YASKAWA

YASKAWA AC Drive-L1000A

AC Drive for Elevator Applications

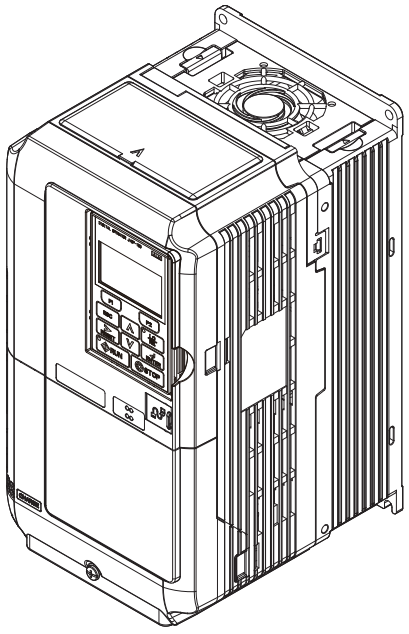
Technical Manual

Type: CIMR-LU□A □□□□

Models: 200 V Class: 1.5 to 110 kW (2 to 150 HP)
400 V Class: 1.5 to 315 kW (2 to 500 HP)
600 V Class: 1.5 to 160 kW (2 to 250 HP)

To properly use the product, read this manual thoroughly and retain for easy reference, inspection, and maintenance. Ensure the end user receives this manual.

STEGBORGS EDITION



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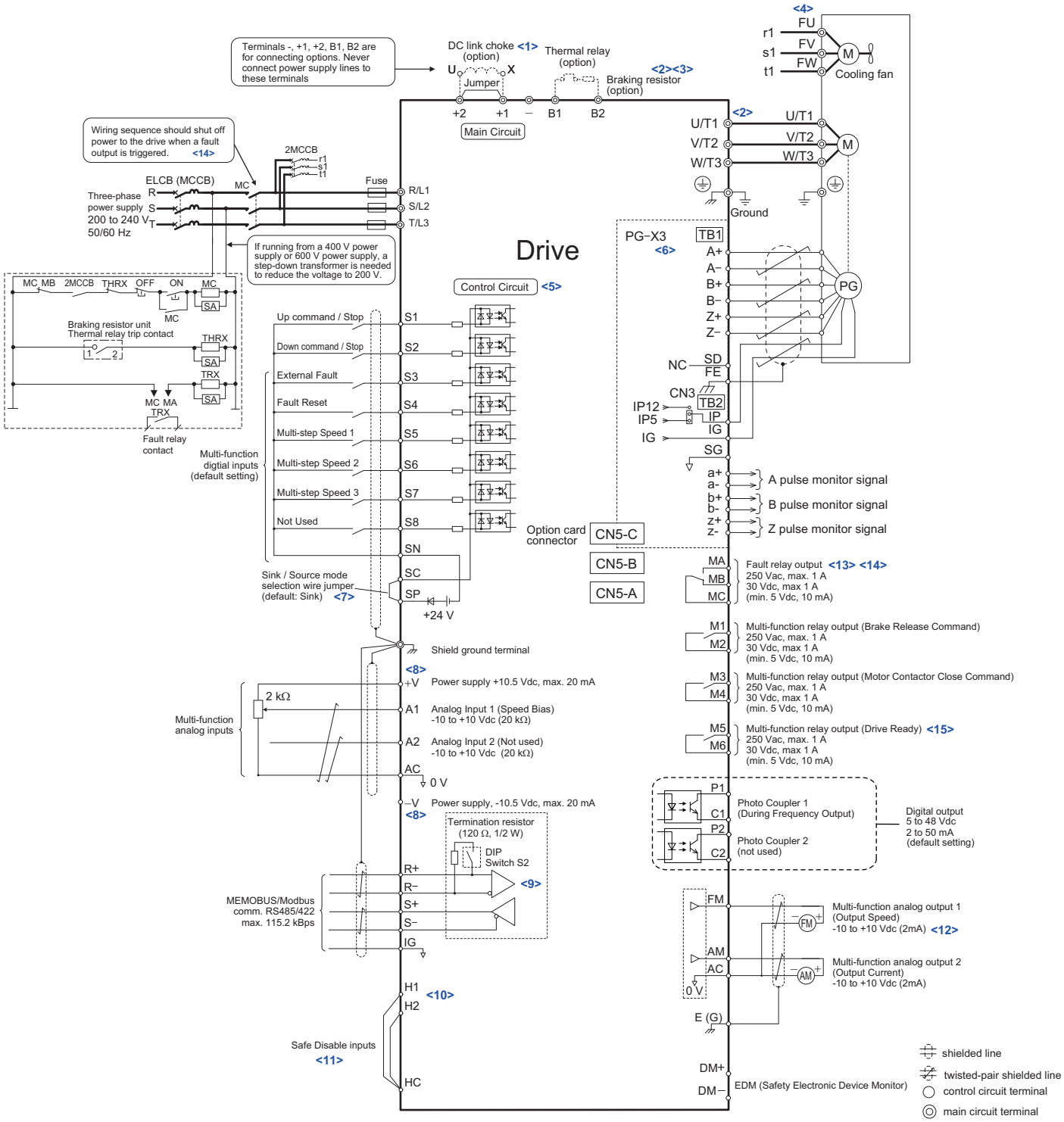


Figure 3.1 Drive Standard Connection Diagram (example: CIMR-LU2A0033)

<1> Remove the jumper when installing a DC link choke. Models CIMR-LU2A0085 through 2A0415, 4A0045 through 4A0605, and 5A0032 through 5A0200 come with a built-in DC link choke.

<2> Set L8-55 to 0 to disable the protection function of the built-in braking transistor of the drive when using an optional regenerative converter or dynamic braking option.

<3> Set up a thermal relay sequence to disconnect drive main power in the event of an overheat condition on the dynamic braking option.

