

YASKAWA

HV305 DRIVE

MAINTENANCE & TROUBLESHOOTING

VERSATILE COMPACT DRIVE

CATALOG CODE:

HV35Uxxxxxxxx

CAPACITIES:

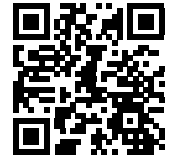
200 V Class, Single-Phase Input: 1/6 to 5 HP

200 V Class, Three-Phase Input: 1/6 to 30 HP

400 V Class, Three-Phase Input: 1/2 to 40 HP

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DOCUMENT NUMBER: TOEPYAIHV3003

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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.

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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/PM	Advanced Open Loop Vector Control for Permanent Magnet Motors
Drive	YASKAWA AC Drive HV305
EDM	External Device Monitor
EZOLV	EZ Open Loop Vector Control
HD	Heavy Duty
IPM motor	Interior Permanent Magnet Synchronous 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 Synchronous Motor
V/f	V/f Control

◆ About Registered Trademarks

- BACnet is a registered trademark of the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE).
- EtherNet/IP is a registered trademark of Open DeviceNet Vendor Association, Inc. (ODVA).
- LonWorks and LonTalk are registered trademarks of Echelon Corporation.
- Modbus is a registered trademark of Schneider Electric SA.
- PROFINET is a registered trademark of PROFIBUS International.
- Other company names and product names in this document are trademarks or registered trademarks of the respective companies.

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

Identifies a hazardous situation, which, if not avoided, can cause minor or moderate injury.

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, measure 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 suited for circuits that supply not more than 31,000 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.

**WARNING**

Risk of electric shock.

**Read manual before installing. Wait 5 minutes for capacitor removing power and opening the manual switch between the drive and motor.**

**AVERTISSEMENT**

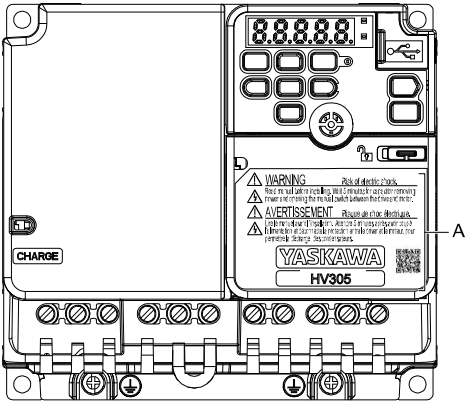
Risque de choc électrique.

**Lire le manuel avant l'installation. Attendez 5 minutes après avoir coupé l'alimentation et déconnecté la protection entre le driver et le moteur, pour permettre la décharge des condensateurs.**

YASKAWA

HV305





A - Warning label

Figure i.1 Warning Label Content and Location

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.

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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, measure 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. Unshielded wire 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 wear out 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.	• 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.	• 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.	• 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.	• Check for a load that is too heavy. • Check the correct motor parameter settings.	
Power Supply Voltage	Examine main power supply and control voltages.	• 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, measure 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	- Examine equipment for discoloration from too much heat or deterioration. - Examine for damaged parts.	- 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.	- 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	- 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.	- Tighten loose screws. - Replace damaged screws.	
Electromagnetic Contactors and Relays	- Examine contactors and relays for too much noise during operation. - Examine coils for signs of too much heat, such as melted or broken insulation.	- 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 there is not damage to the wiring. A small quantity of discoloration is not a problem.	
Electrolytic Capacitor	- 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	- Examine terminals for stripped, damaged, or loose connections. - Make sure that all terminals have been correctly tightened.	- 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	- 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.	- 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.	

1.2 Inspection

Table 1.5 Cooling System Periodic Inspection Checklist

Inspection Area	Inspection Points	Corrective Action	Checked
Cooling fan	• Check for unusual oscillation or unusual noise. • Check for damaged or missing fan blades.	Clean or replace the fans as necessary.	
Heatsink	• 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	• Make sure that the keypad shows the data correctly. • Examine for dust or other unwanted material that collected on components in the area.	• If you have problems with the display or the keys, contact Yaskawa or your nearest sales representative. • Clean the keypad.	

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

You can replace these parts of the drive:

- Cooling fan

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.

⚠ 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, measure 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.

◆ 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:

Performance life estimate is based on these use conditions. These conditions are provided for the purpose of replacing parts to maintain performance. Some parts may require more frequent replacement due to poor environments or rigorous use. Operating conditions for performance life estimate: Ambient temperature: Yearly average of 40 °C (IP20/UL Open Type), 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.

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	Digital Outputs (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 = 0 [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 Maintenance Time	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 = 30</i> has been set, the drive will count the operation time for the cooling fan from 300 hours and <i>U4-03 [Cooling Fan Opn 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.
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

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.

To replace a cooling fan, contact Yaskawa or your nearest sales representative.

◆ Number of Cooling Fans

Table 1.11 Single-Phase 200 V Class

Model	Cooling Fans	Replacement Procedure	Ref.
B001 - B006	-	-	-
B010, B012	1	A	25
B018	2	B	

Table 1.12 Three-Phase 200 V Class

Model	Cooling Fans	Replacement Procedure	Ref.
2001-2004	-	-	-
2006 - 2021	1	A	25
2030	1	B	29
2042 - 2082	2	A	25

Table 1.13 Three-Phase 400 V Class

Model	Cooling Fans	Replacement Procedure	Ref.
4001 - 4004	-	-	-
4005 - 4012	1	A	25
4018, 4023	1	B	29
4031 - 4060	2	A	25

◆ Replace the Cooling Fan (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, measure 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.

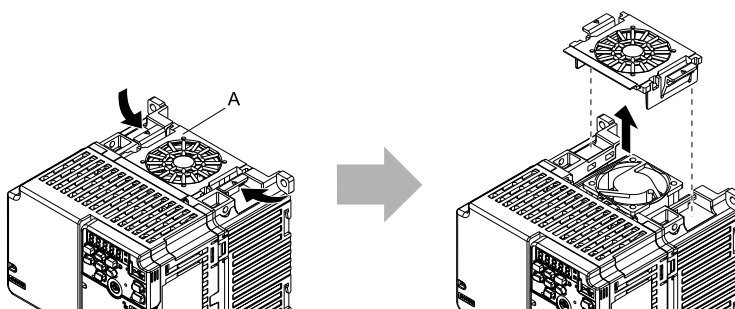
NOTICE

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.

■ Remove a Fan

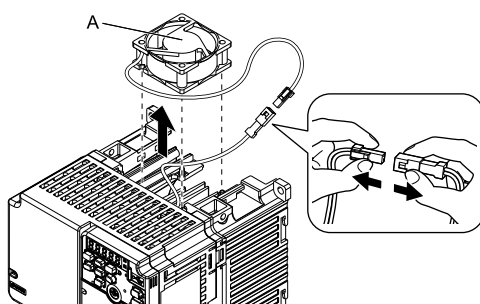
1. To remove the fan finger guard from the drive, push the hooks on the left and right sides of it and pull up.



A - Fan finger guard

Figure 1.1 Remove the Fan Finger Guard

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



A - Cooling fan

Figure 1.2 Remove the Cooling Fan

■ Install a Fan

Reverse the removal procedure to install a cooling fan.

1. Connect the power supply connector between the drive and cooling fan.

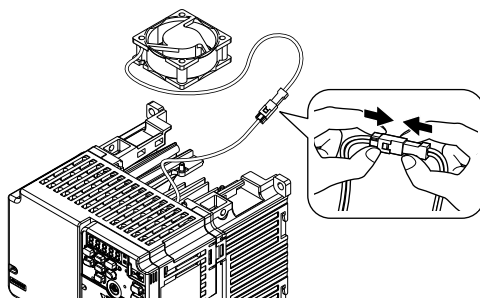


Figure 1.3 Connect the Power Supply Connector

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

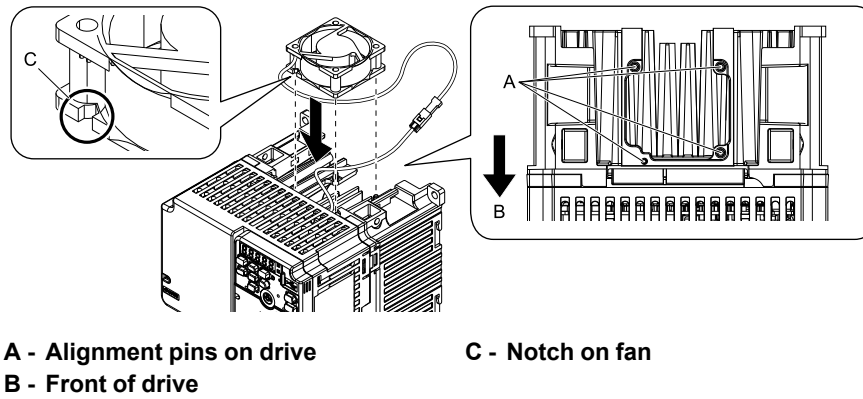
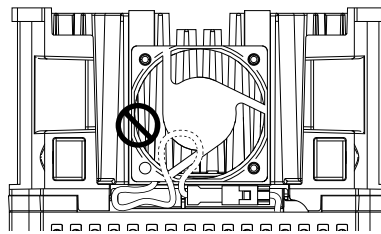


Figure 1.4 Install the Cooling Fan

Note:

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



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

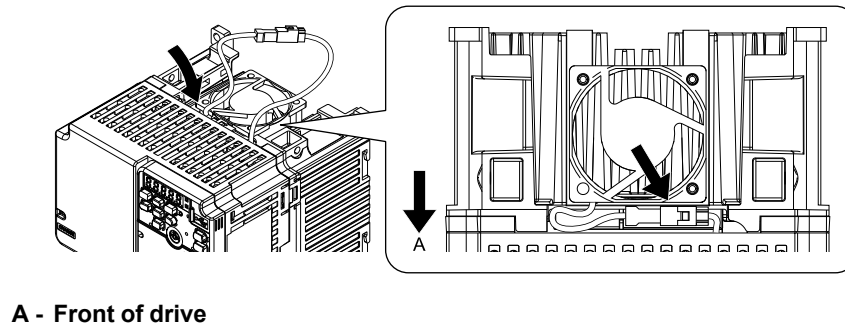


Figure 1.5 Put the Cable and Connector in the Drive Recess

1.4 Replace Cooling Fans

Note:

The connector installation position is different for different models.

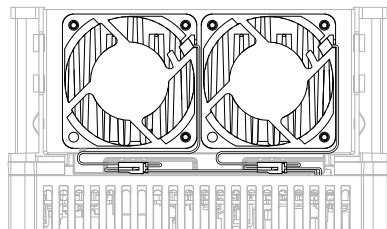


Figure 1.6 Put the Connector in the Recess

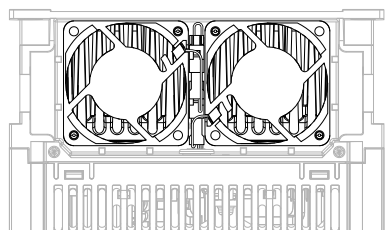


Figure 1.7 Put the Connector in Between the Fans

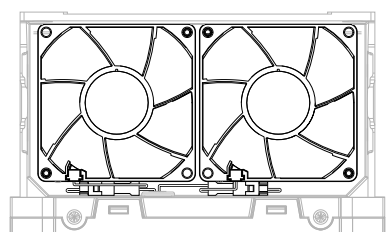


Figure 1.8 Put the Connector in Between the Drive and Fan

4. Insert the fan cover straight until the hook clicks into place.

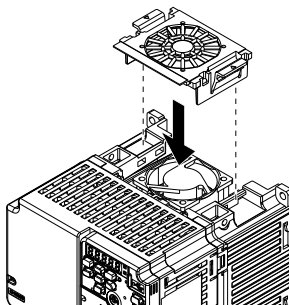


Figure 1.9 Reattach the Fan Finger Guard

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

◆ Replace the Cooling Fan (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, measure 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.

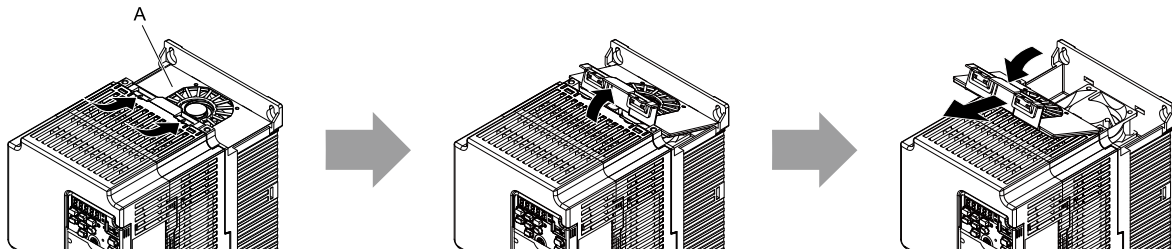
NOTICE

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.

■ Remove a Fan

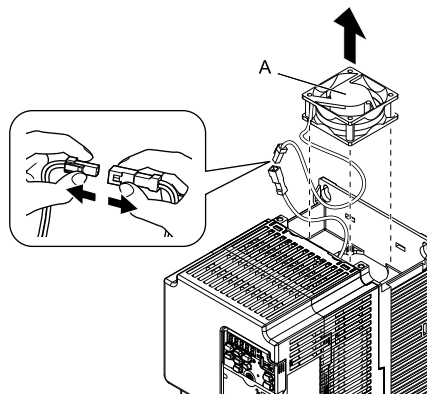
1. Push the tabs toward the back of the drive and pull up to remove the fan finger guard from the drive.



A - Fan finger guard

Figure 1.10 Remove the Fan Finger Guard

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



A - Cooling fan

Figure 1.11 Remove the Cooling Fan

■ Install the Cooling Fans

Reverse the removal procedure to install a cooling fan.

1. Connect the power supply connector between the drive and cooling fan.

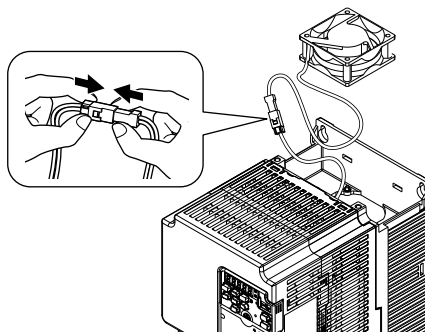
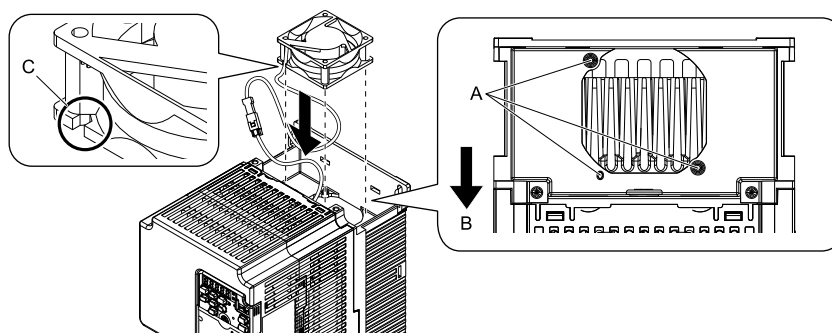


Figure 1.12 Connecting the power supply connector

2. Install the cooling fans so that they align with the pins on the drive.



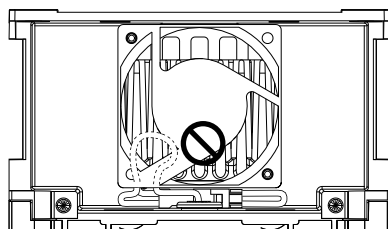
A - Alignment pins on drive
B - Front of drive

C - Notches

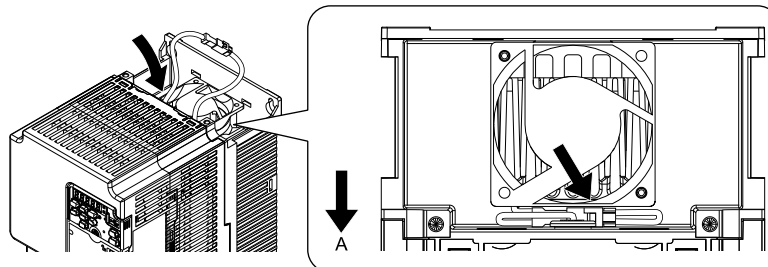
Figure 1.13 Installing the cooling fans

Note:

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



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



A - Front of drive

Figure 1.14 Putting the cable and connector in the recess

4. Insert the tabs of the fan cover into the holes in the drive and press in the fan cover until the hook clicks into place.

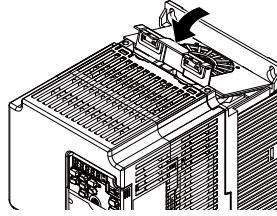


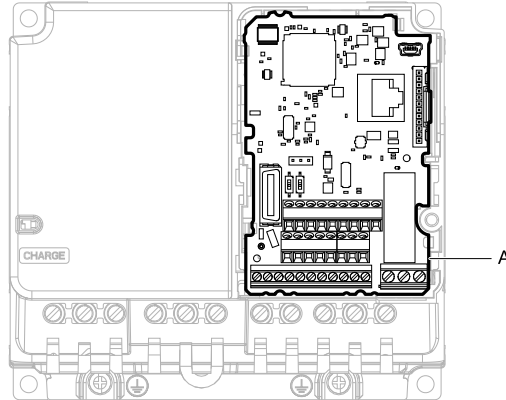
Figure 1.15 Reattach the Fan Finger Guard

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

1.5 Replace the Drive

◆ About the Control Circuit Board

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



A - Control circuit board

Figure 1.16 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.

⚠ 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, measure 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

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.

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 existing drive models to be replaced may not match wire gauge ranges on new drives. 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.

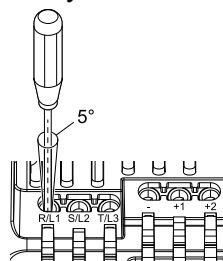


Figure 1.17 Permitted Angle

- 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.

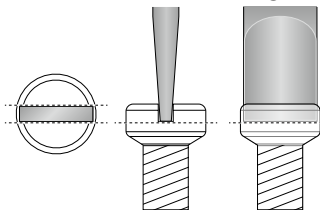
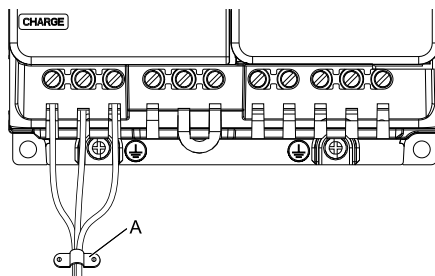


Figure 1.18 Tightening Slotted Screws

- 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.
- Do not let strain on the wiring cause damage. Use a strain relief near the wiring to release the tension. Refer to [Figure 1.19](#) for an example.



A - Cable clamp

Figure 1.19 Strain Relief Example

Table 1.14 Recommended Wiring Tools

Screw Size	Screw Shape	Wire Gauge	Adapter	Bit		Torque Driver Model (Tightening Torque)	Torque Wrench (Tightening Torque)
				Model	Manufacturer		
M3		-	Bit	SF-BIT-SL 0,5X3,0-70	PHOENIX CONTACT	TSD-M 1,2NM (0.3 - 1.2 N·m (2.7 - 10.6 in·lb))	-
M4		-	Bit	SF-BIT-SL 1,0X4,0-70	PHOENIX CONTACT	TSD-M 3NM (1.2 - 3.0 N·m (10.6 - 26.6 in·lb))	-
M5 ^{*1}		≤ 25 mm ² (AWG 10)	Bit	SF-BIT-SL 1,2X6,5-70	PHOENIX CONTACT	TSD-M 3NM (1.2 - 3.0 N·m (10.6 - 26.6 in·lb))	-
		≥ 30 mm ² (AWG 8)				-	4.1 - 4.5 N·m (36.3 - 39.8 in·lb) ^{*2} ^{*3}
M6	 (WAF: 5 mm)	-	Bit	SF-BIT-HEX 5-50	PHOENIX CONTACT	-	5 - 9 N·m (44.3 - 79.7 in·lb) ^{*2} ^{*3}

*1 When you wire drive models 2042, 2056, 4031, 4038, 4044, and 4060, 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 Board

Remove the front cover and keypad from the drive.

1. Push the tabs to the left that hold the control board to the drive.

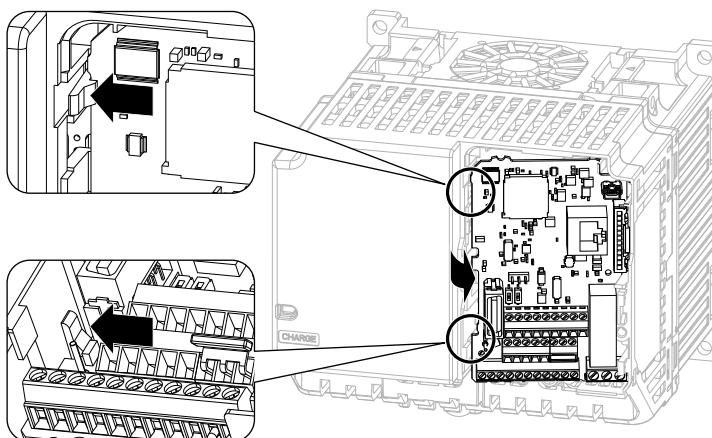


Figure 1.20 Unhook the Tabs

2. Pull the left side of the control circuit board out first.

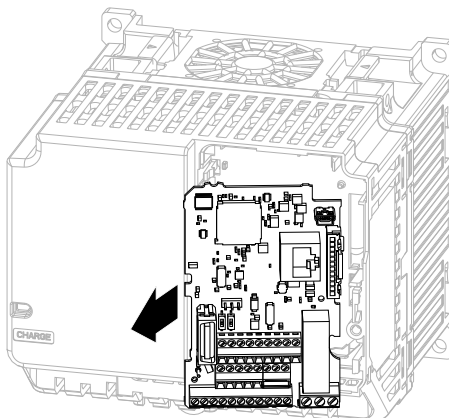


Figure 1.21 Remove the Control Circuit Board

■ Put the Control Circuit Board in a New Drive

Remove the keypad, front cover, and control circuit board of the new drive.

Wire the main circuit terminals of the new drive, then attach the wired control circuit board.

1. Wire the main circuit terminals.

Note:

To wire terminals +1 and +2, remove the jumper between terminals +1 and +2.

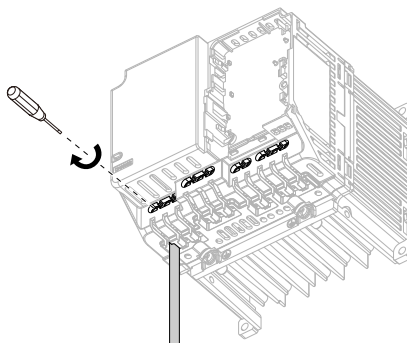


Figure 1.22 Wire the Main Circuit Terminals

2. Attach the wired control circuit board to the drive.
Push the control circuit board until the hooks click into place on the drive.

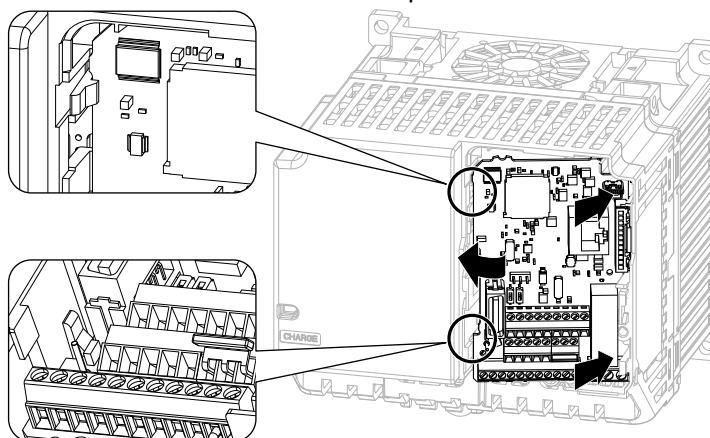


Figure 1.23 Attach the Control Circuit Board

3. Attach the keypad and front cover to the new drive.

4. Energize the drive and set these parameters:
 - *o2-04 [Drive Model (KVA) Selection]*: Set this parameter to the model number of the new drive.
 - *o4-01 to o4-13 [Maintenance Period]*: Reset the performance life monitors for the components.

1.6 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°C to $+70^{\circ}\text{C}$ (-4°F to $+158^{\circ}\text{F}$). 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.

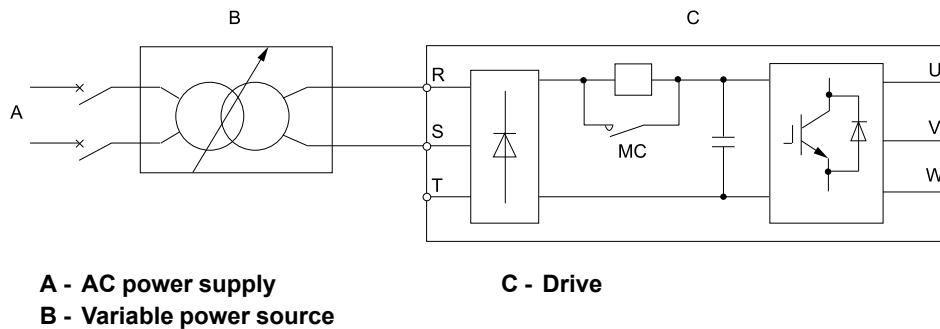


Figure 1.24 Power Distribution Method

Troubleshooting

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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, measure 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.

⚠ WARNING**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.

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
Fault	When the drive detects a fault, it will cause these conditions: • The keypad shows the fault code, and ALM/ERR stays illuminated. • The drive shuts off output, and the motor coasts to a stop. Some faults let the user select a motor stopping method. • The terminal set to $H2-01$ to $H2-03 = E$ [MFDO Function Selection = Fault] will activate. The drive will not operate until you clear the fault with a Fault Reset and the drive goes back to usual status.
Minor Faults/Alarms	When the drive detects a minor fault or an alarm, it will cause these conditions: • The keypad shows the alarm code, and ALM/ERR flashes. • 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 $H2-03 = 10$ [Alarm] will activate. 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. It is not necessary to do Fault Reset.
Operation Errors	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. When the drive detects an operation error, these conditions will result: • The keypad shows the error code. • Multi-function outputs do not output an alarm signal. Find the parameters that caused the error and correct the settings.
An Auto-Tuning Error	An error occurs during Auto-Tuning. When the drive detects a tuning error, it will cause these conditions: • The keypad shows the error code. • Multi-function outputs do not output an alarm signal. • The motor coasts to stop. Remove the cause of the error and do Auto-Tuning again.
Copy Function Error	An error occurs when you use the keypad for a backup, restore, or verify operation. When the drive detects a copy function error, it will cause these conditions: • The keypad shows the error code. • Multi-function outputs do not output an alarm signal. 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.

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	65
bAT (0085)	Keypad Battery Low Voltage	Flashing	Alarm	65
bAT (0402)	Keypad Battery Low Voltage	Illuminated	Fault	48
bb (0008)	Baseblock	Flashing	Alarm	65
bCE (008A)	Bluetooth Communication Error	Flashing	Alarm	65
bCE (0416)	Bluetooth Communication Fault	Illuminated	Fault	48
boL (0045)	Braking Transistor Overload	Flashing	Alarm	65
boL (004F)	Braking Transistor Overload Fault	Illuminated	Fault	48
bUS (0015)	Option Communication Error	Flashing	Alarm	65
bUS (0022)	Option Communication Error	Illuminated	Fault	48
CALL (001D)	Serial Comm Transmission Error	Flashing	Alarm	66
CE (0014)	Serial Communication Error	Flashing	Alarm	66
CE (0021)	Serial Communication Error	Illuminated	Fault	48
CF (0025)	Control Fault	Illuminated	Fault	49
CoF (0046)	Current Offset Fault	Illuminated	Fault	49
CP1 (0087)	Comparator 1 Limit Error	Flashing	Alarm	66
CP1 (0414)	Comparator 1 Limit Error	Illuminated	Fault	49
CP2 (0088)	Comparator 2 Limit Error	Flashing	Alarm	66
CP2 (0415)	Comparator 2 Limit Error	Illuminated	Fault	49
CPEr	Control Mode Mismatch	-	Backup Function Runtime Error	84
CPF00, CPF01 CPF02, CPF03 (0083, 0084) CPF08 (0089) CPF11 - CPF14 (008C - 008F) CPF16 - CPF24 (0091 - 0099) CPF38 (00A7)	Control Circuit Error	Illuminated	Fault	50
CPF06 (0087)	EEPROM Memory Data Error	Illuminated	Fault	50
CPF47	FLASH Memory Data Error	Illuminated	Fault	50
CPyE	Error Writing Data	-	Backup Function Runtime Error	84
CrST	Remove RUN Command to Reset	Flashing	Not an alarm.	67
CSEr	Control Mode Mismatch	-	Backup Function Runtime Error	84
CyC (0033)	MECHATROLINK CommCycleSettingErr	Flashing	Alarm	67
CyPo (0029)	Cycle Power to Accept Changes	Flashing	Alarm	67
dCE1 (041A)	Communication Error1	Illuminated	Fault	50
dCE2 (041B)	Communication Error2	Illuminated	Fault	50
dEv (0011)	Speed Deviation	Flashing	Alarm	67

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

Display (Hex.)	Name	ALM LED	Type	Ref.
dEv (0019)	Speed Deviation	Illuminated	Fault	50
dFPS	Drive Model Mismatch	-	Backup Function Runtime Error	84
dnE (002A)	Drive Disabled	Flashing	Alarm	67
dv7 (005B)	Polarity Judge Timeout	Illuminated	Fault	51
dWA2 (004A)	DriveWorksEZ Alarm 2	Flashing	Alarm	67
dWA3 (004B)	DriveWorksEZ Alarm 3	Flashing	Alarm	67
dWAL (0049)	DriveWorksEZ Alarm	Flashing	Alarm	67
dWF1 (004A)	EEPROM Memory DWEZ Data Error	Illuminated	Fault	51
dWF2 (004B)	DriveWorksEZ Fault 2	Illuminated	Fault	51
dWF3 (004C)	DriveWorksEZ Fault 3	Illuminated	Fault	51
dWFL (0049)	DriveWorksEZ Fault	Illuminated	Fault	51
E5 (0031)	MECHATROLINK Watchdog Timer Err	Flashing	Alarm	67
E5 (0039)	MECHATROLINK Watchdog Timer Err	Illuminated	Fault	51
EF (0007)	FWD/REV Run Command Input Error	Flashing	Alarm	68
EF0 (001A)	Option Card External Fault	Flashing	Alarm	68
EF0 (0027)	Option Card External Fault	Illuminated	Fault	51
EF1 (0042)	External Fault (Terminal S1)	Illuminated	Fault	51
EF1 (0039)	External Fault (Terminal S1)	Flashing	Alarm	68
EF2 (003A)	External Fault (Terminal S2)	Flashing	Alarm	68
EF2 (0043)	External Fault (Terminal S2)	Illuminated	Fault	52
EF3 (0009)	External Fault (Terminal S3)	Flashing	Alarm	68
EF3 (0011)	External Fault (Terminal S3)	Illuminated	Fault	52
EF4 (000A)	External Fault (Terminal S4)	Flashing	Alarm	68
EF4 (0012)	External Fault (Terminal S4)	Illuminated	Fault	52
EF5 (000B)	External Fault (Terminal S5)	Flashing	Alarm	68
EF5 (0013)	External Fault (Terminal S5)	Illuminated	Fault	52
EF6 (000C)	External Fault (Terminal S6)	Flashing	Alarm	69
EF6 (0014)	External Fault (Terminal S6)	Illuminated	Fault	52
EF7 (000D)	External Fault (Terminal S7)	Flashing	Alarm	69
EF7 (0015)	External Fault (Terminal S7)	Illuminated	Fault	52
End1	Excessive Rated Voltage Setting	Flashing	Auto-Tuning Error	80
End2	Iron Core Saturation Coefficient	Flashing	Auto-Tuning Error	80
End3	Rated Current Setting Alarm	Flashing	Auto-Tuning Error	80
End4	Adjusted Slip Calculation Error	Flashing	Auto-Tuning Error	80
End5	Resistance Tuning Error	Flashing	Auto-Tuning Error	80
End6	Leakage Inductance Alarm	Flashing	Auto-Tuning Error	80
End7	No-Load Current Alarm	Flashing	Auto-Tuning Error	80
End8	HFI Alarm	Flashing	Auto-Tuning Error	81
End9	Initial Pole Detection Alarm	Flashing	Auto-Tuning Error	81
EP24v (0081)	External Power 24V Supply	Flashing	Alarm	69
Er-01	Motor Data Error	Flashing	Auto-Tuning Error	81
Er-02	Drive in an Alarm State	Flashing	Auto-Tuning Error	81
Er-03	STOP Button was Pressed	Flashing	Auto-Tuning Error	81

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

Display (Hex.)	Name	ALM LED	Type	Ref.
Er-04	Resistance Tuning Error	Flashing	Auto-Tuning Error	81
Er-05	No-Load Current Alarm	Flashing	Auto-Tuning Error	82
Er-08	Rated Slip Error	Flashing	Auto-Tuning Error	82
Er-09	Acceleration Error	Flashing	Auto-Tuning Error	82
Er-10	Motor Direction Error	Flashing	Auto-Tuning Error	82
Er-11	Motor Speed Error	Flashing	Auto-Tuning Error	82
Er-12	Current Detection Error	Flashing	Auto-Tuning Error	82
Er-13	Leakage Inductance Alarm	Flashing	Auto-Tuning Error	83
Er-14	Motor Speed Error 2	Flashing	Auto-Tuning Error	83
Er-15	Torque Saturation Error	Flashing	Auto-Tuning Error	83
Er-16	Inertia ID Error	Flashing	Auto-Tuning Error	83
Er-17	Reverse Prohibited Error	Flashing	Auto-Tuning Error	83
Er-18	Back EMF Error	Flashing	Auto-Tuning Error	83
Er-19	PM Inductance Error	Flashing	Auto-Tuning Error	83
Er-20	Stator Resistance Error	Flashing	Auto-Tuning Error	83
Er-25	HighFreq Inject Param Tuning Err	Flashing	Auto-Tuning Error	83
Err (001F)	EEPROM Write Error	Illuminated	Fault	53
FbH (0028)	Excessive PID Feedback	Flashing	Alarm	69
FbH (0041)	Excessive PID Feedback	Illuminated	Fault	53
FbL (0027)	PID Feedback Loss	Flashing	Alarm	69
FbL (0028)	PID Feedback Loss	Illuminated	Fault	53
GF (0006)	Ground Fault	Illuminated	Fault	53
HCA (0034)	High Current Alarm	Flashing	Alarm	69
iFEr	Communication Err	-	Backup Function Runtime Error	84
L24v (0021)	Loss of External Power 24 Supply	Flashing	Alarm	70
LF (001C)	Output Phase Loss	Illuminated	Fault	53
LF2 (0036)	Output Current Imbalance	Illuminated	Fault	54
LoG	Log Com Error	Flashing	Alarm	70
LSO (0051)	Low Speed Motor Step-Out	Illuminated	Fault	54
LT-1 (0035)	Cooling Fan Maintenance Time	Flashing	Alarm	70
LT-2 (0036)	Capacitor Maintenance Time	Flashing	Alarm	70
LT-3 (0043)	SoftChargeBypassRelay MainteTime	Flashing	Alarm	70
LT-4 (0044)	IGBT Maintenance Time (50%)	Flashing	Alarm	70
ndAT	Model,VolClass,Capacity Mismatch	-	Backup Function Runtime Error	84
nSE (0052)	Node Setup Error	Illuminated	Fault	54
oC (0007)	Overcurrent	Illuminated	Fault	54
oFA00 (0101)	Option Not Compatible with Port	Illuminated	Fault	56
oFA03 - oFA06 (0104 - 0107)	Option Card Error Occurred at Option Port (CN5)	Illuminated	Fault	56
oFA10, oFA11 (0111, 0112)	Option Card Error Occurred at Option Port (CN5)	Illuminated	Fault	56
oFA12 - oFA17 (0113 - 0118)	Option Card Connection Error (CN5)	Illuminated	Fault	56
oFA30 - oFA43 (0131 - 013E)	Communication Option Card Connection Error (CN5)	Illuminated	Fault	56
oH (0003)	Heatsink Overheat	Flashing	Alarm	70
oH (0009)	Heatsink Overheat	Illuminated	Fault	56

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

Display (Hex.)	Name	ALM LED	Type	Ref.
oH1 (000A)	Heatsink Overheat	Illuminated	Fault	57
oH2 (0004)	External Overheat (H1-XX=B)	Flashing	Alarm	71
oH3 (001D)	Motor Overheat (PTC Input)	Illuminated	Fault	57
oH3 (0022)	Motor Overheat (PTC Input)	Flashing	Alarm	71
oH4 (0020)	Motor Overheat Fault (PTC Input)	Illuminated	Fault	57
oL1 (000B)	Motor Overload	Illuminated	Fault	57
oL2 (000C)	Drive Overload	Illuminated	Fault	58
oL3 (0005)	Overtorque 1	Flashing	Alarm	71
oL3 (000D)	Overtorque Detection 1	Illuminated	Fault	59
oL4 (0006)	Overtorque 2	Flashing	Alarm	71
oL4 (000E)	Overtorque Detection 2	Illuminated	Fault	59
oL5 (003D)	Mechanical Weakening Detection 1	Flashing	Alarm	71
oL5 (0044)	Mechanical Weakening Detection 1	Illuminated	Fault	59
oL7 (002B)	High Slip Braking Overload	Illuminated	Fault	59
oPE01	Drive Capacity Setting Fault	Flashing	Parameter Setting Error	75
oPE02	Parameter Range Setting Error	Flashing	Parameter Setting Error	75
oPE03	Multi-Function Input Setting Err	Flashing	Parameter Setting Error	75
oPE05	Run Cmd/Freq Ref Source Sel Err	Flashing	Parameter Setting Error	76
oPE07	Analog Input Selection Error	Flashing	Parameter Setting Error	77
oPE08	Parameter Selection Error	Flashing	Parameter Setting Error	77
oPE09	PID Control Selection Fault	Flashing	Parameter Setting Error	78
oPE10	V/f Data Setting Error	Flashing	Parameter Setting Error	78
oPE11	Carrier Frequency Setting Error	Flashing	Parameter Setting Error	78
oPE13	Pulse Monitor Selection Error	Flashing	Parameter Setting Error	78
oPE16	Energy Saving Constants Error	Flashing	Parameter Setting Error	78
oPE29	Baud Rate Setting Error	Flashing	Parameter Setting Error	78
oPE33	Digital Output Selection Error	Flashing	Parameter Setting Error	79
oPr (001E)	Keypad Connection Fault	Illuminated	Fault	59
oS (0010)	Overspeed	Flashing	Alarm	72
oS (0018)	Overspeed	Illuminated	Fault	72
ov (0002)	Overvoltage	Flashing	Alarm	72
ov (0008)	Overvoltage	Illuminated	Fault	60
PASS	Modbus Communication Test	Flashing	Not an alarm.	72
PE1 (0047) PE2 (0048)	PLC Faults	Illuminated	Fault	61
PF (0047)	Input Phase Loss	Flashing	Alarm	72
PF (001B)	Input Phase Loss	Illuminated	Fault	61
PWEr	DWEZ Password Mismatch	-	Backup Function Runtime Error	84
rdEr	Error Reading Data	-	Backup Function Runtime Error	85
rF (004E)	Braking Resistor Fault	Illuminated	Fault	61
rH (0010)	Braking Resistor Overheat	Illuminated	Fault	61
rr (000F)	Dynamic Braking Transistor Fault	Illuminated	Fault	62
rUn (001B)	Motor Switch during Run	Flashing	Alarm	73

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

Display (Hex.)	Name	ALM LED	Type	Ref.
SC (0005)	Short Circuit/IGBT Failure	Illuminated	Fault	62
SCF (040F)	Safety Circuit Fault	Illuminated	Fault	62
SE (0020)	Modbus Test Mode Error	Flashing	Alarm	73
SEr (003B)	Speed Search Retries Exceeded	Illuminated	Fault	62
SToF (003B)	Safe Torque OFF	Flashing	Alarm	73
STPo (0037)	Motor Step-Out Detected	Illuminated	Fault	62
TiM (0089)	Keypad Time Not Set	Flashing	Alarm	73
TiM (0401)	Keypad Time Not Set	Illuminated	Fault	63
TrPC (0042)	IGBT Maintenance Time (90%)	Flashing	Alarm	73
UL3 (001E)	Undertorque Detection 1	Flashing	Alarm	73
UL3 (0029)	Undertorque Detection 1	Illuminated	Fault	63
UL4 (001F)	Undertorque Detection 2	Flashing	Alarm	73
UL4 (002A)	Undertorque Detection 2	Illuminated	Fault	63
UL5 (003E)	Mechanical Weakening Detection 2	Flashing	Alarm	73
UL5 (0045)	Mechanical Weakening Detection 2	Illuminated	Fault	63
Uv (0001)	DC Bus Undervoltage	Flashing	Alarm	74
Uv1 (0002)	DC Bus Undervoltage	Illuminated	Fault	63
Uv2 (0003)	Control Power Undervoltage	Illuminated	Fault	64
Uv3 (0004)	Soft Charge Answerback Fault	Illuminated	Fault	64
vAEr	Voltage Class, Capacity Mismatch	-	Backup Function Runtime Error	85
vFyE	Parameters do not Match	-	Backup Function Runtime Error	85

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 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: - The drive detects this error when you use the Bluetooth LCD keypad and operate the drive with 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	BrakingTransistor Overload Fault	The duty cycle of the braking transistor is high (the regeneration power or repetition frequency is high).	- 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 TransistorProtection Selection = Disable].
		The braking transistor in the drive is broken.	Replace the 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.	- Repair short circuits and connect cables. - Replace the defective communications cable.
		Electrical interference caused a communication data error.	- 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: - 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	Serial 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.	- Repair short circuits and connect cables. - Replace the defective communications cable.

Code	Name	Causes	Possible Solutions
		Electrical interference caused a communication data error.	- 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: - The drive detects this error if it does not correctly receive control data for the <i>CE</i> detection time set to <i>H5-09 [CE Detection Time]</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>H5-04 [Communication Error Stop Method]</i>.			
Code	Name	Causes	Possible Solutions
CF	Control Fault	Motor parameters are set incorrectly	Correctly set the motor parameters and do Auto-Tuning again.
		The torque limit setting is too low.	Adjust <i>L7-01</i> to <i>L7-04 [Torque Limit]</i> .
		The load inertia is too large.	- Adjust <i>C1-02</i>, <i>C1-04</i>, <i>C1-06</i>, and <i>C1-08 [Deceleration Times]</i>. - 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 <i>b1-03 [Stopping Method Selection]</i> .
		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.	- 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</i> = Enabled].
Note: - 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).	- Make a sequence that does not restart operation when induced voltage stays in the motor. - Set <i>b3-01</i> = 1 [<i>Speed Search at Start Selection</i> = Enabled]. - Use <i>Speed Search from Fmax or Fref [H1-xx = 61, 62]</i> to do a speed search through one of the external terminals. Note: When controlling the PM motor, External Speed Search commands 1 and 2 operate the same.
		A drive hardware problem occurred.	Replace the drive.
Note: - The drive detects this error if the current offset value is more than the permitted setting range while the drive automatically adjusts the current offset. - Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
CP1	Comparator 1 Limit Error	The monitor value set in <i>H2-20 [Comparator 1 Monitor Selection]</i> was in the range of <i>H2-21 [Comparator 1 Lower Limit]</i> and <i>H2-22 [Comparator 1 Upper Limit]</i> .	Examine the monitor value and remove the cause of the fault.
Note: - The drive detects this error when <i>H2-01</i> to <i>H2-03</i> = 66 [<i>MFDO Function Selection</i> = <i>Comparator1</i>]. - Do a Fault Reset to clear the fault. - Set the stopping method for this fault in <i>H2-33 [Comparator1 Protection Selection]</i>.			
Code	Name	Causes	Possible Solutions
CP2	Comparator 2 Limit Error	The monitor value set in <i>H2-26 [Comparator 2 Monitor Selection]</i> was outside the range of <i>H2-27 [Comparator 2 Lower Limit]</i> and <i>H2-28 [Comparator 2 Upper Limit]</i> .	Examine the monitor value and remove the cause of the fault.
Note: - The drive detects this error when <i>H2-01</i> to <i>H2-03</i> = 67 [<i>MFDO Function Selection</i> = <i>Comparator2</i>]. - Do a Fault Reset to clear the fault. - Set the stopping method for this fault in <i>H2-35 [Comparator2 Protection Selection]</i>.			

2.4 Fault

Code	Name	Causes	Possible Solutions
CPF00, CPF01, CPF02, CPF03, CPF08, CPF11 - CPF14, CPF16 - CPF24, CPF38	Control Circuit Error	A drive hardware problem occurred.	- 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: - Do a Fault Reset to clear the fault. - Fault trace is not available for these faults.			
Code	Name	Causes	Possible Solutions
CPF06	EEPROM Memory Data Error	The drive power supply was de-energized while a communication option card entered a parameter Write command.	Set <i>A1-03 = 2220, 3330</i> [<i>Initialize Parameters = 2-Wire Initialization, 3-Wire Initialization</i>] and initialize the drive.
		An EEPROM peripheral circuit error occurred.	- 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: - The drive detects this error if there is an error in the data written to the EEPROM of the drive. - Do a Fault Reset to clear the fault. - Fault trace is not available for this fault.			
Code	Name	Causes	Possible Solutions
CPF25	Terminal Board not Connected	The terminal board is not correctly connected to the drive.	- De-energize the drive. - Correctly connect the terminal board to the drive. - Re-energize the drive.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
CPF47	FLASH Memory Data Error	There was a FLASH memory data write error.	- Write the Device Object Name or Location fields again. - If the fault stays, replace the control board or the drive.
Note: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
dCE1	Communication Error1	A drive hardware problem occurred temporarily due to noise.	- Remove the cause of the noise. - If the fault stays, replace the control board or the drive.
Note: - Do a Fault Reset to clear the fault. - Fault trace is not available for these faults.			
Code	Name	Causes	Possible Solutions
dCE2	Communication Error2	A drive hardware problem occurred temporarily due to noise.	- Remove the cause of the noise. - If the fault stays, replace the control board or the drive.
Note: - 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</i> to <i>C1-08</i> [<i>Acceleration/Deceleration Time</i>].
		The <i>dEv</i> detection level settings are incorrect.	Adjust <i>F1-10</i> [<i>Speed Deviation Detection Level</i>] and <i>F1-11</i> [<i>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: - 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</i> [<i>Speed Deviation Detection Select</i>].			

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: - 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.	- 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</i> [<i>Initialize Parameters = 2-Wire Initialization, 3-Wire Initialization</i>] to initialize the drive, then upload the DriveWorksEZ project to the drive again.
Note: - 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: - MECHATROLINK-II Installation Guide (MECHATROLINK Members Association, manual number MMATDEP011) - MECHATROLINK-III Installation Manual (MECHATROLINK Members Association, publication number MMATDEP018)
Note: - 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</i> [<i>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.	- 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: - 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</i> [<i>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.	- 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 S1.
		<i>External Fault</i> [<i>H1-01 = 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.			

2.4 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.
		External Fault [H1-02 = 20 to 2B] 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.
		External Fault [H1-03 = 20 to 2B] 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.
		External Fault [H1-04 = 20 to 2B] 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.
		External Fault [H1-05 = 20 to 2B] 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.
		External Fault [H1-06 = 20 to 2B] 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.	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.
		External Fault [H1-07 = 20 to 2B] 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
Err	EEPROM Write Error	There was a problem with the EEPROM hardware.	- 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.	- Push ENTER Key. - Set the parameters again.
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</i> [<i>PID High Feedback Detection Lvl</i>] and <i>b5-37</i> [<i>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: - 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</i> [<i>Feedback Loss Detection Select</i>].			
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: - 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.	- 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.	- 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: - 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
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.

2.4 Fault

Code	Name	Causes	Possible Solutions
		The output transistor in the drive is damaged.	- 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: - 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 [Output Phase Loss Protection Sel]</i> to enable and disable <i>LF</i> detection.			
Code	Name	Causes	Possible Solutions
LF2	Output Current Imbalance	Phase loss occurred 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 output terminal screws of the drive are loose.	Tighten the terminal screws to the correct tightening torque.
		There is not balance between the three phases of the PM motor impedance.	- 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.
		The drive output circuit is broken.	- 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: - 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.	- Set <i>E5-01 [IPM Motor Code Selection]</i> correctly as specified by the motor. - For specialized motors, refer to the motor test report and set <i>E5-xx</i> correctly.
		The load is too large.	- 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.	- Set <i>b3-01 = 1 [Speed Search at Start Selection = Enabled]</i>. - If the value for <i>U6-57 [PolePolarityDeterVal]</i> is lower than 819, increase the value set in <i>n8-84 [Polarity Detection Current]</i>. Consult the motor manufacturer for information about maximum setting values.
		The setting of <i>n8-84 [Polarity Detection Current]</i> 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 <i>L8-93 [Low Speed Pull-out DetectionTime]</i> , <i>L8-94 [Low Speed Pull-out Detect Level]</i> , and <i>L8-95 [Low Speed Pull-out Amount]</i> .	Increase the values set in <i>L8-93</i> to <i>L8-95</i> .
		The drive incorrectly detected the motor magnetic pole position.	If you are using an IPM motor, do High Frequency Injection Auto-Tuning.
Note: - The drive detects this fault if it detects step-out while running at low speed. - Do a Fault Reset to clear the fault. <i>LSo</i> 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 <i>L8-93</i> to <i>L8-95</i> to a range in which the drive does not malfunction.			
Code	Name	Causes	Possible Solutions
nSE	Node Setup Error	The <i>H1-xx = 47 [Node Setup (CANopen)]</i> 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: Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oC	Overcurrent	The load is too heavy.	- 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.

Code	Name	Causes	Possible Solutions
		The motor main circuit cable is contacting ground to make a short circuit.	- 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.	- 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.	- 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 [Acceleration Times]</i> to get the necessary torque. - Increase the values set in <i>C2-01</i> to <i>C2-04 [S-Curve Characteristics]</i> to 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.	- 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.	- 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>.
		The torque compensation gain is too large.	Decrease the value set in <i>C4-01 [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.	- Find the time when the fault occurs. - If the fault occurs at the same time as an overexcitation operation, decrease <i>n3-13 [OverexcitationBraking (OEB) Gain]</i> and consider the motor flux saturation.
		The drive received a Run command while the motor was coasting.	- 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.	- Enter the correct motor code to <i>E5-01 [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 [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.	- Set <i>E5-xx [PM Motor Parameters]</i> correctly or do Rotational Auto-Tuning. - Decrease the value of <i>n8-41 [HFI P Gain]</i> in 0.5-unit increments. Note: Set <i>n8-41</i> > 0.0 for an ordinary IPM motor.
		The control method is set incorrectly for the motor.	Set <i>A1-02 [Control Method Selection]</i> correctly.
		The motor main circuit cable is too long.	- Replace the drive with a larger capacity model. - Decrease <i>C6-02 [Carrier Frequency]</i>. Or set <i>C6-02</i> = B.
		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.	- Decrease <i>n3-13 [OverexcitationBraking (OEB) Gain]</i>. - Decrease <i>n3-21 [HSB Current Suppression Level]</i>.		
Note: - 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.			

2.4 Fault

Code	Name	Causes	Possible Solutions
oC2	Overcurrent2	When <i>A1-02</i> = 5, 6, 8 [<i>Control Method Selection</i> = <i>OLV/PM, AOLV/PM, or EZOLV</i>], the output current is more than the value set in <i>L8-27</i> [<i>Overcurrent Detection Gain</i>].	Correct the value set in <i>L8-27</i> .
Note: - 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 is not compatible.	Connect a correct option.
Note: - 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	You changed the option card connected to connector CN5 during operation.	- De-energize the drive. - 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
oFA03 to oFA06	Option Card Error Occurred at Option Port (CN5)	A fault occurred in the option card.	- 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
oFA10, oFA11	Option Card Error Occurred at Option Port (CN5)	A fault occurred in the option card.	- 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
oFA12 to oFA17	Option Card Connection Error (CN5)	A fault occurred in the option card.	- 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
oFA30 to oFA43	Communication Option Card Connection Error (CN5)	A fault occurred in the option card.	- 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
oH	Heatsink Overheat	The ambient temperature is high and the heatsink temperature of the drive is more than the value set in <i>L8-02</i> [<i>Overheat Alarm Level</i>].	- 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.	- Measure the output current. - Decrease the load. - Decrease the value set in <i>C6-02</i> [<i>Carrier Frequency Selection</i>].
		The internal cooling fan of the drive stopped.	- Use the procedures in this manual to replace the cooling fan. - Set <i>o4-03</i> = 0 [<i>Fan Operation Time Setting</i> = 0 h].
Note: - The drive detects this fault if the heatsink temperature of the drive is more than the value set in <i>L8-02</i>. - 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>L8-03</i> [<i>Overheat Pre-Alarm Selection</i>].			

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.	• 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.	• Measure the output current. • Decrease the load. • Decrease the value set in <i>C6-02</i> [<i>Carrier Frequency Selection</i>].
Note: • 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.	• 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: • When <i>H3-02</i> or <i>H3-10</i> = <i>E</i> [<i>MFAI Function Select</i> = <i>Motor Temperature (PTC Input)</i>], the drive detects this fault if the motor overheat signal input from analog input terminal A1 or A2 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.	• 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: • The drive detects this fault if the motor overheat signal in analog input terminals A1, or A2 is more than the Fault detection level. (If <i>H3-02</i>, <i>H3-10</i>= <i>E</i> [<i>Terminal A1/A2 Function Select</i> = <i>Motor Temperature (PTC Input)</i>].) • Do a Fault Reset to clear the fault.			
Code	Name	Causes	Possible Solutions
oL1	Motor Overload	The load is too large.	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.	• 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.	- 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. Note: For general-purpose motors, overload can occur while running at low speed when operating at below the rated current.
		<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.	- 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>. 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.
		<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 match.	- 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.	- Lower the value set in <i>n3-13 [OverexcitationBraking (OEB) Gain]</i>. - Set <i>L3-04</i> $\neq$ 4 [<i>Stall Prevention during Decel $\neq$ Overexcitation/ High Flux</i>]. - Set <i>n3-23</i> = 0 [<i>Overexcitation Braking Operation = Disabled</i>].
		The speed search-related parameters are set incorrectly.	- 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.
		The motor main circuit cable is too long.	- Replace the drive with a larger capacity model. - Decrease <i>C6-02 [Carrier Frequency]</i>. Or set <i>C6-02</i> = B.
		Note: - 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.	- 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.	- 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>. 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.
		The drive capacity is too small.	Replace the drive with a larger capacity model.
		Overload occurred while running at low speed.	- 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>.
		The torque compensation gain is too large.	Decrease the value set in <i>C4-01 [Torque Compensation Gain]</i> to make sure that the motor does not stall.

Code	Name	Causes	Possible Solutions
		The speed search-related parameters are set incorrectly.	- Examine the settings for all speed search-related parameters. - Adjust <i>b3-03</i> [<i>Speed Search Deceleration Time</i>]. - Set <i>b3-24</i> = 1 [<i>Speed Search Method Selection</i> = <i>Speed Estimation</i>] after Auto-Tuning.
		Phase loss in the input power supply is causing the output current to change.	- 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.	- 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>].
Note: - 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. <i>L5-07</i> [<i>Fault Reset Enable Select Grp1</i>] 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 <i>L6-02</i> [<i>Torque Detection Level 1</i>] and <i>L6-03</i> [<i>Torque Detection Time 1</i>] settings.
Note: - The drive detects this fault if the drive output current is more than the level set in <i>L6-02</i> for longer than <i>L6-03</i>. - 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>L6-01</i> [<i>Torque Detection Selection 1</i>]. <i>L5-07</i> [<i>Fault Reset Enable Select Grp1</i>] 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 <i>L6-05</i> [<i>Torque Detection Level 2</i>] and <i>L6-06</i> [<i>Torque Detection Time 2</i>] settings.
Note: - The drive detects this fault if the drive output current is more than the level set in <i>L6-05</i> for longer than <i>L6-06</i>. - 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>L6-04</i> [<i>Torque Detection Selection 2</i>]. <i>L5-07</i> [<i>Fault Reset Enable Select Grp1</i>] 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 <i>L6-08</i> [<i>Mechanical Fatigue Detect Select</i>].	Do a deterioration diagnostic test on the machine side.
Note: - 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>L6-08</i>.			
Code	Name	Causes	Possible Solutions
oL7	High Slip Braking Overload	The load inertia is too large.	- Decrease deceleration times in <i>C1-02</i>, <i>C1-04</i>, <i>C1-06</i>, and <i>C1-08</i> [<i>Deceleration Times</i>] 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.	
		The value set in <i>n3-04</i> [<i>HSB Overload Time</i>] is too small.	- Increase the value set in <i>n3-04</i>. - Connect a thermal overload relay to the motor, and set <i>n3-04</i> = 1200 s (<i>maximum value</i>).
Note: - The drive detects this fault if the output frequency is constant for longer than <i>n3-04</i>. - Do a Fault Reset to clear the 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.	- Remove the keypad and then reconnect it. - Replace the cable if damaged.
Note: - The drive detects this fault if these conditions are correct: <i>o2-06</i> = 1 [<i>Keypad Disconnect Detection</i> = <i>Enabled</i>]. <i>b1-02</i> = 0 [<i>Run Command Selection 1</i> = <i>Keypad</i>], or the drive is operating in LOCAL Mode with the keypad. - Do a Fault Reset to clear the fault.			

2.4 Fault

Code	Name	Causes	Possible Solutions
oS	Overspeed	There is overshoot.	- Decrease <i>C5-01 [ASR Proportional Gain 1]</i> and increase <i>C5-02 [ASR Integral Time 1]</i>. - Use <i>H6-02 to H6-05 [Pulse Train Input Setting Parameters]</i> to adjust the pulse train gain.
		There is an incorrect number of PG pulses set in the drive.	Set <i>H6-02 [Terminal RP Frequency Scaling]</i> to the pulse train frequency during 100% reference (maximum motor rotation speed).
		The <i>oS</i> detection level is set incorrectly.	Adjust <i>F1-08 [Overspeed Detection Level]</i> and <i>F1-09 [Overspeed Detection Delay Time]</i> .
		If the drive detects the fault at start or in the low speed range (10% or less) and <i>n8-57 = 1 [HFI Overlap Selection = Enabled]</i> for PM Control methods, the high frequency injection gain is too high.	- Set <i>E5-xx [PM Motor Parameters]</i> correctly or do Rotational Auto-Tuning. - Decrease the value of <i>n8-41 [HFI P Gain]</i> in 0.5 unit increments. Note: Set <i>n8-41 > 0.0</i> for IPM motors.
Note: - The drive detects this fault if the motor speed is more than the value set in <i>F1-08</i> for longer than <i>F1-09</i>. - 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>F1-03 [Overspeed Detection Selection]</i>.			
Code	Name	Causes	Possible Solutions
ov	Overvoltage	The deceleration time is too short and too much regenerative energy is flowing back into the drive.	- Increase the values set in <i>C1-02, C1-04, C1-06, or C1-08 [Deceleration Times]</i>. - Connect a dynamic braking option to the drive. - Perform Deceleration Rate Tuning.
		The acceleration time is too short.	- Make sure that sudden drive acceleration does not cause the fault. - Increase the values set in <i>C1-01, C1-03, C1-05, or C1-07 [Acceleration Times]</i>. - Increase the value set in <i>C2-02 [S-Curve Time @ End of Accel]</i>. - Set <i>L3-11 = 1 [Overvoltage Suppression Select = Enabled]</i>.
		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).	- Examine the motor main circuit cable, terminals, and motor terminal box, and then remove ground faults. - Re-energize the drive.
		The speed search-related parameters are set incorrectly (this fault also occurs during recovery from momentary power loss and after Auto Restarts).	- Examine the settings for all speed search related parameters. - Set <i>b3-19 ≠ 0 [Speed Search Restart Attempts ≠ 0 times]</i>. - Adjust <i>b3-03 [Speed Search Deceleration Time]</i>. - Do Stationary Auto-Tuning for Line-to-Line Resistance and then set <i>b3-24 = 1 [Speed Search Method Selection = Speed Estimation]</i>.
		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.
		Electrical interference caused a drive malfunction.	- 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.	- 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.
		The Short Circuit Braking function used in OLV/PM control method.	Connect a braking resistor to the drive.
		There is motor hunting.	- 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>.

Code	Name	Causes	Possible Solutions
		Speed search does not complete at start when you set <i>A1-02 = 8 [EZOLV]</i> and use an induction motor.	When <i>E9-01 = 0 [Motor Type Selection = Induction (IM)]</i> , set <i>b3-24 = 2 [Speed Search Method Selection = Current Detection Speed Search]</i> .
Note: - 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. - 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. <i>L5-08 [Fault Reset Enable Select Grp2]</i> disables the Auto Restart function.			
Code	Name	Causes	Possible Solutions
PE1, PE2	PLC Faults	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.	- 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.	- 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.	- 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: - 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 holding brake is stopping the motor.	Release the holding brake.
Note: - 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
rF	Braking Resistor Fault	The resistance of the dynamic braking option connected to the drive is too low.	Use a dynamic braking option that fits the model and duty rating of the drive.
		A regenerative converter or regenerative unit is connected to the drive.	Set <i>L8-55 = 0 [Internal DB Transistor Protection = Disable]</i> .
Note: Do a Fault Reset to clear the fault.			
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.	- Check the load level, deceleration time, and speed. - Decrease the load. - Increase the values set in <i>C1-02</i>, <i>C1-04</i>, <i>C1-06</i>, or <i>C1-08 [Deceleration Times]</i>. - Use a dynamic braking option that lets you use more power.
		The duty cycle is too high.	Examine the duty cycle. Note: When <i>L8-01 = 1 [3% ERF DB Resistor Protection = Enabled]</i> , the maximum braking duty cycle is 3%.
		The braking load is too heavy.	- Calculate the braking load and braking power again, and decrease the braking load. - Use a braking resistor that improves braking power.

2.4 Fault

Code	Name	Causes	Possible Solutions
		The braking resistor is not sufficient.	Use the braking resistor specifications to select a sufficient braking resistor.
Note: • 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
rr	Dynamic Braking Transistor Fault	The drive control circuit is damaged.	• 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: Do a Fault Reset to clear the fault.			
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.	• 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.	• 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 <i>A1-02</i> = 5, 6 [<i>Control Method Selection</i> = <i>OLV/PM</i> or <i>AOLV/PM</i>], the output current is more than the value set in <i>L8-27</i> [<i>Overcurrent Detection Gain</i>].	Set <i>L8-27</i> correctly.
Note: • 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.	• Decrease the value set in <i>b3-10</i> [<i>Speed Estimation Detection Gain</i>]. • Increase the value set in <i>b3-17</i> [<i>Speed Est Retry Current Level</i>]. • Increase the value set in <i>b3-18</i> [<i>Speed Est Retry Detection Time</i>]. • Do Auto-Tuning again.
		The motor is coasting in the opposite direction of the Run command.	Set <i>b3-14</i> = 1 [<i>Bi-directional Speed Search</i> = <i>Enabled</i>].
Note: • The drive detects this error if the number of speed search restarts is more than the value set in <i>b3-19</i> [<i>Speed Search Restart Attempts</i>]. • 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.	• Set <i>E5-01</i> [<i>PM Motor Code Selection</i>] correctly as specified by the motor. • For specialized motors, refer to the motor test report and set <i>E5-xx</i> correctly.
		The load is too large.	• Increase the value set in <i>n8-55</i> [<i>Motor to Load Inertia Ratio</i>]. • Increase the value set in <i>n8-51</i> [<i>Pull-in Current @ Acceleration</i>]. If the drive detects <i>STPo</i> during deceleration when increasing the value set in <i>n8-51</i>, set the value of <i>n8-79</i> [<i>Pull-in Current @ Deceleration</i>] lower than <i>n8-51</i>. • Decrease the load. • Replace the drive and motor with larger capacity models.
		The load inertia is too large.	Increase the value set in <i>n8-55</i> .

Code	Name	Causes	Possible Solutions
		The acceleration/deceleration times are too short.	• Increase the values set in <i>C1-01 to C1-08 [Acceleration/Deceleration Times]</i>. • Increase the value set in <i>C2-01 [S-Curve Time @ Start of Accel]</i>.
		Speed response is too slow.	Increase the value set in <i>n8-55</i> .
Note: 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: • Do a Fault Reset to clear the fault. • Parameter <i>o4-24 [bAT Detection Selection]</i> enables and disables <i>TiM</i> detection.			
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 <i>L6-02 [Torque Detection Level 1]</i> and <i>L6-03 [Torque Detection Time 1]</i> settings.
Note: • The drive detects this error if the drive output current is less than the level set in <i>L6-02</i> for longer than <i>L6-03</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>L6-01 [Torque Detection Selection 1]</i> .			
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 <i>L6-05 [Torque Detection Level 2]</i> and <i>L6-06 [Torque Detection Time 2]</i> settings.
Note: • The drive detects this error if the drive output current is less than the level set in <i>L6-05</i> for longer than <i>L6-06</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>L6-04 [Torque Detection Selection 2]</i> .			
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 <i>L6-08 [Mechanical Fatigue Detect Select]</i> .	Examine the machine for deterioration.
Note: • 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>L6-08</i> .			
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.	• 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 <i>U4-05 [CapacitorMaintenance]</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.
		The relay or contactor on the soft-charge bypass relay is damaged.	<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 board, contact Yaskawa or your nearest sales representative.
Note: • The drive detects this error if the DC bus voltage decreases below the level set in <i>L2-05 [Undervoltage Detection Lvl (Uv1)]</i> while the drive is running. • The <i>Uv1</i> 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 <i>E1-01 [Input AC Supply Voltage]</i> < 400. • Do a Fault Reset to clear the fault. • Fault trace is not available for this fault. • <i>L5-08 [Fault Reset Enable Select Grp2]</i> disables the Auto Restart function.			

2.4 Fault

Code	Name	Causes	Possible Solutions
Uv2	Control Power Undervoltage	The value set in <i>L2-02 [Power Loss Ride Through Time]</i> 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.	• 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: • 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	The relay or contactor on the soft-charge bypass relay is damaged.	• Re-energize the drive. • If the fault stays, replace the control board or the drive. • Check 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.
Note: • 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.	- 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 Selection = 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: - 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>o4-24 [bAT Detection Selection]</i> enables and disables <i>bAT</i> detection.			
Code	Name	Causes	Possible Solutions
bb	Baseblock	An external baseblock command was entered through MFDI terminal S1 to S7, 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 or nearer to the keypad depending on the specifications of the smartphone or tablet.
		Radio waves from a different device are causing interference with the communication 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: - The drive detects this error when you operate the drive with a smartphone or tablet with a Bluetooth LCD Keypad. - If the drive detects this error, the terminal assigned to <i>H2-01 to H2-03 = 10 [MFDO Function Select = 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).	- 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 Selection = Disable]</i> .
		The braking transistor in the drive is broken.	Replace the drive.
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
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.	- Repair short circuits and connect cables. - Replace the defective communications cable.
		Electrical interference caused a communication data error.	- 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.

