop hunting or oscillation errors caused by the control function during a test run. Adjust the applicable parameters as specified by your control method and drive status.

- [V/f Control and Closed Loop V/f Control on page 432](#)
- [Open Loop Vector Control Method on page 433](#)
- [Closed Loop Vector Control Method on page 435](#)
- [Advanced Open Loop Vector Control Method on page 435](#)
- [Open Loop Vector Control for PM Motors on page 437](#)
- [Advanced Open Loop Vector Control Method for PM Motors on page 438](#)
- [Closed Loop Vector Control Method for PM on page 438](#)
- [EZ Open Loop Vector Control Method on page 439](#)

Note:

This section only lists frequently adjusted parameters. If you must adjust parameters that have a higher degree of precision, contact Yaskawa.

◆ V/f Control and Closed Loop V/f Control

Table 6.17 Parameters for Fine Tuning the Drive (V/f and CL-V/f)

Issue	Parameter Number	Possible Solutions	Default	Recommended Setting
Hunting or oscillation in the middle speed range (10 Hz to 40 Hz)	n1-02 [Hunting Prevention Gain Setting]	<ul style="list-style-type: none"> • If torque is not sufficient with heavy loads, decrease the setting value. • If hunting or oscillation occur with light loads, increase the setting value. • If hunting occurs with a low-inductance motor, for example a motor with a larger frame size or a high-frequency motor, lower the setting value. 	1.00	0.10 - 2.00
Hunting or oscillation in the high speed range (120 Hz or more)	C4-25 [High-Speed Voltage Compensation]	Adjust the setting value.	1 [Enabled]	0 [Disabled]
<ul style="list-style-type: none"> • The volume of the motor excitation sound is too high. • Hunting or oscillation in the low speed range (10 Hz or lower), or in the middle speed range (10 Hz to 40 Hz) 	C6-02 [Carrier Frequency Selection]	<ul style="list-style-type: none"> • If the volume of the motor excitation sound is too high, increase the carrier frequency. • If hunting or oscillation occur in the low or middle speed range, decrease the carrier frequency. 	1 (2 kHz) ^{*1}	1 to upper limit value
<ul style="list-style-type: none"> • Unsatisfactory motor torque and speed response • Hunting or oscillation 	C4-02 [Torque Compensation Delay Time]	<ul style="list-style-type: none"> • If torque or speed response are slow, decrease the setting value. • If hunting or oscillation occur, increase the setting value. 	200 ms ^{*2}	100 ms to 1000 ms
<ul style="list-style-type: none"> • Torque in the low speed range (10 Hz or slower) is not sufficient. • Hunting or oscillation 	C4-01 [Torque Compensation Gain]	<ul style="list-style-type: none"> • If torque is not sufficient in the low speed range (10 Hz or slower), increase the setting value. • If hunting or oscillation occur with light loads, decrease the setting value. 	1.00	0.50 - 1.50
<ul style="list-style-type: none"> • Torque in the low speed range (10 Hz or slower) is not sufficient. • Large initial vibration at start up. 	<ul style="list-style-type: none"> • E1-08 [Mid Point A Voltage] • E1-10 [Minimum Output Voltage] 	<ul style="list-style-type: none"> • If torque is not sufficient in the low speed range (10 Hz or slower), increase the setting value. • If there is large initial vibration at start up, decrease the setting value 	<ul style="list-style-type: none"> • E1-08: 15.0 V ^{*3} • E1-10: 9.0 V ^{*3} 	Default setting +/- 5 V ^{*4}

Issue	Parameter Number	Possible Solutions	Default	Recommended Setting
In V/f control method, speed precision is unsatisfactory.	C3-01 [Slip Compensation Gain]	Set E2-01 [Motor Rated Current], E2-02 [Motor Rated Slip], and E2-03 [Motor No-Load Current], then adjust C3-01.	0.0 (no slip compensation)	0.5 - 1.5
In Closed Loop V/f control method, speed precision is unsatisfactory.	<ul style="list-style-type: none"> C5-01 [ASR Proportional Gain 1] C5-02 [ASR Integral Time 1] 	Adjust C5-01, C5-02.	<ul style="list-style-type: none"> C5-01: 0.20 C5-02: 0.200 s 	<ul style="list-style-type: none"> Proportional gain = 0.10 to 1.00 Integral time = 0.100 to 2.000 s

- *1 The default setting changes when the settings for C6-01 [Normal / Heavy Duty Selection] and o2-04 [Drive Model (KVA) Selection] change.
- *2 The default setting changes when the settings for A1-02 [Control Method Selection] and o2-04 [Drive Model (KVA) Selection] change.
- *3 The default setting changes when the settings for A1-02 [Control Method Selection] and E1-03 [V/f Pattern Selection] change.
- *4 Recommended settings are for 200 V class drives. Multiply the voltage by 2 for 400 V class drives.
- *5 In Closed Loop V/f Control, ASR only controls the output frequency. You cannot make a high-gain as in Closed Loop Vector control.

■ Precaution When You Use IE3 Premium Efficiency Motors

IE3 motors have different motor characteristics from IE1 and other motors. Set the parameters as specified by the motor characteristics. If you have a momentary power loss, and the drive detects oC [Overcurrent] or ov [Overvoltage] during speed search after it restores power, set these parameters:

- b3-03 [Speed Search Deceleration Time] = default value × 2
- L2-03 [Minimum Baseblock Time] = default value × 2
- L2-04 [Powerloss V/f Recovery Ramp Time] = default value × 2

◆ Open Loop Vector Control Method

In Open Loop Vector Control, keep C4-01 [Torque Compensation Gain] at its default setting (1.00).

If you cannot get speed precision during regeneration in Open Loop Vector Control, set C3-04 = 1 [Slip Compensation at Regen = Enabled Above 6 Hz].

Table 6.18 Parameters for Fine Tuning the Drive (A1-02 = 2 [OLV])

Issue	Parameter Number	Possible Solutions	Default	Recommended Setting
<ul style="list-style-type: none"> Unsatisfactory motor torque and speed response Hunting or oscillation in the mid-range speed range (10 Hz to 40 Hz) 	n2-01 [Automatic Freq Regulator Gain]	<ul style="list-style-type: none"> To increase the speed of torque or speed response, decrease the setting value in 0.05-unit increments. If hunting or oscillation occur, decrease the setting value in 0.05-unit increments. 	1.00	0.50 - 2.00
	n2-02 [Automatic Freq Regulator Time 1]	<ul style="list-style-type: none"> To increase the speed of torque or speed response, decrease the setting value in 10 ms increments and examine the response. If hunting or oscillation occur or if the load inertia is too much, increase the setting value in 50 ms increments and examine the response. <p>Note: Make sure that this parameter setting is: $n2-02 \leq n2-03$ [Automatic Freq Regulator Time 2]. When you adjust n2-02, you must also increase the C4-02 [Torque Compensation Delay Time] value by the same ratio.</p>	50 ms	50 ms to 2000 ms
Hunting or oscillation in the high speed range (120 Hz or more)	C4-25 [High-Speed Voltage Compensation]	Adjust the setting value.	1 [Enabled]	0 [Disabled]

6.10 Fine Tuning during Test Runs (Adjust the Control Function)

Issue	Parameter Number	Possible Solutions	Default	Recommended Setting
<p><i>ov</i> [Overvoltage] occurs when the drive stops accelerating, starts to decelerate, or when there are large changes in the load.</p>	n2-03 [Automatic Freq Regulator Time 2]	<ul style="list-style-type: none"> If <i>ov</i> occurs, increase the setting value in 50 ms increments and examine the response. If the response is not sufficient, decrease the setting value in 10 ms increments and examine the response. <p>Note: Make sure that this parameter setting is: $n2-02$ [Automatic Freq Regulator Time 1] \leq $n2-03$. When you adjust $n2-03$, you must also increase the $C4-06$ [Motor 2 Torque Comp Delay Time] value by the same ratio.</p>	750 ms	750 ms to 2000 ms
	C4-06 [Motor 2 Torque Comp Delay Time]	<ul style="list-style-type: none"> If <i>ov</i> occurs, increase the setting value in 10 ms increments and examine the response. If the response is not sufficient, decrease the setting value in 2 ms increments and examine the response. <p>Note: Make sure that this parameter setting is: $C4-02$ [Torque Compensation Delay Time] \leq $C4-06$. When you adjust $C4-06$, you must also increase the $n2-03$ [Automatic Freq Regulator Time 2] value by the same ratio.</p>	150 ms	150 ms to 750 ms
<ul style="list-style-type: none"> Unsatisfactory motor torque and speed response Hunting or oscillation 	C4-02 [Torque Compensation Delay Time]	<ul style="list-style-type: none"> If torque or speed response are slow, decrease the setting value in 2 ms increments. If hunting or oscillation occur, increase the setting value in 10 ms increments. <p>Note: Make sure that this parameter setting is: $C4-02 \leq C4-06$ [Motor 2 Torque Comp Delay Time]. When you adjust $C4-02$, you must also increase the $n2-02$ [Automatic Freq Regulator Time 1] value by the same ratio.</p>	20 ms *1	20 ms - 100 ms *1
<ul style="list-style-type: none"> Speed response is slow. Speed is not stable. 	C3-02 [Slip Compensation Delay Time]	<ul style="list-style-type: none"> If speed response is slow, decrease the setting value in 10 ms increments. If speed is not stable, increase the value in 10 ms increments. 	200 ms *1	100 ms to 500 ms
Speed precision is unsatisfactory.	C3-01 [Slip Compensation Gain]	<ul style="list-style-type: none"> If speed is too slow, increase the setting value in 0.1 unit increments. If speed is too fast, decrease the setting value in 0.1 unit increments. 	1.0 *2	0.5 - 1.5
<ul style="list-style-type: none"> The volume of the motor excitation sound is too high. Hunting or oscillation in the low speed range (10 Hz or lower) 	C6-02 [Carrier Frequency Selection]	<ul style="list-style-type: none"> If the volume of the motor excitation sound is too high, increase the carrier frequency. If hunting or oscillation occur the the low speed range, decrease the carrier frequency. 	1 (2 kHz) *3	0 to upper limit value
<ul style="list-style-type: none"> Torque in the low speed range (10 Hz or lower) is not sufficient. Speed response is slow. Large initial vibration at start up. 	<ul style="list-style-type: none"> E1-08 [Mid Point A Voltage] E1-10 [Minimum Output Voltage] 	<ul style="list-style-type: none"> If torque or speed response are slow, increase the setting value. If there is large initial vibration at start up, decrease the setting value <p>Note: If you set the value too high, the drive can output a large torque reference although the load is light.</p>	<ul style="list-style-type: none"> E1-08: 11.0 V *2 E1-10: 2.0 V *2 	Default setting +/- 2 V *4

*1 The default setting changes when the settings for $A1-02$ [Control Method Selection] and $o2-04$ [Drive Model (KVA) Selection] change.

*2 The default setting changes when the settings for $A1-02$ [Control Method Selection] and $E1-03$ [V/f Pattern Selection] change.

*3 The default setting changes when the settings for $C6-01$ [Normal / Heavy Duty Selection] and $o2-04$ change.

*4 Recommended settings are for 200 V class drives. Multiply the voltage by 2 for 400 V class drives.

■ Precaution When You Use IE3 Premium Efficiency Motors

IE3 motors have different motor characteristics from IE1 and other motors. Set the parameters as specified by the motor characteristics. If you have a momentary power loss, and the drive detects *oC* [Overcurrent] or *ov* [Overvoltage] during speed search after it restores power, set these parameters:

- *b3-03* [Speed Search Deceleration Time] = default value × 2
- *L2-03* [Minimum Baseblock Time] = default value × 2
- *L2-04* [Powerloss V/f Recovery Ramp Time] = default value × 2

◆ Closed Loop Vector Control Method

Table 6.19 Parameters for Fine Tuning the Drive (CLV)

Issue	Parameter Number	Possible Solutions	Default	Recommended Setting
<ul style="list-style-type: none"> • Unsatisfactory motor torque and speed response • Hunting or oscillation 	<ul style="list-style-type: none"> • High speed C5-01 [ASR Proportional Gain 1] • Low speed C5-03 [ASR Proportional Gain 2 (P)] *1 	<ul style="list-style-type: none"> • If torque or speed response are slow, increase the setting value in increments of 5.00. • If hunting or oscillation occur, decrease the setting value. 	20.00	10.00 - 50.00
	<ul style="list-style-type: none"> • High speed C5-02 [ASR Integral Time 1] • Low speed C5-04 [ASR Integral Time 2] *1 	<ul style="list-style-type: none"> • If torque or speed response are slow, decrease the setting value. • If hunting or oscillation occur, increase the setting value. 	0.500 s	0.300 s to 1.000 s
Hunting or oscillation in the high speed range (120 Hz or more)	C4-25 [High-Speed Voltage Compensation]	Adjust the setting value.	1 [Enabled]	0 [Disabled]
The drive cannot find ASR proportional gain or integral time for low speed or high speed.	C5-07 [ASR Gain Switchover Frequency] *1	Change the ASR proportional gain and ASR integral time to conform to the output frequency.	0.0 Hz	0.0 Hz to maximum output frequency
Hunting or oscillation	C5-06 [ASR Delay Time] *1	<ul style="list-style-type: none"> • If torque or speed response are slow, decrease the setting value in increments of 0.010. • If the rigidity of the machine is unsatisfactory and vibration is possible, increase the setting value. 	0.004 s	0.004 s to 0.020 s
<ul style="list-style-type: none"> • The volume of the motor excitation sound is too high. • Hunting or oscillation in the low speed range (3 Hz or lower) 	C6-02 [Carrier Frequency Selection]	<ul style="list-style-type: none"> • If the volume of the motor excitation sound is too high, increase the carrier frequency. • If hunting or oscillation occur the the low speed range, decrease the carrier frequency. 	1 (2.0 kHz) *2	2.0 kHz to upper limit value

*1 Refer to the section on *C5-xx parameters* for more information about speed control (ASR).

*2 The default setting changes when the settings for *C6-01* [Normal / Heavy Duty Selection] and *o2-04* [Drive Model (KVA) Selection] change.

◆ Advanced Open Loop Vector Control Method

Table 6.20 Parameters for Fine Tuning the Drive (AOLV)

Issue	Parameter Number	Possible Solutions	Default	Recommended Setting
<ul style="list-style-type: none"> • <i>oS</i> [Overspeed] occurs. • Hunting or oscillation. 	T1-01 [Auto-Tuning Mode Selection]	<ul style="list-style-type: none"> • Make sure that the output of the drive and the motor are connected correctly. • Do Rotational Auto-Tuning for a single motor. 	-	0
Hunting or oscillation in the high speed range (120 Hz or more)	C4-25 [High-Speed Voltage Compensation]	Adjust the setting value.	1 [Enabled]	0 [Disabled]
The volume of the motor excitation sound is too high.	C6-02 [Carrier Frequency Selection]	If the volume of the motor excitation sound is too high, increase the carrier frequency.	1 (2 kHz) *1	1 to upper limit value

6.10 Fine Tuning during Test Runs (Adjust the Control Function)

Issue	Parameter Number	Possible Solutions	Default	Recommended Setting
Speed precision is unsatisfactory	E2-02 [Motor Rated Slip]	<ul style="list-style-type: none"> Decouple the motor and machine and do Rotational Auto-Tuning. If the motor speed is slow, increase the value of E2-02 in small increments (approximately 0.1% of the default setting value). If the motor speed is fast, decrease the value of E2-02 in small increments (approximately 0.1% of the default setting value). 	*2	Set to a value that is ±5% of the current value.
<ul style="list-style-type: none"> Unsatisfactory motor torque and speed response Hunting or oscillation 	<ul style="list-style-type: none"> High speed C5-01 [ASR Proportional Gain 1] Low speed C5-03 [ASR Proportional Gain 2 (P)] *3 	<ul style="list-style-type: none"> If torque or speed response are slow, increase the setting value in increments of 5.00. If hunting or oscillation occur, decrease the setting value. 	<ul style="list-style-type: none"> C5-01 = 10.00 C5-03 = 20.00 	10.00 - 50.00
	<ul style="list-style-type: none"> High speed C5-02 [ASR Integral Time 1] Low speed C5-04 [ASR Proportional Gain 2 (P)] *3 	<ul style="list-style-type: none"> If torque or speed response are slow, decrease the setting value. If hunting or oscillation occur, increase the setting value. 	0.500 s	0.300 s to 1.000 s
The drive cannot find speed response for low speed or high speed.	<ul style="list-style-type: none"> C5-07 [ASR Gain Switchover Frequency] *4 High speed C5-01 [ASR Proportional Gain 1] C5-02 [ASR Integral Time 1] Low speed C5-03 [ASR Proportional Gain 2 (P)] *3 C5-04 [ASR Integral Time 2] 	Change the ASR proportional gain and ASR integral time to conform to the output frequency.	<ul style="list-style-type: none"> C5-07 = 0.0 Hz C5-01 = 10.00 C5-02 = 0.500 s C5-03 = 20.00 C5-04 = 0.500 s 	C5-07: 0.0 to maximum output frequency
Hunting or oscillation	C5-06 [ASR Delay Time] *4	<ul style="list-style-type: none"> If torque or speed response are slow, decrease the setting value in increments of 0.010. If the rigidity of the machine is unsatisfactory and vibration is possible, increase the setting value. 	0.004 s	0.004 s to 0.020 s
When you operate the drive at a frequency close to zero speed, the motor rotates at a frequency slightly higher than the frequency reference.	<ul style="list-style-type: none"> E1-09 [Minimum Output Frequency] n4-70 [Speed Command Comp @ Low Freq] 	<ul style="list-style-type: none"> Set E1-09 > 0. Note: When frequency reference E1-09 < 0, the drive output will turn OFF. Decrease the setting value of n4-70 in 0.1 Hz increments. Note: If you set the value too low, the motor can rotate in reverse. 	<ul style="list-style-type: none"> E1-09 = 0.0 Hz n4-70 = 1.00 Hz 	<ul style="list-style-type: none"> E1-09 = 0.5 Hz n4-70 = 0.50 Hz

*1 The default setting changes when the settings for C6-01 [Normal / Heavy Duty Selection] and o2-04 [Drive Model (KVA) Selection] change.

*2 The default setting changes when the setting for o2-04 [Drive Model Selection] changes.

*3 Refer to the section on C5-xx parameters for more information about speed control (ASR).

*4 The best values for a no-load operation are different than the best values for actual loading operation.

◆ Open Loop Vector Control for PM Motors

Table 6.21 Parameters for Fine Tuning the Drive (A1-02 = 5 [OLV/PM])

Issue	Parameter Number	Possible Solutions	Default	Recommended Setting
Unsatisfactory motor performance	E1-xx parameters, E5-xx parameters	<ul style="list-style-type: none"> Check the settings for E1-06, E1-04 [Base Frequency, Maximum Output Frequency]. Check the E5-xx and make sure that you set all motor data correctly. <p>Note: Do not set E5-05 [PM Motor Resistance (ohms/phase)] to a line-to-line resistance value.</p> <ul style="list-style-type: none"> Do Auto-Tuning. 	-	-
Unsatisfactory motor torque and speed response	n8-55 [Motor to Load Inertia Ratio]	Adjust to align the load inertia ratio of the motor and machine.	0	Near the load inertia ratio.
	n8-45 [Speed Feedback Detection Gain]	Decrease the setting value in increments of 0.05.	0.80	-
	C4-01 [Torque Compensation Gain]	Adjust the setting value. Note: If you set this value too high, it can cause overcompensation and motor oscillation.	0.00	1.00
<ul style="list-style-type: none"> Oscillation when the motor starts. Motor stalls. 	n8-51 [Pull-in Current @ Accel/Decel]	Increase the setting value in increments of 5%.	50%	-
	<ul style="list-style-type: none"> b2-02 [DC Injection Braking Current] b2-03 [DC Inject Braking Time at Start] 	Use DC Injection Braking at start. Note: This can cause the motor to rotate in reverse for approximately 1/8 of a turn at start.	<ul style="list-style-type: none"> b2-02: 50% b2-03: 0.00 s 	<ul style="list-style-type: none"> b2-02: Adjust as necessary. b2-03: 0.5 s
	n8-55 [Motor to Load Inertia Ratio]	Increase the setting value. Note: When you operate a single motor or with a minimum quantity of inertia, if you set this value too high, it can cause motor oscillation.	0	Near the load inertia ratio.
There is too much current during deceleration.	n8-79 [Pull-in Current at Deceleration]	Set $n8-79 < n8-51$.	50% Note: When $n8-79 = 0$, the drive will apply the $n8-51$ setting to the pull-in current during deceleration.	Decrease in increments of 5%.
Stalling or oscillation occurs when you apply the load during constant speed	n8-47 [Pull-in Current Comp Filter Time]	Decrease the setting value in increments of 0.2 s.	5.0 s	-
	n8-48 [Pull-in/Light Load Id Current]	Increase the setting value in increments of 5%.	30%	-
	n8-55 [Motor to Load Inertia Ratio]	Increase the setting value. Note: When you operate a single motor or with a minimum quantity of inertia, if you set this value too high, it can cause motor oscillation.	0	Near the load inertia ratio.
Hunting or oscillation	n8-45 [Speed Feedback Detection Gain]	Increase the setting value in increments of 0.05.	0.80	-
The drive detects STPo [Motor Step-Out Detected] fault when the load is not too high.	<ul style="list-style-type: none"> E5-09 [PM Back-EMF V_{peak} (mV/(rad/s))] E5-24 [PM Back-EMF L-L V_{rms} (mV/rpm)] 	<ul style="list-style-type: none"> Adjust the setting value. Examine the motor code on the motor nameplate or the data sheet, then set correct values for E5-09 or E5-24. 	*1	<ul style="list-style-type: none"> Yaskawa motor Set the motor code from the motor nameplate. Motor from another manufacturer Set the values from the test report.
The drive detected stalling or STPo [Motor Step-Out Detected] at high speed and maximum output voltage.	n8-62 [Output Voltage Limit Level]	Set to a value lower than the actual input voltage.	<ul style="list-style-type: none"> 200.0 V 400.0 V 	-

*1 The default setting changes when the settings for E5-01 [Motor Code Selection] and o2-04 [Drive Model (KVA) Selection] change.

◆ Advanced Open Loop Vector Control Method for PM Motors

Table 6.22 Parameters for Fine Tuning the Drive (A1-02 = 6 [AOLV/PM])

Issue	Parameter Number	Possible Solutions	Default	Recommended Setting
<ul style="list-style-type: none"> Unsatisfactory motor torque and speed response Hunting or oscillation 	<ul style="list-style-type: none"> High speed C5-01 [ASR Proportional Gain 1] Low speed C5-03 [ASR Proportional Gain 2] 	<ul style="list-style-type: none"> If torque or speed response are slow, increase the setting value in increments of 5.00. If hunting or oscillation occur, decrease the setting value. 	10.00	5.00 to 30.00 ^{*1}
	<ul style="list-style-type: none"> High speed C5-02 [ASR Integral Time 1] Low speed C5-04 [ASR Integral Time 2] 	<ul style="list-style-type: none"> If torque or speed response are slow, decrease the setting value. If hunting or oscillation occur, increase the setting value. 	0.500 s	0.300 s to 1.000 s ^{*1}
The drive cannot find ASR proportional gain or integral time for low speed or high speed.	C5-07 [ASR Gain Switchover Frequency]	Change the ASR proportional gain and ASR integral time to conform to the output frequency.	0.0%	0.0% to maximum rotation speed
Hunting or oscillation	C5-06 [ASR Delay Time]	If the rigidity of the machine is unsatisfactory and vibration is possible, increase the setting value in increments of 0.010.	0.016 s	0.016 s to 0.035 s ^{*1}
Step-out	E1-xx parameters, E5-xx parameters	Refer to the motor nameplate or test report and set E1-xx or E5-xx correctly.	-	-

*1 The best values for a no-load operation are different than the best values for actual loading operation.

◆ Closed Loop Vector Control Method for PM

Table 6.23 Parameters for Fine Tuning the Drive (CLV/PM)

Issue	Parameter Number	Possible Solutions	Default	Recommended Setting
<ul style="list-style-type: none"> Unsatisfactory motor torque and speed response Hunting or oscillation 	<ul style="list-style-type: none"> High speed C5-01 [ASR Proportional Gain 1] Low speed C5-03 [ASR Proportional Gain 2] 	<ul style="list-style-type: none"> If torque or speed response are slow, increase the setting value in increments of 5.00. If hunting or oscillation occur, decrease the setting value. 	20.00	10.00 to 50.00 ^{*1}
	<ul style="list-style-type: none"> High speed C5-02 [ASR Integral Time 1] Low speed C5-04 [ASR Integral Time 2] 	<ul style="list-style-type: none"> If torque or speed response are slow, decrease the setting value. If hunting or oscillation occur, increase the setting value. 	0.500 s	0.300 to 1.000 s ^{*1}
The drive cannot find speed response for low speed or high speed.	<ul style="list-style-type: none"> C5-07 [ASR Gain Switchover Frequency] High speed C5-01 [ASR Proportional Gain 1] C5-02 [ASR Integral Time 1] Low speed C5-03 [ASR Proportional Gain 2] C5-04 [ASR Integral Time 2] 	Change the ASR proportional gain and ASR integral time to conform to the output frequency.	<ul style="list-style-type: none"> C5-07 = 0.0 % C5-01 = 20.00 C5-02 = 0.500 s C5-03 = 20.00 C5-04 = 0.500 s 	0.0% to maximum rotation speed
Hunting or oscillation	C5-06 [ASR Delay Time]	If the rigidity of the machine is unsatisfactory and vibration is possible, increase the setting value in increments of 0.010.	0.004 s	0.004 to 0.020 s ^{*1}
Step-out	E1-xx parameters, E5-xx parameters	Refer to the motor nameplate or test report and set E1-xx or E5-xx correctly.	-	-

*1 The best values for a no-load operation are different than the best values for actual loading operation.