<4> Self-cooling motors do not require the same wiring necessary for motors with separate cooling fans.

<5> Supplying power to the control circuit separately from the main circuit requires a 24 V power supply (option).

<6> For control modes that do not use a motor speed feedback signal, PG option card wiring is not necessary.

3.9 Control I/O Configuration

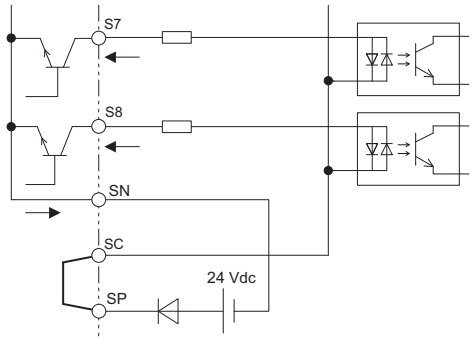
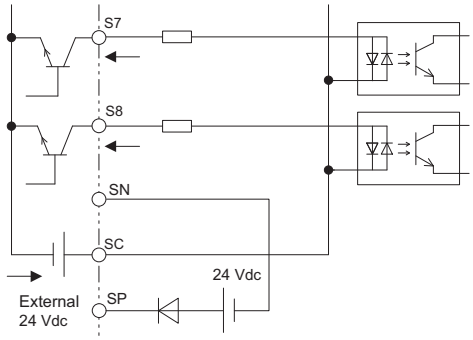
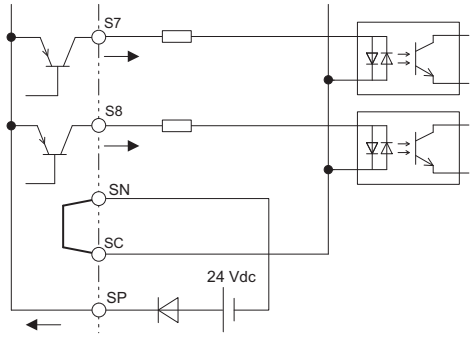
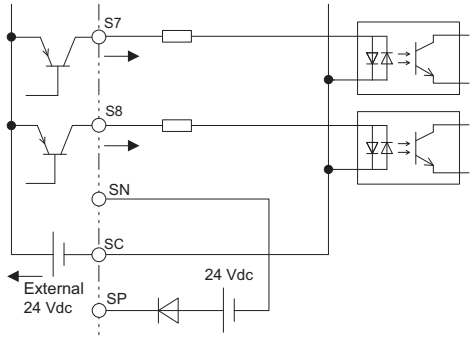
◆ Setting Sink/Source with Input Terminals SN and SP

Note: Terminals H1, H2, DM+, and DM- on 600 V class models are designed to the functionality, but are not certified to IEC/EN 61800-5-1, ISO/EN 13849 Cat.3, IEC/EN 61508 SIL2, Insulation coordination: class 1.

Use the wire jumper between terminals SC and SP or SC and SN to select between Sink mode, Source mode or external power supply for the digital inputs S1 to S8 as shown in *Table 3.11* (Default: Sink mode, internal power supply).

NOTICE: *Damage to Equipment. Do not short terminals SP and SN. Failure to comply will damage the drive.*

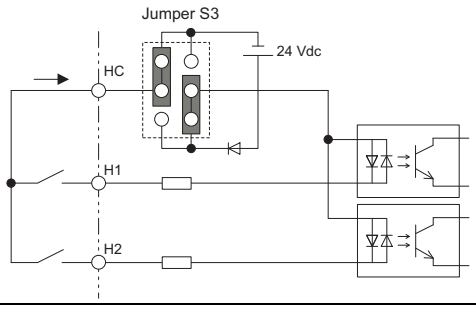
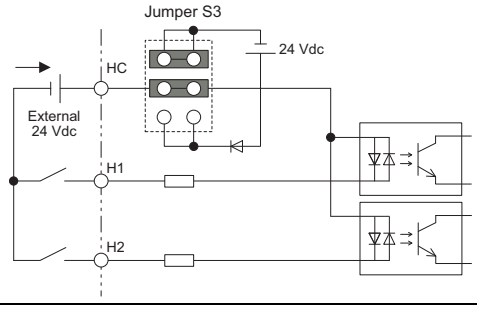
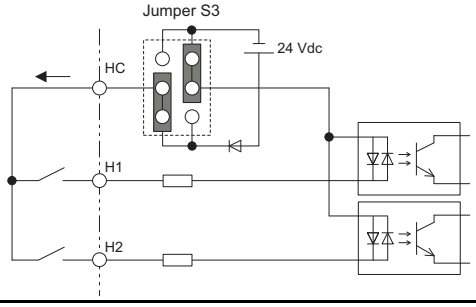
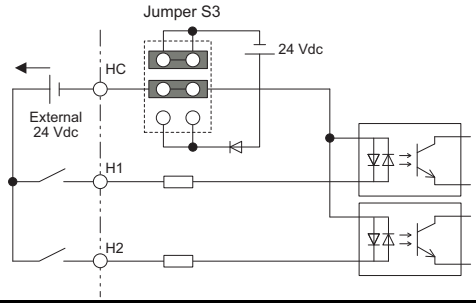
Table 3.11 Digital Input Sink / Source / External Power Supply Selection

	Drive Internal Power Supply (Terminal SN and SP)	External 24 Vdc Power Supply
Sinking Mode (NPN)		
Sourcing Mode (PNP)		

◆ Sinking/Sourcing Mode Selection for Safe Disable Inputs

Use jumper S3 on the terminal board to select between Sink mode, Source mode or external power supply for the Safe Disable inputs H1 and H2 as shown in *Table 3.12* (Default: Sink mode, internal power supply).

