YASKAWA

iQpump®605 DRIVE

MAINTENANCE & TROUBLESHOOTING

INTELLIGENT PUMP CONTROLLER

CATALOG CODE:

WM65Wxxxxxxx

CAPACITIES:

208 V class: 2.2 to 110 kW (3 to 150 HP)
480 V class: 2.2 to 450 kW (3 to 600 HP)

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i

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
Drive	YASKAWA AC Drive iQpump®605
EDM	External Device Monitor
EZOLV	EZ Open Loop Vector Control
IPM motor	Interior Permanent Magnet motors
MFAI	Multi-Function Analog Input
MFAO	Multi-Function Analog Output
MFDI	Multi-Function Digital Input
MFDO	Multi-Function Digital Output
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 motors
V/f	V/f Control

◆ About Registered Trademarks

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i.2 Using the Product Safely

◆ Explanation of Signal Words

⚠WARNING

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

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

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

⚠DANGER

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

⚠WARNING

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

⚠CAUTION

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

NOTICE

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

◆ General Safety

General Precautions

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

⚠DANGER

Do not ignore the safety messages in this manual.

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

Electrical Shock Hazard

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

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

⚠WARNING

Crush Hazard

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

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

Sudden Movement Hazard

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

Incorrect function settings can cause serious injury or death.

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

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

Arc Flash Hazard

Obey local codes and Arc Flash safety requirements contained in the Standard for Electrical Safety in the Workplace NFPA 70E (2009 Edition or later) and the Workplace Electrical Safety, Canadian Standards Association (CSA) Z462-12. Obey safe work procedures and use applicable personal protective equipment (PPE).

If you do not obey these requirements and procedures, it can cause serious injury or death.

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.

Disconnect all power to the drive and remove all wires to do maintenance on the drive.

If you only turn OFF the built-in Main Switch before you do maintenance, there can be high voltage on input terminals R/L1, S/L2, and T/L3 of the Main Switch and touching energized terminals will 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

Install sufficient branch circuit short circuit protection as specified by applicable codes and this manual. The drive is suitable for circuits that supply not more than 100,000 RMS symmetrical amperes, 240 Vac maximum (208 V Class), 480 Vac maximum (480 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.

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 cycle the Main Switch more than 6000 times.

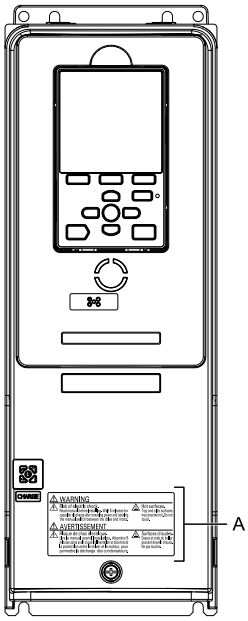
If you cycle the Main Switch more times than the limit, it will cause the contact failure, or you cannot open or close the Main Switch.

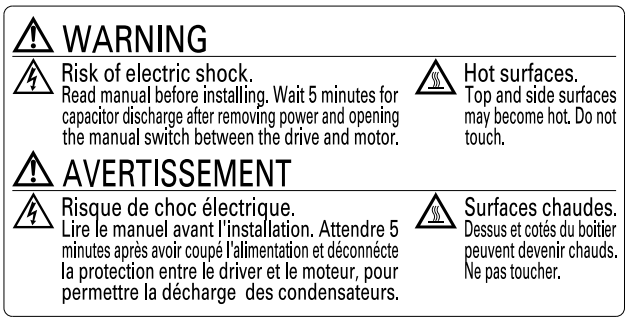
Make sure that you stop the motor before you turn ON/OFF the Main Switch.

If you turn ON/OFF the Main Switch during run, it can cause Main Switch failure.

◆ Warning Label Content and Location

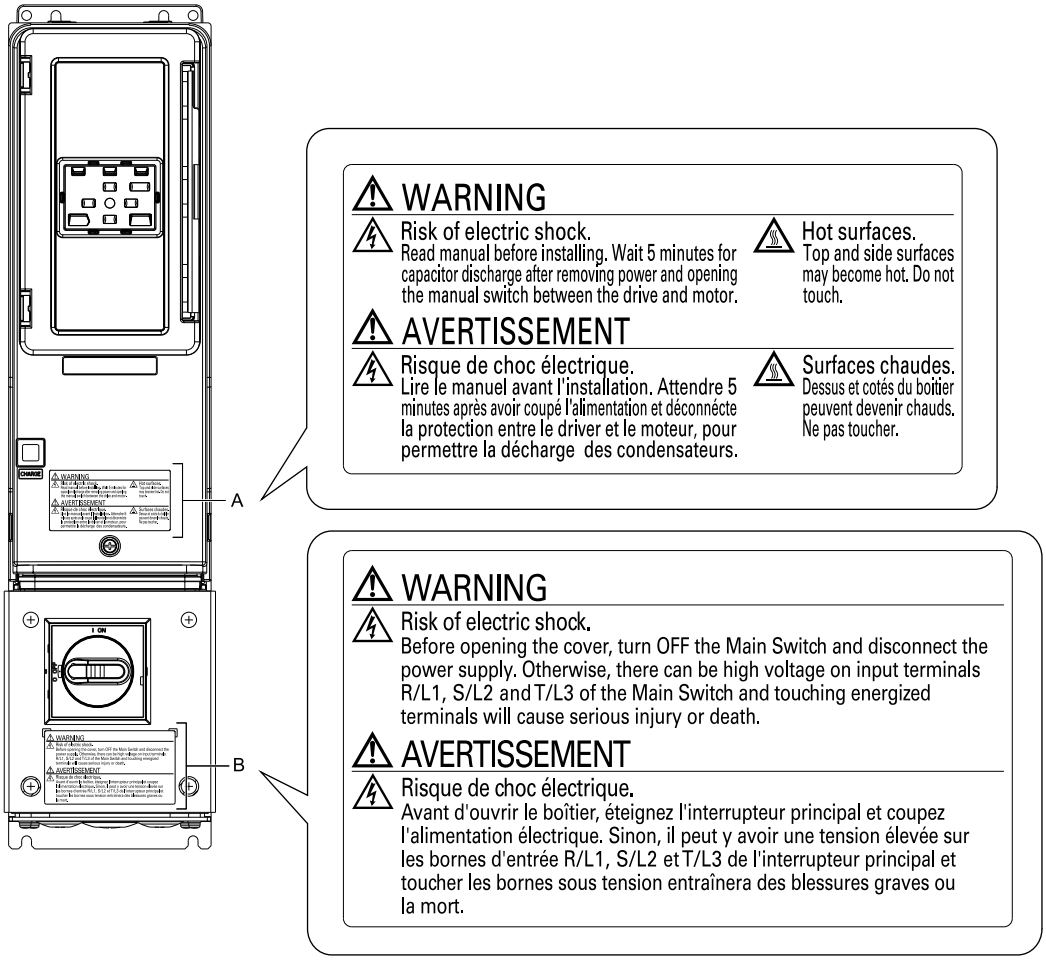
The drive warning labels are in the locations shown in Figure i.1 and Figure i.2. Use the drive as specified by this information.





A - Warning label

Figure i.1 Warning Label Content and Location (Models: 2xxxxB/F/V/W and 4xxxxB/F/V/W without Main Switch)



A - Warning label **B - Warning label for Main Switch**

Figure i.2 Warning Label Content and Location (Models: 2xxxxT and 4xxxxT with Main Switch)

◆ Cybersecurity

This product is designed to connect and communicate information and data through a network interface. It is the sole responsibility of the customer to provide and continuously guarantee a secure connection between the product and the customer's network or if applicable, any other network. The customer must establish and maintain the appropriate measures (such as, but not limited to, the installation of firewalls, the application of authentication measures, the encryption of data, the installation of antivirus programs, etc.) to protect the product, the network, its system and the interface against all types of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. Yaskawa and its affiliates are not responsible for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

i.3 Warranty Information

◆ Exclusion of Liability

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

⚠WARNING

Injury to Personnel

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

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

1

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, remove the covers before measuring for dangerous voltages to make sure that the drive is safe.

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

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

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

⚠WARNING

Electrical Shock Hazard

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

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

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

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

Always ground the motor-side grounding terminal.

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

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

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

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

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

Fire Hazard

Tighten all terminal screws to the correct tightening torque.

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

Damage to Equipment

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

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

Fire Hazard

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

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

⚠WARNING

Electrical Shock Hazard

Do not modify the drive body or drive circuitry.

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

Sudden Movement Hazard

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

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

⚠CAUTION

Burn Hazard

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

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

NOTICE

Damage to Equipment

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

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

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

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

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

Incorrect connections can cause damage to the drive.

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

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

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

You can cause damage to the drive and connected equipment.

Note:

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

1.2 Inspection

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

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

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

Note:

Examine the drive one time each year at a minimum.

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

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

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

◆ Recommended Daily Inspection

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

Table 1.1 Daily Inspection Checklist

Inspection Area	Inspection Points	Corrective Action	Checked
Motor	Examine for unusual oscillation or noise coming from the motor.	• 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, circulation fans, and circuit board 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, remove the covers before measuring for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.

Table 1.2 Main Circuit Periodic Inspection Checklist

Inspection Area	Inspection Points	Corrective Action	Checked
General	• 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 or terminals.	
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.	
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.	

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. • Examine if the clock battery is expired.	• If you have problems with the display or the keys, contact Yaskawa or your nearest sales representative. • Clean the keypad. • Replace the battery.	

1.3 Maintenance

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

- Control circuit terminal board
- 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:

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

Note:
Make sure that you use a keypad with FLASH number 1004 or later. Keypads with FLASH numbers 1003 and earlier will not show characters correctly.

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

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

⚠ DANGER Electrical Shock Hazard

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

◆ 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:

The performance life estimate uses these operating conditions. Yaskawa provides these conditions so you can replace parts to maintain performance. Unsatisfactory conditions or heavy use will make it necessary for you to replace some parts more frequently than other parts.
Operating conditions for performance life estimate:

- Yearly average
  - –IP20/Open Type enclosure: 40 °C (104 °F)
  - –IP20/UL Type 1 and External Heatsink Installation of IP55/UL Type 12: 30 °C (86 °F)
- Load factor
  80% maximum
- Operation time
  24 hours a day

◆ Monitors that Show 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 see how close you are to the end of the useful life of a component. 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 reached by the IGBTs.

◆ Alarm Outputs for Maintenance Monitors

You can use *H2-xx [Multi-Function Digital Out]* to send a message that tells you when a specified component is near the end of its performance life estimate. Set *H2-xx* to the applicable value for your component as shown in Table 1.9.

When the specified component is near the end of its performance life estimate, the MFDO terminals set for *H2-xx = 2F [Maintenance Notification]* will turn ON, 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 *o4-03 = 0 [Fan Operation Time Setting = 0 h]* to reset the cooling fan operation time.	2F
LT-2	Capacitor Maintenance Time	The capacitors for the main circuit and control circuit are at 90% of expected performance life.	Replace the board or the drive. Contact Yaskawa or your nearest sales representative to replace the board.	
LT-3	SoftChargeBypassRelay MainteTime	The soft charge bypass relay is at 90% of its performance life estimate.	Replace the board or the drive. Contact Yaskawa or your nearest sales representative to replace the board.	
LT-4	IGBT Maintenance Time (50%)	The IGBT is at 50% of its expected performance life.	Check the load, carrier frequency, and output frequency.	
TrPC	IGBT Maintenance Time (90%)	The IGBT is at 90% of its expected performance life.	Replace the IGBT or the drive.	10

◆ Related Parameters

Replace the component, then set *o4-03, o4-05, o4-07, and o4-09 [Maintenance Setting] = 0* to reset the Maintenance Monitor. If you do not reset these parameters after you replace the parts, the Maintenance Monitor function will

continue to count down the performance life from the value from the previous part. If you do not reset the Maintenance Monitor, the drive will not have the correct value of the performance life for the new part.

Note:

The maintenance period is different 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 *o4-03 = 30* has been set, the drive will count the operation time for the cooling fan from 300 hours and *U4-03 [Fan Elapsed Time]* 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 and Circulation Fans

⚠ CAUTION **Injury to Personnel**

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

NOTICE

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

◆ Cooling Fans and Circulation Fans by Drive Model

Table 1.11 Cooling Fans and Circulation Fans for IP20/UL Open Type and IP20/UL Type 1 Drives

Model	Cooling Fan	Circulation Fan	Circuit Board Cooling Fan	Replacement Procedure	Reference
4005, 4008	-	-	-	-	-
2011 - 2031 4011 - 4034	1	-	-	Procedure A	27
2046, 2059 4040 - 4052	1	-	-	Procedure B	32
4065	1	1	-		
2075 - 2114 4077 - 4124	2	-	-	Procedure C	39
2143, 2169 4156	2	-	-	Procedure D	44
2211, 2273 4180 - 4302	2	-	-	Procedure E	47
4361	2	1	-	Procedure F	50
2343, 2396 4414	3	1	-		
4477 - 4590	2	1	2	Procedure G	56
4720	3	1	2	Procedure H	65

Table 1.12 Cooling Fans and Circulation Fans for IP55/UL Type 12 Drives

Model	Cooling Fan	Circulation Fan	Replacement Procedure	Reference
4005	-	-	-	-
2011, 2017 4008 - 4014	1	-	Procedure A	27
2024, 2031 4021 - 4034	1	1		
2046, 2059 4040 - 4065	1	1	Procedure B	32
2075 - 2114 4077 - 4124	2	1	Procedure C	39
2143, 2169 4156	2	1	Procedure I	72

Table 1.13 Cooling Fans and Circulation Fans for IP55/UL Type 12 Drives with Main Switch

Model	Cooling Fan	Circulation Fan	Replacement Procedure	Reference
4005	-	-	-	-
2011, 2017 4008 - 4014	1	-	Procedure A	27
2024, 2031 4021 - 4034	1	1		
2046, 2059 4040 - 4065	1	1	Procedure B	32
2075 - 2114 4077 - 4096	2	1	Procedure C	39
4124	2	1	Procedure J	79
2143, 2169 4156	2	1	Procedure I	72

◆ Fan Replacement (Procedure A)

⚠ DANGER Electrical Shock Hazard

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

⚠ CAUTION Burn Hazard

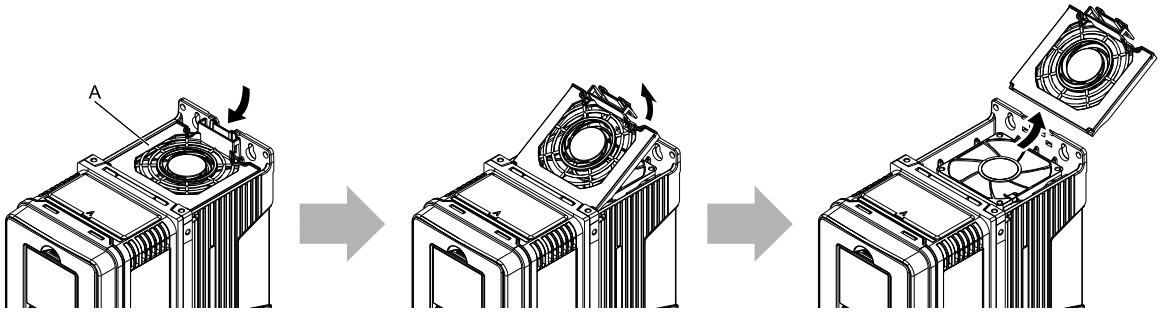
Do not touch a hot drive heatsink. De-energize the drive, wait for a minimum of 15 minutes, then make sure that the heatsink is cool before you replace the cooling fans.
If you touch a hot drive heatsink, it can burn you.

NOTICE

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

■ Fan Removal

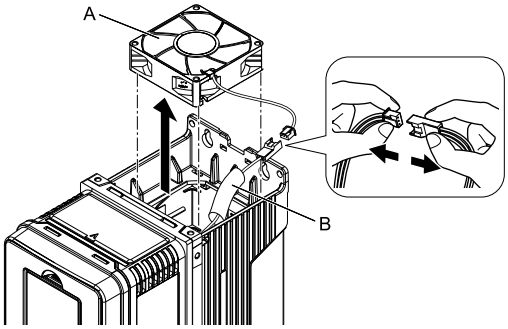
1. Push the tab on the back side of the fan finger guard and pull up to remove the fan finger guard from the drive.



A - Fan finger guard

Figure 1.1 Remove the Fan Finger Guard

2. Pull the cooling fan straight up from the drive. Remove the protective tube on the relay connector and disconnect the connector to remove the fan from the drive.



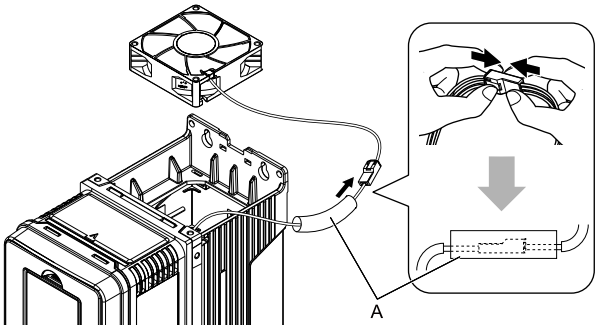
A - Cooling fan **B - Protective tube**

Figure 1.2 Remove the Cooling Fan

■ Fan Installation

Reverse the removal procedure for fan installation.

1. Connect the relay connector between the drive and cooling fan, and attach the protective tube.

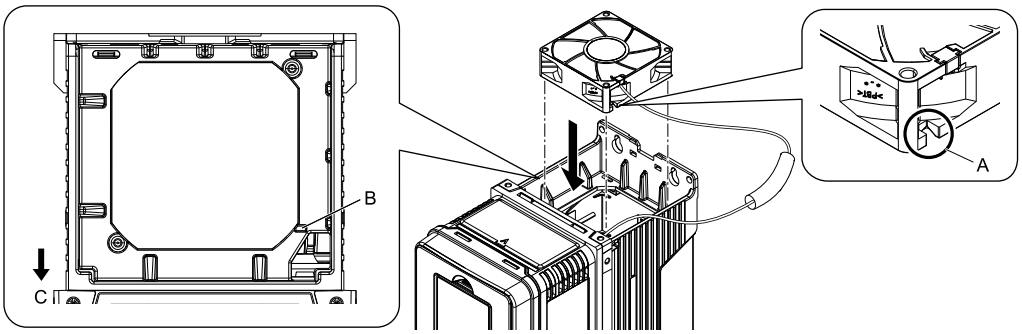


A - Protective tube

Figure 1.3 Connect the Relay Connector

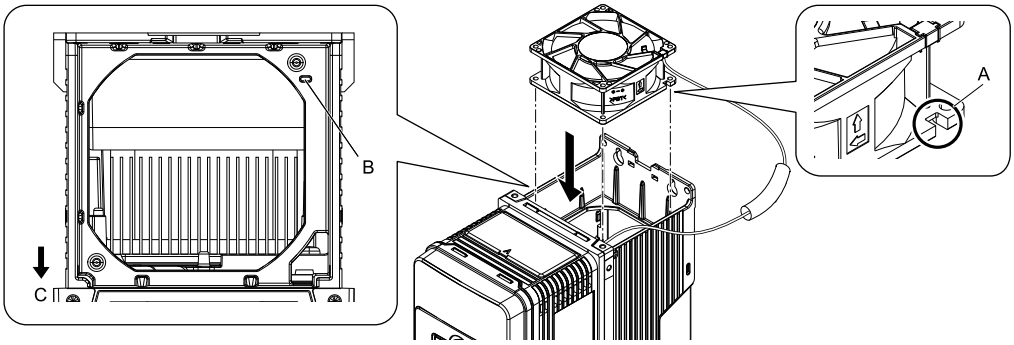
2. Align the notches on the fan with the pin on the drive and install the cooling fan in the drive.

Note:
The positions of notch on the fan and alignment pin on the drive are different for different drive models. Use these figures to make sure that you use correct positions for your drive.



A - Notch on fan **C - Front of drive**
B - Alignment pin on drive

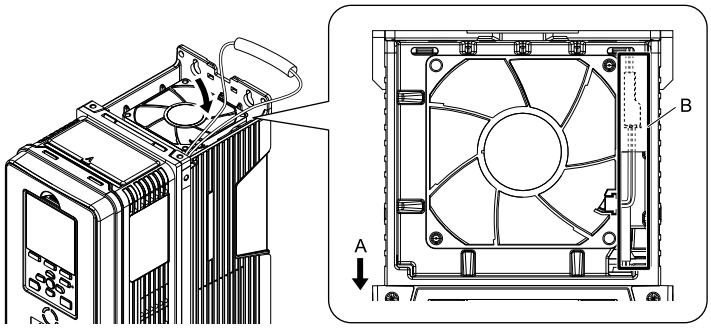
Figure 1.4 Install the Cooling Fan (Drive Models: 2011, 2017, 4008xV/T, 4011, 4014)



A - Notch on fan
B - Alignment pin on drive
C - Front of drive

Figure 1.5 Install the Cooling Fan (Drive Models: 2024, 2031, 4021 to 4034)

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

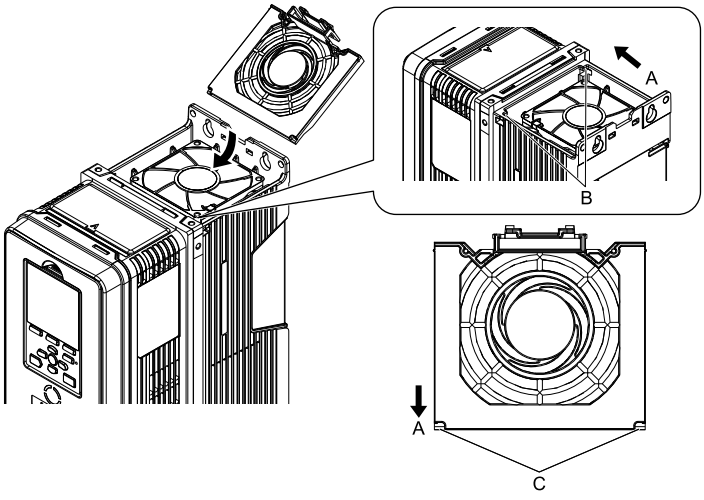


A - Front of drive
B - Recess for cable and connector *1

Figure 1.6 Put the Cable and Connector in the Drive Recess

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

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



A - Front of drive
B - Drive holes
C - Connector tabs

Figure 1.7 Install the Fan Finger Guard

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

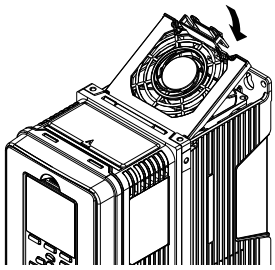


Figure 1.8 Install the Fan Finger Guard

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

■ Circulation Fan Removal

Note:

Use this procedure only when you use one of these drive models:

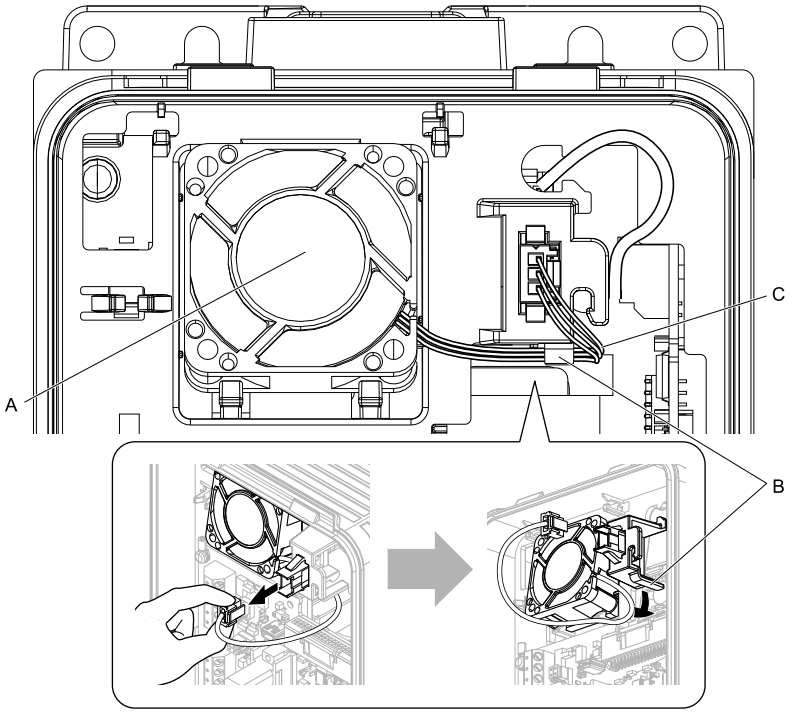
- 2024xV, 2031xV
- 4021xV to 4034xV
- 2024xT, 2031xT
- 4021xT to 4034xT

Remove the drive cover before you start this procedure.

⚠ CAUTION Crush Hazard

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

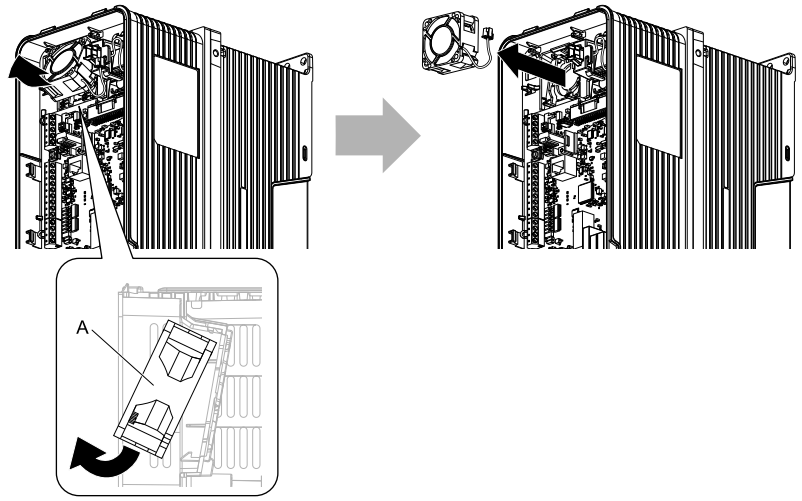
1. Disconnect the connector and remove the fan cable from the hook.



A - Circulation fan
B - Hook
C - Fan cable

Figure 1.9 Disconnect the Connector and Remove the Fan Cable

2. Pull the bottom of the fan forward to remove it from the drive.



A - Circulation fan

Figure 1.10 Remove the Circulation Fan

■ Circulation Fan Installation

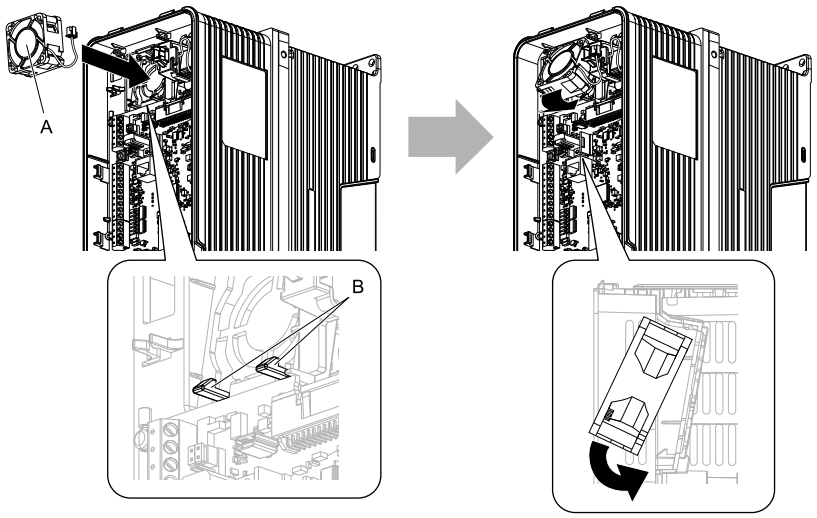
Note:

Use this procedure only when you use one of these drive models:

- 2024xV, 2031xV
- 4021xV to 4034xV
- 2024xT, 2031xT
- 4021xT to 4034xT

Reverse the removal procedure for circulation fan installation.

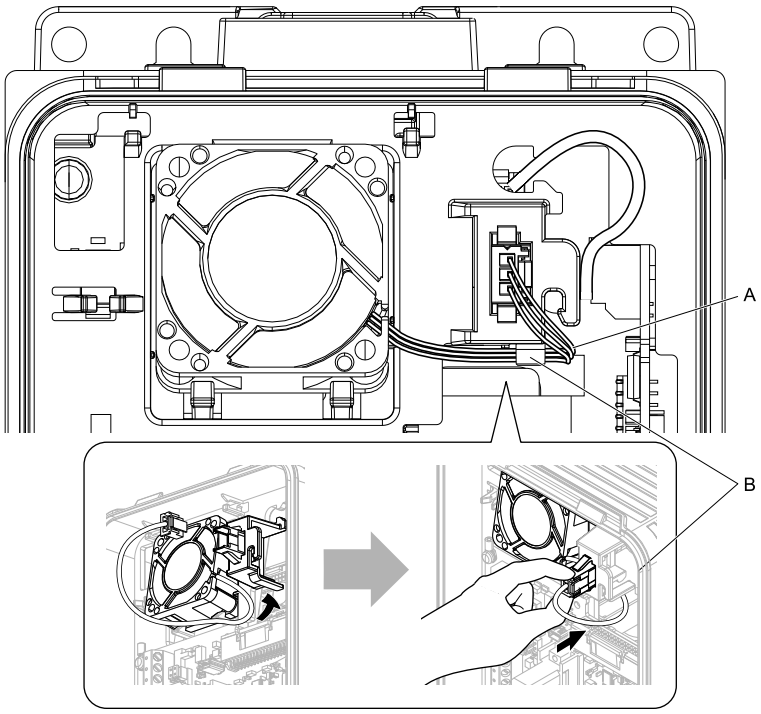
1. Put the side of the fan nearest to the top of the drive in first, and push it until the tabs click into position.



A - Circulation fan **B - Tabs**

Figure 1.11 Install the Circulation Fan

2. Put the cable back into its initial position and connect the connector.



A - Fan cable **B - Hook**

Figure 1.12 Put the Cable Back into the Drive and Connect the Connector

◆ Fan Replacement (Procedure B)

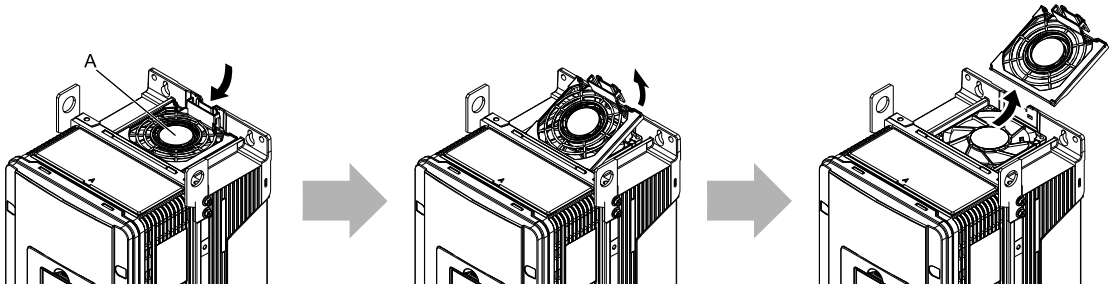
⚠ DANGER Electrical Shock Hazard
Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge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

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

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

■ Fan Removal

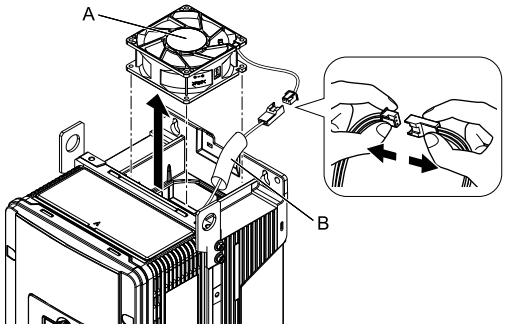
1. Push the tab on the back side of the fan finger guard and pull up to remove the fan finger guard from the drive.



A - Fan finger guard

Figure 1.13 Remove the Fan Finger Guard

2. Pull the cooling fan straight up from the drive. Remove the protective tube on the relay connector and disconnect the connector to remove the fan from the drive.



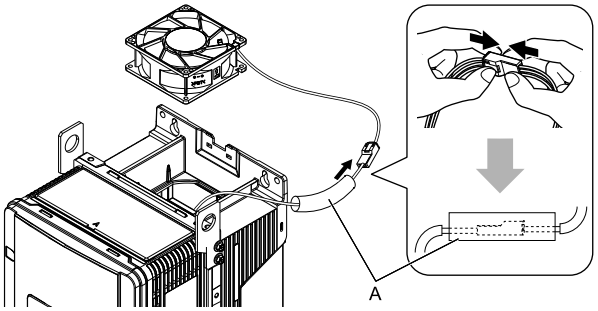
A - Cooling fan **B - Protective tube**

Figure 1.14 Remove the Cooling Fan

■ Fan Installation

Reverse the removal procedure for fan installation.

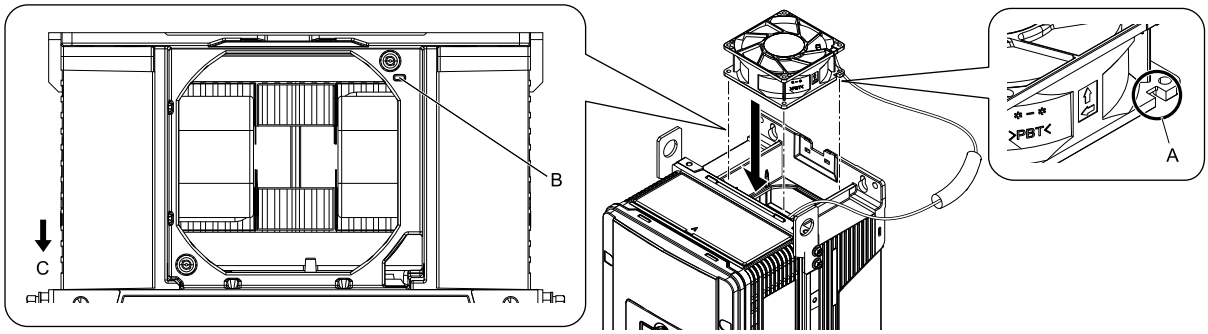
1. Connect the relay connector between the drive and cooling fan, and attach the protective tube.



A - Protective tube

Figure 1.15 Connect the Relay Connector

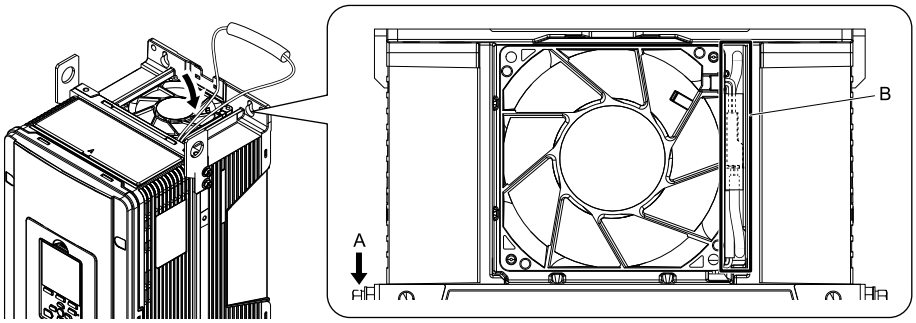
2. Align the notch on the fan with the pin on the drive and install the cooling fan in the drive.



A - Notch on fan
B - Alignment pin on drive
C - Front of drive

Figure 1.16 Install the Cooling Fan

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

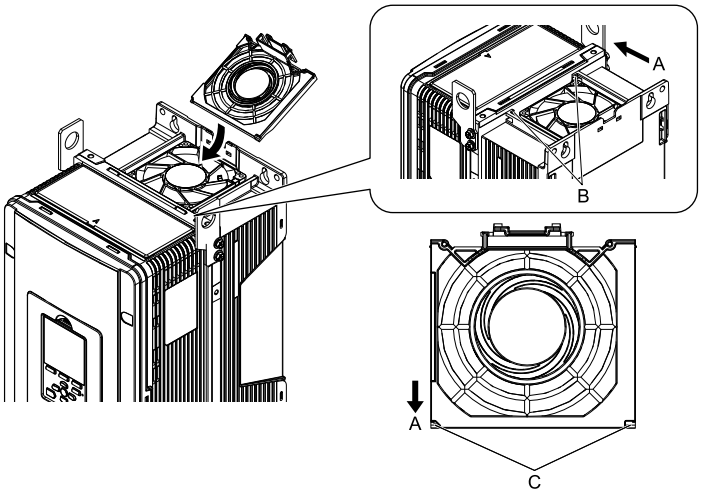


A - Front of drive
B - Recess for cable and connector *1

Figure 1.17 Put the Cable in the Drive Recess

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

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



A - Front of drive
B - Drive holes
C - Connector tabs

Figure 1.18 Install the Fan Finger Guard

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

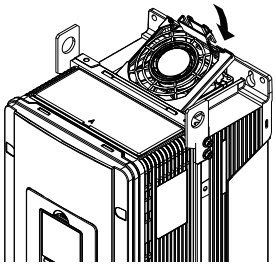


Figure 1.19 Install the Fan Finger Guard

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

■ Circulation Fan Removal

Note:

Use this procedure only when you use one of these drive models:

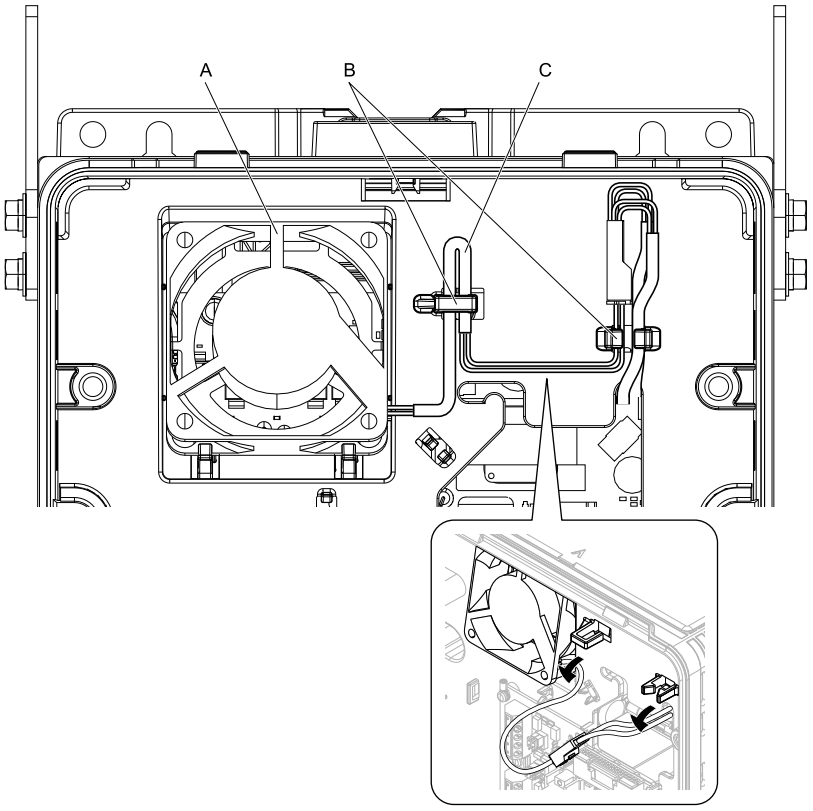
- 4065xF
- 2046xV, 2059xV
- 4040xV to 4065xV
- 2046xT, 2059xT
- 4040xT to 4065xT

Remove the drive cover before you start this procedure.

⚠ CAUTION Crush Hazard

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

1. Remove the fan cable from the hooks.



A - Circulation fan
B - Hooks
C - Fan cable

Figure 1.20 Remove the Fan Cable

2. Disconnect the relay connector.

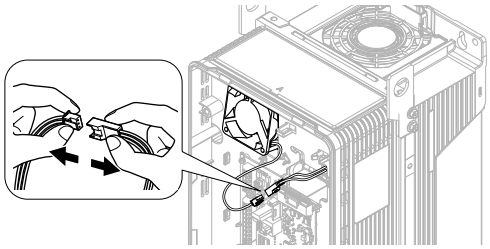
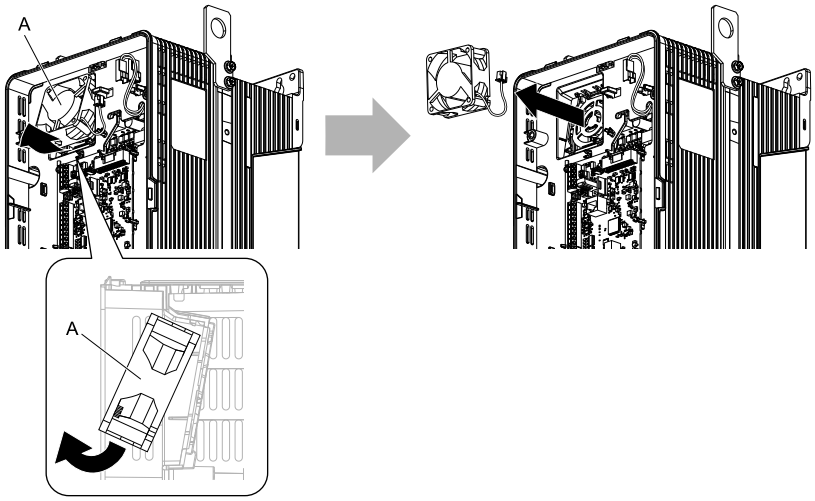


Figure 1.21 Disconnect the Relay Connector

3. Pull the bottom of the fan forward to remove it from the drive.



A - Circulation fan

Figure 1.22 Remove the Circulation Fan

■ Circulation Fan Installation

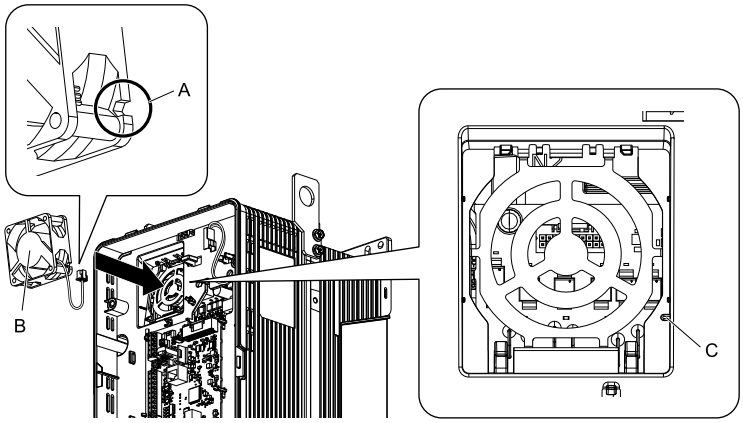
Note:

Use this procedure only when you use one of these drive models:

- 4065xF
- 2046xV, 2059xV
- 4040xV to 4065xV
- 2046xT, 2059xT
- 4040xT to 4065xT

Reverse the removal procedure for circulation fan installation.

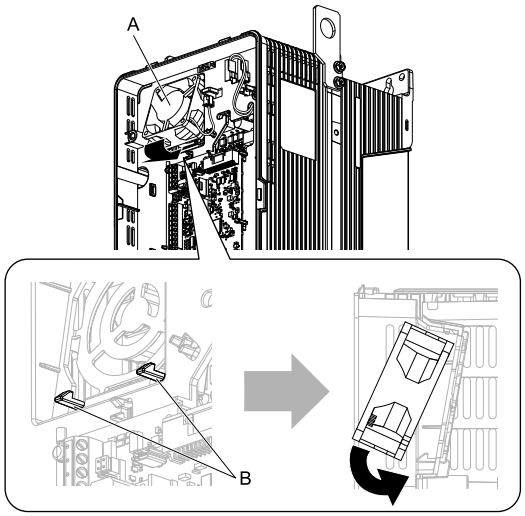
1. Align the notch on the fan with the pin on the drive and install the fan in the drive.



A - Notch on fan
B - Circulation fan
C - Alignment pin on drive

Figure 1.23 Install the Circulation Fan

2. Put the side of the fan nearest to the top of the drive in first, and push it until the tabs click into position.



A - Circulation fan **B - Tabs**

Figure 1.24 Install the Circulation Fan

3. Connect the relay connector.

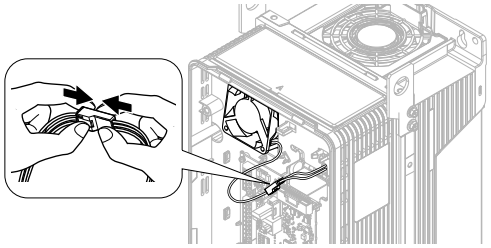
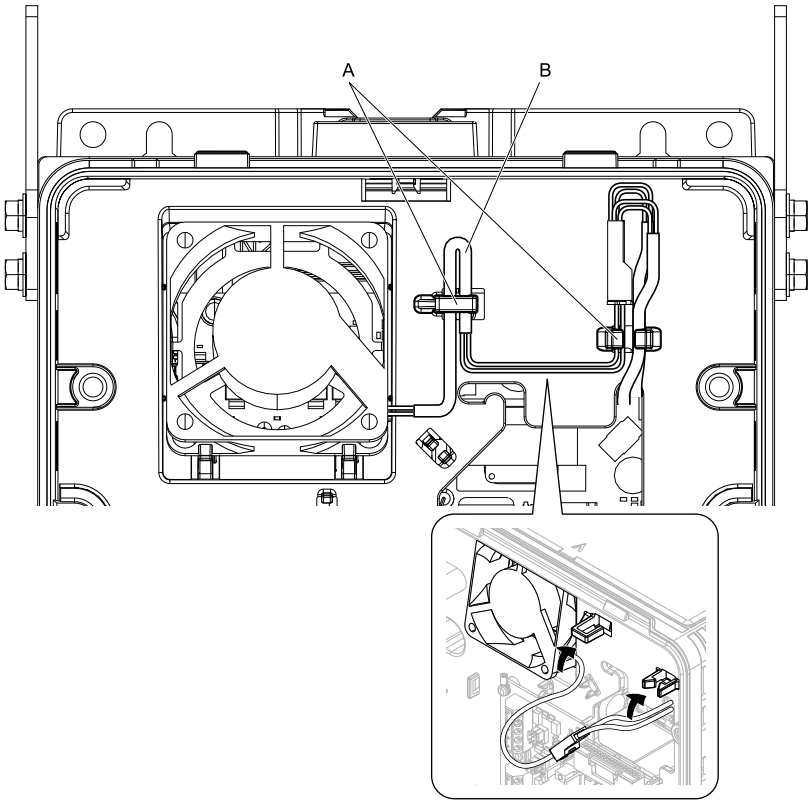


Figure 1.25 Connect the Relay Connector

4. Put the cable and connector back into their initial positions.



A - Hooks **B - Fan cable**

Figure 1.26 Put the Cable Back into the Drive

◆ Fan Replacement (Procedure C)

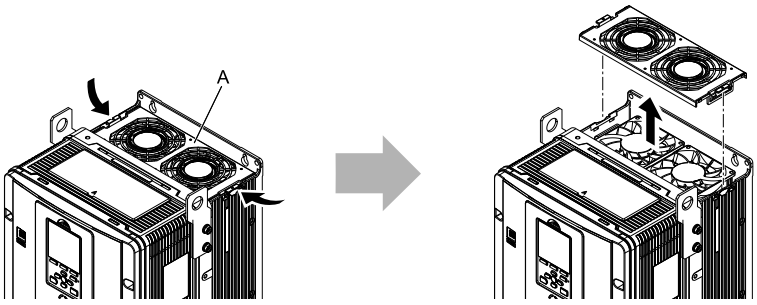
⚠ DANGER Electrical Shock Hazard
Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge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

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

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

■ Fan Removal

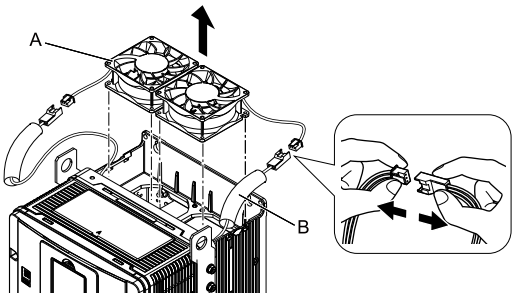
1. Push the tabs on the left and right sides of the fan finger guard and pull up to remove the fan finger guard from the drive.



A - Fan finger guard

Figure 1.27 Remove the Fan Finger Guard

2. Pull the cooling fans straight up from the drive. Remove the protective tubes on the relay connectors and disconnect the connectors to remove the fans from the drive.



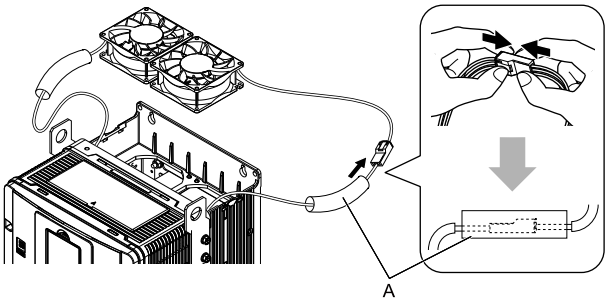
A - Cooling fans **B - Protective tubes**

Figure 1.28 Remove the Cooling Fans

■ Fan Installation

Reverse the removal procedure for fan installation.

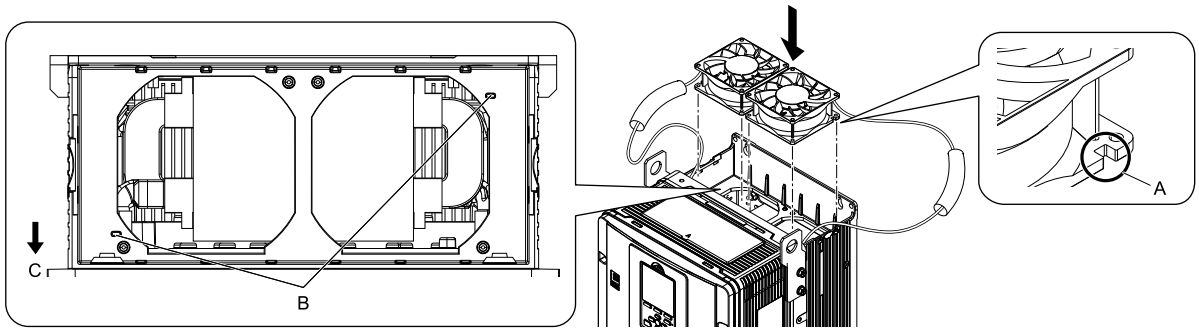
1. Connect the relay connectors between the drive and cooling fans, and attach the protective tubes.



A - Protective tubes

Figure 1.29 Connect the Relay Connectors

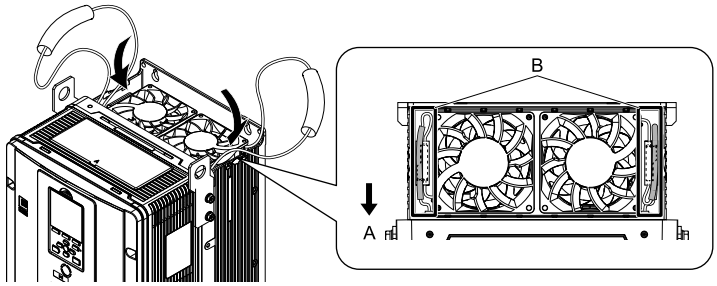
2. Align the notches on the fans with the pins on the drive and install the cooling fans in the drive.



A - Notch on fan
B - Alignment pins on drive
C - Front of drive

Figure 1.30 Install the Cooling Fans

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



A - Front of drive
B - Recess for cables and connectors *1

Figure 1.31 Put the Cables and Connectors in the Drive Recess

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

4. Install the fan finger guard straight until the tabs click into place.

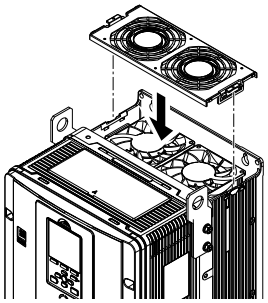


Figure 1.32 Install the Fan Finger Guard

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

■ Circulation Fan Removal

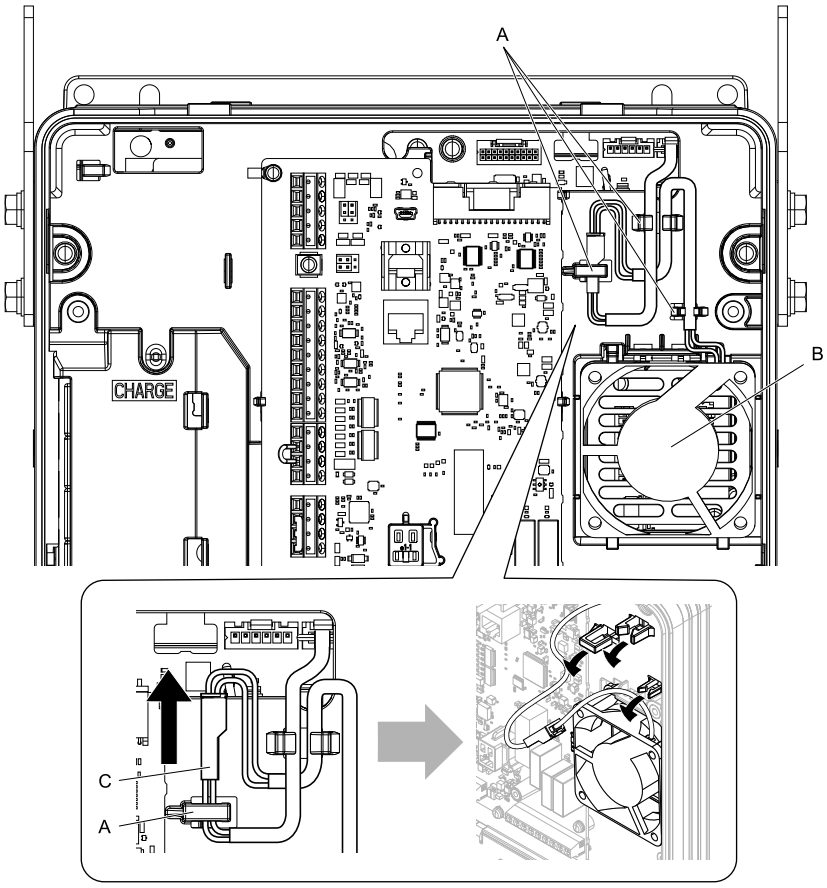
Note:

Use this procedure only when you use one of these drive models:
- 2075xV to 2114xV
- 4077xV to 4124xV
- 2075xT to 2114xT
- 4077xT, 4096xT

Remove the drive cover before you start this procedure.

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

1. Pull the relay connector toward the top of the drive to remove from the hook then remove the cable from the hooks.



A - Hooks
B - Circulation fan
C - Relay connector

Figure 1.33 Remove the Cable

2. Disconnect the relay connector.

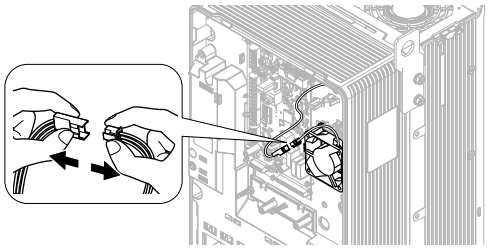
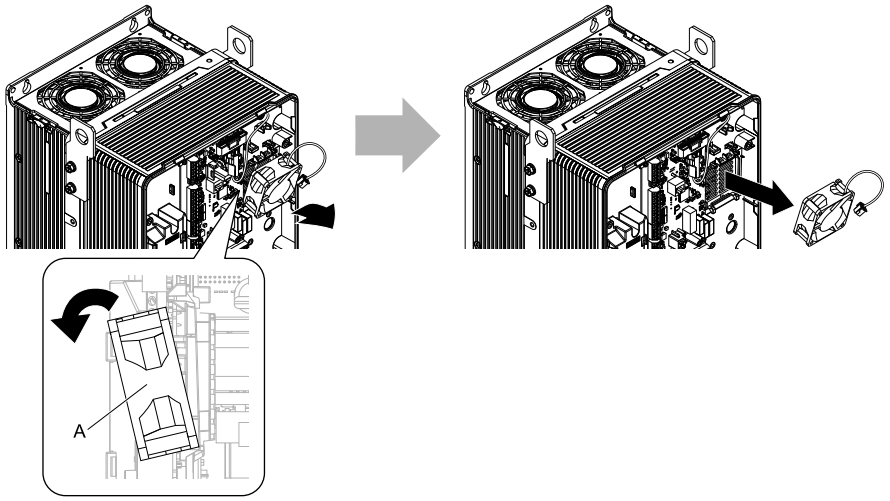


Figure 1.34 Disconnect the Relay Connector

3. Pull the top of the fan forward to remove it from the drive.



A - Circulation fan

Figure 1.35 Remove the Circulation Fan

■ Circulation Fan Installation

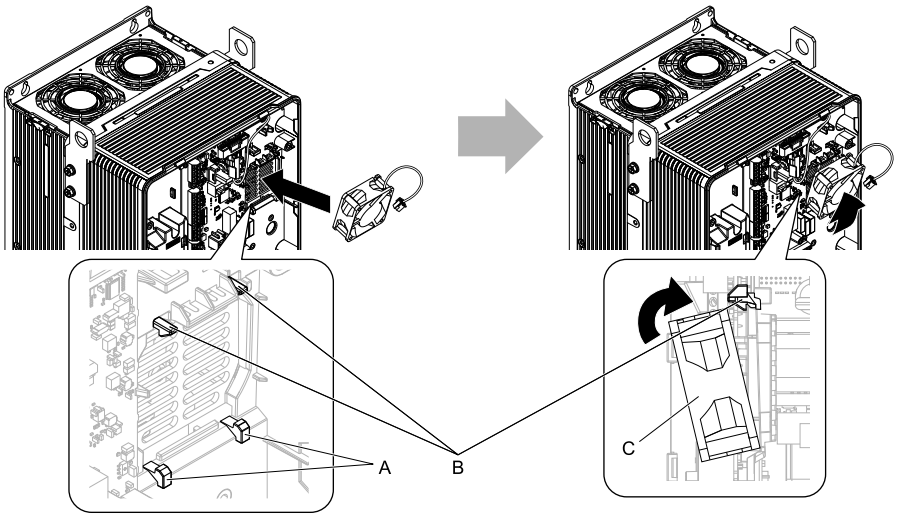
Note:

Use this procedure only when you use one of these drive models:

- 2075xV to 2114xV
- 4077xV to 4124xV
- 2075xT to 2114xT
- 4077xT, 4096xT

Reverse the removal procedure for circulation fan installation.

1. Put the bottom of the fan on the tabs in position A then push the fan until the tabs in position B click into position to put the fan back into the drive.



A - Tabs at the bottom of the fan
B - Tabs at the top of the fan
C - Circulation fan

Figure 1.36 Install the Circulation Fan

2. Connect the relay connector.

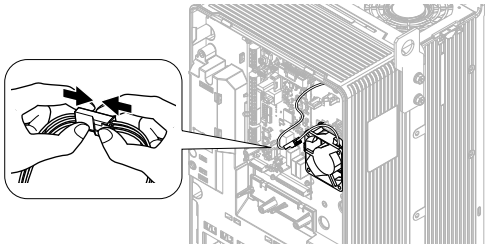
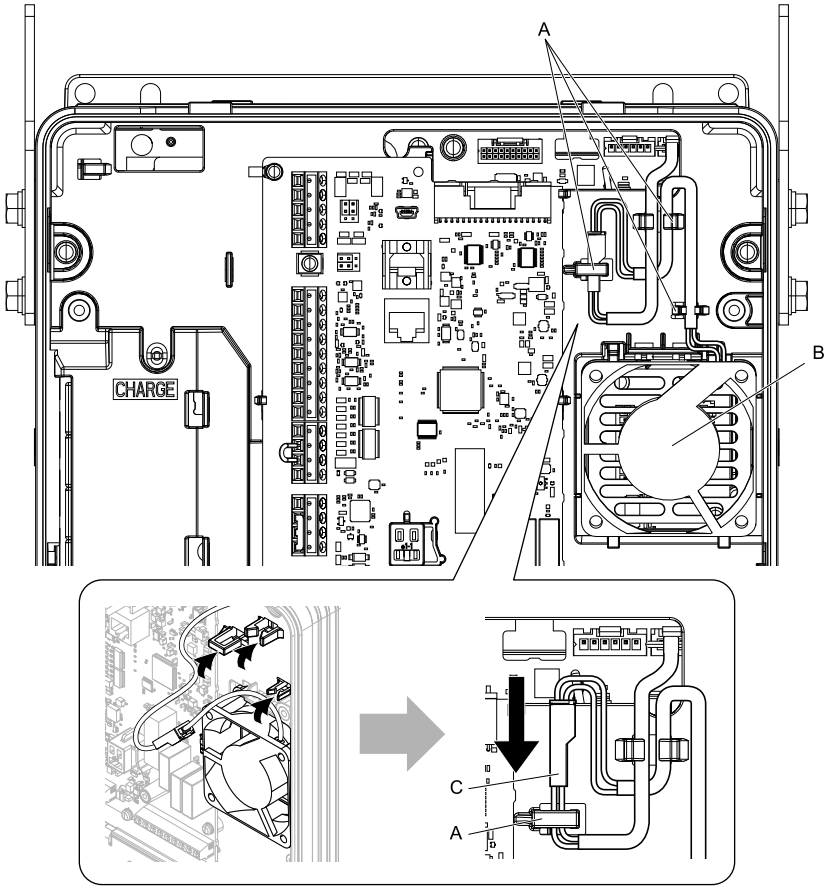


Figure 1.37 Connect the Relay Connector

3. Put the cable and relay connector back into their initial position.



A - Hooks
B - Circulation fan
C - Relay connector

Figure 1.38 Put the Cable and Relay Connector Back into the Drive

◆ Fan Replacement (Procedure D)

⚠ DANGER Electrical Shock Hazard

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

⚠ CAUTION **Burn Hazard**

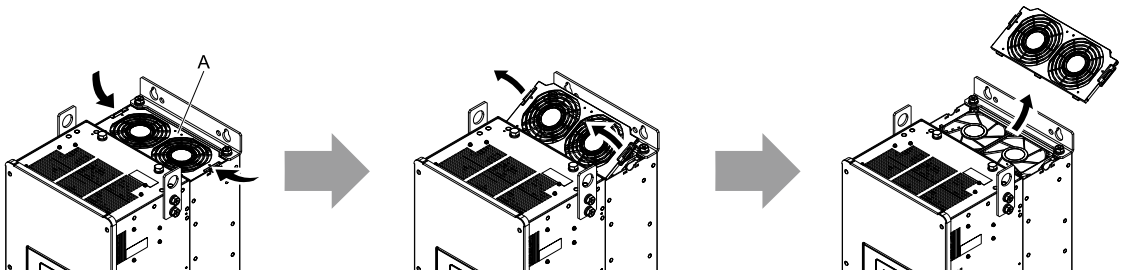
Do not touch a hot drive heatsink. De-energize the drive, wait for a minimum of 15 minutes, then make sure that the heatsink is cool before you replace the cooling fans.
If you touch a hot drive heatsink, it can burn you.

NOTICE

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

■ Fan Removal

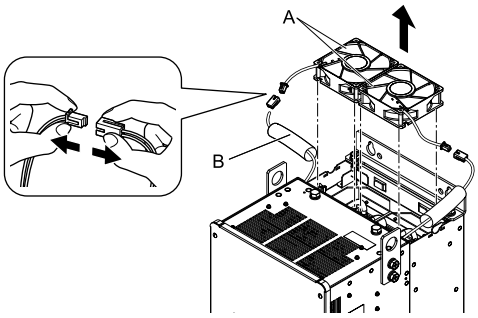
1. Push the tabs on the left and right sides of the fan finger guard and pull up to remove the fan finger guard from the drive.



A - Fan finger guard

Figure 1.39 Remove the Fan Finger Guard

2. Pull the cooling fans straight up from the drive. Remove the protective tubes on the relay connectors and disconnect the connectors to remove the fans from the drive.



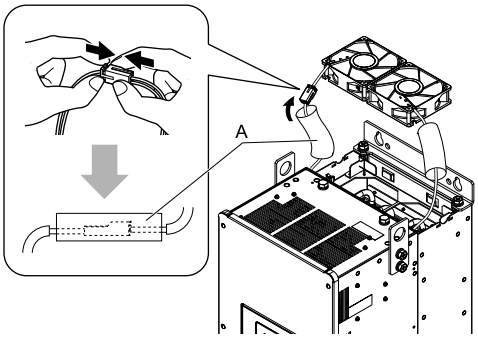
A - Cooling fans **B - Protective tubes**

Figure 1.40 Remove the Cooling Fans

■ Fan Installation

Reverse the removal procedure for fan installation.

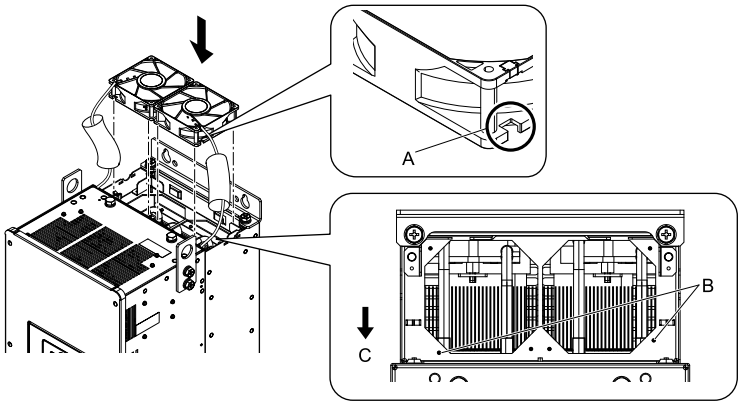
1. Connect the relay connectors, and attach the protective tubes.



A - Protective tubes

Figure 1.41 Connect the Relay Connectors

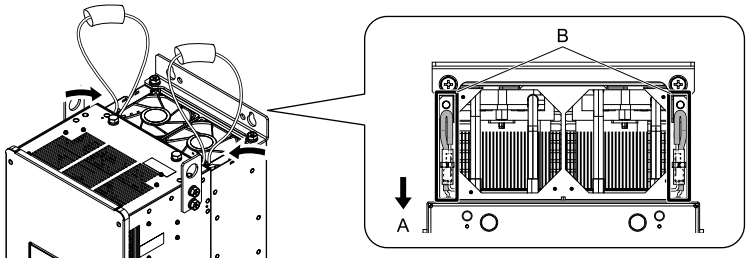
2. Align the notches on the fan with the pins on the drive and install the cooling fans in the drive.



A - Notch on fan
B - Alignment pins on drive
C - Front of drive

Figure 1.42 Install the Cooling Fans

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

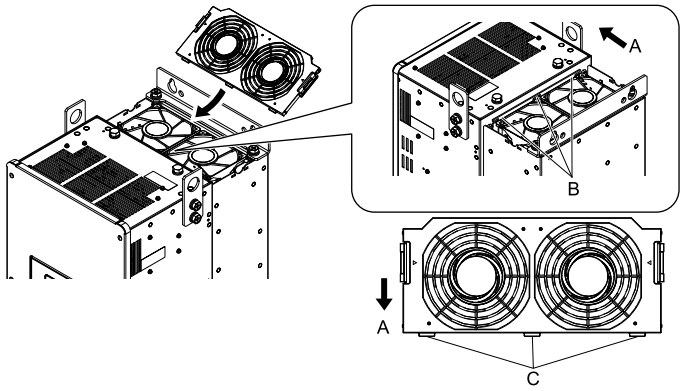


A - Front of drive
B - Recess for cables and connectors *1

Figure 1.43 Put the Cables and Connectors in the Drive Recess

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

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



A - Front of drive
B - Drive holes
C - Connector tabs

Figure 1.44 Install the Fan Finger Guard

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

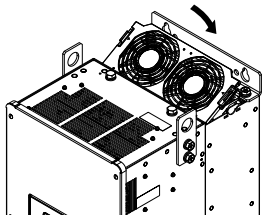


Figure 1.45 Install the Fan Finger Guard

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

◆ Fan Replacement (Procedure E)

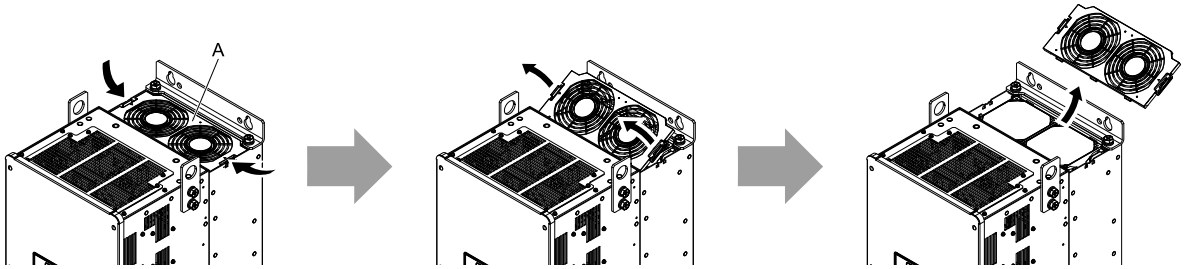
⚠ DANGER Electrical Shock Hazard
Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge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

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

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

■ Fan Removal

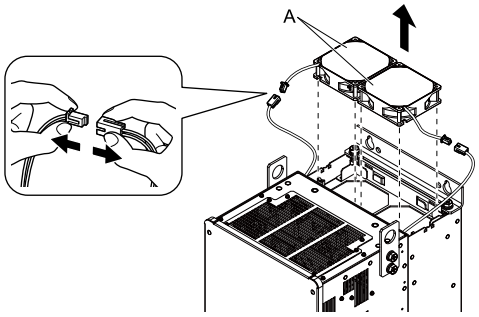
1. Push the tabs on the left and right sides of the fan finger guard and pull up to remove the fan finger guard from the drive.



A - Fan finger guard

Figure 1.46 Remove the Fan Finger Guard

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



A - Cooling fans

Figure 1.47 Remove the Cooling Fans

■ Fan Installation

Reverse the removal procedure for fan installation.

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

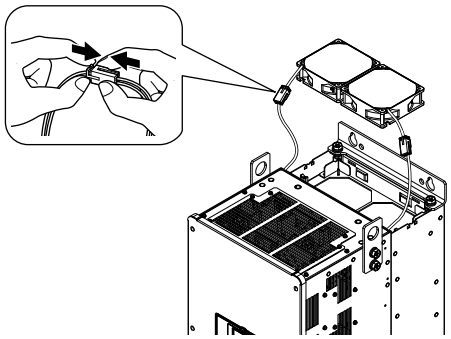
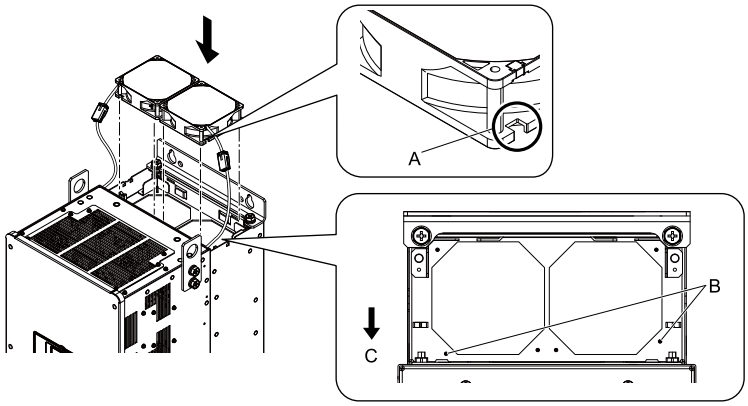


Figure 1.48 Connect the Relay Connectors

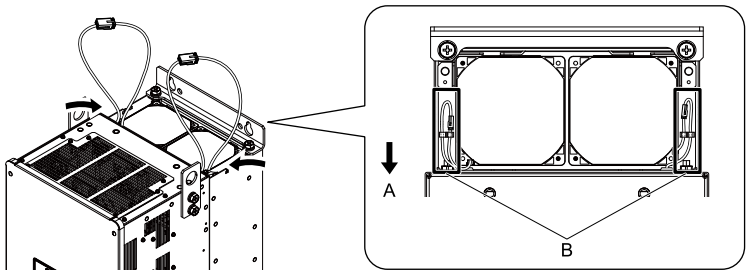
2. Align the notches on the fans with the pins on the drive and install the cooling fans in the drive.



A - Notch on fan
B - Alignment pins on drive
C - Front of drive

Figure 1.49 Install the Cooling Fans

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

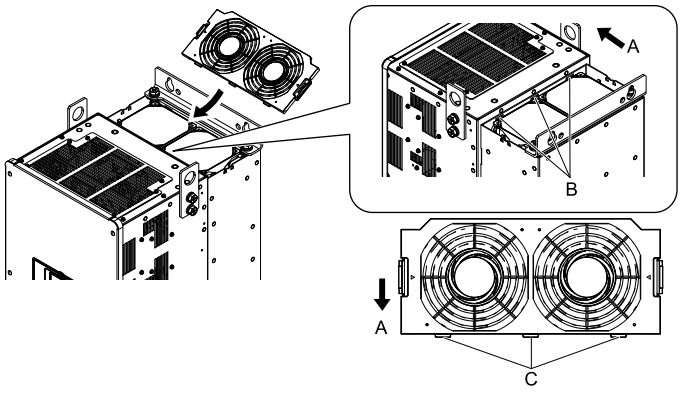


A - Front of drive
B - Recess for cables and connectors *1

Figure 1.50 Put the Cables and Connectors in the Drive Recess

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

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



A - Front of drive
B - Drive holes
C - Connector tabs

Figure 1.51 Install the Fan Finger Guard

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

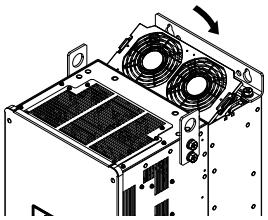


Figure 1.52 Install the Fan Finger Guard

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

◆ Fan Replacement (Procedure F)

⚠ DANGER Electrical Shock Hazard

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

⚠ CAUTION Burn Hazard

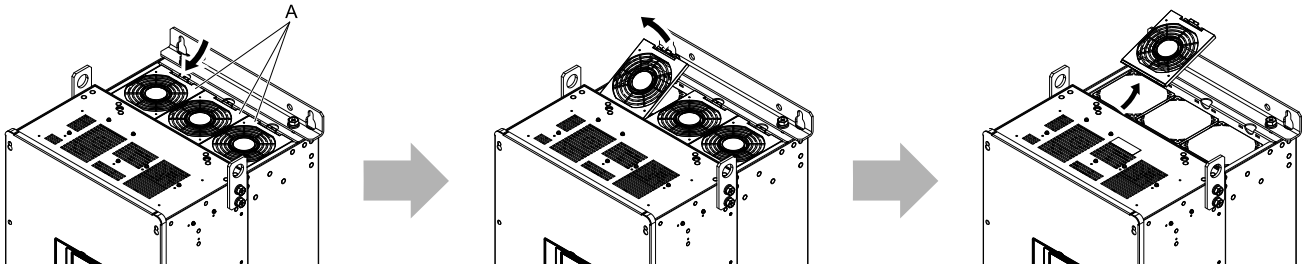
Do not touch a hot drive heatsink. De-energize the drive, wait for a minimum of 15 minutes, then make sure that the heatsink is cool before you replace the cooling fans.
If you touch a hot drive heatsink, it can burn you.

NOTICE

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

■ Fan Removal

1. Push the tab on the back side of each fan finger guard and pull up to remove the fan finger guards from the drive.

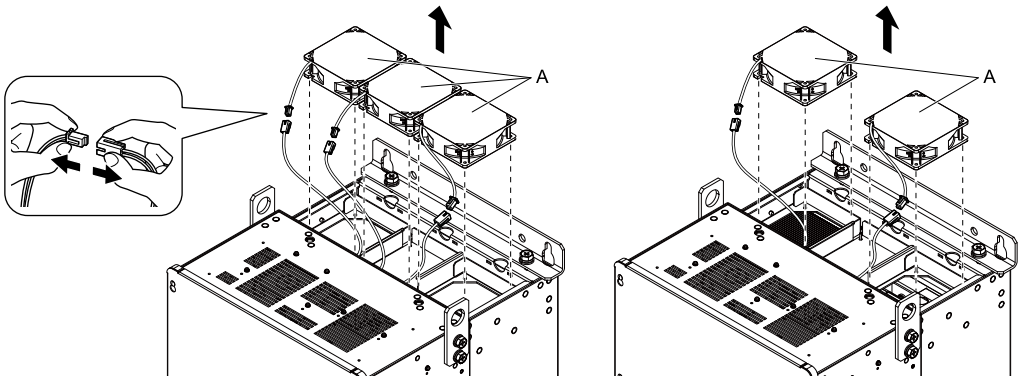


A - Fan finger guards

Figure 1.53 Remove the Fan Finger Guards

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

Note:
The number of fans is different for different drive models.



A - Cooling fans

Figure 1.54 Remove the Cooling Fans

■ Fan Installation

Reverse the removal procedure for fan installation.

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

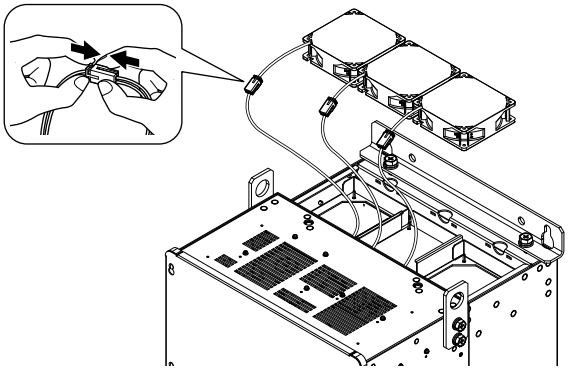
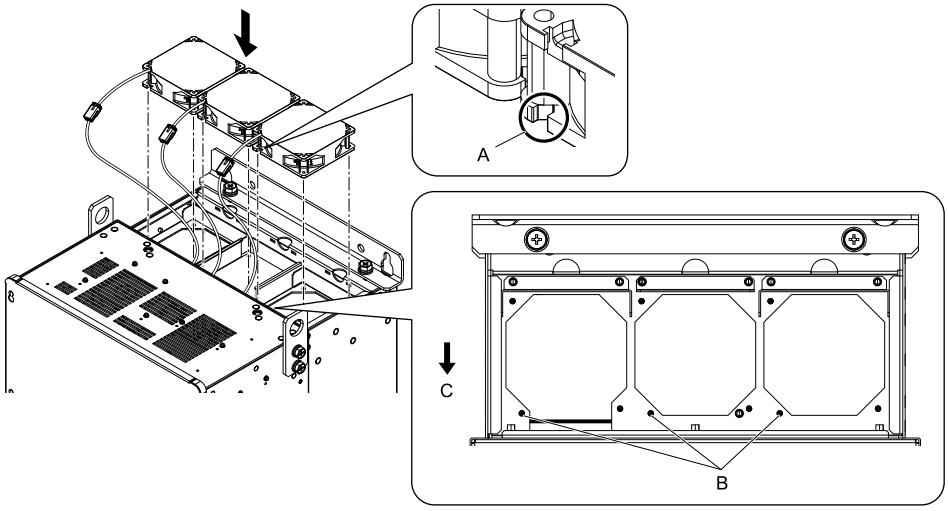


Figure 1.55 Connect the Relay Connectors

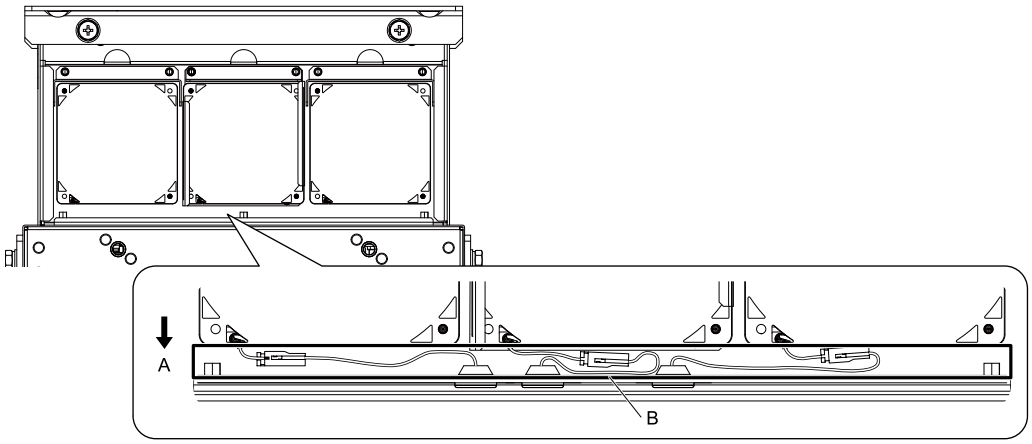
2. Align the notches on the fans with the pins on the drive and install the cooling fans in the drive.



A - Notch on fan
B - Alignment pins on drive
C - Front of drive

Figure 1.56 Install the Cooling Fans

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



A - Front of drive

B - Recess for the cables and connectors *1

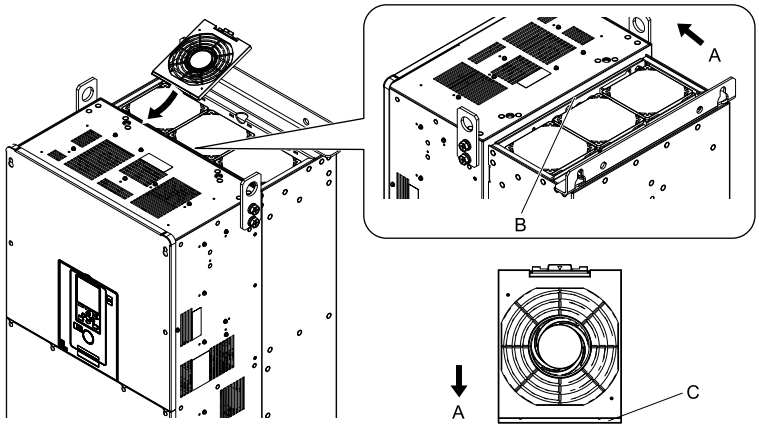
Figure 1.57 Put the Cables and Connectors in the Drive Recess

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

4. Hold the fan finger guards at an angle and put the connector tabs on the fan finger guards into the receiving areas on the drive.

Note:

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



A - Front of drive

B - Receiving area

C - Tab

Figure 1.58 Install the Fan Finger Guards

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

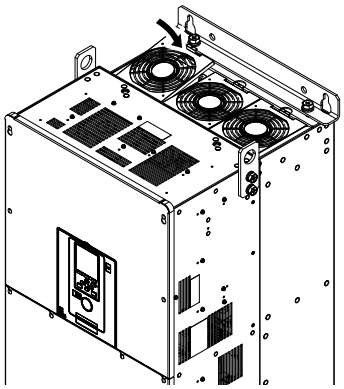


Figure 1.59 Install the Fan Finger Guards

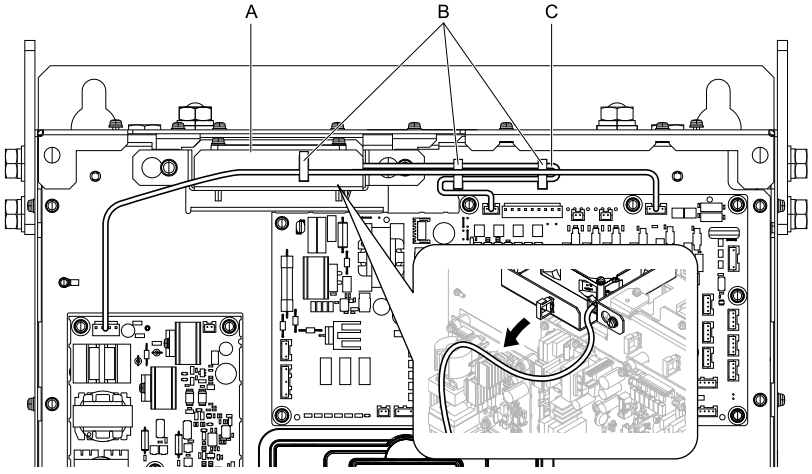
6. Energize the drive and set *o4-03 = 0 [Fan Operation Time Setting = 0 h]* to reset the fan operation time.

■ Circulation Fan Removal

Remove the drive cover before you start this procedure.

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

1. Remove the cable from the clamps.

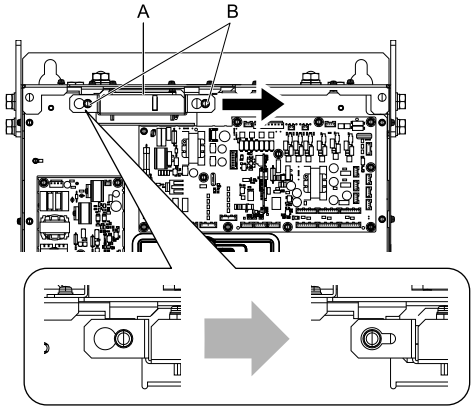


A - Fan unit
B - Clamps
C - Fan cable

Figure 1.60 Remove the Fan Cable

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

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



A - Fan unit **B - Screws**

Figure 1.61 Slide the Fan Unit

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

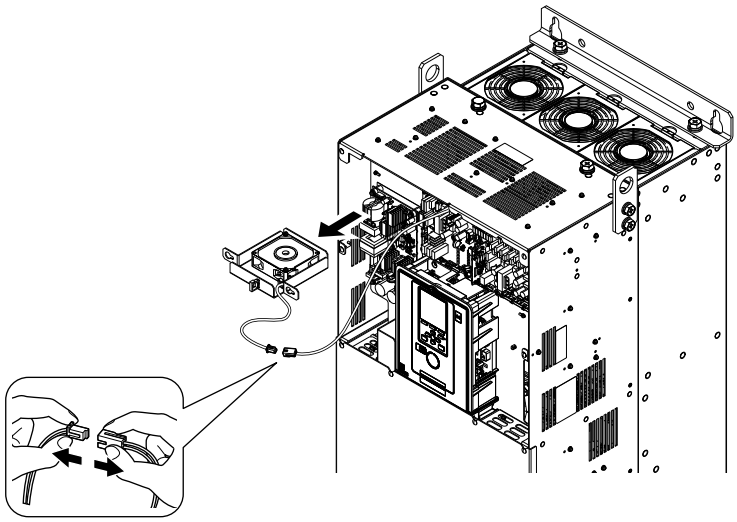
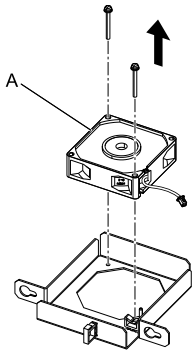


Figure 1.62 Remove the Fan Unit

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



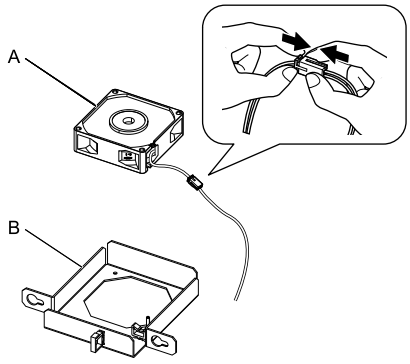
A - Circulation fan

Figure 1.63 Remove the Circulation Fan

■ Circulation Fan Installation

Reverse the removal procedure for fan installation.

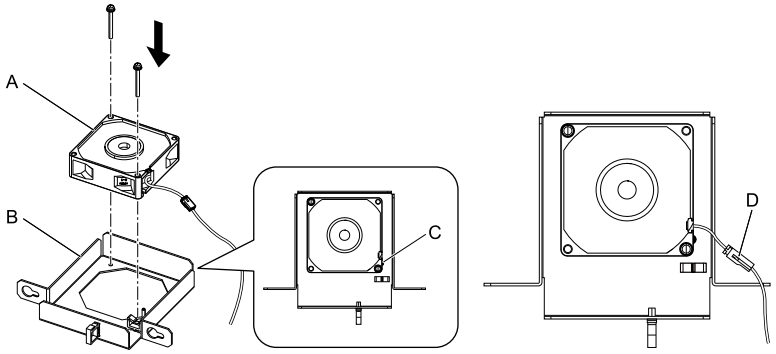
1. Connect the relay connector between the drive and circulation fan.



A - Circulation fan **B - Fan unit base**

Figure 1.64 Connect the Relay Connector

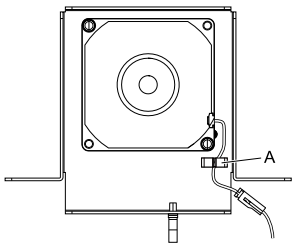
2. Align the pin on the fan unit base with the notch on the fan and put the fan in the fan unit base, then use the screws to attach it.
   Tighten the screws to a tightening torque of 0.98 N·m to 1.33 N·m (8.67 lbf·in to 11.77 lbf·in).



A - Circulation fan **C - Alignment pin on fan unit base**
B - Fan unit base **D - Circulation fan connector**

Figure 1.65 Install the Circulation Fan

3. Attach the fan cable through the clamp.



A - Clamp

Figure 1.66 Attach the Fan Cable

4. Put the fan unit into the specified location and slide it to the left, then use screws to attach it to the drive.
   Tighten the screws to a tightening torque of 1.96 N·m to 2.53 N·m (17.35 lbf·in to 22.39 lbf·in).

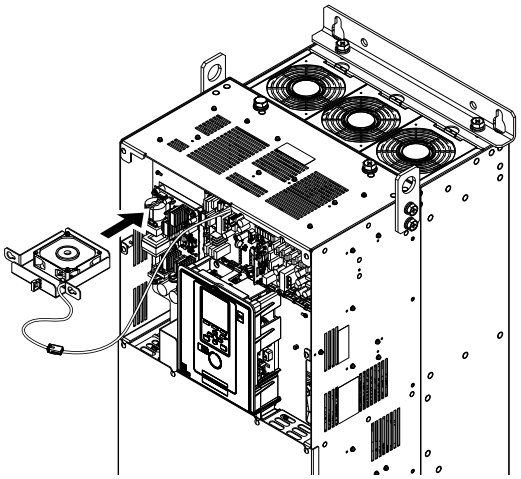
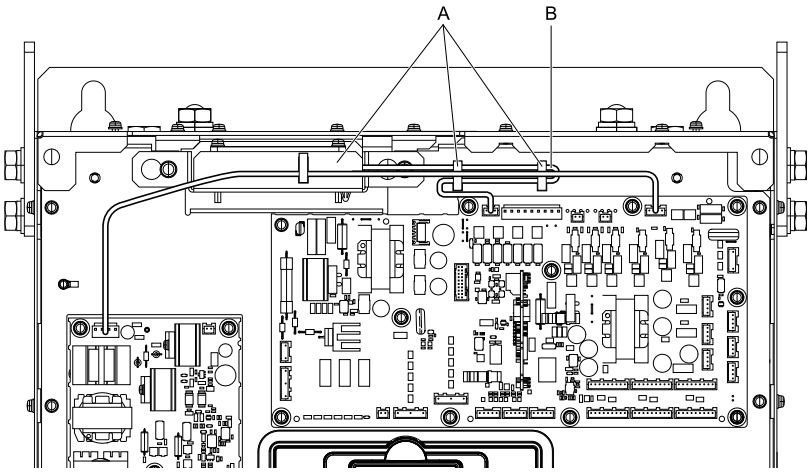


Figure 1.67 Install the Fan Unit

5. Attach the cable through the clamps.



A - Clamps **B - Fan cable**

Figure 1.68 Attach the Fan Cable through the Clamps

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

◆ Fan Replacement (Procedure G)

⚠ DANGER Electrical Shock Hazard

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

⚠ CAUTION Burn Hazard

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

NOTICE

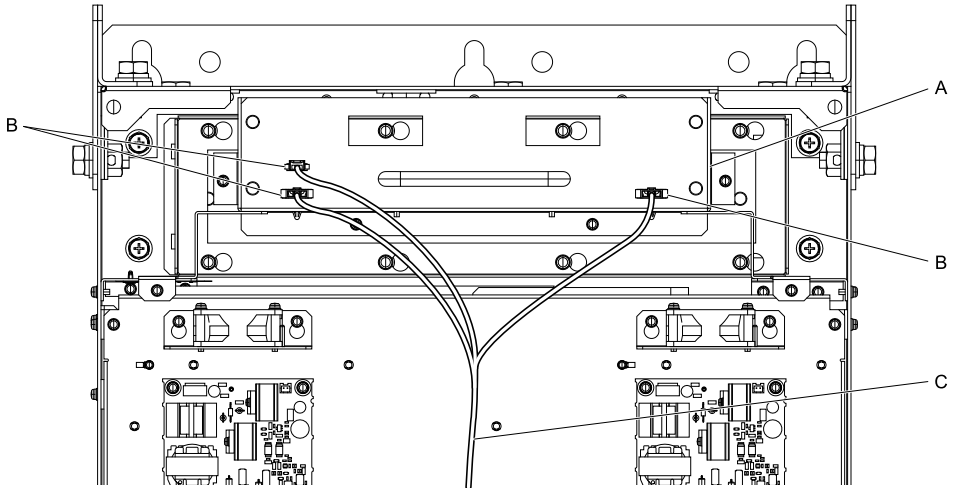
Use the instructions in this manual to replace the cooling fans. When you do maintenance on the fans, replace all the fans to increase product life.
If you install the fans incorrectly, it can cause damage to the drive.

■ Fan Removal

1. Remove the drive cover.

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

2. Unplug the fan cable from the fan connectors.

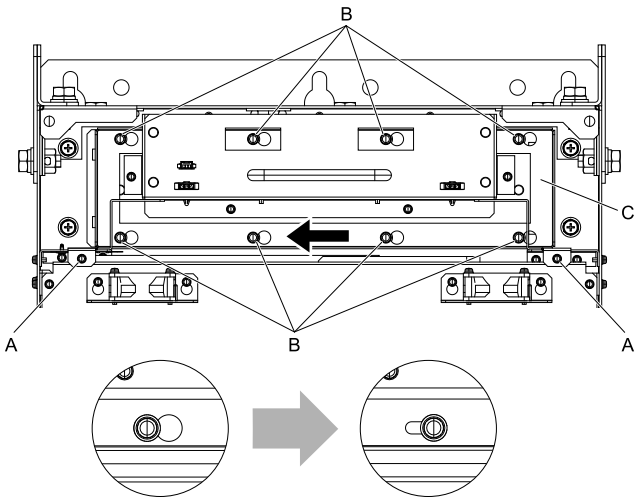


A - Fan unit
B - Fan connectors
C - Fan cable

Figure 1.69 Remove the Fan Cable

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

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



A - Screw position A
B - Screw position B
C - Slide panel

Figure 1.70 Slide the Slide Panel

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

Note:
When you remove the fan unit, make sure that it does not fall.

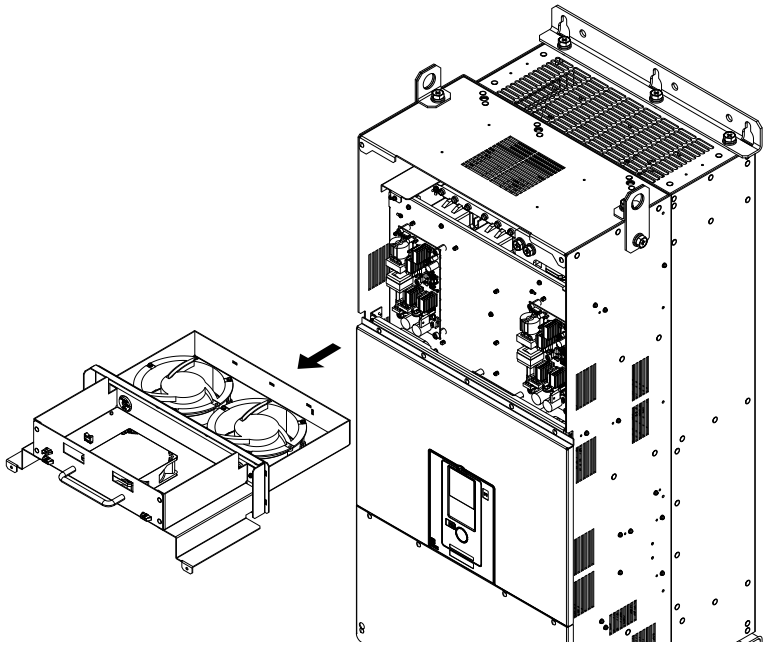
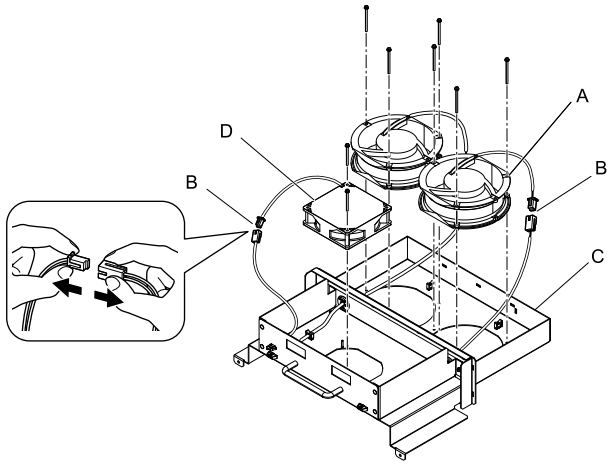


Figure 1.71 Remove the Fan Unit

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



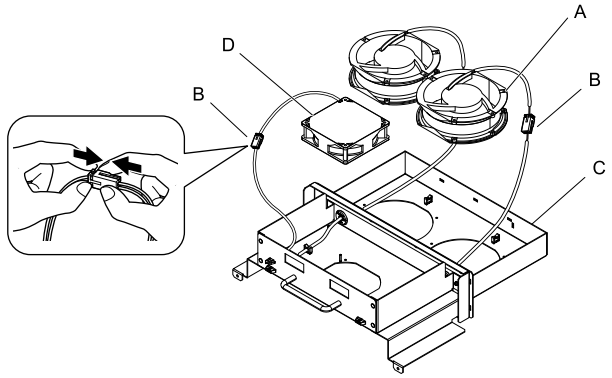
A - Cooling fans
B - Relay connectors
C - Fan unit base
D - Circulation fan

Figure 1.72 Remove the Cooling Fans and Circulation Fan

■ Fan Installation

Reverse the removal procedure for fan installation.

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



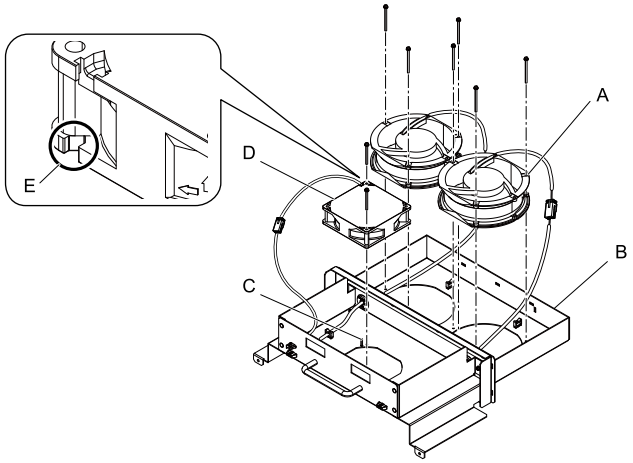
A - Cooling fans
B - Relay connectors
C - Fan unit base
D - Circulation fan

Figure 1.73 Connect the Relay Connectors

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

   Tighten the M4 screws to a tightening torque of 0.98 N·m to 1.33 N·m (8.67 lbf·in to 11.77 lbf·in).

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

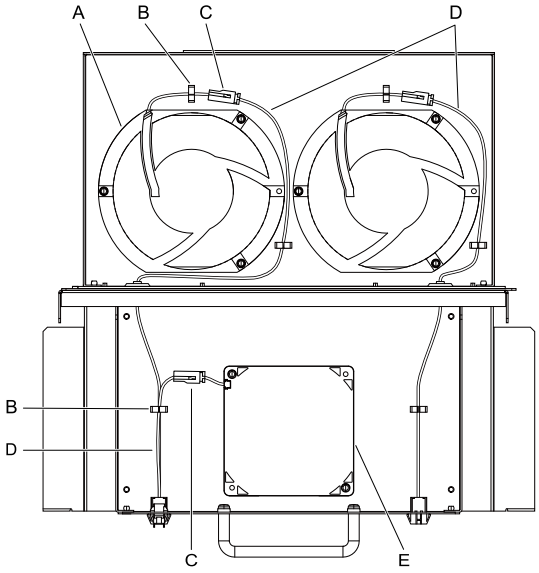


A - Cooling fans
B - Fan unit base
C - Alignment pin on fan unit base
D - Circulation fan
E - Notch on fan

Figure 1.74 Install the Cooling Fans and Circulation Fan

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

Note:
Attach the relay cables to the hooks.



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

Figure 1.75 Put the Cables and Connectors in the Drive Recess

4. Put the fan unit into the specified location.

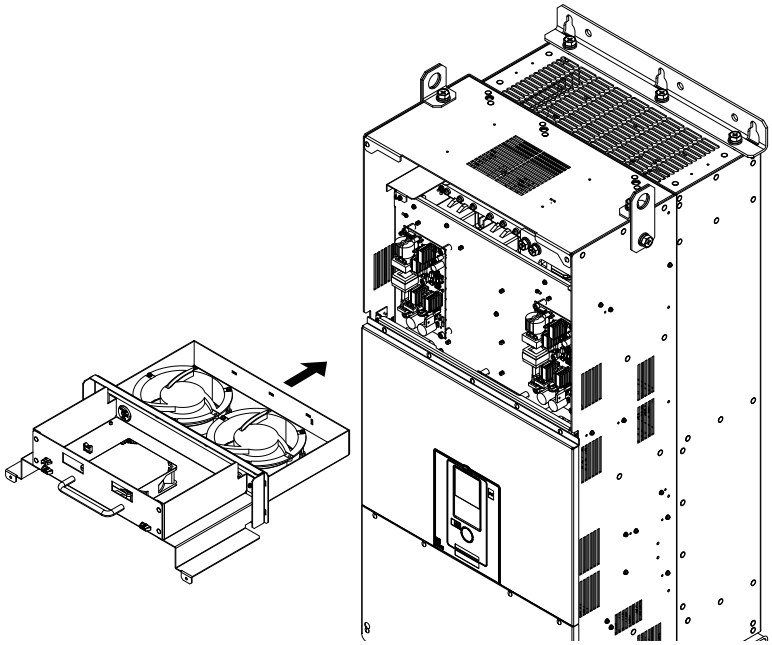
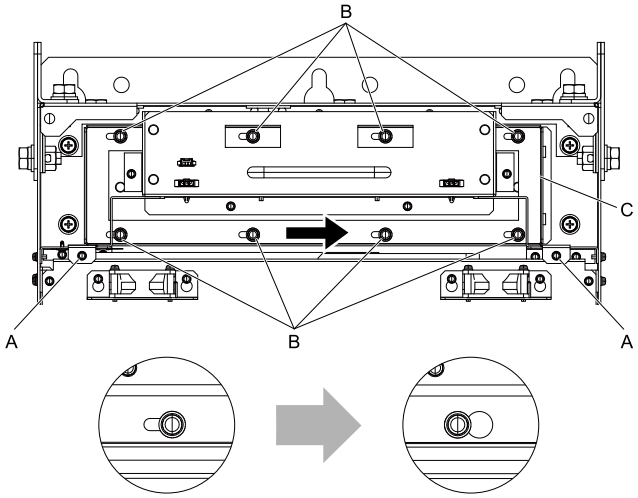


Figure 1.76 Install the Fan Unit

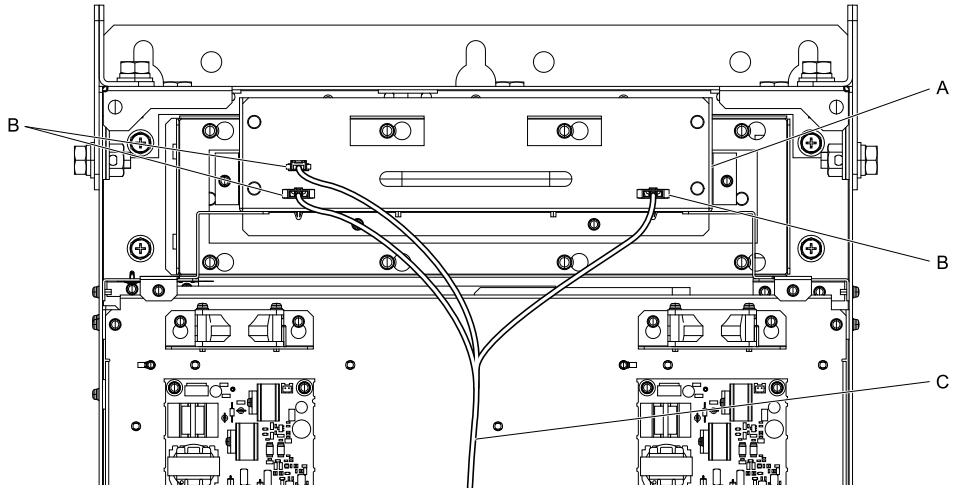
5. Slide the fan unit to the right and use the screws to attach it to the drive.
   Tighten the screws to a correct tightening torque:
   - Screws in Position A: 0.98 N·m to 1.33 N·m (8.67 lbf·in to 11.77 lbf·in)
   - Screws in Position B: 1.96 N·m to 2.53 N·m (17.35 lbf·in to 22.39 lbf·in)



A - Screw position A
B - Screw position B
C - Fan unit

Figure 1.77 Slide the Fan Unit

6. Connect the fan cable to the fan connectors.



A - Fan unit
B - Fan connectors
C - Fan cable

Figure 1.78 Connect Cooling Fan Connectors

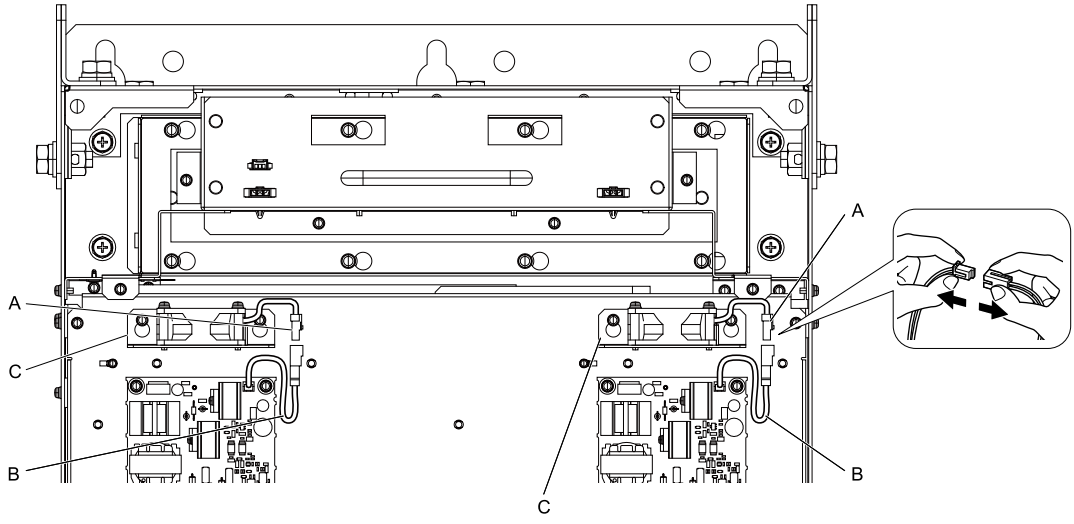
7. Install the drive cover.
8. Energize the drive and set *o4-03 = 0 [Fan Operation Time Setting = 0 h]* to reset the fan operation time.

■ Circuit Board Cooling Fan Removal

Remove the drive cover before you start this procedure.

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

1. Disconnect the relay cables from the fan connectors.

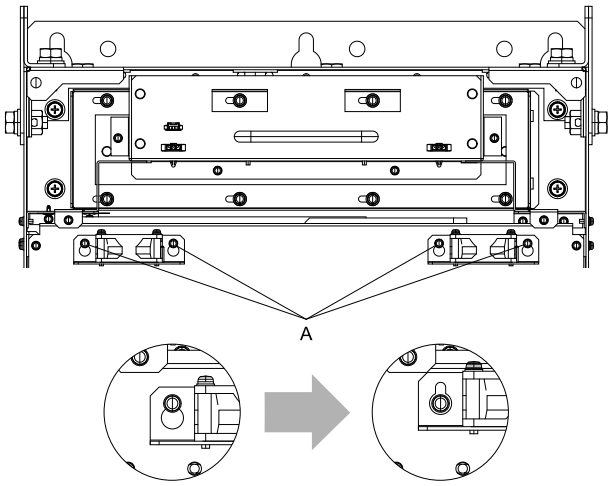


A - Fan connectors
B - Relay cables
C - Circuit board cooling fan units

Figure 1.79 Disconnect the Relay Cables

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

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



A - Screws

Figure 1.80 Slide the Circuit Board Cooling Fan Units

3. Remove the circuit board cooling fan units.

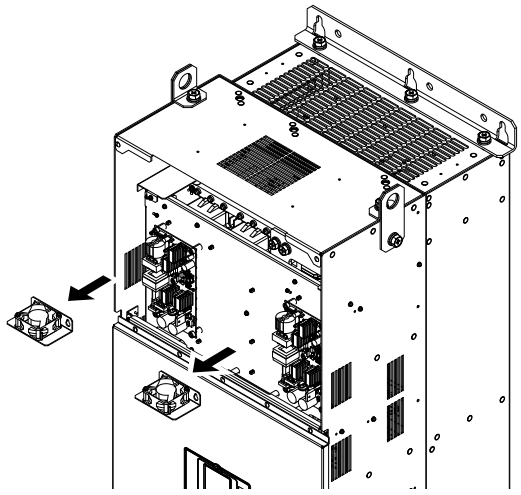
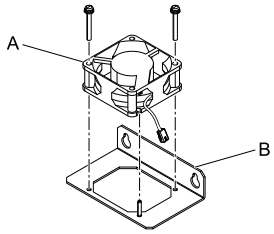


Figure 1.81 Remove the Circuit Board Cooling Fan Units

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



A - Circuit board cooling fan **B - Fan unit base**

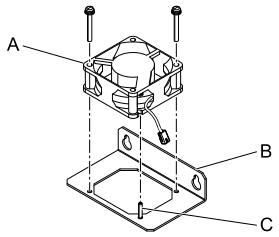
Figure 1.82 Remove the Circuit Board Cooling Fans

■ Circuit Board Cooling Fan Installation

Reverse the removal procedure for fan installation.

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

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



A - Circuit board cooling fan
B - Fan unit base
C - Alignment pin on fan unit base

Figure 1.83 Install the Circuit Board Cooling Fan

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

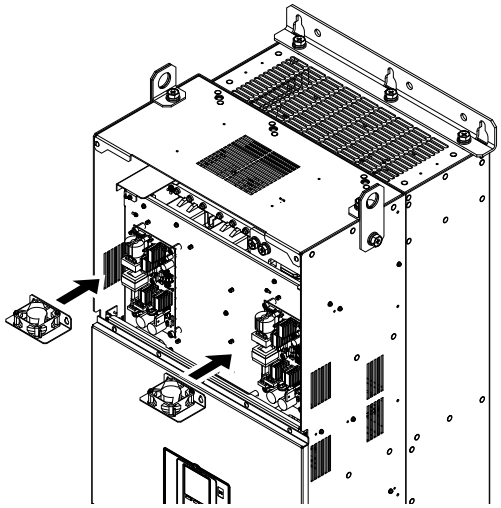
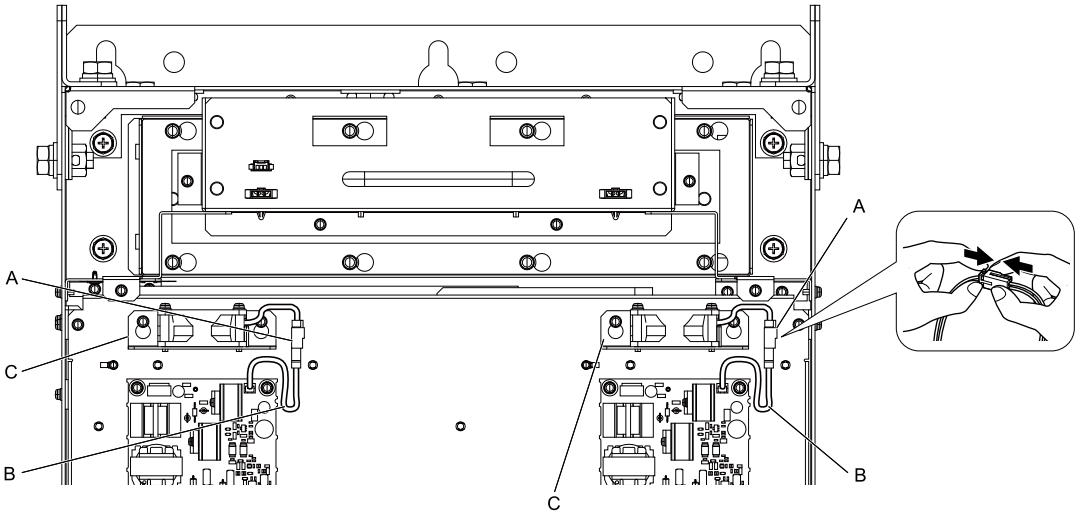


Figure 1.84 Install the Circuit Board Cooling Fan Unit

3. Connect the relay cables to the fan connectors.



A - Fan connectors
B - Relay cables
C - Circuit board cooling fan units

Figure 1.85 Connect the Relay Cables

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

◆ Fan Replacement (Procedure H)

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

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

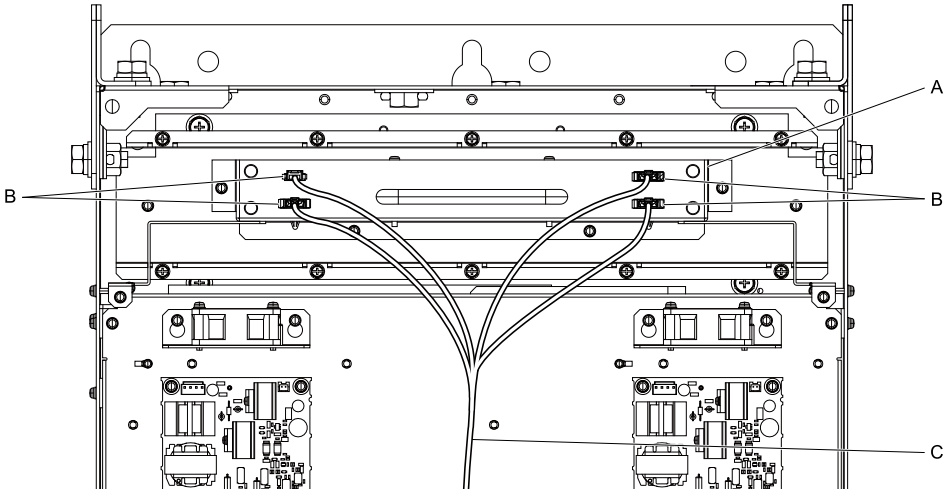
NOTICE
Use the instructions in this manual to replace the cooling fans. When you do maintenance on the fans, replace all the fans to increase product life.
If you install the fans incorrectly, it can cause damage to the drive.

■ Fan Removal

1. Remove the drive cover.

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

2. Unplug the fan cables from the fan connectors.

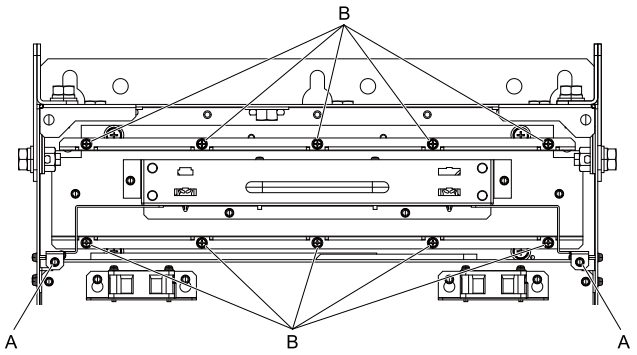


A - Fan unit
B - Fan connectors
C - Fan cable

Figure 1.86 Unplug the Fan Cables

3. Loosen the screws that attach the fan unit.

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



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

Figure 1.87 Loosen the Screws

4. Remove the fan unit.

Note:
When you remove the fan unit, make sure that it does not fall.

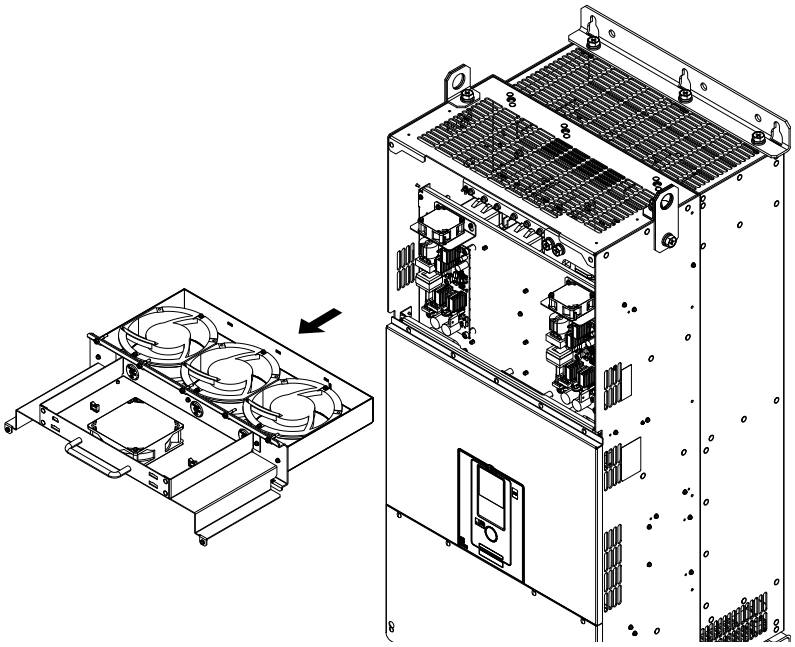
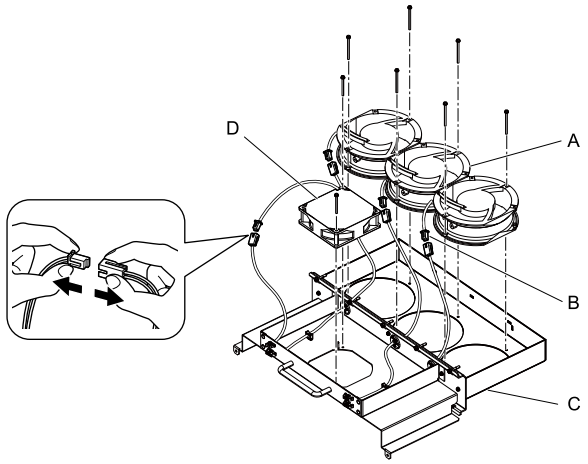


Figure 1.88 Remove the Fan Unit

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



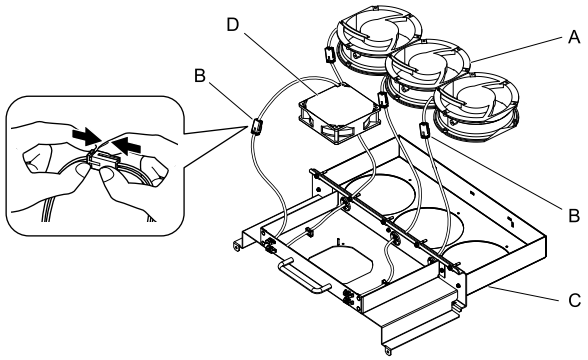
A - Cooling fans
B - Relay connectors
C - Fan unit base
D - Circulation fan

Figure 1.89 Remove the Cooling Fans and Circulation Fan

■ Fan Installation

Reverse the removal procedure for fan installation.

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

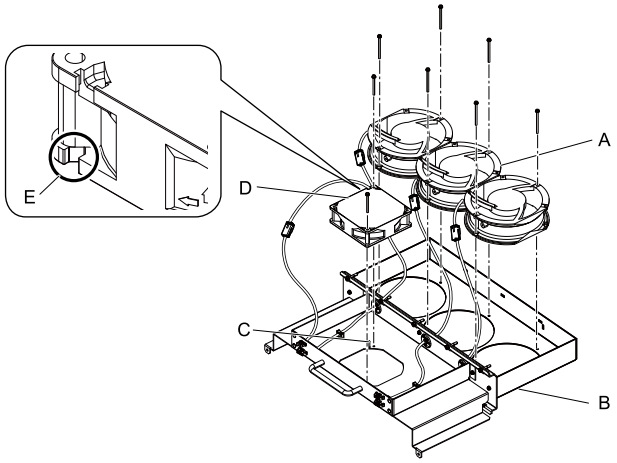


A - Cooling fans
B - Relay connectors
C - Fan unit base
D - Circulation fan

Figure 1.90 Connect the Relay Connectors

2. Align the pins on the fan unit base with the notches on the fans and put the fans in the fan unit base, then use the screws to attach them.
   Tighten the M4 screws to a tightening torque of 0.98 N·m to 1.33 N·m (8.67 lbf·in to 11.77 lbf·in).

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

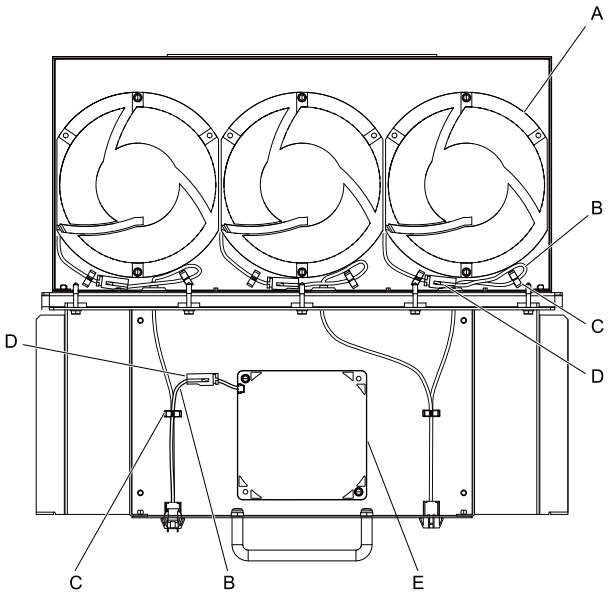


A - Cooling fans
B - Fan unit base
C - Alignment pin on fan unit base
D - Circulation fan
E - Notch on fan

Figure 1.91 Install the Cooling Fans and Circulation Fan

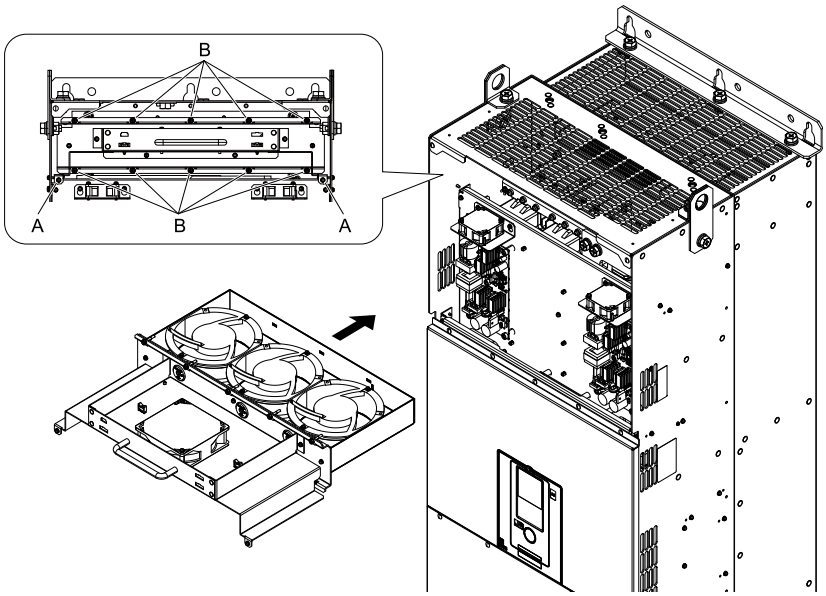
3. Put the cables and connectors in the recess of the drive.

Note:
Attach the fan cables to the cable hooks on the fan unit.



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

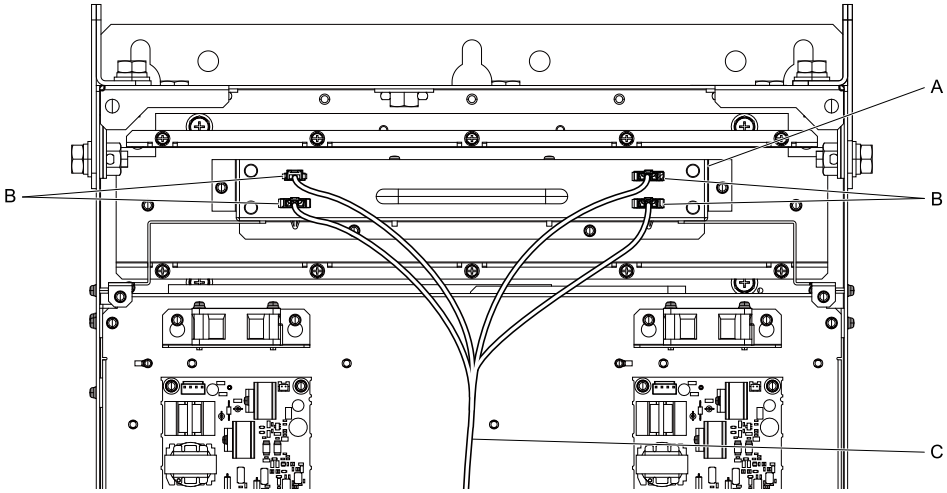
4. Put the fan unit into the specified location and use screws to attach it to the drive.
   Tighten the screws to a correct tightening torque:
   - Screws in Position A: 0.98 N·m to 1.33 N·m (8.67 lbf·in to 11.77 lbf·in)
   - Screws in Position B: 1.96 N·m to 2.53 N·m (17.35 lbf·in to 22.39 lbf·in)



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

Figure 1.92 Install the Fan Unit

5. Connect the fan cable to the fan connectors.



A - Fan unit **C - Fan cable**
B - Fan connectors

Figure 1.93 Connect Cooling Fan Connectors

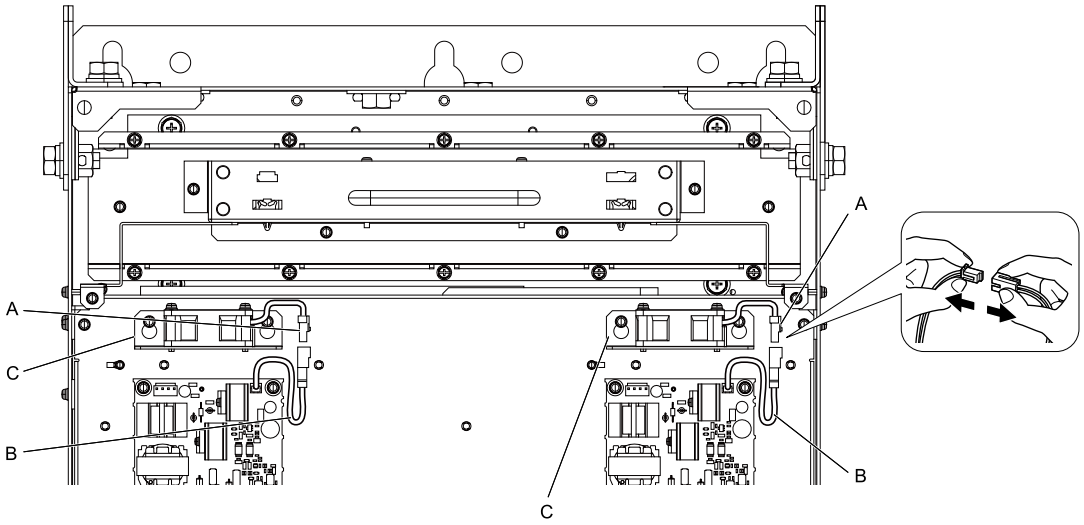
6. Install the drive cover.
7. Energize the drive and set *o4-03 = 0 [Fan Operation Time Setting = 0 h]* to reset the fan operation time.

■ Circuit Board Cooling Fan Removal

Remove the drive cover before you start this procedure.

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

1. Disconnect the relay cables from the fan connectors.

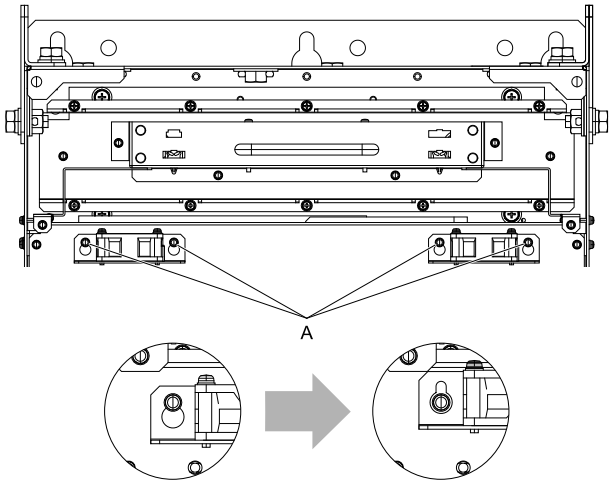


A - Fan connectors
B - Relay cables
C - Circuit board cooling fan units

Figure 1.94 Disconnect the Relay Cables

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

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



A - Screws

Figure 1.95 Slide the Circuit Board Cooling Fan Unit

3. Remove the circuit board cooling fan units.

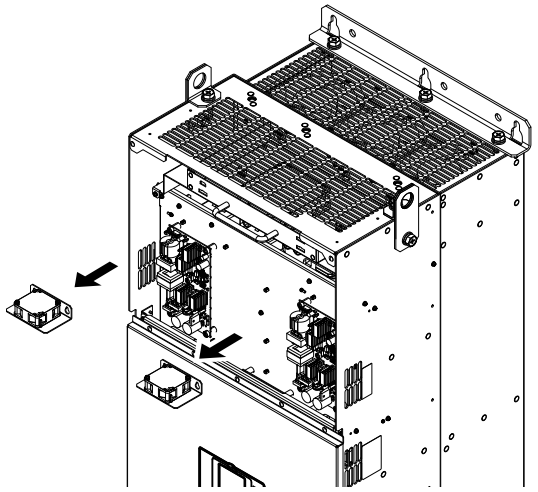
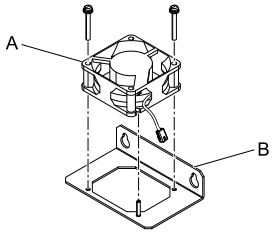


Figure 1.96 Remove the Circuit Board Cooling Fan Units

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



A - Circuit board cooling fan **B - Fan unit base**

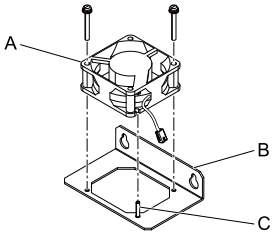
Figure 1.97 Remove the Circuit Board Cooling Fans

■ Circuit Board Cooling Fan Installation

Reverse the removal procedure for fan installation.

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

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



A - Circuit board cooling fan **C - Alignment pin on fan unit base**
B - Fan unit base

Figure 1.98 Install the Circuit Board Cooling Fan

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

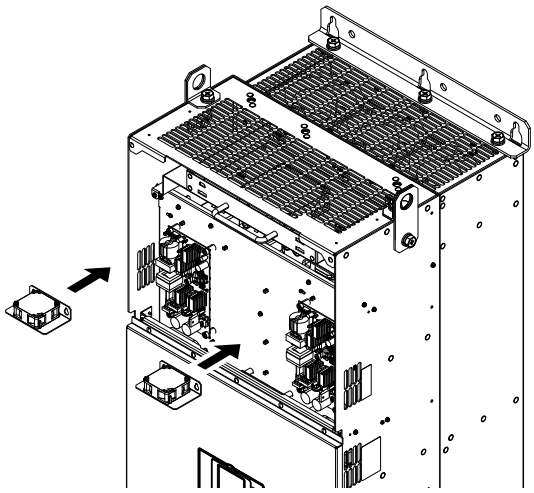
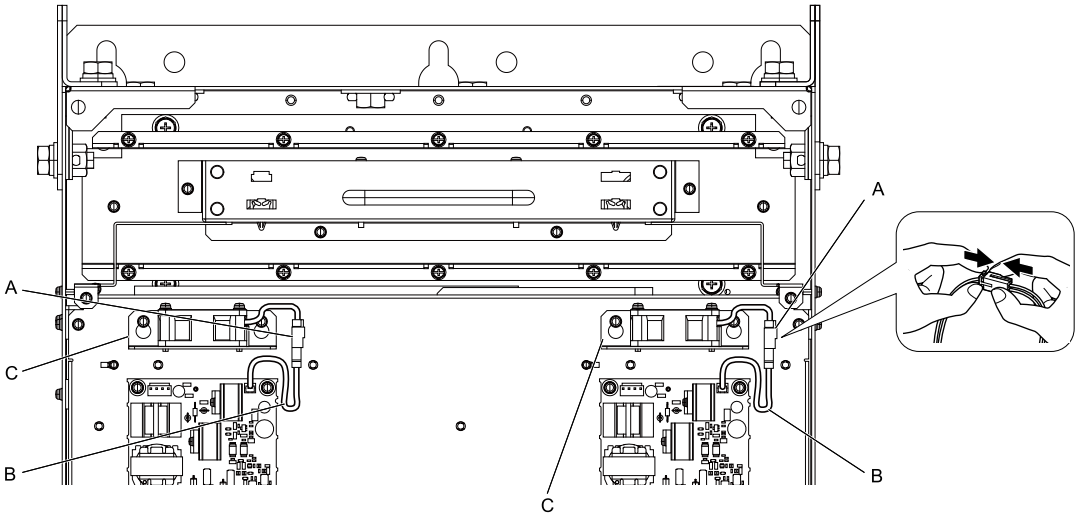


Figure 1.99 Install the Circuit Board Cooling Fan Unit

3. Connect the relay cables to the fan connectors.



A - Fan connectors
B - Relay cables
C - Circuit board cooling fan units

Figure 1.100 Connect the Relay Cables

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

◆ Fan Replacement (Procedure I)

⚠ DANGER Electrical Shock Hazard

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

⚠ CAUTION **Burn Hazard**

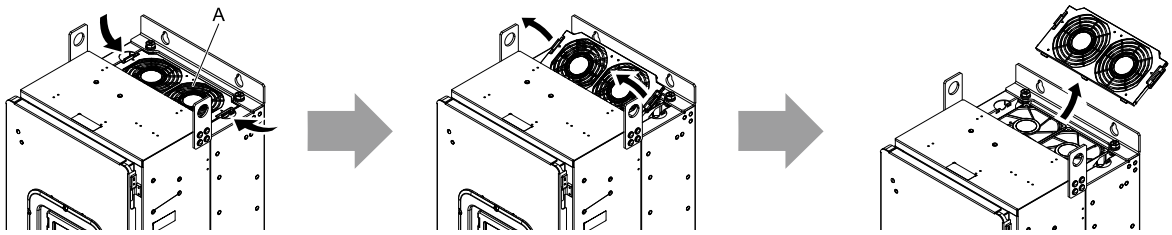
Do not touch a hot drive heatsink. De-energize the drive, wait for a minimum of 15 minutes, then make sure that the heatsink is cool before you replace the cooling fans.
If you touch a hot drive heatsink, it can burn you.

NOTICE

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

■ Fan Removal

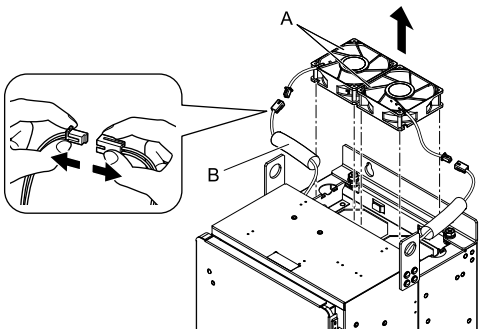
1. Push the tabs on the left and right sides of the fan finger guard and pull up to remove the fan finger guard from the drive.



A - Fan finger guard

Figure 1.101 Remove the Fan Finger Guard

2. Pull the cooling fans straight up from the drive. Remove the protective tubes on the relay connectors and disconnect the connectors to remove the fans from the drive.



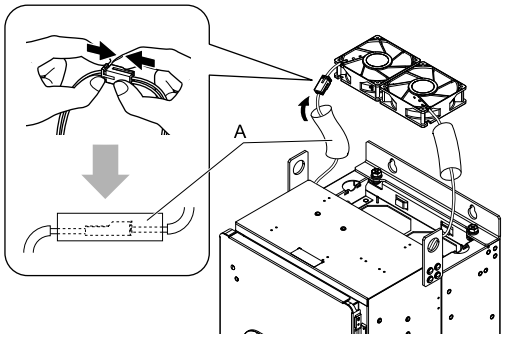
A - Cooling fans **B - Protective tubes**

Figure 1.102 Remove the Cooling Fans

■ Fan Installation

Reverse the removal procedure for fan installation.

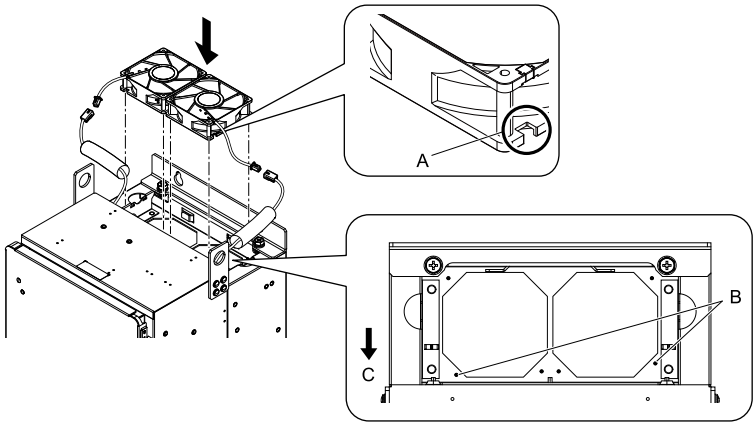
1. Connect the relay connectors, and attach the protective tubes.



A - Protective tubes

Figure 1.103 Connect the Relay Connectors

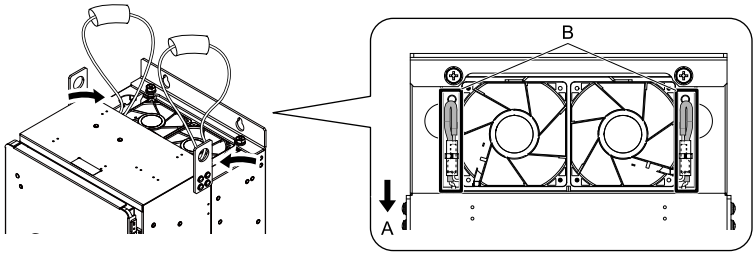
2. Align the notches on the fans with the pins on the drive and install the cooling fans in the drive.



A - Notch on fan
B - Alignment pins on drive
C - Front of drive

Figure 1.104 Install the Cooling Fans

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

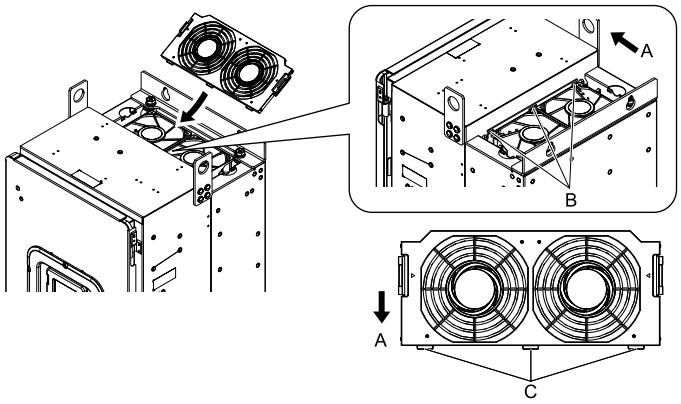


A - Front of drive
B - Recess for cables and connectors *1

Figure 1.105 Put the Cables and Connectors in the Drive Recess

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

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



A - Front of drive
B - Drive holes
C - Connector tabs

Figure 1.106 Install the Fan Finger Guard

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

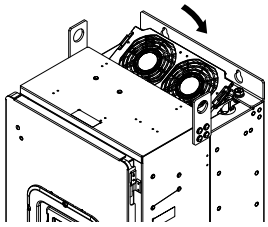


Figure 1.107 Install the Fan Finger Guard

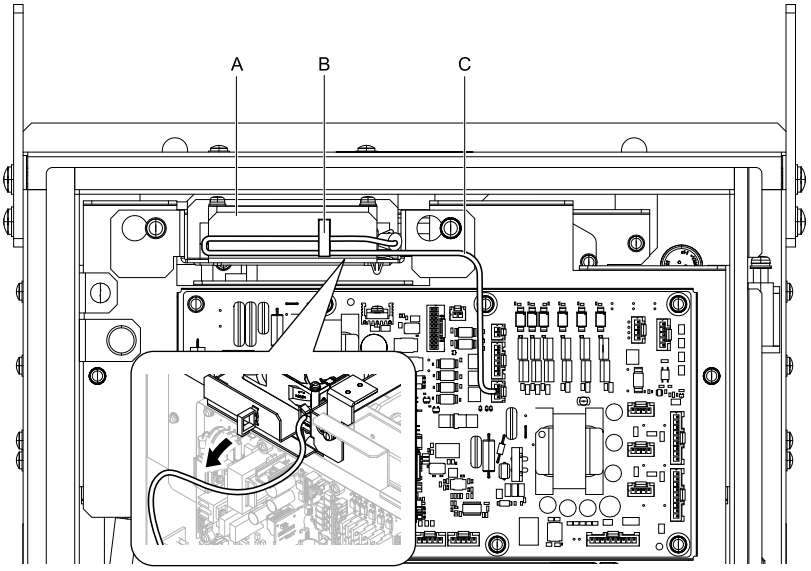
6. Energize the drive and set *o4-03 = 0 [Fan Operation Time Setting = 0 h]* to reset the fan operation time.

■ Circulation Fan Removal

Remove the drive cover before you start this procedure.

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

1. Remove the cable from the clamp.

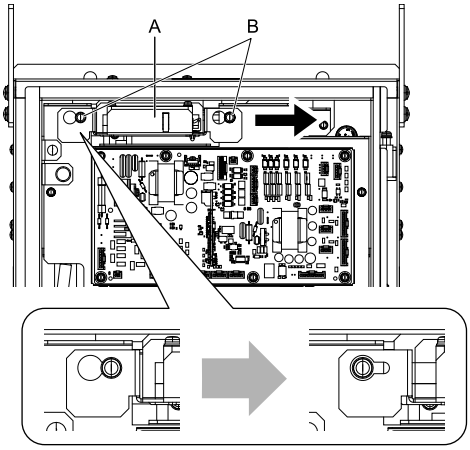


A - Fan unit
B - Clamp
C - Fan cable

Figure 1.108 Remove the Fan Cable

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

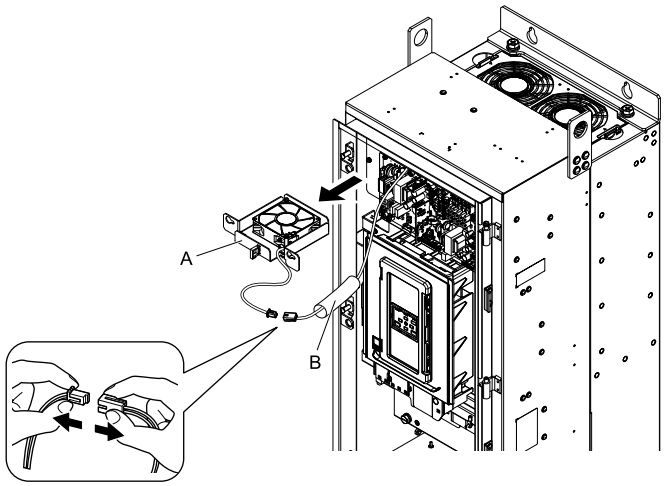
Note:
To remove the fan unit, it is only necessary to loosen the screws.



A - Fan unit
B - Screws

Figure 1.109 Slide the Fan Unit

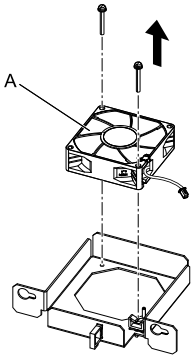
3. Remove the protective tube on the relay connectors and disconnect the connectors to remove the fan unit from the drive.



A - Fan unit **B - Protective tube**

Figure 1.110 Remove the Fan Unit

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



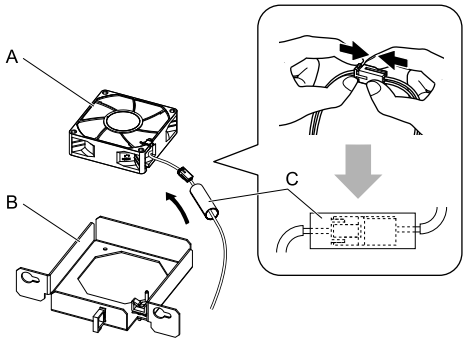
A - Circulation fan

Figure 1.111 Remove the Circulation Fan

■ Circulation Fan Installation

Reverse the removal procedure for fan installation.

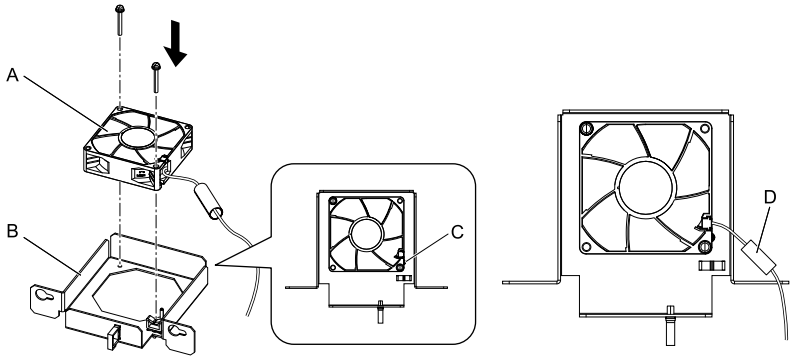
1. Connect the relay connector between the drive and circulation fan, and attach the protective tube.



A - Circulation fan **C - Protective tube**
B - Fan unit base

Figure 1.112 Connect the Relay Connector

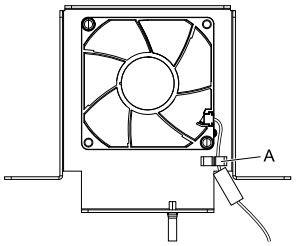
2. Align the pin on the fan unit base with the notch on the fan and put the fan in the fan unit base, then use the screws to attach it.
   Tighten the screws to a tightening torque of 0.98 N·m to 1.33 N·m (8.67 lbf·in to 11.77 lbf·in).



A - Circulation fan
B - Fan unit base
C - Alignment pin on fan unit base
D - Protective tube

Figure 1.113 Install the Circulation Fan

3. Attach the fan cable through the clamp.



A - Clamp

Figure 1.114 Attach the Fan Cable

4. Put the fan unit into the specified location and slide it to the left, then use screws to attach it to the drive.
   Tighten the screws to a tightening torque of 1.96 N·m to 2.53 N·m (17.35 lbf·in to 22.39 lbf·in).