◆ EZ Open Loop Vector Control Method

Table 6.24 Parameters for Fine Tuning the Drive (A1-02 = 8 [EZOLV])

Issue	Parameter Number	Possible Solutions	Default	Recommended Setting
<ul style="list-style-type: none"> Unsatisfactory motor torque and speed response Hunting or oscillation 	<ul style="list-style-type: none"> High speed C5-01 [ASR Proportional Gain 1] Low speed C5-03 [ASR Proportional Gain 2] 	<ul style="list-style-type: none"> If torque or speed response are slow, increase the setting value in increments of 5.00. If hunting or oscillation occur, decrease the setting value. 	10.00	10.00 to 50.00 ^{*1}
	<ul style="list-style-type: none"> High speed C5-02 [ASR Integral Time 1] Low speed C5-04 [ASR Integral Time 2] 	<ul style="list-style-type: none"> If torque or speed response are slow, decrease the setting value. If hunting or oscillation occur, increase the setting value. 	0.500 s	0.300 s to 1.000 s ^{*1}
The drive cannot find ASR proportional gain or integral time for low speed or high speed.	C5-07 [ASR Gain Switchover Frequency]	Change the ASR proportional gain and ASR integral time to conform to the output frequency.	0.0%	0.0% to maximum rotation speed
Hunting or oscillation	C5-06 [ASR Delay Time]	If the rigidity of the machine is unsatisfactory and vibration is possible, increase the setting value in increments of 0.010.	0.004 s	0.004 s to 0.020 s ^{*1}
Step-out	E9-xx parameters	Refer to the motor nameplate or test report and set E9-xx correctly.	-	-
Oscillation when the motor starts.	n8-51 [Accel / Decel Pull-In Current]	Increase the setting value.	80%	Increase in increments of 5%.
Motor stalls.	L7-01 to L7-04 [Torque Limit]	Increase the setting value.	200%	Increase in increments of 10%.

*1 The best values for a no-load operation are different than the best values for actual loading operation.

6.11 Test Run Checklist

Examine the items in this checklist and check each item before a test run.

Checked	No.	Description
	1	Correctly install and wire the drive as specified by this manual.
	2	Energize the drive.
	3	Set the voltage for the power supply in <i>E1-01 [Input AC Supply Voltage]</i> .

Check the applicable items as specified by your control method.

WARNING! Sudden Movement Hazard. Correctly wire the start/stop and safety circuits before you energize the drive. If you momentarily close a digital input terminal, it can start a drive that is programmed for 3-Wire control and cause serious injury or death from moving equipment.

Table 6.25 V/f Control [A1-02 = 0] and Closed Loop V/f Control [A1-02 = 1]

Checked	No.	Description
	4	Select the best V/f pattern for your application and motor characteristics. Example: For a motor with a rated frequency of 60 Hz, set <i>E1-03 = 1 [V/f Pattern Selection = Const Trq, 60Hz base, 60Hz max]</i> as a standard V/f pattern.

Table 6.26 Closed Loop V/f Control [A1-02 = 1]

Checked	No.	Description
	5	Set <i>F1-01 [Encoder 1 Pulse Count (PPR)]</i> correctly and make sure that encoder pulse counting direction is correct.
	6	Set <i>C5-01 [ASR Proportional Gain 1]</i> and <i>C5-02 [ASR Integral Time 1]</i> .

Table 6.27 Open Loop Vector Control [A1-02 = 2] or Closed Loop Vector Control [A1-02 = 3]

Checked	No.	Description
	7	Decouple motor shafts and machines.
	8	Refer to the information on the motor nameplate and set this data correctly: <ul style="list-style-type: none"> • Motor rated power (kW) to <i>T1-02</i> • Motor rated voltage (V) to <i>T1-03</i> • Motor rated current (A) to <i>T1-04</i> • Motor base frequency (Hz) to <i>T1-05</i> • Number of motor poles to <i>T1-06</i> • Motor base speed (min^{-1}) to <i>T1-07</i>
	9	Do Rotational Auto-Tuning.

Table 6.28 Closed Loop Vector Control [A1-02 = 3]

Checked	No.	Description
	10	Set <i>F1-01 [Encoder 1 Pulse Count (PPR)]</i> and <i>F1-05 [Encoder 1 Rotation Selection]</i> .
	11	Set <i>C5-01 [ASR Proportional Gain 1]</i> and <i>C5-02 [ASR Integral Time 1]</i> .

Table 6.29 PM Open Loop Vector Control [A1-02 = 5]

Checked	No.	Description
	12	Set <i>E5-01 through E5-24 [PM Motor Settings]</i> .

Table 6.30 PM Advanced Open Loop Vector [A1-02 = 6]

Checked	No.	Description
	13	Set <i>E5-01 through E5-24 [PM Motor Settings]</i> .
	14	Set <i>C5-01 [ASR Proportional Gain 1]</i> and <i>C5-02 [ASR Integral Time 1]</i> .

Table 6.31 PM Closed Loop Vector Control [A1-02 = 7]

Checked	No.	Description
	15	Set <i>E5-01 through E5-24 [PM Motor Settings]</i> .
	16	Set <i>C5-01 [ASR Proportional Gain 1]</i> and <i>C5-02 [ASR Integral Time 1]</i> .

Checked	No.	Description
	17	Set F1-01 [Encoder 1 Pulse Count (PPR)] and F1-05 [Encoder 1 Rotation Selection].
	18	Set E5-11 [Encoder Z-Pulse Offset].
Checked	No.	Description
	19	The keypad will show "Rdy" after starting to operate the motor.
	20	To give the Run command and frequency reference from the keypad, push LO/RE to set to LOCAL Mode (when in LOCAL Mode, the LO/RE LED illuminates).
	21	If the motor rotates in the opposite direction during test run, switch two of the motor cables (U/T1, V/T2, W/T3).
	22	Set Heavy Duty or Normal Duty Mode with C6-01 [Normal / Heavy Duty Selection] to conform to the load condition.
	23	Set E2-01 [Motor Rated Current (FLA)] and L1-01 [Motor Overload Protection Select] correctly for motor thermal protection.
	24	Set the drive for REMOTE Mode when the control circuit terminals supply the Run command and frequency reference (in REMOTE Mode, the LO/RE LED turns OFF).
	25	<p>When terminal A1 is used for the frequency reference:</p> <ul style="list-style-type: none"> • Voltage input <ul style="list-style-type: none"> – Set DIP Switch S1-1 on the drive to "V". – Set H3-01 = 0, 1 [Terminal A1 Signal Level Select = 0 to 10V (Lower Limit at 0), -10 to +10V (Bipolar Reference)]. – Set H3-02 = 0 [Terminal A1 Function Selection = Frequency Reference]. • Current input <ul style="list-style-type: none"> – Set DIP Switch S1-1 on the drive to "I". – Set H3-01 = 2, 3 [Terminal A1 Signal Level Select = 4 to 20 mA, 0 to 20 mA]. – Set H3-02 = 0 [Terminal A1 Function Selection = Frequency Reference].
	26	<p>When terminal A2 is used for the frequency reference:</p> <ul style="list-style-type: none"> • Voltage input <ul style="list-style-type: none"> – Set DIP Switch S1-2 on the drive to "V". – Set H3-09 = 0, 1 [Terminal A2 Signal Level Select = 0 to 10V (Lower Limit at 0), -10 to 10 V (Bipolar Reference)]. – Set H3-10 = 0 [Terminal A2 Function Selection = Frequency Reference]. • Current input <ul style="list-style-type: none"> – Set DIP Switch S1-2 on the drive to "I". – Set H3-09 = 2, 3 [Terminal A2 Signal Level Select = 4 to 20 mA, 0 to 20 mA]. – Set H3-10 = 0 [Terminal A2 Function Selection = Frequency Reference].
	27	<p>When terminal A3 is used for the frequency reference:</p> <ul style="list-style-type: none"> • Voltage input <ul style="list-style-type: none"> – Set DIP Switch S4 on the drive to analog input side. – Set DIP Switch S1-3 on the drive to "V". – Set H3-05 = 0, 1 [Terminal A3 Signal Level Select = 0 to 10V (Lower Limit at 0), -10 to +10V (Bipolar Reference)]. – Set H3-06 = 0 [Terminal A3 Function Selection = Frequency Reference]. • Current input <ul style="list-style-type: none"> – Set DIP Switch S4 on the drive to analog input side. – Set DIP Switch S1-3 on the drive to "I". – Set H3-05 = 2, 3 [Terminal A3 Signal Level Select = 4 to 20 mA (Lower Limit at 4), 0 to 20 mA (Bipolar Reference)]. – Set H3-06 = 0 [Terminal A3 Function Selection = Frequency Reference].
	28	<p>Make sure that the frequency reference reaches the necessary minimum and maximum values. → If drive operation is incorrect, make these adjustments:</p> <p>Gain adjustment: Set the maximum voltage and current values, then adjust the analog input gain until the frequency reference reaches the necessary value. (For terminal A1 input: H3-03, for terminal A2 input: H3-11, for terminal A3 input: H3-07)</p> <p>Bias adjustment: Set the maximum voltage/current values, then adjust the analog input bias until the frequency reference reaches the necessary minimum value. (For terminal A1 input: H3-04, for terminal A2 input: H3-12, for terminal A3 input: H3-08)</p>

Specifications

7.1	Section Safety	444
7.2	Drive Duty Modes	445
7.3	Model-Specific Specifications (200 V Class).....	446
7.4	Model-Specific Specifications (400 V Class).....	448
7.5	Model-Specific Specifications (6-Phase/12-Pulse 400 V Class).....	452
7.6	Drive Specifications.....	453
7.7	Drive Watt Loss.....	457
7.8	Drive Derating	461
7.9	Drive Exterior and Mounting Dimensions.....	469
7.10	Knock-Out Hole Dimensions (IP20/UL Type 1).....	488
7.11	Peripheral Devices and Options.....	493

7.1 Section Safety

 **DANGER**

Do not ignore the safety messages in this manual.

If you ignore the safety messages in this manual, it will cause serious injury or death. The manufacturer is not responsible for injuries or damage to equipment.

7.2 Drive Duty Modes

The drive has two duty modes from which to select for the application: Heavy Duty (HD) and Normal Duty (ND). Refer to [Table 7.1](#) for information about the differences between HD and ND ratings.

Table 7.1 Drive Duty Modes

Duty Rating	C6-01 Setting	Application	Default Carrier Frequency	Overload Tolerance (oL2 [Drive Overload])
Heavy Duty Rating (HD)	0	<ul style="list-style-type: none"> Extruder Conveyor Constant torque or high overload capacity 	2 kHz	150% of the rated output current for 60 seconds The permitted frequency of overload is one time each 10 minutes.
Normal Duty Rating (ND)	1	<ul style="list-style-type: none"> Fan Pump Blower Variable speed control 	<ul style="list-style-type: none"> Models 2004 to 2415, 4002 to 4720: 2 kHz Swing-PWM Models 4810 to 4H12: 2 kHz Models T103 to T720: 2 kHz Swing-PWM 	110% of the rated output current for 60 seconds The permitted frequency of overload is one time each 10 minutes.

7.3 Model-Specific Specifications (200 V Class)

Table 7.2 Rating (200 V Class)

Model		2004	2006	2008	2010	2012	2018	2021	2030	2042	
Maximum Applicable Motor Output (kW)	HD	0.55	0.75	1.1	1.5	2.2	3	3.7	5.5	7.5	
	ND	0.75	1.1	1.5	2.2	3	3.7	5.5	7.5	11	
Maximum Applicable Motor Output (HP)	HD	3/4	1	1 1/2	2	3	4	5	7 1/2	10	
	ND	1	1 1/2	2	3	4	5	7 1/2	10	15	
Input	Rated Input Current (A)	HD (AC)	3.6	4.8	6.7	8.9	12.7	17	20.7	30	40.3
		HD (DC)	4.5	5.9	8.2	10.9	15.6	20.8	25.3	36.8	49.4
		ND (AC)	4.8	6.7	8.9	12.7	17	20.7	30	40.3	52
		ND (DC)	5.9	8.2	10.9	15.6	20.8	25.3	36.8	49.4	71.3
Output	Rated Output Current (A)	HD	3.5	5	6.9	8	11	14	17.5	25	33
		ND	4.2	6	8	9.6	12.2	17.5	21	30	42
Power Supply	Input Power (kVA)	HD	1.5	2.0	2.8	3.7	5.3	7.1	8.6	12.5	16.8
		ND	2.0	2.8	3.7	5.3	7.1	8.6	12.5	16.8	21.6

*1 The maximum applicable motor output complies with 208 V motor ratings as specified in NEC Table 430.250. The rated output current of the drive output amps must be equal to or more than the motor rated current.

*2 The maximum applicable motor output is based on 4-pole, general-purpose 220 V motor ratings. The rated output current of the drive output amps must be equal to or more than the motor rated current.

Table 7.3 Rating (200 V Class)

Model		2056	2070	2082	2110	2138	
Maximum Applicable Motor Output (kW)	HD *1	11	15	18.5	22	30	
	ND *2	15	18.5	22	30	37	
Maximum Applicable Motor Output (HP)	HD *1	15	20	25	30	40	
	ND *2	20	25	30	40	50	
Input	Rated Input Current (A)	HD (AC)	58.2	78.4	96	82	111
		HD (DC)	71.3	96	118	100	136
		ND (AC)	78.4	96	114	111	136
		ND (DC)	96	117.6	139	136	166
Output	Rated Output Current (A)	HD	47	60	75	88	115
		ND	56	70	82	110	138
Power Supply	Input Power (kVA)	HD	24.2	32.6	39.9	34.1	46.1
		ND	32.6	39.9	47.4	46.1	56.5

*1 The maximum applicable motor output complies with 208 V motor ratings as specified in NEC Table 430.250. The rated output current of the drive output amps must be equal to or more than the motor rated current.

*2 The maximum applicable motor output is based on 4-pole, general-purpose 220 V motor ratings. The rated output current of the drive output amps must be equal to or more than the motor rated current.

Table 7.4 Rating (200 V Class)

Model		2169	2211	2257	2313	2360	2415
Maximum Applicable Motor Output (kW)	HD *1	37	45	55	75	90	110
	ND *2	45	55	75	90	110	-
Maximum Applicable Motor Output (HP)	HD *1	50	60	75	100	125	150
	ND *2	60	75	100	125	150	-

Model		2169	2211	2257	2313	2360	2415	
Input	Rated Input Current (A)	HD (AC)	136	164	200	271	324	394
		HD (DC)	166	201	245	331	396	482
		ND (AC)	164	200	271	324	394	-
		ND (DC)	201	245	331	396	482	-
Output	Rated Output Current (A)	HD	145	180	215	283	346	415
		ND	169	211	257	313	360	-
Power Supply	Input Power (kVA)	HD	56.5	68.2	83.1	113	135	164
		ND	68.2	83.1	113	135	164	-

- *1 The maximum applicable motor output complies with 208 V motor ratings as specified in NEC Table 430.250. The rated output current of the drive output amps must be equal to or more than the motor rated current.
- *2 The maximum applicable motor output is based on 4-pole, general-purpose 220 V motor ratings. The rated output current of the drive output amps must be equal to or more than the motor rated current.

7.4 Model-Specific Specifications (400 V Class)

Table 7.5 Rating (400 V Class)

Model		Duty Rating	4002	4004	4005	4007	4009	4012	4018	4023
Maximum Applicable Motor Output (kW) at 380 V Input *1		HD	0.55	1.1	1.5	2.2	3.0	4.0	5.5	7.5
		ND	0.75	1.5	2.2	3.0	4.0	5.5	7.5	11
Maximum Applicable Motor Output (HP) at 460 V Input *2		HD	3/4	1.5	2	3	4	5	7.5	10
		ND	1	2	3	4	5	7.5	10	15
Input	Rated Input Current (A) at 380 V Input	HD (AC)	1.9	3.5	4.7	6.7	8.9	11.7	15.8	21.2
		HD (DC)	2.3	4.3	5.8	8.2	10.9	14.3	19.4	26.0
		ND (AC)	2.5	4.7	6.7	8.9	11.7	15.8	21.2	30.6
		ND (DC)	3.1	5.8	8.2	10.9	14.3	19.4	26.0	37.5
	Rated Input Current (A) at 460 V Input	HD (AC)	1.6	2.1	3.9	5.5	7.4	9.0	13.1	17.5
		HD (DC)	1.9	2.5	4.8	6.8	9.0	11.0	16.0	21.5
		ND (AC)	2.1	3.9	5.5	7.4	9.0	13.1	17.5	25.3
		ND (DC)	2.5	4.8	6.8	9.0	11.0	16.0	21.5	31.0
Output	Rated Output Current (A)	HD	1.8	3.4	4.8	5.5	7.2	9.2	14.8	18
		ND	2.1	4.1	5.4	7.1	8.9	11.9	17.5	23.4
Power Supply	Input Power (kVA) at 380 V Input	HD	1.5	2.8	3.7	5.3	7.1	9.3	13	17
		ND	2.0	3.7	5.3	7.1	9.3	13	17	24
	Input Power (kVA) at 460 V Input	HD	1.3	1.7	3.2	4.6	6.2	7.5	11	15
		ND	1.7	3.2	4.6	6.2	7.5	11	15	21

*1 The maximum applicable motor output complies with 380 V motor ratings as specified in Annex G of IEC 60947-4-1. The rated output current of the drive output amps must be equal to or more than the motor rated current.

*2 The maximum applicable motor output complies with 460 V motor ratings as specified in NEC Table 430.250. The rated output current of the drive output amps must be equal to or more than the motor rated current.

Table 7.6 Rating (400 V Class)

Model		Duty Rating	4031	4038	4044	4060	4075	4089	4103
Maximum Applicable Motor Output (kW) at 380 V Input *1		HD	11	15	18.5	22	30	37	45
		ND	15	18.5	22	30	37	45	55
Maximum Applicable Motor Output (HP) at 460 V Input *2		HD	15	20	25	30	40	50	60
		ND	20	25	30	40	50	60	75
Input	Rated Input Current (A) at 380 V Input	HD (AC)	30.6	41.3	50.5	43.1	58.3	71.5	86.5
		HD (DC)	37.5	50.5	61.9	52.8	71.4	87.5	106.0
		ND (AC)	41.3	50.5	59.7	58.3	71.5	86.5	105
		ND (DC)	50.5	61.9	73.2	71.4	87.5	106.0	129
	Rated Input Current (A) at 460 V Input	HD (AC)	25.3	34.1	41.7	35.6	48.1	59.0	71.4
		HD (DC)	31.0	41.8	51.1	43.7	59.0	72.3	87.5
		ND (AC)	34.1	41.7	49.4	48.1	59.0	71.4	86.9
		ND (DC)	41.8	51.1	60.4	59.0	72.3	87.5	106.0
Output	Rated Output Current (A)	HD	24	31	39	45	60	75	91
		ND	31	38	44	59.6	74.9	89.2	103

Model		Duty Rating	4031	4038	4044	4060	4075	4089	4103
Power Supply	Input Power (kVA) at 380 V Input	HD	24	33	40	34	46	57	69
		ND	33	40	48	46	57	69	84
	Input Power (kVA) at 460 V Input	HD	21	28	35	30	40	49	59
		ND	28	35	41	40	49	59	72

- *1 The maximum applicable motor output complies with 380 V motor ratings as specified in Annex G of IEC 60947-4-1. The rated output current of the drive output amps must be equal to or more than the motor rated current.
- *2 The maximum applicable motor output complies with 460 V motor ratings as specified in NEC Table 430.250. The rated output current of the drive output amps must be equal to or more than the motor rated current.

Table 7.7 Rating (400 V Class)

Model		Duty Rating	4140	4168	4208	4250	4302	4371	4414
Maximum Applicable Motor Output (kW) at 380 V Input *1		HD	55	75	90	110	132	160	200
		ND	75	90	110	132	160	200	220
Maximum Applicable Motor Output (HP) at 460 V Input *2		HD	75	100	125	150	200	250	300
		ND	100	125	150	200	250	300	350
Input	Rated Input Current (A) at 380 V Input	HD (AC)	105	142	170	207	248	300	373
		HD (DC)	129	174	209	254	304	367	457
		ND (AC)	142	170	207	248	300	373	410
		ND (DC)	174	209	254	304	367	457	502
	Rated Input Current (A) at 460 V Input	HD (AC)	86.9	118	141	171	232	289	346
		HD (DC)	106.0	144	172	210	284	354	424
		ND (AC)	118	141	171	232	289	346	403
		ND (DC)	144	172	210	284	354	424	494
Output	Rated Output Current (A)	HD	112	150	180	216	260	304	371
		ND	140	168	208	250	302	371	414
Power Supply	Input Power (kVA) at 380 V Input	HD	84	113	135	165	198	239	297
		ND	113	135	165	198	239	297	327
	Input Power (kVA) at 460 V Input	HD	72	98	117	142	193	240	288
		ND	98	117	142	193	240	288	335

- *1 The maximum applicable motor output complies with 380 V motor ratings as specified in Annex G of IEC 60947-4-1. The rated output current of the drive output amps must be equal to or more than the motor rated current.
- *2 The maximum applicable motor output complies with 460 V motor ratings as specified in NEC Table 430.250. The rated output current of the drive output amps must be equal to or more than the motor rated current.

Table 7.8 Rating (400 V Class)

Model		Input Voltage	Duty Rating	4477	4568	4605	4720
Maximum Applicable Motor Output (kW)	< 460 V *1	HD		220	250	315	315
		ND		250	315	355	370
	≥ 460 V *2	HD		260	300	335	370
		ND		300	335	370	450
Maximum Applicable Motor Output (HP)	< 460 V *1	HD		300	335	400	400
		ND		335	400	450	500
	≥ 460 V *2	HD		350	400	450	500
		ND		400	450	500	600

7.4 Model-Specific Specifications (400 V Class)

Model		Input Voltage	Duty Rating	4477	4568	4605	4720
Input	Rated Input Current (A)	< 460 V	HD (AC)	410	465	584	584
			HD (DC)	502	569	715	715
			ND (AC)	465	584	657	684
			ND (DC)	569	715	805	838
		≥ 460 V	HD (AC)	403	460	516	573
			HD (DC)	494	563	632	702
			ND (AC)	460	516	573	686
			ND (DC)	563	632	702	840
Output	Rated Output Current (A)	< 460 V	HD	414	477	605	605
			ND	477	568	675	720
		≥ 460 V	HD	414	477	515	605
			ND	477	515	605	720
Power Supply	Input Power (kVA)	< 460 V	HD	327	370	465	-
			ND	370	465	523	-
		≥ 460 V	HD	335	382	429	476
			ND	382	429	476	570

*1 The maximum applicable motor output complies with 380 V motor ratings as specified in Annex G of IEC 60947-4-1. The rated output current of the drive output amps must be equal to or more than the motor rated current.

*2 The maximum applicable motor output complies with 460 V motor ratings as specified in NEC Table 430.250. The rated output current of the drive output amps must be equal to or more than the motor rated current.

Table 7.9 Rating (400 V Class)

Model		Input Voltage	Duty Rating	4810	4930	4H11	4H12
Maximum Applicable Motor Output (kW)		< 460 V	HD	400	450	500	560
			ND	450	500	560	630
		≥ 460 V	HD	450	525	600	675
			ND	525	600	675	750
Maximum Applicable Motor Output (HP)		< 460 V	HD	536	603	670	751
			ND	603	670	751	845
		≥ 460 V	HD	600	700	800	900
			ND	700	800	900	1000
Input	Rated Input Current (A)	< 460 V	HD (AC)	783	830	976	1031
			HD (DC)	959	1017	1195	1262
			ND (AC)	879	922	1091	1158
			ND (DC)	1077	1129	1337	1418
		≥ 460 V	HD (AC)	726	799	965	1024
			HD (DC)	890	978	1182	1255
			ND (AC)	846	912	1085	1137
			ND (DC)	1036	1117	1328	1392
Output	Rated Output Current (A)	< 460 V	HD	720	810	930	1090
			ND	810	930	1090	1200
		≥ 460 V	HD	720	810	930	1090
			ND	810	930	1090	1200

Model		Input Voltage	Duty Rating	4810	4930	4H11	4H12
Power Supply	Input Power (kVA)	< 460 V	HD	474	533	612	717
			ND	533	612	717	790
		≥ 460 V	HD	574	645	741	868
			ND	645	741	868	956

- *1 The maximum applicable motor output complies with 380 V motor ratings as specified in Annex G of IEC 60947-4-1. The rated output current of the drive output amps must be equal to or more than the motor rated current.
- *2 The maximum applicable motor output complies with 460 V motor ratings as specified in NEC Table 430.250. The rated output current of the drive output amps must be equal to or more than the motor rated current.

7.5 Model-Specific Specifications (6-Phase/12-Pulse 400 V Class)

Table 7.10 Ratings (6-Phase/12-Pulse 400 V Class)

Model		Duty Rating	T103	T140	T168	T208	T250	T302
Maximum Applicable Motor Output (kW) at 380 V Output *1		HD	45	55	75	90	110	132
		ND	55	75	90	110	132	160
Maximum Applicable Motor Output (HP) at 460 V Output *2		HD	60	75	100	125	150	200
		ND	75	100	125	150	200	250
Input	Rated Input Current (A) at 380 V Input	HD	87	105	142	170	207	248
		ND	105	142	170	207	248	300
	Rated Input Current (A) at 460 V Input	HD	71	87	118	141	171	232
		ND	87	118	141	171	232	289
Output	Rated Output Current (A)	HD	91	112	150	180	216	260
		ND	103	140	168	208	250	302
Power Supply	Input Power (kVA) at 380 V Input	HD	60	74	99	118	142	171
		ND	68	92	111	137	165	199
	Input Power (kVA) at 460 V Input	HD	61	76	99	124	143	191
		ND	76	99	124	143	191	241

*1 The maximum applicable motor output complies with 380 V motor ratings as specified in Annex G of IEC 60947-4-1. The rated output current of the drive output amps must be equal to or more than the motor rated current.

*2 The maximum applicable motor output complies with 460 V motor ratings as specified in NEC Table 430.250. The rated output current of the drive output amps must be equal to or more than the motor rated current.

Table 7.11 Ratings (6-Phase/12-Pulse 400 V Class)

Model		Duty Rating	T371	T414	T477	T568	T605	T720
Maximum Applicable Motor Output (kW) at 380 V Output *1		HD	160	200	220	250	315	315
		ND	200	220	250	315	355	370
Maximum Applicable Motor Output (HP) at 460 V Output *2		HD	250	300	350	400	450	500
		ND	300	350	400	450	500	600
Input	Rated Input Current (A) at 380 V Input	HD	300	373	410	465	584	584
		ND	373	410	465	584	657	684
	Rated Input Current (A) at 460 V Input	HD	289	346	403	460	516	573
		ND	346	403	460	516	573	686
Output	Rated Output Current (A)	HD	304	371	414	477	605	605
		ND	371	414	477	568	675	720
Power Supply	Input Power (kVA) at 380 V Input	HD	200	244	272	314	398	398
		ND	244	272	314	374	444	474
	Input Power (kVA) at 460 V Input	HD	241	288	330	380	410	482
		ND	288	330	380	410	482	574

*1 The maximum applicable motor output complies with 380 V motor ratings as specified in Annex G of IEC 60947-4-1. The rated output current of the drive output amps must be equal to or more than the motor rated current.