2.5 Minor Faults/Alarms

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 <i>H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]</i> will activate. • If the drive detects this error, it will operate the motor as specified by the stopping method set in <i>F6-01 [Communication Error Selection]</i>.			
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.	• 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.
		The communications circuitry is damaged.	• Do a self-diagnostics check. • If the problem continues, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
		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 set to <i>H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]</i> will activate.			
Code	Name	Causes	Possible Solutions
CE	Serial 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.	• Repair short circuits and connect cables. • Replace the defective communications cable.
		Electrical interference caused a communication data error.	• 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.	• Examine the values set in <i>H5-xx</i>. • Examine the settings on the controller side and correct the difference in communication conditions.
		The value set in <i>H5-09 [CE Detection Time]</i> is too small for the communications cycle.	• Change the controller software settings. • Increase the value set in <i>H5-09</i>.
		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 <i>CE</i> detection time set to <i>H5-09</i>. • If the drive detects this error, the terminal set to <i>H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]</i> will activate. • If the drive detects this error, it will operate the motor as specified by the stopping method set in <i>H5-04 [Communication Error Stop Method]</i>.			
Code	Name	Causes	Possible Solutions
CP1	Comparator 1 Limit Error	The monitor value set in <i>H2-20 [Comparator 1 Monitor Selection]</i> was in the range of <i>H2-21 [Comparator 1 Lower Limit]</i> and <i>H2-22 [Comparator 1 Upper Limit]</i> .	Examine the monitor value and remove the cause of the fault.
Note: • The drive detects this error when the terminal is assigned to <i>H2-01 to H2-03 = 66 [MFDO Function Select = Comparator1]</i>. • 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>H2-33 [Comparator1 Protection Selection]</i> enables and disables <i>CP1</i> detection.			
Code	Name	Causes	Possible Solutions
CP2	Comparator 2 Limit Error	The monitor value set in <i>H2-26 [Comparator 2 Monitor Selection]</i> was outside the range of <i>H2-27 [Comparator 2 Lower Limit]</i> and <i>H2-28 [Comparator 2 Upper Limit]</i> .	Examine the monitor value and remove the cause of the fault.
Note: • The drive detects this error when the terminal is assigned to <i>H2-01 to H2-03 = 67 [MFDO Function Select = Comparator2]</i>. • 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>H2-35 [Comparator2 Protection Selection]</i> enables and disables <i>CP2</i> 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 <i>H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]</i> will activate.			
Code	Name	Causes	Possible Solutions
CyPo	Cycle Power to Accept Changes	Although <i>F6-15 = 1 [Comm. Option Parameters Reload = Reload Now]</i> , 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 large.	Decrease the load.
		The acceleration/deceleration times are too short.	Increase the values set in <i>C1-01 to C1-08 [Acceleration/Deceleration Times]</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: • 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>. • If the drive detects this error, the terminal set to <i>H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]</i> will activate. • If the drive detects this error, it 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
dnE	Drive Disabled	A terminal set for <i>H1-xx = 6A [Drive Enable]</i> turned OFF.	Examine the operation sequence.
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
dWA2	DriveWorksEZ Alarm 2	There was an error in the DriveWorksEZ program.	Examine the DriveWorksEZ program and remove the cause of the fault. This is not a drive fault.
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
dWA3	DriveWorksEZ Alarm 3	There was an error in the DriveWorksEZ program.	Examine the DriveWorksEZ program and remove the cause of the fault. This is not a drive fault.
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
dWAL	DriveWorksEZ Alarm	There was an error in the DriveWorksEZ program.	Examine the DriveWorksEZ program and remove the cause of the fault. This is not a drive fault.
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
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: • MECHATROLINK-II Installation Guide (MECHATROLINK Members Association, manual number MMATDEP011) • MECHATROLINK-III Installation Manual (MECHATROLINK Members Association, publication number MMATDEP018)
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. • If the drive detects this error, it will operate the motor as specified by the stopping method set in <i>F6-25 [MECHATROLINK Watchdog Error Sel]</i>.			

2.5 Minor Faults/Alarms

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: - 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.
		A programming error occurred on the controller side.	Examine the operation of the controller program.
Note: - The drive detects this error if the alarm function on the external device side is operating. - If the drive detects this error, the terminal set to <i>H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]</i> will activate. - If the drive detects this error, it will operate the motor as specified by the stopping method set 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: If the drive detects this error, the terminal assigned to <i>H2-01 to H2-03 = 10 [MFDO Function Select = Alarm]</i> will activate.			
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: If the drive detects this error, the terminal assigned to <i>H2-01 to H2-03 = 10 [MFDO Function Select = Alarm]</i> will activate.			
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: If the drive detects this error, the terminal assigned to <i>H2-01 to H2-03 = 10 [MFDO Function Select = Alarm]</i> will activate.			
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 [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 activate.			
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 activate.			

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.
		External Fault [H1-06 = 2C to 2F] 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 H2-01 to H2-03 = 10 [MFDO Function Select = Alarm] will activate.			
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.
		External Fault [H1-07 = 2C to 2F] 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 H2-01 to H2-03 = 10 [MFDO Function Select = Alarm] will activate.			
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.	- Examine the main circuit power supply. - Turn ON the main circuit power supply to run the drive.
Note: - Set o2-26 [Ext. Power 24V Supply Display] to enable or disable EP24v detection. - The drive will not output an alarm signal for this alarm.			
Code	Name	Causes	Possible Solutions
FbH	Excessive PID Feedback	The FbH detection level is set incorrectly.	Adjust b5-36 [PID High Feedback Detection Lvl] and b5-37 [PID High Feedback 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 board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: - The drive detects this error if the PID feedback input is more than the level set in b5-36 for longer than b5-37. - If the drive detects this error, the terminal set to H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm] will activate. - If the drive detects this error, it will operate the motor as specified by the stopping method set in b5-12 [Feedback Loss Detection Select].			
Code	Name	Causes	Possible Solutions
FbL	PID Feedback Loss	The FbL detection level is set incorrectly.	Adjust b5-13 [PID Feedback Loss Detection Lvl] and b5-14 [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 board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: - The drive detects this error if the PID feedback input is lower than the level set in b5-13 for longer than b5-14. - If the drive detects this error, the terminal set to H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm] will activate. - If the drive detects this error, it will operate the motor as specified by the stopping method set in b5-12 [Feedback Loss Detection Select].			
Code	Name	Causes	Possible Solutions
HCA	High Current Alarm	The load is too heavy.	- Decrease the load for applications with repetitive starts and stops. - Replace the drive with a larger capacity model.
		The acceleration time is too short.	- 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] until you get the necessary torque. - Increase the values set in C2-01 to C2-04 [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.	- 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.

2.5 Minor Faults/Alarms

Code	Name	Causes	Possible Solutions
		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: • 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 set to <i>H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]</i> will activate.			
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.	• 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: • Set <i>o2-23 [External 24V Powerloss Detection]</i> 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 in the keypad.	Put a micro SD card in the keypad.
		• 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. • A communication error between the keypad and drive occurred during a log communication.	Set <i>o5-01 = 0 [Log Start/Stop Selection = OFF]</i> .
Note: If the drive detects this error, the terminal assigned to <i>H2-01 to H2-03 = 6A [MFDO Function Select = Data Logger Error]</i> will be ON.			
Code	Name	Causes	Possible Solutions
LT-1	Cooling Fan Maintenance Time	The cooling fan is at 90% of its expected performance life.	1. Use the procedures in this manual to replace the cooling fan. 2. Set <i>o4-03 = 0 [Fan Operation Time Setting = 0 h]</i> to reset the cooling fan operation time.
Note: When the estimated performance life is expired, the terminal assigned to <i>H2-01 to H2-03 = 2F [MFDO Function Select = Maintenance Notification]</i> will be ON.			
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 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 <i>H2-01 to H2-03 = 2F [MFDO Function Select = Maintenance Notification]</i> 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 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 <i>H2-01 to H2-03 = 2F [MFDO Function Select = Maintenance Notification]</i> 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 <i>H2-01 to H2-03 = 2F [MFDO Function Select = Maintenance Notification]</i> will be ON.			
Code	Name	Causes	Possible Solutions
oH	Heatsink Overheat	The ambient temperature is high and the heatsink temperature is more than the <i>L8-02 [Overheat Alarm Level]</i> .	• 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.	• 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.

Code	Name	Causes	Possible Solutions
		The internal cooling fan or fans have stopped.	1. Use the procedures in this manual to replace the cooling fan. 2. Set $\alpha 4-03 = 0$ [Fan Operation Time Setting = 0 h].
Note: 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 set to H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm] will activate. If the drive detects this error, it will operate the motor as specified by the stopping method set in L8-03 [Overheat Pre-Alarm Selection].			
Code	Name	Causes	Possible Solutions
oH2	External Overheat (H1-XX=B)	An external device sent an oH2.	1. Find the external device that output the overheat alarm. 2. Remove the cause of the problem. 3. Clear the Overheat Alarm (oH2) [H1-xx = B] set to MFDI terminals S1 to S7.
Note: If the drive detects this error, the terminal set to H2-01 to H2-03 = 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
		The motor has overheated.	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]. Note: If the values set in E1-08 and E1-10 are too low, the overload tolerance will decrease at low speeds.
Note: The drive detects this fault if the motor overheat signal input from analog input terminal A1 or A2 is more than the fault detection level. If the drive detects this error, the terminal set to H2-01 to H2-03 = 10 [MFDO Function Selection = 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].
Note: 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 set to H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm] will activate. 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].
Note: 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 set to H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm] will activate. 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.
Note: If the drive detects this error, the terminal set to H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm] will activate. If the drive detects this error, it will operate the motor as specified by the Stopping Method set in L6-08.			

2.5 Minor Faults/Alarms

Code	Name	Causes	Possible Solutions
oS	Overspeed	There is overshoot.	- Decrease <i>C5-01 [ASR Proportional Gain 1]</i> and increase <i>C5-02 [ASR Integral Time 1]</i>. - Use <i>H6-02 to H6-05 [Pulse Train Input Setting Parameters]</i> to adjust the pulse train gain.
		There is an incorrect number of PG pulses set in the drive.	Set <i>H6-02 [Terminal RP Frequency Scaling]</i> to the pulse train frequency during 100% reference (maximum motor rotation speed).
		The <i>oS</i> detection level is set incorrectly.	Adjust <i>F1-08 [Overspeed Detection Level]</i> and <i>F1-09 [Overspeed Detection Delay Time]</i> .
Note: - The drive detects this error if the motor speed is more than the value set in <i>F1-08</i> for longer than <i>F1-09</i>. - If the drive detects this error, the terminal set to <i>H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]</i> will activate. - If the drive detects this error, it will operate the motor as specified by the stopping method set in <i>F1-03 [Overspeed Detection Selection]</i>.			
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).	- Examine the motor main circuit cable, terminals, and motor terminal box, and then remove ground faults. - 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.	- 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 <i>L5-01 ≠ 0 [Number of Auto-Restart Attempts ≠ 0 times]</i>.
Note: - The drive detects this error if the DC bus voltage is more than the <i>ov</i> detection level when the Run command has not been input (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 <i>H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]</i> will activate.			
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.	- Examine the supply voltage for problems. - Make the drive input power stable.
		Unsatisfactory balance between voltage phases.	- 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.	- Examine the capacitor maintenance time in monitor <i>U4-05 [Capacitor Maintenance]</i>. - If <i>U4-05</i> is more than 90%, replace the capacitor. Contact Yaskawa or your nearest sales representative for more information. - Examine the supply voltage for problems. - Re-energize the drive. - If the alarm stays, replace the circuit board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: - The drive detects this error if the DC bus voltage changes irregularly without regeneration. - 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. - Use <i>L8-05 [Input Phase Loss Protection Sel]</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.

Code	Name	Causes	Possible Solutions
		The holding brake is stopping the motor.	Release the holding brake.
Note: • 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 activate. • 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: 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
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: 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
SToF	Safe Torque OFF Hardware	One of the two terminals H1-HC and H2-HC received the Safe Disable input signal.	• 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: 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	There is a battery in the keypad, but the date and time are not set.	Set the date and time with the keypad.
Note: • 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. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
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
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 <i>L6-02 [Torque Detection Level 1]</i> and <i>L6-03 [Torque Detection Time 1]</i> .
Note: • The drive detects this error if the drive output current is less than the level set in <i>L6-02</i> for longer than <i>L6-03</i>. • If the drive detects this error, the terminal set to <i>H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]</i> will activate. • Set the conditions that trigger the minor fault using <i>L6-01 [Torque Detection Selection 1]</i>.			
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 <i>L6-05 [Torque Detection Level 2]</i> and <i>L6-06 [Torque Detection Time 2]</i> .
Note: • The drive detects this error if the drive output current is less than the level set in <i>L6-05</i> for longer than <i>L6-06</i>. • If the drive detects this error, the terminal set to <i>H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]</i> will activate. • Set the conditions that trigger the minor fault using <i>L6-04 [Torque Detection Selection 2]</i>.			
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 <i>L6-08 [Mechanical Fatigue Detect Select]</i> .	Examine the machine for deterioration.
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. • If the drive detects this error, it will operate the motor as specified by the Stopping Method set in <i>L6-08</i>.			

2.5 Minor Faults/Alarms

Code	Name	Causes	Possible Solutions
Uv	DC Bus Undervoltage	The drive input power voltage is changing too much.	• Use a better power supply voltage to align with the drive rated voltage. • Make the drive input power stable. • If there is not a fault with the input power supply, examine the magnetic contactor on the main circuit side for faults.
		A phase loss occurred 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.	Examine for loose screws and tighten them as specified by the tightening torque values in the manual.
		There was a loss of power.	Use a better power supply.
		The main circuit capacitors have deteriorated.	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.
		The drive input power transformer is too small and voltage drops when the power is switched on.	• Check for an alarm when a molded-case circuit breaker, Leakage Breaker (ELCB, GFCI, 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.	Measure the ambient temperature of the drive.
		The Charge LED is broken.	Replace the board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
Note: • 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). –The DC bus voltage < <i>L2-05 [Undervoltage Detection Lvl (Uv1)]</i>. –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 set to <i>H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]</i> will activate.			

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	Parameters settings are not in the applicable setting range.	1. Push  to show <i>U1-18 [oPE Fault Parameter]</i>, and find parameters that are not in the applicable setting range. 2. Correct the parameter settings. Note: If more than one error occurs at the same time, other <i>oPExx</i> errors have priority over <i>oPE02</i>.
		Set $E2-01 \leq E2-03$ [<i>Motor Rated Current (FLA) ≤ Motor No-Load Current</i>].	Make sure that $E2-01 > E2-03$. Note: If it is necessary to set $E2-01 < E2-03$, first lower the value set in <i>E2-03</i>, and then set <i>E2-01</i>.
Code	Name	Causes	Possible Solutions
oPE03	Multi-Function Input Setting Err	The settings for these parameters do not agree: • <i>H1-01 to H1-07 [Terminals S1 to S7 Function Selection]</i> • <i>H7-01 to H7-04 [Virtual Multi-Function Inputs 1 to 4]</i>	Correct the parameter settings.
		The settings for MFDIs overlap. Note: This does not include <i>H1-xx = 20 to 2F [MFDI Function Select = External Fault]</i> and <i>[Reserved]</i> .	Set the parameters correctly to prevent MFDI function overlap.
		You did not set these pairs of MFDI functions to Digital Inputs (<i>H1-xx</i> and <i>H7-01 to H7-04</i>) at the same time: • Setting values <i>10 [Up Command]</i> and <i>11 [Down Command]</i> • Setting values <i>75 [Up 2 Command]</i> and <i>76 [Down 2 Command]</i> • Setting values <i>42 [Run Command (2-Wire Sequence 2)]</i> and <i>43 [FWD/REV (2-Wire Sequence 2)]</i>	Set the MFDI pairs.
		You set a minimum of two of these MFDI combinations to Digital Inputs (<i>H1-xx</i> and <i>H7-01 to H7-04</i>) at the same time: • Setting values <i>10 [Up Command]</i> and <i>11 [Down Command]</i> • Setting values <i>75 [Up 2 Command]</i> and <i>76 [Down 2 Command]</i> • Setting value <i>A [Accel/Decel Ramp Hold]</i> • Setting value <i>1E [Reference Sample Hold]</i> • Setting values <i>44 to 46 [Add Offset Frequency 1 to 3 (d7-01 to d7-03)]</i>	Remove the function settings that are not in use.

2.6 Parameter Setting Errors

Code	Name	Causes	Possible Solutions
		You set these commands in Digital Inputs (<i>H1-xx</i> and <i>H7-01</i> to <i>H7-04</i>) at the same time: - Setting values 61 [<i>Speed Search from Fmax</i>] and 62 [<i>Speed Search from Fref</i>] - Setting values 65, 66, 7A, 7B [<i>KEB Ride-Thru 1 or 2 Activate</i>] and 68 [<i>High Slip Braking (HSB) Activate</i>] - Setting values 16 [<i>Motor 2 Selection</i>] and 1A [<i>Accel/Decel Time Selection 2</i>] - Setting values 65, 66 [<i>KEB Ride-Thru 1 Activate</i>] and 7A, 7B [<i>KEB Ride-Thru 2 Activate</i>] - Setting values 40, 41 [<i>Forward RUN (2-Wire), Reverse RUN (2-Wire)</i>] and 42, 43 [<i>Run Command (2-Wire Sequence 2), FWD/REV (2-Wire Sequence 2)</i>] - Setting values 60 [<i>DC Injection Braking Command</i>] and 6A [<i>Drive Enable</i>] - Setting values 16 [<i>Motor 2 Selection</i>] and 75, 76 [<i>Up 2 Command, Down 2 Command</i>]	Remove the function settings that are not in use.
		Settings for N.C. and N.O. input [<i>H1-xx</i>] for these functions were selected at the same time: - Setting value 15 [<i>Fast Stop (N.O.)</i>] - Setting value 17 [<i>Fast Stop (N.C.)</i>]	Remove one of the function settings.
		You entered these settings while <i>H1-xx</i> = 2 [<i>External Reference 1/2 Selection</i>]: <i>b1-15</i> = 4 [<i>Frequency Reference Selection 2 = Pulse Train Input</i>] <i>H6-01</i> ≠ 0 [<i>Terminal RP Pulse Train Function ≠ Frequency Reference</i>]	Set <i>H6-01</i> = 0.
		You entered these settings while <i>H1-xx</i> = 2 [<i>External Reference 1/2 Selection</i>]: <i>b1-15</i> = 3 [<i>Option PCB</i>] or <i>b1-16</i> = 3 [<i>Run Command Selection 2 = Option PCB</i>] - You did not connect an option to the drive.	Connect an input option to the drive.
		You entered these settings while <i>H1-xx</i> = 2 [<i>External Reference 1/2 Selection</i>]: <i>b1-15</i> = 1 [<i>Analog Input</i>] <i>H3-02</i> ≠ 0 [<i>Terminal A1 Function Selection ≠ Frequency Reference</i>] or <i>H3-10</i> ≠ 0 [<i>Terminal A2 Function Selection ≠ Frequency Reference</i>]	Set <i>H3-02</i> = 0 or <i>H3-10</i> = 0.
		These parameters are set at the same time: <i>H1-xx</i> ≠ 6A [<i>Drive Enable</i>] <i>H2-xx</i> = 38 [<i>Drive Enabled</i>]	Correct the parameter settings.
		These parameters are set at the same time: <i>H6-01</i> ≠ 3 [<i>PG Speed Feedback (V/F Control)</i>] <i>H1-xx</i> = 7E [<i>Reverse Rotation Identifier</i>]	Correct the parameter settings.
		These parameters are set at the same time: <i>H1-xx</i> = 75/76 [<i>Up 2 /Down 2 Command</i>] <i>H3-09</i> = 1 [<i>Terminal A1, A2 Signal Level Select = 0 to +10V(Without Limit)</i>]	Remove one of the function settings.
Code	Name	Causes	Possible Solutions
oPE05	Run Cmd/Freq Ref Source Sel Err	The setting to assign the Run command or frequency reference to an option card or the pulse train input is incorrect.	Correct the parameter settings.
		<i>b1-01</i> = 3 [<i>Frequency Reference Selection 1 = Option PCB</i>] is set, but there is no option card connected to the drive.	Connect an option card to the drive.
		<i>b1-02</i> = 3 [<i>Run Command Selection 1 = Option PCB</i>] is set, but there is no option card connected to the drive.	
		These parameters are set at the same time: <i>b1-01</i> = 4 [<i>Pulse Train Input</i>] <i>H6-01</i> ≠ 0 [<i>Terminal RP Pulse Train Function ≠ Frequency Reference</i>]	Set <i>H6-01</i> = 0.

Code	Name	Causes	Possible Solutions
oPE07	Analog Input Selection Error	The settings for H3-02 and H3-10 [MFAI Function Select] and H7-30 [Virtual Analog Input Selection] overlap.	Set H3-02, H3-10, and H7-30 correctly to prevent overlap. Note: It is possible to set these functions to multiple analog input terminals at the same time: • Setting value 0 [Frequency Reference] • Setting values F and 1F [Not Used]
		These parameters are set at the same time: • H3-02, 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.
		These parameters are set at the same time: • H3-02, H3-10, H7-30 = C [PID Setpoint] • H6-01 = 2 [PID Setpoint Value]	
		These parameters are set at the same time: • H3-02, H3-10, H7-30 = C • b5-18 = 1 [PID Setpoint Selection = Enabled]	
		These parameters are set at the same time: • H6-01 = 2 • b5-18 = 1	
Code	Name	Causes	Possible Solutions
oPE08	Parameter Selection Error	A function was set that is not compatible with the control method selected in A1-02 [Control Method Selection].	1. Push ENTER Key to show U1-18 [oPE Fault Parameter], and find parameters that are not in the applicable setting range. 2. 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 [OLV], you used these parameter settings: • 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]	• Set n2-02 < n2-03. • Set C4-02 < C4-06.
		When A1-02 = 0 [V/f], you used these parameter settings: • H6-01 = 3 [Terminal RP Pulse Train Function = Speed Feedback (V/F Control)] • H1-xx = 16 [MFDI Function Select = Motor 2 Selection]	Correct the parameter settings. Note: You cannot use Speed Feedback (V/F Control) with the Motor Switch function.
		When A1-02 = 5 [OLV/PM], you set E5-02 to E5-07 [PM Motor Parameters] = 0.	• 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.
		When A1-02 = 5, 6 [OLV/PM, AOLV/PM], you used these parameter settings: • 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.
		When A1-02 = 5, 6, you set E5-09 ≠ 0 and E5-24 ≠ 0.	Set E5-09 = 0 or E5-24 = 0.
		When A1-02 = 6, you set these parameters: • n8-57 = 0 [HFI Overlap Selection = Disabled] • You set E1-09 [Minimum Output Frequency] < the 5% value of E1-06.	Correct the parameter settings.
		When A1-02 = 6, you set these parameters: • n8-35 = 0 [Initial Pole Detection Method = Pull-in] • n8-57 = 1 [Enabled]	Correct the parameter settings.
		When A1-02 = 8 [EZOLV], you used these parameter settings: • 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].

2.6 Parameter Setting Errors

Code	Name	Causes	Possible Solutions
oPE09	PID Control Selection Fault	These parameters are set at the same time: $b5-15 \neq 0.0$ [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]	- Set $b5-15 \neq 0.0$. - Set $b1-03 = 0, 1$ [Ramp to Stop, Coast to Stop].
		These parameters are set at the same time: $b5-01 = 1, 2$ [Enabled (Standard), Enabled (D = Feedforward)] $d2-02 \neq 0.0$ [Frequency Reference Lower Limit $\neq 0.0\%$]	Correct the parameter settings.
		These parameters are set at the same time: $b5-01 = 1, 2$ [Enabled (Standard), Enabled (D = Feedforward)] $b5-11 = 1$ [PID Output Reverse Selection = Negative Output Accepted]	Correct the parameter settings.
		These parameters are set at the same time: $b5-01 = 3, 4$ [Trim (Fref+PID Out, D = Fdbk), Trim (Fref+PID Out, D = FeedFwd)] $d2-02 \neq 0.0$ has been set.	Correct the parameter settings.
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])			
Code	Name	Causes	Possible Solutions
oPE10	V/f Data Setting Error	The parameters that set the V/f pattern do not satisfy these conditions: - 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: $C6-05 > 6$ [Carrier Freq Proportional Gain > 6] $C6-04 > C6-03$ [Carrier Frequency Lower Limit $>$ Carrier Frequency Upper Limit] Note: When $C6-05 < 7$, $C6-04$ becomes disabled. The drive sets the carrier frequency to the value set to $C6-03$.	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
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
oPE29	Baud Rate Setting Error	The baud rate setting [$H5-02$] does not align with the currently selected protocol [$H5-08$]. This contradictory setting is true: $H5-08 = 3$ and $H5-02 \neq 3, 4, 5, 7$ [Communication Protocol Selection = BACnet and Communication Speed Selection $\neq 9600$ bps, 19.2 kbps, 38.4 kbps, 76.8 kbps]	Correct the parameter settings.

Code	Name	Causes	Possible Solutions
oPE33	Digital Output Selection Error	These two parameters are set at the same time: $H2-60 \neq F$ [Term MA,MB,MC Secondary Function $\neq$ Not Used] $H2-01 = 1xx$ [Term MA,MB,MC Function Selection = Inverse output of xx]	Clear the $H2-01$ to $H2-03 = 1xx$ [Inverse output of xx] settings. Note: If you use the function to output logical calculation results ($H2-60$, $H2-63$, $H2-66 \neq F$), you cannot set $H2-01$ to $H2-03 = 1xx$.
		These two parameters are set at the same time: $H2-63 \neq F$ [Terminal P1 Secondary Function $\neq$ Not Used] $H2-02 = 1xx$ [Term P1 Function Selection = Inverse output of xx]	
		These two parameters are set at the same time: $H2-66 \neq F$ [Terminal P2 Secondary Function $\neq$ Not Used] $H2-03 = 1xx$ [Term P2 Function Selection = Inverse output of xx]	
		These parameter pairs are set incorrectly: $H2-21$ [Comparator 1 Lower Limit] $> H2-22$ [Comparator 1 Upper Limit] $H2-27$ [Comparator 2 Lower Limit] $> H2-28$ [Comparator 2 Upper Limit]	- 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%.	- 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.	- 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> [Motor Saturation Coefficient 2] have temporary values.	- 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.	- 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> [Motor Saturation Coefficient 2] 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.	- 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> [Control Method Selection] setting is not applicable.	- 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.

Code	Name	Causes	Possible Solutions
End8	HFI Alarm	- Inductance saliency ratio (<i>E5-07/E5-06</i>) is too small. - The drive cannot find the <i>n8-36 [HFI Frequency Level for L Tuning]</i> value.	- Set the correct value on the motor nameplate to <i>E5-xx [PM Motor Settings]</i> or do rotational/stationary Auto-Tuning. - When it is necessary to set <i>n8-35 = 1 [Initial Pole Detection Method = High Frequency Injection]</i> or <i>n8-57 = 1 [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. Note: If the drive detects <i>End8</i>, it will automatically set <i>n8-35 = 0 [Pull-in]</i> and <i>n8-57 = 0 [Disabled]</i>. Do not change the settings unless necessary.
Code	Name	Causes	Possible Solutions
End9	Initial Pole Detection Alarm	The drive cannot calculate the correct value for <i>n8-84 [Polarity Detection Current]</i> during High Frequency Injection Tuning.	When <i>n8-35 = 1 [Initial Pole Detection Method = High Frequency Injection]</i> or <i>n8-57 = 1 [HFI Overlap Selection = Enabled]</i>, make sure that the motor does not rotate in reverse at start. Note: If the drive detects <i>End9</i>, it will automatically set <i>n8-35 = 0 [Pull-in]</i> and <i>n8-57 = 0 [Disabled]</i>. Do not change the settings unless necessary.
Code	Name	Causes	Possible Solutions
Er-01	Motor Data Error	The motor nameplate data entered during Auto-Tuning is incorrect.	- Make sure that the motor nameplate data is correct. - Do Auto-Tuning again and correctly set the motor nameplate data.
		The combination of the motor rated power and motor rated current do not match.	- Examine the combination of drive capacity and motor output. - Do Auto-Tuning again, and correctly set the motor rated power and motor rated current.
		The combination of the motor rated current that was entered during Auto-Tuning and <i>E2-03 [Motor No-Load Current]</i> do not match.	- 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.
		The combination of the setting values of Motor Base Frequency and Motor Base Speed do not match.	Do Auto-Tuning again, and correctly set the Motor Base Frequency and Motor Base Speed.
Code	Name	Causes	Possible Solutions
Er-02	Drive in an Alarm State	The motor nameplate data entered during Auto-Tuning is incorrect.	- Make sure that the motor nameplate data entered in Auto-Tuning is correct. - Do Auto-Tuning again and correctly set the motor nameplate data.
		You did Auto-Tuning while the drive had a minor fault or alarm.	Clear the minor fault or alarm and do Auto-Tuning again.
		There is a defective motor cable or cable connection.	Examine and repair motor wiring.
		The load is too large.	- Decrease the load. - Examine the machine area to see if, for example, the motor shaft is locked.
		The drive detected a minor fault during Auto-Tuning.	- Stop Auto-Tuning. - Examine the minor fault code and remove the cause of the problem. - Do Auto-Tuning again.
Code	Name	Causes	Possible Solutions
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.	- 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.	
		The motor nameplate data entered during Auto-Tuning is incorrect.	- Make sure that the input motor nameplate data is correct. - Do Auto-Tuning again and correctly set the motor nameplate data.

2.7 Auto-Tuning Errors

Code	Name	Causes	Possible Solutions
Er-05	No-Load Current Error	The Auto-Tuning results were not in the applicable parameter setting range.	- 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.	- 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.	- 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-08	Rated Slip Error	The motor nameplate data entered during Auto-Tuning is incorrect.	- 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.	- Examine and repair the motor wiring. - If the motor and machine are connected during Rotational Auto-Tuning, decouple the motor from the machinery.
		The Auto-Tuning results were not in the applicable parameter setting range.	
		Rotational Auto-Tuning was done with a load that was more than 30% of the rating connected to the motor.	- 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-09	Acceleration Error	The motor did not accelerate for the specified acceleration time.	- Increase the value set in <i>C1-01 [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.	- 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 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%).	- Increase the value set in <i>C1-01 [Acceleration Time 1]</i>. - Disconnect the machine from the motor and do Rotational Auto-Tuning again.
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.	- 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.	

Code	Name	Causes	Possible Solutions
		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 C5-01 [ASR Proportional Gain 1].
Code	Name	Causes	Possible Solutions
Er-15	Torque Saturation Error	During Inertia Tuning, the output torque was more than the value set in L7-01 to L7-04 [Torque Limit].	• Increase the value set in L7-01 to L7-04 [Torque Limit] 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).	• 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.	1. Enable reverse in the target machine. 2. Set <i>b1-04 = 0 [Reverse Enabled]</i>. 3. 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.	1. Make sure that the input motor nameplate data is correct. 2. 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.	1. Make sure that the input motor nameplate data is correct. 2. 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.	1. Make sure that the input motor nameplate data is correct. 2. Do Auto-Tuning again and correctly set the motor nameplate data.
Code	Name	Causes	Possible Solutions
Er-25	HighFreq Inject Param Tuning Err	The motor data is incorrect.	Do Stationary Auto-Tuning again. 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.

2.8 Backup Function Operating Mode Display and Errors

◆ Operating Mode Display

When you use the LCD keypad to do the backup function, the keypad shows the running operation on the LCD display. 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. If there are errors, refer to these tables:

Note:

Push any key on the keypad to clear an error.

Code	Name	Causes	Possible Solutions
CPEr	Control Mode Mismatch	The keypad setting and drive setting for <i>A1-02 [Control Method Selection]</i> do not agree.	1. Set <i>A1-02</i> on the drive to the same value that is on the keypad. 2. Restore the parameters.
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.	1. Examine the drive model that you used to back up the parameters. 2. 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.	1. Make sure that drive model and the value set in <i>o2-04 [Drive Model (KVA) Selection]</i> agree. 2. Restore the parameters.
		The parameters are not stored in the keypad.	1. Connect a keypad that has the correct parameters. 2. 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.	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.	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 Occurs Without Power Loss

⚠ 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.
-

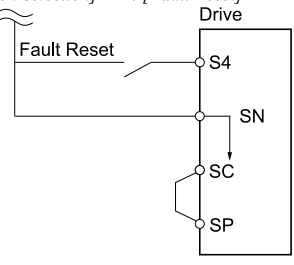
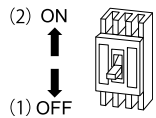
◆ Fault Occurs Without Power Loss

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 Procedure

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  on the keypad.
Method 2	Switch ON the MFDI terminal set to $H1-xx = 14$ [MFDI Function Select = Fault Reset]. Note: The default setting for $H1-04$ [Terminal S4 Function Selection] is 14 [Fault Reset]. 
Method 3	- De-energize the drive main circuit power supply. - 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. Turn the Run command OFF to reset 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

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	Reference
The Parameter Settings Will Not Change	88
The Motor Does Not Rotate after You Enter a Run Command	89
The Motor Rotates in the Opposite Direction from the Run Command	90
The Motor Rotates in Only One Direction	90
The Motor Is Too Hot	90
The Correct Auto-Tuning Mode Is Not Available	91
The Motor Stalls during Acceleration or Accel/Decel Time Is Too Long	91
The Drive Frequency Reference Is Different than the Controller Frequency Reference Command	92
PM Motor Speed Is Not Stable	92
There Is Too Much Motor Oscillation and the Rotation Is Irregular	92
Deceleration Takes Longer than Expected when You Enable Dynamic Braking	92
There Is Audible Noise from the Drive or Motor Cables when You Energize the Drive	93
The Ground Fault Circuit Interrupter (GFCI) Trips During Run	93
Motor Rotation Causes Unexpected Audible Noise from Connected Machinery	93
Motor Rotation Causes Oscillation or Hunting	93
PID Output Fault	94
The Starting Torque Is Not Sufficient	94
The Motor Rotates after You Shut Off Drive Output	94
The Output Frequency Is Lower Than the Frequency Reference	94
The Motor Will Not Restart after Power Loss	95

◆ The Parameter Settings Will Not Change

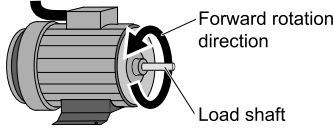
Causes	Possible Solutions
The drive is operating the motor (the drive is in Drive Mode).	Stop the drive and change to Programming Mode.
Parameter <i>A1-01</i> = 0 [<i>Access Level Selection = Operation Only</i>].	Set <i>A1-01</i> = 2 [<i>Access Level Selection = Advanced Level</i>] or <i>A1-01</i> =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

Causes	Possible Solutions
An incorrect password was entered in <i>A1-04 [Password]</i> .	- Enter the correct password to <i>A1-04</i> again. - If you forgot the password, set the password again with <i>A1-04</i> and <i>A1-05 [Password Setting]</i>. Note: If the password is set, it will not be possible to change these parameters until the password matches: <i>A1-01 [Access Level Selection]</i> <i>A1-02 [Control Method Selection]</i> <i>A1-03 [Initialize Parameters]</i> <i>A1-06 [Application Preset]</i> <i>A1-07 [DriveWorksEZ Function Selection]</i> <i>A2-01 to A2-32 [User Parameter 1 to User Parameter 32]</i>
The drive detected <i>Uv [Undervoltage]</i> .	- View <i>U1-07 [DC Bus Voltage]</i> 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.	- Make sure that the READY LED on the keypad is on. - If the READY LED is off, push and hold the ESC Key to go back to the frequency reference screen (the initial screen).
The drive stopped and you pushed  to transfer the Run command source to the keypad.	Do one of these two: - Push . - Re-energize the drive. Note: Set <i>o2-01 = 0 [LO/RE Key Function Selection = Disabled]</i> to prevent changing the Run command source with .
Auto-Tuning completed.	Push and hold the ESC Key to go back to the frequency reference screen (the initial screen). 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.
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 <i>b1-02 [Run Command Selection 1]</i> correctly.
The frequency reference source is set incorrectly.	Set <i>b1-01 [Frequency Reference Selection 1]</i> correctly.
There is defective wiring in the control circuit terminals.	- Correctly wire the drive control circuit terminals. - View <i>U1-10 [Input Terminal Status]</i> for input terminal status.
The settings for voltage input and current input of the master frequency reference are incorrect.	Examine these analog input terminal signal level settings: - Terminal A1: <i>H3-01 [Terminal A1 Signal Level Select]</i> - Terminal A2: DIP switch S1 and <i>H3-09 [Terminal A2 Signal Level Select]</i>
The selection for the sinking/sourcing mode and the internal/external power supply is incorrect.	- 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.	- View <i>U1-01 [Freq Reference]</i>. - Increase the frequency reference to a value higher than <i>E1-09 [Minimum Output Frequency]</i>.
The MFAI setting is incorrect.	- Make sure that the functions set to the MFAI are correct. The frequency reference is 0 when <i>H3-02, H3-10 = 1 [MFAI Function Select = Frequency Gain]</i> and voltage (current) is not input. - Use <i>U1-13, U1-14 [Terminal A1, A2 Input Voltage]</i> to make sure that the analog input values set to terminals A1 and A2 are applicable.
You pushed  .	Turn the Run command OFF then ON from an external input. Note: When you push  during operation, the drive will ramp to stop. Set <i>o2-02 = 0 [STOP Key Function Selection = Disabled]</i> to disable the  function.
The 2-wire sequence and 3-wire sequence are set incorrectly.	- Set one of the parameters <i>H1-03 to H1-07 [Terminals S3 to S7 Function Select]</i> to 0 [3-Wire Sequence] to enable the 3-wire sequence. - If a 2-wire sequence is necessary, make sure that <i>H1-03 to H1-07 ≠ 0</i>.

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

Causes	Possible Solutions
The phase wiring between the drive and motor is incorrect.	- 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.	- 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.  Figure 2.1 Forward Rotating Motor Note: - 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.
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.	Turn ON 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.	- 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. Note: The motor also has a short-term overload rating. Examine this rating carefully before setting drive parameters.
The motor is running continuously at a very low speed.	- 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.	- 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.	- 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>]. 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).
The air around the motor is too hot.	- 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.	- 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 [Control Method Selection]</i> .

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

Causes	Possible Solutions
The drive and motor system are at the torque limit or current suppression will not let the drive accelerate.	- Decrease the load. - Use a larger motor. Note: Although the drive has a Stall Prevention function and a Torque Compensation Limit function, if you try to accelerate too fast or try to drive a load that is too large, it can be too much for the limits of the motor.
Torque limit is set incorrectly.	Set the torque limit correctly.
The acceleration time setting is too short.	Examine the values set in <i>C1-01, C1-03, C1-05, or C1-07 [Acceleration Time]</i> and set them to applicable values.
The load is too large.	- 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. 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, if you try to accelerate too fast or try to drive a load that is too large, it can be too much for the limits of the motor.
The frequency reference is low.	- Examine <i>E1-04 [Maximum Output Frequency]</i> and increase the setting if it is set too low. - Examine <i>U1-01 [Frequency Reference]</i> for the correct frequency reference. - Examine the multi-function input terminals to see if a frequency reference signal switch is set. - When you use an MFAL, examine the low gain level set in <i>H3-03, H3-11 [Terminal A1, A2 Gain Setting]</i>.
The frequency reference is set incorrectly.	When <i>H3-10 = 1 [Terminal A2 Function Selection = Frequency Gain]</i>, see if the drive is set for voltage (current). - Examine the value set in <i>H3-10</i>. - Use <i>U1-14 [Terminal A2 Input Voltage]</i> to make sure that the analog input value set to terminal A2 is applicable.
The motor characteristics and drive parameter settings are not compatible.	- Set the correct V/f pattern to agree with the characteristics of the motor. - Examine the V/f pattern set in <i>E1-03 [V/f Pattern Selection]</i>. - Do Rotational Auto-Tuning.
The drive is operating in vector control mode, but you did not complete Auto-Tuning.	- Do Auto-Tuning. - Calculate motor data and reset motor parameters. - Set <i>A1-02 = 0 [Control Method Selection = V/f Control]</i>.
The Stall Prevention level during acceleration setting is too low.	Increase the value set in <i>L3-02 [Stall Prevent Level during Accel]</i>. Note: If the <i>L3-02</i> value is too low, the acceleration time can be unsatisfactorily long.
The Stall Prevention level during run setting is too low.	Increase the value set in <i>L3-06 [Stall Prevent Level during Run]</i>. Note: If the <i>L3-06</i> value is too low, speed will decrease before the drive outputs torque.
The drive is at the limit of the V/f motor control method.	- 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. Note: V/f control method does not supply high torque at low speeds.

◆ 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. - Terminal A1: <i>H3-03 [Terminal A1 Gain Setting]</i>, <i>H3-04 [Terminal A1 Bias Setting]</i> - Terminal A2: <i>H3-11 [Terminal A2 Gain Setting]</i>, <i>H3-12 [Terminal A2 Bias Setting]</i>
The drive is receiving frequency bias signals from analog input terminals A1 and A2 and the sum of all signals makes the frequency reference.	- Examine parameters <i>H3-02</i>, <i>H3-10 [MFAI Function Select]</i>. If both of these parameters = 0, change the settings. - Use <i>U1-13</i>, <i>U1-14 [Terminal A1, A2 Input Voltage]</i> to make sure that the analog input values set to terminals A1 and A2 are applicable.
PID control is enabled.	If PID control is not necessary, set <i>b5-01</i> = 0 [<i>PID Mode Setting = Disabled</i>]. 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 <i>E1-04 [Maximum Output Frequency]</i> while PID control is active.

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

Causes	Possible Solutions
<i>E5-01 [PM Motor Code Selection]</i> 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: <i>n8-55 [Motor to Load Inertia Ratio]</i> <i>n8-45 [Speed Feedback Detection Gain]</i> <i>C4-02 [Torque Compensation Delay Time]</i>
Hunting occurs at start.	Increase the value set in <i>C2-01 [S-Curve Time @ Start of Accel]</i> .
Too much current is flowing through the drive.	Set <i>E5-01 [PM Motor Code Selection]</i> correctly as specified by the motor. For special-purpose motors, enter the correct value to <i>E5-xx</i> as specified by the motor test report.
Operation is not stable when <i>n8-57</i> = 1 [<i>HFI Overlap Selection = Enabled</i>].	- Do High Frequency Injection Auto-Tuning. - Decrease the value set in <i>n8-41 [HFI P Gain]</i> in increments of 0.5. Note: Set <i>n8-41</i> > 0.0 for IPM motors.

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

Causes	Possible Solutions
Unsatisfactory balance of motor phases.	- Make sure that the drive input power voltage supplies stable power. - Set <i>L8-05</i> = 0 [<i>Input Phase Loss Protect Select = Disabled</i>].
The motor is hunting.	- Set <i>n1-01</i> = 1 [<i>Hunting Prevention Selection = Enabled</i>]. - Increase the value of <i>n2-01 [SpdFeedbackDetectCtr (AFR) Gain]</i> or <i>n2-02 [SpdFeedbackDetCtr (AFR)TimeConst]</i>.

◆ Deceleration Takes Longer Than Expected When Dynamic Braking Is Enabled

Causes	Possible Solutions
The stall prevention during deceleration setting is incorrect.	- Examine the setting for <i>L3-04 [Decel Stall Prevention Selection]</i>. - When the drive has a dynamic braking option installed, set <i>L3-04</i> = 0 [<i>Disabled</i>]. - If the drive detects <i>ov [Overvoltage]</i>, set <i>L3-04</i> = 3 [<i>General Purpose w/ DB resistor</i>].
The deceleration time setting is too long.	Set <i>C1-02</i> , <i>C1-04</i> , <i>C1-06</i> , or <i>C1-08 [Deceleration Times]</i> to applicable values.
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 [Overvoltage]</i>.

Causes	Possible Solutions
The drive and motor system reached the torque limit.	- 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. - If H3-02, H3-10 = 10, 11, 12, 15 [MFAI Function Select = Torque Limit], examine the settings for the MFAls. - Examine the values set in H3-02 and H3-10. - Use U1-13, U1-14 [Terminal A1, A2 Input Voltage] to make sure that the analog input values set to terminals A1 and A2 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 the Drive Is Energized

Causes	Possible Solutions
The relay switching in the drive is making too much noise.	- 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.	- 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.	- 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.	- 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. - 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 Filter Time Constant].
The cable between the drive and motor is too long.	- 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.	- Examine the MFAI terminal settings. - Make sure that $H3-02, H3-10 = B$ [MFAI Function Select = PID Feedback]. - 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. 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.
The detection level and the target value do not agree.	Use $H3-03, H3-11$ [Terminal A1 and A2 Gain Setting] to adjust PID target and feedback signal scaling. 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.
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.	- 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]. Note: Enabling the Jump frequency prevents the drive from outputting the frequencies specified in the Jump range.
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. Note: This calculation supplies the upper value for the output frequency: $E1-04 \times d2-01 / 100$
A large load triggered Stall Prevention function during acceleration.	- Decrease the load. - Adjust $L3-02$ [Stall Prevent Level during Accel].
$L3-01 = 3$ [Stall Prevent Select during Accel = ILim Mode] has been set.	- Check whether the V/f pattern and motor parameter settings are appropriate, and set them correctly. - If this does not solve the problem, and it is not necessary to limit the current level of stall during acceleration, adjust $L3-02$. - If this does not solve the problem, set $L3-01 = 1$ [Enabled].
The motor is rotating at this speed: $b2-01$ [DC Injection/Zero SpeedThreshold] $\leq$ Motor Speed $< E1-09$ [Minimum Output Frequency]	Set $E1-09 < b2-01$.

◆ The Motor Will Not Restart after a Loss of Power

Causes	Possible Solutions
The drive did not receive a Run command after applying power.	• 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

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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 Modes

Icon	Description
	The parameter is available when operating the drive with 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 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 EZ Open Loop Vector Control.
Hex.	Hexadecimal numbers that represent MEMOBUS addresses to change parameters over network communication.
RUN	The parameter can be changed settings during run.
Expert	The parameter that is available in Expert Mode only. <i>*1</i>

*1 Set $A1-01 = 3$ [*Access Level Selection = Expert Level*] to display 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.

Parameter	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
b8	Energy Saving
C1	Accel & Decel Time
C2	S-Curve Characteristics
C3	Slip Compensation
C4	Torque Compensation
C5	Automatic Speed Regulator (ASR: Automatic Speed Regulator)
C6	Carrier Frequency
d1	Frequency Reference
d2	Reference Limits
d3	Jump Frequency
d4	Frequency Ref Up/Down & Hold
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	Fault Detection during PG Speed Control
F6	Communication Options
F7	Communication Options
H1	Digital Inputs
H2	Digital Outputs
H3	Analog Inputs
H4	Analog Outputs
H5	Modbus Communication
H6	Pulse Train Input/Output
H7	Virtual MFIO selection

Parameter	Name
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
n1	Hunting Prevention
n2	Auto Freq Regulator (AFR)
n3	High Slip/Overexcite Braking
n5	Feed Forward Control
n6	Online Tuning
n7	EZ Drive
n8	PM Motor Control Tuning
nA	PM Motor Control Tuning
o1	Keypad Display
o2	Keypad Operation
o3	Copy Keypad Function
o4	Maintenance Monitors
o5	Log Function
q	DriveWorksEZ Parameters
r	DWEZ Connection 1-20
T0	Tuning Mode Selection
T1	Induction Motor 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
U6	Operation Status Monitors
U8	DriveWorksEZ Monitors
UC	BACnet Diagnostic Monitors

3.4 A: Initialization Parameters

◆ A1: Initialization

No. (Hex.)	Name	Description	Default (Range)
A1-00 (0100) RUN	Language Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the language for the LCD keypad. Note: When you use <i>A1-03 [Initialize Parameters]</i> to initialize the drive, the drive will not reset this parameter. 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	0 (0 - 12)
A1-01 (0101) RUN	Access Level Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets user access to parameters. The access level controls which parameters the keypad will display, and which parameters the user can set. 0 : Operation Only 1 : User Parameters 2 : Advanced Level 3 : Expert Level	2 (0 - 3)
A1-02 (0102)	Control Method Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the control method for the drive application and the motor. 0 : V/f Control 2 : Open Loop Vector 5 : PM Open Loop Vector 6 : PM Advanced Open Loop Vector 8 : EZ Vector Control	0 (0, 2, 5, 6, 8)
A1-03 (0103)	Initialize Parameters	V/f OLV OLV/PM AOLV/PM EZOLV Sets parameters to default values. 0 : No Initialization 1110 : User Initialization 2220 : 2-Wire Initialization 3330 : 3-Wire Initialization	0 (0 - 3330)
A1-04 (0104)	Password	V/f OLV OLV/PM AOLV/PM EZOLV 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.	0000 (0000 - 9999)
A1-05 (0105)	Password Setting	V/f OLV OLV/PM AOLV/PM EZOLV 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.	0000 (0000 - 9999)
A1-06 (0127)	Application Preset	V/f OLV OLV/PM AOLV/PM EZOLV Sets the drive to operate in selected application conditions. 0 : General-purpose 1 : Water Supply Pump 2 2 : Conveyor 3 : Exhaust Fan 4 : HVAC Fan 5 : Air Compressor 8 : Conveyor 2	0 (0 - 5, 8)

3.4 A: Initialization Parameters

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

◆ A2: User Parameters

No. (Hex.)	Name	Description	Default (Range)
A2-01 to A2-32 (0106 - 0125)	User Parameters 1 to 32	V/f OLV OLV/PM AOLV/PM EZOLV You can select a maximum of 32 parameters for the drive and save the values to parameters <i>A2-01 to A2-32</i>. Use Setup Mode to show the saved parameters. You can immediately access these saved parameters. Note: When the <i>A1-06 [Application Preset]</i> value changes, the settings for <i>A2-01 to A2-32</i> change.	Parameters in General-Purpose Setup Mode (Determined by A1-06)
A2-33 (0126)	User Parameter Auto Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the automatic save feature for changes to parameters <i>A2-17 to A2-32 [User Parameters 17 to 32]</i>. 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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the input method for the frequency reference. 0 : Keypad 1 : Analog Input 2 : Serial Communications 3 : Option PCB 4 : Pulse Train Input	1 (0 - 4)
b1-02 (0181)	Run Command Selection 1	V/f OLV OLV/PM AOLV/PM EZOLV Sets the input method for the Run command. 0 : Keypad 1 : Digital Input 2 : Serial Communications 3 : Option PCB	1 (0 - 3)
b1-03 (0182)	Stopping Method Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the method to stop the motor after removing a Run command or entering a Stop command. Note: When A1-02 = 5, 6, 8 [Control Method Selection = OLV/PM, AOLV/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	0 (0 - 3)
b1-04 (0183)	Reverse Operation Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the reverse operation function. Disable reverse operation in fan or pump applications where reverse rotation is dangerous. 0 : Reverse Enabled 1 : Reverse Disabled	0 (0, 1)
b1-06 (0185)	Digital Input Reading	V/f OLV OLV/PM AOLV/PM EZOLV Sets the number of times that the drive reads the sequence input command to prevent malfunction because of noise. 0 : Single Scan 1 : Double Scan	1 (0, 1)
b1-07 (0186)	LOCAL/REMOTE Run Selection	V/f OLV OLV/PM AOLV/PM EZOLV 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	0 (0, 1)
b1-08 (0187)	Run Command Select in PRG Mode	V/f OLV OLV/PM AOLV/PM EZOLV 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	0 (0 - 2)
b1-14 (01C3)	Phase Order Selection	V/f OLV OLV/PM AOLV/PM EZOLV 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. 0 : Standard 1 : Switch Phase Order	0 (0, 1)
b1-15 (01C4)	Frequency Reference Selection 2	V/f OLV OLV/PM AOLV/PM EZOLV Sets the input method for frequency reference 2. 0 : Keypad 1 : Analog Input 2 : Memobus/Modbus Communications 3 : Option PCB 4 : Pulse Train Input	0 (0 - 4)

3.5 b: Application

No. (Hex.)	Name	Description	Default (Setting Range)
b1-16 (01C5)	Run Command Selection 2	V/f OLV OLV/PM AOLV/PM EZOLV Sets the input method for Run Command 2 when the user switches the control circuit terminals ON/OFF to change the Run command source. 0 : Keypad 1 : Digital Input 2 : Memobus/Modbus Communications 3 : Option PCB	0 (0 - 3)
b1-17 (01C6)	Run Command at Power Up	V/f OLV OLV/PM AOLV/PM EZOLV Sets drive response when energizing a drive that has an external Run command. Set this parameter in applications where energizing or de-energizing the drive enables the Run command. 0 : Disregard Existing RUN Command 1 : Accept Existing RUN Command	0 (0, 1)
b1-35 (1117) Expert	Digital Input Deadband Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets the deadband time for MFDIs.	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 Speed Threshold	V/f OLV OLV/PM AOLV/PM EZOLV Sets the frequency to start DC Injection Braking or Short Circuit Braking. Note: This parameter is available when <i>b1-03 = 0</i> [Stopping Method Selection = Ramp to Stop].	Determined by A1-02 (0.0 - 10.0 Hz)
b2-02 (018A)	DC Injection Braking Current	V/f OLV OLV/PM AOLV/PM EZOLV Sets the DC Injection Braking current as a percentage of the drive rated current.	50% (0 - 75%)
b2-03 (018B)	DC Inject Braking Time at Start	V/f OLV OLV/PM AOLV/PM EZOLV Sets the DC Injection Braking Time at stop.	0.00 s (0.00 - 10.00 s)
b2-04 (018C)	DC Inject Braking Time at Stop	V/f OLV OLV/PM AOLV/PM EZOLV Sets the DC Injection Braking Time at stop.	Determined by A1-02 (0.00 - 10.00 s)
b2-08 (0190)	Magnetic Flux Compensation Value	V/f OLV OLV/PM AOLV/PM EZOLV Sets how much current the drive injects when DC Injection Braking at Start starts (Initial Excitation) as a percentage of <i>E2-03</i> [Motor No-Load Current].	0% (0 - 1000%)
b2-12 (01BA)	Short Circuit Brake Time @ Start	V/f OLV OLV/PM AOLV/PM EZOLV Sets the Short Circuit Braking time at start.	0.00 s (0.00 - 25.50 s)
b2-13 (01BB)	Short Circuit Brake Time @ Stop	V/f OLV OLV/PM AOLV/PM EZOLV Sets the Short Circuit Braking time at stop.	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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the Short Circuit Braking Current 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 = 5, 6</i> [OLV/PM, AOLV/PM]: <i>E5-03</i> [PM Motor Rated Current (FLA)] • <i>A1-02 = 8</i> [EZOLV]: <i>E9-06</i> [Motor Rated Current (FLA)]	100.0% (0.0 - 200.0%)

◆ b3: Speed Search

No. (Hex.)	Name	Description	Default (Range)
b3-01 (0191)	Speed Search at Start Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the Speed Search at Start function where the drive will perform Speed Search with each Run command. 0 : Disabled 1 : Enabled	0 (0, 1)
b3-02 (0192)	SpeedSearch Deactivation Current	V/f OLV OLV/PM AOLV/PM EZOLV 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.	Determined by A1-02 (0 - 200%)

No. (Hex.)	Name	Description	Default (Range)
b3-03 (0193)	Speed Search Deceleration Time	V/f OLV OLV/PM AOLV/PM EZOLV 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. Note: When $A1-02 = 8$ [Control Method Selection = EZOLV], this parameter takes effect only in Expert Mode.	2.0 s (0.1 - 10.0 s)
b3-04 (0194)	V/f Gain during Speed Search	V/f OLV OLV/PM AOLV/PM EZOLV Sets the ratio used to reduce the V/f during searches to reduce the output current during speed searches.	Determined by o2-04 (10 - 100)
b3-05 (0195)	Speed Search Delay Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets the Speed Search delay time to activate a magnetic contactor installed between the drive and motor.	0.2 s (0.0 - 100.0 s)
b3-06 (0196) Expert	Speed Estimation Current Level 1	V/f OLV OLV/PM AOLV/PM EZOLV 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.	Determined by o2-04 (0.0 - 2.0)
b3-07 (0197) Expert	Speed Estimation Current Level 2	V/f OLV OLV/PM AOLV/PM EZOLV 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.	1.0 (0.0 - 3.0)
b3-08 (0198)	Speed Estimation ACR P Gain	V/f OLV OLV/PM AOLV/PM EZOLV 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.	Determined by A1-02 and o2-04 (0.00 - 6.00)
b3-09 (0199)	Speed Estimation ACR I Time	V/f OLV OLV/PM AOLV/PM EZOLV 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.	Determined by A1-02 when $A1-02 \neq 5$ 20.0 when $A1-02 = 5$ (0.0 - 1000.0 ms)
b3-10 (019A) Expert	Speed Estimation Detection Gain	V/f OLV OLV/PM AOLV/PM EZOLV Sets the gain to correct estimated frequencies from Speed Estimation Speed Search.	1.05 (1.00 - 1.20)
b3-14 (019E)	Bi-directional Speed Search	V/f OLV OLV/PM AOLV/PM EZOLV Sets the direction of Speed Search to the direction of the frequency reference or in the motor rotation direction as detected by the drive. 0 : Disabled 1 : Enabled	0 (0, 1)
b3-17 (01F0) Expert	Speed Est Retry Current Level	V/f OLV OLV/PM AOLV/PM EZOLV 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%.	150% (0 - 200%)
b3-18 (01F1) Expert	Speed Est Retry Detection Time	V/f OLV OLV/PM AOLV/PM EZOLV 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.	0.10 s (0.00 - 1.00 s)
b3-19 (01F2)	Speed Search Restart Attempts	V/f OLV OLV/PM AOLV/PM EZOLV Sets the number of times to restart Speed Search if Speed Search does not complete.	3 times (0 - 10 times)
b3-24 (01C0)	Speed Search Method Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the Speed Search method when you start the motor or when you restore power after a momentary power loss. Note: - When $A1-02 = 8$ [Control Method Selection = EZOLV], the default setting changes when the setting for $E9-01$ [Motor Type Selection] changes. $E9-01 = 0$ [Induction (IM)]: 2 $E9-01 = 1, 2$ [Permanent Magnet (PM), Synchronous Reluctance (SynRM)]: 1 - When you set $b3-24$, it will trigger the drive to initialize $b3-14$ [Bi-directional Speed Search]. After you set $b3-24$, set $b3-14$. 1 : Speed Estimation 2 : Current Detection 2	2 (1, 2)
b3-25 (01C8) Expert	Speed Search Wait Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets the length of time the drive will wait to start the Speed Search Retry function.	0.5 s (0.0 - 30.0 s)
b3-26 (01C7) Expert	Direction Determination Level	V/f OLV OLV/PM AOLV/PM EZOLV Sets the level to find the motor rotation direction. Increase the value if the drive cannot find the direction.	1000 (40 to 60000)
b3-29 (077C) Expert	Speed Search Back-EMF Threshold	V/f OLV OLV/PM AOLV/PM EZOLV 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.	10% (0 - 10%)

3.5 b: Application

No. (Hex.)	Name	Description	Default (Range)
b3-31 (0BC0) Expert	Spd Search Current Reference Lvl	V/f OLV OLV/IPM AOLV/IPM EZOLV Sets the current level that decreases the output current during Current Detection Speed Search.	1.50 (1.50 - 3.50)
b3-32 (0BC1) Expert	Spd Search Current Complete Lvl	V/f OLV OLV/IPM AOLV/IPM EZOLV Sets the current level that completes Speed Search.	1.20 (0.00 - 1.49)
b3-33 (0B3F) Expert	Speed Search during Uv Selection	V/f OLV OLV/IPM AOLV/IPM EZOLV Sets the function that starts Speed Search at start-up if the drive detects a <i>Uv [Undervoltage]</i> when it receives a Run command. 0 : Disabled 1 : Enabled	1 (0, 1)
b3-54 (3123)	Search Time	V/f OLV OLV/IPM AOLV/IPM 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 OLV OLV/IPM AOLV/IPM EZOLV Sets the length of time that the drive will increase the current from zero current to the setting value of <i>b3-06 [Speed Estimation Current Level 1]</i> .	10 ms (10 - 2000 ms)
b3-56 (3126)	InverseRotationSearch WaitTime	V/f OLV OLV/IPM AOLV/IPM 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	Initial Pole Detection Response Gain	V/f OLV OLV/IPM AOLV/IPM EZOLV Sets the responsiveness for initial motor magnetic pole calculation when <i>A1-02 = 6 [Control Method Selection = AOLV/IPM]</i> . Set <i>b3-61 > 0.0</i> for an ordinary IPM motor. It is automatically set if High Frequency Injection Tuning is used. Note: • Set <i>n8-35 = 1 [Initial Pole Calculation Method = High Frequency Injection]</i> to enable this parameter. • Set <i>n8-41 [HFI P Gain]</i> to adjust the responsiveness for initial motor magnetic pole calculation when <i>A1-02 = 5 [OLV/IPM]</i> .	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 OLV OLV/IPM AOLV/IPM 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 OLV OLV/IPM AOLV/IPM EZOLV Sets the OFF-delay time for the timer input.	0.0 s (0.0 - 3000.0 s)
b4-03 (0B30) Expert	Terminal MA, MB, MC ON-Delay Time	V/f OLV OLV/IPM AOLV/IPM EZOLV Sets the delay time until the contact is turned ON after the function set with <i>H2-01</i> turns ON.	0 ms (0 - 65000 ms)
b4-04 (0B31) Expert	Terminal MA, MB, MC OFF-Delay Time	V/f OLV OLV/IPM AOLV/IPM EZOLV Sets the delay time to deactivate the contact after the function set in <i>H2-01</i> deactivates.	0 ms (0 - 65000 ms)
b4-05 (0B32) Expert	Terminal P1 ON-Delay Time	V/f OLV OLV/IPM AOLV/IPM EZOLV Sets the delay time to activate the contact after the function set in <i>H2-02</i> activates.	0 ms (0 - 65000 ms)
b4-06 (0B33) Expert	Terminal P1 OFF-Delay Time	V/f OLV OLV/IPM AOLV/IPM EZOLV Sets the delay time to deactivate the contact after the function set in <i>H2-02</i> deactivates.	0 ms (0 - 65000 ms)
b4-07 (0B34) Expert	Terminal P2 ON-Delay Time	V/f OLV OLV/IPM AOLV/IPM EZOLV Sets the delay time until the contact is turned ON after the function set with <i>H2-03</i> turns ON.	0 ms (0 - 65000 ms)
b4-08 (0B35) Expert	Terminal P2 OFF-Delay Time	V/f OLV OLV/IPM AOLV/IPM EZOLV Sets the delay time to deactivate the contact after the function set in <i>H2-03</i> deactivates.	0 ms (0 - 65000 ms)

◆ b5: PID control

No. (Hex.)	Name	Description	Default (Range)
b5-01 (01A5)	PID Mode Setting	V/f OLV OLV/PM AOLV/PM EZOLV Sets the type of PID control. 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 Note: Use settings 5 to 8 when the drive is a replacement for a previous generation drive.	0 (0 - 8)
b5-02 (01A6) RUN	Proportional Gain (P)	V/f OLV OLV/PM AOLV/PM EZOLV Sets the proportional gain (P) that is applied to PID input.	1.00 (0.00 - 25.00)
b5-03 (01A7) RUN	Integral Time (I)	V/f OLV OLV/PM AOLV/PM EZOLV Sets the integral time (I) that is applied to PID input.	1.0 s (0.0 - 360.0 s)
b5-04 (01A8) RUN	Integral Limit	V/f OLV OLV/PM AOLV/PM EZOLV Sets the upper limit for integral control (I) 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]	100.0% (0.0 - 100.0%)
b5-05 (01A9) RUN	Derivative Time (D)	V/f OLV OLV/PM AOLV/PM EZOLV Sets the derivative time (D) for PID control. This parameter adjusts system responsiveness.	0.00 s (0.00 - 10.00 s)
b5-06 (01AA) RUN	PID Output Limit	V/f OLV OLV/PM AOLV/PM EZOLV Sets the maximum possible output from the PID controller 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]	100.0% (0.0 - 100.0%)
b5-07 (01AB) RUN	PID Offset Adjustment	V/f OLV OLV/PM AOLV/PM EZOLV Sets the offset for the PID control output 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]	0.0% (-100.0 - +100.0%)
b5-08 (01AC) RUN Expert	PID Primary Delay Time Constant	V/f OLV OLV/PM AOLV/PM EZOLV Sets the primary delay time constant for the PID control output. Usually it is not necessary to change this setting.	0.00 s (0.00 - 10.00 s)
b5-09 (01AD)	PID Output Level Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the polarity of the PID output. 0 : Normal Output (Direct Acting) 1 : Reverse Output (Reverse Acting)	0 (0, 1)
b5-10 (01AE) RUN	PID Output Gain Setting	V/f OLV OLV/PM AOLV/PM EZOLV Sets the amount of gain to apply to the PID output.	1.00 (0.00 - 25.00)
b5-11 (01AF)	PID Output Reverse Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function that enables and disables reverse motor rotation for negative PID control output. 0 : Lower Limit is Zero 1 : Negative Output Accepted	0 (0, 1)

3.5 b: Application

No. (Hex.)	Name	Description	Default (Range)
b5-12 (01B0)	Feedback Loss Detection Select	V/f OLV OLV/PM AOLV/PM EZOLV Sets the drive response to PID feedback loss/excess. Sets drive operation after the drive detects PID feedback loss/excess. 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	0 (0 - 5)
b5-13 (01B1)	PID Feedback Loss Detection Lvl	V/f OLV OLV/PM AOLV/PM EZOLV Sets the level that triggers <i>PID Feedback Loss [FbL]</i> detection as 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% (0 - 100%)
b5-14 (01B2)	PID Feedback Loss Detection Time	V/f OLV OLV/PM AOLV/PM EZOLV 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>.	1.0 s (0.0 - 25.5 s)
b5-15 (01B3)	PID Sleep Function Start Level	V/f OLV OLV/PM AOLV/PM EZOLV Sets the output level that triggers the PID Sleep function.	0 (0.0 - 590.0)
b5-16 (01B4)	PID Sleep Delay Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets a delay time to start or stop the PID Sleep function.	0.0 s (0.0 - 25.5 s)
b5-17 (01B5) RUN	PID Accel/Decel Time	V/f OLV OLV/PM AOLV/PM EZOLV 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.	0.0 s (0.0 - 6000.0 s)
b5-18 (01DC)	b5-19 PID Setpoint Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function that enables and disables <i>b5-19 [PID Setpoint Value]</i>. 0 : Disabled 1 : Enabled	0 (0, 1)
b5-19 (01DD) RUN	PID Setpoint Value	V/f OLV OLV/PM AOLV/PM EZOLV Sets the PID setpoint when <i>b5-18 = 1 [b5-19 PID Setpoint Selection = Enabled]</i>.	0.00% (0.00 - 100.00%)
b5-20 (01E2)	PID Unit Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the number of digits to set and show the PID setpoint. 0 : 0.01Hz units 1 : 0.01% units 2 : rev/min 3 : User Units	1 (0 - 3)
b5-34 (019F) RUN	PID Output Lower Limit Level	V/f OLV OLV/PM AOLV/PM EZOLV Sets the output lower limit for the PID control as 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>	0.0% (-100.0 - +100.0%)
b5-35 (01A0) RUN	PID Input Limit Level	V/f OLV OLV/PM AOLV/PM EZOLV Sets the output upper limit for the PID control as 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>	1000.0% (0.0 - 1000.0%)
b5-36 (01A1)	PID High Feedback Detection Lvl	V/f OLV OLV/PM AOLV/PM EZOLV Sets the level that triggers <i>Excessive PID Feedback [FbH]</i> as 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>	100% (0 - 100%)