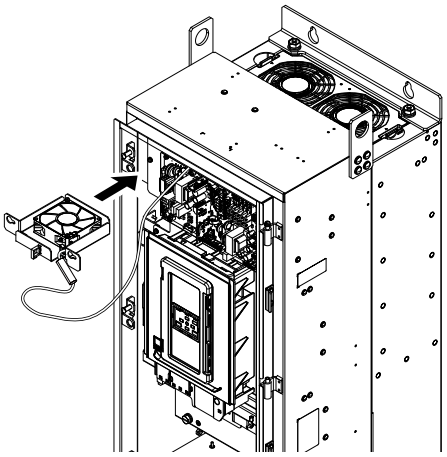
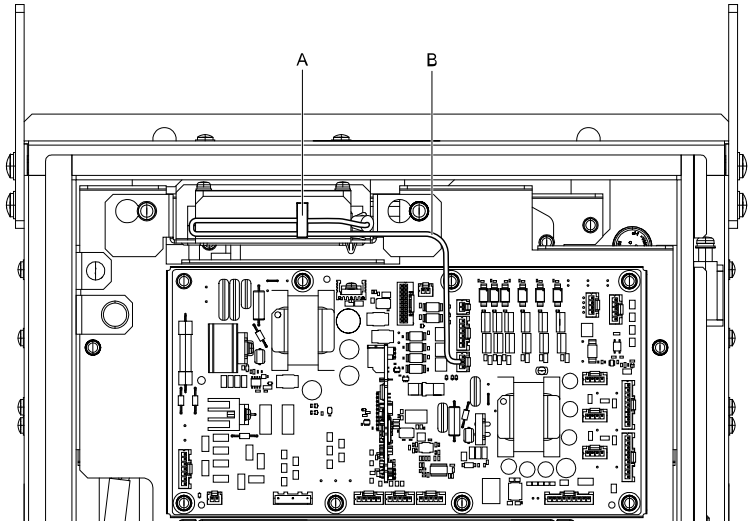


Figure 1.115 Install the Fan Unit

5. Attach the cable through the clamp.



A - Clamp **B - Fan cable**

Figure 1.116 Attach the Fan Cable through the Clamp

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

◆ Fan Replacement (Procedure J)

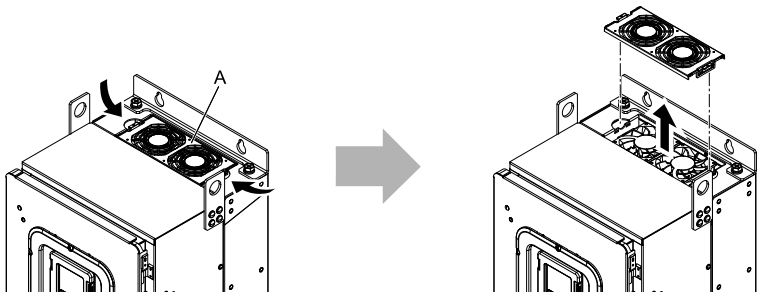
⚠ DANGER Electrical Shock Hazard
Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge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

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

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

■ Fan Removal

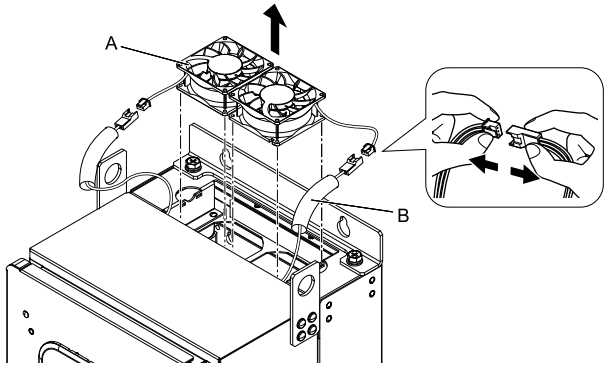
1. Push the tabs on the left and right sides of the fan finger guard and pull up to remove the fan finger guard from the drive.



A - Fan finger guard

Figure 1.117 Remove the Fan Finger Guard

2. Pull the cooling fans straight up from the drive. Remove the protective tubes on the relay connectors and disconnect the connectors to remove the fans from the drive.



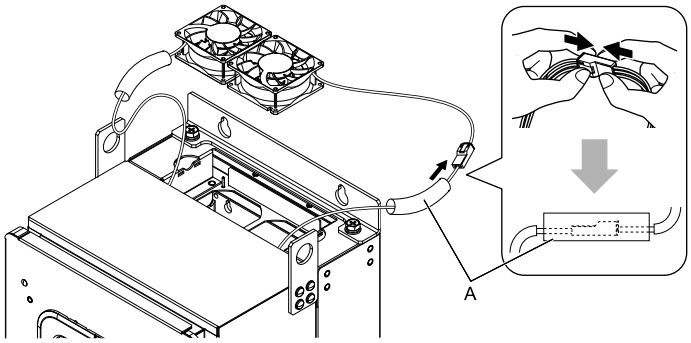
A - Cooling fans **B - Protective tubes**

Figure 1.118 Remove the Cooling Fans

■ Fan Installation

Reverse the removal procedure for fan installation.

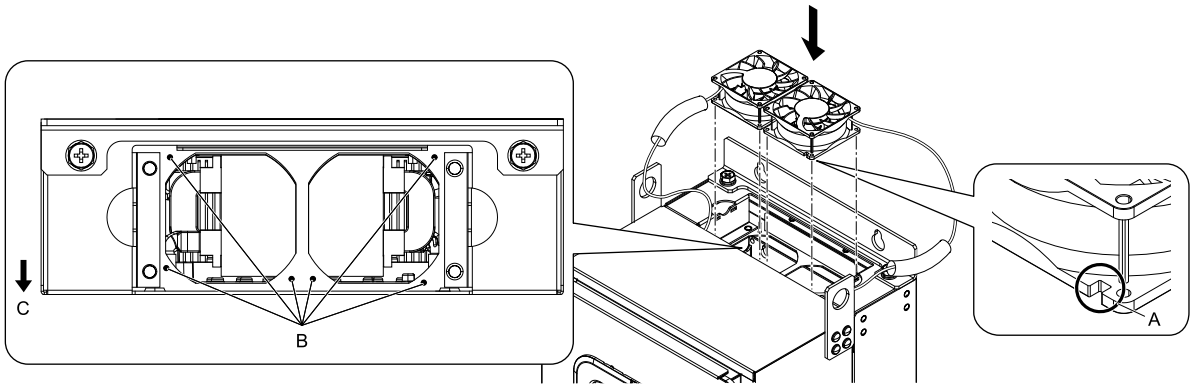
1. Connect the relay connectors between the drive and cooling fans, and attach the protective tubes.



A - Protective tubes

Figure 1.119 Connect the Relay Connectors

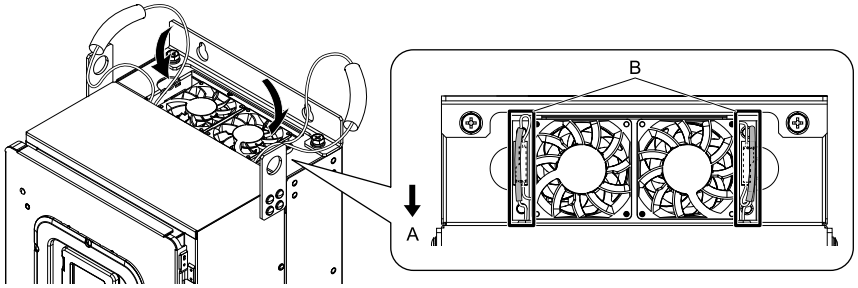
2. Align the notches on the fans with the pins on the drive and install the cooling fans in the drive.



A - Notch on fan
B - Alignment pins on drive
C - Front of drive

Figure 1.120 Install the Cooling Fans

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



A - Front of drive
B - Recess for cables and connectors *1

Figure 1.121 Put the Cables and Connectors in the Drive Recess

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

4. Install the fan finger guard straight until the tabs click into place.

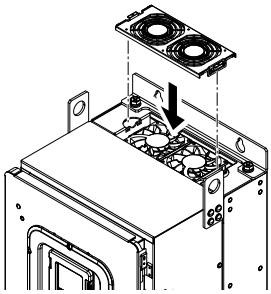


Figure 1.122 Install the Fan Finger Guard

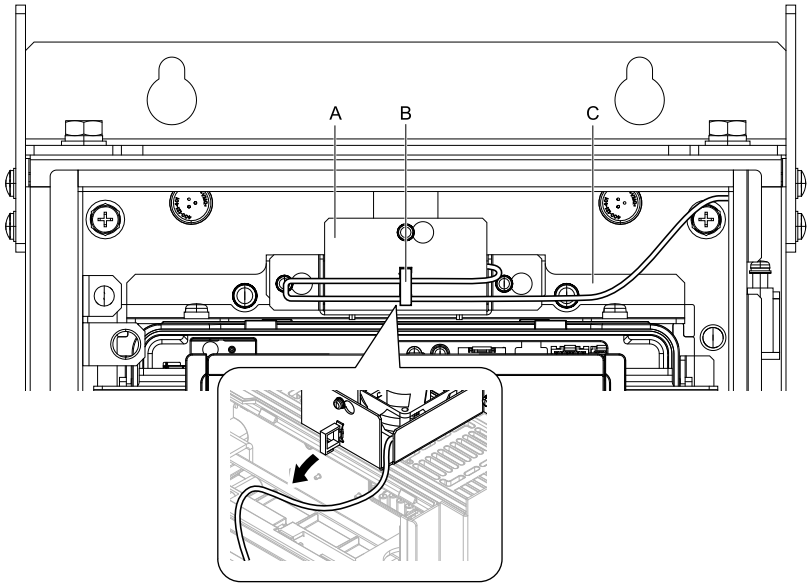
5. Energize the drive and set *o4-03 = 0 [Fan Operation Time Setting = 0 h]* to reset the fan operation time.

■ Circulation Fan Removal

Remove the drive cover before you start this procedure.

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

1. Remove the cable from the clamp.

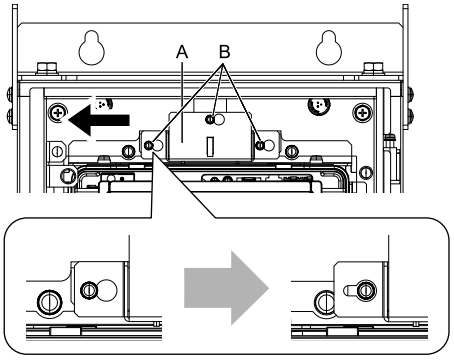


A - Fan unit
B - Clamp
C - Fan cable

Figure 1.123 Remove the Fan Cable

2. Loosen the screws that attach the fan unit and slide the fan unit to the left.

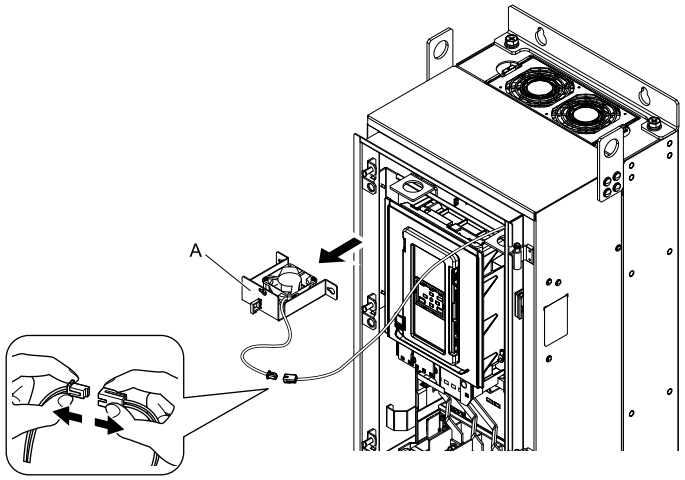
Note:
To remove the fan unit, it is only necessary to loosen the screws.



A - Fan unit
B - Screws

Figure 1.124 Slide the Fan Unit

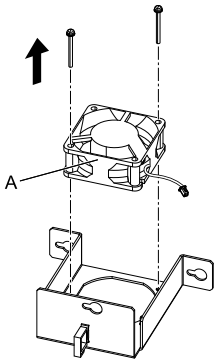
3. Disconnect the connectors to remove the fan unit from the drive.



A - Fan unit

Figure 1.125 Remove the Fan Unit

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



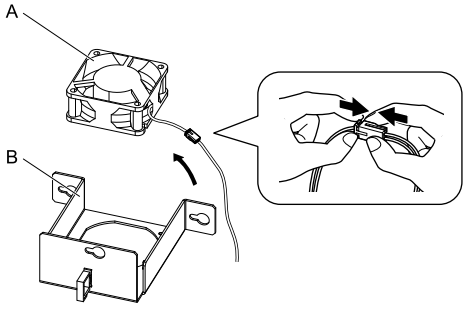
A - Circulation fan

Figure 1.126 Remove the Circulation Fan

■ Circulation Fan Installation

Reverse the removal procedure for fan installation.

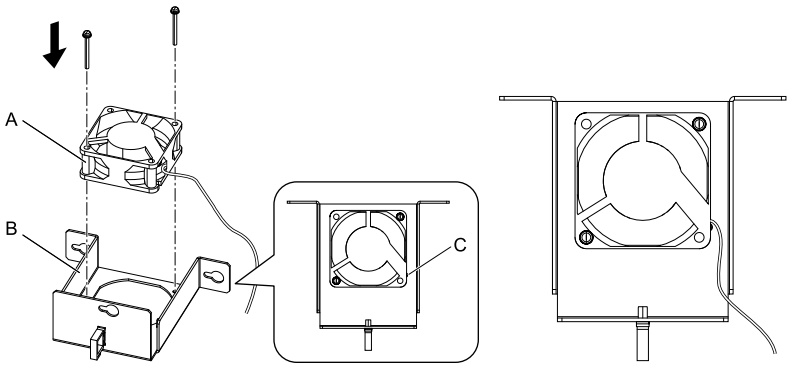
1. Connect the relay connector between the drive and circulation fan.



A - Circulation fan **B - Fan unit base**

Figure 1.127 Connect the Relay Connector

2. Align the pin on the fan unit base with the notch on the fan and put the fan in the fan unit base, then use the screws to attach it.
   Tighten the screws to a tightening torque of 0.98 N·m to 1.33 N·m (8.67 lbf·in to 11.77 lbf·in).



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

Figure 1.128 Install the Circulation Fan

3. Put the fan unit into the specified location and slide it to the right, then use screws to attach it to the drive. Tighten the screws to a tightening torque of 1.96 N·m to 2.53 N·m (17.35 lbf·in to 22.39 lbf·in).

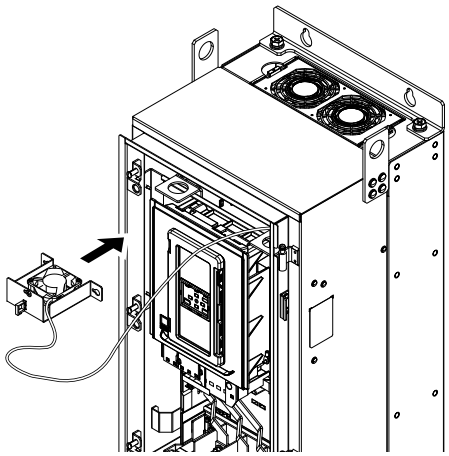
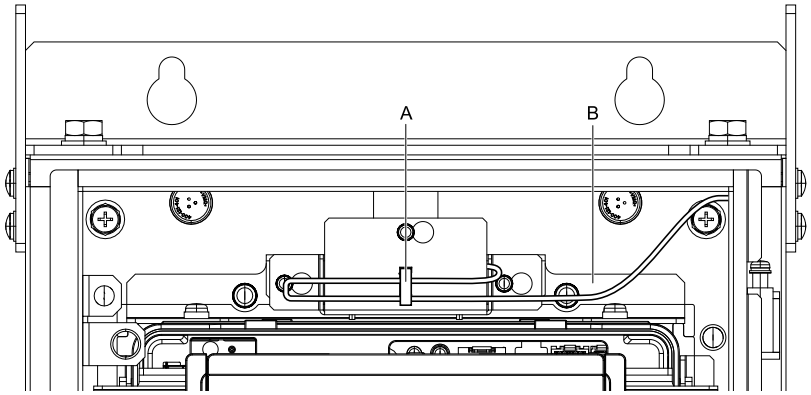


Figure 1.129 Install the Fan Unit

4. Attach the cable through the clamp.



A - Clamp
B - Fan cable

Figure 1.130 Attach the Fan Cable through the Clamp

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

1.5 Replace the Keypad Battery

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

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

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

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

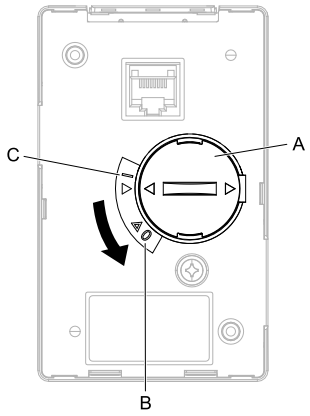
⚠ WARNING Fire Hazard
Do not disassemble batteries. Do not expose batteries to heat or fire.
If the battery explodes, it can cause a fire.

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

The performance life estimate of a new battery is different for different keypad versions.
Refer to "REV" on the keypad nameplate for the keypad version.

- Keypad with REV: H and earlier or REV: J and later
  - 5 years (20 °C (68 °F))
  - 3.5 years (-10 °C to +50 °C (14 °F to 122 °F))
- Keypad with REV: I
  - 2.5 years (20 °C (68 °F))
  - 1.8 years (-10 °C to +50 °C (14 °F to 122 °F))

1. De-energize the drive and remove the keypad.
2. Use a slotted screwdriver to turn the battery cover counterclockwise and remove the cover.

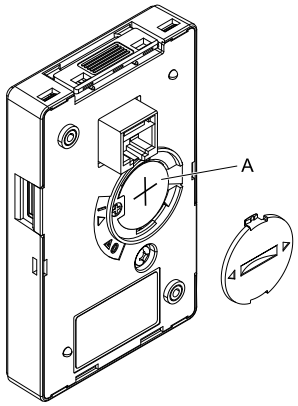


A - Battery cover
B - Opened
C - Closed

Figure 1.131 Remove the Battery Cover

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

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



A - Battery

Figure 1.132 Insert the New Battery

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

1.6 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

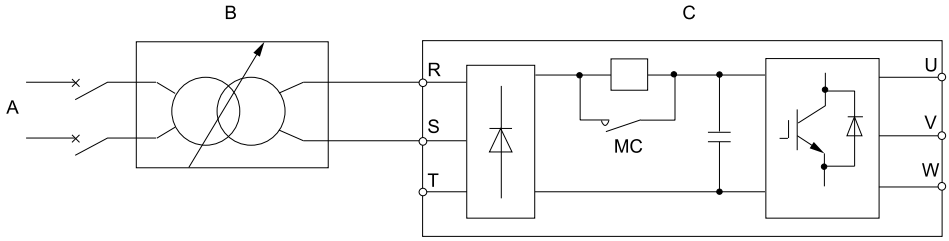
- Temperature and Humidity
  When you store the drive for approximately one month, for example during shipping, you can put the drive in a location where the temperature is -20 °C to +70 °C (-4 °F to +158 °F). Correctly package and store the drive during shipping to prevent vibration and impact damage.
  Do not put the drive in direct sunlight or where there will be condensation or ice. Put the drive in a location where the relative humidity is 95% or less.
- Dust and Oil Mist
  Do not keep the drive locations with dust or oil mist. For example, cement factories and cotton mills.
- Corrosive Gas
  Do not keep the drive in locations with corrosive gas. For example, chemical plants, refineries, and sewage plants.
- Salt Damage
  Do not keep the drive in salty locations. For example, locations near the ocean, and salt damage-designated locations.

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

◆ Regular Application of Power

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

If you store the drive for longer than two years and do not apply power, Yaskawa recommends that you use a variable power source and gradually increase the power from 0 V to the rated drive voltage over a period of 2 to 3 minutes. Apply power for a minimum of 1 hour with no load to reform the main circuit electrolytic capacitor. When you operate the drive after you apply power, wire the drive correctly and check for drive faults, overcurrents, motor vibration, motor speed differences, and other defects during operation.



A - AC power supply
B - Variable power source
C - Drive

Figure 1.133 Power Distribution Method

2

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, remove the covers before measuring for dangerous voltages to make sure that the drive is safe.

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

⚠WARNING

Electrical Shock Hazard

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

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

Always ground the motor-side grounding terminal.

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

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

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

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

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

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

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

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

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

Do not modify the drive body or drive circuitry.

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

Fire Hazard

Tighten all terminal screws to the correct tightening torque.

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

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

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

⚠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
Faults	When the drive detects a fault, it will cause these conditions: • The keypad shows the fault code and  and ALM/ERR of the LED Status Ring illuminate continuously. • The keypad shows the fault code and  and ALM/ERR on the LED Status Ring illuminate continuously when *o2-24 = 0 or 1 [LED Light Function Selection = Enable Status Ring & Keypad LED or LED Status Ring Disable]*. • The drive shuts off output, and the motor coasts to a stop. Some faults let the user select a motor stopping method. • Fault relay output MA-MC will turn ON, and MB-MC will turn OFF. 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  and ALM/ERR on the LED Status Ring flash when *o2-24 = 0 or 1*. • The drive will continue to operate the motor. Some alarms let the user select a motor stopping method. • If the drive detects a minor fault, the terminal set to *H2-01 to H2-03 = 10 [MFDO Function Select = Alarm]* will switch ON. If you do not set parameters *H2-01 to H2-03* , the drive will not trigger MFDO terminals when it detects a minor fault. • The drive will not output a minor fault signal when it detects an alarm. 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.
Auto-Tuning Errors	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 Errors	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.

Note:

If there is no information on the display when you energize the keypad, there can be a connection error. Remove the keypad and connect it again to make sure that you correctly connected the cable between the drive and the keypad.

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.
Accum (00DF)	Accumulated Level Reached	Flashing	Alarm	128
Accum (0468)	Accumulated Level Reached	Illuminated	Fault	101
AEr (0032)	Station Address Setting Error	Flashing	Alarm	128
AFBL (00A2)	Analog Fdbk Lost Switched to Net	Flashing	Alarm	128
AJA (00E3)	Anti-Jam Active	Flashing	Alarm	128
AJF (046B)	Anti-Jam Fault	Illuminated	Fault	101
ALRC (00EC)	Accum Lvl Reached Cycle Run Cmd	Flashing	Alarm	128
AUdiS (00A3)	Low WL/SP/PI Aux FB Drv Disabled	Flashing	Alarm	128
AUFbL (00A5)	WL/SP/PI Aux Fdbk Lost Using Net	Flashing	Alarm	128
AuxFB (00A4)	PI Aux Feedback Level Loss	Flashing	Alarm	128
AuxFB (0420)	PI Aux Feedback Level Loss	Illuminated	Fault	101
bAT (0085)	Keypad Battery Low Voltage	Flashing	Alarm	128
bAT (0402)	Keypad Battery Low Voltage	Illuminated	Fault	101
bb (0008)	Baseblock	Flashing	Alarm	129
bCE (008A)	Bluetooth Communication Error	Flashing	Alarm	129
bCE (0416)	Bluetooth Communication Fault	Illuminated	Fault	101
BuDif (00A6)	Main Fdbk Lost, Using Diff Fdbk	Flashing	Alarm	129
Bu-Fb (0090)	Main Fdbk Lost Using Backup Fdbk	Flashing	Alarm	129
BuFbl (0091)	Backup Fdbk Lost Chk/Repl Xducer	Flashing	Alarm	129
bUS (0015)	Option Communication Error	Flashing	Alarm	129
bUS (0022)	Option Communication Error	Illuminated	Fault	101
bUSy	Busy	-	Not an alarm.	130
CALL (001D)	Serial Comm Transmission Error	Flashing	Alarm	130
CE (0092)	Run at H5-34 (CE Go-To-Freq)	Flashing	Alarm	130
CE (0014)	Modbus Communication Error	Flashing	Alarm	130
CE (0021)	Modbus Communication Error	Illuminated	Fault	102
CoF (0046)	Current Offset Fault	Illuminated	Fault	102
CPEr	Control Mode Mismatch	-	Backup Function Runtime Error	152
CPF00 (0081)	Control Circuit Error	Illuminated	Fault	102
CPF01 (0082)	Control Circuit Error	Illuminated	Fault	102
CPF02 (0083)	A/D Conversion Error	Illuminated	Fault	102
CPF03 (0084)	Control Board Connection Error	Illuminated	Fault	103
CPF06 (0087)	EEPROM Memory Data Error	Illuminated	Fault	103
CPF07 (0088)	Terminal Board Connection Error	Illuminated	Fault	103

Display (Hex.)	Name	ALM LED	Type	Ref.
CPF08 (0089)	Terminal Board Connection Error	Illuminated	Fault	103
CPF11 (008C)	RAM Fault	Illuminated	Fault	103
CPF12 (008D)	FLASH Memory Fault	Illuminated	Fault	103
CPF13 (008E)	Watchdog Circuit Exception	Illuminated	Fault	103
CPF14 (008F)	Control Circuit Fault	Illuminated	Fault	104
CPF16 (0091)	Clock Fault	Illuminated	Fault	104
CPF17 (0092)	Timing Fault	Illuminated	Fault	104
CPF18 (0093)	Control Circuit Fault	Illuminated	Fault	104
CPF19 (0094)	Control Circuit Fault	Illuminated	Fault	104
CPF20 (0095)	Control Circuit Error	Illuminated	Fault	104
CPF21 (0096)	Control Circuit Error	Illuminated	Fault	104
CPF22 (0097)	Hybrid IC Error	Illuminated	Fault	104
CPF23 (0098)	Control Board Connection Error	Illuminated	Fault	105
CPF24 (0099)	Drive Unit Signal Fault	Illuminated	Fault	105
CPF26 (009B)	BB Circuit Error	Illuminated	Fault	105
CPF27 (009C)	PWM Set Reg Error	Illuminated	Fault	105
CPF28 (009D)	PWM Pattern Error	Illuminated	Fault	105
CPF29 (009E)	On-Delay Error	Illuminated	Fault	105
CPF30 (009F)	BB On Error	Illuminated	Fault	105
CPF31 (00A0)	ASIC Code Error	Illuminated	Fault	105
CPF32 (00A1)	ASIC Startup Error	Illuminated	Fault	106
CPF33 (00A2)	Watch-dog Eror	Illuminated	Fault	106
CPF34 (00A3)	Power/Clock Eror	Illuminated	Fault	106
CPF35 (00A4)	Ext A/D Conv Error	Illuminated	Fault	106
CPF36 (00A5)	ASIC COM Error	Illuminated	Fault	106
CPF37 (00A6)	ASIC COM Error	Illuminated	Fault	106
CPF38 (00A7)	EEPROM Data Error	Illuminated	Fault	106
CPF39 (00A8)	CPU-ASIC Communication Error	Illuminated	Fault	106
CPyE	Error Writing Data	-	Backup Function Runtime Error	152
CrST	Cannot Reset	Flashing	Not an alarm.	131
CSEr	Control Mode Mismatch	-	Backup Function Runtime Error	152
CyPo (0029)	Cycle Power to Accept Changes	Flashing	Alarm	131
dEv (0011)	Speed Deviation	Flashing	Alarm	131
dEv (0019)	Speed Deviation	Illuminated	Fault	107
dFPS	Drive Model Mismatch	-	Backup Function Runtime Error	152
DIFF (0093)	Differential Feedback Exceeded	Flashing	Alarm	131
DIFF (0421)	Differential Feedback Exceeded	Illuminated	Fault	107
dnE (002A)	Drive Disabled	Flashing	Alarm	131
DRA (00E4)	De-Rag Active	Flashing	Alarm	131
DRF (046C)	De-Rag Fault	Illuminated	Fault	107
DS (00DC)	De-Scale/De-Rag Active	Flashing	Alarm	132
dv7 (005B)	Polarity Judge Timeout	Illuminated	Fault	107
dWAL (0049)	DriveWorksEZ Alarm	Flashing	Alarm	132

Display (Hex.)	Name	ALM LED	Type	Ref.
dWA2 (004A)	DriveWorksEZ Alarm 2	Flashing	Alarm	132
dWA3 (004B)	DriveWorksEZ Alarm 3	Flashing	Alarm	132
dWF1 (004A)	EEPROM Memory DWEZ Data Error	Illuminated	Fault	107
dWFL (0049)	DriveWorksEZ Fault	Illuminated	Fault	107
dWF2 (004B)	DriveWorksEZ Fault 2	Illuminated	Fault	107
dWF3 (004C)	DriveWorksEZ Fault 3	Illuminated	Fault	107
EF (0007)	FWD/REV Run Command Input Error	Flashing	Alarm	132
EF0 (001A)	Option Card External Fault	Flashing	Alarm	132
EF0 (0027)	Option Card External Fault	Illuminated	Fault	108
EF1 (0039)	Pump Fault (Terminal S1)	Flashing	Alarm	132
EF1 (0042)	Pump Fault (Terminal S1)	Illuminated	Fault	108
EF2 (003A)	Pump Fault (Terminal S2)	Flashing	Alarm	132
EF2 (0043)	Pump Fault (Terminal S2)	Illuminated	Fault	108
EF3 (0009)	Pump Fault (Terminal S3)	Flashing	Alarm	132
EF3 (0011)	Pump Fault (Terminal S3)	Illuminated	Fault	108
EF4 (000A)	Pump Fault (Terminal S4)	Flashing	Alarm	133
EF4 (0012)	Pump Fault (Terminal S4)	Illuminated	Fault	108
EF5 (000B)	Pump Fault (Terminal S5)	Flashing	Alarm	133
EF5 (0013)	Pump Fault (Terminal S5)	Illuminated	Fault	108
EF6 (000C)	Pump Fault (Terminal S6)	Flashing	Alarm	133
EF6 (0014)	Pump Fault (Terminal S6)	Illuminated	Fault	108
EF7 (000D)	Pump Fault (Terminal S7)	Flashing	Alarm	133
EF7 (0015)	Pump Fault (Terminal S7)	Illuminated	Fault	109
EF8 (000E)	Pump Fault (Terminal S8)	Flashing	Alarm	133
EF8 (0016)	Pump Fault (Terminal S8)	Illuminated	Fault	109
End1	Excessive Rated Voltage Setting	Flashing	An Auto-Tuning Error	149
End2	Iron Core Saturation Coefficient	Flashing	An Auto-Tuning Error	149
End3	Rated Current Setting Alarm	Flashing	An Auto-Tuning Error	149
End4	Adjusted Slip Calculation Error	Flashing	An Auto-Tuning Error	149
End5	Resistance Tuning Error	Flashing	An Auto-Tuning Error	149
End6	Leakage Inductance Alarm	Flashing	An Auto-Tuning Error	149
End7	No-Load Current Alarm	Flashing	An Auto-Tuning Error	149
End8	HFI Alarm	Flashing	An Auto-Tuning Error	149
End9	Initial Pole Detection Alarm	Flashing	An Auto-Tuning Error	150
EOF (0067)	Emergency Override FWD	Flashing	Alarm	133
EOR (0068)	Emergency Override REV	Flashing	Alarm	134
EP24v (0081)	External Power 24V Supply	Flashing	Alarm	134
Er-01	Motor Data Error	Flashing	An Auto-Tuning Error	150
Er-02	Drive in an Alarm State	Flashing	An Auto-Tuning Error	150
Er-03	STOP Button was Pressed	Flashing	An Auto-Tuning Error	150
Er-04	Line-to-Line Resistance Error	Flashing	An Auto-Tuning Error	150
Er-05	No-Load Current Error	Flashing	An Auto-Tuning Error	150
Er-08	Rated Slip Error	Flashing	An Auto-Tuning Error	151

Display (Hex.)	Name	ALM LED	Type	Ref.
Er-09	Acceleration Error	Flashing	An Auto-Tuning Error	151
Er-12	Current Detection Error	Flashing	An Auto-Tuning Error	151
Er-13	Leakage Inductance Error	Flashing	An Auto-Tuning Error	151
Er-18	Back EMF Error	Flashing	An Auto-Tuning Error	151
Er-19	PM Inductance Error	Flashing	An Auto-Tuning Error	151
Er-20	Stator Resistance Error	Flashing	An Auto-Tuning Error	151
Er-25	HighFreq Inject Param Tuning Err	Flashing	An Auto-Tuning Error	151
Err (001F)	EEPROM Write Error	Illuminated	Fault	109
FAn1 (0413)	Drive Cooling Fan Fault	Illuminated	Fault	109
FDBKL (0094)	Feedback Loss Wire Break	Flashing	Alarm	134
FDBKL (0422)	WIRE Break	Illuminated	Fault	109
FLGT (0095)	Feedback Loss, Go To Freq b5-83	Flashing	Alarm	134
FMLST (00E5)	Net Flow Meter Lost:Check Source	Flashing	Alarm	134
FR<MS (009E)	Freq Ref < Minimum Speed (Y1-06)	Flashing	Alarm	134
FR<TH (009F)	Freq. Reference < Thrust (Y4-12)	Flashing	Alarm	135
GF (0006)	Ground Fault	Illuminated	Fault	110
HCA (0034)	High Current Alarm	Flashing	Alarm	135
HFB (0423)	High Feedback Sensed	Illuminated	Fault	110
HiAux (0096)	High PI Aux Feedback Level	Flashing	Alarm	135
HiAux (0424)	High PI Aux Feedback Level	Illuminated	Fault	110
HIFB (0097)	High Feedback Sensed	Flashing	Alarm	135
HiFlo (00E0)	High Flow	Flashing	Alarm	135
HiFlo (046A)	High Flow	Illuminated	Fault	110
HiSuc (00AE)	High Suction Pressure	Flashing	Alarm	135
HiSuc (042F)	High Suction Pressure	Illuminated	Fault	110
HLCE (0411)	High Level Communication Errors	Illuminated	Fault	110
HWL (0433)	High Water Level Digital Input	Illuminated	Fault	111
iFEr	Communication Err	-	Backup Function Runtime Error	152
L24v (0021)	Loss of External Power 24 Supply	Flashing	Alarm	135
LCP (00A7)	Low City Pressure	Flashing	Alarm	136
LF (001C)	Output Phase Loss	Illuminated	Fault	111
LF2 (0036)	Output Current Imbalance	Illuminated	Fault	111
LFB (0425)	Low Feedback Sensed	Illuminated	Fault	111
LoAux (0099)	Low PI Aux Feedback Level	Flashing	Alarm	136
LoAux (0426)	Low PI Aux Feedback Level	Illuminated	Fault	111
LOFB (009A)	Low Feedback Sensed	Flashing	Alarm	136
LoG	Com Error / Abnormal SD Card	Flashing	Alarm	136
LOP (009B)	Loss of Prime	Flashing	Alarm	136
LOP (0427)	Loss of Prime	Illuminated	Fault	112
LoSuc (00AD)	Low Suction Pressure	Flashing	Alarm	136
LoSuc (042E)	Low Suction Pressure	Illuminated	Fault	112
LowFl (00DE)	Low Flow	Flashing	Alarm	136
LowFl (0467)	Low Flow	Illuminated	Fault	112

Display (Hex.)	Name	ALM LED	Type	Ref.
LowWL (00AC)	Low Water Level	Flashing	Alarm	137
LowWL (042D)	Low Water Level	Illuminated	Fault	112
LSP (00A8)	Low Suction Pressure	Flashing	Alarm	137
LT-1 (0035)	Cooling Fan Maintenance Time	Flashing	Alarm	137
LT-2 (0036)	Capacitor Maintenance Time	Flashing	Alarm	137
LT-3 (0043)	SoftChargeBypassRelay MainteTime	Flashing	Alarm	137
LT-4 (0044)	IGBT Maintenance Time (50%)	Flashing	Alarm	137
LWL (0432)	Low Water Level Digital Input	Illuminated	Fault	112
LWT (00A9)	Low Water In Tank	Flashing	Alarm	137
MSL (0428)	Net Master Lost	Illuminated	Fault	112
ndAT	Error Received Data	-	Backup Function Runtime Error	152
NETSC (00A1)	NETSCAN Waiting for Master	Flashing	Alarm	137
NMS (009C)	Setpoint Not Met	Flashing	Alarm	137
NMS (0429)	Setpoint Not Met	Illuminated	Fault	112
nSE (0052)	Node Setup Error	Illuminated	Fault	113
oC (0007)	Overcurrent	Illuminated	Fault	113
OD (009D)	Output Disconnect	Flashing	Alarm	138
OD (042A)	Output Disconnect	Illuminated	Fault	114
oFA00 (0101)	Option Not Compatible with Port	Illuminated	Fault	114
oFA01 (0102)	Option Fault/Connection Error	Illuminated	Fault	114
oFA02 (0103)	Duplicate Options	Illuminated	Fault	114
oFA03 (0104)	Diagnostic Error	Illuminated	Fault	114
oFA04 (0105)	Flash Write Mode	Illuminated	Fault	114
oFA05 (0106)	Option A/D Error	Illuminated	Fault	115
oFA06 (0107)	Option Communication Error	Illuminated	Fault	115
oFA10 (0111)	Option RAM Error	Illuminated	Fault	115
oFA11 (0112)	Option Ope Mode Error	Illuminated	Fault	115
oFA12 (0113)	Drive Receive CRC Error	Illuminated	Fault	115
oFA13 (0114)	Drive Receive Frame Error	Illuminated	Fault	115
oFA14 (0115)	Drive Receive Abort Error	Illuminated	Fault	115
oFA15 (0116)	Option Receive CRC Error	Illuminated	Fault	115
oFA16 (0117)	Option Receive Frame Error	Illuminated	Fault	116
oFA17 (0118)	Option Receive Abort Error	Illuminated	Fault	116
oFA30 (0131)	COM ID Error	Illuminated	Fault	116
oFA31 (0132)	Type Code Error	Illuminated	Fault	116
oFA32 (0133)	SUM Check Error	Illuminated	Fault	116
oFA33 (0134)	Option Receive Time Over	Illuminated	Fault	116
oFA34 (0135)	Memobus Time Over	Illuminated	Fault	116
oFA35 (0136)	Drive Receive Time Over 1	Illuminated	Fault	116
oFA36 (0137)	CI Check Error	Illuminated	Fault	117
oFA37 (0138)	Drive Receive Time Over 2	Illuminated	Fault	117
oFA38 (0139)	Control Reference Error	Illuminated	Fault	117
oFA39 (013A)	Drive Receive Time Over 3	Illuminated	Fault	117

Display (Hex.)	Name	ALM LED	Type	Ref.
oFA40 (013B)	CtrlResSel 1Err	Illuminated	Fault	117
oFA41 (013C)	Drive Receive Time Over 4	Illuminated	Fault	117
oFA42 (013D)	CtrlResSel 2Err	Illuminated	Fault	117
oFA43 (013E)	Drive Receive Time Over 5	Illuminated	Fault	117
oFb00 (0201)	Option Not Compatible with Port	Illuminated	Fault	118
oFb01 (0202)	Option Fault/Connection Error	Illuminated	Fault	118
oFb02 (0203)	Duplicate Options	Illuminated	Fault	118
oFb03 (0204)	Diagnostic Error	Illuminated	Fault	118
oFb04 (0205)	Flash Write Mode	Illuminated	Fault	118
oFb05 (0206)	Option A/D Error	Illuminated	Fault	118
oFb06 (0207)	Option Communication Error	Illuminated	Fault	118
oFb10 (0211)	Option RAM Error	Illuminated	Fault	118
oFb11 (0212)	Option Ope Mode Error	Illuminated	Fault	118
oFb12 (0213)	Drive Receive CRC Error	Illuminated	Fault	119
oFb13 (0214)	Drive Receive Frame Error	Illuminated	Fault	119
oFb14 (0215)	Drive Receive Abort Error	Illuminated	Fault	119
oFb15 (0216)	Option Receive CRC Error	Illuminated	Fault	119
oFb16 (0217)	Option Receive Frame Error	Illuminated	Fault	119
oFb17 (0218)	Option Receive Abort Error	Illuminated	Fault	119
oH (0003)	Heatsink Overheat	Flashing	Alarm	138
oH (0009)	Heatsink Overheat	Illuminated	Fault	119
oH1 (000A)	Heatsink Overheat	Illuminated	Fault	120
oH2 (0004)	External Overheat (H1-XX=B)	Flashing	Alarm	138
oH3 (001D)	Motor Overheat (PTC Input)	Illuminated	Fault	120
oH3 (0022)	Motor Overheat (PTC Input)	Flashing	Alarm	138
oH4 (0020)	Motor Overheat Fault (PTC Input)	Illuminated	Fault	120
oL1 (000B)	Motor Overload	Illuminated	Fault	120
oL2 (000C)	Drive Overload	Illuminated	Fault	121
oL3 (0005)	Overtorque 1	Flashing	Alarm	139
oL3 (000D)	Overtorque Detection 1	Illuminated	Fault	122
oL4 (0006)	Overtorque 2	Flashing	Alarm	139
oL4 (000E)	Overtorque Detection 2	Illuminated	Fault	122
oL7 (002B)	High Slip Braking Overload	Illuminated	Fault	122
oPE01	Drive Capacity Setting Fault	Flashing	Parameter Setting Error	143
oPE02	Parameter Range Setting Error	Flashing	Parameter Setting Error	143
oPE03	Multi-Function Input Setting Err	Flashing	Parameter Setting Error	143
oPE05	Run Cmd/Freq Ref Source Sel Err	Flashing	Parameter Setting Error	145
oPE07	Analog Input Selection Error	Flashing	Parameter Setting Error	146
oPE08	Parameter Selection Error	Flashing	Parameter Setting Error	146
oPE09	PID Control Selection Fault	Flashing	Parameter Setting Error	147
oPE10	V/f Data Setting Error	Flashing	Parameter Setting Error	147
oPE11	Carrier Frequency Setting Error	Flashing	Parameter Setting Error	147
oPE16	Energy Saving Constants Error	Flashing	Parameter Setting Error	147

Display (Hex.)	Name	ALM LED	Type	Ref.
oPE33	Digital Output Selection Error	Flashing	Parameter Setting Error	148
oPE35	Network WL/SP/PI Aux Mode	Flashing	Parameter Setting Error	148
oPE43	Flow Meter Input	Flashing	Parameter Setting Error	148
oPE44	Water Level / Suct Pres / PI Aux	Flashing	Parameter Setting Error	148
oPr (001E)	Keypad Connection Fault	Illuminated	Fault	122
oS (0010)	Overspeed	Flashing	Alarm	139
oS (0018)	Overspeed	Illuminated	Fault	123
ov (0002)	DC Bus Overvoltage	Flashing	Alarm	139
ov (0008)	Overvoltage	Illuminated	Fault	123
ov2 (0405)	DC Bus Overvoltage 2	Illuminated	Fault	123
ovEr	Too Many Parameters Changed	-	Not an alarm.	139
PASS	Modbus Communication Test	Flashing	Not an alarm.	139
PE1 (0047)	PLC Fault 1	Illuminated	Fault	123
PE2 (0048)	PLC Fault 2	Illuminated	Fault	124
PF (0047)	Input Phase Loss	Flashing	Alarm	139
PF (001B)	Input Phase Loss	Illuminated	Fault	124
POC (00E2)	Pump Over Cycle	Flashing	Alarm	140
POC (0469)	Pump Over Cycle	Illuminated	Fault	124
PSE (0437)	JOHB-SMP3 Protocol Set Error	Illuminated	Fault	124
rdEr	Error Reading Data	-	Backup Function Runtime Error	152
R-DNE (00D8)	Remote Drive Disable	Flashing	Alarm	140
rUn (001B)	Motor Switch during Run	Flashing	Alarm	140
SC (0005)	Short Circuit/IGBT Failure	Illuminated	Fault	124
SCF (040F)	Safety Circuit Fault	Illuminated	Fault	125
SE (0020)	Modbus Test Mode Error	Flashing	Alarm	140
SEr (003B)	Speed Search Retries Exceeded	Illuminated	Fault	125
SPCNR (00DD)	Single Phase Converter Not Ready	Flashing	Alarm	140
SPCNR (0435)	Single Phase Converter Not Ready	Illuminated	Fault	125
SPL (00B0)	Suction Pressure Feedback Loss	Flashing	Alarm	140
SPL (0431)	Suction Pressure Feedback Loss	Illuminated	Fault	125
STo (003C)	Safe Torque OFF	-	Alarm	140
SToF (003B)	Safe Torque OFF	Flashing	Alarm	141
STPo (0037)	Motor Step-Out Detected	Illuminated	Fault	125
TiM (0089)	Keypad Time Not Set	Flashing	Alarm	141
TiM (0401)	Keypad Time Not Set	Illuminated	Fault	125
TrPC (0042)	IGBT Maintenance Time (90%)	Flashing	Alarm	141
UL3 (001E)	Undertorque Detection 1	Flashing	Alarm	141
UL3 (0029)	Undertorque Detection 1	Illuminated	Fault	126
UL4 (001F)	Undertorque Detection 2	Flashing	Alarm	141
UL4 (002A)	Undertorque Detection 2	Illuminated	Fault	126
UL6 (004E)	Underload or Belt Break Detected	Flashing	Alarm	141
UL6 (005A)	Underload or Belt Break Detected	Illuminated	Fault	126
Uv (0001)	DC Bus Undervoltage	Flashing	Alarm	141

Display (Hex.)	Name	ALM LED	Type	Ref.
Uv1 (0002)	DC Bus Undervoltage	Illuminated	Fault	126
Uv2 (0003)	Control Power Undervoltage	Illuminated	Fault	126
Uv3 (0004)	Soft Charge Answerback Fault	Illuminated	Fault	127
vAEr	Voltage Class, Capacity Mismatch	-	Backup Function Runtime Error	153
vFyE	Parameters do not Match	-	Backup Function Runtime Error	153
VLTS (042B)	Volute Thermostat Fault	Illuminated	Fault	127
WFR (00E9)	Waiting for Run	Flashing	Alarm	142
WLL (00AF)	Water Level Feedback Loss	Flashing	Alarm	142
WLL (0430)	Water Level Feedback Loss	Illuminated	Fault	127

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
Accum	Accumulated Level Reached	Accumulated volume has is more than the *Y6-11* to *Y6-14* settings and *Y6-15 = 2 or 3 [Accumulated Volume Behavior = Fault (and Digital Output) or Fault + MFDO + Accum Reset]*	Set *Y6-05 = 7770 [Flow Accumulation Set Reset = Reset Accumulation]* or via Reset Accumulation digital input).
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
AJF	Anti-Jam Fault	The drive could not clear the debris from the impeller in fewer than the number of tries set in *Y7-02 [Anti-Jam Cycle Count]*. Display text for Anti-Jam function is set to Anti-Jam *[Y7-09 = 0]*.	• Check for correct pump operation. • Adjust the *Y7-03 [AJ Detection Current Lvl @ Start]* level or the *Y7-02* counts. • If text is incorrect check *Y7-09 [Anti-Jam Display Text Selection]*.
Note: • Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
AuxFB	PI Aux Feedback Level Loss	The analog input from the terminal set for *PI Auxiliary Control Feedback Level [H3-xx = 27]* is more than 21 mA or less than 3 mA for longer than 1 s.	Repair transducer or wiring.
Note: • Do a Fault Reset to clear the fault. • Parameter *YF-19 [PI Aux Ctrl Feedback WireBreak]* sets the Auto Restart function of this error.			
Code	**Name**	**Causes**	**Possible Solutions**
bAT	Keypad Battery Low Voltage	The keypad battery voltage is low.	Replace the keypad battery.
Note: Use *o4-24 [bAT Detection Selection]* to enable/disable *bAT* detection.			
Code	**Name**	**Causes**	**Possible Solutions**
bCE	Bluetooth Communication Fault	The smartphone or tablet with DriveWizard Mobile or DriveWizard installed is too far from the keypad.	Use the smartphone or tablet 10 m (32.8 ft) or nearer to the keypad. **Note:** *bCE* can occur when the smartphone or tablet is 10 m (32.8 ft) or nearer to the keypad depending on the specifications of the smartphone or tablet.
		Radio waves from a different device are causing interference with communications between the smartphone or tablet and keypad.	Make sure that no device around the keypad uses the same radio bandwidth (2400 MHz to 2480 MHz), and prevent radio interference.
Note: • The drive detects this error when you use the Bluetooth LCD keypad to operate the drive from a smartphone or tablet. • Do a Fault Reset to clear the fault. • Set the stopping method for this fault in *o2-27 [bCE Detection Selection]*.			
Code	**Name**	**Causes**	**Possible Solutions**
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.

Code	Name	Causes	Possible Solutions
		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	Modbus Communication Error	The communications cable wiring is incorrect.	Correct wiring errors.
		There is a short circuit in the communications cable or the communications cable is not connected.	• 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.

Note:
• The drive detects this error if it does not correctly receive control data for the *CE* detection time set to *H5-09 [CE Detection Time]*.
• Do a Fault Reset to clear the fault.
• If the drive detects this error, the drive will operate the motor as specified by the stopping method set in *H5-04 [Communication Error Stop Method]*.

Code	Name	Causes	Possible Solutions
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 *b3-01 = 1 [Speed Search at Start Selection = Enabled]*. • Use *Speed Search from Fmax or Fref [H1-xx = 61, 62]* to do a speed search through one of the external terminals. **Note:** When controlling the PM motor, External Speed Search commands 1 and 2 operate the same.
		A drive hardware problem occurred.	• Do a Fault Reset to clear the fault or de-energize the drive. • If the fault stays, replace the drive.

Code	Name	Causes	Possible Solutions
CPF00	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
CPF01	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
CPF02	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
CPF03	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	Control Circuit Error (EEPROM memory Data Error)	The drive power supply was de-energized while a communication option entered a parameter Write command.	Set *A1-03 = 2220, 3330 [Initialize Parameters = 2-Wire Initialization, 3-Wire Initialization]* and initialize the drive.
		An EEPROM peripheral circuit error occurred.	• Re-energize the drive. • If the fault stays, replace the control board or the drive. For information about how to replace the control board, contact Yaskawa or your nearest sales representative.

Note:
• The drive detects this error if there is an error in the data written to the drive EEPROM.
• Do a Fault Reset to clear the fault.
• Fault trace is not available for these faults.

Code	Name	Causes	Possible Solutions
CPF07	Control Circuit Error	A drive hardware problem occurred.	• 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
CPF08	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
CPF11	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
CPF12	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
CPF13	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
CPF14	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**
CPF16	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**
CPF17	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**
CPF18	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**
CPF19	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**
CPF20	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**
CPF21	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**
CPF22	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
CPF23	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**
CPF24	Control Circuit Error (Drive Unit Signal Fault)	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**
CPF26	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**
CPF27	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**
CPF28	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**
CPF29	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**
CPF30	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**
CPF31	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
CPF32	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**
CPF33	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**
CPF34	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**
CPF35	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**
CPF36	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**
CPF37	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**
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**
CPF39	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
dEv	Speed Deviation	The load is too heavy.	Decrease the load.
		Acceleration and deceleration times are set too short.	Increase the values set in *C1-01 to C1-04 [Acceleration/ Deceleration Time]*.
		The *dEv* detection level settings are incorrect.	Adjust *F1-10 [Speed Deviation Detection Level]* and *F1-11 [Speed Deviation Detect DelayTime]*.
		The load is locked up.	Examine the machine.
		The holding brake is stopping the motor.	Release the holding brake.

Note:
• The drive detects this error if the difference between the detected speed and the speed reference is more than the setting of *F1-10* for longer than *F1-11*.
• 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 *F1-04 [Speed Deviation Detection Select]*.

Code	Name	Causes	Possible Solutions
DIFF	Differential Feedback Exceeded	The difference between the PID Feedback and *Differential Level Source [H3-xx = 2D]* is more than the level set in *Y4-18 [Differential Level]* for the time set in *Y4-19 [Differential Lvl Detection Time]*.	• Replace the feedback transducer or transducers. • Make sure that the settings of *Y4-18 [Differential Level] to Y4-20 [Differential Level Detection Sel]* are correct.

Note:
Do a Fault Reset to clear the fault.

Code	Name	Causes	Possible Solutions
DRF	De-Rag Fault	The drive could not clear the debris from the impeller in fewer than the number of tries set in *Y7-02 [Anti-Jam Cycle Count]*. Display text for Anti-Jam function is set to De-Rag *[Y7-09 = 1]*.	• Check for correct pump operation. • Adjust the *Y7-03 [AJ Detection Current Lvl @ Start]* level or the *Y7-02* counts. • If text is incorrect check *Y7-09 [Anti-Jam Display Text Selection]*.

Note:
• Do a Fault Reset to clear the fault.

Code	Name	Causes	Possible Solutions
dv7	Polarity Judge Timeout	There is a disconnection in the motor coil winding.	Measure the motor line-to-line resistance and replace the motor if a coil is disconnected.
		The screws on the drive output terminals are loose.	Tighten the terminal screws to the correct tightening torque.

Note:
• 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 *A1-03 = 2220, 3330 [Initialize Parameters = 2-Wire Initialization, 3-Wire Initialization]* 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
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.
• This fault is ignored during Emergency Override

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.
• This fault is ignored during Emergency Override

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.
• This fault is ignored during Emergency Override

Code	Name	Causes	Possible Solutions
EF0	Option Card External Fault	The communication option 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 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 *F6-03 [Comm External Fault (EF0) Select]*.

Code	Name	Causes	Possible Solutions
EF1	Pump 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.
		Pump Fault [H1-01 = 20 to 2B] is set to MFDI terminal S1, but the terminal is not in use.	Correctly set the MFDI.

Note:
Do a Fault Reset to clear the fault.

Code	Name	Causes	Possible Solutions
EF2	Pump 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.
		Pump 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	Pump 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.
		Pump 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	Pump 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.
		Pump 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	Pump 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.
		Pump 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	Pump 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.

Code	Name	Causes	Possible Solutions
		Pump 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	Pump 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.
		Pump 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
EF8	Pump Fault (Terminal S8)	MFDI terminal S8 caused an external fault through an external device.	1. Find the device that caused the external fault and remove the cause. 2. Clear the external fault input in the MFDI.
		The wiring is incorrect.	Correctly connect the signal line to MFDI terminal S8.
		Pump Fault [H1-08 = 20 to 2B] is set to MFDI terminal S8, but the terminal is not in use.	Correctly set the MFDI.

Note:
Do a Fault Reset to clear the fault.

Code	Name	Causes	Possible Solutions
Err	EEPROM Write Error	There was a problem with the EEPROM hardware.	• 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
FAn1	Drive Cooling Fan Fault	The cooling fan stopped operating correctly.	• Examine cooling fan operation. • Re-energize the drive. • Examine *U4-03 [Fan Elapsed Time]* and *U4-04 [Fan Life Mon]*. If the performance life of the cooling fan is expired or if there is damage to the fan, replace the fan.
		The circulation fan is damaged.	• Examine circulation fan operation. • Re-energize the drive. • Examine *U4-03 [Fan Elapsed Time]* and *U4-04 [Fan Life Mon]*. If there is damage to the circulation fan or if the performance life of the fan is expired, replace the fan.

Note:
Do a Fault Reset to clear the fault.

Code	Name	Causes	Possible Solutions
FDBKL	WIRE Break	The analog input from the terminal set for *PID Feedback [H3-xx = B]* is more than 21mA or less than 3mA for longer than 1 s in these conditions: • *b5-82 = 2 [Feedback Loss 4 ~ 20mA Detect Sel = Fault]* • *b5-01 ≠ 0 [PID Mode Setting ≠ Disabled]* • *H3-01, H3-09, or H3-05 = 2 [Terminal A1/A2/A3 Signal Level Selection = 4 to 20 mA]*	Make sure that you install the PID feedback source and it operates correctly.

Note:
• Do a Fault Reset to clear the fault.
• If the drive detects this fault, it will operate the motor as specified by the settings of *b5-82*.
• Parameter *L5-42 [Feedback Loss Fault Retry Select]* sets the Auto Restart function of this fault.

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.
• *L5-08 [Fault Reset Enable Select Grp2]* disables the Auto Restart function.

Code	Name	Causes	Possible Solutions
HFB	High Feedback Sensed	The feedback level is more than the level set in *Y1-11 [High Feedback Level]* for the time set in *Y1-12 [High Feedback Lvl Fault Dly Time]*.	• Decrease the feedback level less than *Y1-11*. • Set *Y1-11* and *Y1-12* correctly.

Note:
• Do a Fault Reset to clear the fault.
• If the drive detects this fault, it will respond as specified by the setting of *Y1-13 [High Feedback Selection]*.
• Parameter *L5-41 [Hi Feedback Flt Retry Selection]* sets the Auto Restart function of this fault.

Code	Name	Causes	Possible Solutions
HiAux	High PI Aux Feedback Level	PI Auxiliary Feedback is more than the level set in *YF-12 [PI Aux Control High Level Detect]* for the time set in *YF-13 [PI Aux High Level Detection Time]* in these conditions: • The drive is running. • The output frequency > 0.	• Decrease the PI Auxiliary Feedback level less than *YF-12*. • Set *YF-12* and *YF-13* correctly.

Note:
• Do a Fault Reset to clear the fault.
• Parameter *YF-14 [PI Aux Control Hi Level Det Sel]* sets the Auto Restart function of this error.

Code	Name	Causes	Possible Solutions
HiFlo	High Flow	Flow rate was more the level set in *Y6-17 [High Flow Level]* for longer than the time set in *Y6-18 [High Flow Detection Time]* and *Y6-19 = 2 or 3 [High Flow Behavior = Fault (and Digital Output) or Auto-Restart (time set by Y6-10)]*.	Reprogram *Y6-17* to *Y6-19* if flow rate is acceptable.

Note:
Do a Fault Reset to clear the fault.

Code	Name	Causes	Possible Solutions
HiSuc	High Suction Pressure	Suction pressure is more than the level set in *YE-12 [High Suction Pressure Det Level]* for longer than the time set in *YE-13 [High Suction Pressure Det Time]*, and the drive is running (AUTO or HAND) and *YE-14 = 2 or 3 [High Suction Pressure Behavior = Fault (and Digital Output) or Auto-Restart (time set by YE-15)]*.	Decrease suction pressure.

Note:
Do a Fault Reset to clear the fault.

Code	Name	Causes	Possible Solutions
HLCE	High Level Communication Errors	Communication data error occurred between the option and the master drive when you use Gateway function. The master drive detects *oFxxx* and the slave drive detects *HLCE*.	Examine the wiring between the option and the master drive and remove the cause of the fault.

Note:
This fault occurs when the drive is a slave drive in Gateway Mode *[F6-16 ≠ 0]* and communication is lost from the master.

Code	Name	Causes	Possible Solutions
HWL	High Water Level Digital Input	• The digital input terminal set to *H1-xx = BC [MFDI Function Selection = High Water Level]* activated or is defective. • The digital input terminal set to *H1-xx = 1BC [! High Water Level]* deactivated or is defective.	• Decrease the water level. • Adjust the terminal set to *H1-xx = BC or 1BC*.

Note:
• Do a Fault Reset to clear the fault.
• Parameter *Y1-36 [High/Low Water DI Fault Det Sel]* sets when the drive detects this fault.
• The drive must not be in a high water level condition to do Auto-Restart.
• Parameter *L5-64 [High Water Level Fault Retry Sel]* sets the Auto Restart function of this fault.

Code	Name	Causes	Possible Solutions
LF	Output Phase Loss	The motor main circuit cable is disconnected.	Connect motor main circuit cable wiring. Correct wiring errors in the main circuit drive input power.
		There is a disconnection in the motor coil winding.	If a coil is disconnected, measure the motor Line-to-Line Resistance and replace the motor.
		The screws on the drive output terminals are loose.	Tighten the terminal screws to the correct tightening torque.
		The rated output current of the motor is less than 5% of the drive rated current.	Examine the drive capacity or the motor output to be applied.
		You are trying to use a single-phase motor.	The drive cannot operate a single-phase motor.
		The output transistor in the drive is damaged.	• 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 *L8-07 [Output Phase Loss Protection Sel]* to enable and disable *LF* 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
LFB	Low Feedback Sensed	The feedback level is less than the level set in *Y1-08 [Low Feedback Level]* for the time set in *Y1-09 [Low Feedback Lvl Fault Dly Time]*.	• Increase the feedback level to more than *Y1-08*. • Set *Y1-08* and *Y1-09* correctly.

Note:
• Do a Fault Reset to clear the fault.
• If the drive detects this fault, it will respond as specified by the setting of *Y1-10 [Low Feedback Selection]*.
• Parameter *L5-40 [Low Feedback Flt Retry Selection]* sets the Auto Restart function of this fault.

Code	Name	Causes	Possible Solutions
LoAux	Low PI Aux Feedback Level	When the drive is running, PI Auxiliary Feedback is less than the level set in *YF-09 [PI Aux Control Low Lvl Detection]* for the time set in *YF-10 [PI Aux Control Low Lvl Det Time]*.	• Increase the PI Auxiliary Feedback level to be more than *YF-09*. • Set *YF-09* and *YF-10* correctly.

Note:
• Do a Fault Reset to clear the fault.
• Parameter *YF-11 [PI Aux Control Low Level Det Sel]* sets the Auto Restart function of this fault.

Code	Name	Causes	Possible Solutions
LOP	Loss of Prime	The drive used the *Y1-18 [Prime Loss Detection Method]* setting and measured a pump load that is less than the level set in *Y1-19 [Prime Loss Level]* for the time set in *Y1-20 [Prime Loss Time]*, and the output frequency is *Y1-21 [Prime Loss Activation Freq]* or more.	• Examine for a dry well, air in the system, or no water in the system. Use preferred priming method suggested by the pump manufacturer to restart the pump. • When there is resistance in the pump, let the system pump water again. • Set *Y1-18* to *Y1-21* correctly.
Note: • Do a Fault Reset to clear the fault. • If the drive detects this fault, it will respond as specified by the setting of *Y1-22 [Prime Loss Selection]*. • Parameters *L5-51 [Loss of Prime Fault Retry Select]* and *Y1-23 [Prime Loss Max Restart Time]* set the Auto Restart function of this fault.			
Code	**Name**	**Causes**	**Possible Solutions**
LoSuc	Low Suction Pressure	Suction pressure is less than the level set in *YE-09 [Low Suction Pressure Det Level]* for longer than the time set in *YE-10 [Low Suction Pressure Det Time]*, and the drive is running (AUTO or HAND) and *YE-11 = 2 or 3 [Low Suction Pressure Behavior = Fault (and Digital Output) or Auto-Restart (time set by YE-15)]*.	Increase suction pressure.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
LowFl	Low Flow	Flow rate was below the level set in *Y6-06 [Low Flow Level]* for longer than the time set in *Y6-07 [Low Flow Detection Time]* and *Y6-09 = 2 or 3 [Low Flow Behavior = Fault (and Digital Output) or Auto-Restart (time set by Y6-10)]*.	Reprogram *Y6-06* to *Y6-09* if flow rate is acceptable.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
LowWL	Low Water Level	Water level is below the level set in *Yd-09 [Low Water Level Detection Level]* for longer than the time set in *Yd-10 [Low Water Level Detection Time]*, and the drive is running (AUTO or HAND) with *Yd-11 = 2 or 3 [Low Water Level Behavior = Fault (and Digital Output) or Auto-Restart (time set by Yd-12)]*.	Increase the water level.
Code	**Name**	**Causes**	**Possible Solutions**
LWL	Low Water Level Digital Input	• The digital input terminal set to *H1-xx = BB [MFDI Function Selection = Low Water Level]* activated or is defective. • The digital input terminal set to *H1-xx = 1BB [! Low Water Level]* deactivated or is defective.	• Increase the water level. • Adjust the terminal set to *H1-xx = BB or 1BB*.
Note: • Do a Fault Reset to clear the fault. • Parameter *Y1-36 [High/Low Water DI Fault Det Sel]* sets when the drive detects this fault. • The drive must not be in a low water level condition to do Auto-Restart. • Parameter *L5-61 [Low Water Level Fault Retry Sel]* sets the Auto Restart function of this fault.			
Code	**Name**	**Causes**	**Possible Solutions**
MSL	Net Master Lost	No message received from the master in the time specified in *Y9-28 [NETSCAN Alarm Time]* when *Y9-27 = 3 [Network Recovery = Fault MSL]*.	• Increase *Y9-28* to account for network latency. • Make sure that there is a drive on the network that has *Y1-01 = 3 [Multiplex Mode = Network Multiplex]* and *Y9-27 = 0 [Network Recovery = Automatic]*. • Check network connections and verify *H5-01 [Drive Node Address]* and *Y9-25 [Highest Node Address]* for all drives on the network.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
NMS	Setpoint Not Met	The feedback deviates from the setpoint at a level more than *Y1-15 [Maximum Setpoint Difference]* for the time set in *Y1-16 [Not Maintaining Setpoint Time]*.	• Examine for a blocked impeller, over cycling, or broken pipe. • Set *Y1-15* and *Y1-16* correctly.
Note: • Do a Fault Reset to clear the fault. • If the drive detects this fault, it will respond as specified by the setting of *Y1-17 [Not Maintaining Setpoint Sel]*. • Parameter *L5-50 [Setpoint Not Met Fault Retry Sel]* sets the Auto Restart function of this fault.			

Code	Name	Causes	Possible Solutions
nSE	Node Setup Error	The drive received a Run command while the Node Setup function was active.	Stop the drive when the Node Setup function is in use.

Note:
Do a Fault Reset to clear the fault.

Code	Name	Causes	Possible Solutions
oC	Overcurrent	The load is too large.	• Measure the current flowing into the motor. • Replace the drive with a larger capacity model if the current value is more than the drive rated current. • Decrease the load or replace with a larger drive to prevent sudden changes in the current level.
		Overheating caused damage to the motor or the motor insulation is not satisfactory.	Measure the motor insulation resistance, and replace the motor if there is electrical conduction or unserviceable insulation.
		The motor main circuit cable is contacting ground to make a short circuit.	• 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 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 *C1-01 or C1-03 [Acceleration Times]* to get the necessary torque. • Increase the values set in *C2-01 to C2-04 [S-Curve Characteristics]* to get the necessary torque. • Replace the drive with a larger capacity model.
		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 *E1-04 to E1-10 [V/f Pattern Parameters]*. For motor 2, adjust *E3-04 to E3-10*.
		The torque compensation gain is too large.	Decrease the value set in *C4-01 [Torque Compensation Gain]* to make sure that the motor does not stall.
		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 overexcitation operation, decrease the value set in *n3-13 [OverexcitationBraking (OEB) Gain]* 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 *b3-01 = 1 [Speed Search at Start Selection = Enabled]* or set *H1-xx = 61, 62 [Speed Search from Fmax or Fref]* to input speed search commands from the MFDI terminals.
		The motor code setting is incorrect for PM Control Methods.	• Enter the correct motor code to *E5-01 [PM Motor Code Selection]* as specified by the PM motor. • For specialized motors, refer to the motor test report and set *E5-xx [PM Motor Settings]* correctly.
		The current flowing in the motor is more than the value set in *L8-27 [Overcurrent Detection Gain]* for PM Control Methods.	Correct the value set in *L8-27*.
		The control method is set incorrectly for the motor.	Set *A1-02 [Control Method Selection]* correctly.
		The motor main circuit cable is too long.	Replace the drive with a larger capacity model.
		Speed search does not complete at start when *A1-02 = 8 [EZ Vector Control]* and you use an induction motor.	When *E9-01 = 0 [Motor Type Selection = Induction (IM)]*, set *b3-24 = 2 [Speed Search Method Selection = Current Detection Speed Search]*.
		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.

Code	Name	Causes	Possible Solutions
		An overcurrent condition occurred during overexcitation deceleration.	• Decrease the value set in *n3-13 [OverexcitationBraking (OEB) Gain]*. • Decrease the value set in *n3-21 [HSB Current Suppression Level]*.
		You are using a premium efficiency motor.	Set these parameters: • *b3-03 [Speed Search Deceleration Time]* = default value × 2 • *L2-03 [Minimum Baseblock Time]* = default value × 2 • *L2-04 [Powerloss V/f Recovery Ramp Time]* = default value × 2
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**
OD	Output Disconnect	The output circuit between the drive and the motor is open, and the drive output current is less than 5% of *E2-01 [Motor Rated Current (FLA)]*.	Close the disconnected output circuit between the drive and the motor.
Note: • Do a Fault Reset to clear the fault. • If the drive detects this fault, it will respond as specified by the setting of *Y4-42 [Output Disconnect Detection Sel]*.			
Code	**Name**	**Causes**	**Possible Solutions**
oFA00	Option Not Compatible with Port	The option connected to connector CN5-A is not compatible.	Connect the option to the correct connector.
		• The DIP switches on the JOHB-SMP3 Multi-Protocol Ethernet Card are at factory default settings. • The DIP switches on the JOHB-SMP3 are not set to a valid protocol. • The DIP switches on the JOHB-SMP3 are set to a valid protocol that is not supported by the drive.	Remove power from the drive, wait for the charge light to go out, then set the DIP switches on the JOHB-SMP3 to the desired protocol.
		The option failed. Check the LED flash pattern on the option as specified by the option manual.	Replace the 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	The option card connected to connector CN5-A is not compatible.	1. De-energize the drive. 2. Refer to the option card manual and correctly connect the option card to the connector on the drive.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFA02	Duplicate Options	The same option cards or the same type of option cards are connected to connectors CN5-A and B.	Connect the option card to the correct connector.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFA03	Diagnostic Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFA04	Flash Write Mode	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			

Code	Name	Causes	Possible Solutions
oFA05	Option A/D Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFA06	Option Communication Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFA10	Option RAM Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFA11	Option Ope Mode Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFA12	Drive Receive CRC Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFA13	Drive Receive Frame Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFA14	Drive Receive Abort Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFA15	Option Receive CRC Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			

Code	Name	Causes	Possible Solutions
oFA16	Option Receive Frame Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFA17	Option Receive Abort Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFA30	COM ID Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFA31	Type Code Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFA32	SUM Check Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFA33	Option Receive Time Over	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFA34	Memobus Time Over	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFA35	Drive Receive Time Over 1	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			

Code	Name	Causes	Possible Solutions
oFA36	CI Check Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFA37	Drive Receive Time Over 2	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFA38	Control Reference Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFA39	Drive Receive Time Over 3	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFA40	CtrlResSel 1Err	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFA41	Drive Receive Time Over 4	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFA42	CtrlResSel 2Err	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFA43	Drive Receive Time Over 5	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			

Code	Name	Causes	Possible Solutions
oFb00	Option Not Compatible with Port	The option connected to connector CN5-B is not compatible.	Connect the option to the correct connector. **Note:** The communication options cannot connect to connector CN5-B.
Note: • Do a Fault Reset to clear the fault. • Fault trace is not available for these faults.			
Code	**Name**	**Causes**	**Possible Solutions**
oFb01	Option Fault/Connection Error	The option card connected to connector CN5-B was changed during operation.	1. De-energize the drive. 2. Refer to the option card manual and correctly connect the option card to the connector on the drive.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFb02	Duplicate Options	The same option cards or the same type of option cards are connected to connectors CN5-A and B.	Connect the option card to the correct connector.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFb03	Diagnostic Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFb04	Flash Write Mode	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFb05	Option A/D Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFb06	Option Communication Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFb10	Option RAM Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFb11	Option Ope Mode Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			

Code	Name	Causes	Possible Solutions
oFb12	Drive Receive CRC Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFb13	Drive Receive Frame Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFb14	Drive Receive Abort Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFb15	Option Receive CRC Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFb16	Option Receive Frame Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oFb17	Option Receive Abort Error	A fault occurred in the option card.	1. De-energize the drive. 2. Make sure that the option card is correctly connected to the connector. 3. If the problem continues, replace the option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
oH	Heatsink Overheat	The ambient temperature is high and the heatsink temperature of the drive is more than the value set in *L8-02 [Overheat Alarm Level]*.	• 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 *C6-02 [Carrier Frequency Selection]*.
		The internal cooling fan of the drive stopped.	1. Use the procedures in this manual to replace the cooling fan. 2. Set *o4-03 = 0 [Fan Operation Time Setting = 0 h]*.
Note: • The drive detects this fault if the heatsink temperature of the drive is more than the value set in *L8-02*. • Do a Fault Reset to clear the fault. • If the drive detects this fault, it will operate the motor as specified by the Stopping Method set in *L8-03 [Overheat Pre-Alarm Selection]*.			

Code	Name	Causes	Possible Solutions
oH1	Heatsink Overheat	The ambient temperature is high and the heatsink temperature of the drive is more than the *oH1* 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 *C6-02 [Carrier Frequency Selection]*.

Note:
• The drive detects this fault if the heatsink temperature of the drive is more than the *oH1* detection level. *o2-04 [Drive Model (KVA) Selection]* determines the *oH1* detection level.
• Do a Fault Reset to clear the fault.
• *L5-08 [Fault Reset Enable Select Grp2]* 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 *C1-01 to C1-04 [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:
• When *H3-02 or H3-10 = E [MFAI Function Selection = Motor Temperature (PTC Input)]*, the drive detects this fault if the motor overheat signal entered to analog input terminals 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 *L1-03 [Motor Thermistor oH Alarm Select]*.

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 *C1-01 to C1-04 [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 *E1-08* and *E1-10* are set too low, the overload tolerance will decrease at low speeds.

Note:
• The drive detects this fault if the motor overheat signal that was entered to an analog input terminals A1or A2 is more than the alarm detection level. (If *H3-02 or H3-10= E [MFAI Function Select = Motor Temperature (PTC Input)]* was set.)
• Do a Fault Reset to clear the fault.

Code	Name	Causes	Possible Solutions
oL1	Motor Overload	The load is too heavy.	Decrease the load. **Note:** Reset *oL1* when *U4-16 [Motor oL1 Level]* < 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 *C1-01 to C1-04 [Acceleration/ Deceleration Times]*.

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.
		L1-01 [Motor Overload (oL1) Protection] is set incorrectly.	Set *L1-01* 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 *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.
		E1-06 [Base Frequency] is set incorrectly.	Set *E1-06* to the rated frequency shown on the motor nameplate.
		One drive is operating more than one motor.	Set *L1-01 = 0 [Motor Overload (oL1) Protection = Disabled]*, connect thermal overload relay to each motor to prevent damage to the motor.
		The electronic thermal protector qualities and the motor overload properties do not align.	• Examine the motor qualities and set *L1-01 [Motor Overload (oL1) Protection]* correctly. • Connect a thermal overload relay to the motor.
		The electronic thermal protector is operating at an incorrect level.	Set *E2-01 [Motor Rated Current (FLA)]* correctly to the value specified by the motor nameplate.
		There is increased motor loss from overexcitation operation.	• Lower the value set in *n3-13 [OverexcitationBraking (OEB) Gain]*. • Set *L3-04 ≠ 4 [Stall Prevention during Decel ≠ Overexcitation/ High Flux]*. • Set *n3-23 = 0 [Overexcitation Braking Operation = Disabled]*.
		The speed search-related parameters are set incorrectly.	• Examine the settings for all speed search related parameters. • Adjust *b3-03 [Speed Search Deceleration Time]*. • Set *b3-24 = 1 [Speed Search Method Selection = Speed Estimation]* after Auto-Tuning.
		Phase loss in the input power supply is causing the output current to change.	Make sure that there is no phase loss, and repair problems.
		Overload occurred during overexcitation deceleration.	• Decrease the value set in *n3-13 [OverexcitationBraking (OEB) Gain]*. • Decrease the value set in *n3-21 [HSB Current Suppression Level]*.

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.
• *L5-07 [Fault Reset Enable Select Grp1]* 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 *C1-01 to C1-04 [Acceleration/ Deceleration Times]*.
		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 *E1-04 to E1-10 [V/f Pattern Parameters]*. Decrease the values set in *E1-08 [Mid Point A Voltage]* and *E1-10 [Minimum Output Voltage]*. For motor 2, adjust *E3-04 to E3-10*. **Note:** If the values set in *E1-08* and *E1-10* 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 *C6-02 [Carrier Frequency Selection]*.

Code	Name	Causes	Possible Solutions
		The torque compensation gain is too large.	Decrease the value set in *C4-01 [Torque Compensation Gain]* to make sure that the motor does not stall.
		The speed search-related parameters are set incorrectly.	• Examine the settings for all speed search-related parameters. • Adjust *b3-03 [Speed Search Deceleration Time]*. • Set *b3-24 = 1 [Speed Search Method Selection = Speed Estimation]* after Auto-Tuning.
		Phase loss in the input power supply is causing the output current to change.	• 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 *n3-13 [OverexcitationBraking (OEB) Gain]*. • Decrease the value set in *n3-21 [HSB Current Suppression Level]*.

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.
• *L5-07 [Fault Reset Enable Select Grp1]* disables the Auto Restart function.

Code	Name	Causes	Possible Solutions
oL3	Overtorque Detection 1	A fault occurred on the machine. Example: The machine is locked.	Examine the machine and remove the cause of the fault.
		The parameters are incorrect for the load.	Adjust *L6-02 [Torque Detection Level 1]* and *L6-03 [Torque Detection Time 1]* settings.

Note:
• The drive detects this fault if the drive output current is more than the level set in *L6-02* for longer than *L6-03*.
• Do a Fault Reset to clear the fault.
• If the drive detects this fault, it will operate the motor as specified by the Stopping Method set in *L6-01 [Torque Detection Selection 1]*.
• *L5-07 [Fault Reset Enable Select Grp1]* disables the Auto Restart function.

Code	Name	Causes	Possible Solutions
oL4	Overtorque Detection 2	A fault occurred on the machine. Example: The machine is locked.	Examine the machine and remove the cause of the fault.
		The parameters are incorrect for the load.	Adjust *L6-05 [Torque Detection Level 2]* and *L6-06 [Torque Detection Time 2]* settings.

Note:
• The drive detects this fault if the drive output current is more than the level set in *L6-05* for longer than *L6-06*.
• Do a Fault Reset to clear the fault.
• If the drive detects this fault, it will operate the motor as specified by the Stopping Method set in *L6-04 [Torque Detection Selection 2]*.
• *L5-07 [Fault Reset Enable Select Grp1]* disables the Auto Restart function.

Code	Name	Causes	Possible Solutions
oL7	High Slip Braking Overload	The load inertia is too large.	Decrease deceleration times in *C1-02 and C1-04 [Deceleration Times]* for applications that do not use High Slip Braking.
		An external force on the load side rotated the motor.	
		Something is preventing deceleration on the load side.	
		The value set in *n3-04 [HSB Overload Time]* is too small.	• Increase the value set in *n3-04*. • Connect a thermal overload relay to the motor, and set *n3-04 = 1200 s (maximum value)*.

Note:
• The drive detects this fault if the output frequency is constant for longer than *n3-04*.
• 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 connect it again. • If the cable is damaged, replace it.

Note:
• The drive detects this fault if these conditions are correct:
– *o2-06 = 1 [Keypad Disconnect Detection = Enabled]*.
– *b1-02 = 0 [Run Command Selection 1 = Keypad]*, or the drive is operating in HAND Mode with the keypad.
• Do a Fault Reset to clear the fault.

Code	Name	Causes	Possible Solutions
oS	Overspeed	There is overshoot.	Decrease *C5-01 [ASR Proportional Gain 1]* and increase *C5-02 [ASR Integral Time 1]*.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
ov	Overvoltage	Deceleration time is too short and regenerative energy is flowing from the motor into the drive.	• Set *L3-04 = 1 [Stall Prevention during Decel = General Purpose]*. • Increase the values set in *C1-02 or C1-04 [Deceleration Times]*. • Perform Deceleration Rate Auto-Tuning.
		The acceleration time is too short.	• Make sure that sudden drive acceleration does not cause the fault. • Increase the values set in *C1-01 or C1-03 [Acceleration Times]*. • Increase the value set in *C2-02 [S-Curve Time @ End of Accel]*. • Set *L3-11 = 1 [Overvoltage Suppression Select = Enabled]*.
		The drive output cable or motor is shorted to ground (the current short to ground is charging the main circuit capacitor of the drive through the power supply).	1. Examine the motor main circuit cable, terminals, and motor terminal box, and then remove ground faults. 2. Re-energize the drive.

		If the drive detects *ov* in these conditions, the speed search-related parameters are incorrect:
		• During speed search
		• During momentary power loss recovery
		• When the drive starts again automatically
		• When you set *A1-02 = 0 [Control Method Selection = V/f Control]* and do rotational Auto-Tuning
		• You are using a premium efficiency motor
			• Examine the settings for all speed search related parameters.
			• Set *b3-19 ≠ 0 [Speed Search Restart Attempts ≠ 0 times]*.
			• Adjust *b3-03 [Speed Search Deceleration Time]* setting.
			• Do Stationary Auto-Tuning for Line-to-Line Resistance and then set *b3-24 = 1 [Speed Search Method Selection = Speed Estimation]*.
			• Increase the value set in *L2-04 [Powerloss V/f Recovery Ramp Time]*.
			• Set these parameters:
			  • *b3-03 [Speed Search Deceleration Time]* = default value × 2
			  • *L2-03 [Minimum Baseblock Time]* = default value × 2
			  • *L2-04 [Powerloss V/f Recovery Ramp Time]* = default value × 2

		The power supply voltage is too high.	Decrease the power supply voltage to align with 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.
		The load inertia is set incorrectly.	• Examine the load inertia settings with KEB, overvoltage suppression, or stall prevention during deceleration. • Adjust *L3-25 [Load Inertia Ratio]* to align with the qualities of the machine.
		There is motor hunting.	• Adjust *n1-02 [Hunting Prevention Gain Setting]* settings. • Adjust *n8-45 [Speed Feedback Detection Gain]* and *n8-47 [Pull-in Current Comp Filter Time]* settings.
		Speed search does not complete at start when you use an induction motor in EZOLV control.	When *E9-01 = 0 [Motor Type Selection = Induction (IM)]*, set *b3-24 = 2 [Speed Search Method Selection = Current Detection 2]*.
Note: • The drive detects this error if the DC bus voltage is more than the *ov* detection level while the drive is running. • The *ov* detection level is approximately 410 V with 208 V class drives. The detection level is approximately 820 V with 480 V class drives. • Do a Fault Reset to clear the fault. • Parameter *L5-08 [Fault Reset Enable Select Grp2]* disables the Auto Restart function.			
Code	**Name**	**Causes**	**Possible Solutions**
ov2	DC Bus Overvoltage 2	The wiring is too long and DC bus voltage is too large.	• Shorten the shielded motor cable. • Decrease the carrier frequency. • If the power supply has a neutral ground, switch on the internal EMC filter.
Note: • The drive detects this fault when the DC bus voltage increases to more than the Stall Prevention Level during Deceleration for the time set in *S6-23 [OV2 Detect Time]*. • Do a Fault Reset to clear the fault. • This fault is resettable, but will not auto-restart.			
Code	**Name**	**Causes**	**Possible Solutions**
PE1	PLC Fault 1	The communication option detected a fault.	Refer to the manual for the communication option card.
Note: Do a Fault Reset to clear the fault.			

Code	Name	Causes	Possible Solutions
PE2	PLC Fault 2	The communication option detected a fault.	Refer to the manual for the communication option card.
Note: Do a Fault Reset to clear the fault.			
Code	**Name**	**Causes**	**Possible Solutions**
PF	Input Phase Loss	There is a phase loss in the drive input power.	Correct errors with the wiring for main circuit drive input power.
		There is loose wiring in the drive input power terminals.	Tighten the terminal screws to the correct tightening torque.
		The drive input power voltage is changing too much.	• 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 *L8-05 = 0 [Input Phase Loss Protection Sel = Disabled]*.
		The main circuit capacitors have become unserviceable.	• Examine the capacitor maintenance time in monitor *U4-05 [Capacitor Life Mon]*. If *U4-05* is more than 90%, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative. • 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 *L8-05* to enable and disable *PF* detection.			
Code	**Name**	**Causes**	**Possible Solutions**
POC	Pump Over Cycle	Pump in the system exceeded the number cycles from normal operation to sleep mode set in *Y2-10 [Max Cycling Protection Allowed]* in the time set in *Y2-11 [Cycling Count Decrement Time]*.	Adjust sleep parameters to prevent the system from over cycling between normal operation and sleep mode.
Note: Do a Fault Reset to clear the fault. Parameter *L5-52 [Over Cycle Fault Retry Selection]* determines whether this fault can be auto-restarted			
Code	**Name**	**Causes**	**Possible Solutions**
PSE	JOHB-SMP3 Protocol Set Error	• The DIP switches on the JOHB-SMP3 Multi-Protocol Ethernet Card are at factory default settings. • The DIP switches on the JOHB-SMP3 are not set to a valid protocol.	Remove power from the drive, wait for the charge light to go out, then set the DIP switches on the JOHB-SMP3 to the desired protocol. **Note:** Refer to the instructions packaged with the JOHB-SMP3 for more information about DIP switch settings.
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 terminals +1 and terminals U/T1, V/T2, and W/T3. Make sure that there is not a short circuit in terminals - and terminals U/T1, V/T2, and W/T3. • If there is a short circuit, contact Yaskawa or your nearest sales representative.
		When *A1-02 = 5 [Control Method Selection = OLV/PM]*, the output current is more than the value set in *L8-27 [Overcurrent Detection Gain]*.	Set *L8-27* 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.	• Make sure that you ground the drive correctly and 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.

Code	Name	Causes	Possible Solutions
SEr	Speed Search Retries Exceeded	The speed search-related parameters are set incorrectly.	• Decrease *b3-10 [Speed Estimation Detection Gain]*. • Increase *b3-17 [Speed Est Retry Current Level]*. • Increase *b3-18 [Speed Est Retry Detection Time]*. • Do Auto-Tuning again.
		The motor is coasting in the opposite direction of the Run command.	Set *b3-14 = 1 [Bi-directional Speed Search = Enabled]*.

Note:
• The drive detects this error if the number of speed search restarts is more than *b3-19 [Speed Search Restart Attempts]*.
• Do a Fault Reset to clear the fault.

Code	Name	Causes	Possible Solutions
SPCNR	Single Phase Converter Not Ready	When *YC-14 = 0 [Behavior when SPC is Not Ready = Coast to Stop - Fault]*, the digital input set to *H1-xx = BE [MFDI Function Selection = Single Phase Converter Ready NC]* deactivated to show the attached converter is faulted or not ready.	• Examine the wiring between the drive and converter. • Examine the error code on converter.

Note:
• Do a Fault Reset to clear the fault.
• The drive must not be in an *SPCNR* condition to do Auto-Restart.

Code	Name	Causes	Possible Solutions
SPL	Suction Pressure Feedback Loss	Wire Break detection for suction pressure. The analog input programmed for *Water Level / Suct Pres Feedback* is less than 3 mA or more than 21 mA for longer than 1 second and *YE-19 = 2 or 3 [Suction Pressure Fdbk Wire Break = Fault (and Digital Output) or Auto-Restart (time set by YE-38)]*.	• Repair level sensor. • Repair wiring.

Note:
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 *E5-01 [PM Motor Code Selection]* correctly as specified by the motor. • For specialized motors, refer to the motor test report and set *E5-xx* correctly.
		The load is too large.	• Increase the value set in *n8-55 [Motor to Load Inertia Ratio]*. • Increase the value set in *n8-51 [Pull-in Current @ Acceleration]*. If the drive detects *STPo* during deceleration when increasing the value set in *n8-51*, set the value of *n8-79 [Pull-in Current @ Deceleration]* lower than *n8-51*. • Decrease the load. • Replace the drive and motor with larger capacity models.
		The load inertia is too large.	Increase the value set in *n8-55*.
		The acceleration/deceleration times are too short.	• Increase the values set in *C1-01 to C1-04 [Acceleration/ Deceleration Times]*. • Increase the value set in *C2-01 [S-Curve Time @ Start of Accel]*.
		Speed response is too slow.	Increase the value set in *n8-55*.

Note:
Do a Fault Reset to clear the fault.

Code	Name	Causes	Possible Solutions
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 *o4-24 [bAT Detection Selection]* enables and disables *TiM* 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 *L6-02 [Torque Detection Level 1]* and *L6-03 [Torque Detection Time 1]* settings.

Note:
• The drive detects this error if the drive output current is less than the level set in *L6-02* for longer than *L6-03*.
• Do a Fault Reset to clear the fault.
• If the drive detects this error, it will operate the motor as specified by the Stopping Method set in *L6-01 [Torque Detection Selection 1]*.

Code	Name	Causes	Possible Solutions
UL4	Undertorque Detection 2	A fault occurred on the machine. Example: There is a broken pulley belt.	Examine the machine and remove the cause of the fault.
		The parameters are incorrect for the load.	Adjust *L6-05 [Torque Detection Level 2]* and *L6-06 [Torque Detection Time 2]* settings.

Note:
• The drive detects this error if the drive output current is less than the level set in *L6-05* for longer than *L6-06*.
• Do a Fault Reset to clear the fault.
• If the drive detects this error, it will operate the motor as specified by the Stopping Method set in *L6-04 [Torque Detection Selection 2]*.

Code	Name	Causes	Possible Solutions
UL6	Underload or Belt Break Detected	The output current decreased less than the motor underload curve set in *L6-14 [Motor Underload Level @ Min Freq]* for longer than the time set in *L6-03 [Torque Detection Time 1]*.	Adjust the *L6-14* setting to set the output current to stay the level more than the motor underload curve during usual operations.

Note:
Do a Fault Reset to clear the fault.

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 *U4-05 [Capacitor Life Mon]*. If *U4-05* is more than 90%, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.
		The relay or contactor on the soft-charge bypass relay is damaged.	*U4-06 [PreChargeRelayMon]* shows the performance life of the soft-charge bypass relay. If *U4-06* is more than 90%, replace the board or the drive. For information about replacing the board, contact Yaskawa or your nearest sales representative.

Note:
• The drive detects this error if the DC bus voltage decreases below the level set in *L2-05 [Undervoltage Detection Lvl (Uv1)]* while the drive is running.
• The *Uv1* detection level is approximately 190 V for a 208 V class drives. The detection level is approximately 380 V for 480 V class drives. The detection level is approximately 350 V when *E1-01 [Input AC Supply Voltage]* < 400.
• Do a Fault Reset to clear the fault.
• Fault trace is not available for this fault.
• *L5-08 [Fault Reset Enable Select Grp2]* disables the Auto Restart function.

Code	Name	Causes	Possible Solutions
Uv2	Control Power Undervoltage	The value set in *L2-02 [Power Loss Ride Through Time]* increased and the momentary power loss recovery unit is not connected to the drive.	Connect the momentary power loss recovery unit to the drive.
		There was a problem with the drive hardware.	• 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 *U4-06 [PreChargeRelayMon]*, which shows the performance life of the soft-charge bypass relay. If *U4-06* is more than 90%, replace the board or the drive. For information about replacing the board, contact Yaskawa or your nearest sales representative.
		Air inside the drive is too hot.	Check the ambient temperature of the drive.
Note: • Do a Fault Reset to clear the fault. • Fault trace is not available for this fault.			
Code	**Name**	**Causes**	**Possible Solutions**
VLTS	Volute Thermostat Fault	The digital input from the terminal set for *Volute Thermostat Fault [H1-xx = 88 or 188]* is active.	Examine the wiring or wait for the motor to cool.
Note: • Do a Fault Reset to clear the fault. • Parameter *L5-53 [VoluteThermostat Fault Retry Sel]* sets the Auto Restart function of this fault.			
Code	**Name**	**Causes**	**Possible Solutions**
WLL	Water Level Feedback Loss	Wire Break detection for water level. The Analog input programmed for Water Level / Suction Pressure is less than 3 mA or is more than 21 mA for longer than 1 second with *Yd-16 ≠ 0 [Water Level Feedback Wire Break ≠ No Display]*.	• Repair level sensor. • Repair wiring.

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
Accum	Accumulated Level Reached	Accumulated volume has is more than the *Y6-11* to *Y6-14* settings and *Y6-15 = 1 or 4 [Accumulated Volume Behavior = Alarm (and Digital Output) or Stop + Alarm + MFDO]*	Set *Y6-05 = 7770 [Flow Accumulation Set Reset = Reset Accumulation]* or via Reset Accumulation digital input).
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 CANopen communication, set *F6-35 [CANopen Node ID Selection]* correctly.
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**
AFBL	Analog Fdbk Lost Switched to Net	Defective or broken analog input source.	Make sure that the PID Feedback source is installed and working correctly. If there is no PID Feedback source, set *Y9-02 = 3 [System Feedback Source = Network Only]* to have it always read from the Network PID Feedback of another drive.
		H3-0x ≠ B [PID Feedback]	Set *H3-0x = B [PID Feedback]* if the analog input source is to be used for PID Feedback. When the drive does not have an analog PID Feedback source, set *Y9-02 = 3* .
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**
AJA	Anti-Jam Active	The drive is doing the Anti-Jam function.	The alarm will clear when the function is complete.
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**
ALRC	Accum Lvl Reached Cycle Run Cmd	Accumulated volume has is more than the *Y6-11* to *Y6-14* settings and *Y6-15 = 5 [Accumulated Volume Behavior = Stop + Alarm + MFDO + AccumReset]*	Cycle the Run command.
Code	**Name**	**Causes**	**Possible Solutions**
AUdiS	Low WL/SP/PI Aux FB Drv Disabled	Drive is not allowed to run in MEMOBUS Multiplex when *Y9-51 = 1 [WaterLvl/SuctPres/PI Aux TurnOff = Enabled]*, WL/SP/PI Aux Feedback is below the *Yd-06/YE-06/YF-06* setting, and the drive is stopped or running as a Lag drive.	• Confirm the setting of *Yd-06/YE-06/YF-06*. • Wait for the WL/SP/PI Aux Control Feedback to recover.
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**
AUFbL	WL/SP/PI Aux Fdbk Lost Using Net	Defective or broken analog input source. The drive detected a wire break with the PI Auxiliary Control Feedback Level analog signal *[H3-xx = 27]* or the Water Level / Suction Pressure analog signal *[H3-xx = 3B]*.	• Make sure that the Water Level/Suction Pressure/PI Auxiliary Control Feedback source is installed and working correctly. • Confirm that Water Level/Suction Pressure/PI Auxiliary Control Feedback Wire break Behavior parameter *Yd-16/YE-19/YF-19* is set correctly • If there is no analog feedback, set *Y9-50 = 3 [WaterLvl/SuctPres/PI Aux Source = Network Only]* so that it will always read from the Water Level/Suction Pressure/PI Auxiliary Control Feedback network of another drive.
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**
AuxFB	PI Aux Feedback Level Loss	The analog input from the terminal set to *H3-xx = 27 [MFAI Function Selection = PI Auxiliary Control Feedback Level]* is more than 21 mA or less than 3 mA for longer than 1 s.	Repair transducer or wiring.
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**
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 *H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]* will activate. • Set *o4-24 [bAT Detection Selection]* to enable/disable *bAT* detection.			

Code	Name	Causes	Possible Solutions
bb	Baseblock	An external baseblock command was entered through one of the MFDI terminals Sx, and the drive output stopped as shown by an external baseblock command.	Examine the external sequence and timing of the baseblock command input.

Note:
The drive will not output a minor fault signal for this alarm.

Code	Name	Causes	Possible Solutions
bCE	Bluetooth Communication Error	The smartphone or tablet with DriveWizard Mobile or DriveWizard is too far from the keypad.	Move to 10 m (32.8 ft) or less from the keypad. **Note:** *bCE* can occur when the smartphone or tablet is 10 m (32.8 ft) or nearer to the keypad for different smartphone and tablet specifications.
		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 a smartphone or tablet and a Bluetooth LCD keypad to operate the drive.
• If the drive detects this error, the terminal set to *H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]* will activate.
• Use *o2-27 [bCE Detection selection]* to enable and disable *bCE* detection.

Code	Name	Causes	Possible Solutions
BuDif	Main Fdbk Lost, Using Diff Fdbk	Parameter *Y4-41 = 1 [Diff Lvl Src Fdbk Backup Select = Enabled]* and the drive detected a wire-break on the analog input terminal set for *PID Feedback [H3-xx = B]*.	Examine the connection of the Main PID Feedback Transducer.
		Main PID Feedback Transducer is broken.	Replace Main PID Feedback Transducer.

Note:
• The drive detects this error if it does not receive the *PID Feedback* signal and it uses *Differential Feedback [H3-xx = 2D]* as backup.
• 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
Bu-Fb	Main Fdbk Lost Using Backup Fdbk	The drive detected wire-break on the analog input terminal set to *H3-xx = B [MFAI Function Selection = PID Feedback]*.	Examine the connection of the Main PID Feedback Transducer.
		Main PID Feedback Transducer is broken.	Replace Main PID Feedback Transducer.

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
BuFbl	Backup Fdbk Lost Chk/Repl Xducer	The drive detected wire-break on the analog input terminal set for *PID Feedback Backup [H3-xx = 24]*.	Examine the connection of the Differential PID Feedback transducer.
		Backup PID Feedback Transducer is broken.	Replace Backup PID Feedback Transducer.
		Parameter *Y4-41 = 1 [Diff Lvl Src Fdbk Backup Select = Enabled]* and the drive detected a wire-break on the analog input terminal set for *Differential Level Source [H3-xx = 2D]*.	Examine the connection of the Differential PID Feedback transducer.
		Parameter *Y4-41 = 1* and the Differential PID Feedback Transducer is broken.	• Replace the Differential PID Feedback Transducer. • Set *Y4-41 = 0 [Disabled]*.

Note:
• The drive detects this error if it does not receive the *PID Feedback Backup* signal.
• 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
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.

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

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

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

Code	Name	Causes	Possible Solutions
CALL	Serial Comm Transmission Error	The communications cable wiring is incorrect.	Correct wiring errors.
		There is a short circuit in the communications cable or the communications cable is not connected.	• Repair the short-circuited or disconnected portion of the cable. • Replace the defective communications cable.
		A programming error occurred on the controller side.	Examine communications at start-up and correct programming errors.
		There is damage to the communications circuitry.	• Do a self-diagnostics check. • If the problem continues, replace the control board or the drive. Contact Yaskawa or your nearest sales representative to replace the control board.
		The termination resistor setting for MEMOBUS/ Modbus communications is incorrect.	On the last drive in a MEMOBUS/Modbus network, set DIP switch S2 to the ON position to enable the termination resistor.

Note:
• The drive detects this error if it does not correctly receive control data from the controller when energizing the drive.
• If the drive detects this error, the terminal assigned to *H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]* will activate.
• If the drive detects this error, it will not be able to run in AUTO or Jog. HAND Mode operation is allowed.
• Parameter *H5-33 [Power-up CALL Alarm]* enables or disables the detection of this alarm at power-up.

Code	Name	Causes	Possible Solutions
CE	Modbus Communication Error	The communications cable wiring is incorrect.	Correct wiring errors.
		There is a short circuit in the communications cable or the communications cable is not connected.	• 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 *H5-xx*. • Examine the settings on the controller side and correct the difference in communication conditions.
		The value set in *H5-09 [CE Detection Time]* is too small for the communications cycle.	• Change the controller software settings. • Increase the value set in *H5-09*.
		The controller software or hardware is causing a communication problem.	Examine the controller and remove the cause of the problem.

Note:
• This alarm is a different alarm from *CE [Run at H5-34 (CE Go-To-Freq)]*. The keypad will show this alarm when:
– *H5-04 ≠ 4 [Communication Error Stop Method ≠ Run at H5-34 (CE Go-To-Freq)]*
– *H5-04 = 4* but the drive cannot operate at the selected frequency
• The drive detects this error if it does not correctly receive control data for the *CE* detection time set to *H5-09*.
• If the drive detects this error, the terminal 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 *H5-04*.

Code	Name	Causes	Possible Solutions
CE	Run at H5-34 (CE Go-To-Freq)	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 recommended shielded line. Ground the shield on the controller side or on 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 *H5-xx*. • Examine the settings on the controller side and correct the difference in communication conditions.
		The value set in *H5-09 [CE Detection Time]* is too small for the communications cycle.	• Make sure that the settings are compatible. • Change the software settings in the PLC. • Increase the value set in *H5-09*.
		The controller software or hardware is causing a communication problem.	Examine the controller and remove the cause of the problem.

Note:
• This alarm is a different alarm from the standard *CE [Modbus Communication Error]*. The keypad will show this alarm only when *H5-04 = 4 [Communication Error Stop Method = Run at H5-34 (CE Go-To-Freq)]*. If the drive cannot operate at the selected frequency, the keypad will show the standard *CE* alarm.
• The drive detects this error if it does not correctly receive control data for the *CE* detection time set to *H5-09*.
• If the drive detects this error, the terminal set to *H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]* will activate.

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
CyPo	Cycle Power to Accept Changes	Although *F6-15 = 1 [Comm. Option Parameters Reload = Reload Now]*, the drive does not update the communication option parameters.	Re-energize the drive to update the communication option parameters.

Code	Name	Causes	Possible Solutions
dEv	Speed Deviation	The load is too heavy	Decrease the load.
		Acceleration and deceleration times are set too short.	Increase the values set in *C1-01 to C1-04 [Acceleration/ Deceleration Time]*.
		The *dEv* detection level settings are incorrect.	Adjust *F1-10 [Speed Deviation Detection Level]* and *F1-11 [Speed Deviation Detect DelayTime]*.
		The load is locked up.	Examine the machine.
		The holding brake is stopping the motor.	Release the holding brake.

Note:
• The drive detects this error if the difference between the detected speed and the speed reference is more than the setting of *F1-10* for longer than *F1-11*.
• If the drive detects this error, the terminal assigned to *H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]* will be ON.
• If the drive detects this error, the drive will operate the motor as specified by the stopping method set in *F1-04 [Speed Deviation Detection Select]*.

Code	Name	Causes	Possible Solutions
DIFF	Differential Feedback Exceeded	The difference between the PID Feedback and *Differential Level Source [H3-xx = 2D]* is more than the level set in *Y4-18 [Pre-Charge Loss of Prime Level 2]* for the time set in *Y4-19 [Differential Lvl Detection Time]*.	• Replace the feedback transducer or transducers. • Set *Y4-18* and *Y4-19* correctly.

Note:
• If the drive detects this error, it will respond as specified by the setting of *Y4-20 [Differential Level Detection Sel]*.
• 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
dnE	Drive Disabled	A terminal set for *H1-xx = 6A [MFDI Function Selection = Drive Enable]* deactivated.	Examine the operation sequence.

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
DRA	De-Rag Active	The drive is doing the De-Rag function.	The alarm will clear when the function is complete.

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
dWAL	DriveWorksEZ Alarm	There was an error in the DriveWorksEZ program.	Examine the DriveWorksEZ program and remove the cause of the error. This is not a drive fault.
Note: If the drive detects this error, the terminal set to *H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]* 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 error. This is not a drive fault.
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**
dWA3	DriveWorksEZ Alarm 3	There was an error in the DriveWorksEZ program.	Examine the DriveWorksEZ program and remove the cause of the error. This is not a drive fault.
Note: If the drive detects this error, the terminal set to *H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]* will activate.			
Code	**Name**	**Causes**	**Possible Solutions**
DS	De-Scale/De-Rag Active	The terminal is set to *H2-xx = C5 or 1C5 [MFDO Function Selection De-Scale or !De-Scale]* and the set length of run time elapsed.	• If you do not want to do De-Scale/De-Rag, set *Y8-01 = 0 [De-Scale Operation Selection = Disabled]*. • Adjust the *Y8-08 [Run Time before De-Scale]* setting.
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**
EF	FWD/REV Run Command Input Error	The drive received a forward command and a reverse command 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 *EF*, the motor will ramp to stop. • 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**
EF0	Option Card External Fault	The communication option card received an external fault from the controller.	1. Find the device that caused the external fault and remove the cause. 2. Clear the external fault input from the controller.
		Programming error occurred on the controller side.	Examine the operation of the controller program.
Note: • 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 *H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]* will activate. • Use *F6-03 [Comm External Fault (EF0) Select]* to set the stopping method for this fault.			
Code	**Name**	**Causes**	**Possible Solutions**
EF1	Pump 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.
		Pump Fault [H1-01 = 2C to 2F] 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 set to *H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]* will activate.			
Code	**Name**	**Causes**	**Possible Solutions**
EF2	Pump 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.
		Pump Fault [H1-02 = 2C to 2F] 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 set to *H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]* will activate.			
Code	**Name**	**Causes**	**Possible Solutions**
EF3	Pump 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.

Code	Name	Causes	Possible Solutions
		Pump Fault [H1-03 = 2C to 2F] 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 set to *H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]* will activate.			
Code	**Name**	**Causes**	**Possible Solutions**
EF4	Pump 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.
		Pump Fault [H1-04 = 2C to 2F] 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 set to *H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]* will activate.			
Code	**Name**	**Causes**	**Possible Solutions**
EF5	Pump 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.
		Pump Fault [H1-05 = 2C to 2F] 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 set to *H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]* will activate.			
Code	**Name**	**Causes**	**Possible Solutions**
EF6	Pump 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.
		Pump 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 set to *H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]* will activate.			
Code	**Name**	**Causes**	**Possible Solutions**
EF7	Pump 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.
		Pump 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 set to *H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]* will activate.			
Code	**Name**	**Causes**	**Possible Solutions**
EF8	Pump Fault (Terminal S8)	MFDI terminal S8 caused an external fault through an external device.	1. Find the device that caused the external fault and remove the cause. 2. Clear the external fault input in the MFDI.
		The wiring is incorrect.	Correctly connect the signal line to MFDI terminal S8.
		Pump Fault [H1-08 = 2C to 2F] is set to MFDI terminal S8, but the terminal is not in use.	Correctly set the MFDI.
Note: If the drive detects this error, the terminal set to *H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]* will activate.			
Code	**Name**	**Causes**	**Possible Solutions**
EOF	Emergency Override FWD	The digital input terminal set to *H1-xx = AF [MFDI Function Selection = Emergency Override FWD]* activated.	When the emergency condition is gone, deactivate the digital input set to *Emergency Override FWD*.
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
EOR	Emergency Override REV	The digital input terminal set to *H1-xx = B0 [MFDI Function Selection = Emergency Override REV]* activated.	When the emergency condition is gone, deactivate the digital input set to *Emergency Override REV*.
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**
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**
FDBKL	Feedback Loss Wire Break	The analog input from the terminal set to *H3-xx = B [MFAI Function Selection = PID Feedback]* is more than 21 mA or less than 3 mA for longer than 1 s in these conditions: • *b5-82 = 1 [Feedback Loss 4 ~ 20mA Detect Sel = Alarm Only]* • *b5-01 ≠ 0 [PID Mode Setting ≠ Disabled]* • *H3-01, H3-09, or H3-05 = 2 [Terminal A1/A2/A3 Signal Level Selection = 4 to 20 mA]*	Make sure that you install the PID feedback source and it operates correctly.
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 settings of *b5-82*. • Parameter *L5-42 [Feedback Loss Fault Retry Select]* sets the Auto Restart function of this error.			
Code	**Name**	**Causes**	**Possible Solutions**
FLGT	Feedback Loss, Go To Freq b5-83	The analog input from the terminal set to *H3-xx = B [MFAI Function Selection = PID Feedback]* is more than 21 mA or less than 3 mA for longer than 1 s in these conditions: • *b5-82 = 3 [Feedback Loss 4 ~ 20mA Detect Sel = Run At b5-83]* • *b5-01 ≠ 0 [PID Mode Setting ≠ Disabled]* • *H3-01 or H3-09 = 2 [Terminal A1/A2 Signal Level Selection = 4 to 20 mA]*	Make sure that you install the PID feedback source and it operates correctly.
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 at the speed set in *b5-83 [Feedback Loss Goto Frequency]* as specified by the setting of *b5-82*.			
Code	**Name**	**Causes**	**Possible Solutions**
FMLST	Net Flow Meter Lost:Check Source	There is no drive on the MEMOBUS Network with a valid Flow Meter source. When *Y1-01 = 3 [Multiplex Mode = Network Multiplex]*, *Y6-01 [Flow Meter Scaling] > 0.0* and *Y9-40 = 0 [Flow Rate Source = Network]*, the Flow Meter function needs a valid Flow Rate from the network that is originating from another drive that also has *Y6-01 > 0.0* with *Y9-40 = 0*.	• If the drive has an operational Flow Meter connected to an analog or pulse input terminal, set *Y9-40 = 0 [Analog]*. • If another drive on the MEMOBUS Network has a Flow meter connected to an analog or pulse input terminal, confirm that drive is online with *Y6-01 > 0.0* and *Y9-40 = 0*.
Code	**Name**	**Causes**	**Possible Solutions**
FR<MS	Freq Ref < Minimum Speed (Y1-06)	The drive frequency reference setting is less than the value set in *Y1-06 [Minimum Speed]* in these conditions: • The drive is not in PI Mode • The drive is running • *Minimum Speed* is enabled (*Y1-06 > 0.00*) • *Y1-06 > Y4-12 [Thrust Frequency]*	Increase the frequency reference to a value more than *Y1-06*.
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 internally sets the frequency reference to the value set in *Y1-06*.			

Code	Name	Causes	Possible Solutions
FR<TH	Freq. Reference < Thrust (Y4-12)	The drive frequency reference setting is less than the value set in *Y4-12 [Thrust Frequency]* in these conditions: • The drive is not in PI Mode • The drive is running • *Thrust* is enabled (*Y4-11 [Thrust Acceleration Time] > 0.00* and *Y4-12 > Y1-06 [Minimum Speed]*)	Increase the frequency reference to a value more than *Y4-12*.
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 internally sets the frequency reference to the value set in *Y4-12*.			
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 or C1-03 [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.
		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 *H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]* will activate.			
Code	**Name**	**Causes**	**Possible Solutions**
HiAux	High PI Aux Feedback Level	PI Auxiliary Feedback is more than the level set in *YF-12 [PI Aux Control High Level Detect]* for the time set in *YF-13 [PI Aux High Level Detection Time]* in these conditions: • The drive is running. • The output frequency > 0.	• Decrease the PI Auxiliary Feedback level to less than *YF-12*. • Set *YF-12* and *YF-13* correctly.
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**
HIFB	High Feedback Sensed	The feedback level is more than the level set in *Y1-11 [High Feedback Level]*.	• Decrease the feedback level to less than *Y1-11 - Y1-14 [Hysteresis Level]*. • Set *Y1-11* and *Y1-12* correctly.
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 respond as specified by the setting of *Y1-13 [High Feedback Selection]*.			
Code	**Name**	**Causes**	**Possible Solutions**
HiFlo	High Flow	Flow rate was more the level set in *Y6-17 [High Flow Level]* for longer than the time set in *Y6-18 [High Flow Detection Time]* and *Y6-19 = 1 [High Flow Behavior = Alarm (and Digital Output)]*.	Reprogram *Y6-17* to *Y6-19* if flow rate is acceptable.
Code	**Name**	**Causes**	**Possible Solutions**
HiSuc	High Suction Pressure	Suction pressure is more than the level set in *YE-12 [High Suction Pressure Det Level]* for longer than the time set in *YE-13 [High Suction Pressure Det Time]*, and the drive is running (AUTO or HAND) and *YE-14 = 1 [High Suction Pressure Behavior = Alarm (and Digital Output)]*.	Decrease suction pressure.
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 *o2-23 [External 24V Powerloss Detection]* to enable or disable *L24v* detection. • The drive will not output an alarm signal for this alarm.			

Code	Name	Causes	Possible Solutions
LCP	Low City Pressure	Insufficient pressure is present on the inlet to the pump in these conditions: • *Y4-24 = 0 [Low City Alarm Text = Low City Pressure]* • The terminal set for *H1-xx = B8 or 1B8 [MFDI Function Selection = Low City Pressure or !Low City Pressure]* activates	• Examine the pressure switch contact for correct operation. • Examine control wiring to drive terminal strip from pressure switch contact. • Make sure that suction pressure is present with an isolated measuring device. • Set *Y4-22 [Low City On-Delay Time]* and *Y4-23 [Low City Off-Delay Time]* correctly. • Deactivate the digital input terminals set to *H1-xx = B8 or 1B8*.
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 during run, it coasts to stop and does not operate until the digital input has deactivated for the time set in *Y4-22*.			
Code	**Name**	**Causes**	**Possible Solutions**
LoAux	Low PI Aux Feedback Level	When the drive is running, PI Auxiliary Feedback is less than the level set in *YF-09 [PI Aux Control Low Lvl Detection]* for the time set in *YF-10 [PI Aux Control Low Lvl Det Time]*.	• Increase the PI Auxiliary Feedback level more than *YF-09*. • Set *YF-09* and *YF-10* correctly.
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**
LOFB	Low Feedback Sensed	The feedback level is less than the level set in *Y1-08 [Low Feedback Level]* for the time set in *Y1-09 [Low Feedback Lvl Fault Dly Time]*.	• Increase the feedback level to more than *Y1-08 + Y1-14 [High Feedback Hysteresis Level]*. • Set *Y1-08* and *Y1-09* correctly.
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 fault, it will respond as specified by the setting of *Y1-10 [Low Feedback Selection]*.			
Code	**Name**	**Causes**	**Possible Solutions**
LoG	Com Error / Abnormal SD Card	There is not a micro SD card 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 *o5-01 = 0 [Log Start/Stop Selection = OFF]*.
		You started short-term data logging on a keypad that does not support short-term data logs.	• Connect a keypad that supports short-term data logs. **Note:** The LCD keypad and Bluetooth LCD keypad with REV: H or later support short-term data logging. The keypad version "REV" is located on the nameplate on the back of the keypad. • Set *o5-00 = 0 [Log Type = Long Term Log]* • Set *o5-01 = 0 [Log Start/Stop Selection = OFF]*.
Note: If the drive detects this error, the terminal set to *H2-01 to H2-03 = 6A [MFDO Function Selection = Data Logger Error]* will activate.			
Code	**Name**	**Causes**	**Possible Solutions**
LOP	Loss of Prime	The drive used the method set in *Y1-18 [Prime Loss Detection Method]* to detect that the pump load is less than the level set in *Y1-19 [Prime Loss Level]* for the time set in *Y1-20 [Prime Loss Time]*, and the output frequency is *Y1-21 [Prime Loss Activation Freq]* or more.	• Examine a dry well, air in the system, or no water in the system. Use preferred priming method suggested by the pump manufacturer to restart the pump. • When there is resistance in the pump, allow the system to pump water again. • Set *Y1-18* to *Y1-21* correctly.
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 fault, it will respond as specified by the setting of *Y1-22 [Prime Loss Selection]*.			
Code	**Name**	**Causes**	**Possible Solutions**
LoSuc	Low Suction Pressure	Suction pressure is less than the level set in *YE-09 [Low Suction Pressure Det Level]* for longer than the time set in *YE-10 [Low Suction Pressure Det Time]*, and the drive is running (AUTO or HAND) and *YE-11 = 1 [Low Suction Pressure Behavior = Alarm (and Digital Output)]*.	Increase suction pressure.
Code	**Name**	**Causes**	**Possible Solutions**
LowFl	Low Flow	Flow rate was below the level set in *Y6-06 [Low Flow Level]* for longer than the time set in *Y6-07 [Low Flow Detection Time]* and *Y6-09 = 1 [Low Flow Behavior = Alarm (and Digital Output)]*.	Reprogram *Y6-06* to *Y6-09* if flow rate is acceptable.

Code	Name	Causes	Possible Solutions
LowWL	Low Water Level	Water level is below the level set in *Yd-09 [Low Water Level Detection Level]* with *Yd-11 = 1 [Low Water Level Behavior = Alarm (and Digital Output)]*.	Increase the water level.

Code	Name	Causes	Possible Solutions
LSP	Low Suction Pressure	An external input has indicated that an insufficient suction pressure condition exists in these conditions: • *Y4-24 = 1 [Low City Alarm Text = Low Suction Pressure]* • The terminal set for *H1-xx = B8 or 1B8 [MFDI Function Selection = Low City Pressure or !Low City Pressure]* activates	• Examine the pressure switch contact for correct operation. • Examine control wiring to drive terminal strip from pressure switch contact. • Make sure that suction pressure is present with an isolated measuring device. • Increase the system pressure. • Set *Y4-22 [Low City On-Delay Time]* and *Y4-23 [Low City Off-Delay Time]* correctly. • Deactivate the digital input terminals set to *H1-xx = B8 or 1B8*.

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 during run, it coasts to stop and does not operate until the digital input has deactivated for the time set in *Y4-22*.

Code	Name	Causes	Possible Solutions
LT-1	Cooling Fan Maintenance Time	The cooling fan is at 90% of its performance life estimate.	1. Replace the cooling fan. 2. Set *o4-03 = 0 [Fan Operation Time Setting = 0 h]* to reset the cooling fan operation time.

Note:
When the performance life estimate is expired, the terminal set to *H2-01 to H2-03 = 2F [MFDO Function Selection = Maintenance Notification]* will activate.

Code	Name	Causes	Possible Solutions
LT-2	Capacitor Maintenance Time	The capacitors for the main circuit and control circuit are at 90% of their performance life estimate.	Replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.

Note:
When the performance life estimate is expired, the terminal set to *H2-01 to H2-03 = 2F [MFDO Function Selection = Maintenance Notification]* will activate.

Code	Name	Causes	Possible Solutions
LT-3	SoftChargeBypassRelay MainteTime	The soft charge bypass relay is at 90% of its performance life estimate.	Replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.

Note:
When the performance life estimate is expired, the terminal set to *H2-01 to H2-03 = 2F [MFDO Function Selection = Maintenance Notification]* will activate.

Code	Name	Causes	Possible Solutions
LT-4	IGBT Maintenance Time (50%)	The IGBT is at 50% of its performance life estimate.	Check the load, carrier frequency, and output frequency.

Note:
When the performance life estimate is expired, the terminal set to *H2-01 to H2-03 = 2F [MFDO Function Selection = Maintenance Notification]* will activate.

Code	Name	Causes	Possible Solutions
LWT	Low Water In Tank	An external input has indicated that the water level in the tank is too low in these conditions: • *Y4-24 = 2 [Low City Alarm Text = Low Water in Tank]* • The terminal set for *H1-xx = B8 or 1B8 [MFDI Function Selection = Low City Pressure or !Low City Pressure]* activates	• Examine the pressure switch contact for correct operation. • Examine control wiring to drive terminal strip from pressure switch contact. • Make sure that suction pressure is present with an isolated measuring device. • Increase the water level. • Set *Y4-22 [Low City On-Delay Time]* and *Y4-23 [Low City Off-Delay Time]* correctly. • Deactivate the digital input terminals set to *H1-xx = B8 or 1B8*.

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 during run, it coasts to stop and does not operate until the digital input has deactivated for the time set in *Y4-22*.

Code	Name	Causes	Possible Solutions
NETSC	NETSCAN Waiting for Master	No message received from the master within the time specified in *Y9-28 [NETSCAN Alarm Time]*.	• Increase *Y9-28* to account for network latency. • Make sure that there is a drive on the network with *Y1-01 = 3 [Multiplex Mode = Contactor Multiplex]* and *Y9-27 = 0 [Network Recovery = Automatic]*.

Code	Name	Causes	Possible Solutions
NMS	Setpoint Not Met	The feedback deviates from the setpoint at a level more than *Y1-15 [Maximum Setpoint Difference]* for the time set in *Y1-16 [Not Maintaining Setpoint Time]*.	• Examine for a blocked impeller, over cycling, or broken pipe. • Set *Y1-15* and *Y1-16* correctly.

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 respond as specified by the setting of *Y1-17 [Not Maintaining Setpoint Sel]*.

Code	Name	Causes	Possible Solutions
OD	Output Disconnect	The output circuit between the drive and the motor is open, and the drive output current is less than 5% of *E2-01 [Motor Rated Current (FLA)]*.	• Close the disconnected output circuit between the drive and the motor. • If you do not use a motor disconnect, set *Y4-42 = 0 [Disabled]*.

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 respond as specified by the setting of *Y4-42 [Output Disconnect Detection Sel]*.

Code	Name	Causes	Possible Solutions
oH	Heatsink Overheat	The ambient temperature is high and the heatsink temperature is more than the *L8-02 [Overheat Alarm Level]*.	• Measure the ambient temperature. • Increase the airflow around the drive. • Install a cooling device (cooling fan or air conditioner) to decrease 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.
		The internal cooling fan or fans stopped.	1. Replace the cooling fan. 2. Set *o4-03 = 0 [Fan Operation Time Setting = 0 h]* to reset the cooling fan operation time.

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.
• Use *L8-03 [Overheat Pre-Alarm Selection]* to the stopping method for this fault.

Code	Name	Causes	Possible Solutions
oH2	External Overheat (H1-XX=B)	An external device sent an *oH2* alarm.	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]* in 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 C1-04 [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:
• When *H3-02 or H3-10 = E [MFAI Function Selection = Motor Temperature (PTC Input)]*, the drive detects this fault if the motor overheat signal entered to analog input terminals A1 and A2 is more than the alarm detection level.
• If the drive detects this error, the terminal set to *H2-01 to H2-03 = 10 [MFDO Function 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]* settings.

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.
• Use *L6-01 [Torque Detection Selection 1]* to set the conditions that trigger the minor fault.

Code	Name	Causes	Possible Solutions
oL4	Overtorque 2	A fault occurred on the machine. Example: The machine is locked.	Examine the machine and remove the cause of the fault.
		The parameters are incorrect for the load.	Adjust *L6-05 [Torque Detection Level 2]* and *L6-06 [Torque Detection Time 2]* settings.

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.
• Use *L6-04 [Torque Detection Selection 2]* to set the conditions that trigger the minor fault.

Code	Name	Causes	Possible Solutions
oS	Overspeed	There is overshoot.	Decrease *C5-01 [ASR Proportional Gain 1]* and increase *C5-02 [ASR Integral Time 1]*.

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
ov	DC Bus Overvoltage	The drive output cable or motor is shorted to ground (the current short to ground is charging the main circuit capacitor of the drive through the power supply).	1. Examine the motor main circuit cable, terminals, and motor terminal box, and then remove ground faults. 2. Re-energize the drive.
		The power supply voltage is too high.	Decrease the power supply voltage to align with the drive rated voltage.
		Electrical interference caused a drive malfunction.	• Examine the control circuit lines, main circuit lines, and ground wiring, and minimize the effects of noise. • Find the source of the noise. If a magnetic contactor is the source, use Surge Protective Device if necessary. • Set *L5-01 ≠ 0 [Number of Auto-Restart Attempts ≠ 0 times]*.

Note:
• The drive detects this error if the DC bus voltage is more than the *ov* detection level when the Run command has not been input (while the drive is stopped).
• The *ov* detection level is approximately 410 V with 208 V class drives. The detection level is approximately 820 V with 480 V class drives.
• 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
ovEr	Too Many Parameters Changed	You tried to change more than 150 parameters.	Make sure that parameters that do not have an effect on drive operation are at their default settings. **Note:** • You can change 150 parameters maximum. • If you change parameters that have dependencies, the drive can detect *ovEr* when the number of changed parameters is fewer than 150.

Code	Name	Causes	Possible Solutions
PASS	Modbus Communication Test	The MEMOBUS/Modbus communications test is complete.	The *PASS* 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 errors with the wiring for main circuit drive input power.
		Loose wiring in the 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.
		Unsatisfactory balance between voltage phases.	• 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.

Code	Name	Causes	Possible Solutions
		The main circuit capacitors are unserviceable.	• Examine the capacitor maintenance time in monitor *U4-05 [Capacitor Life Mon]*. • If *U4-05* is more than 90%, replace the capacitor. Contact Yaskawa or your nearest sales representative for more information.
			• Examine the input power for problems. • Re-energize the drive. • If the alarm stays, replace the circuit board or the drive. Contact Yaskawa or your nearest sales representative for more information.

Note:
• The drive detects this error if the DC bus voltage changes irregularly without regeneration.
• If the drive detects this error, the terminal set to *H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]* will activate.
• Use *L8-05 [Input Phase Loss Protection Sel]* to enable and disable PF detection.

Code	Name	Causes	Possible Solutions
POC	Pump Over Cycle	Pump in the system exceeded the number cycles from normal operation to sleep mode set in *Y2-10 [Max Cycling Protection Allowed]* in the time set in *Y2-11 [Cycling Count Decrement Time]*.	Adjust sleep parameters to prevent the system from over cycling between normal operation and sleep mode.

Code	Name	Causes	Possible Solutions
R-DNE	Remote Drive Disable	• The digital input set to *H1-xx = BD [MFDI Function Selection = Remote Drive Disable]* activated. • The digital input set to *H1-xx = 1BD [!Remote Drive Disable]* deactivated.	Examine the statuses of the digital input terminals set to *H1-xx = BD or 1BD*

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
rUn	Motor Switch during Run	The drive received a *Motor 2 Selection [H1-xx = 16]* 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 *H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]* will activate.

Code	Name	Causes	Possible Solutions
SE	Modbus Test Mode Error	MEMOBUS/Modbus communications self-diagnostics *[H1-xx = 67]* was done while the drive was running.	Stop the drive and do MEMOBUS/Modbus communications self-diagnostics.

Note:
If 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
SPCNR	Single Phase Converter Not Ready	When *YC-14 = 1 [Behavior when SPC is Not Ready = Coast to Stop - Alarm]*, the digital input set to *H1-xx = BE [MFDI Function Selection = Single Phase Converter Ready NC]* deactivated to show that the attached converter is faulted or not ready.	• Examine the wiring between the drive and converter. • Examine the error code on converter.

Note:
• If the drive detects this error, the terminal set to *H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]* will activate.
• The De-Scale and Contactor Multiplex functions will be reset when this alarm is active.

Code	Name	Causes	Possible Solutions
SPL	Suction Pressure Feedback Loss	Wire Break detection for suction pressure. The analog input programmed for *Water Level / Suct Pres Feedback* is less than 3 mA or more than 21 mA for longer than 1 second and *YE-19 = 1 [Suction Pressure Fdbk Wire Break = Alarm (and Digital Output)]*.	• Repair level sensor. • Repair wiring.

Code	Name	Causes	Possible Solutions
STo	Safe Torque OFF	Safe Disable inputs H1-HC and H2-HC are open.	• Make sure that the Safe Disable signal is input from an external source to terminal H1-HC and H2-HC. • When the Safe Disable function is not in use, use a jumper to connect terminals H1-HC and H2-HC.
		There is internal damage to the two Safe Disable channels.	Replace the board or the drive. Contact Yaskawa or your nearest sales representative to replace the board.

Note:
• The drive will not output an alarm signal for this alarm.
• If the drive detects this error, the terminal set to *H2-01 to H2-03 = 21 [MFDO Function Selection = Safe Torque OFF]* will activate.

Code	Name	Causes	Possible Solutions
SToF	Safe Torque OFF Hardware	One of the two terminals H1-HC or 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. Contact Yaskawa or your nearest sales representative to replace the board.

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
TiM	Keypad Time Not Set	There is a battery in the keypad, but you have not set the date and time.	Use the keypad to set the date and time.

Note:
• Parameter *o4-24 [bAT Detection selection]* enables and disables *TiM* detection.
• 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
TrPC	IGBT Maintenance Time (90%)	The IGBT is at 90% of its performance life estimate.	Replace the IGBT or the drive. For more information, contact Yaskawa or your nearest sales representative.

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
UL3	Undertorque Detection 1	A fault occurred on the machine. Example: There is a broken pulley belt.	Examine the machine and remove the cause of the fault.
		The parameters are incorrect for the load.	Adjust *L6-02 [Torque Detection Level 1]* and *L6-03 [Torque Detection Time 1]* settings.

Note:
• The drive detects this error if the drive output current is less than the level set in *L6-02* for longer than *L6-03*.
• If the drive detects this error, the terminal 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 *L6-01 [Torque Detection Selection 1]*.

Code	Name	Causes	Possible Solutions
UL4	Undertorque Detection 2	A fault occurred on the machine. Example: There is a broken pulley belt.	Examine the machine and remove the cause of the fault.
		The parameters are incorrect for the load.	Adjust *L6-05 [Torque Detection Level 2]* and *L6-06 [Torque Detection Time 2]* settings.

Note:
• The drive detects this error if the drive output current is less than the level set in *L6-05* for longer than *L6-06*.
• If detected, the terminal 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 *L6-04 [Torque Detection Selection 2]*.

Code	Name	Causes	Possible Solutions
UL6	Underload or Belt Break Detected	The output current decreased less than the motor underload curve set in *L6-14 [Motor Underload Level @ Min Freq]* for longer than the time set in *L6-03 [Torque Detection Time 1]*.	Examine parameters *L6-13 [Motor Underload Curve Select]* and *L6-14*.
		The belt has broken disconnecting the motor from the load.	

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
Uv	Undervoltage	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 a phase loss in the drive input power.	Correct errors with the wiring for main circuit drive input power.
		There is loose wiring in the drive input power terminals.	Tighten the terminal screws to the correct tightening torque.
		There was a loss of power.	Use a better power supply.
		The main circuit capacitors have become unserviceable.	Examine the capacitor maintenance time in monitor *U4-05 [Capacitor Life Mon]*. If *U4-05* is more than 90%, replace the control board or the drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.

Code	Name	Causes	Possible Solutions
		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 or GFCI) (with overcurrent protective function), or magnetic contactor is ON. • Check the capacity of the drive power supply transformer.
		Air inside the drive is too hot.	Check the ambient temperature of the drive.
		The Charge LED is broken.	Replace the control board or the entire drive. For information about replacing the control board, contact Yaskawa or your nearest sales representative.

Note:
• 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 < *L2-05 [Undervoltage Detection Lvl (Uv1)]*.
–The Contactor that prevents inrush current in the drive was opened.
–There is low voltage in the control drive input power.
• If the drive detects this error, the terminal set to *H2-01 to H2-03 = 10 [MFDO Function Selection = Alarm]* will activate.

Code	Name	Causes	Possible Solutions
WFR	Waiting for Run	The drive has *Drive Enable No Run Cycle* active (closed) on the digital input and the drive is OFF.	Examine the operation sequence.

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
WLL	Water Level Feedback Loss	Wire Break detection for water level. The Analog input programmed for Water Level / Suction Pressure is less than 3 mA or is more than 21 mA for longer than 1 second with *Yd-16 = 1 [Water Level Feedback Wire Break = Alarm Only]*.	• Repair level sensor. • Repair wiring.

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 *o2-04 [Drive Model (KVA) Selection]* does not agree with the drive model.	Set *o2-04* 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 *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*.
		You set *E2-01 ≤ E2-03 [Motor Rated Current (FLA) ≤ Motor No-Load Current]*.	Make sure that *E2-01 > E2-03*. **Note:** If it is necessary to set *E2-01 < E2-03*, first lower the value set in *E2-03*, and then set *E2-01*.
		The settings for these parameters do not agree: • *L8-12 [Ambient Temperature Setting] = 60 °C* and *L8-35 = 1 or 3 [Installation Method Selection = Side-by-Side Mounting or IP55/UL Type 12]* for models 2011 to 2169 and 4005 to 4156 • *L8-35 = 1 or 3* for models 2211 to 2396 and 4180 to 4720	Set *L8-35 = 0 or 2 [IP20/UL Open Type or IP20/UL Type 1]*.
		You set *S3-09 < S3-10 [PI2 Control Output Upper Limit < PI2 Control Output Lower Limit]*.	Make sure that *S3-09 > S3-10* at all times.
		You set *S3-13 > S3-15 [PI2 Control Low Feedback Lvl > PI2 Control High Feedback Lvl]*.	Make sure that *S3-13 < S3-15* at all times.
		H2-xx = D3 [Harmonic Filter Output] and *n1-13 = 0 [DC Bus Stabilization Control = Disabled]* while *A1-02 = 0 or 8 (Control Method Selection= V/f or EZ Vector Control]*.	Set *n1-13 = 1 [Enabled]* or de-program digital output *D3*.
		One of the following conflicting parameters has been set: • *Y1-01 = 3 [Multiplex Mode = Network Multiplex]* and *F6-16 ≠ 0 [Gateway Mode ≠ Disabled]*. • *Y1-01 = 3 [Multiplex Mode = Network Multiplex]* and *A1-07 ≠ 0 [DriveWorksEZ Function Selection ≠ DWEZ Disabled]*. • *Q7-01 ≠ 0 [Remote I/O Slave Address ≠ 0]* and *H1-xx ≠ 9F [Multi-Function Digital Input ≠ DWEZ Disabled]*.	When *Y1-01 = 3*, set *F6-16 = 0*, or disable DriveWorksEZ while *Q1-07 ≠ 0*.
Code	**Name**	**Causes**	**Possible Solutions**
oPE03	Multi-Function Input Setting Err	The settings for these parameters do not agree: • *F3-10 to F3-25 [Terminal D1 to DF Function Selection]* • *H1-01 to H1-08 [Terminals S1 to S8 Function Selection]* • *H7-01 to H7-04 [Virtual Multi-Function Inputs 1 to 4]*	Correct the parameter settings.
		The settings for MFDIs overlap. **Note:** This does not include *H1-xx = 20 to 2F [MFDI Function Selection = Ext Pump Fault]* and *[Reserved]*.	Set the parameters correctly to prevent MFDI function overlap.
		These pairs of MFDI functions are not set to Digital Inputs (*H1-xx*, *F3-10 to F3-25*, and *H7-01 to H7-04*) at the same time: • Setting values *10 [Up Command]* and *11 [Down Command]* • Setting values *75 [Up 2 Command]* and *76 [Down 2 Command]* • Setting values *42 [Run Command (2-Wire Sequence 2)]* and *43 [FWD/REV (2-Wire Sequence 2)]*	Set the MFDI pairs.

Code	Name	Causes	Possible Solutions
		A minimum of two of these MFDI combinations are set to Digital Inputs (*H1-xx*, *F3-10 to F3-25*, and *H7-01 to H7-04*) at the same time: • Setting values *10 [Up Command]* and *11 [Down Command]* • Setting values *75 [Up 2 Command]* and *76 [Down 2 Command]* • Setting value *A [Accel/Decel Ramp Hold]* • Setting value *1E [Reference Sample Hold]*	Remove the function settings that are not in use.
		The parameter settings are enabled at the same time. • *b5-01 [PID Mode Setting]* • *H1-xx = 10 [Up Command]* • *H1-xx = 11 [Down Command]*	• Set *b5-01 = 0 [Disabled]*. • Remove the function Up/Down command settings.
		These commands are set in Digital Inputs (*H1-xx*, *F3-10 to F3-25*, and *H7-01 to H7-04*) at the same time: • Setting values *61 [Speed Search from Fmax]* and *62 [Speed Search from Fref]* • Setting values *65, 66, 7A, 7B [KEB Ride-Thru 1 or 2 Activate]* and *68 [High Slip Braking (HSB) Activate]* • Setting values *16 [Motor 2 Selection]* and *1A [Accel/Decel Time Selection 2]* • Setting values *65, 66 [KEB Ride-Thru 1 Activate]* and *7A, 7B [KEB Ride-Thru 2 Activate]* • Setting values *40, 41 [Forward RUN (2-Wire), Reverse RUN (2-Wire)]* and *42, 43 [Run Command (2-Wire Sequence 2), FWD/REV (2-Wire Sequence 2)]* • Setting values *60 [DC Injection Braking Command]* and *6A [Drive Enable]* • Setting values *16 [Motor 2 Selection]* and *75,j 76 [Up 2 Command, Down 2 Command]*	Remove the function settings that are not in use.
		These groups of MFDI functions are not set to Digital Inputs (*H1-xx*, *F3-10 to F3-25*, and *H7-01 to H7-04*) at the same time: • Setting values *C7 [PID Setpoint Selection 1], C8 [PID Setpoint Selection 2],* and *C9 [PID Setpoint Selection 3]* • Setting values *C0 [Dedicated Multi-Setpoint YA-02], C1 [Dedicated Multi-Setpoint YA-03], C2 [Dedicated Multi-Setpoint YA-04], C3 [Dedicated Multi-Setpoint YA-05], C4 [Dedicated Multi-Setpoint YA-06], C5 [Dedicated Multi-Setpoint YA-07],* and *C6 [Dedicated Multi-Setpoint YA-08]*	Set the MFDI groups correctly.
		Two of these three MFDI functions are set to Digital Inputs (*H1-xx*, *F3-10 to F3-25*, and *H7-01 to H7-04*) at the same time: • Setting value *50 [Motor Pre-heat 2]* • Setting value *60 [DC Injection Braking Command]* • Setting value *6A [Drive Enable]*	Remove the function setting that are not in use and use only one function.
		Settings for N.C. and N.O. input *[H1-xx]* for these functions were selected at the same time: • Setting value *15 [Fast Stop (N.O.)]* • Setting value *17 [Fast Stop (N.C.)]*	Remove one of the function settings.
		These settings were entered while *H1-xx = 2 [External Reference 1/2 Selection]*: • *b1-15 = 4 [Frequency Reference Selection 2 = Pulse Train Input]* • *H6-01 ≠ 0 [Terminal RP Pulse Train Function ≠ Frequency Reference]*	Set *H6-01 = 0*.
		These settings were entered while *H1-xx = 2 [External Reference 1/2 Selection]*: • *b1-15 = 3 [Option PCB]* or *b1-16 = 3 [Run Command Selection 2 = Option PCB]* • No option card is connected to the drive.	Connect an input option card to the drive.
		These settings were entered while *H1-xx = 2 [External Reference 1/2 Selection]*: • *b1-15 = 1 [Analog Input]* • *H3-02 ≠ 0 [Terminal A1 Function Selection ≠ Frequency Reference]* or *H3-10 ≠ 0 [Terminal A2 Function Selection ≠ Frequency Reference]*	Set *H3-02 = 0* or *H3-10 = 0*.

Code	Name	Causes	Possible Solutions
		These MFDI/MFDO functions are set at the same time: • *H1-xx ≠ 6A [Drive Enable]* and *H1-xx ≠ 70 [Drive Enable No Run Cycle]* • *H2-xx = 38 [Drive Enabled]*	• Set *H1-xx = 6A or 70*. • Change the MFDO setting.
		These MFDI functions are set at the same time: • *H1-xx = 6A [Drive Enable]* • *H1-xx = 70 [Drive Enable No Run Cycle]*	Remove one of the function settings.
		These MFDI functions are set at the same time: • *H1-xx = 67 [Communications Test Mode]* • *H1-xx = AF or B0 [Emergency Override FWD or Emergency Override REV]*	Remove one of the function settings.
		These parameters are set at the same time: • *H1-xx = 62 [Speed Search from Fref]* • *H5-22 = 1 [Speed Search from MODBUS = Enabled]*	Remove one of the function settings.
		These parameters are set at the same time: • *H1-xx = 70 [Drive Enable No Run Cycle]* • *b1-02 ≠ 0 [Run Command Selection 1 ≠ Keypad]*	Remove the *H1-xx = 70* function setting or set *b1-02 = 0*.
		These parameters are set at the same time: • *H1-xx = 70 [Drive Enable No Run Cycle]* • *b1-16 ≠ 0 [Run Command Selection 2 ≠ Keypad]*	Remove the *H1-xx = 70* function setting or set *b1-16 = 0*.
		These parameters are set at the same time: • *H1-xx = 70 [Drive Enable No Run Cycle]* • *H1-xx = 0 [3-Wire Sequence]*	Remove one of the function settings.
		Parameter *S3-01 ≠ 0 [PI2 Control Enable Selection ≠ Disabled]* and MFDI set for *H1-xx = AD [Select PI2 Control PI Parameters]* is ON.	• Set *S3-01 = 0* to use *H1-xx = AD* for the adjustments of *S3-06 [PI2 Control Proportional Gain]* and *S3-07 [PI2 Control Integral Time]* instead of the primary PI controller Proportional and Integral adjustments. • When PI2 Control is necessary, remove the MFDI function setting.
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.
		b1-01 = 3 [Frequency Reference Selection 1 = Option PCB] is set, but there is no option card connected to the drive.	Connect an option card to the drive.
		b1-02 = 3 [Run Command Selection 1 = Option PCB] is set, but there is no option card connected to the drive.	
		These parameters are set at the same time: • *b1-01 = 4 [Pulse Train Input]* • *H6-01 ≠ 0 [Terminal RP Pulse Train Function ≠ Frequency Reference]*	Set *H6-01 = 0*.
		These parameters are set at the same time: • *F3-01 = 6 [Digital Input Function Selection = BCD (5-digit), 0.01 Hz]* • *F3-03 = 0, 1 [Digital Input Data Length Select = 8-bit, 12-bit]*	Set *F3-03 = 2 [16-bit]*.
		These parameters are set at the same time: • *b1-01 = 3 [Frequency Reference Selection 1= Option PCB]* • *F2-01 = 0 or 2 [Analog Input Function Selection = 3 Independent Channels or 3 Additional Channels]*	Correct the parameter settings.
		These parameters are set and there is an AI-A3 option card connected to the drive: • *H1-xx = 2 [External Reference 1/2 Selection]* • *b1-15 = 3 [Frequency Reference Selection 2 = Option PCB]* • *F2-01 = 0 [Analog Input Function Selection = 3 Independent Channels]*	Correct the parameter settings.

Code	Name	Causes	Possible Solutions
oPE07	Analog Input Selection Error	The settings for *H3-02, H3-06, H3-10 [MFAI Function Selection]* and *H7-30 [Virtual Analog Input Selection]* overlap.	Set *H3-02, H3-06, 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, H3-06, H3-10, H7-30 = B [PID Feedback]* • *H6-01 = 1 [Terminal RP Pulse Train Function = PID Feedback Value]*	Remove the function settings that are not in use.
		These parameters are set at the same time: • *H3-02, H3-06, H3-10, H7-30 = C [PID Setpoint]* • *H6-01 = 2 [PID Setpoint Value]*	
		These parameters are set at the same time: • *H3-02, H3-06, H3-10, H3-40, H3-41, H3-42, H7-30 = 24 [PID Feedback Backup]* • *Y4-41 = 1 [Diff Lvl Src Fdbk Backup Select = Enabled]*	• Use only *H3-xx = 2D [Differential Level Source]* as a backup PID feedback and remove the function setting of *H3-xx = 24*. • Use *H3-xx = 24* as a backup PID feedback and set *Y4-41 = 0 [Disabled]* to not let the drive use *H3-xx = 2D* as a backup PID feedback.
		These parameters are set at the same time when *F2-01 = 2 [Analog Input Function Selection = 3 Additional Channels]*: • *F2-05, F2-09, F2-13 [Terminal Vx Function Selection], H3-40, H3-41, H3-42 = B [PID Feedback]* • *H6-01 = 1*	• Remove the function settings that are not in use. • When you use *H6-01* and *F2-05*, *F2-09*, *F2-13* at the same time, set *F2-01 ≠ 2*.
		These parameters are set at the same time when *F2-01 = 2*: • *F2-05, F2-09, F2-13, H3-40, H3-41, H3-42 = C [PID Setpoint]* • *H6-01 = 2*	
		The settings for *F2-05, F2-09, and F2-13* overlap when *F2-01 = 2*.	• Set the parameters correctly to prevent overlap. • Set *F2-01 ≠ 2*.
		The settings for *F2-05, F2-09, F2-13* and the settings for these parameters overlap when *F2-01 = 2*: • *H3-02, H3-06, H3-10* • *H3-40, H3-41, H3-42* • *H7-30*	
		The settings for these parameters overlap: • *H3-02, H3-06, H3-10* • *H3-40, H3-41, H3-42* • *H7-30*	Set these parameters correctly to prevent overlap
Code	**Name**	**Causes**	**Possible Solutions**
oPE08	Parameter Selection Error	You set a function that is not compatible with the control method set in *A1-02 [Control Method Selection]*.	1. Push  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 = 0 [V/f]*, you set these parameters: • *S1-01 = 1 [Dynamic Noise Control = Enabled]* • *Y4-42 ≠ 0 [Output Disconnect Detection Sel ≠ Disabled]*	Set *S1-01 = 0* or *Y4-42 = 0*.
		When *A1-02 = 0 [V/f]*, you used *H1-xx = 16 [MFDI Function Selection = Motor 2 Selection]*.	Correct the parameter setting.
		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*, 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*, you set *E5-09 ≠ 0* and *E5-24 ≠ 0*.	Set *E5-09 = 0* or *E5-24 = 0*.

Code	Name	Causes	Possible Solutions
		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]*.
		You set *L6-02 [Torque Detection Level 1] < L6-14 [Motor Underload Level @ Min Freq]*.	Set parameters to be *L6-02 ≥ L6-14*.
Code	**Name**	**Causes**	**Possible Solutions**
oPE09	PID Control Selection Fault	These parameters are set at the same time: • *b5-01 = 1* • *b5-11 = 1 [PID Output Reverse Selection = Negative Output Accepted]* And one of these parameters is set: • *d2-02 ≠ 0.0 [Frequency Reference Lower Limit ≠ 0.0%]* • *Y1-06 ≠ 0.0 [Minimum Speed ≠ 0.0%]* • *Y4-12 ≠ 0.0 [Thrust Frequency ≠ 0.0%]* • *Y1-01 ≠ 0 [Multiplex Mode ≠ Drive Only]* • *Yd-01 ≠ 0 [Water Level Selection ≠ Disabled]* • *YE-01 ≠ 0 [Suction Pressure Control Select ≠ Disabled]* • *YF-01≠ 0 [PI Aux Control Selection ≠ Disabled]*	Correct the parameter settings.
		These parameters are set at the same time: • *Y2-01 = 5 [Sleep Level Type = Output Frequency (non-PID)]* • *Y2-02 [Sleep Level]* > 0.0 Hz • *Y4-17 [Utility Start Delay Time]* > 0.0 min	Correct the parameter settings.
Note: The drive detects this error if the PID control function selection is incorrect. (When *b5-01 = 1 [PID Mode Setting = Standard]*)			
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 ≤ E1-07 < E1-06 ≤ E1-11 ≤ E1-04 [Minimum Output Frequency ≤ Mid Point A Frequency < Base Frequency ≤ Mid Point B Frequency ≤ Maximum Output Frequency]* • For motor 2: *E3-09 ≤ E3-07 < E3-06 ≤ E3-11 ≤ E3-04 [Minimum Output Frequency ≤ Mid Point A Frequency < Base Frequency ≤ Mid Point B Frequency ≤ 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. *C6-03* stays active.	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**
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.
		These parameters are set at the same time: • *b8-01 = 1 [Energy Saving Control Selection = Enabled]* • *S1-01 = 1 [Dynamic Noise Control = Enabled]*	Disable Energy Saving Control or Dynamic Noise Control.

Code	Name	Causes	Possible Solutions
oPE33	Digital Output Selection Error	These two parameters are set at the same time: • *H2-60 ≠ F [Term M1-M2 Secondary Function ≠ Not Used]* • *H2-01 = 1xx [Term M1-M2 Function Selection = Inverse output of xx]*	Clear the *H2-01 to H2-03 = 1xx [Inverse output of xx]* settings. **Note:** It is not possible to set *H2-01 to H2-03 = 1xx [Inverse output of xx]* when using output functions for logic operations (*H2-60, H2-63, H2-66 ≠ F*).
		These two parameters are set at the same time: • *H2-63 ≠ F [Term M3-M4 Secondary Function ≠ Not Used]* • *H2-02 = 1xx [Term M3-M4 Function Selection = Inverse output of xx]*	
		These two parameters are set at the same time: • *H2-66 ≠ F [Term MD-ME-MF Secondary Function ≠ Not Used]* • *H2-03 = 1xx [Term MD-ME-MF Function Selection = Inverse output of xx]*	
Code	**Name**	**Causes**	**Possible Solutions**
oPE35	Network WL/SP/PI Aux Mode	These two parameters are set at the same time: • *Y9-51 = 1 [WaterLvl/SuctPres/PI Aux TurnOff = Enabled]* • *Y9-50 ≠ 0 [WaterLvl/SuctPres/PI Aux Source ≠ Analog Only]*	Confirm the settings for *Y9-50* and *Y9-51*.
		These two parameters are set at the same time: • *Y9-51 = 1 [WaterLvl/SuctPres/PI Aux TurnOff = Enabled]* • *YE-01 ≠ 0 [Suction Pressure Control Select ≠ Disabled]*	Confirm the settings for *YE-01* and *Y9-51*.
Code	**Name**	**Causes**	**Possible Solutions**
oPE43	Flow Meter Input	These two parameters are set at the same time: • *H6-01 = 5 [Terminal RP Pulse Train Function = Flow Meter]* • *H3-xx = 3A [MFAI = Flow Meter]*	De-program one of the flow meter inputs.
		Flow Meter Scaling is set to zero and flow meter is being used as PID feedback. *Y6-01 = 0 [Flow Meter Scaling = 0.0]*, *Y1-02 = 25 System Units = Flow (Use Y6-04)]*, and *b5-01 = 1 [PID Mode Setting = Standard]*.	• Adjust *Y6-01*. • Reprogram *Y1-02* or *b5-01*.
Code	**Name**	**Causes**	**Possible Solutions**
oPE44	Water Level / Suct Pres / PI Aux	More than one of the following parameters have been set to a non-zero value: • *Yd-01 [Water Level Selection]* • *YE-01 [Suction Pressure Control Select]* • *YF-01 [PI Aux Control Selection]*	Confirm the settings for *Yd-01, YF-01* and *YE-01*.
		Water Level / Suct Pres Feedback MFAI and PI Auxiliary Control Feedback MFAI have been programmed simultaneously.	Confirm the *H3-xx* settings.