*2 The maximum applicable motor output complies with 460 V motor ratings as specified in NEC Table 430.250. The rated output current of the drive output amps must be equal to or more than the motor rated current.

7.6 Drive Specifications

Note:

- To get the OLV, CLV, and AOLV specifications, do Rotational Auto-Tuning.
- To get the longest product life, install the drive in an environment that meets the necessary specifications.

Table 7.12 Control Characteristics

Item	Specification
Control Methods	<ul style="list-style-type: none"> • V/f Control • V/f Control with Encoder • Open Loop Vector • Closed Loop Vector • Advanced Open Loop Vector • PM Open Loop Vector • PM Advanced Open Loop Vector • PM Closed Loop Vector • EZ Vector Control
Carrier Frequency	<ul style="list-style-type: none"> • Models 2004 to 2138, 4002 to 4103, and T103 HD: 8 kHz without derating the drive capacity. ND: 2 kHz without derating the drive capacity. Derate the drive capacity to use values to 15 kHz maximum. • Models 2169 to 2415, 4140 to 4414, and T140 to T414 HD: 5 kHz without derating the drive capacity. ND: 2 kHz without derating the drive capacity. Derate the drive capacity to use values to 10 kHz maximum. • Models 4477 to 4720, and T477 to T720 HD: 2 kHz without derating the drive capacity. ND: 2 kHz without derating the drive capacity. Derate the drive capacity to use values to 5 kHz maximum.
Maximum Output Voltage	<ul style="list-style-type: none"> • 200 V Class: Three-phase 200 V to 240 V • 400 V Class: Three-phase 380 V to 480 V <p>Note: The maximum output voltage is proportional to the input voltage.</p>
Frequency Control Range	<ul style="list-style-type: none"> • AOLV and EZOLV: 0.01 Hz to 120 Hz • CL-V/f, CLV, AOLV/PM, and CLV/PM: 0.01 Hz to 400 Hz • V/f, OLV, and OLV/PM: 0.01 Hz to 590 Hz
Frequency Accuracy (Temperature Fluctuation)	<p>Digital inputs: $\pm 0.01\%$ of the maximum output frequency ($-10\text{ }^{\circ}\text{C}$ to $+40\text{ }^{\circ}\text{C}$ ($14\text{ }^{\circ}\text{F}$ to $104\text{ }^{\circ}\text{F}$)) Analog inputs: $\text{In} \pm 0.1\%$ of the maximum output frequency ($25\text{ }^{\circ}\text{C} \pm 10\text{ }^{\circ}\text{C}$ ($77\text{ }^{\circ}\text{F} \pm 18\text{ }^{\circ}\text{F}$))</p>
Frequency Setting Resolution	<p>Digital inputs: 0.01 Hz Analog inputs: 1/2048 of the maximum output frequency (11-bit signed)</p>
Output Frequency Resolution	0.001 Hz
Frequency Setting Signal	<p>Main speed frequency reference: -10 VDC to $+10\text{ VDC}$ (20 kΩ), 0 VDC to 10 VDC (20 kΩ), 4 mA to 20 mA (250 Ω), 0 mA to 20 mA (250 Ω) Main speed reference: Pulse train input (maximum 32 kHz)</p>
Starting Torque	<ul style="list-style-type: none"> • V/f: 150%/3 Hz • CL-V/f: 150%/3 Hz • OLV: 200%/0.3 Hz • CLV: 200%/0 min⁻¹ (r/min) • AOLV: 200%/0.3 Hz • OLV/PM: 100%/5% speed • AOLV/PM: 200%/0 min⁻¹ (r/min) • CLV/PM: 200%/0 min⁻¹ (r/min) • EZOLV: 100%/1% speed <p>Note:</p> <ul style="list-style-type: none"> • Correctly select the drive and motor capacity for this starting torque in these control methods: <ul style="list-style-type: none"> –OLV –CLV –AOLV –AOLV/PM –CLV/PM • Set $n8-57 = 1$ [HFI Overlap Selection = Enabled] for this starting torque in AOLV/PM. When you use a non-Yaskawa PM motor, do Rotational Auto-Tuning.

7.6 Drive Specifications

Item	Specification
Speed Control Range	<ul style="list-style-type: none"> V/f: 1:40 CL-V/f: 1:40 OLV: 1:200 CLV: 1:1500 AOLV: 1:200 OLV/PM: 1:20 AOLV/PM: 1:100 CLV/PM: 1:1500 EZOLV: 1:100 <p>Note:</p> <ul style="list-style-type: none"> Set $n8-57 = 1$ [<i>HF1 Overlap Selection = Enabled</i>] for this Speed Control Range in AOLV/PM. When you use a non-Yaskawa PM motor, do Rotational Auto-Tuning. Speed control range of 1:100 for AOLV/PM is Instantaneous operation range. Correctly select the drive and motor capacity for continuous operation.
Zero Speed Control	<p>Possible in these control methods:</p> <ul style="list-style-type: none"> CLV AOLV/PM CLV/PM
Torque Limits	<p>You can use parameter settings for different limits in four quadrants in these control methods:</p> <ul style="list-style-type: none"> OLV CLV AOLV AOLV/PM CLV/PM EZOLV
Acceleration and Deceleration Times	<p>0.0 s to 6000.0 s</p> <p>The drive can set four pairs of different acceleration and deceleration times.</p>
Braking Torque	<p>Approximately 20%</p> <p>Approximately 125% with a dynamic braking option</p> <ul style="list-style-type: none"> Short-time average deceleration torque Motor output 0.4/0.75 kW: over 100% Motor output 1.5 kW: over 50% Motor output 2.2 kW and larger: over 20%. Overexcitation Braking/High Slip Braking allow for approximately 40% Continuous regenerative torque: Approximately 20%. Dynamic braking option allows for approximately 125%, 10%ED, 10 s <p>WARNING! Set $L3-04 = 0$ [<i>Stall Prevention during Decel = Disabled</i>] when you operate the drive with:</p> <ul style="list-style-type: none"> a regenerative converter regenerative unit braking unit braking resistor braking resistor unit. <p><i>If you set the parameter incorrectly, the drive can decelerate for too long and cause serious injury or death.</i></p> <p>Note:</p> <ul style="list-style-type: none"> Models 2004 to 2138 and 4002 to 4168 have a built-in braking transistor. Short-time average deceleration torque refers to the necessary torque to decelerate the motor (uncoupled from the load) from the rated speed to zero. Motor characteristics can change the actual specifications. Motor characteristics change the continuous regenerative torque and short-time average deceleration torque for motors 2.2 kW and larger.
V/f Characteristics	Select from 15 pre-defined V/f patterns, or a user-set V/f pattern.
Main Control Functions	Torque Control, Droop Control, Speed/Torque Control Switching, Feed Forward Control, Zero Servo Function, Restart After Momentary Power Loss, Speed Search, Overtorque/Undertorque Detection, Torque Limit, 17 Step Speed (maximum), Accel/Decel Switch, S-curve Acceleration/Deceleration, 3-wire Sequence, Auto-Tuning (Rotational and Stationary), Dwell Function, Cooling Fan ON/OFF Switch, Slip Compensation, Torque Compensation, Frequency Jump, Upper/Lower Limits for Frequency Reference, DC Injection Braking at Start and Stop, Overexcitation Braking, High Slip Braking, PID Control (with Sleep Function), Energy Saving Control, MEMOBUS/Modbus Communication (RS-485 max, 115.2 kbps), Auto Restart, Application Presets, DriveWorksEZ (customized functions), Removable Terminal Block with Parameter Backup Function, Online Tuning, KEB, Overexcitation Deceleration, Inertia (ASR) Tuning, Overvoltage Suppression, High Frequency Injection

Table 7.13 Protection Functions

Item	Specification
Motor Protection	Electronic thermal overload protection
Momentary Overcurrent Protection	Drive stops when the output current is more than 200% of the HD output current.
Overload Protection	<p>Drive stops when the output current is more than these overload tolerances:</p> <ul style="list-style-type: none"> HD: 150% of the rated output current for 60 seconds The permitted frequency of overload is one time each 10 minutes. ND: 110% of the rated output current for 60 seconds The permitted frequency of overload is one time each 10 minutes. <p>Note:</p> <ul style="list-style-type: none"> If output frequency < 6 Hz, the drive can trigger the overload protection function when the output current is in the overload tolerance range. Derating can be necessary for applications that start and stop frequently.

Item	Specification
Overvoltage Protection	200 V Class: Stops when the DC bus voltage is more than approximately 410 V 400 V Class: Stops when the DC bus voltage is more than approximately 820 V
Undervoltage Protection	200 V Class: Stops when the DC bus voltage decreases to less than approximately 190 V 400 V Class: Stops when the DC bus voltage decreases to less than approximately 380 V
Momentary Power Loss Ride-thru	Stops when power loss is longer than 15 ms. Continues operation if power loss is shorter than 2 s (depending on parameter settings). Note: <ul style="list-style-type: none"> The stop time can be shorter depending on the load and motor speed. Drive capacity will change the continuous operation time. A Momentary Power Loss Recovery Unit is necessary to continue operation through a 2 s power loss on models 2004 to 2056 and 4002 to 4031.
Heatsink Overheat Protection	The drive stops when the thermistor detects an IGBT temperature more than approximately 100 °C (212 °F). The trip temperature level is different for different drive models.
Braking Resistor Overheat Protection	Overheat detection for braking resistor (optional ERF-type, 3% ED)
Stall Prevention	Stall prevention is available during acceleration, deceleration, and during run.
Ground Fault Protection	Electronic circuit protection Note: This protection detects ground faults during run. The drive will not provide protection when: <ul style="list-style-type: none"> There is a low-resistance ground fault for the motor cable or terminal block You energize the drive when there is a ground fault.
DC Bus Charge LED	Charge LED illuminates when DC bus voltage is more than 50 V.
Braking Transistor	Models 2004 to 2138 and 4002 to 4168 have a braking transistor.
DC Link Choke	Models 2110 to 2415 and 4060 to 4H12 have a DC link choke.

Table 7.14 Environment

Item	Specification
Area of Use	Indoors
Power Supply	Overvoltage Category III Permitted frequency fluctuation: $\pm 5\%$ Permitted voltage fluctuation: -15% to $+10\%$ 200 V Class: <ul style="list-style-type: none"> Three-phase AC power supply 200 V to 240 V at 50/60 Hz DC power supply 270 V to 340 V 400 V Class: <ul style="list-style-type: none"> Three-phase AC power supply 380 V to 480 V at 50/60 Hz DC power supply 513 V to 679 V 6-Phase/12-Pulse 400 V Class: <ul style="list-style-type: none"> Three-phase AC power supply 380 V to 480 V at 50/60 Hz
Surrounding Air Temperature	IP00/UL Open Type/Heatsink External Mounting: $-10\text{ }^{\circ}\text{C}$ to $+50\text{ }^{\circ}\text{C}$ ($14\text{ }^{\circ}\text{F}$ to $122\text{ }^{\circ}\text{F}$) IP20/UL Open Type/Heatsink External Mounting: $-10\text{ }^{\circ}\text{C}$ to $+50\text{ }^{\circ}\text{C}$ ($14\text{ }^{\circ}\text{F}$ to $122\text{ }^{\circ}\text{F}$) IP20/UL Type 1: $-10\text{ }^{\circ}\text{C}$ to $+40\text{ }^{\circ}\text{C}$ ($14\text{ }^{\circ}\text{F}$ to $104\text{ }^{\circ}\text{F}$) IP55/UL Type 12 Heatsink External Mounting; front side: $-10\text{ }^{\circ}\text{C}$ to $+50\text{ }^{\circ}\text{C}$ ($14\text{ }^{\circ}\text{F}$ to $122\text{ }^{\circ}\text{F}$) IP55/UL Type 12 Heatsink External Mounting; back side: $-10\text{ }^{\circ}\text{C}$ to $+40\text{ }^{\circ}\text{C}$ ($14\text{ }^{\circ}\text{F}$ to $104\text{ }^{\circ}\text{F}$) <ul style="list-style-type: none"> When you install the drive in an enclosure, use a cooling fan or air conditioner to keep the internal air temperature in the permitted range. Do not let the drive freeze. You can use IP00/IP20/UL Open Type drives at a maximum of $60\text{ }^{\circ}\text{C}$ ($140\text{ }^{\circ}\text{F}$) when you derate the output current. You can use IP20/UL Type 1 drives at a maximum of $50\text{ }^{\circ}\text{C}$ ($122\text{ }^{\circ}\text{F}$) when you derate the output current.
Humidity	95% RH or less Do not let condensation form on the drive.
Storage Temperature	$-20\text{ }^{\circ}\text{C}$ to $+70\text{ }^{\circ}\text{C}$ ($-4\text{ }^{\circ}\text{F}$ to $+158\text{ }^{\circ}\text{F}$) (short-term temperature during transportation)
Surrounding Area	Pollution degree 2 or less Install the drive in an area without: <ul style="list-style-type: none"> Oil mist, corrosive or flammable gas, or dust Metal powder, oil, water, or other unwanted materials Radioactive materials or flammable materials, including wood Harmful gas or fluids Salt Direct sunlight

7.6 Drive Specifications

Item	Specification
Altitude	1000 m (3281 ft) Maximum Note: Derate the output current by 1% for each 100 m (328 ft) to install the drive in altitudes between 1000 m to 4000 m (3281 ft to 13123 ft). It is not necessary to derate the rated voltage in these conditions: <ul style="list-style-type: none"> • When you install the drive at 2000 m (6562 ft) or lower • When you install the drive between 2000 m to 4000 m (6562 ft to 13123 ft) and ground the neutral point on the power supply. Contact Yaskawa or your nearest sales representative if you will not ground the neutral point.
Vibration ^{*1}	<ul style="list-style-type: none"> • 10 Hz to 20 Hz: 2004 to 2415, 4002 to 4720, T103 to T720: 1 G (9.8 m/s², 32.15 ft/s²) 4810 to 4H12: 0.6 G (5.9 m/s², 19.36 ft/s²) • 20 Hz to 55 Hz: 2004 to 2211, 4002 to 4168, T103 to T168: 0.6 G (5.9 m/s², 19.36 ft/s²) 2257 to 2415, 4208 to 4H12, T208 to T720: 0.2 G (2.0 m/s², 6.56 ft/s²)
Installation Orientation	Install the drive vertically for sufficient airflow to cool the drive.

*1 This drive passed the vibration test with a logarithmic sweep as specified by EN 60068-2-6 and JIS C60068-2-6. If the internal components of the drive vibrate too much, it can cause damage to the drive even when the vibration frequency is in the specification. If the drive components vibrate, improve the installation environment to decrease vibration. To improve the installation environment for vibration, you can put the motor on a rubber pad or reinforce the structure of the installation.

Table 7.15 Standard

Item	Specification
Applicable Standards	<ul style="list-style-type: none"> • UL 508C ^{*1} • EN 61800-3 • IEC/EN 61800-5-1 • Two Safe Disable inputs and one EDM output according to EN ISO 13849-1:2015 (PL e (Cat.III)), IEC/EN 61508 SIL3
Enclosure Protection Design	IP00/UL Open Type IP20/UL Open Type IP20/UL Type 1 IP55/UL Type 12 Note: To change an IP20/UL Open Type drive to an IP20/UL Type 1 drive, install a UL Type 1 kit. You cannot install a UL Type 1 kit to models T103 to T720.

*1 Models 4810 to 4H12 comply with UL 61800-5-1.

7.7 Drive Watt Loss

◆ 200 V Class

Table 7.16 Drive Watt Loss (Heavy Duty)

Model	Carrier Frequency kHz	Interior Unit Loss W	Cooling Fin Loss W	Total Loss W
2004	8	35	19	54
2006	8	37	26	63
2008	8	40	36	76
2010	8	44	43	87
2012	8	50	61	111
2018	8	47	82	129
2021	8	56	105	161
2030	8	74	174	248
2042	8	88	183	271
2056	8	112	267	379
2070	8	145	373	518
2082	8	179	478	657
2110	8	155	563	718
2138	8	212	680	892
2169	5	275	820	1095
2211	5	314	991	1305
2257	5	398	1252	1650
2313	5	502	1643	2145
2360	5	582	1978	2560
2415	5	644	2359	3003

Table 7.17 Drive Watt Loss (Normal Duty)

Model	Carrier Frequency kHz	Interior Unit Loss W	Cooling Fin Loss W	Total Loss W
2004	2	35	18	53
2006	2	38	25	63
2008	2	42	34	76
2010	2	49	46	95
2012	2	56	62	118
2018	2	53	88	141
2021	2	75	125	200
2030	2	95	206	301
2042	2	129	227	356
2056	2	149	302	451
2070	2	177	403	580
2082	2	202	467	669
2110	2	192	631	823
2138	2	269	814	1083
2169	2	338	941	1279

7.7 Drive Watt Loss

Model	Carrier Frequency kHz	Interior Unit Loss W	Cooling Fin Loss W	Total Loss W
2211	2	384	1131	1515
2257	2	519	1534	2053
2313	2	579	1794	2373
2360	2	655	2071	2726
2415	2	608	2156	2764

◆ 400 V Class

Table 7.18 Drive Watt Loss (Heavy Duty)

Model	Carrier Frequency kHz	Interior Unit Loss W	Cooling Fin Loss W	Total Loss W
4002	8	38	15	53
4004	8	42	28	70
4005	8	46	37	83
4007	8	48	45	93
4009	8	37	61	98
4012	8	46	82	128
4018	8	65	140	205
4023	8	73	150	223
4031	8	101	211	312
4038	8	119	272	391
4044	8	148	354	502
4060	8	126	389	515
4075	8	165	527	692
4089	8	184	617	801
4103	8	237	779	1016
4140	5	300	956	1256
4168	5	486	1274	1760
4208	5	446	1432	1878
4250	5	558	1464	2022
4302	5	692	2061	2753
4371	5	843	2499	3342
4414	5	777	2212	2989
4477	2	963	2696	3659
4568	2	1183	3329	4512
4605	2	1376	4109	5485
4720	2	1395	4198	5593
4810	2	2036	5778	7814
4930	2	2120	6563	8683
4H11	2	2690	7708	10398
4H12	2	2866	8917	11783

Table 7.19 Drive Watt Loss (Normal Duty)

Model	Carrier Frequency kHz	Interior Unit Loss W	Cooling Fin Loss W	Total Loss W
4002	2	39	16	55
4004	2	44	33	77
4005	2	48	31	79
4007	2	52	44	96
4009	2	42	58	100
4012	2	57	84	141
4018	2	82	144	226
4023	2	108	185	293
4031	2	138	222	360
4038	2	145	270	415
4044	2	168	335	503
4060	2	157	444	601
4075	2	185	527	712
4089	2	212	665	877
4103	2	264	766	1030
4140	2	393	1126	1519
4168	2	574	1348	1922
4208	2	493	1465	1958
4250	2	686	1738	2424
4302	2	817	2257	3074
4371	2	1022	2553	3575
4414	2	873	2422	3295
4477	2	1183	3329	4512
4568	2	1429	3989	5418
4605	2	1526	4572	6098
4720	2	1723	5184	6907
4810	2	2385	6626	9011
4930	2	2465	7613	10078
4H11	2	3162	9020	12182
4H12	2	3236	9931	13167

◆ 6-Phase/12-Pulse 400 V Class

Table 7.20 Drive Watt Loss (Heavy Duty)

Model	Carrier Frequency kHz	Interior Unit Loss W	Cooling Fin Loss W	Total Loss W
T103	8	208	750	958
T140	5	256	912	1168
T168	5	352	1139	1491
T208	5	400	1385	1785
T250	5	490	1397	1887
T302	5	616	1985	2601
T371	5	638	2499	3137

7.7 Drive Watt Loss

Model	Carrier Frequency kHz	Interior Unit Loss W	Cooling Fin Loss W	Total Loss W
T414	5	625	2212	2837
T477	2	911	2835	3746
T568	2	1042	3329	4371
T605	2	1184	4110	5294
T720	2	1203	4198	5401

Table 7.21 Drive Watt Loss (Normal Duty)

Model	Carrier Frequency kHz	Interior Unit Loss W	Cooling Fin Loss W	Total Loss W
T103	2	223	725	948
T140	2	320	1053	1373
T168	2	389	1164	1553
T208	2	434	1406	1840
T250	2	594	1646	2240
T302	2	718	2158	2876
T371	2	694	2561	3255
T414	2	698	2423	3121
T477	2	1042	3329	4371
T568	2	1214	3989	5203
T605	2	1281	4572	5853
T720	2	1459	5184	6643

7.8 Drive Derating

You must derate the drive capacity to operate the drive above the rated temperature, altitude, and default carrier frequency.

◆ Carrier Frequency Settings and Rated Current Values

Table 7.22, Table 7.25, and Table 7.28 show how the drive rated output current changes when the C6-02 [Carrier Frequency Selection] value changes.

The output current value changes linearly as the carrier frequency changes. You can use the values from the tables to calculate a frequency that is not shown. When A1-02 = 4 [Control Method Selection = AOLV], refer to Table 7.23, Table 7.26, and Table 7.29.

When A1-02 = 6 [AOLV/PM], refer to Table 7.24, Table 7.27, and Table 7.30.

Note:

The drive only applies the carrier frequency derating of the output current to the reference output current value of $oL2$ [Drive Overload]. The drive will not derate the 100% output rated current of parameters and monitors as specified in the output rated current shown in *Model-Specific Specifications (200 V Class) on page 446* and *Model-Specific Specifications (400 V Class) on page 448*.

■ 200 V Class

Table 7.22 Carrier Frequency and Rated Current Derating When A1-02 = 0, 1, 2, 3, 5, 7, 8

Model	Rated Current (A)											
	Heavy Duty Rating (HD) C6-01 = 0						Normal Duty Rating (ND) C6-01 = 1					
	2 kHz	5 kHz	8 kHz	10 kHz	12.5 kHz	15 kHz	2 kHz	5 kHz	8 kHz	10 kHz	12.5 kHz	15 kHz
2004	3.5	3.5	3.5	3.4	3.2	3.06	4.2	4.0	3.6	3.4	3.1	2.77
2006	5.0	5.0	5.0	4.8	4.6	4.3	6.0	5.6	5.0	4.6	4.1	3.6
2008	6.9	6.9	6.9	6.5	5.9	5.4	8.0	7.6	6.9	6.5	5.9	5.4
2010	8.0	8.0	8.0	7.4	6.6	5.8	9.6	9.0	8.0	7.4	6.6	5.8
2012	11.0	11.0	11.0	10.4	9.6	8.8	12.0	11.7	11.0	10.5	9.9	9.3
2018	14.0	14.0	14.0	12.6	10.8	9.1	17.5	16.1	14.0	12.6	10.8	9.1
2021	17.5	17.5	17.5	16.1	14.3	12.6	21.0	19.6	17.0	16.1	14.3	12.5
2030	25.0	25.0	25.0	23.0	20.5	18.0	30.0	28.0	25.0	23.0	20.5	18.0
2042	33.0	33.0	33.0	29.3	24.8	20.2	42.0	38.4	33.0	29.4	24.9	20.4
2056	47.0	47.0	47.0	43.4	38.9	34.4	56.0	52.4	47.0	43.4	38.9	34.4
2070	60.0	60.0	60.0	56.0	51.0	46.0	70.0	66.0	60.0	56.0	51.0	46.0
2082	75.0	75.0	75.0	68.6	60.5	53.0	82.0	82.0	75.0	68.8	61.0	53.1
2110	88.0	88.0	88.0	80.5	71.0	62.0	110.0	102.7	92.0	84.3	75.2	66.0
2138	115.0	115.0	115.0	105.1	92.8	81.0	138.0	128.8	115.0	105.8	94.3	82.8
2169	145.0	145.0	125.2	112.0	-	-	169.0	152.7	128.3	112.0	-	-
2211	180.0	180.0	155.2	138.6	-	-	211.0	190.2	158.9	138.1	-	-
2257	215.0	215.0	184.8	164.7	-	-	257.0	230.4	190.5	163.9	-	-
2313	283.0	283.0	249.0	226.4	-	-	313.0	288.5	251.7	227.1	-	-
2360	346.0	346.0	294.3	259.8	-	-	360.0	330.8	287.6	258.8	-	-
2415	415.0	415.0	365.2	332.0	-	-	-	-	-	-	-	-

Table 7.23 Carrier Frequency and Rated Current Derating When A1-02 = 4 [AOLV]

Model	Rated Current (A)									
	Heavy Duty Rating (HD) C6-01 = 0					Normal Duty Rating (ND) C6-01 = 1				
	2 kHz	5 kHz	8 kHz	10 kHz	12.5 kHz	2 kHz	5 kHz	8 kHz	10 kHz	12.5 kHz
2004	3.5	3.5	3.2	3.1	2.8	4.2	3.7	3.1	2.8	2.3
2006	5.0	5.0	4.6	4.3	4.0	6.0	5.1	4.0	3.6	2.8
2008	6.9	6.9	6.0	5.4	4.5	8.0	7.0	6.0	5.4	4.5
2010	8.0	8.0	6.7	5.8	4.5	9.6	8.2	7.0	5.8	4.6
2012	11.0	11.0	9.8	8.8	7.7	12.0	11.1	10.0	9.3	8.4
2018	14.0	14.0	11.2	9.1	6.4	17.5	14.3	11.0	9.1	6.4
2021	17.5	17.5	14.7	12.6	9.9	21.0	17.8	15.0	12.5	9.9
2030	25.0	25.0	21.0	18.0	14.3	30.0	25.5	21.0	18.0	14.3
2042	33.0	33.0	25.7	20.2	13.3	42.0	33.9	26.0	20.4	13.7
2056	47.0	47.0	39.8	34.4	27.7	56.0	47.9	40.0	34.4	27.6
2070	60.0	60.0	52.0	46.0	38.5	70.0	61.0	52.0	46.0	38.5
2082	75.0	75.0	62.1	52.5	40.4	82.0	76.7	63.0	53.1	41.4
2110	88.0	88.0	72.9	61.6	47.5	110.0	93.5	77.0	66.0	52.3
2138	115.0	115.0	95.3	80.5	62.0	138.0	117.3	97.0	82.8	65.6
2169	145.0	128.5	98.8	78.9	-	169.0	132.3	95.7	71.2	-
2211	180.0	159.3	122.0	97.2	-	211.0	164.1	117.2	86.0	-
2257	215.0	189.8	144.5	114.3	-	257.0	197.2	137.3	97.4	-
2313	283.0	254.7	203.8	169.8	-	313.0	257.8	202.6	165.8	-
2360	346.0	302.9	225.3	173.6	-	360.0	294.8	230.0	186.8	-
2415	415.0	373.5	298.8	249.0	-	-	-	-	-	-