Table 3.12 Safe Disable Input Sink / Source / External Power Supply Selection

	Drive Internal Power Supply	External 24 Vdc Power Supply
Sinking Mode		
Sourcing Mode		

4.5 Auto-Tuning

WARNING! *Sudden Movement Hazard. The drive and motor may start unexpectedly during Auto-Tuning, which could result in death or serious injury. Ensure the area surrounding the drive motor and load are clear before proceeding with Auto-Tuning. Remove main power from the drive before servicing the drive or motor. Do not touch the motor during Auto-Tuning.*

Note: When using a PM motor for the first time, or when replacing the drive or PM motor, always make sure that motor parameters are set properly and the speed detection functions accurately prior to operation. Using a PM motor requires that the encoder offset be set correctly in addition to entering motor data to corresponding parameters. If the motor, encoder, or drive are ever replaced, be sure to perform Encoder Offset Auto-Tuning.

Insufficient torque can cause the elevator car to move in the direction of the load, or cause the motor to behave erratically (reverse operation, stand still, sudden accelerations, etc.).

For more information, refer to the instruction manual included with the motor.

◆ Types of Auto-Tuning

The drive offers different types of Auto-Tuning for induction motors and permanent magnet motors. The type of Auto-Tuning used differs further based on the control mode and other operating conditions. Refer to the tables below to select the type of Auto-Tuning that bests suits the application. Directions for performing Auto-Tuning are listed in *Start-Up Flowcharts on page 104*.

Note: The drive will only show Auto-Tuning parameters that are valid for the control mode that has been set in A1-02. If the control mode is for an induction motor, the Auto-Tuning parameters for PM motors will not be available. If the control mode is for a PM motor, the Auto-Tuning parameters for induction motors will not be available. Inertia Tuning and ASR Gain Tuning parameters and setting options will be visible only when the drive is set for operation with CLV or CLV/PM.

■ Auto-Tuning for Induction Motors

This feature automatically sets the V/f pattern and motor parameters E1-☐☐ and E2-☐☐ for an induction motor. Additionally, the feature also sets some F1-☐☐ parameters for speed feedback detection in Closed Loop Vector.

Table 4.5 Types of Auto-Tuning for Induction Motors

Type	Setting	Requirements and Benefits	Control Mode (A1-02)		
			V/f (0)	OLV (2)	CLV (3)
Rotational Auto-Tuning	T1-01 = 0	• Rotational Auto-Tuning gives the most accurate results, and is recommended if possible. • Motor must run freely or with light load (<30%), i.e. ropes have to be removed.	No	Yes	Yes
Stationary Auto-Tuning 1	T1-01 = 1	• A motor test report listing motor data is not available. • Automatically calculates motor parameters needed for vector control. • Use if ropes cannot be removed. Note that the accuracy is less then with Rotational Auto-Tuning.	No	Yes	Yes
Stationary Auto-Tuning for Line-to-Line Resistance	T1-01 = 2	• Used for V/f Control or in vector control modes when the drive was previously set up properly and now the motor cable has changed. • Used in V/f control if drive and motor capacities differ. • Should not be used for any vector control modes unless the motor cable has changed.	Yes	Yes	Yes
Stationary Auto-Tuning 2	T1-01 = 4	• A motor test report is available. Once the no-load current and the rated slip have been entered, the drive calculates and sets all other motor-related parameters. • Use if ropes cannot be removed and if slip and no-load current data are available.	No	Yes	Yes

Table 4.6 lists the data that must be entered for Auto-Tuning. Make sure this data is available before starting Auto-Tuning. The necessary information is usually listed on the motor nameplate or in the motor test report provided by the motor manufacturer. Also refer to *Flowchart B: Auto-Tuning for Induction Motors on page 109* for details on Auto-Tuning process and selections.

Table 4.6 Auto-Tuning Input Data

Input Value	Input Parameter	Unit	Tuning Type (T1-01)			
			0 Standard	1 Stationary 1	2 Line-to-Line Resistance	4 Stationary 2
Control Mode	A1-02	–	2, 3	2, 3	0, 1, 2, 3	2, 3
Motor Rated Power	T1-02	kW	YES	YES	YES	YES
Motor Rated Voltage	T1-03	Vac	YES	YES	N/A	YES
Motor Rated Current	T1-04	A	YES	YES	YES	YES
Motor Rated Frequency	T1-05	Hz	YES	YES	N/A	YES

Input Value	Input Parameter	Unit	Tuning Type (T1-01)			
			0 Standard	1 Stationary 1	2 Line-to-Line Resistance	4 Stationary 2
Number of Motor Poles	T1-06	–	YES	YES	N/A	YES
Motor Rated Speed	T1-07	r/min	YES	YES	N/A	YES
PG Number of Pulses per Revolution	T1-08	–	YES <1>	YES <1>	N/A	YES <1>
Motor No-load Current	T1-09	A	N/A	YES	N/A	YES
Motor Rated Slip	T1-10	Hz	N/A	N/A	N/A	YES

<1> Input data is needed for CLV/PM only.

■ Auto-Tuning for Permanent Magnet Motors

Automatically sets the V/f pattern and motor parameters E1-□□, E5-□□, and some F1-□□ parameters for speed feedback detection.

Table 4.7 Types of Auto-Tuning for Permanent Magnet Motors

Type	Setting	Requirements and Benefits
Motor Data Input	T2-01 = 0	• Use if a motor test report is available. • Input motor data from the motor test report. Convert data into the correct unit before inputting data if necessary. • Motor does not rotate during Auto-Tuning.
Stationary Auto-Tuning	T2-01 = 1	• Use if a motor test report is not available. • Input motor data from the motor name plate. Make sure to convert data into the correct units. The drive automatically calculates the motor data.
Stationary Stator Resistance Auto-Tuning	T2-01 = 2	• Tunes stator resistance only. • Should be performed if the motor cabling has changed.
Rotational Back EMF Constant Auto-Tuning	T2-01 = 11	• Use if a motor test is not available. • Tunes the Motor Induction Voltage only. • Should be performed after Motor data are set and the encoder offset is adjusted. • The motor must be uncoupled from the mechanical system (remove ropes).
Auto-Tuning of PG-E3 Encoder Characteristics <1>	T2-01 = 12	Perform this Auto-Tuning to obtain accurate position data from the motor rotor for driving a PM motor.