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.
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 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.
		A1-02 [Control Method Selection] setting is not applicable.	• Examine the value set in *A1-02*. • 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 (*E5-07*/*E5-06*) is too small. • The drive cannot find the *n8-36 [HFI Frequency Level for L Tuning]* value.	• Set the correct value on the motor nameplate to *E5-xx [PM Motor Settings]* or do rotational/stationary Auto-Tuning. • When it is necessary to set *n8-35 = 1 [Initial Pole Detection Method = High Frequency Injection]*, 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 *End8*, it will automatically set *n8-35 =0 [Pull-in]*. 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 *n8-84 [Polarity Detection Current]* during High Frequency Injection Tuning.	When *n8-35 = 1 [Initial Pole Detection Method = High Frequency Injection]*, make sure that the motor does not rotate in reverse at start. **Note:** If the drive detects *End9*, it will automatically set *n8-35 =0 [Pull-in]*. 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 *E2-03 [Motor No-Load Current]* do not match.	• Examine the motor rated current and the no-load current. • Set *E2-03* 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.	1. Stop Auto-Tuning. 2. Examine the minor fault code and remove the cause of the problem. 3. Do Auto-Tuning again.
Code	**Name**	**Causes**	**Possible Solutions**
Er-03	OFF Button was Pressed	You pushed the OFF button during Auto-Tuning.	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.
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.	1. Increase the value set in *C1-01 [Acceleration Time 1]*. 2. Disconnect the machine from the motor and do Rotational Auto-Tuning again.
		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-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.	
		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 Error	The motor rated current value is incorrect.	Correctly set the rated current indicated on the motor nameplate and do Auto-Tuning again.
		The drive could not complete tuning for leakage inductance in fewer than 300 s.	Examine and repair motor wiring.
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 *Er-25* after you do Stationary Auto-Tuning, it is possible that the motor cannot use high frequency injection. For more information, contact Yaskawa or your nearest sales representative.

2.8 Backup Function Operating Mode Display and Errors

◆ Operating Mode Display

When you use the backup function from the keypad, the keypad will show messages related to the current operation. These messages will not identify errors in the drive operation.

Keypad Display	Name	Display	State
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 align 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 shows the error codes. Refer to this table to remove the cause of the errors.

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 *A1-02 [Control Method Selection]* do not agree.	1. Set *A1-02* 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 *o2-04 [Drive Model (KVA) Selection]* 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 Qx-xx *[DriveWorksEZ Parameters]* and *Rx-xx [DriveWorksEZ Connections]* is incorrect.	Set the DWEZ PC software password supplied by Yaskawa for the DWEZ program user ID downloaded to the drive.
Code	**Name**	**Causes**	**Possible Solutions**
rdEr	Error Reading Data	You tried to back up the data when *o3-02 = 0 [Copy Allowed Selection = Disabled]*.	Set *o3-02 = 1 [Enabled]* 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 *o2-04 [Drive Model (KVA) Selection]* 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 Status Messages

The HOA keypad will show these status messages on line 1 of the keypad display during the conditions listed below. These are not faults or alarms.

Keypad Display	Description
Current Limit Foldback	Drive output speed is being limited due to the output current limit. Decrease the load or replace with higher capacity drive.
De-staging Lag in XXX min *1	De-stage is in progress. X indicates the length of time before de-stage takes place. One or more of the de-stage conditions have been met: • High Feedback Quick De-stage • Low Feedback Quick De-stage • Normal De-stage • Low Water Level De-stage • Suction Pressure De-stage • PI Auxiliary Control De-stage Adjust parameter settings if de-stage is not desired given the system conditions.
Digital Out Dly: Exit in XXXmin *1	The drive is delaying the start of the motor and the Lube Pump digital output is energized with *Y4-29 = 1 [Lube Pump Text = Digital Out Delay]*. Wait or cycle the Run command. Verify setting of *Y4-31 [Lube Pump Time]*.
Flow Rate Limit Foldback	Drive output speed is being limited due to too much (*Y6-26 = 1 [Flow Rate Limit Selection = Enabled]*) or not enough (*Y6-26 = 2 [Enabled - Low Limit]*) Flow Rate (*UA-83*). If the Flow Rate Limiter is activating incorrectly, confirm and adjust Flow Rate parameters *Y6-01, Y6-26, Y6-27, Y6-28* and/or *Y6-29*.
Level Control Active	*Yd-01 = 1 [Water Level Selection = Enabled]* and is active. Set *Yd-01 = 0 [Disabled]* or adjust *Yd-25 [Water Lvl Ctrl Activation Level]*.
Lube Pump Active: Exit in XXXmin *1	The drive is delaying the start of the motor and the Lube Pump digital output is energized with *Y4-29 = 0 [Lube Pump Text = Lube Pump]*. Wait or cycle the Run command. Verify setting of *Y4-31 [Lube Pump Time]*.
Net Drv Err: Check Faulted Drive	Another drive in the network has a system fault (*NMS, HFB, HWL, LFB, LWL, LowFl, HiFlo, or ACCUM*). Another drive in the network has a *Low City Pressure* alarm. Check the other drives in the system.
Net FB Lost: Check FB Source	Network PID Feedback has been lost. No valid analog PID feedback source can be found on the network. Repair the source of network feedback or add an analog source.
Net WL/SP/PI Aux Feedback Lost	Network source for Water Level, Suction Control Pressure, or Aux PI Feedback has been lost. Valid analog source for Water Level, Suction Control Pressure, or Aux PI Feedback cannot be found on the network. Check the source on drives configured with *Y9-50 ≠ 3 [WaterLvl/SuctPres/PI Aux Source ≠ Network Only]*.
Network Pre-Charge Active	Pre-Charge is active on another networked drive. If the MFDI was previously open, drive will enter Pre-Charge if required.
Network Start Delay: Y9-29	System was on the Pump Off Network state and a drive has been put on AUTO Mode. The iQpump MEMOBUS network is waiting for *Y9-29 [Network AUTO Start Delay]* to elapse.
[o1-83 value *2] XX	Parameter *o1-83 > 0 [Drive Name]*. The "XX" on the screen will be replaced *o1-84 [Drive Name Unit Number]* value when *o1-84 > 0*. Change *o1-83* or *o1-84* settings.
PI Aux Control Active	*YF-01 = 2 [PI Aux Control Selection = Enabled]* and is active. Set *YF-01 = 0 [Disabled]* or adjust *YF-25 [PI Aux Control Activation Level]*.
Pre-Charge: Exit in XXX min *1	Pre-Charge active. X indicates time left before Pre-Charge exits due to timers (*Y4-03* + *Y4-07*). Pressure Feedback is low. Adjust the Pre-Charge parameters.
PrimerPump Activ: Exit in XXXmin *1	The drive is delaying the start of the motor and the Lube Pump digital output is energized with *Y4-29 = 2 [Lube Pump Text = Primer Pump]*. Wait or cycle the Run command. Verify setting of *Y4-31 [Lube Pump Time]*.
Scrn Mtr Starter: Exit in XXXmin *1	The drive is delaying the start of the motor and the Lube Pump digital output is energized with *Y4-29 = 3 [Lube Pump Text = Screen Motor Starter]*. Wait or cycle the Run command. Verify setting of *Y4-31 [Lube Pump Time]*.

Keypad Display	Description
Seq Timer Set: Wait for RUN Cmd	Sequence Timers are programmed to run the drive but there is no Run Command.
Sequence Timer Active: IDLE	Sequence Timers are programmed to run the drive, the Run Command is applied, but the timer has not started yet.
Sequence Timer 1: RUN	Sequence Timers are programmed to run the drive, the Run Command is applied and the timer is running the drive. The active timer number is displayed.
Single Phase Foldback	The drive is limiting output speed because of too much DC Bus voltage ripple. The drive lost an input phase, or for a single phase application, the motor is drawing too much load. Make sure that all input phases are present and decrease the output load.
Sleep Active Minimum Water Level	Water Level Control caused the drive to sleep. The water level was below the *Yd-04 [Minimum Water Level]* level for longer than the *Yd-05 [Water Level Sleep Delay Time]* time and forced the drive to go into a sleep condition. Confirm Water Level sleep settings.
Sleep Active Min Suct Pressure	Drive is in sleep due to Suction Pressure Control. The Suction Pressure dropped below the YE-04 level for more than the YE-05 time, forcing the drive to go to a sleep condition. Confirm Suction Pressure sleep parameter settings.
Sleep AUTO→Off AUTO Cmd to RUN	Drive switched to OFF due to entering sleep with *Y2-15 = 1 or 2 [Sleep AUTO → OFF Selection = Enabled or Enabled with Timer]*. Issue a Run command.
Staging Lag in XXX min *1	Stage is in progress. X indicates the length of time before staging takes place. The conditions for staging a new drive have been met. Adjust parameter settings if staging is not desired given the system conditions.
Suction Control Active	*YE-01 = 1 [Suction Pressure Control Select = Suction Pressure (PSI)]* and is active. Set *YE-01 = 0 [Disabled]* or adjust *YE-25 [Suc Pres Ctrl Activation Level]*.
Vacuum Control Active	*YE-01 = 2 [Suction Pressure Control Select = Vacuum ("Hg)]* and is active. Set *YE-01 = 0 [Disabled]* or adjust *YE-25 [Suc Pres Ctrl Activation Level]*.

*1 Unit changes to “sec” for values less than or equal to 180 seconds.
*2 The text shown here will be different for different *o1-83* values.

2.10 Diagnosing and Resetting Faults

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

◆ Fault and Power Loss Occur at the Same Time

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

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

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

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

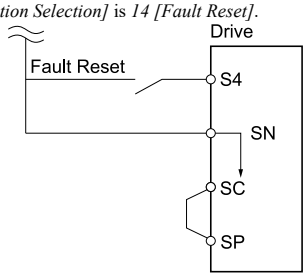
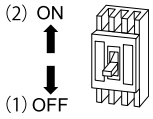
◆ Fault Occurs Without Power Loss

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

◆ Fault Reset

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

Table 2.3 Fault Reset Methods

Methods	Description
Method 1	While the keypad is showing the fault or alarm code, push F1 (Reset) or > on the keypad.
Method 2	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	1. De-energize the drive main circuit power supply. 2. Energize the drive again after the keypad display goes out. 

Note:

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

2.11 Troubleshooting Without Fault Display

Note:

Make sure that you use a keypad with FLASH number 1004 or later. Keypads with FLASH numbers 1003 and earlier will not show characters correctly.

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

If there is no display on the keypad and no lights illuminate on the keypad, replace the keypad, control board, or external cooling fan. If the keypad display error stays, replace the drive. For information about replacing the keypad, control board, and external cooling fan, contact Yaskawa or your nearest sales representative.

- 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	158
The Motor Does Not Rotate After Entering Run Command	159
The Motor Rotates in the Opposite Direction from the Run Command	160
The Motor Rotates in Only One Direction	160
The Motor Is Too Hot	160
oPE02 Error Occurs When Decreasing the Motor Rated Current Setting	161
The Correct Auto-Tuning Mode Is Not Available	161
The Motor Stalls during Acceleration or Accel/Decel Time Is Too Long	161
The Drive Frequency Reference Is Different than the Controller Frequency Reference Command	162
The Motor Speed Is Not Stable When Using a PM Motor	162
There Is Too Much Motor Oscillation and the Rotation Is Irregular	162
There Is Audible Noise from the Drive or Motor Cables When the Drive Is Energized	162
The Ground Fault Circuit Interrupter (GFCI) Trips During Run	163
Motor Rotation Causes Unexpected Audible Noise from Connected Machinery	163
Motor Rotation Causes Oscillation or Hunting	163
PID Output Fault	163
The Starting Torque Is Not Sufficient	163
The Motor Rotates after the Drive Output Is Shut Off	164
The Output Frequency Is Lower Than the Frequency Reference	164
The Motor Is Making an Audible Noise	164
The Motor Will Not Restart after a Loss of Power	164

◆ The Parameter Settings Will Not Change

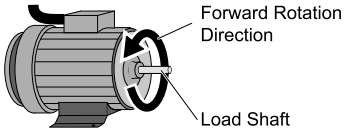
Causes	Possible Solutions
The drive is operating the motor (the drive is in Drive Mode).	Stop the drive and change to Programming Mode.
Parameter *A1-01 = 0 [Access Level Selection = Operation Only]*.	Set *A1-01 = 2 [Access Level Selection = Advanced Level]* or *A1-01 = 3 [Expert Level]*.
Parameter *H1-xx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

Causes	Possible Solutions
You entered an incorrect password in *A1-04 [Password]*.	• Enter the correct password to *A1-04* again. • If you forgot the password, set the password again with *A1-04* and *A1-05 [Password Setting]*. **Note:** If you set the password, you cannot change these parameters until the password aligns: • *A1-01 [Access Level Selection]* • *A1-02 [Control Method Selection]* • *A1-03 [Initialize Parameters]* • *A2-01 to A2-32 [User Parameter 1 to User Parameter 32]*
The drive detected *Uv [Undervoltage]*.	• View *U1-07 [DC Bus Voltage]* to see the power supply voltage. • Examine the main circuit wiring.

◆ The Motor Does Not Rotate After Entering Run Command

Causes	Possible Solutions
The drive is not in Drive Mode.	1. Make sure that the keypad shows [Rdy]. 2. If the keypad does not show [Rdy], go back to the Home screen.
Auto-Tuning completed.	Go back to the Home screen on the keypad. **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 *b1-02 [Run Command Selection 1]* correctly.
The frequency reference source is set incorrectly.	Set *b1-01 [Frequency Reference Selection 1]* correctly.
There is defective wiring in the control circuit terminals.	• Correctly wire the drive control circuit terminals. • View *U1-10 [Input Terminal Status]* for input terminal status.
The settings for voltage input and current input of the master frequency reference are incorrect.	Examine these analog input terminal signal level settings: • Terminal A1: Jumper switch S1 and *H3-01 [Terminal A1 Signal Level Select]* • Terminal A2: Jumper switch S1 and *H3-09 [Terminal A2 Signal Level Select]* • Terminal A3: Jumper switch S1 and *H3-05 [Terminal A3 Signal Level Select]*
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 *U1-01 [Freq Reference]*. • Increase the frequency reference to a value higher than *E1-09 [Minimum Output Frequency]*.
The MFAI setting is incorrect.	• Make sure that the functions set to the MFAI are correct. The frequency reference is 0 when *H3-02, H3-10, H3-06 = 1 [MFAI Function Selection = Frequency Gain]* and voltage (current) is not input. • View *U1-13 to U1-15 [Terminal A1, A2, A3 Input Voltage]* to see if the analog input values set to terminals A1, A2, and A3 are applicable.
You pushed OFF.	Turn the Run command OFF then ON from an external input. **Note:** • When you push OFF during operation, the drive will ramp to stop. Set *o2-02 = 0 [STOP Key Function Selection = Disabled]* to disable the OFF function. • You can only disable OFF when *b1-02/b1-16 = 1, 2, or 3 [Run Command Selection 1/Run Command Selection 2 = Digital Input, Serial Communications, or Option PCB]*.
The 2-wire sequence and 3-wire sequence are set incorrectly.	• Set one of the parameters *H1-03 to H1-08 [Terminals S3 to S8 Function Select]* to *0 [3-Wire Sequence]* to enable the 3-wire sequence. • If a 2-wire sequence is necessary, make sure that *H1-03 to H1-08 ≠ 0*.
Parameter *b1-02 = 7, 8, or 9 [Run Command Selection 1 = AUTO Command + Term Run, AUTO Command + Serial Run, or AUTO Command + Option Run]* and you did not push the AUTO key for the external run.	Push the AUTO key.

◆ 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 [Bi-directional Speed Search = Disabled]*, 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 [Reverse Operation Selection = Reverse Enabled]*.
The drive did not receive a Reverse run signal and 3-Wire sequence is selected.	Activate the terminals to which *H1-xx = 0 [3-Wire Sequence]* 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 [Motor Overload (oL1) Protection]*, *L1-02 [Motor Overload Protection Time]*, and *E2-01 [Motor Rated Current (FLA)]*. • 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 [Control Method Selection = V/f Control]*.
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 480 V class. • Install an AC reactor on the output side of the drive and set *C6-02 = 1 [Carrier Frequency Selection = 2.0 kHz]*. **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 208 V class drive, 1200 V for a 480 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.

◆ oPE02 Error Occurs When Decreasing the Motor Rated Current Setting

Causes	Possible Solutions
Motor rated current and the motor no-load current setting in the drive are incorrect.	• You are trying to set the motor rated current in *E2-01 [Motor Rated Current (FLA)]* to a value lower than the no-load current set in *E2-03 [Motor No-Load Current]*. • Make sure that value set in *E2-01* is higher than *E2-03*. • If it is necessary to set *E2-01* lower than *E2-03*, first decrease the value set to *E2-03*, then change the *E2-01* setting as necessary.

◆ 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 *A1-02 [Control Method Selection]*.

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

Causes	Possible Solutions
The drive and motor system reached the torque limit or current suppression will not let the drive accelerate.	• Decrease the load. • Use a larger motor. **Note:** Although the drive has a Stall Prevention function and a Torque Compensation Limit function, accelerating too fast or trying to drive a load that is too large can exceed the limits of the motor.
Torque limit is set incorrectly.	Set the torque limit correctly.
The acceleration time setting is too short.	Examine the values set in *C1-01, C1-03, C1-05, or C1-07 [Acceleration Times]* and set them to applicable values.
The load is too heavy.	• 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, accelerating too fast or trying to drive a load that is too large can exceed the limits of the motor.
The frequency reference is low.	• Examine *E1-04 [Maximum Output Frequency]* and increase the setting if it is set too low. • Examine *U1-01 [Frequency Reference]* for the correct frequency reference. • Examine the multi-function input terminals to see if a frequency reference signal switch has been set. • Examine the low gain level set in *H3-03, H3-11, H3-07 [Terminal A1, A2, A3 Gain Setting]* when you use MFAI.
The frequency reference is set incorrectly.	When *H3-02, H3-06, H3-10 = 1 [MFAI Function Selection = Frequency Gain]* are set, see if voltage (current) has been set. • Check the values set in *H3-02, H3-06, and H3-10*. • Use *U1-13 to U1-15 [Terminal A1, A2, A3 Input Voltage]* to make sure that the analog input values set to terminals A1, A2, and A3 are applicable.
The motor 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 *E1-03 [V/f Pattern Selection]*. • Perform Rotational Auto-Tuning.
The drive is operating in vector control mode, but Auto-Tuning is not completed.	• Do Auto-Tuning. • Calculate motor data and reset motor parameters. • Set *A1-02 = 0 [Control Method Selection = V/f Control]*.
The Stall Prevention level during acceleration setting is too low.	Increase the value set in *L3-02 [Stall Prevent Level during Accel]*. **Note:** If the *L3-02* 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 *L3-06 [Stall Prevent Level during Run]*. **Note:** If the *L3-06* value is too low, speed will decrease while the drive outputs torque.
Drive reached the limitations 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 provide 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: *H3-03 [Terminal A1 Gain Setting]*, *H3-04 [Terminal A1 Bias Setting]* • Terminal A2: *H3-11 [Terminal A2 Gain Setting]*, *H3-12 [Terminal A2 Bias Setting]* • Terminal A3: *H3-07 [Terminal A3 Gain Setting]*, *H3-08 [Terminal A3 Bias Setting]*
The drive is receiving frequency bias signals from analog input terminals A1 to A3 and the sum of all signals makes the frequency reference.	• Examine parameters *H3-02, H3-10, H3-06 [MFAI Function Select]*. If two or more of these parameters are set to *0*, change the settings. • Use *U1-13 to U1-15 [Terminal A1, A2, A3 Input Voltage]* to make sure that the analog input values set to terminals A1, A2, and A3 are applicable.
The motor rotates faster than the frequency reference at low speed.	Set *E1-09 > 0 [Minimum Output Frequency]*. **Note:** • The recommended setting for *E1-09* is 0.5 Hz. • When frequency reference < *E1-09*, the drive output will turn OFF.
PID control is enabled.	If PID control is not necessary, set *b5-01 = 0 [PID Mode Setting = Disabled]*. **Note:** When PID control is enabled, the drive adjusts the output frequency as specified by the target value. The drive will only accelerate to the maximum output frequency set in *E1-04 [Maximum Output Frequency]* while PID control is active.

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

Causes	Possible Solutions
Parameter *E5-01 [PM Motor Code Selection]* is set incorrectly.	Refer to “Motor Performance Fine-Tuning” in the technical manual.
The drive is operating the motor at more than the specified speed control range.	Examine the speed control range and adjust the speed.
The motor is hunting.	Adjust these parameters to have the largest effect: • *n8-55 [Motor to Load Inertia Ratio]* • *n8-45 [Speed Feedback Detection Gain]* • *C4-02 [Torque Compensation Delay Time]*
Hunting occurs at start.	Increase the value set in *C2-01 [S-Curve Time @ Start of Accel]*.
Too much current is flowing through the drive.	Set *E5-01* correctly as specified by the motor. For special-purpose motors, enter the correct value to *E5-xx* as specified by the motor test report.

◆ 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 *L8-05 = 0 [Input Phase Loss Protect Select = Disabled]*.
The motor is hunting.	Set *n1-01 = 1 [Hunting Prevention Selection = Enabled]*.

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

Causes	Possible Solutions
The relay switching in the drive is making too much noise.	• 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.
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. • See if *H3-02, H3-10, H3-06 = B [MFAI Function Select = PID Feedback]* is set. • Make sure that the MFAI terminal settings agree with the signal inputs. • Examine the connection of the feedback signal. • Make sure that *b5-xx [PID Control]* is set correctly. **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, H3-07 [Terminal A1, A2, A3 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]*, *d2-01 [Frequency Reference Upper Limit]*, and *Y1-40 [Maximum Speed]* to the best values for the application. **Note:** This calculation supplies the upper value for the output frequency: The smaller of *E1-04* × *d2-01* / 100 or *Y1-40*.
A large load triggered Stall Prevention function during acceleration.	• Decrease the load. • Adjust *L3-02 [Stall Prevent Level during Accel]*.
L3-01 = 3 [Stall Prevention during Accel = Current Limit Method] has been set.	1. Make sure that the V/f pattern and motor parameter settings are appropriate, and set them correctly. 2. If this does not solve the problem, and it is not necessary to limit the current level of stall during acceleration, adjust *L3-02*. 3. 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]* ≤ Motor Speed < *E1-09 [Minimum Output Frequency]*	Set *E1-09* < *b2-01*.

◆ The Motor Is Making an Audible Noise

Causes	Possible Solutions
100% of the rated output current of the drive was exceeded while operating at low speeds.	• If the sound is coming from the motor, set *L8-38 = 0 [Carrier Frequency Reduction = Disabled]*. • If *oL2 [Drive Overloaded]* occurs frequently after setting *L8-38 = 0*, replace the drive with a high-capacity drive.

◆ The Motor Will Not Restart after a Loss of Power

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

3

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 Methods

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

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

Note:

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

3.3 Parameter Groups

Represents the type of product parameters.

Parameters	Name
A1	Initialization
A2	User Parameters
b1	Operation Mode Selection
b2	DC Injection Braking and Short Circuit Braking
b3	Speed Search
b4	Timer Function
b5	PID Control
b6	Dwell Function
b8	Energy Saving
C1	Accel & Decel Time
C2	S-Curve Characteristics
C3	Slip Compensation
C4	Torque Compensation
C5	Auto Speed Regulator (ASR)
C6	Carrier Frequency
d1	Frequency Reference
d2	Reference Limits
d3	Jump Frequency
d4	Frequency Ref Up/Down & Hold
d6	Field Weakening
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
F2	Analog Input Option
F3	Digital Input Option
F4	Analog Output Option
F5	Digital Output Option
F6	Communication Options
F7	Ethernet Options
H1	Digital Inputs
H2	Digital Outputs
H3	Analog Inputs
H4	Analog Outputs
H5	Modbus Communication
H6	Pulse Train Input
H7	Virtual Inputs / Outputs

Parameters	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
L9	Drive Protection 2
n1	Hunting Prevention
n3	High Slip/Overexcite Braking
n7	EZ Drive
n8	PM Motor Control Tuning
o1	Keypad Display
o2	Keypad Operation
o3	Copy Keypad Function
o4	Maintenance Monitors
o5	Log Function
Q	DriveWorksEZ Parameters
R	DWEZ Connection 1-20
S2	Sequence Run Timers
S3	PI2 Control
S6	Protection
U1	Operation Status Monitors
U2	Fault Trace
U3	Fault History
U4	Maintenance Monitors
U5	PID Monitors
U6	Operation Status Monitors
U8	DriveWorksEZ Monitors
UA	Multiplex
Y1	Application Basics
Y2	PID Sleep and Protection
Y3	Contactor Multiplex
Y4	Application Advanced
Y5	HAND/OFF/AUTO Operation
Y6	Flow Meter Setup
Y7	Anti-Jam
Y8	De-Scale/De-Rag

Parameters	Name
Y9	Network Multiplex Options
YA	Preset Setpoint
YC	Foldback Features

Parameters	Name
Yd	Water Level Control
YE	Suction Pressure Control
YF	PI Auxiliary Control

3.4 A: Initialization Parameters

◆ A1: Initialization

No. (Hex.)	Name	Description	Default (Range)
A1-00 (0100) RUN	Language Selection	V/f OLV/PM EZOLV Sets the language for the LCD keypad. **Note:** When you use *A1-03 [Initialize Parameters]* to initialize the drive, the drive will not reset this parameter. 0 : English 3 : French 5 : Spanish 6 : Portuguese	0 (0, 3, 5, 6)
A1-01 (0101) RUN	Access Level Selection	V/f OLV/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 4 : Lock Parameters	2 (0 - 4)
A1-02 (0102)	Control Method Selection	V/f OLV/PM EZOLV Sets the control method for the drive application and the motor. 0 : V/f Control 5 : PM Open Loop Vector 8 : EZ Vector Control	0 (0 - 8)
A1-03 (0103)	Initialize Parameters	V/f OLV/PM EZOLV Sets parameters to default values. 0 : No Initialization 1110 : User Initialization 2220 : 2-Wire Initialization 3330 : 3-Wire Initialization 6008 : Pressure Control 6009 : Pump Down Level Control 6011 : Vertical Turbine Pressure Ctl 6012 : Pivot Panel Vert. Turbine Ctl 6013 : Advanced Pressure Control 6014 : Pivot Panel Submersible 6015 : Pivot Panel Pump Command 6016 : Pivot Panel Sub. Pump Command 7005 : Serial Comms External HOA 7006 : Serial Comms HOA Keys 7770 : General Purpose 7771 : Sub. Pump General Purpose **Note:** • Selections 6009, 6011, 6012, 6013, 6014, 6015, 6016, 7005, 7006 and 7771 are available only when *A1-02 = 0 [Control Method = V/f Control]*. After you initialize the drive, the drive automatically sets *A1-03 = 0*. • User Parameters can save the parameter values for your application and use these values as default values for drive initialization. • To use the 2 motor switchover function, first turn OFF the terminal to which *H1-xx = 16 [MFDI Function Selection = Motor 2 Selection]* is set, then change the *A1-03* setting. An incorrect procedure will trigger *oPE08 [Parameter Selection Error]*.	0 (0 - 7771)
A1-04 (0104)	Password	V/f OLV/PM EZOLV Entry point for the password set in *A1-05 [Password Setting]*. 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/PM EZOLV Set the password to lock parameters and prevent changes to parameter settings. Enter the correct password in *A1-04 [Password]* to unlock parameters and accept changes.	0000 (0000 - 9999)

No. (Hex.)	Name	Description	Default (Range)
A1-06 (0127)	Application Preset	V/f OLV/PM EZOLV Sets the drive to operate in selected application conditions. **Note:** You cannot set this parameter. This parameter functions as a monitor only. 0 : Pressure Control 1 : General Purpose 2 : Sub. Pump General Purpose 3 : Pivot Panel Pump Command 4 : Pivot Panel Sub. Pump Command 5 : Serial Comms External HOA 6 : Serial Comms HOA Keys 8 : Pressure Control 9 : Pump Down Level Control 11 : Vertical Turbine Pressure Ctl 12 : Pivot Panel Vert. Turbine Ctl 13 : Advanced Pressure Control 14 : Pivot Panel Submersible	0 (0 - 14)
A1-07 (0128) Expert	DriveWorksEZ Function Selection	V/f OLV/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. 0 : DWEZ Disabled 1 : DWEZ Enabled 2 : Enabled/Disabled wDigital Input **Note:** • When DWEZ is enabled *[A1-07 ≠ 0]*, the FWD or REV display at the top of the keypad screen will flash. • When DWEZ is enabled *[A1-07 ≠ 0]*, the drive saves *Qx-xx [DriveWorksEZ Parameters]* to *A2-17 to A2-32*.	0 (0 - 2)
A1-11 (111D) Expert	Firmware Update Lock	V/f OLV/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/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 (0106)	User Parameter 1	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 1 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*.	A1-02 (Determined by A1-01, A1-02)
A2-02 (0107)	User Parameter 2	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 2 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*.	b1-01 (Determined by A1-01, A1-02)
A2-03 (0108)	User Parameter 3	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 3 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*.	b1-02 (Determined by A1-01, A1-02)
A2-04 (0109)	User Parameter 4	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 4 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*.	b1-03 (Determined by A1-01, A1-02)
A2-05 (010A)	User Parameter 5	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 5 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*.	C1-01 (Determined by A1-01, A1-02)
A2-06 (010B)	User Parameter 6	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 6 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*.	C1-02 (Determined by A1-01, A1-02)

No. (Hex.)	Name	Description	Default (Range)
A2-07 (010C)	User Parameter 7	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 7 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*.	C6-02 (Determined by A1-01, A1-02)
A2-08 (010D)	User Parameter 8	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 8 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*.	d1-01 (Determined by A1-01, A1-02)
A2-09 (010E)	User Parameter 9	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 9 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*.	d1-02 (Determined by A1-01, A1-02)
A2-10 (010F)	User Parameter 10	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 10 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*.	d1-03 (Determined by A1-01, A1-02)
A2-11 (0110)	User Parameter 11	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 11 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*.	d1-04 (Determined by A1-01, A1-02)
A2-12 (0111)	User Parameter 12	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 12 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*.	d1-17 (Determined by A1-01, A1-02)
A2-13 (0112)	User Parameter 13	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 13 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*.	E1-01 (Determined by A1-01, A1-02)
A2-14 (0113)	User Parameter 14	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 14 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*.	E1-03 (Determined by A1-01, A1-02)
A2-15 (0114)	User Parameter 15	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 15 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*.	E1-04 (Determined by A1-01, A1-02)
A2-16 (0115)	User Parameter 16	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 16 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*.	E1-05 (Determined by A1-01, A1-02)
A2-17 (0116)	User Parameter 17	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 17 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*. You can set *A2-17* to *A2-32* when *A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required]*.	E1-06 (Determined by A1-01, A1-02)
A2-18 (0117)	User Parameter 18	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 18 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*. You can set *A2-17* to *A2-32* when *A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required]*.	E1-09 (Determined by A1-01, A1-02)
A2-19 (0118)	User Parameter 19	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 19 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*. You can set *A2-17* to *A2-32* when *A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required]*.	E1-13 (Determined by A1-01, A1-02)
A2-20 (0119)	User Parameter 20	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 20 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*. You can set *A2-17* to *A2-32* when *A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required]*.	E2-01 (Determined by A1-01, A1-02)
A2-21 (011A)	User Parameter 21	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 21 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*. You can set *A2-17* to *A2-32* when *A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required]*.	E2-04 (Determined by A1-01, A1-02)
A2-22 (011B)	User Parameter 22	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 22 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*. You can set *A2-17* to *A2-32* when *A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required]*.	E2-11 (Determined by A1-01, A1-02)

No. (Hex.)	Name	Description	Default (Range)
A2-23 (011C)	User Parameter 23	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 23 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*. You can set *A2-17* to *A2-32* when *A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required]*.	H4-02 (Determined by A1-01, A1-02)
A2-24 (011D)	User Parameter 24	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 24 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*. You can set *A2-17* to *A2-32* when *A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required]*.	L1-01 (Determined by A1-01, A1-02)
A2-25 (011E)	User Parameter 25	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 25 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*. You can set *A2-17* to *A2-32* when *A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required]*.	L3-04 (Determined by A1-01, A1-02)
A2-26 (011F)	User Parameter 26	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 26 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*. You can set *A2-17* to *A2-32* when *A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required]*.	- (Determined by A1-01, A1-02)
A2-27 (0120)	User Parameter 27	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 27 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*. You can set *A2-17* to *A2-32* when *A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required]*.	- (Determined by A1-01, A1-02)
A2-28 (0121)	User Parameter 28	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 28 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*. You can set *A2-17* to *A2-32* when *A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required]*.	- (Determined by A1-01, A1-02)
A2-29 (0122)	User Parameter 29	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 29 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*. You can set *A2-17* to *A2-32* when *A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required]*.	- (Determined by A1-01, A1-02)
A2-30 (0123)	User Parameter 30	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 30 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*. You can set *A2-17* to *A2-32* when *A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required]*.	- (Determined by A1-01, A1-02)
A2-31 (0124)	User Parameter 31	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 31 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*. You can set *A2-17* to *A2-32* when *A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required]*.	- (Determined by A1-01, A1-02)
A2-32 (0125)	User Parameter 32	V/f OLV/PM EZOLV Sets the parameter number to be shown for number 32 of the [User Custom Parameters] under the main menu. You can select a maximum of 32 parameters for the drive and set them to parameters *A2-01* to *A2-32*. You can set *A2-17* to *A2-32* when *A2-33 = 0 [User Parameter Auto Selection = Disabled: Manual Entry Required]*.	- (Determined by A1-01, A1-02)
A2-33 (0126)	User Parameter Auto Selection	V/f OLV/PM EZOLV Sets the automatic save feature for changes to parameters *A2-17 to A2-32 [User Parameters 17 to 32]*. 0 : Disabled: Manual Entry Required 1 : Enabled: Auto Save Recent Parms	0 (0, 1)

3.5 b: Application

◆ b1: Operation Mode Selection

No. (Hex.)	Name	Description	Default (Range)
b1-01 (0180)	Frequency Reference Selection 1	V/f OLV/PM EZOLV Sets the input method for the frequency reference. 0 : Keypad 1 : Analog Input 2 : Memobus/Modbus Communications 3 : Option PCB 4 : Pulse Train Input	0 (0 - 4)
b1-02 (0181)	Run Command Selection 1	V/f OLV/PM EZOLV Sets the input method for the Run command. 0 : Keypad 1 : Digital Input 2 : Serial Communications 3 : Option PCB 7 : AUTO Command + Term Run 8 : AUTO Command + Serial Run 9 : AUTO Command + Option Run	0 (0 - 9)
b1-03 (0182)	Stopping Method Selection	V/f OLV/PM EZOLV Sets the method to stop the motor after removing a Run command or entering a Stop command. 0 : Ramp to Stop 1 : Coast to Stop 2 : DC Injection Braking to Stop 3 : Coast to Stop with Timer **Note:** When *A1-02 = 5 or 8 [Control Method Selection = OLV/PM or EZOLV]*, the setting range is 0, 1, 3.	1 (0 - 3)
b1-04 (0183)	Reverse Operation Selection	V/f OLV/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	1 (0, 1)
b1-08 (0187)	Run Command Select in PRG Mode	V/f OLV/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 : Disregards Existing RUN Command 1 : Accept RUN while Programming 2 : Allow Programming Only at Stop	0 (0 - 2)
b1-11 (01DF)	Run Delay @ Stop (Backspin)	V/f OLV/PM EZOLV Sets the amount of time that the drive will not accept the Run command again after the Run command is removed. **Note:** • This parameter will operate when the drive goes to sleep then wakes up. • The time set in this parameter does not apply for faults or Auto-Restarts. • When there is an active Run command while the time set in *b1-11* is active, the keypad will show a *[Start Delay: b1-11 Timer Active]* message.	0.0 s (0.0 - 6000.0 s)
b1-12 (01E0)	Run Delay Memory Selection	V/f OLV/PM EZOLV Sets how the drive saves Run Delay Timer to the EEPROM during power loss. 0 : Disabled 1 : Only at Stop 2 : Running & Stop	2 (0 - 2)
b1-14 (01C3)	Phase Order Selection	V/f OLV/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. **Note:** When you use *A1-03 [Initialize Parameters]* to initialize the drive, the drive will not reset this parameter. 0 : Standard 1 : Switch Phase Order	0 (0, 1)

No. (Hex.)	Name	Description	Default (Range)
b1-15 (01C4)	Frequency Reference Selection 2	V/f OLV/PM EZOLV Sets the input method for the frequency reference. 0 : Keypad 1 : Analog Input 2 : Memobus/Modbus Communications 3 : Option PCB 4 : Pulse Train Input	0 (0 - 4)
b1-16 (01C5)	Run Command Selection 2	V/f OLV/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 : Serial Communications 3 : Option PCB 7 : AUTO Command + Term Run 8 : AUTO Command + Serial Run 9 : AUTO Command + Option Run	0 (0 - 9)
b1-17 (01C6)	Run Command at Power Up	V/f OLV/PM EZOLV Sets drive response when the CPU changes from de-energized to energized and there is an active Run command. Set this parameter in applications where energizing or de-energizing the drive enables the Run command. When the CPU stays energized during loss of power, *L2-01 [Power Loss Ride Through Select]* sets operation. 0 : Disregard Existing RUN Command 1 : Accept Existing RUN Command	1 (0, 1)
b1-40 (3BCF)	Deceleration Abort Time	V/f OLV/PM EZOLV Sets the maximum time until the drive shuts off the output to decelerate to stop. **Note:** Set this parameter to 0.0 s to disable this function.	0.0 s (0.0 - 6000.0 s)

◆ b2: DC Injection Braking and Short Circuit Braking

No. (Hex.)	Name	Description	Default (Range)
b2-01 (0189)	DC Injection/Zero SpeedThreshold	V/f OLV/PM EZOLV Sets the frequency to start DC Injection Braking or Short Circuit Braking near the end of a stop ramp. **Note:** This parameter is available when *b1-03 = 0 [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/PM EZOLV Sets the DC Injection Braking current as a percentage of the drive rated current.	50% (0 - 100%)
b2-03 (018B)	DC Inject Braking Time at Start	V/f OLV/PM EZOLV Sets the DC Injection Braking Time at start.	0.00 s (0.00 - 10.00 s)
b2-04 (018C)	DC Inject Braking Time at Stop	V/f OLV/PM EZOLV Sets the DC Injection Braking Time at stop.	Determined by A1-02 (0.00 - 10.00 s)
b2-09 (01E1)	Pre-heat Current 2	V/f OLV/PM EZOLV Sets the percentage of motor rated output current used with MFDI *H1-xx = 50 [MFDI Function Selection = Motor Pre-heat 2]* for the motor pre-heat function.	5% (0 - 100%)
b2-12 (01BA)	Short Circuit Brake Time @ Start	V/f OLV/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/PM EZOLV Sets the Short Circuit Braking time at stop.	Determined by A1-02 (0.00 - 25.50 s)
b2-18 (0177)	Short Circuit Braking Current	V/f OLV/PM EZOLV Sets the Short Circuit Braking Current as a percentage of the motor rated current. **Note:** Parameter *A1-02 [Control Method Selection]* selects which parameter is the motor rated current. • *A1-02 = 5 [OLV/PM]*: *E5-03 [PM Motor Rated Current (FLA)]* • *A1-02 = 8 [EZOLV]*: *E9-06 [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/PM EZOLV Sets the drive to do a Speed Search each time the drive receives a Run command. 0 : Disabled 1 : Enabled	0 (0, 1)
b3-02 (0192)	SpeedSearch Deactivation Current	V/f OLV/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.	120% (0 - 200%)
b3-03 (0193)	Speed Search Deceleration Time	V/f OLV/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/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/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/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/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/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/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 ≠ 5 20.0 when A1-02 = 5 (0.0 - 1000.0 ms)
b3-10 (019A) Expert	Speed Estimation Detection Gain	V/f OLV/PM EZOLV Sets the gain to correct estimated frequencies from Speed Estimation Speed Search. **Note:** When *A1-02 = 8 [Control Method Selection = EZOLV]*, the default setting is 1.00 and the setting range is 1.00 - 1.10.	1.05 (1.00 - 1.20)
b3-11 (019B) Expert	Spd Est Method Switch-over Level	V/f OLV/PM EZOLV Uses the quantity of voltage in the motor to automatically switch the search method within the type of speed measurement. **Note:** • 208 V class at 100% = 200 V • 480 V class at 100% = 400 V	5.0% (0.5 - 100.0%)
b3-12 (019C) Expert	Speed Search Current Deadband	V/f OLV/PM EZOLV Sets the minimum current detection level during Speed Search. If the drive does not do Speed Estimation, increase this setting in 0.1-unit increments.	determined by o2-04 (2.0 - 10.0)

No. (Hex.)	Name	Description	Default (Range)
b3-14 (019E)	Bi-directional Speed Search	V/f OLV/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 **Note:** • The initial value of *b3-14* is different for different *A1-02 [Control Method Selection]* settings when you set these parameters: –*A1-02 = 0, 8 [Control Method Selection = V/f, EZOLV]* –*E9-01 = 0 [Motor Type Selection = Induction (IM)]* –*b3-24 = 1 [Speed Search Method Selection = Speed Estimation Speed Search]* • The initial value of *b3-14* is 0 when you set these parameters: –*A1-02 = 0, 8* –*E9-01 = 0* –*b3-24 = 2 [Current Detection 2]* • The initial value of *b3-14* is different for different *A1-02 [Control Method Selection]* settings when you set these parameters: –*A1-02 = 8 [EZOLV]* –*E9-01 = 1, 2 [Permanent Magnet (PM), Synchronous Reluctance (SynRM)]* • When you change *A1-02*, *b3-24*, and *E9-01*, also set *b3-14*.	Determined by A1-02, b3-24, and E9-01 (0, 1)
b3-17 (01F0) Expert	Speed Est Retry Current Level	V/f OLV/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%.	110% (0 - 200%)
b3-18 (01F1) Expert	Speed Est Retry Detection Time	V/f OLV/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/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/PM EZOLV Sets the Speed Search method when you start the motor or when you return power after a momentary power loss. **Note:** • The default setting is different for different control methods. –*A1-02 = 0 [Control Method Selection = V/f]*: 2 –*A1-02 = 8 [EZOLV]* and *E9-01 = 0 [Motor Type Selection = Induction (IM)]*: 2 –*A1-02 = 8* and *E9-01 ≠ 0*: 1 • When *A1-02 = 8* and *E9-01 = 1, 2*, set *b3-24 = 1*. If *b3-24 = 2*, the drive will detect *oPE08 [Parameter Selection Error]*. 1 : Speed Estimation 2 : Current Detection 2	Determined by A1-02 (1, 2)
b3-25 (01C8) Expert	Speed Search Wait Time	V/f OLV/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/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)
b3-27 (01C9) Expert	Speed Search RUN/BB Priority	V/f OLV/PM EZOLV Sets the conditions necessary to start Speed Search. 0 : SS Only if RUN Applied Before BB 1 : SS Regardless of RUN/BB Sequence	0 (0, 1)
b3-29 (077C) Expert	Speed Search Back-EMF Threshold	V/f OLV/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%)
b3-31 (0BC0) Expert	Spd Search Current Reference Lvl	V/f OLV/PM 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/PM EZOLV Sets the current level that completes Speed Search.	1.20 (0.00 - 1.49)
b3-39 (1B8F) Expert	Regen Judgment Lv of Spd Search	V/f OLV/PM EZOLV Sets the level to determine the regenerative state during speed search. Usually it is not necessary to change this setting.	15% (0 - 50%)

No. (Hex.)	Name	Description	Default (Range)
b3-54 (3123)	Search Time	V/f OLV/PM EZOLV Sets the length of time that the drive will run Speed Search.	400 ms (10 - 2000 ms)
b3-55 (3124) Expert	Current Increment Time	V/f OLV/PM EZOLV Sets the length of time that the drive will increase the current from zero current to the setting value of *b3-06 [Speed Estimation Current Level 1]*.	10 ms (10 - 2000 ms)
b3-56 (3126)	InverseRotationSearch WaitTime	V/f OLV/PM EZOLV Sets the wait time until the drive starts inverse rotation search after it completes forward search when you do inverse rotation search during Current Detection Speed Search.	Determined by o2-04 (0.1 - 5.0 s)

◆ b4: Timer Function

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

◆ b5: PID Control

No. (Hex.)	Name	Description	Default (Range)
b5-01 (01A5)	PID Mode Setting	V/f OLV/PM EZOLV Sets the type of PID control. 0 : Disabled 1 : Standard	1 (0, 1)
b5-02 (01A6) RUN	Proportional Gain (P)	V/f OLV/PM EZOLV Sets the proportional gain (P) that is applied to PID input. **Note:** When *Y1-24 [Level at Full Speed] > 0.0* , this parameter has no effect.	2.00 (0.00 - 25.00)
b5-03 (01A7) RUN	Integral Time (I)	V/f OLV/PM EZOLV Sets the integral time (I) that is applied to PID input.	3.0 s (0.0 - 360.0 s)
b5-04 (01A8) RUN	Integral Limit	V/f OLV/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]* When *Y1-24 [Level at Full Speed] > 0.0* , this parameter has no effect.	100.0% (0.0 - 100.0%)
b5-05 (01A9) RUN	Derivative Time (D)	V/f OLV/PM EZOLV Sets the derivative time (D) for PID control. This parameter adjusts system responsiveness.	0.00 s (0.00 - 10.00 s)

No. (Hex.)	Name	Description	Default (Range)
b5-06 (01AA) RUN	PID Output Limit	V/f OLV/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/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	PID Primary Delay Time Constant	V/f OLV/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/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/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/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)
b5-17 (01B5) RUN	PID Accel/Decel Time	V/f OLV/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)
b5-34 (019F) RUN	PID Output Lower Limit Level	V/f OLV/PM EZOLV Sets the output lower limit for the PID control 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%)
b5-35 (01A0) RUN	PID Input Limit Level	V/f OLV/PM EZOLV Sets the output upper limit for the PID control 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]*	1000.0% (0.0 - 1000.0%)
b5-39 (01FF)	PID User Unit Display Digits	V/f OLV/PM EZOLV Sets the number of digits to set and show the PID setpoint. 0 : No Decimal Places (XXXXX) 1 : One Decimal Place (XXXX.X) 2 : Two Decimal Places (XXX.XX) 3 : Three Decimal Places (XX.XXX)	1 (0 - 3)
b5-40 (017F)	Frequency Reference Monitor @PID	V/f OLV/PM EZOLV Sets the contents for monitor *U1-01 [Frequency Reference]* in PID control. 0 : U1-01 Includes PID Output 1 : U1-01 Excludes PID Output	0 (0, 1)

No. (Hex.)	Name	Description	Default (Range)
b5-41 (0160)	PID Output 2 Unit	V/f OLV/PM EZOLV Sets the display units in *U5-14 [PID Out2 Upper 4]* and *U5-15 [PID Out2 Lower 4]*. 0 : "WC: inches of water column 1 : PSI: pounds per square inch 2 : GPM: gallons/min 3 : °F: Fahrenheit 4 : ft³/min: cubic feet/min 5 : m³/h: cubic meters/hour 6 : L/h: liters/hour 7 : L/s: liters/sec 8 : bar: bar 9 : Pa: Pascal 10 : °C: Celsius 11 : m: meters 12 : ft: feet 13 : L/min: liters/min 14 : m³/min: cubic meters/min 15 : "Hg: Inch Mercury 16 : kPa: kilopascal 25 : Flow (Use Y6-04) 48 : %: Percent 49 : Custom(Y1-32~34) 50 : None	50 (0 - 50)
b5-42 (0161) RUN	PID Output 2 Calc Mode	V/f OLV/PM EZOLV Sets how to calculate the original PID output. 0 : Linear 1 : Square Root 2 : Quadratic 3 : Cubic **Note:** Used for *U5-14 [PID Out2 Upper 4]* and *U5-15 [PID Out2 Lower 4]* only.	0 (0 - 3)
b5-43 (0162) RUN	PID Out2 Monitor MAX Upper4 Dig	V/f OLV/PM EZOLV Sets the upper 4 digits of the maximum monitor value. Used with *b5-44 [PID Out2 Monitor MAX Lower4 Dig]* to set maximum monitor value of *U5-14 [PID Out2 Upper 4]* and *U5-15 [PID Out2 Lower 4]* at maximum frequency. **Note:** Used for *U5-14 [PID Out2 Upper 4]* and *U5-15 [PID Out2 Lower 4]* only.	0 (0 - 9999)
b5-44 (0163) RUN	PID Out2 Monitor MAX Lower4 Dig	V/f OLV/PM EZOLV Sets the lower 4 digits of the maximum monitor value. Used with *b5-43 [PID Out2 Monitor MAX Upper4 Dig]* to set maximum monitor value of *U5-14 [PID Out2 Upper 4]* and *U5-15 [PID Out2 Lower 4]* at maximum frequency. **Note:** Used for *U5-14 [PID Out2 Upper 4]* and *U5-15 [PID Out2 Lower 4]* only.	0.00 (0.00 - 99.99)
b5-45 (0164) RUN	PID Out2 Monitor MIN for Linear	V/f OLV/PM EZOLV Sets the minimum display value to show when at zero speed. Only effective when *b5-42 = 0 [PID Output 2 Calc Mode = Linear]*. **Note:** Used for *U5-14 [PID Out2 Upper 4]* and *U5-15 [PID Out2 Lower 4]* only.	0.0 (0.0 - 999.9)
b5-53 (0B8F) RUN	PID Integrator Ramp Limit	V/f OLV/PM EZOLV Sets the responsiveness of PID control when the PID feedback changes quickly.	0.0 Hz (0.0 - 10.0 Hz)
b5-71 (3C22)	Min PID Transducer Scaling	V/f OLV/PM EZOLV Sets the minimum PID level corresponding to the lowest analog input signal level. **Note:** • To enable this parameter, you must set *b5-71 < Y1-03 [PID User Unit Display Scaling]*. If you set *b5-71 > Y1-03*, the drive will disable all PID analog inputs. • Parameters *Y1-02 [PID Unit Display Selection]*, *Y1-03*, and *b5-39 [PID User Unit Display Digits]* set the unit, scaling, and resolution.	0.00 (-99.99 - +99.99)
b5-82 (31B0)	Feedback Loss 4 ~ 20mA Detect Sel	V/f OLV/PM EZOLV Sets the drive to do a 4 to 20 mA wire-break detection on the analog input set for PID feedback. 0 : Disabled 1 : Alarm Only 2 : Fault 3 : Run At b5-83	2 (0 - 3)

No. (Hex.)	Name	Description	Default (Range)
b5-83 (31B1) RUN	Feedback Loss GoTo Frequency	V/f OLV/PM EZOLV Sets the speed at which the drive will run if the drive detects a 4 to 20 mA wire-break on the PID Feedback and *b5-82 = 3 [Feedback Loss 4 ~ 20mA Detect Sel = Run At b5-83]*. **Note:** When *A1-02 = 8 [Control Method Selection = EZ Vector Control]*, the range is 0.0 to 120.0 Hz.	0.0 Hz (0.0 - 400.0 Hz)
b5-84 (31B2) RUN	Feedback Loss Loss Of Prime Lvl	V/f OLV/PM EZOLV Sets the level at which the drive will detect Loss of Prime in the pump. **Note:** • Loss of Prime condition occurs when the measured quantity set by *Y1-18 [Prime Loss Detection Method]* decreases to this level for the time set in *Y1-20 [Loss of Prime Time]* and the output frequency is at the *Y4-02 [Pre-Charge Frequency]* level. • The drive will respond to the Loss of Prime condition as specified by *Y1-22 [Loss of Prime Selection]*. • Display unit and scaling are dependent on System Units.	0.0 A (0.0 - 1000.0 A)
b5-85 (31B3) RUN	Feedback Loss GoTo Freq Timeout	V/f OLV/PM EZOLV When *b5-82 = 3 [Feedback Loss 4 ~ 20mA Detect Sel = Run At b5-83]* and the Feedback signal is lost, the drive will run at the *b5-83 [Feedback Loss Goto Frequency]* speed for this length of time, after which the drive will fault on *FDBKL [WIRE Break]*. **Note:** Set this parameter to 0 s to disable the function.	0 s (0 - 6000 s)
b5-86 (31B4) RUN	Feedback Loss Start Delay	V/f OLV/PM EZOLV When you initiate a Run command, the drive will wait for this length of time before it will fault on *FDBKL [WIRE Break]* or use parameter *b5-83 [Feedback Loss Goto Frequency]*.	0.0 s (0.0 - 120.0 s)

◆ b6: Dwell Function

No. (Hex.)	Name	Description	Default (Range)
b6-01 (01B6)	Dwell Reference at Start	V/f OLV/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/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/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/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/PM EZOLV Sets the Energy-saving control function. 0 : Disabled 1 : Enabled	0 (0, 1)
b8-04 (01CF) Expert	Energy Saving Coefficient Value	V/f OLV/PM EZOLV Sets the Energy-saving control coefficient to maintain maximum motor efficiency. The default setting is for Yaskawa motors. **Note:** • When you do Rotational Auto-Tuning, the drive will automatically set the energy-saving coefficient. • The minimum values and the maximum values are different for different drive models. –2011 to 2024, 4005 and 4008: 0.0 - 2000.0 –2031 to 2396, 4011 to 4720: 0.00 - 655.00	Determined by E2-11 and o2-04 (0.00 - 655.00)
b8-05 (01D0) Expert	Power Detection Filter Time	V/f OLV/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/PM EZOLV Sets the voltage limit for Search Operation as a percentage of the motor rated voltage.	0% (0 - 100%)

No. (Hex.)	Name	Description	Default (Range)
b8-19 (0B40) Expert	E-Save Search Frequency	V/f OLV/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/PM EZOLV Sets the amplitude of Energy-saving control search operations.	1.0 degrees (0.1 - 5.0 degrees)
b8-28 (0B8B) Expert	Over Excitation Action Selection	V/f OLV/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/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/PM EZOLV Sets the length of time to accelerate from zero to maximum output frequency. **Note:** When *C1-10 = 0 [Accel/Decel Time Setting Units = 0.01 s (0.00 to 600.00 s)]*, the setting range is 0.00 to 600.00 s.	20.0 s (0.0 - 6000.0 s)
C1-02 (0201) RUN	Deceleration Time 1	V/f OLV/PM EZOLV Sets the length of time to decelerate from maximum output frequency to zero. **Note:** When *C1-10 = 0 [Accel/Decel Time Setting Units = 0.01 s (0.00 to 600.00 s)]*, the setting range is 0.00 to 600.00 s.	10.0 s (0.0 - 6000.0 s)
C1-03 (0202) RUN	Acceleration Time 2	V/f OLV/PM EZOLV Sets the length of time to accelerate from zero to maximum output frequency. **Note:** When *C1-10 = 0 [Accel/Decel Time Setting Units = 0.01 s (0.00 to 600.00 s)]*, the setting range is 0.00 to 600.00 s.	10.0 s (0.0 - 6000.0 s)
C1-04 (0203) RUN	Deceleration Time 2	V/f OLV/PM EZOLV Sets the length of time to decelerate from maximum output frequency to zero. **Note:** When *C1-10 = 0 [Accel/Decel Time Setting Units = 0.01 s (0.00 to 600.00 s)]*, the setting range is 0.00 to 600.00 s.	10.0 s (0.0 - 6000.0 s)
C1-05 (0204) RUN	Acceleration Time 3	V/f OLV/PM EZOLV Sets the length of time to accelerate from zero to maximum output frequency. **Note:** • Set *A1-02 = 0 [Control Method Selection = V/f Control]* and *H1-xx =16 [MFDI Function Selection = Motor 2 Selection]* to enable this parameter. • When *C1-10 = 0 [Accel/Decel Time Setting Units = 0.01 s (0.00 to 600.00 s)]*, the setting range is 0.00 to 600.00 s.	10.0 s (0.0 - 6000.0 s)
C1-06 (0205) RUN	Deceleration Time 3	V/f OLV/PM EZOLV Sets the length of time to decelerate from maximum output frequency to zero. **Note:** • Set *A1-02 = 0 [Control Method Selection = V/f Control]* and *H1-xx =16 [MFDI Function Selection = Motor 2 Selection]* to enable this parameter. • When *C1-10 = 0 [Accel/Decel Time Setting Units = 0.01 s (0.00 to 600.00 s)]*, the setting range is 0.00 to 600.00 s.	10.0 s (0.0 - 6000.0 s)
C1-07 (0206) RUN	Acceleration Time 4	V/f OLV/PM EZOLV Sets the length of time to accelerate from zero to maximum output frequency. **Note:** When *C1-10 = 0 [Accel/Decel Time Setting Units = 0.01 s (0.00 to 600.00 s)]*, the setting range is 0.00 to 600.00 s.	10.0 s (0.0 - 6000.0 s)
C1-08 (0207) RUN	Deceleration Time 4	V/f OLV/PM EZOLV Sets the length of time to decelerate from maximum output frequency to zero. **Note:** When *C1-10 = 0 [Accel/Decel Time Setting Units = 0.01 s (0.00 to 600.00 s)]*, the setting range is 0.00 to 600.00 s.	10.0 s (0.0 - 6000.0 s)
C1-09 (0208) RUN	Fast Stop Time	V/f OLV/PM EZOLV Sets the length of time that the drive will decelerate to zero for a Fast Stop. **Note:** If you decelerate the drive too quickly, the drive will detect an *ov [Overvoltage]* fault and shut off the output, and the motor will coast to stop. To prevent motor coasting and stop the motor quickly and safely, make sure to set a Fast Stop time in *C1-09*.	10.0 s (0.0 - 6000.0 s)
C1-10 (0209)	Accel/Decel Time Setting Units	V/f OLV/PM EZOLV Sets the setting units for *C1-01 to C1-08 [Accel/Decel Times 1 to 4]*, *C1-09 [Fast Stop Time]*, *L2-06 [Kinetic Energy Backup Decel Time]*, and *L2-07 [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/PM EZOLV Sets the frequency at which the drive will automatically change acceleration and deceleration times.	Determined by A1-02 (0.0 - 400.0 Hz)

◆ C2: S-Curve Characteristics

No. (Hex.)	Name	Description	Default (Range)
C2-01 (020B)	S-Curve Time @ Start of Accel	V/f OLV/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/PM EZOLV Sets the S-curve acceleration time at completion.	0.20 s (0.00 - 10.00 s)
C2-03 (020D)	S-Curve Time @ Start of Decel	V/f OLV/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/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 Expert	Slip Compensation Gain	V/f OLV/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 you change the slip compensation gain: • *E2-01 [Motor Rated Current (FLA)]* • *E2-02 [Motor Rated Slip]* • *E2-03 [Motor No-Load Current]*	0.0 (0.0 - 2.5)
C3-02 (0210) RUN Expert	Slip Compensation Delay Time	V/f OLV/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) Expert	Slip Compensation Limit	V/f OLV/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) Expert	Slip Compensation at Regen	V/f OLV/PM EZOLV Sets the slip compensation function during regenerative operation. 0 : Disabled 1 : Enabled Above 6Hz 2 : Enabled Above Defined Range	0 (0 - 2)
C3-21 (033E) RUN Expert	Motor 2 Slip Compensation Gain	V/f OLV/PM EZOLV Sets the gain for the motor 2 slip compensation function. Usually it is not necessary to change this setting. **Note:** • Set *A1-02 = 0 [Control Method Selection = V/f Control]* and *H1-xx = 16 [MFDI Function Selection = Motor 2 Selection]* to enable this parameter. • Correctly set these parameters before you change the slip compensation gain: –*E4-01 [Motor 2 Rated Current]* –*E4-02 [Motor 2 Rated Slip]* –*E4-03 [Motor 2 Rated No-Load Current]*	0.0 (0.0 - 2.5)
C3-22 (0241) RUN Expert	Motor 2 Slip Comp Delay Time	V/f OLV/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. **Note:** Set *A1-02 = 0 [Control Method Selection = V/f Control]* and *H1-xx =16 [MFDI Function Selection = Motor 2 Selection]* to enable this parameter.	2000 (0 - 10000 ms)
C3-23 (0242) Expert	Motor 2 Slip Compensation Limit	V/f OLV/PM EZOLV Sets the upper limit for the slip compensation function as a percentage of the motor 2 rated slip. **Note:** Set *A1-02 = 0 [Control Method Selection = V/f Control]* and *H1-xx =16 [MFDI Function Selection = Motor 2 Selection]* to enable this parameter.	200% (0 - 250%)

No. (Hex.)	Name	Description	Default (Range)
C3-24 (0243) Expert	Motor 2 Slip Comp during Regen	V/f OLV/PM EZOLV Sets the slip compensation during regenerative operation function for motor 2. 0 : Disabled 1 : Enabled Above 6Hz 2 : Enabled Above Defined Range **Note:** Set *A1-02 = 0 [Control Method Selection = V/f Control]* and *H1-xx =16 [MFDI Function Selection = Motor 2 Selection]* to enable this parameter.	0 (0 - 2)
C3-29 (1B5D) RUN Expert	Slip Compensation Gain @ Low Spd	V/f OLV/PM EZOLV Sets the slip compensation gain at low speed. 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/PM EZOLV Sets the gain for the torque compensation function. Use this parameter value for motor 1 when you operate multiple motors. **Note:** If *A1-02 = 8 [Control Method Selection = EZOLV]*, you cannot change the setting while the drive is running.	Determined by A1-02 (0.00 - 2.50)
C4-02 (0216) RUN	Torque Compensation Delay Time	V/f OLV/PM EZOLV Sets the torque compensation delay time. Usually it is not necessary to change this setting. **Note:** When *A1-02 = 5, 8 [Control Method Selection = OLV/PM, EZOLV]*, you cannot change the setting while the drive is running.	Determined by A1-02 (0 - 60000 ms)
C4-07 (0341) RUN	Motor 2 Torque Compensation Gain	V/f OLV/PM EZOLV Sets the gain for motor 2 torque compensation function when you use the Motor Switch function.	1.00 (0.00 - 2.50)
C4-23 (1583) Expert	Current Control Gain	V/f OLV/PM EZOLV Sets the Current control gain. Usually it is not necessary to change this parameter.	1.00 (0.50 - 2.50)

◆ C5: Auto Speed Regulator (ASR)

No. (Hex.)	Name	Description	Default (Range)
C5-01 (021B) RUN	ASR Proportional Gain 1	V/f OLV/PM EZOLV Sets the gain to adjust ASR response.	Determined by A1-02 (0.00 - 300.00)
C5-02 (021C) RUN	ASR Integral Time 1	V/f OLV/PM EZOLV Sets the ASR integral time.	Determined by A1-02 (0.000 - 60.000 s)
C5-03 (021D) RUN	ASR Proportional Gain 2	V/f OLV/PM EZOLV Sets the gain to adjust ASR response.	Determined by A1-02 (0.00 - 300.00)
C5-04 (021E) RUN	ASR Integral Time 2	V/f OLV/PM EZOLV Sets the ASR integral time.	Determined by A1-02 (0.000 - 60.000 s)
C5-06 (0220)	ASR Delay Time	V/f OLV/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/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/PM EZOLV Set the upper limit of the ASR integral amount as a percentage of the rated load.	400% (0 - 400%)

◆ C6: Carrier Frequency

No. (Hex.)	Name	Description	Default (Range)
C6-02 (0224)	Carrier Frequency Selection	V/f OLV/PM EZOLV Sets the carrier frequency for the transistors in the drive. 1 : 2.0 kHz 2 : 5.0 kHz 3 : 8.0 kHz 4 : 10.0 kHz 5 : 12.5 kHz 7 : Swing PWM1 (Audible Sound 1) 8 : Swing PWM2 (Audible Sound 2) 9 : Swing PWM3 (Audible Sound 3) A : Swing PWM4 (Audible Sound 4) B : Leakage Current Rejection PWM F : User Defined (C6-03 to C6-05) **Note:** • The carrier frequency for Swing PWM 1 to 4 is equivalent to 2.0 kHz. Swing PWM applies a special PWM pattern to decrease the audible noise. • When *A1-02 = 5 or 8 [Control Method Selection = OLV/PM or EZOLV]*, you cannot set to *7 to A* • Setting *B* uses a PWM pattern that decreases the leakage current that the drive detects over long wiring distances. This can help decrease alarm detection and decrease problems with the current monitor from leakage current over long wiring distances.	Determined by A1-02 and o2-04 (Determined by A1-02)
C6-03 (0225)	Carrier Frequency Upper Limit	V/f OLV/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 - 12.5 kHz)
C6-04 (0226)	Carrier Frequency Lower Limit	V/f OLV/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 - 12.5 kHz)
C6-05 (0227)	Carrier Freq Proportional Gain	V/f OLV/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)

3.7 d: Reference Settings

◆ d1: Frequency Reference

No. (Hex.)	Name	Description	Default (Range)
d1-01 (0280) RUN	Reference 1	V/f OLV/PM EZOLV Sets the frequency reference in the units from *o1-03 [Frequency Display Unit Selection]*.	0.00 Hz (0.00 - 400.00 Hz)
d1-02 (0281) RUN	Reference 2	V/f OLV/PM EZOLV Sets the frequency reference in the units from *o1-03 [Frequency Display Unit Selection]*.	0.00 Hz (0.00 - 400.00 Hz)
d1-03 (0282) RUN	Reference 3	V/f OLV/PM EZOLV Sets the frequency reference in the units from *o1-03 [Frequency Display Unit Selection]*.	0.00 Hz (0.00 - 400.00 Hz)
d1-04 (0283) RUN	Reference 4	V/f OLV/PM EZOLV Sets the frequency reference in the units from *o1-03 [Frequency Display Unit Selection]*.	0.00 Hz (0.00 - 400.00 Hz)
d1-05 (0284) RUN	Reference 5	V/f OLV/PM EZOLV Sets the frequency reference in the units from *o1-03 [Frequency Display Unit Selection]*.	0.00 Hz (0.00 - 400.00 Hz)
d1-06 (0285) RUN	Reference 6	V/f OLV/PM EZOLV Sets the frequency reference in the units from *o1-03 [Frequency Display Unit Selection]*.	0.00 Hz (0.00 - 400.00 Hz)
d1-07 (0286) RUN	Reference 7	V/f OLV/PM EZOLV Sets the frequency reference in the units from *o1-03 [Frequency Display Unit Selection]*.	0.00 Hz (0.00 - 400.00 Hz)
d1-08 (0287) RUN	Reference 8	V/f OLV/PM EZOLV Sets the frequency reference in the units from *o1-03 [Frequency Display Unit Selection]*.	0.00 Hz (0.00 - 400.00 Hz)
d1-09 (0288) RUN	Reference 9	V/f OLV/PM EZOLV Sets the frequency reference in the units from *o1-03 [Frequency Display Unit Selection]*.	0.00 Hz (0.00 - 400.00 Hz)
d1-10 (028B) RUN	Reference 10	V/f OLV/PM EZOLV Sets the frequency reference in the units from *o1-03 [Frequency Display Unit Selection]*.	0.00 Hz (0.00 - 400.00 Hz)
d1-11 (028C) RUN	Reference 11	V/f OLV/PM EZOLV Sets the frequency reference in the units from *o1-03 [Frequency Display Unit Selection]*.	0.00 Hz (0.00 - 400.00 Hz)
d1-12 (028D) RUN	Reference 12	V/f OLV/PM EZOLV Sets the frequency reference in the units from *o1-03 [Frequency Display Unit Selection]*.	0.00 Hz (0.00 - 400.00 Hz)
d1-13 (028E) RUN	Reference 13	V/f OLV/PM EZOLV Sets the frequency reference in the units from *o1-03 [Frequency Display Unit Selection]*.	0.00 Hz (0.00 - 400.00 Hz)
d1-14 (028F) RUN	Reference 14	V/f OLV/PM EZOLV Sets the frequency reference in the units from *o1-03 [Frequency Display Unit Selection]*.	0.00 Hz (0.00 - 400.00 Hz)
d1-15 (0290) RUN	Reference 15	V/f OLV/PM EZOLV Sets the frequency reference in the units from *o1-03 [Frequency Display Unit Selection]*.	0.00 Hz (0.00 - 400.00 Hz)
d1-16 (0291) RUN	Reference 16	V/f OLV/PM EZOLV Sets the frequency reference in the units from *o1-03 [Frequency Display Unit Selection]*.	0.00 Hz (0.00 - 400.00 Hz)
d1-17 (0292) RUN	Jog Reference	V/f OLV/PM EZOLV Sets the Jog frequency reference in the units from *o1-03 [Frequency Display Unit Selection]*. Set *H1-xx = 6 [MFDI Function Selection = Jog Reference Selection]* to use the Jog frequency reference.	6.00 Hz (0.00 - 400.00 Hz)

◆ d2: Reference Limits

No. (Hex.)	Name	Description	Default (Range)
d2-01 (0289)	Frequency Reference Upper Limit	V/f OLV/PM EZOLV Sets maximum limit for all frequency references. The maximum output frequency is 100%. **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 [Motor Max Revolutions]*	100.0% (0.0 - 110.0%)
d2-02 (028A)	Frequency Reference Lower Limit	V/f OLV/PM EZOLV Sets minimum limit for all frequency references. The maximum output frequency is 100%. **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 [Motor Max Revolutions]*	0.0% (0.0 - 110.0%)
d2-03 (0293)	Analog Frequency Ref Lower Limit	V/f OLV/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 *A1-02 [Control Method Selection]* selects which parameter is the maximum output frequency. • *A1-02 ≠ 8*: *E1-04 [Maximum Output Frequency]* • *A1-02 = 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/PM EZOLV Sets the median value of the frequency band that the drive will avoid. **Note:** • When *A1-02 = 8 [Control Method Selection = EZ Vector Control]*, the upper limit is 120 Hz. • Set this parameter to 0.0 Hz to disable the Jump frequency.	0.0 Hz (0.0 - 400.0 Hz)
d3-02 (0295)	Jump Frequency 2	V/f OLV/PM EZOLV Sets the median value of the frequency band that the drive will avoid. **Note:** • When *A1-02 = 8 [Control Method Selection = EZ Vector Control]*, the upper limit is 120 Hz. • Set this parameter to 0.0 Hz to disable the Jump frequency.	0.0 Hz (0.0 - 400.0 Hz)
d3-03 (0296)	Jump Frequency 3	V/f OLV/PM EZOLV Sets the median value of the frequency band that the drive will avoid. **Note:** • When *A1-02 = 8 [Control Method Selection = EZ Vector Control]*, the upper limit is 120 Hz. • Set this parameter to 0.0 Hz to disable the Jump frequency.	0.0 Hz (0.0 - 400.0 Hz)
d3-04 (0297)	Jump Frequency Width	V/f OLV/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/PM EZOLV Sets the function that saves the frequency reference after a Stop command or when de-energizing the drive. Set *H1-xx [MFDI Function Selection]* to one of these values to enable this parameter: • *A [Accel/Decel Ramp Hold]* • *10/11 [Up/Down Command]* • *75/76 [Up/Down 2 Command]* 0 : Disabled 1 : Enabled	0 (0, 1)
d4-03 (02AA) RUN	Up/Down 2 Bias Step Frequency	V/f OLV/PM EZOLV Sets the bias that the Up/Down 2 function adds to or subtracts from the frequency reference.	0.00 Hz (0.00 - 99.9.9 Hz)

No. (Hex.)	Name	Description	Default (Range)
d4-04 (02AB) RUN	Up/Down 2 Ramp Selection	V/f OLV/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/PM EZOLV Sets the function that saves the bias value to the drive when you open or close the two Up/Down 2 Commands *[H1-xx = 75, 76]*. Set *d4-03 [Up/Down 2 Bias Step Frequency] = 0.00* before you set this parameter. 0 : Hold when Neither Up/Down Closed 1 : Reset when Neither / Both Closed	0 (0, 1)
d4-06 (02AD)	Up/Down 2 Bias Mode Selection	V/f OLV/PM EZOLV Saves the bias value from the Up/Down 2 Command where the maximum output frequency is 100%. **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% (-99.9 - 100.0%)
d4-07 (02AE) RUN	Analog Freq Ref Fluctuate Limit	V/f OLV/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 *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]*	1.0% (0.1 - 100.0%)
d4-08 (02AF) RUN	Up/Down 2 Bias Upper Limit	V/f OLV/PM EZOLV Sets the upper limit of the Up/Down 2 bias 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%)
d4-09 (02B0) RUN	Up/Down 2 Bias Lower Limit	V/f OLV/PM EZOLV Sets the lower limit of the Up/Down 2 bias 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% (-99.9 - 0.0%)
d4-10 (02B6)	Up/Down Freq Lower Limit Select	V/f OLV/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

No. (Hex.)	Name	Description	Default (Range)
d6-01 (02A0)	Field Weakening Level	V/f OLV/PM EZOLV Sets the drive output voltage as a percentage of *E1-05 [Maximum Output Voltage]* when *H1-xx = 63 [Field Weakening]* is activated.	80% (0 - 100%)
d6-02 (02A1)	Field Weakening Frequency Limit	V/f OLV/PM EZOLV Sets the minimum output frequency to start field weakening.	0.0 Hz (0.0 - 400.0 Hz)

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/PM EZOLV Sets the drive input voltage. **NOTICE** **Damage to Equipment** **Set *E1-01 [Input AC Supply Voltage]* to align with the drive input voltage (not motor voltage).** **If this parameter is incorrect, the protective functions of the drive will not operate correctly and it can cause damage to the drive.**	208 V Class: 240 V, 480 V Class: 480 V (208 V Class: 155 - 255 V, 480 V Class: 310 - 510 V)
E1-03 (0302)	V/f Pattern Selection	V/f OLV/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, 60Hz base, 72Hz max 4 : VT, 50Hz, 65% Vmid reduction 5 : VT, 50Hz, 50% Vmid reduction 6 : VT, 60 Hz, 65% Vmid reduction 7 : VT, 60Hz, 50% Vmid reduction 8 : High Trq, 50Hz, 25% Vmin boost 9 : High Trq, 50Hz, 65% Vmin boost A : High Trq, 60Hz, 25% Vmin boost B : High Trq, 60Hz, 65% Vmin boost C : High Freq, 60Hz base, 90Hz max D : High Freq, 60Hz base, 120Hz max E : High Freq, 60Hz base, 180Hz max F : Custom **Note:** • 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. • Parameter *A1-03 [Initialize Parameters]* will not initialize the value of *E1-03*.	F (Determined by A1-02)
E1-04 (0303)	Maximum Output Frequency	V/f OLV/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/PM EZOLV Sets the maximum output voltage for the V/f pattern.	208 V Class: 230.0 V, 480 V Class: 460.0 V (208 V Class: 0.0 - 255.0 V, 480 V Class: 0.0 - 510.0 V)
E1-06 (0305)	Base Frequency	V/f OLV/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/PM EZOLV Sets a middle output frequency for the V/f pattern.	Determined by E1-03 (0.0 - E1-04)
E1-08 (0307)	Mid Point A Voltage	V/f OLV/PM EZOLV Sets a middle output voltage for the V/f pattern.	Determined by o2-04 (208 V Class: 0.0 - 255.0 V, 480 V Class: 0.0 - 510.0 V)
E1-09 (0308)	Minimum Output Frequency	V/f OLV/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/PM EZOLV Sets the minimum output voltage for the V/f pattern.	Determined by E1-03 (208 V Class: 0.0 - 255.0 V, 480 V Class: 0.0 - 510.0 V)
E1-11 (030A) Expert	Mid Point B Frequency	V/f OLV/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/PM EZOLV Sets a middle point voltage for the V/f pattern.	0.0 V (208 V Class: 0.0 - 255.0 V, 480 V Class: 0.0 - 510.0 V)
E1-13 (030C) Expert	Base Voltage	V/f OLV/PM EZOLV Sets the base voltage for the V/f pattern.	0.0 V (208 V Class: 0.0 - 255.0 V, 480 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/PM EZOLV Sets the motor rated current in amps.	Determined by o2-04 (10% to 200% of the drive rated current)
E2-02 (030F)	Motor Rated Slip	V/f OLV/PM EZOLV Sets motor rated slip.	Determined by o2-04 (0.000 - 20.000 Hz)
E2-03 (0310)	Motor No-Load Current	V/f OLV/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 (0 to E2-01)
E2-04 (0311)	Motor Pole Count	V/f OLV/PM EZOLV Sets the number of motor poles.	2 (2 - 120)
E2-05 (0312)	Motor Line-to-Line Resistance	V/f OLV/PM EZOLV Sets the line-to-line resistance for the motor stator windings.	Determined by o2-04 (0.000 - 65.000 Ω)
E2-06 (0313)	Motor Leakage Inductance	V/f OLV/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 (0.0 - 60.0%)
E2-10 (0317)	Motor Iron Loss	V/f OLV/PM EZOLV Sets the motor iron loss.	Determined by o2-04 (0 - 65535 W)
E2-11 (0318)	Motor Rated Power	V/f OLV/PM EZOLV Sets the motor rated output in the units from *o1-58 [Motor Power Unit Selection]*.	Determined by o2-04 (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/PM EZOLV Sets the control method for motor 2. **Note:** Parameter *L1-01 [Motor Overload (oL1) Protection]* sets the protection operation of *oL1 [Motor Overload]* the same as Motor 1. 0 : V/f Control	0 (0)
E3-04 (031A)	Motor 2 Maximum Output Frequency	V/f OLV/PM EZOLV Set the maximum output frequency for the motor 2 V/f pattern.	Determined by E3-01 (40.0 - 400.0 Hz)
E3-05 (031B)	Motor 2 Maximum Output Voltage	V/f OLV/PM EZOLV Sets the maximum output voltage for the motor 2 V/f pattern.	Determined by E3-01 (208 V Class: 0.0 - 255.0 V, 480 V Class: 0.0 - 510.0 V)
E3-06 (031C)	Motor 2 Base Frequency	V/f OLV/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/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/PM EZOLV Sets a middle output voltage for the motor 2 V/f pattern.	Determined by E3-01 (208 V Class: 0.0 - 255.0 V, 480 V Class: 0.0 - 510.0 V)
E3-09 (031F)	Motor 2 Minimum Output Frequency	V/f OLV/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/PM EZOLV Sets the minimum output voltage for the motor 2 V/f pattern.	Determined by E3-01 (208 V Class: 0.0 - 255.0 V, 480 V Class

No. (Hex.)	Name	Description	Default (Range)
E3-11 (0345) Expert	Motor 2 Mid Point B Frequency	V/f OLV/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/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 (208 V Class: 0.0 - 255.0 V, 480 V Class: 0.0 - 510.0 V)
E3-13 (0347) Expert	Motor 2 Base Voltage	V/f OLV/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 (208 V Class: 0.0 - 255.0 V, 480 V Class: 0.0 - 510.0 V)

◆ E4: Motor 2 Parameters

No. (Hex.)	Name	Description	Default (Range)
E4-01 (0321)	Motor 2 Rated Current	V/f OLV/PM EZOLV Sets the motor rated current for motor 2 in amps.	Determined by o2-04 (10% to 200% of the drive rated current)
E4-02 (0322)	Motor 2 Rated Slip	V/f OLV/PM EZOLV Sets the motor rated slip for motor 2.	Determined by o2-04 (0.000 - 20.000 Hz)
E4-03 (0323)	Motor 2 Rated No-Load Current	V/f OLV/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 (Less than 0 - E4-01)
E4-04 (0324)	Motor 2 Motor Poles	V/f OLV/PM EZOLV Sets the number of poles for motor 2.	2 (2 - 120)
E4-05 (0325)	Motor 2 Line-to-Line Resistance	V/f OLV/PM EZOLV Sets the line-to-line resistance for the motor 2 stator windings.	Determined by o2-04 (0.000 - 65.000 Ω)
E4-06 (0326)	Motor 2 Leakage Inductance	V/f OLV/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 (0.0 - 60.0%)
E4-10 (0340)	Motor 2 Iron Loss	V/f OLV/PM EZOLV Sets the motor iron loss for motor 2.	Determined by o2-04 (0 - 65535 W)
E4-11 (0327)	Motor 2 Rated Power	V/f OLV/PM EZOLV Sets the motor rated power in the units from *o1-58 [Motor Power Unit Selection]*.	Determined by o2-04 (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/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/PM EZOLV Sets the PM motor rated output in the units set in *o1-58 [Motor Power Unit Selection]*.	Determined by o2-04 (0.13 - 650.00 HP)
E5-03 (032B)	PM Motor Rated Current (FLA)	V/f OLV/PM EZOLV Sets the PM motor rated current (FLA).	Determined by o2-04 (10% to 200% of the drive rated current)
E5-04 (032C)	PM Motor Pole Count	V/f OLV/PM EZOLV Sets the number of PM motor poles.	4 (2 - 120)
E5-05 (032D)	PM Motor Resistance (ohms/phase)	V/f OLV/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/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/PM EZOLV Sets the PM motor q-axis inductance.	1.00 mH (0.00 - 600.00 mH)

No. (Hex.)	Name	Description	Default (Range)
E5-09 (0331)	PM Back-EMF Vpeak (mV/(rad/s))	V/f **OLV/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/PM** EZOLV Sets the RMS value for PM motor line voltage.	0.1 mV/min^{-1} (0.0 - 6500.0 mV/min^{-1})

◆ E9: Motor Setting

No. (Hex.)	Name	Description	Default (Range)
E9-01 (11E4)	Motor Type Selection	V/f OLV/PM **EZOLV** Sets the type of motor. 0 : Induction (IM) 1 : Permanent Magnet (PM) 2 : Synchronous Reluctance (SynRM)	0 (0 - 2)
E9-02 (11E5)	Maximum Speed	V/f OLV/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/PM **EZOLV** Sets the rated rotation speed of the motor.	3600 RPM (100 - 7200 RPM)
E9-04 (11E7)	Base Frequency	V/f OLV/PM **EZOLV** Sets the rated frequency of the motor.	Determined by E9-01 (40.0 - 120.0 Hz)
E9-05 (11E8)	Base Voltage	V/f OLV/PM **EZOLV** Sets the rated voltage of the motor.	208 V Class: 230.0 V, 480 V Class: 460.0 V (208 V Class: 0.0 - 255.0 V, 480 V Class: 0.0 - 510.0 V)
E9-06 (11E9)	Motor Rated Current (FLA)	V/f OLV/PM **EZOLV** Sets the motor rated current in amps.	Determined by E9-01 and o2-04 (10% to 200% of the drive rated current)
E9-07 (11EA)	Motor Rated Power	V/f OLV/PM **EZOLV** Sets the motor rated output in the units from *o1-58 [Motor Power Unit Selection]*.	Determined by E9-02 and o2-04 (0.00 - 650.00 HP)
E9-08 (11EB)	Motor Pole Count	V/f OLV/PM **EZOLV** Sets the number of motor poles.	2 (2 to 120)
E9-09 (11EC)	Motor Rated Slip	V/f OLV/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/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

◆ F2: Analog Input Option

No. (Hex.)	Name	Description	Default (Range)
F2-01 (038F)	Analog Input Function Selection	V/f OLV/PM EZOLV Sets the input method for the analog inputs used with AI-A3. 0 : 3 Independent Channels 1 : 3 Channels Added Together 2 : 3 Additional Channels	0 (0 - 2)
F2-02 (0368) RUN	Analog Input Option Card Gain	V/f OLV/PM EZOLV Sets the analog reference gain as a percentage when the maximum output frequency is 100%. **Note:** • Set *F2-01 = 1 [Analog Input Function Selection = 3 Channels Added Together]* to enable this function. • Parameter *A1-02 [Control Method Selection]* selects which parameter is the maximum output frequency. –*A1-02 ≠ 8 [EZOLV]*: *E1-04 [Maximum Output Frequency]* –*A1-02 = 8*: *E9-02 [Maximum Speed]*	100.0% (-999.9 - +999.9%)
F2-03 (0369) RUN	Analog Input Option Card Bias	V/f OLV/PM EZOLV Sets the analog reference bias as a percentage when the maximum output frequency is 100%. **Note:** • Set *F2-01 = 1 [Analog Input Function Selection = 3 Channels Added Together]* to enable this function. • Parameter *A1-02 [Control Method Selection]* selects which parameter is the maximum output frequency. –*A1-02 ≠ 8 [EZOLV]*: *E1-04 [Maximum Output Frequency]* –*A1-02 = 8*: *E9-02 [Maximum Speed]*	0.0% (-999.9 - +999.9%)
F2-04 (3160)	Terminal V1 Signal Level Select	V/f OLV/PM EZOLV Sets the input signal level for MFAI terminal V1. **Note:** • Set *F2-01 = 2 [Analog Input Function Selection = 3 Additional Channels]* to enable this parameter. • Use DIP switch S1 on the AI-A3 option card to switch between the voltage input or current input to align with the setting of this parameter. 0 : 0 to 10V (Lower Limit at 0) 1 : -10 to +10V (Bipolar Reference) 2 : 4 to 20 mA	0 (0 - 2)
F2-05 (3161)	Terminal V1 Function Selection	V/f OLV/PM EZOLV Sets the function for MFAI terminal V1. **Note:** Set *F2-01 = 2 [Analog Input Function Selection = 3 Additional Channels]* to enable this parameter.	F (4 - 3B)
F2-06 (3162) RUN	Terminal V1 Gain Setting	V/f OLV/PM EZOLV Sets the gain of the analog signal input to MFAI terminal V1. **Note:** Set *F2-01 = 2 [Analog Input Function Selection = 3 Additional Channels]* to enable this parameter.	100.0% (-999.9 - +999.9%)
F2-07 (3163) RUN	Terminal V1 Bias Setting	V/f OLV/PM EZOLV Sets the bias of the analog signal input to MFAI terminal V1. **Note:** Set *F2-01 = 2 [Analog Input Function Selection = 3 Additional Channels]* to enable this parameter.	0.0% (-999.9 - +999.9%)
F2-08 (3164)	Terminal V2 Signal Level Select	V/f OLV/PM EZOLV Sets the input signal level for MFAI terminal V2. **Note:** • Set *F2-01 = 2 [Analog Input Function Selection = 3 Additional Channels]* to enable this parameter. • Use DIP switch S1 on the AI-A3 option card to switch between the voltage input or current input to align with the setting of this parameter. 0 : 0 to 10V (Lower Limit at 0) 1 : -10 to +10V (Bipolar Reference) 2 : 4 to 20 mA	0 (0 - 2)

No. (Hex.)	Name	Description	Default (Range)
F2-09 (3165)	Terminal V2 Function Selection	V/f OLV/PM EZOLV Sets the function for MFAI terminal V2. **Note:** Set *F2-01 = 2 [Analog Input Function Selection = 3 Additional Channels]* to enable this parameter.	F (4 - 3B)
F2-10 (3166) RUN	Terminal V2 Gain Setting	V/f OLV/PM EZOLV Sets the gain of the analog signal input to MFAI terminal V2. **Note:** Set *F2-01 = 2 [Analog Input Function Selection = 3 Additional Channels]* to enable this parameter.	100.0% (-999.9 - +999.9%)
F2-11 (3167) RUN	Terminal V2 Bias Setting	V/f OLV/PM EZOLV Sets the bias of the analog signal input to MFAI terminal V2. **Note:** Set *F2-01 = 2 [Analog Input Function Selection = 3 Additional Channels]* to enable this parameter.	0.0% (-999.9 - +999.9%)
F2-12 (3168)	Terminal V3 Signal Level Select	V/f OLV/PM EZOLV Sets the input signal level for MFAI terminal V3. **Note:** • Set *F2-01 = 2 [Analog Input Function Selection = 3 Additional Channels]* to enable this parameter. • Use DIP switch S1 on the AI-A3 option card to switch between the voltage input or current input to align with the setting of this parameter. 0 : 0 to 10V (Lower Limit at 0) 1 : -10 to +10V (Bipolar Reference) 2 : 4 to 20 mA	0 (0 - 2)
F2-13 (3169)	Terminal V3 Function Selection	V/f OLV/PM EZOLV Sets the function for MFAI terminal V3. **Note:** Set *F2-01 = 2 [Analog Input Function Selection = 3 Additional Channels]* to enable this parameter.	F (4 - 3B)
F2-14 (316A) RUN	Terminal V3 Gain Setting	V/f OLV/PM EZOLV Sets the gain of the analog signal input to MFAI terminal V3. **Note:** Set *F2-01 = 2 [Analog Input Function Selection = 3 Additional Channels]* to enable this parameter.	100.0% (-999.9 - +999.9%)
F2-15 (316B) RUN	Terminal V3 Bias Setting	V/f OLV/PM EZOLV Sets the bias of the analog signal input to MFAI terminal V3. **Note:** Set *F2-01 = 2 [Analog Input Function Selection = 3 Additional Channels]* to enable this parameter.	0.0% (-999.9 - +999.9%)
F2-16 (316C)	V1 Unit Selection	V/f OLV/PM EZOLV Sets the units shown in *U1-21 [AI-A3 Term V1Level]*. 0 : Percent (%) 1 : Units (mA or VDC)	1 (0, 1)
F2-17 (316D)	V2 Unit Selection	V/f OLV/PM EZOLV Sets the units shown in *U1-22 [AI-A3 Term V2Level]*. 0 : Percent (%) 1 : Units (mA or VDC)	1 (0, 1)
F2-18 (316E)	V3 Unit Selection	V/f OLV/PM EZOLV Sets the units shown in *U1-23 [AI-A3 Term V3Level]*. 0 : Percent (%) 1 : Units (mA or VDC)	1 (0, 1)

◆ F3: Digital Input Option

No. (Hex.)	Name	Description	Default (Range)
F3-01 (0390)	Digital Input Function Selection	V/f OLV/PM EZOLV Sets the data format of digital input signals. This parameter is enabled when *o1-03 = 0 or 1 [Frequency Display Unit Selection = 0.01 Hz or 0.01% (100% = E1-04)]*. **Note:** When *o1-03 = 2* or *3 [Revolutions Per Minute (RPM) or User Units (o1-10 & o1-11)]*, the input signal will be BCD. The *o1-03* value sets the setting units. 0 : BCD, 1% units 1 : BCD, 0.1% units 2 : BCD, 0.01% units 3 : BCD, 1 Hz units 4 : BCD, 0.1 Hz units 5 : BCD, 0.01 Hz units 6 : BCD (5-digit), 0.02 Hz 7 : Binary input 8 : Multi-Function Digital Input	8 (0 - 8)
F3-03 (03B9)	Digital Input Data Length Select	V/f OLV/PM EZOLV Sets the number of bits to set the frequency reference with *DI-A3*. 0 : 8-bit 1 : 12-bit 2 : 16-bit	2 (0 - 2)
F3-10 (0BE3) Expert	Terminal D0 Function Selection	V/f OLV/PM EZOLV Sets the function for terminal D0 of the DI-A3 option when *F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input]*.	F (1 - 1FF)
F3-11 (0BE4) Expert	Terminal D1 Function Selection	V/f OLV/PM EZOLV Sets the function for terminal D1 of the DI-A3 option when *F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input]*.	F (1 - 1FF)
F3-12 (0BE5) Expert	Terminal D2 Function Selection	V/f OLV/PM EZOLV Sets the function for terminal D2 of the DI-A3 option when *F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input]*.	F (1 - 1FF)
F3-13 (0BE6) Expert	Terminal D3 Function Selection	V/f OLV/PM EZOLV Sets the function for terminal D3 of the DI-A3 option when *F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input]*.	F (1 - 1FF)
F3-14 (0BE7) Expert	Terminal D4 Function Selection	V/f OLV/PM EZOLV Sets the function for terminal D4 of the DI-A3 option when *F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input]*.	F (1 - 1FF)
F3-15 (0BE8) Expert	Terminal D5 Function Selection	V/f OLV/PM EZOLV Sets the function for terminal D5 of the DI-A3 option when *F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input]*.	F (1 - 1FF)
F3-16 (0BE9) Expert	Terminal D6 Function Selection	V/f OLV/PM EZOLV Sets the function for terminal D6 of the DI-A3 option when *F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input]*.	F (1 - 1FF)
F3-17 (0BEA) Expert	Terminal D7 Function Selection	V/f OLV/PM EZOLV Sets the function for terminal D7 of the DI-A3 option when *F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input]*.	F (1 - 1FF)
F3-18 (0BEB) Expert	Terminal D8 Function Selection	V/f OLV/PM EZOLV Sets the function for terminal D8 of the DI-A3 option when *F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input]*.	F (1 - 1FF)
F3-19 (0BEC) Expert	Terminal D9 Function Selection	V/f OLV/PM EZOLV Sets the function for terminal D9 of the DI-A3 option when *F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input]*.	F (1 - 1FF)
F3-20 (0BED) Expert	Terminal DA Function Selection	V/f OLV/PM EZOLV Sets the function for terminal DA of the DI-A3 option when *F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input]*.	F (1 - 1FF)
F3-21 (0BEE) Expert	Terminal DB Function Selection	V/f OLV/PM EZOLV Sets the function for terminal DB of the DI-A3 option when *F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input]*.	F (1 - 1FF)

No. (Hex.)	Name	Description	Default (Range)
F3-22 (0BEF) Expert	Terminal DC Function Selection	V/f OLV/PM EZOLV Sets the function for terminal DC of the DI-A3 option when *F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input]*.	F (1 - 1FF)
F3-23 (0BF0) Expert	Terminal DD Function Selection	V/f OLV/PM EZOLV Sets the function for terminal DD of the DI-A3 option when *F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input]*.	F (1 - 1FF)
F3-24 (0BF1) Expert	Terminal DE Function Selection	V/f OLV/PM EZOLV Sets the function for terminal DE of the DI-A3 option when *F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input]*.	F (1 - 1FF)
F3-25 (0BF2) Expert	Terminal DF Function Selection	V/f OLV/PM EZOLV Sets the function for terminal DF of the DI-A3 option when *F3-01 = 8 [Digital Input Function Selection = Multi-Function Digital Input]*.	F (1 - 1FF)

◆ F4: Analog Monitor Option

No. (Hex.)	Name	Description	Default (Range)
F4-01 (0391)	Terminal V1 Function Selection	V/f OLV/PM EZOLV Sets the monitor signal output from terminal V1. Set the *x-xx* part of the *Ux-xx [Monitor]*. For example, set *F4-01 = 102* to monitor *U1-02 [Output Frequency]*.	102 (000 - 1098)
F4-02 (0392) RUN	Terminal V1 Gain	V/f OLV/PM EZOLV Sets the gain of the monitor signal that is sent from terminal V1. Sets the analog signal output level from the terminal V1 at 10 V or 20 mA as 100% when an output for monitoring items is 100%.	100.0% (-999.9 - +999.9%)
F4-03 (0393)	Terminal V2 Function Selection	V/f OLV/PM EZOLV Sets the monitor signal output from terminal V2. Set the *x-xx* part of the *Ux-xx [Monitor]*. For example, set *F4-03 = 103* to monitor *U1-03 [Output Current]*.	103 (000 - 1098)
F4-04 (0394) RUN	Terminal V2 Gain	V/f OLV/PM EZOLV Sets the gain of the monitor signal that is sent from terminal V2. Sets the analog signal output level from terminal V2 at 10 V or 20 mA as 100% when an output for monitoring items is 100%.	50.0% (-999.9 - +999.9%)
F4-05 (0395) RUN	Terminal V1 Bias	V/f OLV/PM EZOLV Sets the bias of the monitor signal that is sent from terminal V1. When an output for monitoring items is 0%, this parameter sets the analog signal output level from the V1 terminal as a percentage of 10 V or 20 mA.	0.0% (-999.9 - +999.9%)
F4-06 (0396) RUN	Terminal V2 Bias	V/f OLV/PM EZOLV Sets the bias of the monitor signal that is sent from terminal V2. Set the level of the analog signal sent from the V2 terminal at 10 V or 20 mA as 100% when an output for monitoring items is 0%.	0.0% (-999.9 - +999.9%)
F4-07 (0397)	Terminal V1 Signal Level	V/f OLV/PM EZOLV Sets the output signal level for terminal V1. 0 : 0 to 10 V 1 : -10 to 10 V	0 (0, 1)
F4-08 (0398)	Terminal V2 Signal Level	V/f OLV/PM EZOLV Sets the output signal level for terminal V2. 0 : 0 to 10 V 1 : -10 to 10 V	0 (0, 1)

◆ F5: Digital Output Option

No. (Hex.)	Name	Description	Default (Range)
F5-01 (0399)	Terminal P1-PC Function Select	V/f OLV/PM EZOLV Sets the function of terminal P1-PC on the DO-A3 option. Set *F5-09 = 2 [DO-A3 Output Mode Selection = Programmable (F5-01 to F5-08)]* to enable this function.	0 (0 - 1FF)
F5-02 (039A)	Terminal P2-PC Function Select	V/f OLV/PM EZOLV Sets the function of terminal P2-PC on the DO-A3 option. Set *F5-09 = 2 [DO-A3 Output Mode Selection = Programmable (F5-01 to F5-08)]* to enable this function.	1 (0 - 1FF)

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

◆ F6: Communication Options

No. (Hex.)	Name	Description	Default (Range)
F6-01 (03A2)	Communication Error Selection	V/f OLV/PM EZOLV Sets the method to stop the motor or let the motor continue operating when the drive detects *bUS [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/PM EZOLV Sets the conditions at which *EF0 [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/PM EZOLV Sets the method to stop the motor or let the motor continue operating when the drive detects an *EF0 [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/PM EZOLV Sets the delay time for the drive to detect *bUS [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 - 5.0 s)
F6-06 (03A7)	Torque Reference/Limit by Comm	V/f OLV/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)

No. (Hex.)	Name	Description	Default (Range)
F6-07 (03A8)	Multi-Step Ref @ NetRef/ ComRef	V/f OLV/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	0 (0, 1)
F6-08 (036A)	Comm Parameter Reset @Initialize	V/f OLV/PM EZOLV Sets the function to initialize *F6-xx and F7-xx parameters* when the drive is initialized with *A1-03 [Initialize Parameters]*. 0 : No Reset - Parameters Retained 1 : Reset Back to Factory Default	0 (0, 1)
F6-14 (03BB)	BUS Error Auto Reset	V/f OLV/PM EZOLV Sets the automatic reset function for *bUS [Option Communication Errors]*. 0 : Disable 1 : Enabled	0 (0, 1)
F6-15 (0B5B)	Comm. Option Parameters Reload	V/f OLV/PM EZOLV Sets the update method when you change *F6-xx, F7-xx [Communication Options]*. 0 : Reload at Next Power Cycle 1 : Reload Now 2 : Cancel Reload Request	0 (0 - 2)
F6-16 (0B8A)	Gateway Mode	V/f OLV/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)
F6-30 (03CB)	PROFIBUS-DP Node Address	V/f OLV/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/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/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/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 *AEr [Station Address Setting Error]* errors and the L. ERR LED on the option will come on.	0 (0 - 126)
F6-36 (03D1)	CANopen Communication Speed	V/f OLV/PM EZOLV Sets the CANopen communications speed. Restart the drive after you change the parameter setting. 0 : Auto-detection 1 : 10 kbps 2 : 20 kbps 3 : 50 kbps 4 : 125 kbps 5 : 250 kbps 6 : 500 kbps 7 : 800 kbps 8 : 1 Mbps	6 (0 - 8)

No. (Hex.)	Name	Description	Default (Range)
F6-45 (02FB)	BACnet Node Address	V/f OLV/PM EZOLV Sets the node address for BACnet communication. **Note:** Be sure to set an address that is different than all other node addresses. Do not set this parameter to 0.	1 (0 - 127)
F6-46 (02FC)	BACnet Baud Rate	V/f OLV/PM EZOLV Sets the BACnet communications speed. 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)
F6-47 (02FD)	Rx to Tx Wait Time	V/f OLV/PM EZOLV Sets the wait time for the drive to receive and send BACnet communication.	5 ms (5 - 65 ms)
F6-48 (02FE)	BACnet Device Object Identifier0	V/f OLV/PM EZOLV Sets the last word of BACnet communication addresses.	0 (0 - FFFF)
F6-49 (02FF)	BACnet Device Object Identifier1	V/f OLV/PM EZOLV Sets the last word of BACnet communication addresses.	0 (0 - 3F)
F6-50 (03C1)	DeviceNet MAC Address	V/f OLV/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 *AEr [Station Address Setting Error]* errors and the MS LED on the option will flash.	64 (0 - 64)
F6-51 (03C2)	DeviceNet Baud Rate	V/f OLV/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/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/PM EZOLV Sets the format of data that the drive sends to the DeviceNet communication master.	71 (0 - 255)
F6-54 (03C5)	Net Idle Fault Detection	V/f OLV/PM EZOLV Sets the function to detect *EF0 [Option Card External Fault]* when the drive does not receive data from the DeviceNet or EtherNet/IP master. 0 : Enabled 1 : Disabled, No Fault Detection 2 : Vendor Specific 3 : RUN Forward 4 : RUN Reverse	0 (0 - 4)
F6-55 (03C6)	DeviceNet Baud Rate Monitor	V/f OLV/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/PM EZOLV Sets the speed scale for DeviceNet communication.	0 (-15 - +15)
F6-57 (03D8)	DeviceNet Current Scaling	V/f OLV/PM EZOLV Sets the current scale of the DeviceNet communication master.	0 (-15 - +15)
F6-58 (03D9)	DeviceNet Torque Scaling	V/f OLV/PM EZOLV Sets the torque scale of the DeviceNet communication master.	0 (-15 - +15)

No. (Hex.)	Name	Description	Default (Range)
F6-59 (03DA)	DeviceNet Power Scaling	V/f OLV/PM EZOLV Sets the power scale of the DeviceNet communication master.	0 (-15 - +15)
F6-60 (03DB)	DeviceNet Voltage Scaling	V/f OLV/PM EZOLV Sets the voltage scale of the DeviceNet communication master.	0 (-15 - +15)
F6-61 (03DC)	DeviceNet Time Scaling	V/f OLV/PM EZOLV Sets the time scale of the DeviceNet communication master.	0 (-15 - +15)
F6-62 (03DD)	DeviceNet Heartbeat Interval	V/f OLV/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/PM EZOLV Sets the function to see the actual DeviceNet MAC address using the keypad. This parameter functions as a monitor only.	63 (0 - 63)
F6-64 (03DF)	Dynamic Out Assembly 109 Param1	V/f OLV/PM EZOLV Sets Configurable Output 1 written to the MEMOBUS register.	0000H (0000H - FFFFH)
F6-65 (03E0)	Dynamic Out Assembly 109 Param2	V/f OLV/PM EZOLV Sets Configurable Output 2 written to the MEMOBUS register.	0000H (0000H - FFFFH)
F6-66 (03E1)	Dynamic Out Assembly 109 Param3	V/f OLV/PM EZOLV Sets Configurable Output 3 written to the MEMOBUS register.	0000H (0000H - FFFFH)
F6-67 (03E2)	Dynamic Out Assembly 109 Param4	V/f OLV/PM EZOLV Sets Configurable Output 4 written to the MEMOBUS register.	0000H (0000H - FFFFH)
F6-68 (03E3)	Dynamic In Assembly 159 Param 1	V/f OLV/PM EZOLV Sets Configurable Input 1 read from the MEMOBUS register.	0000H (0000H - FFFFH)
F6-69 (03E4)	Dynamic In Assembly 159 Param 2	V/f OLV/PM EZOLV Sets Configurable Input 2 read from the MEMOBUS register.	0000H (0000H - FFFFH)
F6-70 (03C7)	Dynamic In Assembly 159 Param 3	V/f OLV/PM EZOLV Sets Configurable Input 3 read from the MEMOBUS register.	0000H (0000H - FFFFH)
F6-71 (03C8)	Dynamic In Assembly 159 Param 4	V/f OLV/PM EZOLV Sets Configurable Input 4 read from the MEMOBUS register.	0000H (0000H - FFFFH)
F6-75 (0B20)	Protocol Selection	V/f OLV/PM EZOLV Sets the protocol for the SI-J3 option card. 1 : N2 (Metasys) 2 : P1 (APOGEE FLN)	2 (1, 2)
F6-76 (0B21)	P1/N2 Communications Fault	V/f OLV/PM EZOLV Enables and disables *bUS [Option Communication Error]* fault detection for the SI-J3 option card. 0 : Disabled 1 : Enabled	1 (0, 1)
F6-77 (0B22)	P1/N2 Fault Time	V/f OLV/PM EZOLV Sets the length of time before the drive will clear a *bUS [Option Communication Error]* fault for the SI-J3 option card.	2.0 s (0.0 - 10.0 s)
F6-78 (0B23)	P1/N2 Address	V/f OLV/PM EZOLV Sets the network node address for the SI-J3 option card.	1 (0 - 255)
F6-79 (0B24)	Baud Rate for P1	V/f OLV/PM EZOLV Sets the baud rate for the P1 protocol with the SI-J3 option card. 2 : 4800 bps 3 : 9600 bps	3 (2, 3)

◆ F7: Ethernet Options

No. (Hex.)	Name	Description	Default (Range)
F7-01 (03E5)	IP Address 1	V/f OLV/PM 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 1 to 4]* to set the IP Address. Be sure to set a different IP address for each drive on the network. • Also set parameters *F7-05 to F7-12 [Subnet Mask 1 to 4, Gateway Address 1 to 4]*.	192 (0 - 255)
F7-02 (03E6)	IP Address 2	V/f OLV/PM 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 1 to 4]* to set the IP Address. Be sure to set a different IP address for each drive on the network. • Also set parameters *F7-05 to F7-12 [Subnet Mask 1 to 4, Gateway Address 1 to 4]*.	168 (0 - 255)
F7-03 (03E7)	IP Address 3	V/f OLV/PM 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 1 to 4]* to set the IP Address. Be sure to set a different IP address for each drive on the network. • Also set parameters *F7-05 to F7-12 [Subnet Mask 1 to 4, Gateway Address 1 to 4]*.	1 (0 - 255)
F7-04 (03E8)	IP Address 4	V/f OLV/PM 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 1 to 4]* to set the IP Address. Be sure to set a different IP address for each drive on the network. • Also set parameters *F7-05 to F7-12 [Subnet Mask 1 to 4, Gateway Address 1 to 4]*.	20 (0 - 255)
F7-05 (03E9)	Subnet Mask 1	V/f OLV/PM 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/PM 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/PM 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/PM 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/PM 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/PM 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/PM 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/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/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/PM EZOLV Sets the duplex mode setting method. 0 : Half/Half 1 : Auto/Auto 2 : Full/Full 3 : Half/Auto 4 : Half/Full 5 : Auto/Half 6 : Auto/Full 7 : Full/Half 8 : Full/Auto	1 (0 - 8)
F7-15 (03F3)	Communication Speed Selection	V/f OLV/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/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/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/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/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/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/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/PM EZOLV Sets the scaling factor for the time monitor in the EtherNet/IP Class ID 2AH Object.	0 (-15 - +15)
F7-23 (03FB)	Dynamic Out Param 1 for CommCard	V/f OLV/PM EZOLV When you use an Ethernet/IP option, sets Output Assembly 116. The drive writes the values from Output Assembly 116 to the MEMOBUS/Modbus address register that is stored for each parameter. The drive will not write the values from Output Assembly 116 to the registers when the MEMOBUS/Modbus address is 0. When you use a PROFINET option, set this parameter to set to configurable output 1.	0
F7-24 (03FC)	Dynamic Out Param 2 for CommCard	V/f OLV/PM EZOLV When you use an Ethernet/IP option, sets Output Assembly 116. The drive writes the values from Output Assembly 116 to the MEMOBUS/Modbus address register that is stored for each parameter. The drive will not write the values from Output Assembly 116 to the registers when the MEMOBUS/Modbus address is 0. When you use a PROFINET option, set this parameter to set to configurable output 2.	0

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

No. (Hex.)	Name	Description	Default (Range)
F7-38 (037A)	Dynamic In Param 6 for CommCard	V/f OLV/PM EZOLV Sets Input Assembly 166 when you use an Ethernet/IP option. The drive sends the values from the MEMOBUS/Modbus address registers stored for each parameter to Input Assembly 166. The drive returns the default register value for the option card when the MEMOBUS/Modbus address is 0 and the value sent to Input Assembly 166 is not defined.	0
F7-39 (037B)	Dynamic In Param 7 for CommCard	V/f OLV/PM EZOLV Sets Input Assembly 166 when you use an Ethernet/IP option. The drive sends the values from the MEMOBUS/Modbus address registers stored for each parameter to Input Assembly 166. The drive returns the default register value for the option card when the MEMOBUS/Modbus address is 0 and the value sent to Input Assembly 166 is not defined.	0
F7-40 (037C)	Dynamic In Param 8 for CommCard	V/f OLV/PM EZOLV Sets Input Assembly 166 when you use an Ethernet/IP option. The drive sends the values from the MEMOBUS/Modbus address registers stored for each parameter to Input Assembly 166. The drive returns the default register value for the option card when the MEMOBUS/Modbus address is 0 and the value sent to Input Assembly 166 is not defined.	0
F7-41 (037D)	Dynamic In Param 9 for CommCard	V/f OLV/PM EZOLV Sets Input Assembly 166 when you use an Ethernet/IP option. The drive sends the values from the MEMOBUS/Modbus address registers stored for each parameter to Input Assembly 166. The drive returns the default register value for the option card when the MEMOBUS/Modbus address is 0 and the value sent to Input Assembly 166 is not defined.	0
F7-42 (037E)	Dynamic In Param 10 for CommCard	V/f OLV/PM EZOLV Sets Input Assembly 166 when you use an Ethernet/IP option. The drive sends the values from the MEMOBUS/Modbus address registers stored for each parameter to Input Assembly 166. The drive returns the default register value for the option card when the MEMOBUS/Modbus address is 0 and the value sent to Input Assembly 166 is not defined.	0
F7-43 (1BCE)	PLC Cnxn Close Behavior@Run	V/f OLV/PM EZOLV Sets the operation when the Forward Close command (PLC communication disconnection command) is received from the network during run. **Note:** This parameter is compatible with option software versions PRG: 3003 and later. Refer to *U6-97 [OPT SPARE 4]* to check the option software version. 0 : Continue 1 : Clear RUN Command 2 : bUS Fault (set by F6-01)	0 (0 - 2)
F7-50 (1BC1)	BACnet/IP Port #	V/f OLV/PM EZOLV Sets the UDP port on which the drive will receive incoming BACnet messages.	47808 (1024 - 65535)
F7-51 (1BE9)	BBMD Foreign Register Addr 1	V/f OLV/PM EZOLV Sets the first octet of the IP Address of the BBMD device to which this unit will register as a foreign device.	0 (0 - 255)
F7-52 (1BEA)	BBMD Foreign Register Addr 2	V/f OLV/PM EZOLV Sets the second octet of the IP Address of the BBMD device to which this unit will register as a foreign device.	0 (0 - 255)
F7-53 (1BEB)	BBMD Foreign Register Addr 3	V/f OLV/PM EZOLV Sets the third octet of the IP Address of the BBMD device to which this unit will register as a foreign device.	0 (0 - 255)
F7-54 (1BEC)	BBMD Foreign Register Addr 4	V/f OLV/PM EZOLV Sets the fourth octet of the IP Address of the BBMD device to which this unit will register as a foreign device.	0 (0 - 255)
F7-55 (1BED)	BBMD Foreign Register Port #	V/f OLV/PM EZOLV Sets the UDP port of the BBMD device to which this unit will register.	47808 (1024 - 65535)
F7-56 (1BEE)	BBMD Foreign Register Time	V/f OLV/PM EZOLV Sets the time interval in which this unit will repeat BBMD foreign registration.	3600 s (0 - 65535 s)
F7-57 (1BEF)	BACnet/IP bUS Timeout Value	V/f OLV/PM EZOLV Sets the length of time that this unit will wait after it receives a Run command or frequency reference command before it detects a *bUS* fault.	3600 s (0 - 65535 s)
F7-60 (0780)	PZD1 Write (Control Word)	V/f OLV/PM EZOLV When you use a Profibus option, set the MEMOBUS/Modbus address for PZD1 (PPO output). PZD1 (PPO output) functions as the STW when *F7-60 = 0 to 2*.	0
F7-61 (0781)	PZD2 Write (Frequency Reference)	V/f OLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD2 (PPO output). PZD2 (PPO output) functions as the HSW when *F7-61 = 0 to 2*.	0
F7-62 (0782)	PZD3 Write	V/f OLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD3 (PPO output). A value of 0, 1, or 2 will disable the PZD3 (PPO output) write operation to the MEMOBUS/Modbus register.	0

No. (Hex.)	Name	Description	Default (Range)
F7-63 (0783)	PZD4 Write	V/f OLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD4 (PPO output). A value of 0, 1, or 2 will disable the PZD4 (PPO output) write operation to the MEMOBUS/Modbus register.	0
F7-64 (0784)	PZD5 Write	V/f OLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD5 (PPO output). A value of 0, 1, or 2 will disable the PZD5 (PPO output) write operation to the MEMOBUS/Modbus register.	0
F7-65 (0785)	PZD6 Write	V/f OLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD6 (PPO output). A value of 0, 1, or 2 will disable the PZD6 (PPO output) write operation to the MEMOBUS/Modbus register.	0
F7-66 (0786)	PZD7 Write	V/f OLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD7 (PPO output). A value of 0, 1, or 2 will disable the PZD7 (PPO output) write operation to the MEMOBUS/Modbus register.	0
F7-67 (0787)	PZD8 Write	V/f OLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD8 (PPO output). A value of 0, 1, or 2 will disable the PZD8 (PPO output) write operation to the MEMOBUS/Modbus register.	0
F7-68 (0788)	PZD9 Write	V/f OLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD9 (PPO output). A value of 0, 1, or 2 will disable the PZD9 (PPO output) write operation to the MEMOBUS/Modbus register.	0
F7-69 (0789)	PZD10 Write	V/f OLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD10 (PPO output). A value of 0, 1, or 2 will disable the PZD10 (PPO output) write operation to the MEMOBUS/Modbus register.	0
F7-70 (078A)	PZD1 Read (Status Word)	V/f OLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD1 (PPO input). PZD1 (PPO input) functions as the ZSW when *F7-70 = 0*.	0
F7-71 (078B)	PZD2 Read (Output Frequency)	V/f OLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD2 (PPO input). PZD2 (PPO input) functions as the HIW when *F7-71 = 0*.	0
F7-72 (078C)	PZD3 Read	V/f OLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD3 (PPO input). A value of 0 will disable the PZD3 (PPO input) load operation from the MEMOBUS/Modbus register.	0
F7-73 (078D)	PZD4 Read	V/f OLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD4 (PPO input). A value of 0 will disable the PZD4 (PPO input) load operation from the MEMOBUS/Modbus register.	0
F7-74 (078E)	PZD5 Read	V/f OLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD5 (PPO input). A value of 0 will disable the PZD5 (PPO input) load operation from the MEMOBUS/Modbus register.	0
F7-75 (078F)	PZD6 Read	V/f OLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD6 (PPO input). A value of 0 will disable the PZD6 (PPO input) load operation from the MEMOBUS/Modbus register.	0
F7-76 (0790)	PZD7 Read	V/f OLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD7 (PPO input). A value of 0 will disable the PZD7 (PPO input) load operation from the MEMOBUS/Modbus register.	0
F7-77 (0791)	PZD8 Read	V/f OLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD8 (PPO input). A value of 0 will disable the PZD8 (PPO input) load operation from the MEMOBUS/Modbus register.	0
F7-78 (0792)	PZD9 Read	V/f OLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD9 (PPO input). A value of 0 will disable the PZD9 (PPO input) load operation from the MEMOBUS/Modbus register.	0
F7-79 (0793)	PZD10 Read	V/f OLV/PM EZOLV When you use a Profibus option, sets the MEMOBUS/Modbus address for PZD10 (PPO input). A value of 0 will disable the PZD10 (PPO input) load operation from the MEMOBUS/Modbus register.	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/PM EZOLV Sets the function for MFDI terminal S1. **Note:** The default setting is *F* when you initialize the drive for *3-Wire Initialization [A1-03 = 3330]*.	40 (1 - 1FF)
H1-02 (0439)	Terminal S2 Function Selection	V/f OLV/PM EZOLV Sets the function for MFDI terminal S2. **Note:** The default setting is *F* when you initialize the drive for *3-Wire Initialization [A1-03 = 3330]*.	F (1 - 1FF)
H1-03 (0400)	Terminal S3 Function Selection	V/f OLV/PM EZOLV Sets the function for MFDI terminal S3.	26 (0 - 1FF)
H1-04 (0401)	Terminal S4 Function Selection	V/f OLV/PM EZOLV Sets the function for MFDI terminal S4.	14 (0 - 1FF)
H1-05 (0402)	Terminal S5 Function Selection	V/f OLV/PM EZOLV Sets the function for MFDI terminal S5. **Note:** The default setting is *0* when the drive is initialized for *3-Wire Initialization [A1-03 = 3330]*.	C7 (0 - 1FF)
H1-06 (0403)	Terminal S6 Function Selection	V/f OLV/PM EZOLV Sets the function for MFDI terminal S6. **Note:** The default setting is *3* when the drive is initialized for *3-Wire Initialization [A1-03 = 3330]*.	80 (0 - 1FF)
H1-07 (0404)	Terminal S7 Function Selection	V/f OLV/PM EZOLV Sets the function for MFDI terminal S7. **Note:** The default setting is *4* when the drive is initialized for *3-Wire Initialization [A1-03 = 3330]*.	81 (0 - 1FF)
H1-08 (0405)	Terminal S8 Function Selection	V/f OLV/PM EZOLV Sets the function for MFDI terminal S8.	F (0 - 1FF)
H1-21 (0B70) RUN	EF1 Delay Time	V/f OLV/PM EZOLV Sets the amount of time delay applied to the *EF1* fault and alarm. (*20 ≤ H1-01 ≤ 2F*)	0.00 s (0.00 - 300.00 s)
H1-22 (0B71) RUN	EF2 Delay Time	V/f OLV/PM EZOLV Sets the amount of time delay applied to the *EF2* fault and alarm. (*20 ≤ H1-02 ≤ 2F*)	0.00 s (0.00 - 300.00 s)
H1-23 (0B72) RUN	EF3 Delay Time	V/f OLV/PM EZOLV Sets the amount of time delay applied to the *EF3* fault and alarm. (*20 ≤ H1-03 ≤ 2F*)	0.00 s (0.00 - 300.00 s)
H1-24 (0B73) RUN	EF4 Delay Time	V/f OLV/PM EZOLV Sets the amount of time delay applied to the *EF4* fault and alarm. (*20 ≤ H1-04 ≤ 2F*)	0.00 s (0.00 - 300.00 s)
H1-25 (0B74) RUN	EF5 Delay Time	V/f OLV/PM EZOLV Sets the amount of time delay applied to the *EF5* fault and alarm. (*20 ≤ H1-05 ≤ 2F*)	0.00 s (0.00 - 300.00 s)
H1-26 (0B75) RUN	EF6 Delay Time	V/f OLV/PM EZOLV Sets the amount of time delay applied to the *EF6* fault and alarm. (*20 ≤ H1-06 ≤ 2F*)	0.00 s (0.00 - 300.00 s)
H1-27 (0B76) RUN	EF7 Delay Time	V/f OLV/PM EZOLV Sets the amount of time delay applied to the *EF7* fault and alarm. (*20 ≤ H1-07 ≤ 2F*)	0.00 s (0.00 - 300.00 s)
H1-28 (0B77) RUN	EF8 Delay Time	V/f OLV/PM EZOLV Sets the amount of time delay applied to the *EF8* fault and alarm. (*20 ≤ H1-08 ≤ 2F*)	0.00 s (0.00 - 300.00 s)
H1-40 (0B54)	Mbus Reg 15C0h bit0 Input Func	V/f OLV/PM EZOLV Sets the MFDI function assigned to *bit 0* of the MEMOBUS register *15C0 (Hex.)*.	F (1 - 1FF)

No. (Hex.)	Name	Description	Default (Range)
H1-41 (0B55)	Mbus Reg 15C0h bit1 Input Func	V/f OLV/PM EZOLV Sets the MFDI function assigned to *bit 1* of the MEMOBUS register *15C0 (Hex.)*.	F (1 - 1FF)
H1-42 (0B56)	Mbus Reg 15C0h bit2 Input Func	V/f OLV/PM EZOLV Sets the MFDI function assigned to *bit 2* of the MEMOBUS register *15C0 (Hex.)*.	F (1 - 1FF)
H1-61 (39E1) RUN	Terminal S1 On-Delay Time	V/f OLV/PM EZOLV Sets the length of time necessary for Terminal S1 to be closed before the drive does the programmed function.	0.0 s (0.0 - 3000.0 s)
H1-62 (39E2) RUN	Terminal S2 On-Delay Time	V/f OLV/PM EZOLV Sets the length of time necessary for Terminal S2 to be closed before the drive does the programmed function.	0.0 s (0.0 - 3000.0 s)
H1-63 (39E3) RUN	Terminal S3 On-Delay Time	V/f OLV/PM EZOLV Sets the length of time necessary for Terminal S3 to be closed before the drive does the programmed function.	0.0 s (0.0 - 3000.0 s)
H1-64 (39E4) RUN	Terminal S4 On-Delay Time	V/f OLV/PM EZOLV Sets the length of time necessary for Terminal S4 to be closed before the drive does the programmed function.	0.0 s (0.0 - 3000.0 s)
H1-65 (39E5) RUN	Terminal S5 On-Delay Time	V/f OLV/PM EZOLV Sets the length of time necessary for Terminal S5 to be closed before the drive does the programmed function.	0.0 s (0.0 - 3000.0 s)
H1-66 (39E6) RUN	Terminal S6 On-Delay Time	V/f OLV/PM EZOLV Sets the length of time necessary for Terminal S6 to be closed before the drive does the programmed function.	0.0 s (0.0 - 3000.0 s)
H1-67 (39E7) RUN	Terminal S7 On-Delay Time	V/f OLV/PM EZOLV Sets the length of time necessary for Terminal S7 to be closed before the drive does the programmed function.	0.0 s (0.0 - 3000.0 s)
H1-68 (39E8) RUN	Terminal S8 On-Delay Time	V/f OLV/PM EZOLV Sets the length of time necessary for Terminal S8 to be closed before the drive does the programmed function.	0.0 s (0.0 - 3000.0 s)
H1-71 (39EB) RUN	Terminal S1 Off-Delay Time	V/f OLV/PM EZOLV Sets the length of time necessary for Terminal S1 to be open before the drive removes the programmed function.	0.0 s (0.0 - 3000.0 s)
H1-72 (39EC) RUN	Terminal S2 Off-Delay Time	V/f OLV/PM EZOLV Sets the length of time necessary for Terminal S2 to be open before the drive removes the programmed function.	0.0 s (0.0 - 3000.0 s)
H1-73 (39ED) RUN	Terminal S3 Off-Delay Time	V/f OLV/PM EZOLV Sets the length of time necessary for Terminal S3 to be open before the drive removes the programmed function.	0.0 s (0.0 - 3000.0 s)
H1-74 (39EE) RUN	Terminal S4 Off-Delay Time	V/f OLV/PM EZOLV Sets the length of time necessary for Terminal S4 to be open before the drive removes the programmed function.	0.0 s (0.0 - 3000.0 s)
H1-75 (39EF) RUN	Terminal S5 Off-Delay Time	V/f OLV/PM EZOLV Sets the length of time necessary for Terminal S5 to be open before the drive removes the programmed function.	0.0 s (0.0 - 3000.0 s)
H1-76 (39F0) RUN	Terminal S6 Off-Delay Time	V/f OLV/PM EZOLV Sets the length of time necessary for Terminal S6 to be open before the drive removes the programmed function.	0.0 s (0.0 - 3000.0 s)
H1-77 (39F1) RUN	Terminal S7 Off-Delay Time	V/f OLV/PM EZOLV Sets the length of time necessary for Terminal S7 to be open before the drive removes the programmed function.	0.0 s (0.0 - 3000.0 s)
H1-78 (39F2) RUN	Terminal S8 Off-Delay Time	V/f OLV/PM EZOLV Sets the length of time necessary for Terminal S8 to be open before the drive removes the programmed function.	0.0 s (0.0 - 3000.0 s)

■ H1-xx: MFDI Setting Values

Setting Value	Function	Description
0	3-Wire Sequence	V/f OLV/PM EZOLV Sets the direction of motor rotation for 3-wire sequence.
2	External Reference 1/2 Selection	V/f OLV/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/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/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/PM EZOLV Uses speed references *d1-01 to d1-16* to set a multi-step speed reference.
6	Jog Reference Selection	V/f OLV/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/PM EZOLV Sets the drive to use *Acceleration/Deceleration Time 1 [C1-01, C1-02]* or *Acceleration/Deceleration Time 2 [C1-03, C1-04]*.
8	Baseblock Command (N.O.)	V/f OLV/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/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/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/PM EZOLV Sets the drive to show an *oH2 [External Overheat (H1-XX=B)]* alarm when the input terminal is ON. The alarm does not have an effect on drive operation.
C	Analog Terminal Enable Selection	V/f OLV/PM EZOLV Sets the command that enables or disables the terminals selected in *H3-14 [Analog Input Terminal Enable Sel]*. ON : Terminal selected with *H3-14* is enabled OFF : Terminal selected with *H3-14* is disabled
E	ASR Integral Reset	V/f OLV/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/PM EZOLV Use this setting for unused terminals or to use terminals in through mode.
10	Up Command	V/f OLV/PM EZOLV Sets the command to use a push button switch to increase the drive frequency reference. You must also set *Setting 11 [Down Command]*. ON : Increases the frequency reference. OFF : Holds the current frequency reference.
11	Down Command	V/f OLV/PM EZOLV Sets the command to use a push button switch to decrease the drive frequency reference. You must also set *Setting 10 [Up Command]*. ON : Decreases the frequency reference. OFF : Holds the current frequency reference.
12	Forward Jog	V/f OLV/PM EZOLV Sets the command to operate the motor in the forward direction at the Jog Frequency set in *d1-17 [Jog Reference]*.
13	Reverse Jog	V/f OLV/PM EZOLV Sets the command to operate the motor in the reverse direction at the Jog Frequency set in *d1-17 [Jog Reference]*.

Setting Value	Function	Description
14	Fault Reset	V/f OLV/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/PM EZOLV Sets the command to ramp to stop in the deceleration time set in *C1-09 [Fast Stop Time]* when the input terminal is activated while the drive is operating.
16	Motor 2 Selection	V/f OLV/PM EZOLV Sets the command for the drive to operate motor 1 or motor 2. Stop the motors before switching. ON : Selects motor 2. OFF : Selects motor 1.
17	Fast Stop (N.C.)	V/f OLV/PM EZOLV Sets the command to ramp to stop in the deceleration time set in *C1-09 [Fast Stop Time]* when the input terminal is activated while the drive is operating.
18	Timer Function	V/f OLV/PM EZOLV Sets the command to start the timer function. Use this setting with *Timer Output [H2-xx = 12]*.
19	PID Disable	V/f OLV/PM EZOLV Sets the command to disable PID control when *b5-01 = 1 [PID Mode Setting = Standard]*. ON : PID control disabled OFF : PID control enabled
1B	Programming Lockout	V/f OLV/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/PM EZOLV Sets the command to sample the frequency reference at terminals A1, A2, or A3 and hold the frequency reference at that frequency.
20	Ext Pump Fault (NO-Always-Ramp)	V/f OLV/PM EZOLV When the terminal activates, the drive ramps to stop in the selected deceleration time. Fault relay output terminal MA-MC will turn ON, and MB-MC will turn OFF. The drive always detects external faults whether the drive is stopped or running.
21	Ext Pump Fault (NC-Always-Ramp)	V/f OLV/PM EZOLV When the terminal deactivates, the drive ramps to stop in the selected deceleration time. Fault relay output terminal MA-MC will turn ON, and MB-MC will turn OFF. The drive always detects external faults whether the drive is stopped or running.
22	Ext Pump Fault (NO-@Run-Ramp)	V/f OLV/PM EZOLV When the terminal activates during run, the drive ramps to stop in the selected deceleration time. Fault relay output terminal MA-MC will turn ON, and MB-MC will turn OFF. The drive does not detect external faults while the drive is stopped.
23	Ext Pump Fault (NC-@Run-Ramp)	V/f OLV/PM EZOLV When the terminal deactivates during run, the drive ramps to stop in the selected deceleration time. Fault relay output terminal MA-MC will turn ON, and MB-MC will turn OFF. The drive does not detect external faults while the drive is stopped.
24	Ext Pump Fault (NO-Always-Coast)	V/f OLV/PM EZOLV When the terminal activates, the drive shuts off the output and the motor coasts to stop. Fault relay output terminal MA-MC will turn ON, and MB-MC will turn OFF. The drive always detects external faults whether the drive is stopped or running.
25	Ext Pump Fault (NC-Always-Coast)	V/f OLV/PM EZOLV When the terminal deactivates, the drive shuts off the output and the motor coasts to stop. Fault relay output terminal MA-MC will turn ON, and MB-MC will turn OFF. The drive always detects external faults whether the drive is stopped or running.
26	Ext Pump Fault (NO-@Run-Coast)	V/f OLV/PM EZOLV When the terminal activates during run, the drive shuts off the output and the motor coasts to stop. Fault relay output terminal MA-MC will turn ON, and MB-MC will turn OFF. The drive does not detect external faults while the drive is stopped.
27	Ext Pump Fault (NC-@Run-Coast)	V/f OLV/PM EZOLV When the terminal deactivates during run, the drive shuts off the output and the motor coasts to stop. Fault relay output terminal MA-MC will turn ON, and MB-MC will turn OFF. The drive does not detect external faults while the drive is stopped.
28	Ext Pump Fault (NO-Always-FStop)	V/f OLV/PM EZOLV When the terminal activates, the drive stops the motor in the deceleration time set to *C1-09 [Fast Stop Time]*. Fault relay output terminal MA-MC turns ON, and MB-MC turns OFF. Stopped drives and running drives will detect external faults.
29	Ext Pump Fault (NC-Always-FStop)	V/f OLV/PM EZOLV When the terminal deactivates, the drive stops the motor in the deceleration time set to *C1-09 [Fast Stop Time]*. Fault relay output terminal MA-MC turns ON, and MB-MC turns OFF. Stopped drives and running drives will detect external faults.
2A	Ext Pump Fault (NO-@Run-FStop)	V/f OLV/PM EZOLV When the terminal activates during run, the drive stops the motor in the deceleration time set to *C1-09 [Fast Stop Time]*. Fault relay output terminal MA-MC turns ON, and MB-MC turns OFF. Stopped drives will not detect external faults.

Setting Value	Function	Description
2B	Ext Pump Fault (NC-@Run-FStop)	V/f OLV/PM EZOLV When the terminal deactivates during run, the drive stops the motor in the deceleration time set to *C1-09 [Fast Stop Time]*. Fault relay output terminal MA-MC turns ON, and MB-MC turns OFF. Stopped drives will not detect external faults.
2C	Ext Pump Fault (NO-Always-Alarm)	V/f OLV/PM EZOLV When the terminal activates, the keypad shows *EFx [Pump Fault (Terminal Sx)]* and the output terminal set for *Alarm [H2-01 to H2-03 = 10]* activates. The drive continues operation. The drive always detects external faults whether the drive is stopped or running.
2D	Ext Pump Fault (NC-Always-Alarm)	V/f OLV/PM EZOLV When the terminal deactivates, the keypad shows *EFx [Pump Fault (Terminal Sx)]* and the output terminal set for *Alarm [H2-01 to H2-03 = 10]* activates. The drive continues operation. The drive always detects external faults whether the drive is stopped or running.
2E	Ext Pump Fault (NO-@Run-Alarm)	V/f OLV/PM EZOLV When the terminal activates during run, the keypad shows *EFx [Pump Fault (Terminal Sx)]* and the output terminal set for *Alarm [H2-01 to H2-03 = 10]* activates. The drive continues operation. The drive does not detect external faults while the drive is stopped.
2F	Ext Pump Fault (NC-@Run-Alarm)	V/f OLV/PM EZOLV When the terminal deactivates during run, the keypad shows *EFx [Pump Fault (Terminal Sx)]* and the output terminal set for *Alarm [H2-01 to H2-03 = 10]* activates. The drive continues operation. The drive does not detect external faults while the drive is stopped.
30	PID Integrator Reset	V/f OLV/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/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/PM EZOLV Uses speed references *d1-01 to d1-16* to set a multi-step speed reference.
34	PID Soft Starter Disable	V/f OLV/PM EZOLV Sets the PID soft starter function. ON : Disable OFF : Enabled
35	PID Input (Error) Invert	V/f OLV/PM EZOLV Sets the command to turn the terminal ON and OFF to switch the PID input level (polarity).
40	Forward RUN (2-Wire)	V/f OLV/PM EZOLV Sets the Forward Run command for 2-wire sequence 1. Set this function and *H1-xx = 41 [Reverse RUN (2-Wire)]* together. ON : Forward Run OFF : Stop **Note:** • If you turn ON the Forward Run command terminal and the Reverse Run command terminal, it will cause an *EF [FWD/REV Run Command Input Error]* alarm and the motor will ramp to stop. • Initialize the drive with a 2-wire sequence to set the Forward Run command to terminal S1. • This function will not operate at the same time as *H1-xx = 42, 43 [Run Command (2-Wire Sequence 2), FWD/REV (2-Wire Sequence 2)]*.
41	Reverse RUN (2-Wire)	V/f OLV/PM EZOLV Sets the Forward Run command for 2-wire sequence 1. Set this function and *H1-xx = 40 [Forward RUN (2-Wire)]* together. ON : Reverse Run OFF : Stop **Note:** • If you turn ON the Forward Run command terminal and the Reverse Run command terminal, it will cause an *EF [FWD/REV Run Command Input Error]* alarm and the motor will ramp to stop. • Initialize the drive with a 2-wire sequence to set the Reverse Run command to terminal S2. • This function will not operate at the same time as *H1-xx = 42, 43 [Run Command (2-Wire Sequence 2), FWD/REV (2-Wire Sequence 2)]*.
42	Run Command (2-Wire Sequence 2)	V/f OLV/PM EZOLV Sets the Run command for 2-wire sequence 2. Set this function and *H1-xx = 43 [FWD/REV (2-Wire Sequence 2)]* together. ON : Run OFF : Stop **Note:** This function will not operate at the same time as *H1-xx = 40, 41 [Forward RUN (2-Wire), Reverse RUN (2-Wire)]*.
43	FWD/REV (2-Wire Sequence 2)	V/f OLV/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:** • You must input the Run command to rotate the motor. • This function will not operate at the same time as *H1-xx = 40, 41 [Forward RUN (2-Wire), Reverse RUN (2-Wire)]*.
50	Motor Pre-heat 2	V/f OLV/PM EZOLV Sets the command to apply the motor pre-heat current set in *b2-09 [Pre-heat Current 2]*.

Setting Value	Function	Description
51	Sequence Timer Disable	V/f OLV/PM EZOLV Sets the function for the drive to ignore sequence timers and run normally. ON : Drive ignores sequence timers and runs normally (based on b1-02 source). OFF : Drive follows sequence timer programming
52	Sequence Timer Cancel	V/f OLV/PM EZOLV Sets the function to disable the currently active sequence timer. ON : When the input changes from open to closed, the currently active sequence timer is disabled. Operation will resume with the next scheduled sequence timer. Re-cycling the run command after the current sequence timer has been canceled will re-enable the sequence timer. OFF : Drive follows sequence timer programming.
60	DC Injection Braking Command	V/f OLV/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 with a PM motor.
61	Speed Search from Fmax	V/f OLV/PM EZOLV Sets the function to use an external reference to start speed search although *b3-01 = 0 [Speed Search Selection at Start = Disabled]* to not allow speed search at start. **Note:** The drive will detect *oPE03 [Multi-Function Input Setting Err]* when *H1-xx = 61 [Speed Search from Fmax]* and *H1-xx = 62 [Speed Search from Fref]* are set at the same time.
62	Speed Search from Fref	V/f OLV/PM EZOLV Sets the function to use an external reference to start speed search although *b3-01 = 0 [Speed Search Selection at Start = Disabled]* to not allow speed search at start. **Note:** The drive will detect *oPE03 [Multi-Function Input Setting Err]* when *H1-xx = 61 [Speed Search from Fmax]* and *H1-xx = 62 [Speed Search from Fref]* are set at the same time.
63	Field Weakening	V/f OLV/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/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/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/PM EZOLV Sets the function for the drive to self-test RS-485 serial communications operation.
68	High Slip Braking (HSB) Activate	V/f OLV/PM EZOLV Sets the command to use high-slip braking to stop the motor.
6A	Drive Enable	V/f OLV/PM EZOLV Sets the function to show *dnE [Drive Disabled]* on the keypad and ignore Run commands when the terminal is OFF.
70	Drive Enable No Run Cycle	V/f OLV/PM EZOLV Prevents the drive from executing a Run command until the *Drive Enable No Run Cycle* input is closed. The drive will run when the Run and *Drive Enable No Run Cycle* inputs are both closed. If the *Drive Enable No Run Cycle* input is opened while the drive is running, the drive will stop according to the *b1-03* setting. ON : Run command is accepted. OFF : The drive cannot execute a Run command. If a Run command is given while the terminal is OFF, it will trigger a *WFR Waiting for Run* alarm. The drive will be allowed to run when the terminal is ON. If the terminal turns OFF while the drive is already running, the drive will stop according to *b1-03 [Stopping Method Selection]* and it will trigger a *WFR Waiting for Run* alarm. Turning ON the terminal will allow the drive to resume running.
75	Up 2 Command	V/f OLV/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, set the optimal bias limit values with *d4-08 [Up/Down 2 Bias Upper Limit]* and *d4-09 [Up/Down 2 Bias Lower Limit]*.
76	Down 2 Command	V/f OLV/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]* together. **Note:** When you use this function, set the optimal bias limit values with *d4-08 [Up/Down 2 Bias Upper Limit]* and *d4-09 [Up/Down 2 Bias Lower Limit]*.

Setting Value	Function	Description
77	ASR Gain (C5-03) Select	V/f OLV/PM EZOLV Sets the function to switch the ASR proportional gain to *C5-01 [ASR Proportional Gain 1]* or *C5-03 [ASR Proportional Gain 2]*. ON : C5-03 OFF : C5-01
7A	KEB Ride-Thru 2 Activate (N.C.)	V/f OLV/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/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/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/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.
80	HAND Mode	V/f OLV/PM EZOLV Sets the function to operate the drive in HAND Mode. ON : Drive is operating in HAND Mode. Frequency reference source is determined by *Y5-01 [HAND Frequency Reference Source]* and *Y5-02 [HAND Frequency Reference 1]*. OFF : Drive is not set to be in HAND Mode.
81	HAND Mode 2	V/f OLV/PM EZOLV Sets the function to operate the drive in HAND Mode 2. ON : Drive is operating in HAND Mode 2. Frequency reference is determined by *Y5-05 [HAND Frequency Reference 2]* . OFF : Drive is not set to be in HAND Mode 2.
82	PI Switch to Aux	V/f OLV/PM EZOLV Sets *YF-xx [PI Auxiliary Control]* parameters as primary PI loop parameters and disables *b5-xx [PID Control]*. **Note:** When this input is active, *YF-xx [PI Auxiliary Control]* parameters will always be the primary PI loop parameters. Parameter *YF-20 [PI Aux Main PI Speed Control]* does not have an effect.
88	Volute Thermostat Fault	V/f OLV/PM EZOLV Sets the drive to show the *VLTS [Volute Thermostat Fault]* when the input terminal is ON. **Note:** This function is active when the drive is running.
90 - 97	DWEZ Digital Inputs 1 to 8	V/f OLV/PM EZOLV Sets digital inputs used with DriveWorksEZ. Refer to the DriveWorksEZ online manual for more information.
9F	DWEZ Disable	V/f OLV/PM EZOLV Sets operation of the DriveWorksEZ program saved in the drive. ON : Disabled OFF : Enabled **Note:** Set *A1-07 = 2 [DriveWorksEZ Function Selection = Enabled/Disabled wDigital Input]* to use this function.
A8	PI2 Control Disable	V/f OLV/PM EZOLV Sets the command to disable the PI2 Control function. Parameter *S3-12 [PI2 Control Disable Mode Sel]* sets the output performance. ON : Enabled OFF : Disabled
AA	PI2 Control Inverse Operation	V/f OLV/PM EZOLV Sets the command to change the sign of the PI2 Control input.
AB	PI2 Control Integral Reset	V/f OLV/PM EZOLV Sets the command to reset the PI2 Control integral value. **Note:** This input has priority over *H1-xx = AC [MFDI Function Selection = PI2 Control Integral Hold]*.

Setting Value	Function	Description
AC	PI2 Control Integral Hold	V/f OLV/PM EZOLV Sets the command to lock the PI2 Control integral value.
AD	Select PI2 Control PI Parameters	V/f OLV/PM EZOLV Sets the command to use the *S3-06 [PI2 Control Proportional Gain]* and *S3-07 [PI2 Control Integral Time]* values instead of the *b5-02 [Proportional Gain (P)]* and *b5-03 [Integral Time (I)]* values. Set *S3-01 = 0 [PI2 Control Enable Selection = Disabled]* to enable this function. **Note:** This multi-function input does not have an effect on PI2 Control. Use this input for the primary PI controller (*b5-xx*).
AF	Emergency Override FWD	V/f OLV/PM EZOLV Sets the command to use the speed set in *S6-02 [Emergency Override Ref Selection]* to run the drive in the forward direction.
B0	Emergency Override REV	V/f OLV/PM EZOLV Sets the command to use the speed set in *S6-02 [Emergency Override Ref Selection]* to run the drive in the reverse direction.
B8	Low City Pressure	V/f OLV/PM EZOLV Sets the command to show that there is not sufficient pressure at the inlet to the pump. OFF : Insufficient pressure is present on the inlet to the pump
B9	Disable Pre-charge	V/f OLV/PM EZOLV Sets the command to disable the Pre-charge function. ON : Pre-charge function is disabled
BB	Low Water Level	V/f OLV/PM EZOLV Sets the drive to show an *LWL [Low Water Level]* fault when the input terminal is ON. ON : Low Water Level Fault OFF : Reservoir/Tank is filled to normal level **Note:** • When *Y1-36 = 0 [High/Low Water DI Fault Det Sel = During Run]* , the drive detects an *LWL* fault when the drive is in operation including Sleep Boost and Feedback Drop Detection. • The drive will not detect an *LWL* fault when the drive is in JOG, Pre-Charge, or Emergency Override. • While in Pre-Charge, when you close the Low Water Level digital input, the drive will exit out of Pre-Charge immediately and ignore the *Y4-03 [Pre-Charge Time]* setting.
BC	High Water Level	V/f OLV/PM EZOLV Sets the drive to show an *HWL [High Water Level]* fault when the input terminal is ON. ON : High Water Level Fault OFF : Reservoir/Tank is filled to normal level. **Note:** • When *Y1-36 = 0 [High/Low Water DI Fault Det Sel = During Run]* , the drive detects an *HWL* fault when the drive is in operation including Sleep Boost and Feedback Drop Detection. • The drive will not detect an *HWL* fault when the drive is in JOG, Pre-Charge, or Emergency Override.
BD	Remote Drive Disable	V/f OLV/PM EZOLV Sets the function to stop or prohibit the drive operation when the input terminal is ON. ON : Stops and prohibits the drive from running. OFF : If MFDI was previously ON, drive will enter Pre-Charge mode if it is programmed. **Note:** • Remote Drive Disable function is disabled during Emergency Override. • These functions will activate even when the Remote Drive Disable function is enabled: –*H1-xx = 50 [MFDI Function Selection = Motor Pre-heat 2]* –*H1-xx = 60 [MFDI Function Selection = DC Injection Braking Command]*
BE	Single Phase Converter Ready NC	V/f OLV/PM EZOLV Sets the function to send a signal from Single Phase Converter to the attached drive that the converter is in a NOT READY or FAULTED state when the input terminal is OFF. ON : Single Phase Converter is in a normal state. OFF : Single Phase Converter is in a NOT READY or FAULTED state. **Note:** You can program this function to *H1-01 to H1-08 [Terminal S1 to S8 Function Select]*, but you cannot program this function to: • *H1-40 to H1-42 [Extend MFDI1 to MFDI3 Function Selection]* • *H7-01 to H7-04 [Virtual Multi-Function Input 1 to 4]*
BF	Reset Accumulation	V/f OLV/PM EZOLV Sets the function to reset the accumulated volume to zero. ON : Accumulated volume will be reset to zero (and held at zero if digital input remains closed). OFF : Accumulation will function normally if programmed.
C0	Dedicated Multi-Setpoint YA-02	V/f OLV/PM EZOLV Sets the function to set the PID setpoint to *YA-02 [Setpoint 2]*. ON : *YA-02 [Setpoint 2]* is PID setpoint. OFF : *YA-01 [Setpoint 1]* is PID setpoint. **Note:** If you use this function and one of *H1-xx = C7, C8, or C9 [PID Setpoint Selection 1, 2, or 3]* at the same time, the drive will detect an *oPE03 [Multi-Function Input Setting Err]*.

Setting Value	Function	Description
C1	Dedicated Multi-Setpoint YA-03	V/f OLV/PM EZOLV Sets the function to set the PID setpoint to *YA-03 [Setpoint 3]*. ON : *YA-03 [Setpoint 3]* is PID setpoint. OFF : *YA-01 [Setpoint 1]* is PID setpoint. **Note:** If you use this function and one of *H1-xx = C7, C8, or C9 [PID Setpoint Selection 1, 2, or 3]* at the same time, the drive will detect an *oPE03 [Multi-Function Input Setting Err]*.
C2	Dedicated Multi-Setpoint YA-04	V/f OLV/PM EZOLV Sets the function to set the PID setpoint to *YA-04 [Setpoint 4]*. ON : *YA-04 [Setpoint 4]* is PID setpoint. OFF : *YA-01 [Setpoint 1]* is PID setpoint. **Note:** If you use this function and one of *H1-xx = C7, C8, or C9 [PID Setpoint Selection 1, 2, or 3]* at the same time, the drive will detect an *oPE03 [Multi-Function Input Setting Err]*.
C3	Dedicated Multi-Setpoint YA-05	V/f OLV/PM EZOLV Sets the function to set the PID setpoint to *YA-05 [Setpoint 5]*. ON : *YA-05 [Setpoint 5]* is PID setpoint. OFF : *YA-01 [Setpoint 1]* is PID setpoint. **Note:** If you use this function and one of *H1-xx = C7, C8, or C9 [PID Setpoint Selection 1, 2, or 3]* at the same time, the drive will detect an *oPE03 [Multi-Function Input Setting Err]*.
C4	Dedicated Multi-Setpoint YA-06	V/f OLV/PM EZOLV Sets the function to set the PID setpoint to *YA-06 [Setpoint 6]*. ON : *YA-06 [Setpoint 6]* is PID setpoint. OFF : *YA-01 [Setpoint 1]* is PID setpoint. **Note:** If you use this function and one of *H1-xx = C7, C8, or C9 [PID Setpoint Selection 1, 2, or 3]* at the same time, the drive will detect an *oPE03 [Multi-Function Input Setting Err]*.
C5	Dedicated Multi-Setpoint YA-07	V/f OLV/PM EZOLV Sets the function to set the PID setpoint to *YA-07 [Setpoint 7]*. ON : *YA-07 [Setpoint 7]* is PID setpoint. OFF : *YA-01 [Setpoint 1]* is PID setpoint. **Note:** If you use this function and one of *H1-xx = C7, C8, or C9 [PID Setpoint Selection 1, 2, or 3]* at the same time, the drive will detect an *oPE03 [Multi-Function Input Setting Err]*.
C6	Dedicated Multi-Setpoint YA-08	V/f OLV/PM EZOLV Sets the function to set the PID setpoint to *YA-08 [Setpoint 8]*. ON : *YA-08 [Setpoint 8]* is PID setpoint. OFF : *YA-01 [Setpoint 1]* is PID setpoint. **Note:** If you use this function and one of *H1-xx = C7, C8, or C9 [PID Setpoint Selection 1, 2, or 3]* at the same time, the drive will detect an *oPE03 [Multi-Function Input Setting Err]*.
C7	PID Setpoint Selection 1	V/f OLV/PM EZOLV Sets the function to switch the PID setpoint to *YA-02 [Setpoint 2]*, *YA-04 [Setpoint 4]*, *YA-06 [Setpoint 6]*, or *YA-08 [Setpoint 8]*. Set this function, *H1-xx = C8 [PID Setpoint Selection 2]*, and *H1-xx = C9 [PID Setpoint Selection 3]* at the same time. ON : Sets the function to switch the PID setpoint to *YA-02 [Setpoint 2], YA-04 [Setpoint 4], YA-06 [Setpoint 6]*, or *YA-08 [Setpoint 8]*. OFF : Sets the PID setpoint according to status of all setpoint selection MFDIs. **Note:** If you use this function and one of *H1-xx = C0 to C6 [Dedicated Multi-Setpoint YA-02 to YA-08]* at the same time, the drive will detect an *oPE03 [Multi-Function Input Setting Err]*.
C8	PID Setpoint Selection 2	V/f OLV/PM EZOLV Sets the function to switch the PID setpoint to *YA-03 [Setpoint 3]*, *YA-04 [Setpoint 4]*, *YA-07 [Setpoint 7]*, or *YA-08 [Setpoint 8]*. Set this function, *H1-xx = C7 [PID Setpoint Selection 1]*, and *H1-xx = C9 [PID Setpoint Selection 3]* at the same time. ON : Sets the function to switch the PID setpoint to *YA-03 [Setpoint 3], YA-04 [Setpoint 4], YA-07 [Setpoint 7],* or *YA-08 [Setpoint 8]*. OFF : Sets the PID setpoint according to status of all setpoint selection MFDIs. **Note:** If you use this function and one of *H1-xx = C0 to C6 [Dedicated Multi-Setpoint YA-02 to YA-08]* at the same time, the drive will detect an *oPE03 [Multi-Function Input Setting Err]*.