Table 7.24 Carrier Frequency and Rated Current Derating When A1-02 = 6 [AOLV/PM]

Model	Rated Current (A)											
	Heavy Duty Rating (HD) C6-01 = 0						Normal Duty Rating (ND) C6-01 = 1					
	2 kHz	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	2 kHz	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz
2004	3.5	3.5	3.4	3.2	3.1	2.9	4.2	3.8	3.5	3.1	2.8	2.4
2006	5.0	5.0	4.9	4.6	4.3	4.1	6.0	5.4	4.8	4.2	3.6	3.0
2008	6.9	6.9	6.7	6.0	5.4	4.7	8.0	7.3	6.7	6.0	5.4	4.7
2010	8.0	8.0	7.7	6.7	5.8	4.8	9.6	8.6	7.7	6.7	5.8	4.8
2012	11.0	11.0	10.7	9.8	8.8	7.9	12.2	11.5	10.7	10.0	9.3	8.6
2018	14.0	14.0	13.3	11.2	9.1	6.9	17.5	15.4	13.3	11.2	9.1	6.9
2021	17.5	17.5	16.8	14.7	12.6	10.4	21.0	18.9	16.8	14.6	12.5	10.4
2030	25.0	25.0	24.0	21.0	18.0	15.0	30.0	27.0	24.0	21.0	18.0	15.0
2042	33.0	33.0	31.2	25.7	20.2	14.7	42.0	36.6	31.2	25.8	20.4	15.0
2056	47.0	47.0	45.2	39.8	34.4	29.0	56.0	50.6	45.2	39.8	34.4	29.0
2070	60.0	60.0	58.0	52.0	46.0	40.0	70.0	64.0	58.0	52.0	46.0	40.0
2082	75.0	75.0	71.8	62.1	52.5	42.9	82.0	81.4	72.0	62.6	53.1	43.7
2110	88.0	88.0	84.2	72.9	61.6	50.3	110.0	99.0	88.0	77.0	66.0	55.0
2138	115.0	115.0	110.1	95.3	80.5	65.7	138.0	124.2	110.4	96.6	82.8	69.0
2169	145.0	138.4	118.6	98.8	78.9	-	169.0	144.6	120.1	95.7	71.2	-

Model	Rated Current (A)											
	Heavy Duty Rating (HD) C6-01 = 0						Normal Duty Rating (ND) C6-01 = 1					
	2 kHz	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	2 kHz	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz
2211	180.0	171.7	146.9	122.0	97.2	-	211.0	179.7	148.5	117.2	86.0	-
2257	215.0	204.9	174.7	144.5	114.3	-	257.0	217.1	177.2	137.3	97.4	-
2313	283.0	271.7	237.7	203.8	169.8	-	313.0	276.2	239.4	202.6	165.8	-
2360	346.0	328.8	277.0	225.3	173.6	-	359.6	316.4	273.2	230.0	186.8	-
2415	415.0	398.4	348.6	298.8	249.0	-	-	-	-	-	-	-

■ 400 V Class

Table 7.25 Carrier Frequency and Rated Current Derating When A1-02 = 0, 1, 2, 3, 5, 7, 8

Model	Rated Current (A)											
	Heavy Duty Rating (HD) C6-01 = 0						Normal Duty Rating (ND) C6-01 = 1					
	2 kHz	5 kHz	8 kHz	10 kHz	12.5 kHz	15 kHz	2 kHz	5 kHz	8 kHz	10 kHz	12.5 kHz	15 kHz
4002	1.8	1.8	1.8	1.6	1.3	1.0	2.1	2.0	1.8	1.7	1.5	1.4
4004	3.4	3.4	3.4	2.9	2.3	1.7	4.1	3.8	3.4	3.1	2.8	2.4
4005	4.8	4.8	4.8	4.3	3.7	3.0	5.4	5.2	4.8	4.6	4.3	3.9
4007	5.5	5.5	5.5	4.9	4.1	3.2	7.1	6.5	5.5	4.8	4.0	3.2
4009	7.2	7.2	7.2	6.5	5.6	4.8	8.9	8.2	7.2	6.5	5.6	4.8
4012	9.2	9.2	9.2	8.1	6.8	5.4	11.9	10.8	9.2	8.1	6.7	5.4
4018	14.8	14.8	14.8	13.1	11.0	8.9	17.5	17.3	14.8	13.1	11.0	8.9
4023	18.0	18.0	18.0	15.9	13.4	10.8	23.0	21.5	18.3	16.2	13.6	11.0
4031	24.0	24.0	24.0	21.2	17.7	14.1	31.0	28.2	24.0	21.1	17.6	14.1
4038	31.0	31.0	31.0	27.5	23.0	18.6	38.0	36.3	31.0	27.5	23.0	18.6
4044	39.0	39.0	39.0	34.5	29.0	23.4	44.0	43.6	37.5	33.5	28.4	23.4
4060	45.0	45.0	45.0	39.1	31.8	24.4	60.0	53.7	44.9	39.1	31.7	24.0
4075	60.0	60.0	60.0	53.1	44.6	36.0	75.0	73.8	62.9	55.6	46.5	37.0
4089	75.0	75.0	75.0	66.4	55.7	45.0	89.0	88.8	75.8	67.2	56.4	46.0
4103	91.0	91.0	91.0	80.6	67.6	54.6	103.0	103.0	90.3	80.1	67.3	55.0
4140	112.0	112.0	91.8	78.4	-	-	140.0	122.8	96.7	79.0	-	-
4168	150.0	150.0	123.0	105.0	-	-	168.0	150.5	124.4	107.0	-	-
4208	180.0	180.0	147.6	126.0	-	-	208.0	179.7	137.2	109.0	-	-
4250	216.0	216.0	177.1	151.2	-	-	250.0	221.8	179.4	151.0	-	-
4302	260.0	260.0	213.2	182.0	-	-	302.0	268.8	218.9	186.0	-	-
4371	304.0	304.0	249.3	212.8	-	-	371.0	327.2	261.6	218.0	-	-
4414	371.0	371.0	304.2	259.7	-	-	414.0	371.0	304.7	261.0	-	-
4477	414.0	345.7	-	-	-	-	477.0	367.0	-	-	-	-
4568	477.0	398.3	-	-	-	-	568.0	437.0	-	-	-	-
4605	605.0	505.2	-	-	-	-	675.0	529.0	-	-	-	-
4720	605.0	505.2	-	-	-	-	720.0	564.0	-	-	-	-
4810	720.0	600.0	-	-	-	-	810.0	624.0	-	-	-	-
4930	810.0	675.0	-	-	-	-	930.0	716.0	-	-	-	-

7.8 Drive Derating

Model	Rated Current (A)											
	Heavy Duty Rating (HD) C6-01 = 0						Normal Duty Rating (ND) C6-01 = 1					
	2 kHz	5 kHz	8 kHz	10 kHz	12.5 kHz	15 kHz	2 kHz	5 kHz	8 kHz	10 kHz	12.5 kHz	15 kHz
4H11	930.0	775.0	-	-	-	-	1090.0	852.0	-	-	-	-
4H12	1090.0	908.0	-	-	-	-	1200.0	938.0	-	-	-	-

Table 7.26 Carrier Frequency and Rated Current Derating When A1-02 = 4 [AOLV]

Model	Rated Current (A)										
	Heavy Duty Rating (HD) C6-01 = 0					Normal Duty Rating (ND) C6-01 = 1					
	2 kHz	5 kHz	8 kHz	10 kHz	12.5 kHz	2 kHz	5 kHz	8 kHz	10 kHz	12.5 kHz	
4002	1.8	1.8	1.3	1.0	0.6	2.1	1.8	1.6	1.4	1.2	
4004	3.4	3.4	2.4	1.7	0.8	4.1	3.5	2.8	2.4	1.9	
4005	4.8	4.8	3.8	3.0	2.1	5.4	4.9	4.3	3.9	3.5	
4007	5.5	5.5	4.2	3.2	2.0	7.1	5.7	4.2	3.2	2.0	
4009	7.2	7.2	5.8	4.8	3.5	8.9	7.4	5.8	4.8	3.5	
4012	9.2	9.2	7.0	5.4	3.3	11.9	9.5	7.0	5.4	3.3	
4018	14.8	14.8	11.4	8.9	5.7	17.5	15.2	11.4	8.9	5.7	
4023	18.0	18.0	13.9	10.8	6.9	23.0	18.8	14.1	11.0	7.1	
4031	24.0	24.0	18.4	14.1	8.8	31.0	24.7	18.3	14.1	8.8	
4038	31.0	31.0	23.9	18.6	12.0	38.0	31.9	23.9	18.6	12.0	
4044	39.0	39.0	30.1	23.4	15.0	44.0	38.5	29.5	23.4	15.8	
4060	45.0	45.0	33.3	24.4	13.4	60.0	46.4	33.2	24.4	13.4	
4075	60.0	60.0	46.3	36.0	23.1	75.0	64.7	48.4	37.5	23.8	
4089	75.0	75.0	57.9	45.0	28.9	89.0	78.0	58.6	45.6	29.4	
4103	91.0	91.0	70.2	54.6	35.1	103.0	92.8	69.9	54.6	35.5	
4140	112.0	95.2	65.0	44.8	-	140.0	101.1	62.0	36.0	-	
4168	150.0	127.5	87.0	60.0	-	168.0	128.7	89.5	63.0	-	
4208	180.0	153.0	104.4	72.0	-	208.0	144.3	80.6	38.0	-	
4250	216.0	183.6	125.3	86.4	-	250.0	186.5	123.0	81.0	-	
4302	260.0	221.0	150.8	104.0	-	302.0	227.2	152.5	103.0	-	
4371	304.0	258.4	176.3	121.6	-	371.0	272.5	174.0	108.0	-	
4414	371.0	315.4	215.2	148.4	-	414.0	316.0	216.9	151.0	-	
4477	414.0	259.8	-	-	-	477.0	230.0	-	-	-	
4568	477.0	299.3	-	-	-	568.0	274.0	-	-	-	
4605	605.0	379.6	-	-	-	675.0	345.0	-	-	-	
4720	605.0	379.6	-	-	-	720.0	368.0	-	-	-	
4810	720.0	450.0	-	-	-	810.0	391.0	-	-	-	
4930	810.0	506.0	-	-	-	930.0	449.0	-	-	-	
4H11	930.0	581.0	-	-	-	1090.0	554.0	-	-	-	
4H12	1090.0	681.0	-	-	-	1200.0	610.0	-	-	-	

Table 7.27 Carrier Frequency and Rated Current Derating When A1-02 = 6 [AOLV/PM]

Model	Rated Current (A)											
	Heavy Duty Rating (HD) C6-01 = 0						Normal Duty Rating (ND) C6-01 = 1					
	2 kHz	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	2 kHz	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz
4002	1.8	1.8	1.7	1.3	1.0	0.6	2.1	1.9	1.7	1.6	1.4	1.2
4004	3.4	3.4	3.2	2.4	1.7	1.0	4.1	3.7	3.3	2.8	2.4	2.0
4005	4.8	4.8	4.5	3.8	3.0	2.3	5.4	5.0	4.7	4.3	3.9	3.6
4007	5.5	5.5	5.2	4.2	3.2	2.3	7.1	6.1	5.2	4.2	3.2	2.3
4009	7.2	7.2	6.9	5.8	4.8	3.8	8.9	7.9	6.8	5.8	4.8	3.7
4012	9.2	9.2	8.7	7.0	5.4	3.8	11.9	10.3	8.6	7.0	5.4	3.8
4018	14.8	14.8	14.0	11.4	8.9	6.3	17.5	16.5	14.0	11.4	8.9	6.3
4023	18.0	18.0	17.0	13.9	10.8	7.7	23.4	20.4	17.3	14.1	11.0	7.8
4031	24.0	24.0	22.6	18.4	14.1	9.9	31.0	26.8	22.6	18.3	14.1	9.9
4038	31.0	31.0	29.2	23.9	18.6	13.3	38.0	34.5	29.2	23.9	18.6	13.3
4044	39.0	39.0	36.8	30.1	23.4	16.7	44.0	41.6	35.5	29.5	23.4	17.3
4060	45.0	45.0	42.1	33.3	24.4	15.6	59.6	50.8	42.0	33.2	24.4	15.6
4075	60.0	60.0	56.6	46.3	36.0	25.7	74.9	70.2	59.3	48.4	37.5	26.5
4089	75.0	75.0	70.7	57.9	45.0	32.1	89.2	84.5	71.5	58.6	45.6	32.7
4103	91.0	91.0	85.8	70.2	54.6	39.0	103.0	100.5	85.2	69.9	54.6	39.3
4140	112.0	105.3	85.1	65.0	44.8	-	140.0	114.1	88.1	62.0	36.0	-
4168	150.0	141.0	114.0	87.0	60.0	-	168.0	141.8	115.6	89.5	63.3	-
4208	180.0	169.2	136.8	104.4	72.0	-	208.0	165.5	123.1	80.6	38.1	-
4250	216.0	203.0	164.2	125.3	86.4	-	250.0	207.7	165.3	123.0	80.6	-
4302	260.0	244.4	197.6	150.8	104.0	-	302.0	252.2	202.3	152.5	102.6	-
4371	304.0	285.8	231.0	176.3	121.6	-	371.0	305.3	239.7	174.0	108.3	-
4414	371.0	348.7	282.0	215.2	148.4	-	414.0	348.6	282.8	216.9	151.1	-
4477	414.0	311.3	-	-	-	-	477.0	312.4	-	-	-	-
4568	477.0	358.7	-	-	-	-	568.0	372.0	-	-	-	-
4605	605.0	455.0	-	-	-	-	675.0	455.0	-	-	-	-
4720	605.0	455.0	-	-	-	-	720.0	485.3	-	-	-	-
4810	720.0	540.0	-	-	-	-	810.0	531.0	-	-	-	-
4930	810.0	607.0	-	-	-	-	930.0	609.0	-	-	-	-
4H11	930.0	697.0	-	-	-	-	1090.0	733.0	-	-	-	-
4H12	1090.0	817.0	-	-	-	-	1200.0	807.0	-	-	-	-

■ 6-Phase/12-Pulse 400 V Class

Table 7.28 Carrier Frequency and Rated Current Derating When A1-02 = 0, 1, 2, 3, 5, 7, 8

Model	Rated Current (A)											
	Heavy Duty Rating (HD) C6-01 = 0						Normal Duty Rating (ND) C6-01 = 1					
	2 kHz	5 kHz	8 kHz	10 kHz	12.5 kHz	15 kHz	2 kHz	5 kHz	8 kHz	10 kHz	12.5 kHz	15 kHz
T103	91.0	91.0	91.0	80.6	67.6	54.6	103.0	103.0	90.3	80.1	67.3	55.0
T140	112.0	112.0	91.8	78.4	-	-	140.0	122.8	96.7	79.0	-	-
T168	150.0	150.0	123.0	105.0	-	-	168.0	150.5	124.4	107.0	-	-

7.8 Drive Derating

Model	Rated Current (A)											
	Heavy Duty Rating (HD) C6-01 = 0						Normal Duty Rating (ND) C6-01 = 1					
	2 kHz	5 kHz	8 kHz	10 kHz	12.5 kHz	15 kHz	2 kHz	5 kHz	8 kHz	10 kHz	12.5 kHz	15 kHz
T208	180.0	180.0	147.6	126.0	-	-	208.0	179.7	137.2	109.0	-	-
T250	216.0	216.0	177.1	151.2	-	-	250.0	221.8	179.4	151.0	-	-
T302	260.0	260.0	213.2	182.0	-	-	302.0	268.8	218.9	186.0	-	-
T371	304.0	304.0	249.3	212.8	-	-	371.0	327.2	261.6	218.0	-	-
T414	371.0	371.0	304.2	259.7	-	-	414.0	371.0	304.7	261.0	-	-
T477	414.0	345.7	-	-	-	-	477.0	367.0	-	-	-	-
T568	477.0	398.3	-	-	-	-	568.0	437.0	-	-	-	-
T605	605.0	505.2	-	-	-	-	675.0	529.0	-	-	-	-
T720	605.0	505.2	-	-	-	-	720.0	564.0	-	-	-	-

Table 7.29 Carrier Frequency and Rated Current Derating When A1-02 = 4 [AOLV]

Model	Rated Current (A)										
	Heavy Duty Rating (HD) C6-01 = 0					Normal Duty Rating (ND) C6-01 = 1					
	2 kHz	5 kHz	8 kHz	10 kHz	12.5 kHz	2 kHz	5 kHz	8 kHz	10 kHz	12.5 kHz	
T103	91.0	91.0	70.2	54.6	35.1	103.0	92.8	69.9	54.6	35.5	
T140	112.0	95.2	65.0	44.8	-	140.0	101.1	62.0	36.0	-	
T168	150.0	127.5	87.0	60.0	-	168.0	128.7	89.5	63.0	-	
T208	180.0	153.0	104.4	72.0	-	208.0	144.3	80.6	38.0	-	
T250	216.0	183.6	125.3	86.4	-	250.0	186.5	123.0	81.0	-	
T302	260.0	221.0	150.8	104.0	-	302.0	227.2	152.5	103.0	-	
T371	304.0	258.4	176.3	121.6	-	371.0	272.5	174.0	108.0	-	
T414	371.0	315.4	215.2	148.4	-	414.0	316.0	216.9	151.0	-	
T477	414.0	259.8	-	-	-	477.0	230.0	-	-	-	
T568	477.0	299.3	-	-	-	568.0	274.0	-	-	-	
T605	605.0	379.6	-	-	-	675.0	345.0	-	-	-	
T720	605.0	379.6	-	-	-	720.0	368.0	-	-	-	

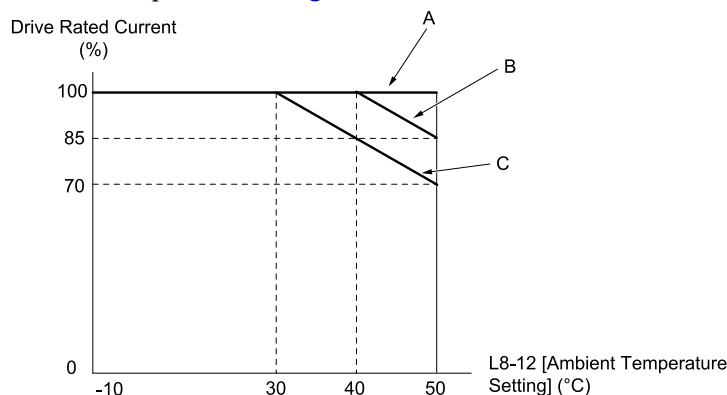
Table 7.30 Carrier Frequency and Rated Current Derating When A1-02 = 6 [AOLV/PM]

Model	Rated Current (A)											
	Heavy Duty Rating (HD) C6-01 = 0						Normal Duty Rating (ND) C6-01 = 1					
	2 kHz	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	2 kHz	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz
T103	91.0	91.0	85.8	70.2	54.6	39.0	103.0	100.5	85.2	69.9	54.6	39.3
T140	112.0	105.3	85.1	65.0	44.8	-	140.0	114.1	88.1	62.0	36.0	-
T168	150.0	141.0	114.0	87.0	60.0	-	168.0	141.8	115.6	89.5	63.3	-
T208	180.0	169.2	136.8	104.4	72.0	-	208.0	165.5	123.1	80.6	38.1	-
T250	216.0	203.0	164.2	125.3	86.4	-	250.0	207.7	165.3	123.0	80.6	-
T302	260.0	244.4	197.6	150.8	104.0	-	302.0	252.2	202.3	152.5	102.6	-
T371	304.0	285.8	231.0	176.3	121.6	-	371.0	305.3	239.7	174.0	108.3	-
T414	371.0	348.7	282.0	215.2	148.4	-	414.0	348.6	282.8	216.9	151.1	-
T477	414.0	311.3	-	-	-	-	477.0	312.4	-	-	-	-
T568	477.0	358.7	-	-	-	-	568.0	372.0	-	-	-	-

Model	Rated Current (A)											
	Heavy Duty Rating (HD) C6-01 = 0						Normal Duty Rating (ND) C6-01 = 1					
	2 kHz	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	2 kHz	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz
T605	605.0	455.0	-	-	-	-	675.0	455.0	-	-	-	-
T720	605.0	455.0	-	-	-	-	720.0	485.3	-	-	-	-

◆ Derating Depending on Ambient Temperature

When you install drives in a place where ambient temperatures are higher than the rated conditions or install drives side-by-side in the enclosure panel, set L8-12 [Ambient Temperature Setting] and L8-35 [Installation Method Selection]. Derate the output current as specified in Figure 7.1.



A - L8-35 = 0

C - L8-35 = 1

B - L8-35 = 2, L8-35 = 3

Figure 7.1 Derating Depending on Drive Installation Method

■ L8-12: Ambient Temperature Setting

No. (Hex.)	Name	Description	Default (Range)
L8-12 (04B8)	Ambient Temperature Setting	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the ambient temperature of the drive installation area.	40 °C (-10 °C - +50 °C)

The drive automatically adjusts the drive rated current to the best value as specified by the set temperature. Set the ambient temperature of the area where you install the drive to a value that is more than the drive rating.

Refer to [Derating Depending on Ambient Temperature on page 467](#) for information about derating depending on ambient temperature.

■ L8-35: Installation Method Selection

No. (Hex.)	Name	Description	Default (Range)
L8-35 (04EC)	Installation Method Selection	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Sets the type of drive installation.	Determined by the drive (0 - 3)

Note:

- Parameter A1-03 [Initialize Parameters] does not initialize this parameter.
- This parameter is set to the correct value when the drive is shipped. Side-by-Side installation
 - Change the value only in these conditions:
 - When you install a UL Type 1 kit on an IP20/UL Open Type drive to convert the drive to an IP20/UL Type 1 drive.

0 : IP00/IP20/UL Open Type/Ex Heatsink

Use this setting to install IP00/IP20/UL Open Type drives or when the heatsink (cooling fin) is outside the enclosure panel.

7.8 Drive Derating

Make sure that there is 30 mm (1.18 in) minimum of space between drives or between the drive and side of the enclosure panel.

1 : Side-by-Side Mounting

Use this setting to install more than one drive side-by-side.

Make sure that there is 2 mm (0.08 in) minimum of space between drives.

2 : IP20/UL Type 1

Use this setting to install IP20/UL Type 1 drives or IP55/UL Type 12 Heatsink External Mounting drives.

3 : Finless

Use this setting to install a finless drive.

◆ Altitude Derating

Install the drive in a location that has an altitude of 1000 m (3281 ft) or lower.

Derate the output current by 1% for each 100 m (328 ft) to install the drive in altitudes between 1000 to 4000 m (3281 to 13123 ft).

It is not necessary to derate the rated voltage in these conditions:

- Installing the drive at 2000 m (6562 ft) or lower
- Installing the drive between 2000 to 4000 m (6562 to 13123 ft) and grounding the neutral point on the power supply.

If you do not ground the drive with a neutral network, contact Yaskawa or your nearest sales representative.

7.9 Drive Exterior and Mounting Dimensions

◆ Drive Models and Exterior and Mounting Dimensions

Refer to the “GA800 Drive IP55/UL Type 12 Heatsink External Mounting Installation Manual (TOEPC71061779)” for the external dimensions of IP55/UL Type 12 Heatsink External Mounting drives.