No. (Hex.)	Name	Description	Default (Range)
b5-37 (01A2)	PID High Feedback Detection Time	V/f OLV OLV/PM AOLV/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 Lv]</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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets the monitor (<i>Ux-xx</i>) used as the PID Feedback. Set the <i>x-xx</i> part of the <i>Ux-xx [Monitor]</i> .	000 (000 - 999)
b5-56 (0BE2)	PID Feedback Monitor Gain	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 to b5-60: (1182 - 1184) RUN	PID Setpoints 2 to 4	V/f OLV OLV/PM AOLV/PM EZOLV Sets the PID setpoint when <i>H1-xx = 3E</i> or <i>3F [MFDI Function Selection = 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 OLV OLV/PM AOLV/PM EZOLV Sets the function that adjusts the PID output in relation to the frequency reference. 0 : Disabled 1 : Enabled	0 (0, 1)
b5-62 (119B)	PID Trim Mode Lower Limit Value	V/f OLV OLV/PM AOLV/PM EZOLV Sets the PID Trim Mode Lower Limit Value as 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%)
b5-63 (119C)	PID Differential FB Monitor Sel	V/f OLV OLV/PM AOLV/PM EZOLV Selects the monitor (<i>Ux-xx</i>) used as the PID Differential Feedback. Set the <i>x-xx</i> part of the <i>Ux-xx [Monitor]</i> .	000 (000 - 999)
b5-64 (119D)	PID Differential FB Monitor Gain	V/f OLV OLV/PM AOLV/PM EZOLV Sets the gain for the monitor specified in <i>b5-63 [PID Differential FB Monitor Sel]</i> .	1.00 (0.00 - 10.00)
b5-65 (119F)	PID Differential FB Monitor Bias	V/f OLV OLV/PM AOLV/PM EZOLV Sets the bias for the monitor specified in <i>b5-63 [PID Differential FB Monitor Sel]</i> .	0.00 (-10.00 - +10.00)
b5-66 (11DE)	PID Feedback Monitor Level	V/f OLV OLV/PM AOLV/PM EZOLV Sets the signal level for the monitor specified in <i>b5-55 [PID Feedback Monitor Selection]</i> . 0 : Absolute 1 : Bi-directional (+/-)	0 (0, 1)

3.5 b: Application

No. (Hex.)	Name	Description	Default (Range)
b5-67 (11DF)	PID Differential FB Monitor Lvl	V/f OLV OLV/PM AOLV/PM EZOLV Sets the signal level for the monitor specified in <i>b5-63 [PID Differential FB Monitor Sel]</i>. 0 : Absolute 1 : Bi-directional (+/-)	0 (0, 1)
b5-89 (0B89) RUN	Sleep Method Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets sleep and wake up operation when using PID. 0 : Standard 1 : EZ Sleep/Wake-up	0 (0, 1)
b5-90 (0B90)	EZ Sleep Unit	V/f OLV OLV/PM AOLV/PM EZOLV Sets the measurement units for <i>b5-91 [EZ Sleep Minimum Speed]</i> and <i>b5-92 [EZ Sleep Level]</i>. 0 : 0.1Hz units 1 : rev/min	0 (0, 1)
b5-91 (0B91) RUN	EZ Sleep Minimum Speed	V/f OLV OLV/PM AOLV/PM EZOLV Sets the minimum speed for the EZ Sleep/Wakeup function. This parameter uses the largest value from <i>b5-91</i>, <i>b5-34 [PID Output Lower Limit Level]</i>, and <i>d2-02 [Frequency Reference Lower Limit]</i>.	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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the value that the output frequency or motor speed must be less than for longer than <i>b5-93 [EZ Sleep Time]</i> to enter Sleep Mode.	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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the length of time that the output frequency or motor speed must be less than <i>b5-92 [EZ Sleep Level]</i> to enter Sleep Mode.	5.0 s (0.0 - 1000.0 s)
b5-94 (0B94) RUN	EZ Sleep Wake-up Level	V/f OLV OLV/PM AOLV/PM EZOLV Sets the level at which the drive resumes operation when exiting Sleep Mode.	0.00% (0.00 - 600.00%)
b5-95 (0B95)	EZ Sleep Wake-up Mode	V/f OLV OLV/PM AOLV/PM EZOLV Sets the wake-up mode to use when exiting Sleep Mode. 0 : Absolute 1 : Setpoint Delta	0 (0, 1)
b5-96 (0B96) RUN	EZ Sleep Wake-up Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets the EZ Wake-up time.	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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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)

◆ b8: Energy Saving

No. (Hex.)	Name	Description	Default (Range)
b8-01 (01CC)	Energy Saving Control Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the Energy-saving control function. 0 : Disabled 1 : Enabled 2 : Automatic Optimization Note: When A1-02 = 6 [Control Method Selection = AOLV/PM], you can only select setting 2 in Expert Mode.	0 (0 - 2)
b8-02 (01CD) RUN Expert	Energy Saving Gain	V/f OLV OLV/PM AOLV/PM EZOLV Sets the gain for Energy-saving control.	0.7 (0.0 - 10.0)
b8-03 (01CE) RUN Expert	Energy Saving Filter Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets the responsiveness for Energy-saving control.	0.50 (0.00 - 10.00 s)
b8-04 (01CF) Expert	Energy Saving Coefficient Value	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets the voltage limit for Search Operation as a percentage of the motor rated voltage.	0% (0 - 100%)
b8-16 (01F8) Expert	PM E-Save Coefficient Ki	V/f OLV OLV/PM AOLV/PM 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	V/f OLV OLV/PM AOLV/PM 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	V/f OLV OLV/PM AOLV/PM 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	V/f OLV OLV/PM AOLV/PM 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	V/f OLV OLV/PM AOLV/PM 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	V/f OLV OLV/PM AOLV/PM 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	V/f OLV OLV/PM AOLV/PM 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	V/f OLV OLV/PM AOLV/PM 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	V/f OLV OLV/PM AOLV/PM 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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the start level for search operations.	10.0% (0.0 - 100.0%)

3.5 b: Application

No. (Hex.)	Name	Description	Default (Range)
b8-26 (0B47) Expert	PM E-Save Power Setpoint	V/f OLV OLV/PM AOLV/PM EZOLV Sets a value to increase torque accuracy.	0.0% (-10.0 - +10.0%)
b8-28 (0B8B) Expert	Over Excitation Action Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function for excitation operation. 0 : Disabled 1 : Enabled	0 (0, 1)
b8-29 (0B8C)	Energy Saving Priority Selection	V/f OLV OLV/PM AOLV/PM 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)

3.6 C: Tuning

◆ C1: Accel & Decel Time

No. (Hex.)	Name	Description	Default (Range)
C1-01 (0200) RUN	Acceleration Time 1	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets the S-curve acceleration time at completion.	0.20 s (0.00 - 10.00 s)

3.6 C: Tuning

No. (Hex.)	Name	Description	Default (Range)
C2-03 (020D)	S-Curve Time @ Start of Decel	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets the gain for the slip compensation function. Usually it is not necessary to change this setting. Note: Correctly set these parameters before changing 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 (0.0 - 2.5)
C3-02 (0210) RUN	Slip Compensation Delay Time	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets the slip compensation function during regenerative operation. 0 : Disabled 1 : Enabled Above 6Hz 2 : Enabled Above C3-15	0 (0 - 2)
C3-05 (0213)	Output Voltage Limit Selection	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets the upper limit for the slip compensation function as a percentage of the motor 2 rated slip.	200% (0 - 250%)

No. (Hex.)	Name	Description	Default (Range)
C3-24 (0243)	Motor 2 Slip Comp during Regen	V/f OLV OLV/PM AOLV/PM EZOLV Sets the slip compensation during regenerative operation function for motor 2. 0 : Disabled 1 : Enabled Above 6Hz 2 : Enabled Above C3-15	0 (0 - 2)
C3-29 (1B5D) Expert	Slip Compensation Gain @ Low Spd	V/f OLV OLV/PM AOLV/PM EZOLV Sets the gain for the slip compensation function in the low speed range. Usually it is not necessary to change this setting.	0.0 (0.0 - 2.5)

◆ C4: Torque Compensation

No. (Hex.)	Name	Description	Default (Range)
C4-01 (0215) RUN	Torque Compensation Gain	V/f OLV OLV/PM AOLV/PM EZOLV Sets the gain for the torque compensation function. Use this parameter value for motor 1 when operating multiple motors. Note: When A1-02 = 8 [Control Method Selection = EZOLV], you cannot change this parameter during drive run.	Determined by A1-02 (0.00 - 2.50)
C4-02 (0216) RUN	Torque Compensation Delay Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets the torque compensation delay time. Usually it is not necessary to change this setting. Note: If A1-02 = 8 [Control Method Selection = 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	V/f OLV OLV/PM AOLV/PM EZOLV Set the amount of torque reference for forward start as a percentage of the motor rated torque.	0.0% (0.0 - 200.0%)
C4-04 (0218)	Torque Compensation @ REV Start	V/f OLV OLV/PM AOLV/PM EZOLV Sets the amount of torque reference for reverse start as a percentage of the motor rated torque.	0.0% (-200.0 - 0.0%)
C4-05 (0219)	Torque Compensation Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets the starting torque constant to use with C4-03 and C4-04 [Torque Compensation @ FWD/REV Start].	10 ms (0 - 200 ms)
C4-06 (021A)	Motor 2 Torque Comp Delay Time	V/f OLV OLV/PM AOLV/PM EZOLV 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.	150 ms (0 - 10000 ms)
C4-07 (0341) RUN	Motor 2 Torque Compensation Gain	V/f OLV OLV/PM AOLV/PM EZOLV Sets the gain for motor 2 torque compensation function when using the Motor Switch function.	1.00 (0.00 - 2.50)
C4-23 (1583) RUN Expert	Current Control Gain	V/f OLV OLV/PM AOLV/PM EZOLV Current control gain. Usually it is not necessary to change this parameter.	1.00 (0.50 - 2.50)

◆ C5: Automatic Speed Regulator (ASR: Automatic Speed Regulator)

No. (Hex.)	Name	Description	Default (Range)
C5-01 (021B) RUN	ASR Proportional Gain 1	V/f OLV OLV/PM AOLV/PM EZOLV Sets the gain to adjust ASR response. Note: When A1-02 = 0 [Control Method Selection = V/f], 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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the ASR integral time. Note: When A1-02 = 0 [Control Method Selection = V/f], 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)

3.6 C: Tuning

No. (Hex.)	Name	Description	Default (Range)
C5-03 (021D) RUN	ASR Proportional Gain 2	V/f OLV OLV/PM AOLV/PM EZOLV Sets the gain to adjust ASR response. Note: When A1-02 = 0 [Control Method Selection = V/f], 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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the ASR integral time. Note: When A1-02 = 0 [Control Method Selection = V/f], 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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the ASR output limit where E1-04 [Maximum Output Frequency] is 100%. Note: When A1-02 = 0 [Control Method Selection = V/f], set H6-01 = 3 [Terminal RP Pulse Train Function = Speed Feedback (V/F Control)] to enable this parameter.	5.0% (0.0 - 20.0%)
C5-06 (0220)	ASR Delay Time	V/f OLV OLV/PM AOLV/PM 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	V/f OLV OLV/PM AOLV/PM 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	V/f OLV OLV/PM AOLV/PM 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	V/f OLV OLV/PM AOLV/PM EZOLV Sets ASR integral operation during acceleration and deceleration. 0 : No 1 : Yes Note: When A1-02 = 0 [Control Method Selection = V/f], set H6-01 = 3 [Terminal RP Pulse Train Function = Speed Feedback (V/F Control)] to enable this parameter.	0 (0, 1)
C5-29 (0B18) Expert	Speed Control Response	V/f OLV OLV/PM AOLV/PM EZOLV Sets the level of speed control responsiveness. Usually it is not necessary to change this setting. 0 : Standard 1 : High Performance 1	1 (0, 1)
C5-39 (030D)	ASR Primary Delay Time Const 2	V/f OLV OLV/PM AOLV/PM EZOLV Sets the filter time constant used when the torque reference is output from ASR. Usually it is not necessary to change this parameter.	0.000 s (0.000 - 0.500 s)

◆ C6: Duty & Carrier Frequency

No. (Hex.)	Name	Description	Default (Range)
C6-01 (0223)	Normal / Heavy Duty Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the drive duty rating. 0 : Heavy Duty Rating 1 : Normal Duty Rating	1 (0, 1)
C6-02 (0224)	Carrier Frequency Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the carrier frequency for the transistors in the drive. 1 : 2.0 kHz 2 : 5.0 kHz (4.0 kHz for AOLV/PM) 3 : 8.0 kHz 4 : 10.0 kHz 5 : 12.5 kHz 6 : 15.0 kHz 7 : Swing PWM4 (Audible Sound 1) 8 : Swing PWM4 (Audible Sound 2) 9 : Swing PWM4 (Audible Sound 3) A : Swing PWM4 (Audible Sound 4) B : Leakage Current Rejection PWM F : User Defined (C6-03 to C6-05) Note: - The setting range changes when the A1-02 [Control Method Selection] value changes: –5, 8 [OLV/PM, EZOLV]: You cannot set to 7 to A. –When 6 [AOLV/PM]: 2 [5.0 kHz (AOLV/PM: 4.0 kHz)] is available. - The carrier frequency for Swing PWM 1 is equivalent to 2.0 kHz. Swing PWM applies a special PWM pattern to decrease the audible noise.	Determined by A1-02, C6-01, and o2-04 (Determined by A1-02)
C6-03 (0225)	Carrier Frequency Upper Limit	V/f OLV OLV/PM AOLV/PM EZOLV Sets the upper limit of the carrier frequency. Set C6-02 = F [Carrier Frequency Selection = User Defined (C6-03 to C6-05)] to set this parameter.	Determined by C6-02 (1.0 - 15.0 kHz)
C6-04 (0226)	Carrier Frequency Lower Limit	V/f OLV OLV/PM AOLV/PM EZOLV Sets the lower limit of the carrier frequency. Set C6-02 = F [Carrier Frequency Selection = User Defined (C6-03 to C6-05)] to set this parameter.	Determined by C6-02 (1.0 - 15.0 kHz)
C6-05 (0227)	Carrier Freq Proportional Gain	V/f OLV OLV/PM AOLV/PM EZOLV Sets the proportional gain for the carrier frequency. Set C6-02 = F [Carrier Frequency Selection = User Defined (C6-03 to C6-05)] to set this parameter.	Determined by C6-02 (0 - 99)
C6-09 (022B)	Carrier Freq at Rotational Tune	V/f OLV OLV/PM AOLV/PM EZOLV Sets the Auto-Tuning carrier frequency. Usually it is not necessary to change this setting. 0 : 5 kHz 1 : Use C6-03	0 (0, 1)

3.7 d: Reference Settings

◆ d1: Frequency Reference

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

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

◆ d2: Reference Limits

No. (Hex.)	Name	Description	Default (Range)
d2-01 (0289)	Frequency Reference Upper Limit	V/f OLV OLV/PM AOLV/PM EZOLV Sets maximum limit for all frequency references. The maximum output frequency is 100%. Note: Parameter <i>A1-02</i> [Control Method Selection] selects which parameter is the maximum output frequency. • <i>A1-02</i> ≠ 8 [EZOLV]: E1-04 [Maximum Output Frequency] • <i>A1-02</i> = 8: E9-02 [Motor Max Revolutions]	100.0% (0.0 - 110.0%)
d2-02 (028A)	Frequency Reference Lower Limit	V/f OLV OLV/PM AOLV/PM EZOLV Sets minimum limit for all frequency references. The maximum output frequency is 100%. Note: Parameter <i>A1-02</i> [Control Method Selection] selects which parameter is the maximum output frequency. • <i>A1-02</i> ≠ 8 [EZOLV]: E1-04 [Maximum Output Frequency] • <i>A1-02</i> = 8: E9-02 [Motor Max Revolutions]	0.0% (0.0 - 110.0%)
d2-03 (0293)	Analog Frequency Ref Lower Limit	V/f OLV OLV/PM AOLV/PM EZOLV 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%. Note: Parameter <i>A1-02</i> [Control Method Selection] selects which parameter is the maximum output frequency. • <i>A1-02</i> ≠ 8: E1-04 [Maximum Output Frequency] • <i>A1-02</i> = 8: E9-02 [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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 [MF DI Function Selection]</i> to one of these values to enable this parameter: <i>A [Accel/Decel Ramp Hold]</i> <i>10/11 [Up/Down Command]</i> <i>75/76 [Up/Down 2 Command]</i> 0 : Disabled 1 : Enabled	0 (0, 1)
d4-03 (02AA) RUN	Up/Down 2 Bias Step Frequency	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets the function that saves the bias value to the drive when you open or close the two <i>Up/Down 2 Commands [H1-xx = 75, 76]</i> . Set <i>d4-03 [Up/Down 2 Bias Step Frequency] = 0.00</i> 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 OLV OLV/PM AOLV/PM EZOLV Saves the bias value from the Up/Down 2 Command where the Maximum Output Frequency is 100%. 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>	0.0% (-99.9 - +100.0%)
d4-07 (02AE) RUN	Analog Freq Ref Fluctuate Limit	V/f OLV OLV/PM AOLV/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 [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>	1.0% (0.1 - 100.0%)
d4-08 (02AF) RUN	Up/Down 2 Bias Upper Limit	V/f OLV OLV/PM AOLV/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 [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>	100.0% (0.0 - 100.0%)

No. (Hex.)	Name	Description	Default (Range)
d4-09 (02B0) RUN	Up/Down 2 Bias Lower Limit	V/f OLV OLV/PM AOLV/PM EZOLV Sets the lower 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. • <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 - 0.0%)
d4-10 (02B6)	Up/Down Freq Lower Limit Select	V/f OLV OLV/PM AOLV/PM EZOLV Sets the lower frequency limit for the Up/Down function. 0 : Greater of d2-02 or Analog 1 : d2-02	0 (0, 1)

◆ d6: Field Weakening /Forcing

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

◆ d7: Offset Frequency

No. (Hex.)	Name	Description	Default (Range)
d7-01 (02B2) RUN	Offset Frequency 1	V/f OLV OLV/PM AOLV/PM EZOLV Uses <i>H1-xx</i> = 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. 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]	0.0% (-100.0 - +100.0%)
d7-02 (02B3) RUN	Offset Frequency 2	V/f OLV OLV/PM AOLV/PM EZOLV Uses <i>H1-xx</i> = 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. 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]	0.0% (-100.0 - +100.0%)
d7-03 (02B4) RUN	Offset Frequency 3	V/f OLV OLV/PM AOLV/PM EZOLV Uses <i>H1-xx</i> = 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. 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]	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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the drive input voltage. NOTICE Set parameter E1-01 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.	200 V Class: 240 V, 400 V: 480 V (200 V Class: 155 - 255 V, 400 V Class: 310 - 510 V)
E1-03 (0302)	V/f Pattern Selection	V/f OLV OLV/PM AOLV/PM EZOLV 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. 0 : Const Trq, 50Hz base, 50Hz max 1 : Const Trq, 60Hz base, 60Hz max 2 : Const Trq, 50Hz base, 60Hz max 3 : Const Trq, 60 Hz base, 72 Hz max 4 : VT, 50Hz, 65% Vmid reduction 5 : VT, 50Hz, 50% Vmid reduction 6 : VT, 60 Hz, 65% Vmid reduction 7 : VT, 60 Hz, 50% Vmid reduction 8 : High Trq, 50Hz, 25% Vmin Boost 9 : High Trq, 50Hz, 65% Vmin Boost A : High Trq, 60 Hz, 25% Vmin Boost B : High Trq, 60 Hz, 65% Vmin Boost C : Const Trq, 60 Hz base, 90 Hz max D : Const Trq, 60 Hz base, 120 Hz max E : Const Trq, 60 Hz base, 180 Hz max F : V/f Pattern Selection Note: - 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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the maximum output frequency for the V/f pattern.	Determined by A1-02 and E5-01 (Determined by A1-02 and E5-01)
E1-05 (0304)	Maximum Output Voltage	V/f OLV OLV/PM AOLV/PM EZOLV Sets the maximum output voltage for the V/f pattern.	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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the base frequency for the V/f pattern.	Determined by A1-02 and E5-01 (0.0 - E1-04)
E1-07 (0306)	Mid Point A Frequency	V/f OLV OLV/PM AOLV/PM EZOLV Sets a middle output frequency for the V/f pattern.	Determined by A1-02 (0.0 - E1-04)
E1-08 (0307)	Mid Point A Voltage	V/f OLV OLV/PM AOLV/PM EZOLV Sets a middle output voltage for the V/f pattern.	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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the minimum output frequency for the V/f pattern.	Determined by A1-02 and E5-01 (Determined by A1-02, E1-04, and E5-01)
E1-10 (0309)	Minimum Output Voltage	V/f OLV OLV/PM AOLV/PM EZOLV Sets the minimum output voltage for the V/f pattern.	Determined by A1-02 (200 V Class: 0.0 - 255.0 V, 400 V Class: 0.0 - 510.0 V)
E1-11 (030A) Expert	Mid Point B Frequency	V/f OLV OLV/PM AOLV/PM EZOLV Sets a middle output frequency for the V/f pattern.	0.0 Hz (0.0 - E1-04)

No. (Hex.)	Name	Description	Default (Range)
E1-12 (030B) Expert	Mid Point B Voltage	V/f OLV OLV/PM AOLV/PM EZOLV Sets a middle point voltage for the V/f pattern.	0.0 V (200 V Class: 0.0 - 255.0 V, 400 V Class: 0.0 - 510.0 V)
E1-13 (030C) Expert	Base Voltage	V/f OLV OLV/PM AOLV/PM EZOLV Sets the base voltage for the V/f pattern.	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)	V/f OLV OLV/PM AOLV/PM EZOLV Sets the motor rated current in amps.	Determined by o2-04, C6-01 (10% to 200% of the drive rated current)
E2-02 (030F)	Motor Rated Slip	V/f OLV OLV/PM AOLV/PM EZOLV Sets motor rated slip.	Determined by o2-04, C6-01 (0.000 - 20.000 Hz)
E2-03 (0310)	Motor No-Load Current	V/f OLV OLV/PM AOLV/PM EZOLV Sets the no-load current for the motor in amps when operating at the rated frequency and the no-load voltage.	Determined by o2-04, C6-01 (0 to E2-01)
E2-04 (0311)	Motor Pole Count	V/f OLV OLV/PM AOLV/PM EZOLV Sets the number of motor poles. Note: • When A1-02 = 0 [Control Method Selection = V/f], the maximum value is 120. • When A1-02 = 2 [OLV], the maximum value is 48.	4 (2 - 120)
E2-05 (0312)	Motor Line-to-Line Resistance	V/f OLV OLV/PM AOLV/PM EZOLV Sets the line-to-line resistance for the motor stator windings.	Determined by o2-04, C6-01 (0.000 - 65.000 Ω)
E2-06 (0313)	Motor Leakage Inductance	V/f OLV OLV/PM AOLV/PM EZOLV 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.	Determined by o2-04, C6-01 (0.0 - 60.0%)
E2-07 (0314)	Motor Saturation Coefficient 1	V/f OLV OLV/PM AOLV/PM EZOLV Sets the motor iron-core saturation coefficient at 50% of the magnetic flux.	0.50 (0.00 - 0.50)
E2-08 (0315)	Motor Saturation Coefficient 2	V/f OLV OLV/PM AOLV/PM EZOLV Sets the motor iron-core saturation coefficient at 75% of the magnetic flux.	0.75 (E2-07 - 0.75)
E2-09 (0316) Expert	Motor Mechanical Loss	V/f OLV OLV/PM AOLV/PM EZOLV 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.	0.0% (0.0 - 10.0%)
E2-10 (0317)	Motor Iron Loss	V/f OLV OLV/PM AOLV/PM EZOLV Sets the motor iron loss.	Determined by o2-04, C6-01 (0 - 65535 W)
E2-11 (0318)	Motor Rated Power	V/f OLV OLV/PM AOLV/PM EZOLV Sets the motor rated output in the units from o1-58 [Motor Power Unit Selection].	Determined by o2-04, C6-01 (0.00 - 650.00 HP)

◆ E3: V/f Pattern for Motor 2

No. (Hex.)	Name	Description	Default (Range)
E3-01 (0319)	Motor 2 Control Mode Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the control method for motor 2. Note: When you change this setting, the drive will set all parameters that are dependent on this parameter to their default settings. 0 : V/f Control 2 : Open Loop Vector	0 (0, 2)
E3-04 (031A)	Motor 2 Maximum Output Frequency	V/f OLV OLV/PM AOLV/PM EZOLV Set the maximum output frequency for the motor 2 V/f pattern.	Determined by E3-01 (40.0 - 590.0 Hz)
E3-05 (031B)	Motor 2 Maximum Output Voltage	V/f OLV OLV/PM AOLV/PM EZOLV Sets the maximum output voltage for the motor 2 V/f pattern.	Determined by E3-01 (200 V Class: 0.0 - 255.0 V, 400 V Class: 0.0 - 510.0 V)

3.8 E: Motor Parameters

No. (Hex.)	Name	Description	Default (Range)
E3-06 (031C)	Motor 2 Base Frequency	V/f OLV OLV/PM AOLV/PM EZOLV Sets the base frequency for the motor 2 V/f pattern.	Determined by E3-01 (0.0 - E3-04)
E3-07 (031D)	Motor 2 Mid Point A Frequency	V/f OLV OLV/PM AOLV/PM EZOLV Sets a middle output frequency for the motor 2 V/f pattern.	Determined by E3-01 (0.0 - E3-04)
E3-08 (031E)	Motor 2 Mid Point A Voltage	V/f OLV OLV/PM AOLV/PM EZOLV Sets a middle output voltage for the motor 2 V/f pattern.	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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the minimum output frequency for the motor 2 V/f pattern.	Determined by E3-01 (0.0 - E3-04)
E3-10 (0320)	Motor 2 Minimum Output Voltage	V/f OLV OLV/PM AOLV/PM EZOLV Sets the minimum output voltage for the motor 2 V/f pattern.	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	V/f OLV OLV/PM AOLV/PM EZOLV 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.	0.0 Hz (0.0 - E3-04)
E3-12 (0346) Expert	Motor 2 Mid Point B Voltage	V/f OLV OLV/PM AOLV/PM EZOLV 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.	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	V/f OLV OLV/PM AOLV/PM EZOLV 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.	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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the motor rated current for motor 2 in amps.	Determined by o2-04, C6-01 (10% to 200% of the drive rated current)
E4-02 (0322)	Motor 2 Rated Slip	V/f OLV OLV/PM AOLV/PM EZOLV Sets the motor rated slip for motor 2.	Determined by o2-04, C6-01 (0.000 - 20.000 Hz)
E4-03 (0323)	Motor 2 Rated No-Load Current	V/f OLV OLV/PM AOLV/PM EZOLV Sets the no-load current for motor 2 in amps when operating at the rated frequency and the no-load voltage.	Determined by o2-04, C6-01 (0 to E4-01)
E4-04 (0324)	Motor 2 Motor Poles	V/f OLV OLV/PM AOLV/PM EZOLV Sets the number of poles for motor 2.	4 (2 - 120)
E4-05 (0325)	Motor 2 Line-to-Line Resistance	V/f OLV OLV/PM AOLV/PM EZOLV Sets the line-to-line resistance for the motor 2 stator windings.	Determined by o2-04, C6-01 (0.000 - 65.000 Ω)
E4-06 (0326)	Motor 2 Leakage Inductance	V/f OLV OLV/PM AOLV/PM EZOLV 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.	Determined by o2-04, C6-01 (0.0 - 60.0%)
E4-07 (0343)	Motor 2 Saturation Coefficient 1	V/f OLV OLV/PM AOLV/PM 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	V/f OLV OLV/PM AOLV/PM 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	V/f OLV OLV/PM AOLV/PM 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	V/f OLV OLV/PM AOLV/PM 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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the motor rated power in the units from o1-58 [Motor Power Unit Selection].	Determined by o2-04, C6-01 (0.00 - 650.00 HP)

◆ E5: PM Motor Settings

No. (Hex.)	Name	Description	Default (Range)
E5-01 (0329)	PM Motor Code Selection	V/f OLV OLV/PM AOLV/PM 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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the PM motor rated output in the units from 01-58 [Motor Power Unit Selection].	Determined by 02-04, C6-01 (0.10 - 30.00 kW)
E5-03 (032B)	Motor Rated Current (FLA)	V/f OLV OLV/PM AOLV/PM EZOLV Sets the PM motor rated current (FLA).	Determined by 02-04, C6-01 (10% to 200% of the drive rated current)
E5-04 (032C)	PM Motor Pole Count	V/f OLV OLV/PM AOLV/PM EZOLV Sets the number of PM motor poles. Note: 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 (ohms/phase)	V/f OLV OLV/PM AOLV/PM EZOLV Sets the resistance per phase of a PM motor. Set 50% of the line-to-line resistance.	0.100 Ω (0.000 - 65.000 Ω)
E5-06 (032E)	PM d-axis Inductance (mH/phase)	V/f OLV OLV/PM AOLV/PM 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)	V/f OLV OLV/PM AOLV/PM EZOLV Sets the PM motor q-axis inductance.	1.00 mH (0.00 - 600.00 mH)
E5-09 (0331)	PM Back-EMF Vpeak (mV/(rad/s))	V/f OLV OLV/PM AOLV/PM EZOLV Sets the peak value of PM motor induced voltage.	0.0 mV/(rad/sec) (0.0 - 2000.0 mV/(rad/s))
E5-24 (0353)	PM Back-EMF L-L Vrms (mV/rpm)	V/f OLV OLV/PM AOLV/PM 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	V/f OLV OLV/PM AOLV/PM 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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the type of motor. 0 : Induction (IM) 1 : Permanent Magnet (PM) 2 : Synchronous Reluctance (SynRM)	0 (0 to 2)
E9-02 (11E5)	Maximum Speed	V/f OLV OLV/PM AOLV/PM EZOLV Sets the maximum speed of the motor.	Determined by E9-01 (40.0 - 120.0 Hz)
E9-03 (11E6)	Rated Speed	V/f OLV OLV/PM AOLV/PM EZOLV Sets the rated rotation speed of the motor.	Determined by E9-01 (100 - 7200 min ⁻¹)
E9-04 (11E7)	Base Frequency	V/f OLV OLV/PM AOLV/PM EZOLV Sets the rated frequency of the motor.	Determined by E9-01 (40.0 - 120.0 Hz)
E9-05 (11E8)	Motor Rated Voltage	V/f OLV OLV/PM AOLV/PM EZOLV Sets the rated voltage of the motor.	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)
E9-06 (11E9)	Motor Rated Current (FLA)	V/f OLV OLV/PM AOLV/PM EZOLV Sets the motor rated current in amps.	Determined by E9-01 and 02-04 (10% to 200% of the drive rated current)
E9-07 (11EA)	Motor Rated Power	V/f OLV OLV/PM AOLV/PM EZOLV Sets the motor rated output in the units from 01-58 [Motor Power Unit Selection].	Determined by E9-02 and 02-04 (0.00 - 650.00 kW)

3.8 E: Motor Parameters

No. (Hex.)	Name	Description	Default (Range)
E9-08 (11EB)	Motor Pole Count	V/f OLV OLV/PM AOLV/PM EZOLV Sets the number of motor poles.	4 (2 to 120)
E9-09 (11EC)	Motor Rated Slip	V/f OLV OLV/PM AOLV/PM EZOLV Sets the motor rated slip.	0.000 Hz (0.000 - 20.000 Hz)
E9-10 (11ED)	Motor Line-to-Line Resistance	V/f OLV OLV/PM AOLV/PM EZOLV Sets the line-to-line resistance for the motor stator windings.	Determined by o2-04 (0.000 - 65.000 Ω)

3.9 F: Options

◆ F1: Fault Detection in PG Speed Control

No. (Hex.)	Name	Description	Default (Range)
F1-02 (0381)	Encoder Signal Loss Detect Sel	V/f OLV OLV/PM AOLV/PM EZOLV Sets the method to stop the motor or let the motor continue operating when the drive detects <i>PGO</i> [Encoder (PG) Feedback Loss]. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) 3 : Alarm Only 4 : No Alarm Display Note: When <i>A1-02</i> = 0 [Control Method Selection = <i>V/f</i>], set <i>H6-01</i> = 3 [Terminal RP Pulse Train Function = Speed Feedback (V/F Control)] to enable this parameter.	1 (0 - 4)
F1-03 (0382)	Overspeed Detection Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the method to stop the motor or let the motor continue to operate when the drive detects <i>oS</i> [Overspeed]. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) 3 : Alarm Only Note: When <i>A1-02</i> = 0 [Control Method Selection = <i>V/f</i>], set <i>H6-01</i> = 3 [Terminal RP Pulse Train Function = Speed Feedback (V/F Control)] to enable this parameter.	1 (0 - 3)
F1-04 (0383)	Speed Deviation Detection Select	V/f OLV OLV/PM AOLV/PM EZOLV Sets the method to stop the motor or let the motor continue to operate when the drive detects <i>dEv</i> [Speed Deviation]. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) 3 : Alarm Only Note: When <i>A1-02</i> = 0 [Control Method Selection = <i>V/f</i>], set <i>H6-01</i> = 3 [Terminal RP Pulse Train Function = Speed Feedback (V/F Control)] to enable this parameter.	3 (0 - 3)
F1-08 (0387)	Overspeed Detection Level	V/f OLV OLV/PM AOLV/PM EZOLV Sets the detection level of <i>oS</i> [Overspeed] as a percentage when the maximum output frequency is 100%. 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> [Motor Max Revolutions] - When <i>A1-02</i> = 0 [Control Method Selection = <i>V/f</i>], set <i>H6-01</i> = 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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the length of time that the speed feedback must be more than the <i>F1-08</i> level to cause <i>oS</i> [Overspeed]. Note: When <i>A1-02</i> = 0 [Control Method Selection = <i>V/f</i>], set <i>H6-01</i> = 3 [Terminal RP Pulse Train Function = Speed Feedback (V/F Control)] to enable this parameter.	Determined by <i>A1-02</i> (0.0 - 2.0 s)
F1-10 (0389)	Speed Deviation Detection Level	V/f OLV OLV/PM AOLV/PM EZOLV Sets the detection level of <i>dEv</i> [Speed Deviation] as a percentage when the maximum output frequency is 100%. 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] - When <i>A1-02</i> = 0 [Control Method Selection = <i>V/f</i>], set <i>H6-01</i> = 3 [Terminal RP Pulse Train Function = Speed Feedback (V/F Control)] to enable this parameter.	10% (0 - 50%)

3.9 F: Options

No. (Hex.)	Name	Description	Default (Range)
F1-11 (038A)	Speed Deviation Detect DelayTime	V/f OLV OLV/PM AOLV/PM EZOLV Sets the length of time that the difference between the frequency reference and speed feedback must be more than the level in <i>F1-10</i> to cause <i>dEv</i> [Speed Deviation]. Note: When <i>A1-02</i> = 0 [Control Method Selection = V/f], 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)
F1-14 (038D)	Encoder Open-Circuit Detect Time	V/f OLV OLV/PM AOLV/PM 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. When <i>A1-02</i> = 0 [Control Method Selection = V/f], 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)

◆ F6: Communication Options

No. (Hex.)	Name	Description	Default (Range)
F6-01 (03A2)	Communication Error Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the method to stop the motor or let the motor continue operating when the drive detects <i>bUS</i> [Option Communication Error]. 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	1 (0 - 5)
F6-02 (03A3)	Comm External Fault (EF0) Detect	V/f OLV OLV/PM AOLV/PM EZOLV Sets the conditions at which <i>EF0</i> [Option Card External Fault] is detected. 0 : Always Detected 1 : Detected during RUN Only	0 (0, 1)
F6-03 (03A4)	Comm External Fault (EF0) Select	V/f OLV OLV/PM AOLV/PM EZOLV Sets the method to stop the motor or let the motor continue operating when the drive detects <i>EF0</i> [Option Card External Fault]. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) 3 : Alarm Only	1 (0 - 3)
F6-04 (03A5)	bUS Error Detection Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets the delay time for the drive to detect <i>bUS</i> [Option Communication Error]. Note: When you install an option card in the drive, the parameter value changes to 0.0 s.	2.0 s (0.0 - 12.0 s)
F6-06 (03A7)	Torque Reference/Limit by Comm	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function that enables and disables the torque reference and torque limit received from the communication option. 0 : Disabled 1 : Enabled	0 (0, 1)
F6-07 (03A8)	Multi-Step Ref @ NetRef/ ComRef	V/f OLV OLV/PM AOLV/PM EZOLV 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). 0 : Disable Multi-Step References 1 : Enable Multi-Step References	1 (0, 1)
F6-08 (036A)	Comm Parameter Reset @Initialize	V/f OLV OLV/PM AOLV/PM EZOLV 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]. 0 : No Reset - Parameters Retained 1 : Reset Back to Factory Default	0 (0, 1)

No. (Hex.)	Name	Description	Default (Range)
F6-10 (03B6)	CC-Link Node Address	V/f OLV OLV/PM AOLV/PM EZOLV Sets the node address for CC-Link communication. Restart the drive after you change the parameter setting. 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.	0 (0 - 64)
F6-11 (03B7)	CC-Link Communication Speed	V/f OLV OLV/PM AOLV/PM EZOLV Sets the communication speed for CC-Link communication. Restart the drive after you change the parameter setting. 0 : 156 kbps 1 : 625 kbps 2 : 2.5 Mbps 3 : 5 Mbps 4 : 10 Mbps	0 (0 - 4)
F6-14 (03BB)	BUS Error Auto Reset	V/f OLV OLV/PM AOLV/PM EZOLV Sets the automatic reset function for <i>bUS</i> [Option Communication Errors]. 0 : Disabled 1 : Enabled	0 (0, 1)
F6-15 (0B5B)	Comm. Option Parameters Reload	V/f OLV OLV/PM AOLV/PM EZOLV Sets the update method when you change <i>F6-xx</i>, <i>F7-xx</i> [Communication Options]. 0 : Reload at Next Power Cycle 1 : Reload Now 2 : Cancel Reload Request	0 (0 - 2)
F6-16 (0B8A)	Gateway Mode	V/f OLV OLV/PM AOLV/PM EZOLV 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	0 (0 to 4)
F6-20 (036B)	MECHATROLINK Station Address	V/f OLV OLV/PM AOLV/PM EZOLV Sets the station address for MECHATROLINK communication. Change the parameter then cycle power on the drive. Note: - 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 <i>AEr</i> [Station Address Setting Error] errors and the L.ERR LED on the option will come on. - The drive detects <i>AEr</i> errors when the station address is 20 or 3F.	0021h (MECHATROLINK-II: 0020h - 003Fh, MECHATROLINK-III: 0003h - 00EFh)
F6-21 (036C)	MECHATROLINK Frame Size	V/f OLV OLV/PM AOLV/PM EZOLV 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)	0 (0, 1)
F6-22 (036D)	MECHATROLINK Link Speed	V/f OLV OLV/PM AOLV/PM EZOLV Sets the communications speed for MECHATROLINK-II. Restart the drive after you change the parameter setting. Note: This parameter is only available with the MECHATROLINK-II option. 0 : 10 Mbps 1 : 4 Mbps	0 (0, 1)
F6-23 (036E)	MECHATROLINK Monitor Select (E)	V/f OLV OLV/PM AOLV/PM EZOLV 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.	0000h (0000h - FFFFh)
F6-24 (036F)	MECHATROLINK Monitor Select (F)	V/f OLV OLV/PM AOLV/PM EZOLV 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.	0000h (0000h - FFFFh)

3.9 F: Options

No. (Hex.)	Name	Description	Default (Range)
F6-25 (03C9)	MECHATROLINK Watchdog Error Sel	V/f OLV OLV/PM AOLV/PM EZOLV Sets the method to stop the motor or let the motor continue operating when the drive detects <i>E5 [MECHATROLINK Watchdog Timer Err]</i>. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) 3 : Alarm Only	1 (0 - 3)
F6-26 (03CA)	MECHATROLINK Allowable No of Err	V/f OLV OLV/PM AOLV/PM EZOLV Sets the number of times that the option must detect a <i>bUS</i> alarm to cause a <i>bUS [Option Communication Error]</i>.	2 (2 - 10 times)
F6-30 (03CB)	PROFIBUS-DP Node Address	V/f OLV OLV/PM AOLV/PM EZOLV Sets the node address for PROFIBUS-DP communication. Restart the drive after you change the parameter setting. Note: Be sure to set an address that is different than all other node addresses. Do not set this parameter to 0.	0 (0 - 125)
F6-31 (03CC)	PROFIBUS-DP Clear Mode Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets what the drive will do after it receives the Clear Mode command. 0 : Reset 1 : Hold Previous State	0 (0, 1)
F6-32 (03CD)	PROFIBUS-DP Data Format Select	V/f OLV OLV/PM AOLV/PM EZOLV Sets the data format of PROFIBUS-DP communication. Restart the drive after you change the parameter setting. 0 : PPO Type 1 : Conventional 2 : PPO (bit0) 3 : PPO (Enter) 4 : Conventional (Enter) 5 : PPO (bit0, Enter)	0 (0 - 5)
F6-35 (03D0)	CANopen Node ID Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the node address for CANopen communication. Restart the drive after you change the parameter setting. 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.	0 (0 - 126)
F6-36 (03D1)	CANopen Communication Speed	V/f OLV OLV/PM AOLV/PM EZOLV Sets the CANopen communications speed. Restart the drive after you change the parameter setting. 0 : Detect Automatically 1 : 10 kbps 2 : 20 kbps 3 : 50 kbps 4 : 125 kbps 5 : 250 kbps 6 : 500 kbps 7 : 800 kbps 8 : 1 Mbps	6 (0 - 8)
F6-48 (02FE)	BACnet Device Object Identifier0	V/f OLV OLV/PM AOLV/PM EZOLV Sets the first word of addresses for BACnet communication.	0 (0 - 0xFFFF)
F6-49 (02FF)	BACnet Device Object Identifier1	V/f OLV OLV/PM AOLV/PM EZOLV Sets the last word of addresses for BACnet communication.	0 (0 - 0x3F)
F6-50 (03C1)	DeviceNet MAC Address	V/f OLV OLV/PM AOLV/PM EZOLV Sets the MAC address for DeviceNet communication. Restart the drive after you change the parameter setting. 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.	64 (0 - 64)

No. (Hex.)	Name	Description	Default (Range)
F6-51 (03C2)	DeviceNet Baud Rate	V/f OLV OLV/PM AOLV/PM EZOLV Sets the DeviceNet communications speed. Restart the drive after you change the parameter setting. 0 : 125 kbps 1 : 250 kbps 2 : 500 kbps 3 : Adjustable from Network 4 : Detect Automatically	4 (0 - 4)
F6-52 (03C3)	DeviceNet PCA Setting	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets the function to detect <i>EF0 [Option Card External Fault]</i> when the drive does not receive data from the DeviceNet master. 0 : Enabled 1 : Disabled, No Fault Detection 2 : Vendor Specific 3 : RUN Forward 4 : Reverse run	0 (0 - 4)
F6-55 (03C6)	DeviceNet Baud Rate Monitor	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets the speed scale for DeviceNet communication.	0 (-15 - +15)
F6-57 (03D8)	DeviceNet Current Scaling	V/f OLV OLV/PM AOLV/PM EZOLV Sets the current scale of the DeviceNet communication master.	0 (-15 - +15)
F6-58 (03D9)	DeviceNet Torque Scaling	V/f OLV OLV/PM AOLV/PM EZOLV Sets the torque scale of the DeviceNet communication master.	0 (-15 - +15)
F6-59 (03DA)	DeviceNet Power Scaling	V/f OLV OLV/PM AOLV/PM EZOLV Sets the power scale of the DeviceNet communication master.	0 (-15 - +15)
F6-60 (03DB)	DeviceNet Voltage Scaling	V/f OLV OLV/PM AOLV/PM EZOLV Sets the voltage scale of the DeviceNet communication master.	0 (-15 - +15)
F6-61 (03DC)	DeviceNet Time Scaling	V/f OLV OLV/PM AOLV/PM EZOLV Sets the time scale of the DeviceNet communication master.	0 (-15 - +15)
F6-62 (03DD)	DeviceNet Heartbeat Interval	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 to F6-67 (03DF - 03E2)	Dynamic Out Assembly 109 Param 1 to 4	V/f OLV OLV/PM AOLV/PM EZOLV Sets Configurable Outputs 1 to 4 written to the MEMOBUS register.	0000h (0000h - FFFFh)
F6-68 to F6-71 (03E3, 03E4, 03C7, and 03C8)	Dynamic In Assembly 159 Param 1 to 4	V/f OLV OLV/PM AOLV/PM EZOLV Sets Configurable Inputs 1 to 4 written to the MEMOBUS register.	0000h (0000h - FFFFh)
F6-72 (081B)	PowerLink Node Address	V/f OLV OLV/PM AOLV/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: Ethernet Options

No. (Hex.)	Name	Description	Default (Range)
F7-01 (03E5)	IP Address 1	V/f OLV OLV/IPM AOLV/IPM EZOLV 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. Note: When $F7-13 = 0$ [Address Mode at Startup = Static]: • Use parameters $F7-01$ to $F7-04$ [IP Address 4] to set the IP Address. Be sure to set a different IP address for each drive on the network. • Also set parameters $F7-01$ to $F7-12$.	192 (0 - 255)
F7-02 (03E6)	IP Address 2	V/f OLV OLV/IPM AOLV/IPM EZOLV 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. Note: When $F7-13 = 0$ [Address Mode at Startup = Static]: • Use parameters $F7-01$ to $F7-04$ [IP Address 4] to set the IP Address. Be sure to set a different IP address for each drive on the network. • Also set parameters $F7-01$ to $F7-12$.	168 (0 - 255)
F7-03 (03E7)	IP Address 3	V/f OLV OLV/IPM AOLV/IPM EZOLV 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. Note: When $F7-13 = 0$ [Address Mode at Startup = Static]: • Use parameters $F7-01$ to $F7-04$ [IP Address 4] to set the IP Address. Be sure to set a different IP address for each drive on the network. • Also set parameters $F7-01$ to $F7-12$.	1 (0 - 255)
F7-04 (03E8)	IP Address 4	V/f OLV OLV/IPM AOLV/IPM EZOLV 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. Note: When $F7-13 = 0$ [Address Mode at Startup = Static]: • Use parameters $F7-01$ to $F7-04$ [IP Address 4] to set the IP Address. Be sure to set a different IP address for each drive on the network. • Also set parameters $F7-01$ to $F7-12$.	20 (0 - 255)
F7-05 (03E9)	Subnet Mask 1	V/f OLV OLV/IPM AOLV/IPM EZOLV Sets the first octet of the subnet mask of the connected network. Note: Set this parameter when $F7-13 = 0$ [Address Mode at Startup = Static].	255 (0 - 255)
F7-06 (03EA)	Subnet Mask 2	V/f OLV OLV/IPM AOLV/IPM EZOLV Sets the second octet of the subnet mask of the connected network. Note: Set this parameter when $F7-13 = 0$ [Address Mode at Startup = Static].	255 (0 - 255)
F7-07 (03EB)	Subnet Mask 3	V/f OLV OLV/IPM AOLV/IPM EZOLV Sets the third octet of the subnet mask of the connected network. Note: Set this parameter when $F7-13 = 0$ [Address Mode at Startup = Static].	255 (0 - 255)
F7-08 (03EC)	Subnet Mask 4	V/f OLV OLV/IPM AOLV/IPM EZOLV Sets the fourth octet of the subnet mask of the connected network. Note: Set this parameter when $F7-13 = 0$ [Address Mode at Startup = Static].	0 (0 - 255)
F7-09 (03ED)	Gateway Address 1	V/f OLV OLV/IPM AOLV/IPM EZOLV Sets the first octet of the gateway address of the connected network. Note: Set this parameter when $F7-13 = 0$ [Address Mode at Startup = Static].	192 (0 - 255)
F7-10 (03EE)	Gateway Address 2	V/f OLV OLV/IPM AOLV/IPM EZOLV Sets the second octet of the gateway address of the connected network. Note: Set this parameter when $F7-13 = 0$ [Address Mode at Startup = Static].	168 (0 - 255)
F7-11 (03EF)	Gateway Address 3	V/f OLV OLV/IPM AOLV/IPM EZOLV Sets the third octet of the gateway address of the connected network. Note: Set this parameter when $F7-13 = 0$ [Address Mode at Startup = Static].	1 (0 - 255)

No. (Hex.)	Name	Description	Default (Range)
F7-12 (03F0)	Gateway Address 4	V/f OLV OLV/PM AOLV/PM EZOLV Sets the fourth octet of the gateway address of the connected network. Note: Set this parameter when $F7-13 = 0$ [Address Mode at Startup = Static].	1 (0 - 255)
F7-13 (03F1)	Address Mode at Startup	V/f OLV OLV/PM AOLV/PM EZOLV Sets the method to set option card IP addresses. 0 : Static 1 : BOOTP 2 : DHCP Note: - 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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the duplex mode setting method. 0 : Half/Half 1 : Auto/Full 2 : Full/Full 3 : Half/Full 4 : Half/Half 5 : Auto/Half 6 : Auto/Full 7 : Full/Half 8 : Full/Full	1 (0 - 8)
F7-15 (03F3)	Communication Speed Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the communications speed. 10 : 10/10 Mbps 100 : 100/100 Mbps 101 : 10/100 Mbps 102 : 100/10 Mbps	10 (10, 100 - 102)
F7-16 (03F4)	Timeout Value	V/f OLV OLV/PM AOLV/PM EZOLV Sets the detection time for a communications timeout. Note: Set this parameter to 0.0 to disable the connection timeout function.	0.0 s (0.0 - 30.0 s)
F7-17 (03F5)	EtherNet/IP Speed Scaling Factor	V/f OLV OLV/PM AOLV/PM EZOLV Sets the scaling factor for the speed monitor in the EtherNet/IP Class ID 2AH Object.	0 (-15 - +15)
F7-18 (03F6)	EtherNet/IP Current Scale Factor	V/f OLV OLV/PM AOLV/PM EZOLV Sets the scaling factor for the output current monitor in the EtherNet/IP Class ID 2AH Object.	0 (-15 - +15)
F7-19 (03F7)	EtherNet/IP Torque Scale Factor	V/f OLV OLV/PM AOLV/PM EZOLV Sets the scaling factor for the torque monitor in the EtherNet/IP Class ID 2AH Object.	0 (-15 - +15)
F7-20 (03F8)	EtherNet/IP Power Scaling Factor	V/f OLV OLV/PM AOLV/PM EZOLV Sets the scaling factor for the power monitor in the EtherNet/IP Class ID 2AH Object.	0 (-15 - +15)
F7-21 (03F9)	EtherNet/IP Voltage Scale Factor	V/f OLV OLV/PM AOLV/PM EZOLV Sets the scaling factor for the voltage monitor in the EtherNet/IP Class ID 2AH Object.	0 (-15 - +15)
F7-22 (03FA)	EtherNet/IP Time Scaling	V/f OLV OLV/PM AOLV/PM EZOLV Sets the scaling factor for the time monitor in the EtherNet/IP Class ID 2AH Object.	0 (-15 - +15)
F7-23 - F7-27 (03FB - 03FF) F7-28 - F7-32 (0370 - 0374)	Dynamic Out Param 1 to 10 for CommCard	V/f OLV OLV/PM AOLV/PM EZOLV 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.	0
F7-33 - F7-42 (0375 - 037E)	Dynamic In Param 1 to 10 for CommCard	V/f OLV OLV/PM AOLV/PM EZOLV Sets Input Assembly 166. 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
F7-50 (1BC1)	BACnet/IP Port #	V/f OLV OLV/PM AOLV/PM EZOLV Sets the UDP port on which the drive will receive incoming BACnet messages.	47808 (1024 - 65535)

3.9 F: Options

No. (Hex.)	Name	Description	Default (Range)
F7-51 (1BE9)	BBMD Foreign Register Addr 1	V/f OLV OLV/PM AOLV/PM EZOLV Sets the first octet of the IP Address of the BACnet Broadcast Management Device (BBMD) to which the drive will register as a foreign device.	0 (0 - 255)
F7-52 (1BEA)	BBMD Foreign Register Addr 2	V/f OLV OLV/PM AOLV/PM EZOLV Sets the second octet of the IP Address of the BBMD device to which the drive will register as a foreign device.	0 (0 - 255)
F7-53 (1BEB)	BBMD Foreign Register Addr 3	V/f OLV OLV/PM AOLV/PM EZOLV Sets the third octet of the IP Address of the BBMD device to which the drive will register as a foreign device.	0 (0 - 255)
F7-54 (1BEC)	BBMD Foreign Register Addr 4	V/f OLV OLV/PM AOLV/PM EZOLV Sets the fourth octet of the IP Address of the BBMD device to which the drive will register as a foreign device.	0 (0 - 255)
F7-55 (1BED)	BBMD Foreign Register Port #	V/f OLV OLV/PM AOLV/PM EZOLV Sets the UDP port of the BBMD device to which the drive will register.	47808 (1024 - 65535)
F7-56 (1BEE)	BBMD Foreign Register Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets the time interval in which the drive will repeat BBMD foreign registration.	3600 s (0 - 65535 s)
F7-57 (1BEF)	BACnet/IP bUS Timeout Value	V/f OLV OLV/PM AOLV/PM EZOLV Sets the length of time that the drive will wait after it receives a Run command or frequency reference command before it detects a <i>bUS</i> fault.	3600 s (0 - 65535 s)
F7-60 (0780)	PZD1 Write (Control Word)	V/f OLV OLV/PM AOLV/PM EZOLV Sets the MEMOBUS/Modbus address for PZD1 (PPO output). PZD1 (PPO output) functions as the STW when <i>F7-60</i> = 0, 1, or 2.	0
F7-61 (0781)	PZD2 Write (Frequency Reference)	V/f OLV OLV/PM AOLV/PM EZOLV Sets the MEMOBUS/Modbus address for PZD2 (PPO output). PZD2 (PPO output) functions as the HSW when <i>F7-61</i> = 0, 1, or 2.	0
F7-62 (0782)	PZD3 Write	V/f OLV OLV/PM AOLV/PM EZOLV 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 OLV OLV/PM AOLV/PM EZOLV 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 OLV OLV/PM AOLV/PM EZOLV 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 OLV OLV/PM AOLV/PM EZOLV 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 OLV OLV/PM AOLV/PM EZOLV 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 OLV OLV/PM AOLV/PM EZOLV 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 OLV OLV/PM AOLV/PM EZOLV 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 OLV OLV/PM AOLV/PM EZOLV 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 OLV OLV/PM AOLV/PM EZOLV Sets the MEMOBUS/Modbus address for PZD1 (PPO Read). PZD1 (PPO input) functions as the ZSW when <i>F7-70</i> = 0.	0
F7-71 (078B)	PZD2 Read (Output Frequency)	V/f OLV OLV/PM AOLV/PM EZOLV Sets the MEMOBUS/Modbus address for PZD2 (PPO Read). PZD2 (PPO input) functions as the HIW when <i>F7-71</i> = 0.	0
F7-72 (078C)	PZD3 Read	V/f OLV OLV/PM AOLV/PM EZOLV Sets the MEMOBUS/Modbus address for PZD3 (PPO Read). A value of 0 will disable the PZD3 (PPO Read) load operation from the MEMOBUS/Modbus register.	0
F7-73 (078D)	PZD4 Read	V/f OLV OLV/PM AOLV/PM EZOLV Sets the MEMOBUS/Modbus address for PZD4 (PPO Read). A value of 0 will disable the PZD4 (PPO Read) load operation from the MEMOBUS/Modbus register.	0

No. (Hex.)	Name	Description	Default (Range)
F7-74 (078E)	PZD5 Read	☐ V/f ☐ OLV ☒ OLV/PM ☐ AOLV/PM ☐ EZOLV Sets the MEMOBUS/Modbus address for PZD5 (PPO Read). A value of 0 will disable the PZD5 (PPO Read) load operation from the MEMOBUS/Modbus register.	0
F7-75 (078F)	PZD6 Read	☐ V/f ☐ OLV ☒ OLV/PM ☐ AOLV/PM ☐ EZOLV Sets the MEMOBUS/Modbus address for PZD6 (PPO Read). A value of 0 will disable the PZD6 (PPO Read) load operation from the MEMOBUS/Modbus register.	0
F7-76 (0790)	PZD7 Read	☐ V/f ☐ OLV ☒ OLV/PM ☐ AOLV/PM ☐ EZOLV Sets the MEMOBUS/Modbus address for PZD7 (PPO Read). A value of 0 will disable the PZD7 (PPO input) load operation from the MEMOBUS/Modbus register.	0
F7-77 (0791)	PZD8 Read	☐ V/f ☐ OLV ☒ OLV/PM ☐ AOLV/PM ☐ EZOLV Sets the MEMOBUS/Modbus address for PZD8 (PPO Read). A value of 0 will disable the PZD8 (PPO Read) load operation from the MEMOBUS/Modbus register.	0
F7-78 (0792)	PZD9 Read	☐ V/f ☐ OLV ☒ OLV/PM ☐ AOLV/PM ☐ EZOLV Sets the MEMOBUS/Modbus address for PZD9 (PPO Read). A value of 0 will disable the PZD9 (PPO Read) load operation from the MEMOBUS/Modbus register.	0
F7-79 (0793)	PZD10 Read	☐ V/f ☐ OLV ☒ OLV/PM ☐ AOLV/PM ☐ EZOLV Sets the MEMOBUS/Modbus address for PZD10 (PPO Read). A value of 0 will disable the PZD10 (PPO Read) load operation from the MEMOBUS/Modbus register.	0

3.10 H: Terminal Functions

◆ H1: Digital Inputs

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

H1-xx: MFDI Setting Values

Setting Value	Function	Description
0	3-Wire Sequence	V/f OLV OLV/PM AOLV/PM EZOLV Sets the direction of motor rotation for 3-wire sequence.
1	LOCAL/REMOTE Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets drive control for the keypad (LOCAL) or an external source (REMOTE). ON : LOCAL OFF : REMOTE
2	External Reference 1/2 Selection	V/f OLV OLV/PM AOLV/PM EZOLV 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 : $b1-01 = [Frequency\ Reference\ Selection\ 1]$, $b1-02 [Run\ Command\ Selection\ 1]$
3	Multi-Step Speed Reference 1	V/f OLV OLV/PM AOLV/PM EZOLV Uses speed references $d1-01$ to $d1-16$ to set a multi-step speed reference.
4	Multi-Step Speed Reference 2	V/f OLV OLV/PM AOLV/PM EZOLV Uses speed references $d1-01$ to $d1-16$ to set a multi-step speed reference.
5	Multi-Step Speed Reference 3	V/f OLV OLV/PM AOLV/PM EZOLV Uses speed references $d1-01$ to $d1-16$ to set a multi-step speed reference.
6	Jog Reference Selection	V/f OLV OLV/PM AOLV/PM EZOLV 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 $d1-16$).
7	Accel/Decel Time Selection 1	V/f OLV OLV/PM AOLV/PM EZOLV Sets the drive to use <i>Acceleration/Deceleration Time 1</i> [$C1-01$, $C1-02$] or <i>Acceleration/Deceleration Time 2</i> [$C1-03$, $C1-04$].
8	Baseblock Command (N.O.)	V/f OLV OLV/PM AOLV/PM EZOLV 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
9	Baseblock Command (N.C.)	V/f OLV OLV/PM AOLV/PM EZOLV 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)
A	Accel/Decel Ramp Hold	V/f OLV OLV/PM AOLV/PM EZOLV 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.
B	Overheat Alarm (oH2)	V/f OLV OLV/PM AOLV/PM EZOLV Sets the drive to display an oH2 [<i>Drive Overheat Warning</i>] alarm when the input terminal is ON. The alarm does not have an effect on drive operation.
C	Analog Terminal Enable Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the command that enables or disables the terminals selected in $H3-14$ [<i>Analog Input Terminal Enable Sel</i>]. ON : Input to the terminal selected with $H3-14$ is enabled OFF : Input to the terminal selected with $H3-14$ is disabled
E	ASR Integral Reset	V/f OLV OLV/PM AOLV/PM EZOLV 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
F	Not Used	V/f OLV OLV/PM AOLV/PM EZOLV Use this setting for unused terminals or to use terminals in through mode.
10	Up Command	V/f OLV OLV/PM AOLV/PM EZOLV Sets the command to use a push button switch to increase the drive frequency reference. You must also set <i>Setting 11</i> [<i>Down Command</i>]. ON : Increases the frequency reference. OFF : Holds the current frequency reference.
11	Down Command	V/f OLV OLV/PM AOLV/PM EZOLV Sets the command to use a push button switch to decrease the drive frequency reference. You must also set <i>Setting 10</i> [<i>Up Command</i>]. ON : Decreases the frequency reference. OFF : Holds the current frequency reference.
12	Forward Jog	V/f OLV OLV/PM AOLV/PM EZOLV Sets the command to operate the motor in the forward direction at the Jog Frequency set in $d1-17$ [<i>Jog Reference</i>].

3.10 H: Terminal Functions

Setting Value	Function	Description
13	Reverse Jog	V/f OLV OLV/PM AOLV/PM EZOLV Sets the command to operate the motor in reverse at the Jog Frequency set in <i>d1-17 [Jog Reference]</i>.
14	Fault Reset	V/f OLV OLV/PM AOLV/PM EZOLV 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.
15	Fast Stop (N.O.)	V/f OLV OLV/PM AOLV/PM EZOLV 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 activated while the drive is operating.
16	Motor 2 Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the command for the drive to operate motor 1 or motor 2. Stop the motors before switching. ON : Operate motor 2 OFF : Operate motor 1
17	Fast Stop (N.C.)	V/f OLV OLV/PM AOLV/PM EZOLV 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 activated while the drive is operating.
18	Timer Function	V/f OLV OLV/PM AOLV/PM EZOLV Sets the command to start the timer function. Use this setting with <i>Timer Output [H2-xx = 12]</i>.
19	PID Disable	V/f OLV OLV/PM AOLV/PM EZOLV 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
1A	Accel/Decel Time Selection 2	V/f OLV OLV/PM AOLV/PM EZOLV Set this function and <i>H1-xx = 7 [Accel/Decel Time Selection 1]</i> together. Sets the drive to use <i>Acceleration/Deceleration Time 3 [C1-05, C1-06]</i> or <i>Acceleration/Deceleration Time 4 [C1-07, C1-08]</i>.
1B	Programming Lockout	V/f OLV OLV/PM AOLV/PM EZOLV Sets the command to prevent parameter changes when the terminal is OFF. ON : Programming Lockout OFF : Parameter Write Prohibit
1E	Reference Sample Hold	V/f OLV OLV/PM AOLV/PM EZOLV Sets the command to sample the frequency reference at terminal A1 or A2, and hold the frequency reference at that frequency.
20 to 2F	External fault	V/f OLV OLV/PM AOLV/PM EZOLV Sets a command to stop the drive when a failure or fault occurs on an external device. 20 : External Fault (NO-Always-Ramp) 21 : External Fault (NC-Always-Ramp) 22 : External Fault (NO-@Run-Ramp) 23 : External Fault (NC-@Run-Ramp) 24 : External Fault (NO-Always-Coast) 25 : External Fault (NC-Always-Coast) 26 : External Fault (NO-@Run-Coast) 27 : External Fault (NC-@Run-Coast) 28 : External Fault (NO-Always-FStop) 29 : External Fault (NC-Always-FStop) 2A : External Fault (NO-@Run-FStop) 2B : External Fault (NC-@Run-FStop) 2C : External Fault (NO-Always-Alarm) 2D : External Fault (NC-Always-Alarm) 2E : External Fault (NO-@Run-Alarm) 2F : External Fault (NC-@Run-Alarm)
30	PID Integrator Reset	V/f OLV OLV/PM AOLV/PM EZOLV Sets the command to reset and hold the PID control integral to 0 when the terminal is ON.
31	PID Integrator Hold	V/f OLV OLV/PM AOLV/PM EZOLV Sets the command to hold the integral value of the PID control while the terminal is activated.
32	Multi-Step Speed Reference 4	V/f OLV OLV/PM AOLV/PM EZOLV Uses speed references <i>d1-01 to d1-16</i> to set a multi-step speed reference.
34	PID Soft Starter Disable	V/f OLV OLV/PM AOLV/PM EZOLV Sets the PID soft starter function. ON : No OFF : Yes

Setting Value	Function	Description
35	PID Input (Error) Invert	V/f OLV OLV/PM AOLV/PM EZOLV Sets the command to turn the terminal ON and OFF to switch the PID input level (polarity).
3E	PID Setpoint Selection 1	V/f OLV OLV/PM AOLV/PM EZOLV Set this function and $H1-xx = 3F$ [PID Setpoint Selection 2] together. Sets the function to switch the PID setpoint to $b5-58$ to $b5-60$ [PID Setpoint 2 to 4].
3F	PID Setpoint Selection 2	V/f OLV OLV/PM AOLV/PM EZOLV Set this function and $H1-xx = 3E$ [PID Setpoint Selection 1] at the same time. Sets the function to switch the PID setpoint to $b5-58$ to $b5-60$ [PID Setpoint 2 to 4].
40	Forward RUN (2-Wire)	V/f OLV OLV/PM AOLV/PM EZOLV Sets the Forward Run command for 2-wire sequence 1. Set this function and $H1-xx = 41$ [Reverse Run Command (2-Wire Seq)] at the same time. ON : Forward Run OFF : Run Stop Note: • If you activate the Forward Run command terminal and the Reverse Run command terminal, the drive will detect minor fault/ alarm EF [FWD/REV Run Command Input Error] 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 $H1-xx = 42, 43$ [Run Command/FWD/REV Command (2-Wire Seq 2)].
41	Reverse RUN (2-Wire)	V/f OLV OLV/PM AOLV/PM EZOLV Sets the Forward Run command for 2-wire sequence 1. Set this function and $H1-xx = 40$ [Forward Run Command (2-Wire Seq)] at the same time. ON : Reverse Run OFF : Run Stop Note: • If you activate the Forward Run command terminal and the Reverse Run command terminal, the drive will detect minor fault/ alarm EF [FWD/REV Run Command Input Error] 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/FWD/REV Command (2-Wire Seq 2)].
42	Run Command (2-Wire Sequence 2)	V/f OLV OLV/PM AOLV/PM EZOLV Sets the Run command for 2-wire sequence 2. Set this function and $H1-xx = 43$ [FWD/REV Command (2-Wire Seq 2)] at the same time. ON : Run OFF : Stop Note: This function will not operate at the same time as $H1-xx = 40, 41$ [Forward/Reverse Run Command (2-Wire Seq)].
43	FWD/REV (2-Wire Sequence 2)	V/f OLV OLV/PM AOLV/PM EZOLV 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: This function will not operate at the same time as $H1-xx = 40, 41$ [Forward/Reverse Run Command (2-Wire Seq)].
44	Add Offset Frequency 1 (d7-01)	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function to add the offset frequency set in $d7-01$ [Offset Frequency 1] to the frequency reference when the terminal activates.
45	Add Offset Frequency 2 (d7-02)	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function to add the offset frequency set in $d7-02$ [Offset Frequency 2] to the frequency reference when the terminal activates.
46	Add Offset Frequency 3 (d7-03)	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function to add the offset frequency set in $d7-03$ [Offset Frequency 3] to the frequency reference when the terminal activates.
47	Node Setup (CANopen)	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function in CANopen communications to start the Node Setup function to set the drive node address from the host controller.
60	DC Injection Braking Command	V/f OLV OLV/PM AOLV/PM EZOLV 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 only when you use a PM motor.
61	Speed Search from Fmax	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function to start speed search using an external reference although $b3-01 = 0$ [Speed Search Selection at Start = Disabled]. Note: The drive will detect $oPE03$ [Multi-Function Input Setting Err] when $H1-xx = 61$ and 62 are set at the same time.