Setting Value	Function	Description
C9	PID Setpoint Selection 3	V/f OLV/PM EZOLV Sets the function to switch the PID setpoint to *YA-05 [Setpoint 5]*, *YA-06 [Setpoint 6]*, *YA-07 [Setpoint 7]*, or *YA-08 [Setpoint 8]*. Set this function, *H1-xx = C7 [PID Setpoint Selection 1]*, and *H1-xx = C8 [PID Setpoint Selection 2]* at the same time. ON : Sets the function to switch the PID setpoint to *YA-05 [Setpoint 5], YA-06 [Setpoint 6], YA-07 [Setpoint 7],* or *YA-08 [Setpoint 8]*. OFF : Sets the PID setpoint according to status of all setpoint selection MFDIs. **Note:** If you use this function and one of *H1-xx = C0 to C6 [Dedicated Multi-Setpoint YA-02 to YA-08]* at the same time, the drive will detect an *oPE03 [Multi-Function Input Setting Err]*.
188	!Volute Thermostat Fault	V/f OLV/PM EZOLV Sets the drive to show the *VLTS [Volute Thermostat Fault]* when the input terminal is OFF. **Note:** This function is active when the drive is running.
190 -197	!DWEZ Digital Inputs 1 to 8	V/f OLV/PM EZOLV Sets digital inputs used with DriveWorksEZ. Refer to the DriveWorksEZ online manual for more information.
19F	!DWEZ Disable	V/f OLV/PM EZOLV Sets operation of the DriveWorksEZ program saved in the drive. ON : Enabled OFF : Disabled **Note:** Set *A1-07 = 2 [DriveWorksEZ Function Selection = Enabled/Disabled wDigital Input]* to use this function.
1A8	!PI2 Control Disable	V/f OLV/PM EZOLV Sets the command to disable the PI2 Control function. Parameter *S3-12 [PI2 Control Disable Mode Sel]* sets the output performance. ON : Disabled OFF : Enabled
1B8	!Low City Pressure	V/f OLV/PM EZOLV Sets the command to show that there is not sufficient pressure at the inlet to the pump. ON : Insufficient pressure is present on the inlet to the pump
1BB	!Low Water Level	V/f OLV/PM EZOLV Sets the drive to show an *LWL [Low Water Level]* fault when the input terminal is OFF. ON : Reservoir/Tank is filled to normal level. OFF : Low Water Level Fault **Note:** • The drive detects an *LWL* fault when the drive is running including Sleep Boost and Feedback Drop Detection. • The drive will not detect an *LWL* fault when the drive is in JOG, Pre-Charge, or Emergency Override. • While in Pre-Charge, when you close the Low Water Level digital input, the drive will exit out of Pre-Charge immediately and ignore the *Y4-03 [Pre-Charge Time]* setting.
1BC	!High Water Level	V/f OLV/PM EZOLV Sets the drive to show an *HWL [High Water Level]* fault when the input terminal is OFF. ON : Reservoir/Tank is filled to normal level. OFF : High Water Level Fault **Note:** • The drive detects an *HWL* fault when the drive is running. • The drive will not detect an *HWL* fault when the drive is stopped, sleeping, or in Emergency Override.
1BD	!Remote Drive Disable	V/f OLV/PM EZOLV Sets the function to stop or prohibit the drive operation when the input terminal is OFF. ON : If MFDI was previously ON, drive will enter Pre-Charge mode if it is programmed. OFF : Stops and prohibits the drive from running. **Note:** • Remote Drive Disable function is disabled during Emergency Override. • These functions will activate even when the Remote Drive Disable function is enabled: –*H1-xx = 50 [MFDI Function Selection = Motor Pre-heat 2]* –*H1-xx = 60 [MFDI Function Selection = DC Injection Braking Command]*

◆ H2: Digital Outputs

No. (Hex.)	Name	Description	Default (Range)
H2-01 (040B)	Term M1-M2 Function Selection	V/f OLV/PM EZOLV Sets the function for MFDO terminal M1-M2. **Note:** When you do not use the terminal or when you use the terminal in through mode, set this parameter to *F*.	37 (0 - 1FF)
H2-02 (040C)	Term M3-M4 Function Selection	V/f OLV/PM EZOLV Sets the function for MFDO terminal M3-M4. **Note:** When you do not use the terminal or when you use the terminal in through mode, set this parameter to *F*.	42 (0 - 1FF)
H2-03 (040D)	Term MD-ME-MF Function Selection	V/f OLV/PM EZOLV Sets the function for MFDO terminal MD-ME-MF. **Note:** When you do not use this terminal, or when you will use the terminal in through mode, set this parameter to *F*.	E (0 - 1FF)
H2-06 (0437)	Watt Hour Output Unit Selection	V/f OLV/PM EZOLV Sets the unit for the output signal when *H2-01 to H2-03 = 39 [MFDO Function Selection = Watt Hour Pulse Output]*. 0 : 0.1 kWh units 1 : 1 kWh units 2 : 10 kWh units 3 : 100 kWh units 4 : 1000 kWh units	0 (0 - 4)
H2-07 (0B3A) Expert	Modbus Register 1 Address Select	V/f OLV/PM EZOLV Sets the address of the MEMOBUS/Modbus register output to the MFDO terminal.	0001 (0001 - 1FFF)
H2-08 (0B3B) Expert	Modbus Register 1 Bit Select	V/f OLV/PM EZOLV Sets the bit of the MEMOBUS/Modbus register output to the MFDO terminal.	0000 (0000 - FFFF)
H2-09 (0B3C) Expert	Modbus Register 2 Address Select	V/f OLV/PM EZOLV Sets the address of the MEMOBUS/Modbus register output to the MFDO terminal.	0001 (0001 - 1FFF)
H2-10 (0B3D) Expert	Modbus Register 2 Bit Select	V/f OLV/PM EZOLV Sets the bit of the MEMOBUS/Modbus register output to the MFDO terminal.	0000 (0000 - FFFF)
H2-40 (0B58) Expert	Mbus Reg 15E0h bit0 Output Func	V/f OLV/PM EZOLV Sets the MFDO for bit 0 of MEMOBUS register 15E0 (Hex.).	F (0 - 1FF)
H2-41 (0B59) Expert	Mbus Reg 15E0h bit1 Output Func	V/f OLV/PM EZOLV Sets the MFDO for bit 1 of MEMOBUS register 15E0 (Hex.).	F (0 - 1FF)
H2-42 (0B5A) Expert	Mbus Reg 15E0h bit2 Output Func	V/f OLV/PM EZOLV Sets the MFDO for bit 2 of MEMOBUS register 15E0 (Hex.).	F (0 - 1FF)
H2-60 (1B46) Expert	Term M1-M2 Secondary Function	V/f OLV/PM EZOLV Sets the second function for terminal M1-M2. Outputs the logical calculation results of the terminals assigned to functions by *H2-01 [Term M1-M2 Function Selection]*.	F (0 - FF)
H2-61 (1B47) Expert	Terminal M1-M2 Logical Operation	V/f OLV/PM EZOLV Sets the logical operation for the functions set in *H2-01 [Term M1-M2 Function Selection]* and *H2-60 [Term M1-M2 Secondary Function]*.	0 (0 - 8)
H2-62 (1B48) Expert	Terminal M1-M2 Delay Time	V/f OLV/PM EZOLV Sets the minimum on time used to output the logical calculation results from terminal M1-M2.	0.1 s (0.0 - 25.0 s)
H2-63 (1B49) Expert	Term M3-M4 Secondary Function	V/f OLV/PM EZOLV Sets the second function for terminal M3-M4. Outputs the logical calculation results of the terminals assigned to functions by *H2-02 [Term M3-M4 Function Selection]*.	F (0 - FF)

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

■ H2-xx: MFDO Setting Values

Setting Value	Function	Description
0	During Run	V/f OLV/PM EZOLV The terminal activates when you input a Run command and when the drive is outputting voltage. ON : Drive is running OFF : Drive is stopping
1	Zero Speed	V/f OLV/PM EZOLV The terminal activates when the output frequency < *E1-09 [Minimum Output Frequency]*. **Note:** Parameter *E1-09* is the reference in all control methods. ON : Output frequency < *E1-09*. OFF : Output frequency ≥ *E1-09*.
2	Speed Agree 1	V/f OLV/PM EZOLV The terminal activates when the output frequency is in the range of the frequency reference ± *L4-02 [Speed Agree Detection Width]*. **Note:** The detection function operates in the two motor rotation directions. 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/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 in the range 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*" or the range of frequency reference ± *L4-02*.
4	Frequency Detection 1	V/f OLV/PM EZOLV The terminal deactivates when the output frequency > "*L4-01 [Speed Agree Detection Level]* + *L4-02 [Speed Agree Detection Width]*". After the terminal deactivates, the terminal stays deactivated until the output frequency is at the value of *L4-01*. **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 < *L4-01*, or the output frequency ≤ "*L4-01* + *L4-02*" OFF : The output frequency > "*L4-01* + *L4-02*"
5	Frequency Detection 2	V/f OLV/PM EZOLV The terminal activates when the output frequency > *L4-01 [Speed Agree Detection Level]*. After the terminal activates, the terminal stays activated until the output frequency is at the value of "*L4-01* - *L4-02 [Speed Agree Detection Width]*". **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 > *L4-01* OFF : The output frequency < "*L4-01* - *L4-02*", or the output frequency ≤ *L4-01*
6	Drive Ready	V/f OLV/PM EZOLV The terminal activates when the drive is ready and running.

Setting Value	Function	Description
7	DC Bus Undervoltage	V/f OLV/PM EZOLV The terminal activates when the DC bus voltage or control circuit power supply is at the voltage set in *L2-05 [Undervoltage Detection Lvl (Uv1)]* or less. The terminal also activates when there is a fault with the DC bus voltage. ON : The DC bus voltage ≤ *L2-05* OFF : The DC bus voltage > *L2-05*
8	During Baseblock (N.O.)	V/f OLV/PM EZOLV The terminal activates during baseblock. When the drive is in baseblock, the drive output transistor stops switching and does not make DC bus voltage. ON : During baseblock OFF : The drive is not in baseblock.
9	Frequency Reference from Keypad	V/f OLV/PM EZOLV Shows the selected frequency reference source. ON : The keypad is the frequency reference source. OFF : Parameter *b1-01 [Frequency Reference Selection 1]* is the frequency reference source.
B	Torque Detection 1 (N.O.)	V/f OLV/PM EZOLV The terminal activates when the drive detects overtorque or undertorque. ON : The output current/torque > *L6-02 [Torque Detection Level 1]*, or the output current/torque < *L6-02* for longer than the time set in *L6-03 [Torque Detection Time 1]*.
C	Frequency Reference Loss	V/f OLV/PM EZOLV The terminal activates when the drive detects a loss of frequency reference.
E	Fault	V/f OLV/PM EZOLV The terminal activates when the drive detects a fault. **Note:** The terminal will not activate for *CPF00* and *CPF01 [Control Circuit Error]* faults.
F	Not Used	V/f OLV/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 you do not configure signals from the PLC.
10	Alarm	V/f OLV/PM EZOLV The terminal activates when the drive detects a minor fault.
11	Fault Reset Command Active	V/f OLV/PM EZOLV The terminal activates when the drive receives the Reset command from the control circuit terminal, serial communications, or the communication option.
12	Timer Output	V/f OLV/PM EZOLV Sets the terminal as the timer output. Use this setting with the timer input set in *H1-xx = 18 [MFDI Function Selection = Timer Function]*.
13	Speed Agree 2	V/f OLV/PM EZOLV The terminal activates when the output frequency is in the range of the frequency reference ± *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 ± *L4-04*". OFF : The output frequency is not in the range of "frequency reference ± *L4-04*".
14	User-Set Speed Agree 2	V/f OLV/PM EZOLV The terminal activates when the output frequency is in the range of *L4-03 [Speed Agree Detection Level (+/-)]* ± *L4-04 [Speed Agree Detection Width (+/-)]* and in the range of the frequency reference ± *L4-04*. **Note:** The detection level set in *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* ± *L4-04*" and the range of frequency reference ± *L4-04*. OFF : The output frequency is not in the range of "*L4-03* ± *L4-04*" or the range of frequency reference ± *L4-04*.
15	Frequency Detection 3	V/f OLV/PM EZOLV The terminal deactivates when the output frequency > "*L4-03 [Speed Agree Detection Level (+/-)]* + *L4-04 [Speed Agree Detection Width (+/-)]*". After the terminal deactivates, the terminal stays deactivated until the output frequency is at the value of *L4-03*. **Note:** The detection level set in *L4-03* is a signed value. The drive will only detect in one direction. ON : The output frequency < *L4-03*, or the output frequency ≤ *L4-03* + *L4-04*. OFF : The output frequency > "*L4-03* + *L4-04*".
16	Frequency Detection 4	V/f OLV/PM EZOLV The terminal activates when the output frequency > *L4-03 [Speed Agree Detection Level (+/-)]*. After the terminal activates, the terminal stays activated until the output frequency is at the value of "*L4-03 - L4-04*". **Note:** The detection level set in *L4-03* is a signed value. The drive will only detect in one direction. ON : The output frequency > *L4-03*. OFF : The output frequency < "*L4-03 - L4-04*", or the output frequency ≤ *L4-03*.

Setting Value	Function	Description
17	Torque Detection 1 (N.C.)	V/f OLV/PM EZOLV The terminal deactivates when the drive detects overtorque or undertorque. OFF : The output current/torque > *L6-02 [Torque Detection Level 1]*, or the output current/torque < *L6-02* for longer than the time set in *L6-03 [Torque Detection Time 1]*.
18	Torque Detection 2 (N.O.)	V/f OLV/PM EZOLV The terminal activates when the drive detects overtorque or undertorque. ON : The output current/torque > *L6-05 [Torque Detection Level 2]*, or the output current/torque < *L6-05* for longer than the time set in *L6-06 [Torque Detection Time 2]*.
19	Torque Detection 2 (N.C.)	V/f OLV/PM EZOLV The terminal deactivates when the drive detects overtorque or undertorque. OFF : The output current/torque > *L6-05 [Torque Detection Level 2]*, or the output current/torque < *L6-05* for longer than the time set in *L6-06 [Torque Detection Time 2]*.
1A	During Reverse	V/f OLV/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/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/PM EZOLV The terminal activates when you select motor 2. ON : Motor 2 Selected OFF : Motor 1 Selected
1E	Executing Auto-Restart	V/f OLV/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/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/PM EZOLV The terminal activates when the drive heatsink temperature is at the level set with *L8-02 [Overheat Alarm Level]*.
21	Safe Torque OFF	V/f OLV/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
2F	Maintenance Notification	V/f OLV/PM EZOLV The terminal activates when drive components are at their estimated maintenance period. Tells you about the maintenance period for these items: • IGBT • Cooling Fan • Capacitor • Soft charge bypass relay
30	During Torque Limit	V/f OLV/PM EZOLV The terminal activates when the torque reference is the torque limit set with *L7 parameters*, *H3-02, H3-06, or H3-10 [MFAI Function Selection]*.
37	During Frequency Output	V/f OLV/PM EZOLV The terminal activates when the drive outputs frequency. ON : The drive is outputting frequency. OFF : The drive is not outputting frequency.
38	Drive Enabled	V/f OLV/PM EZOLV This terminal activates when the *H1-xx = 6A [Drive Enable] or 70 [Drive Enable No Run Cycle]* terminal activates.
39	Watt Hour Pulse Output	V/f OLV/PM EZOLV Outputs the pulse that shows the watt hours.
3A	Drive Overheat Alarm	V/f OLV/PM EZOLV The terminal activates when the drive heatsink temperature is at the *L8-02 [Overheat Alarm Level]* setting while *L8-03 = 4 [Overheat Pre-Alarm Selection = Operate at Reduced Speed (L8-19)]* and the drive is running.
3D	During Speed Search	V/f OLV/PM EZOLV The terminal activates when the drive is doing speed search.

Setting Value	Function	Description
42	Pressure Reached	V/f OLV/PM EZOLV The terminal activates when the pressure feedback is at the Pressure Setpoint.
4A	During KEB Ride-Thru	V/f OLV/PM EZOLV The terminal activates during KEB Ride-Thru.
4B	During Short Circuit Braking	V/f OLV/PM EZOLV The terminal activates during Short Circuit Braking. **Note:** When *A1-02 = 8 [Control Method Selection = EZOLV]*, this function is available only when you use a PM motor.
4C	During Fast Stop	V/f OLV/PM EZOLV The terminal activates when the fast stop is in operation.
4D	oH Pre-Alarm Reduction Limit	V/f OLV/PM EZOLV The terminal activates when *L8-03 = 4 [Overheat Pre-Alarm Selection = Operate at Reduced Speed (L8-19)]* and *oH [Heatsink Overheat]* does not clear after the drive decreases the frequency for 10 cycles.
51	Sequence Timer 1	V/f OLV/PM EZOLV Sets the function to activate Sequence Timer 1. ON : Sequence Timer 1 is active.
52	Sequence Timer 2	V/f OLV/PM EZOLV Sets the function to activate Sequence Timer 2. ON : Sequence Timer 2 is active.
53	Sequence Timer 3	V/f OLV/PM EZOLV Sets the function to activate Sequence Timer 3. ON : Sequence Timer 3 is active.
54	Sequence Timer 4	V/f OLV/PM EZOLV Sets the function to activate Sequence Timer 4. ON : Sequence Timer 4 is active.
58	UL6 Underload Detected	V/f OLV/PM EZOLV The terminal activates when the drive detected *UL6 [Underload or Belt Break Detected]*.
60	Internal Cooling Fan Failure	V/f OLV/PM EZOLV The terminal activates when the drive detects a cooling fan failure in the drive.
61	Pole Position Detection Complete	V/f OLV/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/PM EZOLV The terminal activates when the bit specified by *H2-08 [Modbus Register 1 Bit Select]* for the MEMOBUS register address set with *H2-07 [Modbus Register 1 Address Select]* activates.
63	Modbus Reg 2 Status Satisfied	V/f OLV/PM EZOLV The terminal activates when the bit specified by *H2-10 [Modbus Register 2 Bit Select]* for the MEMOBUS register address set with *H2-09 [Modbus Register 2 Address Select]* activates.
69	External Power 24V Supply	V/f OLV/PM EZOLV The terminal activates when there is an external 24V power supply between terminals PS-AC. ON : The external 24V power supply is supplying power. OFF : The external 24V power supply is not supplying power.
6A	Data Logger Error	V/f OLV/PM EZOLV The terminal activates when the drive detects a *LoG [Com Error / Abnormal SD card]*.
71	Low PI2 Control Feedback Level	V/f OLV/PM EZOLV The terminal activates when the PI2 Control Feedback Level is less than *S3-13 [PI2 Control Low Feedback Lvl]*.
72	High PI2 Control Feedback Level	V/f OLV/PM EZOLV The terminal activates when the PI2 Control Feedback Level is more than *S3-15 [PI2 Control High Feedback Lvl]*.
89	Output Current Lim	V/f OLV/PM EZOLV The terminal activates when the output current limit is limiting the drive output speed.
8A	Pump 2 Control	V/f OLV/PM EZOLV Sets the function to do a contactor control for a second pump. ON : Pump 2 Running **Note:** You can use this function only when you set *Y1-01 = 1 [Multiplex Mode = Contactor Multiplex]*.

Setting Value	Function	Description
8B	Pump 3 Control	V/f OLV/PM EZOLV Sets the function to do a contactor control for a third pump. ON : Pump 3 Running **Note:** You can use this function only when you set *Y1-01 = 1 [Multiplex Mode = Contactor Multiplex]* and *Y3-00 [Number of Lag Pumps in System] > 1*.
8C	Pump 4 Control	V/f OLV/PM EZOLV Sets the function to do a contactor control for a fourth pump. ON : Pump 4 Running **Note:** You can use this function only when you set *Y1-01 = 1 [Multiplex Mode = Contactor Multiplex]* and *Y3-00 [Number of Lag Pumps in System]> 2*.
8D	Pump 5 Control	V/f OLV/PM EZOLV Sets the function to do a contactor control for a fifth pump. ON : Pump 5 Running **Note:** You can use this function only when you set *Y1-01 = 1 [Multiplex Mode = Contactor Multiplex]* and *Y3-00 [Number of Lag Pumps in System] > 3*.
8E	Pump 6 Control	V/f OLV/PM EZOLV Sets the function to do a contactor control for a sixth pump. ON : Pump 6 Running **Note:** You can use this function only when you set *Y1-01 = 1 [Multiplex Mode = Contactor Multiplex]* and *Y3-00 [Number of Lag Pumps in System] > 4*.
90 to 92	DWEZ Digital Outputs 1 to 3	V/f OLV/PM EZOLV Sets the DriveWorksEZ digital output. Refer to the DriveWorksEZ online manual for more information.
94	Loss of Prime	V/f OLV/PM EZOLV The terminal activates when the drive is in an *LOP [Loss of Prime]* condition.
95	Volute Thermostat Fault	V/f OLV/PM EZOLV The terminal activates when the terminal set for *H1-xx = 88 [MFDI Function Selection = Volute Thermostat Fault]* is active.
96	High Feedback	V/f OLV/PM EZOLV The terminal activates when the drive is in a High Feedback Condition as specified by *Y1-11 [High Feedback Level]* and *Y1-12 [High Feedback Lvl Fault Dly Time]* and when the drive detects an *HFB [High Feedback Sensed]* fault or an *HIFB [High Feedback Sensed]* alarm.
97	Low Feedback	V/f OLV/PM EZOLV The terminal activates when the drive is in a Low Feedback Condition as specified by *Y1-08 [Low Feedback Level]* and *Y1-09 [Low Feedback Lvl Fault Dly Time]* and when the drive detects an *LFB [Low Feedback Sensed]* fault or an *LOFB [High Feedback Sensed]* alarm.
9E	Low PI Auxiliary Control Level	V/f OLV/PM EZOLV The terminal activates when the PI Aux Feedback Level is less than *YF-09 [PI Aux Control Low Level Detect]* or if the drive detects an *LoAux [Low PI Aux Feedback Level]* fault.
9F	High PI Auxiliary Control Level	V/f OLV/PM EZOLV The terminal activates when the PI Aux Feedback Level is more than *YF-12 [PI Aux Control High Level Detect]* or if the drive detects an *HiAux [High PI Aux Feedback Level]* fault.
A0 to A7	DWEZ Extended Digital Outputs 1 to 8	V/f OLV/PM EZOLV Sets the digital output for the DriveWorksEZ DO-A3 option card. Refer to the DriveWorksEZ online manual for more information.
AA	Utility Delay	V/f OLV/PM EZOLV The terminal activates when the drive is stopped and is waiting for the timer set in *Y4-17 [Utility Start Delay]* to expire.
AB	Thrust Mode	V/f OLV/PM EZOLV The terminal activates when the output frequency is between 0.0 Hz and the value set in *Y4-12 [Thrust Frequency]* and the Thrust Bearing function is active.
AC	Setpoint Not Maintained	V/f OLV/PM EZOLV The terminal activates when the drive detects *NMS [Setpoint Not Met]* condition.

Setting Value	Function	Description
B8	Pump Fault	V/f OLV/PM EZOLV The terminal activates when one of these faults is active: • *LFB Low Feedback Sensed* • *HFB High Feedback Sensed* • *LWL Low Water Level* • *HWL High Water Level* • *POC Pump Over Cycle* • *LowWL Low Water Level* • *VLTS Volute Thermostat Fault* • *NMS Setpoint Not Met* • *EFx Pump Fault (Terminal Sx)*
B9	Transducer Loss	V/f OLV/PM EZOLV The terminal activates when the current into the analog input associated with PID feedback is more than 21 mA or less than 3 mA, or an *FDBKL [WIRE Break]* Fault or an *FDBKL [Feedback Loss Wire Break]* Alarm is active.
BA	WL/SP/PIAux Control Active	V/f OLV/PM EZOLV The terminal activates when Water Level / Suction Pressure / PI Auxiliary Control is affecting the output speed.
BB	Differential Feedback Exceeded	V/f OLV/PM EZOLV The terminal activates when the difference between the PID Feedback and the value from the terminal set for *H3-xx = 2D [Differential Feedback]* is more than *Y4-18 [Differential Level]* for the time set in *Y4-19 [Differential Lvl Detection Time]*.
BC	Sleep Active	V/f OLV/PM EZOLV The terminal activates when the Sleep function is active and the drive is not operating. **Note:** The terminal will not activate for Sleep Boost function.
BD	Start Delay	V/f OLV/PM EZOLV The terminal activates when the Feedback is more than the start level or the Feedback is less than the Inverse PID and the start timer is timing. **Note:** You must set *Y1-04 [Sleep Wake-up Level]* ≠ *0* and *Y1-05 [Sleep Wake-up Level Delay Time]* ≠ *0* to use this function.
BE	Pre-Charge	V/f OLV/PM EZOLV The terminal activates when the drive is in Pre-Charge Mode.
C0	HAND Mode	V/f OLV/PM EZOLV The terminal activates when the drive is in HAND Mode operation.
C1	AUTO Mode	V/f OLV/PM EZOLV The terminal activates when the drive is in AUTO Mode operation.
C2	OFF Mode	V/f OLV/PM EZOLV The terminal activates when the drive is in OFF Mode.
C3	Main Feedback Lost	V/f OLV/PM EZOLV The terminal activates when the drive loses the main PID feedback.
C4	Backup Feedback Lost	V/f OLV/PM EZOLV The terminal activates when the drive loses the backup PID feedback.
C5	De-Scale Active	V/f OLV/PM EZOLV Sets the drive to go into the De-Scale function when the output terminal is ON. ON : De-Scale is running **Note:** De-Scale function is disabled and will be reset during Emergency Override.
C6	Lube Pump	V/f OLV/PM EZOLV Sets the drive to go into the Lube Pump function when the output terminal is ON. ON : This will energize and delay the drive output for the time set in *Y4-31 [Lube Pump Time]* each time the drive is supposed to start. It will energize during Run when *Y4-30 = 1 [Lube Pump During Run = Active During Run]*.
C8	Low Flow	V/f OLV/PM EZOLV The terminal activates when the flow rate is less than *Y6-06 [Low Flow Level]* for *Y6-07 [Low Flow Detection Time]*.
C9	Accumulation Level	V/f OLV/PM EZOLV The terminal activates when the accumulated volume is at or above the level set in *Y6-11 to Y6-14*.
CA	High Flow	V/f OLV/PM EZOLV The terminal activates when the flow rate is higher than *Y6-17 [High Flow Level]* for *Y6-18 [High Flow Detection Time]*.
CB	Low Water Level	V/f OLV/PM EZOLV The terminal activates when the water level feedback is below *Yd-09 [Low Water Level Detection Level]*.
CC	Low Suction Pressure	V/f OLV/PM EZOLV The terminal activates when the Suction Pressure feedback is less than *YE-09 [Low Suction Pressure Det Level]*.

Setting Value	Function	Description
CD	High Suction Pressure	V/f OLV/PM EZOLV The terminal activates when the Suction Pressure feedback is higher than *YE-12 [High Suction Pressure Det Level]*.
CE	Anti-Jam/De-Rag Active	V/f OLV/PM EZOLV The terminal activates when the drive is running in Anti-Jam/De-Rag mode (configured by *Y7-xx*).
CF	Flow Rate Limit	V/f OLV/PM EZOLV The terminal activates when the flow rate (limit) is affecting output speed.
D3	Harmonic Filter Output	V/f OLV/PM EZOLV The terminal activates when the drive exceeds the speed/current conditions set in *Y4-50 [Harmonic Filter Output Selection]*. **Note:** You must set *n1-13 = 1 [DC Bus Stabilization Control = Enabled]* when you program this digital output.
D4	External Fan Switch	V/f OLV/PM EZOLV The terminal activates when the external fan is turned on when drive is running.
100	!During Run	V/f OLV/PM EZOLV The terminal deactivates when you input a Run command and when the drive is outputting voltage. ON : Drive is stopping OFF : Drive is running
101	!Zero Speed	V/f OLV/PM EZOLV The terminal deactivates when the output frequency < *E1-09 [Minimum Output Frequency]*. **Note:** Parameter *E1-09* is the reference in all control methods. ON : Output frequency ≥ value of *E1-09*. OFF : Output frequency < value of *E1-09*.
102	!Speed Agree 1	V/f OLV/PM EZOLV The terminal deactivates when the output frequency is in the range of the frequency reference ± *L4-02 [Speed Agree Detection Width]*. **Note:** The detection function operates in the two motor rotation directions. ON : The output frequency does not align with the frequency reference although the drive is running. OFF : The output frequency is in the range of "frequency reference ± *L4-02*".
103	!User-Set Speed Agree 1	V/f OLV/PM EZOLV The terminal deactivates 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 not in the range of "*L4-01* ± *L4-02*" or the range of frequency reference ± *L4-02*. OFF : The output frequency is in the range of "*L4-01* ± *L4-02*" and the range of frequency reference ± *L4-02*.
104	!Frequency Detection 1	V/f OLV/PM EZOLV The terminal activates when the output frequency > "*L4-01 [Speed Agree Detection Level]* + *L4-02 [Speed Agree Detection Width]*". After the terminal activates, the terminal stays activated until the output frequency is at the value of *L4-01*. **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 > "*L4-01* + *L4-02*" OFF : The output frequency < *L4-01*, or the output frequency ≤ "*L4-01* + *L4-02*"
105	!Frequency Detection 2	V/f OLV/PM EZOLV The terminal deactivates when the output frequency > *L4-01 [Speed Agree Detection Level]*. After the terminal deactivates, the terminal stays deactivated until the output frequency is at the value of "*L4-01 - L4-02 [Speed Agree Detection Width]*". **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 < "*L4-01 - L4-02*", or the output frequency ≤ *L4-01* OFF : The output frequency > *L4-01*
106	!Drive Ready	V/f OLV/PM EZOLV The terminal deactivates when the drive is ready and running.
107	!DC Bus Undervoltage	V/f OLV/PM EZOLV The terminal deactivates when the DC bus voltage or control circuit power supply is at the voltage set in *L2-05 [Undervoltage Detection Lvl (Uv1)]* or less. The terminal also deactivates when there is a fault with the DC bus voltage. ON : The DC bus voltage > *L2-05* OFF : The DC bus voltage ≤ *L2-05*
108	!During Baseblock (N.O.)	V/f OLV/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.

Setting Value	Function	Description
109	!Frequency Reference from Keypad	V/f OLV/PM EZOLV Shows the selected frequency reference source. ON : Parameter *b1-01 [Frequency Reference Selection 1]* is the frequency reference source. OFF : The keypad is the frequency reference source.
10B	!Torque Detection 1 (N.O.)	V/f OLV/PM EZOLV The terminal deactivates when the drive detects overtorque or undertorque. OFF : The output current/torque > *L6-02 [Torque Detection Level 1]*, or < *L6-02* for longer than the time set with *L6-03 [Torque Detection Time 1]*.
10C	!Frequency Reference Loss	V/f OLV/PM EZOLV The terminal deactivates when the drive detects a loss of frequency reference.
10E	!Fault	V/f OLV/PM EZOLV The terminal deactivates when the drive detects a fault. **Note:** The terminal will not deactivate for *CPF00* and *CPF01 [Control Circuit Error]* faults.
110	!Alarm	V/f OLV/PM EZOLV The terminal deactivates when the drive detects a minor fault.
111	!Fault Reset Command Active	V/f OLV/PM EZOLV The terminal deactivates when the drive receives the Reset command from the control circuit terminal, serial communications, or the communication option.
112	!Timer Output	V/f OLV/PM EZOLV Sets the terminal as the timer output. Use this setting with the timer input set in *H1-xx = 118 [MFDI Function Selection = !Timer Function]*.
113	!Speed Agree 2	V/f OLV/PM EZOLV The terminal deactivates when the output frequency is in the range of the frequency reference ± *L4-04 [Speed Agree Detection Width (+/-)]*. **Note:** The detection function operates in the two motor rotation directions. ON : The output frequency is not in the range of "frequency reference ± *L4-04*". OFF : The output frequency is in the range of "frequency reference ± *L4-04*".
114	!User-Set Speed Agree 2	V/f OLV/PM EZOLV The terminal deactivates when the output frequency is in the range of *L4-03 [Speed Agree Detection Level (+/-)]* ± *L4-04 [Speed Agree Detection Width (+/-)]* and in the range of the frequency reference ± *L4-04*. **Note:** The detection level set in *L4-03* is a signed value. The drive will only detect in one direction. ON : The output frequency is not in the range of "*L4-03* ± *L4-04*" or the range of frequency reference ± *L4-04*. OFF : The output frequency is in the range of "*L4-03* ± *L4-04*" and the range of frequency reference ± *L4-04*.
115	!Frequency Detection 3	V/f OLV/PM EZOLV The terminal activates when the output frequency > "*L4-03 [Speed Agree Detection Level (+/-)]* + *L4-04 [Speed Agree Detection Width (+/-)]*". After the terminal activates, the terminal stays activated until the output frequency is at the value of *L4-03*. **Note:** The detection level set in *L4-03* is a signed value. The drive will only detect in one direction. ON : The output frequency > "*L4-03* + *L4-04*" OFF : The output frequency < *L4-03*, or the output frequency ≤ "*L4-03* + *L4-04*"
116	!Frequency Detection 4	V/f OLV/PM EZOLV The terminal deactivates when the output frequency > *L4-03 [Speed Agree Detection Level (+/-)]*. After the terminal deactivates, the terminal stays deactivated until the output frequency is at the value of "*L4-03 - L4-04*". **Note:** The detection level set in *L4-03* is a signed value. The drive will only detect in one direction. ON : The output frequency < "*L4-03 - L4-04*", or the output frequency ≤ *L4-03* OFF : The output frequency > *L4-03*
117	!Torque Detection 1 (N.C.)	V/f OLV/PM EZOLV The terminal activates when the drive detects overtorque or undertorque. ON : The output current/torque > *L6-02 [Torque Detection Level 1]*, or the output current/torque < *L6-02* for longer than the time set in *L6-03 [Torque Detection Time 1]*.
118	!Torque Detection 2 (N.O.)	V/f OLV/PM EZOLV The terminal deactivates when the drive detects overtorque or undertorque. OFF : The output current/torque > *L6-05 [Torque Detection Level 2]*, or the output current/torque < *L6-05* for longer than the time set in *L6-06 [Torque Detection Time 2]*.
119	!Torque Detection 2 (N.C.)	V/f OLV/PM EZOLV The terminal activates when the drive detects overtorque or undertorque. ON : The output current/torque > *L6-05 [Torque Detection Level 2]*, or the output current/torque < *L6-05* for longer than the time set in *L6-06 [Torque Detection Time 2]*.

Setting Value	Function	Description
11A	!During Reverse	V/f OLV/PM EZOLV The terminal deactivates when the motor operates in the reverse direction. ON : The motor is operating in the forward direction or the motor stopped. OFF : The motor is operating in the reverse direction.
11B	!During Baseblock (N.C.)	V/f OLV/PM EZOLV The terminal activates during baseblock. When the drive is in baseblock, the drive output transistor stops switching and does not make DC bus voltage. ON : During baseblock. OFF : The drive is not in baseblock.
11C	!Motor 2 Selected	V/f OLV/PM EZOLV The terminal deactivates when motor 2 is selected. ON : Motor 1 Selection OFF : Motor 2 Selection
11E	!Executing Auto-Restart	V/f OLV/PM EZOLV The terminal deactivates when the Auto Restart function is trying to restart after a fault.
11F	!Motor Overload Alarm (oL1)	V/f OLV/PM EZOLV The terminal deactivates when the electronic thermal protection value of the motor overload protective function is a minimum of 90% of the detection level.
120	!Drive Overheat Pre-Alarm (oH)	V/f OLV/PM EZOLV The terminal deactivates when the drive heatsink temperature is at the level set with *L8-02 [Overheat Alarm Level]*.
121	!Safe Torque OFF	V/f OLV/PM EZOLV The terminal deactivates (safety stop state) when the safety circuit and safety diagnosis circuit are operating correctly and when terminals H1-HC and H2-HC are OFF (Open). ON : Safety circuit fault or RUN/READY OFF : Safety stop state
12F	!Maintenance Notification	V/f OLV/PM EZOLV The terminal deactivates 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
130	!During Torque Limit	V/f OLV/PM EZOLV The terminal deactivates when the torque reference is the torque limit set with *L7 parameters*, *H3-02, or H3-10 [MFAI Function Selection]*.
137	!During Frequency Output	V/f OLV/PM EZOLV The terminal deactivates when the drive outputs frequency. ON : The drive is not outputting frequency. OFF : The drive is outputting frequency.
138	!Drive Enabled	V/f OLV/PM EZOLV This terminal deactivates when the *H1-xx = 6A [Drive Enable] or 70 [Drive Enable No Run Cycle]* terminal deactivates.
139	!Watt Hour Pulse Output	V/f OLV/PM EZOLV Outputs the pulse that shows the watt hours.
13A	!Drive Overheat Alarm	V/f OLV/PM EZOLV The terminal deactivates when the drive heatsink temperature is at the *L8-02 [Overheat Alarm Level]* setting while *L8-03 = 4 [Overheat Pre-Alarm Selection = Operate at Reduced Speed (L8-19)]* and the drive is running.
13D	!During Speed Search	V/f OLV/PM EZOLV The terminal deactivates when the drive is doing speed search.
142	!Pressure Reached	V/f OLV/PM EZOLV The terminal deactivates when the pressure feedback is at the Pressure Setpoint.
14A	!During KEB Ride-Thru	V/f OLV/PM EZOLV The terminal deactivates during KEB Ride-Thru.
14B	!During Short Circuit Braking	V/f OLV/PM EZOLV The terminal deactivates during Short Circuit Braking. **Note:** When *A1-02 = 8 [Control Method Selection = EZOLV]*, this function is available only when you use a PM motor.
14C	!During Fast Stop	V/f OLV/PM EZOLV The terminal deactivates when the fast stop is in operation.

Setting Value	Function	Description
14D	!oH Pre-Alarm Reduction Limit	V/f OLV/PM EZOLV The terminal deactivates when *L8-03 = 4 [Overheat Pre-Alarm Selection = Operate at Reduced Speed (L8-19)]* and *oH [Heatsink Overheat]* does not clear after the drive decreases the frequency for 10 cycles.
151	!Sequence Timer 1	V/f OLV/PM EZOLV The terminal deactivates when Sequence Timer 1 is active.
152	!Sequence Timer 2	V/f OLV/PM EZOLV The terminal deactivates when Sequence Timer 2 is active.
153	!Sequence Timer 3	V/f OLV/PM EZOLV The terminal deactivates when Sequence Timer 3 is active.
154	!Sequence Timer 4	V/f OLV/PM EZOLV The terminal deactivates when Sequence Timer 4 is active.
158	!UL6 Underload Detected	V/f OLV/PM EZOLV The terminal deactivates when the drive detected *UL6 [Underload or Belt Break Detected]*.
160	!Internal Cooling Fan Failure	V/f OLV/PM EZOLV The terminal deactivates when the drive detects a cooling fan failure in the drive.
161	!Pole Position Detection Complete	V/f OLV/PM EZOLV The terminal deactivates when drive receives a Run command and the drive detects the motor magnetic pole position of the PM motor.
162	!Modbus Reg 1 Status Satisfied	V/f OLV/PM EZOLV The terminal deactivates when the bit specified by *H2-08 [Modbus Register 1 Bit Select]* for the MEMOBUS register address set with *H2-07 [Modbus Register 1 Address Select]* activates.
163	!Modbus Reg 2 Status Satisfied	V/f OLV/PM EZOLV The terminal deactivates when the bit specified by *H2-10 [Modbus Register 2 Bit Select]* for the MEMOBUS register address set with *H2-09 [Modbus Register 2 Address Select]* activates.
169	!External Power 24V Supply	V/f OLV/PM EZOLV The terminal deactivates when there is an external 24 V power supply between terminals PS-AC. ON : The external 24 V power supply is not supplying power. OFF : The external 24 V power supply is supplying power.
16A	!Data Logger Error	V/f OLV/PM EZOLV The terminal deactivates when the drive detects *LoG [Com Error / Abnormal SD card]*.
171	!Low PI2 Control Feedback Level	V/f OLV/PM EZOLV The terminal deactivates when the PI2 Control Feedback Level is less than *S3-13 [PI2 Control Low Feedback Lvl]*.
172	!High PI2 Control Feedback Level	V/f OLV/PM EZOLV The terminal deactivates when the PI2 Control Feedback Level is more than *S3-15 [PI2 Control High Feedback Lvl]*.
189	!Output Current Lim	V/f OLV/PM EZOLV The terminal deactivates when the output current limit is limiting the drive output speed.
18A	!Pump 2 Control	V/f OLV/PM EZOLV Sets the function to do a contactor control for a second pump. OFF : Pump 2 Running **Note:** You can use this function only when you set *Y1-01 = 1 [Multiplex Mode = Contactor Multiplex]*.
18B	!Pump 3 Control	V/f OLV/PM EZOLV Sets the function to do a contactor control for a third pump. OFF : Pump 3 Running **Note:** You can use this function only when you set *Y1-01 = 1 [Multiplex Mode = Contactor Multiplex]* and *Y3-00 [Number of Lag Pumps in System] > 1*.
18C	!Pump 4 Control	V/f OLV/PM EZOLV Sets the function to do a contactor control for a fourth pump. OFF : Pump 4 Running **Note:** You can use this function only when you set *Y1-01 = 1 [Multiplex Mode = Contactor Multiplex]* and *Y3-00 [Number of Lag Pumps in System]> 2*.
18D	!Pump 5 Control	V/f OLV/PM EZOLV Sets the function to do a contactor control for a fifth pump. OFF : Pump 5 Running **Note:** You can use this function only when you set *Y1-01 = 1 [Multiplex Mode = Contactor Multiplex]* and *Y3-00 [Number of Lag Pumps in System] > 3*.

Setting Value	Function	Description
18E	!Pump 6 Control	V/f OLV/PM EZOLV Sets the function to do a contactor control for a sixth pump. OFF : Pump 6 Running **Note:** You can use this function only when you set *Y1-01 = 1 [Multiplex Mode = Contactor Multiplex]* and *Y3-00 [Number of Lag Pumps in System] > 4*.
190 to 192	!DWEZ Digital Outputs 1 to 3	V/f OLV/PM EZOLV Sets the DriveWorksEZ digital output. Refer to the DriveWorksEZ online manual for more information.
194	!Loss of Prime	V/f OLV/PM EZOLV The terminal deactivates when the drive is in an *LOP [Loss of Prime]* condition.
195	!Volute Thermostat Fault	V/f OLV/PM EZOLV The terminal deactivates when the terminal set for *H1-xx = 88 [MFDI Function Selection = Volute Thermostat Fault]* is active.
196	!High Feedback	V/f OLV/PM EZOLV The terminal deactivates when the drive is in a High Feedback Condition as specified by *Y1-11 [High Feedback Level]* and *Y1-12 [High Feedback Lvl Fault Dly Time]* and when the drive detects an *HFB [High Feedback Sensed]* fault or an *HIFB [High Feedback Sensed]* alarm.
197	!Low Feedback	V/f OLV/PM EZOLV The terminal deactivates when the drive is in a Low Feedback Condition as specified by *Y1-08 [Low Feedback Level]* and *Y1-09 [Low Feedback Lvl Fault Dly Time]* and when the drive detects an *LFB [Low Feedback Sensed]* fault or an *LOFB [High Feedback Sensed]* alarm.
19E	!Low PI Auxiliary Control Level	V/f OLV/PM EZOLV The terminal deactivates when the PI Aux Feedback Level is less than *YF-09 [PI Aux Control Low Level Detect]* or if the drive detects an *LoAux [Low PI Aux Feedback Level]* fault.
19F	!High PI Auxiliary Control Level	V/f OLV/PM EZOLV The terminal deactivates when the PI Aux Feedback Level is more than *YF-12 [PI Aux Control High Level Detect]* or if the drive detects an *HiAux [High PI Aux Feedback Level]* fault.
1A0 to 1A7	!DWEZ Extended Digital Outputs 1 to 8	V/f OLV/PM EZOLV Sets the digital output for the DriveWorksEZ DO-A3 option card. Refer to the DriveWorksEZ online manual for more information.
1AA	!Utility Delay	V/f OLV/PM EZOLV The terminal deactivates when the drive is stopped and is waiting for the timer set in *Y4-17 [Utility Start Delay]* to expire.
1AB	!Thrust Mode	V/f OLV/PM EZOLV The terminal deactivates when the output frequency is between 0.0 Hz and the value set in *Y4-12 [Thrust Frequency]* and the Thrust Bearing function is active.
1AC	!Setpoint Not Maintained	V/f OLV/PM EZOLV The terminal deactivates when the drive detects *NMS [Setpoint Not Met]* condition.
1B8	!Pump Fault	V/f OLV/PM EZOLV The terminal deactivates when one of these faults is active: • *LFB Low Feedback Sensed* • *HFB High Feedback Sensed* • *LWL Low Water Level* • *HWL High Water Level* • *POC Pump Over Cycle* • *LowWL Low Water Level* • *VLTS Volute Thermostat Fault* • *NMS Setpoint Not Met* • *EFx Pump Fault (Terminal Sx)*
1B9	!Transducer Loss	V/f OLV/PM EZOLV The terminal deactivates when the current into the analog input associated with PID feedback is more than 21 mA or less than 3 mA, or an *FDBKL [WIRE Break]* Fault or an *FDBKL [Feedback Loss Wire Break]* Alarm is active.
1BA	!WL/SP/PIAux Control Active	V/f OLV/PM EZOLV The terminal deactivates when Water Level / Suction Pressure / PI Auxiliary Control is affecting the output speed.
1BB	!Differential Feedback Exceeded	V/f OLV/PM EZOLV The terminal deactivates when the difference between the PID Feedback and the value from the terminal set for *H3-xx = 2D [Differential Feedback]* is more than *Y4-18 [Differential Level]* for the time set in *Y4-19 [Differential Lvl Detection Time]*.
1BC	!Sleep Active	V/f OLV/PM EZOLV The terminal deactivates when the Sleep function is active and the drive is not operating. **Note:** The terminal will not deactivate for Sleep Boost function.

Setting Value	Function	Description
1BD	!Start Delay	V/f OLV/PM EZOLV The terminal deactivates when the Feedback is more than the start level or the Feedback is less than the Inverse PID and the start timer is timing. **Note:** You must set *Y1-04 [Sleep Wake-up Level] ≠ 0* and *Y1-05 [Sleep Wake-up Level Delay Time] ≠ 0* to use this function.
1BE	!Pre-Charge	V/f OLV/PM EZOLV The terminal deactivates when the drive is in Pre-Charge Mode.
1C0	!HAND Mode	V/f OLV/PM EZOLV The terminal deactivates when the drive is in HAND Mode operation.
1C1	!AUTO Mode	V/f OLV/PM EZOLV The terminal deactivates when the drive is in AUTO Mode operation.
1C2	!OFF Mode	V/f OLV/PM EZOLV The terminal deactivates when the drive is in OFF Mode.
1C3	!Main Feedback Lost	V/f OLV/PM EZOLV The terminal deactivates when the drive loses the main PID feedback.
1C4	!Backup Feedback Lost	V/f OLV/PM EZOLV The terminal deactivates when the drive loses the backup PID feedback.
1C5	!De-Scale Active	V/f OLV/PM EZOLV Sets the drive to go into the De-Scale function when the output terminal is OFF. OFF : De-Scale is running **Note:** De-Scale function is disabled and will be reset during Emergency Override.
1C6	!Lube Pump	V/f OLV/PM EZOLV Sets the drive to go into the Lube Pump function when the output terminal is OFF. OFF : This will energize and delay the drive output for the time set in *Y4-31 [Lube Pump Time]* each time the drive is supposed to start. It will energize during Run when *Y4-30 = 1 [Lube Pump During Run = Active During Run]*.
1C8	!Low Flow	V/f OLV/PM EZOLV The terminal deactivates when the flow rate is less than *Y6-06 [Low Flow Level]* for *Y6-07 [Low Flow Detection Time]*.
1C9	!Accumulation Level	V/f OLV/PM EZOLV The terminal deactivates when the accumulated volume is at or above the level set in *Y6-11 to Y6-14*.
1CA	!High Flow	V/f OLV/PM EZOLV The terminal deactivates when the flow rate is higher than *Y6-17 [High Flow Level]* for *Y6-18 [High Flow Detection Time]*.
1CB	!Low Water Level	V/f OLV/PM EZOLV The terminal deactivates when the water level feedback is below *Yd-09 [Low Water Level Detection Level]*.
1CC	!Low Suction Pressure	V/f OLV/PM EZOLV The terminal deactivates when the Suction Pressure feedback is less than *YE-09 [Low Suction Pressure Det Level]*.
1CD	!High Suction Pressure	V/f OLV/PM EZOLV The terminal deactivates when the Suction Pressure feedback is higher than *YE-12 [High Suction Pressure Det Level]*.
1CE	!Anti-Jam/De-Rag Active	V/f OLV/PM EZOLV The terminal deactivates when the drive is running in Anti-Jam/De-Rag mode (configured by *Y7-xx*).
1CF	!Flow Rate Limit	V/f OLV/PM EZOLV The terminal deactivates when the flow rate (limit) is affecting output speed.
1D3	!Harmonic Filter Output	V/f OLV/PM EZOLV The terminal deactivates when the drive exceeds the speed/current conditions set in *Y4-50 [Harmonic Filter Output Selection]*. **Note:** You must set *n1-13 = 1 [DC Bus Stabilization Control = Enabled]* when you program this digital output.
1D4	!External Fan Switch	V/f OLV/PM EZOLV The terminal deactivates when the external fan is turned on when drive is running.

◆ H3: Analog Inputs

No. (Hex.)	Name	Description	Default (Range)
H3-01 (0410)	Terminal A1 Signal Level Select	V/f OLV/PM EZOLV Sets the input signal level for MFAI terminal A1. 0 : 0 to 10V (Lower Limit at 0) 2 : 4 to 20 mA 3 : 0 to 20 mA	0 (0 - 3)
H3-02 (0434)	Terminal A1 Function Selection	V/f OLV/PM EZOLV Sets a function for MFAI terminal A1.	0 (0 - 3B)
H3-03 (0411) RUN	Terminal A1 Gain Setting	V/f OLV/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/PM EZOLV Sets the bias of the analog signal input to MFAI terminal A1.	0.0% (-999.9 - +999.9%)
H3-05 (0413)	Terminal A3 Signal Level Select	V/f OLV/PM EZOLV Sets the input signal level for MFAI terminal A3. 0 : 0-10V (Lower Limit at 0) 2 : 4 to 20 mA 3 : 0 to 20 mA	0 (0 - 3)
H3-06 (0414)	Terminal A3 Function Selection	V/f OLV/PM EZOLV Sets the function for MFAI terminal A3.	2E (0 - 3B)
H3-07 (0415) RUN	Terminal A3 Gain Setting	V/f OLV/PM EZOLV Sets the gain of the analog signal input to MFAI terminal A3.	100.0% (-999.9 - +999.9%)
H3-08 (0416) RUN	Terminal A3 Bias Setting	V/f OLV/PM EZOLV Sets the bias of the analog signal input to MFAI terminal A3.	0.0% (-999.9 - +999.9%)
H3-09 (0417)	Terminal A2 Signal Level Select	V/f OLV/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	2 (0 - 3)
H3-10 (0418)	Terminal A2 Function Selection	V/f OLV/PM EZOLV Sets the function for MFAI terminal A2.	B (0 - 3B)
H3-11 (0419) RUN	Terminal A2 Gain Setting	V/f OLV/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/PM EZOLV Sets the bias of the analog signal input to MFAI terminal A2.	0.0% (-999.9 - +999.9%)
H3-14 (041C)	Analog Input Terminal Enable Sel	V/f OLV/PM EZOLV Sets the enabled terminal or terminals when *H1-xx = C [MFDI Function Select = Analog Terminal Enable Selection]* is ON. 1 : Terminal A1 only 2 : Terminal A2 only 3 : Terminals A1 and A2 4 : Terminal A3 only 5 : Terminals A1 and A3 6 : Terminals A2 and A3 7 : Terminals A1, A2, and A3	7 (1 - 7)
H3-16 (02F0)	Terminal A1 Offset	V/f OLV/PM EZOLV Sets the offset level for analog signals input to terminal A1. Usually it is not necessary to change this setting.	0 (-500 - +500)
H3-17 (02F1)	Terminal A2 Offset	V/f OLV/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)

No. (Hex.)	Name	Description	Default (Range)
H3-18 (02F2)	Terminal A3 Offset	V/f OLV/PM EZOLV Sets the offset level for analog signals input to terminal A3. Usually it is not necessary to change this setting.	0 (-500 - +500)
H3-40 (0B5C) Expert	Mbus Reg 15C1h Input Function	V/f OLV/PM EZOLV Sets the MEMOBUS AI1 function.	F (4 - 2D)
H3-41 (0B5F) Expert	Mbus Reg 15C2h Input Function	V/f OLV/PM EZOLV Sets the MEMOBUS AI2 function.	F (4 - 2D)
H3-42 (0B62) Expert	Mbus Reg 15C3h Input Function	V/f OLV/PM EZOLV Sets the MEMOBUS AI3 function.	F (4 - 2D)
H3-43 (117F) Expert	Mbus Reg Inputs FilterTime Const	V/f OLV/PM EZOLV Sets the time constant to apply a primary delay filter to the MEMOBUS analog input register values.	0.00 s (0.00 - 2.00 s)
H3-45 (335B)	Terminal A1 Filter Time Constant	V/f OLV/PM EZOLV Sets the time constant when applying a primary delay filter to the A1 MFAI terminal.	0.03 s (0.00 - 2.00 s)
H3-46 (335C)	Terminal A2 Filter Time Constant	V/f OLV/PM EZOLV Sets the time constant when applying a primary delay filter to the A2 MFAI terminal.	0.03 s (0.00 - 2.00 s)
H3-47 (335D)	Terminal A3 Filter Time Constant	V/f OLV/PM EZOLV Sets the time constant when applying a primary delay filter to the A3 MFAI terminal.	0.03 s (0.00 - 2.00 s)
H3-48 (335E)	Option V1 Filter Time Constant	V/f OLV/PM EZOLV Sets the time constant when applying a primary delay filter to the AI-A3 Option V1 MFAI terminal.	0.03 s (0.00 - 2.00 s)
H3-49 (335F)	Option V2 Filter Time Constant	V/f OLV/PM EZOLV Sets the time constant when applying a primary delay filter to the AI-A3 Option V2 MFAI terminal.	0.03 s (0.00 - 2.00 s)
H3-50 (3360)	Option V3 Filter Time Constant	V/f OLV/PM EZOLV Sets the time constant when applying a primary delay filter to the AI-A3 Option V3 MFAI terminal.	0.03 s (0.00 - 2.00 s)
H3-61 (336B)	A1 Unit Selection	V/f OLV/PM EZOLV Sets the units shown in *U1-13 [Terminal A1 Level]*. 0 : Percent (%) 1 : Units (mA or VDC)	1 (0, 1)
H3-62 (336C)	A2 Unit Selection	V/f OLV/PM EZOLV Sets the units shown in *U1-14 [Terminal A2 Level]*. 0 : Percent (%) 1 : Units (mA or VDC)	1 (0, 1)
H3-63 (336D)	A3 Unit Selection	V/f OLV/PM EZOLV Sets the units shown in *U1-15 [Terminal A3 Level]*. 0 : Percent (%) 1 : Units (mA or VDC)	1 (0, 1)

■ H3-xx: MFAI Setting Values

Setting Value	Function	Description
0	Frequency Reference	V/f OLV/PM EZOLV The input value from the MFAI terminal set with this function becomes the master frequency reference.
1	Frequency Gain	V/f OLV/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/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 *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]*

Setting Value	Function	Description
3	Auxiliary Frequency Reference 2	V/f OLV/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 *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]*
4	Output Voltage Bias	V/f OLV/PM EZOLV Set this parameter to input a bias signal and amplify the output voltage.
5	Accel/Decel Time Gain	V/f OLV/PM EZOLV Enters a signal to adjust the gain used for *C1-01 to C1-04 [Acceleration/Deceleration Times 1 and 2]* and *C1-09 [Fast Stop Time]* when the full scale analog signal (10 V or 20 mA) is 100%.
6	DC Injection Braking Current	V/f OLV/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/PM EZOLV Enters a signal to adjust the overtorque/undertorque detection level. **Note:** Use this function with *L6-01 [Torque Detection Selection 1]*. This parameter functions as an alternative to *L6-02 [Torque Detection Level 1]*.
8	Stall Prevent Level During Run	V/f OLV/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/PM EZOLV Enters a signal to adjust the output frequency lower limit level 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]*
B	PID Feedback	V/f OLV/PM EZOLV Enter the PID feedback value 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]*
C	PID Setpoint	V/f OLV/PM EZOLV Enters the PID setpoint 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]*
D	Frequency Bias	V/f OLV/PM EZOLV Enters the bias value added to the frequency reference 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]*
E	Motor Temperature (PTC Input)	V/f OLV/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/PM EZOLV Use this setting for unused terminals or to use terminals in through mode.
10	Forward Torque Limit	V/f OLV/PM EZOLV Enters the forward torque limit when the motor rated torque is 100%.
11	Reverse Torque Limit	V/f OLV/PM EZOLV Enters the load torque limit if the motor rated torque is 100%.
12	Regenerative Torque Limit	V/f OLV/PM EZOLV Enters the regenerative torque limit if the motor rated torque is 100%.
15	General Torque Limit	V/f OLV/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/PM EZOLV Enters the PID differential feedback value if the full scale analog signal (10 V or 20 mA) is 100%.

Setting Value	Function	Description
1F	Not Used	V/f OLV/PM EZOLV Use this setting for unused terminals or to use terminals in through mode.
24	PID Feedback Backup	V/f OLV/PM EZOLV Enters the PID Feedback Backup signal for the drive to use when it loses the primary PID feedback set for *H3-xx = B [PID Feedback]*. **Note:** The full-scale of the analog signal goes from *b5-71 [Min PID Transducer Scaling]* to *Y1-03 [PID User Unit Display Scaling]*.
25	PI2 Control Setpoint	V/f OLV/PM EZOLV Enters the PI2 Control setpoint level as a percentage of the *S3-02 [PI2 Control Transducer Scale]* value. **Note:** Parameters *S3-03 [PI2 Control Decimal Place Pos]* and *S3-04 [PI2 Control Unit Selection]* set the resolution and unit.
26	PI2 Control Feedback	V/f OLV/PM EZOLV Enters the PI2 Control feedback level as a percentage of the *S3-02 [PI2 Control Transducer Scale]* value. **Note:** Parameters *S3-03 [PI2 Control Decimal Place Pos]* and *S3-04 [PI2 Control Unit Selection]* set the resolution and unit.
27	PI Auxiliary Control Feedback	V/f OLV/PM EZOLV Enters the PI Auxiliary Control feedback value when *YF-01 = 1 [PI Aux Control Selection = Enabled]*. **Note:** • The full-scale of the analog signal goes from *YF-35 [PI Auxiliary Minimum Transducer Scale]* to *YF-02 [PI Aux Control Transducer Scale]*. • Parameter *YF-22 [PI Aux Level Decimal Place Pos]* sets the resolution.
2B	Emergency Override PID Feedback	V/f OLV/PM EZOLV This input is the PID Feedback source when Emergency Override is running in PID mode (*S6-02 = 2 or 3 [Emergency Override Ref Selection = System PID Mode or Independent PID Mode]*). **Note:** • When *S6-02 = 2 [Emergency Override Ref Selection = System PID Mode]*, the full-scale of the analog signal goes from *b5-71 [Min PID Transducer Scaling]* to *Y1-03 [PID User Unit Display Scaling]*. • When *S6-02 = 3 [Independent PID Mode]*, the full-scale of the analog signal goes from *b5-71* to *S6-03 [EMOVR Independent PID Scale]*. • When you set MEMOBUS register 3A93h bit 4, register 3A95h becomes the Emergency Override Feedback source.
2C	Emergency Override PID Setpoint	V/f OLV/PM EZOLV This input is the PID Setpoint source when Emergency Override is running in PID mode (*S6-02 = 2 or 3 [Emergency Override Ref Selection = System PID Mode or Independent PID Mode]*). **Note:** • When *S6-02 = 2 [Emergency Override Ref Selection = System PID Mode]*, the full-scale of the analog signal goes from *b5-71 [Min PID Transducer Scaling]* to *Y1-03 [PID User Unit Display Scaling]*. • When *S6-02 = 3 [Independent PID Mode]*, the full-scale of the analog signal goes from *b5-71* to *S6-03 [EMOVR Independent PID Scale]*. • When you set MEMOBUS register 3A93h bit 5, register 3A96h becomes the Emergency Override Setpoint source.
2D	Differential Level Source	V/f OLV/PM EZOLV Enters a feedback value to calculate the Differential Level between the *Differential Level Source* feedback and the primary *PID Feedback [H3-xx = B]*. **Note:** The full-scale of the analog signal goes from *b5-71 [Min PID Transducer Scaling]* to *Y1-03 [PID User Unit Display Scaling]*.
2E	HAND Frequency Reference	V/f OLV/PM EZOLV HAND mode Frequency Reference while *Y5-01 = 0*.
30	DWEZ Analog Input 1	V/f OLV/PM EZOLV Use with DriveWorksEZ. Refer to the DriveWorksEZ online manual for more information.
31	DWEZ Analog Input 2	V/f OLV/PM EZOLV Use with DriveWorksEZ. Refer to the DriveWorksEZ online manual for more information.
32	DWEZ Analog Input 3	V/f OLV/PM EZOLV Use with DriveWorksEZ. Refer to the DriveWorksEZ online manual for more information.
3A	Flow Meter	V/f OLV/PM EZOLV Analog input source for supplying the flow rate to the Flow Meter function. Full scale: *Y6-01*.
3B	Water Level / Suct Pres Feedback	V/f OLV/PM EZOLV Supplies the feedback for Water Level Control / Suction Pressure Control / Vacuum Control depending on which control is enabled.

◆ H4: Analog Outputs

No. (Hex.)	Name	Description	Default (Range)
H4-01 (041D)	Terminal FM Analog Output Select	V/f OLV/PM EZOLV Sets the monitoring number (Ux-xx) to be output from MFAO terminal FM. Set the *x-xx* part of the *Ux-xx [Monitor]*. For example, set *H4-01 = 102* to monitor *U1-02 [Output Frequency]*.	102 (000 - 1098)
H4-02 (041E) RUN	Terminal FM Analog Output Gain	V/f OLV/PM EZOLV Sets the gain of the monitor signal that is sent from MFAO terminal FM. Sets the analog signal output level from the terminal FM at 10 V or 20 mA as 100% when an output for monitoring items is 100%.	100.0% (-999.9 - +999.9%)
H4-03 (041F) RUN	Terminal FM Analog Output Bias	V/f OLV/PM EZOLV Sets the bias of the monitor signal that is sent from MFAO terminal FM. Set the level of the analog signal sent from terminal FM at 10 V or 20 mA as 100% when an output for monitoring items is 0%.	0.0% (-999.9 - +999.9%)
H4-04 (0420)	Terminal AM Analog Output Select	V/f OLV/PM EZOLV Sets the monitoring number (Ux-xx) to be output from MFAO terminal AM. Set the *x-xx* part of the *Ux-xx [Monitor]*. For example, set *H4-04 = 103* to monitor *U1-03 [Output Current]*.	103 (000 - 1299)
H4-05 (0421) RUN	Terminal AM Analog Output Gain	V/f OLV/PM EZOLV Sets the gain of the monitor signal that is sent from MFAO terminal AM. When an output for monitoring items is 0%, this parameter sets the analog signal output level from the AM terminal at 10 V or 20 mA as 100%.	50.0% (-999.9 - +999.9%)
H4-06 (0422) RUN	Terminal AM Analog Output Bias	V/f OLV/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%)
H4-07 (0423)	Terminal FM Signal Level Select	V/f OLV/PM EZOLV Sets the MFAO terminal FM output signal level. **Note:** Set jumper S5 on the control circuit terminal block accordingly when you change this parameter. 0 : 0 to 10 Vdc 2 : 4 to 20 mA	0 (0, 2)
H4-08 (0424)	Terminal AM Signal Level Select	V/f OLV/PM EZOLV Sets the MFAO terminal AM output signal level. **Note:** Set jumper S5 on the control circuit terminal block accordingly when you change this parameter. 0 : 0 to 10 Vdc 2 : 4 to 20 mA	0 (0, 2)
H4-20 (0B53)	Analog Power Monitor 100% Level	V/f OLV/PM EZOLV Sets the level at 10 V when you set *U1-08 [Output Power]* for analog output.	0.00 kW (0.00 - 650.00 kW)

◆ H5: Modbus Communication

No. (Hex.)	Name	Description	Default (Range)
H5-01 (0425)	Drive Node Address	V/f OLV/PM EZOLV Sets the communication slave address for drives. **Note:** • Re-energize the drive or set *H5-20 = 1 [Communication Parameters Reload = Reload Now]* after you change the parameter setting. • Setting 0 will not let the drive respond to MEMOBUS/Modbus communications. • When *Y1-01 = 3 [Multiplex Mode = Network Multiplex]*, range is dependent on *Y9-25 [Highest Node Address]*.	1FH (0 - FFH)
H5-02 (0426)	Communication Speed Selection	V/f OLV/PM EZOLV Sets the communications speed for MEMOBUS/Modbus communications. **Note:** Re-energize the drive or set *H5-20 = 1 [Communication Parameters Reload = Reload Now]* after you change the parameter setting. 0 : 1200 bps 1 : 2400 bps 2 : 4800 bps 3 : 9600 bps 4 : 19.2 kbps 5 : 38.4 kbps 6 : 57.6 kbps 7 : 76.8 kbps 8 : 115.2 kbps	3 (0 - 8)
H5-03 (0427)	Communication Parity Selection	V/f OLV/PM EZOLV Sets the communications parity used for MEMOBUS/Modbus communications. **Note:** Re-energize the drive or set *H5-20 = 1 [Communication Parameters Reload = Reload Now]* after you change the parameter setting. 0 : No parity 1 : Even parity 2 : Odd parity	0 (0 - 2)
H5-04 (0428)	Communication Error Stop Method	V/f OLV/PM EZOLV Sets the motor Stopping Method when the drive detects a Modbus Communication Error condition. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) 3 : Alarm Only 4 : Run at H5-34 (CE Go-To-Freq)	3 (0 - 4)
H5-05 (0429)	Comm Fault Detection Selection	V/f OLV/PM EZOLV Sets the function that detects *CE [Modbus Communication Error]* issues during MEMOBUS/Modbus communications. 0 : Disabled 1 : Enabled	1 (0, 1)
H5-06 (042A)	Drive Transmit Wait Time	V/f OLV/PM EZOLV Sets the time to wait to send a response message after the drive receives a command message from the master. **Note:** Restart the drive after changing the parameter setting.	5 ms (0 - 65 ms)
H5-09 (0435)	CE Detection Time	V/f OLV/PM EZOLV Sets the detection time for *CE [Modbus Communication Error]* issues when communication stops.	2.0 s (0.0 - 10.0 s)
H5-10 (0436)	Modbus Register 0025H Unit Sel	V/f OLV/PM EZOLV Sets the unit of measure used for the MEMOBUS/Modbus communications monitor register 0025H (output voltage reference monitor). 0 : 0.1 V units 1 : 1 V units	0 (0, 1)
H5-11 (043C)	Comm ENTER Command Mode	V/f OLV/PM EZOLV Sets the function to make the Enter command necessary to change parameters through MEMOBUS/Modbus communications. 0 : ENTER Command Required 1 : ENTER Command Not Required	0 (0, 1)

No. (Hex.)	Name	Description	Default (Range)
H5-12 (043D)	Run Command Method Selection	V/f OLV/PM EZOLV Sets the input method for the Run command when *b1-02 = 2 [Run Command Selection 1 = Memobus/Modbus Communications]* or *b1-16 = 2 [Run Command Selection 2 = Memobus/Modbus Communications]*. 0 : FWD/Stop, REV/Stop 1 : Run/Stop, FWD/REV	0 (0, 1)
H5-18 (11A2)	Motor Speed Filter over Comms	V/f OLV/PM EZOLV Sets the filter time constant used when monitoring motor speed during MEMOBUS/Modbus communications or with a communication option.	0 ms (0 - 100 ms)
H5-20 (0B57)	Communication Parameters Reload	V/f OLV/PM EZOLV Sets the function to immediately enable updated MEMOBUS/Modbus communications parameters. 0 : Reload at Next Power Cycle 1 : Reload Now	0 (0, 1)
H5-22 (11CF)	Speed Search from MODBUS	V/f OLV/PM EZOLV Enables the MEMOBUS/Modbus communication register Speed Search function (bit0 of 15DFH). 0 : Disabled 1 : Enabled	0 (0, 1)
H5-25 (1589) RUN Expert	Function 5A Register 1 Selection	V/f OLV/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 Expert	Function 5A Register 2 Selection	V/f OLV/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 Expert	Function 5A Register 3 Selection	V/f OLV/PM EZOLV Returns the contents of the specified MEMOBUS/Modbus communications register when responding to the master device.	0042H (U1-03) (0000H - FFFFH)
H5-28 (158C) RUN Expert	Function 5A Register 4 Selection	V/f OLV/PM EZOLV Returns the contents of the specified MEMOBUS/Modbus communications register when responding to the master device.	0049H (U1-10) (0000H - FFFFH)
H5-33 (3FB3)	Power-up CALL Alarm	V/f OLV/PM EZOLV Enables and disables *CALL [Serial Comm Transmission Error]* alarm detection. 0 : Disabled 1 : Enabled	1 (0, 1)
H5-34 (3FB4) RUN	Comm Error (CE) Go-To-Frequency	V/f OLV/PM EZOLV Sets the speed at which the drive will run when *H5-04 = 4 [Communication Error Stop Method = Run at H5-34]* and there is a *CE*.	0.0 Hz (0.0 - 400.0 Hz)
H5-35 (3FB5) RUN	Comm Error (CE) Go-To-Timeout	V/f OLV/PM EZOLV When *H5-04 = 4 [Communication Error Stop Method = Run at H5-34]* and a *CE* is present, the drive will run at the *H5-34 [Comm Error (CE) Go-To-Frequency]* speed for this length of time before it triggers a *CE* fault. **Note:** Set this parameter to 0 s to disable the time-out.	0 s (0 - 6000 s)
H5-36 (3FB6)	CE Fault Restart Select	V/f OLV/PM EZOLV Sets the drive to restart (*L5-01 [Number of Auto-Restart Attempts]*) after a *CE* fault. 0 : No Retry 1 : Retry	0 (0, 1)

◆ H6: Pulse Train Input

No. (Hex.)	Name	Description	Default (Range)
H6-01 (042C)	Terminal RP Pulse Train Function	V/f OLV/PM EZOLV Sets the function for pulse train input terminal RP. 0 : Frequency Reference 1 : PID Feedback Value 2 : PID Setpoint Value 5 : Flow Meter	0 (0 - 5)
H6-02 (042D) RUN	Terminal RP Frequency Scaling	V/f OLV/PM EZOLV Sets the frequency of the pulse train input signal used when the item selected with *H6-01 [Terminal RP Pulse Train Function]* is input at 100%.	1440 Hz (100 - 32000 Hz)
H6-03 (042E) RUN	Terminal RP Function Gain	V/f OLV/PM EZOLV Sets the gain used when the function in *H6-01 [Terminal RP Pulse Train Function]* is input to terminal RP.	100.0% (0.0 - 1000.0%)
H6-04 (042F) RUN	Terminal RP Function Bias	V/f OLV/PM EZOLV Sets the bias used when the function in *H6-01 [Terminal RP Pulse Train Function]* is input to terminal RP. Sets a value at the time when the pulse train is 0 Hz.	0.0% (-100.0 - 100.0%)
H6-05 (0430) RUN	Terminal RP Filter Time	V/f OLV/PM EZOLV Sets the time constant for the pulse train input primary delay filters.	0.50 s (0.00 - 2.00 s)
H6-08 (043F)	Terminal RP Minimum Frequency	V/f OLV/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 Inputs / Outputs

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

No. (Hex.)	Name	Description	Default (Range)
H7-12 (11A6) Expert	Virtual Multi-Function Output 2	V/f OLV/PM EZOLV Sets the function for virtual digital output 2.	F (0 - 1FF)
H7-13 (11A7) Expert	Virtual Output 2 Delay Time	V/f OLV/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/PM EZOLV Sets the function for virtual digital output 3.	F (0 - 1FF)
H7-15 (11A9) Expert	Virtual Output 3 Delay Time	V/f OLV/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/PM EZOLV Sets the function for virtual digital output 4.	F (0 - 1FF)
H7-17 (11AB) Expert	Virtual Output 4 Delay Time	V/f OLV/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/PM EZOLV Sets the virtual analog input function.	F (0 - 2D)
H7-31 (1178) RUN Expert	Virtual Analog Input Gain	V/f OLV/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/PM EZOLV Sets the virtual analog input bias.	0.0% (-999.9 - 999.9%)
H7-40 (1163) Expert	Virtual Analog Out Signal Select	V/f OLV/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) Expert	Virtual Analog Output Function	V/f OLV/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 - 1098)
H7-42 (1165) Expert	Virtual Analog Output FilterTime	V/f OLV/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/PM EZOLV Sets the motor overload protection with electronic thermal protectors. 0 : Disabled 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 *L1-01 = 1 to 6 [Enabled]*. 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/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/PM EZOLV Sets drive operation when the PTC input signal entered into the drive is at the *oH3 [Motor Overheat (PTC Input)]* detection level. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) 3 : Alarm Only	3 (0 - 3)
L1-04 (0483)	Motor Thermistor oH Fault Select	V/f OLV/PM EZOLV Sets the drive operation when the PTC input signal to the drive is at the *oH4 [Motor Overheat Fault (PTC Input)]* detection level. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09)	1 (0 - 2)
L1-05 (0484)	Motor Thermistor Filter Time	V/f OLV/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/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/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 to150% of the drive rated current)
L1-13 (046D)	Motor Overload Memory Selection	V/f OLV/PM EZOLV Sets the function that keeps the current electronic thermal protector value after power loss. 0 : Disabled 1 : Enabled 2 : Enabled, using RTC **Note:** The drive saves *oL* status, time and date when there is a power loss. The drive uses this information and time of power up to calculate *oL*.	2 (0 - 2)
L1-22 (0768) Expert RUN	Leakage Current Filter Time1	V/f OLV/PM EZOLV Sets the leakage current detection reduction filter time constant during constant speed run. **Note:** You can set this parameter when *C6-02 = B [Carrier Frequency Selection = Leakage Current Detection Reduction Rate PWM]*.	20.0 s (0.0 - 60.0 s)
L1-23 (0769) Expert RUN	Leakage Current Filter Time2	V/f OLV/PM EZOLV Sets the leakage current detection reduction filter time constant during acceleration/deceleration. **Note:** • You can set this parameter when *C6-02 = B [Carrier Frequency Selection = Leakage Current Detection Reduction Rate PWM]*. • When the setting value increases, the current monitor also starts up slowly. Examine the relevant sequence for problems.	20 s (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/PM EZOLV Sets the drive operation after a momentary power loss. 0 : Disable 1 : Enabled 2 : Enabled while CPU Power Active 3 : Kinetic Energy Backup: L2-02 4 : Kinetic Energy Backup: CPU Power 5 : Kinetic Energy Backup: DecelStop **Note:** When the CPU is inactive, *b1-17 [Run Command at Power Up]* sets operation at power up.	2 (0 - 5)
L2-02 (0486)	Power Loss Ride Through Time	V/f OLV/PM EZOLV Sets the maximum time that the drive will wait until it tries to restart after power loss.	Determined by o2-04 (0.0 - 25.5 s)
L2-03 (0487)	Minimum Baseblock Time	V/f OLV/PM EZOLV Sets the minimum time to continue the drive output block (baseblock) after a baseblock.	Determined by o2-04 (0.1 - 5.0 s)
L2-04 (0488)	Powerloss V/f Recovery Ramp Time	V/f OLV/PM EZOLV Sets the time for the drive output voltage to go back to the correct voltage after it completes speed searches.	Determined by o2-04 (0.0 - 5.0 s)
L2-05 (0489)	Undervoltage Detection Lvl (Uv1)	V/f OLV/PM EZOLV Sets the voltage at which the drive triggers a *Uv1 [DC Bus Undervoltage]* fault or at which it activates the KEB function. 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 (208 V Class: 150 - 220 V, 480 V Class: 300 - 440 V)
L2-06 (048A) Expert	Kinetic Energy Backup Decel Time	V/f OLV/PM EZOLV Sets the deceleration time during KEB operation to decrease the maximum output frequency to 0.	0.0 s (0.0 - 6000.0 s)
L2-07 (048B) Expert	Kinetic Energy Backup Accel Time	V/f OLV/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/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/PM EZOLV Sets the quantity of output frequency reduction used as a percentage of *E2-02 [Motor Rated Slip]* when KEB operation starts.	20% (0 - 100%)
L2-10 (048E) Expert	Minimum KEB Time	V/f OLV/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/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/PM EZOLV Sets the KEB function operation mode. 0 : Single Drive KEB Ride-Thru 1 1 : Single Drive KEB Ride-Thru 2 3 : System KEB Ride-Thru 2	0 (0 - 3)
L2-30 (045E) Expert	KEB Zero Speed Operation	V/f OLV/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/PM EZOLV Sets the KEB start voltage offset.	Determined by A1-02 (208 V Class: 0 - 100 V, 480 V Class: 0 - 200 V)

◆ L3: Stall Prevention

No. (Hex.)	Name	Description	Default (Range)
L3-01 (048F)	Stall Prevention during Accel	V/f OLV/PM EZOLV Sets the method of Stall Prevention During Acceleration. 0 : Disabled 1 : Enabled 2 : Intelligent (Ignore Accel Ramp)	1 (0 - 2)
L3-02 (0490)	Stall Prevent Level during Accel	V/f OLV/PM EZOLV Sets the output current level to activate the Stall Prevention function during acceleration as a percentage of the drive rated output current. **Note:** • When *L8-38 = 4 [Carrier Frequency Reduction = Enabled for All Speeds/Overheat]*, the default is set to 120% of drive rated current. • If you use a motor that is small compared to the drive and the motor stalls, decrease the setting value. • When you operate the motor in the constant power range, set *L3-03 [Stall Prevent Limit during Accel]*.	Determined by L8-38 (0 - 120%)
L3-03 (0491)	Stall Prevent Limit during Accel	V/f OLV/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/PM EZOLV Sets the method that the drive will use to prevent overvoltage faults when decelerating. **Note:** 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 = 8 [EZOLV]*, the setting range is *0, 1*. 0 : Disabled 1 : General Purpose 2 : Intelligent (Ignore Decel Ramp) 4 : Overexcitation/High Flux 5 : Overexcitation/High Flux 2	0 (Determined by A1-02)
L3-05 (0493)	Stall Prevention during RUN	V/f OLV/PM EZOLV Sets the function to enable and disable Stall Prevention During Run. **Note:** • An output frequency lower than 6 Hz will disable Stall Prevention during Run. The *L3-05* and *L3-06 [Stall Prevent Level during Run]* settings do not have an effect. • The default setting changes when the *A1-02 [Control Method Selection]* value changes: –*A1-02 = 0, 5 [V/f, OLV/PM]*: 2 –*A1-02 = 8 [EZOLV]*: 3 0 : Disabled 1 : Deceleration Time 1 (C1-02) 2 : Deceleration Time 2 (C1-04) 3 : Intelligent	0 (Determined by A1-02)
L3-06 (0494)	Stall Prevent Level during Run	V/f OLV/PM EZOLV Sets the output current level to enable the Stall Prevention function during operation as a percentage of the drive rated output current. **Note:** • When *L8-38 = 4 [Carrier Frequency Reduction = Enabled for All Speeds/Overheat]*, the default is set to 120% of drive rated current. • This parameter is applicable when *L3-05 = 1, 2 [Stall Prevention during RUN = Deceleration Time 1 (C1-02), Deceleration Time 2 (C1-04)]*. • When *L3-23 = 1 [Stall P Reduction at Constant HP = Automatic Reduction @ CHP Region]*, the drive will automatically decrease the level in the constant output range.	Determined by L8-38 (5 - 120%)
L3-11 (04C7)	Overvoltage Suppression Select	V/f OLV/PM EZOLV Sets the overvoltage suppression function. 0 : Disabled 1 : Enabled	0 (0, 1)
L3-17 (0462)	DC Bus Regulation Level	V/f OLV/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.	208 V Class: 375 V, 480 V Class: 750 V (208 V Class: 150 - 400 V, 480 V Class: 300 - 800 V)
L3-20 (0465) Expert	DC Bus Voltage Adjustment Gain	V/f OLV/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/PM EZOLV Sets the proportional gain to calculate acceleration and deceleration rates.	1.00 (0.10 - 10.00)

No. (Hex.)	Name	Description	Default (Range)
L3-22 (04F9)	PM Stall Prevention Decel Time	V/f **OLV/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 Prevention during Accel = Enabled]*.	0.0 s (0.0 - 6000.0 s)
L3-23 (04FD)	Stall P Reduction at Constant HP	**V/f** OLV/PM EZOLV Sets the function to automatically decrease the Stall Prevention Level during Run for Constant Horse Power (CHP) part of the speed range. 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/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, E2-11, and E5-01 (0.001 - 10.000 s)
L3-25 (046F) Expert	Load Inertia Ratio	**V/f** **OLV/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/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/PM** **EZOLV** Sets a delay time between reaching the Stall Prevention level and starting the Stall Prevention function.	50 ms (0 - 5000 ms)
L3-35 (0747) Expert	Speed Agree Width for Auto Decel	**V/f** **OLV/PM** **EZOLV** Sets the width for speed agreement when *L3-04 = 2 [Stall Prevention during Decel = Intelligent (Ignore Decel Ramp)]*. Usually it is not necessary to change this setting.	0.00 Hz (0.00 - 1.00 Hz)

◆ L4: Speed Detection

No. (Hex.)	Name	Description	Default (Range)
L4-01 (0499)	Speed Agree Detection Level	**V/f** **OLV/PM** **EZOLV** Sets the level to detect speed agree or motor speed when *H2-01 to H2-03 = 2, 3, 4, 5 [MFDO Function Selection = Speed Agree 1, User-Set Speed Agree 1, Frequency Detection 1, Frequency Detection 2]*.	0.0 Hz (0.0 - 400.0 Hz)
L4-02 (049A)	Speed Agree Detection Width	**V/f** **OLV/PM** **EZOLV** 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]*.	2.0 Hz (0.0 - 20.0 Hz)
L4-03 (049B)	Speed Agree Detection Level (+/-)	**V/f** **OLV/PM** **EZOLV** Sets the speed agree detection level or motor speed detection level when *H2-01 to H2-03 = 13, 14, 15, 16 [MFDO Function Selection = Speed Agree 2, User-Set Speed Agree 2, Frequency Detection 3, Frequency Detection 4]*.	0.0 Hz (-400.0 - +400.0 Hz)
L4-04 (049C)	Speed Agree Detection Width (+/-)	**V/f** **OLV/PM** **EZOLV** 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]*.	2.0 Hz (0.0 - 20.0 Hz)
L4-05 (049D)	Fref Loss Detection Selection	**V/f** **OLV/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/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/PM** **EZOLV** Sets the condition that activates speed detection. 0 : No Detection during Baseblock 1 : Detection Always Enabled	0 (0, 1)

◆ L5: Fault Restart

No. (Hex.)	Name	Description	Default (Range)
L5-01 (049E)	Number of Auto-Restart Attempts	V/f OLV/PM EZOLV Sets the number of times that the drive will try to restart.	5 (0 - 10 times)
L5-02 (049F)	Fault Contact at Restart Select	V/f OLV/PM EZOLV Sets the function that sends signals to the MFDO terminal set for *Fault [H2-xx = E]* while the drive is automatically restarting. 0 : Active Only when Not Restarting 1 : Always Active	0 (0, 1)
L5-04 (046C)	Interval Method Restart Time	V/f OLV/PM EZOLV Sets the time interval between each Auto Restart attempt.	20.0 s (0.5 - 3600.0 s)
L5-07 (0B2A)	Fault Reset Enable Select Grp1	V/f OLV/PM EZOLV Use these 4 digits to set the Auto Restart function for *oL1* to *oL4*. From left to right, the digits set *oL1*, *oL2*, *oL3*, and *oL4*, 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/PM EZOLV Use these 4 digits to set the Auto Restart function for *Uv1*, *ov*, *oH1*, and *GF*. From left to right, the digits set *Uv1*, *ov*, *oH1*, and *GF*, 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)
L5-40 (3670)	Low Feedback Flt Retry Selection	V/f OLV/PM EZOLV Sets the drive to do an Auto Restart when the drive detects an *LFB [Low Feedback Sensed]* fault. 0 : No Retry 1 : Retry	0 (0, 1)
L5-41 (3671)	Hi Feedback Flt Retry Selection	V/f OLV/PM EZOLV Sets the drive to do an Auto Restart when the drive detects an *HFB [High Feedback Sensed]* fault. 0 : No Retry 1 : Retry	0 (0, 1)
L5-42 (3672)	Feedback Loss Fault Retry Select	V/f OLV/PM EZOLV Sets the drive to try an Auto Restart when the drive detects an *FDBKL [WIRE Break]* fault. 0 : No Retry 1 : Retry	0 (0, 1)

No. (Hex.)	Name	Description	Default (Range)
L5-43 (3673)	LowFeedback Fault Retry Attempts	V/f OLV/PM EZOLV Sets the number of restart attempts when the drive detects an *LFB Low Feedback Sensed* condition.	3 (0 - 10)
L5-44 (3674)	Hi Feedback Fault Retry Attempts	V/f OLV/PM EZOLV Sets the number of restart attempts when the drive detects an *HFB High Feedback Sensed* condition.	3 (0 - 10)
L5-45 (3675)	Fdbk Loss Fault Retry Attempts	V/f OLV/PM EZOLV Sets the number of restart attempts when the drive detects a *FBL Feedback Loss* condition.	3 (0 - 10)
L5-46 (3676)	Low Feedback Fault Restart Time	V/f OLV/PM EZOLV Sets the time interval between each *LFB Low Feedback Sensed* auto-restart attempt.	20.0 s (0.5 -3600.0 s)
L5-47 (3677)	Hi Feedback Fault Restart Time	V/f OLV/PM EZOLV Sets the time interval between each *HFB High Feedback Sensed* auto-restart attempt.	20.0 s (0.5 -3600.0 s)
L5-48 (3678)	Feedback Loss Fault Restart Time	V/f OLV/PM EZOLV Sets the time interval between each *FDBKL Feedback Loss* auto-restart attempt.	20.0 s (0.5 -3600.0 s)
L5-49 (3679)	Fault Retry Speed Search Select	V/f OLV/PM EZOLV Sets the drive to do a speed search at the start of a Fault Retry. 0 : Disabled 1 : Enabled	0 (0, 1)
L5-50 (367A)	Setpoint Not Met Fault Retry Sel	V/f OLV/PM EZOLV Sets the drive to try an Auto Restart when it detects an *NMS [SetPoint Not Met]* fault. 0 : No Retry 1 : Retry	0 (0, 1)
L5-51 (367B)	Loss of Prime Fault Retry Select	V/f OLV/PM EZOLV Sets the drive to try an Auto Restart if it detects an *LOP [Loss Of Prime]* fault. 0 : No Retry 1 : Retry 2 : Infinite Retries	0 (0 - 2)
L5-52 (367C)	Over Cycle Fault Retry Selection	V/f OLV/PM EZOLV Sets the drive to try an Auto Restart if it detects an *POC [Pump Over Cycle]* fault. 0 : No Retry 1 : Retry 2 : Infinite Retries	0 (0 - 2)
L5-53 (3251)	VoluteThermostat Fault Retry Sel	V/f OLV/PM EZOLV Sets the drive to try an Auto Restart if it detects a *VLTS [Volute Thermostat Fault]* fault. **Note:** The drive will only restart after the Thermostat digital input de-activates and the *L5-60 [Volute Thermostat Restart Time]* timer is expired. 0 : No Retry 1 : Retry	0 (0, 1)
L5-54 (367E)	Setpoint Not Met Retry Attempts	V/f OLV/PM EZOLV Sets the number restart attempts when the drive detects an *NMS Setpoint Not Met* condition.	3 (0 - 10)
L5-55 (367F)	Loss of Prime Flt Retry Attempts	V/f OLV/PM EZOLV Sets the number restart attempts when the drive detects an *LOP Loss of Prime* condition. If *L5-51 = 2 [Loss of Prime Fault Retry Select = Infinite Retries]*, the drive will ignore this parameter.	3 (0 - 10)
L5-56 (3680)	Over Cycle Fault Retry Attempts	V/f OLV/PM EZOLV Sets the number of restart attempts when the drive detects an *POC Pump Over Cycle* condition. **Note:** When *L5-52 = 2 [Over Cycle Fault Retry Selection = Infinite Retries]*, the drive will ignore this parameter.	3 (0 - 10)
L5-57 (3681)	Volute Thermostat Retry Attempts	V/f OLV/PM EZOLV Sets the number restart attempts when the drive detects a *VLTS [Volute Thermostat Fault]* condition.	3 (0 - 10)
L5-58 (3682)	Setpoint Not Met Restart Time	V/f OLV/PM EZOLV Sets the time interval between each *NMS Setpoint Not Met* auto-restart attempt.	20.0 s (0.5 - 3600.0 s)
L5-59 (3683)	Over Cycle Fault Restart Time	V/f OLV/PM EZOLV Sets the time interval between each *POC Pump Over Cycle* auto-restart attempt.	20.0 s (0.5 -3600.0 s)
L5-60 (3684)	Volute Thermostat Restart Time	V/f OLV/PM EZOLV Sets the time interval between each *VLTS [Volute Thermostat Fault]* auto-restart attempt.	20.0 s (0.5 - 3600.0 s)
L5-61 (3685)	Low Water Level Fault Retry Sel	V/f OLV/PM EZOLV Sets the auto-restart function after the drive detects an *LWL Low Water Level Digital Input* fault. 0 : No Retry 1 : Retry	0 (0, 1)

No. (Hex.)	Name	Description	Default (Range)
L5-62 (3686)	Low Water Level Retry Attempts	V/f OLV/PM EZOLV Sets the number restart attempts when the drive detects a *LWL Low Water Level Digital Input* condition.	3 (0 - 10)
L5-63 (3687)	Low Water Level Restart Time	V/f OLV/PM EZOLV Sets the time interval between each *LWL Low Water Level Digital Input* auto-restart attempt. **Note:** If the *LWL* fault condition stays after the time set in this parameter, the drive will not try to auto-restart until the fault condition is removed.	20.0 s (0.5 - 3600.0 s)
L5-64 (3688)	High Water Level Fault Retry Sel	V/f OLV/PM EZOLV Sets the auto-restart function after the drive detects an *HWL High Water Level Digital Input* fault. 0 : No Retry 1 : Retry	0 (0, 1)
L5-65 (3689)	High Water Level Retry Attempts	V/f OLV/PM EZOLV Sets the number restart attempts when the drive detects a *HWL High Water Level Digital Input* condition.	3 (0 - 10)
L5-66 (368A)	High Water Level Restart Time	V/f OLV/PM EZOLV Sets the time interval between each *HWL High Water Level Digital Input* auto-restart attempt. **Note:** If the *HWL* fault condition stays after the time set in this parameter, the drive will not try to auto-restart until the fault condition is removed.	20.0 s (0.5 - 3600.0 s)

◆ L6: Torque Detection

No. (Hex.)	Name	Description	Default (Range)
L6-01 (04A1)	Torque Detection Selection 1	V/f OLV/PM EZOLV Sets torque detection conditions that will trigger an overtorque or undertorque response from the drive. 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 9 : UL6 @ Speed Agree - Alarm only 10 : UL6 @ RUN - Alarm only 11 : UL6 @ Speed Agree - Fault 12 : UL6 @ RUN - Fault	0 (0 - 12)
L6-02 (04A2)	Torque Detection Level 1	V/f OLV/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.	15% (0 - 300%)
L6-03 (04A3)	Torque Detection Time 1	V/f OLV/PM EZOLV Sets the detection time for Overtorque/Undertorque Detection 1.	10.0 s (0.0 - 10.0 s)
L6-04 (04A4)	Torque Detection Selection 2	V/f OLV/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/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%)

No. (Hex.)	Name	Description	Default (Range)
L6-06 (04A6)	Torque Detection Time 2	V/f OLV/PM EZOLV Sets the detection time for Overtorque/Undertorque Detection 2.	0.1 s (0.0 - 10.0 s)
L6-13 (062E)	Motor Underload Curve Select	V/f OLV/PM EZOLV Sets the motor underload protection (*UL6 [Undertorque Detection 6]*) based on motor load and sets the level of *L6-02 [Torque Detection Level 1]* to refer to Fbase or Fmax. 0 : Base Frequency Enable 1 : Max Frequency Enable	0 (0, 1)
L6-14 (062F)	Motor Underload Level @ Min Freq	V/f OLV/PM EZOLV Sets the *UL6 [Undertorque Detection 6]* detection level at minimum frequency by percentage of drive rated current. **Note:** If you set this parameter < *L6-02 [Torque Detection Level 1]*, it will trigger an *oPE08* error.	15% (0 - 300%)

◆ L7: Torque Limit

No. (Hex.)	Name	Description	Default (Range)
L7-01 (04A7) RUN	Forward Torque Limit	V/f OLV/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/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/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/PM EZOLV Sets the torque limit value for reversed regenerative conditions as a percentage of the motor rated torque.	200% (0 - 300%)
L7-16 (044D)	Torque Limit Process at Start	V/f OLV/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)
L8-02 (04AE)	Overheat Alarm Level	V/f OLV/PM EZOLV Sets the *oH* detection level temperature.	Determined by o2-04 (50 - 150 °C)
L8-03 (04AF)	Overheat Pre-Alarm Selection	V/f OLV/PM EZOLV Sets drive operation if it detects an *oH* alarm. 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/PM EZOLV Sets the function to enable and disable input phase loss detection. 0 : Disabled 1 : Enabled	1 (0, 1)

No. (Hex.)	Name	Description	Default (Range)
L8-07 (04B3)	Output Phase Loss Protection Sel	V/f OLV/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/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/PM EZOLV Sets operation of the heatsink cooling fan. 0 : During Run, w/ L8-11 Off-Delay 1 : Always On 2 : Temperature-Dependent Fan Ctrl.	0 (0 - 2)
L8-11 (04B7)	Heatsink Fan Off-Delay Time	V/f OLV/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 Fan Operation Selection = During Run, w/ L8-11 Off-Delay]*.	300 s (0 - 300 s)
L8-12 (04B8)	Ambient Temperature Setting	V/f OLV/PM EZOLV Sets the ambient temperature of the drive installation area. **Note:** The setting range changes when the *L8-35 [Installation Method Selection]* setting changes. • When *L8-35 = 0 or 2 [IP20/UL Open Type or IP20/UL Type 1]*: -10 °C ~ +60 °C • When *L8-35 = 1 or 3 [Side-by-Side Mounting or IP55/UL Type 12]*: -10 °C ~ +50 °C	40 °C (Determined by L8-35)
L8-15 (04BB)	Drive oL2 @ Low Speed Protection	V/f OLV/PM EZOLV Sets the function to decrease the drive overload level at which the drive will trigger *oL2 [Drive Overload]* during low speed operation (6 Hz or slower) to prevent damage to the main circuit transistors. **Note:** Contact Yaskawa or your nearest sales representative before disabling this function at low speeds. If you frequently operate drives with high output current in low speed ranges, it can cause heat stress and decrease the life span of drive IGBTs. 0 : Disabled (No Additional Derate) 1 : Enabled (Reduced oL2 Level)	1 (0, 1)
L8-18 (04BE)	Software Current Limit Selection	V/f OLV/PM EZOLV Set the software current limit selection function to prevent damage to the main circuit transistor caused by too much current. 0 : Disabled 1 : Enabled	0 (0, 1)
L8-19 (04BF)	Freq Reduction @ oH Pre-Alarm	V/f OLV/PM EZOLV Sets the ratio at which the drive derates the frequency reference during an *oH* alarm.	90.0% (10.0 - 100.0%)
L8-27 (04DD)	Overcurrent Detection Gain	V/f OLV/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/PM EZOLV Sets the function to detect *LF2 [Output Current Imbalance]*. 0 : Disabled 1 : Enabled	1 (0, 1)
L8-31 (04E1)	LF2 Detection Time	V/f OLV/PM EZOLV Sets the LF2 [Output Current Imbalance] detection time.	3 (1 – 100)
L8-35 (04EC)	Installation Method Selection	V/f OLV/PM EZOLV Sets the type of drive installation. 0 : IP20/UL Open Type 1 : Side-by-Side Mounting 2 : IP20/UL Type 1 3 : IP55/UL Type 12	Determined by the drive (0 - 3)

No. (Hex.)	Name	Description	Default (Range)
L8-38 (04EF)	Carrier Frequency Reduction	V/f OLV/PM EZOLV Sets the carrier frequency reduction function. The drive decreases the carrier frequency when the output current is more than a specified level. 0 : Disabled 1 : Enabled below 6 Hz 2 : Enabled for All Speeds 3 : Enable at Overload 4 : Enabled for All Speeds/Overheat **Note:** Setting *0 [Disabled]* is available when *A1-02 = 5 or 8 [Control Method Selection = PM Open Loop Vector or EZ Vector Control]*.	4 (0 - 4)
L8-41 (04F2)	High Current Alarm Selection	V/f OLV/PM EZOLV Sets the function to cause an *HCA [High Current Alarm]* when the output current is more than 150% of the drive rated current. 0 : Disabled 1 : Enabled	0 (0, 1)
L8-90 (0175) Expert	STPo Detection Level (Low Speed)	V/f OLV/PM EZOLV Sets the detection level that the control fault must be equal to or more than to cause an *STPo [Motor Step-Out Detected]*.	0 times (0 - 5000 times)
L8-97 (3104)	Carrier Freq Reduce during OH	V/f OLV/PM EZOLV Sets the function to decrease carrier frequency during oH pre-alarm. 0 : Disabled 1 : Enabled	0 (0, 1)

◆ L9: Drive Protection 2

No. (Hex.)	Name	Description	Default (Range)
L9-16 (11DC) Expert	FAn1 Detect Time	V/f OLV/PM EZOLV Sets the detection time for *FAn1 [Drive Cooling Fan Fault]*. Yaskawa recommends that you do not change this parameter value.	4.0 s (0.0 - 30.0 s)

3.12 n: Special Adjustment

◆ n1: Hunting Prevention

No. (Hex.)	Name	Description	Default (Range)
n1-01 (0580)	Hunting Prevention Selection	V/f OLV/PM EZOLV Sets the function to prevent hunting. 0 : Disabled 1 : Enabled (Normal)	1 (0, 1)
n1-02 (0581) Expert	Hunting Prevention Gain Setting	V/f OLV/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/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/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/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/PM EZOLV Adjusts the responsiveness of the oscillation suppression function for the DC bus voltage. Set *n1-13 = 1 [DC Bus Stabilization Control = Enabled]* to enable this parameter.	100.0 ms (0.0 - 500.0 ms)

◆ n3: High Slip/Overexcite Braking

No. (Hex.)	Name	Description	Default (Range)
n3-01 (0588) Expert	HSB Deceleration Frequency Width	V/f OLV/PM EZOLV Sets the amount by which the output frequency is to be lowered during high-slip braking, as a percentage of *E1-04 [Maximum Output Frequency]*, which represents the 100% value.	5% (1 - 20%)
n3-02 (0589) Expert	HSB Current Limit Level	V/f OLV/PM EZOLV Sets the maximum current output during high-slip braking as a percentage, where *E2-01 [Motor Rated Current (FLA)]* is 100%. Also sets the current suppression to prevent exceeding drive overload tolerance. **Note:** When *L8-38 = 4 [Carrier Frequency Reduction = Enabled for All Speeds/Overheat]*, the default is set to 120% of drive rated current.	Determined by L8-38 (0 - 120%)
n3-03 (058A) Expert	HSB Dwell Time at Stop	V/f OLV/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 *E1-09*.	1.0 s (0.0 - 10.0 s)
n3-04 (058B) Expert	HSB Overload Time	V/f OLV/PM EZOLV Sets the time used to detect *oL7 [High Slip Braking Overload]*, 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) Expert	OverexcitationBraking (OEB) Gain	V/f OLV/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/PM EZOLV Sets the function that injects harmonic signals during overexcitation deceleration. 0 : Disabled 1 : Enabled	0 (0, 1)

No. (Hex.)	Name	Description	Default (Range)
n3-21 (0579) Expert	HSB Current Suppression Level	V/f OLV/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) Expert	Overexcitation Braking Operation	V/f OLV/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)

◆ n7: EZ Drive

No. (Hex.)	Name	Description	Default (Range)
n7-01 (3111) Expert	Damping Gain for Low Frequency	V/f OLV/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/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/PM EZOLV Sets the speed calculation gain during usual operation. Usually it is not necessary to change this setting.	15.0 (1.0 - 50.0)
n7-08 (3118) Expert	Speed Calculation Gain2	V/f OLV/PM EZOLV Sets the speed calculation gain during a speed search. **Note:** When *E9-01 = 1 [Motor Type Selection = Permanent Magnet (PM)]*, the setting range is 1.0 - 80.0.	25.0 (1.0 - 50.0)
n7-10 (311A) Expert	Pull-in Current Switching Speed	V/f OLV/PM EZOLV Parameter *n8-51 [Pull-in Current @ Acceleration]*, is in effect when the output frequency is ≤ *n7-10*, where the speed is set as a percentage of rated speed. **Note:** • The value set in *n8-51 [Pull-in Current @ Acceleration]* is enabled for speeds that are not higher than *n7-10* during deceleration. The value set in *b8-01 [Energy Saving Control Selection]* is enabled for speeds higher than *n7-10*. • If there is a large quantity of oscillation when you operate in the low speed range, increase the setting value. • When it is most important to save energy in the low speed range, decrease the setting value.	10.0% (0.0 - 100.0%)
n7-11 (311B) Expert	Drv Mode Switch Hysteresis Band	V/f OLV/PM EZOLV Sets the hysteresis level for Switching Speed set in *n7-10 [Pull-in Current Switching Speed]*. When the speed is lower than *n7-10* + *n7-11* during acceleration, the drive enables pull-in current. **Note:** • The value set in *n8-51 [Pull-in Current @ Acceleration]* is enabled for speeds that are not higher than *n7-10* + *n7-11* during acceleration. The value set in *b8-01 [Energy Saving Control Selection]* is enabled for speeds higher than *n7-10* + *n7-11*. • If there is a large quantity of oscillation when you operate in the low speed range, increase the setting value. • When it is most important to save energy in the low speed range, decrease the setting value.	5.0% (1.0 - 20.0%)
n7-13 (311D) Expert	Pull-in Current Switching Time	V/f OLV/PM EZOLV Sets a time to enable the pull-in current commands. If there is a large quantity of oscillation at speeds around *n7-10 [Pull-in Current Switching Speed]*, decrease the setting in decrements of 20 ms.	100 ms (0 - 1000 ms)
n7-17 (3122) Expert	Resistance TemperatureCorrection	V/f OLV/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)

◆ n8: PM Motor Control Tuning

No. (Hex.)	Name	Description	Default (Range)
n8-23 (0556) Expert	ACR q Gain @PoleEst	V/f **OLV/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/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/PM** EZOLV Sets the q-axis limit of the current regulator when the drive estimates the initial pole. Usually it is not necessary to change this setting.	0% (0 - 150%)
n8-26 (0559) Expert	ACR d Gain @PoleEst	V/f **OLV/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/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/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) Expert	Initial Pole Detection Method	V/f **OLV/PM** EZOLV Sets how the drive detects the position of the rotor at start. **Note:** • When you operate an SPM motor, set *n8-35 = 0*. When you operate an IPM motor, set *n8-35 = 0 to 2*. • When you set *n8-35 = 1*, do High Frequency Injection Auto-Tuning. 0 : Pull-in 1 : High Frequency Injection	0 (0, 1)
n8-36 (0563) Expert	HFI Frequency Level for L Tuning	V/f **OLV/PM** EZOLV Sets the injection frequency for high frequency injection. **Note:** • Set *n8-35 = 1 [Initial Pole Detection Method = High Frequency Injection]* 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/PM** EZOLV Sets the high frequency injection amplitude as a percentage where 200 V = 100% for 208 V class drives and 400 V = 100% for a 480 V class drives. Usually it is not necessary to change this setting. **Note:** • Set *n8-35 = 1 [Initial Pole Detection Method = High Frequency Injection]* 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) Expert	HFI LPF Cutoff Freq	V/f **OLV/PM** EZOLV Sets the low-pass filter shut-off frequency for high frequency injection. **Note:** • Set *n8-35 = 1 [Initial Pole Detection Method = High Frequency Injection]* 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/PM** EZOLV Sets the response gain for the high frequency injection speed estimation. **Note:** • Set *n8-35 = 1 [Initial Pole Detection Method = High Frequency Injection]* to enable this parameter. • Set *n8-41 > 0.0* for IPM motors.	2.5 (-10.0 - +10.0)
n8-42 (0569) Expert	HFI I Time	V/f **OLV/PM** EZOLV Sets the integral time constant for the high frequency injection speed estimation. Usually it is not necessary to change this setting. **Note:** Set *n8-35 = 1 [Initial Pole Detection Method = High Frequency Injection]* to enable this parameter.	0.10 s (0.00 - 9.99 s)
n8-45 (0538) Expert	Speed Feedback Detection Gain	V/f **OLV/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)

No. (Hex.)	Name	Description	Default (Range)
n8-46 (0539) Expert	PM Phase Compensation Gain	V/f OLV/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) Expert	Pull-in Current Comp Filter Time	V/f OLV/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) Expert	Pull-in/Light Load Id Current	V/f OLV/PM EZOLV Sets the d-axis current that flows to the motor during run at constant speed as a percentage where *E5-03 [PM Motor Rated Current (FLA)]* = 100%.	30% (0 - 200%)
n8-49 (053C) Expert	Heavy Load Id Current	V/f OLV/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 *E5-03 [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%)
n8-50 (053D) Expert	Medium Load Iq Level (High)	V/f OLV/PM EZOLV Sets the load current level to start high efficiency control as a percentage of *E5-03 [PM Motor Rated Current (FLA)]*. Usually it is not necessary to change this setting.	80% (50 - 255%)
n8-51 (053E) Expert	Pull-in Current @ Acceleration	V/f OLV/PM EZOLV Sets the pull-in current allowed to flow during acceleration/deceleration as a percentage of the motor rated current. **Note:** Parameter *A1-02 [Control Method Selection]* selects which parameter is the motor rated current. • *A1-02 = 5 [OLV/PM]*: *E5-03 [PM Motor Rated Current (FLA)]* • *A1-02 = 8 [EZOLV]*: *E9-06 [Motor Rated Current (FLA)]*	Determined by A1-02 (0 - 200%)
n8-52 (053F) Expert	ACR P Gain	V/f OLV/PM EZOLV Sets the proportional gain of the current regulator. Usually it is not necessary to change this setting.	10.0 (-100.0 - 100.0)
n8-54 (056D) Expert	Voltage Error Compensation Time	V/f OLV/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) Expert	Motor to Load Inertia Ratio	V/f OLV/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)
n8-56 (056F) Expert	PM High Performance Selection	V/f OLV/PM EZOLV Usually it is not necessary to change this setting. Sets the high efficiency control method for IPM motor. 0 : Disabled 1 : Enabled (Vd) 2 : Enabled (Vd & Vq)	1 (0 - 2)
n8-62 (057D) Expert	Output Voltage Limit Level	V/f OLV/PM EZOLV Sets the output voltage limit to prevent saturation of the output voltage. Usually it is not necessary to change this parameter. **Note:** • When *A1-02 = 8 [Control Method Selection = EZOLV]*, this parameter is available in Expert Mode. • When *A1-02 = 8*, the default setting is: −208 V Class: 230.0 V −480 V Class: 460.0 V	208 V Class: 200.0 V, 480 V Class: 400.0 V (208 V Class: 0.0 - 240.0 V, 480 V Class: 0.0 - 480.0 V)
n8-63 (057E) Expert	Output Voltage Limit P Gain	V/f OLV/PM EZOLV Sets the proportional gain for output voltage control. Usually it is not necessary to change this setting.	1.00 (0.00 - 100.00)
n8-64 (057F) Expert	Output Voltage Limit I Time	V/f OLV/PM EZOLV Sets the integral time for output voltage control. Usually it is not necessary to change this setting.	0.040 s (0.000 - 5.000)
n8-65 (065C) Expert	Speed Fdbk Gain @ oV Suppression	V/f OLV/PM EZOLV Sets the gain of internal speed feedback detection suppression while the overvoltage suppression function is operating as a magnification value. Usually it is not necessary to change this parameter.	1.50 (0.00 - 10.00)
n8-66 (0235) Expert	Output Voltage Limit Filter Time	V/f OLV/PM EZOLV Sets the filter time constant for output voltage control. Usually it is not necessary to change this setting.	0.020 s (0.000 - 5.000)

No. (Hex.)	Name	Description	Default (Range)
n8-74 (05C3)	Light Load Iq Level	V/f **OLV/PM** EZOLV Set *n8-48 [Pull-in/Light Load Id Current]* to the percentage of load current (q-axis current) that you will apply, where *E5-03 [PM Motor Rated Current (FLA)]* = a setting value of 100%.	30% (0 - 255%)
n8-75 (05C4)	Medium Load Iq Level (low)	V/f **OLV/PM** EZOLV Set *n8-78 [Medium Load Id Current]* to the percentage of load current (q-axis current) that you will apply, where *E5-03 [PM Motor Rated Current (FLA)]* = a setting value of 100%.	50% (0 - 255%)
n8-76 (05CD) Expert	Id Switching Filter Time	V/f **OLV/PM** EZOLV Sets the filter time constant for d-axis current reference. Usually it is not necessary to change this setting.	200 ms (0 - 5000 ms)
n8-77 (05CE)	Heavy Load Iq Level	V/f **OLV/PM** EZOLV Set *n8-49 [Heavy Load Id Current]* to the percentage of load current (q-axis current) that you will apply, where *E5-03 [PM Motor Rated Current (FLA)]* = a setting value of 100%.	90% (0 - 255%)
n8-78 (05F4)	Medium Load Id Current	V/f **OLV/PM** EZOLV Sets the level of the pull-in current for mid-range loads.	0% (-200 - +200%)
n8-79 (05FE) Expert	Pull-in Current @ Deceleration	V/f **OLV/PM** EZOLV Sets the pull-in current that can flow during deceleration as a percentage of the *E5-03 [PM Motor Rated Current (FLA)]*. **Note:** When *n8-79 = 0*, the drive will use the value set in *n8-51 [Pull-in Current @ Acceleration]*.	50% (0 - 200%)
n8-84 (02D3) Expert	Polarity Detection Current	V/f **OLV/PM** EZOLV Sets the current for processing an estimation of the initial motor magnetic pole as a percentage, where *E5-03 [PM Motor Rated Current]* is the 100% value.	100% (0 - 150%)
n8-88 (02BD) Expert	Vout Limit Switching Level	V/f **OLV/PM** EZOLV Sets the current level at which output voltage limit sequence selection occurs as a percentage where *E5-03 [PM Motor Rated Current]* is 100%. Normally there is no need to change this setting.	400% (0 - 400%)
n8-89 (02BE) Expert	Vout Limit Switching Hysteresis	V/f **OLV/PM** EZOLV Sets the hysteresis width of the current level at which output voltage limit sequence selection occurs as a percentage where *E5-03 [PM Motor Rated Current]* is 100%. Normally there is no need to change this setting.	3% (0 - 400%)
n8-90 (02BF) Expert	Vout Limit Switching Speed	V/f **OLV/PM** EZOLV Sets the speed level at which output voltage limit sequence selection occurs as a percentage where *E1-04 [Maximum Output Frequency]* is 100%. Usually it is not necessary to change this setting.	200% (0 - 200%)
n8-91 (02F7) Expert	Id Limit at Voltage Saturation	V/f **OLV/PM** EZOLV Sets the limit value of feedback output voltage limit Id operation. Usually it is not necessary to change this setting.	-50% (-200 - 0%)

3.13 o: Keypad-Related Settings

◆ o1: Keypad Display

No. (Hex.)	Name	Description	Default (Range)
o1-03 (0502)	Frequency Display Unit Selection	V/f OLV/PM EZOLV Sets the display units for the frequency reference and output frequency. 0 : 0.01Hz units 1 : 0.01% units 2 : min^{-1} (r/min) unit 3 : User Units (o1-09 -o1-11)	0 (0 - 3)
o1-05 (0504) RUN	LCD Contrast Adjustment	V/f OLV/PM EZOLV Sets the contrast of the LCD display on the keypad.	5 (0 - 10)
o1-09 (051C)	Freq. Reference Display Units	V/f OLV/PM EZOLV Sets the unit of display for the frequency reference parameters and frequency-related monitors when *o1-03 = 3 [Frequency Display Unit Selection = User Units (o1-09 ~ o1-11)]*. 0 : "WC: inches of water column 1 : PSI: pounds per square inch 2 : GPM: gallons/min 3 : °F: Fahrenheit 4 : ft^3/min: cubic feet/min 5 : m^3/h: cubic meters/hour 6 : L/h: liters/hour 7 : L/s: liters/sec 8 : bar: bar 9 : Pa: Pascal 10 : °C: Celsius 11 : m: meters 12 : ft: feet 13 : L/min: liters/min 14 : m^3/min: cubic meters/min 15 : "Hg: Inch Mercury 16 : kPa: kilopascal 48 : %: Percent 49 : Custom(o1-13~15) 50 : None	50 (0 - 50)
o1-10 (0520)	User Units Maximum Value	V/f OLV/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/PM EZOLV Sets the number of decimal places for frequency reference and monitor values. 0 : No Decimal Places (XXXXX) 1 : One Decimal Place (XXXX.X) 2 : Two Decimal Places (XXX.XX) 3 : Three Decimal Places (XX.XXX)	Determined by o1-03 (0 - 3)
o1-13 (3105)	Freq. Reference Custom Unit 1	V/f OLV/PM EZOLV Sets the first character of the custom unit display when *o1-03 = 3 [Frequency Display Unit Selection = User Units]* and *o1-09 = 49 [Freq. Reference Display Units = Custom (o1-13~15)]*.	41 (20 - 7A)
o1-14 (3106)	Freq. Reference Custom Unit 2	V/f OLV/PM EZOLV Sets the second character of the custom unit display when *o1-03 = 3 [Frequency Display Unit Selection = User Units]* and *o1-09 = 49 [Freq. Reference Display Units = Custom (o1-13~15)]*.	41 (20 - 7A)
o1-15 (3107)	Freq. Reference Custom Unit 3	V/f OLV/PM EZOLV Sets the third character of the custom unit display when *o1-03 = 3 [Frequency Display Unit Selection = User Units]* and *o1-09 = 49 [Freq. Reference Display Units = Custom (o1-13~15)]*.	41 (20 - 7A)
o1-18 (310A)	User Defined Parameter 1	V/f OLV/PM EZOLV Lets you set values to use as reference information.	0 (0 - 999)
o1-19 (310B)	User Defined Parameter 2	V/f OLV/PM EZOLV Lets you set values to use as reference information.	0 (0 - 999)
o1-24 (11AD) RUN	Custom Monitor 1	V/f OLV/PM EZOLV Sets Custom Monitor 1 to be displayed on the home screen. A setting of 0 removes this custom monitor from the cycling list.	101 (0, 101 - 1098)

No. (Hex.)	Name	Description	Default (Range)
o1-25 (11AE) RUN	Custom Monitor 2	V/f OLV/PM EZOLV Sets Custom Monitor 2 to be displayed on the home screen. This monitor is not in the cycling list.	102 (0, 101 - 1098)
o1-26 (11AF) RUN	Custom Monitor 3	V/f OLV/PM EZOLV Sets Custom Monitor 3 to be displayed on the home screen. This monitor is not in the cycling list.	1091 (0, 101 - 1098)
o1-27 (11B0) RUN	Custom Monitor 4	V/f OLV/PM EZOLV Sets Custom Monitor 4 to be displayed on the home screen. A setting of 0 removes this custom monitor from the cycling list.	103 (0, 101 - 1099)
o1-28 (11B1) RUN	Custom Monitor 5	V/f OLV/PM EZOLV Sets Custom Monitor 5 to be displayed on the home screen. A setting of 0 removes this custom monitor from the cycling list. **Note:** Default is 116 *[U1-16]* for V/f and OLV/PM control methods.	105 (0, 101 - 1099)
o1-29 (11B2) RUN	Custom Monitor 6	V/f OLV/PM EZOLV Sets Custom Monitor 6 to be displayed on the home screen. A setting of 0 removes this custom monitor from the cycling list.	106 (0, 101 - 1099)
o1-30 (11B3) RUN	Custom Monitor 7	V/f OLV/PM EZOLV Sets Custom Monitor 7 to be displayed on the home screen. A setting of 0 removes this custom monitor from the cycling list.	107 (0, 101 - 1099)
o1-31 (11B4) RUN	Custom Monitor 8	V/f OLV/PM EZOLV Sets Custom Monitor 8 to be displayed on the home screen. A setting of 0 removes this custom monitor from the cycling list.	108 (0, 101 - 1099)
o1-32 (11B5) RUN	Custom Monitor 9	V/f OLV/PM EZOLV Sets Custom Monitor 9 to be displayed on the home screen. A setting of 0 removes this custom monitor from the cycling list.	110 (0, 101 - 1299)
o1-33 (11B6) RUN	Custom Monitor 10	V/f OLV/PM EZOLV Sets Custom Monitor 10 to be displayed on the home screen. A setting of 0 removes this custom monitor from the cycling list.	111 (0, 101 - 1099)
o1-34 (11B7) RUN	Custom Monitor 11	V/f OLV/PM EZOLV Sets Custom Monitor 11 to be displayed on the home screen. A setting of 0 removes this custom monitor from the cycling list.	113 (0, 101 - 1099)
o1-35 (11B8) RUN	Custom Monitor 12	V/f OLV/PM EZOLV Sets Custom Monitor 12 to be displayed on the home screen. A setting of 0 removes this custom monitor from the cycling list.	114 (0, 101 - 1099)
o1-36 (11B9) RUN	LCD Backlight Brightness	V/f OLV/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/PM EZOLV Sets the automatic shut off function for the LCD backlight. 0 : OFF 1 : ON	1 (0, 1)
o1-38 (11BB) RUN	LCD Backlight Off-Delay	V/f OLV/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/PM EZOLV Sets the function to show the LCD keypad initial setup screen each time you energize the drive. This parameter is only available with an LCD keypad. 0 : TURN OFF power up setup screen 1 : KEEP ON power up setup screen	1 (0, 1)
o1-58 (3125)	Motor Power Unit Selection	V/f OLV/PM EZOLV Sets the setting unit for parameters that set the motor rated power. 0 : kW 1 : HP	1 (0, 1)

No. (Hex.)	Name	Description	Default (Range)
o1-83 (31BD)	Drive Name	V/f OLV/PM EZOLV Selects the text to be displayed on the top line of the Status Monitor as the drive name. 0 : Disabled - No Text 1 : IQPUMP605 2 : iQpump 3 : Auxiliary Pump 4 : Backup Pump 5 : Booster Pump 6 : Canal Pump 7 : Chopper Pump 8 : Emergency Pump 9 : High Service Pump 10 : Irrigation Pump 11 : Jockey Pump 12 : Lift Pump 13 : Main Feed Pump 14 : Prog. Cavity Pump 15 : Pump 16 : Reservoir Pump 17 : Slurry Pump 18 : Standby Pump 19 : Storage Tank 20 : Submersible Pump 21 : Sump Pump 22 : Transfer Pump 23 : Trash Pump 24 : Vert. Turbine Pump 25 : Well Pump 26 : Zone 27 : North Pump 28 : South Pump 29 : East Pump 30 : West Pump 31 : NW Pump 32 : NE Pump 33 : SW Pump 34 : SE Pump	1 (0 - 34)
o1-84 (31BE)	Drive Name Unit Number	V/f OLV/PM EZOLV Selects the unit number to be displayed on the top line of the Status Monitor. The unit number will show up as a 2–digit number (zero-filled). **Note:** A setting of 0 removes the unit number from the drive name (no number displayed).	0 (0 - 99)
o1-90 (31C4) RUN	Custom Monitor 13	V/f OLV/PM EZOLV Sets Custom Monitor 13 to be displayed on the home screen. A setting of 0 removes this custom monitor from the cycling list.	115 (0, 101 - 1099)
o1-91 (31C5) RUN	Custom Monitor 14	V/f OLV/PM EZOLV Sets Custom Monitor 14 to be displayed on the home screen. A setting of 0 removes this custom monitor from the cycling list.	125 (0, 101 - 1099)
o1-92 (31C6) RUN	Custom Monitor 15	V/f OLV/PM EZOLV Sets Custom Monitor 15 to be displayed on the home screen. A setting of 0 removes this custom monitor from the cycling list.	401 (0, 101 - 1099)
o1-93 (31C7) RUN	Custom Monitor 16	V/f OLV/PM EZOLV Sets Custom Monitor 16 to be displayed on the home screen. A setting of 0 removes this custom monitor from the cycling list.	1002 (0, 101 - 1099)
o1-94 (31C8) RUN	Custom Monitor 17	V/f OLV/PM EZOLV Sets Custom Monitor 17 to be displayed on the home screen. A setting of 0 removes this custom monitor from the cycling list.	1003 (0, 101 - 1099)
o1-95 (31C9) RUN	Custom Monitor 18	V/f OLV/PM EZOLV Sets Custom Monitor 18 to be displayed on the home screen. A setting of 0 removes this custom monitor from the cycling list.	1099 (0, 101 - 1099)

No. (Hex.)	Name	Description	Default (Range)
o1-96 (31CA) RUN	Custom Monitor 19	V/f OLV/PM EZOLV Sets Custom Monitor 19 to be displayed on the home screen. A setting of 0 removes this custom monitor from the cycling list.	0 (0, 101 - 1099)
o1-97 (31CB) RUN	Custom Monitor 20	V/f OLV/PM EZOLV Sets Custom Monitor 20 to be displayed on the home screen. A setting of 0 removes this custom monitor from the cycling list.	0 (0, 101 - 1099)

◆ o2: Keypad Operation

No. (Hex.)	Name	Description	Default (Setting Range)
o2-02 (0506)	OFF Key Function Selection	V/f OLV/PM EZOLV Sets the function to use the OFF key 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/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/PM EZOLV Sets the Drive Model code. Set this parameter after you replace the control board.	Determined by the drive (-)
o2-05 (0509)	Home Mode Freq Ref Entry Mode	V/f OLV/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/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/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)	Parameter Write during Uv	V/f OLV/PM EZOLV Enables and disables the function to change parameter settings during a *Uv [DC Bus Undervoltage]* condition. 0 : Disabled 1 : Enabled	0 (0, 1)
o2-23 (11F8) RUN	External 24V Powerloss Detection	V/f OLV/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 : Disabled 1 : Enabled	0 (0, 1)
o2-24 (11FE)	LED Light Function Selection	V/f OLV/PM EZOLV Sets the function to show the LED status rings and keypad LED lamps. **Note:** When you use *A1-03 [Initialize Parameters]* to initialize the drive, the drive will not reset this parameter. 0 : Enable Status Ring & Keypad LED 1 : LED Status Ring Disable 2 : Keypad LED Light Disable	0 (0 - 2)

No. (Hex.)	Name	Description	Default (Setting Range)
o2-26 (1563)	Alarm Display at Ext. 24V Power	V/f OLV/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 : Disabled 1 : Enabled	1 (0, 1)
o2-27 (1565)	bCE Detection Selection	V/f OLV/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 *C1-09*) 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/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/PM EZOLV Sets the copy function when *o3-01 = 1 [Copy Keypad Function Selection = Backup (drive → keypad)]*. 0 : Disabled 1 : Enabled	1 (0, 1)
o3-04 (0B3E)	Select Backup/Restore Location	V/f OLV/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/PM EZOLV Sets which parameters are backed up, restored, and referenced. This parameter is only available with an LCD keypad. 0 : Standard Parameters 1 : Standard + DWEZ Parameters	Determined by A1-07 (0, 1)
o3-06 (0BDE)	Auto Parameter Backup Selection	V/f OLV/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/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/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/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	1 (0, 1)
o4-03 (050E)	Fan Operation Time Setting	V/f OLV/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/PM EZOLV Sets the *U4-05 [Capacitor Life Mon]* monitor value.	0% (0 - 150%)
o4-07 (0523)	Softcharge Relay Maintenance Set	V/f OLV/PM EZOLV Sets the *U4-06 [PreChargeRelayMon]* monitor value.	0% (0 - 150%)
o4-09 (0525)	IGBT Maintenance Setting	V/f OLV/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/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/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/PM EZOLV Resets the monitor values for *U4-02 [Total 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/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 **Note:** When you use *A1-03 [Initialize Parameters]* to initialize the drive, the drive will not reset this parameter.	1 (0 - 2)
o4-23 (1550) RUN	Date Format	V/f OLV/PM EZOLV Sets the date display format. This parameter is only available on an LCD keypad. 0 : YYYY/MM/DD 1 : DD/MM/YYYY 2 : MM/DD/YYYY **Note:** When you use *A1-03 [Initialize Parameters]* to initialize the drive, the drive will not reset this parameter.	2 (0 - 2)
o4-24 (310F) RUN	bAT Detection Selection	V/f OLV/PM EZOLV Sets operation when the drive detects *bAT [Keypad Battery Low Voltage]* and *TiM [Keypad Time Not Set]*. 0 : Disable 1 : Enable (Alarm Detected) 2 : Enable (Fault Detected)	0 (0 - 2)

◆ o5: Log Function

No. (Hex.)	Name	Description	Default (Range)
o5-00 (1E81) RUN	Log Type	V/f OLV/PM EZOLV Sets the type of data log function. This parameter is only available when using an LCD keypad. 0 : Long Term Log 1 : Short Term Log	0 (0 - 1)
o5-01 (1551) RUN	Log Start/Stop Selection	V/f OLV/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/PM EZOLV Sets the data log sampling cycle. This parameter is only available when using an LCD keypad. **Note:** • You cannot set a time that ends in an odd number. • The default setting and range are different for different *o5-00* settings. - *o5-00 = 0 [Log Type = Long Term Log]*: 1000 ms (100 - 6000 ms) - *o5-00 = 1 [Short Term Log]*: 10 ms (2 - 98 ms)	o5-00 = 0: 1000 ms, o5-00 = 1: 10 ms (o5-00 = 0: 100 - 6000 ms, o5-00 = 1: 2 - 98 ms)
o5-03 (1553) RUN	Log Monitor Data 1	V/f OLV/PM EZOLV Sets the data log monitor. This parameter is only available on an LCD keypad.	101 (000, 101 - 1299)
o5-04 (1554) RUN	Log Monitor Data 2	V/f OLV/PM EZOLV Sets the data log monitor. This parameter is only available on an LCD keypad.	102 (000, 101 - 1299)
o5-05 (1555) RUN	Log Monitor Data 3	V/f OLV/PM EZOLV Sets the data log monitor. This parameter is only available on an LCD keypad.	103 (000, 101 - 1299)
o5-06 (1556) RUN	Log Monitor Data 4	V/f OLV/PM EZOLV Sets the data log monitor. This parameter is only available on an LCD keypad.	107 (000, 101 - 1299)
o5-07 (1557) RUN	Log Monitor Data 5	V/f OLV/PM EZOLV Sets the data log monitor. This parameter is only available on an LCD keypad.	108 (000, 101 - 1299)
o5-08 (1558) RUN	Log Monitor Data 6	V/f OLV/PM EZOLV Sets the data log monitor. This parameter is only available on an LCD keypad. **Note:** When *A1-02 = 0 or 5 [Control Method Selection = V/f, OLV/PM]*, the default setting is *0*.	114 (000, 101 - 1299)
o5-09 (1559) RUN	Log Monitor Data 7	V/f OLV/PM EZOLV Sets the data log monitor. This parameter is only available on an LCD keypad.	1090 (000, 101 - 1299)
o5-10 (155A) RUN	Log Monitor Data 8	V/f OLV/PM EZOLV Sets the data log monitor. This parameter is only available on an LCD keypad.	1091 (000, 101 - 1299)
o5-11 (155B) RUN	Log Monitor Data 9	V/f OLV/PM EZOLV Sets the data log monitor. This parameter is only available on an LCD keypad.	112 (000, 101 - 1299)
o5-12 (155C) RUN	Log Monitor Data 10	V/f OLV/PM EZOLV Sets the data log monitor. This parameter is only available on an LCD keypad.	111 (000, 101 - 1299)
o5-15 (1E82) RUN	Trigger Type Selection	V/f OLV/PM EZOLV Sets the type of trigger for the short-term data log. This parameter is only available when using an LCD keypad. 0 : Digital Trigger 1 : Analog Trigger	0 (0 - 1)
o5-16 (1E83) RUN	Digital Trigger Object	V/f OLV/PM EZOLV Selects the function to set for the digital trigger target (0 - FF) from the setting values for multi-function digital outputs. This parameter is only available when using an LCD keypad.	E (0 - FF)
o5-17 (1E84) RUN	Analog Trigger Object	V/f OLV/PM EZOLV Selects the monitor (*Ux-xx*) to set for the analog trigger (0 - 1299) target. This parameter is only available when using an LCD keypad.	102 (0 - 1299)

No. (Hex.)	Name	Description	Default (Range)
o5-18 (1E85) RUN	Analog Trigger Level	V/f OLV/PM EZOLV Sets the level to compare with the analog trigger target. This parameter is only available when using an LCD keypad.	0.0% (-999.9% - +999.9%)
o5-19 (1E86) RUN	Trigger Condition	V/f OLV/PM EZOLV Selects the condition that detects the trigger. This parameter is only available when using an LCD keypad. 0 : Rising Edge 1 : Falling Edge	0 (0 - 1)
o5-20 (1E87) RUN	Pre-Trigger Setting	V/f OLV/PM EZOLV Sets the percentage of data to save before the drive detects the trigger for the short-term data log. This parameter is only available when using an LCD keypad.	90% (0% - 100%)
o5-21 (1E88) RUN	Trend Log Sampling Time Selection	V/f OLV/PM EZOLV Selects the sampling cycle for the trend log to save data before the drive detects the trigger. The trend log works with the short-term data log. This parameter is only available when using an LCD keypad. 0 : Trend Log Disabled 1 : 0.1 s (About 1 hour) 2 : 1 s (About 10 hours) 3 : 10 s (About 100 hours) 4 : 60 s (About 600 hours)	0 (0 - 4)

3.14 Q: DriveWorksEZ Parameters

◆ Q1-01 to Qx-xx: Reserved for DriveWorksEZ

No. (Hex.)	Name	Description
Q1-01 to Qx-xx (1600 - xxxx)	Reserved for DriveWorksEZ	V/f OLV/PM EZOLV These parameters are reserved for use with DriveWorksEZ.