Table 7.31 Three-Phase 200 V Class

Model	Ref.	
	IP20/UL Open Type	IP20/UL Type 1
2004 - 2042	470	480
2056	471	481
2070, 2082	472	482
2110	473	483
2138	474	484
2169, 2211	475	485
2257, 2313	476	486
2360	477	487
2415	477	-

Table 7.32 Three-Phase 400 V Class

Model	Ref.		
	IP00/UL Open Type	IP20/UL Open Type	IP20/UL Type 1
4002 - 4023	-	470	480
4031, 4038	-	471	481
4044 - 4060	-	472	482
4075	-	473	483
4089, 4103	-	474	484
4140, 4168	-	475	485
4208 - 4302	-	476	486
4371	-	477	487
4414	-	477	-
4477 - 4720	-	478	-
4810 - 4H12	479	-	-

Table 7.33 6-Phase/12-Pulse 400 V Class

Model	Ref.
	IP00/UL Open Type
T103	474
T140, T168	475
T208 - T302	476
T371, T414	477
T477 - T720	478

◆ IP00/IP20/UL Open Type

■ 2004 - 2042, 4002 - 4023

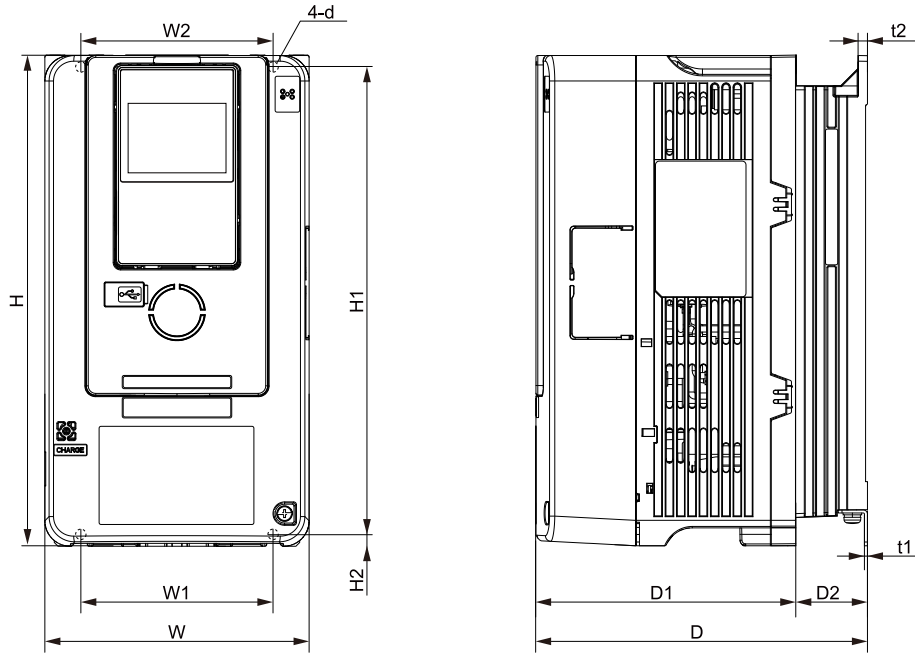


Figure 7.2 Dimension Diagram 1

Table 7.34 Three-Phase 200 V Class (IP20/UL Open Type)

Model	Dimensions mm (in)											Est. Weight kg (lb)	
	W	H	D	D1	D2	W1	W2	H1	H2	t1	t2		d
2004	140 (5.51)	260 (10.24)	176 (6.93)	138 (5.43)	38 (1.50)	102 (4.02)	102 (4.02)	248 (9.76)	6 (0.24)	1.6 (0.06)	5 (0.20)	M5	3.5 (7.72)
2006	140 (5.51)	260 (10.24)	176 (6.93)	138 (5.43)	38 (1.50)	102 (4.02)	102 (4.02)	248 (9.76)	6 (0.24)	1.6 (0.06)	5 (0.20)	M5	3.5 (7.72)
2008	140 (5.51)	260 (10.24)	176 (6.93)	138 (5.43)	38 (1.50)	102 (4.02)	102 (4.02)	248 (9.76)	6 (0.24)	1.6 (0.06)	5 (0.20)	M5	3.5 (7.72)
2010	140 (5.51)	260 (10.24)	176 (6.93)	138 (5.43)	38 (1.50)	102 (4.02)	102 (4.02)	248 (9.76)	6 (0.24)	1.6 (0.06)	5 (0.20)	M5	3.5 (7.72)
2012	140 (5.51)	260 (10.24)	176 (6.93)	138 (5.43)	38 (1.50)	102 (4.02)	102 (4.02)	248 (9.76)	6 (0.24)	1.6 (0.06)	5 (0.20)	M5	3.5 (7.72)
2018	140 (5.51)	260 (10.24)	211 (8.31)	138 (5.43)	73 (2.87)	102 (4.02)	102 (4.02)	248 (9.76)	6 (0.24)	1.6 (0.06)	5 (0.20)	M5	3.8 (8.38)
2021	140 (5.51)	260 (10.24)	211 (8.31)	138 (5.43)	73 (2.87)	102 (4.02)	102 (4.02)	248 (9.76)	6 (0.24)	1.6 (0.06)	5 (0.20)	M5	3.8 (8.38)
2030	140 (5.51)	260 (10.24)	211 (8.31)	138 (5.43)	73 (2.87)	102 (4.02)	102 (4.02)	248 (9.76)	6 (0.24)	1.6 (0.06)	5 (0.20)	M5	4.2 (9.26)
2042	140 (5.51)	260 (10.24)	211 (8.31)	138 (5.43)	73 (2.87)	102 (4.02)	102 (4.02)	248 (9.76)	6 (0.24)	1.6 (0.06)	5 (0.20)	M5	4.2 (9.26)

Table 7.35 Three-Phase 400 V Class (IP20/UL Open Type)

Model	Dimensions mm (in)											Est. Weight kg (lb)	
	W	H	D	D1	D2	W1	W2	H1	H2	t1	t2		d
4002	140 (5.51)	260 (10.24)	176 (6.93)	138 (5.43)	38 (1.50)	102 (4.02)	102 (4.02)	248 (9.76)	6 (0.24)	1.6 (0.06)	5 (0.20)	M5	3.4 (7.50)
4004	140 (5.51)	260 (10.24)	176 (6.93)	138 (5.43)	38 (1.50)	102 (4.02)	102 (4.02)	248 (9.76)	6 (0.24)	1.6 (0.06)	5 (0.20)	M5	3.4 (7.50)

Model	Dimensions mm (in)												Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	H1	H2	t1	t2	d	
4005	140 (5.51)	260 (10.24)	176 (6.93)	138 (5.43)	38 (1.50)	102 (4.02)	102 (4.02)	248 (9.76)	6 (0.24)	1.6 (0.06)	5 (0.20)	M5	3.4 (7.50)
4007	140 (5.51)	260 (10.24)	211 (8.31)	138 (5.43)	73 (2.87)	102 (4.02)	102 (4.02)	248 (9.76)	6 (0.24)	1.6 (0.06)	5 (0.20)	M5	3.7 (8.16)
4009	140 (5.51)	260 (10.24)	211 (8.31)	138 (5.43)	73 (2.87)	102 (4.02)	102 (4.02)	248 (9.76)	6 (0.24)	1.6 (0.06)	5 (0.20)	M5	3.7 (8.16)
4012	140 (5.51)	260 (10.24)	211 (8.31)	138 (5.43)	73 (2.87)	102 (4.02)	102 (4.02)	248 (9.76)	6 (0.24)	1.6 (0.06)	5 (0.20)	M5	3.7 (8.16)
4018	140 (5.51)	260 (10.24)	211 (8.31)	138 (5.43)	73 (2.87)	102 (4.02)	102 (4.02)	248 (9.76)	6 (0.24)	1.6 (0.06)	5 (0.20)	M5	4.0 (8.82)
4023	140 (5.51)	260 (10.24)	211 (8.31)	138 (5.43)	73 (2.87)	102 (4.02)	102 (4.02)	248 (9.76)	6 (0.24)	1.6 (0.06)	5 (0.20)	M5	4.0 (8.82)

■ 2056, 4031, 4038

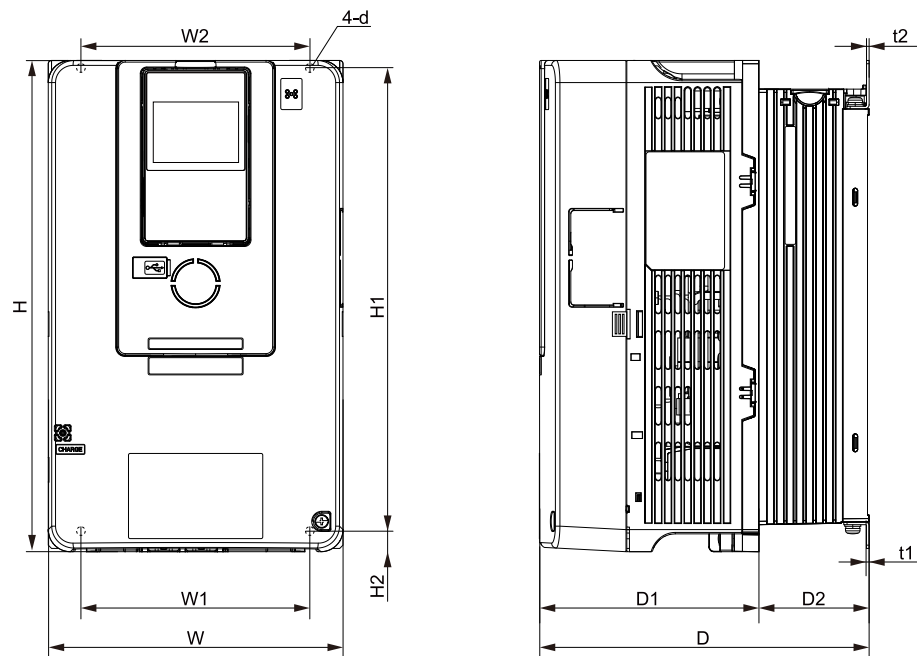


Figure 7.3 Dimension Diagram 2

Table 7.36 Three-Phase 200 V Class (IP20/UL Open Type)

Model	Dimensions mm (in)												Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	H1	H2	t1	t2	d	
2056	180 (7.09)	300 (11.81)	202 (7.95)	134 (5.28)	68 (2.68)	140 (5.51)	140 (5.51)	284 (11.18)	8 (0.32)	1.6 (0.06)	1.6 (0.06)	M5	6 (13.23)

Table 7.37 Three-Phase 400 V Class (IP20/UL Open Type)

Model	Dimensions mm (in)												Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	H1	H2	t1	t2	d	
4031	180 (7.09)	300 (11.81)	202 (7.95)	134 (5.28)	68 (2.68)	140 (5.51)	140 (5.51)	284 (11.18)	8 (0.32)	1.6 (0.06)	1.6 (0.06)	M5	5.5 (12.13)
4038	180 (7.09)	300 (11.81)	202 (7.95)	134 (5.28)	68 (2.68)	140 (5.51)	140 (5.51)	284 (11.18)	8 (0.32)	1.6 (0.06)	1.6 (0.06)	M5	5.5 (12.13)

■ 2070, 2082, 4044, 4060

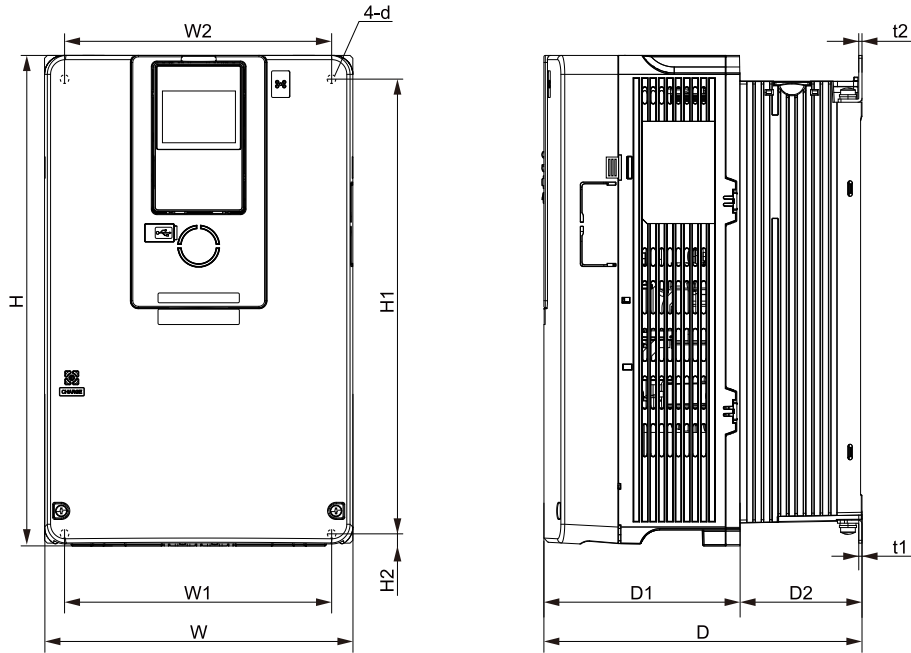


Figure 7.4 Dimension Diagram 3

Table 7.38 Three-Phase 200 V Class (IP20/UL Open Type)

Model	Dimensions mm (in)											Est. Weight kg (lb)	
	W	H	D	D1	D2	W1	W2	H1	H2	t1	t2		d
2070	220 (8.66)	350 (13.78)	227 (8.94)	140 (5.51)	87 (3.43)	192 (7.56)	192 (7.56)	335 (13.19)	8 (0.32)	2.3 (0.09)	2.3 (0.09)	M6	8.5 (18.74)
2082	220 (8.66)	350 (13.78)	227 (8.94)	140 (5.51)	87 (3.43)	192 (7.56)	192 (7.56)	335 (13.19)	8 (0.32)	2.3 (0.09)	2.3 (0.09)	M6	9.5 (20.95)

Table 7.39 Three-Phase 400 V Class (IP20/UL Open Type)

Model	Dimensions mm (in)											Est. Weight kg (lb)	
	W	H	D	D1	D2	W1	W2	H1	H2	t1	t2		d
4044	220 (8.66)	350 (13.78)	227 (8.94)	140 (5.51)	87 (3.43)	192 (7.56)	192 (7.56)	335 (13.19)	8 (0.32)	2.3 (0.09)	2.3 (0.09)	M6	8 (17.64)
4060	220 (8.66)	350 (13.78)	246 (9.69)	140 (5.51)	106 (4.17)	192 (7.56)	192 (7.56)	335 (13.19)	8 (0.32)	2.3 (0.09)	2.3 (0.09)	M6	13 (28.67)

■ 2110, 4075

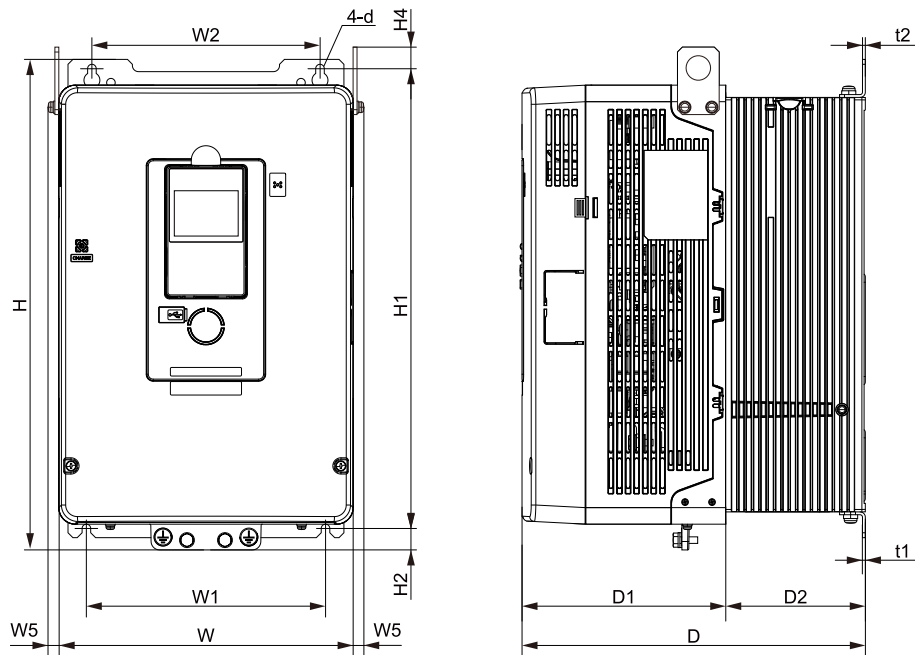


Figure 7.5 Dimension Diagram 4

Table 7.40 Three-Phase 200 V Class (IP20/UL Open Type, No Internal EMC Filter)

Model	Dimensions mm (in)													Est. Weight kg (lb)	
	W	H	D	D1	D2	W1	W2	W5 (Maximum)	H1	H2	H4	t1	t2		d
2110	240 (9.45)	400 (15.75)	280 (11.02)	166 (6.54)	114 (4.49)	195 (7.68)	186 (7.32)	12 (0.47)	375 (14.76)	17.5 (0.69)	17.5 (0.69)	2.3 (0.09)	2.3 (0.09)	M6	18 (39.69)

Table 7.41 Three-Phase 400 V Class (IP20/UL Open Type)

Model	Dimensions mm (in)													Est. Weight kg (lb)	
	W	H	D	D1	D2	W1	W2	W5 (Maximum)	H1	H2	H4	t1	t2		d
4075	240 (9.45)	400 (15.75)	280 (11.02)	166 (6.54)	114 (4.49)	195 (7.68)	186 (7.32)	12 (0.47)	375 (14.76)	17.5 (0.69)	17.5 (0.69)	2.3 (0.09)	2.3 (0.09)	M6	15 (33.08)

■ 2138, 4089, 4103, T103

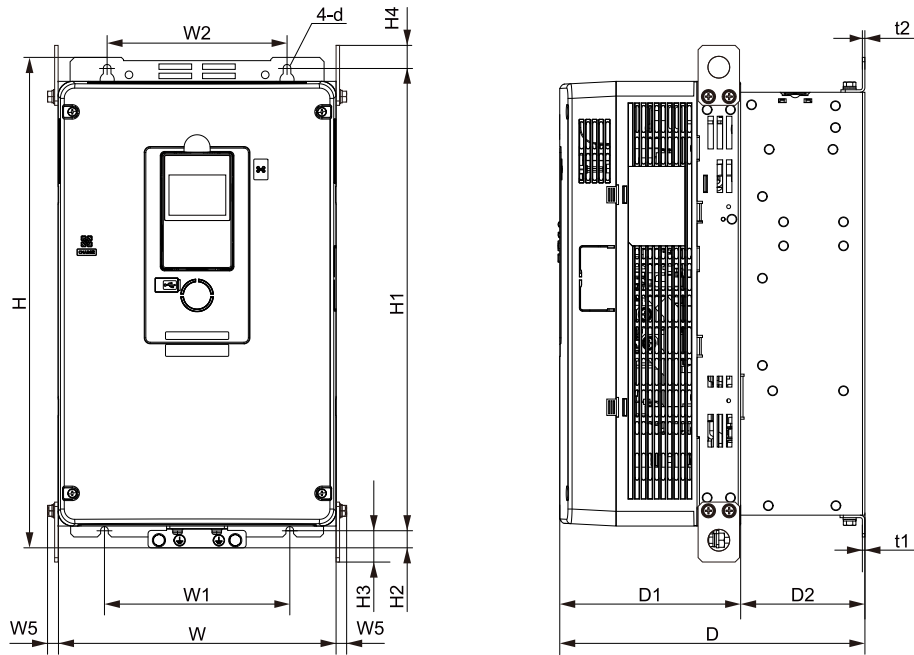


Figure 7.6 Dimension Diagram 5

Table 7.42 Three-Phase 200 V Class (IP20/UL Open Type)

Model	Dimensions mm (in)															Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	W5 (Maximum)	H1	H2	H3	H4	t1	t2	d	
2138	255 (10.04)	450 (17.72)	280 (11.02)	166 (6.54)	114 (4.49)	170 (6.69)	165 (6.50)	12 (0.47)	424 (16.69)	16 (0.63)	29 (1.14)	21 (0.83)	2.3 (0.09)	2.3 (0.09)	M6	21 (46.31)

Table 7.43 Three-Phase 400 V Class (IP20/UL Open Type)

Model	Dimensions mm (in)															Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	W5 (Maximum)	H1	H2	H3	H4	t1	t2	d	
4089	255 (10.04)	450 (17.72)	280 (11.02)	166 (6.54)	114 (4.49)	170 (6.69)	165 (6.50)	12 (0.47)	424 (16.69)	16 (0.63)	29 (1.14)	21 (0.83)	2.3 (0.09)	2.3 (0.09)	M6	20 (44.10)
4103	255 (10.04)	450 (17.72)	280 (11.02)	166 (6.54)	114 (4.49)	170 (6.69)	165 (6.50)	12 (0.47)	424 (16.69)	16 (0.63)	29 (1.14)	21 (0.83)	2.3 (0.09)	2.3 (0.09)	M6	24 (52.92)

Table 7.44 400 V Class, 6-Phase/12-Pulse Drives (IP00/UL Open Type)

Model	Dimensions mm (in)															Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	W5 (Maximum)	H1	H2	H3	H4	t1	t2	d	
T103	255 (10.04)	450 (17.72)	280 (11.02)	166 (6.54)	114 (4.49)	170 (6.69)	165 (6.50)	12 (0.47)	424 (16.69)	16 (0.63)	29 (1.14)	21 (0.83)	2.3 (0.09)	2.3 (0.09)	M6	20 (44.10)

■ 2169, 2211, 4140, 4168, T140, T168

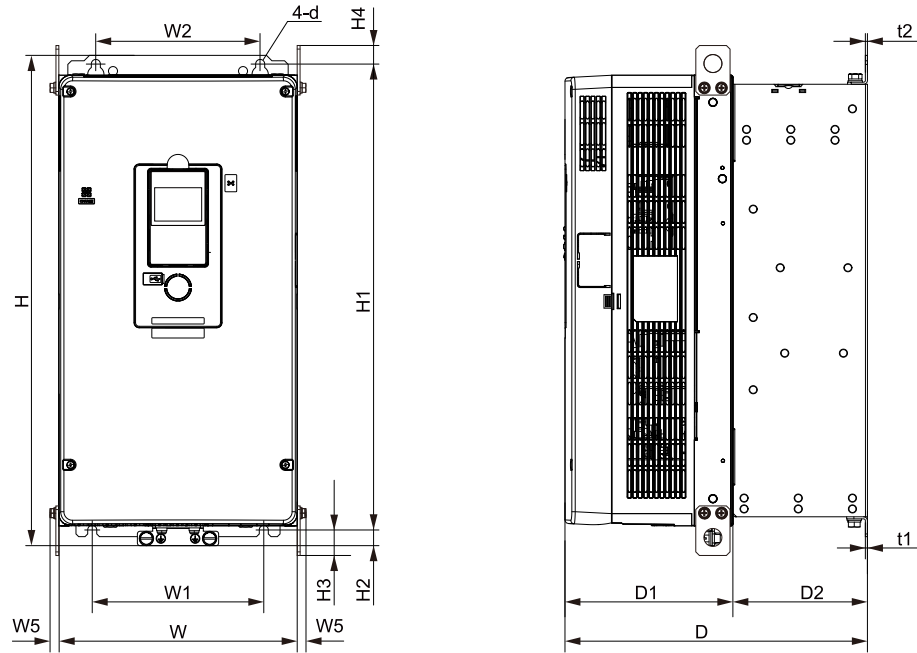


Figure 7.7 Dimension Diagram 6

Table 7.45 Three-Phase 200 V Class (IP20/UL Open Type)

Model	Dimensions mm (in)															Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	W5 (Maximum)	H1	H2	H3	H4	t1	t2	d	
2169	264 (10.39)	543 (21.38)	335 (13.19)	186 (7.32)	149 (5.87)	190 (7.48)	182 (7.17)	12 (0.47)	516 (20.31)	17.5 (0.69)	28.5 (1.12)	20.5 (0.81)	2.3 (0.09)	2.3 (0.09)	M8	34 (74.97)
2211	264 (10.39)	543 (21.38)	335 (13.19)	186 (7.32)	149 (5.87)	190 (7.48)	182 (7.17)	12 (0.47)	516 (20.31)	17.5 (0.69)	28.5 (1.12)	20.5 (0.81)	2.3 (0.09)	2.3 (0.09)	M8	35 (77.18)

Table 7.46 Three-Phase 400 V Class (IP20/UL Open Type)

Model	Dimensions mm (in)															Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	W5 (Maximum)	H1	H2	H3	H4	t1	t2	d	
4140	264 (10.39)	543 (21.38)	335 (13.19)	186 (7.32)	149 (5.87)	190 (7.48)	182 (7.17)	12 (0.47)	516 (20.31)	17.5 (0.69)	28.5 (1.12)	20.5 (0.81)	2.3 (0.09)	2.3 (0.09)	M8	36 (79.38)
4168	264 (10.39)	543 (21.38)	335 (13.19)	186 (7.32)	149 (5.87)	190 (7.48)	182 (7.17)	12 (0.47)	516 (20.31)	17.5 (0.69)	28.5 (1.12)	20.5 (0.81)	2.3 (0.09)	2.3 (0.09)	M8	37 (81.59)

Table 7.47 400 V Class, 6-Phase/12-Pulse Drives (IP00/UL Open Type)

Model	Dimensions mm (in)															Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	W5 (Maximum)	H1	H2	H3	H4	t1	t2	d	
T140	264 (10.39)	543 (21.38)	335 (13.19)	186 (7.32)	149 (5.87)	190 (7.48)	182 (7.17)	12 (0.47)	516 (20.31)	17.5 (0.69)	28.5 (1.12)	20.5 (0.81)	2.3 (0.09)	2.3 (0.09)	M8	31 (68.30)
T168	264 (10.39)	543 (21.38)	335 (13.19)	186 (7.32)	149 (5.87)	190 (7.48)	182 (7.17)	12 (0.47)	516 (20.31)	17.5 (0.69)	28.5 (1.12)	20.5 (0.81)	2.3 (0.09)	2.3 (0.09)	M8	31 (68.30)

■ 2257, 2313, 4208 to 4302, T208 to T302

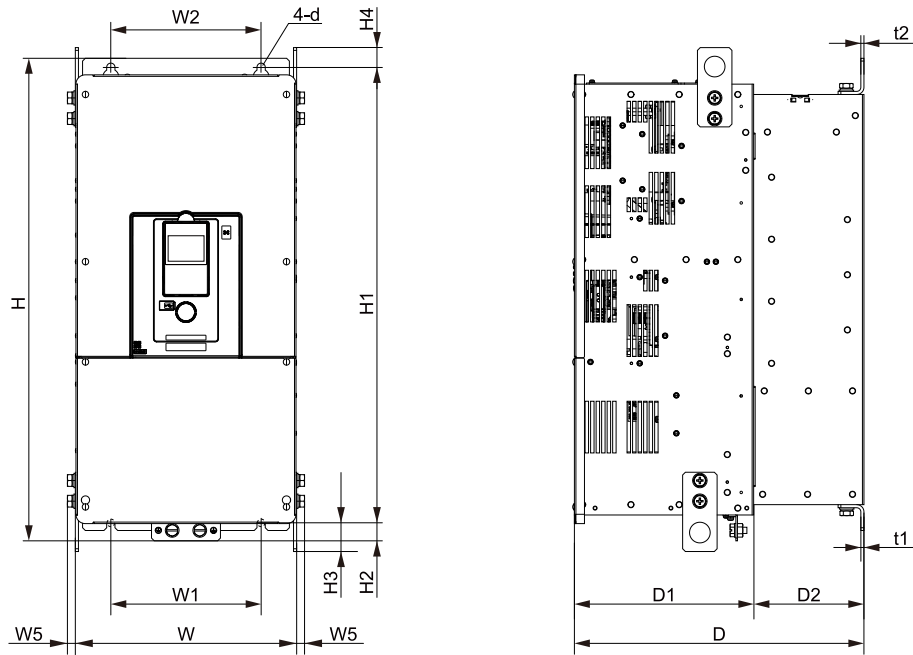


Figure 7.8 Dimension Diagram 7

Table 7.48 Three-Phase 200 V Class (IP20/UL Open Type)