<1> Available in drive software versions PRG: 7017 or later.
Auto-Tuning of PG-E3 encoder characteristics requires a PG-E3 option with software version 1102 or later. To identify the PG-E3 software version, refer to the PG-E3 labeling on the option, in the field designated “C/N” (S + four digit number).

Table 4.8 lists the data that must be entered for Auto-Tuning. Make sure the data is available before starting Auto-Tuning. The information needed is usually listed on the motor nameplate or in the motor test report provided by the motor manufacturer. Also refer to *Flowchart C: Auto-Tuning for PM Motors on page 110* for details on the tuning mode selection and the tuning process.

Table 4.8 Auto-Tuning Input Data

Input Value	Input Parameter	Unit	Tuning Type (T2-01)							
			0 Motor Parameter Settings	1 Stationary	2 Stationary Stator Resistance	3 Initial Magnet Pole Search Parameters Auto-Tuning	4 Encoder Offset Stationary Auto-Tuning	10 Encoder offset rotational Auto-Tuning	11 Back EMF Constant	12 Auto-Tuning of PG-E3 Encoder Character-istics
Control Mode	A1-02	–	7	7	7	7	7	7	7	7
Motor Rated Power	T2-04	kW	Yes	Yes	N/A	N/A	N/A	N/A	N/A	N/A
Motor Rated Voltage	T2-05	V	Yes	Yes	N/A	N/A	N/A	N/A	N/A	N/A
Motor Rated Current	T2-06	A	Yes	Yes	Yes	N/A	N/A	N/A	N/A	N/A
Number of Motor Poles	T2-08	N/A	Yes	Yes	N/A	N/A	N/A	N/A	N/A	N/A
Motor Rated Speed	T2-09	r/min	Yes	Yes	N/A	N/A	N/A	N/A	N/A	N/A
Stator 1 Phase Resistance	T2-10	Ω	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A
d-Axis Inductance	T2-11	mH	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A
q-Axis Inductance	T2-12	mH	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Induced Voltage Constant Unit Selection	T2-13	N/A	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Voltage Constant	T2-14	<2>	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PG Number of Pulses per Revolution	T2-16	N/A	Yes	Yes	N/A	N/A	N/A	N/A	N/A	N/A
Z Pulse Offset	T2-17	deg (mech.)	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Input Value	Input Parameter	Unit	Tuning Type (T2-01)							
			0 Motor Parameter Settings	1 Stationary	2 Stationary Stator Resistance	3 Initial Magnet Pole Search Parameters Auto-Tuning	4 Encoder Offset Stationary Auto-Tuning	10 Encoder offset rotational Auto-Tuning	11 Back EMF Constant	12 Auto-Tuning of PG-E3 Encoder Character-istics
Control Mode	**A1-02**	**–**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**
Speed Reference for Auto-Tuning of PG-E3 Encoder Characteristics <1>	T2-18	r/min	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes
Rotation Direction for Auto-Tuning of PG-E3 Encoder Characteristics <1>	T2-19	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yes

<1> Available in drive software versions PRG: 7017 or later.
<2> Depends on T2-13 setting.

■ PG Encoder Offset Auto-Tuning

PG encoder Offset Tuning is used for PM motors (A1-02 = 7). It measures the angle between the PG encoder zero position and the rotor magnet orientation. PG encoder offset tuning should be performed when:

- setting up the drive for the first time,
- after initialization,
- after changing the motor rotation direction (b1-14),
- after changing the encoder rotation direction (F1-05),
- or after replacing the encoder.

Properly set the motor and PG encoder data before performing PG Encoder Offset Tuning.

Table 4.9 Types of Auto-Tuning for PG Encoder Offset

Type	Setting	Requirements and Benefits
Initial Magnet Pole Search Parameters Auto-Tuning	T2-01 = 3	• Should be performed after motor Auto-Tuning in order to determine the PG encoder tuning method. • Attempts to detect the motor rotor position, determines whether PG encoder offset can be tuned using Stationary Encoder Offset Tuning and sets parameters needed for Initial Magnet Pole Search (n8-36, n8-37). • When using the Rescue Operation mode, perform this tuning to let the drive automatically set the parameters needed for Initial Magnet Pole Search with power supply from a battery or UPS (n8-81, n8-82). • Must be performed when using an incremental PG encoder. **Important:** If this tuning fails when using a PG-X3 card with an incremental PG encoder the motor cannot be driven using an incremental PG encoder. Change the PG encoder to an absolute PG encoder.
Stationary PG Encoder Offset Auto-Tuning	T2-01 = 4	• Tunes the PG encoder offset without rotating the motor. • If the PG encoder offset cannot be tuned properly by this method, try Rotating PG Encoder Offset Tuning.
Rotational PG Encoder Offset Auto-Tuning	T2-01 = 10	• Tunes the PG encoder offset while rotating the motor. • Motor and mechanical system must be uncoupled (ropes must be removed from traction sheave).

■ Auto-Tuning of PG-E3 Encoder Characteristics

This feature optimizes the drive settings for the characteristics of the PG-E3 speed-control option card for the ERN1387 encoder (manufactured by HEIDENHAIN) while rotating the motor. Perform Auto-Tuning to obtain accurate position data from the motor rotor for driving a PM motor. This type of Auto-Tuning automatically sets the characteristics of the PG-E3 option card for the ERN1387 encoder in parameters F1-66 to F1-81 (Encoder Adjust 1 to 16).