3.15 R: DWEZ Connection 1-20

◆ R1-01 to R1-40: DriveWorksEZ Connection Parameters 1 to 20 (Upper / Lower)

No. (Hex.)	Name	Description
R1-01 to R1-40 (1840 - 1867)	DriveWorksEZ Connection Parameters 1 to 20 (Upper / Lower)	V/f OLV/PM EZOLV DriveWorksEZ Connection Parameters 1 to 20 (Upper / Lower)

3.16 S: Special Applications

◆ S1: Dynamic Noise Control

No. (Hex.)	Name	Description	Default (Range)
S1-01 (3200) Expert	Dynamic Noise Control	V/f OLV/PM EZOLV Sets the function that decreases the output voltage in variable torque applications to decrease audible noise. 0 : Disabled 1 : Enabled	0 (0, 1)
S1-02 (3201) Expert	Voltage Reduction Rate	V/f OLV/PM EZOLV Sets the rate at which the drive will decrease the output voltage as a percentage of the V/f pattern when operating with no load.	50.0% (50.0 - 100.0%)
S1-03 (3202) Expert	Voltage Restoration Level	V/f OLV/PM EZOLV Sets the level at which the drive will start to restore the voltage as a percentage of the drive rated torque.	20.0% (0.0 - 90.0%)
S1-04 (3203) Expert	Voltage Restoration Off Level	V/f OLV/PM EZOLV Sets the level at which voltage restoration for the V/f pattern is complete as a percentage of the drive rated torque. If the output is more than *S1-04*, the drive will control the voltage as specified by the V/f pattern setting. **Note:** The lower limit of this parameter is the value of *S1-03 [Voltage Restoration Level]* + 10.0%.	50.0% (10.0 - 100.0%)
S1-05 (3204) Expert	Volt Restore Sensitivity Time K	V/f OLV/PM EZOLV Sets the level of sensitivity of the output torque and LPF time constant for the voltage reduction rate. You can adjust the level of sensitivity with the load response.	1.000 s (0.000 - 3.000 s)
S1-06 (3205) Expert	Volt Restore Impact Load Time K	V/f OLV/PM EZOLV Sets the voltage restoration time constant when you add an impact load.	0.050 s (0.000 - 1.000 s)
S1-07 (324C) Expert	Output Phase Loss Level	V/f OLV/PM EZOLV Decreases the output phase loss level when Dynamic Noise control is active.	100.0% (10.0 - 100.0%)

◆ S2: Sequence Run Timers

No. (Hex.)	Name	Description	Default (Range)
S2-01 (3206)	Timer 1 Start Time	V/f **OLV/PM** EZOLV Sets the start time for timer 1. **Note:** • Default is when *o4-22 = 1 [Time Format = 12 Hour Clock]*. When *o4-22 = 0 [24 Hour Clock]*, default is 00:00. When *o4-22 = 2 [12 Hour JP Clock]*, default is 00:00 AM. • Range is when *o4-22 = 1*. When *o4-22 = 0*, range is 00:00 to 24:00. When *o4-22 = 2*, range is 00:00 AM to 11:59 PM.	12:00 (12:00 AM - 11:59 PM)
S2-02 (3207)	Timer 1 Stop Time	V/f **OLV/PM** EZOLV Sets the stop time for timer 1. **Note:** • Default is when *o4-22 = 1 [Time Format = 12 Hour Clock]*. When *o4-22 = 0 [24 Hour Clock]*, default is 00:00. When *o4-22 = 2 [12 Hour JP Clock]*, default is 00:00 AM. • Range is when *o4-22 = 1*. When *o4-22 = 0*, range is 00:00 to 24:00. When *o4-22 = 2*, range is 00:00 AM to 11:59 PM.	12:00 (12:00 AM - 11:59 PM)

No. (Hex.)	Name	Description	Default (Range)
S2-03 (3208)	Timer 1 Day Selection	V/f OLV/PM EZOLV Sets the days for which sequence timer 1 is active. 0 : Timer Disabled 1 : Daily 2 : Mon - Fri 3 : Sat - Sun 4 : Monday 5 : Tuesday 6 : Wednesday 7 : Thursday 8 : Friday 9 : Saturday 10 : Sunday	0 (0 - 10)
S2-04 (3209)	Timer 1 Sequence Selection	V/f OLV/PM EZOLV Sets the drive response when sequence timer 1 is active. 0 : Digital Out Only 1 : Run 2 : Run - PID Disable 3 : Allow Alternation	0 (0 - 3)
S2-05 (320A)	Timer 1 Reference Source	V/f OLV/PM EZOLV Selects the frequency reference source to run the drive when sequence timer 1 is active (only applicable when *S2-04 > 0 [Timer 1 Sequence Selection ≠ Digital Out Only]*). 0 : Operator (d1-01/YA-01) 1 : Operator (d1-02/YA-02) 2 : Operator (d1-03/YA-03) 3 : Operator (d1-04/YA-04) 4 : Terminals 5 : Serial Com 6 : Option PCB 7 : Pulse Input 8 : Set by b1-01/b1-15 9 : Operator (d1-05/YA-05) 10 : Operator (d1-06/YA-06) 11 : Operator (d1-07/YA-07) 12 : Operator (d1-08/YA-08) **Note:** For reference source 0 to 3, the drive will use *d1-xx* frequency reference when PID mode is disabled and *YA-xx* setpoint when PID is enabled.	8 (0 - 12)
S2-06 (320B)	Timer 2 Start Time	V/f OLV/PM EZOLV Sets the start time for timer 2. **Note:** • Default is when *o4-22 = 1 [Time Format = 12 Hour Clock]*. When *o4-22 = 0 [24 Hour Clock]*, default is 00:00. When *o4-22 = 2 [12 Hour JP Clock]*, default is 00:00 AM. • Range is when *o4-22 = 1*. When *o4-22 = 0*, range is 00:00 to 24:00. When *o4-22 = 2*, range is 00:00 AM to 11:59 PM.	12:00 (12:00 AM - 11:59 PM)
S2-07 (320C)	Timer 2 Stop Time	V/f OLV/PM EZOLV Sets the stop time for timer 2. **Note:** • Default is when *o4-22 = 1 [Time Format = 12 Hour Clock]*. When *o4-22 = 0 [24 Hour Clock]*, default is 00:00. When *o4-22 = 2 [12 Hour JP Clock]*, default is 00:00 AM. • Range is when *o4-22 = 1*. When *o4-22 = 0*, range is 00:00 to 24:00. When *o4-22 = 2*, range is 00:00 AM to 11:59 PM.	12:00 (12:00 AM - 11:59 PM)
S2-08 (320D)	Timer 2 Day Selection	V/f OLV/PM EZOLV Sets the days for which sequence timer 2 is active. 0 : Timer disabled 1 : Daily 2 : Mon - Fri 3 : Sat - Sun 4 : Monday 5 : Tuesday 6 : Wednesday 7 : Thursday 8 : Friday 9 : Saturday 10 : Sunday	0 (0 - 10)

No. (Hex.)	Name	Description	Default (Range)
S2-09 (320E)	Timer 2 Sequence Selection	V/f OLV/PM EZOLV Sets the drive response when sequence timer 2 is active. 0 : Digital Out Only 1 : Run 2 : Run - PID Disable 3 : Allow Alternation	0 (0 - 3)
S2-10 (320F)	Timer 2 Reference Source	V/f OLV/PM EZOLV Selects the frequency reference source to run the drive when sequence timer 2 is active (only applicable when *S2-09 > 0 [Timer 2 Sequence Selection ≠ 0]*). 0 : Operator (d1-01/YA-01) 1 : Operator (d1-02/YA-02) 2 : Operator (d1-03/YA-03) 3 : Operator (d1-04/YA-04) 4 : Terminals 5 : Serial Com 6 : Option PCB 7 : Pulse Input 8 : Set by b1-01/b1-15 9 : Operator (d1-05/YA-05) 10 : Operator (d1-06/YA-06) 11 : Operator (d1-07/YA-07) 12 : Operator (d1-08/YA-08) **Note:** For reference source 0 to 3, the drive will use *d1-xx* frequency reference when PID mode is disabled and *YA-xx* setpoint when PID is enabled.	8 (0 - 12)
S2-11 (3210)	Timer 3 Start Time	V/f OLV/PM EZOLV Sets the start time for timer 3. **Note:** • Default is when *o4-22 = 1 [Time Format = 12 Hour Clock]*. When *o4-22 = 0 [24 Hour Clock]*, default is 00:00. When *o4-22 = 2 [12 Hour JP Clock]*, default is 00:00 AM. • Range is when *o4-22 = 1*. When *o4-22 = 0*, range is 00:00 to 24:00. When *o4-22 = 2*, range is 00:00 AM to 11:59 PM.	12:00 (12:00 AM - 11:59 PM)
S2-12 (3211)	Timer 3 Stop Time	V/f OLV/PM EZOLV Sets the stop time for timer 3. **Note:** • Default is when *o4-22 = 1 [Time Format = 12 Hour Clock]*. When *o4-22 = 0 [24 Hour Clock]*, default is 00:00. When *o4-22 = 2 [12 Hour JP Clock]*, default is 00:00 AM. • Range is when *o4-22 = 1*. When *o4-22 = 0*, range is 00:00 to 24:00. When *o4-22 = 2*, range is 00:00 AM to 11:59 PM.	12:00 (12:00 AM - 11:59 PM)
S2-13 (3212)	Timer 3 Day Selection	V/f OLV/PM EZOLV Sets the days for which sequence timer 3 is active. 0 : Timer Disabled 1 : Daily 2 : Mon - Fri 3 : Sat - Sun 4 : Monday 5 : Tuesday 6 : Wednesday 7 : Thursday 8 : Friday 9 : Saturday 10 : Sunday	0 (0 - 10)
S2-14 (3213)	Timer 3 Sequence Selection	V/f OLV/PM EZOLV Sets the drive response when sequence timer 3 is active. 0 : Digital Out Only 1 : Run 2 : Run - PID Disable 3 : Allow Alternation	0 (0 - 3)

No. (Hex.)	Name	Description	Default (Range)
S2-15 (3214)	Timer 3 Reference Source	V/f OLV/PM EZOLV Selects the frequency reference source to run the drive when sequence timer 3 is active (only applicable when *S2-14 > 0 [Timer 3 Sequence Selection ≠ Digital Out Only]*). 0 : Operator (d1-01/YA-01) 1 : Operator (d1-02/YA-02) 2 : Operator (d1-03/YA-03) 3 : Operator (d1-04/YA-04) 4 : Terminals 5 : Serial Com 6 : Option PCB 7 : Pulse Input 8 : Set by b1-01/b1-15 9 : Operator (d1-05/YA-05) 10 : Operator (d1-06/YA-06) 11 : Operator (d1-07/YA-07) 12 : Operator (d1-08/YA-08) **Note:** For reference source 0 to 3, the drive will use *d1-xx* frequency reference when PID mode is disabled and *YA-xx* setpoint when PID is enabled.	8 (0 - 12)
S2-16 (3215)	Timer 4 Start Time	V/f OLV/PM EZOLV Sets the start time for timer 4. **Note:** • Default is when *o4-22 = 1 [Time Format = 12 Hour Clock]*. When *o4-22 = 0 [24 Hour Clock]*, default is 00:00. When *o4-22 = 2 [12 Hour JP Clock]*, default is 00:00 AM. • Range is when *o4-22 = 1*. When *o4-22 = 0*, range is 00:00 to 24:00. When *o4-22 = 2*, range is 00:00 AM to 11:59 PM.	12:00 (12:00 AM - 11:59 PM)
S2-17 (3216)	Timer 4 Stop Time	V/f OLV/PM EZOLV Sets the stop time for timer 4. **Note:** • Default is when *o4-22 = 1 [Time Format = 12 Hour Clock]*. When *o4-22 = 0 [24 Hour Clock]*, default is 00:00. When *o4-22 = 2 [12 Hour JP Clock]*, default is 00:00 AM. • Range is when *o4-22 = 1*. When *o4-22 = 0*, range is 00:00 to 24:00. When *o4-22 = 2*, range is 00:00 AM to 11:59 PM.	12:00 (12:00 AM - 11:59 PM)
S2-18 (3217)	Timer 4 Day Selection	V/f OLV/PM EZOLV Sets the days for which sequence timer 4 is active. 0 : Timer disabled 1 : Daily 2 : Mon - Fri 3 : Sat - Sun 4 : Monday 5 : Tuesday 6 : Wednesday 7 : Thursday 8 : Friday 9 : Saturday 10 : Sunday	0 (0 - 10)

No. (Hex.)	Name	Description	Default (Range)
S2-19 (3218)	Timer 4 Sequence Selection	V/f OLV/PM EZOLV Sets the drive response when sequence timer 4 is active. 0 : Digital Out Only 1 : Run 2 : Run - PID Disable 3 : Allow Alternation	0 (0 - 3)
S2-20 (3219)	Timer 4 Reference Source	V/f OLV/PM EZOLV Selects the frequency reference source to run the drive when sequence timer 4 is active (only applicable when *S2-19 > 0 [Timer 4 Sequence Selection ≠ Digital Out Only]*). 0 : Operator (d1-01/YA-01) 1 : Operator (d1-02/YA-02) 2 : Operator (d1-03/YA-03) 3 : Operator (d1-04/YA-04) 4 : Terminals 5 : Serial Com 6 : Option PCB 7 : Pulse Input 8 : Set by b1-01/b1-15 9 : Operator (d1-05/YA-05) 10 : Operator (d1-06/YA-06) 11 : Operator (d1-07/YA-07) 12 : Operator (d1-08/YA-08) **Note:** For reference source 0 to 3, the drive will use *d1-xx* frequency reference when PID mode is disabled and *YA-xx* setpoint when PID is enabled.	8 (0 - 12)

◆ S3: PI2 Control

No. (Hex.)	Name	Description	Default (Range)
S3-01 (321A) RUN	PI2 Control Enable Selection	V/f OLV/PM EZOLV Sets when the PI Auxiliary Control function is enabled: 0 : Disabled 1 : Always 2 : Drive Running 3 : Motor Running	0 (0 - 3)
S3-02 (321B) RUN	PI2 Control Transducer Scale	V/f OLV/PM EZOLV Sets the full scale (10 V or 20 mA) output of the pressure transducer that is connected to the analog input terminals programmed for PI2 (Setpoint or Feedback). **Note:** Parameters *S3-04 [PI2 Control Unit Selection]*, *S3-03 [PI2 Control Decimal Place Pos]*, and *S3-02 [PI2 Control Transducer Scale]* set the unit, resolution, and upper limit.	100.00 (1.00 - 600.00)
S3-03 (321C) RUN	PI2 Control Decimal Place Pos	V/f OLV/PM EZOLV Sets the decimal place display for secondary PI units. 0 : No Decimal Places (XXXXX) 1 : One Decimal Place (XXXX.X) 2 : Two Decimal Places (XXX.XX) 3 : Three Decimal Places (XX.XXX)	2 (0 - 3)

No. (Hex.)	Name	Description	Default (Range)
S3-04 (321D) RUN	PI2 Control Unit Selection	V/f OLV/PM EZOLV Sets the units displayed for the PI2 Control parameters and monitor. 0 : "WC: inches of water column 1 : PSI: pounds per square inch 2 : GPM: gallons/min 3 : °F: Fahrenheit 4 : ft^3/min: cubic feet/min 5 : m^3/h: cubic meters/hour 6 : L/h: liters/hour 7 : L/s: liters/sec 8 : bar: bar 9 : Pa: Pascal 10 : °C: Celsius 11 : m: meters 12 : ft: feet 13 : L/min: liters/min 14 : m^3/min: cubic meters/min 15 : "Hg: Inch Mercury 16 : kPa: kilopascal 48 : %: Percent 49 : Custom(S3-18~20) 50 : None	48 (0 - 50)
S3-05 (321E) RUN	PI2 Control Setpoint	V/f OLV/PM EZOLV Sets the PI2 Control target setpoint. **Note:** Parameters *S3-04 [PI2 Control Unit Selection]*, *S3-03 [PI2 Control Decimal Place Pos]*, and *S3-02 [PI2 Control Transducer Scale]* set the unit, resolution, and upper limit.	0.00 (0.00 - 600.00)
S3-06 (321F) RUN	PI2 Control Proportional Gain	V/f OLV/PM EZOLV Sets the proportional gain of the PI2 Control. Set this parameter to 0.00 to disable proportional control.	1.00 (0.00 - 25.00)
S3-07 (3220) RUN	PI2 Control Integral Time	V/f OLV/PM EZOLV Sets the integral time for the suction pressure control. Set this parameter to 0.00 to disable the integrator.	1.0 s (0.0 - 360.0 s)
S3-08 (3221) RUN	PI2 Control Integral Max Limit	V/f OLV/PM EZOLV Sets the maximum output possible from the integrator.	100.0% (0.0 - 100.0%)
S3-09 (3222) RUN	PI2 Control Output Upper Limit	V/f OLV/PM EZOLV Sets the maximum output possible from the PI Auxiliary Control function.	100.0% (0.0 - 100.0%)
S3-10 (3223) RUN	PI2 Control Output Lower Limit	V/f OLV/PM EZOLV Sets the minimum output possible from the PI Auxiliary Control function.	0.0% (-100.0 - +100.0%)
S3-11 (3224) RUN	PI2 Control Output Level Sel	V/f OLV/PM EZOLV Sets the PI2 controller output direction. 0 : Direct Acting (Normal Output) 1 : Inverse Acting (Reverse Output)	0 (0, 1)
S3-12 (3225) RUN	PI2 Control Disable Mode Sel	V/f OLV/PM EZOLV Sets what *U5-20 [PI2 Control Output]* will output when disabled. 0 : No Output (0%) 1 : Lower Limit (S3-10) 2 : Setpoint	0 (0 - 2)
S3-13 (3226) RUN	PI2 Control Low Feedback Lvl	V/f OLV/PM EZOLV Sets the secondary PI low feedback detection level. **Note:** Parameters *S3-04 [PI2 Control Unit Selection]*, *S3-03 [PI2 Control Decimal Place Pos]*, and *S3-02 [PI2 Control Transducer Scale]* set the unit, resolution, and upper limit.	0.00 (0.00 - 600.00)
S3-14 (3227) RUN	PI2 Control Low Feedback Time	V/f OLV/PM EZOLV Sets the secondary PI low feedback detection delay time in seconds.	1.0 s (0.0 - 25.5 s)

No. (Hex.)	Name	Description	Default (Range)
S3-15 (3228) RUN	PI2 Control High Feedback Lvl	V/f OLV/PM EZOLV Sets the secondary PI high feedback detection level. **Note:** Parameters *S3-04 [PI2 Control Unit Selection]*, *S3-03 [PI2 Control Decimal Place Pos]*, and *S3-02 [PI2 Control Transducer Scale]* set the unit, resolution, and upper limit.	100.00 (0.00 - 600.00)
S3-16 (3229) RUN	PI2 Control High Feedback Time	V/f OLV/PM EZOLV Sets the secondary PI high feedback detection delay time in seconds.	1.0 s (0.0 - 25.5 s)
S3-17 (322A) RUN	PI2 Control Feedback Det Sel	V/f OLV/PM EZOLV Sets when the low and high feedback detection multifunction outputs (71h and 72h) for PI2 Control are active. 0 : While PI2 Control Enabled 1 : Always **Note:** Feedback level detection compares PI2 Control Feedback from analog input *H3-xx = 26 [MFAI Function Selection = PI2 Control Feedback]* to these parameters: • *S3-13 [PI2 Control Low Feedback Lvl]* for low feedback level detection • *S3-15 [PI2 Control High Feedback Lvl]* for high feedback level detection	0 (0, 1)
S3-18 (322B) RUN	PI2 Control Custom Unit 1	V/f OLV/PM EZOLV Sets the first character of the PI2 Control custom unit display when *S3-04 = 49 [PI2 Control Unit Selection = Custom(S3-18~20)]*.	41 (20 - 7A)
S3-19 (322C) RUN	PI2 Control Custom Unit 2	V/f OLV/PM EZOLV Sets the second character of the PI2 Control custom unit display when *S3-04 = 49 [PI2 Control Unit Selection = Custom(S3-18~20)]*.	41 (20 - 7A)
S3-20 (322D) RUN	PI2 Control Custom Unit 3	V/f OLV/PM EZOLV Sets the third character of the PI2 Control custom unit display when *S3-04 = 49 [PI2 Control Unit Selection = Custom(S3-18~20)]*.	41 (20 - 7A)

◆ S6: Protection

No. (Hex.)	Name	Description	Default (Range)
S6-01 (3236)	Emergency Override Speed	V/f OLV/PM EZOLV Sets the speed command for emergency override mode when *S6-02 = 0 [Emergency Override Ref Selection = Use S6-01 Reference]*. **Note:** • When *A1-02 = 8 [Control Method Selection = EZOLV]*, *E1-09 [Minimum Output Frequency]* (*E9-04 [Base Frequency]*) sets the lower limit, and *E1-04 [Maximum Output Frequency]* (*E9-02 [Maximum Speed]*) sets the upper limit. • Parameter default is lower-limited to *E1-09* (*E9-04* when *A1-02 = 8*). The default setting will automatically increase when *E1-09* (*E9-04*) > *S6-01*.	1.50 Hz (1.50 - 60.00 Hz)
S6-02 (3237)	Emergency Override Ref Selection	V/f OLV/PM EZOLV Sets the Emergency Override Speed Source: 0 : Use S6-01 Reference 1 : Use Frequency Reference 2 : System PID Mode 3 : Independent PID Mode	0 (0 - 3)
S6-03 (323A)	EMOVR Independent PID Scale	V/f OLV/PM EZOLV Sets the scaling on the Emergency PID Feedback and Setpoint (if programmed) Analog Inputs. **Note:** • *S6-05 [EMOVR Independent PID Unit Digit]* sets the resolution for this parameter. • *S6-04 [EMOVR Independent PID Unit]* sets the units for this parameter.	100.00 (0.10 - 600.00)

No. (Hex.)	Name	Description	Default (Range)
S6-04 (323B)	EMOVR Independent PID Unit	V/f OLV/PM EZOLV 0 : "WC: inches of water column 1 : PSI: pounds per square inch 2 : GPM: gallons/min 3 : °F: Fahrenheit 4 : ft^3/min: cubic feet/min 5 : m^3/h: cubic meters/hour 6 : L/h: liters/hour 7 : L/s: liters/sec 8 : bar: bar 9 : Pa: Pascal 10 : °C: Celsius 11 : m: meters 12 : ft: feet 13 : L/min: liters/min 14 : m^3/min: cubic meters/min 15 : "Hg: Inch Mercury 16 : kPa: kilopascal 48 : %: Percent 49 : Custom(Y1-32~34) 50 : None	48 (0 - 50)
S6-05 (323C)	EMOVR Independent PID Unit Digit	V/f OLV/PM EZOLV Sets the number of digits for *S6-06 [EMOVR PID Setpoint]* when *S6-02 = 3[Emergency Override Ref Selection = Independent PID Mode]*. 0 : No Decimal Places (XXXXX) 1 : One Decimal Place (XXXX.X) 2 : Two Decimal Places (XXX.XX) 3 : Three Decimal Places (XX.XXX)	2 (0 - 3)
S6-06 (323D) RUN	EMOVR PID Setpoint	V/f OLV/PM EZOLV Sets the PID Setpoint when *S6-02 = 3[Emergency Override Ref Selection = Independent PID Mode]*. **Note:** When *S6-02 = 3*: units and resolution are dependent on *S6-04 [EMOVR Independent PID Unit]* and *S6-05 [EMOVR Independent PID Unit Digit]*. Value is internally limited to 300% of *S6-03 [EMOVR Independent PID Scale]*.	0.00 (0 - 600.00)
S6-07 (323E)	EMOVR Fault Suppression Mode	V/f OLV/PM EZOLV Sets the drive to let Emergency Override disable faults during operation. 0 : Fault Suppression 1 : Test Mode	0 (0, 1)
S6-08 (323F)	EMOVR Drive Enable Input Mode	V/f OLV/PM EZOLV Sets whether the Drive Enable Input (if programmed) must be inactive (drive is disabled) for Emergency Override to function. 0 : Drive Enable Status Ignored 1 : EMOVRun Only When Drive Disabled **Note:** You must program Drive Enable to a Digital Input for this parameter to have an effect.	0 (0, 1)
S6-09 (3240)	Emergency Override Min Speed	V/f OLV/PM EZOLV When Emergency Override is active, the output frequency is lower-limited to this value. **Note:** When *A1-02 = 8 [Control Method Selection = EZOLV]*, the range is 0.00 to 120.00 Hz.	0.00 Hz (0.00 - 400.00 Hz)
S6-10 (3241)	Emergency Override Max Speed	V/f OLV/PM EZOLV When Emergency Override is active, the output frequency is upper-limited to this value. **Note:** • When *A1-02 = 8 [Control Method Selection = EZOLV]*, the range is 0.00 to 120.00 Hz. • Set this parameter to 0.00 Hz to disable the limit.	0.00 Hz (0.00 - 400.00 Hz)
S6-23 (324E)	OV2 Detect Time	V/f OLV/PM EZOLV Sets the detection time of *ov2 [DC Bus Overvoltage 2]* in 0.1 s increments. **Note:** Set this parameter to 0.0 s to disable *ov2* detection.	10.0 s (0.0 - 1200.0 s)

3.17 Y: Application Features

◆ Y1: Application Basics

No. (Hex.)	Name	Description	Default (Range)
Y1-01 (3C00)	Multiplex Mode	V/f OLV/PM EZOLV Sets the base operation mode of the drive controller. 0 : Drive Only 1 : Contactor Multiplex 3 : Network Multiplex	0 (0 - 3)
Y1-02 (3C01)	System Units	V/f OLV/PM EZOLV Sets the units the drive will use for standard PID. 0 : “WC: inches of water column 1 : PSI: pounds per square inch 2 : GPM: gallons/min 3 : °F: Fahrenheit 4 : ft^3/min: cubic feet/min 5 : m^3/h: cubic meters/hour 6 : L/h: liters/hour 7 : L/s: liters/sec 8 : bar: bar 9 : Pa: Pascal 10 : °C: Celsius 11 : m: meters 12 : ft: feet 13 : L/min: liters/min 14 : m^3/min: cubic meters/min 15 : “Hg: Inch Mercury 16 : kPa: kilopascal 25 : Flow (Use Y6-04) 48 : %: Percent 49 : Custom(Y1-32~34) 50 : None	1 (0 - 50)
Y1-03 (3C02)	Feedback Device Scaling	V/f OLV/PM EZOLV Sets the value that the drive sets or shows as the PID setpoint when at maximum output frequency. **Note:** Unit set by *Y1-02 [System Units]*, resolution set by *b5-39 [PID User Unit Display Digits]*.	145.0 (0.1 - 6000.0)
Y1-04 (3C03) RUN	Sleep Wake-up Level	V/f OLV/PM EZOLV Sets the level that feedback must be less than for the time set in *Y1-05 [Sleep Wake-up Level Delay Time]* to start the system. This level also sets the wake up level when the drive is in Sleep Mode. When *Y1-04 < 0*, the feedback level must decrease this amount to less than the setpoint. **Note:** • When PID operates in reverse mode, the feedback value must increase to more than the start level for the time set in *Y1-05* for the system to start. • When *Y2-01 = 5 [Sleep Level Type = Output Frequency (non-PID)]*, the drive will ignore this parameter. • Unit set by *Y1-02 [System Units]*, resolution set by *b5-39 [PID User Unit Display Digits]*. • When *Y1-01 = 3 [Multiplex Mode = Network Multiplex]*, function is active only on the first drive in the network. Drives that are staging or in alternation will not undergo this process. • Range is 0.0 to 999.9 with a sign-bit “-” or “+” to identify Delta to Setpoint. • Set this parameter to 0.0 to disable the function.	0.0 (-999.9 - +999.9)
Y1-05 (3C04) RUN	Sleep Wake-up Level Delay Time	V/f OLV/PM EZOLV Sets the drive to start the System again when the feedback decreases to less than *Y1-04 [Sleep Wake-up Level]* for the time set in this parameter.	1.0 s (0.0 - 3600.0 s)

No. (Hex.)	Name	Description	Default (Range)
Y1-06 (3C05) RUN	Minimum Speed	V/f OLV/PM EZOLV Sets the minimum frequency at which the drive will run. The drive applies this setting to HAND and AUTO Modes. **Note:** • When *Y1-07 = 1 [Minimum Speed Units = RPM]* the default is 2400 RPM. When *A1-03 = 6011 or 6012 [Initialize Parameters = Vertical Turbine Pressure Ctl or Pivot Panel Vert. Turbine Ctl]* the default is 900 RPM. • The unit, decimal place, and setting range change when *Y1-07 [Minimum Speed Units]* changes: –*Y1-07 = 0 (Hz)*: The setting range is 0.0 Hz to a Maximum Frequency set by *E1-04, E3-04* or *E9-02.* –*Y1-07 = 1 (RPM)*: The setting range is 0 RPM to a Maximum Frequency set by *E1-04, E3-04* or *E9-02* in RPM. • The minimum speed used by the drive will be the highest value of these: –*Y4-12 [Thrust Frequency]* –*d2-02 [Frequency Reference Lower Limit]* –*Y1-06 [Minimum Speed]* –*S6-09 [Emergency Override Minimum Speed]* (during Emergency Override operation only) • When *A1-03 = 6011 [Vertical Turbine Pressure Ctl]* or *6012 [Pivot Panel Vert. Turbine Ctrl]*, the drive will ignore this parameter when running in HAND Mode.	40.0 Hz Determined by Y1-07
Y1-07 (3C06)	Minimum Speed Units	V/f OLV/PM EZOLV Sets the units and decimal place for *Y1-06 [Minimum Speed]*. 0 : Hz 1 : RPM **Note:** Changing *Y1-07* will set *Y1-06 [Minimum Speed]* to the default value.	0 (0, 1)
Y1-08 (3C07) RUN	Low Feedback Level	V/f OLV/PM EZOLV Sets the lower detection level for the PID feedback. **Note:** • Unit set by *Y1-02 [System Units]*, resolution set by *b5-39 [PID User Unit Display Digits]*. • Range is 0.0 to 999.9 with a sign-bit "-" to identify Delta to Setpoint.	0.0 (0.0 - 999.9)
Y1-09 (3C08) RUN	Low Feedback Lvl Fault Dly Time	V/f OLV/PM EZOLV Sets the delay time for the drive to detect an *LFB [Low Feedback Sensed]* fault after the feedback level decreases to less than the value set in *Y1-08 [Low Feedback Level]*. **Note:** Set *Y1-10 = 0 [Low Feedback Selection = Fault (and Digital Output)]* to enable this parameter.	10 s (0 - 3600 s)
Y1-10 (3C09)	Low Feedback Selection	V/f OLV/PM EZOLV Sets the drive response when the feedback decreases to less than *Y1-08 [Low Feedback Level]* for longer than the time set in *Y1-09 [Low Feedback Lvl Fault Dly Time]*. 0 : Fault (and Digital Output) 1 : Alarm (and Digital Output) 2 : Digital Output Only	0 (0 - 2)
Y1-11 (3C0A) RUN	High Feedback Level	V/f OLV/PM EZOLV Sets the upper detection level for the PID feedback. **Note:** • Unit set by *Y1-02 [System Units]*, resolution set by *b5-39 [PID User Unit Display Digits]*. • Range is 0.0 to 999.9 with a sign-bit "+" to identify Delta to Setpoint.	0.0 (0.0 - 999.9)
Y1-12 (3C0B) RUN	High Feedback Lvl Fault Dly Time	V/f OLV/PM EZOLV Sets the delay time between when the drive detects high feedback until the drive faults on an *HFB [High Feedback Sensed]* fault. **Note:** This parameter is effective only when *Y1-13 = 0 [High Feedback Selection = Fault (and Digital Output)]*.	5 s (0 - 3600 s)
Y1-13 (3C0C)	High Feedback Selection	V/f OLV/PM EZOLV Sets the drive response when the feedback increased to more than *Y1-11 [High Feedback Level]* for longer than the time set in *Y1-12 [High Feedback Lvl Fault Dly Time]*. 0 : Fault (and Digital Output) 1 : Alarm (and Digital Output) 2 : Digital Output Only	0 (0 - 2)
Y1-14 (3C0D) RUN	Feedback Hysteresis Level	V/f OLV/PM EZOLV Sets the hysteresis level for low and high level feedback detection. **Note:** Parameters *Y1-02 [PID Unit Display Selection]*, *Y1-03 [PID User Unit Display Scaling]*, and *b5-39 [PID User Unit Display Digits]* set the unit, scaling, and resolution.	0.0 (0.0 - 10.0)

No. (Hex.)	Name	Description	Default (Range)
Y1-15 (3C0E) RUN	Maximum Setpoint Difference	V/f OLV/PM EZOLV Sets a percentage of difference between the setpoint and the feedback. The difference must be more than this value for the time set in *Y1-16 [Not Maintaining Setpoint Time]* to trigger the drive response set in *Y1-17 [Not Maintaining Setpoint Sel]*. **Note:** • Parameters *Y1-02 [PID Unit Display Selection]*, *Y1-03 [PID User Unit Display Scaling]*, and *b5-39 [PID User Unit Display Digits]* set the unit, scaling, and resolution. • If there is a fault, the drive will coast to a stop. • Set this parameter to 0.0 to disable the function.	0.0 (0.0 - 6000.0)
Y1-16 (3C0F) RUN	Not Maintaining Setpoint Time	V/f OLV/PM EZOLV Sets the delay time before a Setpoint Not Met condition occurs. The drive must detect the setpoint difference set in *Y1-15 [Maximum Setpoint Difference]* before the timer will start. **Note:** Set *Y1-15 = 0 [Maximum Setpoint Difference = 0]* to disable this function.	60 s (0 - 3600 s)
Y1-17 (3C10)	Not Maintaining Setpoint Sel	V/f OLV/PM EZOLV Sets the drive response when the feedback increases to more or decreases to less than the setpoint for more than the amount set in *Y1-15 [Maximum Setpoint Difference]*. 0 : Fault (and Digital Output) 1 : Alarm (and Digital Output) 2 : Digital Output Only	0 (0 - 2)
Y1-18 (3C11)	Prime Loss Detection Method	V/f OLV/PM EZOLV Sets the units and quantity that the drive will use to determine *LOP [Loss of Prime]*. 0 : Current (A) 1 : Power (kW) 2 : Torque (%)	0 (0 - 2)
Y1-19 (3C12) RUN	Prime Loss Level	V/f OLV/PM EZOLV Sets the level to detect the *LOP [Loss of Prime]* in the pump during RUN or Sleep Boost Mode. **Note:** *Y1-18 [Prime Loss Detection Method]* selection sets the units for this parameter.	0.0 (0.0 - 1000.0)
Y1-20 (3C13) RUN	Prime Loss Time	V/f OLV/PM EZOLV Sets the delay time before the drive detects an *LOP [Loss of Prime]* condition. The timer starts when the drive detects the conditions in *Y1-18 [Prime Loss Detection Method]* and *Y1-19 [Prime Loss Level]*.	20 s (0 - 600 s)
Y1-21 (3C14)	Prime Loss Activation Freq	V/f OLV/PM EZOLV Sets the frequency level above which the drive enables Loss of Prime detection. **Note:** • When *A1-02 = 8 [Control Method Selection = EZOLV]*, the upper limit is the Hz equivalent of *E9-02 [Maximum Speed]*. • When *H1-xx = 16 [MFDI Function Selection = Motor 2 Selection]* for Motor 2, the upper limit is the larger value between *E1-04 [Maximum Output Frequency]* and *E3-04 [Motor 2 Maximum Output Frequency]*.	0.0 Hz (0.0 - E1-04 Hz)
Y1-22 (3C15)	Prime Loss Selection	V/f OLV/PM EZOLV Sets the drive response when the drive is in the Loss of Prime condition. 0 : Fault (and Digital Output) 1 : Alarm (and Digital Output) 2 : Digital Output Only	0 (0 - 2)
Y1-23 (3C16)	Prime Loss Max Restart Time	V/f OLV/PM EZOLV Sets the time in minutes that the drive will wait before it tries a restart after a restart fails or after it does not do a restart because of a fault.	0.2 min (0.2 - 6000.0 min)
Y1-24 (3C17) RUN	Level at Full Speed	V/f OLV/PM EZOLV Sets the level used to override the programmed P-gain *[b5-02]* and I-limit *[b5-04]* with calculated values based on Sleep level, Wake-up level, Minimum Pump Speed, Transducer Scaling, and Maximum Frequency. The value programmed in this parameter should be the target level when at full-speed operation. **Note:** • When this parameter is set to 0.0, the function is disabled and the PID will use the programmed P-gain and I-limit. • Parameters *Y1-02 [PID Unit Display Selection], Y1-03 [PID User Unit Display Scaling]*, and *b5-39 [PID User Unit Display Digits]* set the unit, range, and resolution.	0.0 (0.0 - 6000.0)
Y1-32 (3FCF)	System Unit Custom Character 1	V/f OLV/PM EZOLV Sets the first character of the custom unit display when *Y1-02 = 49 [System Units = Custom(Y1-32~34)]* or when *b5-41 = 49 [PID Output 2 Unit = Custom (Y1-32~34)]*.	41 (20 - 7A)
Y1-33 (3FD0)	System Unit Custom Character 2	V/f OLV/PM EZOLV Sets the second character of the custom unit display when *Y1-02 = 49 [System Units = Custom(Y1-32~34)]* or when *b5-41 = 49 [PID Output 2 Unit = Custom (Y1-32~34)]*.	41 (20 - 7A)

No. (Hex.)	Name	Description	Default (Range)
Y1-34 (3FD1)	System Unit Custom Character 3	V/f OLV/PM EZOLV Sets the third character of the custom unit display when *Y1-02 = 49 [System Units = Custom(Y1-32~34)]* or when *b5-41 = 49 [PID Output 2 Unit = Custom (Y1-32~34)]*.	41 (20 - 7A)
Y1-36 (3C23)	High/Low Water DI Fault Det Sel	V/f OLV/PM EZOLV Sets when the MFDI terminals set for *H1-xx = BB or BC [Low Water Level or High Water Level]* will be active to detect the *LWL [Low Water Level]* and *HWL [High Water Level]* faults. 0 : During Run 1 : Always **Note:** • The drive will not detect *LWL* and *HWL* faults during Emergency Override. • The drive will not detect *LWL* until Pre-Charge is complete. The drive will also not detect the fault during JOG. • The drive cannot Auto-Restart the faults until the drive is no longer in a low or high water level condition. If the time set for *L5-04 [Interval Method Restart Time]* pases but the low or high water level condition is not cleared, the drive will continue to stay in the Auto-Restart state.	0 (0, 1)
Y1-37 (3C24)	External Fan Delay Off Time	V/f OLV/PM EZOLV Sets the delay time after the drive is turned off and before the External Fan Switch MFDO is deactivated.	5.0 min (0.0 - 60.0 min)
Y1-40 (3C27) RUN	Maximum Speed	V/f OLV/PM EZOLV Sets the maximum speed. **Note:** This parameter is not effective when *Y1-40 = 0.0 Hz* or *Y1-40 > E1-04 [Maximum Output Frequency] × d2-01 [Frequency Reference Upper Limit]*.	0.0 Hz (Determined by A1-02)

◆ Y2: PID Sleep and Protection

No. (Hex.)	Name	Description	Default (Range)
Y2-01 (3C64)	Sleep Level Type	V/f OLV/PM EZOLV Sets the data source that the drive uses to know when to activate the Sleep Function. 0 : Output Frequency 1 : Output Current 2 : Feedback 3 : Output Speed (RPM) 4 : Flow Meter 5 : Output Frequency (non-PID) **Note:** • Feedback depends on PID direction operation. • When the Sleep Function is active, the keypad will show the “Sleep” Alarm.	0 (0 - 5)
Y2-02 (3C65) RUN	Sleep Level	V/f OLV/PM EZOLV Sets the level that the level type set in *Y2-01 [Sleep Level Type]* must be at for the time set in *Y2-03 [Sleep Delay Time]* for the drive to enter Sleep Mode. **Note:** • When you set this parameter to 0.0, this function will not be active. • This function is active only when the drive operates in AUTO Mode. • When *Y2-01 = 5 [Output Frequency (non-PID)]*, the drive will disable the Sleep function when you set this parameter to 0.0. • When *Y2-01 ≠ 5*, the drive will set the sleep level to the largest value from *d2-02 [Frequency Reference Lower Limit]*, *Y1-06 [Minimum Speed]*, and *Y4-12 [Thrust Frequency]* when you set this parameter to 0.0.	0.0 (0.0 - 6000.0)
Y2-03 (3C66) RUN	Sleep Delay Time	V/f OLV/PM EZOLV Sets the delay time before the drive enters Sleep Mode when the drive is at the sleep level set in *Y2-02 [Sleep Level]*.	5 s (0 - 3600 s)
Y2-04 (3C67) RUN	Sleep Activation Level	V/f OLV/PM EZOLV Sets the level above which the output frequency must increase to activate the Sleep Function when *Y2-01 = 0, 3, or 5 [Sleep Level Type = Output Frequency, Output Speed (RPM), or Output Frequency (non-PID)]*. **Note:** • When you set this parameter to 0.0, this function will not be active, and the Sleep Function will activate above the minimum speed (largest value from *d2-02 [Frequency Reference Lower Limit]*, *Y1-06 [Minimum Speed]*, and *Y4-12 [Thrust Frequency]*). • The unit for this parameter is usually Hz. When *Y2-01 = 3 [Sleep Level Type = Output Speed (RPM)]*, the unit is RPM.	0.0 (0.0 - 6000.0)

No. (Hex.)	Name	Description	Default (Range)
Y2-05 (3C68) RUN	Sleep Boost Level	V/f OLV/PM EZOLV Sets the quantity of boost that the drive applies to the setpoint before it goes to sleep. **Note:** • Parameters *Y1-02 [PID Unit Display Selection]*, *Y1-03 [PID User Unit Display Scaling]*, and *b5-39 [PID User Unit Display Digits]* set the unit, scaling, and resolution. • Set this parameter to 0.0 to disable Sleep Boost Function.	0.0 (0.0 - 6000.0)
Y2-06 (3C69) RUN	Sleep Boost Hold Time	V/f OLV/PM EZOLV Sets the length of time that the drive will keep the boosted pressure before it goes to sleep.	5.0 s (0.5 - 160.0 s)
Y2-07 (3C6A) RUN	Sleep Boost Max Time	V/f OLV/PM EZOLV Sets the length of time that the system (feedback) has to reach the boosted setpoint. The system must reach the boosted setpoint in the time set in this parameter, or it will go to sleep.	20.0 s (1.0 - 160.0 s)
Y2-08 (3C6B) RUN	Delta Feedback Drop Level	V/f OLV/PM EZOLV Sets the level of the PID Error (set-point minus feedback) to deactivate the Sleep Mode operation. **Note:** • Parameters *Y1-02 [PID Unit Display Selection]*, *Y1-03 [PID User Unit Display Scaling]*, and *b5-39 [PID User Unit Display Digits]* set the unit, scaling, and resolution. • Set this parameter to 0.0 to disable the function.	0.0 (0.0 - 6000.0)
Y2-09 (3C6C) RUN	Feedback Drop Detection Time	V/f OLV/PM EZOLV Sets the time during which the software monitors the feedback to detect a flow/no-flow condition. Refer to *Y2-08 [Delta Feedback Drop Level]* for more information.	10.0 s (0.0 - 3600.0 s)
Y2-10 (3C6D) RUN	Max Cycling Protection Allowed	V/f OLV/PM EZOLV Maximum number of cycles allowed within time specified in *Y2-11 [Cycling Count Decrement Time]* before the system faults on *POC [Pump Over Cycle]*. One cycle is defined when the drive transfers from normal operation in AUTO Mode to Sleep Mode. Set this parameter to 0 to disable the function. **Note:** • When *Y1-01 = 3 [Multiplex Mode = Network Multiplex]*, this function is active when there is only one drive running in the network. Set this parameter to 0 to disable the function.	0 (0 - 10)
Y2-11 (3C6E) RUN	Cycling Count Decrement Time	V/f OLV/PM EZOLV Sets the time for which the drive needs to be running in AUTO Mode before the cycle counter is decremented. One cycle is defined when the drive transfers from normal operation in AUTO Mode to sleep mode. When no cycling occurs within the programmed time, the drive will decrease the internal cycle register.	300 s (0 - 3600 s)
Y2-12 (3C6F)	Over Cycle Mode	V/f OLV/PM EZOLV Sets how the drive will respond when it detects an Over Cycle condition. 0 : Disabled 1 : Alarm 2 : Fault 3 : AUTO Setpoint Compensation	0 (0 - 3)
Y2-13 (3C70)	Setpoint Compensation	V/f OLV/PM EZOLV Sets the amount of setpoint the drive will compensate when there is too much cycling. **Note:** Units set by *Y1-02 [System Units]*, internal scaling by *Y1-03 [Feedback Device Scaling]*, and resolution by *b5-39 [PID User Unit Display Digits]*	0.0 (0.0 - 6000.0)
Y2-14 (3C71)	Maximum Setpoint Compensation	V/f OLV/PM EZOLV Sets the maximum allowed setpoint compensation for the over cycling function. **Note:** Units set by *Y1-02 [System Units]*, internal scaling by *Y1-03 [Feedback Device Scaling]*, and resolution by *b5-39 [PID User Unit Display Digits]*	0.0 (0.0 - 6000.0)
Y2-15 (3C72) RUN	Sleep AUTO → OFF Selection	V/f OLV/PM EZOLV Selects if sleep is allowed with *Y1-04 Sleep Wake-up Level] = 0.0* and also cause the drive to switch to OFF when sleep conditions are met. 0 : Disabled 1 : Enabled 2 : Enabled with Timer	0 (0 - 2)
Y2-16 (3C73) RUN	Sleep AUTO → OFF Delay Timer	V/f OLV/PM EZOLV Set the length of time that the drive will sleep before the drive will switch to OFF when sleep conditions are met. The timer begins after Sleep Boost and Feedback Drop are complete.	0 s (0 - 3600 s)
Y2-23 (3C7A) RUN	Anti-No-Flow Bandwidth	V/f OLV/PM EZOLV Sets the quantity of PI error bandwidth that the drive uses to detect an Anti- No-Flow condition. **Note:** Do not set this parameter value too high, because operation can become unstable.	0.40% (0.00 - 2.00%)

No. (Hex.)	Name	Description	Default (Range)
Y2-24 (3C7B) RUN	Anti-No-Flow Detection Time	V/f OLV/PM EZOLV Sets the time delay before the drive starts the increased deceleration rate after it detects Anti-No-Flow.	10.0 s (1.0 - 60.0 s)
Y2-25 (3C7C) RUN	Anti-No-Flow Release Level	V/f OLV/PM EZOLV Sets the amount below the setpoint which the feedback must decrease before the drive will disengage Anti-No-Flow and return to normal PI operation. **Note:** Parameters *Y1-02 [PID Unit Display Selection]*, *Y1-03 [PID User Unit Display Scaling]*, and *b5-39 [PID User Unit Display Digits]* set the unit, scaling, and resolution.	3.0 (0.0 - 100.0)

◆ Y3: Contactor Multiplex

No. (Hex.)	Name	Description	Default (Range)
Y3-00 (3CC7)	Number of Lag Pumps in System	V/f OLV/PM EZOLV Sets the number of lag pumps present.	1 (1 - 5)
Y3-01 (3CC8)	Lag Pump Staging Method	V/f OLV/PM EZOLV Sets the method to add contactor lag pumps to the system. 0 : Output Frequency 1 : Feedback 2 : Feedback + Output Frequency	0 (0 - 2)
Y3-02 (3CC9)	Lag Pump Shutdown Method	V/f OLV/PM EZOLV Sets the method to remove contactor pumps from the system. 0 : Output Frequency 1 : Feedback 2 : Feedback + Output Frequency	0 (0 - 2)
Y3-03 (3CCA) RUN	Multiplex Max Speed Staging Lvl	V/f OLV/PM EZOLV Sets the maximum level used for the multiplex pumping operation. **Note:** • This parameter is active only when *Y3-01 = 0 or 2 [Lag Pump Staging Method = Output Frequency or Feedback + Output Frequency]*. • When *A1-02 = 8 [Control Method Selection = EZ Vector Control]*, the upper limit is the Hz equivalent of *E9-02 [Maximum Speed]*. While you set *H1-xx = 16 [MFDI Function Selection = Motor 2 Selection]*, the upper limit is the greater of the *E1-04 [Maximum Output Frequency]* value and the *E3-04 [Motor 2 Maximum Output Frequency]* value.	59.0 Hz (0 - E1-04 Hz)
Y3-04 (3CCB) RUN	Add Lag Pump Delta Level	V/f OLV/PM EZOLV Sets the level used for the multiplex pumping operation. **Note:** • This parameter is active only when *Y3-01 = 1 or 2 [Lag Pump Staging Method = Feedback or Feedback + Output Frequency]*. • Parameters *Y1-02 [PID Unit Display Selection]*, *Y1-03 [PID User Unit Display Scaling]*, and *b5-39 [PID User Unit Display Digits]* set the unit, scaling, and resolution. • To prevent excessive cycling, do not set this level too close to the system setpoint.	0.0 (0.0 - 6000.0)
Y3-05 (3CCC) RUN	Add Lag Pump Delay Time	V/f OLV/PM EZOLV Sets the delay time before the drive adds a pump to the system.	2 s (0 - 3600 s)
Y3-06 (3CCD) RUN	Freq Reduction after Staging	V/f OLV/PM EZOLV Sets the upper limit of the output frequency after a lag pump is staged.	0.0 Hz (0.0 - 30.0 Hz)
Y3-07 (3CCE) RUN	Freq Reduction Time after Stage	V/f OLV/PM EZOLV Sets the amount of time that the output frequency will be limited after lag pump is staged. **Note:** Set this parameter to 0.0 s to disable this function.	0.0 s (0.0 - 240.0 s)

No. (Hex.)	Name	Description	Default (Range)
Y3-08 (3CCF) RUN	Shutdown Lag Pump Delta Level	V/f OLV/PM EZOLV Sets the shutdown level used for the multiplex pumping operation. **Note:** • This parameter is active only when *Y3-02 = 1 or 2 [Lag Pump Shutdown Method = Feedback or Feedback + Output Frequency]*. • Parameters *Y1-02 [PID Unit Display Selection]*, *Y1-03 [PID User Unit Display Scaling]*, and *b5-39 [PID User Unit Display Digits]* set the unit, scaling, and resolution. • These parameters set the Pump Shutdown Frequency: –*Y3-50 [Pump 2 Shutdown Frequency]* –*Y3-60 [Pump 3 Shutdown Frequency]* –*Y3-70 [Pump 4 Shutdown Frequency]* –*Y3-80 [Pump 5 Shutdown Frequency]* –*Y3-90 [Pump 6 Shutdown Frequency]* • To prevent excessive cycling, do not set this level too close to the system setpoint.	0.0 (0.0 - 6000.0)
Y3-09 (3CD0) RUN	Shutdown Lag Pump Delay Time	V/f OLV/PM EZOLV Sets the delay time before the drive shuts down one of the lag pump.	5 s (0 - 3600 s)
Y3-10 (3CD1) RUN	Max Setpoint Boost@ De-stage	V/f OLV/PM EZOLV Sets the maximum amount of boost that can be added to the setpoint after a de-stage occurs. **Note:** Parameters *Y1-02 [PID Unit Display Selection]*, *Y1-03 [PID User Unit Display Scaling]*, and *b5-39 [PID User Unit Display Digits]* set the unit, scaling, and resolution.	0.0 (-200.0 - +200.0)
Y3-11 (3CD2) RUN	Setpoint Boost Time	V/f OLV/PM EZOLV Sets the amount of time that the setpoint will remain boosted after lag pump is de-staged. **Note:** Set this parameter to 0.0 s to disable this function.	5.0 s (0.0 - 60.0 s)
Y3-12 (3CD3) RUN	Multi Pump Setpoint Increase	V/f OLV/PM EZOLV Sets the system setpoint increase each time a new pump is brought online. **Note:** Parameters *Y1-02 [PID Unit Display Selection]*, *Y1-03 [PID User Unit Display Scaling]*, and *b5-39 [PID User Unit Display Digits]* set the unit, scaling, and resolution.	0.0 (0.0 - 6000.0)
Y3-13 (3CD4) RUN	Multi Pump Setpoint Decrease	V/f OLV/PM EZOLV Sets the system setpoint decrease each time a new pump is brought online. **Note:** Parameters *Y1-02 [PID Unit Display Selection]*, *Y1-03 [PID User Unit Display Scaling]*, and *b5-39 [PID User Unit Display Digits]* set the unit, scaling, and resolution.	0.0 (0.0 - 6000.0)
Y3-14 (3CD5) RUN	Multiplex Stabilization Time	V/f OLV/PM EZOLV Sets the time used to stabilize the system when the drive adds or shuts down a pump during multiplex operation. **Note:** • When a pump is added, the stabilize timer temporarily disables the lead/lag functionality for the programmed time to prevent pump cycling. • Set *Y1-01 = 1 [Multiplex Mode = Contactor Multiplex]* to enable this function. Time pump protection and lead/lag control is suspended during stabilization time. • During stabilization time, the pump protection and staging/de-staging is suspended.	2 s (0 - 3600 s)
Y3-15 (3CD6) RUN	High Feedback Quick De-stage	V/f OLV/PM EZOLV Sets the High Feedback level that will trigger a quick de-stage. The quick de-stage uses an internal 2 s delay. **Note:** • Parameters *Y1-02 [PID Unit Display Selection]*, *Y1-03 [PID User Unit Display Scaling]*, and *b5-39 [PID User Unit Display Digits]* set the unit, scaling, and resolution. • Set this parameter to 0.0 to disable this function. • This function is intended for *b5-09 = 0 [PID Output Level Selection = Direct Acting]* only. If you use this function when *b5-09 = 1 [Reverse Acting]*, it may cause pumps to de-stage incorrectly.	0.0 (0.0 - 6000.0)
Y3-16 (3CD7) RUN	Low Feedback Quick De-stage	V/f OLV/PM EZOLV Sets the Low Feedback level that will trigger a quick de-stage. The quick de-stage uses an internal 2 s delay. **Note:** • Parameters *Y1-02 [PID Unit Display Selection]*, *Y1-03 [PID User Unit Display Scaling]*, and *b5-39 [PID User Unit Display Digits]* set the unit, scaling, and resolution. • Set this parameter to 0.0 to disable this function. • This function is intended for *b5-09 = 1 [PID Output Level Selection = Reverse Acting]* only. If you use this function when *b5-09 = 0 [Direct Acting]*, it may cause pumps to de-stage incorrectly.	0.0 (0.0 - 6000.0)

No. (Hex.)	Name	Description	Default (Range)
Y3-30 (3CE5)	Stage Selection Mode	V/f OLV/PM EZOLV Sets the method of staging for the pumps. 0 : Sequential 1 : Stop History	0 (0, 1)
Y3-31 (3CE6)	De-stage Selection Mode	V/f OLV/PM EZOLV Sets the method to remove contactor pumps. 0 : Last In, First Out 1 : First In, First Out	0 (0, 1)
Y3-40 (3CEF)	Pre-Charge Helper Pump Select	V/f OLV/PM EZOLV Sets which of the lag pumps can come on during Pre-Charge. 0 : Disabled 2 : Pump 2 (MFDO 8A) 3 : Pump 3 (MFDO 8B) 4 : Pump 4 (MFDO 8C) 5 : Pump 5 (MFDO 8D) 6 : Pump 6 (MFDO 8E)	0 (0 - 6)
Y3-41 (3CF0)	Pre-Charge Helper Pump Time	V/f OLV/PM EZOLV Sets how long the helper pump specified in *Y3-40 [Pre-Charge Helper Pump Select]* is energized. **Note:** Set this parameter to 0.0 to disable this function.	0.0 min (0.0 - 3600.0 min)
Y3-42 (3CF1)	Helper Pump after Pre-Charge	V/f OLV/PM EZOLV Sets whether the helper pump that was used in *Y3-40 [Pre-Charge Helper Pump Select]* turns off or maintains its state when Pre-Charge is finished: 0 : Turn Off 1 : Continue	0 (0, 1)
Y3-43 (3CF2)	Pre-Charge Helper On-Delay Time	V/f OLV/PM EZOLV Sets how long the drive is in the Pre-Charge mode before the helper pump specified in *Y3-40 [Pre-Charge Helper Pump Select]* energized.	2.0 min (0.0 - 600.0 min)
Y3-50 (3CF9) RUN	Pump 2 Shutdown Frequency	V/f OLV/PM EZOLV Sets the shutdown frequency used for Pump 2 in multiplex pumping operation. **Note:** • This parameter is active only when *Y3-02 = 0 or 2 [Lag Pump Shutdown Method = Output Frequency or Feedback + Output Frequency]*. • When *A1-02 = 8 [Control Method Selection = EZ Vector Control]*, the upper limit is the Hz equivalent of *E9-02 [Maximum Speed]*. While you set *H1-xx = 16 [MFDI Function Selection = Motor 2 Selection]*, the upper limit is the greater of the *E1-04 [Maximum Output Frequency]* value and the *E3-04 [Motor 2 Maximum Output Frequency]* value.	40.0 Hz (0.0 - E1-04 Hz)
Y3-60 (3CC3) RUN	Pump 3 Shutdown Frequency	V/f OLV/PM EZOLV Sets the shutdown frequency used for Pump 3 in multiplex pumping operation. **Note:** • This parameter is active only when *Y3-02 = 0 or 2 [Lag Pump Shutdown Method = Output Frequency or Feedback + Output Frequency]*. • When *A1-02 = 8 [Control Method Selection = EZ Vector Control]*, the upper limit is the Hz equivalent of *E9-02 [Maximum Speed]*. While you set *H1-xx = 16 [MFDI Function Selection = Motor 2 Selection]*, the upper limit is the greater of the *E1-04 [Maximum Output Frequency]* value and the *E3-04 [Motor 2 Maximum Output Frequency]* value.	40.0 Hz (0.0 - E1-04 Hz)
Y3-70 (3CC4) RUN	Pump 4 Shutdown Frequency	V/f OLV/PM EZOLV Sets the shutdown frequency used for Pump 4 in multiplex pumping operation. **Note:** • This parameter is active only when *Y3-02 = 0 or 2 [Lag Pump Shutdown Method = Output Frequency or Feedback + Output Frequency]*. • When *A1-02 = 8 [Control Method Selection = EZ Vector Control]*, the upper limit is the Hz equivalent of *E9-02 [Maximum Speed]*. While you set *H1-xx = 16 [MFDI Function Selection = Motor 2 Selection]*, the upper limit is the greater of the *E1-04 [Maximum Output Frequency]* value and the *E3-04 [Motor 2 Maximum Output Frequency]* value.	40.0 Hz (0.0 - E1-04 Hz)

No. (Hex.)	Name	Description	Default (Range)
Y3-80 (3CC5) RUN	Pump 5 Shutdown Frequency	V/f OLV/PM EZOLV Sets the shutdown frequency used for Pump 5 in multiplex pumping operation. **Note:** • This parameter is active only when *Y3-02 = 0 or 2 [Lag Pump Shutdown Method = Output Frequency or Feedback + Output Frequency]*. • When *A1-02 = 8 [Control Method Selection = EZ Vector Control]*, the upper limit is the Hz equivalent of *E9-02 [Maximum Speed]*. While you set *H1-xx = 16 [MFDI Function Selection = Motor 2 Selection]*, the upper limit is the greater of the *E1-04 [Maximum Output Frequency]* value and the *E3-04 [Motor 2 Maximum Output Frequency]* value.	40.0 Hz (0.0 - E1-04 Hz)
Y3-90 (3CC6) RUN	Pump 6 Shutdown Frequency	V/f OLV/PM EZOLV Sets the shutdown frequency used for Pump 6 in multiplex pumping operation. **Note:** • This parameter is active only when *Y3-02 = 0 or 2 [Lag Pump Shutdown Method = Output Frequency or Feedback + Output Frequency]*. • When *A1-02 = 8 [Control Method Selection = EZ Vector Control]*, the upper limit is the Hz equivalent of *E9-02 [Maximum Speed]*. While you set *H1-xx = 16 [MFDI Function Selection = Motor 2 Selection]*, the upper limit is the greater of the *E1-04 [Maximum Output Frequency]* value and the *E3-04 [Motor 2 Maximum Output Frequency]* value.	40.0 Hz (0.0 - E1-04 Hz)

◆ Y4: Application Advanced

No. (Hex.)	Name	Description	Default (Range)
Y4-01 (3CFA) RUN	Pre-Charge Level	V/f OLV/PM EZOLV Sets the level at which the drive will activate the pre-charge function when the drive is running at the frequency set in *Y4-02 [Pre-Charge Frequency]*. **Note:** • The drive will exit Pre-Charge when one of these conditions is true: –The feedback level increases to more than *Y4-01* –The pre-charge time set in *Y4-03 [Pre-Charge Time]* expires –Low Water Level digital input is deactivated *[BB]* –Disable Pre-Charge digital input is activated *[B9]*. • Units are set by *Y1-02 [System Units]* and resolution is set by *b5-39 [PID User Unit Display Digits]* and upper limited to 200% of *Y1-03 [PID User Unit Display Scaling]*.	0.0 (0.0 - 6000.0)
Y4-02 (3CFB) RUN	Pre-Charge Frequency	V/f OLV/PM EZOLV Sets the frequency at which the pre-charge function will operate. **Note:** • When *A1-02 = 8 [Control Method Selection = EZOLV]*, the upper limit is the Hz equivalent of *E9-02 [Maximum Speed]*. • When *H1-xx = 16 [MFDI Function Selection = Motor 2 Selection]* for Motor 2, the upper limit is the larger value between *E1-04 [Maximum Output Frequency]* and *E3-04 [Motor 2 Maximum Output Frequency]*.	0.0 Hz (0.0 - E1-04 Hz)
Y4-03 (3CFC) RUN	Pre-Charge Time	V/f OLV/PM EZOLV Sets the length of time that the Pre-Charge function will run. **Note:** • When *Y1-01 = 3 [Multiplex Mode = Network Multiplex]*, this function is active only on the first drive to run in the network. Set this parameter to 0.0 to disable the function.	0.0 min (0.0 - 3600.0 min)
Y4-05 (3CFE) RUN	Pre-Charge Loss of Prime Level	V/f OLV/PM EZOLV Detects loss of prime in the pump. If the measured quantity set in *Y1-18 [Prime Loss Detection Method]* is less than the level set in this parameter for the length of time set in *Y1-20 [Prime Loss Time]* and the output frequency is at the level set in *Y4-02 [Pre-Charge Frequency]*, it will trigger a "Loss Of Prime" condition . **Note:** • Parameter *Y1-18 [Prime Loss Detection Method]* sets units. • The drive will respond to the "Loss of Prime" condition based on *Y1-22 [Prime Loss Selection]*.	0.0 (0.0 - 1000.0)
Y4-06 (3CFF) RUN	Pre-Charge Frequency 2	V/f OLV/PM EZOLV Sets the frequency reference that the drive uses when the Pre-Charge 2 function is active. **Note:** • When *A1-02 = 8 [Control Method Selection = EZOLV]*, the upper limit is the Hz equivalent of *E9-02 [Maximum Speed]*. • When *H1-xx = 16 [MFDI Function Selection = Motor 2 Selection]* for Motor 2, the upper limit is the larger value between *E1-04 [Maximum Output Frequency]* and *E3-04 [Motor 2 Maximum Output Frequency]*.	0.0 Hz (0 - E1-04 Hz)
Y4-07 (3D00) RUN	Pre-Charge Time 2	V/f OLV/PM EZOLV Sets the length of time that the drive will spend at the Pre-Charge Frequency 2 speed during Pre-Charge. **Note:** Set this parameter to 0.0 to disable the function.	0.0 min (0 - 3600.0 min)

No. (Hex.)	Name	Description	Default (Range)
Y4-08 (3D01) RUN	Pre-Charge Loss of Prime Level 2	V/f OLV/PM EZOLV Detects loss of prime in the pump. If the measured quantity set in *Y1-18 [Prime Loss Detection Method]* is less than the level set in this parameter for the length of time set in *Y1-20 [Prime Loss Time]* and the output frequency is at the level set in *Y4-06 [Pre-Charge Frequency 2]*, it will trigger a "Loss Of Prime" condition . **Note:** • Parameter *Y1-18 [Prime Loss Detection Method]* sets units. • The drive will respond to the "Loss of Prime" condition based on *Y1-22 [Prime Loss Selection]*.	0.0 (0 - 1000.0)
Y4-10 (3D03)	AUTO Key Memory at Power Down	V/f OLV/PM EZOLV Sets whether the drive will save the AUTO key of the keypad on power-down. 0 : Disabled 1 : Enabled	0 (0, 1)
Y4-11 (3D04) RUN	Thrust Acceleration Time	V/f OLV/PM EZOLV Sets the time at which the drive output frequency will ramp up to the reference frequency set in *Y4-12 [Thrust Frequency]*.	1.0 s (0.0 - 600.0 s)
Y4-12 (3D05) RUN	Thrust Frequency	V/f OLV/PM EZOLV Sets the Thrust Frequency that the drive will use to know which acceleration and deceleration time to use. The drive will accelerate to this frequency in the *Y4-11 [Thrust Acceleration Time]* time and decelerate from this frequency in the *Y4-13 [Thrust Deceleration Time]* time. **Note:** • When *A1-02 = 8 [Control Method Selection = EZOLV]*, the upper limit is the Hz equivalent of *E9-02 [Maximum Speed]*. • When *H1-xx = 16 [MFDI Function Selection = Motor 2 Selection]* for Motor 2, the upper limit is the larger value between *E1-04 [Maximum Output Frequency]* and *E3-04 [Motor 2 Maximum Output Frequency]*. • When *A1-03 = 6011 [Vertical Turbine Pressure Ctl]* or *6012 [Pivot Panel Vert. Turbine Ctrl]*, the drive will ignore this parameter when running in HAND Mode.	30.0 Hz (0.0 - E1-04 Hz)
Y4-13 (3D06) RUN	Thrust Deceleration Time	V/f OLV/PM EZOLV Sets the length of time necessary for the drive to go from the Thrust Frequency in *Y4-12 [Thrust Frequency]* to stop when Thrust Mode is active.	2.5 s (0.0 - 600.0 s)
Y4-17 (3D0A) RUN	Utility Start Delay	V/f OLV/PM EZOLV Sets the length of time that the drive will delay starting when there is a Run command at power-up. **Note:** Set this parameter to 0.0 to disable the function.	0.2 min (0.0 - 1000.0 min)
Y4-18 (3D0B) RUN	Differential Level	V/f OLV/PM EZOLV Sets the maximum difference that the drive will allow when it subtracts the Differential Feedback from the Primary PID Feedback. **Note:** • The drive will respond as specified by the setting in *Y4-20 [Differential Level Detection Selection]* when the difference increases to more than the value set in this parameter for the time set in *Y4-19 [Differential Level Detection Time]*. • Parameters *Y1-02 [System Units]*, *Y1-03 [PID User Unit Display Scaling]*, and *b5-39 [PID User Unit Display Digits]* set the unit, scaling, and resolution. • Set this parameter to 0.00 to disable Differential Feedback Detection.	10.0 (0.0 - 6000.0)
Y4-19 (3D0C) RUN	Differential Lvl Detection Time	V/f OLV/PM EZOLV Sets the length of time that the difference between PID Feedback and the Differential Feedback must be more than *Y4-18 [Differential Level]* before the drive will respond as specified by *Y4-20 [Differential Level Detection Selection]*.	10 s (0 - 3600 s)
Y4-20 (3D0D) RUN	Differential Level Detection Sel	V/f OLV/PM EZOLV Sets the drive response during a Differential Level Detected condition. 0 : Fault (and Digital Out) 1 : Alarm (and Digital Out) 2 : Digital Out Only	0 (0 - 2)
Y4-22 (3D0F) RUN	Low City On-Delay Time	V/f OLV/PM EZOLV Sets the length of time that the drive will wait to stop when the drive detects a Low City Pressure condition.	10 s (1 - 1000 s)
Y4-23 (3D10) RUN	Low City Off-Delay Time	V/f OLV/PM EZOLV Sets the length of time that the drive will wait to start again after you clear a Low City Pressure condition.	5 s (0 - 1000 s)
Y4-24 (3D11) RUN	Low City Alarm Text	V/f OLV/PM EZOLV Sets the alarm message to show on the keypad when the drive detects a Low City Pressure condition. 0 : Low City Pressure 1 : Low Suction Pressure 2 : Low Water in Tank	0 (0 - 2)

No. (Hex.)	Name	Description	Default (Range)
Y4-29 (3D16) RUN	Lube Pump Text	V/f OLV/PM EZOLV Selects the display text when Lube Pump is active. It also changes the text for the Lube Pump Digital Output selection *[H2-xx = C6]*. 0 : Lube Pump 1 : Digital Out Delay 2 : Primer Pump 3 : Screen Motor Starter	0 (0 - 3)
Y4-30 (3D17) RUN	Lube Pump During Run	V/f OLV/PM EZOLV When enabled, the Lube Pump digital output *[H2-xx = C6]* stays activated after the timer expires and the drive starts to run normally. The output will deactivate only when the drive stops, faults, or sleeps. 0 : Disabled 1 : Active During Run	0 (0 - 1)
Y4-31 (3D18) RUN	Lube Pump Time	V/f OLV/PM EZOLV Sets the length of time that the drive output is delayed and the Lube Pump digital output *[H2-xx = C6]* is energized before the drive will run. Set this parameter to 0.0 to disable the feature.	0.0 s (0.0 - 3000.0 s)
Y4-32 (3D19) RUN	Pre-Charge Level 2	V/f OLV/PM EZOLV For normal PI operation and during Pre-Charge 2, if the PI Feedback signal is more than the level set in this parameter, Pre-Charge 2 is cancelled and the drive resumes normal operation. For inverse PI operation and during Pre-Charge 2, if the PI Feedback signal is less than the level set in this parameter, Pre-Charge 2 is cancelled and the drive resumes normal operation. When this parameter is set to *0*, Pre-Charge 2 still runs when *Y4-07 ≠ 0.0 [Pre-Charge Time 2]*, but the drive uses *Y4-01 [Pre-Charge Level]* to determine when normal operation should resume. **Note:** Units are set by *Y1-02 [System Units]* and resolution is set by *b5-39 [PID User Unit Display Digits]* and upper limited to 200% of *Y1-03 [PID User Unit Display Scaling]*.	0.0 (0 - 6000.0)
Y4-36 (3D1D) RUN	Pressure Reached Exit Conditions	V/f OLV/PM EZOLV Sets how the digital output responds to Feedback changes after it activates. 0 : Hysteresis Above & Below 1 : Hysteresis 1-Way	1 (0, 1)
Y4-37 (3D1E) RUN	Pressure Reached Hysteresis Lvl	V/f OLV/PM EZOLV Sets the hysteresis level that will cause the drive to exit the Pressure Reached condition. **Note:** Parameters *Y1-02 [PID Unit Display Selection]*, *Y1-03 [PID User Unit Display Scaling]*, and *b5-39 [PID User Unit Display Digits]* set the unit, scaling, and resolution.	3.0 (0.1 - 100.0)
Y4-38 (3D1F) RUN	Pressure Reached On Delay Time	V/f OLV/PM EZOLV Sets the length of time that the drive will wait before it activates the Pressure Reached condition.	1.0 s (0.1 - 60.0 s)
Y4-39 (3D20) RUN	Pressure Reached Off Delay Time	V/f OLV/PM EZOLV Sets the length of time that the drive will wait before it deactivates the Pressure Reached condition.	1.0 s (0.1 - 60.0 s)
Y4-40 (3D21) RUN	Pressure Reached Detection Sel	V/f OLV/PM EZOLV Sets the drive status that triggers the Pressure Reached Detection digital output. 0 : Always 1 : Drive Running 2 : Run Command	0 (0 - 2)
Y4-41 (3D22) RUN	Diff Lvl Src Fdbk Backup Select	V/f OLV/PM EZOLV Sets the function to enable or disable *Differential Level Source [H3-xx = 2D]* as the backup transducer if there is a failure with the primary PID Feedback transducer *[H3-xx = B]* and the PID Feedback Backup transducer *[H3-xx = 24]* is not available. 0 : Disabled 1 : Enabled	0 (0, 1)
Y4-42 (3D23)	Output Disconnect Detection Sel	V/f OLV/PM EZOLV Sets the drive response when you open the output disconnect then connect it again. 0 : Disabled 1 : Alarm - Speed Search 2 : Alarm - Start at Zero 3 : Fault **Note:** When the Output Disconnect is active, the drive internally disables Output Phase Loss Detection of more than one phase.	0 (0 - 3)
Y4-43 (3D24)	Output Disconnect Inject Current	V/f OLV/PM EZOLV Sets the level of DC injection current during output disconnect as a percentage of the drive rated current.	30% (5 - 50%)

No. (Hex.)	Name	Description	Default (Range)
Y4-50 (3D2B)	Harmonic Filter Output Selection	V/f OLV/PM EZOLV Sets how the harmonic filter output will close. 0 : Speed 1 : Current 2 : Speed + Current	0 (0 - 2)
Y4-51 (3D2C)	HFO Speed Point	V/f OLV/PM EZOLV Sets the speed point that must be exceeded to close the harmonic filter output (as a percentage of maximum frequency). **Note:** Depending on control method, maximum frequency is *E1-04 [Maximum Output Frequency], E3-04 [Motor 2 Maximum Output Frequency]*, or *E9-02 [Maximum Speed]*.	70% (0 - 100%)
Y4-52 (3D2D)	HFO Current Point	V/f OLV/PM EZOLV Sets the current point that must be exceeded to close the harmonic filter output (as a percentage of motor rated current). **Note:** Depending on control method, maximum current is *E2-01 [Motor Rated Current], E5-03 [PM Motor Rated Current]*, or *E9-06 [Motor Rated Current]* .	70% (0 - 100%)
Y4-53 (3D2E)	HFO Delay On-Time	V/f OLV/PM EZOLV Sets a delay for the activation of HFO.	5.0 s (0.0 - 6000.0 s)
Y4-54 (3D2F)	HFO Delay Off-Time	V/f OLV/PM EZOLV Sets a delay for the deactivation of HFO.	0.0 s (0.0 - 6000.0 s)

◆ Y5: Hand/Off/Auto Operation

No. (Hex.)	Name	Description	Default (Range)
Y5-01 (3D40)	HAND Frequency Reference Source	V/f OLV/PM EZOLV Sets the frequency reference source when HAND Mode is active. 0 : HAND Analog Input 1 : HAND Reference 1 (Y5-02)	1 (0, 1)
Y5-02 (3D41) RUN	HAND Frequency Reference	V/f OLV/PM EZOLV Sets the frequency reference when HAND Mode is active and *Y5-01 = 1 [HAND Frequency Reference Source = HAND Reference 1 (Y5-02)]*. **Note:** • When *A1-02 = 8 [Control Method Selection = EZOLV]*, the upper limit is the Hz equivalent of *E9-02 [Maximum Speed]*. • When *H1-xx = 16 [MFDI Function Selection = Motor 2 Selection]* for Motor 2, the upper limit is the larger value between *E1-04 [Maximum Output Frequency]* and *E3-04 [Motor 2 Maximum Output Frequency]*.	40.00 Hz (0.00 - E1-04 Hz)
Y5-03 (3D42)	HAND/AUTO Switchover During Run	V/f OLV/PM EZOLV Sets the function to enable or disable switching between HAND and AUTO Mode during run. Switching from AUTO to HAND is not permitted when the drive is running in MEMOBUS Multiplex mode with auxiliary drives enabled. 0 : Disabled 1 : Enabled	0 (0, 1)
Y5-04 (3D43)	Operation HAND Key	V/f OLV/PM EZOLV Sets the HAND key on the HOA keypad to let you switch between HAND Mode and AUTO Mode. 0 : Disabled 1 : Enabled	1 (0, 1)
Y5-05 (3D44) RUN	HAND Frequency Reference 2	V/f OLV/PM EZOLV Sets the frequency reference when HAND Mode 2 is active. **Note:** • When *A1-02 = 8 [Control Method Selection = EZOLV]*, the upper limit is the Hz equivalent of *E9-02 [Maximum Speed]*. • When *H1-xx = 16 [MFDI Function Selection = Motor 2 Selection]* for Motor 2, the upper limit is the larger value between *E1-04 [Maximum Output Frequency]* and *E3-04 [Motor 2 Maximum Output Frequency]*.	0.00 Hz (0.00 - E1-04 Hz)
Y5-06 (3D45) RUN	HAND Reference Prime Loss Level	V/f OLV/PM EZOLV Detects loss of prime in the pump during HAND mode. If the measured quantity (determined by *Y1-18*) is less than this level for the time specified in *Y1-20* and the output frequency is at or more than the *Y5-02* level, a “Loss Of Prime” condition occurs. The drive will respond to the “Loss Of Prime” condition depending the setting of *Y1-22*.	0.0 (0.0 - 1000.0)

No. (Hex.)	Name	Description	Default (Range)
Y5-07 (3D46) RUN	HAND Reference Prime Loss Level 2	V/f OLV/PM EZOLV Detects loss of prime in the pump during HAND mode 2. If the measured quantity in *Y1-18* is less than this level for the time specified in *Y1-20* and the output frequency is at or more than the *Y5-05* level, the drive will detect a *Loss Of Prime* condition. The drive will respond to the "Loss Of Prime" condition depending the setting of *Y1-22*. **Note:** Parameter *Y1-18 [Prime Loss Detection Method]* set the units.	0.0 (0.0 - 1000.0)
Y5-09 (3D48)	HAND MOP Selection	V/f OLV/PM EZOLV Sets whether you can use MOP to change HAND references from the Home screen. 0 : ENTER Key Required 1 : Immediate/MOP-style	0 (0, 1)

◆ Y6: Flow Meter Setup

No. (Hex.)	Name	Description	Default (Range)
Y6-01 (3D5E)	Flow Meter Scaling	V/f OLV/PM EZOLV This parameter enables the flow meter functions when set ≠ 0.0. It sets the display scaling when "Flow Rate" is used as the PID feedback and sets the scaling for the "Flow Rate" analog output. When you use a pulse input is for the flow rate, this parameter will also set the scaling for the "Flow Rate" analog input. **Note:** Decimal place position is set by *Y6-22 [Flow Meter Decimal Place Pos.]*.	0.0 GPM (0.0 - 6000.0 GPM)
Y6-02 (3D5F)	Turbine Input Scaling Coarse	V/f OLV/PM EZOLV Sets the scaling for the turbine in units of pulses/gallon. Pulses/Gallon = *Y6-02* + *Y6-03 [Turbine Input Scaling Fine]*. **Note:** Scaling is internally limited to 0.0001 ppG.	1 ppG (0 - 6000 ppG)
Y6-03 (3D60)	Turbine Input Scaling Fine	V/f OLV/PM EZOLV Sets the scaling for the turbine in units of pulses/gallon. Pulses/Gallon = *Y6-02 [Turbine Input Scaling Coarse]* + *Y6-03*. **Note:** Scaling is internally limited to 0.0001 ppG.	0.0000 ppG (0.0000 - 0.9999 ppG)
Y6-04 (3D61)	Water Flow Units	V/f OLV/PM EZOLV Sets the display units for flow meter related parameters and monitors 0 : U.S. Gallons / min (GPM) 1 : U.S. Gallons / hour (GPH) 2 : Cubic Feet / min (CFM) 3 : Cubic Meters / hour (CMH) 4 : Acre-Feet / year (AFY) **Note:** This parameter affects these parameters and monitors: *Y2-02 [Sleep Level]*, *Y6-06 [Low Flow Level]*, *Y6-17 [High Flow Level]*, *Y6-27 [Flow Rate Limit Level]*, *Y9-41 [Add Flow Level]*, *Y9-42 [Remove Flow Level]*, and *UA-83 [Flow Rate]*.	0 (0 - 4)
Y6-05 (3D62) RUN	Flow Accumulation Set Reset	V/f OLV/PM EZOLV Resets the accumulated flow and sets monitors *UA-84* to *UA-89* to *0*. 0 : No Reset 7770 : Reset Accumulation 8880 : Set Accumulation (Y6-31 - Y6-34) **Note:** After you modify this parameter, it will automatically return to 0.	0 (0 - 65535)
Y6-06 (3D63) RUN	Low Flow Level	V/f OLV/PM EZOLV Sets the level below which the flow must be for longer than the time set in *Y6-07 [Low Flow Detection Time]* to trigger a Low Flow condition. **Note:** • Setting this parameter to 0.0 will disable the function. • Unit text is set by *Y6-04 [Water Flow Units]*. • Decimal place position is set by *Y6-22 [Flow Meter Decimal Place Pos.]*.	0.0 (0.0 - 6000.0)
Y6-07 (3D64) RUN	Low Flow Detection Time	V/f OLV/PM EZOLV Sets the length of time that the flow rate must be below the level set in *Y6-06 [Low Flow Level]* to detect a Low Flow condition.	10 s (0 - 6000 s)

No. (Hex.)	Name	Description	Default (Range)
Y6-08 (3D65) RUN	Low Flow Detection Wait Time	V/f OLV/PM EZOLV Sets the length of time that the drive will wait after coming out of a zero speed condition before activating Low Flow detection. **Note:** This feature is canceled when the Flow Rate is above the Low Flow Level for the time set in *Y6-21 [Low Flow Det Wait Time Cancel]*.	0.0 min (0.0 - 3600.0 min)
Y6-09 (3D66)	Low Flow Behavior	V/f OLV/PM EZOLV Sets how the drive will respond when it detects a *LowFl Low Flow* condition. 0 : Digital Output Only 1 : Alarm (and Digital Output) 2 : Fault (and Digital Output) 3 : Auto-Restart (time set by Y6-10)	1 (0 - 3)
Y6-10 (3D67)	Low Flow Auto-Restart Time	V/f OLV/PM EZOLV Sets the length of time that the drive will wait before it tries to auto-restart after a *LowFl Low Flow* fault. **Note:** This parameter is effective only when *Y6-09 = 3 [Low Flow Behavior = Auto-Restart (time set by Y6-10)]*.	3.0 min (0.1 - 6000.0 min)
Y6-11 (3D68) RUN	Accumulation Level - Millions	V/f OLV/PM EZOLV Sets the accumulated volume that will trigger the *Accumulated Flow Level* alarm, *Accumulated Flow Level* fault, or the Accumulated Flow Level digital output. **Note:** • Accumulated Flow Level is calculated using this formula: Level = (*Y6-11* × 1,000,000) + (*Y6-12* × 1000) + *Y6-13* + *Y6-14* • Unit text is set by *Y6-16 [Flow Meter Accumulator Units]*.	0 (0 - 65535)
Y6-12 (3D69) RUN	Accumulation Level - Thousands	V/f OLV/PM EZOLV Sets the accumulated volume that will trigger the *Accumulated Flow Level* alarm, *Accumulated Flow Level* fault, or the Accumulated Flow Level digital output. **Note:** • Accumulated Flow Level is calculated using this formula: Level = (*Y6-11* × 1,000,000) + (*Y6-12* × 1000) + *Y6-13* + *Y6-14* • Unit text is set by *Y6-16 [Flow Meter Accumulator Units]*.	0 (0 - 999)
Y6-13 (3D6A) RUN	Accumulation Level - Ones	V/f OLV/PM EZOLV Sets the accumulated volume that will trigger the *Accumulated Flow Level* alarm, *Accumulated Flow Level* fault, or the Accumulated Flow Level digital output. **Note:** • Accumulated Flow Level is calculated using this formula: Level = (*Y6-11* × 1,000,000) + (*Y6-12* × 1000) + *Y6-13* + *Y6-14* • Unit text is set by *Y6-16 [Flow Meter Accumulator Units]*.	0 (0 - 999)
Y6-14 (3D6B) RUN	Accumulation Level - Decimal	V/f OLV/PM EZOLV Sets the accumulated volume that will trigger the *Accumulated Flow Level* alarm, *Accumulated Flow Level* fault, or the Accumulated Flow Level digital output. **Note:** • Accumulated Flow Level is calculated using this formula: Level = (*Y6-11* × 1,000,000) + (*Y6-12* × 1000) + *Y6-13* + *Y6-14* • Unit text is set by *Y6-16 [Flow Meter Accumulator Units]*.	0.0000 (0.0000 - 0.9999)
Y6-15 (3D6C) RUN	Accumulated Volume Behavior	V/f OLV/PM EZOLV Sets how the drive will respond when the accumulated volume reaches the level set by Accumulation Level parameters *Y6-11* to *Y6-14*. When you use settings 2 to 5, *Y6-20 [Accumulator Stopping Method]* sets the stopping method when the accumulated volume reaches the target value. 0 : Digital Output Only 1 : Alarm (and Digital Output) 2 : Fault (and Digital Output) 3 : Fault + MFDO + Accum Reset 4 : Stop + Alarm + MFDO 5 : Stop + Alarm + MFDO + AccumReset	1 (0 - 5)
Y6-16 (3D6D)	Flow Meter Accumulator Units	V/f OLV/PM EZOLV Sets the units that the drive uses to accumulate flow. 1 : Gallons (gal) 2 : Acre-Feet (A-F) **Note:** Changing this parameter will reset the accumulated flow displayed in monitors *UA-84* to *UA-87* to *0*.	1 (1, 2)

No. (Hex.)	Name	Description	Default (Range)
Y6-17 (3D6E) RUN	High Flow Level	V/f OLV/PM EZOLV Sets the level above which the flow must be for longer than the time set in *Y6-18 [High Flow Detection Time]* to trigger a High Flow condition. **Note:** • Setting this parameter to 0.0 will disable the function. • Unit text is set by *Y6-04 [Water Flow Units]*. • Decimal place position is set by *Y6-22 [Flow Meter Decimal Place Pos.]*.	0.0 (0.0 - 6000.0)
Y6-18 (3D6F) RUN	High Flow Detection Time	V/f OLV/PM EZOLV Sets the length of time that the flow rate must be above the level set in *Y6-17 [High Flow Level]* to detect a High Flow condition.	10 s (0 - 6000 s)
Y6-19 (3D70)	High Flow Behavior	V/f OLV/PM EZOLV Sets how the drive will respond it detects a *HiFlo High Flow* condition. 0 : Digital Output Only 1 : Alarm (and Digital Output) 2 : Fault (and Digital Output) 3 : Auto-Restart (time set by Y6-42)	1 (0 - 3)
Y6-20 (3D71)	Accumulator Stopping Method	V/f OLV/PM EZOLV Sets how the drive will stop when the accumulated volume reaches the level set by Accumulation Level parameters *Y6-11* to *Y6-14*. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use C1-09) **Note:** This parameter is effective only when *Y6-15 = 2 - 5 [Fault and Stop selections]*.	1 (0 - 2)
Y6-21 (3D72) RUN	Low Flow Det Wait Time Cancel	V/f OLV/PM EZOLV Sets the length of time that the flow rate must be above the level set in *Y6-06 [Low Flow Level]* to cancel the delay wait time set in *Y6-08 [Low Flow Detection Wait Time]* and start Low Flow Detection.	5 s (0 - 6000 s)
Y6-22 (3D73)	Flow Meter Decimal Place Pos	V/f OLV/PM EZOLV Sets the number of decimal places for the Flow Meter parameters and monitors. 0 : No Decimal Places (XXXXX) 1 : One Decimal Place (XXXX.X) 2 : Two Decimal Places (XXX.XX)	1 (0 - 2)
Y6-26 (3D77)	Flow Rate Limit Selection	V/f OLV/PM EZOLV Enables and disables the Flow Rate Limiter. 0 : Disabled 1 : Enabled 2 : Enabled - Low Limit	0 (0 - 2)
Y6-27 (3D78) RUN	Flow Rate Limit Level	V/f OLV/PM EZOLV Sets the Flow Rate Limit according to the *Y6-26 [Flow Rate Limit Selection]* setting. When *Y6-26 = 1 [Enabled]*, the drive decreases speed when the Flow rate increases rapidly or is more than this level (PI control). When *Y6-26 = 2 [Enabled - Low Limit]*, the drive decreases speed when the Flow rate decreases rapidly or is less than this level (PI control). **Note:** • Unit text is set by *Y6-04 [Water Flow Units]*. • Decimal place position is set by *Y6-22 [Flow Meter Decimal Place Pos.]*.	0.0 (0.0 - 6000.0)
Y6-28 (3D79) RUN	Flow Rate Limit Regulator P Gain	V/f OLV/PM EZOLV Sets the responsiveness of the Flow Rate limit regulator. Increasing the setting increases the responsiveness.	1.00 (0.00 - 25.00)
Y6-29 (3D7A) RUN	Flow Rate Limit Regulator I Time	V/f OLV/PM EZOLV Sets the responsiveness of the Flow Rate limit regulator. Reducing the setting increases the responsiveness.	1.00 s (0.00 - 10.00 s)
Y6-30 (3D7B) RUN	Flow Limit Regulator Delay	V/f OLV/PM EZOLV Sets the length of time before the Flow Rate Limiter activates after the drive has started to run.	10 s (0 - 6000 s)
Y6-31 (3D7C) RUN	Set Accumulation Level Millions	V/f OLV/PM EZOLV Sets the stored accumulated volume. **Note:** • Level = (*Y6-31* × 1,000,000) + (*Y6-32* × 1000) + *Y6-33* + *Y6-34* • Value is written to the drive when *Y6-05 = 8880 [Flow Accumulation Set Reset = Set Accumulation (Y6-31 - Y6-34)]*, after which the values in *Y6-31* to *Y6-34* reset to *0*. • Unit text is set by *Y6-16 [Flow Meter Accumulator Units]*.	0 (0 - 655535)

No. (Hex.)	Name	Description	Default (Range)
Y6-32 (3D7D) RUN	Set Accumulation Level Thousands	V/f OLV/PM EZOLV Sets the stored accumulated volume. **Note:** • Level = (*Y6-31* × 1,000,000) + (*Y6-32* × 1000) + *Y6-33* + *Y6-34* • Value is written to the drive when *Y6-05 = 8880 [Flow Accumulation Set Reset = Set Accumulation (Y6-31 - Y6-34)]*, after which the values in *Y6-31* to *Y6-34* reset to *0*. • Unit text is set by *Y6-16 [Flow Meter Accumulator Units]*.	0 (0 - 999)
Y6-33 (3D7E) RUN	Set Accumulation Level Ones	V/f OLV/PM EZOLV Sets the stored accumulated volume. **Note:** • Level = (*Y6-31* × 1,000,000) + (*Y6-32* × 1000) + *Y6-33* + *Y6-34* • Value is written to the drive when *Y6-05 = 8880 [Flow Accumulation Set Reset = Set Accumulation (Y6-31 - Y6-34)]*, after which the values in *Y6-31* to *Y6-34* reset to *0*. • Unit text is set by *Y6-16 [Flow Meter Accumulator Units]*.	0 (0 - 999)
Y6-34 (3D7F) RUN	Set Accumulation Level Decimal	V/f OLV/PM EZOLV Sets the stored accumulated volume. **Note:** • Level = (*Y6-31* × 1,000,000) + (*Y6-32* × 1000) + *Y6-33* + *Y6-34* • Value is written to the drive when *Y6-05 = 8880 [Flow Accumulation Set Reset = Set Accumulation (Y6-31 - Y6-34)]*, after which the values in *Y6-31* to *Y6-34* reset to *0*. • Unit text is set by *Y6-16 [Flow Meter Accumulator Units]*.	0.0000 (0.0000 - 0.9999)
Y6-35 (3D80) RUN	Accumulator Delta Save Selection	V/f OLV/PM EZOLV Sets and resets the starting value used to calculate monitor *UA-89 [Delta Volume Accum]*. 0 : - - 1 : Set 2 : Reset	0 (0 - 2)
Y6-36 (3D81) RUN	Delta Accumulator Level Millions	V/f OLV/PM EZOLV Sets the starting value used for monitor *UA-89 [Delta Volume Accum]*. **Note:** • Level = (*Y6-36* × 1,000,000) + (*Y6-37* × 1000) + *Y6-38* + *Y6-39* • Setting *Y6-35 = 1 [Accumulator Delta Save Selection = Set]* will overwrite the values by the current accumulation values as displayed by *UA-84 to UA-87 (or UA-88)*. • Setting *Y6-35 = 2 [Reset]* will reset the *Y6-36* to *Y6-39* values to *0*. • Unit text is set by *Y6-16 [Flow Meter Accumulator Units]*.	0 (0 - 65535)
Y6-37 (3D82) RUN	Delta Accumulator Lvl Thousands	V/f OLV/PM EZOLV Sets the starting value used for monitor *UA-89 [Delta Volume Accum]*. **Note:** • Level = (*Y6-36* × 1,000,000) + (*Y6-37* × 1000) + *Y6-38* + *Y6-39* • Setting *Y6-35 = 1 [Accumulator Delta Save Selection = Set]* will overwrite the values by the current accumulation values as displayed by *UA-84 to UA-87 (or UA-88)*. • Setting *Y6-35 = 2 [Reset]* will reset the *Y6-36* to *Y6-39* values to *0*. • Unit text is set by *Y6-16 [Flow Meter Accumulator Units]*.	0 (0 - 999)
Y6-38 (3D83) RUN	Delta Accumulator Level Ones	V/f OLV/PM EZOLV Sets the starting value used for monitor *UA-89 [Delta Volume Accum]*. **Note:** • Level = (*Y6-36* × 1,000,000) + (*Y6-37* × 1000) + *Y6-38* + *Y6-39* • Setting *Y6-35 = 1 [Accumulator Delta Save Selection = Set]* will overwrite the values by the current accumulation values as displayed by *UA-84 to UA-87 (or UA-88)*. • Setting *Y6-35 = 2 [Reset]* will reset the *Y6-36* to *Y6-39* values to *0*. • Unit text is set by *Y6-16 [Flow Meter Accumulator Units]*.	0 (0 - 999)
Y6-39 (3D84) RUN	Delta Accumulator Level Decimal	V/f OLV/PM EZOLV Sets the starting value used for monitor *UA-89 [Delta Volume Accum]*. **Note:** • Level = (*Y6-36* × 1,000,000) + (*Y6-37* × 1000) + *Y6-38* + *Y6-39* • Setting *Y6-35 = 1 [Accumulator Delta Save Selection = Set]* will overwrite the values by the current accumulation values as displayed by *UA-84 to UA-87 (or UA-88)*. • Setting *Y6-35 = 2 [Reset]* will reset the *Y6-36* to *Y6-39* values to *0*. • Unit text is set by *Y6-16 [Flow Meter Accumulator Units]*.	0.0000 (0.0000 - 0.9999)
Y6-40 (3D85)	Low Flow Fault Retry Attempts	V/f OLV/PM EZOLV Sets the number of times that the drive will try to restart when a *LowFl Low Flow* condition is detected.	3 (0 - 10)
Y6-41 (3D86)	High Flow Fault Retry Attempts	V/f OLV/PM EZOLV Sets the number of times that the drive will try to restart when a *HiFlo High Flow* condition is detected.	3 (0 - 10)
Y6-42 (3D87)	High Flow Fault Restart Time	V/f OLV/PM EZOLV Sets the time interval between each *HiFlo High Flow* auto-restart attempt.	20.0 s (0.5 - 3600.0 s)

◆ Y7: Anti-Jam

No. (Hex.)	Name	Description	Default (Range)
Y7-01 (3D90)	Anti-Jam Selection	V/f OLV/PM EZOLV Enables and disables the Anti-Jam function. 0 : Disabled 1 : Enabled	0 (0, 1)
Y7-02 (3D91) RUN	Anti-Jam Cycle Count	V/f OLV/PM EZOLV Sets the maximum number of cycles that the drive will try before triggering an Anti-Jam fault.	1 (1 - 100)
Y7-03 (3D92) RUN	AJ Detection Current Lvl @ Start	V/f OLV/PM EZOLV Sets the current level (at start) that will trigger the Anti-Jam function. Set as a percentage of motor rated current.	120% (50 - 200%)
Y7-04 (3D93) RUN	AJ Detection Current Lvl @ Start	V/f OLV/PM EZOLV Sets the length of time the current must be more than the *Y7-03 [AJ Detection Current Lvl @ Start]* level to trigger the Anti-Jam function.	0.3 s (0.1 - 2.0 s)
Y7-05 (3D94) RUN	AJ Detection Current Level @ Run	V/f OLV/PM EZOLV Sets the current level (during run) that will trigger the Anti-Jam function. Set as a percentage of motor rated current. A setting of 0% disables Anti-Jam during run.	0% (0 - 200%)
Y7-06 (3D95) RUN	Anti-Jam Detection Time @ Run	V/f OLV/PM EZOLV Sets the length of time that the current must be more than the *Y7-05 [AJ Detection Current Level @ Run]* level to trigger the Anti-Jam function (during run).	0.3 s (0.1 - 2.0 s)
Y7-07 (3D96) RUN	Anti-Jam Frequency Reference	V/f OLV/PM EZOLV Sets the maximum speed when the Anti-Jam feature is operating.	25.00 Hz (1.50 - 400.00 Hz)
Y7-08 (3D97) RUN	Anti-Jam Release Time	V/f OLV/PM EZOLV Sets the length of time that the current must be less than the level set in *Y7-03 [AJ Detection Current Lvl @ Start]* to resume normal operation.	2.0 s (0.5 - 10.0 s)
Y7-09 (3D98) RUN	Anti-Jam Display Text Selection	V/f OLV/PM EZOLV Selects the text shown when the Anti-Jam function is active. This selection also changes the fault and alarm text that will display if the drive was unable to clear the debris from the impeller in the number of tries set in *Y7-02 [Anti-Jam Cycle Count]*. 0 : Anti-Jam 1 : De-Rag	0 (0, 1)

◆ Y8: De-Scale/De-Rag

No. (Hex.)	Name	Description	Default (Range)
Y8-01 (3DE0)	De-Scale Operation Selection	V/f OLV/PM EZOLV Sets the drive De-Scale functionality. 0 : Disabled 1 : De-Scale Enabled 2 : Force De-Scale	0 (0 - 2)
Y8-02 (3DE1) RUN	De-Scale Cycle Count	V/f OLV/PM EZOLV Sets the number of forward/reverse cycles for the De-Scale function.	1 (1 - 100)
Y8-03 (3DE2) RUN	De-Scale Forward Speed	V/f OLV/PM EZOLV Sets the speed during the forward portion of the De-Scale operation. **Note:** When *A1-02 = 8 [Control Method Selection = EZ Vector Control]*, the upper limit is the Hz equivalent of *E9-02 [Maximum Speed]*. While you set *H1-xx = 16 [MFDI Function Selection = Motor 2 Selection]*, the upper limit is the greater of the *E1-04 [Maximum Output Frequency]* value and the *E3-04 [Motor 2 Maximum Output Frequency]* value.	25.00 Hz (0.00 - E1-04 Hz)
Y8-04 (3DE3) RUN	De-Scale Forward Run Time	V/f OLV/PM EZOLV Set the amount of time the drive will run in the forward portion of the De-Scale cycle.	10 s (1 - 6000 s)
Y8-05 (3DE4) RUN	De-Scale Reverse Run Time	V/f OLV/PM EZOLV Set the amount of time the drive will run in the reverse portion of the De-Scale cycle.	10 s (1 - 6000 s)

No. (Hex.)	Name	Description	Default (Range)
Y8-06 (3DE5) RUN	De-Scale Acceleration Time	V/f OLV/PM EZOLV Sets the amount of time it will take the drive to accelerate from zero to the De-Scale frequency reference *Y8-03 [De-Scale Forward Speed]* or *Y8-09 [De-Scale Reverse Speed]*. **Note:** Internally limited to the equivalent range of 0.1 s to 6000.0 s acceleration from 0 Hz to Maximum Frequency.	2.0 s (0.1 - 600.0 s)
Y8-07 (3DE6) RUN	De-Scale Deceleration Time	V/f OLV/PM EZOLV Sets the amount of time it will take the drive to decelerate from the De-Scale frequency reference *Y8-03 [De-Scale Forward Speed]* or *Y8-09 [De-Scale Reverse Speed]* to zero. **Note:** Internally limited to the equivalent range of 0.1 s to 6000.0 s acceleration from 0 Hz to Maximum Frequency.	2.0 s (0.1 - 600.0 s)
Y8-08 (3DE7) RUN	Run Time before De-Scale	V/f OLV/PM EZOLV Sets the number of pump operating hours (*U1-16 ≠ 0 [SFS Output Freq ≠ 0]*) before a De-Scale routine will run.	168.0 h (0.1 - 2000.0 h)
Y8-09 (3DE8) RUN	De-Scale Reverse Speed	V/f OLV/PM EZOLV Sets the speed during the reverse portion of the De-Scale operation. **Note:** When *A1-02 = 8 [Control Method Selection = EZ Vector Control]*, the upper limit is the Hz equivalent of *E9-02 [Maximum Speed]*. While you set *H1-xx = 16 [MFDI Function Selection = Motor 2 Selection]*, the upper limit is the greater of the *E1-04 [Maximum Output Frequency]* value and the *E3-04 [Motor 2 Maximum Output Frequency]* value.	25.00 Hz (0.00 - E1-04 Hz)

◆ Y9: Network Multiplex Options

No. (Hex.)	Name	Description	Default (Range)
Y9-01 (3DF4)	Lead Drive Selection	V/f OLV/PM EZOLV Specifies how the next Lead Drive is selected. This parameter is always used when there is a network request to stage. 0 : Next Available 1 : Lowest Runtime 2 : Stop History	1 (0 - 2)
Y9-02 (3DF5)	System Feedback Source	V/f OLV/PM EZOLV Defines which signal to use for PID Feedback when *Y1-01 = 3 [Multiplex Mode = Network Multiplex]*. 0 : Analog Only 1 : Ana→Net, No Alarm 2 : Ana→Net, Alarm 3 : Network Only **Note:** Setting has no effect when *Y1-01 ≠ 3*.	0 (0 - 3)
Y9-03 (3DF6) RUN	Alternation Time	V/f OLV/PM EZOLV Specifies the time for a drive to request alternation, influenced by *Y9-04 [Alternation Mode]*. The alternation feature is disabled when this parameter is set to 0. **Note:** Unit text is set by *Y9-19 [Alternation Time Unit]*.	24 (0 - 1000)
Y9-04 (3DF7)	Alternation Mode	V/f OLV/PM EZOLV Sets the method of alternation. The new lead drive is selected using *Y9-01 [Lead Drive Selection]*. 0 : FIFO Auto 1 : FIFO Forced 2 : LIFO 3 : FIFO @Sleep	0 (0 - 3)
Y9-05 (3DF8)	Lag Drive Mode	V/f OLV/PM EZOLV Sets how lag drives function and defines the running fixed speed, turning off, and following the output speed of the Lead drive. 0 : Fixed Speed 2 : Turn Off 3 : Follow Lead Speed	0 (0 - 3)
Y9-06 (3DF9) RUN	Lag Fixed Speed	V/f OLV/PM EZOLV Sets the speed at which the drive will run when the drive changes from a lead to a lag and *Y9-05 = 0 [Lag Drive Mode = Fixed Speed]* after the time set in *Y9-07 [Lag Fixed Speed Delay]* expires. **Note:** When *A1-02 = 8 [Control Method Selection = EZ Vector Control]*, the range is 0.0 - 120.0 Hz.	55.0 Hz (0.0 - 400.0 Hz)

No. (Hex.)	Name	Description	Default (Range)
Y9-07 (3DFA) RUN	Lag Fixed Speed Delay	V/f OLV/PM EZOLV Sets the length of time that the speed is latched when the drive changes from a lead to a lag before the drive responds based on the *Y9-05* setting.	5 s (0 - 1000 s)
Y9-08 (3DFB)	Staging Mode	V/f OLV/PM EZOLV Sets the detection method for staging a new drive. 0 : Output Frequency 1 : Feedback 2 : Feedback + Output Frequency 3 : Flow Meter	0 (0 - 3)
Y9-09 (3DFC) RUN	Staging Frequency Level	V/f OLV/PM EZOLV When *Y9-08 = 0 [Staging Mode = Output Frequency]*, sets the level above which the output frequency must be for the time set in *Y9-11 [Staging Delay Time]* for the lead drive to request a new lead drive through the iQpump MEMOBUS network. When *Y9-08 = 2 [Feedback + Output Frequency]*, sets the level above which the output frequency must be when the delta feedback (setpoint – feedback for direct acting PID, feedback – setpoint for reverse acting PID) is more than the level set in *Y9-10 [Staging Delta Feedback Level]* for the time set in *Y9-11*, for the the lead drive to request a new lead drive through the iQpump MEMOBUS network. **Note:** When *A1-02 = 8 [Control Method Selection = EZ Vector Control]*, the range is 0.0 - 120.0 Hz.	59.5 Hz (0.0 - 400.0 Hz)
Y9-10 (3DFD) RUN	Staging Delta Feedback Level	V/f OLV/PM EZOLV When *Y9-08 = 1 [Staging Mode = Feedback]*, sets the level above which the delta feedback must be for the time set in *Y9-11 [Staging Delay Time]* for the lead drive to request a new lead drive through the iQpump MEMOBUS network. When *Y9-08 = 2 [Feedback + Output Frequency]*, sets the level above which the delta feedback (setpoint – feedback for direct acting PID, feedback – setpoint for reverse acting PID) must be when the output frequency is more than *Y9-09 [Staging Frequency Level]* for the time set in *Y9-11* for the lead drive to request a new lead drive through the iQpump MEMOBUS network. **Note:** Unit set by *Y1-02 [System Units]*, resolution set by *b5-39 [PID User Unit Display Digits]*.	4.0 PSI (0.0 - 6000.0 PSI)
Y9-11 (3DFE) RUN	Staging Delay Time	V/f OLV/PM EZOLV Sets the delay time before a new lead drive is added to the system.	10 s (0 - 3600 s)
Y9-12 (3DFF)	De-staging Mode	V/f OLV/PM EZOLV Sets the detection method for de-staging to the previous lead drive. 0 : Output Frequency 1 : Feedback 2 : Feedback + Output Frequency 3 : Flow Meter	0 (0 - 3)
Y9-13 (3E00) RUN	De-staging Frequency Level	V/f OLV/PM EZOLV When *Y9-12 = 0 [De-staging Mode = Output Frequency]*, sets the level below which the output frequency must be for the time set in *Y9-15 [De-staging Delay Time]* for the lead drive to request to be removed through the iQpump MEMOBUS network. When *Y9-12 = 2 [Feedback + Output Frequency]*, sets the level below which the output frequency must be when the delta feedback (setpoint – feedback for direct acting PID, feedback – setpoint for reverse acting PID) is more than the level set in *Y9-14 [De-taging Delta Feedback Level]* for the time set in *Y9-15*, for the the lead drive to request to be removed through the iQpump MEMOBUS network. **Note:** • The de-staging frequency level is the maximum value of *d2-02 [Frequency Reference Lower Limit]*, *Y1-06 [Minimum Speed]*, and *Y4-12 [Thrust Frequency]* if any value is greater than the value set in *Y9-13*. • When *A1-02 = 8 [Control Method Selection = EZ Vector Control]*, the range is 0.0 - 120.0 Hz.	40.0 Hz (0.0 - 400.0 Hz)
Y9-14 (3E01) RUN	De-staging Delta Feedback Level	V/f OLV/PM EZOLV When *Y9-12 = 1 [De-staging Mode = Feedback]*, sets the level above which the delta feedback (setpoint – feedback for direct acting PID, feedback – setpoint for reverse acting PID) must be for the time set in *Y9-15 [De-staging Delay Time]* for the lead drive to request to be removed through the iQpump MEMOBUS network. When *Y9-12 = 2 [Feedback + Output Frequency]*, sets the level above which the delta feedback must be when the output frequency is less than *Y9-13 [De-staging Frequency Level]* for the time set in *Y9-15* for the lead drive to request to be removed through the iQpump MEMOBUS network. **Note:** Unit set by *Y1-02 [System Units]*, resolution set by *b5-39 [PID User Unit Display Digits]*.	0.0 PSI (0.0 - 6000.0 PSI)
Y9-15 (3E02) RUN	De-staging Delay Time	V/f OLV/PM EZOLV Sets the delay time before the lead drive is removed from the system.	10 s (0 - 3600 s)
Y9-16 (3E03) RUN	Stabilization Time	V/f OLV/PM EZOLV Sets the time used to stabilize the system when a drive is staged or de-staged. Lead-lag control and pump protection is suspended during this time. The lead drive will resume lead-lag control and pump protection behavior when the this timer expires.	3 s (0 - 3600 s)

No. (Hex.)	Name	Description	Default (Range)
Y9-17 (3E04) RUN	Setpoint Modifier	V/f OLV/PM EZOLV Sets the value to increment the System Setpoint depending on the number of drives running. **Note:** Example: Drive 1: Setpoint Drive X: Setpoint + ((X-1) (*Y9-17*)) • Example: Drive 1: Setpoint Drive X: Setpoint + ((X-1) (*Y9-17*)) • Unit set by *Y1-02 [System Units]*, resolution set by *b5-39 [PID User Unit Display Digits]*.	0.0 PSI (-999.9 - 999.9 PSI)
Y9-18 (3E05) RUN	High Feedback De-stage Level	V/f OLV/PM EZOLV Sets the feedback level as a percentage of *Y1-11 [High Feedback Level]* that will trigger a quick de-stage. The quick de-stage ignores *Y9-12* to *Y9-15* and uses an internal 2-second delay. **Note:** • This function is intended to be used when *b5-09 = 0 [PID Output Level Selection = Normal Output (Direct Acting)]* only, and may cause drives to de-stage incorrectly when *b5-09 = 1 [Reverse Output (Reverse Acting)]*. • A setting of 0.0% disables the High Feedback De-stage feature.	97.0% (0.0 - 100.0%)
Y9-19 (3E06) RUN	Alternation Time Unit	V/f OLV/PM EZOLV Sets the units for *Y9-03 [Alternation Time]*. 0 : Hours (H) 1 : Minutes (min)	0 (0, 1)
Y9-20 (3E07)	Allow Network Run	V/f OLV/PM EZOLV Sets when a network Run command is allowed. 0 : Always 1 : First/Alternation 2 : First Only 3 : Alternation Only	0 (0 - 3)
Y9-21 (3E08) RUN	Run Priority	V/f OLV/PM EZOLV Sets the Lead Drive selection priority overriding the *Y9-01 [Lead Drive Selection]* value. The drive with the lowest *Y9-21* value has the highest priority and will become the Lead Drive first. If more than one drive has the lowest *Y9-21* value, *Y9-01* determines which drive becomes the Lead.	8 (1 - 16)
Y9-22 (3E09) RUN	System Fault Retry Attempts	V/f OLV/PM EZOLV Sets the number of times that the iQpump MEMOBUS network will allow automatic restarts of system faults. The drive uses *L5-04 [Interval Method Restart Time*] to decide when to attempt a system fault restart. Set this parameter to the same value for all networked drives for correct operation.	5 (0 - 10)
Y9-23 (3E0A)	Max Drives Allowed to Run	V/f OLV/PM EZOLV Sets a limit on the maximum number of drives that can run on the system.	8 (1 - 8)
Y9-24 (3E0B) RUN	Lead Swap at Sleep Delay Time	V/f OLV/PM EZOLV When the Lead Drive has been in Sleep Mode for the length of time set in this parameter and there is another drive available with a lower *Y9-21 [Run Priority]* value, the available drive will request for a swap. **Note:** Set this parameter to 0 to disable the function.	0 s (0 - 7200 s)
Y9-25 (3E0C)	Highest Node Address	V/f OLV/PM EZOLV Sets the highest possible node address in the MEMOBUS network. For optimal network performance, it is recommended to set the serial communication address *H5-01* starting from 1h then consecutively up to the last drive and then setting this parameter to that *H5-01* address.	8 (2 - 8)
Y9-26 (3E0D)	Master Time-out	V/f OLV/PM EZOLV Sets the minimum length of time that the slave drives will wait for a message from the master before doing the action set in *Y9-27 [Network Recovery]*.	4.0 s (1.0 - 10.0 s)
Y9-27 (3E0E)	Network Recovery	V/f OLV/PM EZOLV Sets the response for slave drives when no messages are received from the master for the time set in *Y9-26 [Master Time-out]*. 0 : Automatic 1 : Slave/Resume 2 : Slave/Stop 3 : Fault MSL	0 (0 - 3)
Y9-28 (3E0F)	NETSCAN Alarm Time	V/f OLV/PM EZOLV Sets the length of time that the slave drives will wait for a message from the master before displaying a *NETSCAN* alarm	2.0 s (1.0 - 10.0 s)
Y9-29 (3E10) RUN	Network AUTO Start Delay	V/f OLV/PM EZOLV Sets the length of time that the network will wait before it selects and stars the Lead Drive after the first drive on the network is put on AUTO Mode.	2.0 s (0.0 - 60.0 s)

No. (Hex.)	Name	Description	Default (Range)
Y9-30 (3E11) RUN	Lag Speed Follower Gain	V/f OLV/PM EZOLV When *Y9-05 = 3 [Lag Drive Mode = Follow Lead Speed]*, the drive will follow the speed of the current lead drive applying this gain and *Y9-31 [Lag Speed Follower Bias]*.	100.0% (0.0 - 300.0%)
Y9-31 (3E12) RUN	Lag Speed Follower Bias	V/f OLV/PM EZOLV When *Y9-05 = 3 [Lag Drive Mode = Follow Lead Speed]*, the drive will follow the speed of the current lead drive applying this bias and *Y9-30 [Lag Speed Follower Gain]*.	0.00 Hz (-60.00 - 60.00 Hz)
Y9-32 (3E13) RUN	Lag Follower Deceleration Rate	V/f OLV/PM EZOLV Sets the deceleration time when *Y9-05 = 3 [Lag Drive Mode = Follow Lead Speed]* and the *Y9-33 [Lag Follower Decel Active Time]* timer is running.	60.0 s (0.0 - 1000.0 s)
Y9-33 (3E14) RUN	Lag Follower Decel Active Time	V/f OLV/PM EZOLV Sets the window during which the *Y9-32 [Lag Follower Deceleration Rate]* deceleration time is effective. The drive will use the standard deceleration rates when it expires. **Note:** A setting of 0.0 s will disable the Lag Follower deceleration time switching.	0.0 s (0.0 - 3600.0 s)
Y9-34 (3E15) RUN	Low Feedback De-stage	V/f OLV/PM EZOLV Sets the low feedback level that will trigger a quick de-stage. The quick de-stage ignores *Y9-12* to *Y9-15* and uses an internal 2 s delay. **Note:** • This function is intended to be used when *b5-09 = 1 [PID Output Level Selection = Reverse Output (Reverse Acting)]* only, and may cause drives to de-stage incorrectly when *b5-09 = 1 [Normal Output (Direct Acting)]*. • Unit set by *Y1-02 [System Units]*, resolution set by *b5-39 [PID User Unit Display Digits]*. • A setting of 0.0 disables the Low Feedback De-stage feature.	0.0 PSI (0.0 - 6000.0 PSI)
Y9-35 (3E16) RUN	Alternation Stabilize Time	V/f OLV/PM EZOLV Sets the maximum length of time that the drive will stay running when it was called to alternate-out. The drive is put into the Alternation Stabilization Mode during this period. **Note:** Set this parameter to 0 to disable the function.	10 s (0 - 1000 s)
Y9-36 (3E17) RUN	Alternation Stabilize Bias	V/f OLV/PM EZOLV Sets the minimum amount of PID error applied to the drive during Alternation Stabilization Mode. A lower value can cause it to stay running longer, while a higher value will make the transition faster at the cost of a more significant pressure change. Set in % of System Unit Scaling *[Y1-03]*.	0.50% (0.00 - 10.00%)
Y9-40 (3E1B) RUN	Flow Rate Source	V/f OLV/PM EZOLV Defines the Flow Meter input source when *Y1-01 = 3 [Multiplex Mode = Memobus Network]*. 0 : Analog 3 : Network	0 (0, 3)
Y9-41 (3E1C) RUN	Add Flow Level	V/f OLV/PM EZOLV When *Y9-08 = 3 [Staging Mode = Flow Meter]* and the Flow Rate is more than the level set in this parameter times the number of pumps running for the length of time set in *Y9-11 [Staging Delay Time]*, the lead drive will request for a new lead drive through the iQpump MEMOBUS network. **Note:** Unit set by *Y6-04 [Water Flow Units]*, resolution set by *Y6-22 [Flow Meter Decimal Place Pos]*.	0.0 (0.0 - 6000.0)
Y9-42 (3E1D) RUN	Remove Flow Level	V/f OLV/PM EZOLV When *Y9-12 = 3 [De-staging Mode = Flow Meter]* and the Flow Rate is less than the level set in this parameter times the number of pumps running for the length of time set in *Y9-15 [De-staging Delay Time]*, the lead drive will request to be removed from the system through the iQpump MEMOBUS network. **Note:** Unit set by *Y6-04 [Water Flow Units]*, resolution set by *Y6-22 [Flow Meter Decimal Place Pos]*.	0.0 (0.0 - 6000.0)
Y9-50 (3E25)	WaterLvl/SuctPres/PI Aux Source	V/f OLV/PM EZOLV Sets the signal to use for Water Level Control *[Yd-xx]*, Suction Pressure Control *[YE-xx]*, or PI Aux Control *[YF-xx]* when *Y1-01 = 3 [Multiplex Mode = Network Multiplex]*. 0 : Analog Only 1 : Ana→Net, No Alrm 2 : Ana→Net, Alarm 3 : Network Only	0 (0 - 3)
Y9-51 (3E26)	WaterLvl/SuctPres/PI Aux TurnOff	V/f OLV/PM EZOLV Sets the MEMOBUS Multiplex response to Water Level, Suction Pressure, or PI Aux Control. 0 : Disabled 1 : Enabled	0 (0, 1)

No. (Hex.)	Name	Description	Default (Range)
Y9-55 (3E2A)	VFD Run Time Offset	V/f OLV/PM EZOLV Sets an offset to the drive run time used for lead drive selection. Impacts lead drive selection only when *Y9-01 = 1 [Lead Drive Selection = Lowest Runtime]*. **Note:** When you use *A1-03 [Initialize Parameters]* to initialize the drive, the drive will not reset this parameter.	0 H (0 - 65535 H)
Y9-98 (3E55)	Network Parameter Push	V/f OLV/PM EZOLV Sets how System-wide Parameters are pushed into the MEMOBUS Multiplex network. 0 : Disabled 1 : Enabled/Prompt **Note:** Parameter push functionality is limited when the drive is in a mixed (iQpump1000 and iQpump605) network.	1 (0, 1)

◆ YA: Preset Setpoint

No. (Hex.)	Name	Description	Default (Range)
YA-01 (3E58) RUN	Setpoint 1	V/f OLV/PM EZOLV Sets the PID Setpoint when *b1-01 = 0 [Frequency Reference Selection 1 = Keypad or Multi-Speed Selection]*. **Note:** • Parameters *Y1-02 [PID Unit Display Selection]*, *Y1-03 [PID User Unit Display Scaling]*, and *b5-39 [PID User Unit Display Digits]* set the unit, scaling, and resolution. • Upper limit determined by *Y6-04 [Water Flow Units]* when *Y1-02 = 25 (System Units = Flow (Use Y6-04))]* and *Y6-01 [Flow Meter Scaling] > 0.0*. The upper limit when *Y6-04 = 2 [Cubic Feet/min (CFM)]* is 800.0 CFM and the upper limit when *Y6-04 = 3 [Cubic Meters/hour (CMH)]* is 1360.0 CMH.	0.0 (0.0 - 6000.0)
YA-02 (3E59) RUN	Setpoint 2	V/f OLV/PM EZOLV Sets the PID Setpoint as specified by the Multi-Setpoint digital inputs. **Note:** • Parameters *Y1-02 [PID Unit Display Selection]*, *Y1-03 [PID User Unit Display Scaling]*, and *b5-39 [PID User Unit Display Digits]* set the unit, scaling, and resolution. • Upper limit determined by *Y6-04 [Water Flow Units]* when *Y1-02 = 25 (System Units = Flow (Use Y6-04))]* and *Y6-01 [Flow Meter Scaling] > 0.0*. The upper limit when *Y6-04 = 2 [Cubic Feet/min (CFM)]* is 800.0 CFM and the upper limit when *Y6-04 = 3 [Cubic Meters/hour (CMH)]* is 1360.0 CMH.	0.0 (0.0 - 6000.0)
YA-03 (3E5A) RUN	Setpoint 3	V/f OLV/PM EZOLV Sets the PID Setpoint as specified by the Multi-Setpoint digital inputs. **Note:** • Parameters *Y1-02 [PID Unit Display Selection]*, *Y1-03 [PID User Unit Display Scaling]*, and *b5-39 [PID User Unit Display Digits]* set the unit, scaling, and resolution. • Upper limit determined by *Y6-04 [Water Flow Units]* when *Y1-02 = 25 (System Units = Flow (Use Y6-04))]* and *Y6-01 [Flow Meter Scaling] > 0.0*. The upper limit when *Y6-04 = 2 [Cubic Feet/min (CFM)]* is 800.0 CFM and the upper limit when *Y6-04 = 3 [Cubic Meters/hour (CMH)]* is 1360.0 CMH.	0.0 (0.0 - 6000.0)
YA-04 (3E5B) RUN	Setpoint 4	V/f OLV/PM EZOLV Sets the PID Setpoint as specified by the Multi-Setpoint digital inputs. **Note:** • Parameters *Y1-02 [PID Unit Display Selection]*, *Y1-03 [PID User Unit Display Scaling]*, and *b5-39 [PID User Unit Display Digits]* set the unit, scaling, and resolution. • Upper limit determined by *Y6-04 [Water Flow Units]* when *Y1-02 = 25 (System Units = Flow (Use Y6-04))]* and *Y6-01 [Flow Meter Scaling] > 0.0*. The upper limit when *Y6-04 = 2 [Cubic Feet/min (CFM)]* is 800.0 CFM and the upper limit when *Y6-04 = 3 [Cubic Meters/hour (CMH)]* is 1360.0 CMH.	0.0 (0.0 - 6000.0)
YA-05 (3E5C) RUN	Setpoint 5	V/f OLV/PM EZOLV Sets the PID Setpoint as specified by the Multi-Setpoint digital inputs. **Note:** Parameters *Y1-02 [System Units]*, *Y1-03 [Feedback Device Scaling]*, and *b5-39 [PID User Unit Display Digits]* set the unit, scaling, and resolution.	0.0 (0.0 - 6000.0)
YA-06 (3E5D) RUN	Setpoint 6	V/f OLV/PM EZOLV Sets the PID Setpoint as specified by the Multi-Setpoint digital inputs. **Note:** Parameters *Y1-02 [System Units]*, *Y1-03 [Feedback Device Scaling]*, and *b5-39 [PID User Unit Display Digits]* set the unit, scaling, and resolution.	0.0 (0.0 - 6000.0)

No. (Hex.)	Name	Description	Default (Range)
YA-07 (3E5E) RUN	Setpoint 7	V/f OLV/PM EZOLV Sets the PID Setpoint as specified by the Multi-Setpoint digital inputs. **Note:** Parameters *Y1-02 [System Units]*, *Y1-03 [Feedback Device Scaling]*, and *b5-39 [PID User Unit Display Digits]* set the unit, scaling, and resolution.	0.0 (0.0 - 6000.0)
YA-08 (3E5F) RUN	Setpoint 8	V/f OLV/PM EZOLV Sets the PID Setpoint as specified by the Multi-Setpoint digital inputs. **Note:** Parameters *Y1-02 [System Units]*, *Y1-03 [Feedback Device Scaling]*, and *b5-39 [PID User Unit Display Digits]* set the unit, scaling, and resolution.	0.0 (0.0 - 6000.0)
YA-09 (3E60)	AUTO PID Setpoint MOP Selection	V/f OLV/PM EZOLV Sets whether you can use MOP to change AUTO PID Setpoint from the Home screen. 0 : ENTER Key Required 1 : Immediate/MOP-style	0 (0, 1)

◆ YC: Foldback Features

No. (Hex.)	Name	Description	Default (Range)
YC-01 (3EBC)	Output Current Limit Select	V/f OLV/PM EZOLV Sets the function to enable or disable the output current regulator. 0 : Disabled 1 : Enabled	0 (0, 1)
YC-02 (3EBD) RUN	Current Limit	V/f OLV/PM EZOLV Sets the current limit. **Note:** Value is internally limited to 300% of the drive rated current set in *n9-01 [Inverter Rated Current]*.	0.0 A (0.0 - 1000.0 A)
YC-03 (3EBE) RUN Expert	Current Limit Regulator Gain	V/f OLV/PM EZOLV Sets the responsiveness of the current limit regulator. A higher value is more responsive.	1.00 (0.00 - 25.00)
YC-04 (3EBF) RUN Expert	Current Limit Reg. Integral Time	V/f OLV/PM EZOLV Sets the responsiveness of the current limit regulator. A lower value is more responsive.	1.00 s (0.00 - 10.00 s)
YC-06 (3EC1)	Current Limit Start Delay	V/f OLV/PM EZOLV Sets the delay time before Current Limit is operational.	0 s (0 - 600 s)
YC-10 (3EC5)	Single Phase Foldback Sel	V/f OLV/PM EZOLV Sets the function to enable or disable the single phase ripple regulator. 0 : Disabled 1 : Enabled	1 (0, 1)
YC-11 (3EC6)	Ripple Regulator Setpoint	V/f OLV/PM EZOLV Sets the ripple regulator setpoint as a percentage of the maximum amount of ripple permitted before the drive detects a *PF [Input Phase Loss]* fault.	95.0% (0.0 - 200.0%)
YC-12 (3EC7)	Current Limit Reg. Integral Time	V/f OLV/PM EZOLV Enables and disables the ripple voltage feedback ramp and how often the feedback ramp is updated. 0 : Ramp Disabled 1 - 100 : Ramp Enabled	1 (0 - 100)
YC-14 (3EC9)	Behavior when SPC is Not Ready	V/f OLV/PM EZOLV Sets the drive behavior when the Single Phase Converter faults or is not ready. 0 : Coast to Stop - Fault 1 : Coast to Stop - Alarm	1 (0, 1)

◆ Yd: Water Level Control

No. (Hex.)	Name	Description	Default (Range)
Yd-01 (3EEE)	Water Level Selection	V/f OLV/PM EZOLV Enables and disables Water Level Control. 0 : Disabled 1 : Enabled	0 (0, 1)
Yd-02 (3EEF) RUN	Water Level Transducer Scaling	V/f OLV/PM EZOLV Sets the full scale (20 mA) output of the pressure transducer connected to analog input terminal *H3-0x = 3B [Water Level / Suct Pres Feedback]*. **Note:** • 1 PSI = 2.308966 ft of water. • Decimal place position is dependent on *Yd-22 [Water Lvl Decimal Place Pos]*.	100.0 PSI (5.0 - 500.0 PSI)
Yd-03 (3EF0) RUN	Water Level Setpoint	V/f OLV/PM EZOLV Sets the amount of water above the sensor to which the drive will attempt to regulate. **Note:** Decimal place position is dependent on *Yd-22 [Water Lvl Decimal Place Pos]*.	20.0 ft (0.0 - 1200.0 ft)
Yd-04 (3EF1) RUN	Minimum Water Level	V/f OLV/PM EZOLV When the amount of water above the sensor is less than this level for longer than the length of time set in *Yd-05 [Water Level Sleep Delay Time]*, the drive will go to sleep. **Note:** • You must set *Y1-04 [Sleep Wake-up Level] ≠ 0* to enter water level sleep. • Decimal place position is dependent on *Yd-22 [Water Lvl Decimal Place Pos]*.	10.0 ft (0.0 - 1200.0 ft)
Yd-05 (3EF2) RUN	Water Level Sleep Delay Time	V/f OLV/PM EZOLV Sets the length of time that the drive will delay before going to sleep after the water level is less than the level set in *Yd-04 [Minimum Water Level]*.	5 s (0 - 3600 s)
Yd-06 (3EF3) RUN	Water Level Sleep Wake-up Level	V/f OLV/PM EZOLV Sets the level above which the water must be for longer than the time set in *Yd-07 [Water Level Sleep Wake-up Time]* to wake up the drive after being forced to sleep based on *Yd-04 [Minimum Water Level]*. **Note:** Decimal place position is dependent on *Yd-22 [Water Lvl Decimal Place Pos]*.	30.0 ft (0.0 - 1200.0 ft)
Yd-07 (3EF4)	Water Level Sleep Wake-up Time	V/f OLV/PM EZOLV Sets the length of time that the water must be above the level set in *Yd-06 [Water Level Sleep Wake-Up Level]* to wake up the drive after being forced to sleep based on *Yd-04 [Minimum Water Level]*.	1 s (0 - 3600 s)
Yd-08 (3EF5) RUN	Water Level Sleep Wake-up Time	V/f OLV/PM EZOLV Sets the minimum speed at which the drive will be allowed to run when the drive is controlling the water level. When the drive is controlling pressure or when this parameter is set to a value less than *Y1-06 [Minimum Speed]* or *Y4-12 [Thrust Frequency]*, the drive will use the *Y1-06* or *Y4-12* value as the minimum speed . **Note:** For EZ Vector Control Method *[A1-02 = 8]*, the range is 0.00 - 120.00 Hz.	0.00 Hz (0.00 - 400.00 Hz)
Yd-09 (3EF6) RUN	Low Water Level Detection Level	V/f OLV/PM EZOLV When the amount of water above the sensor is lower than this level for longer than the time set in *Yd-10 [Low Water Level Detection Time]*, the drive will respond based on the *Yd-11 [Low Water Level Behavior]* setting. **Note:** • *Yd-10* detection time only applies when *Yd-11 = 2 or 3 [Fault (and Digital Output) or Auto-Restart (time set by Yd-12)]*. • Decimal place position is dependent on *Yd-22 [Water Lvl Decimal Place Pos]*. • Setting this parameter to 0.0 disables this detection.	0.0 ft (0.0 - 1200.0 ft)
Yd-10 (3EF7) RUN	Low Water Level Detection Time	V/f OLV/PM EZOLV Sets the length of time delay that the water level must be less than the level set in *Yd-09 [Low Water Level Detection Level]* before the drive will react. This detection time only applies when *Yd-11 = 2 or 3 [Fault (and Digital Output) or Auto-Restart (time set by Yd-12)]*. **Note:** Unit is dependent on *Yd-15 [Low Water Level Detect Time Unit]*.	0.1 (0.0 - 300.0)
Yd-11 (3EF8)	Low Water Level Behavior	V/f OLV/PM EZOLV Sets the drive response when the water level in the well is less than the level set in *Yd-09 [Low Water Level Detection Level]* for longer than the time set in *Yd-10 [Low Water Level Detection Time]*. 0 : Digital Output Only 1 : Alarm (and Digital Output) 2 : Fault (and Digital Output) 3 : Auto-Restart (time set by Yd-12) **Note:** Detection time set in *Yd-10 [Low Water Level Detection Time]* only applies to settings 2 and 3.	0 (0 - 3)

No. (Hex.)	Name	Description	Default (Range)
Yd-12 (3EF9)	Water Lvl Ctrl Auto-Restart Time	V/f OLV/PM EZOLV Sets the length of time that the drive will wait before it tries to auto-restart after a *LowWL Low Water Level* fault. This is effective only when *Yd-11 = 3 [Low Water Level Behavior = Auto-Restart (time set by Yd-12)]* and *Yd-39 ≠ 0 [LowWaterLevel Flt Retry Attempts]*.	5.0 min (0.1 - 6000.0 min)
Yd-13 (3EFA) RUN	Water Level Control P Gain	V/f OLV/PM EZOLV Sets the proportional gain when the drive is operating in Water Level Control.	2.00 (0.00 - 25.00)
Yd-14 (3EFB) RUN	Water Level Control I Time	V/f OLV/PM EZOLV Sets the integral time when the drive is operating in Water Level Control. Setting this parameter to 0.0 disables the water level control integrator.	5.0 s (0.0 - 360.0 s)
Yd-15 (3EFC)	Low Water Level Detect Time Unit	V/f OLV/PM EZOLV Sets the time units for *Yd-10 [Low Water Level Detection Time]*. 0 : Minutes (min) 1 : Seconds (sec)	0 (0, 1)
Yd-16 (3EFD)	Water Level Feedback Wire Break	V/f OLV/PM EZOLV Sets behavior when the analog input selected for water level feedback is programmed to receive a 4 to 20 mA signal and the signal is lost. 0 : No Display 1 : Alarm Only 2 : Fault (no retry, coast to stop) 3 : Auto-Restart (time set by Yd-38)	2 (0 - 3)
Yd-20 (3F02)	Water Level Speed Control	V/f OLV/PM EZOLV Enables and disables the effect of the Water Level Controller on output speed 0 : Disabled 1 : Enabled	1 (0, 1)
Yd-22 (3F04)	Water Level Decimal Place Pos	V/f OLV/PM EZOLV Sets the number of decimal places for the Water Level parameters and monitor. 0 : No Decimal Places (XXXXX) 1 : One Decimal Place (XXXX.X) 2 : Two Decimal Places (XXX.XX) 3 : Three Decimal Places (XX.XXX)	1 (0 - 3)
Yd-25 (3F07) RUN	Water Lvl Ctrl Activation Level	V/f OLV/PM EZOLV Sets the level at which the amount of water above the sensor must be less than for longer than the time set in *Yd-26 [Water Lvl Ctrl Activation Delay]* to activate Water Level Control and affect the output frequency. Also sets the level at which the amount of water below the sensor must be above for longer than the *Yd-26* time to deactivate Water Level Control and have no effect on the output frequency. Water Level Control is always active (if enabled) when set to 0.0. **Note:** Decimal place position is dependent on *Yd-22 [Water Lvl Decimal Place Pos]*.	0.0 ft (0.0 - 1200.0 ft)
Yd-26 (3F08) RUN	Water Lvl Ctrl Activation Delay	V/f OLV/PM EZOLV Sets the time for which the amount of water above the sensor must be less than the level set in *Yd-25 [Water Lvl Ctrl Activation Level*] to activate Water Level Control and affect the output frequency. Also sets the time for which the amount of water below the sensor must be above the *Yd-25* level to deactivate Water Level Control and have no effect on the output frequency.	2 s (0 - 3600 s)
Yd-35 (3F11) RUN	Water Level Min Transducer Scale	V/f OLV/PM EZOLV Sets the minimum scale output of the water level transducer connected to the *H3-xx = 3B [Water Level / Suction Pressure]* analog input terminal. **Note:** You must set this parameter < *Yd-02 [Water Level Transducer Scaling]* to be effective. If this parameter is set > *Yd-02*, Water Level Feedback will be disabled (set to 0).	0.0 PSI (-999.9 - 999.9 PSI)
Yd-36 (3F12) RUN	Water Lvl Lo Lvl Det Hysteresis	V/f OLV/PM EZOLV Sets the hysteresis level used for *LowWL Low Water* detection. **Note:** • When *Yd-11 = 3 [Low Water Level Behavior = Auto-Restart (time set by Yd-12)]*, the water level must be above the value of *Yd-09 + Yd-36* before *Yd-12 [Water Lvl Ctrl Auto-Restart Time]* starts. • Decimal place position is dependent on *Yd-22 [Water Lvl Decimal Place Pos]*.	0.0 ft (0.0 - 100.0 ft)
Yd-37 (3F13)	WaterLvlLoss Flt Retry Attempts	V/f OLV/PM EZOLV Sets the number of times that the drive will try to restart when a *WLL Water Level Feedback Loss* condition is detected.	3 (0 - 10)
Yd-38 (3F14)	WaterLvlLoss Fault Restart Time	V/f OLV/PM EZOLV Sets the time interval between each *WLL Water Level Feedback Loss* auto-restart attempt.	20.0 s (0.5 - 3600.0 s)
Yd-39 (3F15)	LowWaterLevel Flt Retry Attempts	V/f OLV/PM EZOLV Sets the number of times that the drive will try to restart when a *LowWL Low Water Level* condition is detected.	3 (0 - 10)

◆ YE: Suction Pressure Control

No. (Hex.)	Name	Description	Default (Range)
YE-01 (3F20)	Suction Pressure Control Select	V/f OLV/PM EZOLV Enables and disables Suction Pressure Control and Vacuum Control. 0 : Disabled 1 : Suction Pressure (PSI) 2 : Vacuum ("Hg)	0 (0 - 2)
YE-02 (3F21) RUN	Suction Pres Transducer Scaling	V/f OLV/PM EZOLV Sets the full scale (20 mA) output of the pressure transducer connected to the analog input terminal programmed for *Water Level / Suct Pres Feedback [H3-xx = 3B]*. **Note:** Unit is dependent on *YE-01 [Suction Pressure Control Select]*. Setting *1 = PSI*, setting *2 = "Hg*, and decimal place position is dependent on *YE-22 [Suction Pressure Dec Place Pos]*.	100.0 (5.0 - 1200.0)
YE-03 (3F22) RUN	Suction Pressure Setpoint	V/f OLV/PM EZOLV Sets the amount of suction pressure to which the drive will attempt to regulate. **Note:** Unit is dependent on *YE-01 [Suction Pressure Control Select]*. Setting *1 = PSI*, setting *2 = "Hg*, and decimal place position is dependent on *YE-22 [Suction Pressure Dec Place Pos]*.	20.0 (0.0 - 1200.0)
YE-04 (3F23) RUN	Minimum Suction Pressure	V/f OLV/PM EZOLV Sets the level below which the suction pressure must be for the length of time set in *YE-05 [Suction Pres Sleep Delay Time]* to put the drive to sleep. **Note:** Unit is dependent on *YE-01 [Suction Pressure Control Select]*. Setting *1 = PSI*, setting *2 = "Hg*, and decimal place position is dependent on *YE-22 [Suction Pressure Dec Place Pos]*.	10.0 (0.0 - 1200.0)
YE-05 (3F24) RUN	Suction Pres Sleep Delay Time	V/f OLV/PM EZOLV Sets the length of time that the drive will delay before going to sleep after the suction pressure is below the level set in *YE-04 [Minimum Suction Pressure]*.	5 s (0 - 3600 s)
YE-06 (3F25) RUN	Suction Pres Sleep Wake-up Level	V/f OLV/PM EZOLV Sets the level above which the suction pressure must be for longer than the time set in *YE-07 [Suction Pres Sleep Wake-up Time]* to wake the drive up after it has been forced to sleep based on *YE-04 [Minimum Suction Pressure]*. **Note:** Unit is dependent on *YE-01 [Suction Pressure Control Select]*. Setting *1 = PSI*, setting *2 = "Hg*, and decimal place position is dependent on *YE-22 [Suction Pressure Dec Place Pos]*.	30.0 (0.0 - 1200.0)
YE-07 (3F26)	Suction Pres Sleep Wake-up Time	V/f OLV/PM EZOLV Sets the length of time that the suction pressure must be more than the level set in *YE-06 [Suction Pres Sleep Wake-up Level]* for the drive to wake up if it has been forced to sleep based on *YE-04 [Minimum Suction Pressure]*.	1 s (0 - 3600 s)
YE-08 (3F27) RUN	Suction Pres Ctrl Minimum Speed	V/f OLV/PM EZOLV Sets the minimum speed at which the drive will be allowed to run when the drive is controlling suction pressure. When the drive is controlling outlet pressure or this parameter is set less than *Y1-06 [Minimum Speed]* or *Y4-12 [Thrust Frequency]*, *Y1-06* or *Y4-12* will be used as the minimum speed. **Note:** For EZ Vector Control Method *[A1-02 = 8]*, the range is 0.0 - 120.0 Hz	0.00 Hz (0.00 - 400.00 Hz)
YE-09 (3F28) RUN	Low Suction Pressure Det Level	V/f OLV/PM EZOLV Sets the level below which the suction pressure must be for longer than the time set in *YE-10 [Low Suction Pressure Det Time]* to trigger the drive response set in *YE-11 [Low Suction Pressure Behavior]*. **Note:** • The detection time set in *YE-10* only applies when *YE-11 = 2 or 3 [Fault (and Digital Output) or Auto-Restart (time set by YE-15)]* while *YE-01 = 1 [Suction Pressure Control Select = Suction Pressure (PSI)]*. When *YE-01 = 2 [Vacuum ("Hg)]*, YE-10 detection time delay applies when *YE-11 = 1, 2, or 3 [Fault (and Digital Output), Auto-Restart (time set by YE-15), or Auto-Restart (time set by YE-15)]*. • A setting of 0.0 disables this detection • Unit is dependent on *YE-01 [Suction Pressure Control Select]*. Setting *1 = PSI*, setting *2 = "Hg*, and decimal place position is dependent on *YE-22 [Suction Pressure Dec Place Pos]*.	0.0 (0.0 - 1200.0)
YE-10 (3F29) RUN	Low Suction Pressure Det Time	V/f OLV/PM EZOLV Sets the length of time that the water level must be below *YE-09 [Low Suction Pressure Det Level]* before the drive will react. **Note:** • The detection time set in this parameter only applies when *YE-11 = 2 or 3 [Fault (and Digital Output) or Auto-Restart (time set by YE-15)]* while *YE-01 = 1 [Suction Pressure Control Select = Suction Pressure (PSI)]*. When *YE-01 = 2 [Vacuum ("Hg)]*, *YE-10* detection time delay applies when *YE-11 = 1, 2, or 3 [Fault (and Digital Output), Auto-Restart (time set by YE-15), or Auto-Restart (time set by YE-15)]*. • Unit is dependent on *YE-18 [Suction Pressure Det Time Unit]*.	0.1 (0.0 - 300.0)

No. (Hex.)	Name	Description	Default (Range)
YE-11 (3F2A)	Low Suction Pressure Behavior	V/f OLV/PM EZOLV Sets how the drive will respond to a *LoSuc Low Suction Pressure* condition when the water level in the well is less than the level set in *YE-09 [Low Suction Pressure Det Level]* for longer than the time set in *YE-10 [Low Suction Pressure Det Time]*. 0 : Digital Output Only 1 : Alarm (and Digital Output) 2 : Fault (and Digital Output) 3 : Auto-Restart (time set by YE-15) **Note:** The detection time set in *YE-10* only applies when *YE-11 = 2 or 3 [Fault (and Digital Output) or Auto-Restart (time set by YE-15)]* while *YE-01 = 1 [Suction Pressure Control Select = Suction Pressure (PSI)]*. When *YE-01 = 2 [Vacuum ("Hg)]*, YE-10 detection time delay applies when *YE-11 = 1, 2, or 3 [Fault (and Digital Output), Auto-Restart (time set by YE-15), or Auto-Restart (time set by YE-15)]*.	1 (0 - 3)
YE-12 (3F2B) RUN	High Suction Pressure Det Level	V/f OLV/PM EZOLV Sets the level above which the suction pressure must be for longer than the time set in *YE-13 [High Suction Pressure Det Time]*, to trigger the drive response set in *YE-14 [High Suction Pressure Behavior]*. **Note:** • A setting of 0.0 disables this detection. • The detection time set in YE-13 only applies when *YE-14 = 2 or 3 [Fault (and Digital Output) or Auto-Restart (time set by YE-15)]*. • Unit is dependent on *YE-01 [Suction Pressure Control Select]*. Setting *1 = PSI*, setting *2 = "Hg*, and decimal place position is dependent on *YE-22 [Suction Pressure Dec Place Pos]*.	0.0 (0.0 -1200.0)
YE-13 (3F2C) RUN	High Suction Pressure Det Time	V/f OLV/PM EZOLV Sets the length of time that the water level must be more than *YE-12 [High Suction Pressure Det Level]* before the drive will react. This is effective only when *YE-14 = 2 or 3 [High Suction Pressure Behavior = Fault (and Digital Output) or Auto-Restart (time set by YE-15)]*. **Note:** Unit is dependent on *YE-18 [Suction Pressure Det Time Unit]*.	0.1 (0.0 - 300.0)
YE-14 (3F2D)	High Suction Pressure Behavior	V/f OLV/PM EZOLV Sets how the drive will respond to a *HiSuc High Suction Pressure* condition when the water level in the well is more than the level set in *YE-12 [High Suction Pressure Det Level]* for longer than the time set in *YE-13 [High Suction Pressure Det Time]*. 0 : Digital Output Only 1 : Alarm (and Digital Output) 2 : Fault (and Digital Output) 3 : Auto-Restart (time set by YE-15) **Note:** The detection time set in *YE-13* only applies when *YE-14 = 2 or 3 [Fault (and Digital Output) or Auto-Restart (time set by YE-15)]*.	1 (0 - 3)
YE-15 (3F2E)	Suction Pres Auto-Restart Time	V/f OLV/PM EZOLV Sets the length of time that the drive will wait before it tries an auto-restart of a *LoSuc Low Suction Pressure* or *HiSuc High Suction Pressure* fault. **Note:** Effective only when *YE-11 = 3 [Low Suction Pressure Behavior = Auto-Restart (time set by YE-15)]* or *YE-14 = 3 [High Suction Pressure Behavior = Auto-Restart (time set by YE-15)]* and *YE-39 ≠ 0 [Low Suction Fault Retry Attempts ≠ 0]* for *Low Suction Pressure* faults, or *YE-40 ≠ 0 [High Suction Flt Retry Attempts ≠ 0]* for *High Suction Pressure* faults.	5.0 min (0.1 - 6000.0 min)
YE-16 (3F2F) RUN	Suction Pressure Control P Gain	V/f OLV/PM EZOLV Sets the proportional gain for when the drive is operating in Suction Pressure Control.	2.00 (0.00 - 25.00)
YE-17 (3F30) RUN	Suction Pressure Control I Time	V/f OLV/PM EZOLV Sets the integral time for when the drive is operating in Suction Pressure Control. **Note:** A setting of 0.0 disables the water level control integrator.	5.0 s (0.0 - 360.0 s)
YE-18 (3F31)	Suction Pressure Det Time Unit	V/f OLV/PM EZOLV Sets the time units for *YE-10 [Low Suction Pressure Det Time]* and *YE-13 [High Suction Pressure Det Time]*. 0 : Minutes (min) 1 : Seconds (sec)	0 (0, 1)
YE-19 (3F32)	Suction Pressure Fdbk Wire Break	V/f OLV/PM EZOLV Sets behavior when the analog input selected for water level feedback is programmed to receive a 4 to 20 mA signal and the signal is lost. 0 : No Display 1 : Alarm Only 2 : Fault (no retry, coast to stop) 3 : Auto-Restart (time set by YE-38)	2 (0 - 3)

No. (Hex.)	Name	Description	Default (Range)
YE-20 (3F36)	Suction Pressure Speed Control	V/f OLV/PM EZOLV Enables and disables Suction Pressure Controller effect on output speed 0 : Disabled 1 : Enabled	1 (0, 1)
YE-22 (3F38)	Suction Pressure Dec Place Pos	V/f OLV/PM EZOLV Sets the number of decimal places for the Suction Pressure parameters and monitors. 0 : No Decimal Places (XXXXX) 1 : One Decimal Place (XXXX.X) 2 : Two Decimal Places (XXX.XX) 3 : Three Decimal Places (XX.XXX)	1 (0 - 3)
YE-25 (3F3B) RUN	Suc Pres Ctrl Activation Level	V/f OLV/PM EZOLV Sets the level below which the pressure be for the time set in *YE-26 [Suc Pres Ctrl Activation Delay]* to activate Suction Pressure Control and let it affect the output frequency. When the suction pressure is more than this level for longer than the time set in *YE-26*, Suction Pressure Control is deactivated and it will not have an effect on the output frequency. **Note:** • Unit is dependent on *YE-01 [Suction Pressure Control Select]*. Setting *1 = PSI*, setting *2 = "Hg*, and decimal place position is dependent on *YE-22 [Suction Pressure Dec Place Pos]*. • Suction Pressure Control is always active (if enabled) when set to 0.0.	0.0 (0.0 - 1200.0)
YE-26 (3F3C) RUN	Suc Pres Ctrl Activation Delay	V/f OLV/PM EZOLV Sets the length of time for which the suction pressure must be less than the level set in *YE-25 [Suc Pres Ctrl Activation Level]* to activate Suction Pressure Control and let it affect the output frequency. When the suction pressure is more than the *YE-25* level for longer than this time, Suction Pressure Control is deactivated and it will not have an effect on the output frequency.	2 s (0 - 3600 s)
YE-35 (3F45) RUN	Suc Pres Min Transducer Scale	V/f OLV/PM EZOLV Sets the minimum scale output of the suction pressure transducer connected to the *H3-xx = 3B [Water Level / Suct Pres Feedback]* analog input terminal. **Note:** • Unit is dependent on *YE-01 [Suction Pressure Control Select]*. Setting *1 = PSI*, setting *2 = "Hg*, and decimal place position is dependent on *YE-22 [Suction Pressure Dec Place Pos]*. • This parameter is only effective when set < *YE-02 [Suction Pres Transducer Scaling]*. If this parameter setting is > *YE-02*, Suction Pressure Feedback will be disabled (set to 0).	0.0 (-999.9 - 999.9)
YE-36 (3F46) RUN	SucPres LoHi Lvl Det Hysteresis	V/f OLV/PM EZOLV Sets the Hysteresis Level used for low and high level detection. **Note:** • Unit is dependent on *YE-01 [Suction Pressure Control Select]*. Setting *1 = PSI*, setting *2 = "Hg*, and decimal place position is dependent on *YE-22 [Suction Pressure Dec Place Pos]*. • When *YE-11 = 3 [Low Suction Pressure Behavior = Auto-Restart (time set by YE-15)]*, the suction pressure must be more than the value of *YE-09 [Low Suction Pressure Det Level] + YE-36* before *YE-15 [Suction Pres Auto-Restart Time]* will start. • When *YE-14 = 3 [High Suction Pressure Behavior = Auto-Restart (time set by YE-15)]*, the suction pressure must be less than the value of *YE-12 [High Suction Pressure Det Level] – YE-36* before *YE-15* will start.	0.0 (0.0 - 100.0)
YE-37 (3F47)	SuctPresLoss Flt Retry Attempts	V/f OLV/PM EZOLV Sets the number of times that the drive will try to restart after it detects a *SPL Suction Pressure Feedback Loss* condition.	3 (0 - 10)
YE-38 (3F48)	SuctPresLoss Fault Restart Time	V/f OLV/PM EZOLV Sets the time interval between each *SPL Suction Pressure Feedback Loss* auto-restart attempt.	20.0 s (0.5 - 3600.0 s)
YE-39 (3F49)	Low Suction Fault Retry Attempts	V/f OLV/PM EZOLV Sets the number of times that the drive will try to restart after it detects a *LoSuc Low Suction Pressure* condition.	3 (0 - 10)
YE-40 (3F4A)	High Suction Flt Retry Attempts	V/f OLV/PM EZOLV Sets the number of times that the drive will try to restart after it detects a *HISuc High Suction Pressure* condition.	3 (0 - 10)

◆ YF: PI Auxiliary Control

No. (Hex.)	Name	Description	Default (Range)
YF-01 (3F50)	PI Aux Control Selection	V/f OLV/PM EZOLV Sets the PI Auxiliary Control function. 0 : Disabled 1 : Enabled	0 (0, 1)
YF-02 (3F51) RUN	PI Aux Control Transducer Scale	V/f OLV/PM EZOLV Sets the full scale (10 V or 20 mA) output of the pressure transducer connected to the analog input terminal programmed for *H3-xx = 27 [PI Aux Control Feedback Level]*. **Note:** Parameters *YF-21 [PI Aux Ctrl Level Unit Selection]* and *YF-22 [PI Aux Level Decimal Place Pos]* set the unit and resolution.	145.0 (1.0 - 6000.0)
YF-03 (3F52) RUN	PI Aux Control Setpoint	V/f OLV/PM EZOLV Sets the level to which the drive will try to regulate. **Note:** Parameters *YF-21 [PI Aux Ctrl Level Unit Selection]* and *YF-22 [PI Aux Level Decimal Place Pos]* set the unit and resolution.	20.0 PSI (0.0 - 6000.0)
YF-04 (3F53) RUN	PI Aux Control Minimum Level	V/f OLV/PM EZOLV Sets the level below which the drive must be for longer than *YF-05 [PI Aux Control Sleep Delay Time]* before the drive goes to sleep and turns off all lag pumps. **Note:** • Set this parameter to 0.0 to disable the function. • Parameters *YF-21 [PI Aux Ctrl Level Unit Selection]* and *YF-22 [PI Aux Level Decimal Place Pos]* set the unit and resolution.	10.0 PSI (0.0 - 6000.0)
YF-05 (3F54) RUN	PI Aux Control Sleep Delay Time	V/f OLV/PM EZOLV Sets the length of time that the drive will delay before it goes to sleep after the level is less than *YF-04 [PI Aux Control Minimum Level]* (when *YF-23 = 1 [PI Aux Ctrl Output Level Select = Inverse Acting]*) or more than *YF-24 [PI Auxiliary Ctrl Maximum Level]* (when *YF-23 = 0 [Direct Acting]*).	5 s (0 - 3600 s)
YF-06 (3F55) RUN	PI Aux Control Wake-up Level	V/f OLV/PM EZOLV Sets the level to wake up the drive when the drive after *YF-04 [PI Aux Control Minimum Level]* or *YF-24 [PI Auxiliary Ctrl Maximum Level]* put the drive to sleep. **Note:** • Parameter *YF-23 [PI Aux Ctrl Output Level Select]* sets the condition to wake up the drive. – *YF-23 = 0 [Direct Acting]*: The PI Aux Feedback must be less than the level set in this parameter for longer than the time set in *YF-07* to wake up. – *YF-23 = 1 [Inverse Acting]*: The PI Aux Feedback must be more than the level set in this parameter for longer than the time set in *YF-07 [PI Aux Control Wake-up Time]* to wake up. • Parameters *YF-21 [PI Aux Ctrl Level Unit Selection]* and *YF-22 [PI Aux Level Decimal Place Pos]* set the unit and resolution. • Range is 0.0 to 999.9 with sign-bit "-" or "+" indicating Delta to Setpoint.	30.0 PSI (0.0 - 999.9 PSI)
YF-07 (3F56)	PI Aux Control Wake-up Time	V/f OLV/PM EZOLV Sets the time to wake up the drive when the drive after *YF-04 [PI Aux Control Minimum Level]* or *YF-24 [PI Auxiliary Ctrl Maximum Level]* put the drive to sleep. **Note:** Parameter *YF-23 [PI Aux Ctrl Output Level Select]* sets the condition to wake up the drive. • *YF-23 = 0 [Direct Acting]*: The PI Aux Feedback must be less than the level set in *YF-06* for longer than the time set in *YF-07* to wake up. • *YF-23 = 1 [Inverse Acting]*: The PI Aux Feedback must be more than the level set in *YF-06 [PI Aux Control Wake-up Level]* for longer than the time set in *YF-07* to wake up.	1.0 s (0.0 - 3600.0 s)
YF-08 (3F57) RUN	PI Aux Control Minimum Speed	V/f OLV/PM EZOLV Sets the minimum speed at which the drive can run when the PI Auxiliary Control has an effect on the output speed. **Note:** The drive will use *Y1-06 [Minimum Speed]* and *Y4-12 [Thrust Frequency]* as the minimum speed when PI Aux Control does not have an effect on the output speed or when you set *YF-08 < Y1-06 and Y4-12*.	0.00 Hz (0.00 - 400.00 Hz)
YF-09 (3F58) RUN	PI Aux Control Low Level Detect	V/f OLV/PM EZOLV Sets the level below which the drive must be for longer than *YF-10 [PI Aux Control Low Lvl Det Time]* to respond as specified by *YF-11 [PI Aux Control Low Level Det Sel]*. **Note:** • Set this parameter to 0.0 to disable the function. • Parameter *YF-10* only applies to when *YF-11 = 2 and 3 [Fault and Auto-Restart (time set by YF-15)]*. • Parameters *YF-21 [PI Aux Ctrl Level Unit Selection]* and *YF-22 [PI Aux Level Decimal Place Pos]* set the unit and resolution. • Range is 0.0 to 999.9 with sign-bit "-" or "+" indicating Delta to Setpoint.	0.0 PSI (0.0 - 999.9 PSI)

No. (Hex.)	Name	Description	Default (Range)
YF-10 (3F59) RUN	PI Aux Low Level Detection Time	V/f OLV/PM EZOLV Sets the length of time that the PI Aux Feedback must be less than *YF-09 [PI Aux Control Low Lvl Detection]* to trigger a drive response when *YF-11 = 2 and 3 [PI Aux Control Low Level Det Sel = Fault and Auto-Restart (time set by YF-15)]*.	0.1 min (0.0 - 300.0 min)
YF-11 (3F5A)	PI Aux Control Low Level Det Sel	V/f OLV/PM EZOLV Sets drive response when the PI Aux Feedback decreases to less than *YF-09 [PI Aux Control Low Lvl Detection]* for longer than *YF-10 [PI Aux Control Low Lvl Det Time]*. 0 : Digital Output Only 1 : Alarm (and Digital Output) 2 : Fault (and Digital Output) 3 : Auto-Restart (time set by YF-15) **Note:** • Set *YF-01 = 1 [PI Aux Control Selection = Enabled]* and *YF-09 [PI Aux Control Low Level Detect]* > 0 to enable PI Aux Low Level Detection. • Parameter *YF-10* only applies when *YF-11 = 2 or 3*.	1 (0 - 3)
YF-12 (3F5B) RUN	PI Aux Control High Level Detect	V/f OLV/PM EZOLV Sets the value above which the level must be for longer than *YF-13 [PI Aux High Level Detection Time]* to respond as specified by *YF-14 [PI Aux Hi Level Detection Select]*. **Note:** • Set this parameter to 0.0 to disable the function. • Parameter *YF-13* only applies to when *YF-14 = 2 and 3 [Fault and Auto-Restart (time set by YF-15)]*. • Parameters *YF-21 [PI Aux Ctrl Level Unit Selection]* and *YF-22 [PI Aux Level Decimal Place Pos]* set the unit and resolution. • Range is 0.0 to 999.9 with sign-bit "-" or "+" indicating Delta to Setpoint.	0.0 PSI (0.0 - 999.9 PSI)
YF-13 (3F5C) RUN	PI Aux High Level Detection Time	V/f OLV/PM EZOLV Sets the length of time that the level must be more than *YF-12 [PI Aux Control High Level Detect]* before the drive will respond when *YF-14 = 2, 3 [PI Aux Hi Level Detection Select]*.	0.1 min (0.0 - 300.0 min)
YF-14 (3F5D)	PI Aux Control Hi Level Det Sel	V/f OLV/PM EZOLV Sets the drive response when the PI Aux Feedback increases to more than the *YF-12 [PI Aux Control High Level Detect]* level for longer than the time set in *YF-13 [PI Aux High Level Detection Time]*. 0 : Digital Output Only 1 : Alarm (and Digital Output) 2 : Fault (and Digital Output) 3 : Auto-Restart (time set by YF-15) **Note:** • Set *YF-01 = 1 [PI Aux Control Selection = Enabled]* and *YF-12 [PI Aux Control High Level Detect]* > 0 to enable PI Aux High Level Detection. • Parameter *YF-13* only applies when *YF-14 = 2 or 3*	1 (0 - 3)
YF-15 (3F5E)	PI Aux Level Detect Restart Time	V/f OLV/PM EZOLV Sets the length of time the drive will wait before it tries an Auto-Restart of *LoAux [Low PI Aux Feedback Level]* or *HiAux [High PI Aux Feedback Level]* fault. **Note:** Effective only when *YF-11 = 3* or *YF-14 = 3*, and *YF-39 > 0 [Low PI Aux Fault Retry Attempts]* for Low PI Aux Feedback Level fault or *YF-40 > 0 [High PI Aux Fault Retry]* for High PI Aux Feedback Level fault.	5.0 min (0.1 - 6000.0 min)
YF-16 (3F5F) RUN	PI Auxiliary Control P Gain	V/f OLV/PM EZOLV Sets the proportional gain for the suction pressure control.	2.00 (0.00 - 25.00)
YF-17 (3F60) RUN	PI Auxiliary Control I Time	V/f OLV/PM EZOLV Sets the integral time for the suction pressure control. **Note:** Set this parameter to 0.0 to disable the integrator.	5.0 s (0.0 - 360.0 s)
YF-18 (3F61)	PI Aux Control Detect Time Unit	V/f OLV/PM EZOLV Sets the time unit for *YF-10 [PI Aux Control Low Lvl Det Time]* and *YF-13 [PI Aux High Level Detection Time]*. 0 : Minutes (min) 1 : Seconds (sec)	0 (0, 1)
YF-19 (3F62)	PI Aux Ctrl Feedback Wire Break	V/f OLV/PM EZOLV Sets how the analog input selected for PI Aux Feedback will respond when it is programmed to receive a 4 mA to 20 mA signal and the signal is lost. 0 : No Display 1 : Alarm Only 2 : Fault (no retry, coast to stop) 3 : Auto-Restart (time set by YF-38)	2 (0 - 3)

No. (Hex.)	Name	Description	Default (Range)
YF-20 (3F63)	PI Aux Main PI Speed Control	V/f OLV/PM EZOLV Sets if the PI Auxiliary Controller has an effect on output speed. 0 : Disabled 1 : Enabled	1 (0, 1)
YF-21 (3F64)	PI Aux Ctrl Level Unit Selection	V/f OLV/PM EZOLV Set the units shown for the PI Aux Level parameters and monitors. 0 : "WC: inches of water column 1 : PSI: pounds per square inch 2 : GPM: gallons/min 3 : °F: Fahrenheit 4 : ft^3/min: cubic feet/min 5 : m^3/h: cubic meters/hour 6 : L/h: liters/hour 7 : L/s: liters/sec 8 : bar: bar 9 : Pa: Pascal 10 : °C: Celsius 11 : m: meters 12 : ft: feet 13 : L/min: liters/min 14 : m^3/min: cubic meters/min 15 : "Hg: Inch Mercury 16 : kPa: kilopascal 48 : %: Percent 49 : Custom (YF-32 ~ 34) 50 : None	1 (0 - 50)
YF-22 (3F65)	PI Aux Level Decimal Place Pos	V/f OLV/PM EZOLV Sets the number of decimal places for the PI Aux Level parameters and monitors. 0 : No Decimal Places (XXXXX) 1 : One Decimal Place (XXXX.X) 2 : Two Decimal Places (XXX.XX) 3 : Three Decimal Places (XX.XXX)	1 (0 - 3)
YF-23 (3F66)	PI Aux Ctrl Output Level Select	V/f OLV/PM EZOLV Sets the PI Auxiliary Controller to be Direct-acting or Inverse-acting. 0 : Direct Acting 1 : Inverse Acting	1 (0, 1)
YF-24 (3F67) RUN	PI Auxiliary Ctrl Maximum Level	V/f OLV/PM EZOLV Sets the maximum level for PI Auxiliary Control. When the level is more than this setting for longer than *YF-05 [PI Aux Control Sleep Delay Time]*, the drive will go to sleep and turn off all lag drives. **Note:** • Set this parameter to 0.0 to disable the function. • Parameters *YF-21 [PI Aux Ctrl Level Unit Selection]* and *YF-22 [PI Aux Level Decimal Place Pos]* set the unit and resolution.	0.0 PSI (0.0 - 6000.0 PSI)
YF-25 (3F68) RUN	PI Aux Control Activation Level	V/f OLV/PM EZOLV Sets the level to activate the PI Auxiliary Control. **Note:** • The drive response changes when the *YF-23 [PI Aux Ctrl Output Level Select]* setting changes. – *YF-23 = 0 [Direct Acting]*: When the PI Aux Feedback level is more than this setting for longer than *YF-26 [PI Aux Control Activation Delay]*, the drive will activate the PI Auxiliary Control to control the output frequency. – *YF-23 = 1 [Inverse Acting]*: When the PI Aux Feedback level is less than this setting for longer than *YF-26*, the drive will activate PI Auxiliary Control to control the output frequency. • When you set this parameter to 0.0 PSI, PI Auxiliary Control is always enabled. • Parameters *YF-21 [PI Aux Ctrl Level Unit Selection]* and *YF-22 [PI Aux Level Decimal Place Pos]* set the unit and resolution.	0.0 PSI (0.0 - 6000.0 PSI)