Model	Dimensions mm (in)															Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	W5 (Maximum)	H1	H2	H3	H4	t1	t2	d	
2257	312 (12.28)	700 (27.56)	420 (16.54)	260 (10.24)	160 (6.30)	218 (8.58)	218 (8.58)	18 (0.71)	659 (25.94)	28 (1.10)	43.5 (1.71)	28.5 (1.12)	4.5 (0.18)	4.5 (0.18)	M10	58 (127.89)
2313	312 (12.28)	700 (27.56)	420 (16.54)	260 (10.24)	160 (6.30)	218 (8.58)	218 (8.58)	18 (0.71)	659 (25.94)	28 (1.10)	43.5 (1.71)	28.5 (1.12)	4.5 (0.18)	4.5 (0.18)	M10	61 (134.51)

Table 7.49 Three-Phase 400 V Class (IP20/UL Open Type)

Model	Dimensions mm (in)															Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	W5 (Maximum)	H1	H2	H3	H4	t1	t2	d	
4208	312 (12.28)	700 (27.56)	420 (16.54)	260 (10.24)	160 (6.30)	218 (8.58)	218 (8.58)	18 (0.71)	659 (25.94)	28 (1.10)	43.5 (1.71)	28.5 (1.12)	4.5 (0.18)	4.5 (0.18)	M10	60 (132.30)
4250	312 (12.28)	700 (27.56)	420 (16.54)	260 (10.24)	160 (6.30)	218 (8.58)	218 (8.58)	18 (0.71)	659 (25.94)	28 (1.10)	43.5 (1.71)	28.5 (1.12)	4.5 (0.18)	4.5 (0.18)	M10	62 (136.71)
4296	312 (12.28)	700 (27.56)	420 (16.54)	260 (10.24)	160 (6.30)	218 (8.58)	218 (8.58)	18 (0.71)	659 (25.94)	28 (1.10)	43.5 (1.71)	28.5 (1.12)	4.5 (0.18)	4.5 (0.18)	M10	65 (143.33)

Table 7.50 400 V Class, 6-Phase/12-Pulse Drives (IP00/UL Open Type)

Model	Dimensions mm (in)															Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	W5 (Maximum)	H1	H2	H3	H4	t1	t2	d	
T208	312 (12.28)	700 (27.56)	420 (16.54)	260 (10.24)	160 (6.30)	218 (8.58)	218 (8.58)	18 (0.71)	659 (25.94)	28 (1.10)	43.5 (1.71)	28.5 (1.12)	4.5 (0.18)	4.5 (0.18)	M10	59 (130.10)
T250	312 (12.28)	700 (27.56)	420 (16.54)	260 (10.24)	160 (6.30)	218 (8.58)	218 (8.58)	18 (0.71)	659 (25.94)	28 (1.10)	43.5 (1.71)	28.5 (1.12)	4.5 (0.18)	4.5 (0.18)	M10	60 (132.30)
T302	312 (12.28)	700 (27.56)	420 (16.54)	260 (10.24)	160 (6.30)	218 (8.58)	218 (8.58)	18 (0.71)	659 (25.94)	28 (1.10)	43.5 (1.71)	28.5 (1.12)	4.5 (0.18)	4.5 (0.18)	M10	61 (134.50)

■ 2360, 2415, 4371, 4414, T371, T414

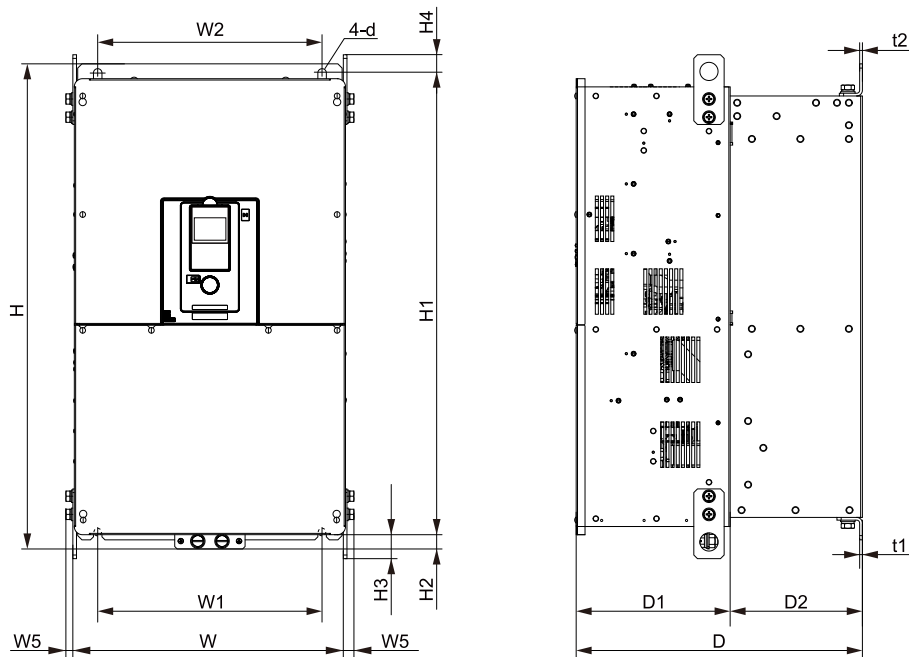


Figure 7.9 Dimension Diagram 8

Table 7.51 Three-Phase 200 V Class (IP20/UL Open Type)

Model	Dimensions mm (in)															Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	W5 (Maximum)	H1	H2	H3	H4	t1	t2	d	
2360	440 (17.32)	800 (31.50)	472 (18.58)	254 (10.00)	218 (8.58)	370 (14.57)	370 (14.57)	20 (0.79)	757 (29.80)	28 (1.10)	44 (1.73)	30 (1.18)	4.5 (0.18)	4.5 (0.18)	M12	100 (220.50)
2415	440 (17.32)	800 (31.50)	472 (18.58)	254 (10.00)	218 (8.58)	370 (14.57)	370 (14.57)	20 (0.79)	757 (29.80)	28 (1.10)	44 (1.73)	30 (1.18)	4.5 (0.18)	4.5 (0.18)	M12	106 (233.73)

Table 7.52 Three-Phase 400 V Class (IP20/UL Open Type)

Model	Dimensions mm (in)															Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	W5 (Maximum)	H1	H2	H3	H4	t1	t2	d	
4371	440 (17.32)	800 (31.50)	472 (18.58)	254 (10.00)	218 (8.58)	370 (14.57)	370 (14.57)	20 (0.79)	757 (29.80)	28 (1.10)	44 (1.73)	30 (1.18)	4.5 (0.18)	4.5 (0.18)	M12	106 (233.73)
4389	440 (17.32)	800 (31.50)	472 (18.58)	254 (10.00)	218 (8.58)	370 (14.57)	370 (14.57)	20 (0.79)	757 (29.80)	28 (1.10)	44 (1.73)	30 (1.18)	4.5 (0.18)	4.5 (0.18)	M12	112 (246.96)

Table 7.53 400 V Class, 6-Phase/12-Pulse Drives (IP00/UL Open Type)

Model	Dimensions mm (in)															Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	W5 (Maximum)	H1	H2	H3	H4	t1	t2	d	
T371	440 (17.32)	800 (31.50)	472 (18.58)	254 (10.00)	218 (8.58)	370 (14.57)	370 (14.57)	20 (0.79)	757 (29.80)	28 (1.10)	44 (1.73)	30 (1.18)	4.5 (0.18)	4.5 (0.18)	M12	97 (213.80)
T414	440 (17.32)	800 (31.50)	472 (18.58)	254 (10.00)	218 (8.58)	370 (14.57)	370 (14.57)	20 (0.79)	757 (29.80)	28 (1.10)	44 (1.73)	30 (1.18)	4.5 (0.18)	4.5 (0.18)	M12	100 (220.50)

■ 4477 to 4720, T477 to T720

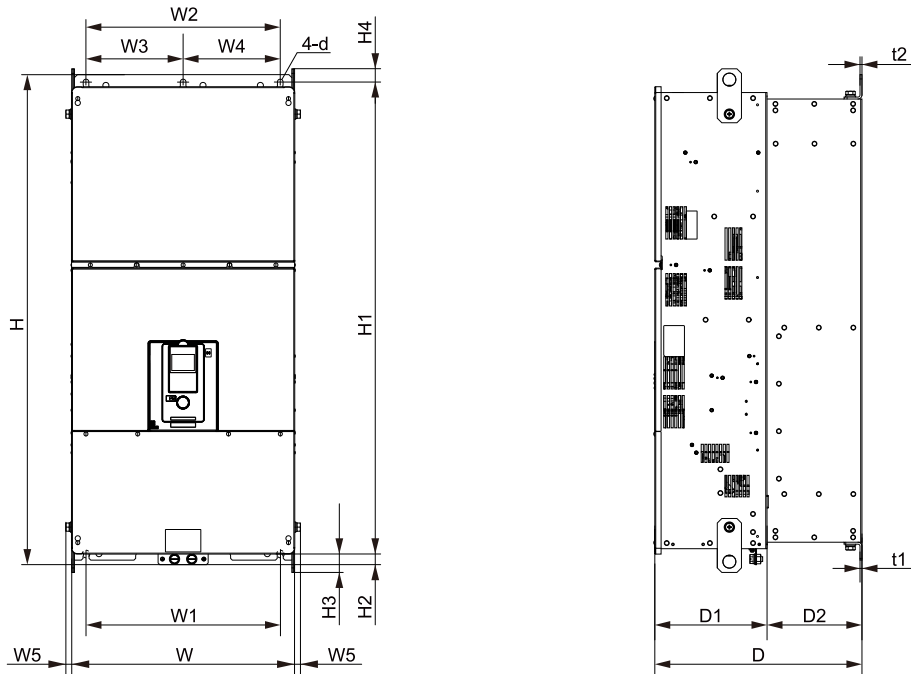


Figure 7.10 Dimension Diagram 9

Table 7.54 Three-Phase 400 V Class (IP20/UL Open Type)

Model	Dimensions mm (in)																Est. Weight kg (lb)	
	W	H	D	D1	D2	W1	W2	W3	W4	W5 (Maximum)	H1	H2	H3	H4	t1	t2		d
4477	510 (20.08)	1136 (44.72)	480 (18.90)	260 (10.24)	220 (8.66)	450 (17.72)	450 (17.72)	225 (8.86)	225 (8.86)	20 (0.79)	1093 (43.03)	25.5 (1.00)	43.5 (1.71)	30.5 (1.20)	4.5 (0.18)	4.5 (0.18)	M12	198 (436.5)
4568	510 (20.08)	1136 (44.72)	480 (18.90)	260 (10.24)	220 (8.66)	450 (17.72)	450 (17.72)	225 (8.86)	225 (8.86)	20 (0.79)	1093 (43.03)	25.5 (1.00)	43.5 (1.71)	30.5 (1.20)	4.5 (0.18)	4.5 (0.18)	M12	198 (436.5)
4605	510 (20.08)	1136 (44.72)	480 (18.90)	260 (10.24)	220 (8.66)	450 (17.72)	450 (17.72)	225 (8.86)	225 (8.86)	20 (0.79)	1093 (43.03)	25.5 (1.00)	43.5 (1.71)	30.5 (1.20)	4.5 (0.18)	4.5 (0.18)	M12	207 (456.3)
4720	510 (20.08)	1136 (44.72)	480 (18.90)	260 (10.24)	220 (8.66)	450 (17.72)	450 (17.72)	225 (8.86)	225 (8.86)	20 (0.79)	1093 (43.03)	25.5 (1.00)	43.5 (1.71)	30.5 (1.20)	4.5 (0.18)	4.5 (0.18)	M12	205 (451.9)

Table 7.55 6-Phase/12-Pulse 400 V Class (IP00/UL Open Type)

Model	Dimensions mm (in)																Est. Weight kg (lb)	
	W	H	D	D1	D2	W1	W2	W3	W4	W5 (Maximum)	H1	H2	H3	H4	t1	t2		d
T477	510 (20.08)	1136 (44.72)	480 (18.90)	260 (10.24)	220 (8.66)	450 (17.72)	450 (17.72)	225 (8.86)	225 (8.86)	20 (0.79)	1093 (43.03)	25.5 (1.00)	43.5 (1.71)	30.5 (1.20)	4.5 (0.18)	4.5 (0.18)	M12	167 (368.20)
T568	510 (20.08)	1136 (44.72)	480 (18.90)	260 (10.24)	220 (8.66)	450 (17.72)	450 (17.72)	225 (8.86)	225 (8.86)	20 (0.79)	1093 (43.03)	25.5 (1.00)	43.5 (1.71)	30.5 (1.20)	4.5 (0.18)	4.5 (0.18)	M12	167 (368.20)
T605	510 (20.08)	1136 (44.72)	480 (18.90)	260 (10.24)	220 (8.66)	450 (17.72)	450 (17.72)	225 (8.86)	225 (8.86)	20 (0.79)	1093 (43.03)	25.5 (1.00)	43.5 (1.71)	30.5 (1.20)	4.5 (0.18)	4.5 (0.18)	M12	173 (381.40)
T720	510 (20.08)	1136 (44.72)	480 (18.90)	260 (10.24)	220 (8.66)	450 (17.72)	450 (17.72)	225 (8.86)	225 (8.86)	20 (0.79)	1093 (43.03)	25.5 (1.00)	43.5 (1.71)	30.5 (1.20)	4.5 (0.18)	4.5 (0.18)	M12	172 (379.20)

■ 4810 - 4H12

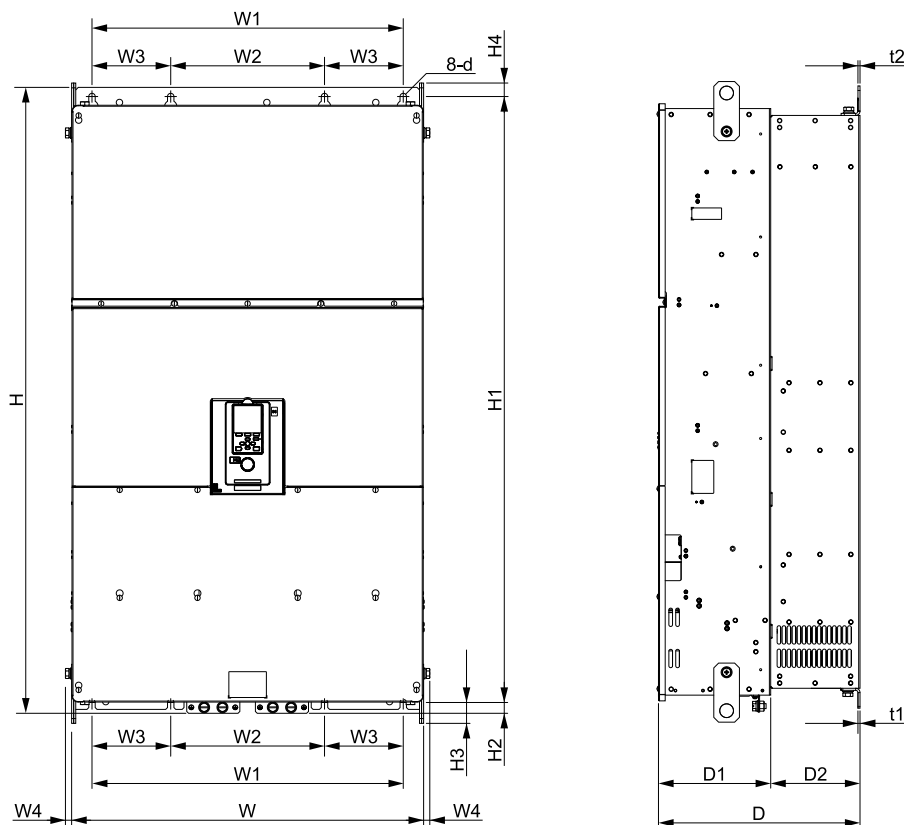


Figure 7.11 Dimension Diagram 10

Table 7.56 Three-Phase 400 V Class (IP00/UL Open Type)

Model	Dimensions mm (in)																Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	W3	W4 (Maximum)	H1	H2	H3	H4	t1	t2	d	
4810	760 (29.92)	1367.5 (53.84)	440 (17.32)	245 (9.65)	195 (7.68)	680 (26.77)	336 (13.23)	172 (6.77)	20 (0.79)	1324 (52.13)	23.5 (0.93)	45.5 (1.79)	29.5 (1.16)	4.5 (0.18)	4.5 (0.18)	M12	363 (800.42)
4930	760 (29.92)	1367.5 (53.84)	440 (17.32)	245 (9.65)	195 (7.68)	680 (26.77)	336 (13.23)	172 (6.77)	20 (0.79)	1324 (52.13)	23.5 (0.93)	45.5 (1.79)	29.5 (1.16)	4.5 (0.18)	4.5 (0.18)	M12	363 (800.42)
4H11	760 (29.92)	1367.5 (53.84)	440 (17.32)	245 (9.65)	195 (7.68)	680 (26.77)	336 (13.23)	172 (6.77)	20 (0.79)	1324 (52.13)	23.5 (0.93)	45.5 (1.79)	29.5 (1.16)	4.5 (0.18)	4.5 (0.18)	M12	368 (811.44)
4H12	760 (29.92)	1367.5 (53.84)	440 (17.32)	245 (9.65)	195 (7.68)	680 (26.77)	336 (13.23)	172 (6.77)	20 (0.79)	1324 (52.13)	23.5 (0.93)	45.5 (1.79)	29.5 (1.16)	4.5 (0.18)	4.5 (0.18)	M12	368 (811.44)

◆ IP20/UL Type1

■ 2004 - 2042, 4002 - 4023

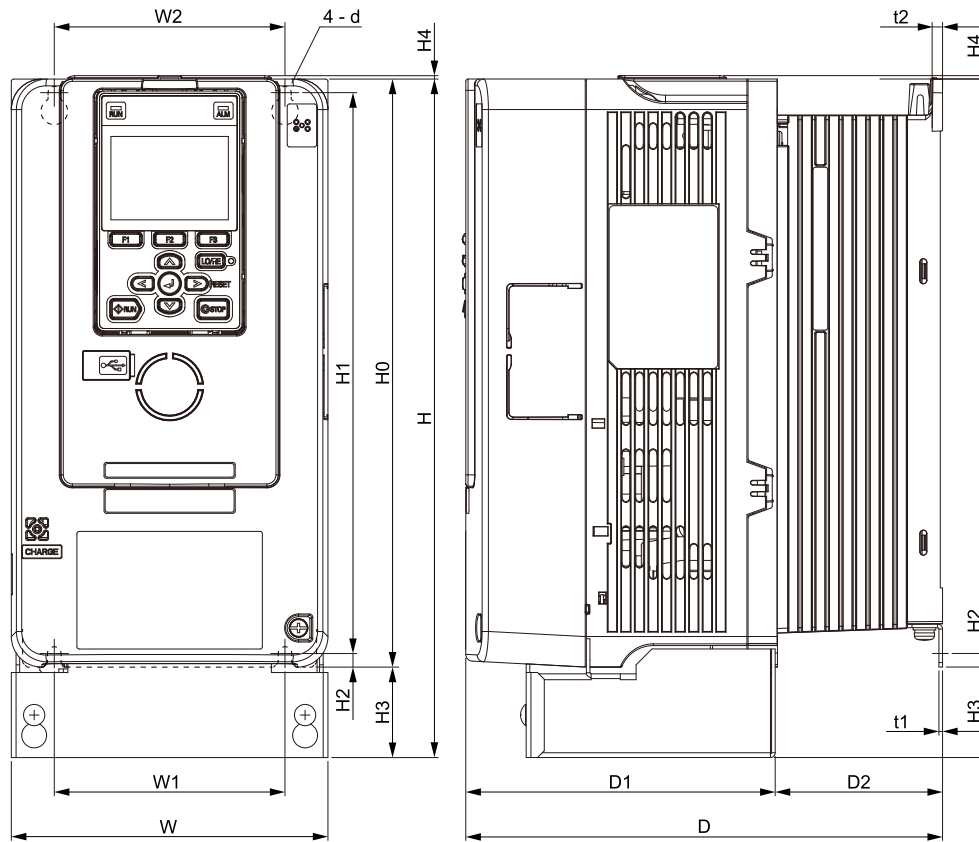


Figure 7.12 Dimension Diagram 1

Table 7.57 Three-Phase 200 V Class (IP20/UL Type 1)

Model	Dimensions mm (in)														Est. Weight kg (lb)	
	W	H	D	D1	D2	W1	W2	H0	H1	H2	H3	H4	t1	t2		d
2004	140 (5.51)	300 (11.81)	175.8 (6.92)	136.8 (5.39)	39 (1.54)	102 (4.02)	102 (4.02)	260 (10.24)	248 (9.76)	6 (0.24)	40 (1.57)	1.5 (0.06)	1.6 (0.06)	5 (0.20)	M5	4.1 (9.04)
2006	140 (5.51)	300 (11.81)	175.8 (6.92)	136.8 (5.39)	39 (1.54)	102 (4.02)	102 (4.02)	260 (10.24)	248 (9.76)	6 (0.24)	40 (1.57)	1.5 (0.06)	1.6 (0.06)	5 (0.20)	M5	4.1 (9.04)
2008	140 (5.51)	300 (11.81)	175.8 (6.92)	136.8 (5.39)	39 (1.54)	102 (4.02)	102 (4.02)	260 (10.24)	248 (9.76)	6 (0.24)	40 (1.57)	1.5 (0.06)	1.6 (0.06)	5 (0.20)	M5	4.1 (9.04)
2010	140 (5.51)	300 (11.81)	175.8 (6.92)	136.8 (5.39)	39 (1.54)	102 (4.02)	102 (4.02)	260 (10.24)	248 (9.76)	6 (0.24)	40 (1.57)	1.5 (0.06)	1.6 (0.06)	5 (0.20)	M5	4.1 (9.04)
2012	140 (5.51)	300 (11.81)	175.8 (6.92)	136.8 (5.39)	39 (1.54)	102 (4.02)	102 (4.02)	260 (10.24)	248 (9.76)	6 (0.24)	40 (1.57)	1.5 (0.06)	1.6 (0.06)	5 (0.20)	M5	4.1 (9.04)
2018	140 (5.51)	300 (11.81)	210.8 (8.3)	136.8 (5.39)	74 (2.91)	102 (4.02)	102 (4.02)	260 (10.24)	248 (9.76)	6 (0.24)	40 (1.57)	1.5 (0.06)	1.6 (0.06)	4.6 (0.18)	M5	4.4 (9.70)
2021	140 (5.51)	300 (11.81)	210.8 (8.3)	136.8 (5.39)	74 (2.91)	102 (4.02)	102 (4.02)	260 (10.24)	248 (9.76)	6 (0.24)	40 (1.57)	1.5 (0.06)	1.6 (0.06)	4.6 (0.18)	M5	4.4 (9.70)
2030	140 (5.51)	300 (11.81)	210.8 (8.3)	136.8 (5.39)	74 (2.91)	102 (4.02)	102 (4.02)	260 (10.24)	248 (9.76)	6 (0.24)	40 (1.57)	1.5 (0.06)	1.6 (0.06)	4.6 (0.18)	M5	4.8 (10.58)
2042	140 (5.51)	300 (11.81)	210.8 (8.3)	136.8 (5.39)	74 (2.91)	102 (4.02)	102 (4.02)	260 (10.24)	248 (9.76)	6 (0.24)	40 (1.57)	1.5 (0.06)	1.6 (0.06)	4.6 (0.18)	M5	4.8 (10.58)

Table 7.58 Three-Phase 400 V Class (IP20/UL Type 1)

Model	Dimensions mm (in)															Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	H0	H1	H2	H3	H4	t1	t2	d	
4002	140 (5.51)	300 (11.81)	175.8 (6.92)	136.8 (5.39)	39 (1.54)	102 (4.02)	102 (4.02)	260 (10.24)	248 (9.76)	6 (0.24)	40 (1.57)	1.5 (0.06)	1.6 (0.06)	5 (0.20)	M5	4 (8.82)
4004	140 (5.51)	300 (11.81)	175.8 (6.92)	136.8 (5.39)	39 (1.54)	102 (4.02)	102 (4.02)	260 (10.24)	248 (9.76)	6 (0.24)	40 (1.57)	1.5 (0.06)	1.6 (0.06)	5 (0.20)	M5	4 (8.82)
4005	140 (5.51)	300 (11.81)	175.8 (6.92)	136.8 (5.39)	39 (1.54)	102 (4.02)	102 (4.02)	260 (10.24)	248 (9.76)	6 (0.24)	40 (1.57)	1.5 (0.06)	1.6 (0.06)	5 (0.20)	M5	4 (8.82)
4007	140 (5.51)	300 (11.81)	210.8 (8.3)	136.8 (5.39)	74 (2.91)	102 (4.02)	102 (4.02)	260 (10.24)	248 (9.76)	6 (0.24)	40 (1.57)	1.5 (0.06)	1.6 (0.06)	4.6 (0.18)	M5	4.3 (9.48)
4009	140 (5.51)	300 (11.81)	210.8 (8.3)	136.8 (5.39)	74 (2.91)	102 (4.02)	102 (4.02)	260 (10.24)	248 (9.76)	6 (0.24)	40 (1.57)	1.5 (0.06)	1.6 (0.06)	4.6 (0.18)	M5	4.3 (9.48)
4012	140 (5.51)	300 (11.81)	210.8 (8.3)	136.8 (5.39)	74 (2.91)	102 (4.02)	102 (4.02)	260 (10.24)	248 (9.76)	6 (0.24)	40 (1.57)	1.5 (0.06)	1.6 (0.06)	4.6 (0.18)	M5	4.3 (9.48)
4018	140 (5.51)	300 (11.81)	210.8 (8.3)	136.8 (5.39)	74 (2.91)	102 (4.02)	102 (4.02)	260 (10.24)	248 (9.76)	6 (0.24)	40 (1.57)	1.5 (0.06)	1.6 (0.06)	4.6 (0.18)	M5	4.6 (10.14)
4023	140 (5.51)	300 (11.81)	210.8 (8.3)	136.8 (5.39)	74 (2.91)	102 (4.02)	102 (4.02)	260 (10.24)	248 (9.76)	6 (0.24)	40 (1.57)	1.5 (0.06)	1.6 (0.06)	4.6 (0.18)	M5	4.6 (10.14)