3.10 H: Terminal Functions

Setting Value	Function	Description
62	Speed Search from Fref	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function to use an external reference to start speed search although $b3-01 = 0$ [Speed Search Selection at Start = Disabled]. Note: The drive will detect $oPE03$ [Multi-Function Input Setting Err] when $H1-xx = 61$ and 62 are set at the same time.
63	Field Weakening	V/f OLV OLV/PM AOLV/PM EZOLV 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.
65	KEB Ride-Thru 1 Activate (N.C.)	V/f OLV OLV/PM AOLV/PM EZOLV Sets operation of the KEB1 function through the KEB Ride-Thru 1 (N.C.). ON : Normal operation OFF : Deceleration during momentary power loss
66	KEB Ride-Thru 1 Activate (N.O.)	V/f OLV OLV/PM AOLV/PM EZOLV Sets operation of the KEB1 function through the KEB Ride-Thru 1 (N.O.). ON : Deceleration during momentary power loss OFF : Normal operation
67	Communications Test Mode	V/f OLV OLV/PM AOLV/PM EZOLV Set the function for the drive to self-test RS-485 serial communications operation.
68	High Slip Braking (HSB) Activate	V/f OLV OLV/PM AOLV/PM EZOLV Sets the command to use high-slip braking to stop the motor.
6A	Drive Enable	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function to show dnE [Drive Enabled] on the keypad and ignore Run commands when the terminal is OFF.
75	Up 2 Command	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function to increase the frequency reference bias value to accelerate the motor when the terminal is activated. Set this function and $H1-xx = 76$ [Down 2 Command] together. Note: When you use this function, use $d4-08$ and $d4-09$ [Up/Down 2 Bias Upper Limit/Lower Limit] to set the optimal bias limit value.
76	Down 2 Command	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function to decrease the frequency reference bias value to decelerate the motor when the terminal is activated. Set this function and $H1-xx = 75$ [Up 2 Command] at the same time. Note: When you use this function, use $d4-08$ and $d4-09$ [Up/Down 2 Bias Upper Limit/Lower Limit] to set the optimal bias limit value.
77	ASR Gain (C5-03) Select	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function to switch the ASR proportional gain set in $C5-01$ [ASR Proportional Gain 1] and $C5-03$ [ASR Proportional Gain 2]. ON : C5-03 OFF : C5-01
7A	KEB Ride-Thru 2 Activate (N.C.)	V/f OLV OLV/PM AOLV/PM EZOLV Sets operation of the KEB2 function through the KEB Ride-Thru 2 (N.C.). ON : Normal operation OFF : Deceleration during momentary power loss
7B	KEB Ride-Thru 2 Activate (N.O.)	V/f OLV OLV/PM AOLV/PM EZOLV Sets operation of the KEB2 function through the KEB Ride-Thru 2 (N.O.). ON : Deceleration during momentary power loss OFF : Normal operation
7C	Short Circuit Braking (N.O.)	V/f OLV OLV/PM AOLV/PM EZOLV Sets operation of Short Circuit Braking (N.O.). ON : Short Circuit Braking is enabled. OFF : Normal operation Note: When $A1-02 = 8$ [Control Method Selection = EZOLV], this function is available only when you use a PM motor.
7D	Short Circuit Braking (N.C.)	V/f OLV OLV/PM AOLV/PM EZOLV Sets operation of Short Circuit Braking (N.C.). ON : Normal operation OFF : Short Circuit Braking is enabled. Note: When $A1-02 = 8$ [Control Method Selection = EZOLV], this function is available only when you use a PM motor.
7E	Reverse Rotation Identifier	V/f OLV OLV/PM AOLV/PM EZOLV Set the motor rotation direction when you use Simple Closed Loop V/f Control method. ON : Reverse run OFF : Forward run

Setting Value	Function	Description
90 - 96	DWEZ Digital Inputs 1 to 7	V/f OLV OLV/PM AOLV/PM EZOLV Sets digital inputs used with DriveWorksEZ. Refer to the DriveWorksEZ online manual for more information.
9F	DWEZ Disable	V/f OLV OLV/PM AOLV/PM EZOLV Sets operation of the DriveWorksEZ program saved in the drive. ON : No OFF : Yes Note: Set <i>A1-07 = 2</i> [DriveWorksEZ Function Selection = Digital input] to enable this function.
101 to 19F	Inverse Input of 1 to 9F	Sets the function of the selected MFDI to operate inversely. To select the function, enter "1xx", where the "xx" is the function setting value. Note: You cannot use inverse input for all functions. Refer to Missing reference ID for more information.

◆ H2: Digital Outputs

No. (Hex.)	Name	Description	Default (Range)
H2-01 (040B)	Term MA/MB-MC Function Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function set for MFDO terminal MA-MC or MB-MC. Note: Set this parameter to <i>F</i> when the terminal is not being used or to use the terminal in through mode.	E (0 - 1FF)
H2-02 (040C)	Term P1-C1 Function Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function for MFDO terminal P1-C1. Note: Set this parameter to <i>F</i> when the terminal is not being used or to use the terminal in through mode.	0 (0 - 1FF)
H2-03 (040D)	Term P2-C2 Function Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function for MFDO terminal P2-C2. Note: Set this parameter to <i>F</i> when the terminal is not being used or to use the terminal in through mode.	2 (0 - 1FF)
H2-06 (0437)	Watt Hour Output Unit Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the unit for the output signal when <i>H2-01 to H2-03 = 39</i> [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	0 (0 - 4)
H2-07 (0B3A)	Modbus Register 1 Address Select	V/f OLV OLV/PM AOLV/PM EZOLV Sets the address of the MEMOBUS/Modbus register output to the MFDO terminal.	0001 (0001 - 1FFF)
H2-08 (0B3B)	Modbus Register 1 Bit Select	V/f OLV OLV/PM AOLV/PM EZOLV Sets the bit of the MEMOBUS/Modbus register output to the MFDO terminal.	0000 (0000 - FFFF)
H2-09 (0B3C)	Modbus Register 2 Address Select	V/f OLV OLV/PM AOLV/PM EZOLV Sets the address of the MEMOBUS/Modbus register output to the MFDO terminal.	0001 (0001 - 1FFF)
H2-10 (0B3D)	Modbus Register 2 Bit Select	V/f OLV OLV/PM AOLV/PM EZOLV Sets the bit of the MEMOBUS/Modbus register output to the MFDO terminal.	0000 (0000 - FFFF)
H2-20 (1540)	Comparator 1 Monitor Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the monitor number for comparator 1. Set the <i>x-xx</i> part of the <i>Ux-xx</i> [Monitor]. For example, set <i>H2-20 = 102</i> to monitor <i>U1-02</i> [Output Frequency].	102 (000 - 999)
H2-21 (1541)	Comparator 1 Lower Limit	V/f OLV OLV/PM AOLV/PM EZOLV Sets the lower limit detection level for comparator 1 when the full scale analog output for the monitor selected in <i>H2-20</i> [Comparator 1 Monitor Selection] is the 100% value.	0.0% (0.0 - 300.0%)
H2-22 (1542)	Comparator 1 Upper Limit	V/f OLV OLV/PM AOLV/PM EZOLV Sets the upper limit detection level for comparator 1 when the full scale analog output for the monitor selected in <i>H2-20</i> [Comparator 1 Monitor Selection] is the 100% value.	0.0% (0.0 - 300.0%)
H2-23 (1543)	Comparator 1 Hysteresis	V/f OLV OLV/PM AOLV/PM EZOLV Sets the hysteresis level for comparator 1 as a percentage of the full scale analog output for the monitor selected in <i>H2-20</i> [Comparator 1 Monitor Selection].	0.0% (0.0 - 10.0%)

3.10 H: Terminal Functions

No. (Hex.)	Name	Description	Default (Range)
H2-24 (1544)	Comparator 1 On-Delay Time	V/f OLV OLV/PM AOLV/PM 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 OLV OLV/PM AOLV/PM 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 OLV OLV/PM AOLV/PM EZOLV Sets the monitor number for comparator 2. Set the x-xx part of the <i>Ux-xx [Monitor]</i> . For example, set <i>H2-26 = 103</i> to monitor <i>U1-03 [Output Current]</i> .	103 (000 - 999)
H2-27 (1547)	Comparator 2 Lower Limit	V/f OLV OLV/PM AOLV/PM 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 [Comparator 2 Monitor Selection]</i> .	0.0% (0.0 - 300.0%)
H2-28 (1548)	Comparator 2 Upper Limit	V/f OLV OLV/PM AOLV/PM 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 [Comparator 2 Monitor Selection]</i> .	0.0% (0.0 - 300.0%)
H2-29 (1549)	Comparator 2 Hysteresis	V/f OLV OLV/PM AOLV/PM 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 [Comparator 2 Monitor Selection]</i> .	0.0% (0.0 - 10.0%)
H2-30 (154A)	Comparator 2 On-Delay Time	V/f OLV OLV/PM AOLV/PM 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 OLV OLV/PM AOLV/PM 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 OLV OLV/PM AOLV/PM 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 [Comparator 1 Monitor Selection]</i> .	0.0s (0.0 - 10.0 s)
H2-33 (159B)	Comparator1 Protection Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets drive operation when it detects <i>CP1 [Comparator1 Limit Fault]</i> . 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 OLV OLV/PM AOLV/PM 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 [Comparator 2 Monitor Selection]</i> .	0.0s (0.0 - 10.0 s)
H2-35 (159D)	Comparator2 Protection Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets drive operation when it detects <i>CP2 [Comparator2 Limit Fault]</i> . 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 OLV OLV/PM AOLV/PM EZOLV Sets the length of time that <i>CP1 [Comparator1 Limit Fault]</i> is disabled.	0.0 s (0.0 - 1000.0 s)
H2-37 (159F)	Comparator 2 Ineffective Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets the length of time that <i>CP2 [Comparator2 Limit Fault]</i> is disabled.	0.0 s (0.0 - 1000.0 s)
H2-40 (0B58)	Mbus Reg 15E0h bit0 Output Func	V/f OLV OLV/PM AOLV/PM 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 OLV OLV/PM AOLV/PM 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 OLV OLV/PM AOLV/PM EZOLV Sets the MFDO for bit 2 of MEMOBUS register 15E0 (Hex.).	F (0 - 1FF)
H2-60 (1B46) Expert	Term MA,MB,MC Secondary Function	V/f OLV OLV/PM AOLV/PM EZOLV Sets the second function for terminal MA/MB-MC. Outputs the logical calculation results of the terminals assigned to functions by <i>H2-01 [Term MA,MB,MC Function Selection]</i> .	F (0 - FF)
H2-61 (1B47) Expert	Term MA,MB,MC Logical Operation	V/f OLV OLV/PM AOLV/PM EZOLV Sets the logical operation for the functions set in <i>H2-01 [Term MA,MB,MC Function Selection]</i> and <i>H2-60 [Term MA,MB,MC Secondary Function]</i> .	0 (0 - 8)
H2-62 (1B48) Expert	Term MA,MB,MC Minimum ON Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets the minimum ON time that the drive uses to output the logical calculation results from terminal MA/MB-MC.	0.1 s (0.0 - 25.0 s)

No. (Hex.)	Name	Description	Default (Range)
H2-63 (1B49) Expert	Terminal P1 Secondary Function	V/f OLV OLV/PM AOLV/PM EZOLV Sets the second function for terminal P1-C1. Outputs the logical calculation results of the terminals assigned to functions by H2-02 [Term P1 Function Selection].	F (0 - FF)
H2-64 (1B4A) Expert	Terminal P1 Logical Operation	V/f OLV OLV/PM AOLV/PM EZOLV Sets the logical operation for the functions set in H2-02 [Term P1 Function Selection] and H2-63 [Terminal P1 Secondary Function].	0 (0 - 8)
H2-65 (1B4B) Expert	Terminal P1 Minimum ON Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets the minimum ON time used to output the logical calculation results from terminal P1-C1.	0.1 s (0.0 - 25.0 s)
H2-66 (1B4C) Expert	Terminal P2 Secondary Function	V/f OLV OLV/PM AOLV/PM EZOLV Sets the second function for terminal P2-C2. Outputs the logical calculation results of the terminals assigned to functions by H2-03 [Term P2 Function Selection].	F (0 - FF)
H2-67 (1B4D) Expert	Terminal P2 Logical Operation	V/f OLV OLV/PM AOLV/PM EZOLV Sets the logical operation for the functions set in H2-03 [Term P2 Function Selection] and H2-66 [Terminal P2 Secondary Function].	0 (0 - 8)
H2-68 (1B4E) Expert	Terminal P2 Minimum ON Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets the minimum ON time used to output the logical calculation results from terminal P2-C2.	0.1 s (0.0 - 25.0 s)

■ H2-xx: MFDO Setting Values

Setting Value	Function	Description																		
0	During Run	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the Run command is input and when the drive is outputting voltage. ON : Drive is running OFF : Drive is stopping																		
1	Zero Speed	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the output frequency is less than the value of 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"> <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>2</td><td>OLV</td><td>b2-01</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>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	2	OLV	b2-01	5	OLV/PM	E1-09	6	AOLV/PM	E1-09	8	EZOLV	E1-09
A1-02 Setting	Control Method Selection	Parameter Used as the Reference																		
0	V/f	E1-09																		
2	OLV	b2-01																		
5	OLV/PM	E1-09																		
6	AOLV/PM	E1-09																		
8	EZOLV	E1-09																		
2	Speed Agree 1	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the output frequency is in the range of the frequency reference ± L4-02 [Speed Agree Detection Width]. 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.																		
3	User-Set Speed Agree 1	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the output frequency is in the range of L4-01 [Speed Agree Detection Level] ± L4-02 [Speed Agree Detection Width] and in the range of the frequency reference ± L4-02. Note: The detection function operates in the two motor rotation directions. The drive uses the L4-01 value as the forward/reverse detection level. ON : The output frequency is within the range as defined by the result of "L4-01 ± L4-02" and the range of frequency reference ± L4-02. OFF : The output frequency is not in the range of "L4-01 ± L4-02" nor the range of frequency reference ± L4-02.																		

3.10 H: Terminal Functions

Setting Value	Function	Description
4	Frequency Detection 1	V/f OLV OLV/PM AOLV/PM EZOLV 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]. After the terminal turns off, the terminal continues to remain off until the output frequency reaches the level set with <i>L4-01</i>. Note: 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. ON : The output frequency is less than the value of <i>L4-01</i> or does not exceed the value of <i>L4-01</i> + <i>L4-02</i>. OFF : The output frequency is higher than the value of <i>L4-01</i> + <i>L4-02</i>.
5	Frequency Detection 2	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the output frequency is higher than the value of <i>L4-01</i> [Speed Agree Detection Level]. After the terminal activates, the terminal stays activated until the output frequency is at the value of <i>L4-01</i> - <i>L4-02</i>. Note: 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. ON : The output frequency is higher than the value of <i>L4-01</i>. OFF : The output frequency is less than the value of "<i>L4-01</i> - <i>L4-02</i>," or it does not exceed the value of <i>L4-01</i>.
6	Drive ready	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the drive is ready and running.
7	DC Bus Undervoltage	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the DC bus voltage or control circuit power supply is less than the voltage set with <i>L2-05</i> [Undervoltage Detection Lvl (<i>U_{v1}</i>)]. The terminal also turns on when there is a fault with the DC bus voltage. ON : The DC bus voltage is less than the setting value of <i>L2-05</i>. OFF : The DC bus voltage is more than the setting value of <i>L2-05</i>.
8	During Baseblock (N.O.)	V/f OLV OLV/PM AOLV/PM EZOLV The terminal turns on 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.
9	Frequency Reference from Keypad	V/f OLV OLV/PM AOLV/PM EZOLV Shows the selected frequency reference source. ON : The keypad is the frequency reference source. OFF : Parameter <i>b1-01</i> or <i>b1-15</i> [Frequency Reference Selection 1 or 2] is the frequency reference source.
A	Run Command Source	V/f OLV OLV/PM AOLV/PM EZOLV Shows the selected Run command source. ON : The keypad is the Run command source. OFF : Parameter <i>b1-02</i> or <i>b1-16</i> [Run Command Selection 1 or 2] is the Run command source.
B	Torque Detection 1 (N.O.)	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the drive detects overtorque or undertorque. ON : The output current/torque > <i>L6-02</i> [Torque Detection Level 1], or < <i>L6-02</i> for longer than the time set with <i>L6-03</i> [Torque Detection Time 1].
C	Frequency Reference Loss	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the drive detects a loss of frequency reference.
D	Braking Resistor Fault	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the mounting-type braking resistor is overheating or when there is a braking transistor fault.
E	Fault	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the drive detects a fault. Note: The terminal will not activate for <i>CPF00</i> and <i>CPF01</i> [Control Circuit Error] faults.
F	Not Used	V/f OLV OLV/PM AOLV/PM EZOLV 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 signals from the PLC are not configured.
10	Alarm	V/f OLV OLV/PM AOLV/PM EZOLV The terminal turns on when the drive detects a minor fault.
11	Fault Reset Command Active	V/f OLV OLV/PM AOLV/PM EZOLV The terminal turns on when the drive receives the Reset command from the control circuit terminal, serial communications, or the communication option.
12	Timer Output	V/f OLV OLV/PM AOLV/PM EZOLV Use this setting when the drive uses the timer function as an output terminal.

Setting Value	Function	Description
13	Speed Agree 2	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the output frequency is in the range of the frequency reference $\pm L4-04$ [Speed Agree Detection Width (+/-)]. Note: The detection function operates in the two motor rotation directions. ON : The output frequency is in the range of "frequency reference $\pm L4-04$". OFF : The output frequency is not in the range of "frequency reference $\pm L4-04$".
14	User-Set Speed Agree 2	V/f OLV OLV/PM AOLV/PM EZOLV 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 $\pm L4-04$. Note: The detection level set with $L4-03$ is a signed value. The drive will only detect in one direction. ON : The output frequency is in the range of "$L4-03 \pm L4-04$" and the range of frequency reference $\pm L4-04$. OFF : The output frequency is not in the range of "$L4-03 \pm L4-04$" nor the range of frequency reference $\pm L4-04$.
15	Frequency Detection 3	V/f OLV OLV/PM AOLV/PM EZOLV The terminal deactivates when the output frequency is higher than the value of "$L4-03$ [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 $L4-03$. Note: The detection level set with $L4-03$ is a signed value. The drive will only detect in one direction. ON : The output frequency is less than the value of $L4-03$ or does not exceed the value of $L4-03 + L4-04$. OFF : The output frequency is higher than the value of $L4-03 + L4-04$.
16	Frequency Detection 4	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the output frequency is higher than the value of $L4-03$ [Speed Agree Detection Level(+/-)]. After the terminal activates, the terminal stays activated until the output frequency is at the value of $L4-03 - L4-04$. Note: The detection level set with $L4-03$ is a signed value. The drive will only detect in one direction. ON : The output frequency is higher than the value of $L4-03$. OFF : The output frequency is less than the value of "$L4-03 - L4-04$," or it does not exceed the value of $L4-03$.
17	Torque Detection 1 (N.C.)	V/f OLV OLV/PM AOLV/PM EZOLV The terminal deactivates when the drive detects overtorque or undertorque. OFF : The output current/torque is more than the torque value set with $L6-02$ [Torque Detection Level 1], or the level is less than the torque value set with $L6-02$ [Torque Detection Level 1] for longer than the time set with $L6-03$ [Torque Detection Time 1].
18	Torque Detection 2 (N.O.)	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the drive detects overtorque or undertorque. ON : The output current/torque is more than the torque value set with $L6-05$ [Torque Detection Level 2], or the level is less than the torque value set with $L6-05$ [Torque Detection Level 2] for longer than the time set with $L6-06$ [Torque Detection Time 2].
19	Torque Detection 2 (N.C.)	V/f OLV OLV/PM AOLV/PM EZOLV The terminal deactivates when the drive detects overtorque or undertorque. OFF : The output current/torque is more than the torque value set with $L6-05$ [Torque Detection Level 2], or the level is less than the torque value set with $L6-05$ [Torque Detection Level 2] for longer than the time set with $L6-06$ [Torque Detection Time 2].
1A	During reverse	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the motor operates in the reverse direction. ON : The motor is operating in the reverse direction. OFF : The motor is operating in the forward direction or the motor stopped.
1B	During Baseblock (N.C.)	V/f OLV OLV/PM AOLV/PM EZOLV 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
1C	Motor 2 Selected	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when motor 2 is selected. ON : Motor 2 Selection OFF : Motor 1 Selection
1E	Executing Auto-Restart	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the Auto Restart function is trying to restart after a fault.
1F	Motor Overload Alarm (oL1)	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the electronic thermal protection value of the motor overload protective function is a minimum of 90% of the detection level.
20	Drive Overheat Pre-Alarm (oH)	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the drive heatsink temperature is at the level set with $L8-02$ [Overheat Alarm Level].

3.10 H: Terminal Functions

Setting Value	Function	Description
21	Safe Torque OFF	V/f OLV OLV/PM AOLV/PM EZOLV 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
22	Mechanical Weakening Detection	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the drive detects mechanical weakening.
2F	Maintenance Notification	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when drive components are at their estimated maintenance period. Tells the user about the maintenance period for these items: • IGBT • Cooling fan • Capacitor • Soft charge bypass relay
30	During Torque Limit	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the torque reference is the torque limit set with <i>L7 parameters</i> or <i>H3-02</i> or <i>H3-10 [MFAI Function Selection]</i>.
37	During Frequency Output	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the drive outputs frequency. ON : The drive outputs frequency. OFF : The drive does not output frequency.
38	Drive Enabled	V/f OLV OLV/PM AOLV/PM EZOLV This terminal activates when the <i>H1-xx = 6A [Drive Enable]</i> terminal activates.
39	Watt Hour Pulse Output	V/f OLV OLV/PM AOLV/PM EZOLV Outputs the pulse that shows the watt hours.
3C	LOCAL Control Selected	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the Run command source or frequency reference source is LOCAL. ON : LOCAL OFF : REMOTE
3D	During Speed Search	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the drive is doing speed search.
3E	PID Feedback Low	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the drive detects <i>FbL [PID Feedback Loss]</i>.
3F	PID Feedback High	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the drive detects <i>FbH [Excessive PID Feedback]</i>.
4A	During KEB Ride-Thru	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates during KEB Ride-Thru.
4B	During Short Circuit Braking	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates during Short Circuit Braking. Note: When <i>A1-02 = 8 [Control Method Selection = EZOLV]</i>, this function is available when you use a PM motor.
4C	During Fast Stop	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the fast stop is in operation.
4D	oH Pre-Alarm Time Limit	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates 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.
4E	Braking Transistor Fault (rr)	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the internal braking transistor overheats and the drive detects an <i>rr [Dynamic Braking Transistor Fault]</i> fault.
4F	Braking Resistor Overheat (rH)	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the braking resistor overheats and the drive detects an <i>rH [Braking Resistor Overheat]</i> fault.
61	Pole Position Detection Complete	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when drive receives a Run command and the drive detects the motor magnetic pole position of the PM motor.
62	Modbus Reg 1 Status Satisfied	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the bit specified by <i>H2-08 [Modbus Register 1 Bit Select]</i> for the MEMOBUS register address set with <i>H2-07 [Modbus Register 1 Address Select]</i> activates.
63	Modbus Reg 2 Status Satisfied	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the bit specified by <i>H2-10 [Modbus Register 2 Bit Select]</i> for the MEMOBUS register address set with <i>H2-09 [Modbus Register 2 Address Select]</i> activates.

Setting Value	Function	Description
66	Comparator1	V/f OLV OLV/PM AOLV/PM EZOLV 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].
67	Comparator2	V/f OLV OLV/PM AOLV/PM EZOLV 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].
69	External Power 24V Supply	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when there is an external 24V power supply between terminals PS-AC. ON : An external 24V power supply supplies power. OFF : An external 24V power supply does not supply power.
6A	Data Logger Error	V/f OLV OLV/PM AOLV/PM EZOLV The terminal activates when the drive detects LoG [Com Error / Abnormal SD card].
90 - 92	DWEZ Digital Output 1 to 3	V/f OLV OLV/PM AOLV/PM EZOLV Sets the DriveWorksEZ digital output. Refer to the DriveWorksEZ online manual for more information.
100 - 192	Inverse output of 0 to 92	V/f OLV OLV/PM AOLV/PM EZOLV Causes inverse output of the function for the selected MFDO. Uses the last two digits of 1xx to select which function to inversely output.

◆ H3: Analog Inputs

No. (Hex.)	Name	Description	Default (Range)
H3-01 (0410)	Terminal A1 Signal Level Select	V/f OLV OLV/PM AOLV/PM EZOLV Sets the input signal level for MFAI terminal A1. 0 : 0 to 10V (Lower Limit at 0) 4 : -10 to +10V (Bipolar Reference)	0 (0, 4)
H3-02 (0434)	Terminal A1 Function Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function for MFAI terminal A1.	0 (0 - 32)
H3-03 (0411) RUN	Terminal A1 Gain Setting	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets the bias of the analog signal input to MFAI terminal A1.	0.0% (-999.9 - +999.9%)
H3-09 (0417)	Terminal A2 Signal Level Select	V/f OLV OLV/PM AOLV/PM EZOLV Sets the input signal level for MFAI terminal A2. 0 : 0-10V (LowLim=0) 2 : 4 to 20 mA 3 : 0 to 20 mA 4 : -10 to +10V (Bipolar Reference)	2 (0, 2 - 4)
H3-10 (0418)	Terminal A2 Function Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function for MFAI terminal A2.	0 (0 - 32)
H3-11 (0419) RUN	Terminal A2 Gain Setting	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 7 : Terminals A1 and A2	7 (1, 2, 7)
H3-16 (02F0)	Terminal A1 Offset	V/f OLV OLV/PM AOLV/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)

3.10 H: Terminal Functions

No. (Hex.)	Name	Description	Default (Range)
H3-17 (02F1)	Terminal A2 Offset	V/f OLV OLV/PM AOLV/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)
H3-40 (0B5C)	Mbus Reg 15C1h Input Function	V/f OLV OLV/PM AOLV/PM EZOLV Sets the MEMOBUS AI1 function.	F (4 - 2F)
H3-41 (0B5F)	Mbus Reg 15C2h Input Function	V/f OLV OLV/PM AOLV/PM EZOLV Sets the MEMOBUS AI2 function.	F (4 - 2F)
H3-42 (0B62)	Mbus Reg 15C3h Input Function	V/f OLV OLV/PM AOLV/PM EZOLV Sets the MEMOBUS AI3 function.	F (4 - 2F)
H3-43 (117F)	Mbus Reg Inputs FilterTime Const	V/f OLV OLV/PM AOLV/PM EZOLV Sets the time constant to apply a primary delay filter to the MEMOBUS analog input terminal.	0.00 s (0.00 - 2.00 s)

■ H3-xx: MFAI Setting Values

Setting Value	Function	Description
0	Frequency Reference	V/f OLV OLV/PM AOLV/PM EZOLV The input value from the MFAI terminal set with this function becomes the master frequency reference.
1	Frequency Gain	V/f OLV OLV/PM AOLV/PM EZOLV The drive multiplies the analog frequency reference with the input value from the MFAI set with this function.
2	Auxiliary Frequency Reference 1	V/f OLV OLV/PM AOLV/PM EZOLV 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%. 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>
3	Auxiliary Frequency Reference 2	V/f OLV OLV/PM AOLV/PM EZOLV 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%. 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>
4	Output Voltage Bias	V/f OLV OLV/PM AOLV/PM EZOLV Set this parameter to input a bias signal to amplify the output voltage.
5	Accel/Decel Time Gain	V/f OLV OLV/PM AOLV/PM EZOLV Enters a signal to adjust the gain used for <i>C1-01 to C1-08 [Acceleration/Deceleration Times 1 to 4]</i> and <i>C1-09 [Fast Stop Time]</i> when the full scale analog signal (10 V or 20 mA) is 100%.
6	DC Injection Braking Current	V/f OLV OLV/PM AOLV/PM EZOLV Enters a signal to adjust the current level used for DC Injection Braking when the drive rated output current is 100%.
7	Torque Detection Level	V/f OLV OLV/PM AOLV/PM EZOLV Enters a signal to adjust the overtorque/undertorque detection level. Note: Use this function with <i>L6-01 [Torque Detection Selection 1]</i> . This parameter functions as an alternative to <i>L6-02 [Torque Detection Level 1]</i> .
8	Stall Prevent Level during Run	V/f OLV OLV/PM AOLV/PM EZOLV Enters a signal to adjust the stall prevention level during run if the drive rated current is 100%.
9	Output Frequency Lower Limit	V/f OLV OLV/PM AOLV/PM EZOLV Enters a signal to adjust the output frequency lower limit level as 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>
B	PID Feedback	V/f OLV OLV/PM AOLV/PM EZOLV Enter the PID feedback value as 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>

Setting Value	Function	Description
C	PID Setpoint	V/f OLV OLV/PM AOLV/PM EZOLV Enters the PID setpoint as 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>
D	Frequency Bias	V/f OLV OLV/PM AOLV/PM EZOLV Enters the bias value added to the frequency reference as 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>
E	Motor Temperature (PTC Input)	V/f OLV OLV/PM AOLV/PM EZOLV 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.
F	Not Used	V/f OLV OLV/PM AOLV/PM EZOLV Use this setting for unused terminals or to use terminals in through mode.
10	Forward Torque Limit	V/f OLV OLV/PM AOLV/PM EZOLV Enters the forward torque limit if the motor rated torque is 100%.
11	Reverse Torque Limit	V/f OLV OLV/PM AOLV/PM EZOLV Enters the load torque limit if the motor rated torque is 100%.
12	Regenerative Torque Limit	V/f OLV OLV/PM AOLV/PM EZOLV Enters the regenerative torque limit if the motor rated torque is 100%.
13	Torque Reference / Torque Limit	V/f OLV OLV/PM AOLV/PM EZOLV Enters the torque reference if the motor rated torque is 100%. This setting is the torque limit for speed control.
14	Torque Compensation	V/f OLV OLV/PM AOLV/PM EZOLV Enters the torque compensation value if the motor rated torque is 100%.
15	General Torque Limit	V/f OLV OLV/PM AOLV/PM 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	V/f OLV OLV/PM AOLV/PM EZOLV Enters the PID differential feedback value if the full scale analog signal (10 V or 20 mA) is 100%.
1F	Not Used	V/f OLV OLV/PM AOLV/PM EZOLV Use this setting for unused terminals or to use terminals in through mode.
30	DWEZ Analog Input 1	V/f OLV OLV/PM AOLV/PM EZOLV Use with DriveWorksEZ. Refer to the DriveWorksEZ online manual for more information.
31	DWEZ Analog Input 2	V/f OLV OLV/PM AOLV/PM 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 AM Analog Output Select	V/f OLV OLV/PM AOLV/PM EZOLV Sets the monitoring number to be output from the MFAO terminal AM. Set the <i>x-xx</i> part of the <i>Ux-xx [Monitor]</i>. For example, set <i>H4-01 = 102</i> to monitor <i>U1-02 [Output Frequency]</i>.	102 (000 - 1201)
H4-02 (041E) RUN	Terminal AM Analog Output Gain	V/f OLV OLV/PM AOLV/PM EZOLV Sets the gain of the monitor signal that is sent from MFAO terminal AM. Sets the analog signal output level from the terminal AM 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 AM Analog Output Bias	V/f OLV OLV/PM AOLV/PM 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%)

3.10 H: Terminal Functions

No. (Hex.)	Name	Description	Default (Range)
H4-07 (0423)	Terminal AM Signal Level Select	V/f OLV OLV/PM AOLV/PM EZOLV Sets the MFAO terminal AM output signal level. Note: Make sure that you set jumper S5 on the control circuit terminal board when you change these parameters. 0 : 0-10V 2 : 4 to 20 mA	0 (0, 2)
H4-20 (0B53)	Analog Power Monitor 100% Level	V/f OLV OLV/PM AOLV/PM EZOLV Sets the level at 10 V when <i>U1-08 [Output Power]</i> is set for analog output.	0.00 kW (0.00 - 650.00 kW)

◆ H5: Serial Communication

No. (Hex.)	Name	Description	Default (Range)
H5-01 (0425)	Drive Node Address	V/f OLV OLV/PM AOLV/PM EZOLV Sets the communication slave address for drives. Note: - Re-energize the drive or set <i>H5-20 = 1 [Communication Parameters Reload = Reload Now]</i> after you change the parameter setting. - Setting 0 will not let the drive respond to serial communications. - This parameter is limited to 0x7F (127) when <i>H5-08 = 3 [Communication Protocol Selection = BACnet]</i>	1FH (0 - FFH)
H5-02 (0426)	Communication Speed Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the communication speed for serial communications. Note: - Re-energize the drive or set <i>H5-20 = 1 [Communication Parameters Reload = Reload Now]</i> after you change the parameter setting. - Settings 0 to 2, 6, and 8 are not available when <i>H5-08 = 3 [Communication Protocol Selection = BACnet]</i> 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	3 (0 - 8)
H5-03 (0427)	Communication Parity Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the communications parity used for serial communications. Note: Re-energize the drive or set <i>H5-20 = 1 [Communication Parameters Reload = Reload Now]</i> after you change the parameter setting. 0 : No parity 1 : Even parity 2 : Odd parity	0 (0 - 2)
H5-04 (0428)	Communication Error Stop Method	V/f OLV OLV/PM AOLV/PM EZOLV Sets the motor Stopping Method when the drive detects <i>CE [Serial Communication Err]</i> issues. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) 3 : Alarm Only	3 (0 - 3)
H5-05 (0429)	Comm Fault Detection Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function that detects <i>CE [Serial Communication Error]</i> issues during serial communications. 0 : Disabled 1 : Enabled	1 (0, 1)
H5-06 (042A)	Drive Transmit Wait Time	Sets the time to wait to send a response message after the drive receives a command message from the master. Note: - Re-energize the drive or set <i>H5-20 = 1 [Communication Parameters Reload = Reload Now]</i> after you change the parameter setting. - This parameter is only effective when <i>H5-08 = 0 [Communication Protocol Selection = MEMOBUS]</i>	5 ms (0 - 65 ms)

No. (Hex.)	Name	Description	Default (Range)
H5-08 (062D)	Communication Protocol Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the communication protocol. 0 : Modbus/MEMOBUS 3 : BACnet	0 (0, 3)
H5-09 (0435)	CE Detection Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets the detection time for <i>CE [Serial Communication Error]</i> issues when communication stops.	2.0 s (0.0 - 25.0 s)
H5-10 (0436)	Modbus Register 0025H Unit Sel	V/f OLV OLV/PM AOLV/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) RUN	Comm ENTER Command Mode	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function to make the Enter command necessary to change parameters through serial communications. 0 : ENTER Command Required 1 : ENTER Command Not Required	1 (0, 1)
H5-12 (043D)	Run Command Method Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the input method for the Run command when <i>b1-02 = 2 [Run Command Selection 1 = Serial Communications]</i> or <i>b1-16 = 2 [Run Command Selection 2 = Serial Communications]</i> . 0 : FWD/Stop, REV/Stop 1 : Run/Stop, FWD/REV Note: Set this parameter to 0 when <i>H5-08 = 3 [Communication Protocol Selection = BACnet]</i>	0 (0, 1)
H5-14 (310D)	BACnet Device Object ID Low Word	V/f OLV OLV/PM AOLV/PM EZOLV BACnet device object ID Low Word.	0x0001 (0x0000 - 0xFFFF)
H5-15 (310E)	BACnet Device Object ID High Word	V/f OLV OLV/PM AOLV/PM EZOLV BACnet device object ID High Word.	0x00 (0x00 - 0x3F)
H5-17 (11A1) Expert	ENTER command response @CPU BUSY	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets the filter time constant used when monitoring motor speed during serial communications or with a communication option.	0 ms (0 - 100 ms)
H5-20 (0B57)	Communication Parameters Reload	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function to immediately enable updated serial communications parameters. 0 : Reload at Next Power Cycle 1 : Reload Now	0 (0, 1)
H5-22 (11CF)	Speed Search from MODBUS	V/f OLV OLV/PM AOLV/PM EZOLV Enables the MEMOBUS/Modbus communication register Speed Search function (bit0 of 15DFH). 0 : Disabled 1 : Enabled	0 (0, 1)
H5-23 (158D)	BACnet Max Master	V/f OLV OLV/PM AOLV/PM EZOLV Sets the max master MAC ID number to scan to when polling for the next node (Poll for Master) Note: The lower limit is different for different <i>H5-01 [Drive Node Address]</i> settings.	0x7F (0x01 - 0x7F)
H5-24 (3DA0)	BACnet Max Info Frames	V/f OLV OLV/PM AOLV/PM EZOLV Sets the maximum data frames that the drive can send out before it passes the network token.	3 (1 - 255)
H5-25 (1589) RUN	Function 5A Register 1 Selection	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Returns the contents of the specified MEMOBUS/Modbus communications register when responding to the master device.	0042H (U1-03) (0000H - FFFFH)

3.10 H: Terminal Functions

No. (Hex.)	Name	Description	Default (Range)
H5-28 (158C) RUN	Function 5A Register 4 Selection	V/f OLV OLV/PM AOLV/PM EZOLV Returns the contents of the specified MEMOBUS/Modbus communications register when responding to the master device.	0049H (U1-10) (0000H - FFFFH)
H5-29 (3AB0)	Memobus Stop Bit Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the number of stop bits. 1 : 1 Stop Bit 2 : 2 Stop Bits Note: Re-energize the drive or set <i>H5-20 = 1</i> [<i>Communication Parameters Reload = Reload Now</i>] after you change the parameter setting.	1 (1, 2)

◆ H6: Pulse Train Input/Output

No. (Hex.)	Name	Description	Default (Range)
H6-01 (042C)	Terminal RP Pulse Train Function	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function for pulse train input terminal RP. 0 : Frequency Reference 1 : PID Feedback Value 2 : PID Setpoint 3 : Speed Feedback (V/F Control)	0 (0 - 3)
H6-02 (042D) RUN	Terminal RP Frequency Scaling	V/f OLV OLV/PM AOLV/PM EZOLV Sets the frequency of the pulse train input signal used when the item selected with <i>H6-01</i> [<i>Terminal RP Pulse Train Function</i>] is input at 100%.	1440 Hz (100 - 32000 Hz)
H6-03 (042E) RUN	Terminal RP Function Gain	V/f OLV OLV/PM AOLV/PM EZOLV Sets the gain used when the function in <i>H6-01</i> [<i>Terminal RP Pulse Train Function</i>] is input to terminal RP.	100.0% (0.0 - 1000.0%)
H6-04 (042F) RUN	Terminal RP Function Bias	V/f OLV OLV/PM AOLV/PM EZOLV Sets the bias used when the function in <i>H6-01</i> [<i>Terminal RP Pulse Train Function</i>] 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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets a function for pulse train monitor output terminal MP. Sets the "x-xx" part of the <i>Ux-xx</i> 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 OLV OLV/PM AOLV/PM EZOLV Sets the frequency of the pulse train output signal used when the monitor set with <i>H6-06</i> [<i>Terminal MP Monitor Selection</i>] is 100%.	1440 Hz (0 - 32000 Hz)
H6-08 (043F)	Terminal RP Minimum Frequency	V/f OLV OLV/PM AOLV/PM EZOLV Sets the minimum frequency of the pulse train signal that terminal RP can detect.	0.5 Hz (0.1 - 1000.0 Hz)

◆ H7: Virtual MFIO selection

No. (Hex.)	Name	Description	Default (Range)
H7-00 (116F) Expert	Virtual MFIO Selection	V/f OLV OLV/PM AOLV/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 : Disable 1 : Enabled	0 (0, 1)
H7-01 (1185) Expert	Virtual Multi-Function Input 1	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function that enters the virtual input set in <i>H7-10</i> [<i>Virtual Multi-Function Output 1</i>]. Note: <i>1B</i> [<i>Programming Lockout</i>] and <i>11B</i> [<i>Inverse Input of 1B</i>] are not available.	F (1 - 19F)

No. (Hex.)	Name	Description	Default (Range)
H7-02 (1186) Expert	Virtual Multi-Function Input 2	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets the function for virtual digital output 1.	F (0 - 1A7)
H7-11 (11A5) Expert	Virtual Output 1 Delay Time	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets the function for virtual digital output 2.	F (0 - 1A7)
H7-13 (11A7) Expert	Virtual Output 2 Delay Time	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets the function for virtual digital output 3.	F (0 - 1A7)
H7-15 (11A9) Expert	Virtual Output 3 Delay Time	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets the function for virtual digital output 4.	F (0 - 1A7)
H7-17 (11AB) Expert	Virtual Output 4 Delay Time	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets the virtual analog input function.	F (0 - 32)
H7-31 (1178) RUN Expert	Virtual Analog Input Gain	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets the virtual analog input bias.	0.0% (-999.9 - 999.9%)
H7-40 (1163)	Virtual Analog Out Signal Select	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets the monitor to be output from the virtual analog output. Set the x-xx part of the Ux-xx [Monitor]. For example, set H7-41 = 102 to monitor U1-02 [Output Frequency].	102 (0 - 999)
H7-42 (1165)	Virtual Analog Output FilterTime	V/f OLV OLV/PM AOLV/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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the motor overload protection with electronic thermal protectors. 0 : No 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) 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.	Determined by A1-02 (0 - 6)
L1-02 (0481)	Motor Overload Protection Time	V/f OLV OLV/PM AOLV/PM EZOLV 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.	1.0 min (0.1 - 5.0 min)
L1-03 (0482)	Motor Thermistor oH Alarm Select	V/f OLV OLV/PM AOLV/PM EZOLV Sets drive operation when the PTC input signal entered into the drive is at the <i>oH3 [Motor Overheat Alarm]</i> detection level. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop 3 : Alarm Only	3 (0 - 3)
L1-04 (0483)	Motor Thermistor oH Fault Select	V/f OLV OLV/PM AOLV/PM EZOLV Sets the drive operation when the PTC input signal to the drive is at the <i>oH4 [Motor Overheat Fault (PTC Input)]</i> detection level. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop	1 (0 - 2)
L1-05 (0484)	Motor Thermistor Filter Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets the primary delay time constant for the PTC input signal entered to the drive. This parameter prevents accidental motor overheat faults.	0.20 s (0.00 - 10.00 s)
L1-08 (1103)	oL1 Current Level	V/f OLV OLV/PM AOLV/PM EZOLV 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.	0.0 A (0.0 A or 10% to 150% of the drive rated current)
L1-09 (1104)	oL1 Current Level for Motor 2	V/f OLV OLV/PM AOLV/PM EZOLV 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.	0.0 A (0.0 A or 10 to 150% of the drive rated current)
L1-13 (046D)	Motor Overload Memory Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function that keeps the current electronic thermal protector value when the drive stops receiving power. 0 : Disabled 1 : Enabled	1 (0, 1)
L1-22 (0768) RUN	Leakage Current Filter Time1	V/f OLV OLV/PM AOLV/PM EZOLV Sets the leakage current detection reduction filter time constant during constant speed run. Note: You can set this parameter when <i>C6-02 = B [Carrier Frequency Selection = Leakage Current Detection Reduction Rate PWM]</i> .	Determined by C6-02 (0.0 - 60.0 s)
L1-23 (0769) RUN	Leakage Current Filter Time2	V/f OLV OLV/PM AOLV/PM EZOLV Sets the leakage current detection reduction filter time constant during acceleration/deceleration. Note: - You can set this parameter when <i>C6-02 = B [Carrier Frequency Selection = Leakage Current Detection Reduction Rate PWM]</i>. - When the setting value increases, the current monitor also starts up slowly. Examine the relevant sequence for problems.	Determined by C6-02 (0.0 - 60.0 s)

◆ L2: Power Loss Ride Through

No. (Hex.)	Name	Description	Default (Range)
L2-01 (0485)	Power Loss Ride Through Select	V/f OLV OLV/PM AOLV/PM EZOLV Sets the drive operation after a momentary power loss. 0 : Disabled 1 : Enabled for L2-02 Time 2 : Enabled while CPU Power Active 3 : Kinetic Energy Backup: L2-02 4 : Kinetic Energy Backup: CPU Power 5 : Kinetic Energy Backup: DecelStop	0 (0 - 5)
L2-02 (0486)	Power Loss Ride Through Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets the maximum time that the drive will wait until trying to restart after power loss.	Determined by o2-04, C6-01 (0.0 - 25.5 s)
L2-03 (0487)	Minimum Baseblock Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets the minimum time to continue the drive output block (baseblock) after a baseblock.	Determined by o2-04, C6-01 (0.1 - 5.0 s)
L2-04 (0488)	Powerloss V/f Recovery Ramp Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets the time for the drive output voltage to go back to correct voltage after completing speed searches.	Determined by o2-04, C6-01 (0.0 - 5.0 s)
L2-05 (0489)	Undervoltage Detection Lvl (Uv1)	V/f OLV OLV/PM AOLV/PM EZOLV 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. 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.	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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the deceleration time during KEB operation used to decrease the maximum output frequency to 0. Note: When L2-29 = 1, 2, or 3 [<i>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.	0.0 s (0.0 - 6000.0 s)
L2-07 (048B) Expert	Kinetic Energy Backup Accel Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets the acceleration time to return the frequency to the frequency reference before a power loss after canceling KEB operation.	0.0 s (0.0 - 6000.0 s)
L2-08 (048C) Expert	Frequency Gain at KEB Start	V/f OLV OLV/PM AOLV/PM EZOLV Sets the quantity of output frequency reduction used when KEB operation starts as a percentage of the motor rated slip before starting KEB operation.	100% (0 - 300%)
L2-09 (048D) Expert	KEB Minimum Frequency Level	V/f OLV OLV/PM AOLV/PM EZOLV Sets the quantity of output frequency reduction used as a percentage of E2-02 [<i>Motor Rated Slip</i>] when KEB operation starts.	20% (0 - 100%)
L2-10 (048E) Expert	Minimum KEB Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets the minimum length of time to operate the KEB after the drive detects a momentary power loss.	50 ms (0 - 25500 ms)
L2-11 (0461) Expert	KEB DC Bus Voltage Setpoint	V/f OLV OLV/PM AOLV/PM EZOLV 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.	Determined by E1-01 (Determined by E1-01)
L2-29 (0475) Expert	Kinetic Energy Backup Method	V/f OLV OLV/PM AOLV/PM EZOLV Sets the KEB function operation mode. 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	0 (0 - 3)

3.11 L: Protection Functions

No. (Hex.)	Name	Description	Default (Range)
L2-30 (045E) Expert	KEB Zero Speed Operation	V/f OLV OLV/PM AOLV/PM EZOLV 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]. 0 : Baseblock 1 : DC/SC Braking	0 (0, 1)
L2-31 (045D) Expert	KEB Start Voltage Offset Level	V/f OLV OLV/PM AOLV/PM EZOLV Sets the KEB start voltage offset.	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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the method of the Stall Prevention During Acceleration. 0 : Disabled 1 : Enabled 2 : Intelligent (Ignore Decel Ramp) 3 : Current Limit Acceleration	1 (0 - 3)
L3-02 (0490)	Stall Prevent Level during Accel	V/f OLV OLV/PM AOLV/PM EZOLV Sets the output current level at which the Stall Prevention function operates during acceleration where the drive rated output current is 100%. Note: The upper limit to the setting range changes when the setting for $C6-01$ [Normal / Heavy Duty Selection] changes. • 150% when $C6-01 = 0$ [Heavy Duty Rating] • 120% when $C6-01 = 1$ [Normal Duty Rating]	Determined by C6-01 (0 - 150%)
L3-03 (0491)	Stall Prevent Limit during Accel	V/f OLV OLV/PM AOLV/PM EZOLV Sets the lower limit for the stall prevention level used in the constant output range as a percentage of the drive rated output current.	50% (0 - 100%)
L3-04 (0492)	Stall Prevention during Decel	V/f OLV OLV/PM AOLV/PM EZOLV Sets the method that the drive will use to prevent overvoltage faults when decelerating. Note: - To connect a dynamic braking option (braking resistor or braking resistor unit) to the drive, set this parameter to 0 or 3. Parameter settings 1, 2, 4, 5, and 7 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: • When $A1-02 = 5$ [OLV/PM], the setting range is 0 to 2. • When $A1-02 = 6$ or 8 [AOLV/PM or EZOLV], the setting range is 0 or 1. 0 : No 1 : General Purpose 2 : Intelligent (Ignore Decel Ramp) 3 : General Purpose w/ DB resistor 4 : Overexcitation/High Flux 5 : Overexcitation/High Flux 2 7 : Overexcitation/High Flux 3	1 (Determined by A1-02)
L3-05 (0493)	Stall Prevention during RUN	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function to enable and disable Stall Prevention During Run. Note: • An output frequency less than 6 Hz disables Stall Prevention during Run. The setting values of $L3-05$ and $L3-06$ [Stall Prevent Level during Run] do not have an effect. • The setting range changes when the $A1-02$ [Control Method Selection] value changes: – $A1-02 = 0, 5$ [V/f, OLV/PM] : 0 to 2 – $A1-02 = 8$ [EZOLV] : 0, 3 0 : No 1 : Deceleration Time 1 (C1-02) 2 : Deceleration Time 2 (C1-04) 3 : Intelligent (Ignore Decel Ramp)	2 (0 - Determined by A1-02)

No. (Hex.)	Name	Description	Default (Range)
L3-06 (0494)	Stall Prevent Level during Run	V/f OLV OLV/PM AOLV/PM EZOLV Sets the output current level at which the Stall Prevention function is enabled during run when the drive rated output current is 100%. Note: - 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 to the setting range changes when the setting for C6-01 [Normal / Heavy Duty Selection] changes. -150% when C6-01 = 0 [Heavy Duty Rating] -120% when C6-01 = 1 [Normal Duty Rating]	Determined by C6-01 (5 - 150%)
L3-11 (04C7)	Overvoltage Suppression Select	V/f OLV OLV/PM AOLV/PM EZOLV Sets the overvoltage suppression function. 0 : Disabled 1 : Enabled	0 (0, 1)
L3-17 (0462)	DC Bus Regulation Level	V/f OLV OLV/PM AOLV/PM EZOLV 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.	200 V Class: 375 V, 400 V: 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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the proportional gain used to control the DC bus voltage.	Determined by A1-02 (0.00 - 5.00)
L3-21 (0466) Expert	OVSuppression Accel/Decel P Gain	V/f OLV OLV/PM AOLV/PM EZOLV Sets the proportional gain to calculate acceleration and deceleration rates.	1.00 (0.10 - 10.00)
L3-22 (04F9)	PM Stall Prevention Decel Time	V/f OLV OLV/PM AOLV/PM EZOLV 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 Prevent Select during Accel = General Purpose].	0.0 s (0.0 - 6000.0 s)
L3-23 (04FD)	Stall P Reduction at Constant HP	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function to automatically decrease the Stall Prevention Level during Run for constant output ranges. 0 : Use L3-06 for Entire Speed Range 1 : Automatic Reduction @ CHP Region	0 (0, 1)
L3-24 (046E) Expert	Motor Accel Time @ Rated Torque	V/f OLV OLV/PM AOLV/PM EZOLV Sets the motor acceleration time to reach the maximum frequency at the motor rated torque for stopped single-drive motors.	Determined by o2-04, C6-01, E2-11, and E5-01 (0.001 - 10.000 s)
L3-25 (046F) Expert	Load Inertia Ratio	V/f OLV OLV/PM AOLV/PM EZOLV Sets the ratio between motor inertia and machine inertia.	1.0 (0.1 - 1000.0)
L3-26 (0455) Expert	Additional DC Bus Capacitors	V/f OLV OLV/PM AOLV/PM EZOLV 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.	0 µF (0 to 65000 µF)
L3-27 (0456)	Stall Prevention Detection Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets a delay time between reaching the Stall Prevention level and starting the Stall Prevention function.	60 ms (0 - 5000 ms)
L3-34 (016F) Expert	Torque Limit Delay Time	V/f OLV OLV/PM AOLV/PM EZOLV 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.	Determined by A1-02 (0.000 - 1.000 s)
L3-35 (0747) Expert	Speed Agree Width for Auto Decel	V/f OLV OLV/PM AOLV/PM EZOLV Sets the width for speed agreement when L3-04 = 2 [Decel Stall Prevention Selection = Automatic Decel Reduction]. Usually it is not necessary to change this setting.	0.00 Hz (0.00 - 1.00 Hz)
L3-36 (11D0)	Current Suppression Gain@Accel	V/f OLV OLV/PM AOLV/PM EZOLV 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.	Determined by A1-02 (0.0 - 100.0)
L3-37 (11D1) Expert	Current Limit P Gain @ Accel	V/f OLV OLV/PM AOLV/PM EZOLV Suppresses current hunting during acceleration. Usually it is not necessary to change this setting.	5 ms (0 - 100 ms)
L3-38 (11D2) Expert	Current Limit I Time @ Accel	V/f OLV OLV/PM AOLV/PM EZOLV Suppresses current hunting and overshooting that occurs when the drive stalls during acceleration. Usually it is not necessary to change this setting.	10.0 (0.0 - 100.0)

3.11 L: Protection Functions

No. (Hex.)	Name	Description	Default (Range)
L3-39 (11D3)	Current Limit Filter Time @Accel	V/f OLV OLV/PM AOLV/PM EZOLV Sets the time constant to adjust the acceleration rate when $L3-01 = 3$ [Stall Prevention during Accel = Current Limit Method]. 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 OLV OLV/PM AOLV/PM EZOLV Sets the function to enable and disable the best S-curve characteristic used for current-limited acceleration. 0 : Disabled 1 : Enabled	0 (0, 1)

◆ L4: Speed Detection

No. (Hex.)	Name	Description	Default (Range)
L4-01 (0499)	Speed Agree Detection Level	V/f OLV OLV/PM AOLV/PM EZOLV Sets the level to detect speed agree or motor speed. 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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets the level to detect speed agree or motor speed. Sets the level 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)
L4-04 (049C)	Speed Agree Detection Width(+/-)	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets the condition that activates speed detection. 0 : No Detection during Baseblock 1 : Detection Always Enabled	0 (0, 1)
L4-08 (047F)	Speed Agree Source Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the drive to use the soft starter output frequency or the motor speed (estimation value) for speed detection. 0 : Softstarter Output (Reference) 1 : Motor Speed (Actual Speed)	0 (0, 1)

◆ L5: Fault Restart

No. (Hex.)	Name	Description	Default (Range)
L5-01 (049E)	Number of Auto-Restart Attempts	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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)

No. (Hex.)	Name	Description	Default (Range)
L5-04 (046C)	Interval Method Restart Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets the time interval between each Auto Restart attempt. This function is enabled when <i>L5-05 = 1</i> [<i>Auto Restart Operation Selection = Use L5-04 Time</i>].	10.0 s (0.5 - 600.0 s)
L5-05 (0467)	Auto-Restart Method	V/f OLV OLV/PM AOLV/PM EZOLV Sets the count method for the Auto Restart operation. 0 : Continuous/Immediate Attempts 1 : Interval/Attempt after L5-04 sec	0 (0, 1)
L5-07 (0B2A)	Fault Reset Enable Select Grp1	V/f OLV OLV/PM AOLV/PM EZOLV Use these 4 digits to set the Auto Restart function for <i>oL1</i> to <i>oL4</i>. From left to right, the digits set <i>oL1</i>, <i>oL2</i>, <i>oL3</i>, and <i>oL4</i>, in order. 0000 : Disabled 0001 : Enabled (—/—/—/oL4) 0010 : Enabled (—/—/oL3/—) 0011 : Enabled (—/—/oL3/oL4) 0100 : Enabled (—/oL2/—/—) 0101 : Enabled (—/oL2/—/oL4) 0110 : Enabled (—/oL2/oL3/—) 0111 : Enabled (—/oL2/oL3/oL4) 1000 : Enabled (oL1/—/—/—) 1001 : Enabled (oL1/—/—/oL4) 1010 : Enabled (oL1/—/oL3/—) 1011 : Enabled (oL1/—/oL3/oL4) 1100 : Enabled (oL1/oL2/—/—) 1101 : Enabled (oL1/oL2/—/oL4) 1110 : Enabled (oL1/oL2/oL3/—) 1111 : Enabled (oL1/oL2/oL3/oL4)	1111 (0000 - 1111)
L5-08 (0B2B)	Fault Reset Enable Select Grp2	V/f OLV OLV/PM AOLV/PM EZOLV Use these 4 digits to set the Auto Restart function for <i>Uv1</i>, <i>ov</i>, <i>oH1</i>, and <i>GF</i>. From left to right, the digits set <i>Uv1</i>, <i>ov</i>, <i>oH1</i>, and <i>GF</i>, in order. 0000 : Disabled 0001 : Enabled (—/—/—/GF) 0010 : Enabled (—/—/oH1/—) 0011 : Enabled (—/—/oH1/GF) 0100 : Enabled (—/ov/—/—) 0101 : Enabled (—/ov/—/GF) 0110 : Enabled (—/ov/oH1/—) 0111 : Enabled (—/ov/oH1/GF) 1000 : Enabled (Uv1/—/—/—) 1001 : Enabled (Uv1/—/—/GF) 1010 : Enabled (Uv1/—/oH1/—) 1011 : Enabled (Uv1/—/oH1/GF) 1100 : Enabled (Uv1/ov/—/—) 1101 : Enabled (Uv1/ov/—/GF) 1110 : Enabled (Uv1/ov/oH1/—) 1111 : Enabled (Uv1/ov/oH1/GF)	1111 (0000 - 1111)

◆ L6: Torque Detection

No. (Hex.)	Name	Description	Default (Range)
L6-01 (04A1)	Torque Detection Selection 1	V/f OLV OLV/PM AOLV/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)
L6-02 (04A2)	Torque Detection Level 1	V/f OLV OLV/PM AOLV/PM EZOLV Sets the detection level for Overtorque/Undertorque Detection 1. In V/f control, drive rated output current = 100% value. In vector control, motor rated torque = 100% value.	150% (0 - 300%)
L6-03 (04A3)	Torque Detection Time 1	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 @ ISpeedl > L6-09 - Alarm 3 : oL5 @ Speed > L6-09 - Fault 4 : oL5 @ ISpeedl > L6-09 - Fault 5 : UL5 @ Speed < L6-09 - Alarm 6 : UL5 @ ISpeedl < L6-09 - Alarm 7 : UL5 @ Speed < L6-09 - Fault 8 : UL5 @ ISpeedl < L6-09 - Fault	0 (0 - 8)
L6-09 (0469)	Mech Fatigue Detect Speed Level	V/f OLV OLV/PM AOLV/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%)

No. (Hex.)	Name	Description	Default (Range)
L6-10 (046A)	Mech Fatigue Detect Delay Time	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets the torque limit value for forward regenerative conditions as a percentage of the motor rated torque.	200% (0 - 300%)
L7-04 (04AA) RUN	Reverse Regenerative Trq Limit	V/f OLV OLV/PM AOLV/PM 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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the integral time constant for the torque limit function.	200 ms (5 - 10000 ms)
L7-07 (04C9)	Torque Limit during Accel/Decel	V/f OLV OLV/PM AOLV/PM 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	V/f OLV OLV/PM AOLV/PM EZOLV Assigns a time filter to allow the torque limit to build at start. 0 : Disabled 1 : Enabled	1 (0, 1)

◆ L8: Drive Protection

No. (Hex.)	Name	Description	Default (Range)
L8-01 (04AD)	3% ERF DB Resistor Protection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function to enable braking resistor protection with a Yaskawa ERF series braking resistor (3% ED) installed on the heatsink. 0 : No 1 : Yes	0 (0, 1)
L8-02 (04AE)	Overheat Alarm Level	V/f OLV OLV/PM AOLV/PM EZOLV Sets the <i>oH</i> detection level in temperature.	Determined by o2-04, C6-01 (50 - 150 °C)
L8-03 (04AF)	Overheat Pre-Alarm Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the operation of drives when an <i>oH</i> 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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function to enable and disable input phase loss detection. 0 : Disabled 1 : Enabled	1 (0, 1)

3.11 L: Protection Functions

No. (Hex.)	Name	Description	Default (Range)
L8-07 (04B3)	Output Phase Loss Protection Sel	V/f OLV OLV/PM AOLV/PM 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)
L8-09 (04B5)	Output Ground Fault Detection	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets operation of the heatsink cooling fan. 0 : During Run, w/ L8-11 Off-Delay 1 : Always On 2 : On when Drive Temp Reaches L8-64	0 (0 - 2)
L8-11 (04B7)	Heatsink Fan Off-Delay Time	V/f OLV OLV/PM AOLV/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 L8-10 = 0 [Heatsink Cooling Fan Ope Select = Dur Run (OffDly)].	60 s (0 - 300 s)
L8-12 (04B8)	Ambient Temperature Setting	V/f OLV OLV/PM AOLV/PM EZOLV Sets the ambient temperature of the drive installation area. Note: The setting range changes when the L8-35 [Installation Method Selection] value changes: • 0 [IP20/UL Open Type]: -10 °C to +60 °C • 1 [Side-by-Side Mounting]: -10 °C to +50 °C • 2 [IP20/UL Type 1]: -10 °C to +50 °C • 3 [External Heatsink]: -10 °C to +50 °C	40 °C (-10 °C - +60 °C)
L8-15 (04BB)	Drive oL2 @ Low Speed Protection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function to decrease drive overload at low speeds to prevent damage to the main circuit transistor during low speed operation (at 6 Hz or slower) to prevent oL2 [Drive Overloaded]. 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. 0 : Disabled (No Additional Derate) 1 : Enabled (Reduced oL2 Level)	1 (0, 1)
L8-18 (04BE)	Software Current Limit Selection	V/f OLV OLV/PM AOLV/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	1 (0, 1)
L8-19 (04BF)	Freq Reduction @ oH Pre-Alarm	V/f OLV OLV/PM AOLV/PM EZOLV Sets the ratio at which the drive derates the frequency reference during an oH alarm.	0.8 (0.1 - 0.9)
L8-27 (04DD)	Overcurrent Detection Gain	V/f OLV OLV/PM AOLV/PM EZOLV Sets the PM motor overcurrent detection level as a percentage of the motor rated current value. Note: Parameter A1-02 [Control Method Selection] selects which parameter is the motor rated current. • A1-02 ≠ 8[EZOLV]: E5-03 [PM Motor Rated Current (FLA)] • A1-02 = 8: E9-06 [Motor Rated Current (FLA)]	300.0% (0.0 - 1000.0%)
L8-29 (04DF)	Output Unbalance Detection Sel	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function to detect LF2. 0 : Disabled 1 : Enabled	1 (0, 1)
L8-31 (04E1)	LF2 Detection Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets the LF2 [Output Current Imbalance] detection time.	3 (1 - 100)
L8-35 (04EC)	Installation Method Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the type of drive installation. 0 : IP20/UL Open Type 1 : Side-by-Side Mounting 2 : IP20/UL Type 1 3 : External Heatsink	0 (0 - 3)

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

3.12 n: Special Adjustment

◆ n1: Hunting Prevention

No. (Hex.)	Name	Description	Default (Range)
n1-01 (0580)	Hunting Prevention Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function to prevent hunting. Note: When you replace a V1000-series drive with a HV305 drive, set <i>n1-01</i> = 1 [<i>Hunting Prevention Selection = Enabled</i>]. 0 : Disable 1 : Enabled	0 (0, 1)
n1-02 (0581) Expert	Hunting Prevention Gain Setting	V/f OLV OLV/PM AOLV/PM EZOLV Sets the performance of the hunting prevention function. Usually it is not necessary to change this parameter.	1.00 (0.00 - 2.50)
n1-03 (0582) Expert	Hunting Prevention Time Constant	V/f OLV OLV/PM AOLV/PM EZOLV Sets the primary delay time constant of the hunting prevention function. Usually it is not necessary to change this parameter.	Determined by o2-04 (0 - 500 ms)
n1-05 (0530) Expert	Hunting Prevent Gain in Reverse	V/f OLV OLV/PM AOLV/PM EZOLV Sets the performance of the hunting prevention function. This parameter adjusts Reverse run. Usually it is not necessary to change this parameter.	0.00 (0.00 - 2.50)
n1-13 (1B59) Expert	DC Bus Stabilization Control	V/f OLV OLV/PM AOLV/PM EZOLV Sets the oscillation suppression function for the DC bus voltage. 0 : Disabled 1 : Enabled	0 (0, 1)
n1-14 (1B5A) Expert	DC Bus Stabilization Time	V/f OLV OLV/PM AOLV/PM EZOLV Adjusts the responsiveness of the oscillation suppression function for the DC bus voltage. Set <i>n1-13</i> = 1 [<i>DC Bus Stabilization Control = Enabled</i>] to enable this parameter.	100.0 ms (50.0 - 500.0 ms)

◆ n2: Auto Freq Regulator (AFR)