No. (Hex.)	Name	Description	Default (Range)
YF-26 (3F69) RUN	PI Aux Control Activation Delay	V/f OLV/PM EZOLV Sets the delay time to activate the PI Auxiliary Control. **Note:** • The drive response changes when the *YF-23 [PI Aux Ctrl Output Level Select]* setting changes. – *YF-23 = 0 [Direct Acting]*: When the PI Aux Feedback level is more than *YF-25 [PI Aux Control Activation Level]* for longer than this time, the drive will activate the PI Auxiliary Control to control the output frequency. – *YF-23 = 1 [Inverse Acting]*: When the PI Aux Feedback level is less than *YF-25* for longer than this time, the drive will activate PI Auxiliary Control to control the output frequency. • When you set this parameter to 0.0 PSI, PI Auxiliary Control is always enabled.	2 s (0 - 3600 s)
YF-32 (3F6F)	PI Aux Custom Unit Character 1	V/f OLV/PM EZOLV Sets the first character of the PI Aux custom unit display when *YF-21 = 49 [PI Aux Ctrl Level Unit Selection = Custom (YF-32 ~ 34)]*.	41 (20 - 7A)
YF-33 (3F70)	PI Aux Custom Unit Character 2	V/f OLV/PM EZOLV Sets the second character of the PI Aux custom unit display when *YF-21 = 49 [PI Aux Ctrl Level Unit Selection = Custom (YF-32 ~ 34)]*.	41 (20 - 7A)
YF-34 (3F71)	PI Aux Custom Unit Character 3	V/f OLV/PM EZOLV Sets the third character of the PI Aux custom unit display when *YF-21 = 49 [PI Aux Ctrl Level Unit Selection = Custom (YF-32 ~ 34)]*.	41 (20 - 7A)
YF-35 (3F72) RUN	PI Aux Minimum Transducer Scale	V/f OLV/PM EZOLV Sets the minimum scale output of the pressure transducer that is connected to the terminal set for *H3-xx = 27 [MFAI Function Selection = PI Auxiliary Control Feedback]*. **Note:** • To enable this parameter, set it to less than *YF-02 [PI Aux Control Transducer Scale]*. If you set it to more than *YF-02*, it will disable the PI Auxiliary Feedback (set to 0). • Parameters *YF-21 [PI Aux Ctrl Level Unit Selection]* and *YF-22 [PI Aux Level Decimal Place Pos]* set the unit and resolution.	0.0 PSI (-999.9 - +999.9 PSI)
YF-36 (3F73) RUN	PI Aux Lo Hi Lvl Det Hysteresis	V/f OLV/PM EZOLV Sets the Hysteresis Level used for low and high level detection. **Note:** • When *YF-11 = 3 [PI Aux Control Low Level Det Sel = Auto-Restart (time set by YF-15)]*, the PI Aux Feedback level must increase more than the value of *YF-09 [PI Aux Control Low Level Detect] + YF-36* before *YF-15 [PI Aux Level Detect Restart Time]* starts. • When *YF-14 = 3 [PI Aux Control Hi Level Det Sel = Auto-Restart (time set by YF-15)]*, the PI Aux Feedback Level must decrease less than the value of *YF-12 [PI Aux Control High Level Detect] – YF- 36* before *YF-15* starts. • Parameters *YF-21 [PI Aux Ctrl Level Unit Selection]* and *YF-22 [PI Aux Level Decimal Place Pos]* set the unit and resolution.	0.0 PSI (0.0 - 100.0 PSI)
YF-37 (3F74)	PI Aux Fdbk Fault Retry Attempts	V/f OLV/PM EZOLV Sets the number restart attempts when the drive detects a *AuxFB PI Aux Feedback Level Loss* condition.	3 (0 - 10)
YF-38 (3F75)	PI Aux Fdbk Fault Restart Time	V/f OLV/PM EZOLV Sets the time interval between each *AuxFB PI Aux Feedback Level Loss* auto-restart attempt.	20.0 s (0.5 - 3600.0 s)
YF-39 (3F76)	Low PI Aux Fault Retry Attempts	V/f OLV/PM EZOLV Sets the number restart attempts when the drive detects a *LoAux Low PI Auxiliary Feedback Level* condition.	3 (0 - 10)
YF-40 (3F77)	High PI Aux Fault Retry Attempts	V/f OLV/PM EZOLV Sets the number restart attempts when the drive detects a *HiAux High PI Auxiliary Feedback Level* condition.	3 (0 - 10)

3.18 U: Monitors

◆ U1: Operation Status Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
U1-01 (0040)	Frequency Reference	V/f OLV/PM EZOLV Shows the frequency reference value. Parameter *o1-03 [Keypad Display Unit Selection]* sets the display units. Unit: 0.01 Hz	10 V = Maximum frequency (0 V to +10 V)
U1-02 (0041)	Output frequency	V/f OLV/PM EZOLV Shows the output frequency. Parameter *o1-03 [Keypad Display Unit Selection]* sets the display units. Unit: 0.01 Hz	10 V = Maximum frequency (0 V to +10 V)
U1-03 (0042)	Output Current	V/f OLV/PM EZOLV Shows the output current. The keypad shows the value of *U1-03* in amperes (A). When you use serial communications to show the monitor, the current is "8192 = drive rated current (A)". Use the formula: "Numerals being displayed / 8192 × drive rated current (A)" to use the serial communication current value shown in the monitor. Unit: Determined by the drive model. • 0.01 A: 2011 to 2046, 4005 to 4014 • 0.1 A: 2059 to 2396, 4021 to 4720	10 V = Drive rated current
U1-04 (0043)	Control Method	V/f OLV/PM EZOLV Shows the drive control method. 0 : V/f Control 5 : PM Open Loop Vector 8 : EZ Vector Control	No signal output available
U1-05 (0044)	Motor Speed	V/f OLV/PM EZOLV Shows the detected motor speed. Parameter *o1-03 [Keypad Display Unit Selection]* sets the display units. Unit: 0.01 Hz	10 V = Maximum frequency (0 V to +10 V)
U1-06 (0045)	Output Voltage	V/f OLV/PM EZOLV Shows the output voltage reference. Unit: 0.1 V	208 V class: 10 V = 200 Vrms 480 V class: 10 V = 400 Vrms
U1-07 (0046)	DC Bus Voltage	V/f OLV/PM EZOLV Shows the DC bus voltage. Unit: 1 V	208 V class: 10 V = 400 V 480 V class: 10 V = 800 V
U1-08 (0047)	Output Power	V/f OLV/PM EZOLV Shows the internally-calculated output power. When you change *A1-02 [Control Method Selection]*, it will also change the signal level of the analog output. • A1-02 = 0: Drive capacity (kW) • A1-02 = 5: *PM Motor Rated Power [E5-02]* (kW) • A1-02 = 8: *Motor Rated Power [E9-07]* (kW) Unit: Determined by the drive model. • 0.01 kW: 2011 to 2046, 4005 to 4014 • 0.1 kW: 2059 to 2396, 4021 to 4720	10 V: Drive capacity (motor rated power) kW (-10 V to +10 V)
U1-09 (0048)	Torque Reference	V/f OLV/PM EZOLV Shows the internal torque reference value. Unit: 0.1%	10 V = Motor rated torque (0 V to +10 V)
U1-10 (0049)	Input Terminal Status	V/f OLV/PM EZOLV Shows the status of the MFDI terminal where 1 = ON, 0 = OFF. For example, *U1-10* shows "00000011" when terminals S1 and S2 are ON. bit0 : Terminal S1 (MFDI 1) bit1 : Terminal S2 (MFDI 2) bit2 : Terminal S3 (MFDI 3) bit3 : Terminal S4 (MFDI 4) bit4 : Terminal S5 (MFDI 5) bit5 : Terminal S6 (MFDI 6) bit6 : Terminal S7 (MFDI 7) bit7 : Terminal S8 (MFDI 8)	No signal output available

No. (Hex.)	Name	Description	MFAO Signal Level
U1-11 (004A)	Output Terminal Status	V/f OLV/PM EZOLV Shows the status of the MFDO terminal where 1 = (ON) and 0 = (OFF). For example, *U1-11* shows "00000011" when terminals M1 and M3 are ON. **Note:** When *H2-xx = 100 to 1C4 [Inverse Output of Function]*, the monitor will show the value before inversion. bit 0 : Terminals M1-M2 bit 1 : Terminals M3-M4 bit 2 : Terminals MD-ME-MF bit 3 : Not used (normal value of 0). bit 4 : Not used (normal value of 0). bit 5 : Not used (normal value of 0). bit 6 : Not used (normal value of 0). bit 7 : Fault relay MA/MB-MC	No signal output available
U1-12 (004B)	Drive Status	V/f OLV/PM EZOLV Shows drive status where 1 = ON and 0 = OFF. For example, *U1-12* shows "00000101" during run with the Reverse Run command. bit0 : During Run bit1 : During zero-speed bit2 : During reverse bit3 : During fault reset signal input bit4 : During speed agreement bit5 : Drive ready bit6 : During minor fault detection bit7 : During fault detection	No signal output available
U1-13 (004E)	Terminal A1 Level	V/f OLV/PM EZOLV Shows the signal level of terminal A1. Unit: 0.1% • Determined by *H3-61*. • "mA" or "VDC" is shown depending on whether the MFAI is set to 0-10 V, 0 to 20 mA, or 4 to 20 mA.	10 V = 100% (0 V to +10 V)
U1-14 (004F)	Terminal A2 Level	V/f OLV/PM EZOLV Shows the signal level of terminal A2. Unit: 0.1% • Determined by *H3-62*. • "mA" or "VDC" is shown depending on whether the MFAI is set to 0-10 V, 0 to 20 mA, or 4 to 20 mA.	10 V = 100% (0 V to +10 V)
U1-15 (0050)	Terminal A3 Level	V/f OLV/PM EZOLV Shows the signal level of terminal A3. Unit: 0.1% • Determined by *H3-63*. • "mA" or "VDC" is shown depending on whether the MFAI is set to 0-10 V, 0 to 20 mA, or 4 to 20 mA.	10 V = 100% (0 V to +10 V)
U1-16 (0053)	SFS Output Freq	V/f OLV/PM EZOLV Shows the output frequency after soft start. Shows the frequency with acceleration and deceleration times and S-curves. Parameter *o1-03 [Keypad Display Unit Selection]* sets the display units. Unit: 0.01 Hz	10 V = Maximum frequency (0 V to +10 V)
U1-17 (0058)	DI-A3 Input Status	V/f OLV/PM EZOLV Shows the reference value input from DI-A3 option. Shows the input signal for DI-A3 in hexadecimal as set in *F3-01 [Digital Input Function Selection]*. 3FFFF: Set (1 bit) + Sign (1 bit) + 16 bit	No signal output available
U1-18 (0061)	oPE Fault Parameter	V/f OLV/PM EZOLV Shows the parameter number that caused the *oPE02 [Parameter Range Setting Error]* or *oPE08 [Parameter Selection Error]*.	No signal output available

No. (Hex.)	Name	Description	MFAO Signal Level
U1-19 (0066)	MEMOBUS/Modbus Error Code	V/f OLV/PM EZOLV Shows the contents of the MEMOBUS/Modbus communication error where 1 = “error” and 0 = “no error”. For example, *U1-19* shows “00000001” when there is a CRC error. bit0 : CRC Error bit1 : Data Length Error bit2 : Not used (normal value of 0). bit3 : Parity Error bit4 : Overrun Error bit5 : Framing Error bit6 : Timed Out bit7 : Not used (normal value of 0).	No signal output available
U1-21 (0077)	AI-A3 Term V1Level	V/f OLV/PM EZOLV Shows the analog reference of terminal V1 on analog input option card AI-A3. Unit: 0.1% • Determined by *F2-16*. • “mA” or “VDC” is shown depending on whether the MFAI is set to 0-10 V, 0 to 20 mA, or 4 to 20 mA.	10 V = 100% (-10 V to +10 V)
U1-22 (072A)	AI-A3 Term V2Level	V/f OLV/PM EZOLV Shows the analog reference of terminal V2 on analog input option card AI-A3. Unit: 0.1% • Determined by *F2-17*. • “mA” or “VDC” is shown depending on whether the MFAI is set to 0-10 V, 0 to 20 mA, or 4 to 20 mA.	10 V = 100% (-10 V to +10 V)
U1-23 (072B)	AI-A3 Term V3Level	V/f OLV/PM EZOLV Shows the analog reference of terminal V3 on analog input option card AI-A3. Unit: 0.1% • Determined by *F2-18*. • “mA” or “VDC” is shown depending on whether the MFAI is set to 0-10 V, 0 to 20 mA, or 4 to 20 mA.	10 V = 100% (-10 V to +10 V)
U1-24 (007D)	Input Pulse Montr	V/f OLV/PM EZOLV Shows the frequency to pulse train input terminal RP. Unit: 1 Hz	Determined by H6-02
U1-25 (004D)	SoftwareNumber Flash	V/f OLV/PM EZOLV Shows the FLASH ID.	No signal output available
U1-26 (005B)	SoftwareNumber ROM	V/f OLV/PM EZOLV Shows the ROM ID.	No signal output available
U1-50 (1199) Expert	Virtual Analog In	V/f OLV/PM EZOLV Shows the virtual analog input value.	Determined by H7-40

◆ U2: Fault Trace

No. (Hex.)	Name	Description	MFAO Signal Level
U2-01 (0080)	Current Fault	V/f OLV/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/PM EZOLV Shows the fault that occurred most recently.	No signal output available
U2-03 (0082)	Freq Reference@Fault	V/f OLV/PM EZOLV Shows the frequency reference at the fault that occurred most recently. Use *U1-01 [Frequency Reference]* to monitor the frequency reference value. Unit: 0.01 Hz	No signal output available
U2-04 (0083)	Output Freq @ Fault	V/f OLV/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

No. (Hex.)	Name	Description	MFAO Signal Level
U2-05 (0084)	Output Current@Fault	V/f OLV/PM EZOLV Shows the output current at the fault that occurred most recently. Use *U1-03 [Output Current]* to monitor the output current. The keypad shows the value of *U1-03* in amperes (A). When you use serial communications to show the monitor, the current is "8192 = drive rated current (A)". Use the formula: "Numerals being displayed / 8192 × drive rated current (A)" to use the serial communication current value shown in the monitor. Unit: Determined by the drive model. • 0.01 A: 2011 to 2046, 4005 to 4014 • 0.1 A: 2059 to 2396, 4021 to 4720	No signal output available
U2-06 (0085)	Motor Speed @ Fault	V/f OLV/PM EZOLV Shows the motor speed at the fault that occurred most recently. Use *U1-05 [Motor Speed]* to monitor the motor speed. Unit: 0.01 Hz	No signal output available
U2-07 (0086)	Output Voltage@Fault	V/f OLV/PM EZOLV Shows the output voltage reference at the fault that occurred most recently. Use *U1-06 [Output Voltage]* to monitor the output voltage reference. Unit: 0.1 V	No signal output available
U2-08 (0087)	DC Bus Voltage@Fault	V/f OLV/PM EZOLV Shows the DC bus voltage at the fault that occurred most recently. Use *U1-07 [DC Bus Voltage]* to monitor the DC bus voltage. Unit: 1 V	No signal output available
U2-09 (0088)	Output Power @ Fault	V/f OLV/PM EZOLV Shows the output power at the fault that occurred most recently. Use *U1-08 [Output Power]* to monitor the output power. Unit: 0.1 kW	No signal output available
U2-10 (0089)	Torque Ref @ Fault	V/f OLV/PM EZOLV 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 torque reference. Unit: 0.1%	No signal output available
U2-11 (008A)	Input Terminal Status @ Fault	V/f OLV/PM EZOLV Shows the status of the MFDI terminals at the most recent fault where 1 = (ON) and 0 = (OFF). For example, *U2-11* shows "00000011" when terminals S1 and S2 are ON. Use *U1-10 [Input Terminal Status]* to monitor the MFDI terminal status. bit0 : Terminal S1 bit1 : Terminal S2 bit2 : Terminal S3 bit3 : Terminal S4 bit4 : Terminal S5 bit5 : Terminal S6 bit6 : Terminal S7 bit7 : Terminal S8	No signal output available
U2-12 (008B)	Output Terminal Status @ Fault	V/f OLV/PM EZOLV Shows the status of the MFDO terminals at the most recent fault where 1 = (ON) and 0 = (OFF). For example, *U2-12* shows "00000011" when terminals M1 and M3 are ON. Use *U1-11 [Output Terminal Status]* to monitor the MFDO terminal status. bit 0 : Terminals M1-M2 bit 1 : Terminals M3-M4 bit 2 : Terminals MD-ME-MF bit 3 : Not used (normal value of 0). bit 4 : Not used (normal value of 0). bit 5 : Not used (normal value of 0). bit 6 : Not used (normal value of 0). bit 7 : Fault relay MA/MB-MC	No signal output available

No. (Hex.)	Name	Description	MFAO Signal Level
U2-13 (008C)	Operation Status @ Fault	V/f OLV/PM EZOLV Shows the status of the MFDO terminals at the most recent fault where 1 = (ON) and 0 = (OFF). For example, *U2-13* shows "00000001" during run. Use *U1-12 [Drive Status]* to monitor the MFDO terminal status. 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
U2-14 (008D)	Elapsed Time @ Fault	V/f OLV/PM EZOLV Shows the cumulative operation time of the drive at the fault that occurred most recently. Use *U4-01 [Total VFD Run Time]* to monitor the cumulative operation time. Unit: 1 h	No signal output available
U2-15 (07E0)	SFS Output @ Fault	V/f OLV/PM EZOLV Shows the output frequency after soft start at the fault that occurred most recently. Use *U1-16 [SFS Output Freq]* to monitor the output frequency after soft start. Unit: 0.01 Hz	No signal output available
U2-16 (07E1)	q-Axis Current@Fault	V/f OLV/PM EZOLV Shows the q-Axis current of the motor at the fault that occurred most recently. Use *U6-01 [Iq SEC Current]* to monitor the q-Axis current of the motor. Unit: 0.1 %	No signal output available
U2-17 (07E2)	d-Axis Current@Fault	V/f OLV/PM EZOLV Shows the d-Axis current of the motor at the fault that occurred most recently. Use *U6-02 [Id EXC Current]* to monitor the d-Axis current of the motor. Unit: 0.1%	No signal output available
U2-20 (008E)	Heatsink Temp @Fault	V/f OLV/PM EZOLV Shows the heatsink temperature at the fault that occurred most recently. Use *U4-08 [Heatsink Temperature]* to monitor the temperature of the heatsink. Unit: 1 °C	No signal output available
U2-21 (1166) Expert	STPo Detect @ Fault	V/f OLV/PM EZOLV Monitors conditions to detect *STPo [Motor Step-Out Detected]* faults. The bit for each condition is shown as ON or OFF. bit0 : Excessive current bit1 : Induced voltage deviation bit2 : d-axis current deviation bit3 : Motor lock at startup bit4 : Acceleration stall continue bit5 : Acceleration stall repeat bit6 : Not used (normal value of 0). bit7 : Not used (normal value of 0).	No signal output available
U2-30 (3008)	Fault 1 YYYY	V/f OLV/PM EZOLV Shows the year when the most recent fault occurred.	No signal output available
U2-31 (3009)	Fault 1 MMDD	V/f OLV/PM EZOLV Shows the month and day when the most recent fault occurred.	No signal output available
U2-32 (300A)	Fault 1 HHMM	V/f OLV/PM EZOLV Shows the time when the most recent fault occurred.	No signal output available
U2-90 (3FC0)	Pump Setpoint @Fault	V/f OLV/PM EZOLV Displays the *Pump Setpoint UA-90* at the time of fault. Monitor limited to 200% of *Y1-03*. Unit: 0.1 PSI	No signal output available
U2-91 (3FC1)	Pump Feedback @Fault	V/f OLV/PM EZOLV Displays the *Pump Feedback UA-91* at the time of fault. Monitor limited to 200% of *Y1-03*. Unit: 0.1 PSI	No signal output available
U2-94 (3FC4)	Motor Speed @ Fault	V/f OLV/PM EZOLV Displays *Motor Speed UA-94*, which is the absolute value of *U1-02 [Output Frequency]* converted to RPM at the time of fault. Unit: 1 RPM	No signal output available

No. (Hex.)	Name	Description	MFAO Signal Level
U2-97 (3FC7)	Water Level @ Fault	V/f OLV/PM EZOLV Displays the amount of water above the water level sensor *UA-97* at the time of fault. **Note:** This monitor is cleared when *Yd-01 = 0 [Water Level Selection = Disabled]*. Unit: 0.1 ft	No signal output available
U2-98 (3FC8)	Suction Press @Fault	V/f OLV/PM EZOLV Displays the amount of suction pressure *UA-98* at the time of fault. Unit: 0.1 PSI **Note:** • This monitor is cleared when *YE-01 = 0 [Suction Pressure Control Select = Disabled]*. • Unit is dependent on *YE-01 [Suction Pressure Control Select]* where setting 1 is PSI and setting 2 is "Hg, and decimal place position is dependent on *YE-22 [Suction Pressure Dec Place Pos]*.	No signal output available

◆ U3: Fault History

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

No. (Hex.)	Name	Description	MFAO Signal Level
U3-13 (0096)	ElapsedTime@3rdFault	V/f OLV/PM EZOLV Shows the cumulative operation time when the third most recent fault occurred. **Note:** The drive saves this cumulative operation time to two types of registers at the same time for the MEMOBUS/Modbus communications. Unit: 1 h	No signal output available
U3-14 (0097)	ElapsedTime@4thFault	V/f OLV/PM EZOLV Shows the cumulative operation time when the fourth most recent fault occurred. **Note:** The drive saves this cumulative operation time to two types of registers at the same time for the MEMOBUS/Modbus communications. Unit: 1 h	No signal output available
U3-15 (080E)	ElapsedTime@5thFault	V/f OLV/PM EZOLV Shows the cumulative operation time when the fifth most recent fault occurred. Unit: 1 h	No signal output available
U3-16 (080F)	ElapsedTime@6thFault	V/f OLV/PM EZOLV Shows the cumulative operation time when the sixth most recent fault occurred. Unit: 1 h	No signal output available
U3-17 (0810)	ElapsedTime@7thFault	V/f OLV/PM EZOLV Shows the cumulative operation time when the seventh most recent fault occurred. Unit: 1 h	No signal output available
U3-18 (0811)	ElapsedTime@8thFault	V/f OLV/PM EZOLV Shows the cumulative operation time when the eighth most recent fault occurred. Unit: 1 h	No signal output available
U3-19 (0812)	ElapsedTime@9thFault	V/f OLV/PM EZOLV Shows the cumulative operation time when the ninth most recent fault occurred. Unit: 1 h	No signal output available
U3-20 (0813)	ElapsedTime@10 Fault	V/f OLV/PM EZOLV Shows the cumulative operation time when the tenth most recent fault occurred. Unit: 1 h	No signal output available
U3-21 (300B)	Fault 1 YYYY	V/f OLV/PM EZOLV Shows the year when the most recent fault occurred.	No signal output available
U3-22 (300C)	Fault 1 MMDD	V/f OLV/PM EZOLV Shows the month and day when the most recent fault occurred.	No signal output available
U3-23 (300D)	Fault 1 HHMM	V/f OLV/PM EZOLV Shows the time when the most recent fault occurred.	No signal output available
U3-24 (300E)	Fault 2 YYYY	V/f OLV/PM EZOLV Shows the year when the second most recent fault occurred.	No signal output available
U3-25 (300F)	Fault 2 MMDD	V/f OLV/PM EZOLV Shows the month and day when the second most recent fault occurred.	No signal output available
U3-26 (3010)	Fault 2 HHMM	V/f OLV/PM EZOLV Shows the time when the second most recent fault occurred.	No signal output available
U3-27 (3011)	Fault 3 YYYY	V/f OLV/PM EZOLV Shows the year when the third most recent fault occurred.	No signal output available
U3-28 (3012)	Fault 3 MMDD	V/f OLV/PM EZOLV Shows the month and day when the third most recent fault occurred.	No signal output available
U3-29 (3013)	Fault 3 HHMM	V/f OLV/PM EZOLV Shows the time when the third most recent fault occurred.	No signal output available
U3-30 (3014)	Fault 4 YYYY	V/f OLV/PM EZOLV Shows the year when the fourth most recent fault occurred.	No signal output available
U3-31 (3015)	Fault 4 MMDD	V/f OLV/PM EZOLV Shows the month and day when the fourth most recent fault occurred.	No signal output available
U3-32 (3016)	Fault 4 HHMM	V/f OLV/PM EZOLV Shows the time when the fourth most recent fault occurred.	No signal output available
U3-33 (3017)	Fault 5 YYYY	V/f OLV/PM EZOLV Shows the year when the fifth most recent fault occurred.	No signal output available

No. (Hex.)	Name	Description	MFAO Signal Level
U3-34 (3018)	Fault 5 MMDD	V/f OLV/PM EZOLV Shows the month and day when the fifth most recent fault occurred.	No signal output available
U3-35 (3019)	Fault 5 HHMM	V/f OLV/PM EZOLV Shows the time when the fifth most recent fault occurred.	No signal output available
U3-36 (301A)	Fault 6 YYYY	V/f OLV/PM EZOLV Shows the year when the sixth most recent fault occurred.	No signal output available
U3-37 (301B)	Fault 6 MMDD	V/f OLV/PM EZOLV Shows the month and day when the sixth most recent fault occurred.	No signal output available
U3-38 (301C)	Fault 6 HHMM	V/f OLV/PM EZOLV Shows the time when the sixth most recent fault occurred.	No signal output available
U3-39 (301D)	Fault 7 YYYY	V/f OLV/PM EZOLV Shows the year when the seventh most recent fault occurred.	No signal output available
U3-40 (301E)	Fault 7 MMDD	V/f OLV/PM EZOLV Shows the month and day when the seventh most recent fault occurred.	No signal output available
U3-41 (301F)	Fault 7 HHMM	V/f OLV/PM EZOLV Shows the time when the seventh most recent fault occurred.	No signal output available
U3-42 (3020)	Fault 8 YYYY	V/f OLV/PM EZOLV Shows the year when the eighth most recent fault occurred.	No signal output available
U3-43 (3021)	Fault 8 MMDD	V/f OLV/PM EZOLV Shows the month and day when the eighth most recent fault occurred.	No signal output available
U3-44 (3022)	Fault 8 HHMM	V/f OLV/PM EZOLV Shows the time when the eighth most recent fault occurred.	No signal output available
U3-45 (3023)	Fault 9 YYYY	V/f OLV/PM EZOLV Shows the year when the ninth most recent fault occurred.	No signal output available
U3-46 (3024)	Fault 9 MMDD	V/f OLV/PM EZOLV Shows the month and day when the ninth most recent fault occurred.	No signal output available
U3-47 (3025)	Fault 9 HHMM	V/f OLV/PM EZOLV Shows the time when the ninth most recent fault occurred.	No signal output available
U3-48 (3026)	Fault 10 YYYY	V/f OLV/PM EZOLV Shows the year when the tenth most recent fault occurred.	No signal output available
U3-49 (3027)	Fault 10 MMDD	V/f OLV/PM EZOLV Shows the month and day when the tenth most recent fault occurred.	No signal output available
U3-50 (3028)	Fault 10 HHMM	V/f OLV/PM EZOLV Shows the time when the tenth most recent fault occurred.	No signal output available

◆ U4: Maintenance Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
U4-01 (004C)	Total VFD Run Time	V/f OLV/PM EZOLV Shows the cumulative operation time of the drive. Use parameter *o4-01 [Elapsed Operating Time Setting]* to reset this monitor. Use parameter *o4-02 [Elapsed Operating Time Selection]* 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 *99999*. After this value is more than *99999*, the drive automatically resets it and starts to count from *0* again. Unit: 1 h **Note:** The MEMOBUS/Modbus communication data is shown in 10 h units. Use register 0099H for data in 1 h units.	10 V: 99999 h
U4-02 (0075)	Total Run Commands	V/f OLV/PM EZOLV Shows how many times that the drive has received a Run command. Use parameter *o4-13 [RUN Command Counter @ Initialize]* to reset this monitor. The maximum value that the monitor will show is *65535*. After this value is more than *65535*, the drive automatically resets it and starts to count from *0* again. Unit: 1	10 V: 65535 times

No. (Hex.)	Name	Description	MFAO Signal Level
U4-03 (0067)	Fan Elapsed Time	V/f OLV/PM EZOLV Shows the cumulative operation time of the cooling fans. Use parameter *o4-03 [Fan Operation Time Setting]* to reset this monitor. The maximum value that the monitor will show is *99999*. After this value is more than *99999*, the drive automatically resets it and starts to count from *0* again. Unit: 1 h **Note:** The MEMOBUS/Modbus communication data is shown in 10 h units. Use register 009BH for data in 1 h units.	10 V: 99999 h
U4-04 (007E)	Fan Life Mon	V/f OLV/PM EZOLV Shows the cumulative operation time of the cooling fans as a percentage of the estimated performance life of the cooling fans. The default value is 0. The value counts up from 0. Use *o4-03 [Fan Operation Time Setting]* to reset this monitor. Unit: 1% **Note:** Replace the cooling fans when this monitor is at 90%.	10 V: 100%
U4-05 (007C)	Capacitor Life Mon	V/f OLV/PM EZOLV Shows the operation time of the electrolytic capacitors for the main circuit and control circuit as a percentage of the estimated performance life of the electrolytic capacitors. The default value is 0. The value counts up from 0. Use *o4-05 [Capacitor Maintenance Setting]* to reset this monitor. Unit: 1% **Note:** Replace the electrolytic capacitor when this monitor is at 90%.	10 V: 100%
U4-06 (07D6)	PreChargeRelayMon	V/f OLV/PM EZOLV Shows the operation time of the soft charge bypass relay as a percentage of the estimated performance life of the soft charge bypass relay. The default value is 0. The value counts up from 0. Use *o4-07 [Softcharge Relay Maintenance Set]* to reset this monitor. Unit: 1% **Note:** Replace the drive when this monitor is at 90%.	10 V: 100%
U4-07 (07D7)	IGBT Maintenance	V/f OLV/PM EZOLV Shows the operation time of the IGBTs as a percentage of the estimated performance life of the IGBTs. The default value is 0. The value counts up from 0. Use *o4-09 [IGBT Maintenance Setting]* to reset this monitor. Unit: 1% **Note:** Replace the drive when this monitor is at 90%.	10 V: 100%
U4-08 (0068)	Heatsink Temp	V/f OLV/PM EZOLV Shows the heatsink temperature of the drive. Unit: 1 °C	10 V: 100 °C
U4-09 (005E)	LED Check	V/f OLV/PM EZOLV Turns on the LED Status Ring and all of the keypad LEDs to make sure that the LEDs operate correctly. 1. Set *o2-24 = 0 [LED Light Function Selection = Enable Status Ring & Keypad LED]*. 2. Push (ENTER) when *U4-09* is the top monitor shown on the keypad. All LEDs on the keypad and LED Status Ring will turn on. **Note:** When Safety input 2 CH is open (STo), READY will flash.	No signal output available
U4-10 (005C)	kWh, Lower 4 Digits	V/f OLV/PM EZOLV Shows the lower 4 digits of the watt hour value for the drive. Unit: 1 kWh **Note:** The watt hour is displayed in 9 digits. Monitor *U4-11 [kWh, Upper 5 Digits]* shows the upper 5 digits and *U4-10* shows the lower 4 digits. Example for 12345678.9 kWh: *U4-10*: 678.9 kWh *U4-11*: 12345 MWh	No signal output available

No. (Hex.)	Name	Description	MFAO Signal Level
U4-11 (005D)	kWh, Upper 5 Digits	V/f OLV/PM EZOLV Shows the upper 5 digits of the watt hour value for the drive. Unit: 1 MWh **Note:** Monitor *U4-11* shows the upper 5 digits and *U4-10 [kWh, Lower 4 Digits]* shows the lower 4 digits. Example for 12345678.9 kWh: *U4-10*: 678.9 kWh *U4-11*: 12345 MWh	No signal output available
U4-13 (07CF)	Peak Hold Current	V/f OLV/PM EZOLV Shows the hold value of the peak value (rms) for the drive output current. Use *U4-14 [PeakHold Output Freq]* 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 held value during baseblock (during stop). The keypad shows the value of *U4-13* in amperes (A). When you use serial communications to show the monitor, the current is "8192 = drive rated current (A)." Use the formula: "Numerals being displayed / 8192 × drive rated current (A)" to use the serial communication current value shown in the monitor. Unit: Determined by the drive model. • 0.01 A: 2011 to 2046, 4005 to 4014 • 0.1 A: 2059 to 2396, 4021 to 4720	No signal output available
U4-14 (07D0)	PeakHold Output Freq	V/f OLV/PM EZOLV Shows the output frequency at which the peak value (rms) of the drive output current is held. The peak hold current can be monitored by *U4-13 [Peak Hold Current]*. The peak hold output frequency will be cleared at the next startup and restart of the power supply. The drive keeps the value that was under hold during baseblock (during stop). Unit: 0.01 Hz	No signal output available
U4-16 (07D8)	Motor oL1 Level	V/f OLV/PM EZOLV Shows the integrated value of *oL1 [Motor Overload]* as a percentage of *oL1* detection level. Unit: 0.1%	10 V: 100%
U4-18 (07DA)	Reference Source	V/f OLV/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 [H1-xx = 2]* selection status • 1: *b1-01 [Frequency Reference Selection 1]* • 2: *b1-15 [Frequency Reference Selection 2]* Y-nn: Frequency reference source • 0-01: Keypad (*d1-01 [Reference 1]*) • 1-00: Analog input (unassigned) • 1-01: MFAI terminal A1 • 1-02: MFAI terminal A2 • 1-03: MFAI terminal A3 • 2-02 to 2-17: Multi-step speed reference (*d1-02 to d1-17 [Reference 2 to 16, Jog Reference]*) • 3-01: MEMOBUS/Modbus communications • 4-01: Communication option card • 5-01: Pulse train input • 7-01: DriveWorksEZ • 9-01: Up/Down command • B-00: Hand Reference 1 (Analog) • B-01: Hand Reference 1 (Y5-02) • C-01: Hand Reference 2 (Y5-05) **Note:** Display is Zero filled.	No signal output available
U4-19 (07DB)	Modbus FreqRef	V/f OLV/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 (0 V to +10 V)
U4-20 (07DC)	Option Freq Ref	V/f OLV/PM EZOLV Shows the frequency reference sent to the drive from the communication option as a decimal. Unit: 0.01 %	10 V: Maximum frequency (0 V to +10 V)

No. (Hex.)	Name	Description	MFAO Signal Level
U4-21 (07DD)	Run Cmd Source	V/f OLV/PM EZOLV Shows the selected Run command source. The keypad shows the Run command source as "XY-nn" as specified by these rules: X: Run command • 0: OFF • 1: AUTO • 2: HAND • 3: JOG, Emergency Override Y: Run command source • 1: HOA Keypad, External terminals • 3: Memobus/Modbus communications • 4: Communication option card • 7: DriveWorksEZ nn: Run command limit status data • 00: No limit status. • 01: The Run command stayed ON when the drive stopped in Programming Mode. • 02: The Run command stayed ON when switching from HAND Mode to AUTO mode, or the Run command was entered during *oPE* at power-up while *b1-17 = 1 [Run Command at Power Up = Accept Existing RUN Command]*. • 03: The Run command is in standby after the drive was energized until the soft charge bypass contactor turns ON. **Note:** The drive will detect *Uv1 [DC Bus Undervoltage]* or *Uv [Undervoltage]* if the soft charge bypass contactor does not turn ON after 10 s. • 04: Will not restart after run stop. • 05: An MFDI terminal cased a Fast stop or you pushed OFF on the keypad to ramp the motor to stop. • 06: *b1-17 = 0 [Run Command at Power Up = Disregard Existing RUN Command]*. • 07: During baseblock while coast to stop with timer. • 08: Frequency reference is less than *E1-09 [Minimum Output Frequency]* during baseblock. • 09: Waiting for the Enter command from PLC. **Note:** Display is Zero filled.	No signal output available
U4-22 (07DE)	Modbus CmdData (hex)	V/f OLV/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: bit0 : Forward run/Stop bit1 : Reverse run/Stop bit2 : External fault bit3 : Fault Reset bit4 : Multi-function input 1 bit5 : Multi-function input 2 bit6 : Multi-function input 3 bit7 : Multi-function input 4 bit8 : Multi-function input 5 bit9 : Multi-function input 6 bitA : Multi-function input 7 bitB : Multi-function input 8 bitC : Not used (normal value of 0). bitD : Not used (normal value of 0). bitE : Not used (normal value of 0). bitF : Not used (normal value of 0).	No signal output available

No. (Hex.)	Name	Description	MFAO Signal Level
U4-23 (07DF)	Option CmdData (hex)	V/f OLV/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 bit 4 : Multi-function input 1 bit 5 : Multi-function input 2 bit 6 : Multi-function input 3 bit 7 : Multi-function input 4 bit 8 : Multi-function input 5 bit 9 : Multi-function input 6 bit A : Multi-function input 7 bit B : Multi-function input 8 bit C : Not used (normal value of 0). bit D : Not used (normal value of 0). bit E : Not used (normal value of 0). bit F : Not used (normal value of 0).	No signal output available
U4-24 (07E6)	Num of Runs (Low)	V/f OLV/PM EZOLV Shows the lower 4 digits of the drive run count. **Note:** The drive run count is an 8-digit number. Monitor *U4-25 [Number of Runs(High)]* shows the upper 4 digits and *U4-24* shows the lower 4 digits.	10 V: 9999
U4-25 (07E7)	Num of Runs(High)	V/f OLV/PM EZOLV Shows the upper 4 digits of the drive run count. **Note:** The drive run count is an 8-digit number. Monitor *U4-25* shows the upper 4 digits and *U4-24 [Number of Runs (Low)]* shows the lower 4 digits.	10 V: 65535
U4-52 (1592)	Network Torque Ref	V/f OLV/PM EZOLV Shows the torque reference that the drive received from a serial communication option card or from MEMOBUS/Modbus communications as a decimal number. Unit: 0.1%	10 V: 100% (0 V to +10 V)
U4-61 (3096) Expert	Total EMOVR Run Time	V/f OLV/PM EZOLV Shows the length of time that the drive operated in Emergency Override Mode. Unit: 1 min **Note:** • The maximum value is 60,000 min. • This monitor does not accumulate operation time when *S6-07 = 1 [EMOVR Fault Suppression Mode = Test Mode]*.	No signal output available
U4-63 (3098) Expert	Ripple Reg. Feedback	V/f OLV/PM EZOLV Shows the amount of DC Bus Voltage Ripple (raw value, before the ripple ramp is applied) 230 V Drives: 100% = 283 VDC 460 V Drives: 100% = 566 VDC 575 V Drives: 100% = 813 VDC Unit: 0.1%	10 V: 100.0%
U4-75 (1BC4)	Comm Option Type	V/f OLV/PM EZOLV Displays the protocol of the communication option currently connected to the drive. 1 : Modbus TCP/IP (SI-EM3) 2 : EtherNet/IP (SI-EN3) or PROFINET (SI-EP3) 9 : DeviceNet (SI-N3) 10 : BACNet (SI-B3) A : PROFIBUS-DP (SI-P3) B : CANopen (SI-S3) 11 : LONWORKS (SI-W3) 13 : Metasys N2/Apogee FLN P1 70 : Protocol not set (JOHB-SMP3) 71 : Modbus TCP/IP (JOHB-SMP3) 72 : EtherNet/IP (JOHB-SMP3) 74 : EtheCAT(JOHB-SMP3) 75 : BACnet/IP(JOHB-SMP3) 78 : PROFINET (JOHB-SMP3) FF : Communication Option not Connected	No signal output available

No. (Hex.)	Name	Description	MFAO Signal Level
U4-76 (1BC5)	MAC Address1 1, 2	V/f OLV/PM EZOLV Displays the first and second octets of MAC address 1. **Note:** When you use a communication option other than JOHB-SMP3, this monitor shows "00-00".	No signal output available
U4-77 (1BC6)	MAC Address1 3, 4	V/f OLV/PM EZOLV Displays the third and fourth octets of MAC address 1. **Note:** When you use a communication option other than JOHB-SMP3, this monitor shows "00-00".	No signal output available
U4-78 (1BC7)	MAC Address1 5, 6	V/f OLV/PM EZOLV Displays the fifth and sixth octets of MAC address 1. **Note:** When you use a communication option other than JOHB-SMP3, this monitor shows "00-00".	No signal output available
U4-79 (1BC8) Expert	MAC Address2 1, 2	V/f OLV/PM EZOLV Displays the first and second octets of MAC address 2. **Note:** When you use a communication option other than JOHB-SMP3, this monitor shows "00-00".	No signal output available
U4-80 (1BC9) Expert	MAC Address2 3, 4	V/f OLV/PM EZOLV Displays the third and fourth octets of MAC address 2. **Note:** When you use a communication option other than JOHB-SMP3, this monitor shows "00-00".	No signal output available
U4-81 (1BCA) Expert	MAC Address2 5, 6	V/f OLV/PM EZOLV Displays the fifth and sixth octets of MAC address 2. **Note:** When you use a communication option other than JOHB-SMP3, this monitor shows "00-00".	No signal output available
U4-82 (1BCB) Expert	MAC Address3 1, 2	V/f OLV/PM EZOLV Displays the first and second octets of MAC address 3. **Note:** When you use a communication option other than JOHB-SMP3, this monitor shows "00-00".	No signal output available
U4-83 (1BCC) Expert	MAC Address3 3, 4	V/f OLV/PM EZOLV Displays the third and fourth octets of MAC address 3. **Note:** When you use a communication option other than JOHB-SMP3, this monitor shows "00-00".	No signal output available
U4-84 (1BCD) Expert	MAC Address3 5, 6	V/f OLV/PM EZOLV Displays the fifth and sixth octets of MAC address 3. **Note:** When you use a communication option other than JOHB-SMP3, this monitor shows "00-00".	No signal output available

◆ U5: PID Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
U5-01 (0057)	PID Feedback	V/f OLV/PM EZOLV Shows the PID control feedback value. Unit: 0.01% **Note:** • Parameters *Y1-02 [PID Unit Display Selection]*, *Y1-03 [PID User Unit Display Scaling]*, and *b5-39 [PID User Unit Display Digits]* set the unit, scaling, and resolution. • You must use an analog monitor option card AO-A3 to output negative values.	10 V = Maximum frequency (-10 V to +10 V)
U5-02 (0063)	PID Input	V/f OLV/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 (0 V to +10 V)
U5-03 (0064)	PID Output	V/f OLV/PM EZOLV Shows the PID control output as a percentage of the maximum output frequency. Unit: 0.01%	10 V: Maximum frequency (0 V to +10 V)

No. (Hex.)	Name	Description	MFAO Signal Level
U5-04 (0065)	PID Setpoint	V/f OLV/PM EZOLV Shows the PID setpoint. Unit: 0.01% **Note:** • Parameters *Y1-02 [PID Unit Display Selection]*, *Y1-03 [PID User Unit Display Scaling]*, and *b5-39 [PID User Unit Display Digits]* set the unit, scaling, and resolution. • You must use an analog monitor option card AO-A3 to output negative values.	10 V = Maximum frequency (-10 V to +10 V)
U5-05 (07D2)	PID Diff Fdbk	V/f OLV/PM EZOLV Shows the PID differential feedback value as a percentage of the maximum output frequency. This monitor is available after you set *H3-02, H3-10, or H3-06 = 16 [MFAI Function Selection = Differential PID Feedback]*. Unit: 0.01%	10 V = Maximum frequency (-10 V to +10 V)
U5-06 (07D3)	PID Fdbk-Diff Fdbk	V/f OLV/PM EZOLV Shows the difference from calculating *U5-05 - U5-01 [PID Diff Fdbk] - [PID Feedback]*. Unit: 0.01% **Note:** *U5-01 [PID Feedback] = U5-06* when *H3-02, H3-10, or H3-06 ≠ 16 [MFAI Function Selection ≠ Differential PID Feedback]*.	10 V = Maximum frequency (-10 V to +10 V)
U5-14 (086B)	PID Out2 Upper 4	V/f OLV/PM EZOLV Shows the custom PI output. Monitor *U5-14* shows the upper four digits and *U5-15 [PID Out2 Lower 4]* shows the lower four digits. The drive uses *b5-43 [PID Out2 Monitor MAX Upper4 Dig]* and *b5-44 [PID Out2 Monitor MAX Lower4 Dig]* to scale the monitors. Unit: 1 **Note:** Parameter *b5-41 [PID Output 2 Unit]* sets the display unit.	10 V = b5-43 × 10000
U5-15 (086C)	PID Out2 Lower 4	V/f OLV/PM EZOLV Shows the custom PI output. Monitor *U5-15* shows the lower four digits and *U5-14 [PID Out2 Upper 4]* shows the upper four digits. The drive uses *b5-43 [PID Out2 Monitor MAX Upper4 Dig]* and *b5-44 [PID Out2 Monitor MAX Lower4 Dig]* to scale the monitors. Unit: 0.01 **Note:** Parameter *b5-41 [PID Output 2 Unit]* sets the display unit.	b5-43 > 0: 10 V = 10000 b5-43 = 0: 10 V = b5-44
U5-17 (086E)	PI2 Setpoint	V/f OLV/PM EZOLV Shows the PI2 Control setpoint. **Note:** Parameters *S3-04 [PI2 Control Unit Selection]* and *S3-03 [PI2 Control Decimal Place Pos]* set the unit and resolution.	10 V = S3-02
U5-18 (086F)	PI2 Feedback	V/f OLV/PM EZOLV Shows the PI2 Control Feedback Level from the terminal set for *H3-xx = 26 [PI2 Control Feedback]*. **Note:** Parameters *S3-04 [PI2 Control Unit Selection]* and *S3-03 [PI2 Control Decimal Place Pos]* set the unit and resolution.	10 V = S3-02
U5-19 (0870)	PI2 Control Input	V/f OLV/PM EZOLV Shows the PI2 Control input (deviation between PI target and feedback). **Note:** Parameters *S3-04 [PI2 Control Unit Selection]* and *S3-03 [PI2 Control Decimal Place Pos]* set the unit and resolution.	10 V = S3-02
U5-20 (0871)	PI2 Control Output	V/f OLV/PM EZOLV Shows the PI2 Control output. **Note:** • Parameters *S3-04 [PI2 Control Unit Selection]* and *S3-03 [PI2 Control Decimal Place Pos]* set the unit and resolution. • The drive operation while *H1-xx = A8 or 1A8 [PI2 Control Disable]* changes when the *S3-12 [PI2 Control Disable Mode Sel]* setting changes.	10 V = S3-02
U5-30 (3000)	Time Hr Min HHMM	V/f OLV/PM EZOLV Shows the current time (Hours and Minutes).	No signal output available
U5-31 (3001)	Date Year	V/f OLV/PM EZOLV Shows the current year.	No signal output available
U5-32 (3002)	Date Mo Day MMDD	V/f OLV/PM EZOLV Shows the current date (Month and Date).	No signal output available

No. (Hex.)	Name	Description	MFAO Signal Level
U5-33 (3003)	Date Week	V/f OLV/PM EZOLV Shows the current date 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)	Setpoint	V/f OLV/PM EZOLV Shows the PID setpoint command. Unit: 0.01% **Note:** • Parameters *Y1-02 [PID Unit Display Selection]*, *Y1-03 [PID User Unit Display Scaling]*, and *b5-39 [PID User Unit Display Digits]* set the unit, scaling, and resolution. • You must use an analog monitor option card AO-A3 to output negative values.	10 V = Maximum frequency (-10 V to +10 V)

◆ U6: Operation Status Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
U6-01 (0051)	Iq SEC Current	V/f OLV/PM EZOLV 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 (0 V to +10 V)
U6-02 (0052)	Id EXC Current	V/f OLV/PM EZOLV 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 (0 V to +10 V)
U6-03 (0054)	ASR Input	V/f OLV/PM EZOLV Shows the ASR input value as a percentage of the maximum frequency. Unit: 0.01%	10 V: Maximum frequency (0 V to +10 V)
U6-04 (0055)	ASR Output	V/f OLV/PM EZOLV Shows the ASR output value as a percentage of the motor rated secondary current. Unit: 0.01%	10 V: Motor secondary rated current (0 V to +10 V)
U6-05 (0059)	Voltage Ref (Vq)	V/f OLV/PM EZOLV Shows the drive internal voltage reference for motor secondary current control (q-Axis). Unit: 0.1 V **Note:** You must use an analog monitor option card AO-A3 to output negative values.	208 V class: 10 V = 200 Vrms 480 V class: 10 V = 400 Vrms (-10 V to +10 V)
U6-06 (005A)	Voltage Ref (Vd)	V/f OLV/PM EZOLV Shows the drive internal voltage reference for motor excitation current control (d-Axis). Unit: 0.1 V **Note:** You must use an analog monitor option card AO-A3 to output negative values.	208 V class: 10 V = 200 Vrms 480 V class: 10 V = 400 Vrms (-10 V to +10 V)
U6-10 (07C1) Expert	ContAxisDeviation	V/f OLV/PM EZOLV Shows the deviation between the γδ-Axis that the drive uses for motor control and the dq-Axis. Unit: 0.1 ° **Note:** You must use an analog monitor option card AO-A3 to output negative values.	5 V: 180 ° (-10 V to +10 V)
U6-14 (07CB) Expert	MagPolePosn(Obs)	V/f OLV/PM EZOLV Shows the value of the flux position estimation. Unit: 0.1 ° **Note:** You must use an analog monitor option card AO-A3 to output negative values.	10 V: 180 ° (-10 V to +10 V)
U6-17 (07D1) Expert	Energy Save Coeff	V/f OLV/PM EZOLV Shows the total time of direction of motor rotation detections for Speed Estimation Speed Searches. This value adjusts *b3-26 [Direction Determination Level]*. **Note:** Upper limit is +32767 and lower limit is -32767.	No signal output available

No. (Hex.)	Name	Description	MFAO Signal Level
U6-20 (07D4)	UP/DOWN 2 Bias Value	V/f OLV/PM EZOLV Shows the bias value used to adjust the frequency reference. Unit: 0.1%	10 V: Maximum Frequency
U6-31 (007B)	TorqueDetect Monitor	V/f OLV/PM EZOLV Monitors the torque reference or the output current after applying the filter. Unit: 0.1%	10 V:100%
U6-36 (0720) Expert	Comm Errors-Host	V/f OLV/PM EZOLV Shows the number of inter-CPU communication errors. When you de-energize the drive, this value resets to 0.	No signal output available
U6-37 (0721) Expert	Comm Errors-Sensor	V/f OLV/PM EZOLV Shows the number of inter-CPU communication errors. When you de-energize the drive, this value resets to 0.	No signal output available
U6-57 (07C4)	PolePolarityDeterVal	V/f OLV/PM EZOLV Shows the change from the integrated current when the drive finds the polarity. Unit: 1 **Note:** If the change from the integrated current is less than 819, increase *n8-84 [Polarity Detection Current]*. *U6-57 = 8192* is equivalent to the motor rated current.	No signal output available
U6-80 (07B0)	Option IP Address 1	V/f OLV/PM EZOLV Shows the currently available local IP Address (1st octet).	No signal output available
U6-81 (07B1)	Option IP Address 2	V/f OLV/PM EZOLV Shows the currently available local IP Address (2nd octet).	No signal output available
U6-82 (07B2)	Option IP Address 3	V/f OLV/PM EZOLV Shows the currently available local IP Address (3rd octet).	No signal output available
U6-83 (07B3)	Option IP Address 4	V/f OLV/PM EZOLV Shows the currently available local IP Address (4th octet).	No signal output available
U6-84 (07B4)	Online Subnet 1	V/f OLV/PM EZOLV Shows the currently available subnet mask (1st octet).	No signal output available
U6-85 (07B5)	Online Subnet 2	V/f OLV/PM EZOLV Shows the currently available subnet mask (2nd octet).	No signal output available
U6-86 (07B6)	Online Subnet 3	V/f OLV/PM EZOLV Shows the currently available subnet mask (3rd octet).	No signal output available
U6-87 (07B7)	Online Subnet 4	V/f OLV/PM EZOLV Shows the currently available subnet mask (4th octet).	No signal output available
U6-88 (07B8)	Online Gateway 1	V/f OLV/PM EZOLV Shows the currently available Gateway address (1st octet).	No signal output available
U6-89 (07B9)	Online Gateway 2	V/f OLV/PM EZOLV Shows the currently available Gateway address (2nd octet).	No signal output available
U6-90 (07F0)	Online Gateway 3	V/f OLV/PM EZOLV Shows the currently available Gateway address (3rd octet).	No signal output available
U6-91 (07F1)	Online Gateway 4	V/f OLV/PM EZOLV Shows the currently available Gateway address (4th octet).	No signal output available
U6-92 (07F2)	Online Speed	V/f OLV/PM EZOLV Shows the currently available communications speed. 10: 10 Mbps 100: 100 Mbps	No signal output available
U6-93 (07F3)	Online Duplex	V/f OLV/PM EZOLV Shows the currently available Duplex setting.	No signal output available
U6-97 (07F7)	OPT SPARE 4	V/f OLV/PM EZOLV Shows the option software version when you use the JOHB-SMP3 option. **Note:** When you use other options, refer to the Instruction Manual for the option.	No signal output available
U6-98 (07F8)	First Fault	V/f OLV/PM EZOLV Shows the contents of the most recent communication options fault (Modbus TCP/IP, EtherNet/IP).	No signal output available
U6-99 (07F9)	Current Fault	V/f OLV/PM EZOLV Shows the contents of current fault from communication options (Modbus TCP/IP, EtherNet/IP).	No signal output available

◆ U8: DriveWorksEZ Monitors

No. (Hex.)	Name	Description	MFAO Signal Level
U8-01 (1950)	DWEZ Monitor 1	V/f OLV/PM EZOLV Shows DWEZ Monitor 1. (Display range: 0.00% to 999.99%) Unit: 0.01%	10 V = 100%
U8-02 (1951)	DWEZ Monitor 2	V/f OLV/PM EZOLV Shows DWEZ Monitor 2. (Display range: 0.00% to 999.99%) Unit: 0.01%	10 V = 100%
U8-03 (1952)	DWEZ Monitor 3	V/f OLV/PM EZOLV Shows DWEZ Monitor 3. (Display range: 0.00% to 999.99%) Unit: 0.01%	10 V = 100%
U8-04 (1953)	DWEZ Monitor 4	V/f OLV/PM EZOLV Shows DWEZ Monitor 4. (Display range: 0.00% to 999.99%) Unit: 0.01%	10 V = 100%
U8-05 (1954)	DWEZ Monitor 5	V/f OLV/PM EZOLV Shows DWEZ Monitor 5. (Display range: 0.00% to 999.99%) Unit: 0.01%	10 V = 100%
U8-06 (1955)	DWEZ Monitor 6	V/f OLV/PM EZOLV Shows DWEZ Monitor 6. (Display range: 0.00% to 999.99%) Unit: 0.01%	10 V = 100%
U8-07 (1956)	DWEZ Monitor 7	V/f OLV/PM EZOLV Shows DWEZ Monitor 7. (Display range: -999.9% to +999.99%) Unit: 0.01%	10 V = 100%
U8-08 (1957)	DWEZ Monitor 8	V/f OLV/PM EZOLV Shows DWEZ Monitor 8. (Display range: -999.9% to +999.99%) Unit: 0.01%	10 V = 100%
U8-09 (1958)	DWEZ Monitor 9	V/f OLV/PM EZOLV Shows DWEZ Monitor 9. (Display range: -999.9% to +999.99%) Unit: 0.01%	10 V = 100%
U8-10 (1959)	DWEZ Monitor 10	V/f OLV/PM EZOLV Shows DWEZ Monitor 10.	No signal output available
U8-11 (195A)	DWEZ Version 1	V/f OLV/PM EZOLV Shows the Upper three digits of the user ID. When you click the setting button on the title bar of the PC tool to open the setting screen, you can confirm the user ID with the primary user ID display.	No signal output available
U8-12 (195B)	DWEZ Version 2	V/f OLV/PM EZOLV Shows the lower five digits of the user ID. When you click the setting button on the title bar of the PC tool to open the setting screen, you can confirm the user ID with the primary user ID display.	No signal output available
U8-13 (195C)	DWEZ Version 3	V/f OLV/PM EZOLV Shows the software ID.	No signal output available
U8-18 (1961)	DWEZ Platform Ver	V/f OLV/PM EZOLV Shows the DriveWorksEZ platform version.	No signal output available
U8-21 (1964)	DWEZ Monitor 21	V/f OLV/PM EZOLV Shows DWEZ Monitor 21. (Display range: -999.9% to +999.99%) Unit: 0.01%	10 V = 100%
U8-22 (1965)	DWEZ Monitor 22	V/f OLV/PM EZOLV Shows DWEZ Monitor 22. Unit: The number of decimal points shown is set with Q2-21.	10 V = 100%
U8-23 (1966)	DWEZ Monitor 23	V/f OLV/PM EZOLV Shows DWEZ Monitor 23. Unit: The number of decimal points shown is set with Q2-22.	10 V = 100%
U8-24 (1967)	DWEZ Monitor 24	V/f OLV/PM EZOLV Shows DWEZ Monitor 24. Unit: The number of decimal points shown is set with Q2-23.	10 V = 100%
U8-25 (1968)	DWEZ Monitor 25	V/f OLV/PM EZOLV Shows DWEZ Monitor 25. Unit: The number of decimal points shown is set with Q2-24.	10 V = 100%

No. (Hex.)	Name	Description	MFAO Signal Level
U8-31 (196E)	DWEZ Monitor 31	V/f OLV/PM EZOLV Shows DWEZ Monitor 31. (Display range: 0.00% to 999.99%) Unit: 0.01%	10 V = 100%
U8-32 (196F)	DWEZ Monitor 32	V/f OLV/PM EZOLV Shows DWEZ Monitor 32. (Display range: 0.00% to 999.99%) Unit: 0.01%	10 V = 100%
U8-33 (1970)	DWEZ Monitor 33	V/f OLV/PM EZOLV Shows DWEZ Monitor 33. (Display range: 0.00% to 999.99%) Unit: 0.01%	10 V = 100%
U8-34 (1971)	DWEZ Monitor 34	V/f OLV/PM EZOLV Shows DWEZ Monitor 34. (Display range: 0.00% to 999.99%) Unit: 0.01%	10 V = 100%
U8-35 (1972)	DWEZ Monitor 35	V/f OLV/PM EZOLV Shows DWEZ Monitor 35. (Display range: 0.00% to 999.99%) Unit: 0.01%	10 V = 100%
U8-36 (1973)	DWEZ Monitor 36	V/f OLV/PM EZOLV Shows DWEZ Monitor 36. (Display range: 0.00% to 999.99%) Unit: 0.01%	10 V = 100%
U8-37 (1974)	DWEZ Monitor 37	V/f OLV/PM EZOLV Shows DWEZ Monitor 37. (Display range: -999.9% to +999.99%) Unit: 0.01%	10 V = 100%
U8-38 (1975)	DWEZ Monitor 38	V/f OLV/PM EZOLV Shows DWEZ Monitor 38. (Display range: -999.9% to +999.99%) Unit: 0.01%	10 V = 100%
U8-39 (1976)	DWEZ Monitor 39	V/f OLV/PM EZOLV Shows DWEZ Monitor 39. (Display range: -999.9% to +999.99%) Unit: 0.01%	10 V = 100%
U8-40 (1977)	DWEZ Monitor 40	V/f OLV/PM EZOLV Shows DWEZ Monitor 40.	No signal output available
U8-51 (1982)	DWEZ Monitor 51	V/f OLV/PM EZOLV Shows DWEZ Monitor 51. (Display range: -999.9% to +999.99%) Unit: 0.01%	10 V = 100%
U8-52 (1983)	DWEZ Monitor 52	V/f OLV/PM EZOLV Shows DWEZ Monitor 52. Unit: The number of decimal points shown is set with Q2-41.	10 V = 100%
U8-53 (1984)	DWEZ Monitor 53	V/f OLV/PM EZOLV Shows DWEZ Monitor 53. Unit: The number of decimal points shown is set with Q2-42.	10 V = 100%
U8-54 (1985)	DWEZ Monitor 54	V/f OLV/PM EZOLV Shows DWEZ Monitor 54. Unit: The number of decimal points shown is set with Q2-43.	10 V = 100%
U8-55 (1986)	DWEZ Monitor 55	V/f OLV/PM EZOLV Shows DWEZ Monitor 55. Unit: The number of decimal points shown is set with Q2-44.	10 V = 100%
U8-60 (198B)	RemoteIO Status	V/f OLV/PM EZOLV Shows the operation status of Remote IO as 1 (ON) and 0 (OFF). If the DriveWorksEZ MEMOBUS master active signal is ON, for example, the monitor shows *U8-60 = 00000001*. bit 0 : Bit 0: DriveWorksEZ MEMOBUS Master Active bit 1 : Not used (normal value of 0) bit 2 : Not used (normal value of 0) bit 3 : Not used (normal value of 0) bit 4 : Not used (normal value of 0) bit 5 : Not used (normal value of 0) bit 6 : Not used (normal value of 0) bit 7 : Not used (normal value of 0)	No signal output available

No. (Hex.)	Name	Description	MFAO Signal Level
U8-61 (198C)	RemoteDI Monitor 0-7bit	V/f OLV/PM EZOLV Shows the operation status of Remote DI1 to DI8 as 1 (ON) and 0 (OFF). If Remote DI1 and DI2 are ON, for example, the monitor shows *U8-61 = 00000011*. bit 0 : Remote DI1 bit 1 : Remote DI2 bit 2 : Remote DI3 bit 3 : Remote DI4 bit 4 : Remote DI5 bit 5 : Remote DI6 bit 6 : Remote DI7 bit 7 : Remote DI8	No signal output available
U8-62 (198D)	RemoteDI Monitor 8-Fbit	V/f OLV/PM EZOLV Shows the operation status of Remote DI9 to DI16 as 1 (ON) and 0 (OFF). If Remote DI9 and DI10 are ON, for example, the monitor shows *U8-62 = 00000011*. bit 0 : Remote DI9 bit 1 : Remote DI10 bit 2 : Remote DI11 bit 3 : Remote DI12 bit 4 : Remote DI13 bit 5 : Remote DI14 bit 6 : Remote DI15 bit 7 : Remote DI16	No signal output available
U8-63 (198E)	RemoteDO Monitor 0-7bit	V/f OLV/PM EZOLV Shows the operation status of Remote DO1 to DO8 as 1 (ON) and 0 (OFF). If Remote DO1 and DO2 are ON, for example, the monitor shows *U8-63 = 00000011*. bit 0 : Remote DO1 bit 1 : Remote DO2 bit 2 : Remote DO3 bit 3 : Remote DO4 bit 4 : Remote DO5 bit 5 : Remote DO6 bit 6 : Remote DO7 bit 7 : Remote DO8	No signal output available
U8-64 (198F)	RemoteDO Monitor 8-Fbit	V/f OLV/PM EZOLV Shows the operation status of Remote DO9 to DO16 as 1 (ON) and 0 (OFF). If Remote DO9 and DO10 are ON, for example, the monitor shows *U8-64 = 00000011*. bit 0 : Remote DO9 bit 1 : Remote DO10 bit 2 : Remote DO11 bit 3 : Remote DO12 bit 4 : Remote DO13 bit 5 : Remote DO14 bit 6 : Remote DO15 bit 7 : Remote DO16	No signal output available

◆ UA: Network Multiplexing

No. (Hex.)	Name	Description	MFAO Signal Level
UA-01 (1EC1)	Network PID Feedback	V/f OLV/PM EZOLV Network PID Feedback recognized by the iQpump Memobus Network. Unit: 0.1 PSI	No signal output available
UA-02 (1EC2)	Network Activity	V/f OLV/PM EZOLV Shows network traffic. A fluctuating number from 0.0% to 100.0% identifies activity, while a relatively constant 0.0% identifies no activity. The unit is followed by an identifier that changes based on network status: <->: Drive cannot communicate to other drives <+>: Drive is a Node on a network <M>: Drive is the Master on an iQpump Network Unit: 0.1%	No signal output available
UA-03 (1EC3)	Time to Alternation	V/f OLV/PM EZOLV Time remaining before a drive requests alternation, which is dependent on *Y9-04 [Alternation Mode]*. Unit: 1 min	No signal output available

No. (Hex.)	Name	Description	MFAO Signal Level
UA-04 (1EC4)	Running Queue No	V/f OLV/PM EZOLV Position in the iQpump MEMOBUS Multiplex Running Queue.	No signal output available
UA-05 (1EC5)	iQ Drives Running	V/f OLV/PM EZOLV Drives that are running on the MEMOBUS Network. Bit positions correspond to the node address: bit 0 -> address 01h… bit 7 -> address 08h.	No signal output available
UA-06 (1EC6)	iQ Drives Available	V/f OLV/PM EZOLV Drives that can be controlled on the MEMOBUS Network. Bit positions correspond to the node address: bit 0 -> address 01h, bit 1 -> address 02h … bit 7 -> address 08h.	No signal output available
UA-07 (1EC7)	VFD Run Time+Offset	V/f OLV/PM EZOLV Shows the cumulative run time of the drive added to the run time offset set in *Y9-55 [VFD Run Time Offset]*. The maximum value that this monitor can display is 65535. Network multiplex refers to this monitor value for run time selection when *Y9-01 = 1 [Lead Drive Selection: Lowest Runtime]*. Check *U4-01 [Total VFD Run Time]* for only the cumulative run time of the drive and for values higher than 65535. Unit: 1 H	No signal output available
UA-79 (37AF)	PID Feedback Backup	V/f OLV/PM EZOLV Shows the PID Feedback Backup *[H3-xx = 24]* signal that the drive uses when it loses PID Feedback *[H3-xx = B]*. Unit: 0.1 PSI	No signal output available
UA-81 (3BB0)	Diff Level Source	V/f OLV/PM EZOLV Shows the Differential Feedback signal from the terminal set for *H3-xx = 2D [Differential Level Source]*. Unit: 0.1 PSI	No signal output available
UA-83 (3B9E)	Flow Rate	V/f OLV/PM EZOLV Shows the flow rate based on the pulse input frequency or the analog voltage (flow rate input) and *Y6-01 [Flow Meter Scaling]* and *Y6-04 [Water Flow Units]*. **Note:** • A 2-second first order filter is applied to this monitor. • Unit text is set by *Y6-04* and decimal place position is set by *Y6-22 [Flow Meter Decimal Place Pos]*. Unit: 0.1	Full Scale: Y6-01
UA-84 (3B9F)	AccumLvl - Millions	V/f OLV/PM EZOLV Monitors *UA-84* to *UA-87* display the volume recorded from the flow meter (Pulse Input or Analog). Total Volume = (*UA-84* × 1000000) + (*UA-85* × 1000) + *UA-86* + *UA-87* **Note:** Unit text depends on *Y6-16 [Flow Meter Accumulation Units]*. Unit: 1 - 0.0001	No signal output available
UA-85 (3BA0)	AccumLvl - Thousands	V/f OLV/PM EZOLV Monitors *UA-84* to *UA-87* display the volume recorded from the flow meter (Pulse Input or Analog). Total Volume = (*UA-84* × 1000000) + (*UA-85* × 1000) + *UA-86* + *UA-87* **Note:** Unit text depends on *Y6-16 [Flow Meter Accumulation Units]*. Unit: 1 - 0.0001	No signal output available
UA-86 (3BA1)	AccumLvl - Ones	V/f OLV/PM EZOLV Monitors *UA-84* to *UA-87* display the volume recorded from the flow meter (Pulse Input or Analog). Total Volume = (*UA-84* × 1000000) + (*UA-85* × 1000) + *UA-86* + *UA-87* **Note:** Unit text depends on *Y6-16 [Flow Meter Accumulation Units]*. Unit: 1 - 0.0001	No signal output available
UA-87 (3BA2)	AccumLvl - Decimals	V/f OLV/PM EZOLV Monitors *UA-84* to *UA-87* display the volume recorded from the flow meter (Pulse Input or Analog). Total Volume = (*UA-84* × 1000000) + (*UA-85* × 1000) + *UA-86* + *UA-87* **Note:** Unit text depends on *Y6-16 [Flow Meter Accumulation Units]*. Unit: 1 - 0.0001	No signal output available
UA-88 (3BA3)	Total Volume Accum	V/f OLV/PM EZOLV Displays the total accumulated volume. **Note:** • This monitor will always return 0 when read over MEMOBUS. • Unit text and decimal place depend on *Y6-16 [Flow Meter Accumulation Units]*. No decimal places are displayed for gallons. Four decimal places are displayed for Acre-Feet. Unit: 0.0001	No signal output available

No. (Hex.)	Name	Description	MFAO Signal Level
UA-89 (3BA4)	Delta Volume Accum	V/f OLV/PM EZOLV Displays the delta of the total accumulated volume. Delta Volume Accumulated = Total Volume - Starting Delta Volume [(*UA-84* to *UA-87* or *UA-88*) - (*Y6-36* to *Y6-39*)] **Note:** • This monitor will always return 0 when read over MEMOBUS. • Unit text and decimal place depend on *Y6-16 [Flow Meter Accumulation Units]*. No decimal places are displayed for gallons. Four decimal places are displayed for Acre-Feet. Unit: 0.0001	No signal output available
UA-90 (3BA5)	Pump Setpoint	V/f OLV/PM EZOLV Shows the PID Setpoint. Unit: 0.01 **Note:** Units set by *Y1-02 [System Units]*, internal scaling by *Y1-03 [Feedback Device Scaling]*, and resolution by *b5-39 [PID User Unit Display Digits]*.	No signal output available
UA-91 (3BA6)	Pump Feedback	V/f OLV/PM EZOLV Shows the PID Feedback. Unit: 0.01 **Note:** Units set by *Y1-02 [System Units]*, internal scaling by *Y1-03 [Feedback Device Scaling]*, and resolution by *b5-39 [PID User Unit Display Digits]*.	10 V = *Y1-03*
UA-92 (3BA7)	Pump Status	V/f OLV/PM EZOLV Shows pump running status where 0 = (OFF) and 1 = (Running). For example, *UA-92* shows "00111111" when the drive and Pump 2 to Pump 6 are running. bit 0 : Drive bit 1 : Pump 2 bit 2 : Pump 3 bit 3 : Pump 4 bit 4 : Pump 5 bit 5 : Pump 6 bit 6 : Not used (normal value of 0). bit 7 : Not used (normal value of 0).	No signal output available
UA-93 (3BA8)	Total Setpoint Comp.	V/f OLV/PM EZOLV Shows the total setpoint compensation in absolute value. Unit: 0.01 **Note:** Units set by *Y1-02 [System Units]*, internal scaling by *Y1-03 [Feedback Device Scaling]*, and resolution by *b5-39 [PID User Unit Display Digits]*.	No signal output available
UA-94 (3BA9)	Motor Speed	V/f OLV/PM EZOLV Shows the absolute value of *U1-02 [Output Frequency]* converted to RPM. Unit: 1 RPM	No signal output available
UA-96 (3BAB)	PI Aux Ctrl Feedback	V/f OLV/PM EZOLV Shows the PI Auxiliary Control Feedback level from the terminal set for *H3-xx = 27 [PI Auxiliary Control Feedback]*. Unit: 1 PSI **Note:** Parameters *YF-21 [PI Aux Ctrl Level Unit Selection]* and *YF-22 [PI Aux Level Decimal Place Pos]* set the unit and resolution.	No signal output available
UA-97 (3BAC)	Water Level	V/f OLV/PM EZOLV Displays the amount of water above the water level sensor. [LPF] Unit: 0.1 ft	10 V = Yd-02
UA-98 (3BAD)	Suction Pressure	V/f OLV/PM EZOLV Shows the amount of suction pressure. Unit: 0.1 **Note:** Unit is dependent on *YE-01 [Suction Pressure Control Select]* where setting 1 is PSI and setting 2 is "Hg, and decimal place position is dependent on *YE-22 [Suction Pressure Dec Place Pos]*.	10 V = YE-02
UA-99 (3BB1)	Anti-No-Flow Timer	V/f OLV/PM EZOLV Shows the value of the anti-no-flow timer. When this value is at the *Y2-24 [Anti-No-Flow Detection Time]* setting, the anti-no-flow feature starts to decrease the output frequency. Unit: 0.1 s	No signal output available

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

The values for parameter *A1-02* changes the default settings for the parameters in these tables:

◆ A1-02 = 0 [V/f]

No.	Name	Range	Unit	Control Method (A1-02 Setting)
				V/f (0)
b2-04	DC Inject Braking Time at Stop	0.00 - 10.00	0.01 s	0.50
b2-13	Short Circuit Brake Time @ Stop	0.00 - 25.50	0.01 s	-
b3-08	Speed Estimation ACR P Gain	0.00 - 6.00	0.01	0.50 *1
b3-09	Speed Estimation ACR I Time	0.0 - 1000.0	0.1 ms	2.0
b3-10	Speed Estimation Detection Gain	1.00 - 1.20 *2	0.01	1.05
b3-14	Bi-directional Speed Search	0 - 1	1	0 *3
b3-24	Speed Search Method Selection	1 - 2	1	2
b8-19	E-Save Search Injection Freq	10 - 300	1 Hz	-
C2-01	S-Curve Time @ Start of Accel	0.00 - 10.00	0.01 s	0.20
C3-02	Slip Compensation Delay Time	0 - 10000	1 ms	2000
C4-01	Torque Compensation Gain	0.00 - 2.50	0.01	1.00
C4-02	Torque Compensation Delay Time	0 - 60000	1 ms	200
C5-01	ASR Proportional Gain 1	0.00 - 300.00	0.01	-
C5-02	ASR Integral Time 1	0.000 - 60.000	0.001 s	-
C5-03	ASR Proportional Gain 2	0.00 - 300.00	0.01	-
C5-04	ASR Integral Time 2	0.000 - 60.000	0.001 s	-
C5-06	ASR Delay Time	0.000 - 0.500	0.001 s	-
C6-02	Carrier Frequency Selection	1 - F	7	7 *1
E1-04	Maximum Output Frequency	40.0 - 400.0 *4	0.1 Hz	60.0 *5
E1-05	Maximum Output Voltage	0.0 - 255.0 *6	0.1 V	230.0 *5
E1-06	Base Frequency	0.0 - 400.0 *4	0.1 Hz	60.0 *5
E1-09	Minimum Output Frequency	0.0 - 400.0 *4	0.1 Hz	1.5 *5
L1-01	Motor Overload (oL1) Protection	0 - 6	1	2
L2-31	KEB Start Voltage Offset Level	0 - 100 *6	1 V	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
n8-51	Pull-in Current @ Acceleration	0 - 200	1%	-
o1-03	Frequency Display Unit Selection	0 - 3	1	0
o1-28	Custom Monitor 5	0, 101 - 1099	1	116

*1 The default setting changes when the setting for *o2-04 [Drive Model Selection]* changes.
*2 The setting range changes when the *A1-02 [Control Method Selection]* setting changes.
*3 When *b3-24 = 1*, the default value is 1.
*4 The setting range varies depending on the setting of *E5-01 [PM Motor Code Selection]* when *A1-02 = 5 [Control Method Selection = PM Open Loop Vector]*.
*5 The default setting changes when the drive model and *E1-03 [V/f Pattern Selection]* change.
*6 This is the value for 208 V class drives. Double the value for 480 V class drives.

◆ A1-02 = 5 and 8 [OLV/PM and EZOLV]

No.	Name	Range	Unit	Control Method (A1-02 Setting)	
				OLV/PM (5)	EZOLV (8)
b2-04	DC Inject Braking Time at Stop	0.00 - 10.00	0.01 s	0.00	0.00
b2-13	Short Circuit Brake Time @ Stop	0.00 - 25.50	0.01 s	0.50	0.00 *1
b3-08	Speed Estimation ACR P Gain	0.00 - 6.00	0.01	0.30	0.60 *2
b3-09	Speed Estimation ACR I Time	0.0 - 1000.0	0.1 ms	2.0	10.0
b3-10	Speed Estimation Detection Gain	1.00 - 1.20 *3	0.01	-	1.00
b3-14	Bi-directional Speed Search	0 - 1	1	-	0
b3-24	Speed Search Method Selection	1 - 2	1	-	1 *4
C2-01	S-Curve Time @ Start of Accel	0.00 - 10.00	0.01 s	1.00	1.00
C3-02	Slip Compensation Delay Time	0 - 10000	1 ms	-	200
C4-01	Torque Compensation Gain	0.00 - 2.50	0.01	0.00	0.00
C4-02	Torque Compensation Delay Time	0 - 60000	1 ms	100	200
C6-02	Carrier Frequency Selection	1 - F	1	2 *2	2 *2
E1-04	Maximum Output Frequency	40.0 - 400.0	0.1 Hz	Determined by E5-01	-
E1-05	Maximum Output Voltage	0.0 - 255.0 *5	0.1 V	Determined by E5-01	-
E1-06	Base Frequency	0.0 - 400.0	0.1 Hz	Determined by E5-01	-
E1-09	Minimum Output Frequency	0.0 - 400.0	0.1 Hz	Determined by E5-01	-
L1-01	Motor Overload (oL1) Protection	0 - 6	1	4	1 *6
L2-31	KEB Start Voltage Offset Level	0 - 100 *5	1 V	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
n8-51	Pull-in Current @ Acceleration	0 - 200	1%	50	80
o1-03	Frequency Display Unit Selection	0 - 3	1	2	0 *7
o1-28	Custom Monitor 5	0, 101 - 1099	1	116	105

*1 Enabled only when *E9-01 = 1 [Motor Type Selection = Permanent Magnet (PM)]*

*2 The default setting is different for different models.

- 2011 - 2114, 4005 - 4052: 0.6
- 2143 - 2396, 4065 - 4720: 0.3

*3 The setting range changes when the *A1-02 [Control Method Selection]* setting changes.

*4 The default settings are different for different motor types.

- *E9-01 = 0 [Motor Type Selection = Induction (IM)]*: 2
- *E9-01 = 1, 2 [Permanent Magnet (PM), Synchronous Reluctance (SynRM)]*: 1

*5 This is the value for 208 V class drives. Double the value for 480 V class drives.

*6 The default settings are different for different motor types.

- *E9-01 = 0 [Motor Type Selection = Induction (IM)]*: 1
- *E9-01 = 1, 2 [Permanent Magnet (PM), Synchronous Reluctance (SynRM)]*: 4

*7 The default settings are different for different motor types.

- *E9-01 = 0 [Motor Type Selection = Induction (IM)]*: 0
- *E9-01 = 1, 2 [Permanent Magnet (PM), Synchronous Reluctance (SynRM)]*: 1

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

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

Table 3.1 Parameters Changed by E1-03: 2011, 2017 and 4005 to 4011

No.	E1-03	E1-04	E1-05 *1*	E1-06	E1-07	E1-08 *1*	E1-09	E1-10 *1*
Unit	-	Hz	V	Hz	Hz	V	Hz	V
Setting Value	0	50.0	230.0	50.0	2.5	17.3	1.3	10.4
	1	60.0	230.0	60.0	3.0	17.3	1.5	10.4
	2	60.0	230.0	50.0	3.0	17.3	1.5	10.4
	3	72.0	230.0	60.0	3.0	17.3	1.5	10.4
	4	50.0	230.0	50.0	25.0	40.3	1.3	9.2
	5	50.0	230.0	50.0	25.0	57.5	1.3	10.4
	6	60.0	230.0	60.0	30.0	40.3	1.5	9.2
	7	60.0	230.0	60.0	30.0	57.5	1.5	10.4
	8	50.0	230.0	50.0	2.5	21.9	1.3	12.7
	9	50.0	230.0	50.0	2.5	27.6	1.3	15
	A	60.0	230.0	60.0	3.0	21.9	1.5	12.7
	B	60.0	230.0	60.0	3.0	27.6	1.5	17.3
	C	90.0	230.0	60.0	3.0	17.3	1.5	10.4
	D	120.0	230.0	60.0	3.0	17.3	1.5	10.4
	E	180.0	230.0	60.0	3.0	17.3	1.5	10.4
	F	60.0 *2*	230.0 *2*	60.0 *2*	3.0 *2*	17.3 *2*	1.5 *2*	10.2 *2*
Control Method (A1-02 Setting)	OLV/PM (5)	*3*	*3*	*3*	-	-	*3*	-

*1 This is the value for 208 V class drives. Double the value for 480 V class drives.
*2 These values are the default settings for *E1-04 to E1-10* and *E3-04 to E3-10 [V/f Pattern for Motor 2]*. These settings are the same as those for the V/f pattern when *E1-03 = 7 [VT, 60 Hz, 50% Vmid reduction]*.
*3 The default setting varies depending on the setting of *E5-01 [PM Motor Code Selection]*.

Table 3.2 Parameters Changed by E1-03: 2024 to 2169 and 4014 to 4065

No.	E1-03	E1-04	E1-05 *1*	E1-06	E1-07	E1-08 *1*	E1-09	E1-10 *1*
Unit	-	Hz	V	Hz	Hz	V	Hz	V
Setting Value	0	50.0	230.0	50.0	2.5	16.1	1.3	8.05
	1	60.0	230.0	60.0	3.0	16.1	1.5	8.05
	2	60.0	230.0	50.0	3.0	16.1	1.5	8.05
	3	72.0	230.0	60.0	3.0	16.1	1.5	8.05
	4	50.0	230.0	50.0	25.0	40.3	1.3	6.9
	5	50.0	230.0	50.0	25.0	57.5	1.3	8.05
	6	60.0	230.0	60.0	30.0	40.3	1.5	6.9
	7	60.0	230.0	60.0	30.0	57.5	1.5	8.05
	8	50.0	230.0	50.0	2.5	20.7	1.3	10.4
	9	50.0	230.0	50.0	2.5	26.5	1.3	12.7
	A	60.0	230.0	60.0	3.0	20.7	1.5	10.4
	B	60.0	230.0	60.0	3.0	26.5	1.5	15
	C	90.0	230.0	60.0	3.0	16.1	1.5	8.05
	D	120.0	230.0	60.0	3.0	16.1	1.5	8.05
	E	180.0	230.0	60.0	3.0	16.1	1.5	8.05
	F	60.0 *2*	230.0 *2*	60.0 *2*	3.0 *2*	16.1 *2*	1.5 *2*	8.1 *2*
Control Method (A1-02 Setting)	OLV/PM (5)	*3*	*3*	*3*	-	-	*3*	-

*1 This is the value for 208 V class drives. Double the value for 480 V class drives.
*2 These values are the default settings for *E1-04 to E1-10* and *E3-04 to E3-10 [V/f Pattern for Motor 2]*. These settings are the same as those for the V/f pattern when *E1-03 = 7 [VT, 60 Hz, 50% Vmid reduction]*.
*3 The default setting varies depending on the setting of *E5-01 [PM Motor Code Selection]*.

Table 3.3 Parameters Changed by E1-03: 2211 to 2396 and 4077 to 4720

No.	E1-03	E1-04	E1-05 *1*	E1-06	E1-07	E1-08 *1*	E1-09	E1-10 *1*
Unit	-	Hz	V	Hz	Hz	V	Hz	V
Setting Value	0	50.0	230.0	50.0	2.5	13.8	1.3	6.9
	1	60.0	230.0	60.0	3.0	13.8	1.5	6.9
	2	60.0	230.0	50.0	3.0	13.8	1.5	6.9
	3	72.0	230.0	60.0	3.0	13.8	1.5	6.9
	4	50.0	230.0	50.0	25.0	40.3	1.3	5.75
	5	50.0	230.0	50.0	25.0	57.5	1.3	6.9
	6	60.0	230.0	60.0	30.0	40.3	1.5	5.75
	7	60.0	230.0	60.0	30.0	57.5	1.5	6.9
	8	50.0	230.0	50.0	2.5	17.3	1.3	8.05
	9	50.0	230.0	50.0	2.5	23	1.3	10.4
	A	60.0	230.0	60.0	3.0	17.3	1.5	8.05
	B	60.0	230.0	60.0	3.0	23	1.5	12.7
	C	90.0	230.0	60.0	3.0	13.8	1.5	6.9
	D	120.0	230.0	60.0	3.0	13.8	1.5	6.9
	E	180.0	230.0	60.0	3.0	13.8	1.5	6.9
	F	60.0 *2*	230.0 *2*	60.0 *2*	3.0 *2*	13.8 *2*	1.5 *2*	6.9 *2*
Control Method (A1-02 Setting)	OLV/PM (5)	*3*	*3*	*3*	-	-	*3*	-

*1 This is the value for 208 V class drives. Double the value for 480 V class drives.
*2 These values are the default settings for *E1-04 to E1-10* and *E3-04 to E3-10 [V/f Pattern for Motor 2]*. These settings are the same as those for the V/f pattern when *E1-03 = 7 [VT, 60 Hz, 50% Vmid reduction]*.
*3 The default setting varies depending on the setting of *E5-01 [PM Motor Code Selection]*.

3.21 Defaults by o2-04 [Drive Model (kVA) Selection]

The values for parameter *o2-04* changes the default settings for the parameters in these tables:

◆ 208 V Class

No. *1	Name	Unit	Default							
-	Drive Model	-	2011	2017	2024	2031	2046	2059	2075	2088
o2-04	Drive Model (KVA) Selection	Hex.	65	67	68	6A	6B	6D	6E	6F
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	3 (2.2)	5 (3.7)	7.5 (5.5)	10 (7.5)	15 (11)	20 (15)	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	-	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
b3-12	Speed Search Current Deadband	-	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
b3-56	InverseRotationSearch WaitTime	s	0.5	0.6	0.7	0.8	0.9	1.0	1.0	1.0
b8-04	Energy Saving Coefficient Value	-	156.8	122.9	94.75	72.69	70.44	63.13	57.87	51.79
C6-02 *2	Carrier Frequency Selection	-	7	7	7	7	7	7	7	7
E2-01 (E4-01)	Motor Rated Current (FLA)	A	10.6	16.7	24.2	30.8	46.2	59.4	74.8	88
E2-02 (E4-02)	Motor Rated Slip	Hz	2.90	2.73	1.50	1.30	1.70	1.60	1.67	1.70
E2-03 (E4-03)	Motor No-Load Current	A	3.0	4.5	5.1	8.0	11.2	15.2	15.7	18.5
E2-05 (E4-05)	Motor Line-to-Line Resistance	Ω	1.601	0.771	0.399	0.288	0.230	0.138	0.101	0.079
E2-06 (E4-06)	Motor Leakage Inductance	%	18.4	19.6	18.2	15.5	19.5	17.2	20.1	19.5
E2-10 (E4-10)	Motor Iron Loss	W	77	112	172	262	245	272	505	538
E5-01	PM Motor Code Selection	-	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF
L2-02	Power Loss Ride Through Time	s	0.7	0.9	1.5	1.8	2.0	2.0	2.0	2.0
L2-03	Minimum Baseblock Time	s	0.5	0.6	0.7	0.8	0.9	1.0	1.0	1.0
L2-04	Powerloss V/f Recovery Ramp Time	s	0.3	0.3	0.3	0.3	0.3	0.6	0.6	0.6
L2-05	Undervoltage Detection Lvl (Uv1)	-	190	190	190	190	190	190	190	190

No. *1	Name	Unit	Default							
-	Drive Model	-	2011	2017	2024	2031	2046	2059	2075	2088
o2-04	Drive Model (KVA) Selection	Hex.	65	67	68	6A	6B	6D	6E	6F
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	3 (2.2)	5 (3.7)	7.5 (5.5)	10 (7.5)	15 (11)	20 (15)	25 (18.5)	30 (22)
L3-24	Motor Accel Time for Inertia Cal	s	0.145	0.154	0.168	0.175	0.265	0.244	0.317	0.355
L8-02	Overheat Alarm Level	°C	95	95	125	125	125	125	115	115
L8-09	Output Ground Fault Detection	-	0	0	0	0	1	1	1	1
L8-35	Installation Method Selection	-	2 *3	2 *3	2 *3	2 *3	2 *3	2 *3	2 *3	2 *3
n1-03	Hunting Prevention Time Constant	ms	10	10	10	10	10	10	10	10

*1 Parameters in parentheses are for motor 2.
*2 These values apply only when *A1-02 = 0 [Control Method Selection = V/f]*. When *A1-02 = 5 and 8 [OLV/PM and EZOLV]*, the value is 2.
*3 When you use an IP55/UL Type 12 drive, the factory default setting is *3 [IP55/UL Type 12]*.

No. *1	Name	Unit	Default						
-	Drive Model	-	2114	2143	2169	2211	2273	2343	2396
o2-04	Drive Model (KVA) Selection	Hex.	70	72	73	74	75	76	77
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	40 (30)	50 (37)	60 (45)	75 (55)	100 (75)	125 (90)	150 (110)
b3-04	V/f Gain during Speed Search	%	80	80	80	80	80	80	80
b3-06	Speed Estimation Current Level 1	-	0.5	0.5	0.5	0.5	0.7	0.7	0.7
b3-08	Speed Estimation ACR P Gain	-	0.50	0.50	0.50	0.50	0.50	0.50	0.50
b3-12	Speed Search Current Deadband	-	2.5	2.5	2.5	2.5	2.5	2.5	2.5
b3-56	InverseRotation Search WaitTime	s	1.1	1.1	1.2	1.3	1.5	1.5	1.7
b8-04	Energy Saving Coefficient Value	-	46.27	38.16	35.78	31.35	23.10	20.65	18.12
C6-02 *2	Carrier Frequency Selection	-	7	7	7	1	1	1	1
E2-01 (E4-01)	Motor Rated Current (FLA)	A	114	143	169	211	273	343	396
E2-02 (E4-02)	Motor Rated Slip	Hz	1.80	1.33	1.60	1.43	1.39	1.39	1.39
E2-03 (E4-03)	Motor No-Load Current	A	21.9	38.2	44.0	45.6	72.0	72.0	72.0
E2-05 (E4-05)	Motor Line-to-Line Resistance	Ω	0.064	0.039	0.030	0.022	0.023	0.023	0.023
E2-06 (E4-06)	Motor Leakage Inductance	%	20.8	18.8	20.2	20.5	20.0	20.0	20.0

No. *1	Name	Unit	Default						
-	Drive Model	-	2114	2143	2169	2211	2273	2343	2396
o2-04	Drive Model (KVA) Selection	Hex.	70	72	73	74	75	76	77
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	40 (30)	50 (37)	60 (45)	75 (55)	100 (75)	125 (90)	150 (110)
E2-10 (E4-10)	Motor Iron Loss	W	699	823	852	960	1200	1200	1200
E5-01	PM Motor Code Selection	-	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF
L2-02	Power Loss Ride Through Time	s	2.0	2.0	2.0	2.0	2.0	2.0	2.0
L2-03	Minimum Baseblock Time	s	1.1	1.1	1.2	1.3	1.5	1.5	1.7
L2-04	Powerloss V/f Recovery Ramp Time	s	0.6	0.6	1	1	1	1	1
L2-05	Undervoltage Detection Lvl (Uv1)	-	190	190	190	190	190	190	190
L3-24	Motor Accel Time for Inertia Cal	s	0.323	0.32	0.387	0.317	0.533	0.592	0.646
L8-02	Overheat Alarm Level	°C	115	110	110	105	105	105	105
L8-09	Output Ground Fault Detection	-	1	1	1	1	1	1	1
L8-35	Installation Method Selection	-	2 *3	2 *3	2 *3	0	0	0	0
n1-03	Hunting Prevention Time Constant	ms	10	10	10	10	10	100	100

*1 Parameters in parentheses are for motor 2.
*2 These values apply only when *A1-02 = 0 [Control Method Selection = V/f]*. When *A1-02 = 5 and 8 [OLV/PM and EZOLV]*, the value is 2.
*3 When you use an IP55/UL Type 12 drive, the factory default setting is *3 [IP55/UL Type 12]*.

◆ 480 V Class

No. *1	Name	Unit	Default							
-	Drive Model	-	4005	4008xF	4008xV 4008xT	4011	4014	4021	4027	4034
o2-04	Drive Model (KVA) Selection	Hex.	95	97	BB	99	9A	9B	9D	9E
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	3 (2.2)	5 (3.7)	5 (3.7)	7.5 (5.5)	10 (7.5)	15 (11)	20 (15)	25 (18.5)
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	-	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
b3-12	Speed Search Current Deadband	-	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5

No. *1	Name	Unit	Default							
-	Drive Model	-	4005	4008xF	4008xV 4008xT	4011	4014	4021	4027	4034
o2-04	Drive Model (KVA) Selection	Hex.	95	97	BB	99	9A	9B	9D	9E
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	3 (2.2)	5 (3.7)	5 (3.7)	7.5 (5.5)	10 (7.5)	15 (11)	20 (15)	25 (18.5)
b3-56	InverseRotationSearch WaitTime	s	0.5	0.6	0.6	0.7	0.8	0.9	1.0	1.0
b8-04	Energy Saving Coefficient Value	-	313.6	245.8	245.8	189.5	145.38	140.88	126.26	115.74
C6-02 *2	Carrier Frequency Selection	-	7	7	7	7	7	7	7	7
E2-01 (E4-01)	Motor Rated Current (FLA)	A	4.80	7.60	7.60	11.00	14.00	21.0	27.0	34.0
E2-02 (E4-02)	Motor Rated Slip	Hz	3.00	2.70	2.70	1.50	1.30	1.70	1.60	1.67
E2-03 (E4-03)	Motor No-Load Current	A	1.5	2.3	2.3	2.6	4	5.6	7.6	7.8
E2-05 (E4-05)	Motor Line-to-Line Resistance	Ω	6.495	3.333	3.333	1.595	1.152	0.922	0.550	0.403
E2-06 (E4-06)	Motor Leakage Inductance	%	18.7	19.3	19.3	18.2	15.5	19.6	17.2	20.1
E2-10 (E4-10)	Motor Iron Loss	W	77	130	130	193	263	385	440	508
E5-01	PM Motor Code Selection	-	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF
L2-02	Power Loss Ride Through Time	s	0.7	0.9	0.9	1.3	1.3	1.7	2.0	2.0
L2-03	Minimum Baseblock Time	s	0.5	0.6	0.6	0.7	0.8	0.9	1.0	1.0
L2-04	Powerloss V/f Recovery Ramp Time	s	0.3	0.3	0.3	0.3	0.3	0.3	0.6	0.6
L2-05	Undervoltage Detection Lvl (Uv1)	-	380	380	380	380	380	380	380	380
L3-24	Motor Accel Time for Inertia Cal	s	0.145	0.154	0.154	0.168	0.175	0.265	0.244	0.317
L8-02	Overheat Alarm Level	°C	115	115	95	95	95	127	127	127
L8-09	Output Ground Fault Detection	-	0	0	0	0	0	0	0	0
L8-35	Installation Method Selection	-	2 *2	2	3	2 *2	2 *2	2 *2	2 *2	2 *2
n1-03	Hunting Prevention Time Constant	ms	10	10	10	10	10	10	10	10

*1 Parameters in parentheses are for motor 2.
*2 When you use an IP55/UL Type 12 drive, the factory default setting is *3 [IP55/UL Type 12]*.
*3 These values apply only when *A1-02 = 0 [Control Method Selection = V/f]*. When *A1-02 = 5 and 8 [OLV/PM and EZOLV]*, the value is 2.

No. *1	Name	Unit	Default						
-	Drive Model	-	4040	4052	4065	4077	4096	4124	4156
o2-04	Drive Model (KVA) Selection	Hex.	9F	A0	A2	A3	A4	A5	A6
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	30 (22)	40 (30)	50 (37)	60 (45)	75 (55)	100 (75)	125 (90)
b3-04	V/f Gain during Speed Search	%	100	100	100	100	80	60	60
b3-06	Speed Estimation Current Level 1	-	0.5	0.5	0.5	0.5	0.5	0.7	0.7
b3-08	Speed Estimation ACR P Gain	-	0.50	0.50	0.50	0.50	0.50	0.80	0.80
b3-12	Speed Search Current Deadband	-	2.5	2.5	2.5	2.5	2.5	2.5	2.5
b3-56	InverseRotation Search WaitTime	s	1.0	1.1	1.1	1.2	1.2	1.3	1.5
b8-04	Energy Saving Coefficient Value	-	103.58	92.54	76.32	71.56	67.2	46.2	38.91
C6-02 *2	Carrier Frequency Selection	-	7	7	7	7	7	7	7
E2-01 (E4-01)	Motor Rated Current (FLA)	A	40.0	52.0	65.0	77.0	96.0	124.0	156.0
E2-02 (E4-02)	Motor Rated Slip	Hz	1.70	1.80	1.33	1.60	1.46	1.39	1.40
E2-03 (E4-03)	Motor No-Load Current	A	9.2	10.9	19.1	22	24	36	40
E2-05 (E4-05)	Motor Line-to-Line Resistance	Ω	0.316	0.269	0.155	0.122	0.088	0.092	0.056
E2-06 (E4-06)	Motor Leakage Inductance	%	23.5	20.7	18.8	19.9	20.0	20.0	20.0
E2-10 (E4-10)	Motor Iron Loss	W	586	750	925	1125	1260	1600	1760
E5-01	PM Motor Code Selection	-	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF
L2-02	Power Loss Ride Through Time	s	2.0	2.0	2.0	2.0	2.0	2.0	2.0
L2-03	Minimum Baseblock Time	s	1.0	1.1	1.1	1.2	1.2	1.3	1.5
L2-04	Powerloss V/f Recovery Ramp Time	s	0.6	0.6	0.6	0.6	1.0	1.0	1.0
L2-05	Undervoltage Detection Lvl (Uv1)	-	380	380	380	380	380	380	380
L3-24	Motor Accel Time for Inertia Cal	s	0.355	0.323	0.320	0.387	0.317	0.533	0.592
L8-02	Overheat Alarm Level	°C	123	123	123	120	124	124	110
L8-09	Output Ground Fault Detection	-	1	1	1	1	1	1	1
L8-35	Installation Method Selection	-	2 *2	2 *2	2 *2	2 *2	2 *2	2 *2	2 *2
n1-03	Hunting Prevention Time Constant	ms	10	10	10	10	10	30	30

*1 Parameters in parentheses are for motor 2.
*2 When you use an IP55/UL Type 12 drive, the factory default setting is *3 [IP55/UL Type 12]*.
*3 These values apply only when *A1-02 = 0 [Control Method Selection = V/f]*. When *A1-02 = 5 and 8 [OLV/PM and EZOLV]*, the value is 2.

No. *1	Name	Unit	Default								
-	Drive Model	-	4180	4240	4302	4361	4414	4477	4515	4590	4720
o2-04	Drive Model (KVA) Selection	Hex.	A7	A8	A9	AA	AC	AD	AE	B1	B2
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	150 (110)	200 (150)	250 (185)	295 (220)	350 (260)	400 (300)	450 (335)	500 (375)	600 (450)
b3-04	V/f Gain during Speed Search	%	60	60	60	60	60	60	60	60	60
b3-06	Speed Estimation Current Level 1	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
b3-08	Speed Estimation ACR P Gain	-	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
b3-12	Speed Search Current Deadband	-	2.5	2.5	2.5	7.0	7.0	7.0	7.0	7.0	2.5
b3-56	InverseRotationSearch WaitTime	s	1.7	1.7	1.9	2.0	2.1	2.1	2.1	2.3	2.8
b8-04	Energy Saving Coefficient Value	-	36.23	32.79	30.57	27.13	21.76	21.76	21.76	23.84	21.40
C6-02 *2	Carrier Frequency Selection	-	1	1	1	1	1	1	1	1	1
E2-01 (E4-01)	Motor Rated Current (FLA)	A	180.0	240.0	302.0	361.0	414.0	477.0	515.0	590.0	720.0
E2-02 (E4-02)	Motor Rated Slip	Hz	1.40	1.38	1.30	1.30	1.25	1.25	1.25	1.00	1.00
E2-03 (E4-03)	Motor No-Load Current	A	49	58	81	96	130	130	130	130	160
E2-05 (E4-05)	Motor Line-to-Line Resistance	Ω	0.046	0.035	0.025	0.020	0.014	0.014	0.014	0.012	0.010
E2-06 (E4-06)	Motor Leakage Inductance	%	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
E2-10 (E4-10)	Motor Iron Loss	W	2150	2350	3200	3700	4700	4700	4700	5560	7050
E5-01	PM Motor Code Selection	-	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF	FFFF
L2-02	Power Loss Ride Through Time	s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
L2-03	Minimum Baseblock Time	s	1.7	1.7	1.9	2.0	2.1	2.1	2.1	2.3	2.8
L2-04	Powerloss V/f Recovery Ramp Time	s	1.0	1.0	1.8	1.8	2.0	2.0	2.0	2.2	2.6
L2-05	Undervoltage Detection Lvl (Uv1)	-	380	380	380	380	380	380	380	380	380

No. *1	Name	Unit	Default								
-	Drive Model	-	4180	4240	4302	4361	4414	4477	4515	4590	4720
o2-04	Drive Model (KVA) Selection	Hex.	A7	A8	A9	AA	AC	AD	AE	B1	B2
E2-11 (E4-11, E5-02)	Motor Rated Power	HP (kW)	150 (110)	200 (150)	250 (185)	295 (220)	350 (260)	400 (300)	450 (335)	500 (375)	600 (450)
L3-24	Motor Accel Time for Inertia Cal	s	0.646	0.673	0.864	0.910	1.392	1.392	1.392	1.667	2.000
L8-02	Overheat Alarm Level	°C	105	120	120	125	125	110	115	133	125
L8-09	Output Ground Fault Detection	-	1	1	1	1	1	1	1	1	1
L8-35	Installation Method Selection	-	0	0	0	0	0	0	0	0	0
n1-03	Hunting Prevention Time Constant	ms	30	30	30	100	100	100	100	100	100

*1 Parameters in parentheses are for motor 2.
*2 These values apply only when *A1-02 = 0 [Control Method Selection = V/f]*. When *A1-02 = 5 and 8 [OLV/PM and EZOLV]*, the value is 2.

4

Mechanical Installation

This chapter explains how to properly mount and install the drive.

4.1 Section Safety 338
4.2 Removing/Reattaching Covers 340

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.

Crush Hazard

Only approved personnel can operate a crane or hoist to move the drive.

If unapproved personnel operate a crane or hoist, it can cause serious injury or death from falling equipment.

Before you hang the drive vertically, use screws to correctly attach the drive front cover and other drive components.

If you do not secure the front cover, it can fall and cause minor injury.

When you use a crane or hoist to lift the drive during installation or removal, prevent more than 1.96 m/s² (0.2 G) vibration or impact.

Too much vibration or impact can cause serious injury or death from falling equipment.

When you lift the drive during installation or removal, do not try to turn the drive over and do not ignore the hanging drive.

If you move a hanging drive too much or if you ignore it, the drive can fall and cause serious injury or death.

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

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

⚠CAUTION

Crush Hazard

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

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

NOTICE

Do not let unwanted objects, for example metal shavings or wire clippings, fall into the drive during drive installation. Put a temporary cover over the drive during installation. Remove the temporary cover before start-up.

Unwanted objects inside of the drive can cause damage to the drive.

Damage to Equipment

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

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

Install vibration-proof rubber on the base of the motor or use the frequency jump function in the drive to prevent specific frequencies that vibrate the motor.

Motor or system resonant vibration can occur in fixed speed machines that are converted to variable speed. Too much vibration can cause damage to equipment.

You can use the drive with an explosion-proof motor, but the drive is not explosion-proof. Install the drive only in the environment shown on the nameplate.

If you install the drive in a dangerous environment, it can cause damage to the drive.

Do not lift the drive with the covers removed.

If the drive does not have covers, you can easily cause damage to the internal parts of the drive.

4.2 Removing/Reattaching Covers

This section gives information about how to remove and reattach the front cover and terminal cover for wiring and inspection.

Different drive models have different procedures to remove and reattach the covers. Refer to Table 4.1 for more information.

Table 4.1 Procedures to Remove Covers by Drive Model

Model	IP20/UL Type 1 and IP20/UL Open Type		IP55/UL Type 12		IP55/UL Type 12 with Main Switch	
	Procedure	Reference	Procedure	Reference	Procedure	Reference
2011 - 2114 4005 - 4096	Procedure A	340	Procedure C	345	Procedure C	345
4124					Procedure D	348
2143 - 2169 4156	Procedure B	342	Procedure D	348		
2211 - 2396 4180 - 4720			-		-	

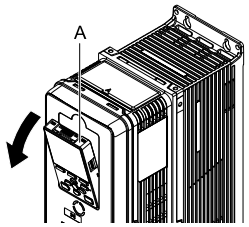
◆ Removing/Reattaching the Cover Using Procedure A

⚠ DANGER Electrical Shock Hazard

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

■ Remove the Front Cover

1. Remove the keypad from the drive.



A - Keypad

Figure 4.1 Remove the Keypad

2. Loosen the front cover screw.

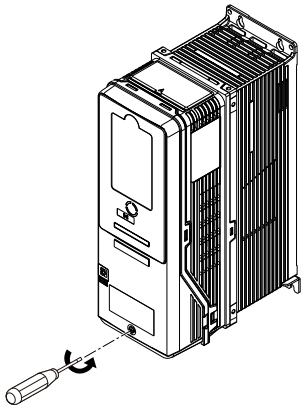


Figure 4.2 Loosen the Front Cover Screw

3. Push on the tabs in the sides of the front cover then pull the front cover forward to remove it from the drive.

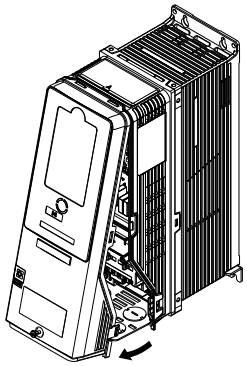


Figure 4.3 Remove the Front Cover

■ Reattach the Front Cover

1. Wire the drive and other peripheral devices.
2. Reverse the steps to reattach the cover.

Note:
- Make sure that you did not pinch wires or signal lines between the front cover and the drive before you reattach the cover.
- Make sure that the tabs on the sides of the front cover correctly click into the hook.
- Tighten the screws to a tightening torque of 0.98 N·m to 1.33 N·m (8.67 lbf·in to 11.77 lbf·in).

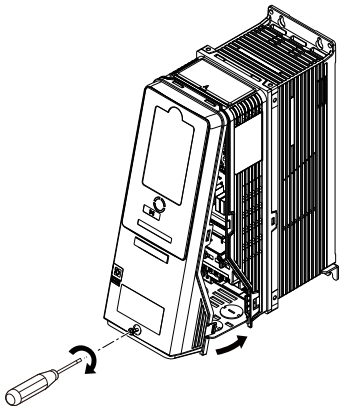


Figure 4.4 Reattach the Front Cover

3. Reattach the keypad to its initial position.

◆ Removing/Reattaching the Cover Using Procedure B

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

■ Remove the Terminal Cover

1. Loosen the screws on the terminal cover, then pull down on the cover.

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

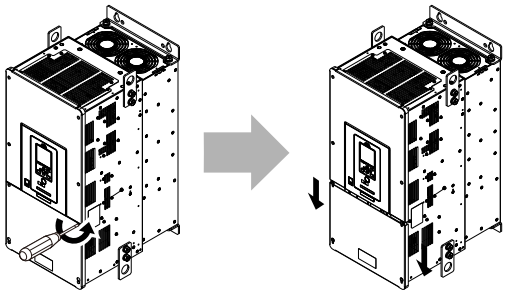


Figure 4.5 Loosen the Terminal Cover Mounting Screws

2. Pull the terminal cover away from the drive.

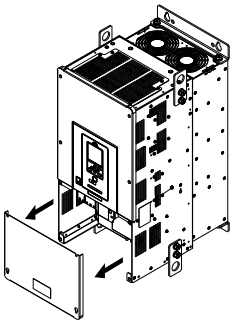
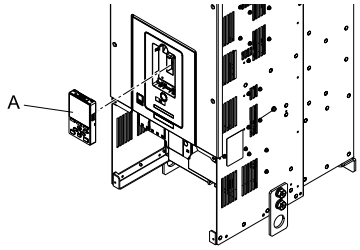


Figure 4.6 Remove the Terminal Cover

■ Remove the Front Cover

1. Remove the keypad from the drive.



A - Keypad

Figure 4.7 Remove the Keypad

2. Loosen the front cover screws.

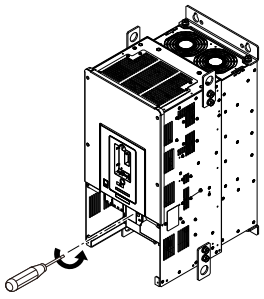
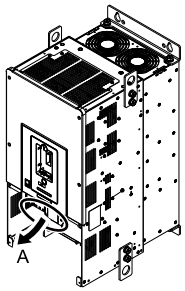


Figure 4.8 Loosen the Front Cover Screws

3. Pull part A of the front cover forward to remove the cover from the drive.



A - Pull forward to remove the front cover.

Figure 4.9 Pull Forward to Remove the Front Cover

4. Remove the front cover from the drive.

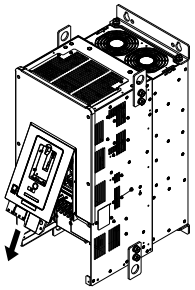
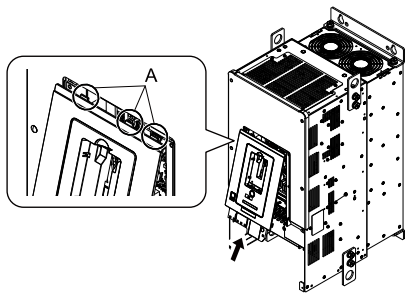


Figure 4.10 Remove the Front Cover

■ Reattach the Front Cover

Wire the drive and other peripheral devices then reattach the front cover.

1. Move the front cover to connect the hooks at the top of the front cover to the drive.



A - Hooks

Figure 4.11 Reattach the Front Cover

2. Move the front cover while pushing on the hooks on the left and right sides of the front cover until it clicks into position.

Note:
Make sure that you did not pinch wires or signal lines between the front cover and the drive before you reattach the cover.

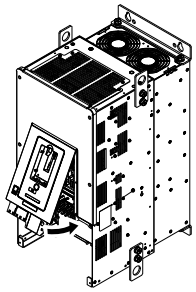


Figure 4.12 Reattach the Front Cover

3. Reattach the keypad to its initial position.

■ Reattach the Terminal Cover

Wire the drive and other peripheral devices then reattach the terminal cover.

Note:
- Make sure that you do not pinch wires or signal lines between the wiring cover and the drive before you reattach the cover.
- Tighten the screws to a tightening torque of 0.98 N·m to 1.33 N·m (8.67 lbf·in to 11.77 lbf·in).

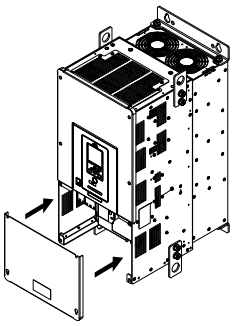


Figure 4.13 Reattach the Terminal Cover

◆ Removing/Reattaching the Cover Using Procedure C

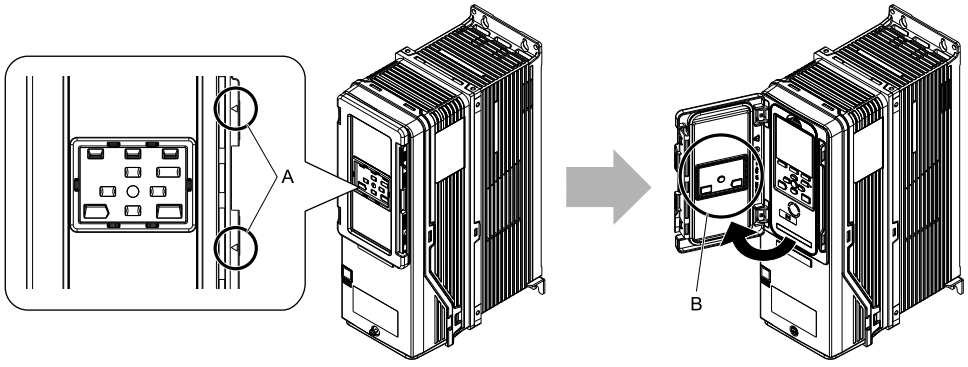
⚠ DANGER Electrical Shock Hazard
Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge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

■ Remove the Front Cover

1. Push in the two tabs on the right side of the IP55/UL Type 12 keypad cover door and pull the door to the left to open.

NOTICE Damage to Equipment
Do not open the IP55/UL Type 12 keypad cover door too far.
If you open the door too far, it will fall off.

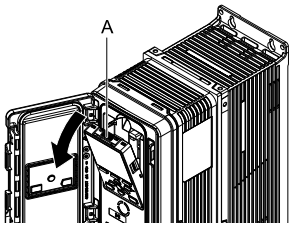
NOTICE Damage to Equipment
When the IP55/UL Type 12 keypad cover door is open, do not push the keypad key cover.
If you push the keypad key cover, it will fall off.



A - Tabs **B - Keypad key cover**

Figure 4.14 Open the IP55/UL Type 12 Keypad Cover Door

2. Remove the keypad from the drive.



A - Keypad

Figure 4.15 Remove the Keypad

3. Loosen the front cover screw.

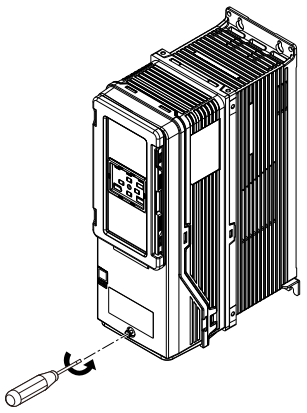


Figure 4.16 Loosen the Front Cover Screw

4. Push in the tabs on the sides of the front cover and pull the front cover forward to remove it from the drive.

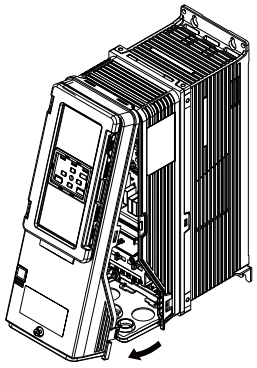


Figure 4.17 Remove the Front Cover

■ Reattach the Front Cover

1. Wire the drive and other peripheral devices.
2. Reverse the steps to reattach the cover. Reattach the cover carefully and make sure that the gasket on the conduit bracket does not twist.

Note:
- Make sure that you did not pinch wires or signal lines between the front cover and the drive before you reattach the cover.
- Make sure that the tabs on the sides of the front cover correctly click into the hook.
- Tighten the screws to a tightening torque of 0.98 N·m to 1.33 N·m (8.67 lbf·in to 11.77 lbf·in).

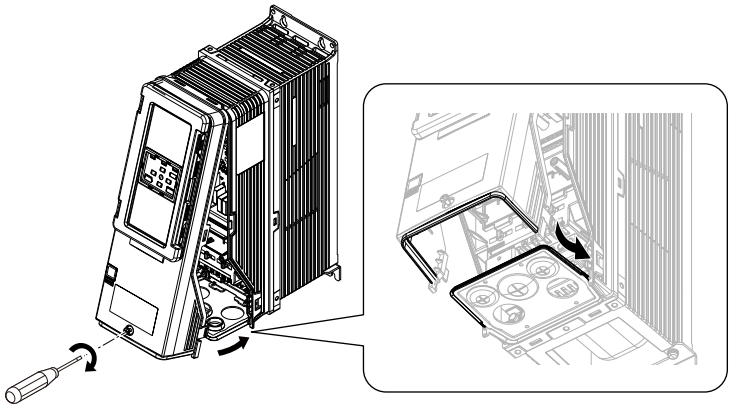


Figure 4.18 Reattach the Front Cover

3. Open the IP55/UL Type 12 keypad cover door and reattach the keypad to its initial position, then close the door until the two tabs click into position.

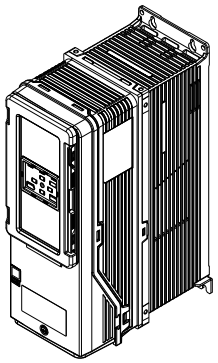
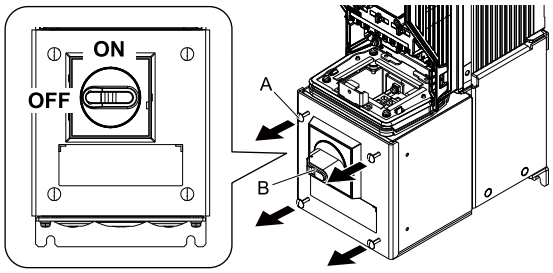


Figure 4.19 Reattach the Keypad and Close the Keypad Cover Door

■ Remove the Main Switch Cover

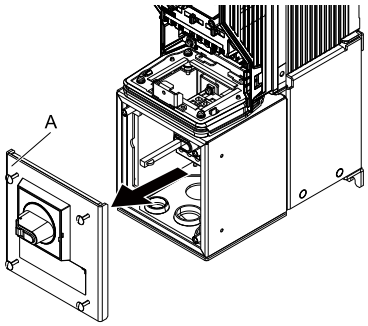
1. Make sure that the Main Switch Disconnect Handle is in the OFF position, then loosen the captive front cover screws on the Main Switch box.



A - Screws **B - Main Switch Disconnect Handle**

Figure 4.20 Loosen the Screws on the Main Switch Cover

2. Pull the cover forward to remove it from the drive.

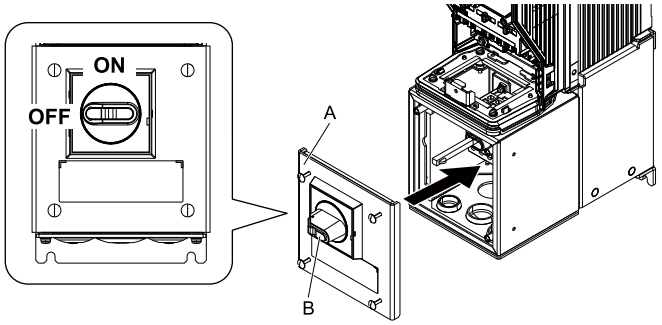


A - Main Switch cover

Figure 4.21 Remove the Main Switch Cover

■ Reattach the Main Switch Cover

1. Make sure that the Main Switch Disconnect Handle is in the OFF position, then reverse the steps to reattach the cover.

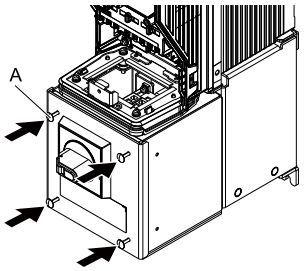


A - Main Switch cover **B - Main Switch Disconnect Handle**

Figure 4.22 Reattach the Main Switch Cover

2. Tighten the screws on the Main Switch cover.

Note:
Tighten the screws to a tightening torque of 0.98 N·m to 1.33 N·m (8.67 lbf·in to 11.77 lbf·in).



A - Screws

Figure 4.23 Tighten the Screws on the Main Switch Cover

◆ Opening/Closing the Door Using Procedure D

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

■ Open the Front Door

1. Make sure that the Main Switch Disconnect Handle is in the OFF position.

Note:
This step is for only the models with the Main Switch.

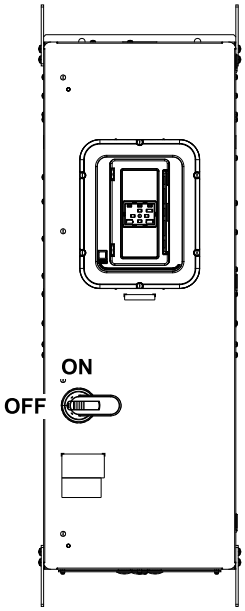
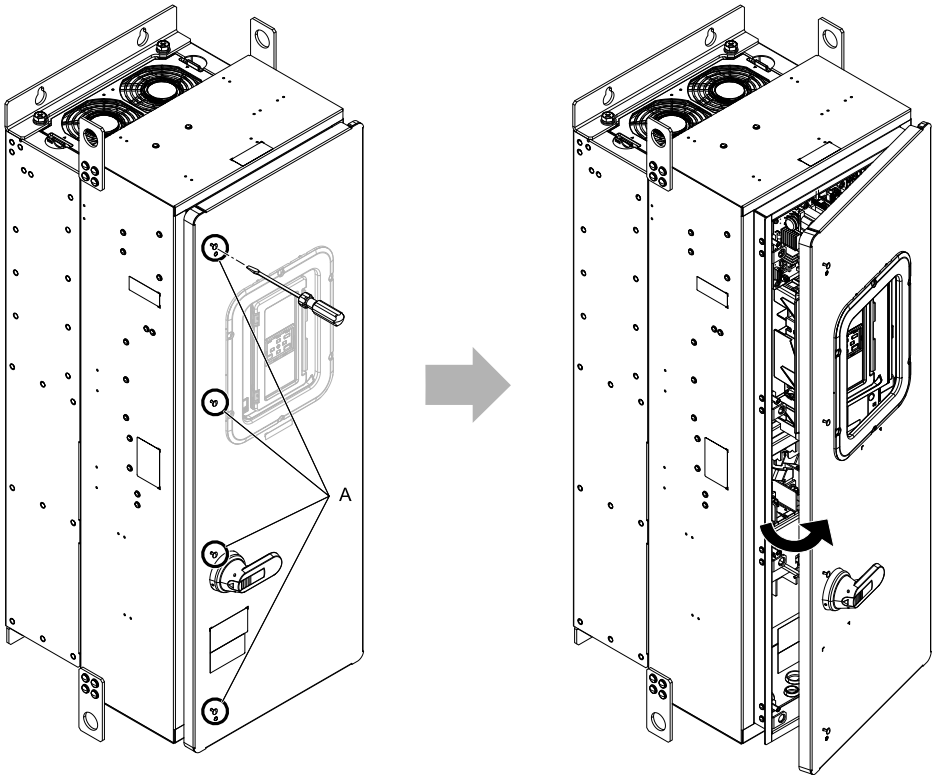


Figure 4.24 Correct Position of the Main Switch Disconnect Handle

2. Loosen the screws on the front door, then open the front door.



A - Screws

Figure 4.25 Open the Front Door

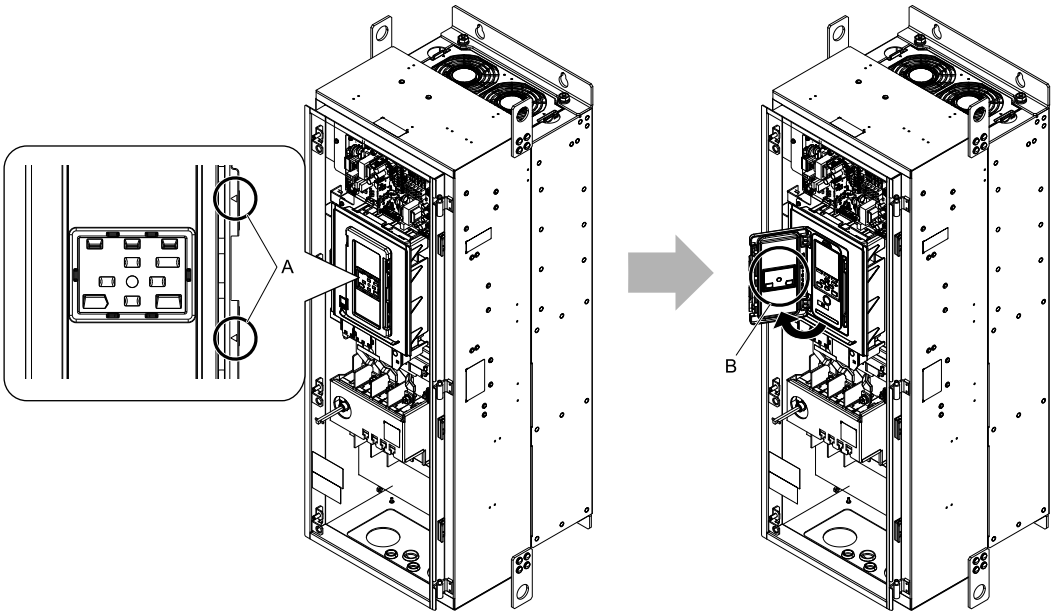
Note:
- For the models without the Main Switch, loosen 3 screws on the front door.
- For the models with the Main Switch, loosen 4 screws on the front door.

■ Remove the Keypad

1. Push in the two tabs on the right side of the IP55/UL Type 12 keypad cover door and pull the door to the left to open.

NOTICE **Damage to Equipment**
Do not open the IP55/UL Type 12 keypad cover door too far.
If you open the door too far, it will fall off.

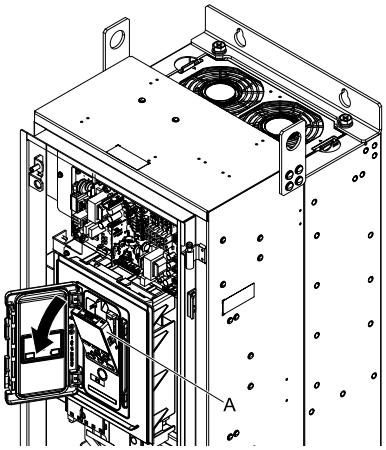
NOTICE **Damage to Equipment**
When the IP55/UL Type 12 keypad cover door is open, do not push the keypad key cover.
If you push the keypad key cover, it will fall off.



A - Tabs **B - Keypad key cover**

Figure 4.26 Open the IP55/UL Type 12 Keypad Cover Door

2. Remove the keypad from the drive.



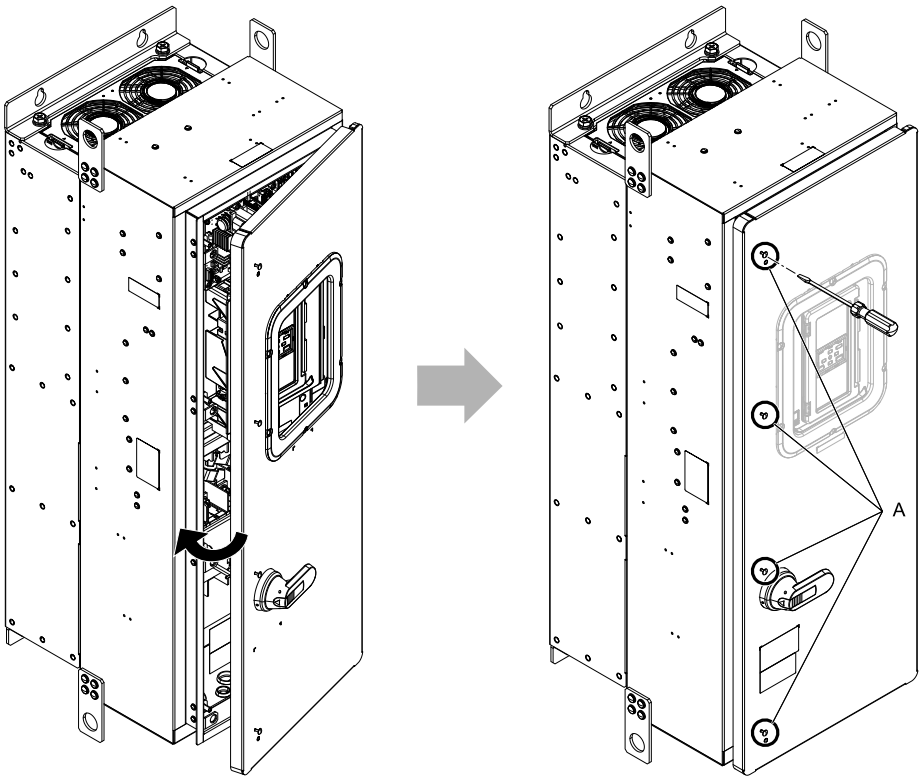
A - Keypad

Figure 4.27 Remove the Keypad

■ Close the Front Door

1. Wire the drive and other peripheral devices.

2. Open the IP55/UL Type 12 keypad cover door and reattach the keypad to its initial position, then close the door until the two tabs click into position.
3. Reverse the steps to close the front door.



A - Screws

Figure 4.28 Close the Front Door

Note:
- Make sure that you did not pinch wires or signal lines between the front door and the drive before you close the door.
- Tighten the screws to a tightening torque of 0.98 N·m to 1.33 N·m (8.67 lbf·in to 11.77 lbf·in).

5

Startup Procedure and Test Run

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5.1 Section Safety

⚠DANGER

Electrical Shock Hazard

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

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

⚠WARNING

Electrical Shock Hazard

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

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

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

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

NOTICE

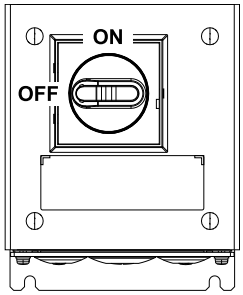
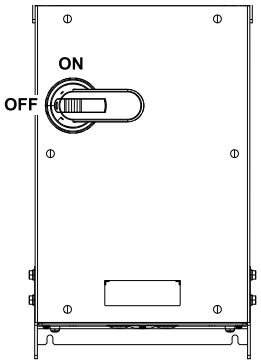
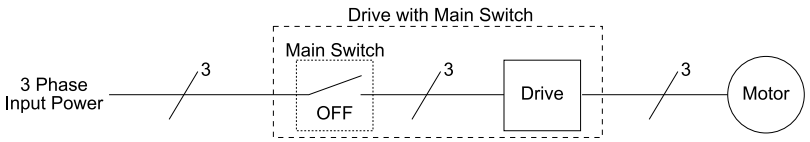
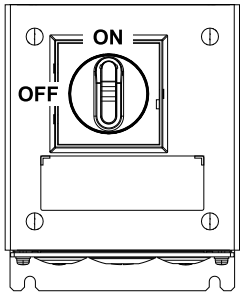
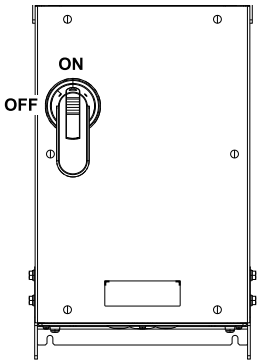
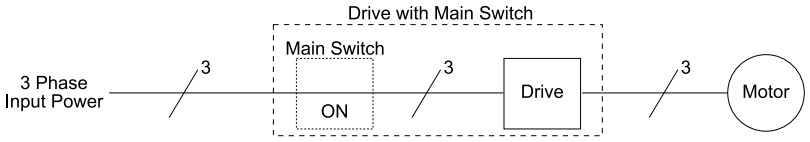
Sudden Movement Hazard

Deactivate the Run command before you switch from Programming Mode to Drive Mode.

If you switch from Programming Mode to Drive Mode and there is an active Run command, the motor will rotate and the equipment can suddenly start.

5.2 Drive Main Switch

Table 5.1 Main Switch and Drive Status

Main Switch Status		Drive Status
2011 - 2031 4005 - 4034	2046 - 4156 4040 - 4156	
		
		

◆ Use and Lock the Main Switch

When you must touch the motors or machines, for example in maintenance, use the Main Switch to de-energize the drive and lock the Main Switch Disconnect Handle in the OFF position as specified by this procedure.

Note:

Yaskawa recommends that you de-energize the drive before you turn the Main Switch from ON to OFF.

⚠ WARNING Electrical Shock Hazard

Disconnect all power to the drive and remove all wires to do maintenance on the drive. If you only turn OFF the built-in Main Switch before you do maintenance, there can be high voltage on input terminals R/L1, S/L2, and T/L3 of the Main Switch and touching energized terminals will 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.

NOTICE Damage to Equipment

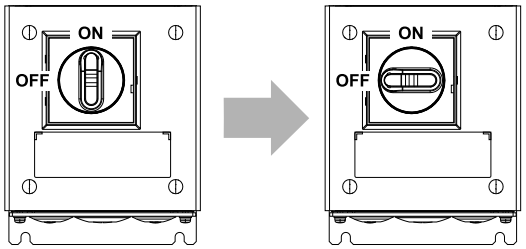
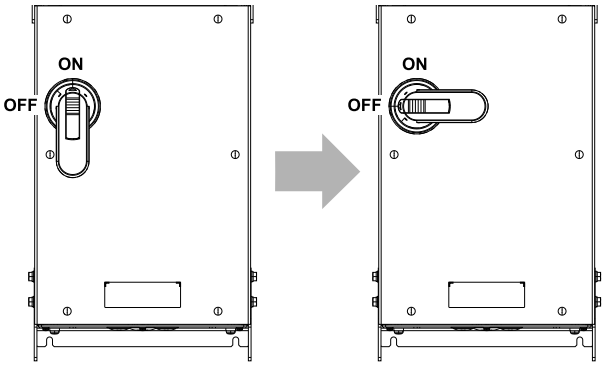
Do not cycle the Main Switch more than 6000 times. If you cycle the Main Switch more times than the limit, it will cause the contact failure, or you cannot open or close the Main Switch.

NOTICE **Damage to Equipment**

Make sure that you stop the motor before you turn ON/OFF the Main Switch.
If you turn ON/OFF the Main Switch during run, it can cause Main Switch failure.

1. Stop the drive and make sure that the motor is completely stopped.
2. Turn the Main Switch from ON to OFF.

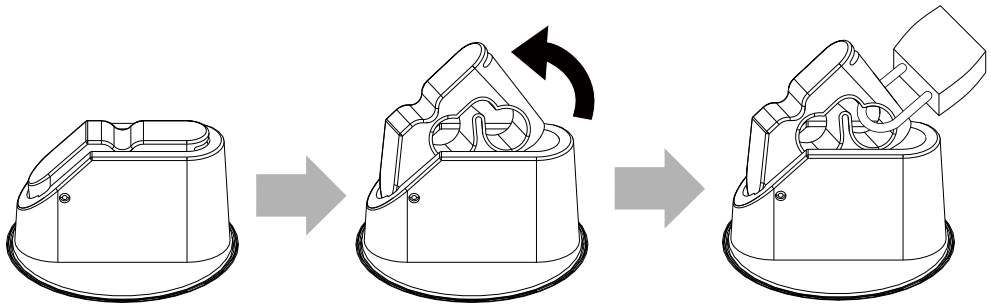
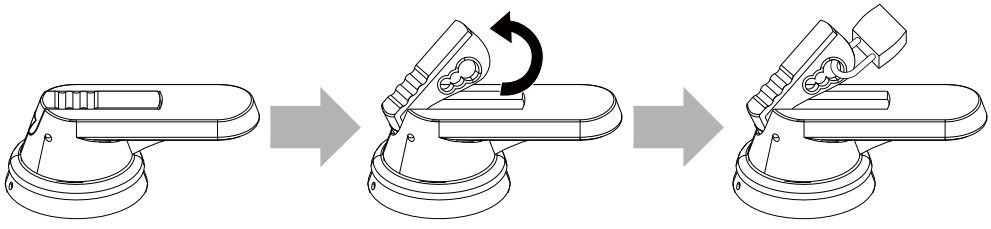
Table 5.2 Turn OFF the Main Switch

Model	Main Switch Status
2011 - 2031 4005 - 4034	
2046 - 2169 4040 - 4156	

3. Put a lock through the hole of the Main Switch.

Note:
The lock is not included with the drive.

Table 5.3 Lock the Main Switch

Model	Main Switch Status
2011 - 2031 4005 - 4034	
2046 - 2169 4040 - 4156	

5.3 Keypad: Names and Functions

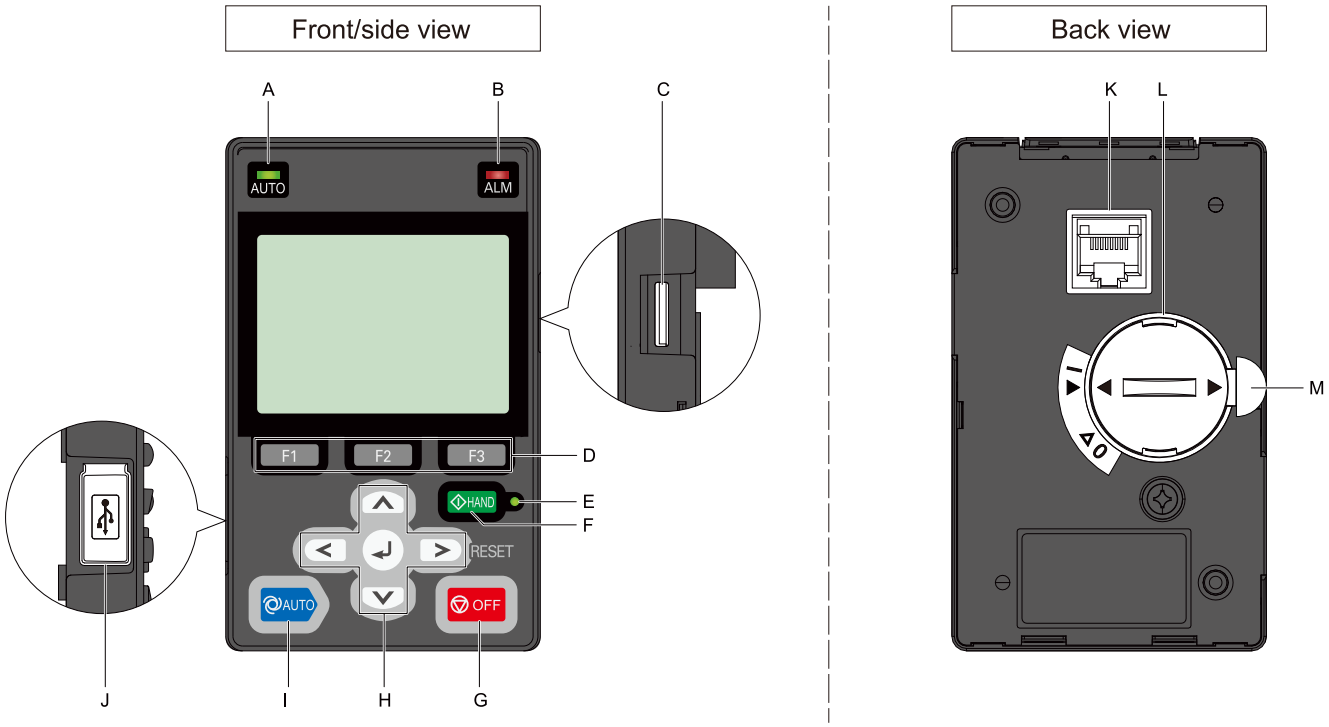


Figure 5.1 Keypad

Table 5.4 Keypad: Names and Functions

No.	Name	Function
A	AUTO LED *1* 	Illuminates to show that the drive is in AUTO Mode.
B	ALM LED 	Illuminates when the drive detects a fault. Flashes when the drive detects: • An alarm • An oPE parameter setting error • A fault or alarm during Auto-Tuning The LED turns off when there are no drive faults or alarms.
C	microSD Card Insertion Slot	The insertion point for a microSD card.
D	Function Keys (F1, F2, F3) 	The menu shown on the keypad sets the functions for function keys. The name of each function is in the lower half of the display window.
E	HAND LED *1* 	Illuminates to show that the drive is in HAND Mode.
F	HAND Key 	Sets drive operation to HAND Mode. The drive uses the *Y5-01 [HAND Frequency Reference Source]* setting.
G	OFF Key 	Stops drive operation. **Note:** The OFF key has highest priority. Push  to stop the motor even when a Run command is active at an external Run command source. Set *o2-02 = 0 [OFF Key Function Selection = Disabled]* to disable  priority. You can only disable  when *b1-02/b1-16 = 1, 2, or 3 [Run Command Selection 1/Run Command Selection 2 = Digital Input, Serial Communications, or Option PCB]*.

No.	Name	Function
H	Left Arrow Key	Moves the cursor to the left. Navigates to the Standard Monitor menu from the Home screen.
	Up Arrow Key/Down Arrow Key	• Scrolls up or down to display the next item or the previous item. • Selects parameter numbers, and increments or decrements setting values. • Scrolls through 18 custom monitors set in *o1-24*, *o1-27* to *o1-35*, and *o1-90* to *o1-97* from the Home screen.
	Right Arrow Key (RESET)	• Moves the cursor to the right. • Continues to the next screen. • Clears drive faults. • Navigates to the Parameter Group Shortcuts from the Home screen.
	ENTER Key	• Enters parameter values and settings. • Selects menu items to move the user between keypad displays. • Selects each mode, parameter, and set value.
I	AUTO Key	Sets drive operation to AUTO Mode. The drive uses the *b1-01 [Frequency Reference Selection 1]* and *b1-02 [Run Command Selection 1]* settings. **Note:** Push HAND on the keypad to set the drive to HAND Mode before you use the keypad to operate the motor.
J	USB Terminal	For factory adjustment.
K	RJ-45 Connector	Uses an RJ-45 8-pin straight through UTP CAT5e extension cable or keypad connector to connect to the drive.
L	Clock Battery Cover	Cover for the clock battery. **Note:** The battery included with the keypad is for operation check. It may be exhausted earlier than the expected battery life described in the manual. To replace the battery, use a Hitachi Maxell "CR2016 Lithium Manganese Dioxide Lithium Battery" or an equivalent battery with these properties: • Nominal voltage: 3 V • Operating temperature range: -20 °C to +85 °C (-4 °F to +185 °F)
M	Insulation Sheet	An insulating sheet is attached to the keypad battery to prevent battery drain. Remove the insulation sheet before you use the keypad for the first time.

*1 Refer to *AUTO LED and HAND LED Indications on page 359* for more information about AUTO LED and HAND LED indications.

◆ LCD Display

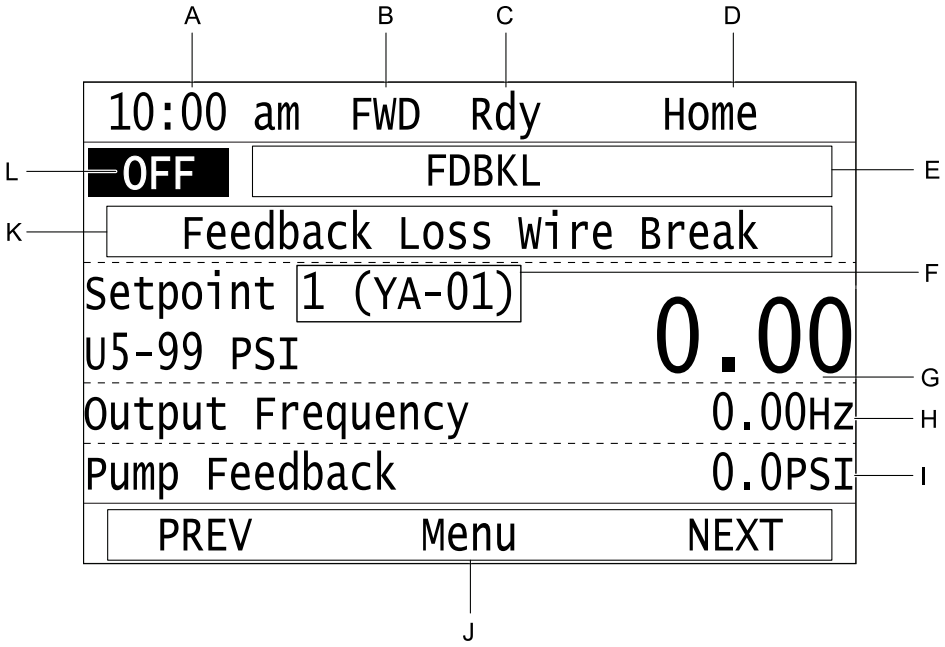


Figure 5.2 LCD Display Indications

Table 5.5 LCD Display Indications and Meanings

Symbol	Name	Description
A	Time display area	Shows the current time. Set the time in the Initial Setup menu.
B	Forward/Reverse run indication	Shows direction of motor rotation. • FWD: Shown when set to Forward run. • REV: Shown when set to Reverse run. **Note:** In DriveWorksEZ operation, FWD or REV flash.
C	Ready	The screen will show Rdy when the drive is ready for operation or when the drive is running.
D	Mode display area	Shows the name of the current mode or screen.
E	Alarm codes and drive status messages display area	Shows an alarm/fault code, drive name/number or message of drive status.
F	Setpoint source indication	Shows the current setpoint source. • Setpoint 1 (YA-01): Parameter *YA-01* • Setpoint 2 (YA-02): Parameter *YA-02* • Setpoint 3 (YA-03): Parameter *YA-03* • Setpoint 4 (YA-04): Parameter *YA-04* • Setpoint (AI): Analog input terminal • Setpoint (FREF): Frequency reference • Setpoint (COM): MEMOBUS/Modbus communications • Setpoint (PULSE): Pulse train input terminal (terminal RP) • Setpoint (EMOV): Emergency Override PID This area will also show the current frequency reference source when applicable. • KPD: Keypad • AI: Analog input terminal (terminals A1 to A3) • COM: MEMOBUS/Modbus communications • OPT: Option card • RP: Pulse train input terminal (terminal RP)
G	Data display area	Shows parameter values, monitor values, and details of the results of operations.
H	Custom Monitor 2 Data display area	Single line monitor showing the monitor name, value, and unit of the monitor programmed *o1-25 [Custom Montior 2]*.
I	Custom Monitor 3 Data display area	Single line monitor showing the monitor name, value, and unit of the monitor programmed in *o1-26 [Custom Montior 3]*.
J	Function keys 1 to 3 (F1 to F3)	The function names shown in this area will change when the selected screen changes. Push one of the function keys F1 to F3 on the keypad to do the function. **Note:** • When F1 shows "PREV", pushing the F1 key will cycle the currently displayed monitor in the middle of the screen to the previous monitor in the cycling list. • When F3 shows "NEXT", pushing the F3 key will cycle the currently displayed monitor in the middle of the screen to the next monitor in the cycling list.
K	Alarm and message texts display area	Shows a fault, minor fault, alarm, or error name and message text. **Note:** When the drive must show a fault, alarm, or error and a message on the keypad at the same time, the keypad will switch between the alarm code and message text in 2-second intervals.
L	HOA mode or alternative Run command source indication	• OFF: The drive is operating in OFF Mode. • AUTO: The drive is operating in AUTO Mode. • HAND: The drive is operating in HAND Mode. • JOG: The drive is operating in JOG Mode. • EMOV: The drive is operating in Emergency Override Mode.