Note: The motor rotates during execution of Auto-Tuning of PG-E3 encoder characteristics. Before starting, refer to the drive technical manual.

Note: Auto-Tuning of PG-E3 encoder characteristics adjusts the unique characteristics of the ERN1387 encoder connected to the drive by using a PG-E3 option card. This type of tuning should be performed when setting up the drive or after replacing the encoder or drive. The signal lines between the PG-E3 option card and the ERN1387 encoder must be connected between the R+ and R- terminals while this type of tuning is performed.

Note: The setting values of parameters F1-66 to F1-81 are reset to factory default values when A1-03 is set to 2220. The setting values of parameters F1-66 to F1-81 are modified at completion of Auto-Tuning of PG-E3 encoder characteristics.

■ Multi-Function Analog Outputs

The H4 parameters assign functions to analog output terminals FM and AM. Select the function for these terminals by entering the last three digits of the desired U monitor. For a list of analog output functions, refer to *U: Monitors on page 430*.

◆ Accel/Decel Ramp and Jerk Settings

Acceleration and deceleration ramps are set using the C1-☐☐ parameters. Use the C2-☐☐ parameters to adjust the jerk at the start of acceleration or deceleration.

Figure 4.13 explains how accel/decel ride and jerk settings can be used to adjust the ride profile.

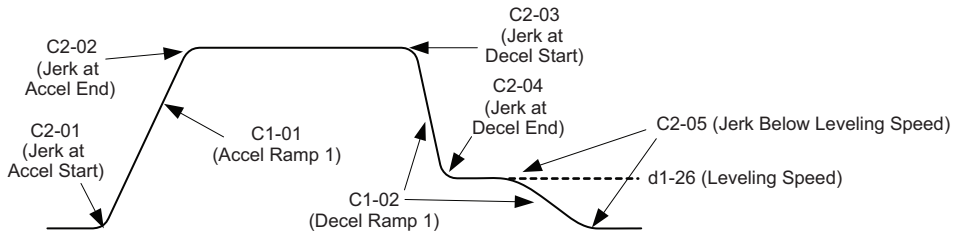


Figure 4.13 Accel/Decel Ramp and the Jerk Function

Units used to set the acceleration and deceleration ramp as well as the Jerk function change with the setting of parameter o1-03. Refer to *Digital Operator Display Unit Selection on page 108* for details.

◆ Elevator Emergency Stop

■ Start condition for Elevator Emergency Coast to Stop

An emergency coast to stop is performed when the Up or Down command is cleared and all of the following conditions are met.

- Parameter b1-03 (Stopping Method Selection) is set to 4.
- Parameter d1-18 (Speed Reference Selection Mode) is set to 0 or 3.
- Parameter b1-01 (Speed Reference Selection) is set to 1.
- The Up/Down command is cleared and U1-05 (Speed Feedback) is equal to or greater than S1-26 (Emergency Stop Start Level).

■ Elevator Emergency Stop Timing Chart

A timing chart for Elevator Emergency Coast to Stop and normal Ramp to Stop appears in *Figure 4.14* and *Figure 4.15*.

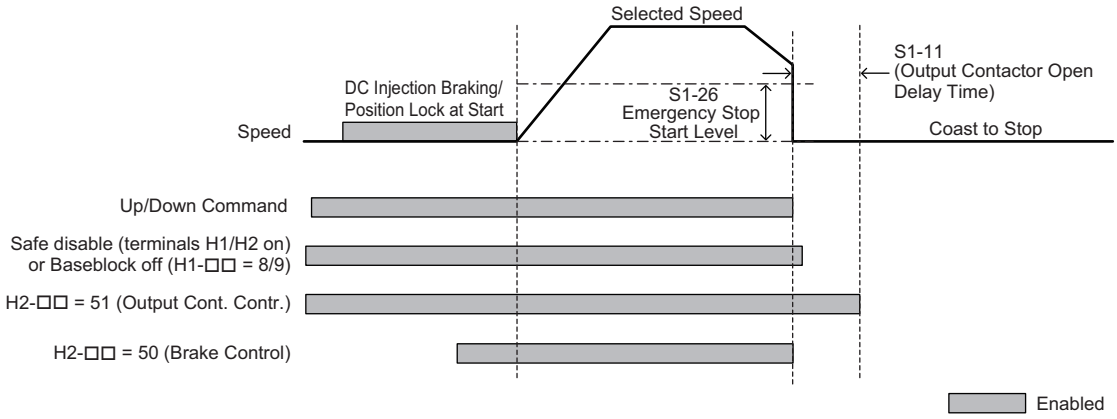
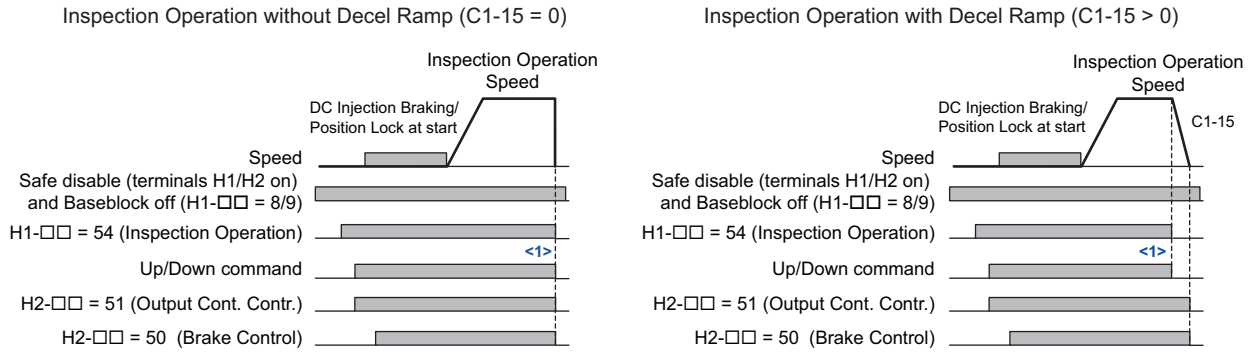


Figure 4.14 With Up/Down command cleared and U1-05 ≥ S1-26

■ Inspection Operation Timing Chart

A timing chart for Inspection Operation appears in *Figure 4.16*.