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

◆ n3: High Slip/Overexcite Braking

No. (Hex.)	Name	Description	Default (Range)
n3-01 (0588) Expert	HSB Deceleration Frequency Width	V/f OLV OLV/PM AOLV/PM EZOLV Sets the amount by which the output frequency is to be lowered during high-slip braking, as a percentage of <i>E1-04</i> [<i>Maximum Output Frequency</i>], which represents the 100% value.	5% (1 - 20%)
n3-02 (0589) Expert	HSB Current Limit Level	V/f OLV OLV/PM AOLV/PM EZOLV Sets the maximum current output during high-slip braking as a percentage, where <i>E2-01</i> [<i>Motor Rated Current (FLA)</i>] is 100%. Also set the current suppression to prevent exceeding drive overload tolerance. Note: The upper limit to the setting range changes when the setting for <i>C6-01</i> [<i>Normal / Heavy Duty Selection</i>] changes. 150% when <i>C6-01</i> = 0 [<i>Heavy Duty Rating</i>] 120% when <i>C6-01</i> = 1 [<i>Normal Duty Rating</i>]	Determined by C6-01 (0 - 150%)

No. (Hex.)	Name	Description	Default (Range)
n3-03 (058A) Expert	HSB Dwell Time at Stop	V/f OLV OLV/PM AOLV/PM EZOLV 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> .	1.0 s (0.0 - 10.0 s)
n3-04 (058B) Expert	HSB Overload Time	V/f OLV OLV/PM AOLV/PM EZOLV 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.	40 s (30 - 1200 s)
n3-13 (0531)	OverexcitationBraking (OEB) Gain	V/f OLV OLV/PM AOLV/PM EZOLV Sets the gain value that the drive multiplies by the V/f pattern output value during overexcitation deceleration to calculate the overexcitation level.	1.10 (1.00 - 1.40)
n3-14 (0532) Expert	OEB High Frequency Injection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function that injects harmonic signals during overexcitation deceleration. 0 : Disabled 1 : Enabled	0 (0, 1)
n3-21 (0579)	HSB Current Suppression Level	V/f OLV OLV/PM AOLV/PM EZOLV Sets the upper limit of the current that is suppressed at the time of overexcitation deceleration as a percentage of the drive rated current.	100% (0 - 150%)
n3-23 (057B)	Overexcitation Braking Operation	V/f OLV OLV/PM AOLV/PM EZOLV Sets the direction of motor rotation where the drive will enable overexcitation. 0 : Disabled 1 : Enabled Only when Rotating FWD 2 : Enabled Only when Rotating REV	0 (0 - 2)

◆ n5: Feed Forward Control

No. (Hex.)	Name	Description	Default (Range)
n5-01 (05B0)	Feed Forward Control Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the feed forward function. 0 : Disabled 1 : Enabled	0 (0, 1)
n5-02 (05B1)	Motor Inertia Acceleration Time	V/f OLV OLV/PM AOLV/PM 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 OLV OLV/PM AOLV/PM 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 OLV OLV/PM AOLV/PM 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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the type of motor data that Online Tuning uses for OLV control. 0 : Disabled 1 : Line-to-Line Resistance Tuning 2 : Voltage Correction Tuning	0 (0 - 2)
n6-05 (05C7) Expert	Online Tuning Gain	V/f OLV OLV/PM AOLV/PM EZOLV Sets the compensation gain when <i>n6-01 = 2 [Online Tuning Selection = Voltage Correction Tuning]</i> . Usually it is not necessary to change this parameter.	1.0 (0.1 - 50.0)

◆ n7: EZ Drive

No. (Hex.)	Name	Description	Default (Range)
n7-01 (3111) Expert	Damping Gain for Low Frequency	V/f OLV OLV/PM AOLV/PM EZOLV Sets the oscillation suppression gain for the low speed range.	1.0 (0.1 - 10.0)
n7-05 (3115) Expert	Response Gain for Load Changes	V/f OLV OLV/PM AOLV/PM EZOLV Sets the response gain related to changes in the load.	50 (10 - 1000)
n7-07 (3117) Expert	Speed Calculation Gain1	V/f OLV OLV/PM AOLV/PM EZOLV Sets the speed calculation gain during usual operation. Usually it is not necessary to change this setting.	15.0 Hz (1.0 - 50.0 Hz)
n7-08 (3118) Expert	Speed Calculation Gain2	V/f OLV OLV/PM AOLV/PM EZOLV Sets the speed calculation gain during a speed search.	25.0 Hz (1.0 - 50.0 Hz)
n7-10 (311A) Expert	Pull-in Current Switching Speed	V/f OLV OLV/PM AOLV/PM EZOLV 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.	10.0% (0.0 - 100.0%)
n7-17 (3122)	Resistance TemperatureCorrection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function to adjust for changes in the motor resistance value caused by changes in the temperature. 0 : Invalid 1 : Valid (Only 1 time) 2 : Valid (Every time)	1 (0 to 2)
n7-19 (3128) Expert	Flux Error Compensation Gain	V/f OLV OLV/PM AOLV/PM EZOLV Sets the gain for magnetic flux compensation. Usually it is not necessary to change this setting.	5000% (0 - 50000%)

◆ n8: PM Motor Control Tuning

No. (Hex.)	Name	Description	Default (Range)
n8-01 (0540)	Pole Position Detection Current	V/f OLV OLV/PM AOLV/PM EZOLV Sets, as a percentage, the Initial Rotor Position Estimated Current, taking the E5-03 [Motor Rated Current (FLA)] as the 100% value. Usually it is not necessary to change this setting.	50% (0 - 100%)
n8-02 (0541)	Pole Alignment Current Level	V/f OLV OLV/PM AOLV/PM EZOLV Sets the current at the time of polar attraction as a percentage where E5-03 [motor rated current] is 100%. Usually it is not necessary to change this setting.	80% (0 - 150%)
n8-11 (054A)	Observer Calculation Gain 2	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 (K _e) Gain	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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%)

No. (Hex.)	Name	Description	Default (Range)
n8-26 (0559) Expert	ACR d Gain @PoleEst	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets how the drive detects the position of the rotor when the motor starts. Note: • When you use an SPM motor, set <i>n8-35</i> = 0. When you use an IPM motor, set <i>n8-35</i> = 0 to 2. • When you set <i>n8-35</i> = 1, do High 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 OLV OLV/PM AOLV/PM EZOLV Sets the injection frequency for high frequency injection. Note: • Set <i>n8-35</i> = 1 [Initial Pole Detection Method = High Frequency Injection] or <i>n8-57</i> = 1 [HFI Overlap Selection = Enabled] to enable this parameter. • The drive automatically calculates this value when High Frequency Injection Auto-Tuning completes successfully.	500 Hz (200 - 1000 Hz)
n8-37 (0564) Expert	HFI Voltage Amplitude Level	V/f OLV OLV/PM AOLV/PM EZOLV 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. Note: • Set <i>n8-35</i> = 1 [Initial Pole Detection Method = High Frequency Injection] or <i>n8-57</i> = 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 LPF Cutoff Freq	V/f OLV OLV/PM AOLV/PM EZOLV Sets the low-pass filter shut-off frequency for high frequency injection. Note: • Set <i>n8-35</i> = 1 [Initial Pole Detection Method = High Frequency Injection] or <i>n8-57</i> = 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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the response gain for the high frequency injection speed estimation.	2.5 (-10.0 - +10.0)
n8-42 (0569) Expert	HFI I Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets the integral time constant for the high frequency injection speed estimation. Usually it is not necessary to change this setting.	0.10 s (0.00 - 9.99 s)
n8-45 (0538)	Speed Feedback Detection Gain	V/f OLV OLV/PM AOLV/PM EZOLV Sets the internal speed feedback detection reduction unit gain as a magnification value. Usually it is not necessary to change this setting.	0.80 (0.00 - 10.00)
n8-46 (0539) Expert	PM Phase Compensation Gain	V/f OLV OLV/PM AOLV/PM EZOLV Sets the gain to compensate for phase differences. Usually it is not necessary to change this setting.	0.3 (0.0 - 10.0)
n8-47 (053A)	Pull-in Current Comp Filter Time	V/f OLV OLV/PM AOLV/PM EZOLV 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.	5.0 s (0.0 - 100.0 s)
n8-48 (053B) RUN	Pull-in/Light Load Id Current	V/f OLV OLV/PM AOLV/PM EZOLV On the basis that parameter <i>E5-03</i> [Motor Rated Current (FLA)] is the 100% value, this parameter sets the d-axis current that flows to the motor during run at constant speed as a percentage.	30% (0 - 200%)
n8-49 (053C) RUN Expert	Heavy Load Id Current	V/f OLV OLV/PM AOLV/PM EZOLV 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 <i>E5-03</i> [PM Motor Rated Current (FLA)] to be 100%. Usually it is not necessary to change this setting.	Determined by E5-01 (-200.0 - +200.0%)

3.12 n: Special Adjustment

No. (Hex.)	Name	Description	Default (Range)
n8-50 (053D) Expert	Medium Load Iq Level (High)	V/f OLV OLV/PM AOLV/PM EZOLV Sets the load current level at which heavy load control starts where <i>E5-03 [Motor Rated Current (FLA)]</i> is 100%. Usually it is not necessary to change this setting.	80% (50 - 255)
n8-51 (053E)	Pull-in Current @ Acceleration	V/f OLV OLV/PM AOLV/PM EZOLV Sets the pull-in current allowed to flow during acceleration/deceleration as a percentage of the motor rated current. Note: Parameter <i>A1-02 [Control Method Selection]</i> selects which parameter is the motor rated current. • <i>A1-02 = 5 [OLV/PM]: E5-03 [Motor Rated Current (FLA)]</i> • <i>A1-02 = 8 [EZOLV]: E9-06 [Motor Rated Current (FLA)]</i>	Determined by A1-02 (0 - 200%)
n8-54 (056D) Expert	Voltage Error Compensation Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets the time constant that the drive uses when adjusting for voltage errors.	1.00 s (0.00 - 10.00 s)
n8-55 (056E)	Motor to Load Inertia Ratio	V/f OLV OLV/PM AOLV/PM EZOLV Sets the ratio between motor inertia and machine inertia. 0 : Below 1:10 1 : Between 1:10 and 1:30 2 : Between 1:30 and 1:50 3 : Beyond 1:50	0 (0 - 3)
n8-57 (0574)	HFI Overlap Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the function that detects motor speed with high frequency injection. Note: When you set <i>n8-57 = 1</i>, do High Frequency Injection Auto-Tuning. 0 : Disabled 1 : Enabled	0 (0, 1)
n8-62 (057D) Expert	Output Voltage Limit Level	V/f OLV OLV/PM AOLV/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 <i>A1-02 = 8 [Control Method Selection = EZOLV]</i>, the default settings are: • 200 V class: 230.0 V • 400 V class: 460.0 V	200 V Class: 200.0 V, 400 V: 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 OLV OLV/PM AOLV/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)
n8-65 (065C) Expert	Speed Fdbk Gain @ oV Suppression	V/f OLV OLV/PM AOLV/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)
n8-69 (065D) Expert	Speed Observer Control P Gain	V/f OLV OLV/PM AOLV/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)
n8-72 (0655) Expert	Speed Estimation Method Select	V/f OLV OLV/PM AOLV/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)
n8-74 (05C3) Expert	Light Load Iq Level	V/f OLV OLV/PM AOLV/PM EZOLV Set <i>n8-48 [Pull-in/Light Load Id Current]</i> to the percentage of load current (q-axis current) that you will apply, where <i>E5-03 [Motor Rated Current (FLA)] = a setting value of 100%</i>.	30% (0 - 255%)
n8-75 (05C4) Expert	Medium Load Iq Level (low)	V/f OLV OLV/PM AOLV/PM EZOLV Set <i>n8-78 [Medium Load Id Current]</i> to the percentage of load current (q-axis current) that you will apply, where <i>E5-03 [Motor Rated Current (FLA)] = a setting value of 100%</i>.	50% (0 - 255%)
n8-77 (05CE) Expert	Heavy Load Iq Level	V/f OLV OLV/PM AOLV/PM EZOLV Set <i>n8-49 [Heavy Load Id Current]</i> to the percentage of load current (q-axis current) that you will apply, where <i>E5-03 [Motor Rated Current (FLA)] = a setting value of 100%</i>.	90% (0 - 255%)
n8-78 (05F4) RUN Expert	Medium Load Id Current	V/f OLV OLV/PM AOLV/PM EZOLV Sets the level of the pull-in current as a percentage, where <i>E5-03 [PM Motor Rated Current (FLA)] = 100%</i>.	0% (0 - 255%)

No. (Hex.)	Name	Description	Default (Range)
n8-79 (05FE)	Pull-in Current @ Deceleration	V/f OLV OLV/PM AOLV/PM EZOLV Sets the pull-in current that can flow during deceleration as a percentage of the <i>E5-03 [PM Motor Rated Current (FLA)]</i>. Note: When <i>n8-79 = 0</i>, the drive will use the value set in <i>n8-51 [Pull-in Current @ Acceleration]</i>.	50% (0 - 200%)
n8-84 (02D3) Expert	Polarity Detection Current	V/f OLV OLV/PM AOLV/PM EZOLV 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>.	100% (0 - 150%)
n8-87 (02BC)	Output Voltage Limit Method	V/f OLV OLV/PM AOLV/PM EZOLV Sets the method of output voltage limit. If there is vibration in the constant output range, set Feedforward Method. Usually it is not necessary to change this setting. 0 : Feedback Method 1 : Feedforward Method	0 (0, 1)
n8-88 (02BD)	Vout Limit Switching Level	V/f OLV OLV/PM AOLV/PM EZOLV Sets the current level at which output voltage limit sequence selection occurs as a percentage where the motor rated current is 100%. Normally there is no need to change this setting. Note: Parameter <i>A1-02 [Control Method Selection]</i> 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 [PM Motor Rated Current (FLA)]	400% (0 - 400%)
n8-89 (02BE)	Vout Limit Switching Hysteresis	V/f OLV OLV/PM AOLV/PM EZOLV Sets the hysteresis width of the current level at which output voltage limit sequence selection occurs as a percentage where the motor rated current is 100%. Normally there is no need to change this setting. Note: Parameter <i>A1-02 [Control Method Selection]</i> 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 [PM Motor Rated Current (FLA)]	3% (0 - 400%)
n8-90 (02BF)	Vout Limit Switching Speed	V/f OLV OLV/PM AOLV/PM EZOLV Sets the speed level at which output voltage limit sequence selection occurs as a percentage where the maximum output frequency is 100%. Usually it is not necessary to change this setting. Note: Parameter <i>A1-02 [Control Method Selection]</i> selects which parameter is the maximum output frequency. • A1-02 = 5, 6 [OLV/PM, AOLV/PM]: E1-04 [Maximum Output Frequency] • A1-02 = 8: E9-02 [Motor Max Revolutions]	200% (0 - 200%)
n8-91 (02F7)	Id Limit at Voltage Saturation	V/f OLV OLV/PM AOLV/PM EZOLV Sets the limit value of feedback output voltage limit Id operation. Enabled when <i>n8-87 = 0 [Output Voltage Control Selection = Speed Feedback Form]</i>. Usually it is not necessary to change this setting.	-50% (-200 - 0%)
n8-94 (012D) Expert	Flux Position Estimation Method	V/f OLV OLV/PM AOLV/PM EZOLV Sets the criteria that the drive uses to find changes in speed or load. Usually it is not necessary to change this setting. 0 : Softstarter 1 : Speed Feedback	1 (0, 1)
n8-95 (012E) Expert	Flux Position Est Filter Time	V/f OLV OLV/PM AOLV/PM EZOLV 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.	30 ms (0 - 100 ms)

◆ nA: PM Motor Control Tuning

No. (Hex.)	Name	Description	Default (Range)
nA-01 (3129) Expert	Observer Calc Gain 3	V/f OLV OLV/PM AOLV/PM EZOLV Sets the gain for speed estimation. Usually it is not necessary to change this setting.	30.0 (0.0 - 1000.0)

3.13 o: Keypad-Related Settings

◆ o1: Keypad Display

No. (Hex.)	Name	Description	Default (Range)
o1-01 (0500) RUN	User Monitor Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the <i>U monitor</i> for the Drive Mode. This parameter is only available when you use an LED keypad.	106 (104 - 1216)
o1-02 (0501) RUN	Monitor Selection at Power-up	V/f OLV OLV/PM AOLV/PM EZOLV Sets the monitor item that the keypad screen shows after energizing the drive. Refer to "U: Monitors" for information about the monitor items that the keypad screen can show. This parameter is only available when you use an LED keypad. 1 : Frequency Reference (U1-01) 2 : Direction 3 : Output Frequency (U1-02) 4 : Output Current (U1-03) 5 : User Monitor (<i>o1-01</i>)	1 (1 - 5)
o1-03 (0502)	Frequency Display Unit Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the display units for the frequency reference and output frequency. 0 : 0.01Hz units 1 : 0.01% units 2 : Revolutions Per Minute (RPM) 3 : User Units	Determined by A1-02 (0 - 3)
o1-04 (0503)	V/f Pattern Display Unit	V/f OLV OLV/PM AOLV/PM EZOLV Sets the setting unit for parameters that set the V/f pattern frequency. 0 : Hz 1 : min⁻¹ (r/min) unit	Determined by A1-02 (0, 1)
o1-05 (0504) RUN	LCD Contrast Adjustment	V/f OLV OLV/PM AOLV/PM EZOLV Sets the contrast of the LCD display on the keypad.	5 (0 - 10)
o1-10 (0520)	User Units Maximum Value	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 to o1-26 (11AD - 11AF) RUN	Custom Monitor 1 to 3	V/f OLV OLV/PM AOLV/PM EZOLV Sets a maximum of 3 monitors as user monitors. These parameters are only available when using an LCD keypad.	o1-24: 101 o1-25: 102 o1-26: 103 (0 - 1201)
o1-27 to o1-35 (11B0 - 11B8) RUN	Custom Monitor 4 to 12	V/f OLV OLV/PM AOLV/PM EZOLV Sets a maximum of 9 monitors as user monitors. These parameters are only available when using an LCD keypad.	1 (000 - 1216)
o1-36 (11B9) RUN	LCD Backlight Brightness	V/f OLV OLV/PM AOLV/PM EZOLV Sets the intensity of the LCD keypad backlight.	5 (1 - 5)
o1-37 (11BA) RUN	LCD Backlight ON/OFF Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the automatic shut off function for the LCD backlight. 0 : OFF 1 : ON	0 (0, 1)
o1-38 (11BB) RUN	LCD Backlight Off-Delay	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets the function to show the LCD keypad initial setup screen each time the drive is energized. This parameter is only available when using an LCD keypad. 0 : No 1 : Yes	1 (0, 1)

No. (Hex.)	Name	Description	Default (Range)
o1-40 (11BD) RUN	Home Screen Display Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the monitor display mode for the Home screen. This parameter is only available when using 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 OLV OLV/PM AOLV/PM EZOLV Sets the horizontal range used to display the monitor set in o1-24 [Custom Monitor 1] as a bar graph. This parameter is only available when using an LCD keypad. 0 : +/- Area (- o1-42 ~ o1-42) 1 : + Area (0 ~ o1-42) 2 : - Area (- o1-42 ~ 0)	0 (0 - 2)
o1-42 (11C2) RUN	1st Monitor Area Setting	V/f OLV OLV/PM AOLV/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 when using an LCD keypad.	100.0% (0.0 - 100.0%)
o1-43 (11C3) RUN	2nd Monitor Area Selection	V/f OLV OLV/PM AOLV/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 when using an LCD keypad. 0 : +/- Area (- o1-44 ~ o1-44) 1 : + Area (0 ~ o1-44) 2 : - Area (- o1-44 ~ 0)	0 (0 - 2)
o1-44 (11C4) RUN	2nd Monitor Area Setting	V/f OLV OLV/PM AOLV/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 when using an LCD keypad.	100.0% (0.0 - 100.0%)
o1-45 (11C5) RUN	3rd Monitor Area Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the horizontal range used to display the monitor set in o1-26 [Custom Monitor 3] as a bar graph. This parameter is only available when using an LCD keypad. 0 : +/- Area (- o1-46 ~ o1-46) 1 : + Area (0 ~ o1-46) 2 : - Area (- o1-46 ~ 0)	0 (0 - 2)
o1-46 (11C6) RUN	3rd Monitor Area Setting	V/f OLV OLV/PM AOLV/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 when using an LCD keypad.	100.0% (0.0 - 100.0%)
o1-47 (11C7) RUN	Trend Plot 1 Scale Minimum Value	V/f OLV OLV/PM AOLV/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 when using an LCD keypad.	-100.0% (-300.0 - +300.0%)
o1-48 (11C8) RUN	Trend Plot 1 Scale Maximum Value	V/f OLV OLV/PM AOLV/PM EZOLV Sets the horizontal axis maximum value used to display the monitor set in o1-24 [Custom Monitor 1] as a trend plot. This parameter is only available when using an LCD keypad.	100.0% (-300.0 - +300.0%)
o1-49 (11C9) RUN	Trend Plot 2 Scale Minimum Value	V/f OLV OLV/PM AOLV/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 when using an LCD keypad.	-100.0% (-300.0 - +300.0%)
o1-50 (11CA) RUN	Trend Plot 2 Scale Maximum Value	V/f OLV OLV/PM AOLV/PM EZOLV Sets the horizontal axis maximum value used to display the monitor set in o1-25 [Custom Monitor 2] as a trend plot. This parameter is only available when using an LCD keypad.	100.0% (-300.0 - +300.0%)
o1-51 (11CB) RUN	Trend Plot Time Scale Setting	V/f OLV OLV/PM AOLV/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 when using an LCD keypad.	300 s (1 - 3600 s)
o1-55 (11EE) RUN	Analog Gauge Area Selection	V/f OLV OLV/PM AOLV/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 when using an LCD keypad. 0 : +/- Area (- o1-56 ~ o1-56) 1 : + Area (0 ~ o1-56)	1 (0, 1)

3.13 o: Keypad-Related Settings

No. (Hex.)	Name	Description	Default (Range)
o1-56 (11EF) RUN	Analog Gauge Area Setting	V/f OLV OLV/PM AOLV/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 when using an LCD keypad.	100.0% (0.0 - 100.0%)
o1-58 (3125)	Motor Power Unit Selection	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets the Drive Model code. Set this parameter after replacing the control board.	Determined by the drive (-)
o2-05 (0509)	Home Mode Freq Ref Entry Mode	V/f OLV OLV/PM AOLV/PM EZOLV 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	0 (0, 1)
o2-06 (050A)	Keypad Disconnect Detection	V/f OLV OLV/PM AOLV/PM EZOLV 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	1 (0, 1)
o2-07 (0527)	Keypad RUN Direction @ Power-up	V/f OLV OLV/PM AOLV/PM EZOLV Sets the direction of motor rotation when the drive is energized and the keypad is the Run command source. 0 : Forward 1 : Reverse	0 (0, 1)
o2-09 (050D)	Reserved	-	-
o2-19 (061F) Expert	Parameter Write during Uv	V/f OLV OLV/PM AOLV/PM EZOLV Lets you change parameters during Uv [Undervoltage]. 0 : Disable 1 : Enabled	0 (0, 1)
o2-23 (11F8) RUN	External 24V Powerloss Detection	V/f OLV OLV/PM AOLV/PM EZOLV 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 : Disable 1 : Enabled	0 (0, 1)

No. (Hex.)	Name	Description	Default (Range)
o2-26 (1563)	Alarm display at ext. 24V power	V/f OLV OLV/PM AOLV/PM EZOLV 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 : No 1 : Yes	1 (0, 1)
o2-27 (1565)	bCE Detection Selection	V/f OLV OLV/PM AOLV/PM EZOLV 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>CI-09</i>) 3 : Alarm Only 4 : No Alarm Display	3 (0 - 4)

◆ o3: Copy Keypad Function

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

◆ o4: Maintenance Monitors

No. (Hex.)	Name	Description	Default (Range)
o4-01 (050B)	Elapsed Operating Time Setting	V/f OLV OLV/PM AOLV/PM EZOLV Sets the initial value of the cumulative drive operation time in 10-hour units.	0 h (0 - 9999 h)
o4-02 (050C)	Elapsed Operating Time Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the condition that counts the cumulative operation time. 0 : U4-01 Shows Total Power-up Time 1 : U4-01 Shows Total RUN Time	0 (0, 1)
o4-03 (050E)	Fan Operation Time Setting	V/f OLV OLV/PM AOLV/PM EZOLV Sets the value from which to start the cumulative drive cooling fan operation time in 10-hour units.	0 h (0 - 9999 h)
o4-05 (051D)	Capacitor Maintenance Setting	V/f OLV OLV/PM AOLV/PM EZOLV Sets the U4-05 [CapacitorMaintenance] monitor value.	0% (0 - 150%)
o4-07 (0523)	Softcharge Relay Maintenance Set	V/f OLV OLV/PM AOLV/PM EZOLV Sets the U4-06 [PreChargeRelayMainte] monitor value.	0% (0 - 150%)
o4-09 (0525)	IGBT Maintenance Setting	V/f OLV OLV/PM AOLV/PM EZOLV Sets the U4-07 [IGBT Maintenance] monitor value.	0% (0 - 150%)
o4-11 (0510)	Fault Trace/History Init (U2/U3)	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets the operation when the drive detects bAT [Keypad Battery Low Voltage] and TiM [Keypad Time Not Set]. This parameter is only available when you use an LCD keypad. 0 : Disable 1 : Enable (Alarm Detected) 2 : Enable (Fault Detected)	0 (0 - 2)

◆ o5: Log Function

No. (Hex.)	Name	Description	Default (Range)
o5-01 (1551) RUN	Log Start/Stop Selection	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Sets the data log sampling cycle. This parameter is only available when using an LCD keypad.	100 ms (100 - 60000 ms)

No. (Hex.)	Name	Description	Default (Range)
o5-03 (1553) RUN	Log Monitor Data 1	V/f OLV OLV/PM AOLV/PM EZOLV Sets the data log monitor. This parameter is only available when using an LCD keypad.	101 (000, 101 - 1212) (Expert: 000, 101 - 1216)
o5-04 (1554) RUN	Log Monitor Data 2	V/f OLV OLV/PM AOLV/PM EZOLV Sets the data log monitor. This parameter is only available when using an LCD keypad.	102 (000, 101 - 1212) (Expert: 000, 101 - 1216)
o5-05 (1555) RUN	Log Monitor Data 3	V/f OLV OLV/PM AOLV/PM EZOLV Sets the data log monitor. This parameter is only available when using an LCD keypad.	103 (000, 101 - 1212) (Expert: 000, 101 - 1216)
o5-06 (1556) RUN	Log Monitor Data 4	V/f OLV OLV/PM AOLV/PM EZOLV Sets the data log monitor. This parameter is only available when using an LCD keypad.	107 (000, 101 - 1212) (Expert: 000, 101 - 1216)
o5-07 (1557) RUN	Log Monitor Data 5	V/f OLV OLV/PM AOLV/PM EZOLV Sets the data log monitor. This parameter is only available when using an LCD keypad.	108 (000, 101 - 1212) (Expert: 000, 101 - 1216)
o5-08 (1558) RUN	Log Monitor Data 6	V/f OLV OLV/PM AOLV/PM EZOLV Sets the data log monitor. This parameter is only available when using an LCD keypad.	V/f, OLV/PM : 000, OLV, AOLV/PM, EZOLV : 105 (000, 101 - 1212) (Expert: 000, 101 - 1216)
o5-09 (1559) RUN	Log Monitor Data 7	V/f OLV OLV/PM AOLV/PM EZOLV Sets the data log monitor. This parameter is only available when using an LCD keypad.	110 (000, 101 - 1212) (Expert: 000, 101 - 1216)
o5-10 (155A) RUN	Log Monitor Data 8	V/f OLV OLV/PM AOLV/PM EZOLV Sets the data log monitor. This parameter is only available when using an LCD keypad.	112 (000, 101 - 1212) (Expert: 000, 101 - 1216)
o5-11 (155B) RUN	Log Monitor Data 9	V/f OLV OLV/PM AOLV/PM EZOLV Sets the data log monitor. This parameter is only available when using an LCD keypad.	000 (000, 101 - 1212) (Expert: 000, 101 - 1216)
o5-12 (155C) RUN	Log Monitor Data 10	V/f OLV OLV/PM AOLV/PM EZOLV Sets the data log monitor. This parameter is only available when using an LCD keypad.	000 (000, 101 - 1212) (Expert: 000, 101 - 1216)

3.14 P: System Feedback

◆ P1: System Feedback Config

No. (Hex.)	Name	Description	Default (Range)
P1-01 (0600) RUN	Initial Fixed Speed	V/f OLV OLV/PM AOLV/PM EZOLV Sets the initial speed at which the drive runs before the <i>P1-02 [Fixed Speed Operation Time]</i> expires. Note: When <i>A1-02 = 8 [Control Method Selection = EZ Vector Control]</i>, the upper limit is the Hz equivalent of <i>E9-02 [Maximum Speed]</i>. When <i>H1-0x = 16 [MFD1 = Motor 2 Selection]</i>, the upper limit is the larger value between <i>E1-04 [Maximum Output Frequency]</i> and <i>E3-04 [Motor 2 Maximum Output Frequency]</i>.	0.00 Hz (0.00 - E1-04 Hz)
P1-02 (0601) RUN	Fixed Speed Operation Time	V/f OLV OLV/PM AOLV/PM EZOLV Sets the length of time the drive runs at the speed set in <i>P1-01 [Initial Fixed Speed]</i> after <i>H1-xx = 81 [Run Command Present]</i> closes. After the time set in this parameter expires, the drive will run the PID control loop. Set this parameter to 0.0 to disable the function.	10.0 s (0.0 - 600.0 s)
P1-03 (0602) RUN	System Feedback Upper Limit	V/f OLV OLV/PM AOLV/PM EZOLV Sets the maximum system PID Feedback value. If the PID value is more than this value, the drive will limit the feedback to the <i>P1-04 [System Feedback Override Value]</i> value. A value of 100.00% is the equivalent to 10 V (or 20 mA) on the analog input feedback. Set this parameter to 0.00% to disable the function. Note: - When <i>A1-02 = 8 [Control Method Selection = EZ Vector Control]</i>, the upper limit is the Hz equivalent of <i>E9-02 [Maximum Speed]</i>. When <i>H1-0x = 16 [MFD1 = Motor 2 Selection]</i>, the upper limit is the larger value between <i>E1-04 [Maximum Output Frequency]</i> and <i>E3-04 [Motor 2 Maximum Output Frequency]</i>. - Parameter unit depends on <i>b5-20 [PID Unit Selection]</i>. When <i>b5-20 = 3 [User Units]</i>, the drive uses the units set in <i>b5-38 [PID User Unit Display Scaling]</i> and <i>b5-39 [PID User Unit Display Digits]</i>.	0.00% (0.00 - 600.0%)
P1-04 (0603) RUN	System Feedback Override Value	V/f OLV OLV/PM AOLV/PM EZOLV Sets the system PID feedback limit when the incoming feedback (maximum of A1 and A2) is more than the value set in <i>P1-03 [System Feedback Upper Limit]</i>. Note: Parameter unit depends on <i>b5-20 [PID Unit Selection]</i>. When <i>b5-20 = 3 [User Units]</i>, the drive uses the units set in <i>b5-38 [PID User Unit Display Scaling]</i> and <i>b5-39 [PID User Unit Display Digits]</i>.	0.00% (0.00 - 600.0%)
P1-05 (0604) RUN	Low System Feedback Det Level 1	V/f OLV OLV/PM AOLV/PM EZOLV Sets the level that the drive uses to make sure that the PID Feedback transducers are working correctly. When <i>H3-xx = B [MFA1 = PID Feedback]</i> is lower than the level set in this parameter, the System PID Feedback is forced to <i>b5-38 [PID User Unit Display Scaling]</i>. Set this parameter to 0.00 to disable the function. Note: Parameter unit depends on <i>b5-20 [PID Unit Selection]</i>. When <i>b5-20 = 3 [User Units]</i>, the drive uses the units set in <i>b5-38 [PID User Unit Display Scaling]</i> and <i>b5-39 [PID User Unit Display Digits]</i>.	0.00% (0.00 - 600.0%)
P1-06 (0605) RUN	Low System Feedback Det Level 2	V/f OLV OLV/PM AOLV/PM EZOLV Sets the level that the drive uses to make sure that the PID Feedback transducers are working correctly. When <i>H3-xx = 36 [MFA2 = PID Feedback2]</i> is lower than the level set in this parameter, the System PID Feedback is forced to <i>b5-38 [PID User Unit Display Scaling]</i>. Set this parameter to 0.00 to disable the function. Note: Parameter unit depends on <i>b5-20 [PID Unit Selection]</i>. When <i>b5-20 = 3 [User Units]</i>, the drive uses the units set in <i>b5-38 [PID User Unit Display Scaling]</i> and <i>b5-39 [PID User Unit Display Digits]</i>.	0.00% (0.00 - 600.0%)
P1-07 (0606) Expert	PID Integral Reset Behavior	V/f OLV OLV/PM AOLV/PM EZOLV Sets the behavior of the PID integral. 0 : Integral Cleared at Stop 1 : Integral Always Active	0 (0, 1)

3.15 q: DriveWorksEZ Parameters

◆ q1-01 to q8-40: Reserved for DriveWorksEZ

No. (Hex.)	Name	Description	Default (Range)
q1-01 to q8-40 (1600 - 17E7)	Reserved for DriveWorksEZ	V/f OLV OLV/PM AOLV/PM EZOLV Refer to "DriveWorksEZ Operation Manual".	These parameters are reserved for use with DriveWorksEZ.

3.16 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 OLV OLV/PM AOLV/PM EZOLV DriveWorksEZ Connection Parameters 1 to 20 (Upper / Lower)	0 (0 - FFFFH)

3.17 T: Motor Tuning

◆ T0: Tuning Mode Selection

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

◆ T1: Induction Motor Auto-Tuning

No. (Hex.)	Name	Description	Default (Range)
T1-00 (0700)	Motor 1/Motor 2 Selection	V/f OLV OLV/PM AOLV/PM EZOLV 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 2 : Motor 2	1 (1, 2)
T1-01 (0701)	Tuning Mode Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the type of Auto-Tuning. 0 : Rotational Auto-Tuning 1 : Stationary Auto-Tuning 1 2 : Stationary Line-Line Resistance	Determined by A1-02 (Determined by A1-02)
T1-02 (0702)	Motor Rated Power	V/f OLV OLV/PM AOLV/PM EZOLV Uses the units set in $\alpha 1-58$ [Motor Power Unit Selection] to set the motor rated output power.	Determined by $\alpha 2-04$, C6-01 (0.00 - 650.00 HP)
T1-03 (0703)	Motor Rated Voltage	V/f OLV OLV/PM AOLV/PM EZOLV Sets the rated voltage (V) of the motor. Enter the base speed voltage for constant output motors.	Determined by $\alpha 2-04$, C6-01 (200 V Class: 0.0 - 255.5 V, 400 V Class: 0.0 - 511.0 V)
T1-04 (0704)	Motor Rated Current	V/f OLV OLV/PM AOLV/PM EZOLV Sets the rated current (A) of the motor.	Determined by $\alpha 2-04$ (10% to 200% of the drive rated current)
T1-05 (0705)	Motor Base Frequency	V/f OLV OLV/PM AOLV/PM EZOLV Sets the base frequency (Hz) of the motor.	60.0 Hz (0.0 - 590.0 Hz)
T1-06 (0706)	Number of Motor Poles	V/f OLV OLV/PM AOLV/PM EZOLV Sets the number of motor poles.	4 (2 to 120)
T1-07 (0707)	Motor Base Speed	V/f OLV OLV/PM AOLV/PM EZOLV Sets the motor base speed for Auto-Tuning (min^{-1} (r/min)).	1750 min^{-1} (r/min) (0 - 35400 min^{-1} (r/min))
T1-09 (0709)	Motor No-Load Current	V/f OLV OLV/PM AOLV/PM EZOLV Sets the no-load current of the motor.	- (0A - T1-04; max. of 2999.9)
T1-10 (070A)	Motor Rated Slip Frequency	V/f OLV OLV/PM AOLV/PM EZOLV Sets motor rated slip.	- (0.000 - 20.000 Hz)
T1-11 (070B)	Motor Iron Loss	V/f OLV OLV/PM AOLV/PM EZOLV Sets the iron loss for calculating the energy-saving coefficient.	Determined by E2-11 or E4-11 (0 - 6535 W)

3.17 T: Motor Tuning

No. (Hex.)	Name	Description	Default (Range)
T1-12 (0BDB)	Test Mode Selection	V/f OLV OLV/PM AOLV/PM EZOLV 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. Note: You must first set $T1-10 = 0$ [Motor Rated Slip Frequency = 0 Hz] to enable this parameter. 0 : No 1 : Yes	0 (0, 1)
T1-13 (0BDC)	No-load voltage	V/f OLV OLV/PM AOLV/PM EZOLV 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. Note: - 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. –B001 - B018, 2001 - 2056, 4001 - 4031: $T1-03 \times 0.85$ –2070, 2082, 4038 - 4060: $T1-03 \times 0.90$	$T1-03 \times 0.9$ (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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the type of Auto-Tuning for PM motors. 0 : Manual Entry w/ Motor Data Sheet 1 : Stationary (Ld, Lq, R) 2 : Stationary (R Only) 4 : PM Motor Code Selection 5 : High Frequency Injection	0 (Determined by A1-02)
T2-02 (0751)	PM Motor Code Selection	V/f OLV OLV/PM AOLV/PM EZOLV If the drive is operating an SMRD, SMRA, or SSR1 series Yaskawa PM motor, enter the PM motor code in to align with the rotation speed and motor output.	FFFF (0000 - FFFF)
T2-03 (0752)	PM Motor Type	V/f OLV OLV/PM AOLV/PM EZOLV Sets the type of PM motor the drive will operate. 0 : IPM motor 1 : SPM motor	1 (0, 1)
T2-04 (0730)	PM Motor Rated Power	V/f OLV OLV/PM AOLV/PM EZOLV Uses the units set in $\alpha 1-58$ [Motor Power Unit Selection] to set the PM motor rated output power.	Determined by $\alpha 2-04$, C6-01 (0.00 - 650.00 HP)
T2-05 (0732)	PM Motor Rated Voltage	V/f OLV OLV/PM AOLV/PM EZOLV Sets the rated voltage (V) of the motor.	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)
T2-06 (0733)	PM Motor Rated Current	V/f OLV OLV/PM AOLV/PM EZOLV Sets the rated current (A) of the motor.	Determined by $\alpha 2-04$ (10% to 200% of the drive rated current)
T2-07 (0753)	PM Motor Base Frequency	V/f OLV OLV/PM AOLV/PM EZOLV Sets the base frequency (Hz) of the motor.	60.0 Hz (0.0 - 590.0 Hz)
T2-08 (0734)	Number of PM Motor Poles	V/f OLV OLV/PM AOLV/PM EZOLV Sets the number of motor poles.	4 (2 - 48)
T2-09 (0731)	PM Motor Base Speed	V/f OLV OLV/PM AOLV/PM EZOLV Sets the motor base speed (min^{-1} (r/min)).	1750 min^{-1} (r/min) (0 - 34500 min^{-1} (r/min))
T2-10 (0754)	PM Motor Stator Resistance	V/f OLV OLV/PM AOLV/PM EZOLV Sets the stator resistance for each motor phase. Note: This parameter does not set line-to-line resistance.	Determined by T2-02 (0.000 - 65.000 Ω)
T2-11 (0735)	PM Motor d-Axis Inductance	V/f OLV OLV/PM AOLV/PM 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	V/f OLV OLV/PM AOLV/PM EZOLV Sets the q-Axis inductance of the motor on a per phase basis.	Determined by T2-02 (0.00 - 600.00 mH)

No. (Hex.)	Name	Description	Default (Range)
T2-13 (0755)	Back-EMF Units Selection	V/f OLV OLV/PM AOLV/PM 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)	V/f OLV OLV/PM AOLV/PM EZOLV Sets the motor induced voltage constant (Ke).	Determined by T2-13 (0.0 - 2000.0)
T2-15 (0756)	Pull-In Current Level	V/f OLV OLV/PM AOLV/PM EZOLV Sets the level of the pull-in current as a percentage of <i>E5-03 [PM Motor Rated Current (FLA)]</i> . Usually it is not necessary to change this setting.	30% (0 - 120%)

◆ T3: ASR and Inertia Tuning

No. (Hex.)	Name	Description	Default (Range)
T3-00 (1198)	Control Loop Tuning Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the type of Control Auto-Tuning. 2 : Deceleration Rate Tuning 3 : KEB Tuning	2 (2, 3)

◆ T4: EZ Tuning

No. (Hex.)	Name	Description	Default (Range)
T4-01 (3130)	EZ Tuning Mode Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the type of Auto-Tuning for EZOLV control. 0 : Motor Parameter Setting 1 : Line-to-Line Resistance	0 (0, 1)
T4-02 (3131)	Motor Type Selection	V/f OLV OLV/PM AOLV/PM EZOLV Sets the type of motor. 0 : Induction (IM) 1 : Permanent Magnet (PM) 2 : Synchronous Reluctance (SynRM)	0 (0, 1, 2)
T4-04 (3133)	Motor Rated Revolutions	V/f OLV OLV/PM AOLV/PM EZOLV Sets rated rotation speed (min^{-1}) of the motor.	- ((40 Hz to 120 Hz) $\times$ 60 $\times$ 2/ E9-08)
T4-05 (3134)	Motor Rated Frequency	V/f OLV OLV/PM AOLV/PM EZOLV Sets the rated frequency (Hz) of the motor.	Determined by E9-01 and o2-04 (40.0 - 120.0 Hz)
T4-06 (3135)	Motor Rated Voltage	V/f OLV OLV/PM AOLV/PM EZOLV Sets the rated voltage (V) of the motor.	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)
T4-07 (3136)	Motor Rated Current	V/f OLV OLV/PM AOLV/PM EZOLV Sets the rated current (A) of the motor.	Determined by o2-04, C6-01 (10% to 200% of the drive rated current)
T4-08 (3137)	Motor Rated Capacity	V/f OLV OLV/PM AOLV/PM EZOLV Sets the motor rated power in the units set in <i>o1-58 [Motor Power Unit Selection]</i> .	Determined by E9-10 (0.10 - 650.00 HP)
T4-09 (3138)	Number of Poles	V/f OLV OLV/PM AOLV/PM EZOLV Sets the number of motor poles.	Determined by E9-01 (2 - 48)

3.18 U: Monitors

◆ U1: Operation Status Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
U1-01 (0040)	Frequency reference	V/f OLV OLV/PM AOLV/PM EZOLV Shows the actual frequency reference value. Parameter <i>o1-03 [Keypad Display Unit Selection]</i> sets the display units. Unit: 0.01 Hz	10 V = Maximum frequency (-10 V to +10 V)
U1-02 (0041)	Output Frequency	V/f OLV OLV/PM AOLV/PM EZOLV Shows the actual output frequency. Parameter <i>o1-03 [Keypad Display Unit Selection]</i> sets the display units. Unit: 0.01 Hz	10 V = Maximum frequency (-10 V to +10 V)
U1-03 (0042)	Output Current	V/f OLV OLV/PM AOLV/PM EZOLV Shows the actual output current. The keypad shows the value of <i>U1-03</i> in amperes (A). When looking at the monitor through MEMOBUS/Modbus communications, the current is "8192 = drive rated current (A)". Calculate the current from the monitor value that is in at MEMOBUS/Modbus communications using "Numerals being displayed / 8192 × drive rated current (A)." Unit: When the drive model changes, the display units for this parameter also change. 0.01 A units: B001 - B018, 2001 - 2042, 4001 - 4023 0.1A units: 2056 - 2082, 4031 - 4060	10 V = Drive rated current
U1-04 (0043)	Control method selection	V/f OLV OLV/PM AOLV/PM EZOLV Shows the drive control method. 0 : V/f Control 2 : Open Loop Vector 5 : PM Open Loop Vector 6 : PM Advanced Open Loop Vector 8 : EZ Vector Control	No signal output available
U1-05 (0044)	Motor Speed	V/f OLV OLV/PM AOLV/PM EZOLV Shows the actual detected motor speed. Parameter <i>o1-03 [Keypad Display Unit Selection]</i> sets the display units. Unit: 0.01 Hz	10 V = Maximum frequency (-10 V to +10 V)
U1-06 (0045)	Output Voltage Ref	V/f OLV OLV/PM AOLV/PM EZOLV Shows the output voltage reference. Unit: 0.1 V	200 V class: 10 V = 200 V _{rms} 400 V class: 10 V = 400 V _{rms}
U1-07 (0046)	DC Bus Voltage	V/f OLV OLV/PM AOLV/PM EZOLV Shows the DC bus voltage. Unit: 1 V	200 V class: 10 V = 400 V 400 V class: 10 V = 800 V
U1-08 (0047)	Output Power	V/f OLV OLV/PM AOLV/PM EZOLV Shows the internally-calculated output power. Changing the setting of <i>A1-02 [Control Method Selection]</i> also changes the signal level of the analog output. - A1-02 = 0: Drive capacity (kW) - A1-02 = 2: Motor Rated Power [E2-11] (kW) - A1-02 = 5, 6: PM Motor Rated Power [E5-02] (kW) - A1-02 = 8: Motor Rated Power [E9-07] (kW) Unit: When the drive model changes, the display units for this parameter also change. 0.01 A units: B001 - B018, 2001 - 2042, 4001 - 4023 0.1A units: 2056 - 2082, 4031 - 4060	10 V: Drive capacity (motor rated power) kW (-10 V to +10 V)
U1-09 (0048)	Torque Reference	V/f OLV OLV/PM AOLV/PM EZOLV Shows the internal torque reference value. Unit: 0.1%	10 V = Motor rated torque (-10 V to +10 V)

No. (Hex.)	Name	Description	MFAO Signal Level
U1-10 (0049)	Input Terminal Status	V/f OLV OLV/PM AOLV/PM EZOLV Shows the status of the MFDO terminal where $\bar{1}$ = ON and 1 = OFF. For example, <i>U1-10</i> shows  when terminals S1 and S3 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 : Not used (normal value of [$\bar{1}$]).	No signal output available
U1-11 (004A)	Output Terminal Status	V/f OLV OLV/PM AOLV/PM EZOLV Shows the status of the MFDO terminal where $\bar{1}$ = ON and 1 = OFF. For example, <i>U1-11</i> shows  when terminals MA and P2 are ON. Note: When <i>H2-xx</i> = 100 to 1A7 [<i>U1-11 Inverse U1-11 Output of Function</i>], <i>U1-11</i> does not show the status in inverse. bit0 : Terminal MA/MB-MC bit1 : Terminal P1-C1 bit2 : Terminal P2-C2 bit3 : Not used (normal value of [$\bar{1}$]). bit4 : Not used (normal value of [$\bar{1}$]). bit5 : Not used (normal value of [$\bar{1}$]). bit6 : Not used (normal value of [$\bar{1}$]). bit7 : Not used (normal value of [$\bar{1}$]).	No signal output available
U1-12 (004B)	Drive Status	V/f OLV OLV/PM AOLV/PM EZOLV Shows drive status where $\bar{1}$ = ON and 1 = OFF. For example, <i>U1-12</i> shows  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	No signal output available
U1-13 (004E)	Terminal A1 Level	V/f OLV OLV/PM AOLV/PM EZOLV Shows the signal level of terminal A1. Unit: 0.1%	10 V = 100% (-10 V to +10 V)
U1-14 (004F)	Terminal A2 Level	V/f OLV OLV/PM AOLV/PM EZOLV Shows the signal level of terminal A2. Unit: 0.1%	10 V = 100% (-10 V to +10 V)
U1-16 (0053)	SFS Output Frequency	V/f OLV OLV/PM AOLV/PM EZOLV Shows the output frequency after soft start. Shows the frequency with acceleration and deceleration times and S-curves. Parameter <i>o1-03</i> [<i>Keypad Display Unit Selection</i>] sets the display units. Unit: 0.01 Hz	10 V = Maximum frequency (-10 V to +10 V)
U1-18 (0061)	oPE Fault Parameter	V/f OLV OLV/PM AOLV/PM EZOLV Shows the parameter number that caused the <i>oPE02</i> [<i>Parameter Range Setting Error</i>] or <i>oPE08</i> [<i>Parameter Selection Error</i>].	No signal output available

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No. (Hex.)	Name	Description	MFAO Signal Level
U1-19 (0066)	MEMOBUS/Modbus Error Code	V/f OLV OLV/PM AOLV/PM EZOLV Shows the contents of the MEMOBUS/Modbus communication error where $\overline{1}$ = "error" and 1 = "no error". For example, U1-19 shows  when the drive detects a CRC error. bit0 : CRC Error bit1 : Data Length Error bit2 : Not used (normal value of [$\overline{1}$]). bit3 : Parity Error bit4 : Overrun Error bit5 : Framing Error bit6 : Timed Out bit7 : Not used (normal value of [$\overline{1}$]).	No signal output available
U1-24 (007D)	Input Pulse Monitor	V/f OLV OLV/PM AOLV/PM EZOLV Shows the frequency to pulse train input terminal RP. Unit: 1 Hz	Determined by H6-02
U1-25 (004D)	Software Flash Number	V/f OLV OLV/PM AOLV/PM EZOLV Shows the FLASH ID.	No signal output available
U1-26 (005B)	SoftwareNumber ROM	V/f OLV OLV/PM AOLV/PM EZOLV Shows the ROM ID.	No signal output available
U1-50 (1199) Expert	Virtual Analog Input	V/f OLV OLV/PM AOLV/PM EZOLV Shows the virtual analog input value.	Determined by H7-40
U1-91 (154E) Expert	Output Voltage	V/f OLV OLV/PM AOLV/PM EZOLV Shows the drive internal output voltage reference. Unit: 0.1 V	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	V/f OLV OLV/PM AOLV/PM EZOLV Shows the fault that the drive has when viewing the monitor.	No signal output available
U2-02 (0081)	Previous Fault	V/f OLV OLV/PM AOLV/PM EZOLV Shows the fault that occurred most recently.	No signal output available
U2-03 (0082)	Freq Reference@Fault	V/f OLV OLV/PM AOLV/PM EZOLV Shows the frequency reference at the fault that occurred most recently. Use U1-01 [Frequency Reference] to monitor the actual frequency reference value. Unit: 0.01 Hz	No signal output available
U2-04 (0083)	Output Freq @ Fault	V/f OLV OLV/PM AOLV/PM EZOLV Shows the output frequency at the fault that occurred most recently. Use U1-02 [Output Frequency] to monitor the actual output frequency. Unit: 0.01 Hz	No signal output available
U2-05 (0084)	Output Current@Fault	V/f OLV OLV/PM AOLV/PM EZOLV Shows the output current at the fault that occurred most recently. Use U1-03 [Output Current] to monitor the actual output current. The keypad shows the value of U1-03 in amperes (A). When looking at the monitor through MEMOBUS/Modbus communications, the current is "8192 = drive rated current (A)". Calculate the current from the monitor value that is in at MEMOBUS/Modbus communications using "Numerals being displayed / 8192 × drive rated current (A)." Unit: When the drive model changes, the display units for this parameter also change. • 0.01 A units: B001 - B018, 2001 - 2042, 4001 - 4023 • 0.1A units: 2056 - 2082, 4031 - 4060	No signal output available
U2-06 (0085)	Motor Speed @ Fault	V/f OLV OLV/PM AOLV/PM EZOLV Shows the motor speed at the fault that occurred most recently. Use U1-05 [Motor Speed] to monitor the actual motor speed. Unit: 0.01 Hz	No signal output available

No. (Hex.)	Name	Description	MFAO Signal Level
U2-07 (0086)	Output Voltage@Fault	     Shows the output voltage reference at the fault that occurred most recently. Use U1-06 [Output Voltage Ref] to monitor the actual output voltage reference. Unit: 0.1 V	No signal output available
U2-08 (0087)	DC Bus Voltage@Fault	     Shows the DC bus voltage at the fault that occurred most recently. Use U1-07 [DC Bus Voltage] to monitor the actual DC bus voltage. Unit: 1 V	No signal output available
U2-09 (0088)	Output Power @ Fault	     Shows the output power at the fault that occurred most recently. Use U1-08 [Output Power] to monitor the actual output power. Unit: 0.1 kW	No signal output available
U2-10 (0089)	Torque Ref @ Fault	     Shows the torque reference at the fault that occurred most recently as a percentage of the motor rated torque. Use U1-09 [Torque Reference] to monitor the actual torque reference. Unit: 0.1%	No signal output available
U2-11 (008A)	Input Terminal Status @ Fault	     Shows the status of the MFDI terminals at the most recent fault where $I = \text{ON}$ and $I = \text{OFF}$. For example, U2-11 shows  when terminals S1 and S3 are ON. Use U1-10 [Input Terminal Status] to monitor the actual 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 : Not used (normal value of [I]).	No signal output available
U2-12 (008B)	Output Terminal Status @ Fault	     Shows the status of the MFDO terminals at the most recent fault where $I = \text{ON}$ and $I = \text{OFF}$. For example, U2-12 shows  when terminals MA and P2 are ON. Use U1-11 [Output Terminal Status] to monitor the actual MFDO terminal status. bit0 : Terminal MA/MB-MC bit1 : Terminal P1-C1 bit2 : Terminal P2-C2 bit3 : Not used (normal value of [I]). bit4 : Not used (normal value of [I]). bit5 : Not used (normal value of [I]). bit6 : Not used (normal value of [I]). bit7 : Not used (normal value of [I]).	No signal output available
U2-13 (008C)	Operation Status @ Fault	     Shows the status of the MFDO terminals at the most recent fault where $I = \text{ON}$ and $I = \text{OFF}$. For example, U2-13 shows  during run. Use U1-12 [Drive Status] to monitor the actual MFDO terminal status. 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	No signal output available

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No. (Hex.)	Name	Description	MFAO Signal Level
U2-14 (008D)	Elapsed Time @ Fault	V/f OLV OLV/PM AOLV/PM EZOLV Shows the cumulative operation time of the drive at the fault that occurred most recently. Use <i>U4-01 [Cumulative Ope Time]</i> to monitor the actual cumulative operation time. Unit: 1 h	No signal output available
U2-15 (07E0)	SFS Output @ Fault	V/f OLV OLV/PM AOLV/PM EZOLV Shows the output frequency after soft start at the fault that occurred most recently. Use <i>U1-16 [SFS Output Frequency]</i> to monitor the actual output frequency after soft start. Unit: 0.01 Hz	No signal output available
U2-16 (07E1)	q-Axis Current@Fault	V/f OLV OLV/PM AOLV/PM EZOLV Shows the q-axis current of the motor at the fault that occurred most recently. Use <i>U6-01 [Iq Secondary Current]</i> to monitor the actual q-Axis current of the motor. Unit: 0.1 %	No signal output available
U2-17 (07E2)	d-Axis Current@Fault	V/f OLV OLV/PM AOLV/PM EZOLV Shows the d-axis current of the motor at the fault that occurred most recently. Use <i>U6-02 [Id ExcitationCurrent]</i> to monitor the actual d-Axis current of the motor. Unit: 0.1 %	No signal output available
U2-19 (07E4)	ControlDeviation@Flt	V/f OLV OLV/PM AOLV/PM EZOLV Shows the amount of control axis deviation ($\Delta\theta$) at the fault that occurred most recently. Use <i>U6-10 [ContAxisDeviation $\Delta\theta$]</i> to monitor the actual amount of control axis deviation ($\Delta\theta$). Unit: 0.1 °	No signal output available
U2-20 (008E)	Heatsink Temp @Fault	V/f OLV OLV/PM AOLV/PM EZOLV Shows the heatsink temperature at the fault that occurred most recently. Use <i>U4-08 [Heatsink Temperature]</i> to monitor the actual temperature of the heatsink. Unit: 1 °C	No signal output available
U2-21 (1166) Expert	STPo Detect @ Fault	V/f OLV OLV/PM AOLV/PM EZOLV Monitors conditions to detect <i>STPo [Motor Step-Out Detected]</i> faults. The bit for each condition is shown as $\uparrow$ = ON or $\downarrow$ = OFF. For example, U2-21 shows  when the drive detects excessive current. 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 $\downarrow$). bit7 : Not used (normal value of $\downarrow$).	No signal output available

◆ U3: Fault History

No. (Hex.)	Name	Description	MFAO Signal Level
U3-01 to U3-04 (0090 - 0093) (0800 - 0803)	1st to 4th MostRecent Fault	V/f OLV OLV/PM AOLV/PM EZOLV Shows the fault history of the first to fourth most recent faults. Note: The drive saves the <i>U3-01 to U3-04 [1st to 4th MostRecent Fault]</i> fault histories to two types of registers at the same time for the MEMOBUS/Modbus communications.	No signal output available
U3-05 to U3-10 (0804 - 0809)	5th to 10th MostRecent Fault	V/f OLV OLV/PM AOLV/PM EZOLV Shows the fault history of the fifth to tenth most recent faults.	No signal output available
U3-11 to U3-14 (0094 - 0097) (080A - 080D)	ElapsedTime@1st to 4thFault	V/f OLV OLV/PM AOLV/PM EZOLV Shows the cumulative operation time when the first to fourth most recent faults occurred. Unit: 1 h Note: The drive saves the <i>U3-11 to U3-14 [ElapsedTime@1st to 4thFault]</i> the cumulative operation time to two types of registers at the same time for the MEMOBUS/Modbus communications.	No signal output available
U3-15 to U3-20 (080E - 0813)	ElapsedTime@5th to 10thFault	V/f OLV OLV/PM AOLV/PM EZOLV Shows the cumulative operation time when the fifth to tenth most recent faults 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 OLV OLV/PM AOLV/PM 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: - 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 <i>99999</i>. After this value is more than <i>99999</i>, the drive automatically resets it and starts to count from <i>0</i> 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 OLV OLV/PM AOLV/PM 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 <i>65535</i>. After this value is more than <i>65535</i>, the drive automatically resets it and starts to count from <i>0</i> again. Unit: 1	10 V: 65535 times
U4-03 (0067)	Cooling Fan Ope Time	V/f OLV OLV/PM AOLV/PM 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 <i>99999</i>. After this value is more than <i>99999</i>, the drive automatically resets it and starts to count from <i>0</i> 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 OLV OLV/PM AOLV/PM EZOLV Shows the cumulative operation time of the cooling fans as a percentage of the replacement life of the cooling fans. Use parameter <i>o4-03 [Fan Operation Time Setting]</i> to reset this monitor. Unit: 1% Note: Replace the cooling fans when this monitor is 90%.	10 V: 100%
U4-05 (007C)	CapacitorMaintenance	V/f OLV OLV/PM AOLV/PM EZOLV Shows the operation time of the electrolytic capacitors for the main circuit and control circuit as a percentage of the replacement life of the electrolytic capacitors. Use parameter <i>o4-05 [Capacitor Maintenance Setting]</i> to reset this monitor. Unit: 1% Note: Replace the electrolytic capacitor when this monitor is 90%.	10 V: 100%
U4-06 (07D6)	PreChargeRelayMainte	V/f OLV OLV/PM AOLV/PM EZOLV Shows the operation time of the soft charge bypass relay as a percentage of the replacement life of the soft charge bypass relay. Use parameter <i>o4-07 [Softcharge Relay Maintenance Set]</i> to reset this monitor. Unit: 1% Note: Replace the drive when this monitor is 90%.	10 V: 100%
U4-07 (07D7)	IGBT Maintenance	V/f OLV OLV/PM AOLV/PM EZOLV Shows the operation time of the IGBTs as a percentage of the replacement life of the IGBTs. Set parameter <i>o4-09 [IGBT Maintenance Setting]</i> to reset this monitor. Unit: 1% Note: Replace the drive when this monitor is 90%.	10 V: 100%
U4-08 (0068)	Heatsink Temperature	V/f OLV OLV/PM AOLV/PM EZOLV Shows the heatsink temperature of the drive. Unit: 1 °C	10 V: 100 °C

3.18 U: Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
U4-09 (005E)	LED Check	V/f OLV OLV/PM AOLV/PM EZOLV Turns on all of the keypad LEDs to make sure that the LEDs operate correctly. 1. With <i>U4-09</i> displayed, press . All LEDs on the keypad will turn on. Note: When Safety input 2 CH is open (STo), READY will flash.	No signal output available
U4-10 (005C)	kWh, Lower 4 Digits	V/f OLV OLV/PM AOLV/PM EZOLV Displays 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	No signal output available
U4-11 (005D)	kWh, Upper 5 Digits	V/f OLV OLV/PM AOLV/PM EZOLV 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	No signal output available
U4-13 (07CF)	Peak Hold Current	V/f OLV OLV/PM AOLV/PM EZOLV 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 looking at the monitor through MEMOBUS/Modbus communications, the current is "8192 = drive rated current (A)". Calculate the current from the monitor value that is in at MEMOBUS/Modbus communications using "Numerals being displayed / 8192 × drive rated current (A)". Unit: When the drive model changes, the display units for this parameter also change. • 0.01 A units: B001 - B018, 2001 - 2042, 4001 - 4023 • 0.1A units: 2056 - 2082, 4031 - 4060	No signal output available
U4-14 (07D0)	PeakHold Output Freq	V/f OLV OLV/PM AOLV/PM EZOLV Displays the output frequency at which the peak value (rms) of the drive output current is held. The peak hold current can be monitored by <i>U4-13 [Peak Hold Current]</i>. 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	No signal output available
U4-16 (07D8)	Motor oL1 Level	V/f OLV OLV/PM AOLV/PM EZOLV Shows the integrated value of <i>oL1 [Motor Overload]</i> as a percentage of <i>oL1</i> detection level. Unit: 0.1%	10 V: 100%
U4-18 (07DA)	Reference Source	V/f OLV OLV/PM AOLV/PM EZOLV 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 [<i>H1-xx = 2</i>] selection status • 1: <i>b1-01 [Frequency Reference Selection 1]</i> • 2: <i>b1-15 [Frequency Reference Selection 2]</i> Y-nn: Frequency reference source • 0-01: Keypad (<i>d1-01 [Reference 1]</i>) • 1-00: Analog input (unassigned) • 1-01: MFAI terminal A1 • 1-02: MFAI terminal A2 • 2-02 to 2-17: Multi-step speed reference (<i>d1-02 to d1-17 [Reference 2 to 16, Jog Reference]</i>) • 3-01: MEMOBUS/Modbus communications • 4-01: Communication option card • 5-01: Pulse train input • 7-01: DriveWorksEZ • 9-01: Up/Down command	No signal output available

No. (Hex.)	Name	Description	MFAO Signal Level
U4-19 (07DB)	Modbus FreqRef (dec)	V/f OLV OLV/PM AOLV/PM EZOLV Shows the frequency reference sent to the drive from the MEMOBUS/Modbus communications as a decimal. Unit: 0.01%	10 V = Maximum frequency (-10 V to +10 V)
U4-20 (07DC)	Option Freq Ref(dec)	V/f OLV OLV/PM AOLV/PM EZOLV Shows the frequency reference sent to the drive from the communication option as a decimal.	10 V = Maximum frequency (-10 V to +10 V)
U4-21 (07DD)	Run Command Source	V/f OLV OLV/PM AOLV/PM EZOLV Shows the selected Run command source. The keypad shows the Run command source as "XY-nn" as specified by these rules: X: <i>External Reference 1/2 Selection</i> [H1-xx = 2] selection status 1: b1-02 [Run Command Selection 1] 2: b1-16 [Run Command Selection 2] Y: Run command source 0: Keypad 1: Control circuit terminal 3: MEMOBUS/Modbus communications 4: Communication option card 7: DriveWorksEZ nn: Run command limit status data 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 <i>Uv1</i> [DC Bus Undervoltage] or <i>Uv</i> [Undervoltage] if the soft charge bypass contactor does not turn ON after 10 s. 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 <i>E1-09</i> [Minimum Output Frequency] during baseblock. 09: Waiting for the Enter command from PLC.	No signal output The keypad shows the Run command source as "XY-nn" as specified by these rules: available
U4-22 (07DE)	Modbus CmdData (hex)	V/f OLV OLV/PM AOLV/PM EZOLV 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: bit 0 : Forward run/Stop bit 1 : Reverse run/Stop bit 2 : External fault bit 3 : Fault Reset Procedure 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 : Not used (normal value of 0). 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).	No signal output available

3.18 U: Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
U4-23 (07DF)	Option CmdData (hex)	V/f OLV OLV/PM AOLV/PM EZOLV 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 Procedure 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 : Not used (normal value of 0). 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).	No signal output available
U4-24 (07E6)	Number of Runs (Low)	V/f OLV OLV/PM AOLV/PM EZOLV Shows the lower 4 digits of the drive run count. Note: The drive run count appears as 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.	No signal output available
U4-25 (07E7)	Number of Runs(High)	V/f OLV OLV/PM AOLV/PM EZOLV Shows the lower 4 digits of the drive run count. Note: The drive run count appears as 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.	No signal output available
U4-52 (1592)	Torque Ref from Comm	V/f OLV OLV/PM AOLV/PM EZOLV Displays the torque reference given to the drive via a serial communication option card or via MEMOBUS/Modbus communications as a decimal number. Unit: 0.1%	10 V = 100% (-10 V to +10 V)

◆ U5: PID Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
U5-01 (0057)	PID Feedback	V/f OLV OLV/PM AOLV/PM EZOLV Shows the PID control feedback value. Parameter <i>b5-20 [PID Unit Selection]</i> sets the display units. Unit: 0.01%	10 V: Maximum frequency (-10 V to +10 V)
U5-02 (0063)	PID Input	V/f OLV OLV/PM AOLV/PM EZOLV 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%	10 V: Maximum frequency (-10 V to +10 V)
U5-03 (0064)	PID Output	V/f OLV OLV/PM AOLV/PM EZOLV Shows the PID control output as a percentage of the maximum output frequency. Unit: 0.01%	10 V: Maximum frequency (-10 V to +10 V)
U5-04 (0065)	PID Setpoint	V/f OLV OLV/PM AOLV/PM EZOLV Shows the PID setpoint. Parameter <i>b5-20 [PID Unit Selection]</i> sets the display units. Unit: 0.01%	10 V: Maximum frequency (-10 V to +10 V)
U5-05 (07D2)	PID DifferentialFdbk	V/f OLV OLV/PM AOLV/PM EZOLV Shows the PID differential feedback value as a percentage of the maximum output frequency. This monitor is available after you set <i>H3-02</i> or <i>H3-10</i> = 16 [<i>MFAI Function Selection</i> = <i>Differential PID Feedback</i>]. Unit: 0.01%	10 V: Maximum frequency (-10 V to +10 V)
U5-06 (07D3)	PID Fdbk-Diff PID Fdbk	V/f OLV OLV/PM AOLV/PM EZOLV Shows the difference from calculating <i>U5-05</i> - <i>U5-01 [PID DifferentialFdbk]</i> - [<i>PID Feedback</i>]. Unit: 0.01% Note: <i>U5-01 [PID Feedback]</i> = <i>U5-06</i> when <i>H3-02</i> or <i>H3-10</i> ≠ 16 [<i>MFAI Function Selection</i> ≠ <i>Differential PID Feedback</i>].	10 V: Maximum frequency (-10 V to +10 V)