◆ AUTO LED and HAND LED Indications

Table 5.6 AUTO LED and HAND LED Indications

AUTO LED	HAND LED	Status
OFF	OFF	OFF Mode
OFF	ON	HAND Mode

AUTO LED	HAND LED	Status
OFF	Long blink (50% duty)	HAND Mode • When the Frequency Reference is 0 or during deceleration • *H1-xx = 70 [Drive Enable No Run Cycle]* removed while HAND MFDI closed
OFF	Double blink	HAND Mode • When an MFDI sends a Fast Stop signal to stop the drive • When you clear the Run command and enter the Run command again during the time set in *C1-02 [Deceleration Time 1]* • Drive Enable Command removed while HAND MFDI closed • OFF pressed while running in HAND from MFDI • Exited Emergency Override with HAND MFDI closed
ON	OFF	AUTO Mode
Long blink (50% duty)	OFF	AUTO Mode • When the Frequency Reference is 0 or during deceleration • During PI Sleep • When *b1-02/b1-16 = 7/8/9* and AUTO is pressed, waiting for RUN command (from External/Serial/Option) • When *b1-02/b1-16 = 7/8/9* and Run command given (from External/Serial/Option) and waiting for AUTO press • When *b1-02/b1-16 = 7/8/9* and the HAND MFDI is removed while the Run command is present • When *b1-02/b1-16 = 0*, AUTO is pressed and *H1-xx = 70 [Drive Enable No Run Cycle]* is opened
Double blink	OFF	AUTO Mode • When an MFDI sends a Fast Stop signal to stop the drive • Drive Enable input removed while an external Run command is present • *b1-02/b1-16 = 1/2/3* and *Y5-03 = 0 [HAND/AUTO Switchover During Run]* and HAND MFDI is opened while external run input is present • Drive exits Emergency Override operation with an external Run command present

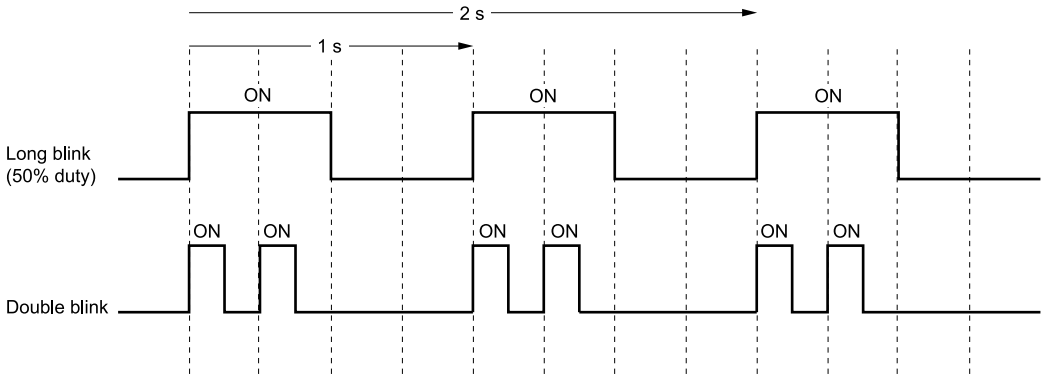


Figure 5.3 AUTO LED and HAND LED Timing Status

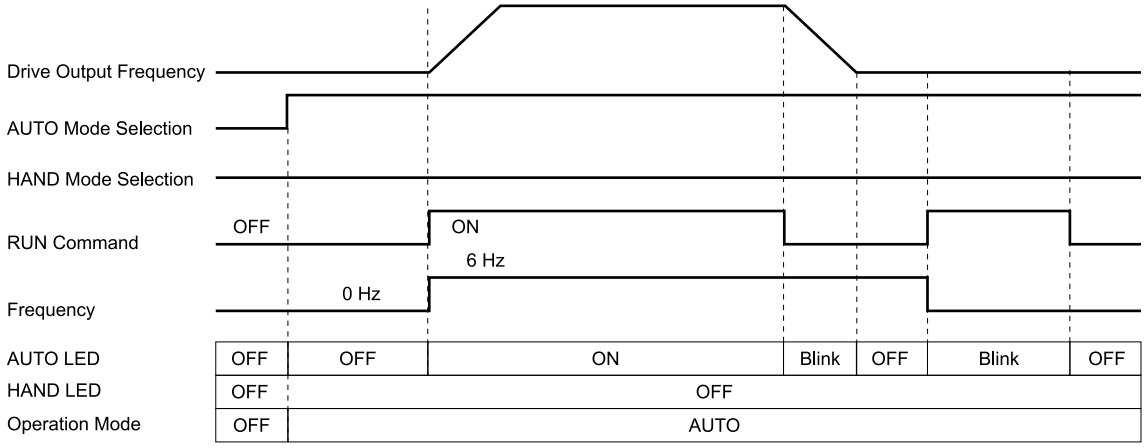


Figure 5.4 LEDs and Drive Operation in AUTO Mode

◆ Keypad Mode and Menu Displays

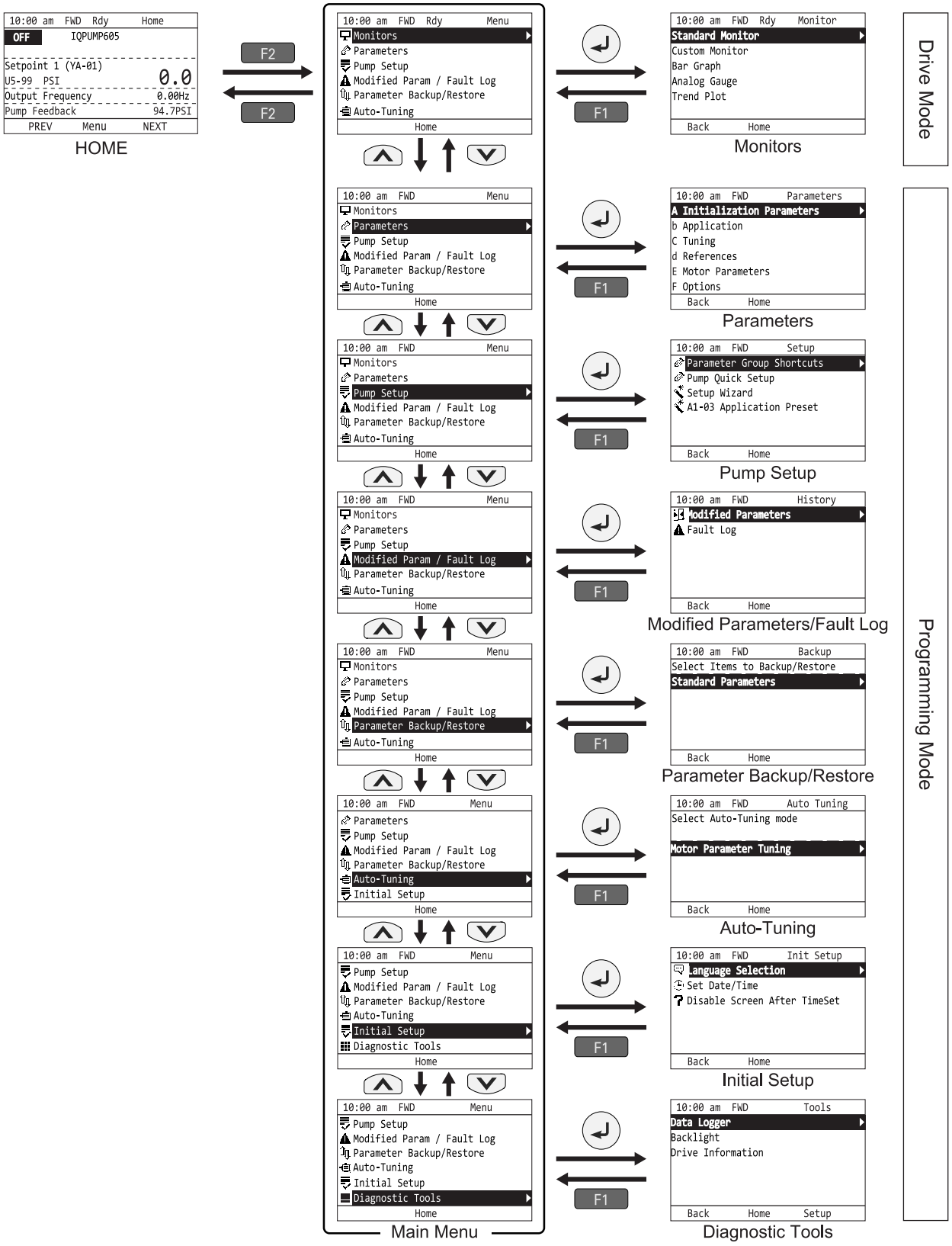


Figure 5.5 Keypad Functions and Display Levels

Note:

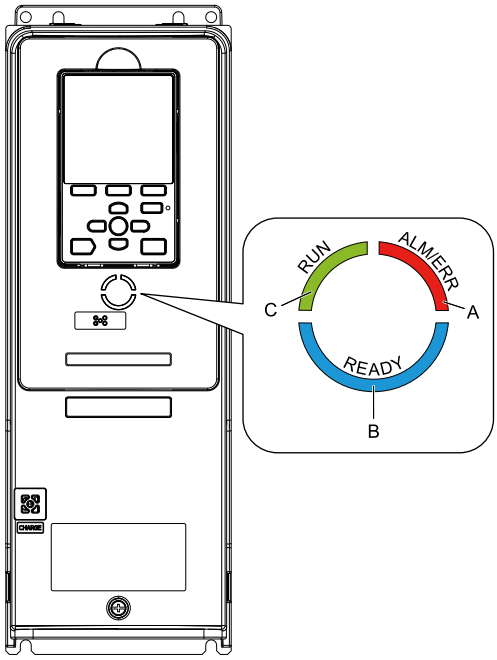
- Energize the drive with factory defaults to show the Initial Setup screen. Push F2 (Home) to show the HOME screen.
  - Select [TURN OFF power up setup screen] from the [Disable Screen After TimeSet] setting to not display the Initial Setup screen.
- Push < from the Home screen to show drive monitors.
- Push ↵ to set *U5-99/YA-01 [Reference 1]* when you set *b1-01 = 0 [Frequency Reference Selection 1 = Keypad]*.
- The keypad will show [Rdy] when the drive is in Drive Mode. The drive is prepared to accept a Run command.
- The drive will not accept a Run command in Programming Mode in the default setting. Set *b1-08 [Run Command Select in PRG Mode]* to accept or reject a Run command from an external source while in Programming Mode.
  - Set *b1-08 = 0 [Disregard RUN while Programming]* to reject the Run command from an external source while in Programming Mode (default).
  - Set *b1-08 = 1 [Accept RUN while Programming]* to accept the Run command from an external source while in Programming Mode.
  - Set *b1-08 = 2 [Allow Programming Only at Stop]* to prevent changes from Drive Mode to Programming Mode while the drive is operating.

Table 5.7 Drive Mode Screens and Functions

Mode	Keypad Screen	Function
Drive Mode	Monitors	Sets monitor items to display.
Programming Mode	Parameters	Changes parameter settings.
	Pump Setup	Shows Parameter Group Shortcuts, Pump Quick Setup, and Wizards.
	Modified Parameters/Fault Log	Shows modified parameters and fault history.
	Parameter Backup/Restore	Saves parameters to the keypad as backup.
	Auto-Tuning	Auto-Tunes the drive.
	Initial Setup	Changes initial settings.
	Diagnostic Tools	Sets data logs and backlight.

5.4 LED Status Ring

The LED Status Ring on the drive cover shows the drive operating status.



A - ALM/ERR **C - RUN**
B - Ready

LED		Status	Description
A	ALM/ERR	Illuminated	The drive detects a fault.
		Flashing *1	The drive detects: • An alarm • An oPE parameter setting error • An Auto-Tuning error **Note:** If the drive detects a fault and an alarm at the same time, the LED will illuminate to identify a fault.
		OFF	There are no drive faults or alarms.
B	Ready	Illuminated	The drive is operating or is prepared for operation.
		Flashing *1	The drive is in *STo [Safe Torque OFF]* condition.
		Flashing Quickly *1	The voltage of the main circuit power supply dropped, and only the external 24 V power supply is providing the power to the drive.
		OFF	• The drive detects a fault. • There is no fault and the drive received a Run command, but the drive cannot operate. For example, in Programming Mode.

LED		Status	Description
C	RUN	Illuminated	The drive is in regular operation.
		Flashing *1	• The drive is decelerating to stop. • The drive received a Run command with a frequency reference of 0 Hz. • The drive received a DC Injection Braking command. • *H1-xx = 70 [Drive Enable No Run Cycle]* removed while HAND MFDI closed. • When *b1-02/b1-16 = 7/8/9* and AUTO is pressed, waiting for RUN command (from External/Serial/Option). • When *b1-02/b1-16 = 7/8/9* and Run command given (from External/Serial/Option) and waiting for AUTO press. • When *b1-02/b1-16 = 7/8/9* and the HAND MFDI is removed while the Run command is present. • When *b1-02/b1-16 = 0*, AUTO is pressed and *H1-xx = 70 [Drive Enable No Run Cycle]* is opened.
		Flashing Quickly *1	• The drive received a Run command from the MFDI terminals when *b1-02 = 0 [Run Command Selection 1 = Keypad]* and you changed the setting to *b1-02 = 1 or 7 [Digital Input or AUTO Command + Term Run]*. • 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 shuts off the drive output. • You pushed OFF on the keypad when the drive is operated from a REMOTE source. • The drive is energized with an active Run command and *b1-17 = 0 [Run Command at Power Up = Disregard Existing RUN Command]*. • The drive is set to coast-to-stop with timer (*b1-03 = 3 [Stopping Method Selection = Coast to Stop with Timer]*), and the Run command is disabled then enabled during the Run wait time. • Drive Enable Command removed while HAND MFDI closed. • OFF pressed while running in HAND from MFDI. • Exited Emergency Override with HAND MFDI closed. • Drive Enable input removed while an external Run command is present. • *b1-02/b1-16 = 1/2/3* and *Y5-03 = 0 [HAND/AUTO Switchover During Run]* and HAND MFDI is opened while external run input is present. • Drive exits Emergency Override operation with an external Run command present.
		OFF	The motor is stopped.

*1 Refer to Figure 5.6 for the difference between “flashing” and “flashing quickly”.

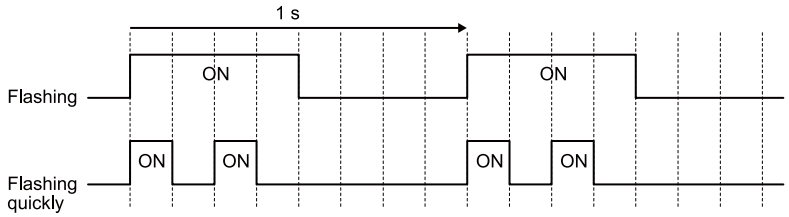


Figure 5.6 LED Flashing Statuses

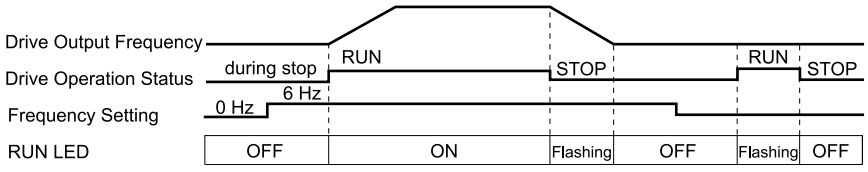


Figure 5.7 Relation between RUN LED and Drive Operation

5.5 Start-up Procedures

This section gives the basic steps necessary to start up the drive.

Use the flowcharts in this section to find the most applicable start-up method for your application.

This section gives information about only the most basic settings.

Note:

Refer to the *A1-06* section to use an Application Preset to set up the drive.

◆ Flowchart A: Connect and Run the Motor with Minimum Setting Changes

Flowchart A shows a basic start-up sequence to connect and run a motor with a minimum of setting changes. Settings can change when the application changes.

Use the drive default parameter settings for basic applications where high precision is not necessary.

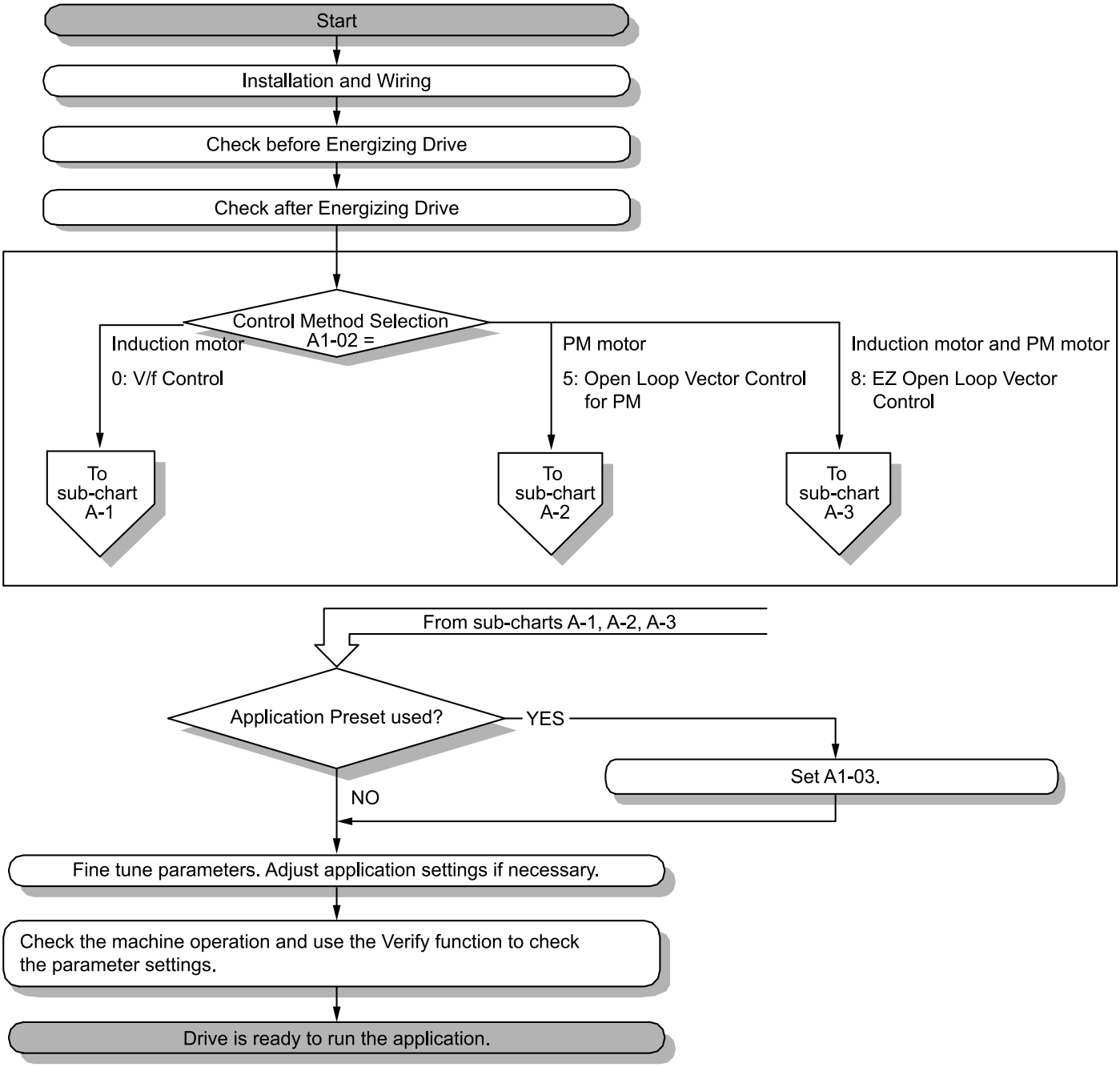


Figure 5.8 Basic Steps before Startup

◆ Sub-Chart A-1: Induction Motor Auto-Tuning and Test Run Procedure

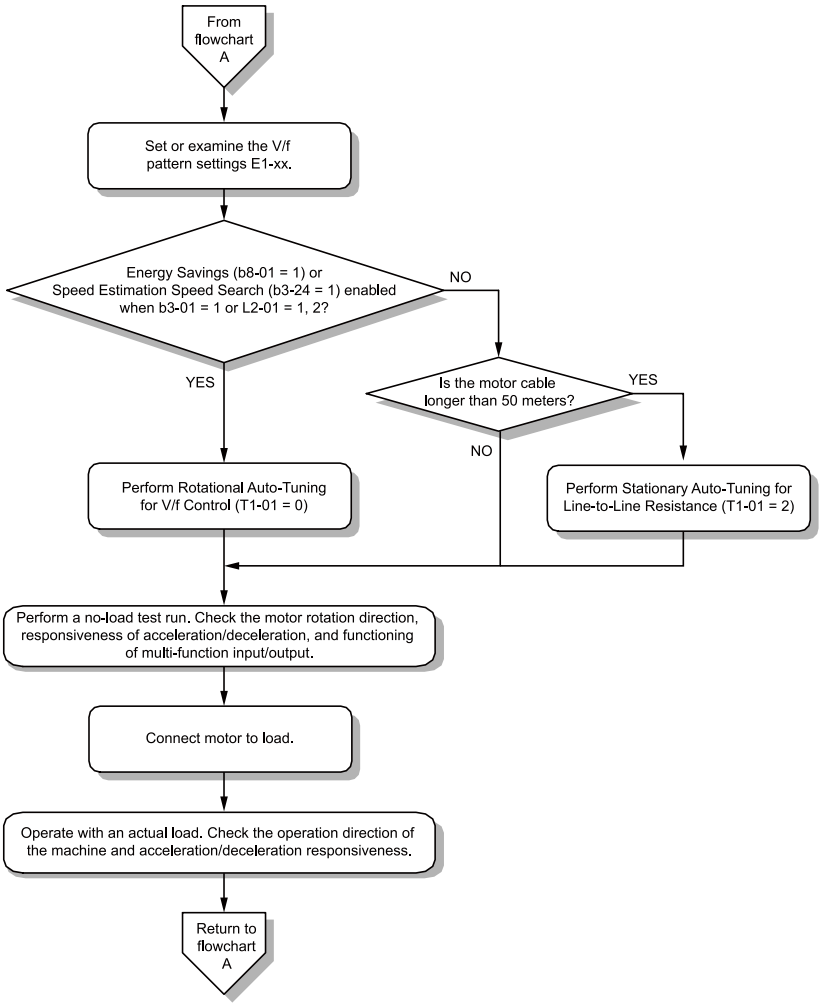


Figure 5.9 Induction Motor Auto-Tuning and Test Run Procedure

◆ Sub-Chart A-2: PM Motor Auto-Tuning and Test Run Procedure

Sub-Chart A-2 gives the basic steps to start up the drive for a PM motor.

⚠ WARNING Crush Hazard

Test the system to make sure that the drive operates safely after you wire the drive and set parameters.
If you do not test the system, it can cause damage to equipment or serious injury or death.

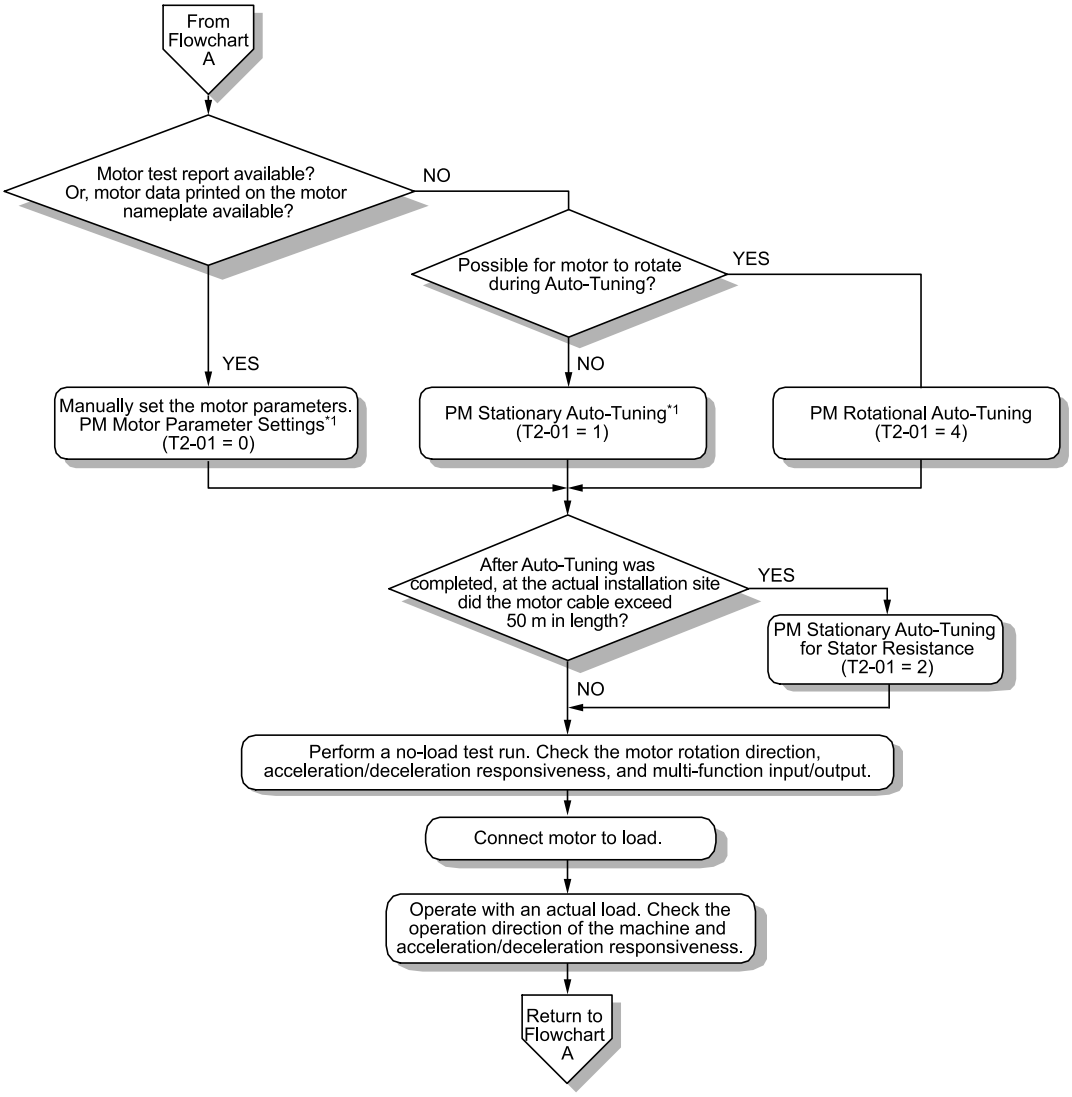


Figure 5.10 PM Motor Auto-Tuning and Test Run Procedure

*1 For PM motors, set *E5-01 [PM Motor Code Selection] = FFFF*.

◆ Subchart A-3: EZ Open Loop Vector Control Test Run Procedure

Subchart A-3 gives the setup procedure to run a PM motor in EZ Open Loop Vector Control.

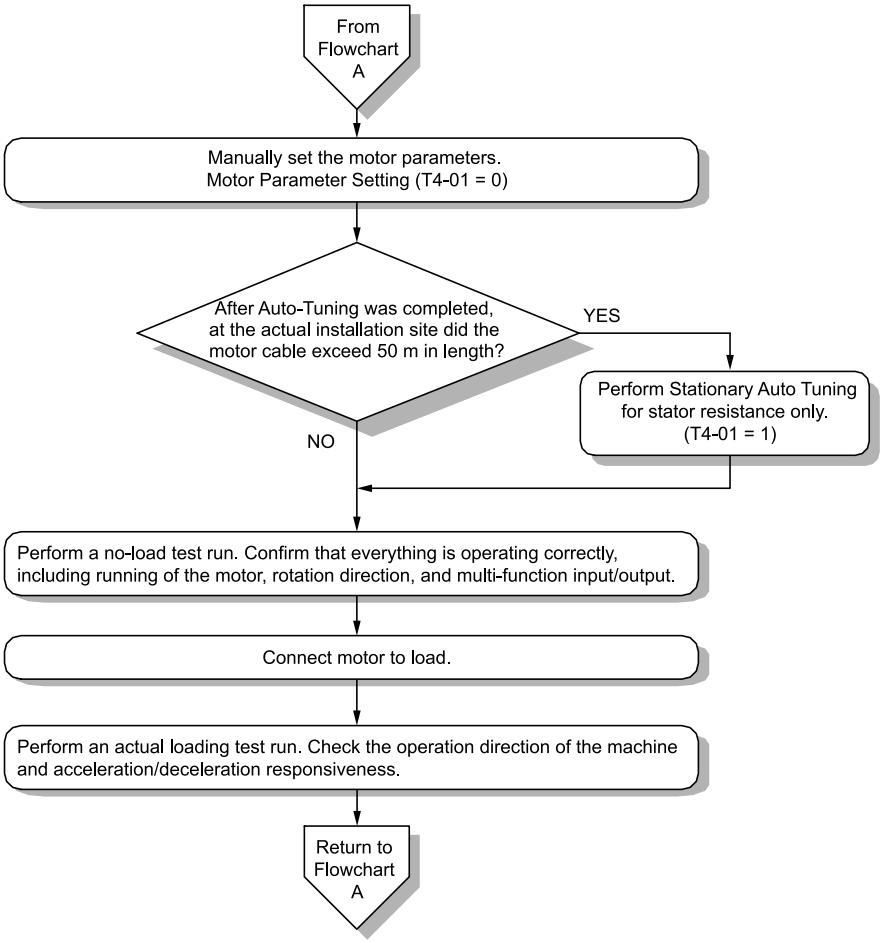


Figure 5.11 Procedure for Test Run of EZ Open Loop Vector Control Method

5.6 Items to Check before Starting Up the Drive

◆ Check before Energizing the Drive

Examine the items in Table 5.8 before you energize the drive.

Table 5.8 Items to Check before Energizing the Drive

Items to Check	Description
Input Power Supply Voltage	The voltage of the input power supply must be: 208 V class: three-phase 200 Vac to 240 Vac 50/60 Hz, 270 Vdc to 340 Vdc 480 V class: three-phase 380 Vac to 480 Vac 50/60 Hz, 510 Vdc to 680 Vdc
	Correctly and safely wire power supply input terminals R/L1, S/L2, T/L3 (use terminals +1 and - for DC power supply input).
	Correctly ground the drive and motor.
Connection between Drive Output Terminals and Motor Terminals	Make sure that you connected drive output terminals U/T1, V/T2, and W/T3 in the correct sequence to agree with motor terminals U, V, and W without loosened screws.
Control Circuit Terminal Wiring	Make sure that you connected the drive control circuit terminals in the correct sequence to agree with devices and switches without loosened screws.
Control Circuit Terminal Status	Turn OFF the inputs from all devices and switches connected to the drive control circuit terminals.
Connection between Machinery and Motor	Disengage all couplings and belts that connect the motor and machinery.

◆ Check after Energizing the Drive

Examine the items in Table 5.9 after you energize the drive. The keypad will show these screens depending on the drive status.

Table 5.9 Display Status after Energizing the Drive

Status	Display	Description
During Usual Operation	--:-- FWD Init Setup Language Selection Set Date/Time Disable Screen After TimeSet Home Initial Setup Screen or 10:00 am FWD Rdy Home OFF IQPUMP605 Setpoint 1 (YA-01) U5-99 PSI 0.0 Output Frequency 0.00Hz Pump Feedback 0.0PSI PREV Menu NEXT HOME Screen	• The data display area will show the Initial Setup screen or the HOME screen • Energize the drive with factory defaults to show the Initial Setup screen. Select [No] from the [Show Initial Setup Screen] settings to show the HOME screen without showing the Initial Setup screen.
When the Drive Detects a Fault	10:00 am FWD Home OFF EF3 Pump Fault (Terminal S3) Setpoint 1 (YA-01) U5-99 PSI 0.0 Output Frequency 0.00Hz Pump Feedback 0.0PSI PREV Menu NEXT	The display changes depending on the fault. Refer to “Troubleshooting” to remove the cause of the fault. ALM will illuminate. **Note:** If the screen shows a different screen, push F2 (Home) from a different screen than the HOME screen to show the fault content again.

Note:

Make sure that you use a keypad with FLASH number 1004 or later. Keypads with FLASH numbers 1003 and earlier will not show characters correctly.

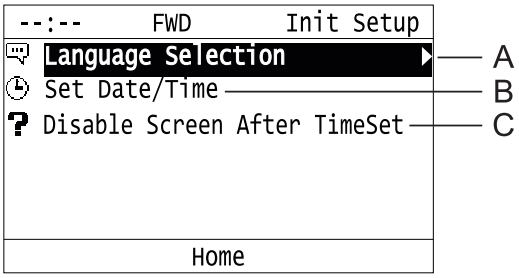
◆ Make the Initial Settings

The keypad will show the Initial Setup screen when you energize the drive for the first time. You can set the date and time or the language to show on the keypad.

Note:

If the keypad does not show the Initial Setup screen, select [Initial Setup] from the Main Menu to show the Initial Setup screen.

1. Make the initial settings for each item.



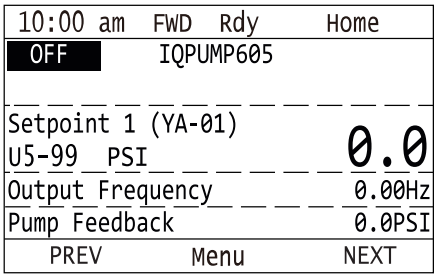
A - Language Selection
B - Set Date/Time
C - Disable Initial Setup Screen

Note:

If you select [KEEP ON] from the [Disable Screen after TimeSet] setting, the keypad will show the Initial Setup screen each time the drive is energized.

If you select [TURN OFF], the keypad will not show the Initial Setup screen each time the drive is energized, starting with the next time.

2. Push F2 (Home).



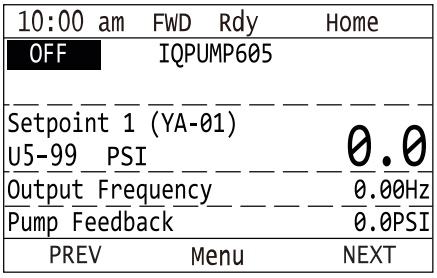
The display shows the HOME screen.

5.7 Keypad Operation

Note:
Make sure that you use a keypad with FLASH number 1004 or later. Keypads with FLASH numbers 1003 and earlier will not show characters correctly.

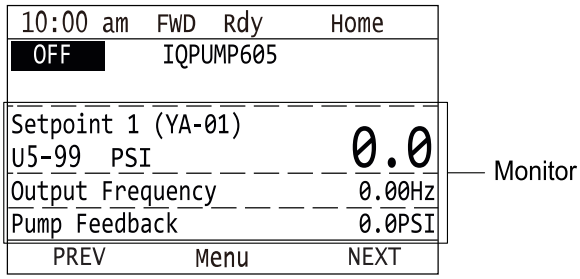
◆ Home Screen Display Selection

This section gives information about the functions that you can control from the HOME screen and the content shown on the HOME screen.



■ View Monitors Shown in Home Screen

This figure shows monitor data in the data display area of the HOME screen.



■ Show the Standard Monitor Menu

Push [<] to show the Standard Monitor menu (*Ux-xx*). Push [F2] (Home) to go back to the HOME screen.

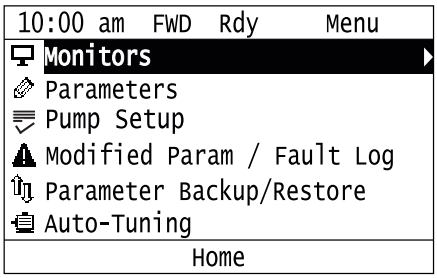
■ Change the Frequency Reference Value

1. Push [↵] to access the screen to change the frequency.
2. Push [<] or [>] to select the digit, then push [^] or [v] to change the value.
3. Push [↵] to keep the changes.

Note:
The HOME screen must show *U1-01 [Frequency Reference]* or you must set *b1-01 = 0 [Frequency Reference Selection 1 = Keypad]* to use this function.

■ Show the Main Menu

Push [F2] to show the main menu. Push [F2] (Home) to go back to the HOME screen.



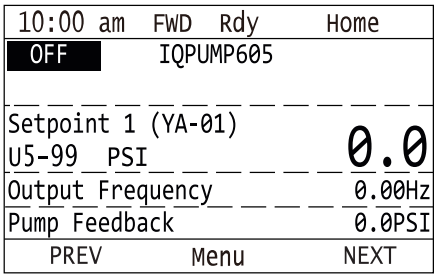
◆ Show the Monitors

This section shows how to show the standard monitors (*Ux-xx*).

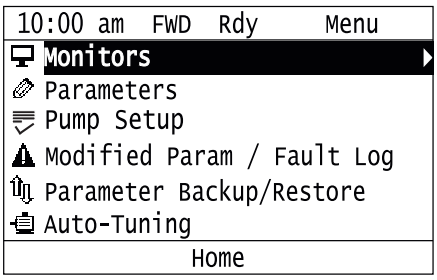
1. Push F2 (Home) to show the HOME screen.

Note:
- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If the screen does not show [Home] for F2, push F1 (Back), and then push F2 to show [Home].

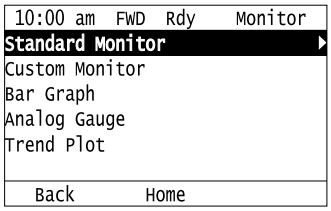
2. Push F2 (Menu).



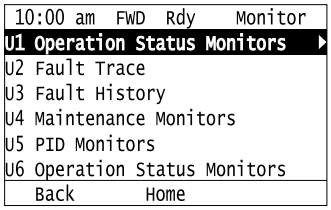
3. Push ^ or v to select [Monitors], then push ↵.



4. Push ^ or v to select [Standard Monitor], then push ↵.



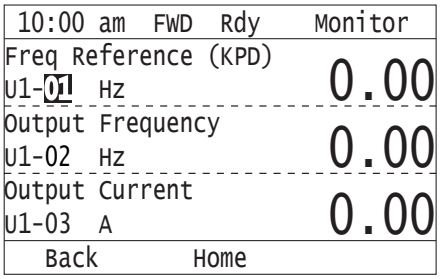
5. Push ^ or v to select the monitor group, then push ↵.



6. Push ^ or v to change the monitor number to show the monitor item.

Note:

Push < to go back to the previous page.



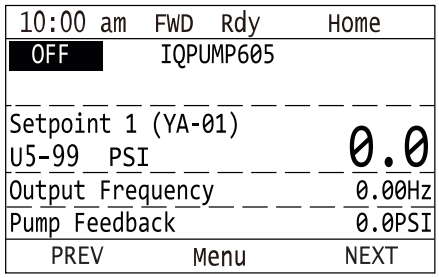
◆ Set Custom Monitors

You can select and register a maximum of 12 monitoring items to regularly show on the keypad.
This procedure shows how to set the motor speed to [Custom Monitor 1].

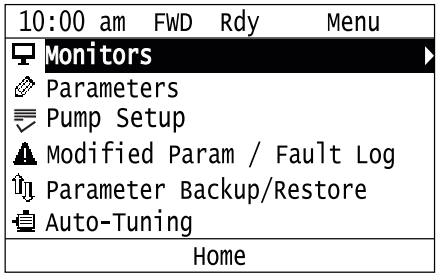
1. Push F2 (Home) to show the HOME screen.

Note:
- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If the keypad does not show [Home] on F2, push F1 (Back) to show [Home] on F2.

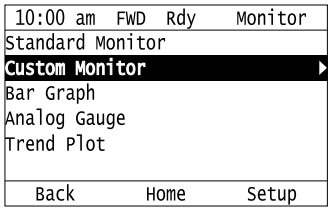
2. Push F2 (Menu).



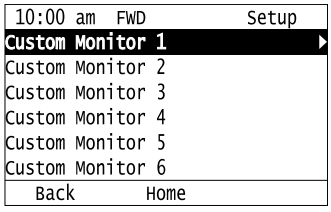
3. Push ▲ or ▼ to select [Monitors], then push ↵.



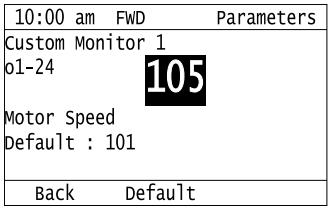
4. Push ▲ or ▼ to select [Custom Monitor], then push F3 (Setup).



5. Push ▲ or ▼ to select [Custom Monitor 1], then push ↵.



6. Push ▲ or ▼ to select the monitor number to register, then push ↵.
   Set the x-xx part of monitor *Ux-xx*. For example, to show monitor *U1-05*, set it to “105” as shown in this figure.



The configuration procedure is complete.

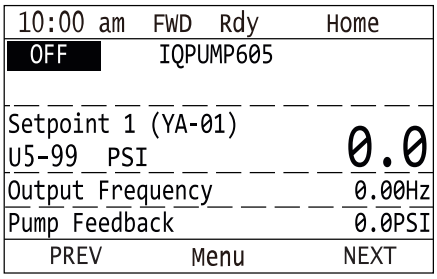
◆ Show Custom Monitors

The procedure in this section shows how to show the registered custom monitors.

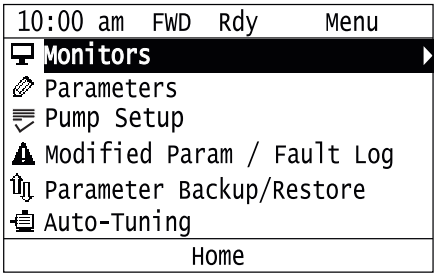
1. Push F2 (Home) to show the HOME screen.

Note:
- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on F2, push F1 (Back) to show [Home] on F2.

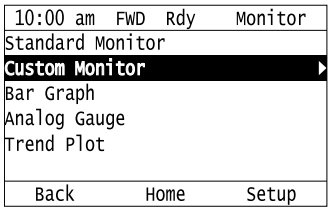
2. Push F2 (Menu).



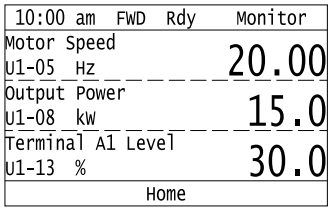
3. Push ▲ or ▼ to select [Monitors], then push ↵.



4. Push ▲ or ▼ to select [Custom Monitor], then push ↵.



The keypad shows the selected monitor as shown in this figure.



- When there are a minimum of two screens, push ^ or v to switch between screens.
- If you registered only one custom monitor to [Custom Monitor 1], the screen will show only one monitor. If you registered custom monitors only to [Custom Monitor 1] and [Custom Monitor 2], the screen will show only two monitors.

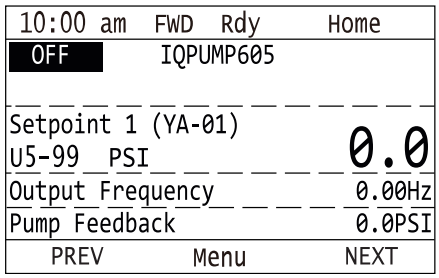
◆ Set the Monitors to Show as a Bar Graph

The procedure in this section shows how to show the frequency reference monitor as a bar graph.

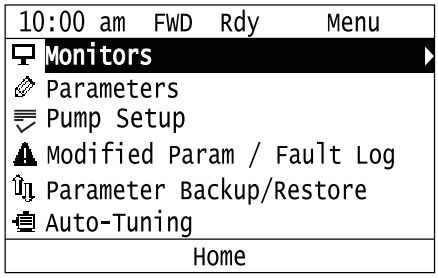
1. Push F2 (Home) to show the HOME screen.

Note:
- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on F2, push F1 (Back) to show [Home] on F2.

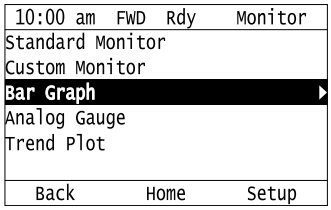
2. Push F2 (Menu).



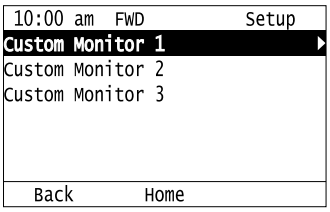
3. Push ^ or v to select [Monitors], then push ↵.



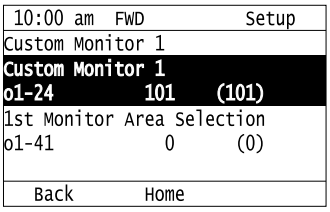
4. Push ^ or v to select [Bar Graph], then push F3 (Setup).



5. Push ▲ or ▼ to select the location to store the monitor, then push ↵.

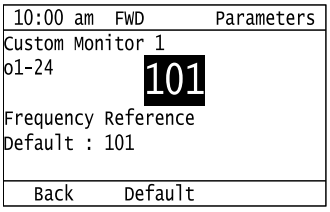


6. Push ↵.



7. Push ▲ or ▼ to select the monitor number to register, then push ↵.

   Enter the three digits in “x-xx” part of monitor *Ux-xx* to identify which monitor to output. For example, to show monitor *U1-01 [Frequency Reference]*, set it to "101" as shown in this figure.



The configuration procedure is complete.

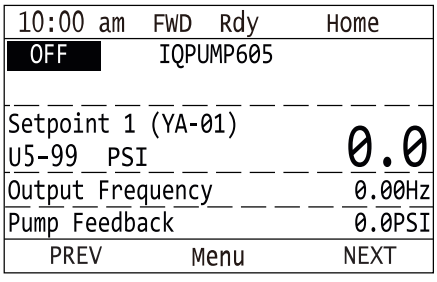
◆ Show Monitors as Bar Graphs

The procedure in this section shows how to show a specific monitor as a bar graph. You can show a maximum of three.

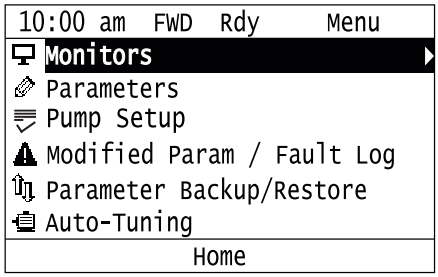
1. Push F2 (Home) to show the HOME screen.

Note:
- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If the screen does not show [Home] for F2, push F1 (Back), and then push F2 to show [Home].

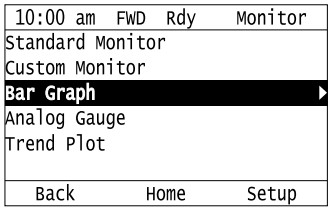
2. Push F2 (Menu).



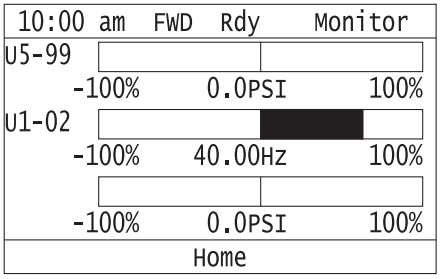
3. Push ▲ or ▼ to select [Monitors], then push ↵.



4. Push ▲ or ▼ to select [Display Bar Graph], then push ↵.



The screen will show the monitors as shown in this figure.



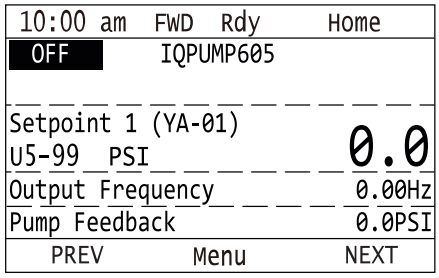
◆ Set the Monitors to Show as Analog Gauges

The procedure in this section shows how to show the frequency reference monitor as an analog gauge.

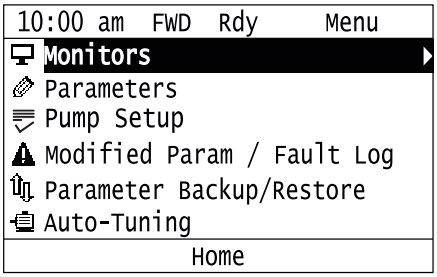
1. Push F2 (Home) to show the HOME screen.

Note:
- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on F2, push F1 (Back) to show [Home] on F2.

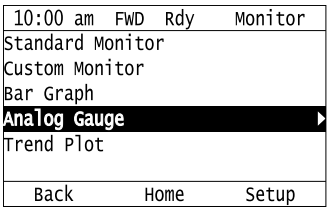
2. Push F2 (Menu).



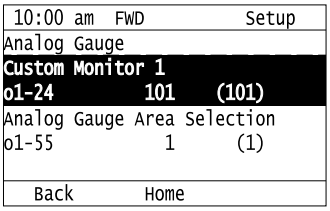
3. Push ▲ or ▼ to select [Monitors], then push ↵.



4. Push ▲ or ▼ to select [Analog Gauge], then push F3 (Setup).

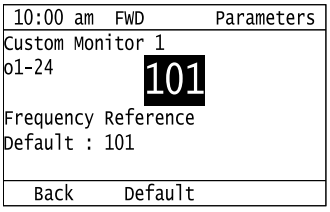


5. Push ↵.



6. Push ▲ or ▼ to select the monitor number to register, then push ↵.

   Enter the three digits in “x-xx” part of monitor *Ux-xx* to identify which monitor to output. For example, to show monitor *U1-01 [Frequency Reference]*, set it to "101" as shown in this figure.



The configuration procedure is complete.

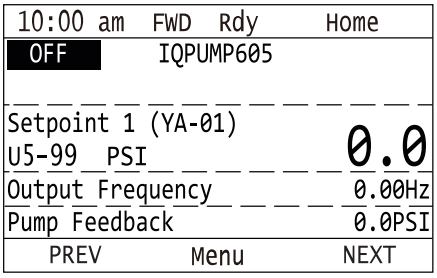
◆ Show Monitors as an Analog Gauge

The following explains how to display the contents selected for a monitor as an analog gauge.

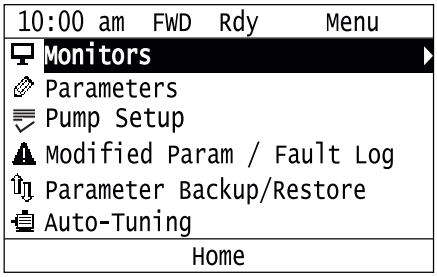
1. Push F2 (Home) to show the HOME screen.

Note:
- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If [Home] is not on F2, push F1 (Back) to show [Home] on F2.

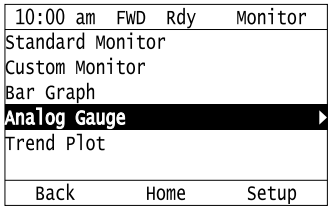
2. Push F2 (Menu).



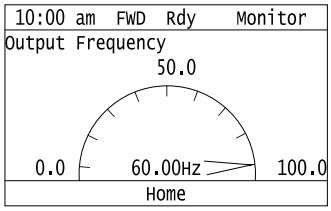
3. Push ▲ or ▼ to select [Monitors], then push ↵.



4. Push ▲ or ▼ to select [Analog Gauge], then push ↵.

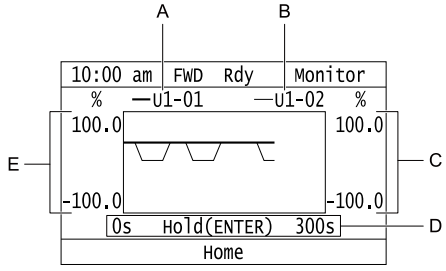


It will be displayed as follows.



◆ Set Monitor Items to Show as a Trend Plot

You must set the items in this figure to display as a trend plot.



A - Monitor Parameter 1 (set with [Custom Monitor 1])

B - Monitor Parameter 2 (set with [Custom Monitor 2])

C - Trend Plot 2 Scale Maximum/ Minimum Value

D - Trend Plot Time Scale

E - Trend Plot 1 Scale Maximum/ Minimum Value

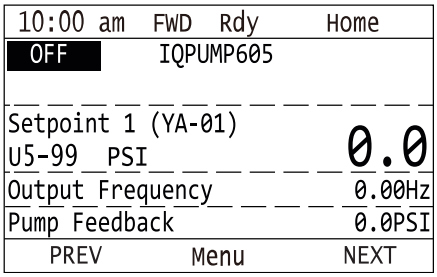
■ Select Monitor Items to Show as a Trend Plot

The procedure in this section shows how to show the frequency reference monitor as a trend plot.

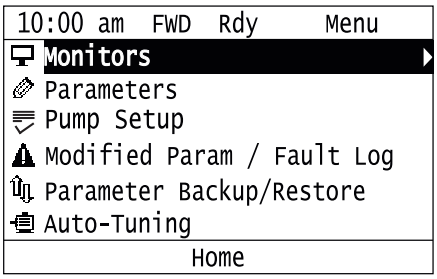
1. Push F2 (Home) to show the HOME screen.

Note:
• The keypad will show [Home] in the top right corner when the HOME screen is active.
• If [Home] is not shown on F2, push F1 (Back) to show [Home] on F2.

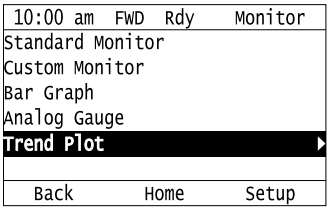
2. Push F2 (Menu).



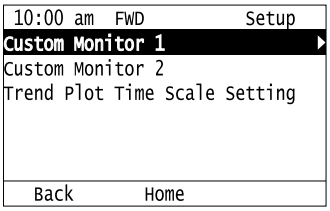
3. Push ▲ or ▼ to select [Monitors], then push ↵.



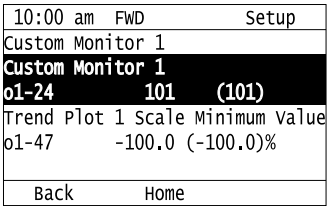
4. Push ▲ or ▼ to select [Trend Plot], then push F3 (Setup).



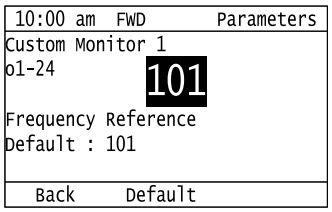
5. Push ▲ or ▼ to select [Custom Monitor 1], then push ↵.



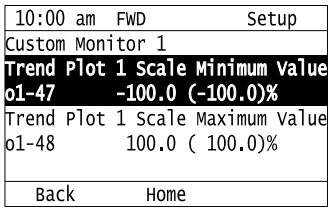
6. Push ↵.



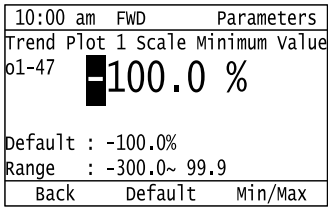
7. Push ▲ or ▼ to select the monitor number to register, then push ↵.
   When the *U parameters* are on the display as “Ux-xx”, the three digits in “x-xx” identify which monitor to output. For example, to show monitor *U1-01 [Frequency Reference]*, set it to “101” as shown in this figure.



8. Push ▲ or ▼ to select [Trend Plot 1 Scale Minimum Value], then push ↵.

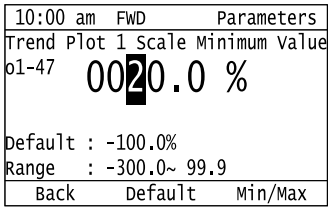


9. Push ◀ or ▶ to select the specified digit, then push ▲ or ▼ to select the correct number.

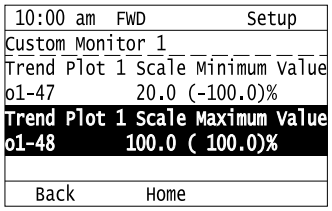


   - Push F2 (Default) to set the parameters to the factory default.
   - Push F3 (Min/Max) to move between the minimum value and maximum value.

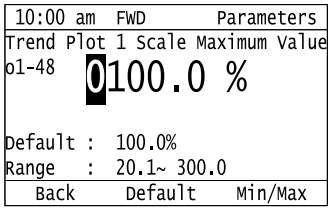
10. Push ↵ to keep the changes.



11. Push ▲ or ▼ to select [Trend Plot 1 Scale Maximum Value], then push ↵.

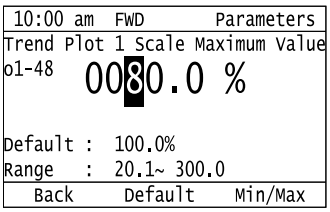


12. Push ◀ or ▶ to select the specified digit, then push ▲ or ▼ to select the correct number.



- Push F2 (Default) to set the parameters to the factory default.
- Push F3 (Min/Max) to move between the minimum value and maximum value.

13. Push ↵ to keep the changes.



14. Push F1 (Back).
    If necessary, use the same procedure to set [Custom Monitor 2].

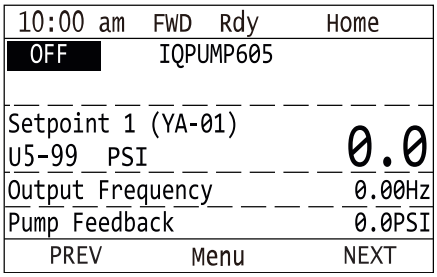
■ Set the Time Scale for the Trend Plot Monitor

The procedure in this section shows how to set the time scale for the trend plot monitor.

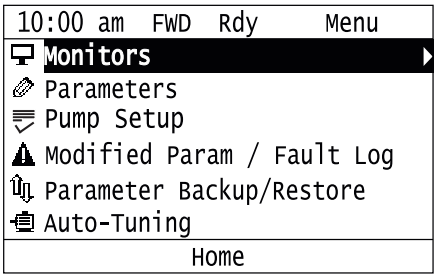
1. Push F2 (Home) to show the HOME screen.

Note:
• The keypad will show [Home] in the top right corner when the HOME screen is active.
• If [Home] is not shown on F2, push F1 (Back) to show [Home] on F2.

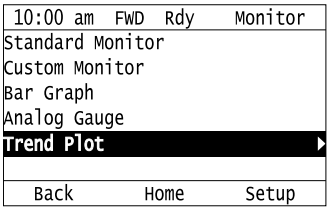
2. Push F2 (Menu).



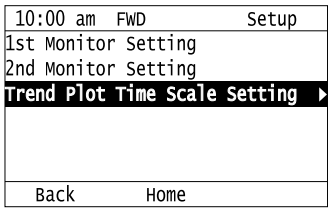
3. Push ^ or v to select [Monitors], then push ↵.



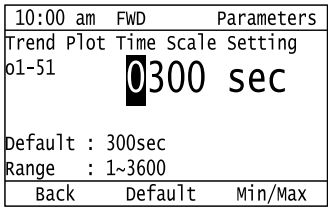
4. Push ^ or v to select [Trend Plot], then push F3 (Setup).



5. Push ▲ or ▼ to select [Trend Plot Time Scale Setting], then push ↵.

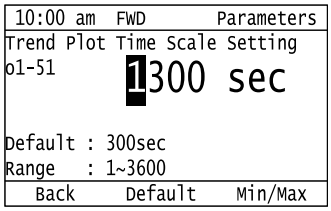


6. Push ◀ or ▶ to select the specified digit, then push ▲ or ▼ to select the correct number.



- Push F2 (Default) to set the parameters to the factory default.
- Push F3 (Min/Max) to move between the minimum value and maximum value.

7. Push ↵ to keep the changes.



The configuration procedure is complete.

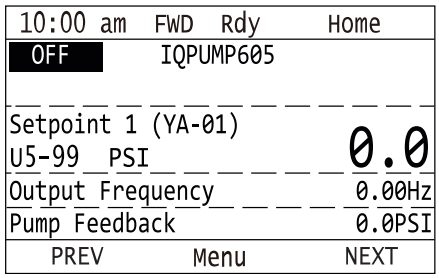
◆ Show Monitor Items as a Trend Plot

The procedure in this section shows how to show the selected monitor data as a trend plot.

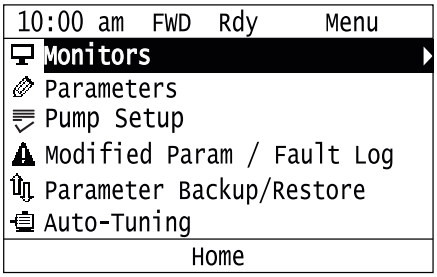
1. Push F2 (Home) to show the HOME screen.

Note:
- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on F2, push F1 (Back) to show [Home] on F2.

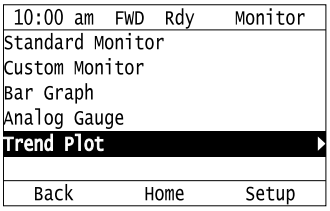
2. Push F2 (Menu).



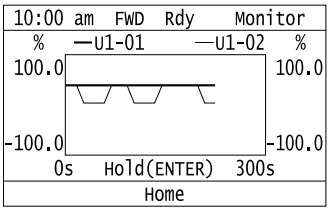
3. Push ▲ or ▼ to select [Monitors], then push ↵.



4. Push ▲ or ▼ to select [Trend Plot], then push ↵.



The screen will show the monitors as shown in this figure.



Note:

Push ↵ (Hold) to switch between Pause and Restart for the monitor display. The "Hold (ENTER)" message flashes while you pause monitoring.

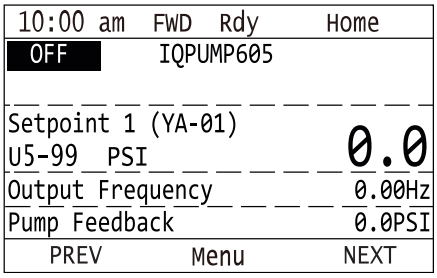
◆ Change Parameter Settings

This example shows how to change the setting value for *C1-01 [Acceleration Time 1]*. Do the steps in this procedure to set parameters for the application.

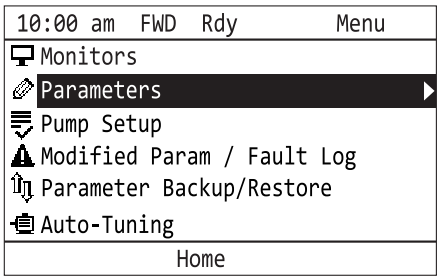
1. Push F2 (Home) to show the HOME screen.

Note:
- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If [Home] is not shown above the F2, push F1 (Back).

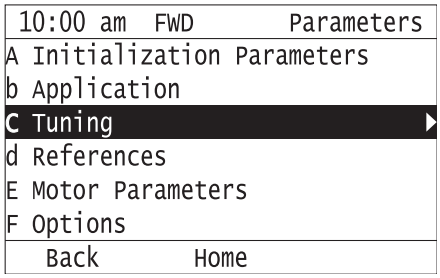
2. Push F2 (Menu).



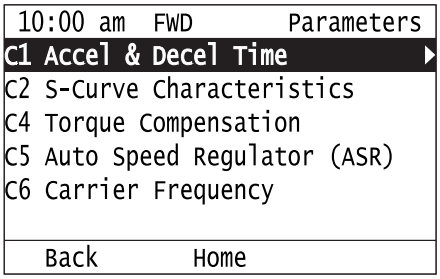
3. Push ▲ or ▼ to select [Parameters], then push ↵.



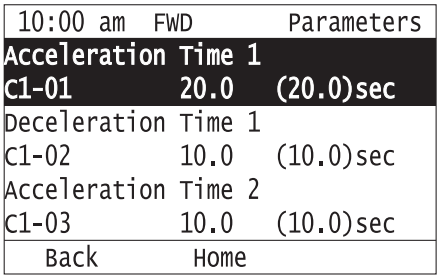
4. Push ▲ or ▼ to select [C Tuning], then push ↵.



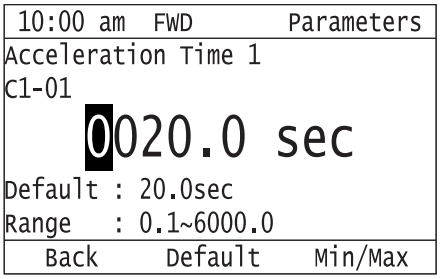
5. Push ▲ or ▼ to select [C1 Accel & Decel Time], then push ↵.



6. Push ▲ or ▼ to select *C1-01*, then push ↵.

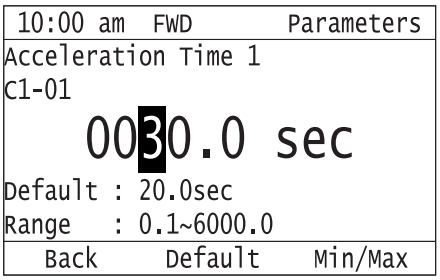


7. Push ◀ or ▶ to select the specified digit, then push ▲ or ▼ to select the correct number.



- Push F2 (Default) to set the parameters to factory defaults.
- Push F3 (Min/Max) to show the minimum value or the maximum value on the display.

8. Push ↵ to keep the changes.



9. Continue to change parameters, then push F1 (Back), F2 (Home) to go back to the home screen after you change all the applicable parameters.

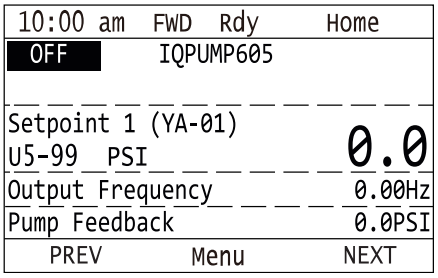
◆ Pump Quick Setup

The parameters shown in the Pump Quick Setup menu will change with the selected Application Preset.

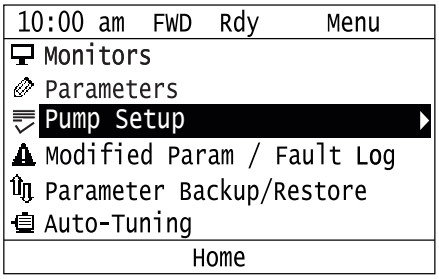
1. Push F2 (Home) to show the HOME screen.

Note:
- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on F2, push F1 (Back) to show [Home] on F2.

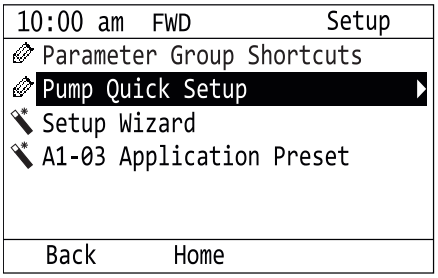
2. Push F2 (Menu).



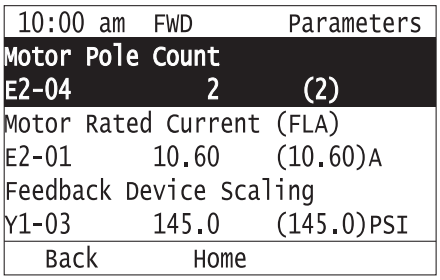
3. Push ^ or v to select [Pump Setup], then push ↵.



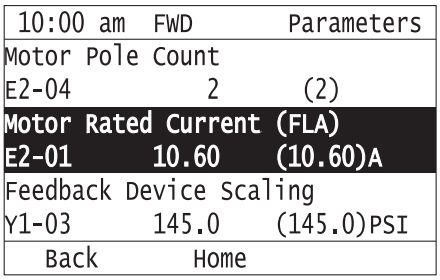
4. Push ^ or v to select [Pump Quick Setup], then push ↵.



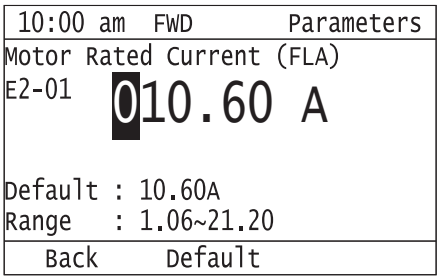
5. Push ▲ or ▼ to show the parameter to examine.



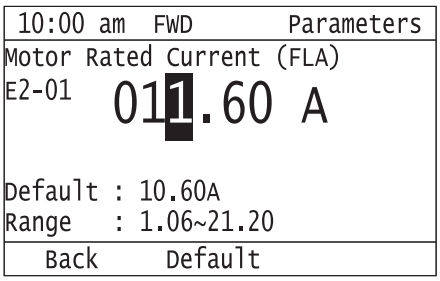
6. To change the parameter settings, push ▲ or ▼ to select the parameter, then push ↵.



7. Push ◀ or ▶ to select the digit, then push ▲ or ▼ to change the value.



8. Change the value, push ↵.



The parameter setting procedure is complete.

◆ Save a Backup of Parameters

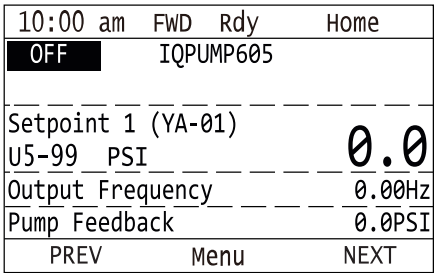
You can save a backup of the drive parameters to the keypad. The keypad can store parameter setting values for a maximum of four drives in different storage areas. Backups of the parameter settings can save time when you set parameters after you replace a drive. When you set up more than one drive, you can copy the parameter settings from a drive that completed a test run to the other drives.

Note:
- Stop the motor before you back up parameters.
- The drive will not accept a Run command while it makes a backup.
- The DriveWorksEZ PC software password is necessary to back up *Qx-xx [DriveWorksEZ Parameter]* and *Rx-xx [DWEZ Connection Parameter]*. If you enter an incorrect password, the drive detects *PWEr [DWEZ Password Mismatch]*.

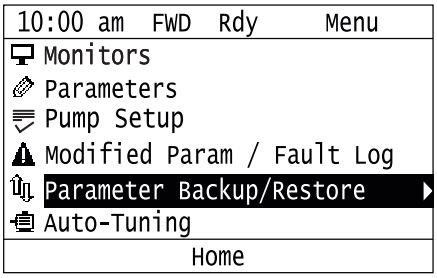
1. Push F2 (Home) to show the HOME screen.

Note:
- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If the screen does not show [Home] for F2, push F1 (Back), and then push F2 to show [Home].

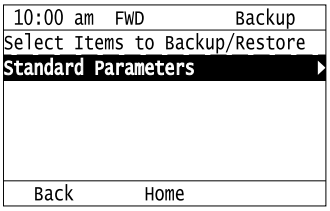
2. Push F2 (Menu).



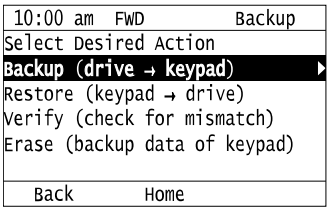
3. Push ^ or v to select [Parameter Backup/Restore], then push ↵.



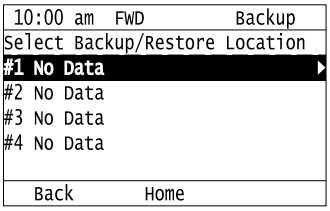
4. Push ^ or v to select the items to back up, then push ↵.



5. Push ^ or v to select [Backup (drive → keypad)], then push ↵.



6. Push ^ or v to select a memory location, then push ↵.



The keypad shows “End” when the backup procedure completes successfully.

◆ Write Backed-up Parameters to the Drive

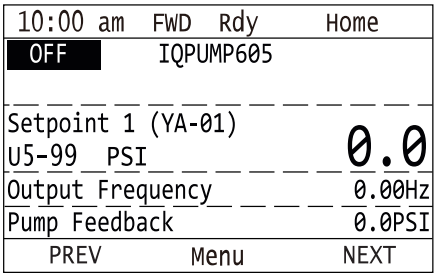
You can back up parameters on the keypad and write them to different drives.

Note:
- Always stop the drive before you start to restore the parameter backups.
- The drive will not accept a Run command while it restores parameters.

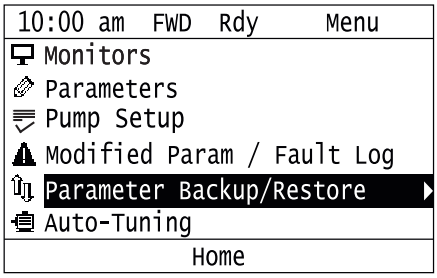
1. Push F2 (Home) to show the HOME screen.

Note:
- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If the screen does not show [Home] for F2, push F1 (Back), and then push F2 to show [Home].

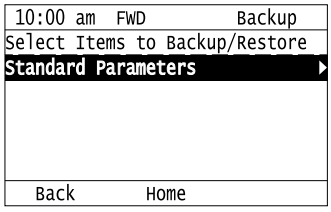
2. Push F2 (Menu).



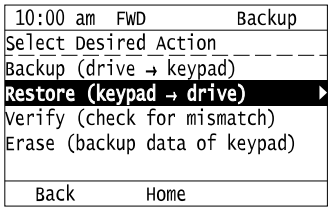
3. Push ▲ or ▼ to select [Parameter Backup/Restore], then push ↵.



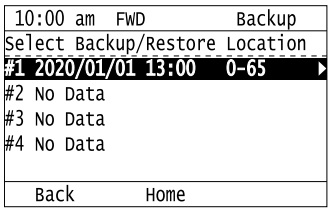
4. Push ▲ or ▼ to select the item to restore, then push ↵.



5. Push ▲ or ▼ to select [Restore (keypad → drive)], then push ↵.



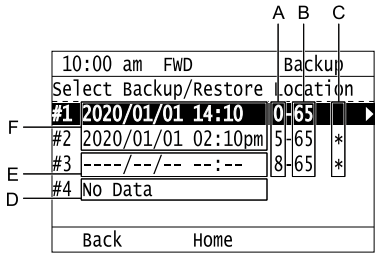
6. Push ▲ or ▼ to select the backed-up parameter data, then push ↵.



The keypad will show the “End” message when the write process is complete.

Note:

Different settings and conditions will change the keypad display.



A - *A1-02 [Control Method Selection]* settings

B - *o2-04 [Drive Model (KVA) Selection]* settings (2 or 3 digits)

C - Presence of DriveWorksEZ parameter backup

D - Parameter backup data is not registered

E - Backup data does not contain the date Information

F - Backup date

◆ Verify Keypad Parameters and Drive Parameters

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

Note:

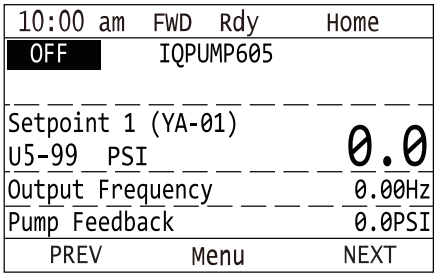
- Always stop the drive before you start to verify the parameters.
- The drive will not accept a Run command while it verifies parameters.

1. Push F2 (Home) to show the HOME screen.

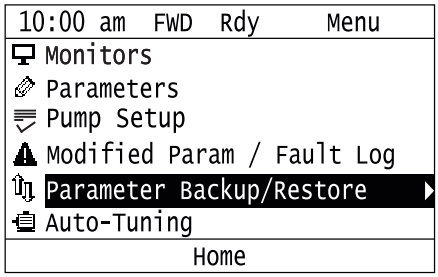
Note:

- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If the screen does not show [Home] for F2, push F1 (Back), and then push F2 to show [Home].

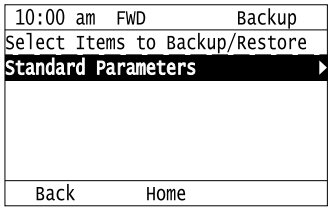
2. Push F2 (Menu).



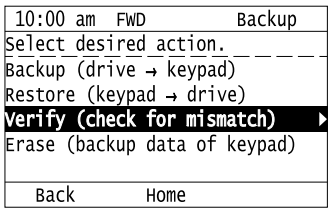
3. Push ▲ or ▼ to select [Parameter Backup/Restore], then push ↵.



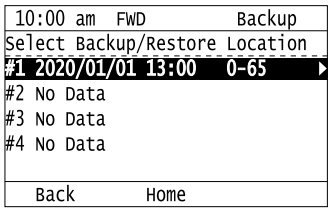
4. Push ▲ or ▼ to select the item to verify, then push ↵.



5. Push ▲ or ▼ to select [Verify (drive → keypad)], then push ↵.



6. Push ▲ or ▼ to select the data to verify, then push ↵.



The keypad shows "End" when the parameter settings backed up in the keypad agree with the parameter settings copied to the drive.

Note:

The keypad shows *vFyE [Parameters do not Match]* when the parameter settings backed up in the keypad do not agree with the parameter settings copied to the drive. Push one of the keys to return to the screen in Step 6.

◆ Delete Parameters Backed Up to the Keypad

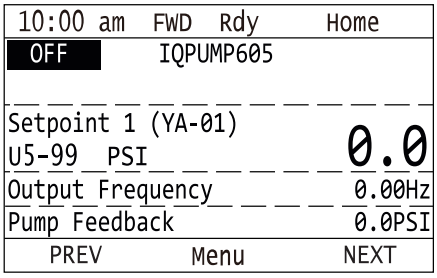
This procedure deletes the parameters that were backed up to the keypad.

1. Push F2 (Home) to show the HOME screen.

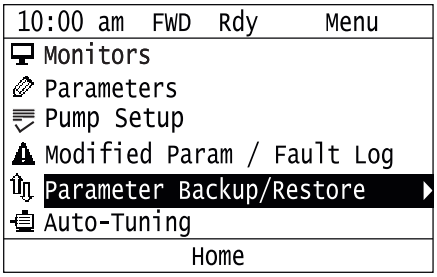
Note:

- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If the screen does not show [Home] for F2, push F1 (Back), and then push F2 to show [Home].

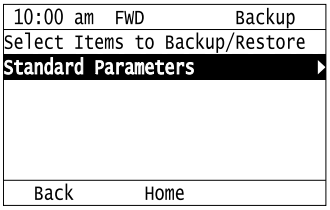
2. Push F2 (Menu).



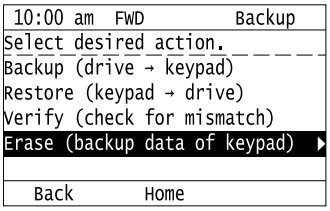
3. Push ▲ or ▼ to select [Parameter Backup/Restore], then push ↵.



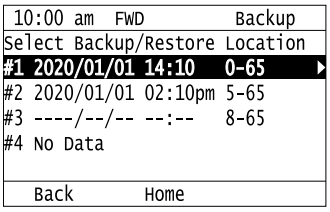
4. Push ▲ or ▼ to select the item to verify, then push ↵.



5. Push ▲ or ▼ to select [Delete (keypad)], then push ↵.



6. Push ▲ or ▼ to select the data to delete, then push ↵.



The keypad will show the “End” message when the write process is complete.

◆ Checking Modified Parameters

■ Modified Parameters Screen Displays

The keypad display for Modified Parameters screen changes when the *A1-06 [Application Preset]* and *A1-07 [DriveWorksEZ Function Selection]* settings change:

A1-06 Settings	A1-07 Settings	Keypad Display	Description
0	0	10:00 am FWD Modified Modified Parameters All Modified: 2 Parameters Back Home	When no Application Preset is selected and *A1-07 = 0 [DWEZ Disabled]*, the Modified Parameters screen will only show [All Modified].
1 - 8	0	10:00 am FWD Modified Modified Parameters Only User Modified: 1 Parameters All Modified: 3 Parameters Back Home	When you set an application macro (*A1-06 ≠ 0*), the Modified Parameters screen will show the Only User Modified menu and All Modified menu. • Only User Modified: This menu shows parameters that have a different value compared to the application preset setting. • All Modified: This menu shows parameters that are able to show up on the modified constants (parameters affected by initialization) and that are set to a value different than the drive standard default value.
0 - 8	1	10:00 am FWD Modified Modified Parameters All Modified: 8 Parameters DriveWorksEZ Modified: 1 Parameters Back Home	When *A1-07 = 1 [DWEZ Enabled]*, the keypad will also show the DriveWorksEZ Modified menu selection. If the modified parameters are returned back to Application Preset default, causing the numbers of parameters modified for Application Preset to be 0, the user will be returned back to the Only User Modified Parameters menu screen with the All Modified list selected.

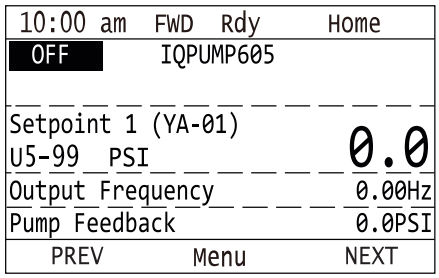
■ Check Modified Parameters

This procedure will show all parameters that are not at their default values. This helps find settings have been changed, and is very useful when you replace a drive. This lets you quickly access and re-edit changed parameters. The keypad will show “0 Parameters” when all parameters are at their default values.

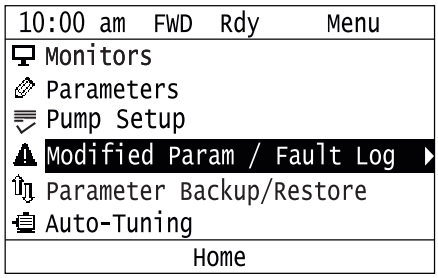
1. Push F2 (Home) to show the HOME screen.

Note:
• The keypad will show [Home] in the top right corner when the HOME screen is active.
• If [Home] is not shown on F2, push F1 (Back) to show [Home] on F2.

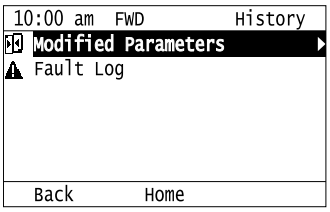
2. Push F2 (Menu).



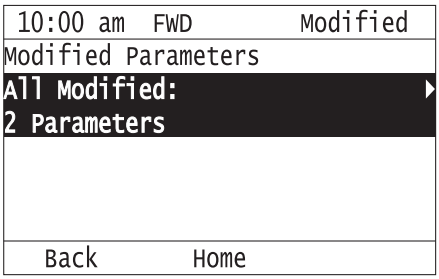
3. Push ^ or v to select [Modified Param / Fault Log], then prush ↵.



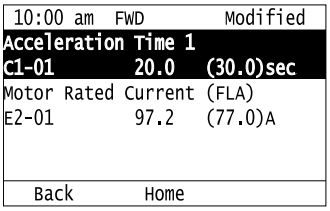
4. Push ▲ or ▼ to select [Modified Parameters], then push ↵.



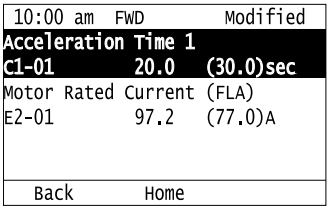
5. Push ↵.



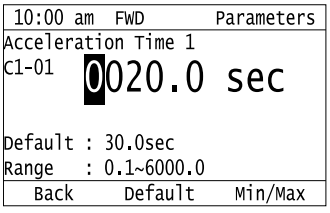
6. Push ▲ or ▼ to show the parameter to check.



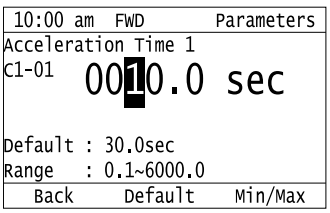
7. To re-edit a parameter, push ▲ or ▼, select the parameter to edit, then push ↵.



8. Push ◀ or ▶ to select the digit, then push ▲ or ▼ to change the value.



9. When you are done changing the value, push ↵.



The parameter revision procedure is complete.

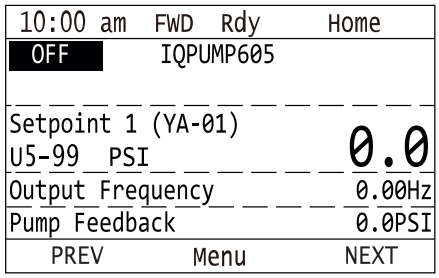
◆ Restore Modified Parameters to Defaults

This procedure will set all parameters with changed values to their default settings.

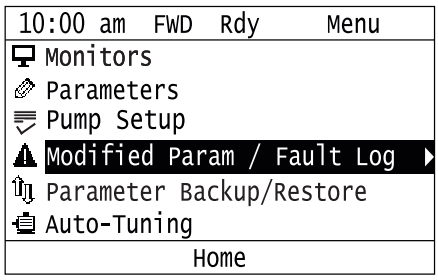
1. Push F2 (Home) to show the HOME screen.

Note:
- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on F2, push F1 (Back) to show [Home] on F2.

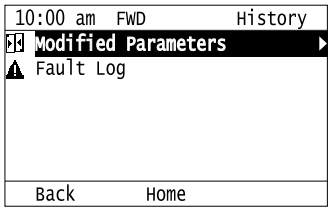
2. Push F2 (Menu).



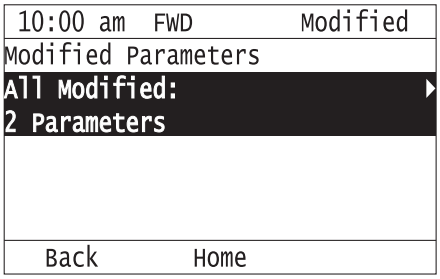
3. Push ▲ or ▼ to select [Modified Param / Fault Log], then push ↵.



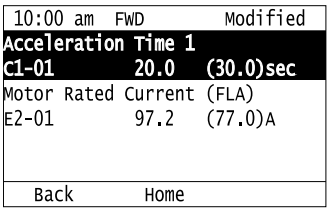
4. Push ▲ or ▼ to select [Modified Parameters], then push ↵.



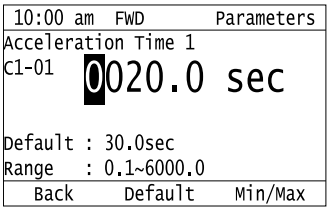
5. Push ↵.



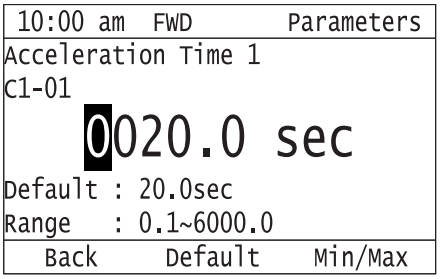
6. Push ▲ or ▼ to select the parameters to return to their default settings, then push ↵.



7. Push F2 (Default).



8. Push ↵.



The modified parameters are now set to default values.

◆ Show Fault History

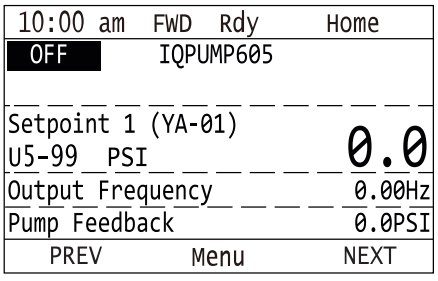
You can examine a maximum of 10 fault codes and dates and times that the faults occurred.

Note:
- To monitor the date and time of faults, you must first set the date and time on the keypad.
- If the keypad does not have a clock battery, you must set the date and time each time you energize the drive.

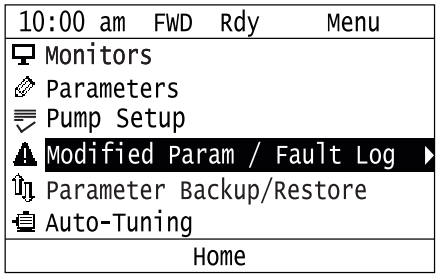
1. Push F2 (Home) to show the HOME screen.

Note:
- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on F2, push F1 (Back) to show [Home] on F2.

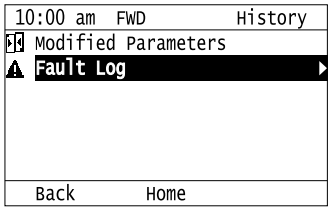
2. Push F2 (Menu).



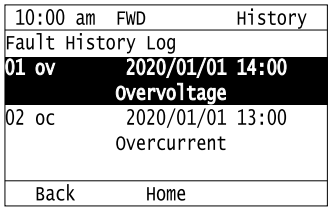
3. Push ▲ or ▼ to select [Modified Parameters/Fault History], then push ↵.



4. Push ▲ or ▼ to select [Fault History], then push ↵.



5. Push ▲ or ▼ to show the fault history you will examine.



◆ Auto-Tuning the Drive

Auto-Tuning uses motor characteristics to automatically set drive parameters.

Refer to the motor nameplate or the motor test report for the necessary information for Auto-Tuning.

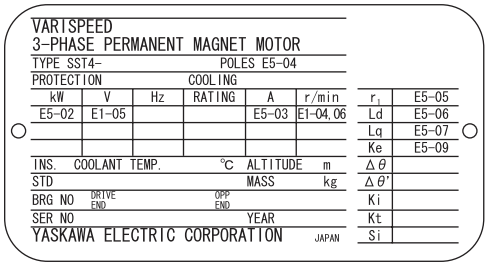


Figure 5.12 Motor Nameplate (Example)

⚠ WARNING Sudden Movement Hazard

Before you do Auto-Tuning, remove all personnel and objects from the area around the drive, motor, and load.

The drive and motor can start suddenly during Auto-Tuning and cause serious injury or death.

⚠ WARNING Electrical Shock Hazard

During Auto-Tuning, the motor will receive high voltage when the motor is stopped. Do not touch the motor until Auto-Tuning is complete.

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

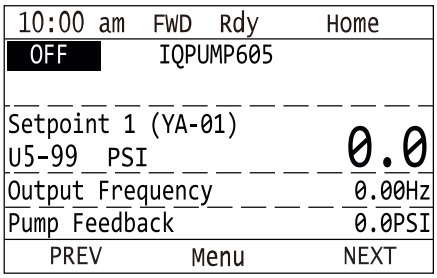
⚠ WARNING Sudden Movement Hazard
Before you do Rotational Auto-Tuning, disconnect the load from the motor.
The load can move suddenly and cause serious injury or death.

This procedure shows how to do Rotational Auto-Tuning.

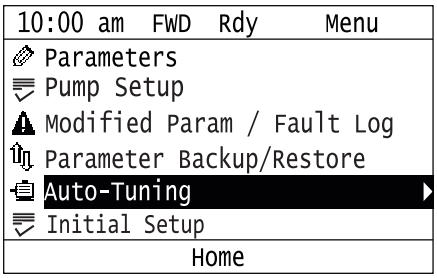
1. Push F2 (Home) to show the HOME screen.

Note:
- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If the screen does not show [Home] for F2, push F1 (Back), and then push F2 to show [Home].

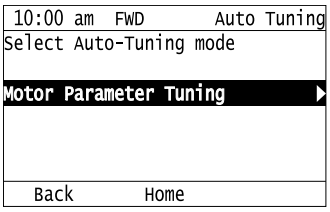
2. Push F2 (Menu).



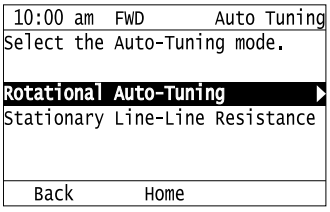
3. Push ▲ or ▼ to select [Auto-Tuning], then push ↵.



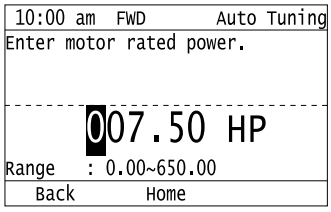
4. Push ↵.



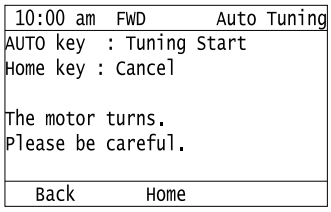
5. Push ▲ or ▼ to select [Rotational Auto-Tuning], then push ↵.



6. Follow the messages shown on the keypad to input the necessary Auto-Tuning data.
   Example: Push ◀ or ▶ to select the specified digit, then push ▲ or ▼ to change the number. Push ↵ to save the change and move to the next entry field.

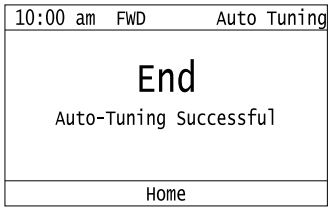


7. Follow the messages shown on the keypad to do the next steps.
8. When the keypad shows the Auto-Tuning start screen, push AUTO.



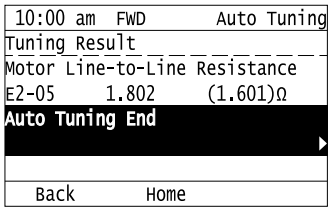
Auto-Tuning starts.
When doing Rotational Auto-Tuning, the motor will stay stopped for approximately one minute with power energized and then the motor will start to rotate.

9. When the keypad shows this screen after Auto-Tuning is complete for 1 or 2 minutes, push ENTER or RIGHT.



The keypad will show a list of the changed parameters as the result of Auto-Tuning.

10. Push UP or DOWN in the parameter change confirmation screen to check the changed parameters, then select [Auto-Tuning Successful] at the bottom of the screen and push ENTER.

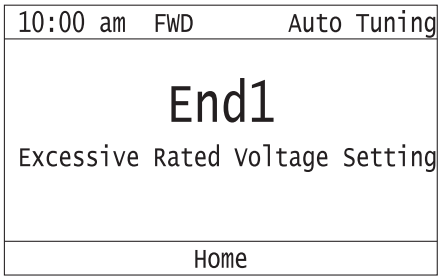


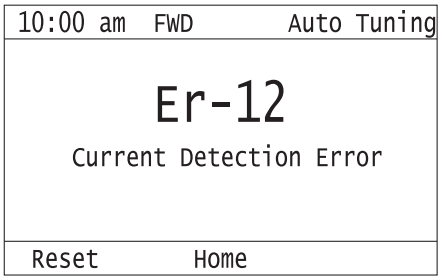
To change a parameter again, push UP or DOWN to select the parameter to change, then push ENTER to show the parameter setting screen.

Auto-Tuning is complete.

Note:

If the drive detects an error or you push OFF before Auto-Tuning is complete, Auto-Tuning will stop and the keypad will show an error code. *Endx* identifies that Auto-Tuning was successful with calculation errors. Find and repair the cause of the error and do Auto-Tuning again, or set the motor parameters manually. You can use the drive in the application if you cannot find the cause of the *Endx* error. *Er-xx* identifies that Auto-Tuning was not successful. Find and repair the cause of the error and do Auto-Tuning again.





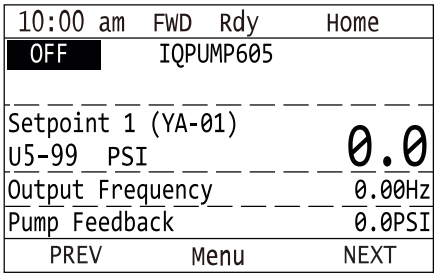
◆ Set the Keypad Language Display

The procedure in this section shows how to set the language shown on the keypad.

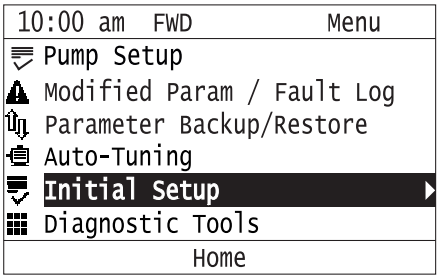
1. Push F2 (Home) to show the HOME screen.

Note:
- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on F2, push F1 (Back), to show [Home] on F2.

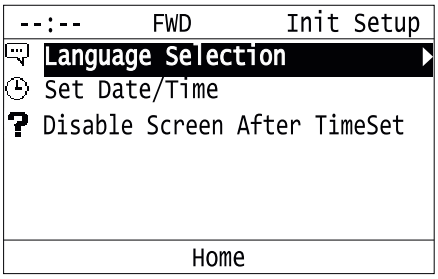
2. Push F2 (Menu).



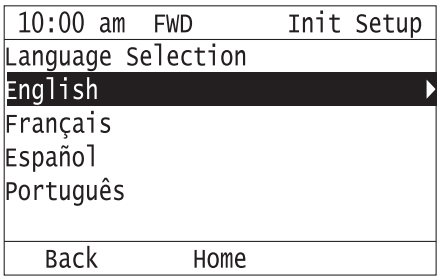
3. Push ^ or v to select [Initial Settings], then push ↵.



4. Push ^ or v to select [Language Selection], then push ↵.



5. Push ▲ or ▼ to select the language, then push ↵.



The procedure to set the keypad language is complete.

◆ Set the Date and Time

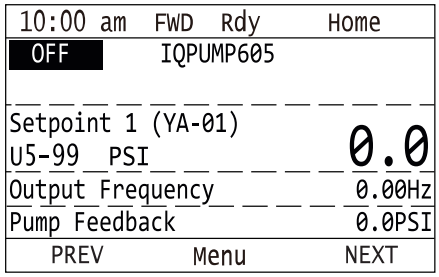
The procedure in this section shows how to set the date and time.

Note:
- Refer to *Replace the Keypad Battery on page 85* for information about the battery installation procedure. The drive can detect an alarm when the battery dies or when you do not set the clock. Set *o4-24 = 1 [bAT Detection selection = Enable (Alarm Detected)]* to enable this alarm.
- If the keypad does not have a clock battery, you must set the date and time each time you energize the drive.

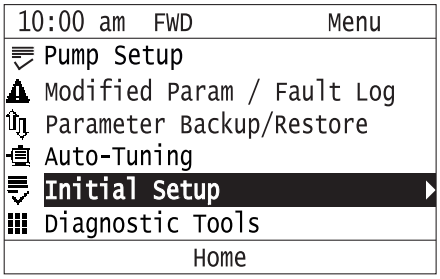
1. Push F2 (Home) to show the HOME screen.

Note:
- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on F2, push F1 (Back) to show [Home] on F2.

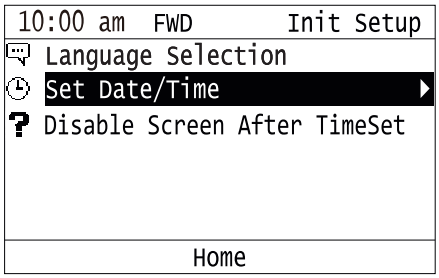
2. Push F2 (Menu).



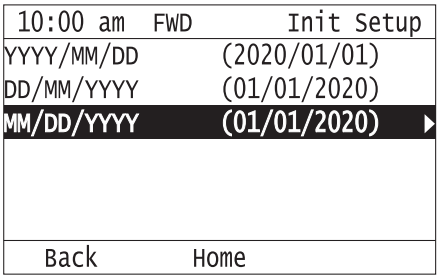
3. Push ▲ or ▼ to select [Initial Setup], then push ↵.



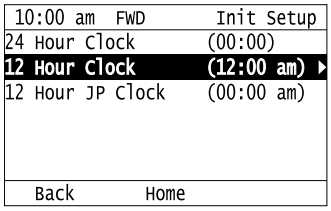
4. Push ▲ or ▼ to select [Set Date/Time], and push ↵.



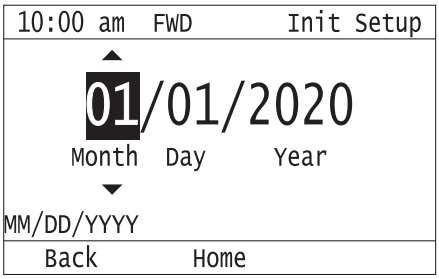
5. Push ▲ or ▼ to select the format of date display, then push ↵.



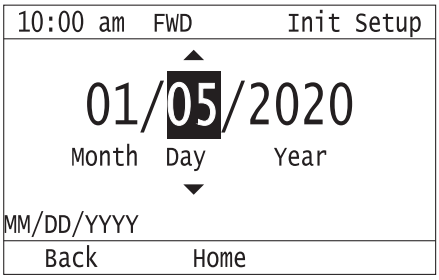
6. Push ▲ or ▼ to select the format of time display, then push ↵.



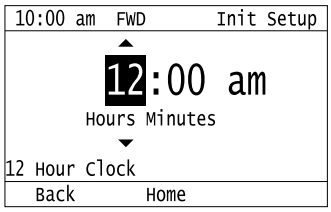
7. Push ◀ or ▶ to select a number from Month/Day/Year, then push ▲ or ▼ to change the value.



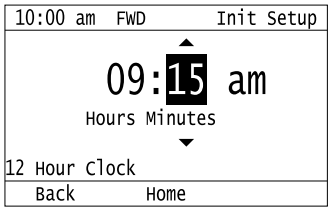
8. When you are done changing the value, push ↵.



9. Push < or > to select the hour or minute, then push ^ or v to change the value.



10. When you are done setting the time, push ↵.



The procedure for setting the date and time is complete.

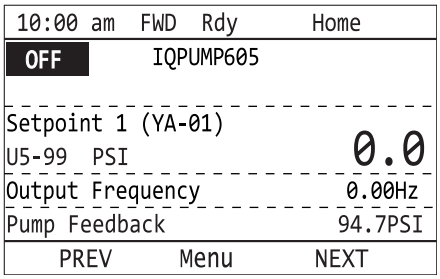
◆ Disable the Initial Setup Screen

Do the steps in this procedure to not show the initial start-up screen when the drive is energized.

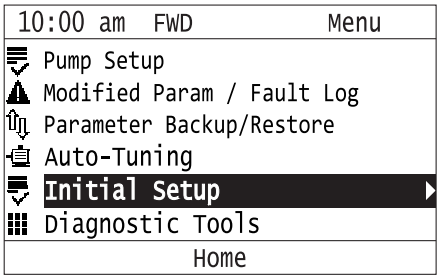
1. Push F2 (Home) to show the HOME screen.

Note:
- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If the screen does not show [Home] for F2, push F1 (Back), and then push F2 to show [Home].

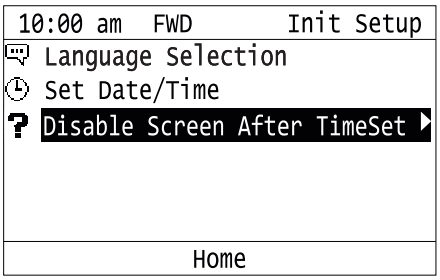
2. Push F2 (Menu).



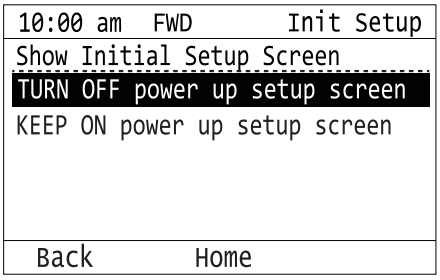
3. Push ^ / v to select [Initial Setup], then push ↵.



4. Push ▲ / ▼ to select [Disable Screen After Timeset], then push ↵.



5. Push ▲ / ▼ to select [TURN OFF power up setup screen], then push ↵.



◆ Start Data Logging

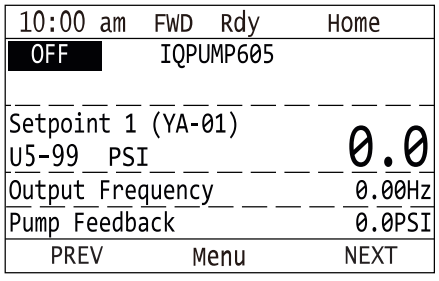
The data log function saves drive status information. Monitors *Ux-xx* are the source of log information. The procedure in this section shows how to start logging data.

You can record a maximum of 10 monitors.

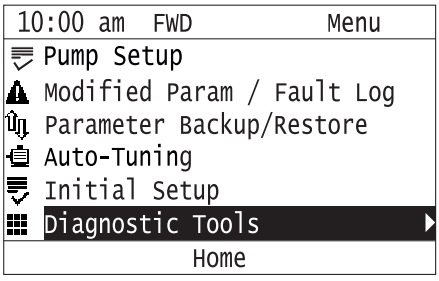
1. Insert a microSD card in the keypad.
2. Push F2 (Home) to show the HOME screen.

Note:
- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If the screen does not show [Home] for F2, push F1 (Back), and then push F2 to show [Home].

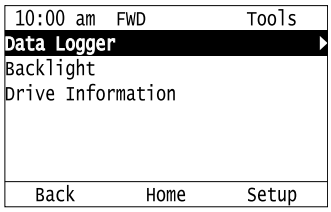
3. Push F2 (Menu).



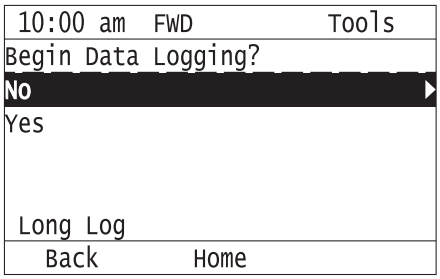
4. Push ▲ or ▼ to select [Diagnostic Tools], then push ↵.



5. Push ▲ or ▼ to select [Data Logger], then push ↵.

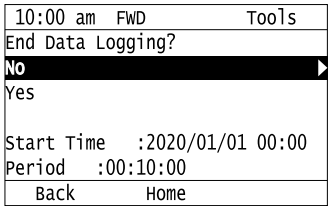


6. Push ▲ or ▼ to select [Yes] or [No], then push ↵.



- [Yes]: Data logging starts.
- [No]: Data logging will not start.

If the drive was logging data when you entered the command, the keypad looks like this:



◆ Configuring the Data Log Content

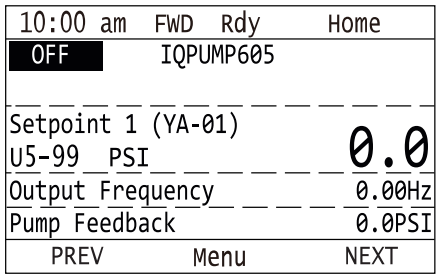
■ Set Monitor to Log

The procedure in this section shows how to set the monitor for which to log data.

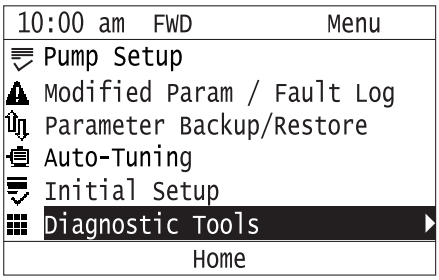
1. Push F2 (Home) to show the HOME screen.

Note:
- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If the screen does not show [Home] for F2, push F1 (Back), and then push F2 to show [Home].

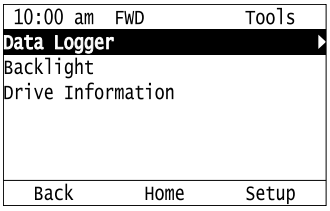
2. Push F2 (Menu).



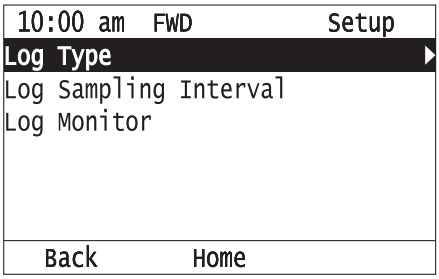
3. Push ▲ or ▼ to select [Diagnostic Tools], then push ↵.



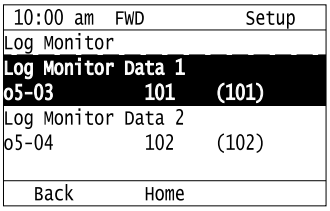
4. Push ▲ or ▼ to select [Data Logger], then push F3 (Setup).



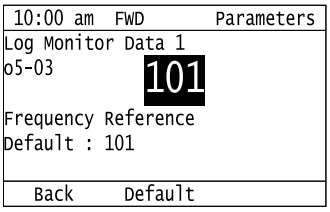
5. Push ▲ or ▼ to select [Log Monitor], then push ↵.



6. Push ▲ or ▼ to select the save-destination monitor parameter, then push ↵.



7. Push ▲ or ▼ to select the monitor number to be logged, then push ↵.



The configuration procedure is complete.

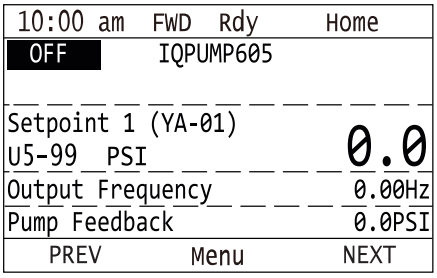
■ Set the Sampling Time

The procedure in this section shows how to set the sampling time for data logging.

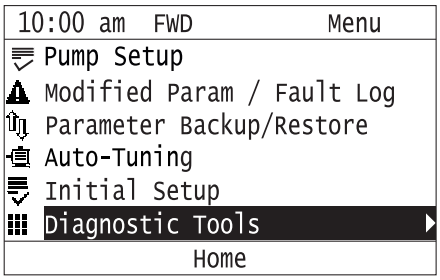
1. Push F2 (Home) to show the HOME screen.

Note:
- When the drive is in HOME Mode, the screen shows [Home] in the upper right-hand corner of the screen.
- If the screen does not show [Home] for F2, push F1 (Back), and then push F2 to show [Home].

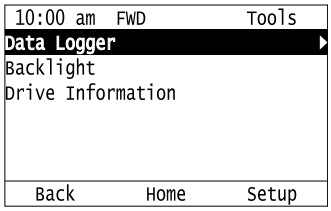
2. Push F2 (Menu).



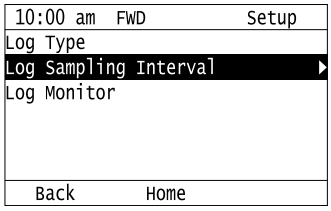
3. Push ▲ or ▼ to select [Diagnostic Tools], then push ↵.



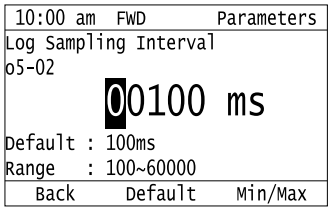
4. Push ▲ or ▼ to select [Data Logger], then push F3 (Setup).



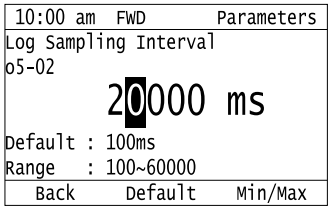
5. Push ▲ or ▼ to select [Log Sampling Interval], then push ↵.



6. Push ◀ or ▶ to select the digit, then push ▲ or ▼ to change the value.



7. When you complete changing the value, push ↵.



The procedure to set the sampling time is complete.

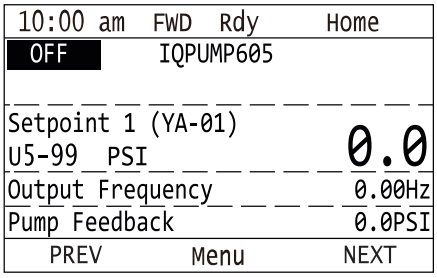
◆ Set Backlight to Automatically Turn OFF

You can set the backlight of the keypad screen to automatically turn OFF after a set length of time since the last key operation on the keypad. The procedure in this section shows how to turn ON and turn OFF the backlight.

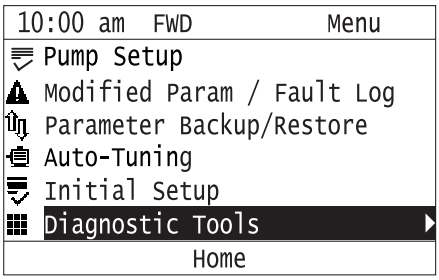
1. Push F2 (Home) to show the HOME screen.

Note:
- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on F2, push F1 (Back) to show [Home] on F2.

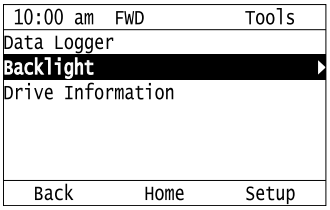
2. Push F2 (Menu).



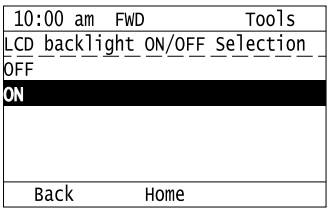
3. Push ▲ or ▼ to select [Diagnostic Tools], then push ↵.



4. Push ▲ or ▼ to select [Backlight], then push ↵.

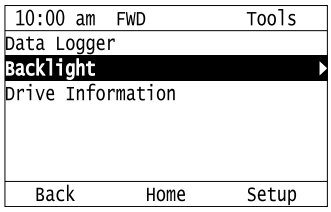


5. Push ▲ or ▼ to select [ON] or [OFF], then push ↵.

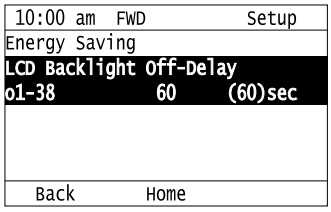


- [ON]: Backlight is always ON
- [OFF]: Backlight turns OFF after set length of time.

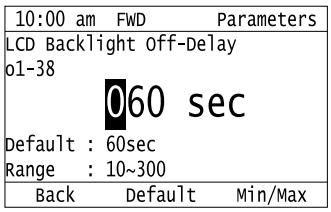
6. Push F3 (Setup).



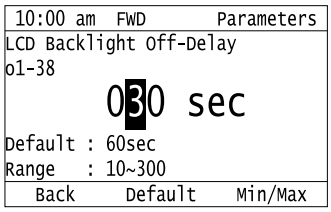
7. Push ↵.



8. Push < or > to select the digit, then push ∧ or ∨ to change the value.



9. When you are done changing the value, push ↵.



The procedure to set the backlight to turn OFF automatically is complete.

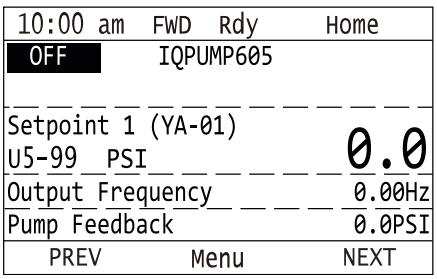
◆ Show Information about the Drive

The procedure in this section shows how to show the drive model, maximum applicable motor output, rated output current, software version, and the serial number on the keypad.

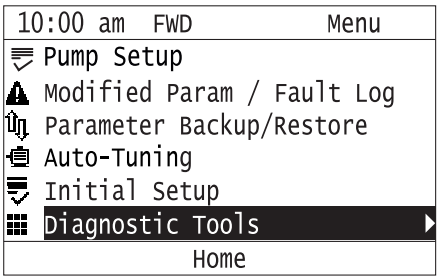
1. Push F2 (Home) to show the HOME screen.

Note:
- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on F2, push F1 (Back) to show [Home] on F2.

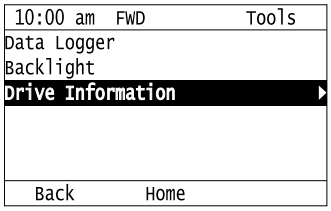
2. Push F2 (Menu).



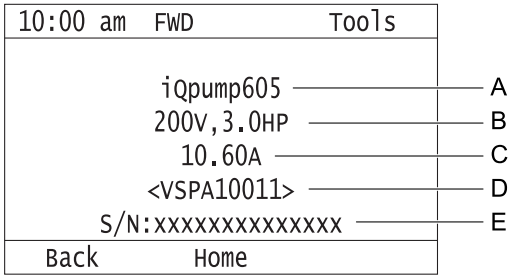
3. Push ▲ or ▼ to select [Diagnostic Tools], then push ↵.



4. Push ▲ or ▼ to select [Drive Information], then push ↵.



The keypad will show the drive information.



A - Drive Series
B - Maximum Applicable Motor Output
C - Rated Output Current
D - Drive Software Version
E - Serial Number

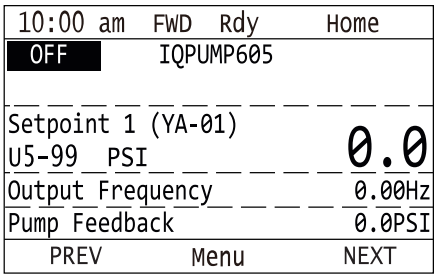
◆ How to Display Communication Option Details on the Keypad

When you install a JOHB-SMP3, Multi-protocol EtherNet option, the keypad can show information about the option. The procedure in this section shows how to display the option information.

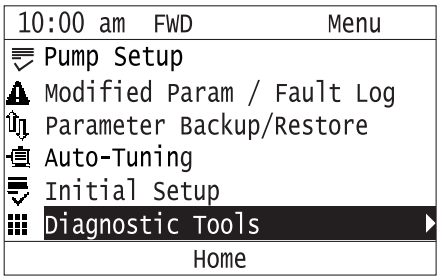
1. Push F2 [Home] to show the HOME screen.

Note:
• The keypad will show [Home] in the top right corner when the HOME screen is active.
• If [Home] is not shown on F2, push F1 (Back), to show [Home] on F2.

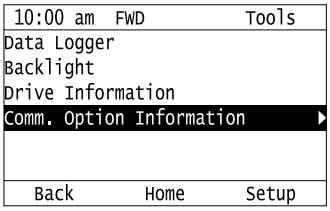
2. Push F2 (Menu).



3. Push ▲ or ▼ to select [Diagnostic Tools], then push ↵.



4. Push ▲ or ▼ to select [Comm. Option Information], then push ↵.



The keypad shows the selected monitor as shown in this example figure.

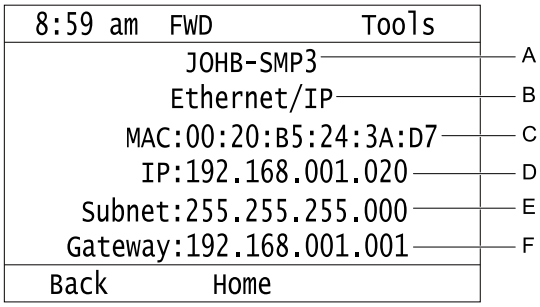


Table 5.10 Name and Description of Display Details

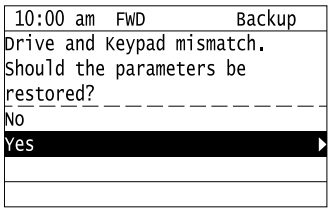
Symbol	Name	Description
A	Station Name or BACnet/IP Device Object Name	PROFINET protocol shows the station name. BACnet/IP protocol shows the device object name. All other protocols show "JOHB-SMP3". **Note:** With PROFINET, the screen shows the station name set on the PLC. If you do not set the station name, the screen shows "No Station Name". With BACnet/IP, the screen shows the device object name set by the building automation controller. If you do not set the device object name, the screen shows "Yaskawa VFD ID" + F6-49 (Hex.) + F6-48 (Hex.). Example of F6-49 = 09 (Hex.) and F6-48 = 2A5A (Hex.): Yaskawa VFD ID092A5A F6-49 = 09 F6-48 = 2A5A The screen will show only the first 32 characters of the station name or the device object name.
B	Protocol	Shows the protocol set on the JOHB-SMP3 card.
C	MAC Address	Shows the currently available MAC address (same content as *U4-76* to *U4-78*).
D	IP Address	Shows the currently available local address (same content as *U6-80* to *U6-83*). Shows "000.000.000.000" for protocols that do not have an IP address.
E	Subnet Mask	Shows the currently available subnet mask (same content as *U6-84* to *U6-87*). Shows "000.000.000.000" for protocols that do not have an IP address.
F	Gateway Address	Shows the currently available gateway address (same content as *U6-88* to *U6-91*). Shows "000.000.000.000" for protocols that do not have an IP address.

◆ How to Restore Backed-up Parameters to the Drive

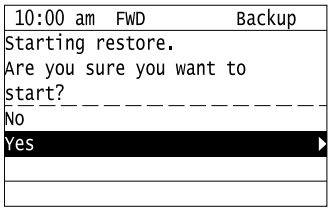
You can automatically back up parameters to the keypad connected to the drive and write those parameters to a drive from the same drive series as specified by the settings of *o3-06 [Auto Parameter Backup Selection]* and *o3-07 [Auto Parameter Backup Interval]*.

Note:
- Set *o3-06 = 1 [Auto Parameter Backup Selection = Enabled]* in each drive to which you will write the parameters.
- This operation is not available when the parameters in the keypad and the parameters on the other drives are set to the same values.

1. Connect the keypad to the drive.
2. Push ▲ or ▼ to select [Yes], then push ↵.



3. Push ▲ or ▼ to select [Yes], then push ↵.



The keypad will show the “End” message when the write process is complete.

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

The drive has application presets to set the necessary parameters for different applications to their best values. To use this function, set *A1-03 = 6008, 6009, 6011, 6012, 6013, 6014, 6015, 6016, 7005, 7006, 7770, or 7771 [Initialize Parameters = Pressure Control, Pump Down Level Control, Vertical Turbine Pressure Ctl, Pivot Panel Vert. Turbine Ctl, Advanced Pressure Control, Pivot Panel Submersible, Pivot Panel Pump Command, Pivot Panel Sub. Pump Command, Serial Comms External HOA, Serial Comms HOA Keys, General Purpose, Sub. Pump General Purpose* to change the setting of *A1-06 [Application Preset]*. To examine the parameters that automatically changed, use [User Custom Parameters] on the Main menu.

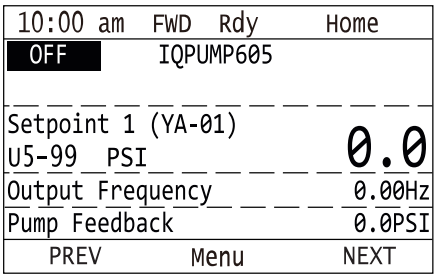
Note:
- Parameter *A1-06* operates only as a monitor. You can read the *A1-06* setting but you cannot change the setting directly.
- When you set *A1-03 = 1110, 2220, or 3330 [User Initialization, 2-Wire Initialization, or 3-Wire Initialization]*, the drive will reset *A1-06* to *0 [Pressure Control]*.

This section shows the procedure to set an application preset.

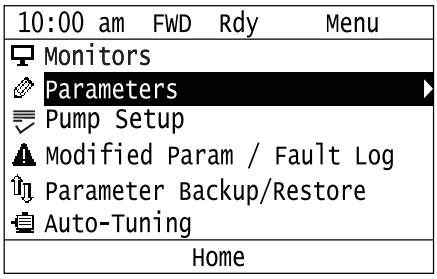
1. Push F2 (Home) to show the HOME screen.

Note:
- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on F2, push F1 (Back) to show [Home] on F2.

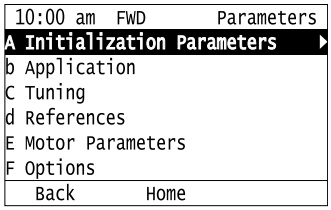
2. Push F2 (Menu).



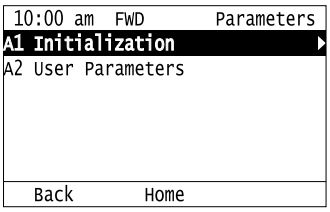
3. Push ▲ or ▼ to select [Parameters], then push ↵.



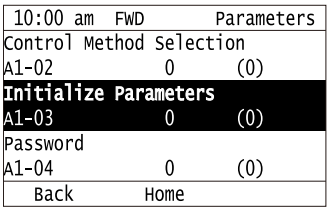
4. Push ▲ or ▼ to select [A Initialization Parameters], then push ↵.



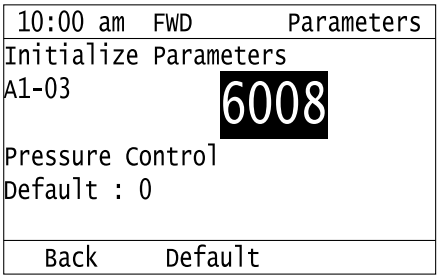
5. Push ▲ or ▼ to select [A1 Initialization], then push ↵.



6. Push ▲ or ▼ to select *A1-03 [Initialize Parameters]*, then push ↵.



7. Push ▲ or ▼ to change the value, then push ↵.



The parameter setting procedure is complete.

Note:

When the drive changes the setting for application preset, 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 Parms]*.

5.9 Parameter Group Shortcuts

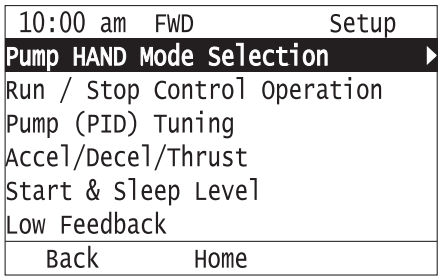
The drive has 16 Parameter Group Shortcuts that are accessible from the HOME screen. These Parameter Groups show commonly used iQpump605 functions and their corresponding parameters to allow for faster access and modification.

This section shows the procedure to access the Parameter Group Shortcuts menu.

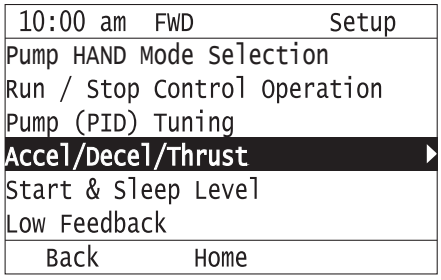
1. Push F2 (Home) to show the HOME screen.

Note:
- The keypad will show [Home] in the top right corner when the HOME screen is active.
- If [Home] is not shown on F2, push F1 (Back) to show [Home] on F2.

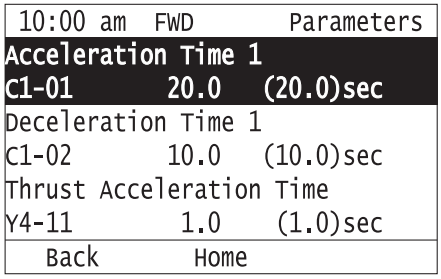
2. Push ➔.



3. Push ↑ or ↓ to select one of the Parameter Group Shortcuts , then push ↵.



4. Push ↑ or ↓ to select [A Initialization Parameters], then push ↵.



5. You can now edit the parameters in the Parameter Group Shortcut that you selected.

◆ Parameter Group Shortcut Selections and Contents

This table lists the 16 Parameter Group Shortcuts and the corresponding accessible parameters in each shortcut:

Table 5.11 Parameter Group Shortcut Selections

Shortcut Group	Parameter	Description
Pump HAND Mode Selection	Y5-01	HAND Frequency Reference Source
	Y5-02	HAND Frequency Reference 1
	Y5-03	HAND/AUTO Switchover During Run
	Y5-04	Operation HAND Key
	Y5-05	HAND Frequency Reference 2
	Y5-06	HAND Reference Prime Loss Level
	Y5-07	HAND Reference Prime Loss Lvl 2
	Y5-09	HAND MOP Selection
	Y4-10	AUTO Key Memory At Power Down
Run / Stop Control Operation	b1-01	Frequency Reference Selection 1
	b1-02	Run Command Selection 1
	b1-03	Stopping Method Selection
	b1-04	Reverse Operation Selection
	b1-11	Run Delay @ Stop (Backspin)
	b1-14	Phase Order Selection
	Y4-10	AUTO Key Memory At Power Down
	Y4-17	Utility Start Delay
Pump (PID) Tuning	b5-01	PID Mode Setting
	b5-02	Proportional Gain (P)
	b5-03	Integral Time (I)
	b5-09	PID Output Level Selection
Accel/Decel/Thrust	C1-01	Acceleration Time 1
	C1-02	Deceleration Time 1
	Y4-11	Thrust Acceleration Time
	Y4-12	Thrust Frequency
	Y4-13	Thrust Deceleration Time
Start & Sleep Level	Y1-04	Sleep Wake-up Level
	Y1-05	Sleep Wake-up Level Delay Time
	Y1-06	Minimum Speed
	Y2-03	Sleep Delay Time
	Y2-05	Sleep Boost Level
	Y2-06	Sleep Boost Hold Time
	Y2-07	Sleep Boost Max Time
Low Feedback	Y1-08	Low Feedback Level
	Y1-09	Low Feedback Lvl Fault Dly Time
	Y1-10	Low Feedback Selection
	L5-40	Low Feedback Flt Retry Selection
	L5-43	LowFeedback Fault Retry Attempts
	L5-46	Low Feedback Fault Restart time

Shortcut Group	Parameter	Description
High Feedback	Y1-11	High Feedback Level
	Y1-12	High Feedback Lvl Fault Dly Time
	Y1-13	High Feedback Selection
	L5-41	Hi Feedback Flt Retry Selection
	L5-44	Hi Feedback Fault Retry Attempts
	L5-47	High Feedback Fault Restart time
Setpoint Not Met	Y1-15	Maximum Setpoint Difference
	Y1-16	Not Maintaining Setpoint Time
	Y1-17	Not Maintaining Setpoint Sel
	L5-50	Setpoint Not Met Fault Retry Sel
	L5-54	Setpoint Not Met Retry Attempts
	L5-58	Setpoint Not Met Restart Time
Dry Run/Loss of Prime	Y1-18	Prime Loss Detection Method
	Y1-19	Prime Loss Level
	Y1-20	Prime Loss Time
	Y1-22	Prime Loss Selection
	Y1-23	Prime Loss Max Restart Time
	L5-51	Loss of Prime Fault Retry Select
	L5-55	Loss of Prime Flt Retry Attempts
Pre-Charge	Y4-01	Pre-Charge Level
	Y4-02	Pre-Charge Frequency
	Y4-03	Pre-Charge Time
	Y4-05	Pre-Charge Loss Of Prime Level
	Y4-06	Pre-Charge Frequency 2
	Y4-07	Pre-Charge Time 2
	Y4-08	Pre-Charge Loss Of Prime Level 2
Output Current Limit	YC-01	Output Current Limit Select
	YC-02	Current Limit
Pump Over Cycle	Y2-10	Max Cycling Protection Allowed
	Y2-11	Cycling Count Decrement Time
	Y2-12	Over Cycle Mode
	L5-52	Over Cycle Fault Retry Selection
	L5-56	Over Cycle Fault Retry Attempts
	L5-59	Over Cycle Fault Restart Time
Auto-Restart	L5-01	Number of Auto-Restart Attempts
	L5-04	Interval Method Restart Time
Single Phase Foldback	YC-10	Single Phase Foldback Sel
	YC-11	Ripple Regulator Setpoint
Multiple Setpoints	YA-01	Setpoint 1
	YA-02	Setpoint 2
	YA-03	Setpoint 3
	YA-04	Setpoint 4

Shortcut Group	Parameter	Description
Edit Default Drive Name	o1-83	Drive Name
	o1-84	Drive Name Unit Number

5.10 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.

The keypad will show the messages with prompts to input the necessary parameter information. These prompts are specified by the selected Auto-Tuning method and the control method setting in *A1-02*.

◆ Auto-Tuning for Induction Motors

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

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 5.12 Types of Auto-Tuning for Induction Motors

Mode	Application Conditions and Benefits	Applicable Control Method (A1-02 Setting)
		V/f (0)
Rotational Auto-Tuning	• 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
Line-to-Line Resistance	• 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

■ Input Data for Induction Motor Auto-Tuning

To do Auto-Tuning, input data for the items in Table 5.13 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 5.13 Input Data for Induction Motor Auto-Tuning

Input Data	Unit	Auto-Tuning Mode	
		Rotational Auto-Tuning	Line-to-Line Resistance
Motor Rated Power	HP	x	x
Motor Rated Voltage	V	x	-
Motor Rated Current	A	x	x
Motor Base Frequency	Hz	x	-
Number of Motor Poles	-	x	-
Motor Base Speed	min^{-1}	x	-
Motor Iron Loss	W	x *1	-

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

◆ Auto-Tuning for Motor Parameters for PM Motor

This section gives information about Auto-Tuning for PM motors. Auto-Tuning sets motor parameters *E1-xx, E5-xx*.

Table 5.14 Auto-Tuning for PM Motors

Mode	Application Conditions and Benefits	Applicable Control Method (A1-02 Setting)
		OLV/PM (5)
PM Motor Parameter Settings	• 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
PM Stationary Auto-Tuning	• 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
PM Stationary Auto-Tuning for Stator Resistance	• 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.	x
PM Rotational Auto-Tuning	• When the information from the motor test report or motor nameplate is not available. • When you can decouple the motor and load the motor can rotate freely while Auto-Tuning. • Values measured during Auto-Tuning are automatically set to the motor parameters.	x
High Frequency Injection Auto-Tuning	• Automatically determines the control parameters required to set *n8-35 = 1 [Initial Pole Detection Method = High Frequency Injection]*. • Applicable to IPM motors only. • Perform tuning with the motor connected to the drive. **Note:** When you want to set *n8-35 = 1*, perform High Frequency Injection Auto-Tuning. Configure the drive with the data from the motor nameplate before performing High Frequency Injection Auto-Tuning. High Frequency Injection Auto-Tuning automatically makes adjustments while it is stopped but still energized.	x

■ Input Data for PM Motor Auto-Tuning

To do Auto-Tuning, input data for the items in Table 5.15 and Table 5.16 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 5.15 Input Data for PM Motor Auto-Tuning

Input Data	Unit	Auto-Tuning Mode			
		PM Motor Parameter Settings		PM Stationary Auto-Tuning	PM Stationary Auto-Tuning for Stator Resistance
Control Method Selection	-	5		5	5
PM Motor Code Selection	-	Motor Code of Yaskawa Motor *1	FFFF *2	-	-
PM Motor Type	-	-	-	x	-
PM Motor Rated Power	HP	-	x	x	-
PM Motor Rated Voltage	V	-	x	x	-
PM Motor Rated Current	A	-	x	x	x
PM Motor Base Frequency	Hz	-	x	x	-
Number of PM Motor Poles	-	-	x	x	-
PM Motor Stator Resistance	Ω	x	x	-	-
PM Motor d-Axis Inductance	mH	x	x	-	-
PM Motor q-Axis Inductance	mH	x	x	-	-
Back-EMF Units Selection	-	x	x	-	-
Back-EMF Voltage Constant (Ke)	*3	x	x	-	-
Pull-In Current Level	%	-	-	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 *Back-EMF Units Selection* changes.

Table 5.16 Input Data for PM Motor Auto-Tuning

Input Data	Unit	Auto-Tuning Mode	
		PM Rotational Auto-Tuning	High Frequency Injection Auto-Tuning
Control Method Selection	**-**	**5**	**5**
PM Motor Code Selection	**-**	**-**	**-**
PM Motor Type	-	x	-
PM Motor Rated Power	HP	x	-
PM Motor Rated Voltage	V	x	-
PM Motor Rated Current	A	x	-
PM Motor Base Frequency	Hz	x	-
Number of PM Motor Poles	-	x	-
PM Motor Stator Resistance	Ω	-	-
PM Motor d-Axis Inductance	mH	-	-
PM Motor q-Axis Inductance	mH	-	-
Back-EMF Units Selection	-	-	-
Back-EMF Voltage Constant (Ke)	*1	-	-
Pull-In Current Level	%	x	-

*1 Changes when the value set in *Back-EMF Units Selection* changes.

◆ Auto-Tuning in EZ Open Loop Vector Control Method

This section gives information about the Auto-Tuning mode for EZ Open Loop Vector Control. Auto-Tuning will set the *E9-xx* parameters.

Table 5.17 EZ Tuning Mode Selection

Mode	Application Conditions and Benefits	Applicable Control Method (A1-02 Setting)
Motor Parameter Setting	• Applicable when driving SynRM (Synchronous Reluctance Motors). • Suitable for derating torque applications, for example fans and pumps.	EZOLV (8)
Line-to-Line Resistance	• 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 5.18 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 5.18 Auto-Tuning Input Data in EZ Open Loop Vector Control Method

Input Data	Unit	Auto-Tuning Mode	
		Motor Parameter Setting	Line-to-Line Resistance
Motor Type Selection	-	x	-
Motor Max Revolutions	min^{-1}	x	-
Motor Rated Revolutions	min^{-1}	x	-
Motor Rated Frequency	Hz	x	-
Motor Rated Voltage	V	x	-
PM Motor Rated Current (FLA)	A	x	x
PM Motor Rated Power (kW)	kW	x	-
Number of Motor Poles	-	x	-

◆ 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 Auto-Tuning the drive.
- 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 208 V class models or by 40 V for 480 V class models). This is very important when operating 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 OFF 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 5.19 shows the status of input/output terminals during Auto-Tuning.

Table 5.19 Status of Input/Output Terminals during Auto-Tuning

Auto-Tuning Type	Mode		Multi-Function Inputs	Multi-Function Outputs *1
Induction Motor Auto-Tuning	Rotational	Rotational Auto-Tuning	Disabled	Functions the same as during usual operation.
	Stationary	Line-to-Line Resistance	Disabled	Keeps the status at the start of Auto-Tuning.
PM Motor Auto-Tuning	Rotational	PM Rotational Auto-Tuning	Disabled	Functions the same as during usual operation.
	Stationary	PM Motor Parameter Settings	Disabled	Keeps the status at the start of Auto-Tuning.
		PM Stationary Auto-Tuning	Disabled	Keeps the status at the start of Auto-Tuning.
		PM Stationary Auto-Tuning for Stator Resistance	Disabled	Keeps the status at the start of Auto-Tuning.
EZ Tuning	Stationary	Motor Parameter Setting	Disabled	Keeps the status at the start of Auto-Tuning.
		Line-to-Line Resistance	Disabled	Keeps the status at the start of Auto-Tuning.

*1 A terminal to which *H2-xx = E [MFDO Function Selection = Fault]* is assigned functions the same as during usual operation.

⚠ WARNING Crush Hazard

Wire a sequence that will not let a multi-function output terminal open the holding brake during Stationary Auto-Tuning.
If the holding brake is open during Stationary Auto-Tuning, it can cause serious injury or death.

⚠ WARNING Sudden Movement Hazard

Before you do Rotational Auto-Tuning, disconnect the load from the motor.
The load can move suddenly and cause serious injury or death.

⚠ WARNING Injury to Personnel

Rotational Auto-Tuning rotates the motor at 50% or more of the motor rated frequency. Make sure that there are no issues related to safety in the area around the drive and motor.
Increased motor frequency can cause serious injury or death.

⚠ WARNING Electrical Shock Hazard

During Auto-Tuning, the motor will receive high voltage when the motor is stopped. Do not touch the motor until Auto-Tuning is complete.
If you touch a motor that is energized, it can cause serious injury or death.

■ Precautions before Rotational Auto-Tuning

⚠ WARNING Electrical Shock Hazard
During Auto-Tuning, the motor will receive high voltage when the motor is stopped. Do not touch the motor until Auto-Tuning is complete.
If you touch a motor that is energized, it can cause serious injury or death.

- Before you do Rotational Auto-Tuning to prevent drive malfunction, uncouple the motor from the load. If you do Rotational Auto-Tuning with the motor connected to a load that is more than 30% of the motor duty rating, the drive will not correctly calculate the motor parameters and the motor can operate incorrectly.
- When the load is 30% or less of the motor duty rating, you can do Auto-Tuning with the motor connected to a load.
- Make sure that the motor magnetic brake is released.
- Make sure that external force from the machine will not cause the motor to rotate.

■ Precautions before Stationary Auto-Tuning

- Make sure that the motor magnetic brake is not open.
- Make sure that external force from the machine will not cause the motor to rotate.

⚠ WARNING Electrical Shock Hazard
During Auto-Tuning, the motor will receive high voltage when the motor is stopped. Do not touch the motor until Auto-Tuning is complete.
If you touch a motor that is energized, it can cause serious injury or death.

■ 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.

5.11 Test Run

After you Auto-Tune the drive, the next step is to do a test run.

⚠ WARNING Crush Hazard
Test the system to make sure that the drive operates safely after you wire the drive and set parameters.
If you do not test the system, it can cause damage to equipment or serious injury or death.

◆ No-Load Test Run

Before connecting the motor to the machine, make sure that you check the operation status of the motor.

■ Precautions before Operation

Before rotating the motor, check these items:

- Check for safety issues near the drive, motor, and machine.
- Make sure that all emergency stop circuits and machine safety mechanisms are operating correctly.

■ Items to Check before Operation

Check these items before operation:

- Is the motor rotating in the forward direction?
- Is the motor rotating smoothly (no unusual sounds or unusual vibrations)?
- Does the motor accelerate/decelerate smoothly?

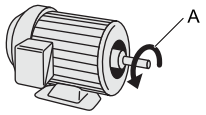
◆ Do a No-Load Test Run

Do these steps for a no-load test run:

1. Energize the drive, or push F2 to show the HOME screen.
   If [Home] is not shown on F2, push F1 (Back) to show [Home] on F2.
2. Push ↵ to show *Y5-02 [HAND Frequency Reference]*, and set it to 6.00 Hz.

Note:
The Run command from AUTO Mode must be OFF.

3. Push F2 to show the HOME screen again.
4. Push HAND to give the drive a Run command from HAND Mode.
   When *o2-24 = 0 or 1 [LED Light Function Selection = Enable Status Ring & Keypad LED or LED Status Ring Disable]*, HAND illuminates and the motor runs at 6.00 Hz in the forward direction.
5. Make sure that the motor is rotating in the correct direction and that the drive does not show a fault.
   If the drive detects a fault, remove the cause.



A - Forward Rotation of Motor (Counter Clockwise Direction as Seen from Load Shaft)

6. Push ∧ to increase the frequency reference value.
   Change the setting value in increments of 10 Hz if necessary and examine the response.
7. Each time you increase the setting value, use *U1-03 [Output Current]* to check the drive output current.
   When the output current of the drive is not more than the motor rated current, the status is correct.
   Example: 6 Hz → 20 Hz → 30 Hz → 40 Hz → 50 Hz → 60 Hz

8. Make sure that the motor rotates correctly, then push OFF.
   HAND is OFF and the motor coasts to stop.

◆ Actual-Load Test Run

Test the operation without a load, then connect the motor and machine to do a test run.

■ Precautions before Operation

Before rotating the motor, check these items:

- Check for safety issues near the drive, motor, and machine.
- Make sure that all emergency stop circuits and machine safety mechanisms are operating correctly.
- Make sure that the motor is fully stopped.
- Connect the motor with the machine.
  Make sure that there are no loose installation screws and that the motor load shafts and machine junctions are correctly secured.
- Keep the keypad near you to push OFF immediately if there is unusual or incorrect operation.

■ Items to Check before Operation

- Make sure that the direction of the machine operation is correct (The motor must rotate in the correct direction).
- Make sure that the motor accelerates and decelerates smoothly.

◆ Do an Actual-Load Test Run

Connect the motor and machine, then do the test run with the same procedure you used for the no-load test run.

- Make sure that *U1-03 [Output Current]* is not too high.

1. Energize the drive, or push F2 (Home) to show the HOME screen.
   If [Home] is not shown on F2, push F1 (Back) to show [Home] on F2
2. Set *Y5-02 [HAND Frequency Reference]* to 6.00 Hz.
3. Push F2 to show the HOME screen again.
4. Push HAND to give the drive a Run command from HAND Mode.
   When *o2-24 = 0 or 1 [LED Light Function Selection = Enable Status Ring & Keypad LED or LED Status Ring Disable]*, HAND illuminates and the motor runs at 6.00 Hz in the forward direction.
5. Make sure that the motor is rotating in the correct direction and that the drive does not show a fault.
   If the drive detects a fault, remove the cause.
6. Push ^ to increase the frequency reference value.
   Change the setting value in increments of 10 Hz if necessary and examine the response.
7. Each time you increase the setting value, use *U1-03 [Output Current]* to check the drive output current.
   When the output current of the drive is not more than the motor rated current, the status is correct.
   Example: 6 Hz → 20 Hz → 30 Hz → 40 Hz → 50 Hz → 60 Hz
8. Make sure that the motor rotates correctly, then push OFF.
   HAND is OFF and the motor coasts to stop.
9. Change the frequency reference and direction of motor rotation, and make sure that there are no unusual sounds or vibrations.
10. If there are hunting or oscillation errors caused by control function or mechanical resonant, adjust the settings to stop the errors.

5.12 Fine Tuning during Test Runs (Adjust the Control Function)

This section gives information about the adjustment procedures to stop hunting or oscillation errors caused by control function during a test run. Adjust the applicable parameters as specified by your control method and drive status.

- *V/f Control on page 428*
- *Open Loop Vector Control for PM Motors on page 429*
- *EZ Open Loop Vector Control Method on page 430*

Note:
This section only lists frequently adjusted parameters. If you must adjust parameters that have a higher degree of precision, contact Yaskawa.

◆ V/f Control

Table 5.20 Parameters for Fine Tuning the Drive (V/f)

Issue	Parameter Number	Possible Solutions	Default	Recommended Setting
Hunting or oscillation at mid-range speeds (10 Hz to 40 Hz)	n1-02 [Hunting Prevention Gain Setting] *1	• If torque is not sufficient with heavy loads, decrease the setting value. • If hunting or oscillation occur with light loads, increase the setting value. • If hunting occurs with a low-inductance motor, for example a motor with a larger frame size or a high-frequency motor, lower the setting value.	1.00	0.10 - 2.00
• The volume of the motor excitation sound is too high. • Hunting or oscillation at low speeds (10 Hz or lower), or at mid-range speeds (10 Hz to 40 Hz)	C6-02 [Carrier Frequency Selection]	• If the volume of the motor excitation sound is too high, increase the carrier frequency. • If hunting or oscillation occur at low or mid-range speeds, decrease the carrier frequency.	1 (2 kHz) *2	1 to upper limit value
• Unsatisfactory motor torque and speed response • Hunting or oscillation	C4-02 [Torque Compensation Delay Time]	• If torque or speed response are slow, decrease the setting value. • If hunting or oscillation occur, increase the setting value.	200 ms *3	100 - 1000 ms
• Torque at low speeds (10 Hz or lower) is not sufficient. • Hunting or oscillation	C4-01 [Torque Compensation Gain]	• If torque at low speeds (10 Hz or lower) is not sufficient, increase the setting value. • If hunting or oscillation occur with light loads, decrease the setting value.	1.00	0.50 - 1.50
• Torque at low speeds (10 Hz or lower) is not sufficient. • Large initial vibration at start up.	• E1-08 [Mid Point A Voltage] • E1-10 [Minimum Output Voltage]	• If torque at low speeds (10 Hz or lower) is not sufficient, increase the setting value. • If there is large initial vibration at start up, decrease the setting value	• E1-08: 15.0 V *4 • E1-10: 9.0 V *4	Default setting +/- 5 V *5
Speed precision is unsatisfactory. (V/f Control)	C3-01 [Slip Compensation Gain] *1	Set *E2-01 [Motor Rated Current]*, *E2-02 [Motor Rated Slip]*, and *E2-03 [Motor No-Load Current]*, then adjust *C3-01*.	0.0 (no slip compensation)	0.5 - 1.5

*1 This is an Expert level parameter. You must set *A1-01 = 3 [Access Level Selection = Expert Level]* to view this parameter.
*2 The default setting changes when the settings for *o2-04 [Drive Model (KVA) Selection]* change.
*3 The default setting changes when the settings for *A1-02 [Control Method Selection]* and *o2-04 [Drive Model (KVA) Selection]* change.
*4 The default setting changes when the settings for *A1-02 [Control Method Selection]* and *E1-03 [V/f Pattern Selection]* change.
*5 Recommended settings are for 208 V class drives. Multiply the voltage by 2 for 480 V class drives.