■ 2056, 4031, 4038

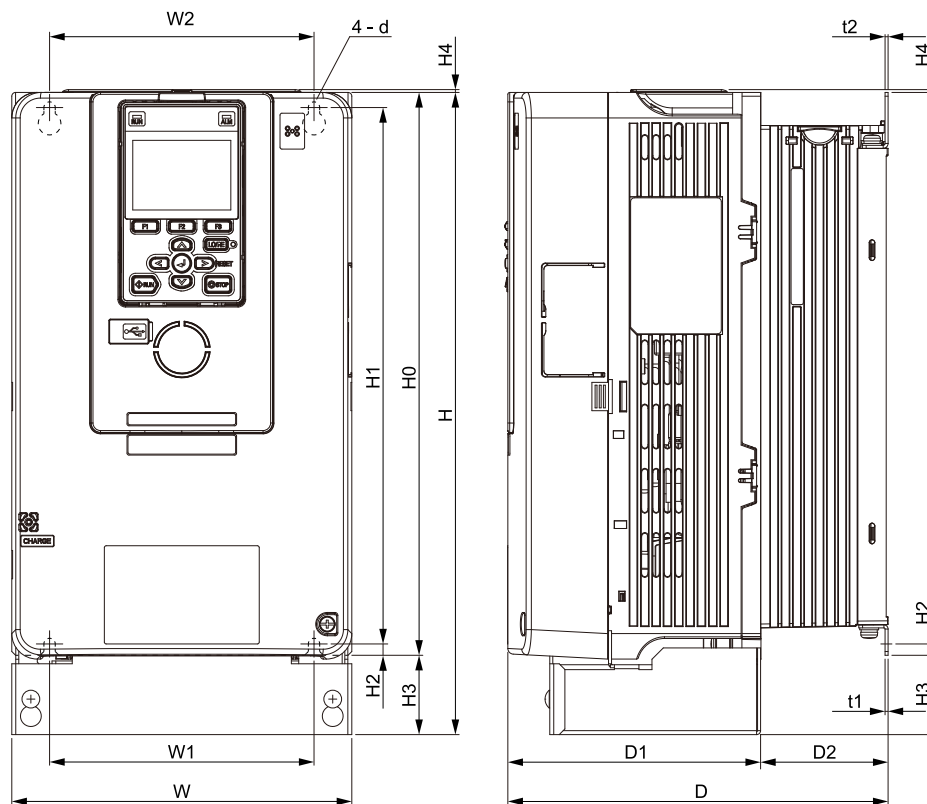


Figure 7.13 Dimension Diagram 2

Table 7.59 Three-Phase 200 V Class (IP20/UL Type 1)

Model	Dimensions mm (in)															Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	H0	H1	H2	H3	H4	t1	t2	d	
2056	180 (7.09)	340 (13.39)	201.3 (7.93)	133.8 (5.27)	67.5 (2.66)	140 (5.51)	140 (5.51)	298 (11.73)	284 (11.18)	6 (0.24)	42 (1.65)	1.5 (0.06)	1.6 (0.06)	1.6 (0.06)	M5	7 (15.44)

Specifications

7.9 Drive Exterior and Mounting Dimensions

Table 7.60 Three-Phase 400 V Class (IP20/UL Type 1)

Model	Dimensions mm (in)															Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	H0	H1	H2	H3	H4	t1	t2	d	
4031	180 (7.09)	340 (13.39)	201.3 (7.93)	133.8 (5.27)	67.5 (2.66)	140 (5.51)	140 (5.51)	298 (11.73)	284 (11.18)	6 (0.24)	42 (1.65)	1.5 (0.06)	1.6 (0.06)	1.6 (0.06)	M5	6.5 (14.33)
4038	180 (7.09)	340 (13.39)	201.3 (7.93)	133.8 (5.27)	67.5 (2.66)	140 (5.51)	140 (5.51)	298 (11.73)	284 (11.18)	6 (0.24)	42 (1.65)	1.5 (0.06)	1.6 (0.06)	1.6 (0.06)	M5	6.5 (14.33)

■ **2070, 2082, 4044, 4060**

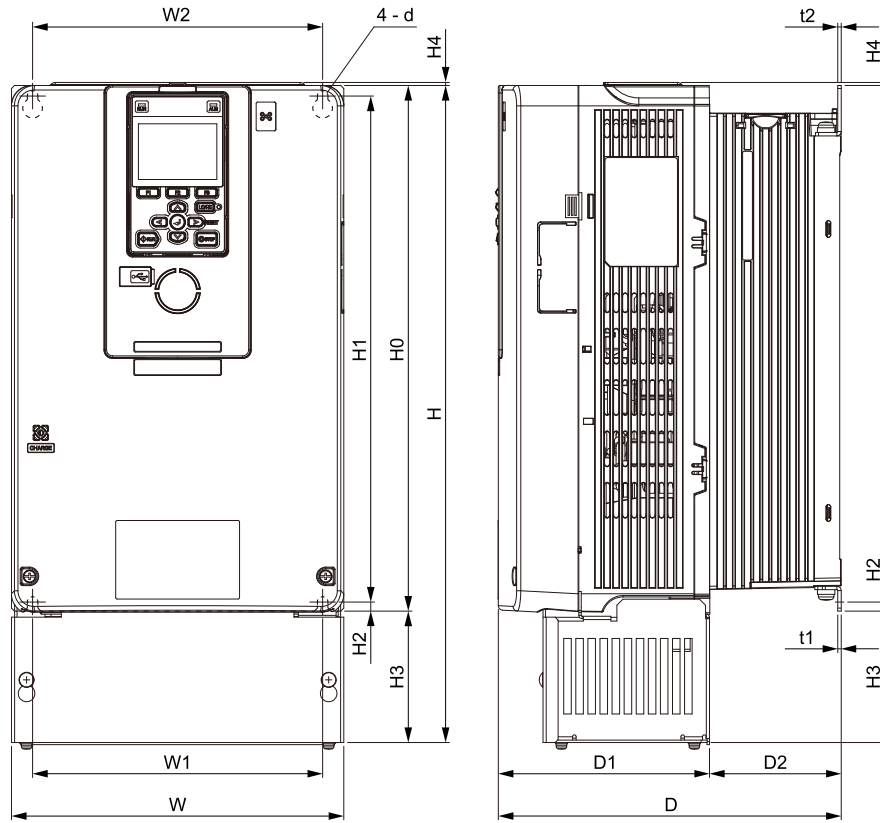


Figure 7.14 Dimension Diagram 3

Table 7.61 Three-Phase 200 V Class (IP20/UL Type 1)

Model	Dimensions mm (in)															Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	H0	H1	H2	H3	H4	t1	t2	d	
2070	220 (8.66)	400 (15.75)	227 (8.94)	139.8 (5.5)	87.2 (3.43)	192 (7.56)	192 (7.56)	348 (13.7)	335 (13.19)	6 (0.24)	52 (2.05)	2 (0.08)	2.3 (0.09)	2.3 (0.09)	M6	9 (19.85)
2082	220 (8.66)	435 (17.13)	227 (8.94)	139.8 (5.5)	87.2 (3.43)	192 (7.56)	192 (7.56)	348 (13.7)	335 (13.19)	6 (0.24)	87 (3.43)	2 (0.08)	2.3 (0.09)	2.3 (0.09)	M6	10.5 (23.15)

Table 7.62 Three-Phase 400 V Class (IP20/UL Type 1)

Model	Dimensions mm (in)															Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	H0	H1	H2	H3	H4	t1	t2	d	
4044	220 (8.66)	400 (15.75)	227 (8.94)	139.8 (5.5)	87.2 (3.43)	192 (7.56)	192 (7.56)	348 (13.7)	335 (13.19)	6 (0.24)	52 (2.05)	2 (0.08)	2.3 (0.09)	2.3 (0.09)	M6	9 (19.85)
4060	220 (8.66)	400 (15.75)	246 (9.69)	139.8 (5.5)	106.2 (4.18)	192 (7.56)	192 (7.56)	348 (13.7)	335 (13.19)	6 (0.24)	52 (2.05)	2 (0.08)	2.3 (0.09)	2.3 (0.09)	M6	14 (30.87)

■ 2110, 4075

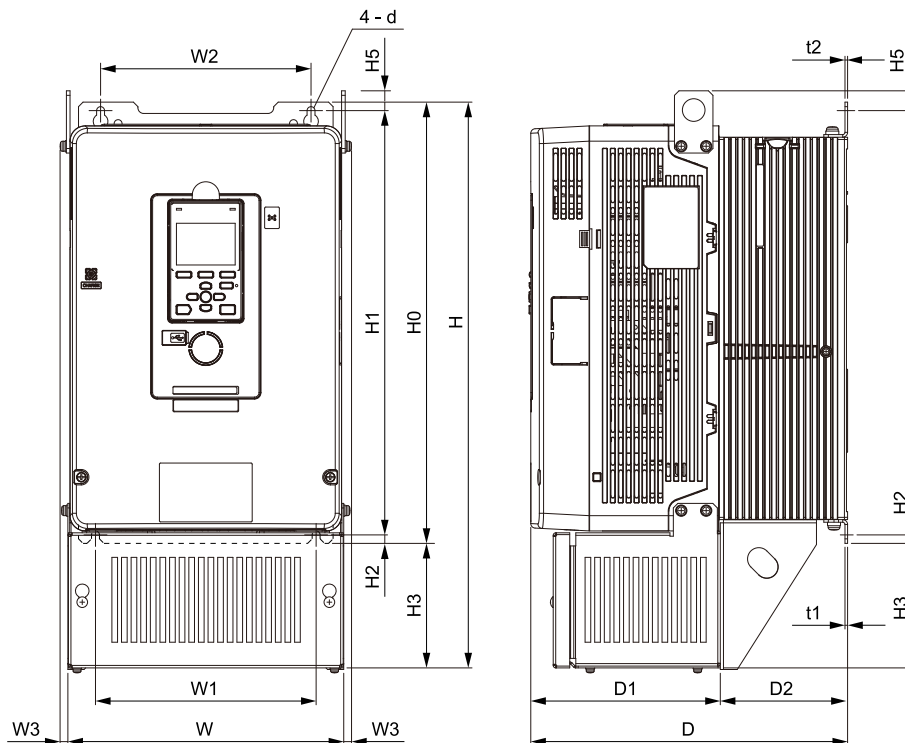


Figure 7.15 Dimension Diagram 4

Table 7.63 Three-Phase 200 V Class (IP20/UL Type 1)

Model	Dimensions mm (in)																Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	W3	H0	H1	H2	H3	H5	t1	t2	d	
2110	243.8 (9.6)	500 (19.69)	280 (11.02)	167.5 (6.59)	112.5 (4.43)	195 (7.68)	186 (7.32)	6.9 (0.27)	390 (15.35)	375 (14.76)	7.5 (0.3)	110 (4.33)	17.5 (0.69)	2.3 (0.09)	2.3 (0.09)	M6	20 (44.10)

Table 7.64 Three-Phase 400 V Class (IP20/UL Type 1)

Model	Dimensions mm (in)																Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	W3	H0	H1	H2	H3	H5	t1	t2	d	
4075	243.8 (9.6)	500 (19.69)	280 (11.02)	167.5 (6.59)	112.5 (4.43)	195 (7.68)	186 (7.32)	6.9 (0.27)	390 (15.35)	375 (14.76)	7.5 (0.3)	110 (4.33)	17.5 (0.69)	2.3 (0.09)	2.3 (0.09)	M6	18 (39.69)

■ 2138, 4089, 4103

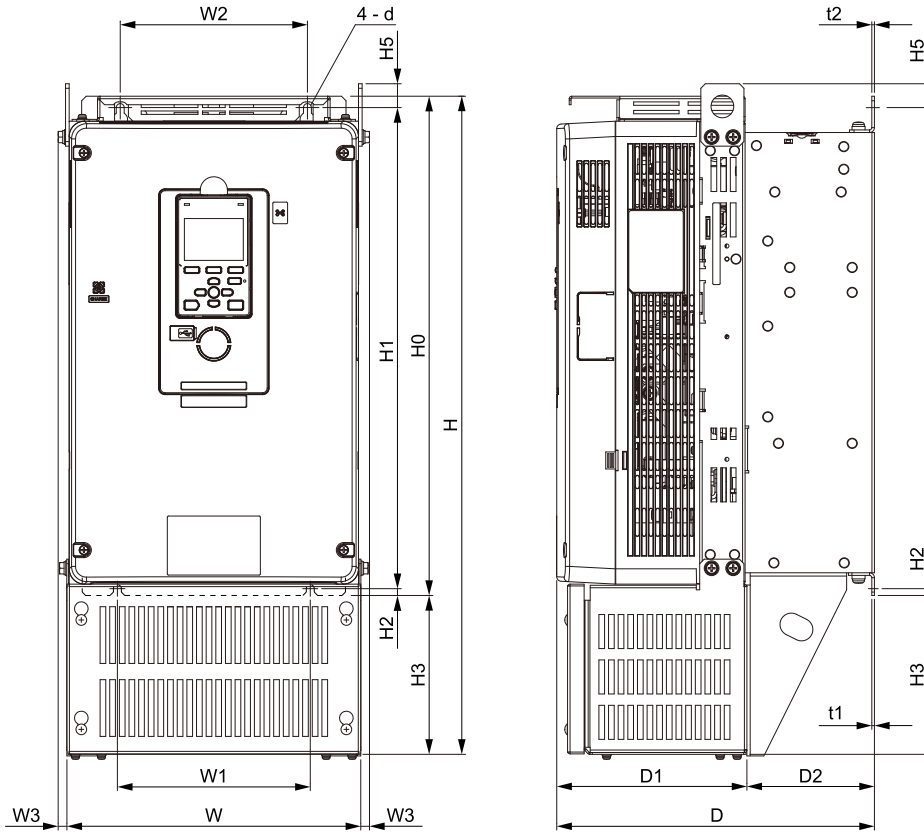


Figure 7.16 Dimension Diagram 5

Table 7.65 Three-Phase 200 V Class (IP20/UL Type 1)

Model	Dimensions mm (in)																Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	W3	H0	H1	H2	H3	H5	t1	t2	d	
2138	259 (10.20)	580 (22.83)	280 (11.02)	167.6 (6.6)	112.4 (4.43)	170 (6.69)	165 (6.50)	7.7 (0.3)	440 (17.32)	424 (16.69)	6 (0.24)	140 (5.51)	21 (0.83)	2.3 (0.09)	2.3 (0.09)	M6	24 (52.92)

Table 7.66 Three-Phase 400 V Class (IP20/UL Type 1)

Model	Dimensions mm (in)																Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	W3	H0	H1	H2	H3	H5	t1	t2	d	
4089	259 (10.20)	580 (22.83)	280 (11.02)	167.6 (6.6)	112.4 (4.43)	170 (6.69)	165 (6.50)	7.7 (0.3)	440 (17.32)	424 (16.69)	6 (0.24)	140 (5.51)	21 (0.83)	2.3 (0.09)	2.3 (0.09)	M6	23 (50.72)
4103	259 (10.20)	580 (22.83)	280 (11.02)	167.6 (6.6)	112.4 (4.43)	170 (6.69)	165 (6.50)	7.7 (0.3)	440 (17.32)	424 (16.69)	6 (0.24)	140 (5.51)	21 (0.83)	2.3 (0.09)	2.3 (0.09)	M6	28 (61.74)

■ 2169, 2211, 4140, 4168

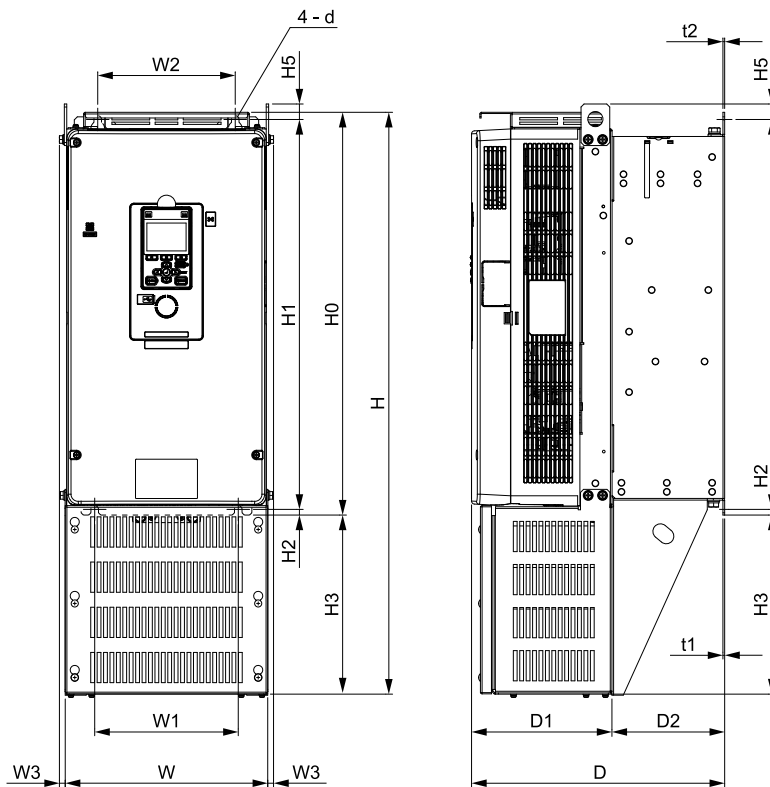


Figure 7.17 Dimension Diagram 6

Table 7.67 Three-Phase 200 V Class (IP20/UL Type 1)

Model	Dimensions mm (in)																Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	W3	H0	H1	H2	H3	H5	t1	t2	d	
2169	268 (10.55)	700 (27.56)	335 (13.19)	185.8 (7.32)	149.2 (5.87)	190 (7.48)	182 (7.17)	7.7 (0.3)	533 (20.98)	516 (20.31)	7.5 (0.3)	167 (6.57)	20.5 (0.81)	2.3 (0.09)	2.3 (0.09)	M8	39 (86.00)
2211	268 (10.55)	770 (30.31)	335 (13.19)	185.8 (7.32)	149.2 (5.87)	190 (7.48)	182 (7.17)	7.7 (0.3)	533 (20.98)	516 (20.31)	7.5 (0.3)	237 (9.33)	20.5 (0.81)	2.3 (0.09)	2.3 (0.09)	M8	41 (90.41)

Table 7.68 Three-Phase 400 V Class (IP20/UL Type 1)

Model	Dimensions mm (in)																Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	W3	H0	H1	H2	H3	H5	t1	t2	d	
4140	268 (10.55)	700 (27.56)	335 (13.19)	185.8 (7.32)	149.2 (5.87)	190 (7.48)	182 (7.17)	7.7 (0.3)	533 (20.98)	516 (20.31)	7.5 (0.3)	167 (6.57)	20.5 (0.81)	2.3 (0.09)	2.3 (0.09)	M8	41 (90.41)
4168	268 (10.55)	700 (27.56)	335 (13.19)	185.8 (7.32)	149.2 (5.87)	190 (7.48)	182 (7.17)	7.7 (0.3)	533 (20.98)	516 (20.31)	7.5 (0.3)	167 (6.57)	20.5 (0.81)	2.3 (0.09)	2.3 (0.09)	M8	42 (92.61)

■ 2257, 2313, 4208 to 4302

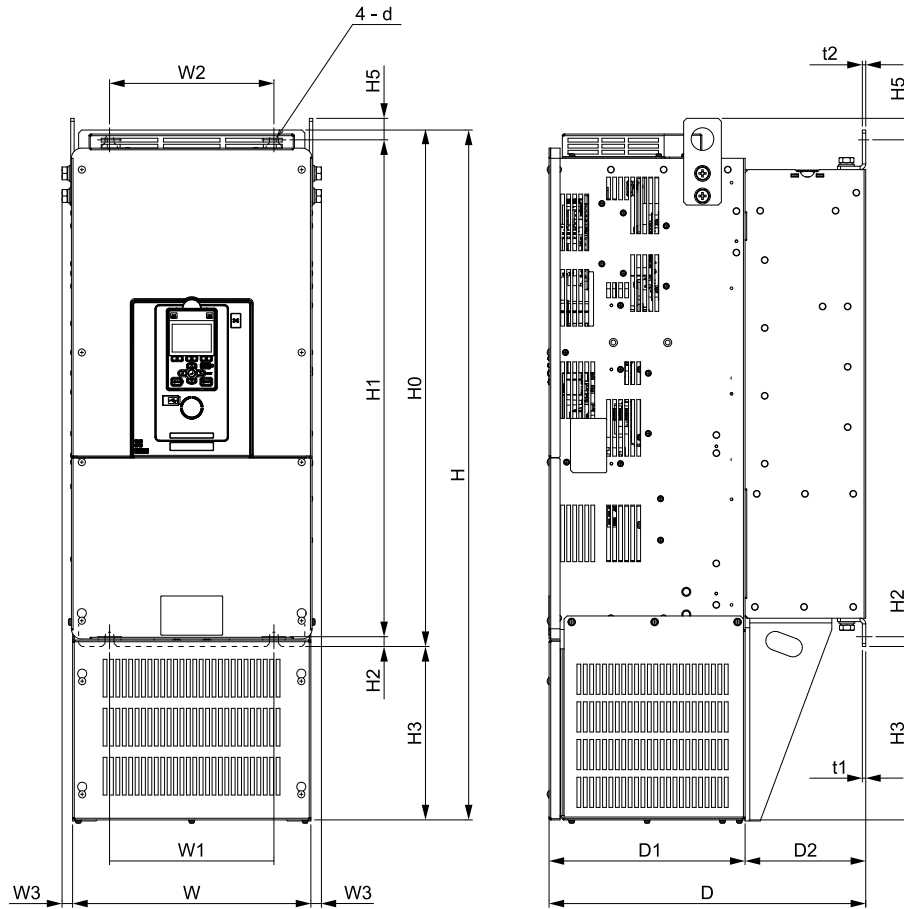


Figure 7.18 Dimension Diagram 7

Table 7.69 200 V Class (IP20/UL Type 1)

Model	Dimensions mm (in)															Est. Weight kg (lb)	
	W	H	D	D1	D2	W1	W2	W3	H0	H1	H2	H3	H5	t1	t2		d
2257	316 (12.44)	915 (36.02)	420 (16.54)	260 (10.24)	160 (6.30)	218 (8.58)	218 (8.58)	14 (0.55)	685 (26.97)	659 (25.94)	13 (0.51)	230 (9.06)	28.5 (1.12)	4.5 (0.18)	4.5 (0.18)	M10	63 (138.92)
2313	316 (12.44)	915 (36.02)	420 (16.54)	260 (10.24)	160 (6.30)	218 (8.58)	218 (8.58)	14 (0.55)	685 (26.97)	659 (25.94)	13 (0.51)	230 (9.06)	28.5 (1.12)	4.5 (0.18)	4.5 (0.18)	M10	66 (145.53)

Table 7.70 400 V Class (IP20/UL Type 1)

Model	Dimensions mm (in)															Est. Weight kg (lb)	
	W	H	D	D1	D2	W1	W2	W3	H0	H1	H2	H3	H5	t1	t2		d
4208	316 (12.44)	915 (36.02)	420 (16.54)	260 (10.24)	160 (6.30)	218 (8.58)	218 (8.58)	14 (0.55)	685 (26.97)	659 (25.94)	13 (0.51)	230 (9.06)	28.5 (1.12)	4.5 (0.18)	4.5 (0.18)	M10	65 (143.33)
4250	316 (12.44)	915 (36.02)	420 (16.54)	260 (10.24)	160 (6.30)	218 (8.58)	218 (8.58)	14 (0.55)	685 (26.97)	659 (25.94)	13 (0.51)	230 (9.06)	28.5 (1.12)	4.5 (0.18)	4.5 (0.18)	M10	67 (147.74)
4302	316 (12.44)	915 (36.02)	420 (16.54)	260 (10.24)	160 (6.30)	218 (8.58)	218 (8.58)	14 (0.55)	685 (26.97)	659 (25.94)	13 (0.51)	230 (9.06)	28.5 (1.12)	4.5 (0.18)	4.5 (0.18)	M10	70 (154.35)

■ 2360, 4371

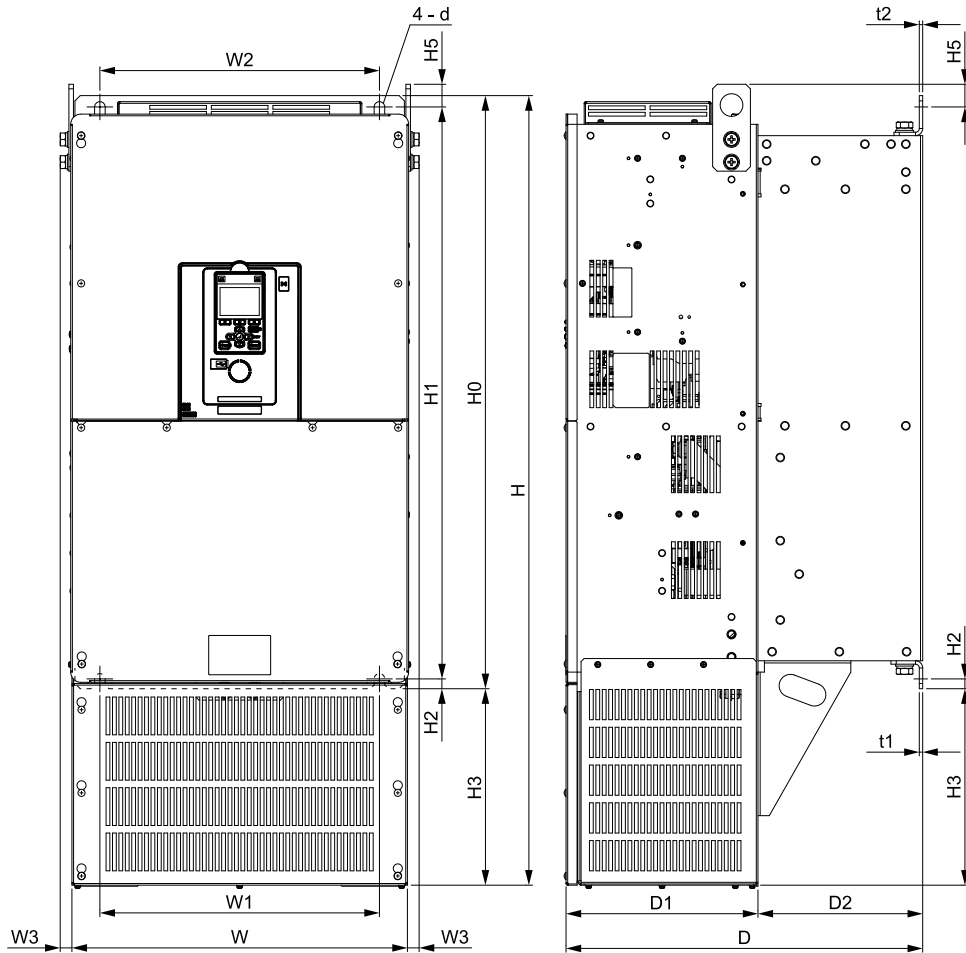


Figure 7.19 Dimension Diagram 8

Table 7.71 Three-Phase 200 V Class (IP20/UL Type 1)