No. (Hex.)	Name	Description	MFAO Signal Level
U5-21 (0872) Expert	Energy Save Coeff Ki	 Shows the energy-saving coefficient Ki value for PM. Unit: 0.01	No signal output available
U5-22 (0873) Expert	Energy Save Coeff Kt	 Shows the energy-saving coefficient Kt value for PM. Unit: 0.01	No signal output available
U5-30 (3000)	Time Hr Min HHMM	 Shows the current time (Hours and Minutes).	No signal output available
U5-31 (3001)	Date Year	 Shows the current year.	No signal output available
U5-32 (3002)	Date Mo Day MMDD	 Shows the current date (Month and Date).	No signal output available
U5-33 (3003)	Date Week	 Shows the current day of the week: bit 0: Sunday bit 1: Monday bit 2: Tuesday bit 3: Wednesday bit 4: Thursday bit 5: Friday bit 6: Saturday bit 7: Not used (normal value of 0)	No signal output available
U5-99 (1599)	PID Setpoint Command	 Shows the PID setpoint command. Parameter b5-20 [PID Unit Selection] sets the display units. Unit: 0.01%	10 V = Maximum frequency (-10 V to +10 V)

◆ U6: Operation Status Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
U6-01 (0051)	Iq Secondary Current	 Shows the value calculated for the motor secondary current (q axis) as a percentage of the motor rated secondary current. Unit: 0.1%	10 V = Motor secondary rated current (-10 V to +10 V)
U6-02 (0052)	Id ExcitationCurrent	 Shows the value calculated for the motor excitation current (d axis) as a percentage of the motor rated secondary current. Unit: 0.1%	10 V = Motor secondary rated current (-10 V to +10 V)
U6-03 (0054)	ASR Input	 Shows the ASR input value as a percentage of the maximum frequency. Unit: 0.01%	10 V = Maximum frequency (-10 V to +10 V)
U6-04 (0055)	ASR Output	 Shows the ASR output value as a percentage of the motor rated secondary current. Unit: 0.01%	10 V = Motor secondary rated current (-10 V to +10 V)
U6-05 (0059)	OutputVoltageRef: Vq	 Shows the drive internal voltage reference for motor secondary current control (q axis). Unit: 0.1 V	200 V class: 10 V = 200 Vrms 400 V class: 10 V = 400 Vrms (-10 V to +10 V)
U6-06 (005A)	OutputVoltageRef: Vd	 Shows the drive internal voltage reference for motor excitation current control (d axis). Unit: 0.1 V	200 V class: 10 V = 200 Vrms 400 V class: 10 V = 400 Vrms (-10 V to +10 V)
U6-07 (005F) Expert	q-Axis ACR Output	 Shows the output value for current control related to motor secondary current (q axis). Unit: 0.1%	200 V class: 10 V = 200 Vrms 400 V class: 10 V = 400 Vrms (-10 V to +10 V)

3.18 U: Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
U6-08 (0060) Expert	d-Axis ACR Output	V/f OLV OLV/PM AOLV/PM EZOLV Shows the output value for current control related to motor excitation current (d axis). Unit: 0.1%	200 V class: 10 V = 200 Vrms 400 V class: 10 V = 400 Vrms (-10 V to +10 V)
U6-09 (07C0) Expert	AdvPhase Compen Δθcmp	V/f OLV OLV/PM AOLV/PM EZOLV Displays the data on forward phase compensation for the calculation results of the amount of control axis deviation. Unit: 1 °	10 V: 180 ° (-10 V to +10 V)
U6-10 (07C1) Expert	ContAxisDeviation Δθ	V/f OLV OLV/PM AOLV/PM EZOLV Shows the deviation between the γδ-Axis used for motor control and the dq-Axis. Unit: 0.1 °	10 V: 180 ° (-10 V to +10 V)
U6-14 (07CB) Expert	MagPolePosition(Obs)	V/f OLV OLV/PM AOLV/PM EZOLV Shows the value of the flux position estimation. Unit: 0.1 °	10 V: 180 ° (-10 V to +10 V)
U6-17 (07D1) Expert	Energy Save Coeff	V/f OLV OLV/PM AOLV/PM EZOLV Shows the total time of direction of motor rotation detections for Speed Estimation Speed Searches. This value adjusts <i>b3-26 [Direction Determination Level]</i>. Note: Upper limit is +32767 and lower limit is -32767.	No signal output available
U6-20 (07D4)	UP/DOWN 2 Bias Value	V/f OLV OLV/PM AOLV/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 OLV OLV/PM AOLV/PM EZOLV Shows the total value of <i>d7-01 to d7-03 [Offset Frequency 1 to 3]</i> selected with <i>Add Offset Frequency 1 to 3 [H1-xx = 44 to 46]</i>. Unit: 0.1%	10 V: Maximum Frequency
U6-31 (007B)	TorqueDetect Monitor	V/f OLV OLV/PM AOLV/PM EZOLV Monitors the torque reference or the output current after applying the filter set to <i>L6-07 [Torque Detection Filter Time]</i>. Unit: 0.1%	10 V:100%
U6-36 (0720) Expert	Comm Errors-Host	V/f OLV OLV/PM AOLV/PM EZOLV Shows the number of inter-CPU communication errors. De-energizing the drive sets this number to 0.	No signal output available
U6-37 (0721) Expert	Comm Errors-Sensor	V/f OLV OLV/PM AOLV/PM EZOLV Shows the number of inter-CPU communication errors. De-energizing the drive sets this number to 0.	No signal output available
U6-57 (07C4)	PolePolarityDeterVal	V/f OLV OLV/PM AOLV/PM EZOLV Shows the change from the integrated current when finding the polarity. Unit: 1 Note: If the change from the integrated current is less than 819, increase <i>n8-84 [Polarity Detection Current]</i>. <i>U6-57 = 8192</i> is equivalent to the motor rated current.	No signal output available
U6-80 to U6-83 (07B0 - 07B3)	Option IP Address 1 to 4	V/f OLV OLV/PM AOLV/PM EZOLV Shows the currently available local IP Address. • <i>U6-80</i>: 1st octet • <i>U6-81</i>: 2nd octet • <i>U6-82</i>: 3rd octet • <i>U6-83</i>: 4th octet	No signal output available
U6-84 to U6-87 (07B4 - 07B7)	Online Subnets 1 to 4	V/f OLV OLV/PM AOLV/PM EZOLV Shows the currently available subnet mask. • <i>U6-84</i>: 1st octet • <i>U6-85</i>: 2nd octet • <i>U6-86</i>: 3rd octet • <i>U6-87</i>: 4th octet	No signal output available
U6-88 to U6-91 (07B8, 07B9, 07F0, 07F1)	Online Gateways 1 to 4	V/f OLV OLV/PM AOLV/PM EZOLV Shows the currently available gateway address. • <i>U6-88</i>: 1st octet • <i>U6-89</i>: 2nd octet • <i>U6-90</i>: 3rd octet • <i>U6-91</i>: 4th octet	No signal output available

No. (Hex.)	Name	Description	MFAO Signal Level
U6-92 (07F2)	Online Speed	 Shows the currently available communications speed. 10: 10 Mbps 100: 100 Mbps	No signal output available
U6-93 (07F3)	Online Duplex	 Shows the currently available Duplex setting.	No signal output available
U6-94 (07F4)	OPT SPARE 1	 Shows CN1B Port 2 link speed currently available. 10: 10 Mbps 100: 100 Mbps	No signal output available
U6-95 (07F5)	OPT SPARE 2	 Shows CN1B Port 2 duplex setting currently available. 0: Half/Half 1: Full/Full	No signal output available
U6-96 (07F6)	OPT SPARE 3		No signal output available
U6-97 (07F7)	OPT SPARE 4	 Shows the option software version.	No signal output available
U6-98 (07F8)	First Fault	 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	 Shows the contents of current fault from communication options (DeviceNet, Modbus TCP/IP, EtherNet/IP).	No signal output available

◆ U7: System Feedback

No. (Hex.)	Name	Description	MFAO Signal Level
U7-02 (0661)	PID Feedback 1	 Shows the PID control feedback value from $H3\text{-}xx = B$ [$MFAI = PID\ Feedback$]. Parameter $b5\text{-}20$ [$PID\ Unit\ Selection$] sets the display units. Unit: 0.01%	Full scale: 0.00 to 100.00%
U7-03 (0662)	PID Feedback 2	 Shows the PID control feedback value from $H3\text{-}xx = 36$ [$MFAI = PID\ Feedback\ 2$]. Parameter $b5\text{-}20$ [$PID\ Unit\ Selection$] sets the display units. Unit: 0.01%	Full scale: 0.00 to 100.00%

◆ U8: DriveWorksEZ Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
U8-01 to U8-10 (1950 - 1959)	DWEZ Monitors 1 to 10	 Shows DriveWorksEZ Monitors 1 to 10. Unit: 0.01%	10 V = 100%
U8-11 (195A)	DWEZ Version 1	 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	 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
U8-13 (195C)	DWEZ Version 3	 Shows the software ID.	No signal output available
U8-18 (1961)	DWEZ Platform Ver	 Shows the DriveWorksEZ platform version.	No signal output available
U8-21 to U8-25 (1964 - 1968)	DWEZ Monitors 21 to 25	 Shows DriveWorks EZ Monitors 21 to 25. Unit: 0.01%	10 V = 100%

3.18 U: Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
U8-31 to U8-40 (196E - 1977)	DWEZ Monitors 31 to 40	V/f OLV OLV/PM AOLV/PM EZOLV Shows DriveWorks EZ Monitors 31 to 40. Unit: 0.01%	10 V = 100%
U8-51 to U8-55 (1982 - 1986)	DWEZ Monitors 51 to 55	V/f OLV OLV/PM AOLV/PM EZOLV Shows DriveWorks EZ Monitors 51 to 55. Unit: 0.01%	10 V = 100%

◆ UC: BACnet Diagnostic Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
UC-01 (3DB0)	BN MSTP Net Health	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows a number between 0.0% and 100.0% that identifies the health of the MSTP network. This number is dependent on the number of CRC errors, token losses, token retries, and net deadtime perceived. Unit: 0.1%	10 V = 100% (-10 V to +10 V)
UC-02 (3DB1)	BACnet Tokens Rx	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the number of received MSTP Tokens after you energize the drive. Unit: 1	No signal output available
UC-03 (3DB2)	BACnet Tokens Tx	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the number of transmitted MSTP Tokens after you energize the drive. Unit: 1	No signal output available
UC-04 (3DB3)	BACnet Messages Rx	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the number of messages with data (non-token, non-polling) received by the drive. Unit: 1	No signal output available
UC-05 (3DB4)	BACnet Messages Tx	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the number of messages with data (non-token, non-polling) transmitted by the drive. Unit: 1	No signal output available
UC-06 (3DB5)	MSTP Next Node Addr	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the next known node in the MSTP loop. This is the node to which the drive will pass the token.	No signal output available
UC-07 (3DB6)	MSTP Prev Node Addr	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the previous known node in the MSTP loop. This is the node from which the drive received the token.	No signal output available
UC-08 (3DB7)	MSTP H MAC Found	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the highest MAC address found on the network. This will report the highest value MAC address to which the token was passed by any node on the MSTP loop.	No signal output available
UC-09 (3DB8)	MSTP L MAC Found	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the lowest MAC address found on the network. This will report the lowest value MAC address to which the token was passed by any node on the MSTP loop.	No signal output available
UC-10 (3DB9)	MSTP # Nodes Found	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the number of unique nodes that transmitted a token on the local MSTP loop. Unit: 1	No signal output available
UC-11 (3DBA)	# of BN COV Sbscript	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the number of COV subscriptions requested by the nodes on the BACnet network. This is limited to the number of objects that support COV subscriptions. Unit: 1	No Signal output available
UC-12 (3DBB)	MSTP Loop Time	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the number of milliseconds between drive transmitted token and drive token received, showing how long the MSTP loop took to pass the token to all nodes on the MSTP network. Unit: 1 ms	No signal output available
UC-13 (3DBC) Expert	BN MSTP CRC Errors	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the number of CRC errors detected after you energize the drive. Unit: 1	No signal output available
UC-14 (3DBD) Expert	BN MSTP Tokens Lost	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the number of token losses seen by the unit since power-on. This is sensed by a net deadtime of greater than 500 ms. Unit: 1	No signal output available

No. (Hex.)	Name	Description	MFAO Signal Level
UC-15 (3DBE) Expert	BN MSTP Tokens Retry	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the number of token retries seen by the unit since power-on. This is sensed by two subsequent token frames seen from the same node to the same node with the same CRC. Unit: 1	No signal output available
UC-16 (3DBF) Expert	BN MSTP Silence Avg	V/f CL-V/f OLV CLV AOLV OLV/PM AOLV/PM CLV/PM EZOLV Shows the average net deadtime (space between active messages), averaged over a 60 packet period. Unit: 1.0 ms	No signal output available

3.19 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 parameter A1-02. When you change the setting for A1-02, the default settings will change.

Table 3.1 A1-02 = 0, 2 [V/f, OLV]

No.	Name	Range	Unit	Control Method (A1-02 Setting)	
				V/f (0)	OLV (2)
b2-01	DC Injection/Zero SpeedThreshold	0.0 - 10.0	0.1 Hz	0.5	0.5
b2-04	DC Inject Braking Time at Stop	0.00 - 10.00	0.01 s	0.50	0.50
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}
b3-09	Speed Estimation ACR I Time	0.0 - 1000.0	0.1 ms	2.0	2.0
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 Hz	0.0 Hz
C2-01	S-Curve Time @ Start of Accel	0.00 - 10.00	0.01 s	0.20	0.20
C3-01	Slip Compensation Gain	0.0 - 2.5	0.1	0.0	1.0
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
C4-02	Torque Compensation Delay Time	0 - 10000	1 ms	200	20
C5-01	ASR Proportional Gain 1	0.00 - 300.00	0.01	0.20	-
C5-02	ASR Integral Time 1	0.000 - 60.000	0.001 s	0.200	-
C5-03	ASR Proportional Gain 2	0.00 - 300.00	0.01	0.02	-
C5-04	ASR Integral Time 2	0.000 - 10.000	0.001 s	0.050	-
C5-06	ASR Delay Time	0.000 - 0.500	0.001 s	-	-
C5-07	ASR Gain Switchover Frequency	0.0 - 400.0	0.1 Hz	-	0.0 Hz
C6-02	Carrier Frequency Selection	1 - F	1	7 ^{*2}	7 ^{*2}
d3-01	Jump Frequency 1	0.0 - 400.0	0.1 Hz	0.0	0.0
d3-02	Jump Frequency 2	0.0 - 400.0	0.1 Hz	0.0	0.0
d3-03	Jump Frequency 3	0.0 - 400.0	0.1 Hz	0.0	0.0
d3-04	Jump Frequency Width	0.0 - 20.0	0.1 Hz	1.0	1.0
E1-04	Maximum Output Frequency	40.0 - 400.0 ^{*2 *3}	0.1 Hz	60.0 ^{*4}	60.0
E1-05	Maximum Output Voltage	0.0 - 255.0 ^{*5}	0.1 V	230.0 ^{*4}	230.0
E1-06	Base Frequency	0.0 - 400.0 ^{*3}	0.1 Hz	60.0 ^{*4}	60.0
E1-07	Mid Point A Frequency	0.0 - 400.0 ^{*3}	0.1 Hz	3.0 ^{*4}	3.0
E1-08	Mid Point A Voltage	0.0 - 255.0 ^{*5}	0.1 V	17.3 ^{*4}	13.8
E1-09	Minimum Output Frequency	0.0 - 400.0 ^{*3}	0.1 Hz	1.5 ^{*4}	0.5
E1-10	Minimum Output Voltage	0.0 - 255.0 ^{*5}	0.1 V	10.2 ^{*4}	2.9

3.19 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)	OLV (2)
F1-09	Overspeed Detection Delay Time	0.0 - 2.0	0.1 s	1.0	-
L1-01	Motor Overload (oL1) Protection	0 - 4	1	2	2
L2-31	KEB Start Voltage Offset Level	0 - 100 *5	1 V	0	0
L3-05	Stall Prevention during RUN	0 - 3	1	2	-
L3-20	DC Bus Voltage Adjustment Gain	0.00 - 5.00	0.01	1.00	0.30
L3-36	Current Suppression Gain@Accel	0.0 - 100.0	0.1	10.0	20.0
L4-01	Speed Agree Detection Level	0.0 - 400.0 *6	0.1	0.0 Hz	0.0 Hz
L4-02	Speed Agree Detection Width	0.0 - 20.0	0.1	2.0 Hz	2.0 Hz
L4-03	Speed Agree Detection Level(+/-)	-400.0 - +400.0 *7	0.1	0.0 Hz	0.0 Hz
L4-04	Speed Agree Detection Width(+/-)	0.0 - 20.0	0.1	2.0 Hz	2.0 Hz
L8-40	Carrier Freq Reduction Off-Delay	0.00 - 2.00	0.01 s	0.50	0.50
L8-90	STPo Detection Level (Low Speed)	0 - 5000	1	-	-
n5-04	Speed Response Frequency	0.00 - 500.00	0.00 Hz	-	-
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
o1-04	V/f Pattern Display Unit	0 - 1	1	-	-

- *1 The default setting changes when the setting for o2-04 [Drive Model Selection] changes.
 *2 The default setting changes when the setting of C6-01 [Normal / Heavy Duty Selection] changes.
 *3 The setting range changes when the setting of E5-01 [PM Motor Code Selection] changes when A1-02 = 5 [OLV/PM].
 *4 The default setting changes when the drive model and E1-03 [V/f Pattern Selection] change.
 *5 This is the value for 200 V class drives. Double the value for 400 V class drives.
 *6 When A1-02 = 5 [OLV/PM], the maximum value of the setting range is 100.0.
 *7 When A1-02 = 5 [OLV/PM], the setting range is -100.0 to +100.0.

Table 3.2 A1-02 = 5, 6, 8 [OLV/PM, AOLV/PM, EZOLV]

No.	Name	Range	Unit	Control Method (A1-02 Setting)		
				OLV/PM (5)	AOLV/PM (6)	EZOLV (8)
b2-01	DC Injection/Zero SpeedThreshold	0.0 - 10.0	0.1	0.5 Hz	1.0%	0.5Hz
b2-04	DC Inject Braking Time at Stop	0.00 - 10.00	0.01 s	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 *6
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

3.19 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)	EZOLV (8)
b5-15	PID Sleep Function Start Level	0.0 - 400.0 ^{*1}	0.1	0.0 Hz	0.0%	0.0 Hz
b6-01	Dwell Reference at Start	0.0 - 400.0 ^{*1}	0.1	0.0 Hz	0.0%	0.0 Hz
b6-03	Dwell Reference at Stop	0.0 - 400.0 ^{*1}	0.1	0.0 Hz	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	20
C1-11	Accel/Decel Time Switchover Freq	0.0 - 400.0 ^{*1}	0.1	0.0 Hz	0.0%	0.0Hz
C2-01	S-Curve Time @ Start of Accel	0.00 - 10.00	0.01 s	1.00	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 - 10000	1 ms	100	-	200
C5-01	ASR Proportional Gain 1	0.00 - 300.00	0.01	-	10.00	10.00
C5-02	ASR Integral Time 1	0.000 - 60.000	0.001 s	-	0.500	0.500
C5-03	ASR Proportional Gain 2	0.00 - 300.00	0.01	-	10.00	10.00
C5-04	ASR Integral Time 2	0.000 - 10.000	0.001 s	-	0.500	0.500
C5-06	ASR Delay Time	0.000 - 0.500	0.001 s	-	0.016	0.004
C5-07	ASR Gain Switchover Frequency	0.0 - 400.0 ^{*1}	0.1	-	0.0%	0.0Hz
C6-02	Carrier Frequency Selection	1 - F	1	2	2	2
d3-01	Jump Frequency 1	0.0 - 400.0 ^{*1}	0.1	0.0 Hz	0.0%	0.0 Hz
d3-02	Jump Frequency 2	0.0 - 400.0 ^{*1}	0.1	0.0 Hz	0.0%	0.0 Hz
d3-03	Jump Frequency 3	0.0 - 400.0 ^{*1}	0.1	0.0 Hz	0.0 %	0.0 Hz
d3-04	Jump Frequency Width	0.0 - 20.0 ^{*2}	0.1	1.0 Hz	1.0 %	1.0 %
E1-04	Maximum Output Frequency	40.0 - 400.0 ^{*3}	0.1 Hz	Determined by E5-01	Determined by E5-01	Determined by E5-01
E1-05	Maximum Output Voltage	0.0 - 255.0 ^{*4}	0.1 V	Determined by E5-01	Determined by E5-01	Determined by E5-01
E1-06	Base Frequency	0.0 - 400.0	0.1 Hz	Determined by E5-01	Determined by E5-01	Determined by E5-01
E1-07	Mid Point A Frequency	0.0 - 400.0	0.1 Hz	-	-	-
E1-08	Mid Point A Voltage	0.0 - 255.0 ^{*4}	0.1 V	-	-	-
E1-09	Minimum Output Frequency	0.0 - 400.0	0.1 Hz	Determined by E5-01	Determined by E5-01	Determined by E5-01
E1-10	Minimum Output Voltage	0.0 - 255.0 ^{*4}	0.1 V	-	-	-
F1-09	Overspeed Detection Delay Time	0.0 - 2.0	0.1 s	-	0.0	-
L1-01	Motor Overload (oL1) Protection	0 - 4	1	4	4	Determined by E9-01
L2-31	KEB Start Voltage Offset Level	0 - 100 ^{*4}	1 V	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
L3-21	OVSuppression Accel/Decel P Gain	0.10 - 10.00	0.01	1.00	1.00	1.00

3.19 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)	EZOLV (8)
L3-36	Current Suppression Gain@Accel	0.0 - 100.0	0.1	-	-	-
L4-01	Speed Agree Detection Level	0.0 - 400.0 *1	0.1	0.0 Hz	0.0%	0.0 Hz
L4-02	Speed Agree Detection Width	0.0 - 20.0 *2	0.1	2.0 Hz	4.0%	2.0 Hz
L4-03	Speed Agree Detection Level(+/-)	-400.0 - +400.0 *5	0.1	0.0 Hz	0.0%	0.0 Hz
L4-04	Speed Agree Detection Width(+/-)	0.0 - 20.0 *2	0.1	2.0 Hz	4.0%	2.0 Hz
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
n5-04	Speed Response Frequency	0.00 - 500.00	0.00 Hz	-	20.00	-
n8-35	Initial Pole Detection Method	0 - 2	1	0	1	-
n8-51	Pull-in Current @ Acceleration	0 - 200%	1	50%	-	80%
o1-03	Frequency Display Unit Selection	0 - 3	1	2	2	0
o1-04	V/f Pattern Display Unit	0 - 1	1	-	1	0

- *1 The setting range is 0.0 to 100.0 when A1-02 = 6 [PM Advanced Open Loop Vector].
 *2 The setting range is 0.0 to 40.0 when A1-02 = 6 [PM Advanced Open Loop Vector].
 *3 The default setting changes when the setting for C6-01 [Normal / Heavy Duty Selection] changes.
 *4 This is the value for 200 V class drives. Double the value for 400 V class drives.
 *5 The setting range is -100.0 to +100.0 when A1-02 = 6 [PM Advanced Open Loop Vector].
 *6 The default setting changes when the setting for o2-04 [Drive Model Selection] changes.

3.20 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)	OLV (2)
C3-21	Motor 2 Slip Compensation Gain	0.0 - 2.50	0.1	0.0	1.0
C3-22	Motor 2 Slip Comp Delay Time	0 - 10000	1 ms	2000	200
E3-04	Motor 2 Maximum Output Frequency	40.0 - 590.0	0.1 Hz	60.0	60.0
E3-05	Motor 2 Maximum Output Voltage	0.0 - 255.0 *1	0.1 V	230.0	230.0
E3-06	Motor 2 Base Frequency	0.0 - 590.0	0.1 Hz	60.0	60.0
E3-07	Motor 2 Mid Point A Frequency	0.0 - 590.0	0.1 Hz	3.0	3.0
E3-08	Motor 2 Mid Point A Voltage	0.0 - 255.0 *1	0.1 V	17.3	13.8
E3-09	Motor 2 Minimum Output Frequency	0.0 - 590.0	0.1 Hz	1.5	0.5
E3-10	Motor 2 Minimum Output Voltage	0.0 - 255.0 *1	0.1 V	10.2	2.9

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

3.21 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 3.3 Parameters Changed by E1-03 (B001 - B018, 2001 - 2021, and 4001 - 4012)

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

*1 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]*.

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

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

Table 3.4 Parameters Changed by E1-03 (2030 - 2082 and 4018 - 4060)

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

*1 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]*.

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

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

3.22 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.

◆ Single-Phase 200 V Class

No. */	Name	Unit	Default							
-	Drive Model	-	B001		B002		B004		B006	
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.	30		31		32		33	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	0.17 (0.1)	0.17 (0.2)	0.25 (0.2)	0.25 (0.4)	0.50 (0.4)	0.75 (0.75)	1.00 (0.75)	1.50 (1.1)
b3-04	V/f Gain during Speed Search	%	100	100	100	100	100	100	100	100
b3-06	Speed Estimation Current Level 1	-	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5
b3-08	Speed Estimation ACR P Gain	-	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
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	-	481.7	356.9	356.9	288.2	288.2	223.7	223.7	196.6
C6-02	Carrier Frequency Selection	-	4	7	4	7	4	7	4	7
E2-01 (E4-01)	Motor Rated Current (FLA)	A	0.6	1.1	1.1	1.9	1.9	3.3	3.3	6.2
E2-02 (E4-02)	Motor Rated Slip	Hz	2.500	2.600	2.600	2.900	2.900	2.500	2.500	2.600
E2-03 (E4-03)	Motor No-Load Current	A	0.40	0.80	0.80	1.20	1.20	1.80	1.80	2.80
E2-05 (E4-05)	Motor Line-to-Line Resistance	Ω	35.98	20.56	20.56	9.842	9.842	5.156	5.156	1.997
E2-06 (E4-06)	Motor Leakage Inductance	%	21.6	20.1	20.1	18.2	18.2	13.8	13.8	18.5
E2-10 (E4-10)	Motor Iron Loss	W	6	11	11	14	14	26	26	53
E5-01	PM Motor Code Selection	-	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF
L2-02	Power Loss Ride Through Time	s	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
L2-03	Minimum Baseblock Time	s	0.2	0.3	0.2	0.3	0.2	0.3	0.3	0.4
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

No. */	Name	Unit	Default							
-	Drive Model	-	B001		B002		B004		B006	
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.	30		31		32		33	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	0.17 (0.1)	0.17 (0.2)	0.25 (0.2)	0.25 (0.4)	0.50 (0.4)	0.75 (0.75)	1.00 (0.75)	1.50 (1.1)
L2-05	Undervoltage Detection Lvl (Uv1)	-	160	160	160	160	160	160	160	160
L3-02	Stall Prevent Level during Accel	%	150	120	150	120	150	120	150	120
L3-06	Stall Prevent Level during Run	%	150	120	150	120	150	120	150	120
L3-24	Motor Accel Time @ Rated Torque	s	0.178	0.178	0.178	0.178	0.178	0.142	0.142	0.142
L8-02	Overheat Alarm Level	°C	105	105	105	105	115	115	115	115
L8-09	Output Ground Fault Detection	-	0	0	0	0	0	0	0	0
n1-03	Hunting Prevention Time Constant	ms	10	10	10	10	10	10	10	10
n3-02	HSB Current Limit Level	%	150	120	150	120	150	120	150	120
n5-02	Motor Inertia Acceleration Time	s	0.178	0.178	0.178	0.142	0.178	0.142	0.142	0.142

*1 Parameters within parentheses are for motor 2.

No. */	Name	Unit	Default					
-	Drive Model	-	B010		B012		B018	
C6-01	Normal / Heavy Duty Selection	-	HD	ND	HD	ND	HD	ND
			0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	34		35		37	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	2.0 (1.5)	3.0 (2.2)	3.0 (2.2)	3.0 (3.0)	5.0 (3.7)	N/A
b3-04	V/f Gain during Speed Search	%	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
b3-08	Speed Estimation ACR P Gain	-	0.5	0.5	0.5	0.5	0.5	0.5
b3-26	Direction Determination Level	-	1000	1000	1000	1000	1000	1000
b8-03	Energy Saving Filter Time	s	0.5	0.5	0.5	0.5	0.5	0.5
b8-04	Energy Saving Coefficient Value	-	169.4	156.8	156.8	136.4	122.9	94.75
C6-02	Carrier Frequency Selection	-	3	7	3	7	3	7
E2-01 (E4-01)	Motor Rated Current (FLA)	A	6.2	8.5	8.5	11.4	14	19.6

3.22 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default					
-	Drive Model	-	B010		B012		B018	
C6-01	Normal / Heavy Duty Selection	-	HD	ND	HD	ND	HD	ND
			0	1	0	1	0	1
o2-04	Drive Model (KVA) Selection	Hex.	34		35		37	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	2.0 (1.5)	3.0 (2.2)	3.0 (2.2)	3.0 (3.0)	5.0 (3.7)	N/A
E2-02 (E4-02)	Motor Rated Slip	Hz	2.6	2.9	2.9	2.7	2.73	1.5
E2-03 (E4-03)	Motor No-Load Current	A	2.8	3	3	3.7	4.5	5.1
E2-05 (E4-05)	Motor Line-to-Line Resistance	Ω	1.997	1.601	1.601	1.034	0.771	0.399
E2-06 (E4-06)	Motor Leakage Inductance	%	18.5	18.4	18.4	19	19.6	18.2
E2-10 (E4-10)	Motor Iron Loss	W	53	77	77	91	112	172
E5-01	PM Motor Code Selection	-	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF
L2-02	Power Loss Ride Through Time	s	0.3	0.3	0.5	0.5	1	1
L2-03	Minimum Baseblock Time	s	0.4	0.5	0.5	0.5	0.6	0.7
L2-04	Powerloss V/f Recovery Ramp Time	s	0.3	0.3	0.3	0.3	0.3	0.3
L2-05	Undervoltage Detection Lvl (Uv1)	-	160	160	160	160	160	160
L3-02	Stall Prevent Level during Accel	%	150	120	150	120	150	120
L3-06	Stall Prevent Level during Run	%	150	120	150	120	150	120
L3-24	Motor Accel Time @ Rated Torque	s	0.166	0.145	0.145	0.145	0.154	0.168
L8-02	Overheat Alarm Level	°C	105	105	110	110	115	115
L8-09	Output Ground Fault Detection	-	0	0	0	0	0	0
n1-03	Hunting Prevention Time Constant	ms	10	10	10	10	10	10
n3-02	HSB Current Limit Level	%	150	120	150	120	150	120
n5-02	Motor Inertia Acceleration Time	s	0.166	0.145	0.145	0.145	0.154	0.168

*1 Parameters within parentheses are for motor 2.

◆ Three-Phase 200 V Class

No. */	Name	Unit	Default							
			2001		2002		2004		2006	
-	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.	60		61		62		63	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	0.17 (0.1)	0.17 (0.2)	0.25 (0.2)	0.25 (0.4)	0.50 (0.4)	0.75 (0.75)	1.00 (0.75)	1.50 (1.1)
b3-04	V/f Gain during Speed Search	%	100	100	100	100	100	100	100	100
b3-06	Speed Estimation Current Level 1	-	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5
b3-08	Speed Estimation ACR P Gain	-	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
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	-	481.7	356.9	356.9	288.2	288.2	223.7	223.7	196.6
C6-02	Carrier Frequency Selection	-	4	7	4	7	4	7	4	7
E2-01 (E4-01)	Motor Rated Current (FLA)	A	0.6	1.1	1.1	1.9	1.9	3.3	3.3	4.9
E2-02 (E4-02)	Motor Rated Slip	Hz	2.500	2.600	2.600	2.900	2.900	2.500	2.500	2.600
E2-03 (E4-03)	Motor No-Load Current	A	0.40	0.80	0.80	1.20	1.20	1.80	1.80	2.30
E2-05 (E4-05)	Motor Line-to-Line Resistance	Ω	35.98	20.56	20.56	9.842	9.842	5.156	5.156	3.577
E2-06 (E4-06)	Motor Leakage Inductance	%	21.6	20.1	20.1	18.2	18.2	13.8	13.8	18.5
E2-10 (E4-10)	Motor Iron Loss	W	6	11	11	14	14	26	26	38
E5-01	PM Motor Code Selection	-	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF
L2-02	Power Loss Ride Through Time	s	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
L2-03	Minimum Baseblock Time	s	0.2	0.3	0.2	0.3	0.2	0.3	0.3	0.4
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
L3-02	Stall Prevent Level during Accel	%	150	120	150	120	150	120	150	120

3.22 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default							
-	Drive Model	-	2001		2002		2004		2006	
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.	60		61		62		63	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	0.17 (0.1)	0.17 (0.2)	0.25 (0.2)	0.25 (0.4)	0.50 (0.4)	0.75 (0.75)	1.00 (0.75)	1.50 (1.1)
L3-06	Stall Prevent Level during Run	%	150	120	150	120	150	120	150	120
L3-24	Motor Accel Time @ Rated Torque	s	0.178	0.178	0.178	0.178	0.178	0.142	0.142	0.142
L8-02	Overheat Alarm Level	°C	115	115	115	115	115	115	120	120
L8-09	Output Ground Fault Detection	-	0	0	0	0	0	0	0	0
n1-03	Hunting Prevention Time Constant	ms	10	10	10	10	10	10	10	10
n3-02	HSB Current Limit Level	l	150	120	150	120	150	120	150	120
n5-02	Motor Inertia Acceleration Time	s	0.178	0.178	0.178	0.142	0.178	0.142	0.142	0.142

*1 Parameters within parentheses are for motor 2.

No. */	Name	Unit	Default							
-	Drive Model	-	2010		2012		2021		2030	
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.	65		66		68		6A	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	2.00 (1.5)	3.00 (2.2)	3.00 (2.2)	4.00 (3.0)	5.00 (3.7)	7.50 (5.5)	7.50 (5.5)	10.00 (7.5)
b3-04	V/f Gain during Speed Search	%	100	100	100	100	100	100	100	100
b3-06	Speed Estimation Current Level l	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
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	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
b8-04	Energy Saving Coefficient Value	-	169.4	156.8	156.8	136.4	122.9	94.75	94.75	72.69
C6-02	Carrier Frequency Selection	-	3	7	3	7	3	7	3	7
E2-01 (E4-01)	Motor Rated Current (FLA)	A	6.2	8.5	8.5	11.4	14	19.6	19.6	26.6

No. */	Name	Unit	Default							
-	Drive Model	-	2010		2012		2021		2030	
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.	65		66		68		6A	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	2.00 (1.5)	3.00 (2.2)	3.00 (2.2)	4.00 (3.0)	5.00 (3.7)	7.50 (5.5)	7.50 (5.5)	10.00 (7.5)
E2-02 (E4-02)	Motor Rated Slip	Hz	2.6	2.9	2.9	2.7	2.73	1.5	1.5	1.3
E2-03 (E4-03)	Motor No-Load Current	A	2.8	3	3	3.7	4.5	5.1	5.1	8
E2-05 (E4-05)	Motor Line-to-Line Resistance	Ω	1.997	1.601	1.601	1.034	0.771	0.399	0.39	0.288
E2-06 (E4-06)	Motor Leakage Inductance	%	18.5	18.4	18.4	19	19.6	18.2	18.2	15.5
E2-10 (E4-10)	Motor Iron Loss	W	53	77	77	91	112	172	172	262
E5-01	PM Motor Code Selection	-	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF
L2-02	Power Loss Ride Through Time	s	0.3	0.3	0.5	0.5	1	1	1	1
L2-03	Minimum Baseblock Time	s	0.4	0.5	0.5	0.5	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
L3-02	Stall Prevent Level during Accel	%	150	120	150	120	150	120	150	120
L3-06	Stall Prevent Level during Run	%	150	120	150	120	150	120	150	120
L3-24	Motor Accel Time @ Rated Torque	s	0.166	0.145	0.145	0.145	0.154	0.168	0.168	0.175
L8-02	Overheat Alarm Level	°C	110	110	110	110	115	115	105	105
L8-09	Output Ground Fault Detection	-	0	0	0	0	0	0	1	1
n1-03	Hunting Prevention Time Constant	ms	10	10	10	10	10	10	10	10
n3-02	HSB Current Limit Level	1	150	120	150	120	150	120	150	120
n5-02	Motor Inertia Acceleration Time	s	0.166	0.145	0.145	0.145	0.154	0.168	0.168	0.175

*1 Parameters within parentheses are for motor 2.

3.22 Defaults by Drive Model and Duty Rating ND/HD

No. *	Name	Unit	Default							
-	Drive Model	-	2042		2056		2070		2082	
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.	6B		6D		6E		6F	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	10 (7.5)	15 (11)	15 (11)	20 (15)	20 (15)	25 (18.5)	25 (18.5)	30 (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
b3-08	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	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
b8-04	Energy Saving Coefficient Value	-	72.69	70.44	70.44	63.13	63.13	57.87	57.87	51.79
C6-02	Carrier Frequency Selection	-	3	7	3	7	3	7	3	7
E2-01 (E4-01)	Motor Rated Current (FLA)	A	26.6	39.7	39.7	53	53	65.8	65.8	77.2
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	Ω	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	-	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF
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
L3-02	Stall Prevent Level during Accel	%	150	120	150	120	150	120	150	120
L3-06	Stall Prevent Level during Run	%	150	120	150	120	150	120	150	120

No. */	Name	Unit	Default							
-	Drive Model	-	2042		2056		2070		2082	
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.	6B		6D		6E		6F	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	10 (7.5)	15 (11)	15 (11)	20 (15)	20 (15)	25 (18.5)	25 (18.5)	30 (22)
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	115	115	125	125	120	120	135	135
L8-09	Output Ground Fault Detection	-	1	1	1	1	1	1	1	1
n1-03	Hunting Prevention Time Constant	ms	10	10	10	10	10	10	10	10
n3-02	HSB Current Limit Level	1	150	120	150	120	150	120	150	120
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 within parentheses are for motor 2.

◆ Three-Phase 400 V Class

No. */	Name	Unit	Default							
-	Drive Model	-	4001		4002		4004		4005	
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.	91		92		93		94	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	0.50 (0.2)	0.50 (0.4)	0.75 (0.4)	1.00 (0.75)	2.00 (0.75)	2.00 (1.5)	3.00 (1.5)	3.00 (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	-	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5
b3-08	Speed Estimation ACR P Gain	-	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
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	-	713.8	576.4	576.4	447.4	447.4	338.8	338.8	313.6
C6-02	Carrier Frequency Selection	-	3	7	3	7	3	7	3	7
E2-01 (E4-01)	Motor Rated Current (FLA)	A	0.6	1	1	1.6	1.6	3.1	3.1	4.2

3.22 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default							
-	Drive Model	-	4001		4002		4004		4005	
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.	91		92		93		94	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	0.50 (0.2)	0.50 (0.4)	0.75 (0.4)	1.00 (0.75)	2.00 (0.75)	2.00 (1.5)	3.00 (1.5)	3.00 (2.2)
E2-02 (E4-02)	Motor Rated Slip	Hz	2.500	2.900	2.900	2.600	2.600	2.500	2.500	3.000
E2-03 (E4-03)	Motor No-Load Current	A	0.40	0.60	0.60	0.80	0.80	1.40	1.40	1.50
E2-05 (E4-05)	Motor Line-to-Line Resistance	Ω	83.94	38.198	38.198	22.459	22.459	10.1	10.1	6.495
E2-06 (E4-06)	Motor Leakage Inductance	%	21.9	18.2	18.2	14.3	14.3	18.3	18.3	18.7
E2-10 (E4-10)	Motor Iron Loss	W	12	14	14	26	26	53	53	77
E5-01	PM Motor Code Selection	-	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF
L2-02	Power Loss Ride Through Time	s	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.3
L2-03	Minimum Baseblock Time	s	0.2	0.2	0.2	0.3	0.3	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)	-	380	380	380	380	380	380	380	380
L3-02	Stall Prevent Level during Accel	%	150	120	150	120	150	120	150	120
L3-06	Stall Prevent Level during Run	%	150	120	150	120	150	120	150	120
L3-24	Motor Accel Time @ Rated Torque	s	0.178	0.178	0.178	0.142	0.142	0.166	0.166	0.145
L8-02	Overheat Alarm Level	°C	120	120	120	120	105	105	90	90
L8-09	Output Ground Fault Detection	-	0	0	0	0	0	0	0	0
n1-03	Hunting Prevention Time Constant	ms	10	10	10	10	10	10	10	10
n3-02	HSB Current Limit Level	%	150	120	150	120	150	120	150	120
n5-02	Motor Inertia Acceleration Time	s	0.178	0.178	0.178	0.142	0.142	0.166	0.166	0.145

*1 Parameters within parentheses are for motor 2.

No. */	Name	Unit	Default							
-	Drive Model	-	4007		4009		4012		4018	
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.	95		96		97		99	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	3.00 (2.2)	4.00 (3.0)	4.00 (3.0)	5.00 (3.7)	5.00 (4.0)	7.50 (5.5)	10.00 (5.5)	10.00 (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
b3-08	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	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
b8-04	Energy Saving Coefficient Value	-	313.6	265.7	265.7	245.8	245.8	189.5	189.5	145.38
C6-02	Carrier Frequency Selection	-	3	7	3	7	3	7	3	7
E2-01 (E4-01)	Motor Rated Current (FLA)	A	4.2	5.7	5.7	7	7	9.8	9.8	13.3
E2-02 (E4-02)	Motor Rated Slip	Hz	3	2.7	2.7	2.7	2.7	1.5	1.5	1.3
E2-03 (E4-03)	Motor No-Load Current	A	1.5	1.9	1.9	2.3	2.3	2.6	2.6	4
E2-05 (E4-05)	Motor Line-to-Line Resistance	Ω	6.495	4.36	4.36	3.333	3.333	1.595	1.595	1.152
E2-06 (E4-06)	Motor Leakage Inductance	%	18.7	19	19	19.3	19.3	18.2	18.2	15.5
E2-10 (E4-10)	Motor Iron Loss	W	77	105	105	130	130	193	193	263
E5-01	PM Motor Code Selection	-	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF
L2-02	Power Loss Ride Through Time	s	0.5	0.5	0.5	0.5	0.5	0.5	0.8	0.8
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)	-	380	380	380	380	380	380	380	380
L3-02	Stall Prevent Level during Accel	%	150	120	150	120	150	120	150	120
L3-06	Stall Prevent Level during Run	%	150	120	150	120	150	120	150	120

3.22 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default							
-	Drive Model	-	4007		4009		4012		4018	
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.	95		96		97		99	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	3.00 (2.2)	4.00 (3.0)	4.00 (3.0)	5.00 (3.7)	5.00 (4.0)	7.50 (5.5)	10.00 (5.5)	10.00 (7.5)
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	90	90	115	115	110	110	120	120
L8-09	Output Ground Fault Detection	-	0	0	0	0	0	0	0	0
n1-03	Hunting Prevention Time Constant	ms	10	10	10	10	10	10	10	10
n3-02	HSB Current Limit Level	%	150	120	150	120	150	120	150	120
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 within parentheses are for motor 2.

No. */	Name	Unit	Default							
-	Drive Model	-	4023		4031		4038		4044	
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.	9A		Rev:A: 9C Rev:B: 19C		Rev:A: 9D Rev:B: 19D		9E	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	10.00 (7.5)	15.00 (11)	15.00 (11)	20.00 (15)	20.00 (15)	25.00 (18.5)	25.00 (18.5)	30.00 (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
b3-08	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	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
b8-04	Energy Saving Coefficient Value	-	145.38	140.88	140.88	126.26	126.26	115.74	115.74	103.58
C6-02	Carrier Frequency Selection	-	3	7	3	7	3	7	3	7
E2-01 (E4-01)	Motor Rated Current (FLA)	A	13.3	19.9	19.9	26.5	26.5	32.9	32.9	38.6
E2-02 (E4-02)	Motor Rated Slip	Hz	1.3	1.7	1.7	1.6	1.6	1.67	1.67	1.7

No. */	Name	Unit	Default							
-	Drive Model	-	4023		4031		4038		4044	
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.	9A		Rev:A: 9C Rev:B: 19C		Rev:A: 9D Rev:B: 19D		9E	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	10.00 (7.5)	15.00 (11)	15.00 (11)	20.00 (15)	20.00 (15)	25.00 (18.5)	25.00 (18.5)	30.00 (22)
E2-03 (E4-03)	Motor No-Load Current	A	4	5.6	5.6	7.6	7.6	7.8	7.8	9.2
E2-05 (E4-05)	Motor Line-to-Line Resistance	Ω	1.152	0.922	0.922	0.55	0.55	0.403	0.403	0.316
E2-06 (E4-06)	Motor Leakage Inductance	%	15.5	19.6	19.6	17.2	17.2	20.1	20.1	23.5
E2-10 (E4-10)	Motor Iron Loss	W	263	385	385	440	440	508	508	586
E5-01	PM Motor Code Selection	-	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF
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)	-	380	380	380	380	380	380	380	380
L3-02	Stall Prevent Level during Accel	%	150	120	150	120	150	120	150	120
L3-06	Stall Prevent Level during Run	%	150	120	150	120	150	120	150	120
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	120	120	120	120	120	120	125	125
L8-09	Output Ground Fault Detection	-	0	0	1	1	1	1	1	1
n1-03	Hunting Prevention Time Constant	ms	10	10	10	10	10	10	10	10
n3-02	HSB Current Limit Level	%	150	120	150	120	150	120	150	120
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 within parentheses are for motor 2.

3.22 Defaults by Drive Model and Duty Rating ND/HD

No. */	Name	Unit	Default	
-	Drive Model	-	4060	
C6-01	Normal / Heavy Duty Selection	-	HD	ND
			0	1
o2-04	Drive Model (KVA) Selection	Hex.	9F	
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	30.00 (22)	40.00 (30)
b3-04	V/f Gain during Speed Search	%	100	100
b3-06	Speed Estimation Current Level 1	-	0.5	0.5
b3-08	Speed Estimation ACR P Gain	-	0.5	0.5
b3-26	Direction Determination Level	-	1000	1000
b8-03	Energy Saving Filter Time	s	0.5	0.5
b8-04	Energy Saving Coefficient Value	-	103.58	92.54
C6-02	Carrier Frequency Selection	-	3	7
E2-01 (E4-01)	Motor Rated Current (FLA)	A	38.6	52.3
E2-02 (E4-02)	Motor Rated Slip	Hz	1.7	1.8
E2-03 (E4-03)	Motor No-Load Current	A	9.2	10.9
E2-05 (E4-05)	Motor Line-to-Line Resistance	Ω	0.316	0.269
E2-06 (E4-06)	Motor Leakage Inductance	%	23.5	20.7
E2-10 (E4-10)	Motor Iron Loss	W	586	750
E5-01	PM Motor Code Selection	-	FFFF	FFFF
L2-02	Power Loss Ride Through Time	s	2	2
L2-03	Minimum Baseblock Time	s	1	1.1
L2-04	Powerloss V/f Recovery Ramp Time	s	0.6	0.6
L2-05	Undervoltage Detection Lvl (Uv1)	-	380	380
L3-02	Stall Prevent Level during Accel	%	150	120
L3-06	Stall Prevent Level during Run	%	150	120
L3-24	Motor Accel Time @ Rated Torque	s	0.355	0.323
L8-02	Overheat Alarm Level	°C	115	115
L8-09	Output Ground Fault Detection	-	1	1
n1-03	Hunting Prevention Time Constant	ms	10	10
n3-02	HSB Current Limit Level	%	150	120
n5-02	Motor Inertia Acceleration Time	s	0.355	0.323

*1 Parameters within parentheses are for motor 2.

3.23 Parameters Changed by PM Motor Code Selection

Note:

The motor codes listed in these tables are the only correct setting values.

◆ Yaskawa SMRA Series SPM Motors

Table 3.5 SMRA Series Motor Code Setting for Specification of 200 V at 1800 min⁻¹ (r/min)

No.	Name	Unit	Motor Code (setting value of E5-01)				
E5-01	PM Motor Code Selection	-	0002	0003	0005	0006	0008
	Voltage Class	V	200	200	200	200	200
	Capacity	kW	0.4	0.75	1.5	2.2	3.7
	Motor Rotation Speed	min ⁻¹	1800	1800	1800	1800	1800
E5-02	PM Motor Rated Power	kW	0.4	0.75	1.5	2.2	3.7
E5-03	PM Motor Rated Current (FLA)	A	2.1	4.0	6.9	10.8	17.4
E5-04	PM Motor Pole Count	-	8	8	8	8	8
E5-05	PM Motor Resistance (ohms/phase)	Ω	2.47	1.02	0.679	0.291	0.169
E5-06	PM d-axis Inductance (mH/phase)	mH	12.7	4.8	3.9	3.6	2.5
E5-07	PM q-axis Inductance (mH/phase)	mH	12.7	4.8	3.9	3.6	2.5
E5-09	PM Back-EMF Vpeak (mV/(rad/s))	mVs/rad	0	0	0	0	0
E5-24	PM Back-EMF L-L Vrms (mV/rpm)	mV/min ⁻¹	62.0	64.1	73.4	69.6	72.2
E1-04	Maximum Output Frequency	Hz	120	120	120	120	120
E1-05	Maximum Output Voltage	V	200.0	200.0	200.0	200.0	200.0
E1-06	Base Frequency	Hz	120	120	120	120	120
E1-09	Minimum Output Frequency	Hz	6	6	6	6	6
L3-24	Motor Accel Time @ Rated Torque	s	0.064	0.066	0.049	0.051	0.044
n5-02	Motor Inertia Acceleration Time	s	0.064	0.066	0.049	0.051	0.044
n8-49	Heavy Load Id Current	%	0	0	0	0	0

Table 3.6 SMRA Series Motor Code Setting for Specification of 200 V at 3600 min⁻¹ (r/min)

No.	Name	Unit	Motor Code (setting value of E5-01)			
E5-01	PM Motor Code Selection	-	0103	0105	0106	0108
	Voltage Class	V	200	200	200	200
	Capacity	kW	0.75	1.5	2.2	3.7
	Motor Rotation Speed	min ⁻¹	3600	3600	3600	3600
E5-02	PM Motor Rated Power	kW	0.75	1.5	2.2	3.7
E5-03	PM Motor Rated Current (FLA)	A	4.1	8.0	10.5	16.5
E5-04	PM Motor Pole Count	-	8	8	8	8
E5-05	PM Motor Resistance (ohms/phase)	Ω	0.538	0.20	0.15	0.097
E5-06	PM d-axis Inductance (mH/phase)	mH	3.2	1.3	1.1	1.1
E5-07	PM q-axis Inductance (mH/phase)	mH	3.2	1.3	1.1	1.1

3.23 Parameters Changed by PM Motor Code Selection

No.	Name	Unit	Motor Code (setting value of E5-01)			
E5-09	PM Back-EMF Vpeak (mV/(rad/s))	mVs/rad	0	0	0	0
E5-24	PM Back-EMF L-L Vrms (mV/rpm)	mV/min ⁻¹	32.4	32.7	36.7	39.7
E1-04	Maximum Output Frequency	Hz	240	240	240	240
E1-05	Maximum Output Voltage	V	200.0	200.0	200.0	200.0
E1-06	Base Frequency	Hz	240	240	240	240
E1-09	Minimum Output Frequency	Hz	12	12	12	12
L3-24	Motor Accel Time @ Rated Torque	s	0.137	0.132	0.132	0.122
n5-02	Motor Inertia Acceleration Time	s	0.137	0.132	0.132	0.122
n8-49	Heavy Load Id Current	%	0	0	0	0

◆ Yaskawa SMRD Series SPM Motors

Table 3.7 SMRD Series Motor Code Setting for Specification of 200 V at 1800 min⁻¹ (r/min)

No.	Name	Unit	Motor Code (setting value of E5-01)		
E5-01	PM Motor Code Selection	-	3000	3001	3002
	Voltage Class	V	200	200	200
	Capacity	kW	0.1	0.2	0.4
	Motor Rotation Speed	min ⁻¹	1800	1800	1800
E5-02	PM Motor Rated Power	kW	0.1	0.2	0.4
E5-03	PM Motor Rated Current (FLA)	A	0.64	1	1.9
E5-04	PM Motor Pole Count	-	6	6	6
E5-05	PM Motor Resistance (ohms/phase)	Ω	17.200	9.960	3.590
E5-06	PM d-axis Inductance (mH/phase)	mH	33.20	19.40	11.90
E5-07	PM q-axis Inductance (mH/phase)	mH	33.20	19.40	11.90
E5-09	PM Back-EMF Vpeak (mV/(rad/s))	mVs/rad	0.0	0.0	0.0
E5-24	PM Back-EMF L-L Vrms (mV/rpm)	mV/min ⁻¹	59.1	69.8	75.9
E1-04	Maximum Output Frequency	Hz	90.0	90.0	90.0
E1-05	Maximum Output Voltage	V	200.0	200.0	200.0
E1-06	Base Frequency	Hz	90.0	90.0	90.0
E1-09	Minimum Output Frequency	Hz	9.0	9.0	9.0
L3-24	Motor Accel Time @ Rated Torque	s	0.100	0.100	0.100
n5-02	Motor Inertia Acceleration Time	s	0.100	0.100	0.100
n8-49	Heavy Load Id Current	%	0.0	0.0	0.0

Table 3.8 SMRD Series Motor Code Setting for Specification of 200 V at 3600 min⁻¹ (r/min)

No.	Name	Unit	Motor Code (setting value of E5-01)		
E5-01	PM Motor Code Selection	-	3101	3102	3103
	Voltage Class	V	200	200	200
	Capacity	kW	0.2	0.4	0.75
	Motor Rotation Speed	min ⁻¹	3600	3600	3600
E5-02	PM Motor Rated Power	kW	0.20	0.40	0.75
E5-03	PM Motor Rated Current (FLA)	A	1.50	2.60	4.20
E5-04	PM Motor Pole Count	-	6	6	6

No.	Name	Unit	Motor Code (setting value of E5-01)		
E5-05	PM Motor Resistance (ohms/phase)	Ω	3.340	1.560	0.541
E5-06	PM d-axis Inductance (mH/phase)	mH	6.58	3.82	2.24
E5-07	PM q-axis Inductance (mH/phase)	mH	6.58	3.82	2.24
E5-09	PM Back-EMF Vpeak (mV/(rad/s))	mVs/rad	0.0	0.0	0.0
E5-24	PM Back-EMF L-L Vrms (mV/rpm)	mV/min ⁻¹	26.3	31.0	32.9
E1-04	Maximum Output Frequency	Hz	180.0	180.0	180.0
E1-05	Maximum Output Voltage	V	200.0	200.0	200.0
E1-06	Base Frequency	Hz	180.0	180.0	180.0
E1-09	Minimum Output Frequency	Hz	18.0	18.0	18.0
L3-24	Motor Accel Time @ Rated Torque	s	0.100	0.100	0.100
n5-02	Motor Inertia Acceleration Time	s	0.100	0.100	0.100
n8-49	Heavy Load Id Current	%	0.0	0.0	0.0

◆ Yaskawa SSR1 Series IPM Motors (Derated Torque)

Table 3.9 SSR1 Series Motor Code Setting for Specification of 200 V at 1750 min⁻¹ (r/min)

No.	Name	Unit	Motor Code (setting value of E5-01)					
E5-01	PM Motor Code Selection	-	1202	1203	1205	1206	1208	120A
	Voltage Class	V	200	200	200	200	200	200
	Capacity	kW	0.4	0.75	1.5	2.2	3.7	5.5
	Motor Rotation Speed	min ⁻¹	1750	1750	1750	1750	1750	1750
E5-02	PM Motor Rated Power	kW	0.4	0.75	1.5	2.2	3.7	5.5
E5-03	PM Motor Rated Current (FLA)	A	1.77	3.13	5.73	8.44	13.96	20.63
E5-04	PM Motor Pole Count	-	4	4	4	4	4	4
E5-05	PM Motor Resistance (ohms/phase)	Ω	8.233	2.284	1.470	0.827	0.455	0.246
E5-06	PM d-axis Inductance (mH/phase)	mH	54.84	23.02	17.22	8.61	7.20	4.86
E5-07	PM q-axis Inductance (mH/phase)	mH	64.10	29.89	20.41	13.50	10.02	7.43
E5-09	PM Back-EMF Vpeak (mV/(rad/s))	mVs/rad	223.7	220.3	240.8	238.0	238.7	239.6
E5-24	PM Back-EMF L-L Vrms (mV/rpm)	mV/min ⁻¹	0.0	0.0	0.0	0.0	0.0	0.0
E1-04	Maximum Output Frequency	Hz	87.5	87.5	87.5	87.5	87.5	87.5
E1-05	Maximum Output Voltage	V	190.0	190.0	190.0	190.0	190.0	190.0
E1-06	Base Frequency	Hz	87.5	87.5	87.5	87.5	87.5	87.5
E1-09	Minimum Output Frequency	Hz	4.4	4.4	4.4	4.4	4.4	4.4
L3-24 */	Motor Accel Time @ Rated Torque	s	0.092	0.076	0.051	0.066	0.075	0.083
n5-02	Motor Inertia Acceleration Time	s	0.092	0.076	0.051	0.066	0.075	0.083
n8-49	Heavy Load Id Current	%	-7.6	-11.5	-9.1	-19.0	-18.7	-23.4

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

3.23 Parameters Changed by PM Motor Code Selection

Table 3.10 SSR1 Series Motor Code Setting for Specification of 200 V at 1750 min⁻¹ (r/min)

No.	Name	Unit	Motor Code (setting value of E5-01)				
E5-01	PM Motor Code Selection	-	120B	120D	120E	120F	1210
	Voltage Class	V	200	200	200	200	200
	Capacity	kW	7.5	11	15	18.5	22
	Motor Rotation Speed	min ⁻¹	1750	1750	1750	1750	1750
E5-02	PM Motor Rated Power	kW	7.5	11.0	15.00	18.50	22.00
E5-03	PM Motor Rated Current (FLA)	A	28.13	41.4	55.4	68.2	80.6
E5-04	PM Motor Pole Count	-	6	6	6	6	6
E5-05	PM Motor Resistance (ohms/phase)	Ω	0.198	0.094	0.066	0.051	0.037
E5-06	PM d-axis Inductance (mH/phase)	mH	4.15	3.40	2.45	2.18	1.71
E5-07	PM q-axis Inductance (mH/phase)	mH	5.91	3.91	3.11	2.55	2.05
E5-09	PM Back-EMF V _{peak} (mV/(rad/s))	mVs/rad	258.2	239.3	248.1	253.6	250.0
E5-24	PM Back-EMF L-L V _{rms} (mV/rpm)	mV/min ⁻¹	0.0	0.0	0.0	0.0	0.0
E1-04	Maximum Output Frequency	Hz	87.5	87.5	87.5	87.5	87.5
E1-05	Maximum Output Voltage	V	190.0	190.0	190.0	190.0	190.0
E1-06	Base Frequency	Hz	87.5	87.5	87.5	87.5	87.5
E1-09	Minimum Output Frequency	Hz	4.4	4.4	4.4	4.4	4.4
L3-24 */	Motor Accel Time @ Rated Torque	s	0.077	0.084	0.102	0.101	0.098
n5-02	Motor Inertia Acceleration Time	s	0.077	0.084	0.102	0.101	0.098
n8-49	Heavy Load Id Current	%	-18.5	-10.9	-16.5	-11.3	-12.8

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

Table 3.11 SSR1 Series Motor Code Setting for Specification of 400 V at 1750 min⁻¹ (r/min)

No.	Name	Unit	Motor Code (setting value of E5-01)					
E5-01	PM Motor Code Selection	-	1232	1233	1235	1236	1238	123A
	Voltage Class	V	400	400	400	400	400	400
	Capacity	kW	0.4	0.75	1.5	2.2	3.7	5.5
	Motor Rotation Speed	min ⁻¹	1750	1750	1750	1750	1750	1750
E5-02	PM Motor Rated Power	kW	0.4	0.75	1.5	2.2	3.7	5.5
E5-03	PM Motor Rated Current (FLA)	A	0.89	1.56	2.81	4.27	7.08	10.31
E5-04	PM Motor Pole Count	-	6	6	6	6	6	6
E5-05	PM Motor Resistance (ohms/phase)	Ω	25.370	9.136	6.010	3.297	1.798	0.982
E5-06	PM d-axis Inductance (mH/phase)	mH	169.00	92.08	67.71	34.40	32.93	22.7
E5-07	PM q-axis Inductance (mH/phase)	mH	197.50	119.56	81.71	54.00	37.70	26.80
E5-09	PM Back-EMF V _{peak} (mV/(rad/s))	mVs/rad	392.6	440.6	478.3	466.3	478.8	478.1
E5-24	PM Back-EMF L-L V _{rms} (mV/rpm)	mV/min ⁻¹	0.0	0.0	0.0	0.0	0.0	0.0
E1-04	Maximum Output Frequency	Hz	87.5	87.5	87.5	87.5	87.5	87.5
E1-05	Maximum Output Voltage	V	380.0	380.0	380.0	380.0	380.0	380.0
E1-06	Base Frequency	Hz	87.5	87.5	87.5	87.5	87.5	87.5
E1-09	Minimum Output Frequency	Hz	4.4	4.4	4.4	4.4	4.4	4.4

No.	Name	Unit	Motor Code (setting value of E5-01)					
L3-24 */	Motor Accel Time @ Rated Torque	s	0.092	0.076	0.051	0.066	0.075	0.083
n5-02	Motor Inertia Acceleration Time	s	0.092	0.076	0.051	0.066	0.075	0.083
n8-49	Heavy Load Id Current	%	-8.6	-11.5	-10.3	-19.8	-8.5	-11.0

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

Table 3.12 SSR1 Series Motor Code Setting for Specification of 400 V at 1750 min⁻¹ (r/min)

No.	Name	Unit	Motor Code (setting value of E5-01)					
E5-01	PM Motor Code Selection	-	123B	123D	123E	123F	1240	1242
	Voltage Class	V	400	400	400	400	400	400
	Capacity	kW	7.5	11	15	18.5	22	30
	Motor Rotation Speed	min ⁻¹	1750	1750	1750	1750	1750	1750
E5-02	PM Motor Rated Power	kW	7.5	11.0	15	18.50	22.00	30.00
E5-03	PM Motor Rated Current (FLA)	A	13.65	20.7	27.5	33.4	39.8	52.0
E5-04	PM Motor Pole Count	-	6	6	6	6	6	6
E5-05	PM Motor Resistance (ohms/phase)	Ω	0.786	0.349	0.272	0.207	0.148	0.235
E5-06	PM d-axis Inductance (mH/phase)	mH	16.49	13.17	10.30	8.72	6.81	5.4
E5-07	PM q-axis Inductance (mH/phase)	mH	23.46	15.60	12.77	11.22	8.47	7.26
E5-09	PM Back-EMF V _{peak} (mV/(rad/s))	mVs/rad	520.0	481.5	498.8	509.5	503.9	561.7
E5-24	PM Back-EMF L-L V _{rms} (mV/rpm)	mV/min ⁻¹	0.0	0.0	0.0	0.0	0.0	0.0
E1-04	Maximum Output Frequency	Hz	87.5	87.5	87.5	87.5	87.5	87.5
E1-05	Maximum Output Voltage	V	380.0	380.0	380.0	380.0	380.0	380.0
E1-06	Base Frequency	Hz	87.5	87.5	87.5	87.5	87.5	87.5
E1-09	Minimum Output Frequency	Hz	4.4	4.4	4.4	4.4	4.4	4.4
L3-24 */	Motor Accel Time @ Rated Torque	s	0.077	0.084	0.102	0.101	0.098	0.130
n5-02	Motor Inertia Acceleration Time	s	0.077	0.084	0.102	0.101	0.098	0.130
n8-49	Heavy Load Id Current	%	-18.6	-12.5	-15.5	-17.9	-15.1	-16.8

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

Table 3.13 SSR1 Series Motor Code Setting for Specification of 200 V at 1450 min⁻¹ (r/min)

No.	Name	Unit	Motor Code (setting value of E5-01)					
E5-01	PM Motor Code Selection	-	1302	1303	1305	1306	1308	130A
	Voltage Class	V	200	200	200	200	200	200
	Capacity	kW	0.4	0.75	1.5	2.2	3.7	5.5
	Motor Rotation Speed	min ⁻¹	1450	1450	1450	1450	1450	1450
E5-02	PM Motor Rated Power	kW	0.4	0.75	1.5	2.2	3.7	5.5
E5-03	PM Motor Rated Current (FLA)	A	1.88	3.13	5.63	8.33	14.17	20.63
E5-04	PM Motor Pole Count	-	6	6	6	6	6	6
E5-05	PM Motor Resistance (ohms/phase)	Ω	3.190	1.940	1.206	0.665	0.341	0.252
E5-06	PM d-axis Inductance (mH/phase)	mH	32.15	26.12	14.72	12.27	8.27	6.49

3.23 Parameters Changed by PM Motor Code Selection

No.	Name	Unit	Motor Code (setting value of E5-01)					
E5-07	PM q-axis Inductance (mH/phase)	mH	41.74	34.30	20.15	14.77	9.81	7.74
E5-09	PM Back-EMF Vpeak (mV/(rad/s))	mVs/rad	264.3	269.6	284.3	287.1	284.5	298.0
E5-24	PM Back-EMF L-L Vrms (mV/rpm)	mV/min ⁻¹	0.0	0.0	0.0	0.0	0.0	0.0
E1-04	Maximum Output Frequency	Hz	72.5	72.5	72.5	72.5	72.5	72.5
E1-05	Maximum Output Voltage	V	190.0	190.0	190.0	190.0	190.0	190.0
E1-06	Base Frequency	Hz	72.5	72.5	72.5	72.5	72.5	72.5
E1-09	Minimum Output Frequency	Hz	3.6	3.6	3.6	3.6	3.6	3.6
L3-24 */	Motor Accel Time @ Rated Torque	s	0.098	0.071	0.066	0.087	0.085	0.072
n5-02	Motor Inertia Acceleration Time	s	0.098	0.071	0.066	0.087	0.085	0.072
n8-49	Heavy Load Id Current	%	-6.6	-10.9	-13.5	-9.0	-9.5	-10.1

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

Table 3.14 SSR1 Series Motor Code Setting for Specification of 200 V at 1450 min⁻¹ (r/min)