<1> The drive stops if either the Up/Down command or Inspection Operation signals are removed.

Figure 4.16 Inspection Operation Sequence

◆ Brake Sequence

WARNING! *Sudden Movement Hazard. Rapid deceleration may cause the drive to fault on an overvoltage condition, resulting in death or serious injury due to an uncontrolled motor state. Be sure to set an acceptable deceleration time in parameter C1-09, Fast Stop Ramp, when using the fast-stop feature.*

NOTICE: *Always turn off the RUN command before changing the setting of parameters d1-18 (Speed Reference Selection Mode), b1-01 (Speed Reference Selection), or H1-□□ (Multi-Function Digital Inputs). If the RUN command is on when changing any of these settings, the motor may unexpectedly start running, and could result in injury.*

The drive supports two types of brake sequences, one with torque compensation at start using an analog input terminal (H3-□□ = 14) and the other without torque compensation at start.

■ Brake Sequence without Torque Compensation

To configure the brake sequence operation without torque compensation, do not set any analog input terminals for "Torque compensation" (H3-□□ = 14).

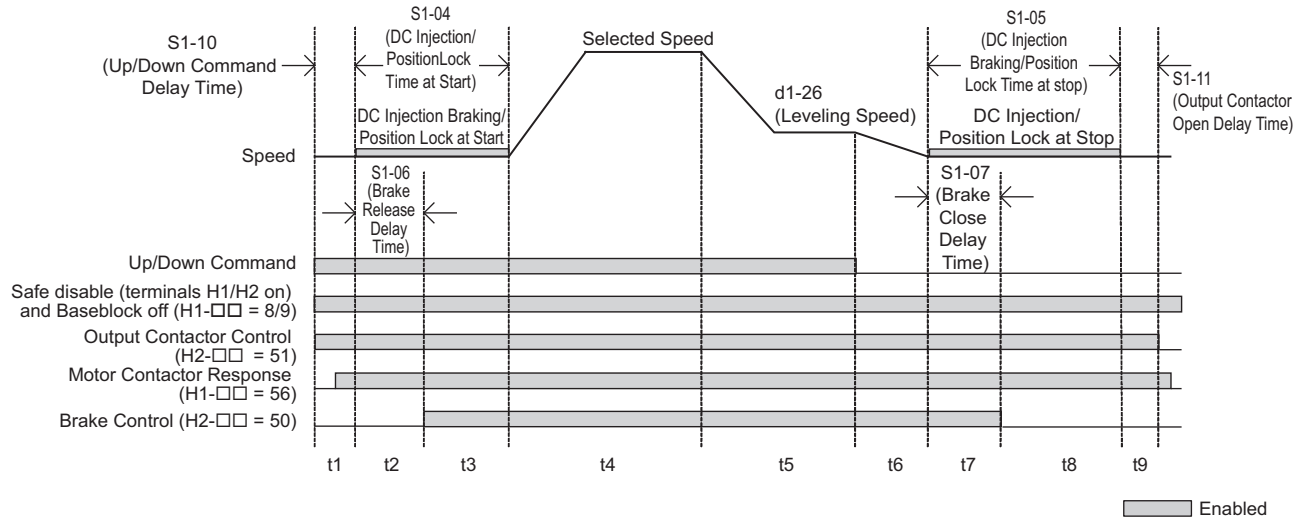


Figure 4.17 Brake Sequence without Torque Compensation at Start

Figure 4.17 is divided into time zones. *Table 4.11* explains the sequence in each time zone.

◆ Ground Fault Circuit Interrupter (ELCB/GFCI) Trips During Run

Cause	Possible Solutions
Excessive leakage current trips ELCB/GFCI ground fault circuit interrupter.	• Increase the ELCB/GFCI sensitivity or use ELCB/GFCI with a higher threshold. • Lower the carrier frequency (C6-03). • Reduce the length of the cable used between the drive and the motor. • Install a noise filter or reactor on the output side of the drive.

◆ Riding Comfort Related Problems

The following table describes the most common problems related to ride comfort and proposes countermeasures to those problems. Before taking any action, make sure the startup procedures have been performed as previously described.