Model	Dimensions mm (in)																Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	W3	H0	H1	H2	H3	H5	t1	t2	d	
2360	444 (17.48)	1045 (41.14)	472 (18.58)	254 (10.00)	218 (8.58)	370 (14.57)	370 (14.57)	15.5 (0.61)	785 (30.91)	757 (29.80)	13 (0.51)	260 (10.24)	30 (1.18)	4.5 (0.18)	4.5 (0.18)	M12	109 (240.35)

Table 7.72 Three-Phase 400 V Class (IP20/UL Type 1)

Model	Dimensions mm (in)																Est. Weight kg (lb)
	W	H	D	D1	D2	W1	W2	W3	H0	H1	H2	H3	H5	t1	t2	d	
4371	444 (17.48)	1045 (41.14)	472 (18.58)	254 (10.00)	218 (8.58)	370 (14.57)	370 (14.57)	15.5 (0.61)	785 (30.91)	757 (29.80)	13 (0.51)	260 (10.24)	30 (1.18)	4.5 (0.18)	4.5 (0.18)	M12	114 (251.37)

7.10 Knock-Out Hole Dimensions (IP20/UL Type 1)

◆ Models and Dimensions of Knock-Out Hole

Model	Reference
2004 to 2042 4002 to 4023	488
2056 4031, 4038	489
2070, 2082 4044, 4060	489
2110 4075	490
2138 4089, 4103	490
2169 4140, 4168	491
2211	491
2257, 2313 4208 - 4302	492
2360 4371	492

■ 2004 - 2042, 4002 - 4023

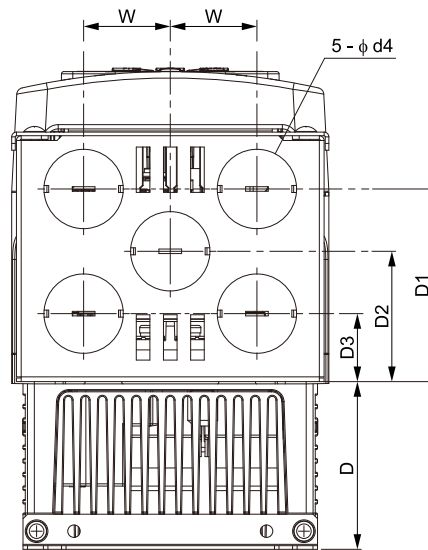


Figure 7.20 Knock-Out Dimension Diagram 1 (Models: 2004 to 2042 and 4002 to 4023)

Model	Dimensions mm (in)					
	D	D1	D2	D3	W	φd4
2004 to 2012 4002 to 4005	39 (1.54)	85 (3.35)	57.5 (2.26)	30 (1.18)	38.3 (1.51)	35 (1.38)
2018 to 2042 4007 to 4023	74 (2.91)	85 (3.35)	57.5 (2.26)	30 (1.18)	38.3 (1.51)	35 (1.38)

■ 2056, 4031, 4038

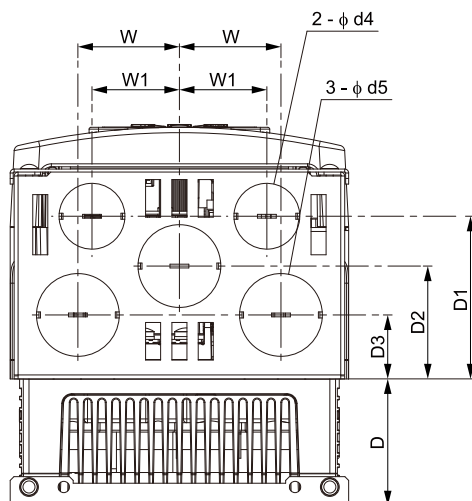


Figure 7.21 Knock-Out Dimension Diagram 2 (Models: 2056, 4031, and 4038)

Model	Dimensions mm (in)							
	D	D1	D2	D3	W	W1	φd4	φd5
2056	67.5	86.5	60	34	54	46.5	35	44
4031, 4038	(2.66)	(3.41)	(2.36)	(1.34)	(2.13)	(1.83)	(1.38)	(1.73)

■ 2070, 2082, 4044, 4060

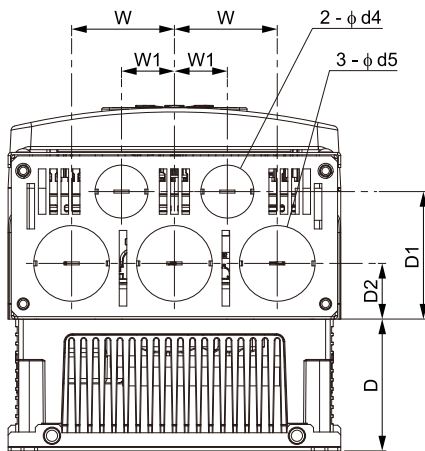


Figure 7.22 Knock-Out Dimension Diagram 3 (Models: 2070, 2082, 4044, and 4060)

Model	Dimensions mm (in)							
	D	D1	D2	W	W1	φd4	φd5	
2070, 2082	87.2	84.3	36.8	68	35	35	50	
4044	(3.43)	(3.32)	(1.45)	(2.68)	(1.38)	(1.38)	(1.97)	
4060	106.2	84.3	36.8	68	35	35	50	
	(4.18)	(3.32)	(1.45)	(2.68)	(1.38)	(1.38)	(1.97)	

■ 2110, 4075

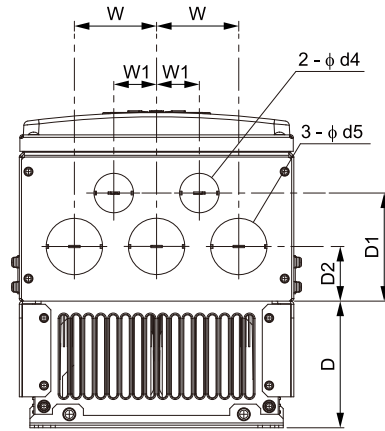


Figure 7.23 Knock-Out Dimension Diagram 4 (Models: 2110 and 4075)

Model	Dimensions mm (in)						
	D	D1	D2	W	W1	φd4	φd5
2110	112.5	96	48.5	73	38	35	50
4075	(4.43)	(3.78)	(1.91)	(2.87)	(1.50)	(1.38)	(1.97)

■ 2138, 4089, 4103

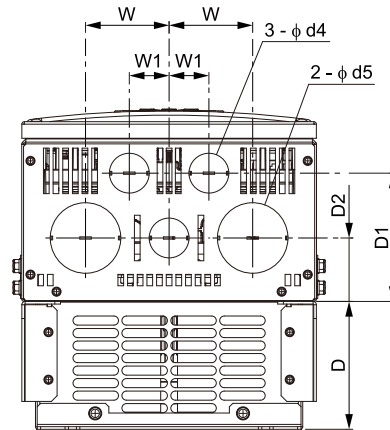


Figure 7.24 Knock-Out Dimension Diagram 5 (Models: 2138, 4089, and 4103)

Model	Dimensions mm (in)						
	D	D1	D2	W	W1	φd4	φd5
2138	112.4	112.8	55.8	73.5	35	35	62
4089, 4103	(4.43)	(4.44)	(2.20)	(2.89)	(1.38)	(1.38)	(2.44)

■ 2169, 4140, 4168

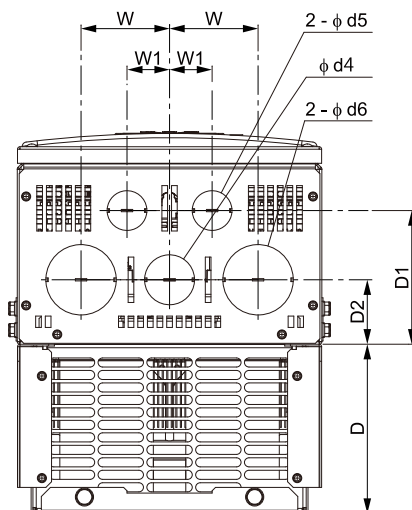


Figure 7.25 Knock-Out Dimension Diagram 6 (Models: 2169, 4140, and 4168)

Model	Dimensions mm (in)								
	D	D1	D2	W	W1	φd4	φd5	φd6	
2169	149.2	117.8	56.8	78	37.5	44	35	62	
4140, 4168	(5.87)	(4.64)	(2.24)	(3.07)	(1.48)	(1.73)	(1.38)	(2.44)	

■ 2211

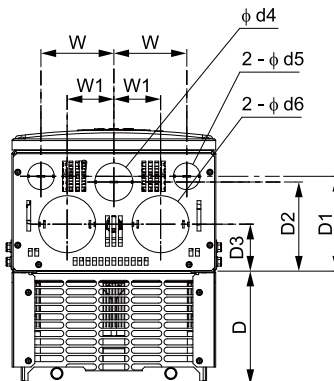


Figure 7.26 Knock-Out Dimension Diagram 7 (Models: 2211)

Model	Dimensions mm (in)									
	D	D1	D2	D3	W	W1	φd4	φd5	φd6	
2211	149.2	124.8	117.3	61.8	96	61.5	50	35	75	
	(5.87)	(4.91)	(4.62)	(2.43)	(3.78)	(2.42)	(1.97)	(1.38)	(2.95)	

■ 2257, 2313, 4208 to 4302

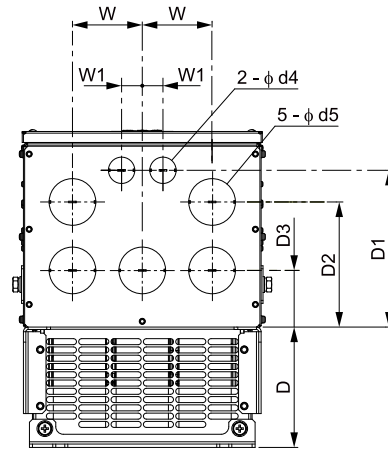


Figure 7.27 Knock-Out Dimension Diagram 8 (Models: 2257, 2313, 4208, 4250, and 4302)

Model	Dimensions mm (in)							
	D	D1	D2	D3	W	W1	φd4	φd5
2257, 2313	160	208.4	166.3	75.3	92.8	27.5	35	62
4208, 4250, 4302	(6.30)	(8.20)	(6.55)	(2.96)	(3.65)	(1.08)	(1.38)	(2.44)

■ 2360, 4371

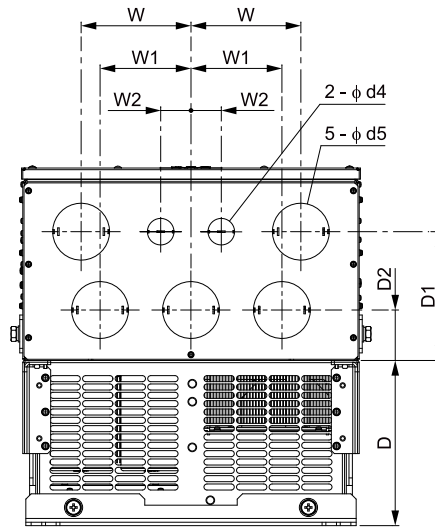


Figure 7.28 Knock-Out Dimension Diagram 9 (Models: 2360 and 4371)

Model	Dimensions mm (in)							
	D	D1	D2	W	W1	W2	φd4	φd5
2360	218	170	66.6	145	120	40	35	75
4371	(8.58)	(6.69)	(2.62)	(5.71)	(4.72)	(1.57)	(1.38)	(2.95)

7.11 Peripheral Devices and Options

There are many available peripheral devices and options for the drive.

Refer to the “GA800 Selection Guide” (SL.GA800.01) for information about available options, including:

- Main Circuit Options
- Frequency Settings and Monitor Options
- Keypad
- Attachment
- Engineering Tools

Contact Yaskawa or your nearest sales representative to make an order.

Installation and wiring: Refer to the instruction manual for each option.

Index

Symbols

Numerics

24 V power supply
Power supply input terminals 348

A

Adjustment of control functionality 432
AEr 120
Alarm 82, 120
ALM indicator 359, 362
ALM/ERR
LED status 365
Altitude
Derating 468
Ambient Temperature Setting
Derating 467
Parameter 467
Analog gauge
Monitors 381
Application Preset
Operation 419
ASR tuning 425
Precautions 429
Auto-Tuning 421
ASR tuning 425
Induction Motor 421
Inertia Tuning 425
PM motors 422
Precautions 427
Precautions to Note before ASR Tuning 429
Precautions to Note before Inertia Tuning 429
Procedure 398
Rotational Auto-Tuning Precautions 428
Stationary Auto-Tuning for Line-to-Line Resistance
precautions 429
Stationary Auto-Tuning Precautions 428
Stator resistance Auto-Tuning precautions 429
Auto-Tuning Error 82, 137

B

Backlight
Timing of shut-off 414
Backup
Parameters (drive to keypad) 390
Bar graph
Monitors 379
Basic operation
Get started 367
bAT
Fault 89
Minor Fault 120
Battery
Replacement 76
Specifications 76
bb 120
bCE
Fault 89
Minor Fault 120
boL
Fault 89

Minor Fault 120
bUS
Fault 89
Minor Fault 120
bUSy 121
C
CALL 121
Carrier frequency
Derating 461
CE
Fault 89
Minor Fault 121
CF 90
Checklist
Test run 440
Circulation Fan
Replacement 28
CoF 90
Control circuit terminal block
Replacement 70
Control circuit terminals
Terminal functions 346
Wiring 345
Cooling Fan
Estimated Lifespan 25
Replacement 28
Copy Function Error 82, 142
CP1
Fault 90
Minor Fault 121
CP2
Fault 91
Minor Fault 122
CPF00 91
CPF01 91
CPF02 91
CPF03 91
CPF06 91
CPF07 91
CPF08 92
CPF10 92
CPF11 92
CPF12 92
CPF13 92
CPF14 92
CPF16 92
CPF17 92
CPF18 93
CPF19 93
CPF20 93
CPF21 93
CPF22 93
CPF23 93
CPF24 93
CPF26 93
CPF27 94
CPF28 94
CPF29 94
CPF30 94
CPF31 94
CPF32 94
CPF33 94

CPF34.....	94
CPF35.....	95
CPF36.....	95
CPF37.....	95
CPF38.....	95
CPF39.....	95
CPyE.....	142
CrST.....	122
CSEr.....	142
CyC.....	122
CyPo.....	122
D	
Data log.....	407
Monitor selection.....	407, 410
Sampling time.....	408–409
Start procedure.....	406
Stop procedure.....	406
Delete	
Delete Backed-up Parameters.....	393
Derating	
Altitude.....	468
Ambient Temperature Setting.....	467
Carrier frequency.....	461
Enclosure Type.....	467
External Cooling Fin.....	467
Finless.....	467
Side-by-side.....	467
dEv	
Fault.....	95
Minor Fault.....	122
dFPS.....	142
Diagnosing and Resetting Faults.....	144
dnE.....	122
Drive	
Control Circuit Terminal Block Replacement.....	70
Exterior and Mounting Dimensions (IP00/UL Open Type).....	478–479
Exterior and Mounting Dimensions (IP20/UL Open Type).....	470–473, 478
Exterior and Mounting Dimensions (IP20/UL Type 1).....	480– 485, 487
Exterior Dimension Diagram (IP20).....	474–477
Exterior Dimension Diagram (UL Type 1).....	486
Exterior Dimensions Diagram (IP20).....	488–492
Inspection.....	22
Long-Term Storage.....	78
Rating (200 V).....	446
Rating (400 V).....	448
Rating (6-Phase/12-Pulse 400 V Class).....	452
Drive watt loss.....	457–459
dv1.....	95
dv2.....	96
dv3.....	96
dv4.....	96
dv7.....	97
dWA2.....	122
dWA3.....	122
dWAL.....	122
dWF1.....	97
dWF2.....	97
dWF3.....	97
dWFL.....	97
E	
E5	
Fault.....	97
Minor Fault.....	123
EF.....	123
EF0	
Fault.....	97
Minor Fault.....	123
EF1	
Fault.....	98
Minor Fault.....	123
EF2	
Fault.....	98
Minor Fault.....	123
EF3	
Fault.....	98
Minor Fault.....	123
EF4	
Fault.....	98
Minor Fault.....	123
EF5	
Fault.....	98
Minor Fault.....	124
EF6	
Fault.....	98
Minor Fault.....	124
EF7	
Fault.....	99
Minor Fault.....	124
EF8	
Fault.....	99
Minor Fault.....	124
Electrolytic Capacitor	
Estimated Lifespan.....	25
Enclosure Type	
Change to IP20/UL Type 1.....	332
Derating.....	467
End1.....	137
End2.....	137
End3.....	137
End4.....	137
End5.....	137
End6.....	137
End7.....	137
End8.....	138
End9.....	138
EP24v.....	124
Er-01.....	138
Er-02.....	138
Er-03.....	138
Er-04.....	139
Er-05.....	139
Er-08.....	139
Er-09.....	139
Er-10.....	139
Er-11.....	139
Er-12.....	140
Er-13.....	140
Er-14.....	140
Er-15.....	140
Er-16.....	140
Er-17.....	140

Er-18	140
Er-19	140
Er-20	140
Er-21	140
Er-25	141
Err	99
Error Code List	83
Exterior and Mounting Dimensions (IP00/UL Open Type)	
Drive	478–479
Exterior and Mounting Dimensions (IP20/UL Open Type)	
Drive	470–473, 478
Exterior and Mounting Dimensions (IP20/UL Type 1)	
Drive	480–485, 487
Exterior Dimension Diagram (IP20)	
Drive	474–477
Exterior Dimension Diagram (UL Type 1)	
Drive	486
Exterior Dimensions Diagram (IP20)	
Drive	488–492
External 24 V power supply	
Power supply input terminals	348
External Cooling Fin	
Derating	467
F	
FAn	
Fault	99
Minor Fault	124
FAn1	99
Fault	82, 89
Fault Code List	83
Fault history	
Display procedure	397
Fault Reset	144
FbH	
Fault	99
Minor Fault	124
FbL	
Fault	100
Minor Fault	125
Fine tuning	432
Finless	
Derating	467
Frequency reference	
Making changes using keypad	375
G	
Getting set up	367
GF	100
H	
HCA	125
HD	445
Heavy Duty Rating	445
HLCE	100
HOME screen	375
I	
iFEr	142
Induction Motor	
Auto-Tuning	421
Inertia Tuning	425
Precautions	429
Inspection	
Drive	22

Installation	
Front cover	326
Keypad	331
Terminal cover	326
UL Type 1 protective cover	332
IP20/UL Type 1	
Attach protective cover	332
J	
Jog operation	375
JOG operation	375
K	
Keypad	
Application Preset	419
Backlight setting	414
Battery Replacement	76
Data log setting	407, 410
Display communication option information	416
Display drive information	415
Display software version	415
HOME screen	375
Installation	331
Language selection	400
LED status	359
Method of operation	359
Remove	331
Set date and time	401
Set time	401
Setup Wizard	403
Start/stop data logging	406
L	
L24v	125
Language selection	
Procedure	400
LED status ring	
ALM/ERR	365
Ready	365
RUN	365
LF	100
LF2	100
LOCAL/REMOTE indicator	359, 362
LoG	125
LSo	101
LT-1	126
LT-2	126
LT-3	126
LT-4	126
M	
Main circuit terminals	
Wiring	342
Main menu	
Display procedure	375
MEMOBUS/Modbus Communications	
Serial communication terminals	351
Setting for termination resistor	355
microSD card	
Insertion slot	359
Minor Fault	82, 120
Minor Fault Code List	83
Monitors	
Data log setting	407–408, 410
Display analog gauge	381

Display bar graph.....	379	oFC02.....	108
Display procedure.....	376	oFC03.....	108
Set custom monitors.....	377	oFC04.....	108
Show custom monitors.....	378	oFC05.....	108
Start/stop data logging.....	406	oFC06.....	109
Trend Plot Display.....	382	oFC10.....	109
Motor		oFC11.....	109
Change direction of motor rotation.....	375	oFC12.....	109
Wiring.....	342	oFC13.....	109
N		oFC14.....	109
ND.....	445	oFC15.....	109
ndAT.....	142	oFC16.....	110
Normal Duty Rating.....	445	oFC17.....	110
nSE.....	101	oFC50.....	110
O		oFC51.....	110
oC.....	101	oFC52.....	110
oFA00.....	102	oFC53.....	110
oFA01.....	103	oFC54.....	110
oFA02.....	103	oFC55.....	110
oFA03.....	103	oH	
oFA04.....	103	Fault.....	110
oFA05.....	103	Minor Fault.....	126
oFA06.....	103	oH1.....	111
oFA10.....	103	oH2.....	126
oFA11.....	103	oH3	
oFA12.....	104	Fault.....	111
oFA13.....	104	Minor Fault.....	126
oFA14.....	104	oH4.....	111
oFA15.....	104	oL1.....	111
oFA16.....	104	oL2.....	112
oFA17.....	104	oL3	
oFA30.....	104	Fault.....	113
oFA31.....	104	Minor Fault.....	127
oFA32.....	105	oL4	
oFA33.....	105	Fault.....	113
oFA34.....	105	Minor Fault.....	127
oFA35.....	105	oL5	
oFA36.....	105	Fault.....	113
oFA37.....	105	Minor Fault.....	127
oFA38.....	105	oL7.....	113
oFA39.....	105	oPE01.....	131
oFA40.....	106	oPE02.....	131
oFA41.....	106	oPE03.....	131
oFA42.....	106	oPE05.....	132
oFA43.....	106	oPE06.....	133
oFb00.....	106	oPE07.....	133
oFb01.....	106	oPE08.....	133
oFb02.....	106	oPE09.....	134
oFb03.....	106	oPE10.....	134
oFb04.....	106	oPE11.....	135
oFb05.....	107	oPE13.....	135
oFb06.....	107	oPE15.....	135
oFb10.....	107	oPE16.....	135
oFb11.....	107	oPE18.....	135
oFb12.....	107	oPE20.....	135
oFb13.....	107	oPE33.....	136
oFb14.....	107	oPr.....	114
oFb15.....	107	Options.....	493
oFb16.....	108	oS	
oFb17.....	108	Fault.....	114
oFC00.....	108	Minor Fault.....	127
oFC01.....	108	ov	
		Fault.....	114

Minor Fault	128
ovEr	128
P	
Parameter	
Backup (drive to keypad)	390
Changing setting values	387
Checking modified parameters	394
Checking user custom parameters	388
Delete Backed-up Parameters	393
Restore (Auto Backup)	417
Restore (keypad to drive)	391
Restoring default settings	396
Verify (keypad and drive)	392
Parameter Setting Errors	82, 131
PASS	128
PC	
Connection procedure	356
PE1	115
PE2	115
Peripheral Devices	493
PF	115, 128
PGo	
Fault	115
Minor Fault	129
PGoH	
Fault	116
Minor Fault	129
PM motors	
Auto-Tuning	422
Power loss	457–459
PSE	116
Pulse train output	
Wiring specifications	352
PWEr	142
R	
Rating (200 V)	
Drive	446
Rating (400 V)	
Drive	448
Rating (6-Phase/12-Pulse 400 V Class)	
Drive	452
rdEr	142
Ready	
LED status	365
Remove	
Front cover	326
Keypad	331
Terminal cover	326
RESET key	359
Restore	
Parameters (Auto Backup)	417
Parameters (keypad to drive)	391
rF	116
rH	116
RJ-45 connector	359
Rotational Auto-Tuning	
Induction Motor	421
PM motors	422
Precautions	428
rr	116
rUn	129
RUN	

LED status	365
RUN indicator	359, 362
RUN key	359
S	
Sampling time setting	
Data log	408–409
SC	116
SCF	117
SE	129
SEr	117
Serial communication terminals	
MEMOBUS/Modbus Communications	351
Set date and time	
Operation	401
Set time	
Operation	401
Setup Wizard	
Operation	403
Side-by-side	
Derating	467
Software version	
Display procedure	415
Stationary Auto-Tuning	
Induction Motor	421
PM motors	422
Precautions	428
Stationary Auto-Tuning for Line-to-Line Resistance	421
Precautions	429
Stator resistance Auto-Tuning	422
Precautions	429
STo	129
SToF	129
STOP key	359
STPo	117
SvE	117
T	
Terminal block	
Control circuit terminal block functions	346
Terminal function selection	353
Terminal A1	353
Terminal A2	353
Terminal A3	354
Terminal AM	354
Terminal FM	354
Terminal screw	
Screwdriver	12
Termination resistor	
Setting switch	355
Test run	
Checklist	440
Fine tuning	432
Procedure	367
Procedure for no-load test run	430
Procedure for test run with actual load	430
TiM	
Fault	117
Minor Fault	129
Trend log	
Data log setting	409
Trend Plot	
Monitors	382
Troubleshooting	

Code Displayed	83
No Code Displayed.....	146
Troubleshooting without Fault Display	146
TrPC.....	129
U	
UL3	
Fault	118
Minor Fault.....	130
UL4	
Fault	118
Minor Fault.....	130
UL5	
Fault	118
Minor Fault.....	130
USB port	359
Connecting a PC.....	356
Uv	130
Uv1.....	118
Uv2.....	118
Uv3.....	119
V	
vAEr	143
Verify	
Parameters (keypad and drive)	392
vFyE	143
W	
Wiring	
Control circuit terminals.....	345
Main circuit terminals.....	342
Motor.....	342
Z	
Z pulse Auto-Tuning.....	422

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In the event that the end user of this product is to be the military and said product is to be employed in any weapons systems or the manufacture thereof, the export will fall under the relevant regulations as stipulated in the Foreign Exchange and Foreign Trade Regulations. Therefore, be sure to follow all procedures and submit all relevant documentation according to any and all rules, regulations and laws that may apply.

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