■ Precaution When You Use IE3 Premium Efficiency Motors

IE3 motors have different motor characteristics from IE1 and other motors. Set the parameters as specified by the motor characteristics. If you have a momentary power loss, and the drive detects *oC [Overcurrent]* or *ov [Overvoltage]* during speed search after it restores power, set these parameters:

- *b3-03 [Speed Search Deceleration Time]* = default value × 2
- *L2-03 [Minimum Baseblock Time]* = default value × 2

- *L2-04 [Powerloss V/f Recovery Ramp Time]* = default value × 2

◆ Open Loop Vector Control for PM Motors

Table 5.21 Parameters for Fine Tuning the Drive (*A1-02 = 5 [OLV/PM]*)

Issue	Parameter Number	Possible Solutions	Default	Recommended Setting
Unsatisfactory motor performance	E1-xx parameters, E5-xx parameters	• Check the settings for *E1-06, E1-04 [Base Frequency, Maximum Output Frequency]*. • Check the *E5-xx* and make sure that all motor data has been set correctly. **Note:** Do not set *E5-05 [PM Motor Resistance (ohms/phase)]* to a line-to-line resistance value. • Do Auto-Tuning.	-	-
Unsatisfactory motor torque and speed response	n8-55 [Motor to Load Inertia Ratio] *1	Adjust to match the load inertia ratio of the motor and machine.	0	Near the actual load inertia ratio.
	n8-45 [Speed Feedback Detection Gain] *1	Decrease the setting value in increments of 0.05.	0.80	-
	C4-01 [Torque Compensation Gain]	Adjust the setting value. **Note:** Setting this value too high can cause overcompensation and motor oscillation.	0.00	1.00
• Oscillation when the motor starts. • Motor stalls.	n8-51 [Pull-in Current @ Accel/ Decel] *1	Increase the setting value in increments of 5%.	50%	-
	• b2-02 [DC Injection Braking Current] • b2-03 [DC Inject Braking Time at Start]	Use DC Injection Braking at start. **Note:** This can cause the motor to rotate in reverse for approximately 1/8 of a turn at start.	• b2-02: 50% • b2-03: 0.00 s	• b2-02: Adjust as necessary. • b2-03: 0.5 s
	n8-55 [Motor to Load Inertia Ratio] *1	Increase the setting value. **Note:** When operating a single motor or with a minimum amount of inertia, setting this value too high can cause motor oscillation.	0	Near the actual load inertia ratio.
There is too much current during deceleration.	n8-79 [Pull-in Current at Deceleration] *1	Set *n8-79* < *n8-51*.	50% **Note:** When *n8-79 = 0*, the drive will apply the *n8-51* setting to the pull-in current during deceleration.	Decrease in increments of 5%.
Stalling or oscillation occurs when load is applied during constant speed	n8-47 [Pull-in Current Comp Filter Time] *1	Decrease the setting value in increments of 0.2 s.	5.0 s	-
	n8-48 [Pull-in/Light Load Id Current] *1	Increase the setting value in increments of 5%.	30%	-
	n8-55 [Motor to Load Inertia Ratio] *1	Increase the setting value. **Note:** When operating a single motor or with a minimum amount of inertia, setting this value too high can cause motor oscillation.	0	Near the actual load inertia ratio.
Hunting or oscillation	n8-45 [Speed Feedback Detection Gain] *1	Increase the setting value in increments of 0.05.	0.80	-
The drive detects *STPo [Motor Step-Out Detected]* fault when the load is not too high.	• E5-09 [PM Back-EMF Vpeak (mV/(rad/s))] • E5-24 [PM Back-EMF L-L Vrms (mV/rpm)]	• Adjust the setting value. • Examine the motor code on the motor nameplate or the data sheet, then set correct values for *E5-09* or *E5-24*.	*2	• Yaskawa motor Set the motor code from the motor nameplate. • Motor from another manufacturer Set the values from the test report.
The drive detected stalling or *STPo [Motor Step-Out Detected]* at high speed and maximum output voltage.	n8-62 [Output Voltage Limit Level] *1	Set to a value lower than the actual input voltage.	• 200.0 V • 400.0 V	-

*1 This is an Expert level parameter. You must set *A1-01 = 3 [Access Level Selection = Expert Level]* to view this parameter.
*2 The default setting changes when the settings for *E5-01 [Motor Code Selection]* and *o2-04 [Drive Model (KVA) Selection]* change.

◆ EZ Open Loop Vector Control Method

Table 5.22 Parameters for Fine Tuning the Drive (*A1-02 = 8 [EZOLV]*)

Issue	Parameter Number	Possible Solutions	Default	Recommended Setting
• Unsatisfactory motor torque and speed response • Hunting or oscillation	• High speed C5-01 [ASR Proportional Gain 1] • Low speed C5-03 [ASR Proportional Gain 2]	• If torque or speed response are slow, increase the setting value in increments of 5.00. • If hunting or oscillation occur, decrease the setting value.	10.00	10.00 to 50.00 *2
	• High speed C5-02 [ASR Integral Time 1] • Low speed C5-04 [ASR Integral Time 2]	• If torque or speed response are slow, decrease the setting value. • If hunting or oscillation occur, increase the setting value.	0.500 s	0.300 s to 1.000 s *2
The drive cannot find ASR proportional gain or integral time for low speed or high speed.	C5-07 [ASR Gain Switchover Frequency]	Change the ASR proportional gain and ASR integral time to conform to the output frequency.	0.0%	0.0% to maximum rotation speed
Hunting or oscillation	C5-06 [ASR Delay Time]	If the rigidity of the machine is unsatisfactory and vibration is possible, increase the setting value in increments of 0.010.	0.004 s	0.004 s to 0.020 s *2
Step-out	E9-xx parameters	Refer to the motor nameplate or test report and set *E9-xx* correctly.	-	-
Oscillation when the motor starts.	n8-51 [Accel / Decel Pull-In Current] *1	Increase the setting value.	80%	Increase in increments of 5%.
Motor stalls.	L7-01 to L7-04 [Torque Limit]	Increase the setting value.	200%	Increase in increments of 10%.

*1 This is an Expert level parameter. You must set *A1-01 = 3 [Access Level Selection = Expert Level]* to view this parameter.
*2 The best values for a no-load operation are different than the best values for actual loading operation.

5.13 Test Run Checklist

Examine the items in this checklist and check each item before a test run.

Checked	No.	Description
	1	Correctly install and wire the drive as specified by this manual.
	2	Energize the drive.
	3	Set the voltage for the power supply in *E1-01 [Input AC Supply Voltage]*.

Check the applicable items as specified by your control method.

⚠ WARNING Sudden Movement Hazard

Correctly wire the start/stop and safety circuits before you energize the drive.
If you momentarily close a digital input terminal, it can start a drive that is programmed for 3-Wire control and cause serious injury or death from moving equipment.

Table 5.23 V/f Control [A1-02 = 0]

Checked	No.	Description
	4	Select the best V/f pattern for your application and motor characteristics. Example: For a motor with a rated frequency of 60 Hz, set *E1-03 = 1 [V/f Pattern Selection = Const Trq, 60Hz base, 60Hz max]* as a standard V/f pattern.

Table 5.24 PM Open Loop Vector Control [A1-02 = 5]

Checked	No.	Description
	5	Set *E5-01 to E5-24 [PM Motor Settings]*.

Checked	No.	Description
	6	The keypad will show “Rdy” after starting to operate the motor.
	7	To give the Run command and frequency reference from the keypad, push HAND to set the drive to HAND Mode. **Note:** When in HAND Mode, HAND illuminates.
	8	If the motor rotates in the opposite direction during test run, switch two of the motor cables (U/T1, V/T2, W/T3).
	9	Set *E2-01 [Motor Rated Current (FLA)]* and *L1-01 [Motor Overload (oL1) Protection]* correctly for motor thermal protection.
	10	To supply the Run command and frequency reference from REMOTE source, make sure that the drive is in OFF Mode in HOME screen.
	11	When terminal A1 is used for the frequency reference: • Voltage input – Set Jumper switch S1 on the drive to “V”. – Set *H3-01 = 0 [Terminal A1 Signal Level Select = 0 to 10V (Lower Limit at 0)]*. – Set *H3-02 = 0 [Terminal A1 Function Selection = Frequency Reference]*. • Current input – Set Jumper switch S1 on the drive to “I”. – Set *H3-01 = 2, 3 [Terminal A1 Signal Level Select = 4 to 20 mA, 0 to 20 mA]*. – Set *H3-02 = 0 [Terminal A1 Function Selection = Frequency Reference]*.

Checked	No.	Description
	12	When terminal A2 is used for the frequency reference: • Voltage input – Set Jumper switch S1 on the drive to “V”. – Set *H3-09 = 0 [Terminal A2 Signal Level Select = 0 to 10V (Lower Limit at 0)]*. – Set *H3-10 = 0 [Terminal A2 Function Selection = Frequency Reference]*. • Current input – Set Jumper switch S1 on the drive to “I”. – Set *H3-09 = 2, 3 [Terminal A2 Signal Level Select = 4 to 20 mA, 0 to 20 mA]*. – Set *H3-10 = 0 [Terminal A2 Function Selection = Frequency Reference]*.
	13	Make sure that the frequency reference reaches the necessary minimum and maximum values. → If drive operation is incorrect, make these adjustments: Gain adjustment: Set the maximum voltage and current values, then adjust the analog input gain until the frequency reference reaches the necessary value. (For terminal A1 input: *H3-03*, for terminal A2 input: *H3-11*) Bias adjustment: Set the maximum voltage/current values, then adjust the analog input bias until the frequency reference reaches the necessary minimum value. (For terminal A1 input: *H3-04*, for terminal A2 input: *H3-12*)

6

Specifications

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6.1 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.

6.2 Model Specifications (208 V Class)

Table 6.1 Rating (208 V Class)

Model			2011	2017	2024	2031	2046	2059	2075	2088	2114
Maximum Applicable Motor Output (kW) *1			2.2	3.7	5.5	7.5	11	15	18.5	22	30
Maximum Applicable Motor Output (HP) *2			3	5	7.5	10	15	20	25	30	40
Input	Rated Input Current (A)	AC	8.8	14	20	27	40	54	66	78	106
		DC	10.0	17.0	25	34	49	66	80	95	129
Output	Rated Output Current (A)		10.6	16.7	24.2	30.8	46.2	59.4	74.8	88	114
Power Supply	Input Power (kVA)		3.7	5.8	8	11	17	22	27	33	44

*1 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.

*2 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.

Table 6.2 Rating (208 V Class)

Model			2143	2169	2211	2273	2343	2396
Maximum Applicable Motor Output (kW) *1			37	45	55	75	90	110
Maximum Applicable Motor Output (HP) *2			50	60	75	100	125	150
Input	Rated Input Current (A)	AC	130	157	200	271	324	394
		DC	159	192	245	332	396	482
Output	Rated Output Current (A)		143	169	211	273	343	396
Power Supply	Input Power (kVA)		54	65	69	94	112	136

*1 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.

*2 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.

6.3 Model Specifications (480 V Class)

Table 6.3 Rating (480 V Class)

Model			4005	4008	4011	4014	4021	4027	4034	4040
Maximum Applicable Motor Output (kW) at 400 V Output *1			1.5	3	4	5.5	7.5	11	15	18.5
Maximum Applicable Motor Output (HP) at 460 V Output *2			3	5	7.5	10	15	20	25	30
Input	Rated Input Current (A) at 400 V Input	AC	4.1	7.1	8.9	11.9	17.5	23.4	31	38
		DC	5.0	8.7	11.0	15.0	21	29	38	47
	Rated Input Current (A) at 460 V Input	AC	3.8	6.2	9	12.1	17.4	23.5	28.7	34
		DC	4.7	7.6	11.0	14.8	21.3	28.8	35.2	41.6
Output	Rated Output Current (A)		4.8	7.6	11	14	21	27	34	40
Power Supply	Input Power (kVA) at 400 V Input		2.8	4.9	6.2	8.2	12	16	21	26
	Input Power (kVA) at 460 V Input		3.2	5.2	7	10	14	20	24	28

*1 The motor capacity (kW) refers to a IEC 60947-4-1, Annex G 400 V motor. The rated output current of the drive output amps should be equal to or greater than the motor rated current.

*2 The maximum applicable motor output complies with 460 V motor ratings as specified in NEC Table 430.250. The rated output current of the drive output amps must be equal to or more than the motor rated current.

Table 6.4 Rating (480 V Class)

Model			4052	4065	4077	4096	4124	4156	4180	4240
Maximum Applicable Motor Output (kW) at 400 V Output *1			22	30	37	45	55	75	90	110
Maximum Applicable Motor Output (HP) at 460 V Output *2			40	50	60	75	100	125	150	200
Input	Rated Input Current (A) at 400 V Input	AC	44	59.6	74.9	89.2	103	140	170	207
		DC	54	73	92	109	126	171	208	254
	Rated Input Current (A) at 460 V Input	AC	45.9	56.3	68.1	82.8	112	134	171	232
		DC	56.2	69.0	83.4	101	137	164	209	284
Output	Rated Output Current (A)		52	65	77	96	124	156	180	240
Power Supply	Input Power (kVA) at 400 V Input		30	41	52	62	71	97	112	136
	Input Power (kVA) at 460 V Input		38	47	57	69	93	111	136	185

*1 The motor capacity (kW) refers to a IEC 60947-4-1, Annex G 400 V motor. The rated output current of the drive output amps should be equal to or greater than the motor rated current.

*2 The maximum applicable motor output complies with 460 V motor ratings as specified in NEC Table 430.250. The rated output current of the drive output amps must be equal to or more than the motor rated current.

Table 6.5 Rating (480 V Class)

Model			4302	4361	4414	4477	4515	4590	4720
Maximum Applicable Motor Output (kW) at 400 V Output *1			160	200	220	250	280	315	375
Maximum Applicable Motor Output (HP) at 460 V Output *2			250	300	350	400	450	500	600
Input	Rated Input Current (A) at 400 V Input	AC	300	373	410	465	520	584	694
		DC	367	457	502	570	637	715	850
	Rated Input Current (A) at 460 V Input	AC	289	346	403	460	515	573	686
		DC	354	424	494	563	631	702	840
Output	Rated Output Current (A)		302	361	414	477	515	590	720

Model		4302	4361	4414	4477	4515	4590	4720
Power Supply	Input Power (kVA) at 400 V Input	197	246	270	306	342	384	457
	Input Power (kVA) at 460 V Input	230	276	321	367	410	457	547

*1 The motor capacity (kW) refers to a IEC 60947-4-1, Annex G 400 V motor. The rated output current of the drive output amps should be equal to or greater than the motor rated current.

*2 The maximum applicable motor output complies with 460 V motor ratings as specified in NEC Table 430.250. The rated output current of the drive output amps must be equal to or more than the motor rated current.

6.4 Common Drive Specifications

Note:
To get the longest product life, install the drive in an environment that meets the necessary specifications.

Table 6.6 Control Characteristics

Item	Specification
Control Methods	• V/f Control (V/f) • PM Open Loop Vector Control (OLV/PM) • EZ Open Loop Vector Control (EZOLV)
Frequency Control Range	• EZOLV: 0.01 Hz to 120 Hz • V/f and OLV/PM: 0.01 Hz to 400 Hz
Frequency Accuracy (Temperature Fluctuation)	Digital inputs: Within ±0.01% of the maximum output frequency (-10 °C to +40 °C (14 °F to 104 °F)) Analog inputs: Within ±0.1% of the maximum output frequency (25 °C ±10 °C (77 °F ±18 °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: 0 Vdc to 10 Vdc (20 kΩ), 4 mA to 20 mA (250 Ω), 0 mA to 20 mA (250 Ω) Main speed reference: Pulse train input (maximum 32 kHz)
Starting Torque	• V/f: 140%/3 Hz • OLV/PM: 100%/10% speed • EZOLV: 100%/10% speed
Speed Control Range	• For Induction Motors: – V/f: 1:40 – EZOLV: 1:10 • For Permanent Magnet Motors and Synchronous Reluctance Motors: – OLV/PM: 1:20 – EZOLV: 1:10
Torque Limits	Parameter settings allow different limits in four quadrants in EZOLV control method.
Accel/Decel Time	0.0 s to 6000.0 s The drive can set two pairs of different acceleration and deceleration times.
V/f Characteristics	Select from 15 pre-defined V/f patterns, or a user-set V/f pattern.
Main Control Functions	Restart After Momentary Power Loss, Speed Search, Overtorque/Undertorque 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, Jump Frequency, Upper/Lower Limits for Frequency Reference, DC Injection Braking at Start and Stop, Overexcitation Braking, High Slip Braking, PID Control (with Sleep Function), Energy Saving Control, MEMOBUS/Modbus Communication (RS-485 max. 115.2 kbps), Auto Restart, Application Presets, KEB, Overexcitation Deceleration, Overvoltage Suppression

Table 6.7 Protection Functions

Item	Specification
Motor Protection	Electronic thermal overload protection
Momentary Overcurrent Protection	Drive stops when the output current is more than 175% of the drive rated output current.
Overload Protection	Drive stops when the output current is more than these overload tolerances: • 110% of the rated output current for 60 seconds • 140% of the rated output current for 2.5 seconds when the drive output frequency is 3 Hz The permitted frequency of overload is one time each 10 minutes. **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	208 V class: Stops when the DC bus voltage is more than approximately 410 V 480 V class: Stops when the DC bus voltage is more than approximately 820 V
Undervoltage Protection	208 V class: Stops when the DC bus voltage decreases to less than approximately 190 V 480 V class: • Stops when the DC bus voltage decreases to less than approximately 350 V when you use an input voltage less than 400 V • Stops when the DC bus voltage decreases to less than approximately 380 V when you use an input voltage less than 460 V • Stops when the DC bus voltage decreases to less than approximately 440 V when you use an input voltage of 460 V or more

Item	Specification
Momentary Power Loss Ride-thru	Immediately stops when power loss is 15 ms or longer. Continues operation if power loss is shorter than 2 s (depending on parameter settings). **Note:** Stop time may be shortened depending on the load and motor speed.
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.
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 • Energizing the drive when there is a ground fault.
DC Bus Charge LED	Charge LED illuminates when DC bus voltage is more than 50 V.

Table 6.8 Environment

Item	Specification
Area of Use	Indoors
Power Supply	Overvoltage Category III
Ambient Temperature Setting	IP20/UL Open Type/Heatsink External Mounting: -10 °C to +50 °C (14 °F to 122 °F) IP20/UL Type 1: -10 °C to +40 °C (14 °F to 104 °F) IP55/UL Type 12 Heatsink External Mounting; front side: -10 °C to +50 °C (14 °F to 122 °F) IP55/UL Type 12 Heatsink External Mounting; back side: -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. • You can use IP20/UL Open Type and IP20/UL Type 1 drives at a maximum of 60 °C (140 °F) when you derate the output current. • You can use IP55/UL Type 12 drives at a maximum of 50 °C (122 °F) when you derate the output current.
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: • When you install the drive at 2000 m (6562 ft) or lower • When you install the drive between 2000 m to 4000 m (6562 ft to 13123 ft) and ground the neutral point on the power supply.
Vibration	• For models 2xxxxB/F/V/W and 4xxxxB/F/V/W without Main Switch: – 10 Hz to 20 Hz: 1 G (9.8 m/s^2, 32.15 ft/s^2) – 20 Hz to 55 Hz: 2011 to 2031, 4005 to 4034: 0.6 G (5.9 m/s^2, 19.36 ft/s^2) 2046 to 2396, 4040 to 4720: 0.2 G (1.96 m/s^2, 6.43 ft/s^2) • For models 2xxxxT and 4xxxxT with Main Switch: – 10 Hz to 20 Hz: 1 G (9.8 m/s^2, 32.15 ft/s^2) – 20 Hz to 55 Hz: 0.2 G (1.96 m/s^2, 6.43 ft/s^2)
Installation Orientation	Install the drive vertically for sufficient airflow to cool the drive.

Table 6.9 Standard

Item	Specification
Harmonized Standard	• UL508C *1* • EN 61800-3 • IEC/EN 61800-5-1 • EN ISO 13849-1:2015 • IEC/EN 61508 (SIL3) • IEC/EN IEC 62061 (SIL3)

*1 Models 2143xV/T, 2169xV/T, 4124xT and 4156xV/T are compatible with UL61800-5-1.

Table 6.10 Enclosure Ratings

Item	Specification
Protection Design	IP20/UL Open Type IP20/UL Type 1 IP55/UL Type 12 IP55/UL Type 12 with Main Switch IP55/UL Type 12 Heatsink External Mounting **Note:** Install a UL Type 1 kit on an IP20/UL Open Type drive to convert the drive to an IP20/UL Type 1.

6.5 Drive Watt Loss

◆ 208 V Class

Table 6.11 Drive Watt Loss (NEMA Rating) for Models: 2xxxxB/F/V/W without Main Switch

Model	Rated Output Current A	Carrier Frequency kHz	Interior Unit Loss W	Cooling Fin Loss W	Total Loss W
2011	10.6	5.0	45	86	131
2017	16.7	5.0	56	140	196
2024	24.2	5.0	75	184	259
2031	30.8	5.0	89	244	333
2046	46.2	5.0	116	314	430
2059	59.4	5.0	148	418	566
2075	74.8	5.0	175	538	713
2088	88	5.0	201	615	816
2114	114	5.0	246	780	1026
2143	143	5.0	244	937	1180
2169	169	5.0	279	1132	1411
2211	211	2.0	339	1417	1756
2273	273	2.0	437	1972	2409
2343	343	2.0	517	2004	2522
2396	396	2.0	585	2245	2830

Table 6.12 Drive Watt Loss (NEMA Rating) for Models: 2xxxxT with Main Switch

Model	Rated Output Current A	Carrier Frequency kHz	Interior Unit Loss W	Cooling Fin Loss W	Total Loss W
2011	10.6	5.0	45	86	131
2017	16.7	5.0	57	140	196
2024	24.2	5.0	76	184	260
2031	30.8	5.0	91	244	335
2046	46.2	5.0	118	314	432
2059	59.4	5.0	151	418	569
2075	74.8	5.0	177	538	715
2088	88	5.0	203	615	818
2114	114	5.0	251	780	1031
2143	143	5.0	244	937	1180
2169	169	5.0	279	1132	1411

◆ 480 V Class

Table 6.13 Drive Watt Loss (NEMA Rating) for Models: 4xxxxB/F/V/W without Main Switch

Model	Rated Output Current A	Carrier Frequency kHz	Interior Unit Loss W	Cooling Fin Loss W	Total Loss W
4005	4.8	5.0	31	44	75
4008xF *1	7.6	5.0	38	70	108
4008xV *1	7.6	5.0	46	99	145
4011	11	5.0	56	142	198

Model	Rated Output Current A	Carrier Frequency kHz	Interior Unit Loss W	Cooling Fin Loss W	Total Loss W
4014	14	5.0	66	196	262
4021	21	5.0	89	212	301
4027	27	5.0	111	285	397
4034	34	5.0	128	327	455
4040	40	5.0	145	373	518
4052	52	5.0	178	470	648
4065	65	5.0	224	600	824
4077	77	5.0	271	819	1090
4096	96	5.0	323	973	1295
4124	124	5.0	423	1294	1717
4156	156	5.0	332	1448	1780
4180	180	2.0	402	1859	2260
4240	240	2.0	426	2106	2532
4302	302	2.0	852	2645	3496
4361	361	2.0	933	2936	3869
4414	414	2.0	901	2825	3727
4477	477	2.0	1172	3814	4986
4515	515	2.0	1242	4236	5479
4590	590	2.0	1325	4632	5957
4720	720	2.0	1597	6235	7831

*1 The watt loss values are different for different drive protection designs.

Table 6.14 Drive Watt Loss (NEMA Rating) for Models: 4xxxxT with Main Switch

Model	Rated Output Current A	Carrier Frequency kHz	Interior Unit Loss W	Cooling Fin Loss W	Total Loss W
4005	4.8	5.0	31	44	75
4008	7.6	5.0	46	99	145
4011	11	5.0	56	142	198
4014	14	5.0	67	196	263
4021	21	5.0	90	212	301
4027	27	5.0	113	285	398
4034	34	5.0	130	327	457
4040	40	5.0	146	373	519
4052	52	5.0	181	470	651
4065	65	5.0	228	600	827
4077	77	5.0	273	819	1093
4096	96	5.0	326	973	1298
4124	124	5.0	423	1294	1717
4156	156	5.0	332	1448	1780

6.6 Drive Derating

You must derate the drive capacity to operate the drive above the rated temperature, altitude, and default carrier frequency.

◆ Carrier Frequency Settings and Rated Current Values

Table 6.15 and Table 6.16 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.

Note:

The drive will apply derating for the rated output current value based on the carrier frequency only to the reference output current value of the *oL2 [Drive Overload]*. The derated value for the 100% rated output current in parameters and monitors will not be the same as the rated output current value shown in *Model Specifications (208 V Class) on page 435* and *Model Specifications (480 V Class) on page 436*.

■ 208 V Class

Table 6.15 Carrier Frequency and Rated Current Derating

Model	Rated Current (A)				
	2 kHz	5 kHz	8 kHz	10 kHz	12.5 kHz
2011	10.6	10.6	8.9	7.7	6.3
2017	16.7	16.7	14.0	12.2	10.0
2024	24.2	24.2	20.3	17.7	14.5
2031	30.8	30.8	25.8	22.6	18.5
2046	46.2	46.2	38.8	33.9	27.7
2059	59.4	59.4	49.9	43.5	35.6
2075	74.8	74.8	62.8	54.9	44.9
2088	88.0	88.0	73.9	64.5	52.8
2114	114	114	95.8	83.6	68.4
2143	143	143	114.5	95.5	71.7
2169	169	169	135.3	112.8	84.7
2211	211	189.2	156.4	134.6	-
2273	273	251.6	219.5	198.1	-
2343	343	315.7	-	-	-
2396	396	373.4	-	-	-

■ 480 V Class

Table 6.16 Carrier Frequency and Rated Current Derating

Model	Rated Current (A)				
	2 kHz	5 kHz	8 kHz	10 kHz	12.5 kHz
4005	4.8	4.8	4.0	3.5	2.8
4008	7.6	7.6	6.3	5.5	4.5
4011	11.0	11.0	9.2	8.0	6.6
4014	14.0	14.0	11.7	10.2	8.4
4021	21.0	21.0	17.6	15.4	12.6
4027	27.0	27.0	22.6	19.8	16.2
4034	34.0	34.0	28.5	24.9	20.4
4040	40.0	40.0	33.6	29.3	24.0

Model	Rated Current (A)				
	2 kHz	5 kHz	8 kHz	10 kHz	12.5 kHz
4052	52.0	52.0	43.7	38.1	31.2
4065	65.0	65.0	54.6	47.7	39.0
4077	77.0	77.0	64.7	56.5	46.2
4096	96.0	96.0	80.6	70.4	57.6
4124	124	124	99.3	82.8	62.2
4156	156	156	124.9	104.2	78.2
4180	180	155.5	118.7	94.2	-
4240	240	212.9	172.3	145.2	-
4302	302	268.8	218.9	185.7	-
4361	361	318.5	254.7	212.2	-
4414	414	369.7	303.3	259	-
4477	477	367.4	-	-	-
4515	515	396.7	-	-	-
4590	590	461.1	-	-	-
4720	720	562.7	-	-	-

◆ Derating Depending on Ambient Temperature

When you install drives in a place where ambient temperatures are higher than the rated conditions or install drives side-by-side in the enclosure panel, set *L8-12 [Ambient Temperature]* and *L8-35 [Installation Method Selection]*. Derate the output current as specified in Figure 6.1 to Figure 6.4.

No. (Hex.)	Name	Description	Default (Range)
L8-12 (04B8)	Ambient Temperature Setting	V/f OLV/PM EZOLV Sets the ambient temperature of the drive installation area.	40 °C (Determined by L8-35)

No. (Hex.)	Name	Description	Default (Range)
L8-35 (04EC)	Installation Method Selection	V/f OLV/PM EZOLV Sets the type of drive installation.	Determined by the drive (0 - 3)

Note:
- The drive will detect an *oPE02 [Parameter Range Setting Error]* in these conditions:
  – If you set *L8-12 = 60 °C* and *L8-35 = 1 or 3* for models 2011 to 2169 and 4005 to 4156
  – If you set *L8-35 = 1 or 3* for models 2211 to 2396 and 4180 to 4720
- To use an IP55/UL Type 12 drive, set *L8-35 = 3*.

0 : IP20/UL Open Type

Use this setting to install an IP20/UL Open Type drive. The applicable output current to operate the drive changes when the ambient temperature changes:

- -10 °C to +50 °C (14 °F to 122 °F): You can operate the drive with 100% output current without derating.
- 50 °C to 60 °C (122 °F to 140 °F): Derate the output current from 100% to 80%.

Make sure that there is 60 mm (2.4 in) minimum of space between drives or between the drive and side of the enclosure panel.

1 : Side-by-Side Mounting

Use this setting to install more than one drive Side-by-Side. The applicable output current to operate the drive changes when the ambient temperature changes:

- -10 °C to +40 °C (14 °F to 104 °F): You can operate the drive with 100% output current without derating.
- 40 °C to 50 °C (104 °F to 122 °F): Derate the output current from 100% to 80%.

Make sure that there is 2 mm (0.08 in) minimum of space between drives.

2 : IP20/UL Type 1

Use this setting to install an IP20/UL Type 1 drive. The applicable output current to operate the drive changes when the drive model and ambient temperature change:

- For the drive models 4005 and 4008
  - -10 °C to +40 °C (14 °F to 104 °F): You can operate the drive with 100% output current without derating.
  - 40 °C to 60 °C (104 °F to 140 °F): Derate the output current from 100% to 80%.
- For the drive models 4011 to 4027
  - -10 °C to +50 °C (14 °F to 122 °F): You can operate the drive with 100% output current without derating.
  - 50 °C to 60 °C (122 °F to 140 °F): Derate the output current from 100% to 80%.
- For the drive models 4034 to 4065
  - -10 °C to +45 °C (14 °F to 113 °F): You can operate the drive with 100% output current without derating.
  - 45 °C to 50 °C (113 °F to 122 °F): Derate the output current from 100% to 90%.
  - 50 °C to 60 °C (122 °F to 140 °F): Derate the output current from 90% to 70%.
- For the drive models 2011 to 2396 and 4077 to 4720
  - -10 °C to +40 °C (14 °F to 104 °F): You can operate the drive with 100% output current without derating.
  - 40 °C to 60 °C (104 °F to 140 °F): Derate the output current from 100% to 60%.

3 : IP55/UL Type 12

Use this setting to install an IP55/UL Type 12 drive. The applicable output current to operate the drive changes when the ambient temperature changes:

- -10 °C to +40 °C (14 °F to 104 °F): You can operate the drive with 100% output current without derating.
- 40 °C to 50 °C (104 °F to 122 °F): Derate the output current from 100% to 80%.

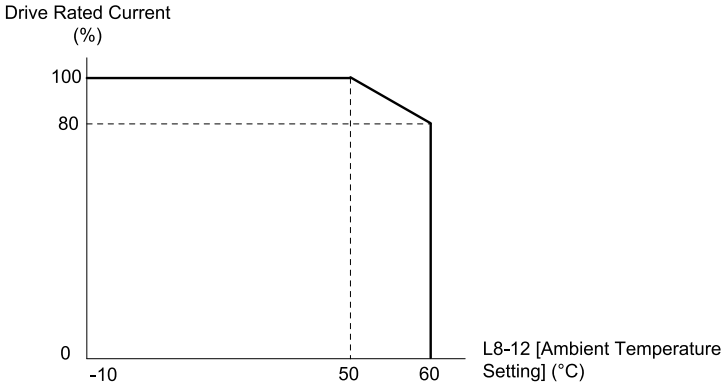


Figure 6.1 Derating for IP20/UL Open Type (L8-35 = 0)

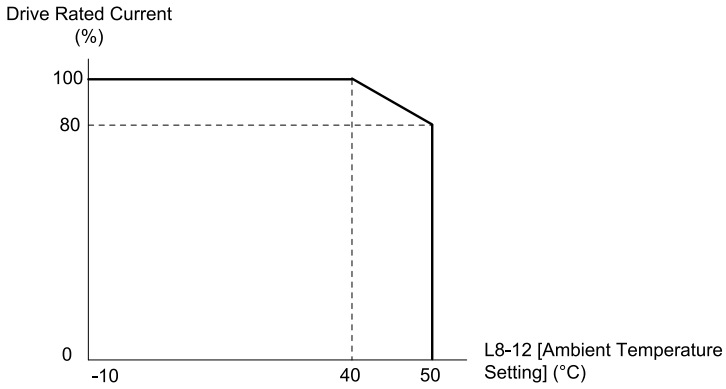
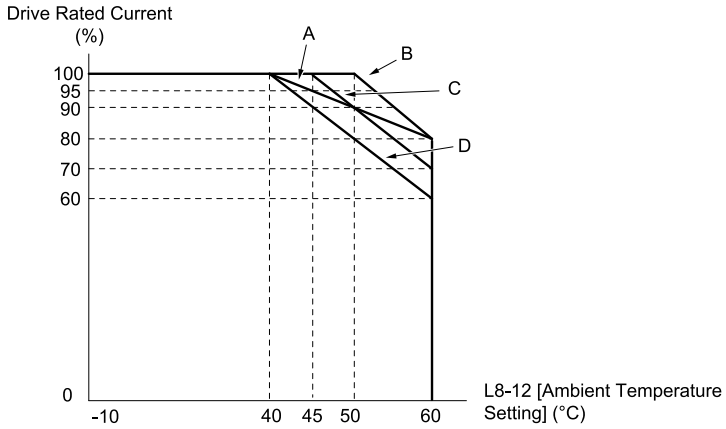


Figure 6.2 Derating for Side-by-Side Mounting (L8-35 = 1)



A - Drive Models: 4005, 4008
B - Drive Models: 4011 to 4027
C - Drive Models: 4034 to 4065
D - Drive Models: 2011 to 2396 and 4077 to 4720

Figure 6.3 Derating for IP20/UL Type 1 (L8-35 = 2)

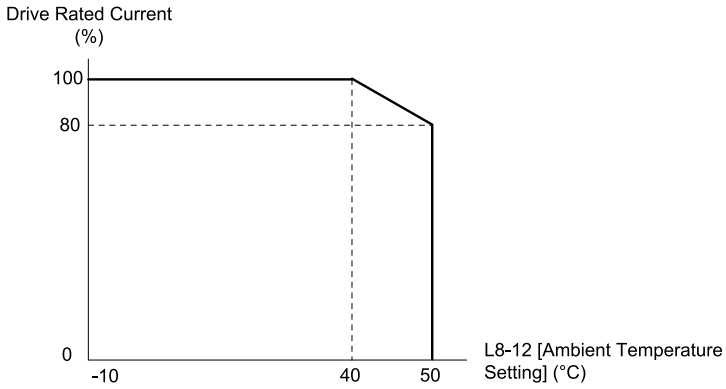


Figure 6.4 Derating for IP55/UL Type 12 (L8-35 = 3)

◆ 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.

6.7 Drive Exterior and Mounting Dimensions

◆ Drive Models and Exterior/Mounting Dimensions

Note:

Refer to the "WM605 IP55/UL Type 12 Heatsink External Mounting Installation Manual (TOEPYAIWM6509)" for the external dimensions of IP55/UL Type 12 Heatsink External Mounting drives.

Table 6.17 Models: 2xxxxB/F and 4xxxxB/F without Main Switch

Model	Reference Pages	
	IP20/UL Open Type Models: 2xxxxB and 4xxxxB	IP20/UL Type 1 Models: 2xxxxF and 4xxxxF
4005, 4008	-	452
2011, 2017 4011, 4014	-	453
2024, 2031 4021 - 4034	-	454
2046, 2059 4040 - 4065	-	455
2075 - 2114 4077 - 4124	-	456
2143, 2169 4156	-	457
2211, 2273 4180 - 4302	449	-
2343, 2396 4361, 4414	450	-
4477 - 4720	452	-

Table 6.18 Models: 2xxxxV and 4xxxxV without Main Switch

Model	Reference Pages
	IP55/UL Type 12 Models: 2xxxxV and 4xxxxV
4005	458
2011, 2017 4008 - 4014	459
2024, 2031 4021 - 4034	460
2046, 2059 4040 - 4065	461
2075 - 2114 4077 - 4124	462
2143, 2169 4156	463
2211, 2273 4180 - 4302	-
2343, 2396 4361, 4414	-
4477 - 4720	-

Table 6.19 Models: 2xxxxT and 4xxxxT with Main Switch

Model	Reference Pages
	IP55/UL Type 12 with Main Switch Models: 2xxxxT and 4xxxxT
4005	464
2011, 2017 4008 - 4014	465
2024, 2031 4021 - 4034	466
2046, 2059 4040 - 4065	467
2075 - 2114 4077 - 4096	468
4124	469
2143, 2169 4156	470

◆ IP20/UL Open Type

■ Drive Models: 2211, 2273, 4180 to 4302

Note:

When you use non-metric hardware to install the drive, use Type B narrow washers or equivalent and make sure that the size of the screw head and washer are applicable for your drive before installation.

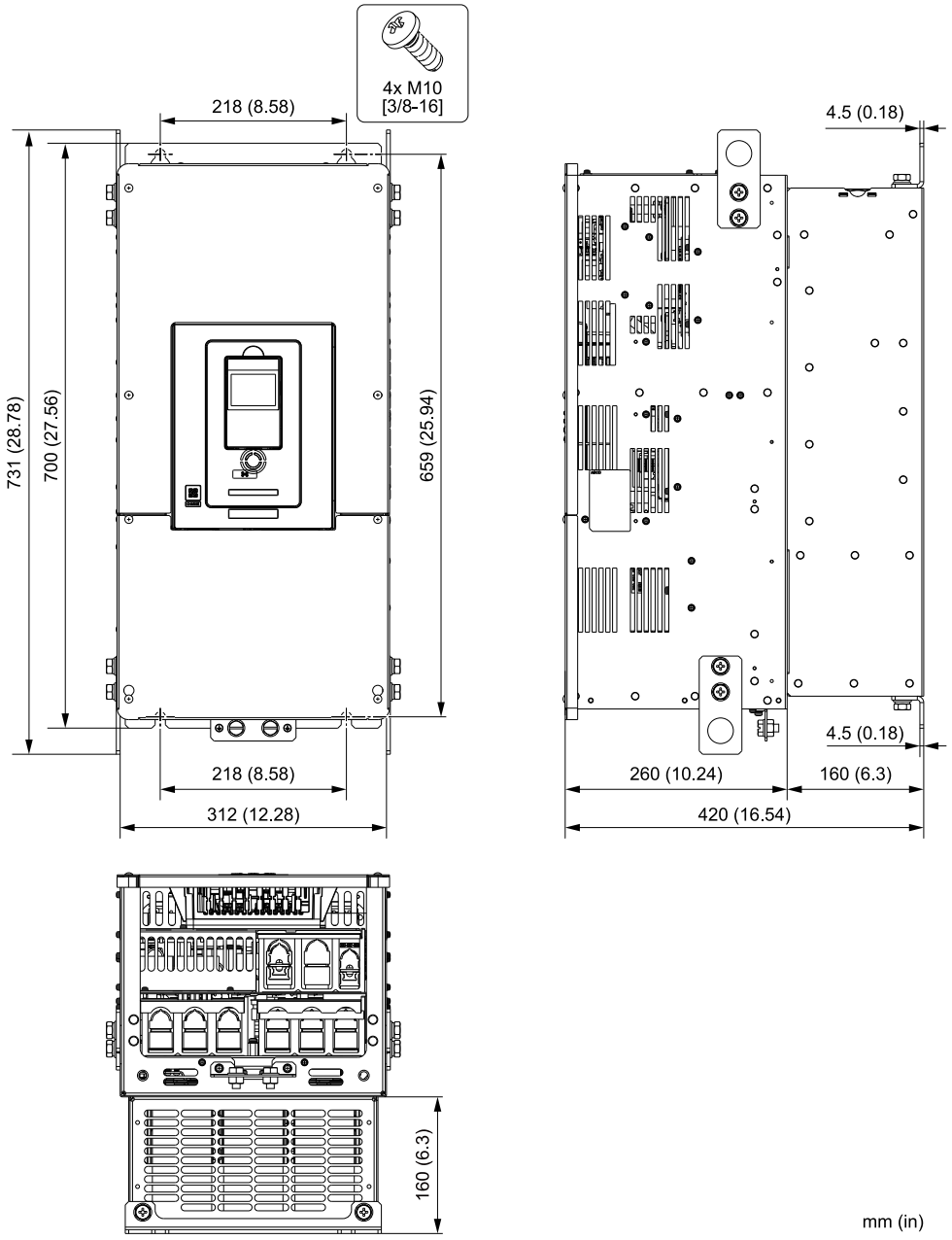


Figure 6.5 Exterior and Mounting Dimensions Diagram 1

Estimated Weight *1 kg (lb)				
2211	**2273**	**4180**	**4240**	**4302**
58 (127.89)	61 (134.51)	60 (132.30)	62 (136.71)	65 (143.33)

*1 The estimated weights are for drives with hardware revision D or later. For estimated weights of drives with hardware revision C or earlier, contact Yaskawa or your nearest sales representative. The “REV” column on the nameplate on the right side of the drive identifies the hardware revision.

■ Drive Models: 2343, 2396, 4361, 4414

Note:

When you use non-metric hardware to install the drive, use Type B narrow washers or equivalent and make sure that the size of the screw head and washer are applicable for your drive before installation.

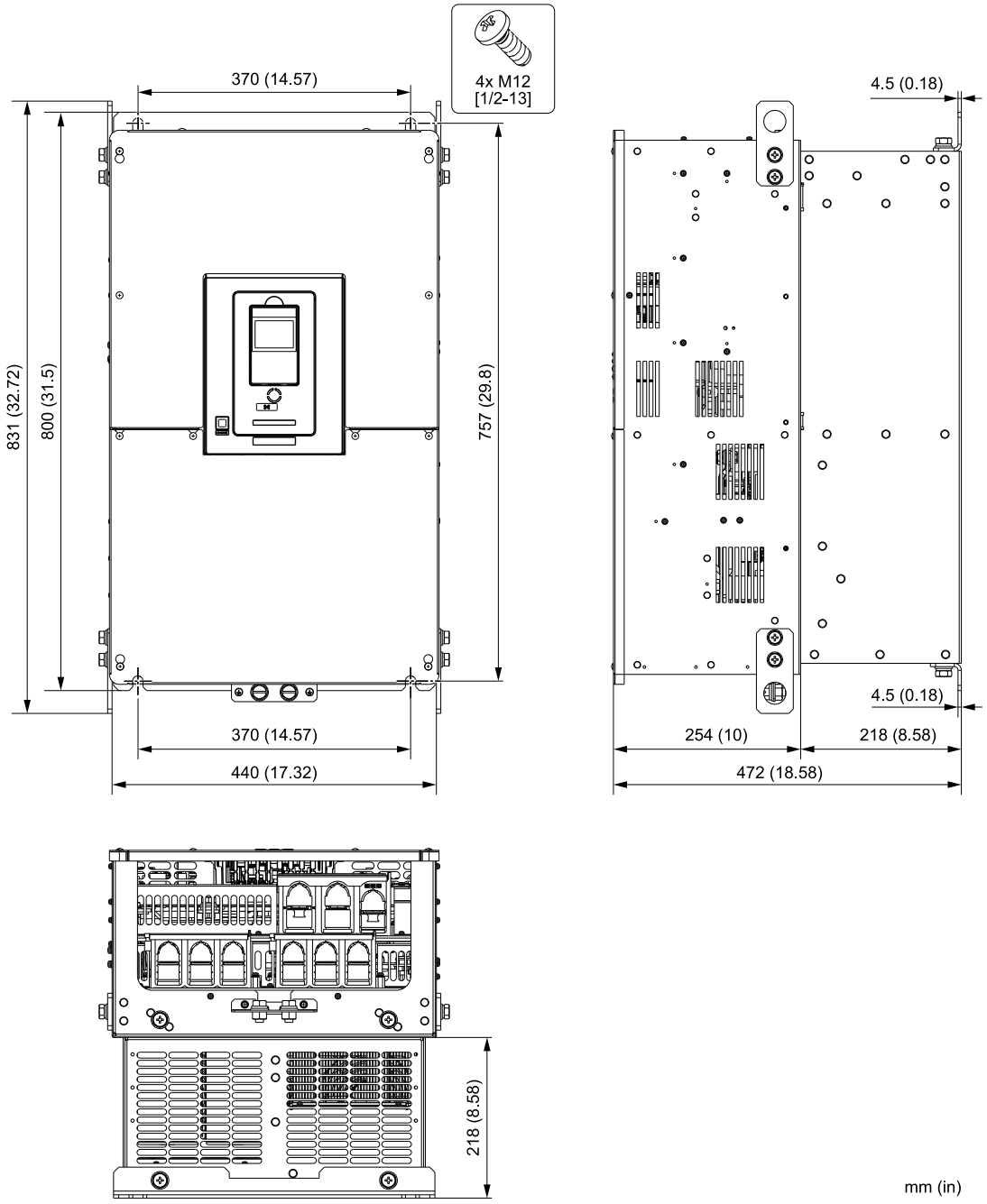


Figure 6.6 Exterior and Mounting Dimensions Diagram 2

Estimated Weight *1 kg (lb)			
2343	**2396**	**4361**	**4414**
100 (220.50)	106 (233.73)	106 (233.73)	112 (246.96)

*1 The estimated weights are for drives with hardware revision D or later. For estimated weights of drives with hardware revision C or earlier, contact Yaskawa or your nearest sales representative. The “REV” column on the nameplate on the right side of the drive identifies the hardware revision.

■ Drive Models: 4477 to 4720

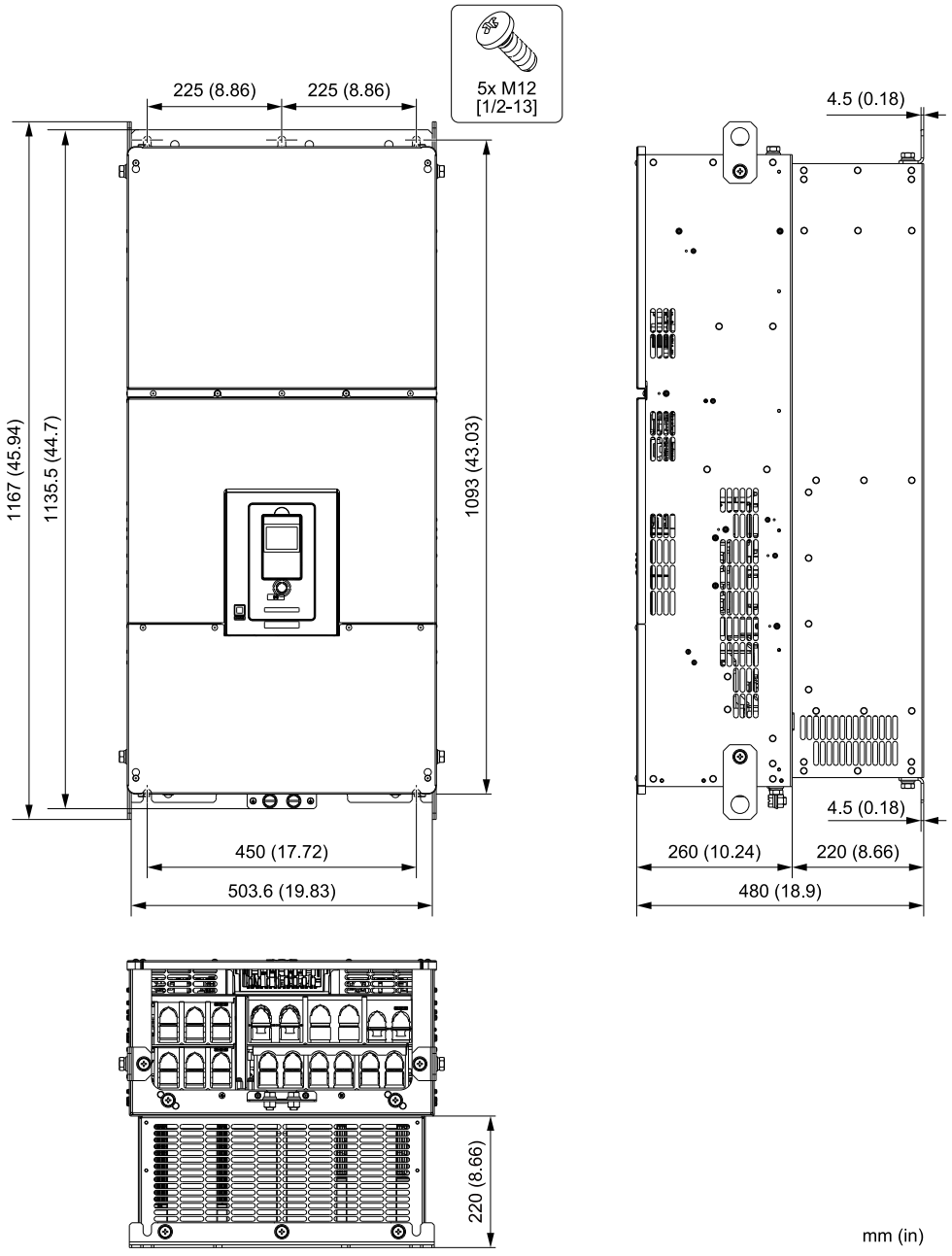


Figure 6.7 Exterior and Mounting Dimensions Diagram 3

Estimated Weight kg (lb)			
4477	**4515**	**4590**	**4720**
190 (418.95)	190 (418.95)	201 (443.21)	199 (438.80)

◆ IP20/UL Type1

■ Drive Models: 4005, 4008

Note:

When you use non-metric hardware to install the drive, use Type B narrow washers or equivalent and make sure that the size of the screw head and washer are applicable for your drive before installation.

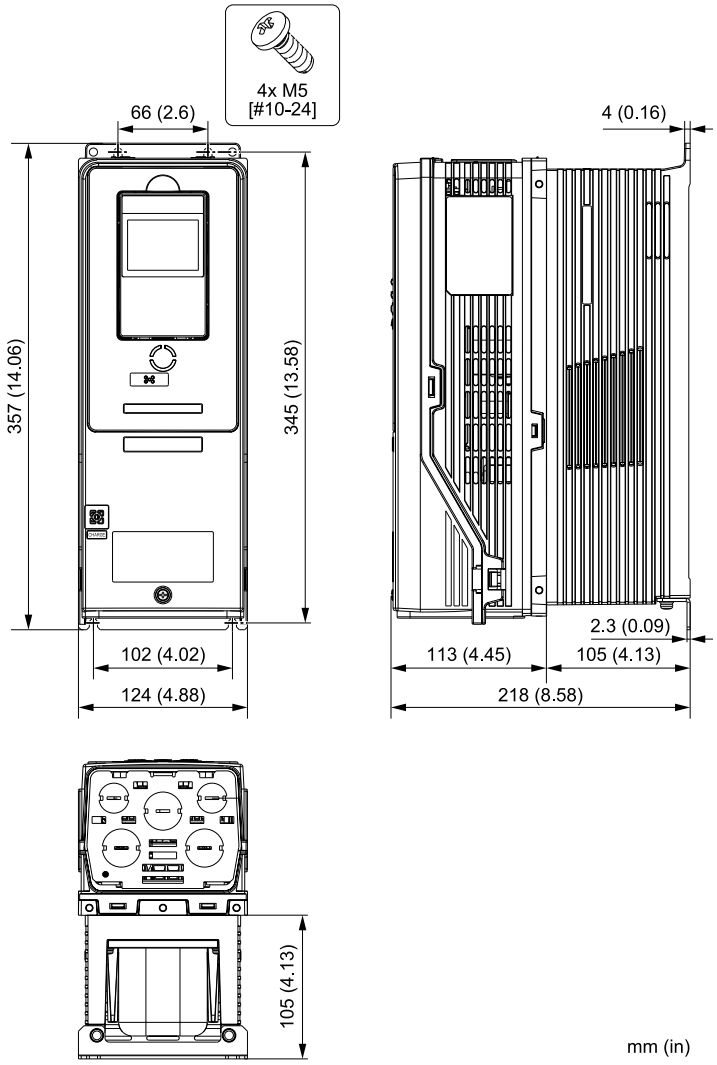


Figure 6.8 Exterior and Mounting Dimensions Diagram 1

Type	Estimated Weight kg (lb)	
	4005	4008
No built-in EMC filter	6.0 (13.2)	7.0 (15.4)
Built-in EMC filter for C2	7.0 (15.4)	7.5 (16.5)

■ Drive Models: 2011, 2017, 4011, 4014

Note:

When you use non-metric hardware to install the drive, use Type B narrow washers or equivalent and make sure that the size of the screw head and washer are applicable for your drive before installation.

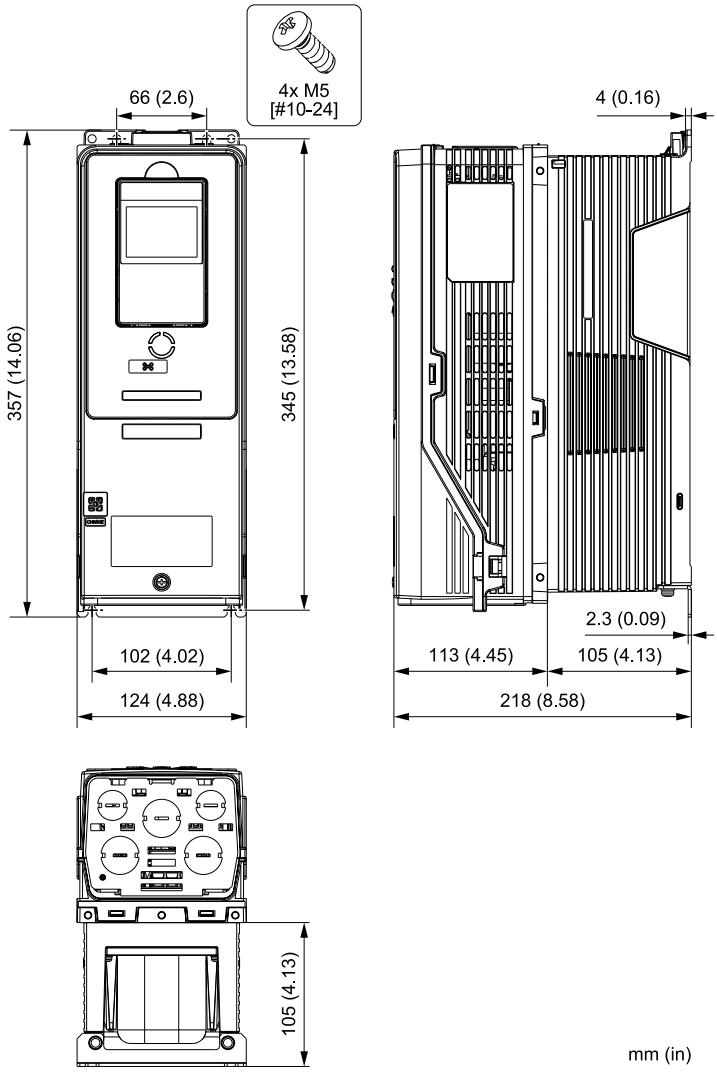


Figure 6.9 Exterior and Mounting Dimensions Diagram 2

Type	Estimated Weight kg (lb)			
	2011	2017	4011	4014
No built-in EMC filter	6.0 (13.2)	6.0 (13.2)	6.5 (14.3)	6.5 (14.3)
Built-in EMC filter for C2	6.5 (14.3)	6.5 (14.3)	7.0 (15.4)	7.0 (15.4)

■ Drive Models: 2024, 2031, 4021 to 4034

Note:

When you use non-metric hardware to install the drive, use Type B narrow washers or equivalent and make sure that the size of the screw head and washer are applicable for your drive before installation.

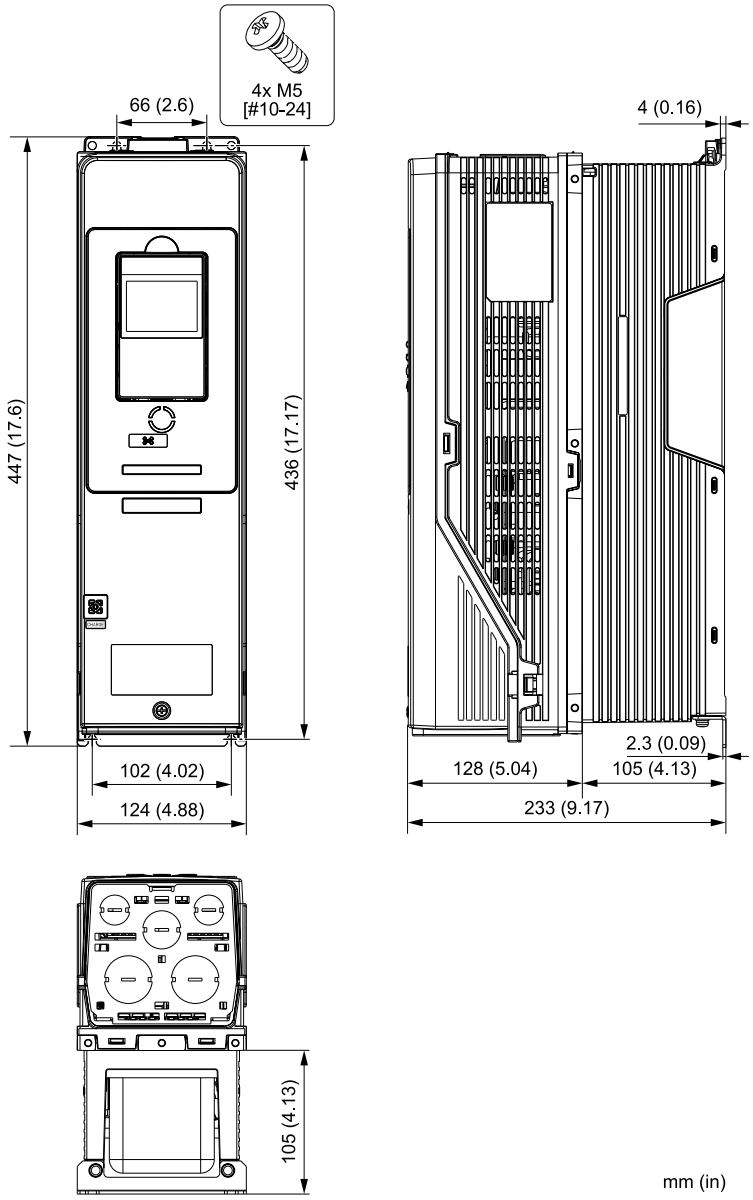


Figure 6.10 Exterior and Mounting Dimensions Diagram 3

Type	Estimated Weight kg (lb)				
	2024	2031	4021	4027	4034
No built-in EMC filter	7.5 (16.5)	8.0 (17.6)	8.0 (17.6)	9.0 (19.8)	10 (22.0)
Built-in EMC filter for C2	8.5 (18.7)	9.0 (19.8)	9.0 (19.8)	10 (22.0)	11 (24.3)

■ Drive Models: 2046, 2059, 4040 to 4065

Note:

When you use non-metric hardware to install the drive, use Type B narrow washers or equivalent and make sure that the size of the screw head and washer are applicable for your drive before installation.

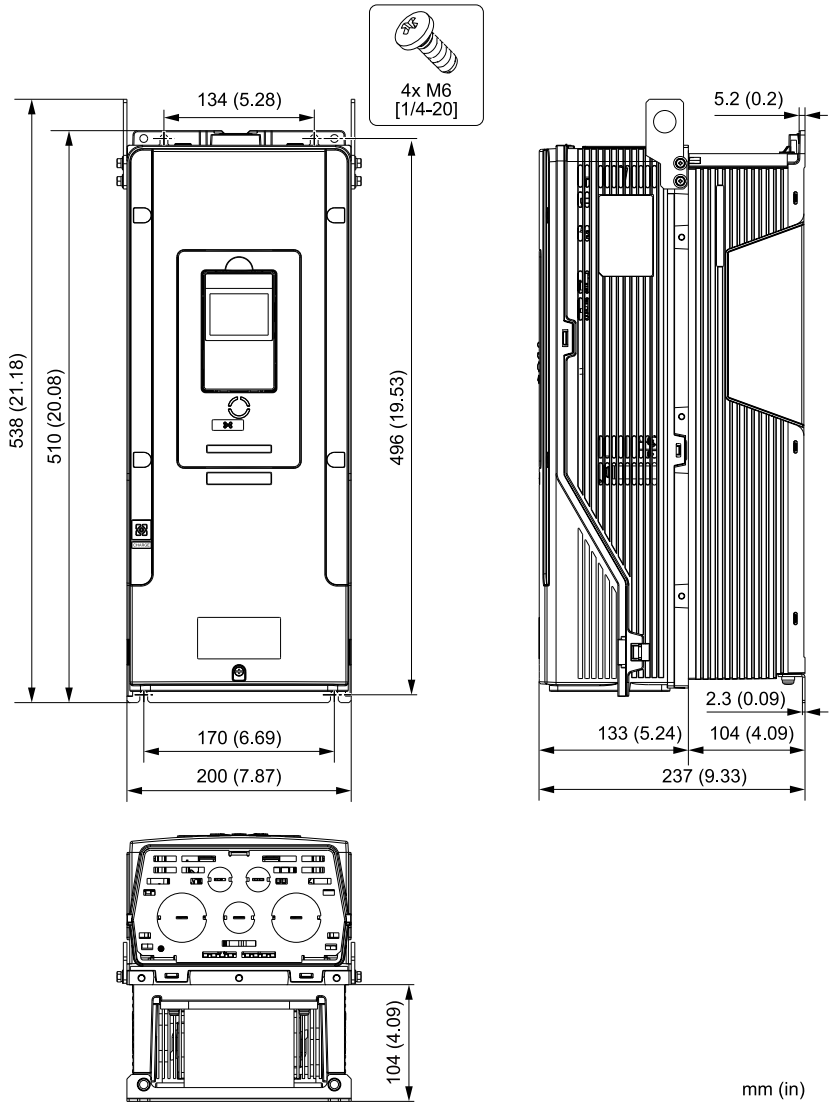


Figure 6.11 Exterior and Mounting Dimensions Diagram 4

Type	Estimated Weight kg (lb)				
	2046	2059	4040	4052	4065
No built-in EMC filter	14 (30.9)	15 (33.1)	15 (33.1)	17 (37.5)	19 (41.9)
Built-in EMC filter for C2	15 (33.1)	16 (35.3)	16 (35.3)	18 (39.7)	20 (44.1)

■ Drive Models: 2075 to 2114, 4077 to 4124

Note:

When you use non-metric hardware to install the drive, use Type B narrow washers or equivalent and make sure that the size of the screw head and washer are applicable for your drive before installation.

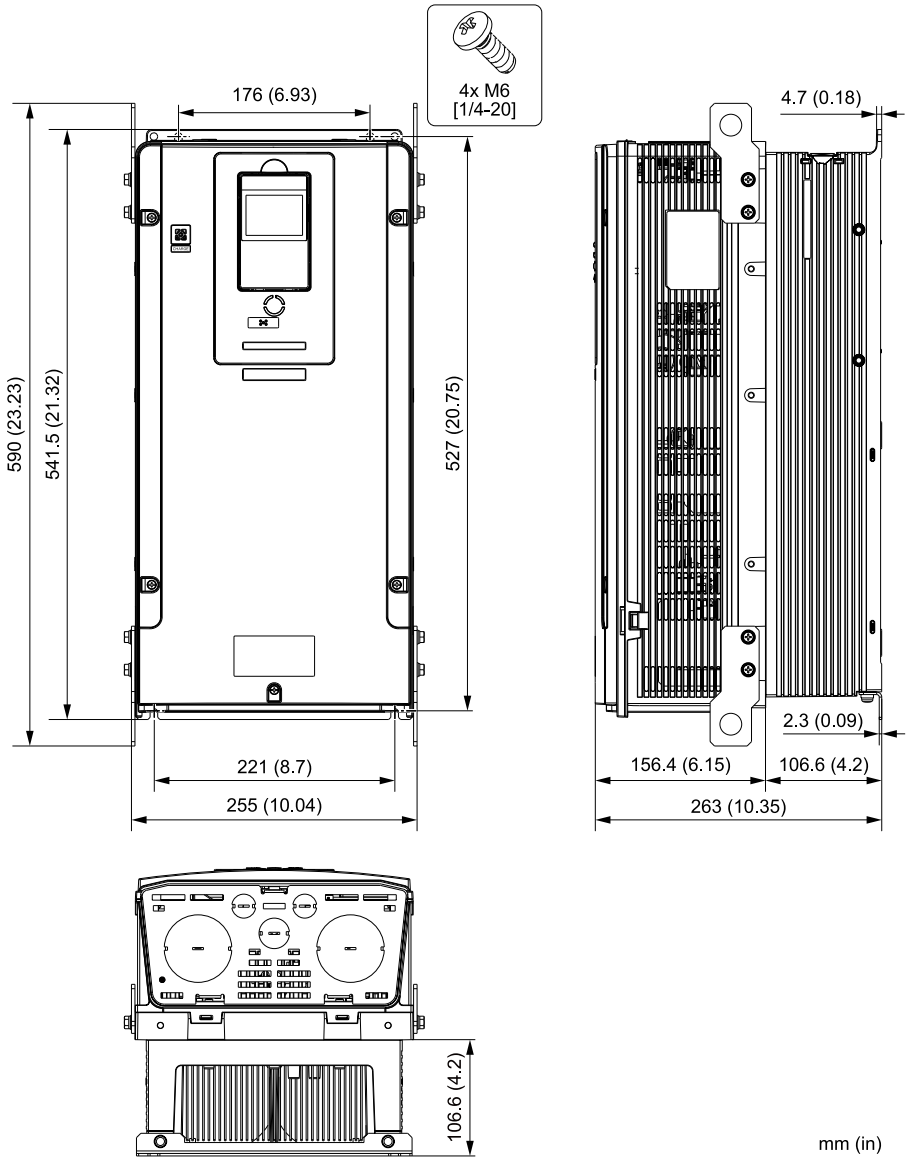


Figure 6.12 Exterior and Mounting Dimensions Diagram 5

Type	Estimated Weight kg (lb)					
	2075	2088	2114	4077	4096	4124
No built-in EMC filter	25 (55.1)	25 (55.1)	28 (61.7)	28 (61.7)	30 (66.1)	32 (70.5)
Built-in EMC filter for C2	25 (55.1)	25 (55.1)	28 (61.7)	28 (61.7)	30 (66.1)	33 (72.8)

■ Drive Models: 2143, 2169, 4156

Note:

When you use non-metric hardware to install the drive, use Type B narrow washers or equivalent and make sure that the size of the screw head and washer are applicable for your drive before installation.

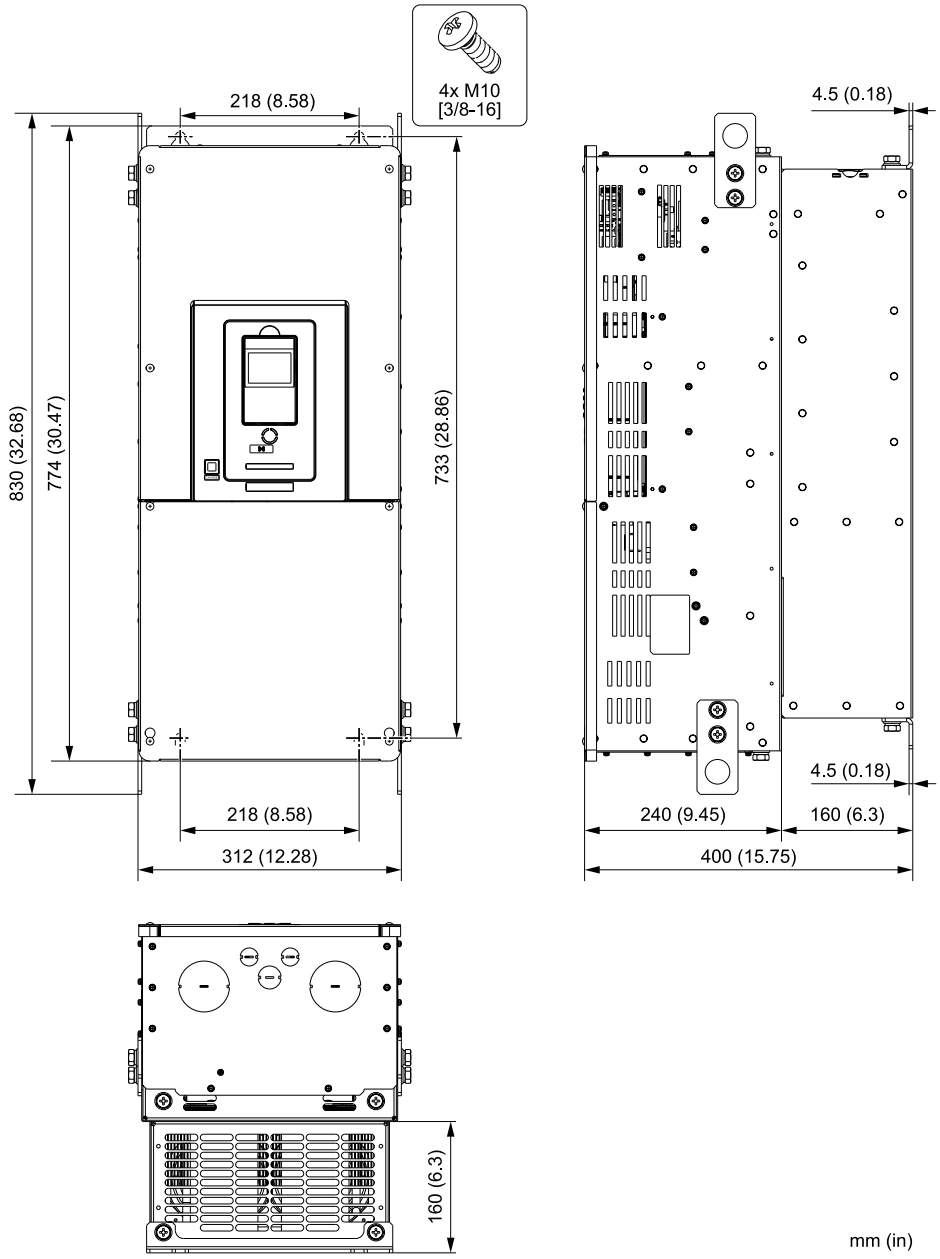


Figure 6.13 Exterior and Mounting Dimensions Diagram 6

Type	Estimated Weight kg (lb)		
	2143	2169	4156
No built-in EMC filter	71 (156.5)	74 (163.1)	76 (167.6)
Built-in EMC filter for C2	74 (163.1)	76 (167.6)	78 (172.0)

◆ IP55/UL Type 12

■ Drive Model: 4005

Note:

When you use non-metric hardware to install the drive, use Type B narrow washers or equivalent and make sure that the size of the screw head and washer are applicable for your drive before installation.

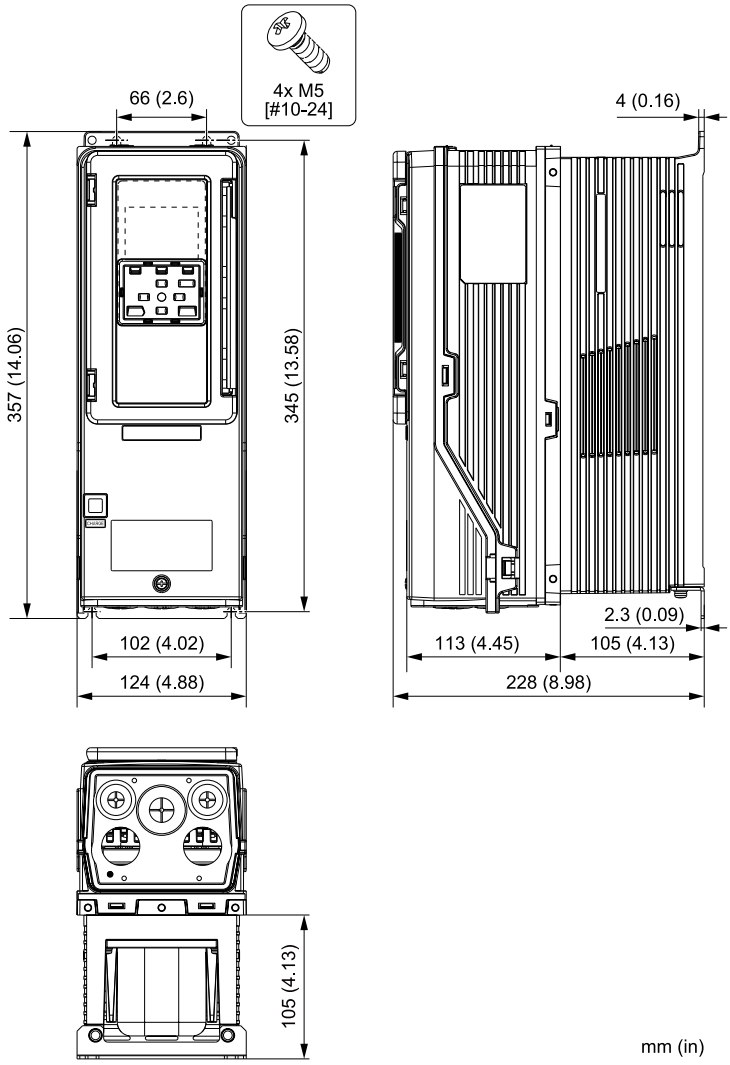


Figure 6.14 Exterior and Mounting Dimensions Diagram 1

Estimated Weight kg (lb)
4005
6.5 (14.3)

■ Drive Models: 2011, 2017, 4008 to 4014

Note:

When you use non-metric hardware to install the drive, use Type B narrow washers or equivalent and make sure that the size of the screw head and washer are applicable for your drive before installation.

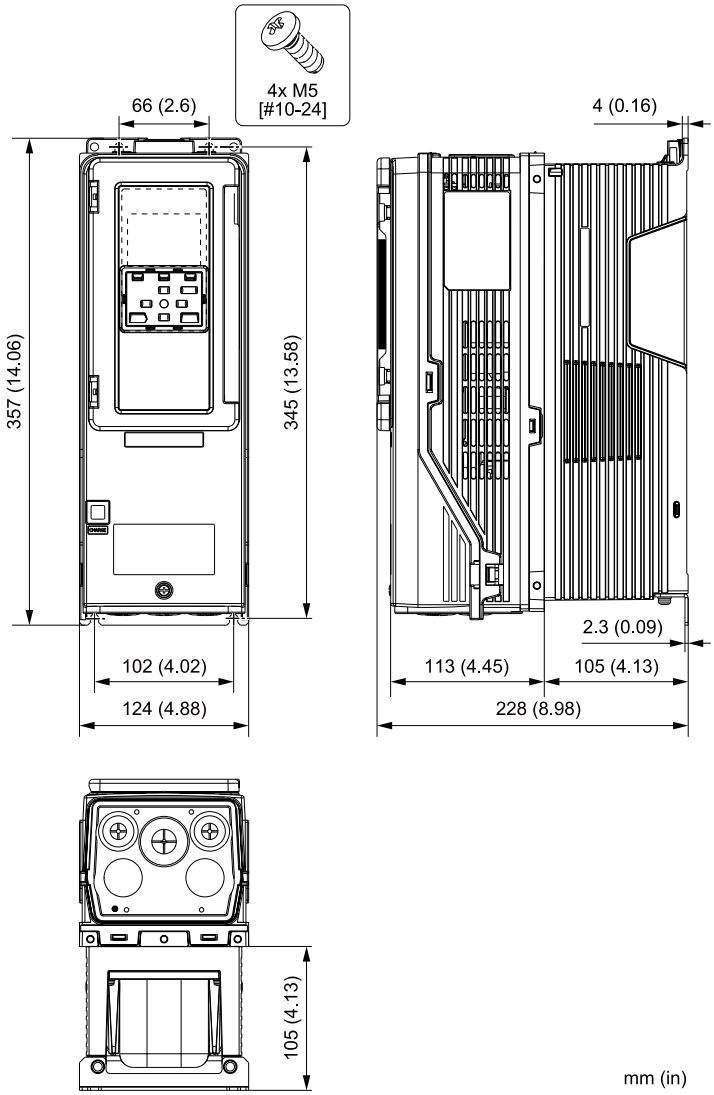


Figure 6.15 Exterior and Mounting Dimensions Diagram 2

Estimated Weight kg (lb)				
2011	**2017**	**4008**	**4011**	**4014**
6.0 (13.2)	6.0 (13.2)	6.5 (14.3)	6.5 (14.3)	6.5 (14.3)

■ Drive Models: 2024, 2031, 4021 to 4034

Note:

When you use non-metric hardware to install the drive, use Type B narrow washers or equivalent and make sure that the size of the screw head and washer are applicable for your drive before installation.

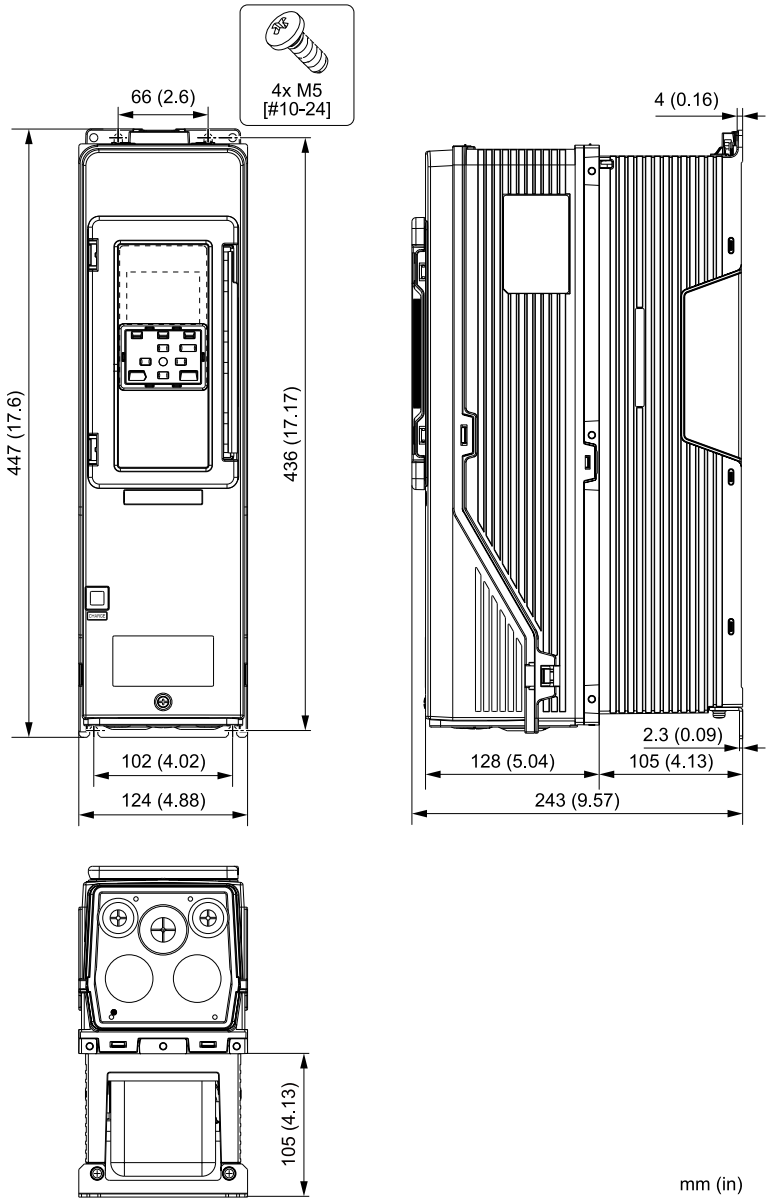


Figure 6.16 Exterior and Mounting Dimensions Diagram 3

Estimated Weight kg (lb)				
2024	**2031**	**4021**	**4027**	**4034**
7.5 (16.5)	8.0 (17.6)	8.5 (18.7)	9.0 (19.8)	11 (24.3)

■ Drive Models: 2046, 2059, 4040 to 4065

Note:

When you use non-metric hardware to install the drive, use Type B narrow washers or equivalent and make sure that the size of the screw head and washer are applicable for your drive before installation.

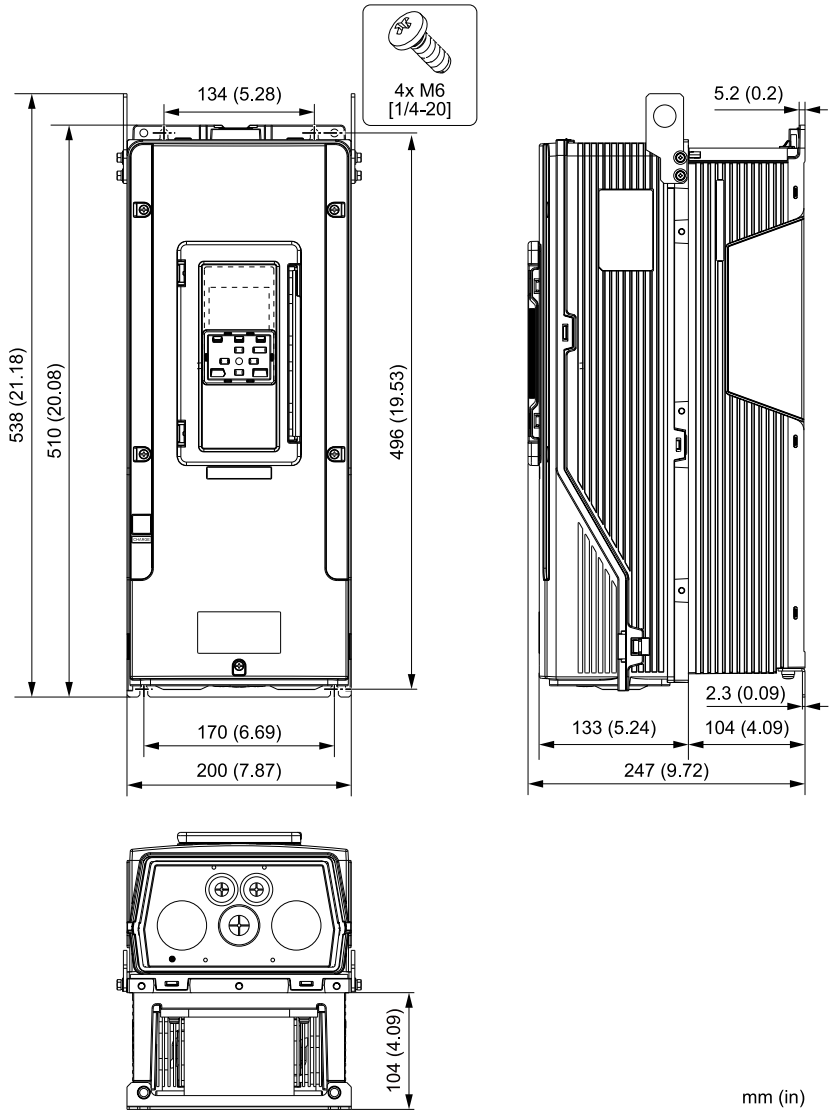


Figure 6.17 Exterior and Mounting Dimensions Diagram 4

Estimated Weight kg (lb)				
2046	**2059**	**4040**	**4052**	**4065**
14 (30.9)	15 (33.1)	15 (33.1)	17 (37.5)	19 (41.9)

■ Drive Models: 2075 to 2114, 4077 to 4124

Note:

When you use non-metric hardware to install the drive, use Type B narrow washers or equivalent and make sure that the size of the screw head and washer are applicable for your drive before installation.

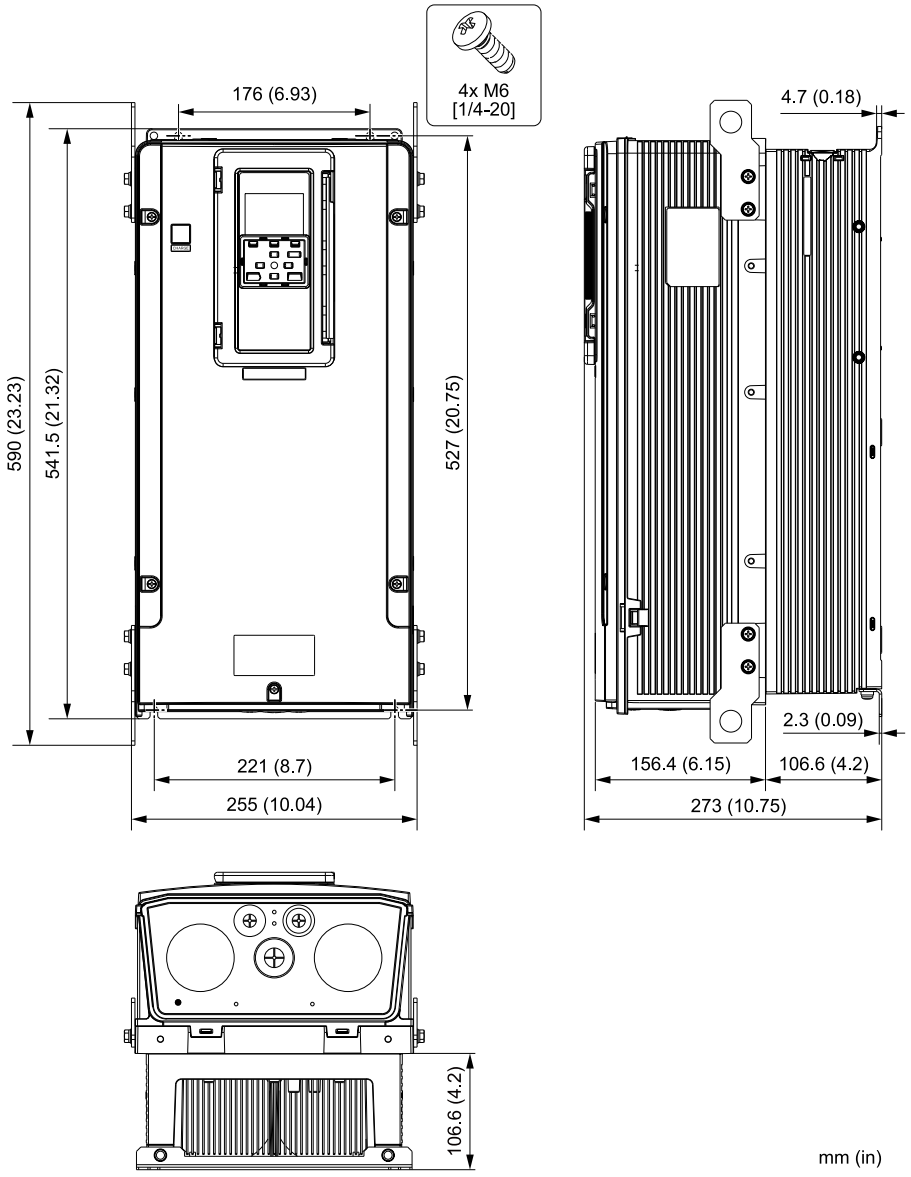


Figure 6.18 Exterior and Mounting Dimensions Diagram 5

Estimated Weight kg (lb)					
2075	**2088**	**2114**	**4077**	**4096**	**4124**
25 (55.1)	25 (55.1)	28 (61.7)	28 (61.7)	30 (66.1)	33 (72.8)

■ Drive Models: 2143, 2169, 4156

Note:

When you use non-metric hardware to install the drive, use Type B narrow washers or equivalent and make sure that the size of the screw head and washer are applicable for your drive before installation.

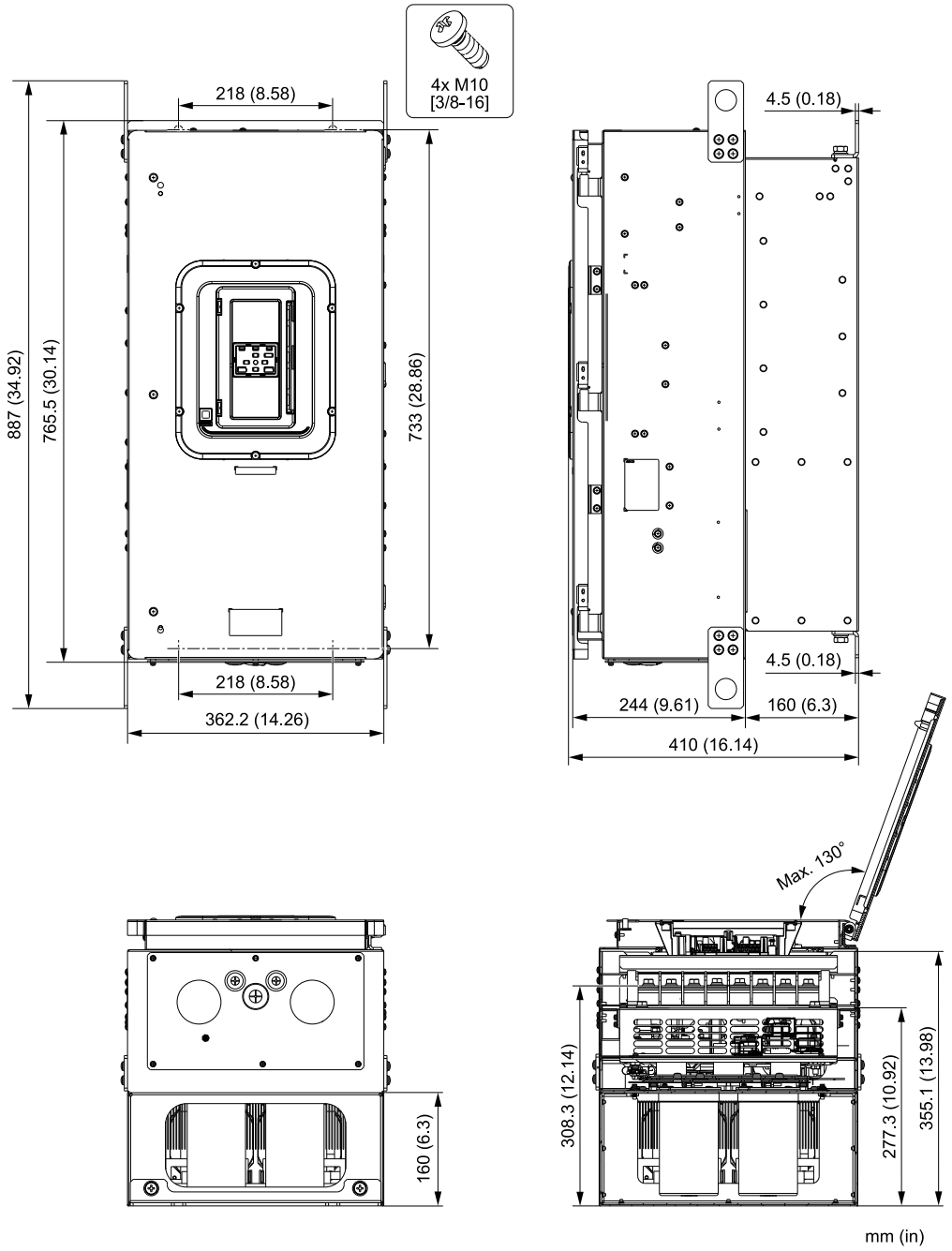


Figure 6.19 Exterior and Mounting Dimensions Diagram 6

Estimated Weight kg (lb)		
2143	**2169**	**4156**
78 (172.0)	81 (178.6)	81 (178.6)

◆ IP55/UL Type 12 with Main Switch

■ Drive Model: 4005

Note:

When you use non-metric hardware to install the drive, use Type B narrow washers or equivalent and make sure that the size of the screw head and washer are applicable for your drive before installation.

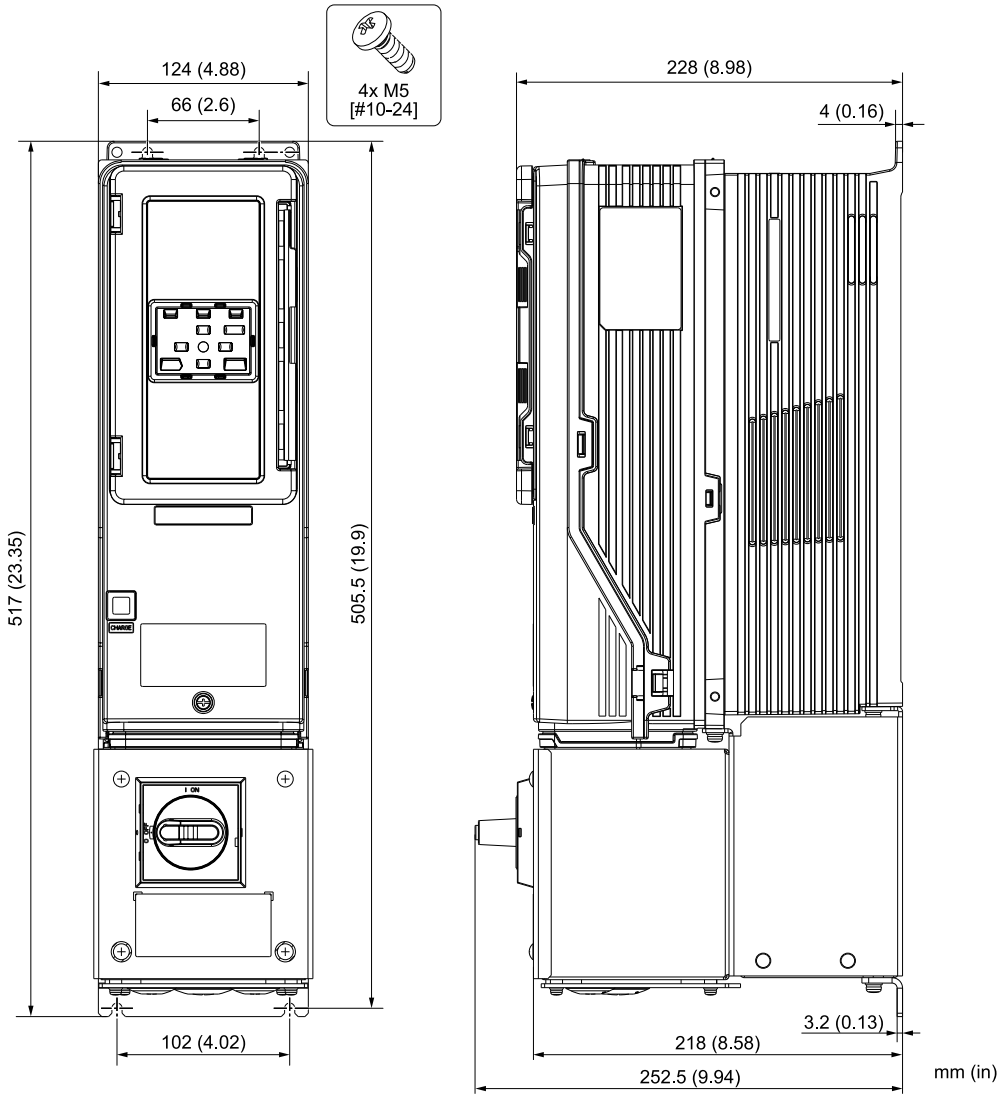


Figure 6.20 Exterior and Mounting Dimensions Diagram 1

Estimated Weight kg (lb)
4005
9.0 (19.8)

■ Drive Models: 2011, 2017, 4008 to 4014

Note:

When you use non-metric hardware to install the drive, use Type B narrow washers or equivalent and make sure that the size of the screw head and washer are applicable for your drive before installation.

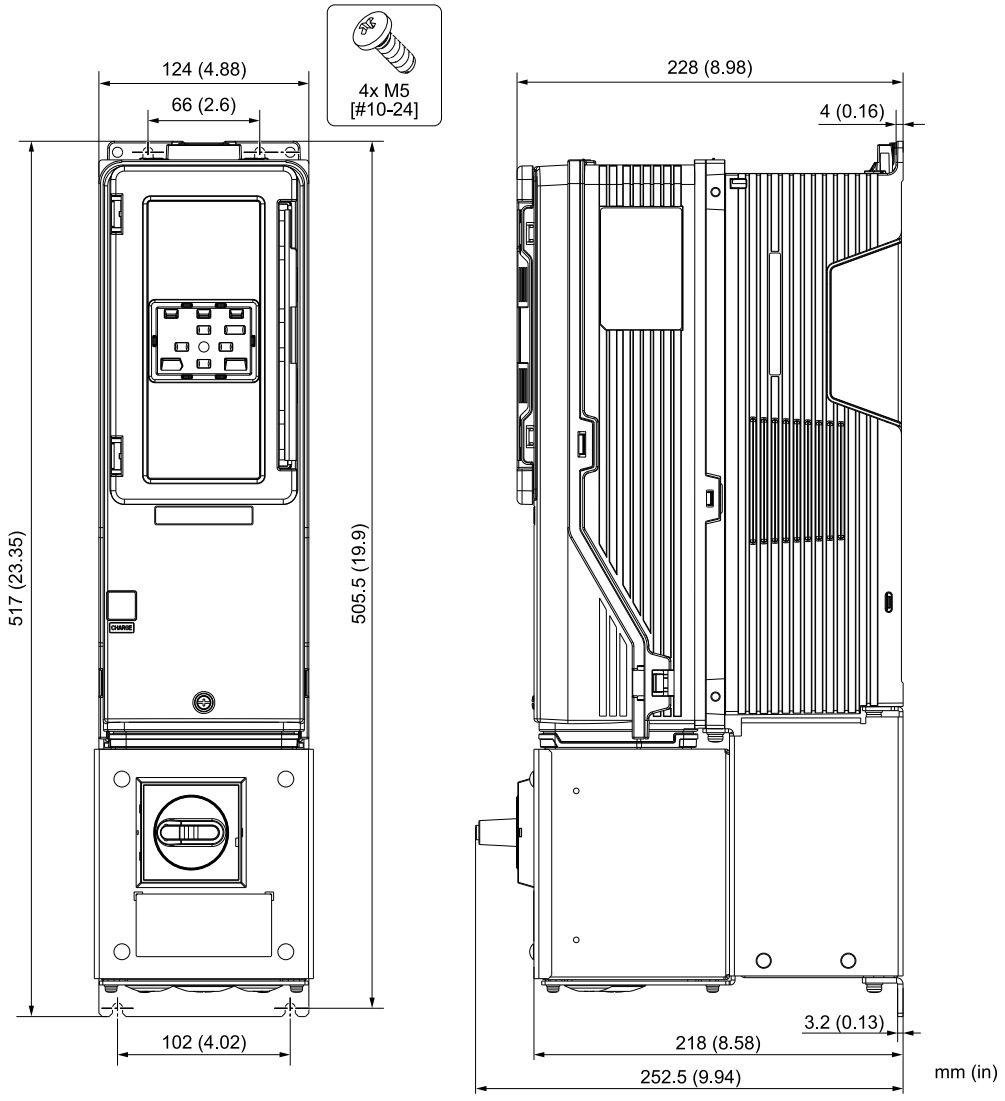


Figure 6.21 Exterior and Mounting Dimensions Diagram 2

Estimated Weight kg (lb)				
2011	**2017**	**4008**	**4011**	**4014**
9.0 (19.8)	9.0 (19.8)	9.5 (20.9)	9.5 (20.9)	9.5 (20.9)

■ Drive Models: 2024, 2031, 4021 to 4034

Note:

When you use non-metric hardware to install the drive, use Type B narrow washers or equivalent and make sure that the size of the screw head and washer are applicable for your drive before installation.

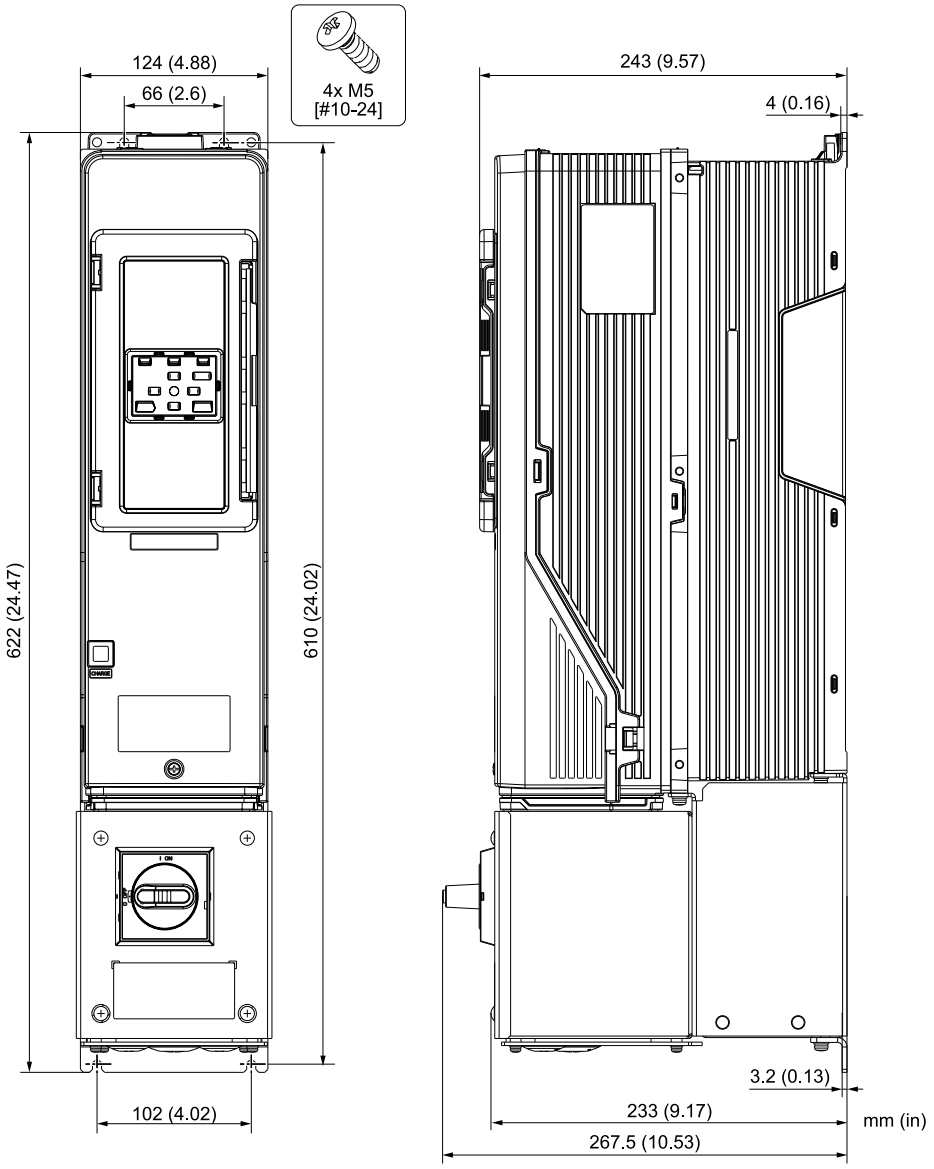


Figure 6.22 Exterior and Mounting Dimensions Diagram 3

Estimated Weight kg (lb)				
2024	**2031**	**4021**	**4027**	**4034**
11 (24.3)	12 (26.5)	12 (26.5)	13 (28.7)	14 (30.9)

■ Drive Models: 2046, 2059, 4040 to 4065

Note:

When you use non-metric hardware to install the drive, use Type B narrow washers or equivalent and make sure that the size of the screw head and washer are applicable for your drive before installation.

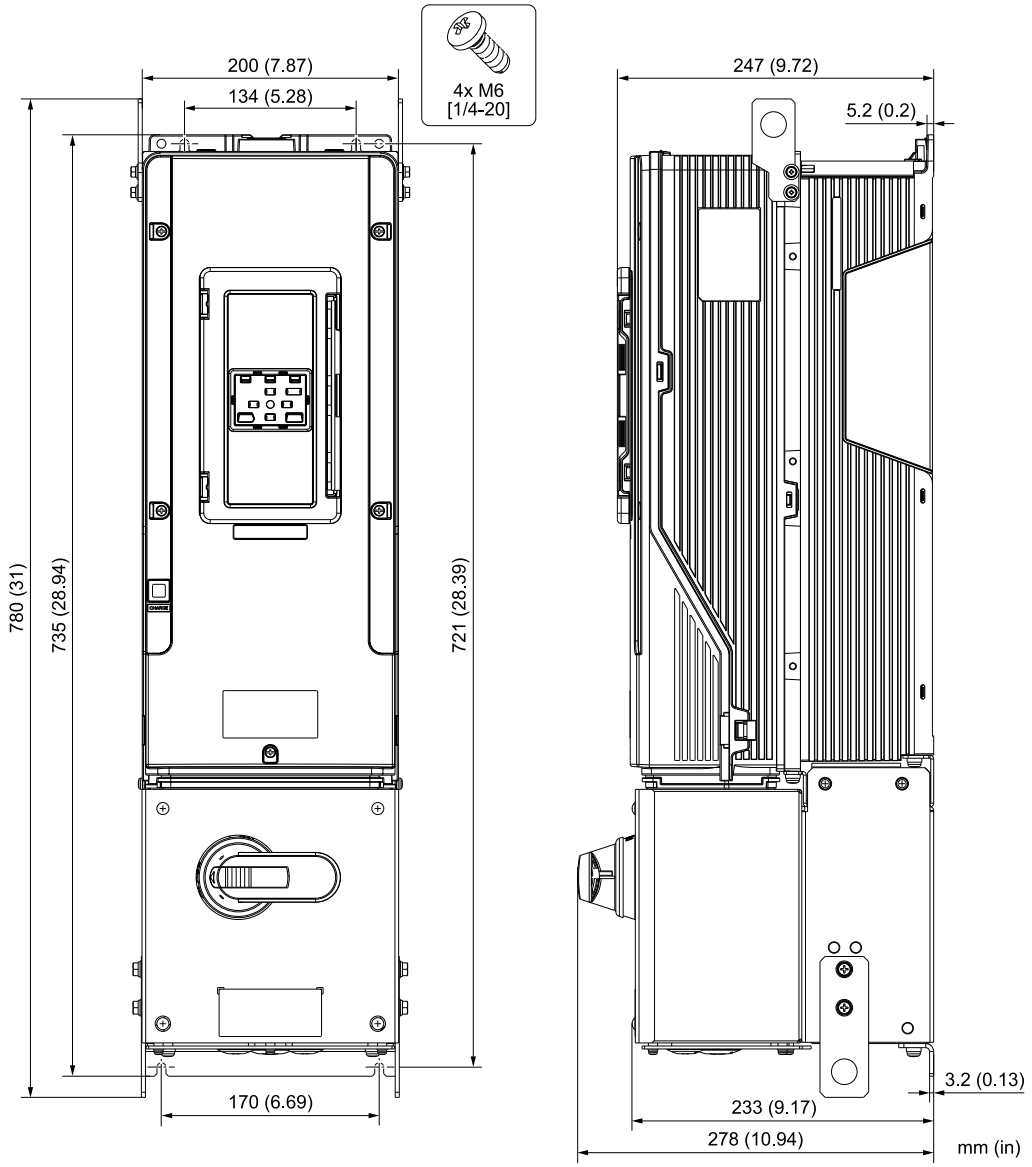


Figure 6.23 Exterior and Mounting Dimensions Diagram 4

Estimated Weight kg (lb)				
2046	**2059**	**4040**	**4052**	**4065**
21 (46.3)	22 (48.5)	22 (48.5)	24 (52.9)	26 (57.3)

■ Drive Models: 2075 to 2114, 4077 to 4096

Note:

When you use non-metric hardware to install the drive, use Type B narrow washers or equivalent and make sure that the size of the screw head and washer are applicable for your drive before installation.

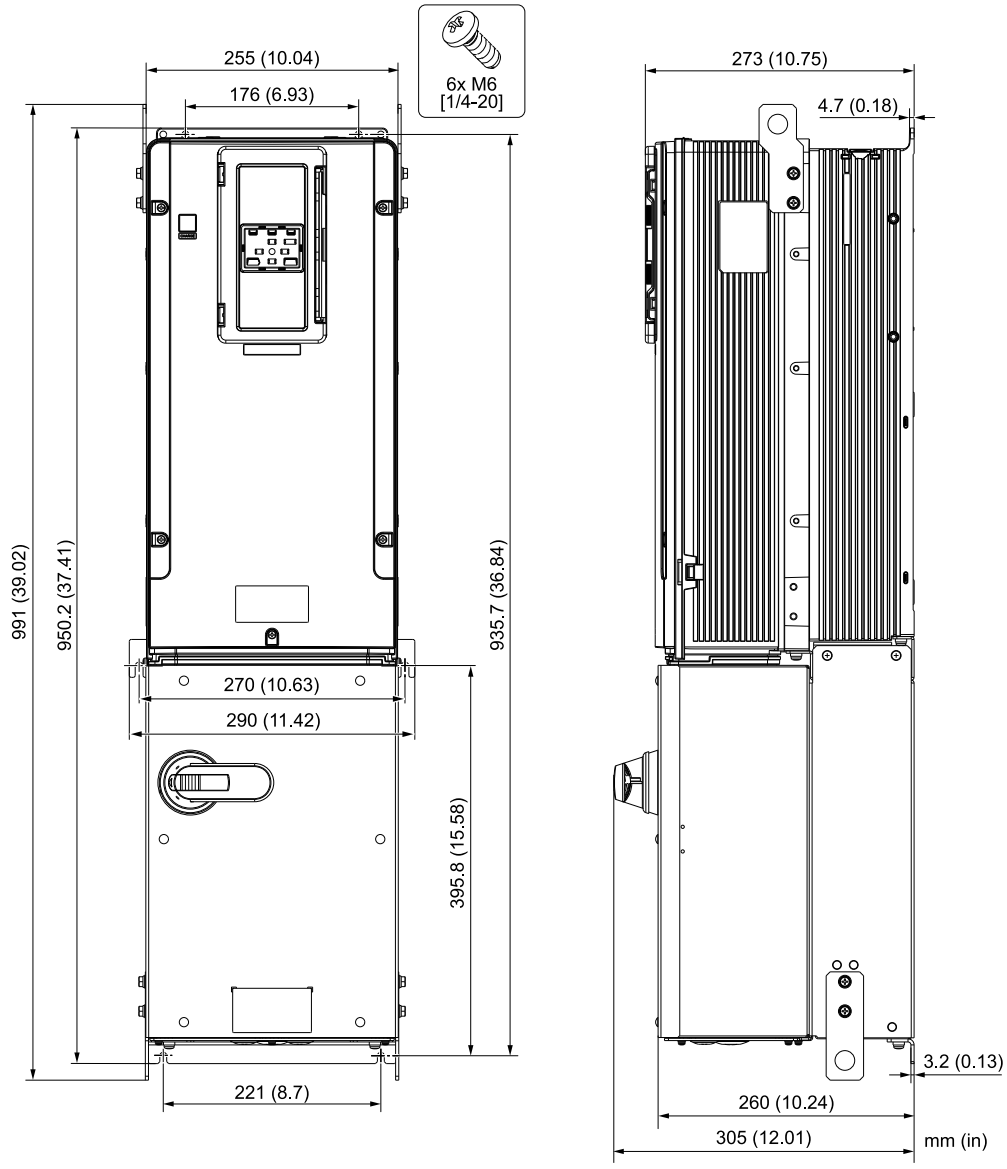


Figure 6.24 Exterior and Mounting Dimensions Diagram 5

Estimated Weight kg (lb)				
2075	**2088**	**2114**	**4077**	**4096**
41 (90.4)	41 (90.4)	44 (97.0)	44 (97.0)	46 (101.4)

■ Drive Models: 4124

Note:

When you use non-metric hardware to install the drive, use Type B narrow washers or equivalent and make sure that the size of the screw head and washer are applicable for your drive before installation.

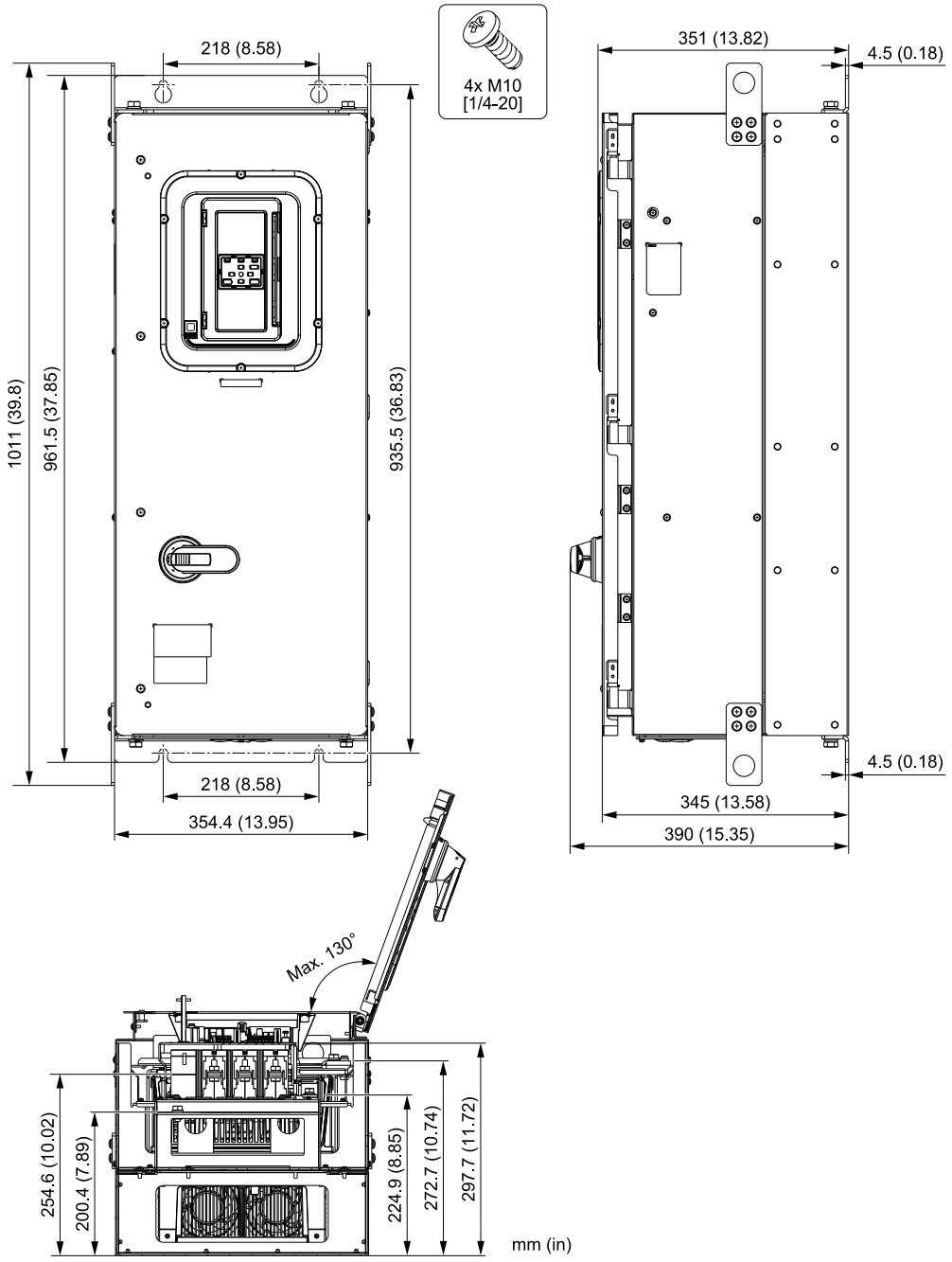


Figure 6.25 Exterior and Mounting Dimensions Diagram 6

Estimated Weight kg (lb)
4124
71 (156.5)

■ Drive Models: 2143, 2169, 4156

Note:

When you use non-metric hardware to install the drive, use Type B narrow washers or equivalent and make sure that the size of the screw head and washer are applicable for your drive before installation.

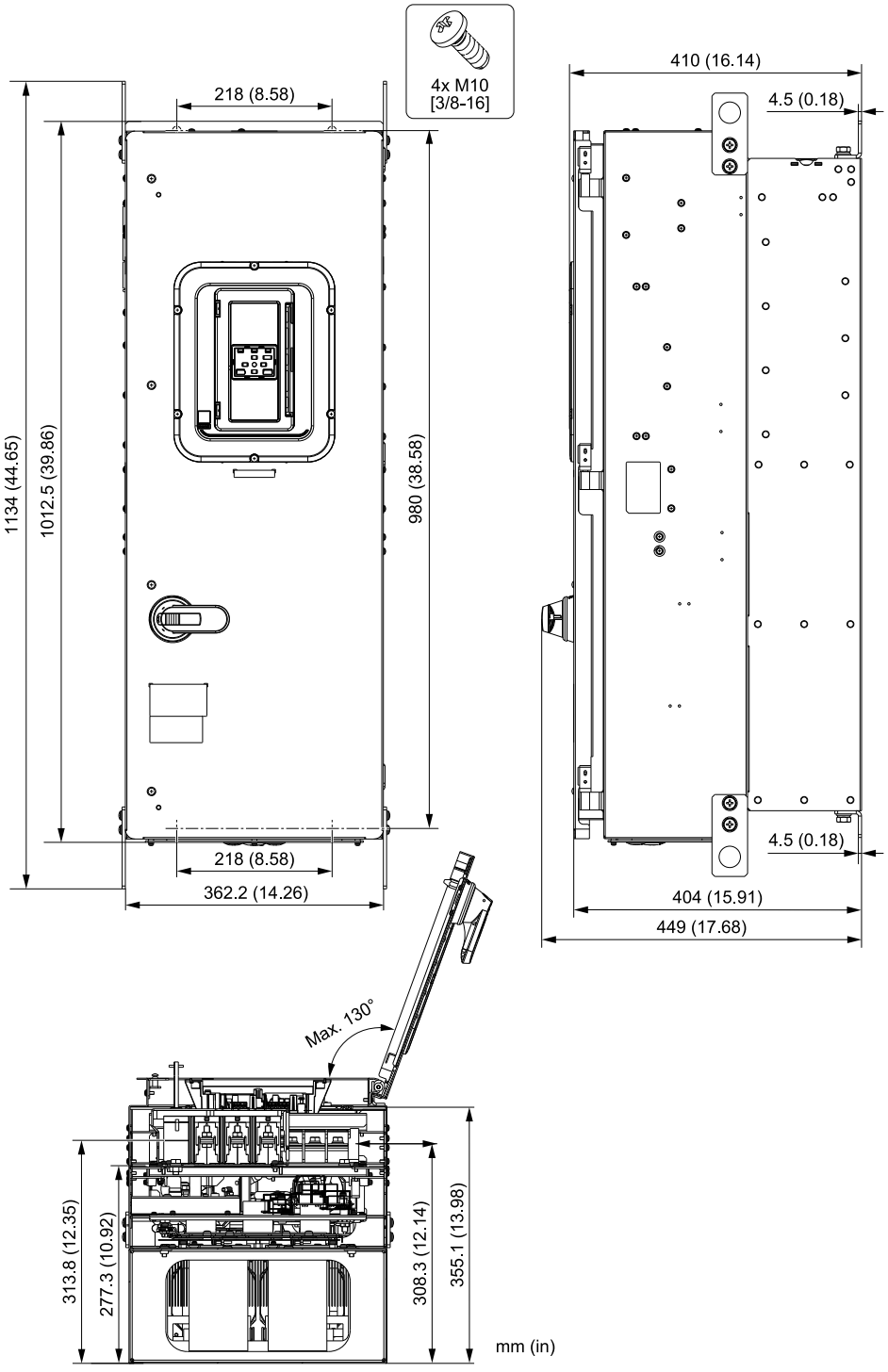


Figure 6.26 Exterior and Mounting Dimensions Diagram 7

Estimated Weight kg (lb)		
2143	**2169**	**4156**
89 (196.2)	92 (202.8)	92 (202.8)

6.8 Knock-Out Hole Dimensions

◆ Drive Models and Knock-Out Hole Dimensions

Table 6.20 Models: 2xxxxF and 4xxxxF without Main Switch

Model	Reference Pages
	IP20/UL Type 1 Models: 2xxxxF and 4xxxxF
4005, 4008	473
2011, 2017 4011, 4014	473
2024, 2031 4021 - 4034	474
2046, 2059 4040 - 4065	474
2075 - 2114 4077 - 4124	475
2143, 2169 4156	475
2211, 2273 4180 - 4302	-
2343, 2396 4361, 4414	-
4477 - 4720	-

Table 6.21 Models: 2xxxxV and 4xxxxV without Main Switch

Model	Reference Pages
	IP55/UL Type 12 Models: 2xxxxV and 4xxxxV
4005	476
2011, 2017 4008 - 4014	476
2024, 2031 4021 - 4034	477
2046, 2059 4040 - 4065	477
2075 - 2114 4077 - 4124	478
2143, 2169 4156	478
2211, 2273 4180 - 4302	-
2343, 2396 4361, 4414	-
4477 - 4720	-

Table 6.22 Models: 2xxxxT and 4xxxxT with Main Switch

Model	Reference Pages
	IP55/UL Type 12 with Main Switch Models: 2xxxxT and 4xxxxT
4005	479
2011, 2017 4008 - 4014	479

Model	Reference Pages
	IP55/UL Type 12 with Main Switch Models: 2xxxxT and 4xxxxT
2024, 2031 4021 - 4034	480
2046, 2059 4040 - 4065	480
2075 - 2114 4077 - 4124	481
4124	481
2143, 2169, 4156	482

◆ IP20/UL Type1

■ Drive Models: 4005, 4008

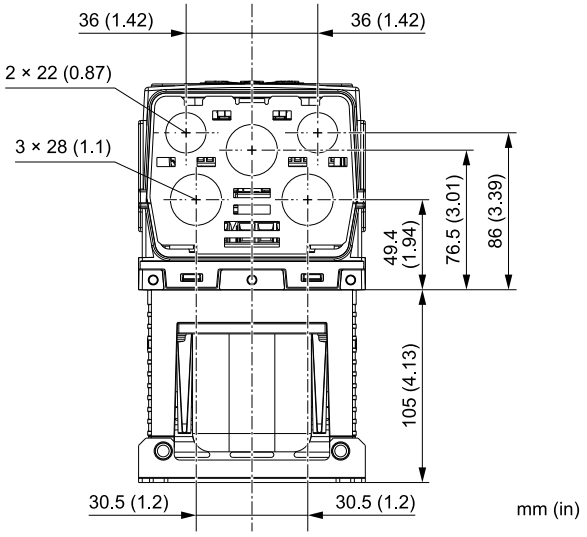


Figure 6.27 Knock-Out Dimensions Diagram 1

■ Drive Models: 2011, 2017, 4011, 4014

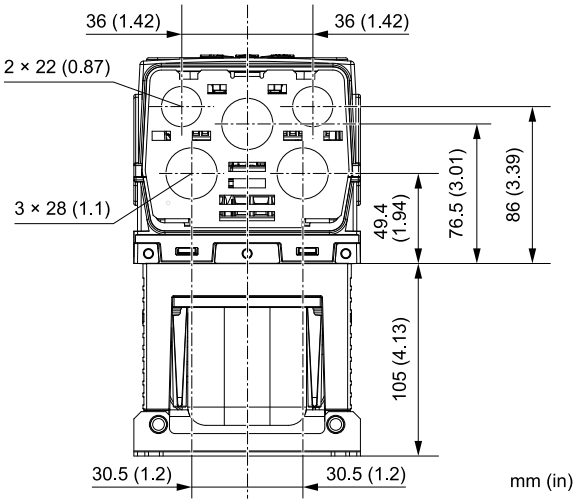


Figure 6.28 Knock-Out Dimensions Diagram 2

■ Drive Models: 2024, 2031, 4021 to 4034

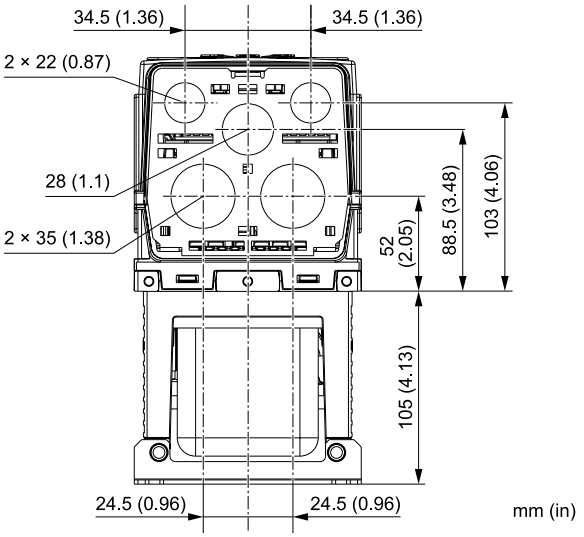


Figure 6.29 Knock-Out Dimensions Diagram 3

■ Drive Models: 2046, 2059, 4040 to 4065

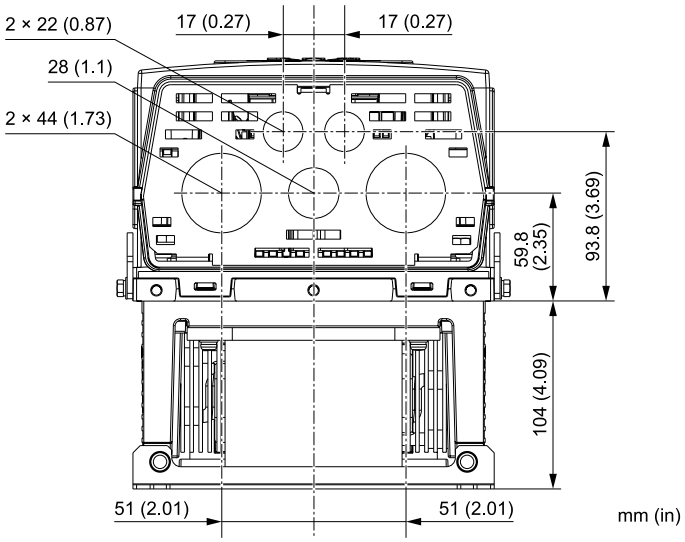


Figure 6.30 Knock-Out Dimensions Diagram 4

■ Drive Models: 2075 to 2114, 4077 to 4124

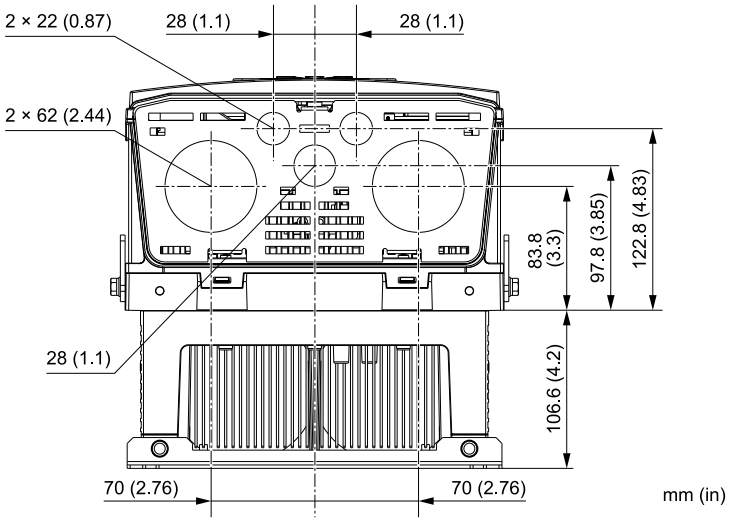


Figure 6.31 Knock-Out Dimensions Diagram 5

■ Drive Models: 2143, 2169, 4156

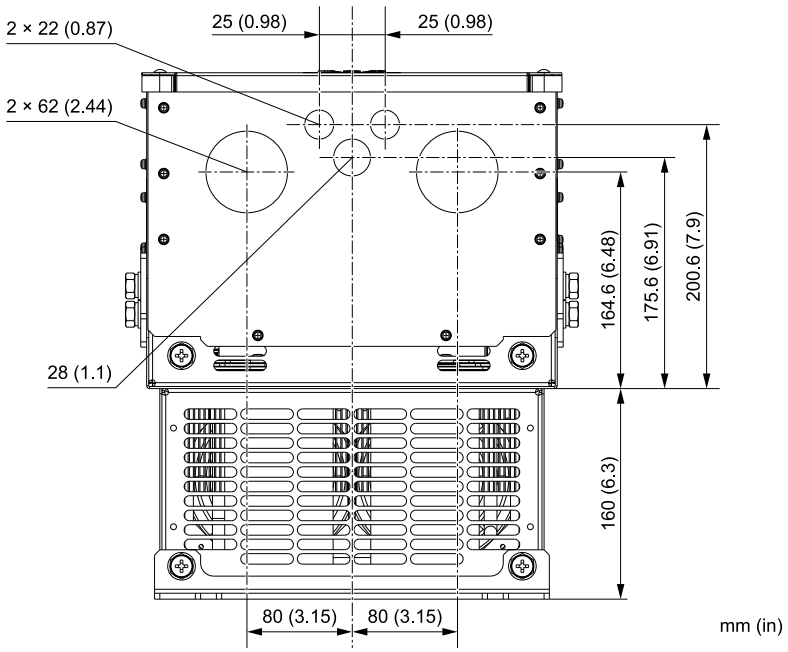


Figure 6.32 Knock-Out Dimensions Diagram 6

◆ IP55/UL Type 12

■ Drive Model: 4005

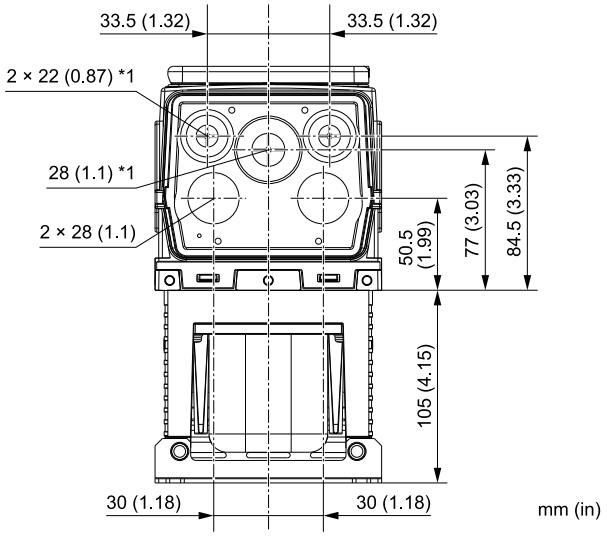


Figure 6.33 Knock-Out Dimensions Diagram 1

*1 You must install the included rubber waterproofing grommets for knock-out holes that you do not use for control circuit wiring.

■ Drive Models: 2011, 2017, 4008 to 4014

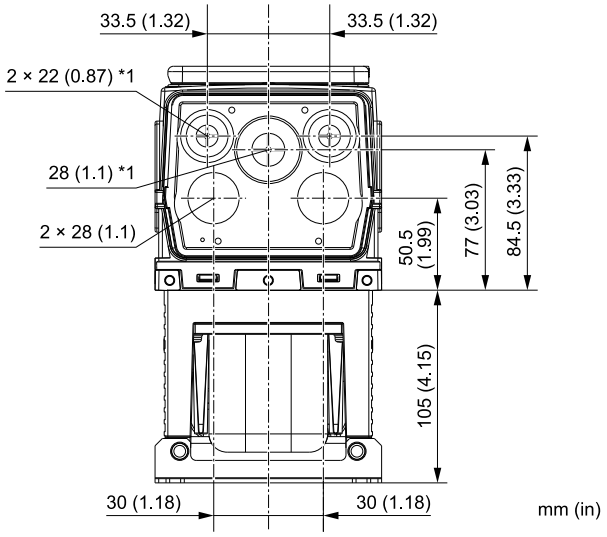


Figure 6.34 Knock-Out Dimensions Diagram 2

*1 You must install the included rubber waterproofing grommets for knock-out holes that you do not use for control circuit wiring.

■ Drive Models: 2024, 2031, 4021 to 4034

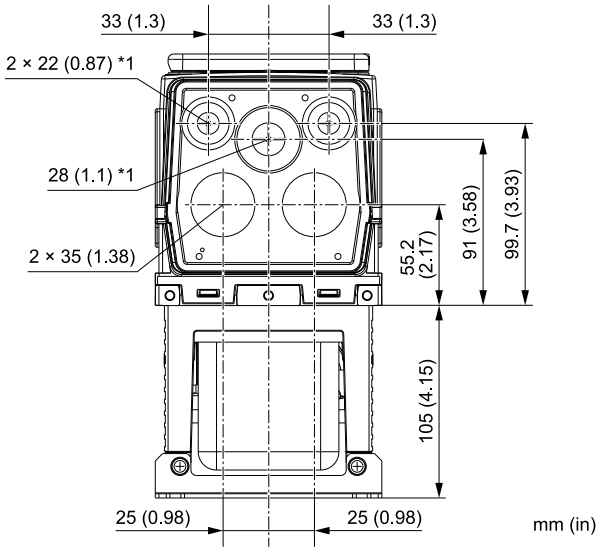


Figure 6.35 Knock-Out Dimensions Diagram 3

*1 You must install the included rubber waterproofing grommets for knock-out holes that you do not use for control circuit wiring.

■ Drive Models: 2046, 2059, 4040 to 4065

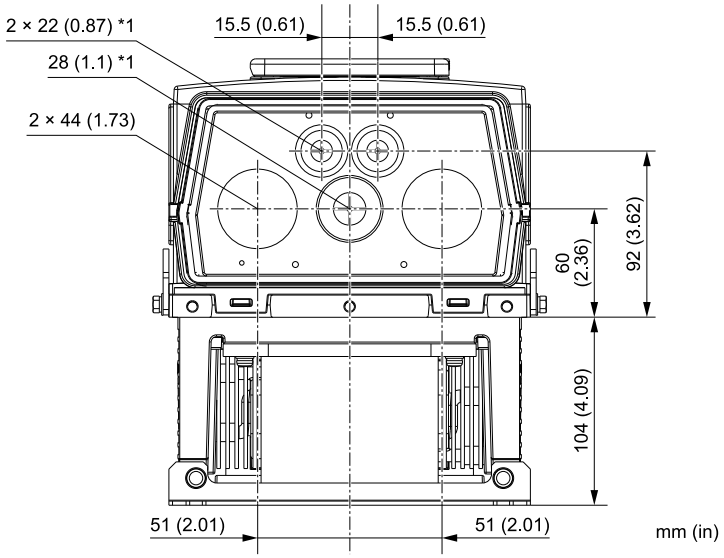


Figure 6.36 Knock-Out Dimensions Diagram 4

*1 You must install the included rubber waterproofing grommets for knock-out holes that you do not use for control circuit wiring.

■ Drive Models: 2075 to 2114, 4077 to 4124

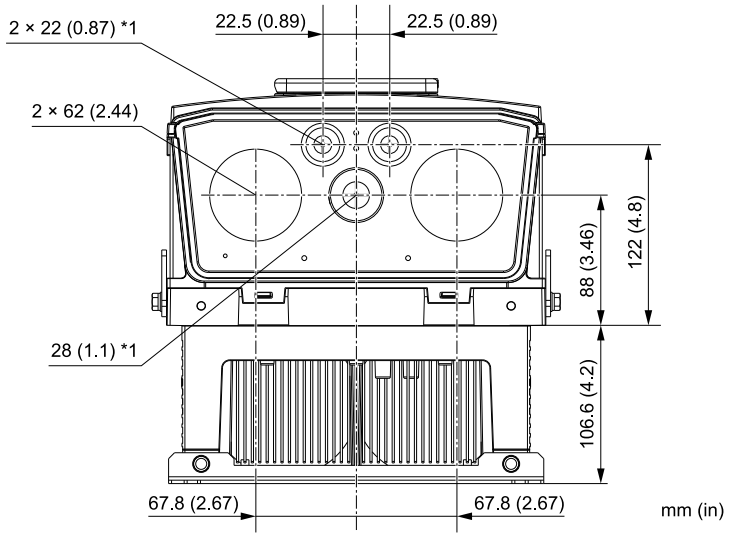


Figure 6.37 Knock-Out Dimensions Diagram 5

*1 You must install the included rubber waterproofing grommets for knock-out holes that you do not use for control circuit wiring.

■ Drive Models: 2143, 2169, 4156

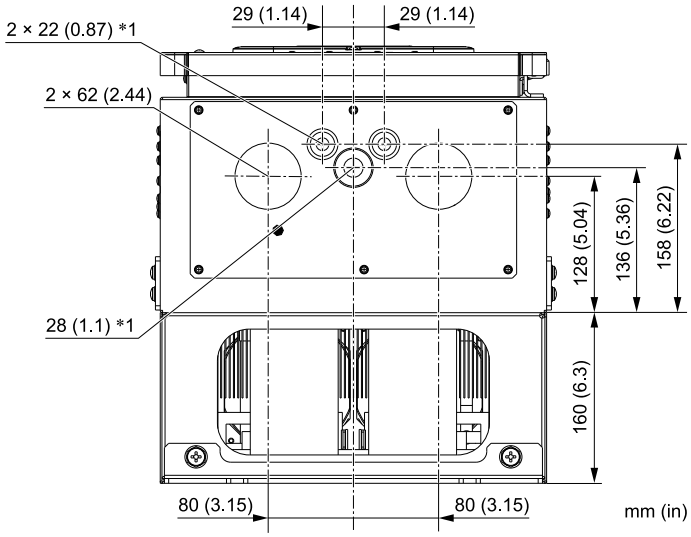


Figure 6.38 Knock-Out Dimensions Diagram 6

*1 You must install the included rubber waterproofing grommets for knock-out holes that you do not use for control circuit wiring.

◆ IP55/UL Type 12 with Main Switch

■ Drive Model: 4005

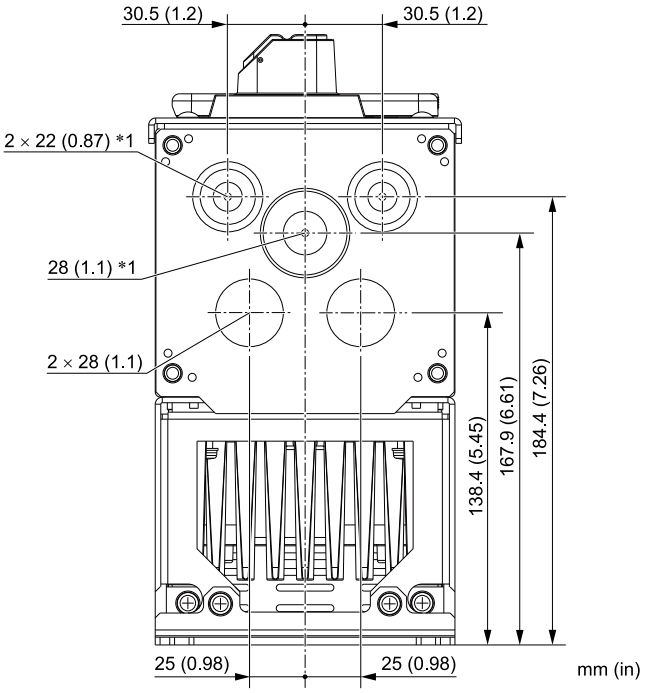


Figure 6.39 Knock-Out Dimensions Diagram 1

*1 You must install the included rubber waterproofing grommets for knock-out holes that you do not use for control circuit wiring.

■ Drive Models: 2011, 2017, 4008 to 4014

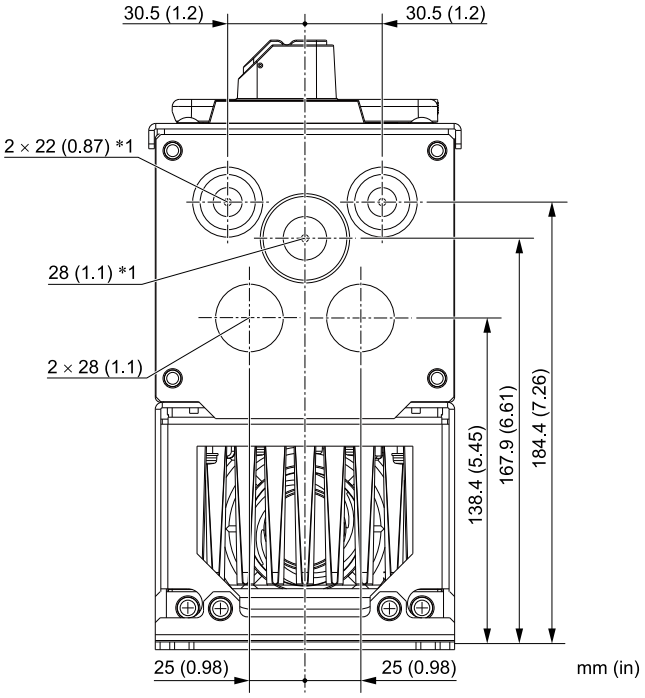


Figure 6.40 Knock-Out Dimensions Diagram 2

*1 You must install the included rubber waterproofing grommets for knock-out holes that you do not use for control circuit wiring.

■ Drive Models: 2024, 2031, 4021 to 4034

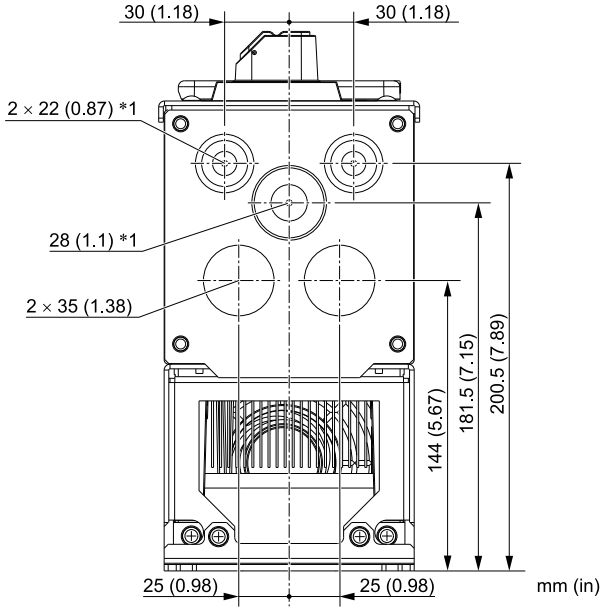


Figure 6.41 Knock-Out Dimensions Diagram 3

*1 You must install the included rubber waterproofing grommets for knock-out holes that you do not use for control circuit wiring.

■ Drive Models: 2046, 2059, 4040 to 4065

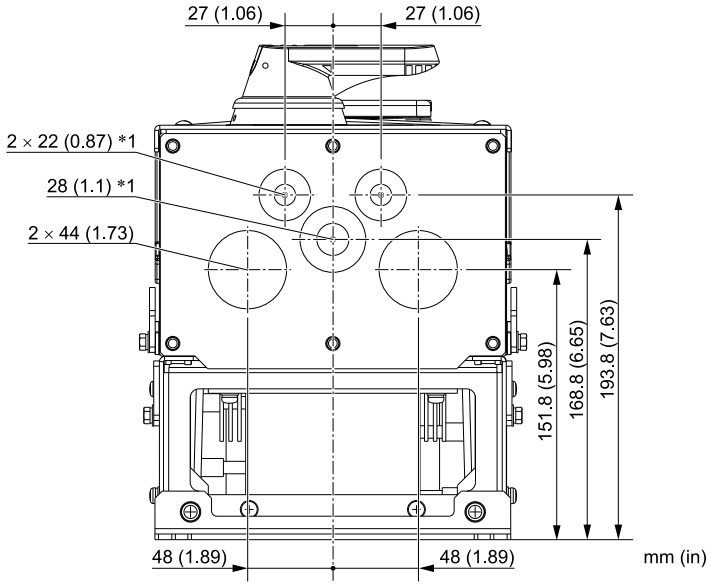


Figure 6.42 Knock-Out Dimensions Diagram 4

*1 You must install the included rubber waterproofing grommets for knock-out holes that you do not use for control circuit wiring.

■ Drive Models: 2075 to 2114, 4077 to 4096

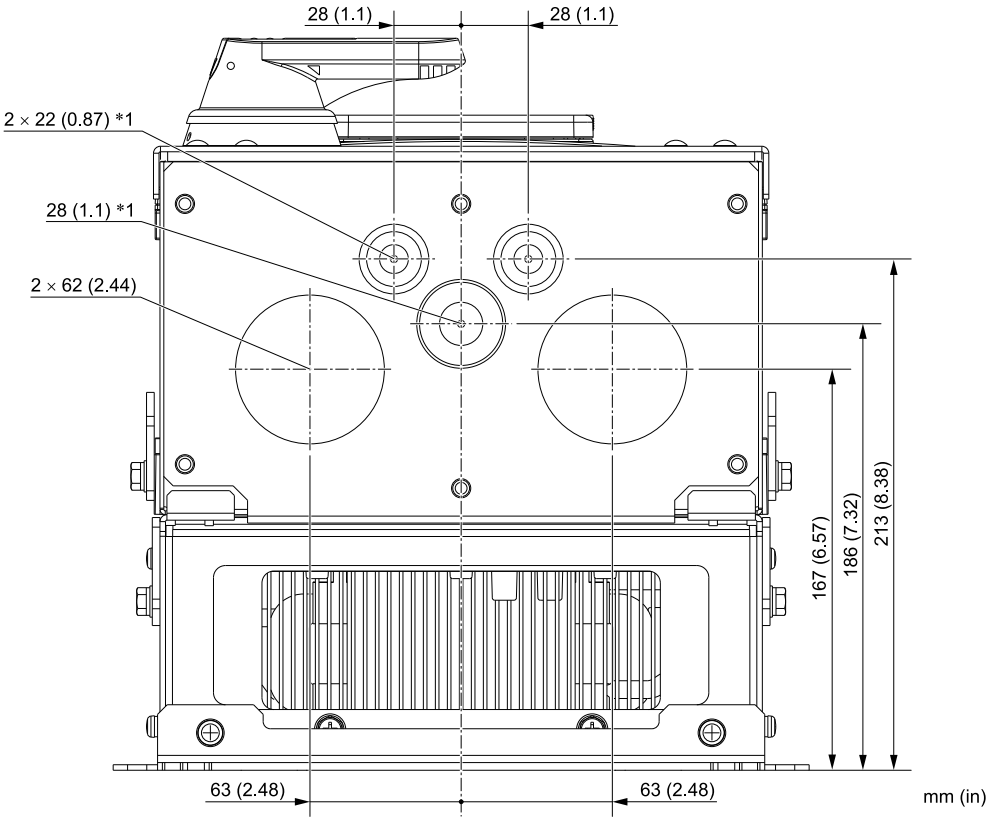


Figure 6.43 Knock-Out Dimensions Diagram 5

*1 You must install the included rubber waterproofing grommets for knock-out holes that you do not use for control circuit wiring.

■ Drive Models: 4124

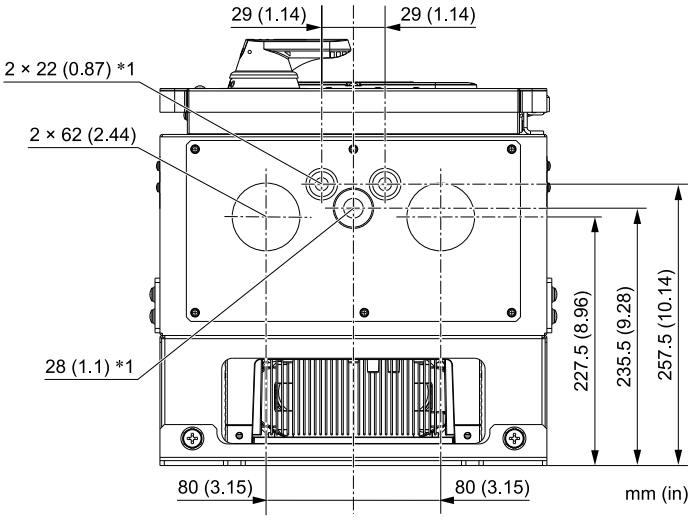


Figure 6.44 Knock-Out Dimensions Diagram 6

*1 You must install the included rubber waterproofing grommets for knock-out holes that you do not use for control circuit wiring.

■ Drive Models: 2143, 2169, 4156

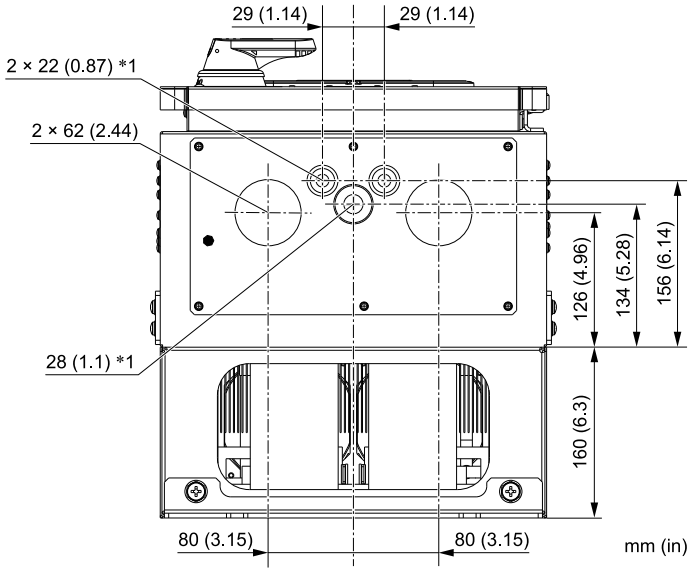


Figure 6.45 Knock-Out Dimensions Diagram 7

*1 You must install the included rubber waterproofing grommets for knock-out holes that you do not use for control circuit wiring.

6.9 Peripheral Devices and Options

There are many available peripheral devices and options for the drive.

Refer to the WM605 Selection Guide (SL.WM605.01) for information about available options, including:

- Main circuit options
- Frequency settings and monitor options
- Keypad options
- Attachment options
- Engineering tools

Contact Yaskawa or your nearest sales representative to make an order.

Refer to the instruction manual for each option for information about option installation and wiring.

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In the event that the end user of this product is to be the military and said product is to be employed in any weapons systems or the manufacture thereof, the export will fall under the relevant regulations as stipulated in the Foreign Exchange and Foreign Trade Regulations. Therefore, be sure to follow all procedures and submit all relevant documentation according to any and all rules, regulations and laws that may apply.
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