No.	Name	Unit	Motor Code (setting value of E5-01)				
E5-01	PM Motor Code Selection	-	130B	130D	130E	130F	1310
	Voltage Class	V	200	200	200	200	200
	Capacity	kW	7.5	11	15	18.5	22
	Motor Rotation Speed	min ⁻¹	1450	1450	1450	1450	1450
E5-02	PM Motor Rated Power	kW	7.5	11.0	15.00	18.50	22.00
E5-03	PM Motor Rated Current (FLA)	A	27.71	39.6	55.5	65.6	75.1
E5-04	PM Motor Pole Count	-	6	6	6	6	6
E5-05	PM Motor Resistance (ohms/phase)	Ω	0.184	0.099	0.075	0.057	0.041
E5-06	PM d-axis Inductance (mH/phase)	mH	6.91	4.07	3.29	2.53	1.98
E5-07	PM q-axis Inductance (mH/phase)	mH	7.66	4.65	3.84	3.01	2.60
E5-09	PM Back-EMF Vpeak (mV/(rad/s))	mVs/rad	335.0	303.9	311.2	300.9	327.7
E5-24	PM Back-EMF L-L Vrms (mV/rpm)	mV/min ⁻¹	0.0	0.0	0.0	0.0	0.0
E1-04	Maximum Output Frequency	Hz	72.5	72.5	72.5	72.5	72.5
E1-05	Maximum Output Voltage	V	190.0	190.0	190.0	190.0	190.0
E1-06	Base Frequency	Hz	72.5	72.5	72.5	72.5	72.5
E1-09	Minimum Output Frequency	Hz	3.6	3.6	3.6	3.6	3.6
L3-24 */	Motor Accel Time @ Rated Torque	s	0.084	0.096	0.085	0.080	0.122
n5-02	Motor Inertia Acceleration Time	s	0.084	0.096	0.085	0.080	0.122
n8-49	Heavy Load Id Current	%	-6.0	-9.3	-10.7	-13.2	-15.7

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

Table 3.15 SSR1 Series Motor Code Setting for Specification of 400 V at 1450 min⁻¹ (r/min)

No.	Name	Unit	Motor Code (setting value of E5-01)					
E5-01	PM Motor Code Selection	-	1332	1333	1335	1336	1338	133A
	Voltage Class	V	400	400	400	400	400	400
	Capacity	kW	0.4	0.75	1.5	2.2	3.7	5.5
	Motor Rotation Speed	min ⁻¹	1450	1450	1450	1450	1450	1450
E5-02	PM Motor Rated Power	kW	0.4	0.75	1.5	2.2	3.7	5.5
E5-03	PM Motor Rated Current (FLA)	A	0.94	1.56	2.81	4.27	6.98	10.21
E5-04	PM Motor Pole Count	-	6	6	6	6	6	6
E5-05	PM Motor Resistance (ohms/phase)	Ω	12.760	7.421	4.825	2.656	1.353	0.999
E5-06	PM d-axis Inductance (mH/phase)	mH	128.60	85.11	58.87	46.42	31.73	26.20
E5-07	PM q-axis Inductance (mH/phase)	mH	166.96	113.19	80.59	60.32	40.45	30.94
E5-09	PM Back-EMF V _{peak} (mV/(rad/s))	mVs/rad	528.6	544.2	568.5	572.8	562.9	587.6
E5-24	PM Back-EMF L-L V _{rms} (mV/rpm)	mV/min ⁻¹	0.0	0.0	0.0	0.0	0.0	0.0
E1-04	Maximum Output Frequency	Hz	72.5	72.5	72.5	72.5	72.5	72.5
E1-05	Maximum Output Voltage	V	380.0	380.0	380.0	380.0	380.0	380.0
E1-06	Base Frequency	Hz	72.5	72.5	72.5	72.5	72.5	72.5
E1-09	Minimum Output Frequency	Hz	3.6	3.6	3.6	3.6	3.6	3.6
L3-24 *1	Motor Accel Time @ Rated Torque	s	0.098	0.071	0.066	0.087	0.085	0.072
n5-02	Motor Inertia Acceleration Time	s	0.098	0.071	0.066	0.087	0.085	0.072
n8-49	Heavy Load Id Current	%	-6.6	-9.2	-13.5	-12.1	-13.7	-10.1

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

Table 3.16 SSR1 Series Motor Code Setting for Specification of 400 V at 1450 min⁻¹ (r/min)

No.	Name	Unit	Motor Code (setting value of E5-01)					
E5-01	PM Motor Code Selection	-	133B	133D	133E	133F	1340	1342
	Voltage Class	V	400	400	400	400	400	400
	Capacity	kW	7.5	11	15	18.5	22	30
	Motor Rotation Speed	min ⁻¹	1450	1450	1450	1450	1450	1450
E5-02	PM Motor Rated Power	kW	7.5	11.0	15	18.50	22.00	30.00
E5-03	PM Motor Rated Current (FLA)	A	13.85	19.5	27.4	32.9	37.6	52.5
E5-04	PM Motor Pole Count	-	6	6	6	6	6	6
E5-05	PM Motor Resistance (ohms/phase)	Ω	0.713	0.393	0.295	0.223	0.164	0.137
E5-06	PM d-axis Inductance (mH/phase)	mH	27.06	15.51	12.65	9.87	7.90	7.01
E5-07	PM q-axis Inductance (mH/phase)	mH	33.45	19.63	15.87	12.40	10.38	8.68
E5-09	PM Back-EMF V _{peak} (mV/(rad/s))	mVs/rad	670.1	612.7	624.6	610.4	655.4	708.4
E5-24	PM Back-EMF L-L V _{rms} (mV/rpm)	mV/min ⁻¹	0.0	0.0	0.0	0.0	0.0	0.0
E1-04	Maximum Output Frequency	Hz	72.5	72.5	72.5	72.5	72.5	72.5
E1-05	Maximum Output Voltage	V	380.0	380.0	380.0	380.0	380.0	380.0

3.23 Parameters Changed by PM Motor Code Selection

No.	Name	Unit			Motor Code (setting value of E5-01)			
E1-06	Base Frequency	Hz	72.5	72.5	72.5	72.5	72.5	72.5
E1-09	Minimum Output Frequency	Hz	3.6	3.6	3.6	3.6	3.6	3.6
L3-24 */	Motor Accel Time @ Rated Torque	s	0.084	0.096	0.085	0.080	0.122	0.108
n5-02	Motor Inertia Acceleration Time	s	0.084	0.096	0.085	0.080	0.122	0.108
n8-49	Heavy Load Id Current	%	-12.2	-15.5	-15.1	-16.0	-15.7	-11.5

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

Table 3.17 SSR1 Series Motor Code Setting for Specification of 200 V at 1150 min⁻¹ (r/min)

No.	Name	Unit	Motor Code (setting value of E5-01)					
E5-01	PM Motor Code Selection	-	1402	1403	1405	1406	1408	140A
	Voltage Class	V	200	200	200	200	200	200
	Capacity	kW	0.4	0.75	1.5	2.2	3.7	5.5
	Motor Rotation Speed	min ⁻¹	1150	1150	1150	1150	1150	1150
E5-02	PM Motor Rated Power	kW	0.4	0.75	1.5	2.2	3.7	5.5
E5-03	PM Motor Rated Current (FLA)	A	1.88	3.02	6.00	8.85	14.27	20.21
E5-04	PM Motor Pole Count	-	6	6	6	6	6	6
E5-05	PM Motor Resistance (ohms/phase)	Ω	4.832	2.704	1.114	0.511	0.412	0.303
E5-06	PM d-axis Inductance (mH/phase)	mH	48.68	32.31	19.22	12.15	7.94	11.13
E5-07	PM q-axis Inductance (mH/phase)	mH	63.21	40.24	24.38	15.35	11.86	14.06
E5-09	PM Back-EMF V _{peak} (mV/(rad/s))	mVs/rad	320.4	327.1	364.4	344.4	357.5	430.8
E5-24	PM Back-EMF L-L V _{rms} (mV/rpm)	mV/min ⁻¹	0.0	0.0	0.0	0.0	0.0	0.0
E1-04	Maximum Output Frequency	Hz	57.5	57.5	57.5	57.5	57.5	57.5
E1-05	Maximum Output Voltage	V	190.0	190.0	190.0	190.0	190.0	190.0
E1-06	Base Frequency	Hz	57.5	57.5	57.5	57.5	57.5	57.5
E1-09	Minimum Output Frequency	Hz	2.9	2.9	2.9	2.9	2.9	2.9
L3-24 */	Motor Accel Time @ Rated Torque	s	0.062	0.044	0.080	0.090	0.067	0.072
n5-02	Motor Inertia Acceleration Time	s	0.062	0.044	0.080	0.090	0.067	0.072
n8-49	Heavy Load Id Current	%	-8.8	-9.9	-9.3	-10.0	-17.7	-12.3

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

Table 3.18 SSR1 Series Motor Code Setting for Specification of 200 V at 1150 min⁻¹ (r/min)

No.	Name	Unit			Motor Code (setting value of E5-01)		
E5-01	PM Motor Code Selection	-	140B	140D	140E	140F	1410
	Voltage Class	V	200	200	200	200	200
	Capacity	kW	7.5	11	15	18.5	22
	Motor Rotation Speed	min ⁻¹	1150	1150	1150	1150	1150
E5-02	PM Motor Rated Power	kW	7.5	11.0	15	18.50	22.00
E5-03	PM Motor Rated Current (FLA)	A	26.67	39.9	55.6	63.5	74.4
E5-04	PM Motor Pole Count	-	6	6	6	6	6
E5-05	PM Motor Resistance (ohms/phase)	Ω	0.165	0.113	0.084	0.066	0.048

No.	Name	Unit	Motor Code (setting value of E5-01)				
E5-06	PM d-axis Inductance (mH/phase)	mH	6.59	4.96	3.83	3.33	2.38
E5-07	PM q-axis Inductance (mH/phase)	mH	8.55	6.12	4.65	4.50	3.15
E5-09	PM Back-EMF Vpeak (mV/(rad/s))	mVs/rad	391.5	384.4	372.1	421.3	410.9
E5-24	PM Back-EMF L-L Vrms (mV/rpm)	mV/min ⁻¹	0.0	0.0	0.0	0.0	0.0
E1-04	Maximum Output Frequency	Hz	57.5	57.5	57.5	57.5	57.5
E1-05	Maximum Output Voltage	V	190.0	190.0	190.0	190.0	190.0
E1-06	Base Frequency	Hz	57.5	57.5	57.5	57.5	57.5
E1-09	Minimum Output Frequency	Hz	2.9	2.9	2.9	2.9	2.9
L3-24 */	Motor Accel Time @ Rated Torque	s	0.088	0.073	0.062	0.091	0.092
n5-02	Motor Inertia Acceleration Time	s	0.088	0.073	0.062	0.091	0.092
n8-49	Heavy Load Id Current	%	-15.3	-13.9	-14.4	-17.9	-15.9

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

Table 3.19 SSR1 Series Motor Code Setting for Specification of 400 V at 1150 min⁻¹ (r/min)

No.	Name	Unit	Motor Code (setting value of E5-01)					
E5-01	PM Motor Code Selection	-	1432	1433	1435	1436	1438	143A
	Voltage Class	V	400	400	400	400	400	400
	Capacity	kW	0.4	0.75	1.5	2.2	3.7	5.5
	Motor Rotation Speed	min ⁻¹	1150	1150	1150	1150	1150	1150
E5-02	PM Motor Rated Power	kW	0.4	0.75	1.5	2.2	3.7	5.5
E5-03	PM Motor Rated Current (FLA)	A	0.94	1.51	3.00	4.43	7.08	10.10
E5-04	PM Motor Pole Count	-	6	6	6	6	6	6
E5-05	PM Motor Resistance (ohms/phase)	Ω	19.320	10.800	4.456	2.044	1.483	1.215
E5-06	PM d-axis Inductance (mH/phase)	mH	194.70	129.20	76.88	48.60	37.58	44.54
E5-07	PM q-axis Inductance (mH/phase)	mH	252.84	160.90	97.52	61.40	47.65	56.26
E5-09	PM Back-EMF Vpeak (mV/(rad/s))	mVs/rad	640.9	654.1	728.8	688.9	702.0	861.5
E5-24	PM Back-EMF L-L Vrms (mV/rpm)	mV/min ⁻¹	0.0	0.0	0.0	0.0	0.0	0.0
E1-04	Maximum Output Frequency	Hz	57.5	57.5	57.5	57.5	57.5	57.5
E1-05	Maximum Output Voltage	V	380.0	380.0	380.0	380.0	380.0	380.0
E1-06	Base Frequency	Hz	57.5	57.5	57.5	57.5	57.5	57.5
E1-09	Minimum Output Frequency	Hz	2.9	2.9	2.9	2.9	2.9	2.9
L3-24 */	Motor Accel Time @ Rated Torque	s	0.062	0.044	0.080	0.090	0.067	0.072
n5-02	Motor Inertia Acceleration Time	s	0.062	0.044	0.080	0.090	0.067	0.072
n8-49	Heavy Load Id Current	%	-8.8	-9.9	-9.3	-10.0	-12.8	-12.3

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

3.23 Parameters Changed by PM Motor Code Selection

Table 3.20 SSR1 Series Motor Code Setting for Specification of 400 V at 1150 min⁻¹ (r/min)

No.	Name	Unit			Motor Code (setting value of E5-01)			
E5-01	PM Motor Code Selection	-	143B	143D	143E	143F	1440	1442
	Voltage Class	V	400	400	400	400	400	400
	Capacity	kW	7.5	11	15	18.5	22	30
	Motor Rotation Speed	min ⁻¹	1150	1150	1150	1150	1150	1150
E5-02	PM Motor Rated Power	kW	7.5	11.0	15	18.50	22.00	30.00
E5-03	PM Motor Rated Current (FLA)	A	13.33	19.9	27.8	31.8	37.2	52.1
E5-04	PM Motor Pole Count	-	6	6	6	6	6	6
E5-05	PM Motor Resistance (ohms/phase)	Ω	0.660	0.443	0.331	0.264	0.192	0.140
E5-06	PM d-axis Inductance (mH/phase)	mH	26.36	19.10	15.09	13.32	9.52	8.16
E5-07	PM q-axis Inductance (mH/phase)	mH	34.20	24.67	18.56	18.00	12.60	11.40
E5-09	PM Back-EMF V _{peak} (mV/(rad/s))	mVs/rad	783.0	762.2	749.6	842.7	821.8	872.3
E5-24	PM Back-EMF L-L V _{rms} (mV/rpm)	mV/min ⁻¹	0.0	0.0	0.0	0.0	0.0	0.0
E1-04	Maximum Output Frequency	Hz	57.5	57.5	57.5	57.5	57.5	57.5
E1-05	Maximum Output Voltage	V	380.0	380.0	380.0	380.0	380.0	380.0
E1-06	Base Frequency	Hz	57.5	57.5	57.5	57.5	57.5	57.5
E1-09	Minimum Output Frequency	Hz	2.9	2.9	2.9	2.9	2.9	2.9
L3-24 */	Motor Accel Time @ Rated Torque	s	0.088	0.073	0.062	0.091	0.092	0.125
n5-02	Motor Inertia Acceleration Time	s	0.088	0.073	0.062	0.091	0.092	0.125
n8-49	Heavy Load Id Current	%	-15.3	-16.7	-14.9	-17.9	-15.9	-17.7

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

Mechanical Installation

This chapter gives information about the correct environment and clearances to install the drive.

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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 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.

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

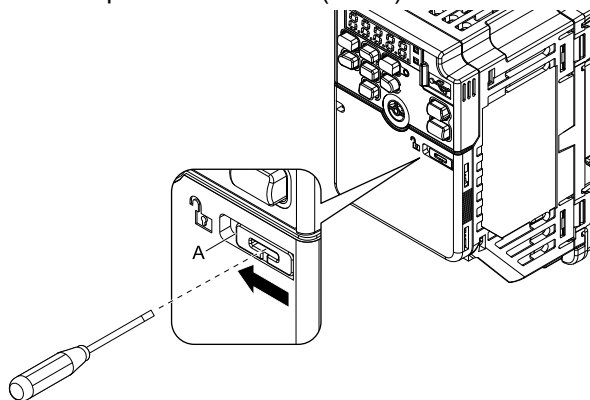
⚠ DANGER Electrical Shock Hazard

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, measure 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. Use a slotted screwdriver to unlock the front cover of the drive.
Use a slotted screwdriver with a tip width of 2.5 mm (0.1 in) or less and a thickness of 0.4 mm (0.02 in) or less.



A - Front cover lock

Figure 4.1 Unlocking

2. Pull down, then pull away from the drive to remove the front cover.

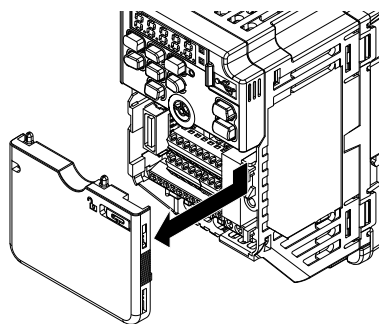


Figure 4.2 Remove the Front Cover

◆ Reattach the Front Cover

1. Reverse the steps to reattach the 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.

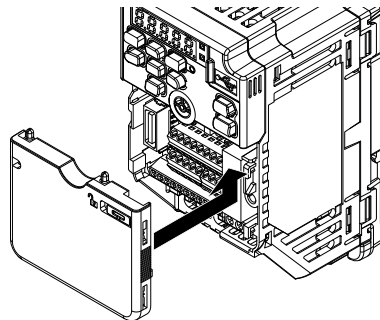
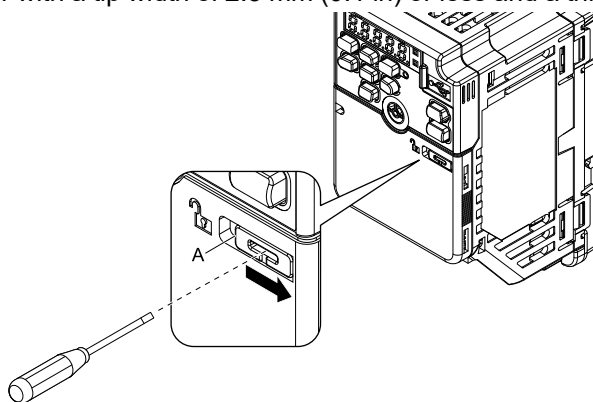


Figure 4.3 Reattach the Front Cover

2. Use a slotted screwdriver to lock the front cover of the drive.
Use a slotted screwdriver with a tip width of 2.5 mm (0.1 in) or less and a thickness of 0.4 mm (0.02 in) or less.



A - Front Cover Lock

Figure 4.4 Locking the Front Cover

4.3 Remove and Reattach the Keypad

◆ Remove the Keypad

Remove the front cover.

Push on the tab on the right side of the keypad, then pull the keypad forward to remove it from the drive.

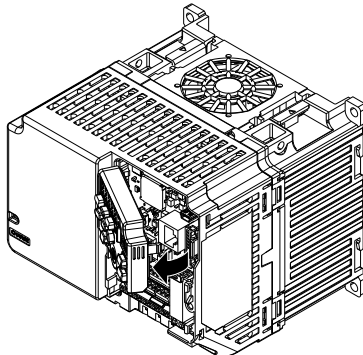


Figure 4.5 Remove the Keypad

◆ Reattach the Keypad

Push in the keypad from the front until the hooks click into place.

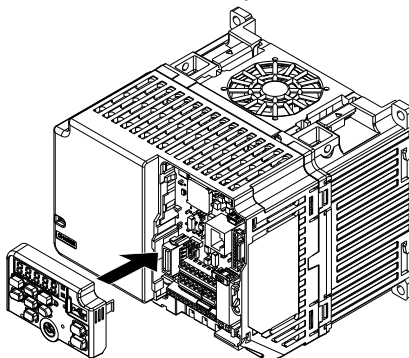


Figure 4.6 Reattach the Keypad

Attach the front cover.

4.4 Install the Keypad in a Control Panel or Another Device

◆ Operate the Keypad Apart from the Drive

You can remove the keypad from the drive and connect it to a remote control extension cable 3 m (9.8 ft) long to make operation easier when you cannot access the drive. You can operate a drive that is in a control panel without opening or closing the control panel door. To order optional accessories, contact Yaskawa or your nearest sales representative.

Name	Option Model	Intended Use
Extension Cable	1 m: UWR0051 3 m: UWR0052	To connect the keypad and drive. This option is an RJ-45, 8-pin straight-through UTP CAT5e cable.
Installation Support Set A	900-192-933-001	To attach the keypad to the control panel. This option uses screws.
Installation Support Set B	900-192-933-002	To attach the keypad to the control panel. This option uses nut clamps. Use this option when weld studs are located in the control panel.
Compact Keypad Panel Mounting Kit	ZPBA-GA500	To attach the HV305 standard keypad to the control panel.

Electrical Installation

This chapter gives how to wire the control circuit terminals, motor, and power supply of the drive.

5.1	Section Safety	232
5.2	Electrical Installation	235
5.3	Main Circuit Wiring	239
5.4	Control Circuit Wiring	242
5.5	Control I/O Connections	248
5.6	Connect the Drive to a PC	252

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, measure 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 BxxxE, 2xxxE, and 4xxxE to comply with the EMC Directive before you turn on the EMC filter or if there is high resistance grounding.

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 EN 61800-5-1:2007 standard specifies that you must wire the power supply to automatically de-energize when the protective ground wire disconnects. If you turn on the internal EMC filter, the leakage current of the drive will be more than 3.5 mA. Use these closed-loop crimp terminals or equivalent to connect a protective ground wire that has a minimum cross-sectional area of 10 mm² (copper wire).

- 8-4NS from JST Mfg. Co., Ltd.
- R8-4S from NICHIFU Co., Ltd.
- P10-8R from PANDUIT Corp.

If you do not obey the standards and regulations, it can cause serious injury or death.

The drive can cause a residual current with a DC component in the protective earthing conductor. 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.

NOTICE

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 differ compared to operating the motor directly from line power. The user should have a full understanding of the load torque characteristics for the application.
- The rated input current of submersible motors is higher than the rated input current of standard motors. Carefully select the correct drive capacity. When the distance between the motor and drive is long, use a wire that can connect the motor to the drive without a reduction in 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, measure 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 [Figure 5.1](#).

⚠ 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 ($A1-06 \neq 0$), 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 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 31,000 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.

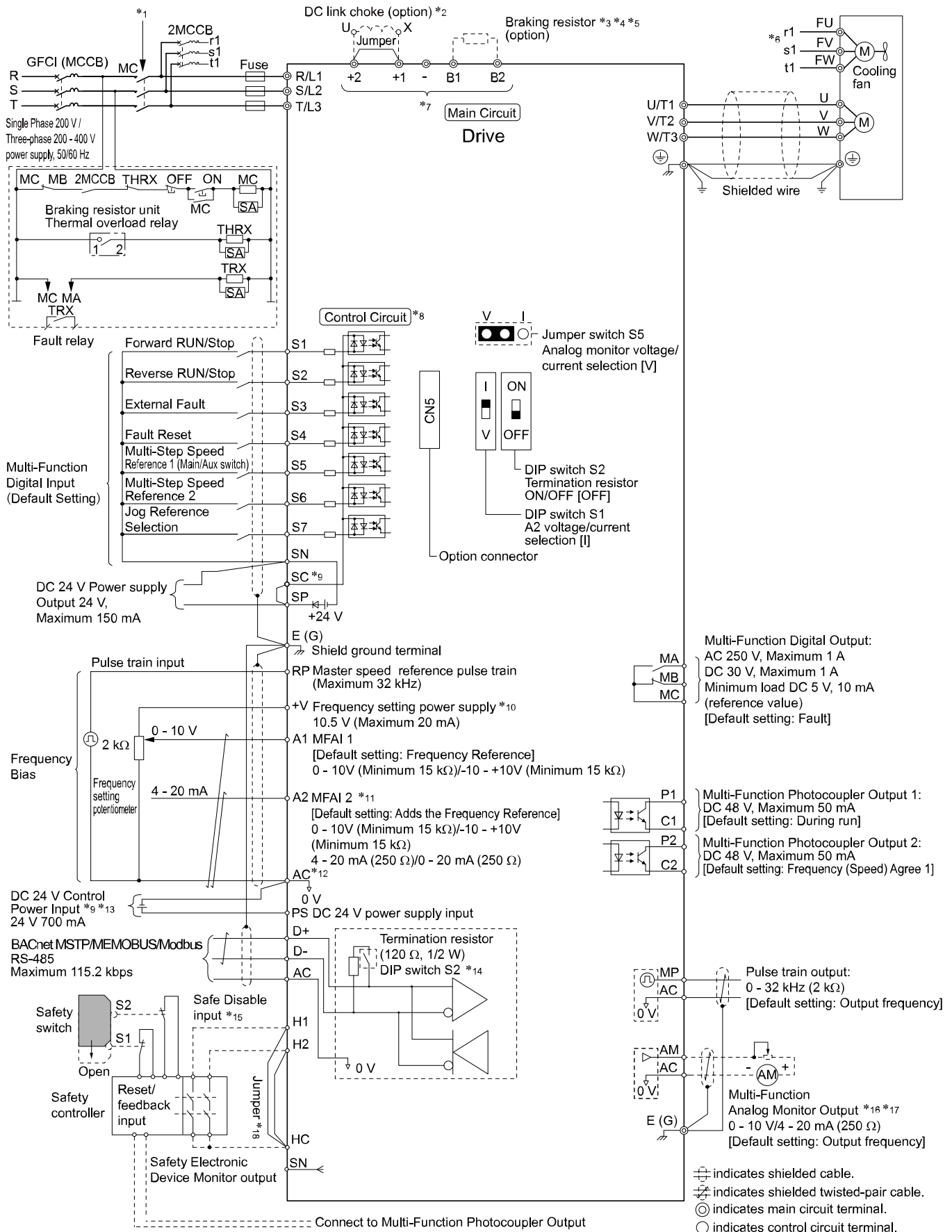


Figure 5.1 Standard Drive Connection Diagram

- *1 Set the wiring sequence to de-energize the drive with the MFDO. 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.
- *3 When you use a regenerative converter or regenerative unit, set *L8-55 = 0* [*Internal DB TransistorProtection = Disable*]. If *L8-55 = 1* [*Protection Enabled*], the drive will detect *rF* [*Braking Resistor Fault*].
- *4 When you use a regenerative converter, regenerative 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.
- *5 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 MFDO.
- *6 Cooling fan wiring is not necessary for self-cooling motors.
- *7 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, and +2. Do not connect an AC power supply lines to these terminals.
Incorrect wiring can cause damage to the drive and serious injury or death from fire.**

- *8 Connect a 24 V power supply to terminals PS-AC to operate the control circuit while the main circuit power supply is OFF.
- *9 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 terminals SC-SP and terminals SC-SN, 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 terminals SC-SP and terminals SC-SN, 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 terminals SC-SP and terminals SC-SN, 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.

- *10 The maximum output current capacity for terminal +V on the control circuit is 20 mA.

NOTICE Damage to Equipment

**Do not install a jumper between terminals +V and AC.
A closed circuit between these terminals will cause damage to the drive.**

- *11 DIP switch S1 sets terminal A2 for voltage or current input. The default setting for S1 is current input ("I" side).
- *12 Do not ground the control circuit terminals AC or connect them to the drive chassis.

NOTICE

**Do not ground the AC control circuit terminals and only connect the AC terminals according to the product instructions.
If you connect the AC terminals incorrectly, it can cause damage to the drive.**

- *13 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.**

- *14 Set DIP switch S2 to "ON" to enable the termination resistor in the last drive in a BACnet MSTP, MEMOBUS/Modbus network.
- *15 Use only Sourcing Mode for Safe Disable input.
- *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 S5 sets terminal AM for voltage or current output. The default setting for S5 is voltage output ("V" side).
- *18 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:

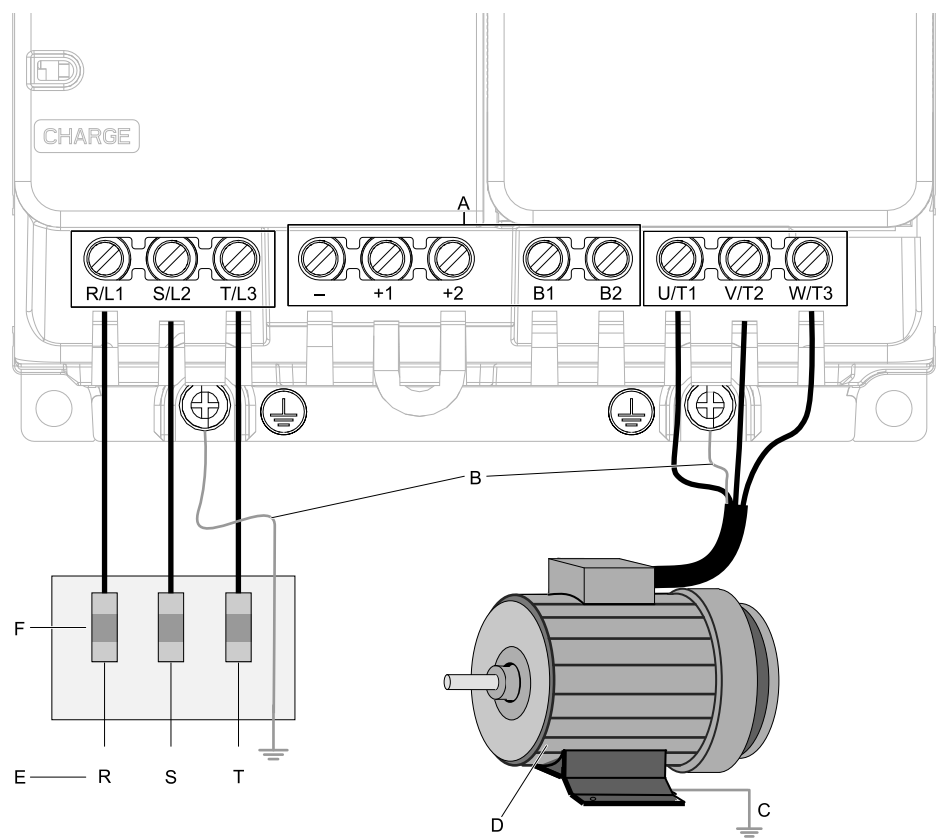
Soldered wire connections can become loose over time and cause unsatisfactory drive performance.

◆ Motor and Main Circuit Connections

⚠ WARNING Electrical Shock Hazard

Do not connect terminals R/L1, S/L2, T/L3, L/L1, N/L2, U/T1, V/T2, W/T3, -, +1, +2, 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 locations of terminals are different for different drive models.

- A - DC bus terminal**

B - Connect to the drive ground terminal.

C - Ground the motor case.
- D - Three-Phase Motor**

E - Use terminals R/L1, S/L2, and T/L3 for three-phase power supply input. Use terminals L/L1 and N/L2 for single-phase power supply input.

F - Input Protection (Fuses or Circuit Breakers)

Figure 5.2 Wiring the Main Circuit and Motor

◆ 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	B001 - B018	2001 - 2082	
		4001 - 4060	
R/L1	-	Main circuit power supply input	To connect a commercial power supply.
S/L2			
T/L3			
L/L1	Main circuit power supply input	-	
N/L2			
U/T1	Drive output	Drive output	To connect a motor.
V/T2			
W/T3			

Terminal	Name			Function
Model	B001 - B018	2001 - 2082		
		4001 - 4060		
-	DC power input	DC power input	-	+1 and +2: To connect a DC link choke. Note: Remove the jumper between terminals +1 and +2 to connect a DC link choke.
+1			DC link choke connection	
+2	-	-		
B1	Braking resistor connection			To connect a braking resistor or braking resistor unit.
B2				
	Ground Wiring			To ground the drive. • 200 V: D class grounding (ground to 100 Ω or less) • 400 V: C class grounding (ground to 10 Ω or less)

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 5.3.

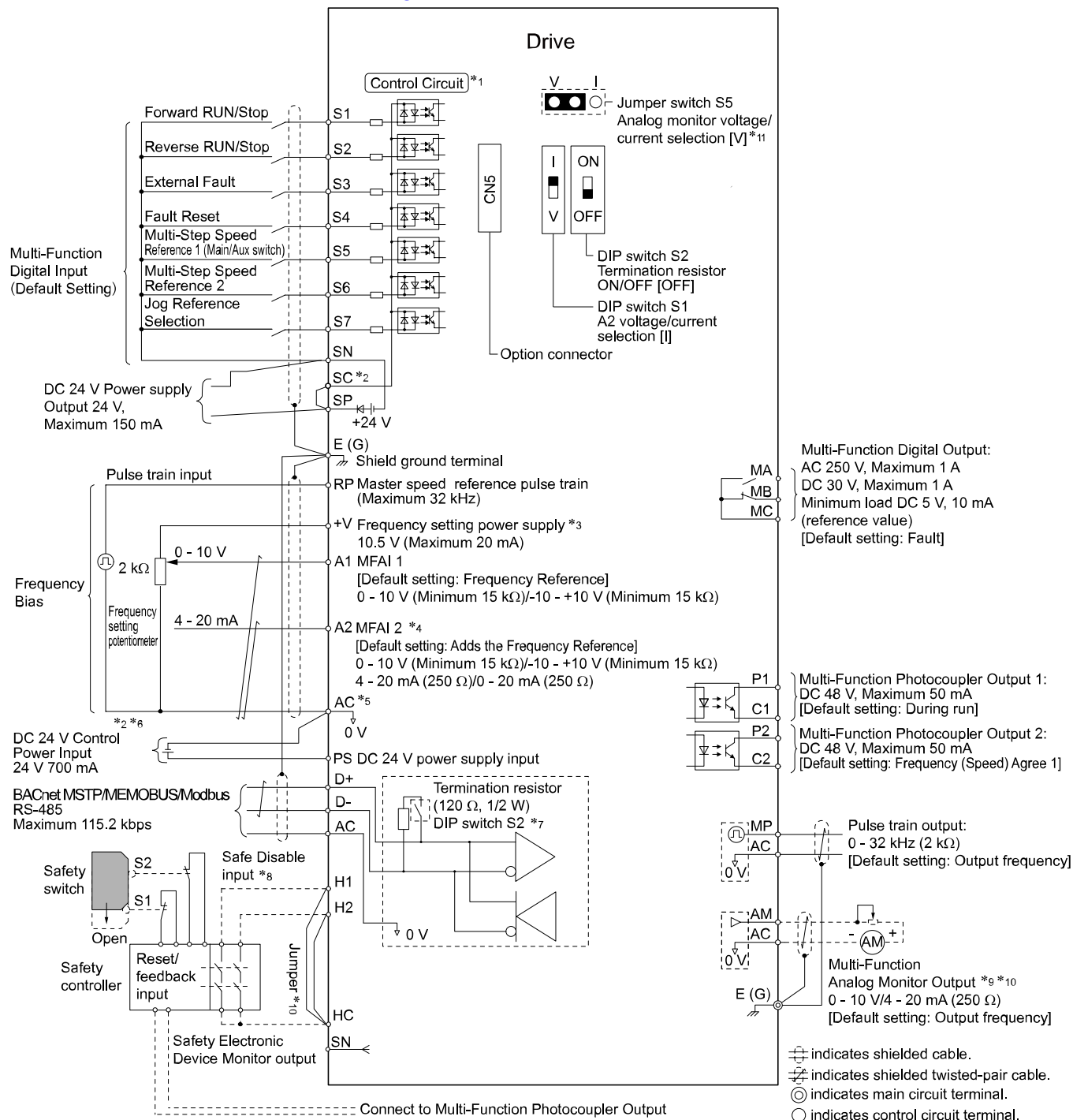


Figure 5.3 Control Circuit Connection Diagram

*1 Connect a 24 V power supply to terminals PS-AC to operate the control circuit while the main circuit power supply is OFF.

- *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 terminals SC-SP and terminals SC-SN, 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 terminals SC-SP and terminals SC-SN, 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 terminals SC-SP and terminals SC-SN, 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 maximum output current capacity for terminal +V on the control circuit is 20 mA.

NOTICE Damage to Equipment

Do not install a jumper between terminals +V and AC.

A closed circuit between these terminals will cause damage to the drive.

- *4 DIP switch S1 sets terminal A2 for voltage or current input. The default setting for S1 is current input ("I" side).

- *5 Do not ground the control circuit terminals AC or connect them to the drive chassis.

NOTICE

Do not ground the AC control circuit terminals and only connect the AC terminals according to 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. Failure to obey 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 BACnet MSTP, 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.

- *11 Jumper S5 sets terminal AM for voltage or current output. The default setting for S5 is voltage output ("V" side).

◆ 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 ($A1-06 \neq 0$), 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 5.2](#) for a list of input terminals and functions.

Table 5.2 Multi-function Input Terminals

Type	Terminal	Name (Default)	Function (Signal Level)
Digital Inputs	S1	MFDI selection 1 (ON: Forward run, OFF: Stop)	- Photocoupler 24 V, 6 mA Note: 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. - 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 terminals SC-SP and terminals SC-SN, 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 terminals SC-SP and terminals SC-SN, 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.
	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)	
	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 terminals SC-SP and terminals SC-SN, 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. 24 V, 6 mA - ON: Normal operation - OFF: Coasting motor - Internal impedance 4.7 kΩ - OFF Minimum OFF time of 3 ms.
	H2	Safe Disable input 2	
	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)	- Response frequency: 0 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)
	A1	MFAI1 (Master frequency reference)	Voltage input Use H3-01 [Terminal A1 Signal Level Select] to select the signal level. 0 V to 10 V/100% (input impedance: minimum 15 kΩ) -10 V to +10 V/-100% to +100% (input impedance: minimum 15 kΩ)
	A2	MFAI2 (Combined to terminal A1)	Voltage input or current input Use DIP switch S1 and H3-09 [Terminal A2 Signal Level Select] to select the input. 0 V to 10 V/100% (input impedance: minimum 15 kΩ) -10 V to +10 V/-100% to +100% (input impedance: minimum 15 kΩ) 4 mA to 20 mA/100%, 0 mA to 20 mA/100% (input impedance: 250 Ω)
	AC	Frequency reference common	0 V
	E (G)	Connecting shielded cable	-

Output Terminals

Refer to [Table 5.3](#) and [Table 5.4](#) for a list of Output terminals and functions.

Table 5.3 Control Circuit Output Terminals

Type	Terminal	Name (Default)	Function (Signal Level)
Digital Outputs	MA	N.O. output (Fault)	- 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	
Multi-function Photocoupler Outputs	P1	Multi-function photocoupler output 1 (During RUN)	- Photocoupler output 48 V, 2 mA to 50 mA
	C1		
	P2	Multi-function photocoupler output 2 (Speed agree 1)	
	C2		

Table 5.4 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 248) for more information.
	AM	Analog monitor output (Output frequency)	Select voltage or current output. 0 V to 10 V/0% to 100% 4 mA to 20 mA (Receiver recommended impedance: 250 Ω) Note: Use jumper S5 and H4-07 [Terminal AM Signal Level Select] to set the signal type.
	AC	Monitor common	0 V

External Power Supply Input Terminals

Refer to [Table 5.5](#) for a list of the functions of the external power supply input terminals.

Table 5.5 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 5.6](#) 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.

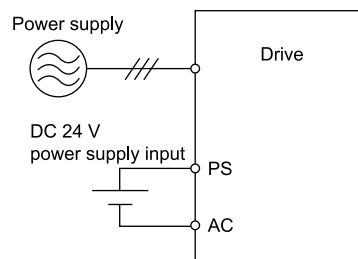


Table 5.6 Power Supply and Alarm Display

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]

Serial Communication Terminals

Refer to [Table 5.7](#) for a list of serial communication terminals and functions.

Table 5.7 Serial Communication Terminals

Type	Terminal	Terminal Name	Function (Signal Level)	
MEMOBUS/Modbus/BACnet Communication	D+	Communication input/output (+)	MEMOBUS/Modbus/BACnet 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/BACnet network.	• RS-485 • MEMOBUS/Modbus/BACnet communication protocol • Maximum 115.2 kbps
	D-	Communication output (-)		
	AC	Shield ground	0 V	

Control Circuit Terminal Configuration

The control circuit terminals are in the positions shown in [Figure 5.4](#).

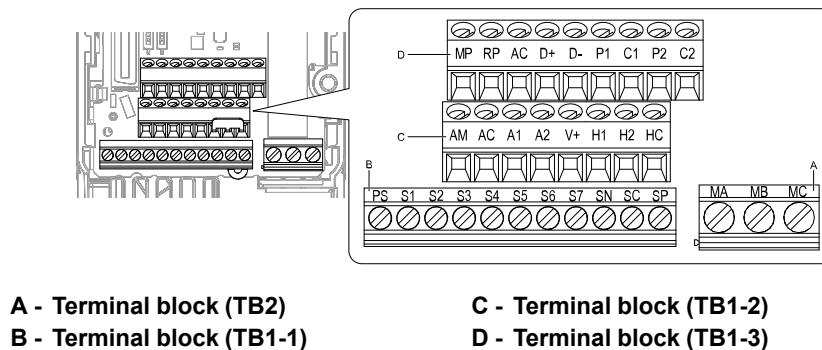


Figure 5.4 Control Circuit Terminal Arrangement

Switches and Jumpers on the Terminal Board

The terminal board has switches to adapt the drive I/Os to the external control signals as shown in [Figure 5.5](#). Set the switches to select the functions for each terminal.

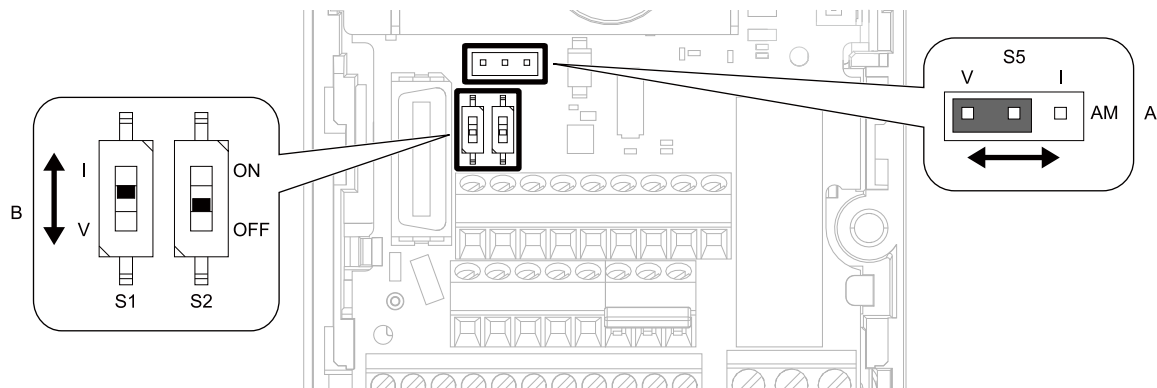


Figure 5.5 Locations of Switches

Table 5.8 I/O Terminals and Switches Functions

Position	Switch	Terminal	Function	Default
A	Jumper switch S5	AM	Sets the output method for terminal AM (voltage or current).	V (voltage output)
B	DIP switch S1	A2	Sets the input method for terminal A2 (voltage or current).	I (current input)
	DIP switch S2	-	Enables and disables the MEMOBUS/Modbus communications termination resistor.	OFF

5.5 Control I/O Connections

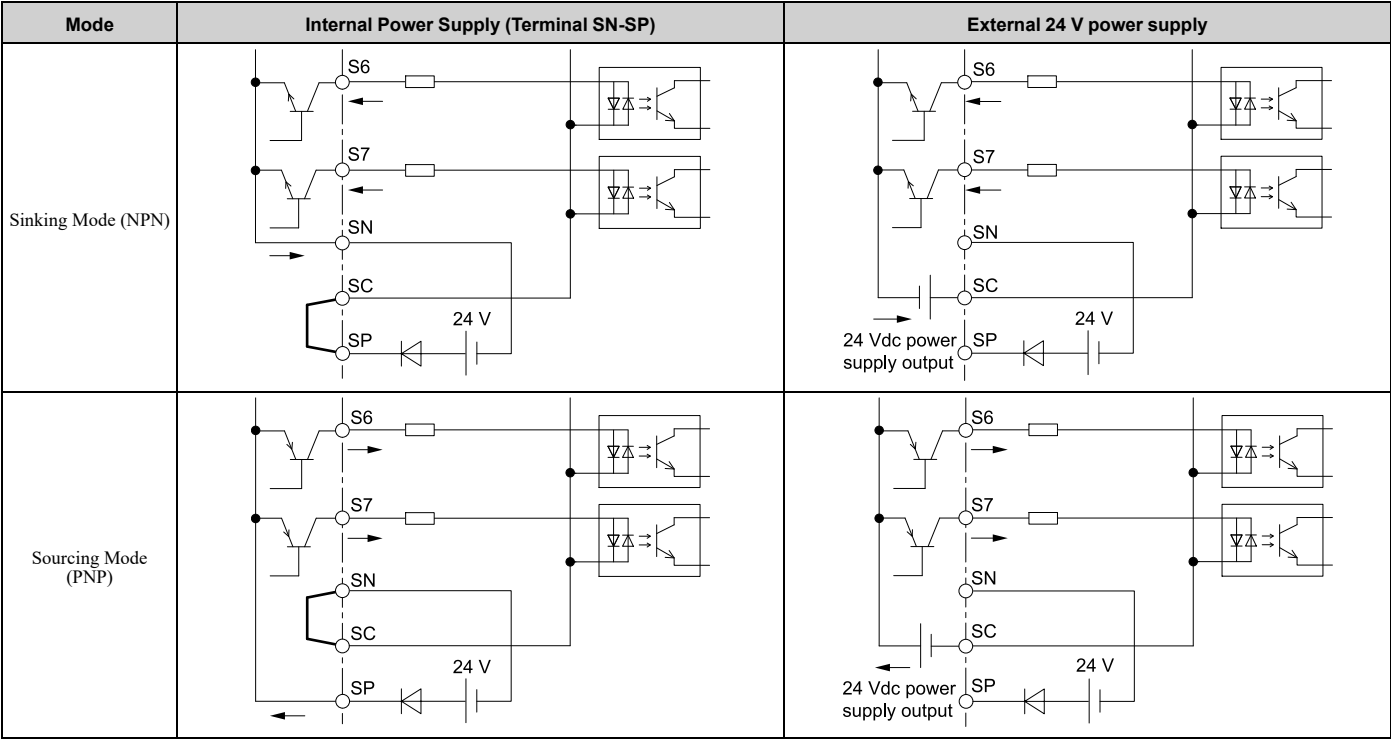
This section gives information about the settings for the listed control circuit I/O signals.

- MFDI (terminals S1 to S7)
- Pulse train output (terminal MP)
- MFAI (terminal A2)
- MFAO (terminal AM)
- MEMOBUS/Modbus/BACnet 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 terminals SC-SP and terminals SC-SN, it will cause damage to the drive.



◆ Pulse Train Output

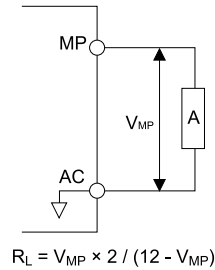
You can use pulse train monitor output terminal MP for sourcing mode or for sinking mode.

- Use for sourcing mode
The load impedance changes the voltage level of the pulse train output signal.

Load Impedance RL(kΩ)	Output Voltage VMP(V)
1.5 kΩ or more	5 V or more
4.0 kΩ or more	8 V or more
10 kΩ or more	10 V or more

Note:

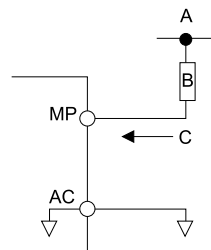
Use the formula in [Figure 5.6](#) to calculate the necessary load resistance (kΩ) to increase output voltage $V_{MP}(V)$.

**A - Load Impedance****Figure 5.6 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 5.7 Wiring to Use Pulse Train Output in Sinking Mode

◆ Set the Input Signal for the MFAI Terminal A2

Use terminal A2 to input a voltage or a current signal. Set the signal type as shown in [Table 5.9](#).

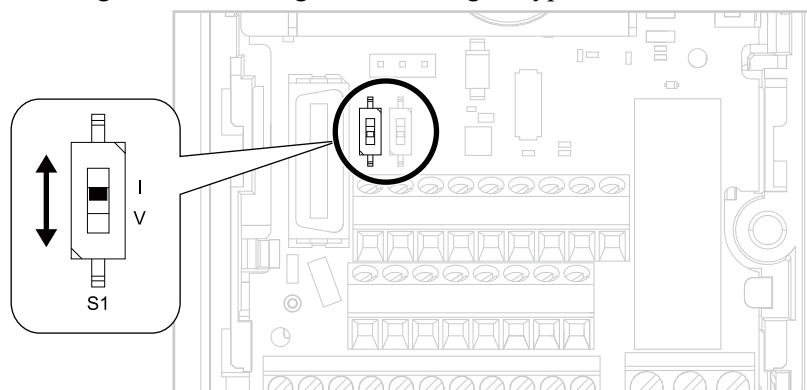
**Figure 5.8 Location of DIP Switch S1**

Table 5.9 MFAI Terminal A2 Signal Settings

Terminal	Input Signal	DIP Switch Settings		Parameter	
		Switch	Setting	No.	Signal Level
A2	Current input	S1	I (Default)	H3-09	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)
	Voltage input		V		0: 0 V to 10 V/0% to 100% (with zero limit) (input impedance: minimum 15 kΩ) 4: -10 V to +10 V/-100% to 100% (input impedance: minimum 15 kΩ)

Note:
Use tweezers or a jig with a tip width of approximately 0.8 mm (0.03 in) to set DIP switches.

◆ Set the Output Signal for the MFAO Terminal AM

Set the signal type for terminal AM to voltage or current output. Use jumper S5 and H4-07 [Terminal AM Signal Level Select] to set the signal type.

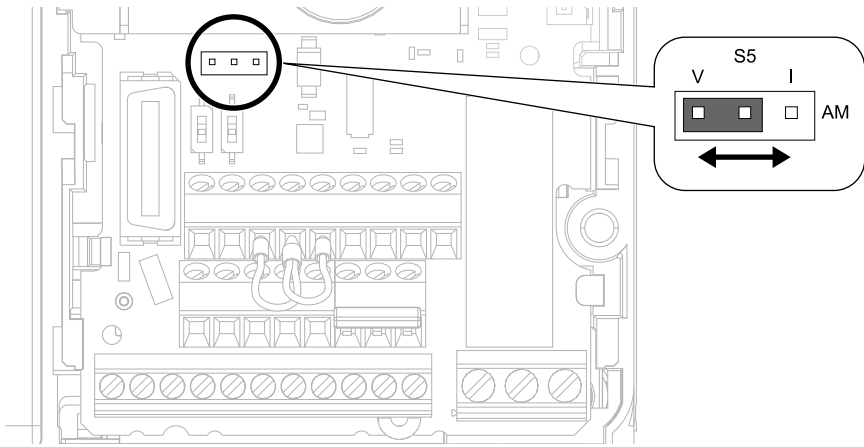
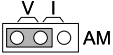
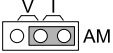


Figure 5.9 Location of Jumper Switch S5

Terminal	Types of Output Signals	Jumper S5	Parameter	
			No.	Signal Level
AM	Voltage output (Default)	 AM	H4-07	0: 0 V to 10 V
	Current output	 AM		2: 4 mA to 20 mA

◆ Switch ON Termination Resistor for MEMOBUS/Modbus/BACnet Communications

When the drive is the last slave in a MEMOBUS/Modbus/BACnet communications, set DIP switch S2 to the ON position. This drive has a built-in termination resistor for the RS-485 interface.

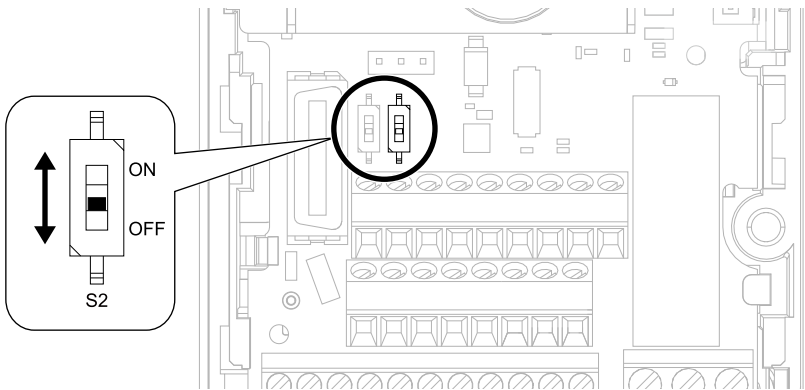


Figure 5.10 Location of DIP Switch S2

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 HVAC software to monitor drive performance and manage parameter settings.

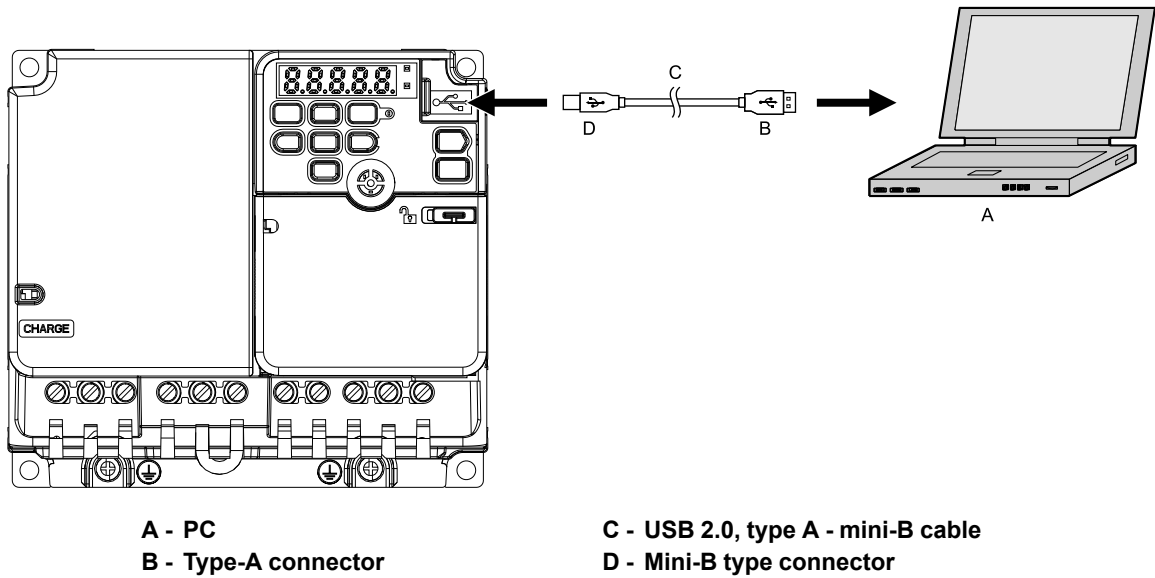


Figure 5.11 Connect to a PC (USB)

Yaskawa recommends that you use a USB cable with connectors connected with shielded wires.

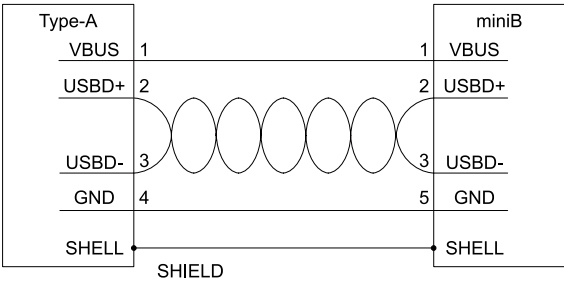


Figure 5.12 Recommended USB Cable

Startup Procedure and Test Run

6.1	Section Safety	254
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6.4	Programming Mode	260
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6.10	Auto-Tuning	270

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, measure 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.

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.

6.2 Overview of Keypad Components and Functions

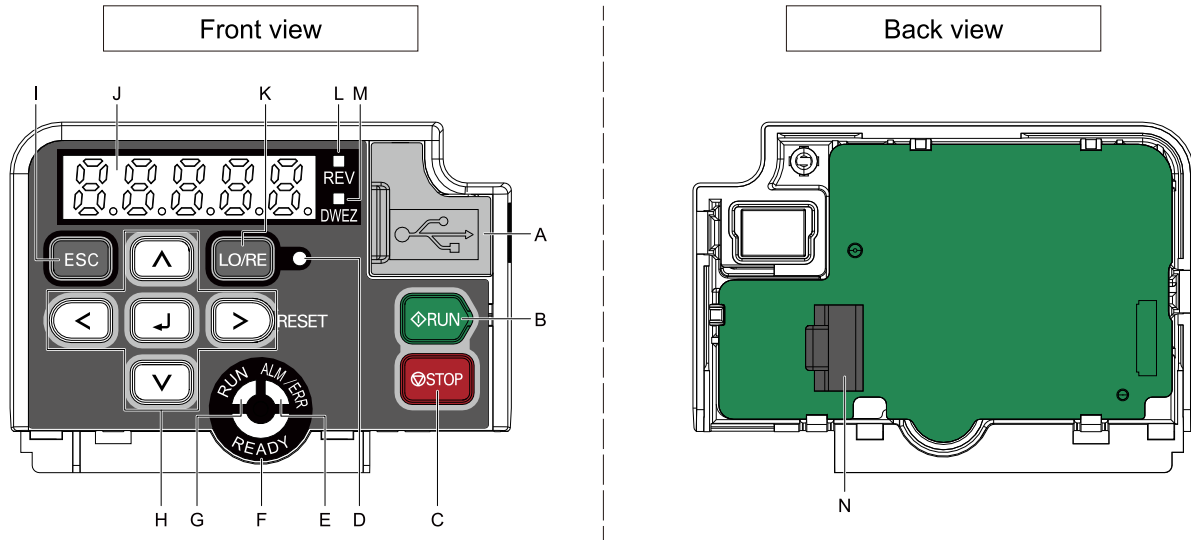


Figure 6.1 Keypad

Table 6.1 Keypad Components and Functions

Symbol	Name	Function
A	USB Terminal Pass-through	Pass-through point to connect a USB cable to the drive to support the DriveWizard PC tool and the DriveWizard Mobile App. Uses a USB cable (USB standard 2.0, type A - mini-B) to connect the drive to a PC, Android smartphone, or tablet.
B	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.
C	STOP Key 	Stops drive operation. Note: Uses a stop-priority circuit. 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].
D	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). Note: • 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 terminal 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.
E	ALM/ERR LED 	Illuminated: The drive detects a fault. OFF: There are no drive faults or alarms. Flashing: • An alarm • Operation Errors • An Auto-Tuning error Note: The LED will illuminate to identify a fault if the drive detects a fault and an alarm at the same time.
F	READY LED 	Illuminated: The drive is operating or is ready for operation. OFF: • The drive detects a fault. • There is no fault and the drive received a Run command, but the drive cannot run. For example, in Programming Mode. Flashing: The drive is in <i>Sto</i> [Safe Torque OFF] condition. Flashing quickly: The voltage of the main circuit power supply is not in drive nameplate specifications, and the external 24 V power supply provides the only power to the drive.

6.2 Overview of Keypad Components and Functions

Symbol	Name	Function
G	RUN LED 	Illuminated: The drive is in normal operation. OFF: The drive is stopped. Flashing: - The drive is decelerating to stop. - The drive received a Run command, but the frequency reference is 0 Hz. Flashing quickly: - When the drive is in LOCAL Mode, the drive received a Run command from the MFDI terminals and is switched to REMOTE 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. - The user 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].
H	Left Arrow Key 	Moves the cursor to the left.
	Up Arrow Key/Down Arrow Key 	- Moves to a different screen. - Selects parameter numbers and increments or decrements setting values.
	Right Arrow Key (RESET) 	- Moves the cursor to the right. - Resets the drive to clear a fault.
	ENTER Key 	- Enters parameter values and settings. - Selects each mode, parameter, and set value.
I	ESC Key 	- Goes back to the previous screen. - Push and hold to go back to the frequency reference screen (the initial screen).
J	LED Display	Shows parameters, errors, and other data.
K	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.
L	REV LED 	Illuminated: The drive received a Reverse run command.
M	DWEZ LED 	Illuminated: The drive is In DriveWorksEZ operation.
N	RJ-45 Connector	Connects to the drive. Use an RJ-45 8-pin straight through UTP CAT5e extension cable to install the keypad in a different location than the drive.

⚠ 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.

◆ Indicator flashing statuses

Refer to [Figure 6.2](#) for the difference between “flashing” and “flashing quickly”.

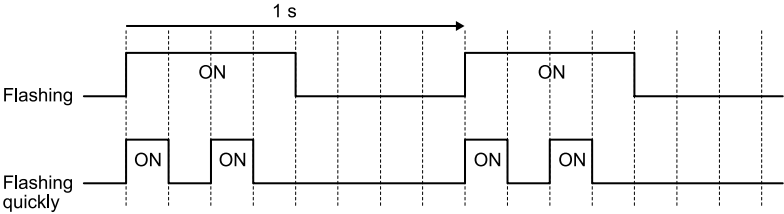


Figure 6.2 About indicator flashing statuses

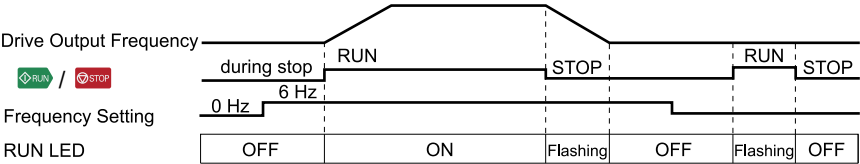


Figure 6.3 Relation between RUN indicator and Drive Operation

◆ Keypad Mode and Menu Displays

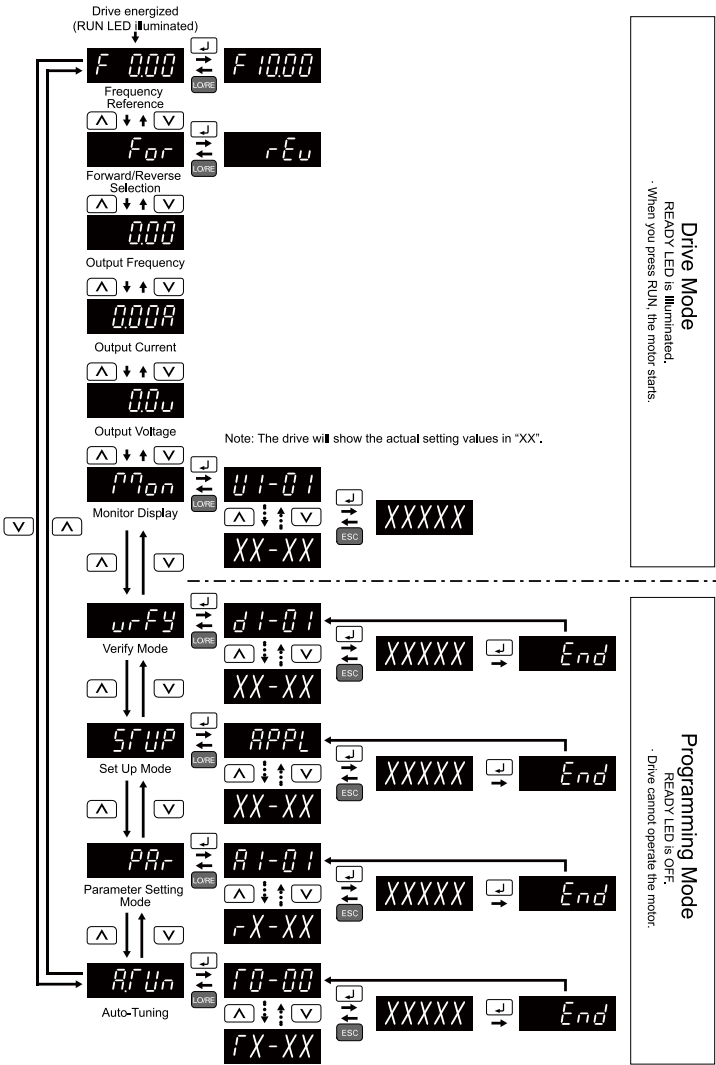


Figure 6.4 Keypad Functions and Display Levels

6.3 Set up the Drive with General-Purpose Setup Mode

Drive parameters are in letter groups from A to U. Setup Mode **SRUP** contains only the most frequently used parameters to help you set up the drive more easily.

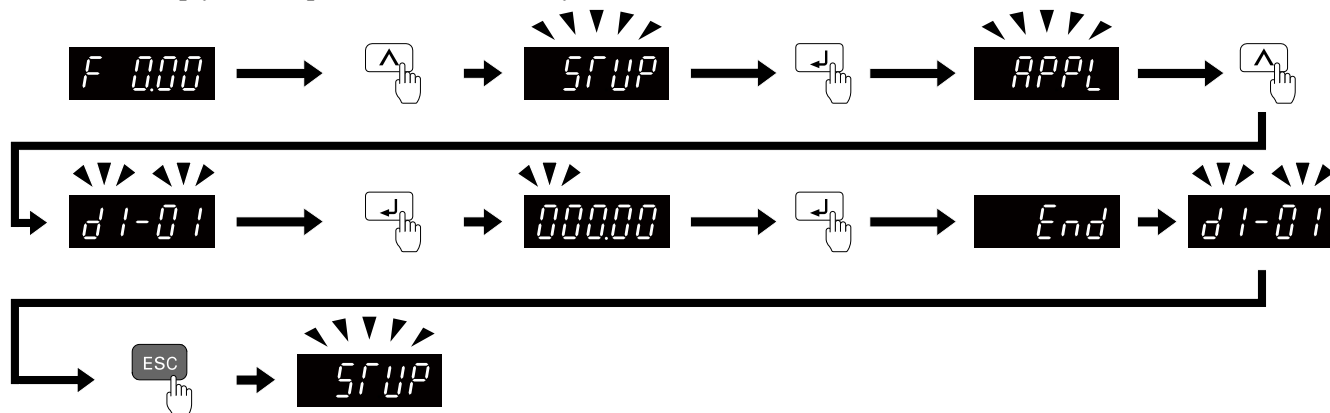


Figure 6.5 Parameters in General-Purpose Setup Mode

Table 6.2 shows the parameters available in Setup Mode. To access parameters not shown in the Setup Mode, use the **PAR** menu.

Table 6.2 Parameters in General-Purpose Setup Mode

User Parameters	Parameter	Name
A2-01	A1-02	Control Method Selection
A2-02	b1-01	Frequency Reference Selection 1
A2-03	b1-02	Run Command Selection 1
A2-04	b1-03	Stopping Method Selection
A2-05	C1-01	Acceleration Time 1
A2-06	C1-02	Deceleration Time 1
A2-07	C6-01	Normal / Heavy Duty Selection
A2-08	C6-02	Carrier Frequency Selection
A2-09	d1-01	Reference 1
A2-10	d1-02	Reference 2
A2-11	d1-03	Reference 3
A2-12	d1-04	Reference 4
A2-13	d1-17	Jog Reference
A2-14	E1-01	Input AC Supply Voltage
A2-15	E1-03	V/f Pattern Selection
A2-16	E1-04	Maximum Output Frequency
A2-17	E1-05	Maximum Output Voltage
A2-18	E1-06	Base Frequency
A2-19	E1-09	Minimum Output Frequency
A2-20	E1-13	Base Voltage
A2-21	E2-01	Motor Rated Current (FLA)
A2-22	E2-04	Motor Pole Count
A2-23	E2-11	Motor Rated Power
A2-24	H4-02	Terminal AM Analog Output Gain

User Parameters	Parameter	Name
A2-25	L1-01	Motor Overload (oL1) Protection
A2-26	L3-04	Stall Prevention during Decel

Note:

- When you change *A1-02 [Control Mode Selection]*, the settings of some parameters automatically change.
- This manual also shows parameters that are not in Setup Mode. Use the **PAR** to set the parameters not shown in the Setup Mode.
- Display parameters change when the *A1-06 [Application Preset]* setting changes.