Problem	Control Mode and Possible Cause		Corrective Action
Rollback at start	V/f and OLV	Insufficient torque when the brake is released.	• Increase the DC Injection Braking Current at Start using parameter S1-02. • Increase the Minimum Output Frequency Voltage (E1-10) and Medium Output Frequency Voltage (E1-08) V/f pattern voltages. Make sure, that the starting and leveling current does not rise too high.
		DC Injection and brake timing is not optimized.	Set the time for DC Injection Braking at Start (S1-04) as short as possible, and make sure that brake releases completely before the motor starts to turn.
	OLV	The slip or torque compensation function acts too slowly.	• Decrease the Torque Compensation Time (C4-02). • Decrease the Slip Compensation Time (C3-02).
	CLV CLV/PM	The speed control is not responding fast enough when the brake is released.	Adjust the speed control loop parameters used During Position Lock. Increase C5-19 and reduce C5-20.
		The Position Lock control loop does not respond fast enough.	• Adjust the speed control loop parameters used During Position Lock. Increase C5-19 and reduce C5-20. • Increase the Position Lock Gain at Start 1 in S3-01 gradually. If vibration occurs reduce it. • Increase the Position Lock Gain at Start 2 in S3-02 gradually until rollback disappears.
	All	Motor torque is not fully established when the brake is released.	Lengthen the Brake Release Delay Time (S1-06) and the time for DC Injection Braking / Position Lock at Start (S1-04).
		Motor contactor closes too late.	Make sure that the contactors are closed before the Up/Down command is issued.
Shock at start	All	Motor starts turning when the brake is not completely released or runs against the brake.	Increase the DC Injection Braking Time at Start using parameter S1-04.
		Acceleration rate is changing too quickly.	Decrease the Jerk at Start. Decrease C2-01 if set in m/s^2, increase C2-01 if set in s.
		Rollback occurs during brake release.	Refer to “Rollback at start”.
Shock at stop	All	Brake is applied too early, causing the motor to run against the brake.	Increase the Delay Time to Close the Brake (S1-07). If necessary, also increase the DC Injection Braking Time at Stop S1-05.
		Motor contactor is released before the brake is fully applied.	Check the motor contactor sequence.
	CLV CLV/PM	Rollback occurs before the brake applies at stop.	• Make sure the speed control loop parameters for position lock are adjusted properly (C5-13 and C5-14). • Increase the Position Lock Gain at Stop S3-03 gradually until no rollback occurs. If vibration occurs reduce the gain S3-03.
Jerk occurs due to overshoot when the motor reaches top speed.	OLV	Too fast torque or slip compensation.	• Increase the Torque Compensation Delay Time (C4-02). • Increase the Slip Compensation Delay Time (C3-02).
	CLV CLV/PM	Speed control loop setting is too soft or too hard.	• Adjust the Speed Control Loop Gain C5-01 and Integral Time C5-02. • Adjust Inertia Compensation parameters (n5-□□) if speed control loop settings cannot solve the problem
		Incorrect motor data.	• For induction motors readjust the motor data (E2-□□), especially the slip (E2-02) and no-load current values (E2-03), or perform Auto-Tuning again. • For PM motors readjust the motor data in E5-□□ or perform Auto-Tuning.
		Inertia compensation function is not set up correctly.	If the Inertia Compensation Function is used (n5-01=1) make sure the values in n5-02 and n5-03 are correct.
	All	The acceleration rate changes too quickly when reaching the selected speed.	Decrease the Jerk at the End of Acceleration. Decrease C2-02 if set in m/s^2, increase C2-02 if set in s.

Problem	Control Mode and Possible Cause		Corrective Action
Motor stops shortly (undershoot) when the leveling speed is reached.	V/f and OLV	Not enough torque at low speed.	Increase the Minimum and Middle Voltage Levels for the V/f pattern voltage (E1-10 and E1-08 respectively). Make sure that the Starting and Leveling Current does not rise too high.
	OLV and CLV	Motor data incorrect.	Adjust the motor data (E2-□□), especially the motor slip (E2-02) and no-load current values (E2-03), or perform Auto-Tuning.
		Too much slip compensation.	
	CLV CLV/PM	Speed control loop responds too slow.	Increase the Speed Control Gain and reduce the Speed Control Integral Time used for Low Speed at Stop. The parameters to be changed depend on the setting of C5-05 and whether a third set of speed loop settings is used. Refer to *Speed Loop Adjustments (CLV and CLV/PM) on page 133*.
		The inertia compensation function is not set up correctly.	If the Inertia Compensation Function is used (n5-01 = 1) make sure the values in n5-02 and n5-03 are correct.
	All	The deceleration rate changes too quickly when reaching leveling speed.	Decrease the Jerk at the End of Deceleration. Decrease C2-04 if set in m/s^2, increase C2-04 if set in s.
Motor speed overshoot at acceleration end and undershoot when reaching leveling speed occurs. Problem cannot be resolved by adjusting the speed loop.	CLV CLV/PM	Inertia is high.	Use the Inertia Compensation Function. Set n5-01 to 1 and then adjust parameters n5-02 and n5-03 as described in *Inertia Compensation (CLV and CLV/PM) on page 133*.
Motor or machine vibrates at high speed or top speed.	OLV	Torque compensation responds too quickly.	Increase the Torque Compensation Delay Time (C4-02).
	CLV CLV/PM	Speed control loop adjusted too hard.	Decrease C5-01, then increase C5-02.
Motor or machine vibrates in the low or medium speed range.	V/f	Output voltage is too high.	Reduce the V/f Pattern settings (E1-08, E1-10).
	OLV	Torque compensation is responding too quickly.	Increase the Torque Compensation Delay Time (C4-02).
		Output voltage is too high.	Reduce the V/f Pattern settings (E1-08, E1-10).
	OLV CLV	The value for the motor slip is set incorrectly.	Check the Motor Slip value in parameter E2-02. Increase or decrease it in steps of 0.2 Hz.
	CLV CLV/PM	Speed control loop adjusted with too much gain.	• Decrease C5-01 and then increase C5-02 if the problem occurs at speed higher than C5-07. • Decrease C5-03 and then increase C5-04 if the problem occurs at speed lower than C5-07. • Decrease C5-13 and then increase C5-14 if the problem occurs at speed lower than C5-07 but only during deceleration.
Motor or machine vibrates in During Position Lock.	CLV CLV/PM	The Position Lock control loop does not respond fast enough.	• If vibration occurs at During Position Lock at start, first decrease S3-02. If decreasing S3-02 does not resolve the problem, decrease S3-01. • Decrease S3-03 if vibration occurs During Position Lock at stop.
		The speed control is not responding quickly enough when the brake is released.	Decrease C5-19 and then increase C5-20.
Vibrations with the frequency equal to the motor speed occur.	CLV CLV/PM	Encoder vibrates.	Check the encoder mounting and the alignment of encoder and motor shaft.
	All	Mechanical problems.	Check bearings and gearbox.
		Rotational parts (motor armature, handwheel, brake disk/drum) are not properly balanced.	Properly balance rotating parts.
Oscillations when using an analog speed reference.	All	The analog reference value is not stable or the signal is noisy.	• Check the analog signal line connection. Use shielded twisted pair cables. • Apply a filter to the analog input signal by setting parameter H3-13.
Top speed is different in motoring and regenerative mode.	OLV	Slip Compensation during Regenerative operation is switched off.	Make sure C3-04 is set properly and set parameter C3-05 to 0.
Speed reference and motor speed do not match when using an analog reference signal.	All	The drives analog input is not set according to the signal level of the controller speed reference output signal.	Check the gain and bias settings for the analog input that is used to set the speed reference. Check parameters H3-03 and H3-04 for input A1, check parameters H3-11 and H3-12 for input A2.
Acceleration is longer than set to C1-□□ parameters.	All	The load is too high.	• Check if the acceleration rate set is not too high (acceleration time is too short). • Make sure the drive rated current is enough to fulfill the application requirements. • Make sure the load is not seized, car guide lubrication is ok, etc.
	V/f and OLV	The load is too high and the current/torque exceeds the stall prevention level.	Check if the Stall Prevention Level at Acceleration in L3-03 is not set too small.
	OLV, CLV CLV/PM	The load is too high and the torque exceeds the drives torque limits.	Check it the Torque Limit parameters L7-□□ are not set too low.
Motor speed does not match the speed reference at constant speed.	All	The load is too high.	Make sure the drive rated current is enough to fulfill the application requirements.
	V/f	The load is too high and the current/torque exceeds the stall prevention level.	Check if the Stall Prevention Level During Run in L3-06 is not set too low.
	OLV, CLV CLV/PM	The load is too high and the torque exceeds the torque limits.	Check it the Torque Limit parameters L7-□□ are not set too low.
High frequency acoustic noise from the motor.	All	The carrier frequency is too low.	Increase the Carrier Frequency in parameter C6-03. If the carrier frequency is set higher than the default setting, a current derating must be considered.