6.4 Programming Mode

In Programming Mode, you can set parameters or do Auto-Tuning. This mode has 4 sub-modes for different programming requirements:

- Verify Menu: Use this mode to examine and set the parameters that are not at default settings.
- Setup Mode: Use this mode to see and set the minimum parameters necessary for drive operation. Refer to [Verify and Set the Changed Parameters \(Verify Menu\) on page 262](#) for more information.
- Parameter Setting Mode: Use this mode to see and set all parameters.
- Auto-Tuning Mode: Use this mode to automatically set the motor parameters necessary for each control method.

◆ Setup Mode

In Setup Mode, you can see and set the minimum parameters necessary for drive operation. Refer to [Figure 6.6](#) for an example.

Note:

1. Refer to [Set up the Drive with General-Purpose Setup Mode on page 258](#) and [Automatic Parameter Settings Optimized for Specific Applications \(Application Presets\) on page 269](#) for more information about Setup mode parameters.
2. Push **APPL** and **↵** to continue to the application selection screen. When you change the setting, it will optimize the parameter for the application. The default setting is 0 [General-purpose].
3. To go back to the initial screen, push **ESC**. To change another parameter in Setup Mode, push **▲** or **▼**.

Change *b1-01* [Frequency Reference Selection 1] from 1 [Analog Input] to 0 [Keypad].

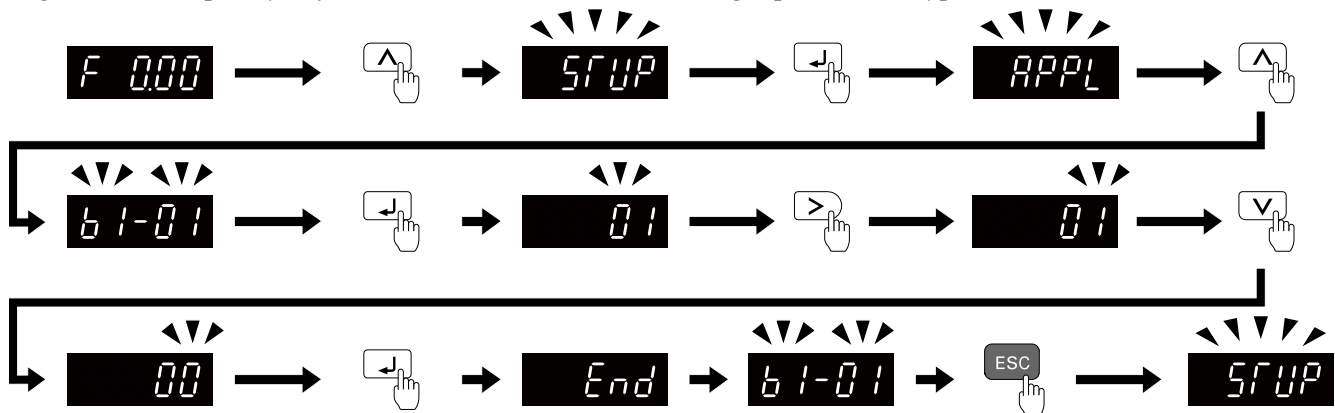


Figure 6.6 Key operation examples in Setup Mode

6.5 Change Parameter Settings

Show the frequency reference screen in advance.

Note:

Push and hold **ESC** to go back to the frequency reference screen from any screen.

Use these steps to change *C1-01 [Acceleration Time 1]* from 1.0 s (default) to 2.0 s.

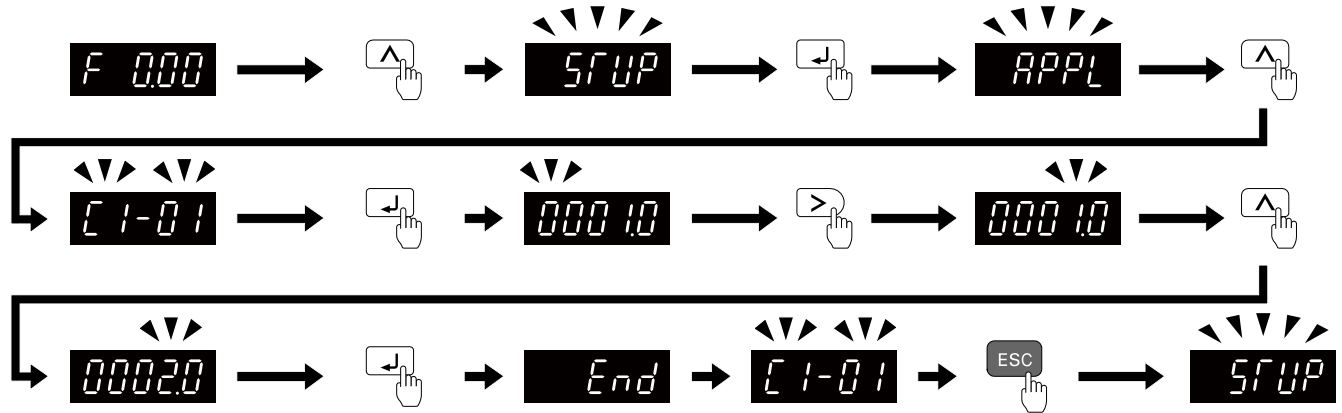


Figure 6.7 Key Operation Examples for Parameter Settings

6.6 Verify and Set the Changed Parameters (Verify Menu)

Show the frequency reference screen in advance.

Note:

Push and hold **ESC** to go back to the frequency reference screen from any screen.

Use Verify mode to view all parameters that are not at default settings. This is very useful when you replace a drive.

When there are no changes to parameter settings, the display shows $\square\square\square\bar{E}$. This lets you quickly access and re-edit changed parameters. [Figure 6.8](#) shows the procedure.

Note:

The drive will only display *A1-02 [Control Method Selection]*, *A1-xx*, *A2-01 to A2-32 [User Parameter 1 to User Parameter 32]*, and *E5-01 [PM Motor Code Selection]*.

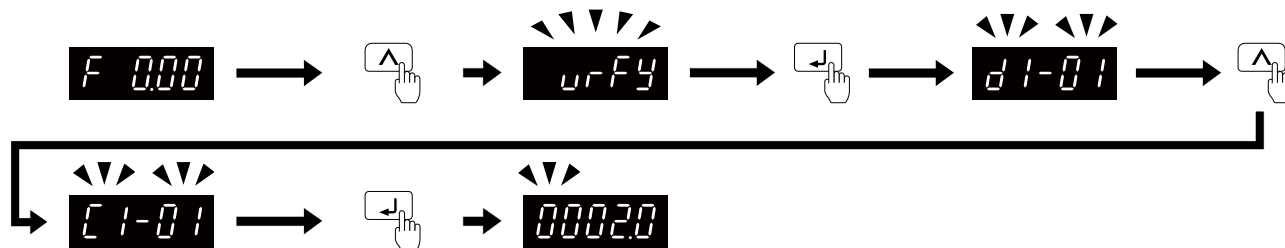


Figure 6.8 Verify and Set the Changed Parameters

6.7 How to Switch between LOCAL and REMOTE

LOCAL mode lets you use the keypad to input Run commands. REMOTE mode lets you use other sources than the keypad to input Run commands.

⚠ 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.

You can use  or MFDI functions (LOCAL/REMOTE Selection) to switch between LOCAL and REMOTE.

Note:

1.  illuminates while the drive is in LOCAL Mode.
2. While you are entering a Run command, you cannot switch between LOCAL and REMOTE.

◆ Use the LO/RE Selection Key on the Keypad to Switch between LOCAL and REMOTE

Each time you push , the mode switches between LOCAL and REMOTE. The LED illuminates in LOCAL Mode.



Figure 6.9 Use the LO/RE Selection Key to Switch between LOCAL and REMOTE

◆ Use MFDI Terminals (S1 to S7) to Switch between LOCAL and REMOTE

When you set $H1-xx = 1$ [*MFDI Function Selection = LOCAL/REMOTE Selection*], you can activate/deactivate the terminal to switch between LOCAL and REMOTE. Set $H1-xx = 1$ to disable the LO/RE key on the keypad. For information about the MFDI functions, refer to the list in **Missing reference ID**.

6.8 Keypad Operation

◆ Digital character mapping table

The LED keypad shows the digital characters as shown in [Table 6.3](#)

Table 6.3 Digital character mapping table

Characters	LED Display	Characters	LED Display	Characters	LED Display	Characters	LED Display
0	0	9	9	I	i	R	r
1	1	A	A	J	j	S	s
2	2	B	b	K	k	T	t
3	3	C	c	L	l	U	u
4	4	D	d	M	m	V	v
5	5	E	e	N	n	W	w
6	6	F	f	O	o	X	No indication
7	7	G	g	P	p	Y	y
8	8	H	h	Q	q	Z	No indication

*1 Shown across two digits.

◆ Show the Monitor

Show the frequency reference screen in advance.

Note:

Push and hold **ESC** to go back to the frequency reference screen from any screen.

Use these steps to monitor parameter settings.

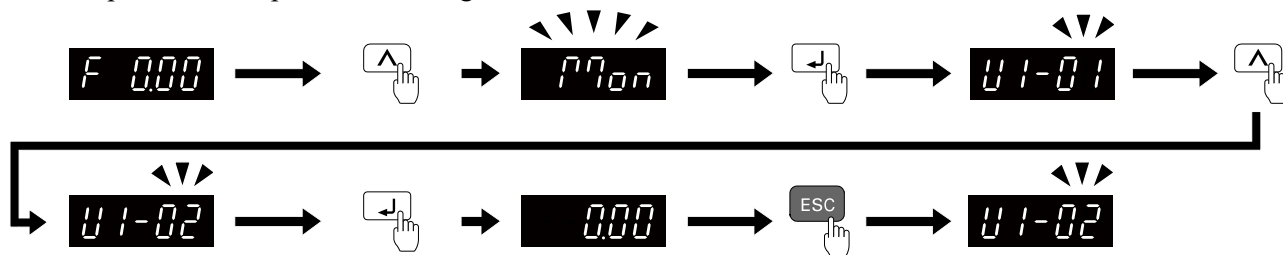


Figure 6.10 How to Monitor the Parameter Setting Values

◆ Check Modified Parameters

Show the frequency reference screen in advance.

Note:

Push and hold **ESC** to go back to the frequency reference screen from any screen.

Use Verify mode to view all parameters that are not at default settings. This is very useful when you replace a drive. This lets you quickly access and re-edit changed parameters.

Note:

The drive will only display A1-02 [Control Method Selection], A1-xx, A2-01 to A2-32 [User Parameter 1 to User Parameter 32], and E5-01 [PM Motor Code Selection].

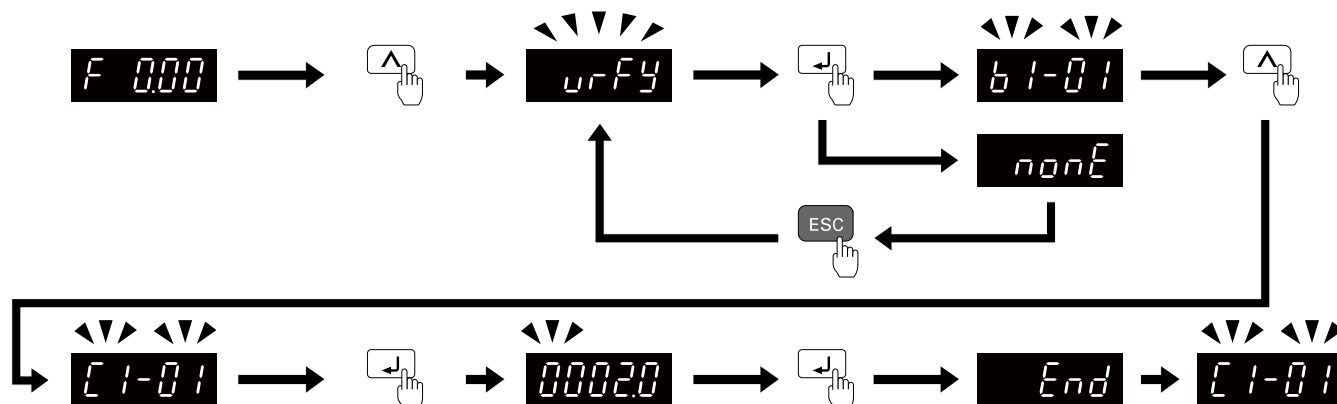


Figure 6.11 How to Examine the Changed Parameters

◆ Set and View Necessary Parameters

Show the frequency reference screen.

Note:

Push and hold **ESC** to return to frequency reference screen from any screen.

The setup mode shows the parameters set in *A2-01 to A2-32 [User Parameter 1 to User Parameter 32]*. This lets you quickly access and change these parameters.

Note:

Setup mode always shows **APPL** (*A1-06 [Application Preset]*) at the top of the list. When you change the setting, the settings for *A2-01 to A2-32* change.

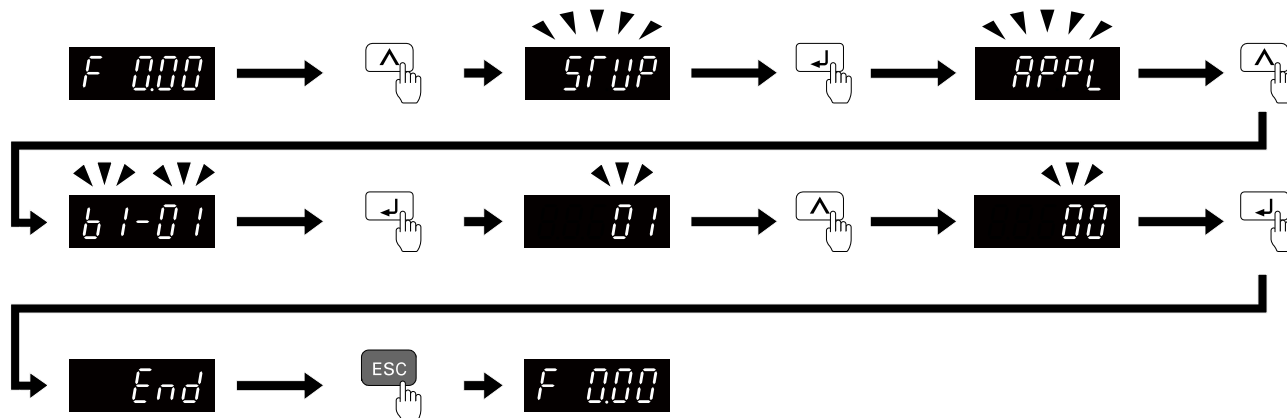


Figure 6.12 View and Set the Necessary Parameters

Continue to change the parameters or press and hold **ESC** to go back to the frequency reference screen.

◆ Change Parameter Settings

Show the frequency reference screen in advance.

Note:

Push and hold **ESC** to go back to the frequency reference screen from any screen.

This example shows how to change *C1-01 [Acceleration Time 1]*. Set the parameter to the necessary value.

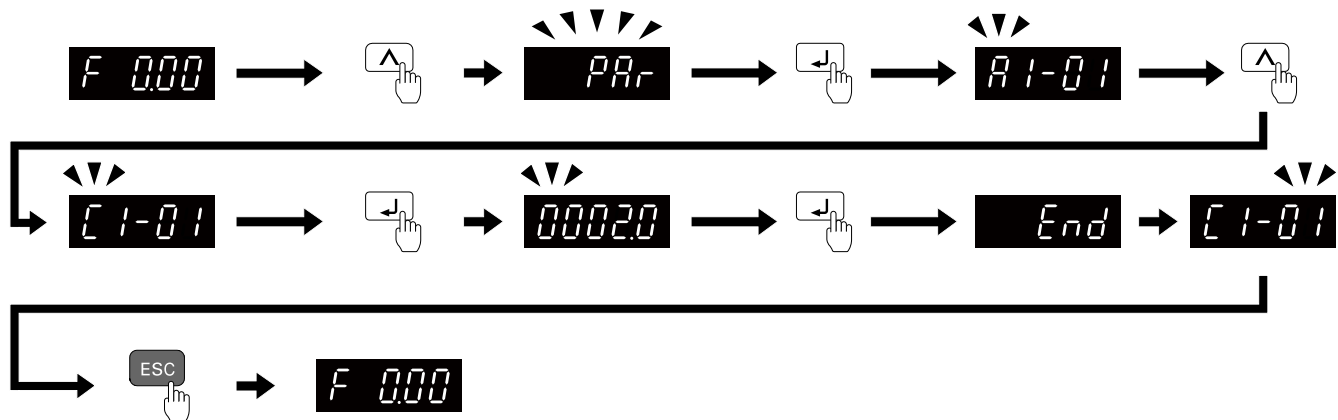


Figure 6.13 How to Change the Parameter Setting

Continue to change parameters or push and hold **ESC** to go back to the frequency reference screen.

◆ Save a Backup of Parameters

Show the frequency reference screen in advance.

Note:

Push and hold **ESC** to go back to the frequency reference screen from any screen.

Use these steps to save a backup of the drive parameters to the keypad.

Making backups of the parameter settings can save time when setting parameters after replacing a drive. If 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:

- Make sure that you stop the motor before you back up parameters.
- The drive does not accept Run commands while it is making a backup.
- Set *o3-02* = 0 [*Copy Allowed Selection = Disabled*] to protect the parameters saved in the keypad.

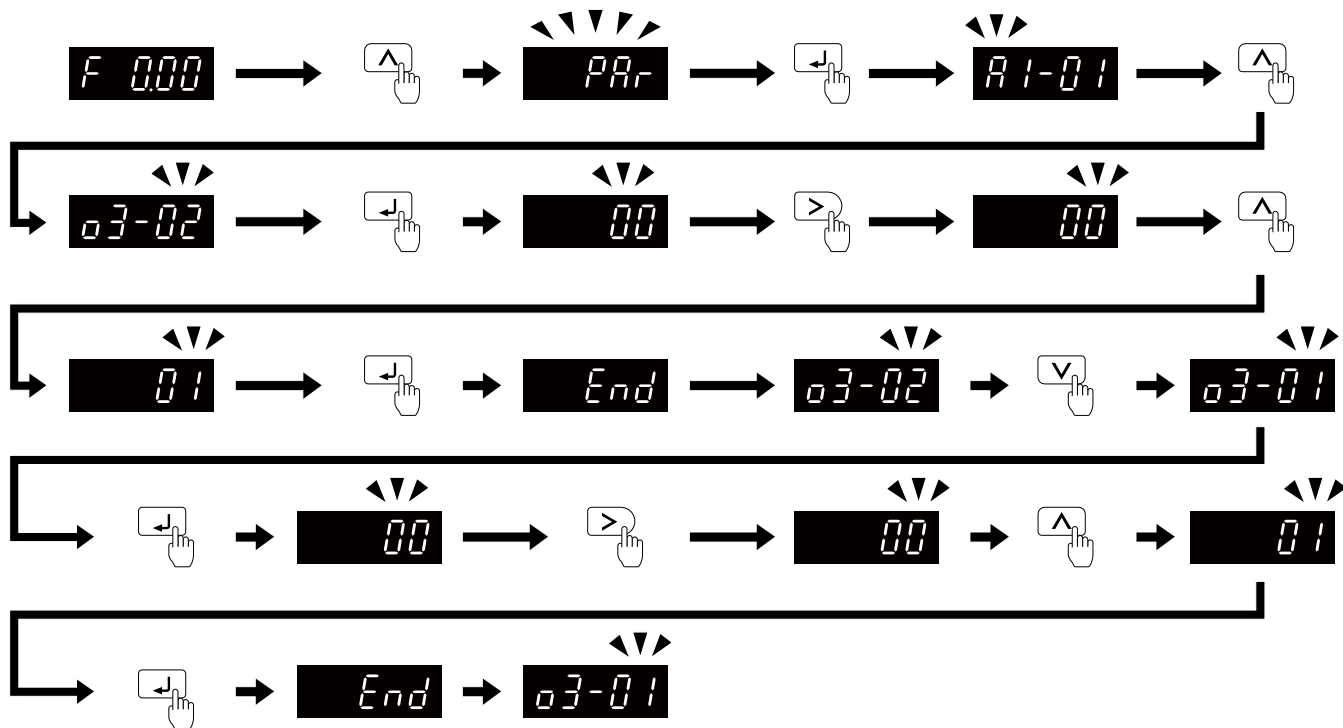


Figure 6.14 How to Save Backed-up Parameters

Push and hold **ESC** to go back to the frequency reference screen.

◆ Write Backed-up Parameters to the Drive

Show the frequency reference screen in advance.

Note:

Push and hold **ESC** to go back to the frequency reference screen from any screen.

Use these steps to write the parameters backed up in the keypad into a different drive.

Note:

- Make sure that you stop the drive before you restore the backed-up parameters.
- The drive does not accept Run commands while it is restoring parameters.

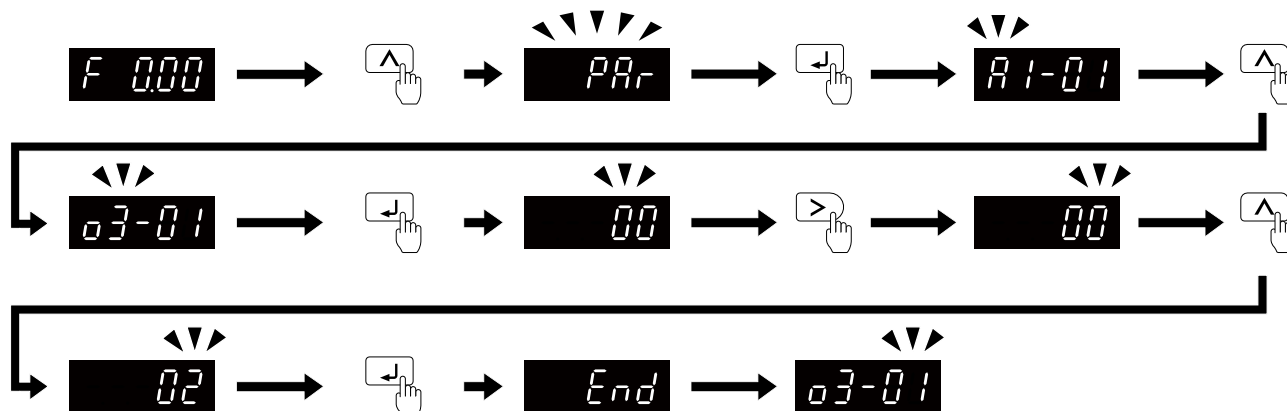


Figure 6.15 Writing backed up parameters

Push and hold **ESC** to go back to the frequency reference screen.

◆ Verify Keypad Parameters and Drive Parameters

Show the frequency reference screen in advance.

Note:

Push and hold **ESC** to go back to the frequency reference screen from any screen.

This procedure verifies that the parameter setting values that were backed up in the keypad agree with the parameter setting values in the drive.

Note:

- Make sure that you stop the drive before you examine parameters.
- The drive does not accept Run commands while it is restoring parameters.

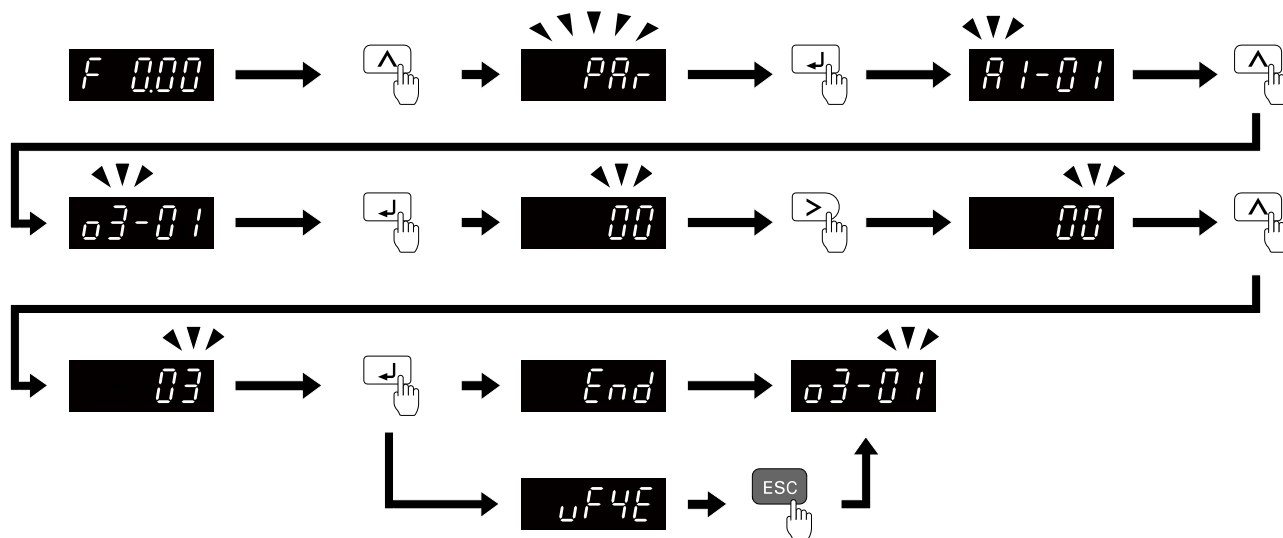


Figure 6.16 Verify Keypad Parameters and Drive Parameters

Push and hold **ESC** to go back to the frequency reference screen.

◆ Delete Parameters Backed Up to the Keypad

Show the frequency reference screen in advance.

Note:

Push and hold **ESC** to go back to the frequency reference screen from any screen.

Use these steps to erase the parameters backed up in the keypad.

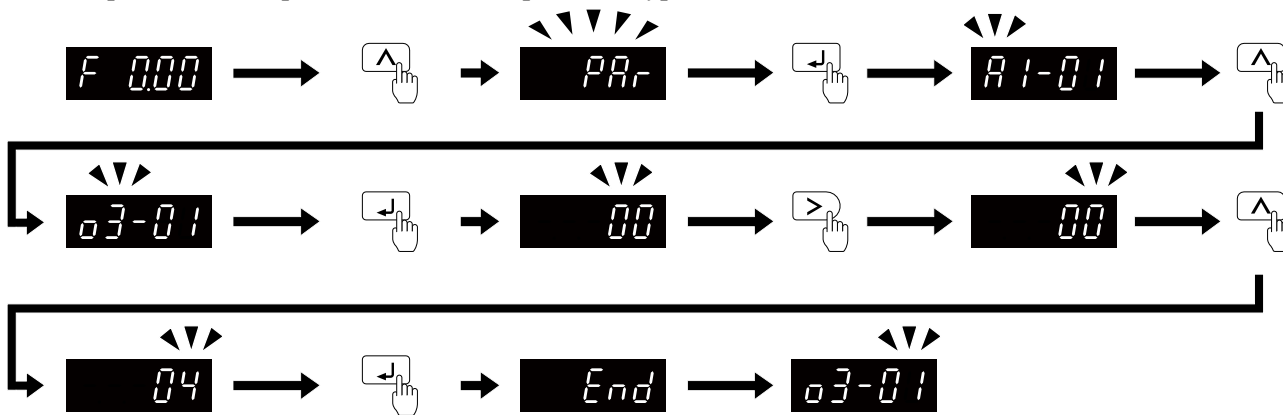


Figure 6.17 How to Erase the Backed-up Parameters

Push and hold **ESC** to go back to the frequency reference screen.

6.9 Automatic Parameter Settings Optimized for Specific Applications (Application Presets)

Show the frequency reference screen.

Note:

Press and hold **ESC** to return to the frequency reference screen from any screen.

Use this procedure to set an application preset.

The drive has application presets to set the necessary parameters for different applications to their best values. Use **urF4** to find parameters that were changed automatically by the application preset function in *A1-06*.

Note:

Before you set *A1-06*, make sure that you set *A1-03* = 2220, 3330 [*Initialize Parameters* = 2-Wire Initialization, 3-Wire Initialization] to initialize parameters.

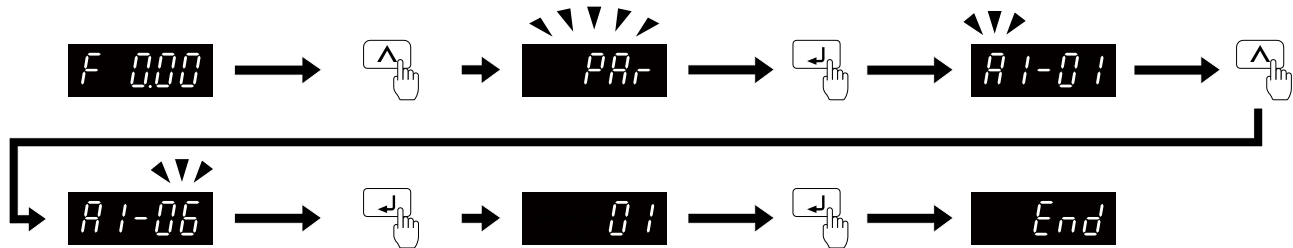


Figure 6.18 Automatic Parameter Settings

Press and hold **ESC** to go back to the frequency reference screen.

Note:

- You cannot directly set parameter *A1-06*. To set an application preset, first set *A1-03* = 2220 to initialize parameters, then set this parameter. If initializing all parameters will cause a problem, do not change the settings.
- When the drive applies 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].

6.10 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.

⚠ WARNING Crush Hazard

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.

◆ Auto-Tuning for Induction Motors

This section gives information about Auto-Tuning for induction motors. Set motor parameters *E1-xx* and *E2-xx* (or, for motor 2, *E3-xx* and *E4-xx*) for Auto-Tuning.

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 6.4 Auto-Tuning Mode Selection

Method	Parameter Settings	Application Conditions and Benefits	Applicable Control Method (A1-02 Setting)	
			V/f (0)	OLV (2)
Rotational Auto-Tuning	T1-01 = 0	- 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
Stationary Auto-Tuning 1	T1-01 = 1	- When you cannot decouple the motor and load. - When 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 you operate the motor with less than 30% load after Auto-Tuning. Set $T1-12 = 1$ [Test Mode Selection = Yes] to do a test run after Auto-Tuning.	-	x
Stationary Line-Line Resistance	T1-01 = 2	- 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

■ Input Data for Induction Motor Auto-Tuning

To do Auto-Tuning, input data for the items in [Table 6.5](#) 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 6.5 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)	Stationary Line-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
Motor Base Frequency	T1-05	Hz	x	x	-

Input Data	Parameter	Unit	Auto-Tuning Mode (T1-01 Setting)		
			Rotational Auto-Tuning (0)	Stationary Auto-Tuning 1 (1)	Stationary Line-Line Resistance (2)
Number of Motor Poles	T1-06	-	x	x	-
Motor Base Speed	T1-07	min ⁻¹	x	x	-
Motor No-Load Current	T1-09	A	-	x	-
Motor Rated Slip Frequency	T1-10	Hz	-	x ^{*1}	-
Motor Iron Loss	T1-11	W	x ^{*2}	-	-
Test Mode Selection ^{*3}	T1-12	-	-	x ^{*4}	-
No-Load Voltage	T1-13	V	x ^{*5}	x ^{*5}	-

*1 Shows 0 Hz as the default value. If you do not know the Motor Rated Slip Frequency, keep the setting at 0 Hz.

*2 Input this value when $A1-02 = 0$ [Control Method Selection = V/f].

*3 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].

*4 Input this value when $T1-10$ [Motor Rated Slip Frequency] = 0 Hz.

*5 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 motor parameters $E1-xx$ and $E5-xx$.

Table 6.6 Auto-Tuning for PM Motors

Mode	Parameter Settings	Application Conditions and Benefits	Applicable Control Method (A1-02 Setting)	
			OLV/PM (5)	AOLV/PM (6)
Manual Entry w/ Motor Data Sheet	T2-01 = 0	- 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
PM Stationary Auto-Tuning	T2-01 = 1	When the information from the motor test report or motor nameplate is not available. 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.	x	x
PM Stationary Auto-Tuning for Stator Resistance	T2-01 = 2	- 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
PM Motor Code Selection	T2-01 = 4	- 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
High Frequency Injection	T2-01 = 5	- 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. 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.	x	x

■ Input Data for PM Motor Auto-Tuning

To do Auto-Tuning, input data for the items in Table 6.7 and Table 6.8 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 PM Motor Auto-Tuning

Input Data	Parameter	Unit	Auto-Tuning Mode (T2-01 Setting)					
			PM Motor Parameter Settings (0)			PM Stationary Auto-Tuning (1)		PM Stationary Auto- Tuning for Stator Resistance (2)
Control Method Selection	A1-02	-	5, 6	5	6	5	6	5, 6
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	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 (K _e)	T2-14	*3	x	x	x	-	-	-
Pull-In Current Level	T2-15	%	-	-	-	x	x	-

*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.

Table 6.8 Input Data for PM Motor Auto-Tuning

Input Data	Parameter	Unit	Auto-Tuning Mode (T2-01 Setting)		
			PM Motor Code Selection (4)		High Frequency Injection (5)
Control Method Selection	A1-02	-	5	6	5, 6
PM Motor Code Selection	T2-02	-	-	-	-
PM Motor Type	T2-03	-	x	x	-
PM Motor Rated Power	T2-04	kW	x	x	-
PM Motor Rated Voltage	T2-05	V	x	x	-
PM Motor Rated Current	T2-06	A	x	x	-
PM Motor Base Frequency	T2-07	Hz	x	-	-
Number of PM Motor Poles	T2-08	-	x	x	-
PM Motor Base Speed	T2-09	min ⁻¹	-	x	-
Pull-In Current Level	T2-15	%	x	x	-

◆ 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 6.9 EZ Tuning Mode Selection

Mode	Parameter Settings	Application Conditions and Benefits	Applicable Control Method (A1-02 Setting)
Motor Parameter Setting	T4-01 = 0	- 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	- 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 6.10](#) 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 6.10 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	-
PM Motor Rated Current (FLA)	T4-07	A	x	x
PM Motor Rated Power (kW)	T4-08	kW	x	-
Number of Motor Poles	T4-09	-	x	-

◆ ASR and Inertia 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:

- 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 6.11 Control Loop Tuning Selection

Mode	Parameter Settings	Application Conditions and Benefits	Applicable Control Methods (A1-02 Settings)				
			V/f (0)	OLV (2)	OLV/PM (5)	AOLV/PM (6)	EZOLV (8)
Deceleration Rate Tuning	T3-00 = 2	To automatically adjust the deceleration rate to prevent an <i>ov</i> [<i>Overvoltage</i>] fault.	x	x	x	x	x
KEB Tuning	T3-00 = 3	- To automatically adjust parameter settings to prevent an <i>ov</i> [<i>Overvoltage</i>] fault with the KEB Ride-Thru function. - When <i>L3-11</i> = 1 [<i>Overvoltage Suppression Select = Enabled</i>].	x	x	x	x	x

■ 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 6.12](#) to the best values.

Table 6.12 Parameters set in Control Tuning

Parameters Automatically Set	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}
L2-06 [Kinetic Energy Backup Decel Time]	-	x ^{*3}
L3-25 [Load Inertia Ratio]	-	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 you must not change the Fast Stop time, 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 the Auto-Tuning, then do it again.
- [Table 6.13](#) shows the status of multi-function input/output terminals during Auto-Tuning.

Table 6.13 Status of Input/Output Terminals during Auto-Tuning

Auto-Tuning Type	Mode		Parameter	Multi-Function Input	Multi-Function Output ^{*/}
Induction Motor Auto-Tuning	Rotational	Rotational Auto-Tuning	T1-01 = 0	Disabled	Functions the same as during usual operation.
	Stationary	Stationary Auto-Tuning 1	T1-01 = 1	Disabled	Keeps the status at the start of Auto-Tuning.
		Line-to-Line Resistance	T1-01 = 2	Disabled	Keeps the status at the start of Auto-Tuning.
PM Motor Auto-Tuning	Rotational	PM Motor Code Selection	T2-01 = 4	Disabled	Functions the same as during usual operation.
	Stationary	Manual Entry w/ Motor Data Sheet	T2-01 = 0	Disabled	Disabled
		PM Stationary Auto-Tuning	T2-01 = 1	Disabled	Keeps the status at the start of Auto-Tuning.
		PM Stationary Auto-Tuning for Stator Resistance	T2-01 = 2	Disabled	Keeps the status at the start of Auto-Tuning.
		High Frequency Injection	T2-01 = 5	Disabled	Keeps the status at the start of Auto-Tuning.
EZ Tuning	Stationary	Motor Parameter Setting	T4-01 = 0	Disabled	Disabled
		Line-to-Line Resistance	T4-01 = 1	Disabled	Keeps the status at the start of Auto-Tuning.
ASR and Inertia Tuning	Rotational	Deceleration Rate Tuning	T3-00 = 2	Disabled	Functions the same as during usual operation.
		KEB Tuning	T3-00 = 3	Disabled	Functions the same as during usual operation.

*1 When you set a terminal to $H2-xx = E$ [MFDO Function Selection = Fault], it will function 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 Crush Hazard

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.

- Uncouple the drive from the motor before Rotational Auto-Tuning to prevent drive malfunction. 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 procedure 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, examine the values of E2-02 and E2-03 again in the Verify Menu or Parameter Setting Mode.
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.

■ 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 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.

Specifications

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7.1 Specifications

◆ 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	- Extruder - Conveyor - Cranes - Constant torque or high overload capacity	Determined by o2-04, A1-02	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	- Fan - Pump - Blower - Variable speed control	Determined by o2-04, A1-02	110% of the rated output current for 60 seconds The permitted frequency of overload is one time each 10 minutes.

◆ Model-Specific Specifications (Single-Phase 200 V Class)

Table 7.2 Ratings (Single-Phase 200 V Class)

Model			B001	B002	B004	B006	B010	B012	B018
Maximum Applicable Motor Output (kW)		HD <i>*1</i>	0.1	0.2	0.4	0.75	1.5	2.2	3.7
		ND <i>*2</i>	0.2	0.4	0.75	1.1	2.2	3.0	-
Maximum Applicable Motor Output (HP)		HD <i>*1</i>	1/6	1/4	1/2	1	2	3	5
		ND <i>*2</i>	1/6	1/4	3/4	1.5	3	3	-
Input	Rated Input Current (A)	HD (AC)	1.4	2.8	5.5	11	14.1	20.6	35.0
		HD (DC)	1.4	2.8	5.5	11	14.1	20.6	35.0
		ND (AC)	2.0	5.0	7.3	13.8	20.2	24.0	-
		ND (DC)	2.0	5.0	7.3	13.8	20.2	24.0	-
Output	Rated Output Capacity (kVA) <i>*3</i>	HD	0.3	0.6	1.1	1.9	3	4.2	6.7
		ND	0.5	0.7	1.3	2.3	3.7	4.6	-
	Rated Output Current (A)	HD	0.8	1.6	3	5	8	11	17.6
		ND	1.2	1.9	3.5	6	9.6	12.2	-
	Overload Tolerance		• 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. Note: Derating can be necessary for applications that start and stop frequently.						
	Carrier Frequency		HD: 10 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.				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.		
	Maximum Output Voltage		Three-phase 200 V to 240 V Note: The maximum output voltage is proportional to the input voltage.						
	Maximum Output Frequency		• V/f, OLV, OLV/PM: 590 Hz • AOLV/PM: 270 Hz • EZOLV: 120 Hz						
Measures for Harmonics	AC reactor		External options						
Braking Device	Braking Transistor		Standard internal characteristics						
EMC Filter	EMC Filter IEC61800-3		Factory option Models BxxxE: Category C1 (Conducted emission)						External options

Model			B001	B002	B004	B006	B010	B012	B018
Power Supply	Rated Voltage/Rated Frequency		• Single-phase AC power supply 200 V to 240 V at 50/60 Hz • DC power supply 270 V to 340 V						
	Permitted Voltage Fluctuation		-15% to +10%						
	Permitted Frequency Fluctuation		±5%						
	Input Power (kVA)	HD	0.4	0.7	1.5	2.9	3.7	5.4	9.2
		ND	0.5	1.3	1.9	3.6	5.3	6.3	-

- *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.
- *3 The rated output capacity is calculated with a rated output voltage of 220 V.

◆ Model Specifications (Three-Phase 200 V Class)

Table 7.3 Ratings (Three-Phase 200 V Class)

Model			2001	2002	2004	2006
Maximum Applicable Motor Output (kW)		HD ^{*1}	0.1	0.2	0.2	0.75
		ND ^{*2}	0.2	0.4	0.75	1.1
Maximum Applicable Motor Output (HP)		HD ^{*1}	1/6	1/4	1/2	1
		ND ^{*2}	1/6	1/4	3/4	1.5
Input	Rated Input Current (A)	HD (AC)	0.7	1.5	2.9	5.8
		HD (DC)	0.9	1.8	3.6	7.1
		ND (AC)	1.1	1.9	3.9	7.3
		ND (DC)	1.3	2.3	4.8	8.9
Output	Rated Output Capacity (kVA) ^{*3}	HD	0.3	0.6	1.1	1.9
		ND	0.5	0.7	1.3	2.3
	Rated Output Current (A)	HD	0.8	1.6	3.0	5.0
		ND	1.2	1.9	3.5	6
	Overload Tolerance		• 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. Note: Derating can be necessary for applications that start and stop frequently.			
	Carrier Frequency		HD: 10 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.			
	Maximum Output Voltage		Three-phase 200 V to 240 V Note: The maximum output voltage is proportional to the input voltage.			
	Maximum Output Frequency		• EZOLV: 120 Hz • AOLV/PM: 270 Hz • V/f, OLV, OLV/PM: 590 Hz			
Measures for Harmonics	DC reactor		External options			
Braking Device	Braking Transistor		Standard internal characteristics			
EMC Filter	EMC Filter IEC61800-3		Factory option Models 2xxxE: Category C3 (Conducted emission)			

7.1 Specifications

Model			2001	2002	2004	2006
Power Supply	Rated Voltage/Rated Frequency		- Three-phase AC power supply 200 V to 240 V at 50/60 Hz - DC power supply 270 V to 340 V			
	Permitted Voltage Fluctuation		-15% to +10%			
	Permitted Frequency Fluctuation		±5%			
	Input Power (kVA)	HD	0.3	0.7	1.3	2.7
		ND	0.5	1.2	1.8	3.3

- *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.
- *3 The rated output capacity is calculated with a rated output voltage of 220 V.

Table 7.4 Ratings (Three-Phase 200 V Class)

Model			2010	2012	2021	2030	
Maximum Applicable Motor Output (kW)			HD ^{*1}	1.5	2.2	3.7	5.5
			ND ^{*2}	2.2	3	5.5	7.5
Maximum Applicable Motor Output (HP)			HD ^{*1}	2	3	5	7.5
			ND ^{*2}	3	4	7.5	10
Input	Rated Input Current (A)	HD (AC)	7.5	11	18.9	24	
		HD (DC)	9.2	13.5	23.1	29.4	
		ND (AC)	10.8	13.9	24	37	
		ND (DC)	13.2	17	29.4	45.3	
Output	Rated Output Capacity (kVA) ^{*3}	HD	3	4.2	6.7	9.5	
		ND	3.7	4.6	8	11.4	
	Rated Output Current (A)	HD	8.0	11.0	17.6	25.0	
		ND	9.6	12.2	21	30	
	Overload Tolerance		- 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. Note: Derating can be necessary for applications that start and stop frequently.				
	Carrier Frequency		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.				
	Maximum Output Voltage		Three-phase 200 V to 240 V Note: The maximum output voltage is proportional to the input voltage.				
	Maximum Output Frequency		- V/f, OLV, OLV/PM: 590 Hz - AOLV/PM: 270 Hz - EZOLV: 120 Hz				
Measures for Harmonics	DC Link Choke		External options				
Braking Device	Braking Transistor		Standard internal characteristics				
EMC Filter	EMC Filter IEC61800-3		Factory option Models 2xxxE: Category C3 (Conducted emission)				
Power Supply	Rated Voltage/Rated Frequency		- Three-phase AC power supply 200 V to 240 V at 50/60 Hz - DC power supply 270 V to 340 V				
	Permitted Voltage Fluctuation		-15% to +10%				
	Permitted Frequency Fluctuation		±5%				
	Input Power (kVA)	HD	3.4	5.0	8.7	11.0	
		ND	4.9	6.4	11	17.0	

- *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.
- *3 The rated output capacity is calculated with a rated output voltage of 220 V.

Table 7.5 Ratings (Three-Phase 200 V Class)

Model			2042	2056	2070	2082	
Maximum Applicable Motor Output (kW)			HD ^{*1}	7.5	11	15	18.5
			ND ^{*2}	11	15	18.5	22
Maximum Applicable Motor Output (HP)			HD ^{*1}	10	15	20	25
			ND ^{*2}	10	20	25	30
Input	Rated Input Current (A)	HD (AC)	37	52	68	96	
		HD (DC)	45.3	63.7	83.3	117.6	
		ND (AC)	52	68	80	114	
		ND (DC)	63.7	83.3	98	139.6	
Output	Rated Output Capacity (kVA) ^{*3}	HD	12.6	17.9	22.9	28.6	
		ND	16	21.3	26.7	31.2	
	Rated Output Current (A)	HD	33.0	47.0	60.0	75.0	
		ND	42	56	70	82	
	Overload Tolerance		• 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. Note: Derating can be necessary for applications that start and stop frequently.				
	Carrier Frequency		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.				
	Maximum Output Voltage		Three-phase 200 V to 240 V Note: The maximum output voltage is proportional to the input voltage.				
	Maximum Output Frequency		• V/f, OLV, OLV/PM: 590 Hz • AOLV/PM: 270 Hz • EZOLV: 120 Hz				
Measures for Harmonics	DC Link Choke		External options				
Braking Device	Braking Transistor		Standard internal characteristics				
EMC Filter	EMC Filter IEC61800-3		Factory option Models 2xxxE: Category C3 (Conducted emission)				
Power Supply	Rated Voltage/Rated Frequency		• Three-phase AC power supply 200 V to 240 V at 50/60 Hz • DC power supply 270 V to 340 V				
	Permitted Voltage Fluctuation		-15% to +10%				
	Permitted Frequency Fluctuation		±5%				
	Input Power (kVA)	HD	17.0	24.0	31.0	44.0	
		ND	24.0	31.0	37.0	52.0	

- *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.
- *3 The rated output capacity is calculated with a rated output voltage of 220 V.

◆ Model Specifications (Three-Phase 400 V Class)

Table 7.6 Ratings (Three-Phase 400 V Class)

Model	Duty Rating	4001	4002	4004	4005	4007	4009	4012
Maximum Applicable Motor Output ^{*1} (kW)	HD	0.2	0.4	0.75	1.5	2.2	3.0	3.7
	ND	0.4	0.75	1.5	2.2	3.0	3.7	5.5
Maximum Applicable Motor Output ^{*1} (HP)	HD	1/2	3/4	2	3	3	4	5
	ND	1/2	1	2	3	4	5	7.5
Input	Rated Input Current (A)	HD (AC)	1.2	1.8	3.2	4.4	6.0	10.4
		HD (DC)	1.5	2.2	3.9	5.4	7.3	12.7
		ND (AC)	1.2	2.1	4.3	5.9	8.1	14
		ND (DC)	1.5	2.6	5.3	7.2	9.9	17.1
Output	Rated Output Capacity ^{*2} (kVA)	HD	0.9	1.4	2.6	3.7	4.3	5.6
		ND	0.9	1.6	3.1	4.1	5.4	6.8
	Rated Output Current (A)	HD	1.2	1.8	3.4	4.8	5.6	7.3
		ND	1.2	2.1	4.1	5.4	7.1	8.9
	Overload Tolerance		- 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. Note: Derating can be necessary for applications that start and stop frequently.					
	Carrier Frequency		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.					
	Maximum Output Voltage		Three-phase 380 V to 480 V Note: The maximum output voltage is proportional to the input voltage.					
	Maximum Output Frequency		- V/f, OLV, OLV/PM: 590 Hz - AOLV/PM: 270 Hz - EZOLV: 120 Hz					
Measures for Harmonics	DC reactor		External options					
Braking Device	Braking Transistor		Standard internal characteristics					
EMC Filter	EMC Filter IEC61800-3		Factory option Models 4xxxE: Category C2 (Conducted emission)					
Power Supply	Rated Voltage/Rated Frequency		Three-phase AC power supply 380 V to 480 V at 50/60 Hz					
	Permitted Voltage Fluctuation		-15% to +10%					
	Permitted Frequency Fluctuation		±5%					
	Input Power (kVA)	HD	1.1	1.6	2.9	4	5.5	9.5
		ND	1.1	1.9	3.9	5.4	7.4	13

*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 rated output capacity is calculated with a rated output voltage of 440 V.

Table 7.7 Ratings (Three-Phase 400 V Class)

Model	Duty Rating	4018	4023	4031	4038	4044	4060
Maximum Applicable Motor Output ^{*1} (kW)	HD	5.5	7.5	11.0	15.0	18.5	22.0
	ND	7.5	11.0	15.0	18.5	22.0	30.0
Maximum Applicable Motor Output ^{*1} (HP)	HD	10	10	15	20	25	30
	ND	10	15	20	25	30	40

Model		Duty Rating	4018	4023	4031	4038	4044	4060
Input	Rated Input Current (A)	HD (AC)	15	20	29	39	50.5	59.7
		HD (DC)	18.4	24.5	35.5	47.8	61.8	73.1
		ND (AC)	20	24	38	44	59.7	80.7
		ND (DC)	24.5	29.4	46.5	53.9	73.1	98.8
Output	Rated Output Capacity ^{*2} (kVA)	HD	11.3	13.7	18.3	23.6	29.7	34.3
		ND	13.3	17.8	23.6	29	33.5	45.7
	Rated Output Current (A)	HD	14.8	18.0	24.0	31.0	39.0	45.0
		ND	17.5	23.4	31.0	38.0	44.0	60
	Overload Tolerance		- 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. Note: Derating can be necessary for applications that start and stop frequently.					
	Carrier Frequency		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.					
	Maximum Output Voltage		Three-phase 380 V to 480 V Note: The maximum output voltage is proportional to the input voltage.					
	Maximum Output Frequency		- V/f, OLV, OLV/PM: 590 Hz - AOLV/PM: 270 Hz - EZOLV: 120 Hz					
Measures for Harmonics	DC reactor		External options					
Braking Device	Braking Transistor		Standard internal characteristics					
EMC Filter	EMC Filter IEC61800-3		Factory option Models 4xxxE: Category C2 (Conducted emission)					
Power Supply	Rated Voltage/Rated Frequency		Three-phase AC power supply 380 V to 480 V at 50/60 Hz					
	Permitted Voltage Fluctuation		-15% to +10%					
	Permitted Frequency Fluctuation		±5%					
	Input Power (kVA)	HD	14	18	27	36	47	55
		ND	18	22	35	40	55	74

*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 rated output capacity is calculated with a rated output voltage of 440 V.

◆ Drive Specifications

Note:

- To get the OLV specifications, do Rotational Auto-Tuning.
- To get the longest product life, install the drive in an environment that meets the necessary specifications.

Table 7.8 Control Characteristics

Item	Specification
Control Methods	• V/f Control • Open Loop Vector • PM Open Loop Vector • PM Advanced Open Loop Vector • EZ Vector Control
Frequency Control Range	• V/f, OLV, and OLV/PM: 0.01 Hz to 590 Hz • AOLV/PM: 0.01 Hz to 270 Hz • EZOLV: 0.01 Hz to 120 Hz

7.1 Specifications

Item	Specification
Frequency Accuracy (Temperature Fluctuation)	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: $\pm 0.1\%$ of the maximum output frequency ($25\text{ }^{\circ}\text{C} \pm 10\text{ }^{\circ}\text{C}$ ($77\text{ }^{\circ}\text{F} \pm 18\text{ }^{\circ}\text{F}$))
Frequency Setting Resolution	Digital inputs: 0.01 Hz Analog inputs: 1/2048 of the maximum output frequency (11-bit)
Output Frequency Resolution	0.001 Hz
Frequency Setting Signal	Main speed frequency reference: -10 Vdc to $+10\text{ Vdc}$ (minimum 15 k Ω), 0 Vdc to 10 Vdc (minimum 15 k Ω), 4 mA to 20 mA (250 Ω), 0 mA to 20 mA (250 Ω) Main speed reference: Pulse train input (maximum 32 kHz)
Starting Torque	- V/f: 150%/3 Hz - OLV: 150%/1 Hz - OLV/PM: 100%/5% speed - AOLV/PM: 100%/0 min⁻¹ (when high frequency injection is enabled) - EZOLV: 100%/10% speed Note: Correctly select the drive and motor capacity for this starting torque in these control methods: - OLV - AOLV/PM
Speed Control Range	- V/f: 1:40 - OLV: 1:100 - OLV/PM: 1:10 - AOLV/PM: 1:100 (when high frequency injection is enabled) - EZOLV: 1:10
Zero Speed Control	Possible in AOLV/PM control methods.
Torque Limits	You can use parameter settings for different limits in four quadrants in these control methods: - OLV - AOLV/PM - EZOLV
Acceleration and Deceleration Times	0.0 s to 6000.0 s The drive can set four pairs of different acceleration and deceleration times.
Braking Torque	Approximately 20% without a resistor Approximately 125% with a dynamic braking option - Short-time average deceleration torque - Motor output 0.1/0.2 kW: over 150% - 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% ⚠ WARNING Set L3-04 = 0 [Stall Prevention during Decel = Disabled] when you operate the drive with: - a regenerative converter - regenerative unit - braking resistor - braking resistor unit. If you set the parameter incorrectly, the drive can decelerate for too long and cause serious injury or death. Note: - 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	Feed Forward Control, Restart After Momentary Power Loss, Speed Search, Overtorque Detection, Torque Limit, 17 Step Speed (max.), 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 Communications (RS-485 max, 115.2 kbps), Auto Restart, Application Presets, DriveWorksEZ (customized functions), Parameter Backup Function, Online Tuning, KEB, Overexcitation Deceleration, Overvoltage Suppression, High Frequency Injection, etc.

Table 7.9 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.

Item	Specification
Overload Protection	Drive stops when the output current is more than these overload tolerances: • HD: 150% of the rated output current for 60 seconds. • ND: 110% of the rated output current for 60 seconds. Note: If output frequency < 6 Hz, the drive can trigger the overload protection function when the output current is in the overload tolerance range.
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	Single-phase 200 V class: Stops when the DC bus voltage decreases to less than approximately 160 V Three-phase 200 V class: Stops when the DC bus voltage decreases to less than approximately 190 V Three-phase 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 and continues operation if power loss is shorter than 2 s (depending on parameter settings). Note: • Load size and motor speed can cause the stop time to be shorter. • 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 2001 to 2042 and 4001 to 4023.
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: • There is a low-resistance ground fault for the motor cable or terminal block • There is a ground fault and you energize the drive
DC Bus Charge LED	Charge LED illuminates when DC bus voltage is more than 50 V.

Table 7.10 Environment

Item	Specification
Area of Use	Indoors
Power Supply	Overvoltage Category III
Ambient Temperature	IP20/UL Open Type: -10 °C to +50 °C (14 °F to 122 °F) IP20/UL Type 1: -10 °C to +40 °C (14 °F to 104 °F) • 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.
Humidity	95% RH or less Do not let condensation form on the drive.
Storage Temperature	-20 °C to +70 °C (-4 °F to +158 °F) (short-term temperature during transportation)
Surrounding Area	Pollution degree 2 or less Install the drive in an area without: • 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
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: • Installing the drive at 2000 m (6562 ft) or lower • Installing the drive between 2000 m to 4000 m (6562 ft to 13123 ft) and grounding the neutral point on the power supply. Contact Yaskawa or your nearest sales representative if you will not ground the neutral point.
Vibration	• 10 Hz to 20 Hz: 1 G (9.8 m/s², 32.15 ft/s²) • 20 Hz to 55 Hz: 0.6 G (5.9 m/s², 19.36 ft/s²)
Installation Orientation	Install the drive vertically for sufficient airflow to cool the drive.

7.1 Specifications

Table 7.11 Standard

Item	Specification
Applicable Standards	- UL 61800-5-1 - EN 61800-3 - EN 61800-5-1 - Two Safe Disable inputs and one EDM output according to EN ISO 13849-1 (Cat.3, PL e), EN 61800-5-2 SIL3
Enclosure Protection Design	IP20/UL Open Type IP20/UL Type 1 Note: Install a UL Type 1 kit (optional) on an IP20/UL Open Type drive to change the drive to an IP20/UL Type 1 enclosure.

◆ 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

The tables in this section 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.

Single-Phase 200 V Class

Table 7.12 Carrier Frequency and Rated Current Derating (Single-Phase 200 V)

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
B001	0.8	0.8	0.8	0.8	0.7	0.6	1.2	1.1	1.0	0.9	0.8	0.6
B002	1.6	1.6	1.6	1.6	1.4	1.3	1.9	1.9	1.7	1.6	1.4	1.3
B004	3.0	3.0	3.0	3.0	2.7	2.4	3.5	3.5	3.2	3.0	2.7	2.4
B006	5.0	5.0	5.0	5.0	4.5	4.0	6.0	6.0	5.4	5.0	4.5	4.0
B010	8.0	8.0	8.0	7.5	7.0	6.4	9.6	9.1	8.3	7.7	7.1	6.4
B012	11.0	11.0	11.0	10.4	9.6	8.8	12.2	11.9	11.0	10.4	9.6	8.8
B018	17.6	17.6	17.6	16.6	15.3	14.1	21.0	19.8	18.1	17.0	15.5	14.1

Table 7.13 AOLV/PM Carrier Frequency and Rated Current Derating (Single-Phase 200 V)

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
B001	0.8	0.8	0.8	0.7	0.6	0.5	1.2	1.1	0.9	0.8	0.6	0.5
B002	1.6	1.6	1.6	1.5	1.3	1.1	1.9	1.9	1.7	1.5	1.3	1.1
B004	3.0	3.0	3.0	2.8	2.4	2.0	3.5	3.5	3.1	2.8	2.4	2.0
B006	5.0	5.0	5.0	4.6	4.0	3.4	6.0	5.8	5.2	4.6	4.0	3.4
B010	8.0	8.0	7.8	7.1	6.4	5.7	9.6	8.8	8.0	7.2	6.4	5.6
B012	11.0	11.0	10.7	9.7	8.8	7.9	12.2	11.6	10.7	9.7	8.8	7.9
B018	17.6	17.6	17.1	15.6	14.1	12.6	21.0	19.3	17.5	15.8	14.1	12.3

Three-Phase 200 V Class

Table 7.14 Carrier Frequency and Rated Current Derating (Three-Phase 200 V)

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
2001	0.8	0.8	0.8	0.8	0.7	0.6	1.2	1.1	1.0	0.9	0.8	0.6
2002	1.6	1.6	1.6	1.6	1.4	1.3	1.9	1.9	1.7	1.6	1.4	1.3
2004	3.0	3.0	3.0	3.0	2.7	2.4	3.5	3.5	3.2	3.0	2.7	2.4
2006	5.0	5.0	5.0	5.0	4.5	4	6.0	6.0	5.4	5.0	4.5	4
2010	8.0	8.0	8.0	7.5	7.0	6.4	9.6	9.1	8.3	7.7	7.1	6.4
2012	11.0	11.0	11.0	10.4	9.6	8.8	12.2	11.9	11.0	10.4	9.6	8.8
2021	17.6	17.6	17.6	16.6	15.3	14.1	21.0	19.8	18.1	17.0	15.5	14.1
2030	25.0	25.0	25.0	23.6	21.8	20	30.0	28.3	25.8	24.2	22.1	20
2042	33.0	33.0	33.0	31.1	28.8	26	42.0	39.4	35.5	32.9	29.7	26
2056	47.0	47.0	47.0	44.3	41.0	38	56.0	52.9	48.3	45.3	41.4	38
2070	60.0	60.0	60.0	56.6	52.3	48	70.0	66.3	60.8	57.2	52.6	48
2082	75.0	75.0	75.0	70.7	65.4	60	82.0	81.4	75.0	70.7	65.4	60

Table 7.15 AOLV/PM Carrier Frequency and Rated Current Derating (Three-Phase 200 V)

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
2001	0.8	0.8	0.8	0.7	0.6	0.5	1.2	1.1	0.9	0.8	0.6	0.5
2002	1.6	1.6	1.6	1.5	1.3	1.1	1.9	1.9	1.7	1.5	1.3	1.1
2004	3.0	3.0	3.0	2.8	2.4	2.0	3.5	3.5	3.1	2.8	2.4	2.0
2006	5.0	5.0	5.0	4.6	4.0	3.4	6.0	5.8	5.2	4.6	4.0	3.4
2010	8.0	8.0	7.8	7.1	6.4	5.7	9.6	8.8	8.0	7.2	6.4	5.6
2012	11.0	11.0	10.7	9.7	8.8	7.9	12.2	11.6	10.7	9.7	8.8	7.9
2021	17.6	17.6	17.1	15.6	14.1	12.6	21.0	19.3	17.5	15.8	14.1	12.4
2030	25.0	25.0	24.3	22.1	20.0	17.9	30.0	27.5	25.0	22.5	20.0	17.5
2042	33.0	33.0	32.1	29.2	26.4	23.6	42.0	38.1	34.2	30.3	26.4	22.5
2056	47.0	47.0	45.7	41.6	37.6	33.6	56.0	51.4	46.8	42.2	37.6	33.0
2070	60.0	60.0	58.3	53.1	48.0	42.9	70.0	64.5	59.0	53.5	48.0	42.5
2082	75.0	75.0	72.9	66.4	60.0	53.6	82.0	79.3	72.9	66.4	60.0	53.6

Three-Phase 400 V Class

Table 7.16 Carrier Frequency and Rated Current Derating (Three-Phase 400 V)

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
4001	1.2	1.2	1.2	1.1	0.9	0.7	1.2	1.2	1.2	1.1	0.9	0.7
4002	1.8	1.8	1.8	1.6	1.3	1.1	2.1	2.1	1.8	1.6	1.3	1.1
4004	3.4	3.4	3.4	3.0	2.5	2.0	4.1	4.0	3.4	3.0	2.5	2.0
4005	4.8	4.8	4.8	4.3	3.6	2.9	5.4	5.4	4.8	4.2	3.6	2.9

7.1 Specifications

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
4007	5.5	5.5	5.5	4.9	4.1	3.3	7.1	6.5	5.5	4.9	4.1	3.3
4009	7.3	7.3	7.3	6.5	5.4	4.4	8.9	8.6	7.3	6.5	5.4	4.4
4012	9.2	9.2	9.2	8.1	6.8	5.5	11.9	10.8	9.2	8.2	6.8	5.5
4018	14.8	14.8	14.8	13.1	11.0	8.9	17.5	17.0	14.5	12.8	10.8	8.7
4023	18.0	18.0	18.0	15.9	13.4	10.8	23.4	21.3	18.2	16.1	13.4	10.8
4031	24.0	24.0	24.0	21.3	17.8	14.4	31.0	28.2	24.1	21.3	17.9	14.4
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	44.0	39.0	34.5	29.0	23.4
4060	45.0	45.0	45.0	39.9	33.4	27.0	60.0	54.5	46.3	40.8	33.9	27.0

Table 7.17 AOLV/PM Carrier Frequency and Rated Current Derating (Three-Phase 400 V)

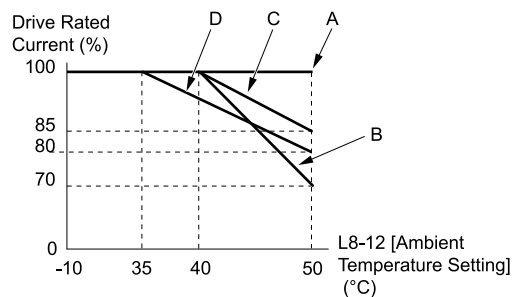
Model	Rated Current (A)											
	Heavy Duty Rating (HD) [C6-01 = 0]						Normal Duty Rating (ND) [C6-01 = 1]					
	2 kHz	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz	2 kHz	4 kHz	6 kHz	8 kHz	10 kHz	12 kHz
4001	1.2	1.2	1.1	0.9	0.7	0.5	1.2	1.2	1.1	0.9	0.7	0.5
4002	1.8	1.8	1.7	1.4	1.1	0.8	2.1	2.0	1.7	1.4	1.1	0.8
4004	3.4	3.4	3.2	2.6	2.0	1.5	4.1	3.8	3.2	2.6	2.0	1.5
4005	4.8	4.8	4.5	3.7	2.9	2.1	5.4	5.3	4.5	3.7	2.9	2.1
4007	5.5	5.5	5.2	4.2	3.3	2.4	7.1	6.2	5.2	4.3	3.3	2.4
4009	7.3	7.3	6.9	5.6	4.4	3.1	8.9	8.1	6.9	5.6	4.4	3.1
4012	9.2	9.2	8.7	7.1	5.5	3.9	11.9	10.3	8.7	7.1	5.5	3.9
4018	14.8	14.8	14.0	11.4	8.9	6.3	17.5	16.2	13.7	11.2	8.7	6.2
4023	18.0	18.0	17.0	13.9	10.8	7.7	23.4	20.3	17.1	14.0	10.8	7.7
4031	24.0	24.0	22.6	18.5	14.4	10.3	31.0	26.9	22.7	18.6	14.4	10.3
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	43.5	36.8	30.1	23.4	16.7
4060	45.0	45.0	42.4	34.7	27.0	19.3	60.0	51.8	43.5	35.3	27.0	18.8

■ Derating Depending on Ambient Temperature

When you install drives in these conditions, set L8-12 [*Ambient Temperature Setting*] and L8-35 [*Installation Method Selection*].

- Surrounding air temperatures are higher than the rated conditions
- Install drives side-by-side in the enclosure panel

Derate the output current as specified in [Figure 7.1](#).



A - L8-35 = 0 [IP20/UL Open Type]
(0.5 m/s of airflow around the drive is necessary)

B - L8-35 = 1 [Side-by-Side Mounting]

C - L8-35 = 2 [IP20/UL Type 1]

D - L8-35 = 3 [External Heatsink/Finless]

Figure 7.1 Derating Depending on Drive Installation Method

■ 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.

Disposal

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8.1 Section Safety

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.

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.

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.

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.

8.2 Disposal Instructions

Correctly dispose of the product and packing material as specified by applicable regional, local, and municipal laws and regulations.

8.3 WEEE Directive



The wheeled bin symbol on this product, its manual, or its packaging identifies that you must recycle it at the end of its product life.

You must discard the product at an applicable collection point for electrical and electronic equipment (EEE). Do not discard the product with usual waste.

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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.

Specifications are subject to change without notice for ongoing product modifications and improvements.

Original instructions.

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