◆ C5: Speed Control Loop

The Speed Control Loop controls the motor speed in CLV and CLV/PM control modes. It adjusts torque reference in order to minimize the difference between speed reference and actual motor speed.

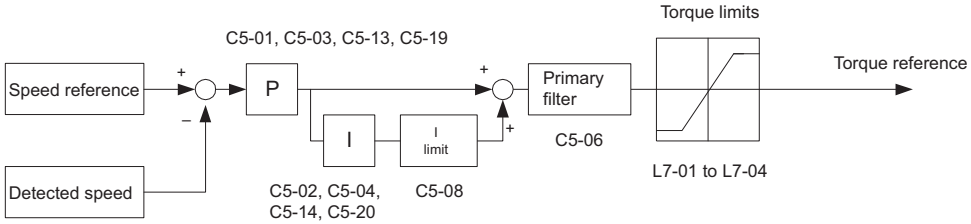


Figure 5.10 Speed Control Block Diagram

■ Adjusting the Speed Control Loop Parameters

Perform Auto-Tuning and set up all motor data correctly prior to adjusting Speed Control Loop parameters.

Analog output signals should be used to monitor the speed reference after softstarter (U1-16) and the motor speed (U1-05) when adjusting the Speed Control Loop. Refer to *H4: Multi-Function Analog Outputs on page 220* for details on setting up analog output functions.

Generally when tuning the Speed Control Loop, first optimize the Speed Control Loop gain, then adjust the integral time settings. Always make adjustments with the load connected to the motor.

The drive provides three different gain and integral time settings for the speed loop. They are automatically switched over if the switching speed in parameter C5-07 is set larger than 0% (default: 0% for CLV, 2% for CLV/PM). If no switching speed is defined (C5-07 = 0) the drive will use one set of speed loop parameters only (C5-01/02).

However, in order to achieve adequate performance in all sections of a trip, for the most installations it will be necessary to use two or all three sets of speed loop settings.

Additional Speed loop settings are provided for Position Lock. Those can be used to prevent rollback especially in gearless applications.

Also refer to *C5-01, C5-03, C5-13 / C5-02, C5-04, C5-14: Speed Control Loop Proportional Gain 1, 2, 3 / Speed Control Loop Integral Time 1, 2, 3 on page 180*.

Perform the following steps for adjusting Speed Control Loop parameters:

1. Check parameter C5-07 and set a speed loop setting switching point. For CLV/PM the drive is preset to 2%. For CLV set C5-07 between 8~10%.
2. Start a trip and check for any problems like rollback, vibration, overshoot, etc.
3. Adjust C5-19/20 in order to solve rollback problems During Position Lock right before the motor starts accelerating. Increase C5-19, then shorten C5-20 if the motor rolls back right after the brake releases. Set them in the opposite way if vibration occurs. If the rollback cannot be eliminated by setting C5-19/10, refer to parameters S3-01/02 (Position Lock Gains at Start).
4. Adjust C5-03/04 in order to improve the performance at start after Position Lock has been finished. Increase C5-03, then shorten C5-04 if the speed response is slow. Set them in the opposite way if vibration occurs.
5. Adjust C5-01/02 in order to solve problems that occur at speeds higher than C5-07. Increase C5-01, then shorten C5-02 if overshoot when reaching the top speed occurs. Set them in the opposite way if vibration occurs.
6. Adjust C5-13/14 in order to improve the stopping behavior. Increase C5-13, then shorten C5-14 if the landing accuracy is poor. Adjust them in the opposite way if vibrations occur. If problems cannot be resolved by setting C5-13/14, refer to parameter S3-03 Position Lock Gain at Stop). Note that C5-13/14 settings will not be effective if the speed reference is set from an analog input.
7. Repeat steps 2 to 6 until the desired riding comfort has been reached. Also refer to *Riding Comfort Related Problems on page 154*.

6.3 Fault Detection

◆ Fault Displays, Causes, and Possible Solutions

Faults are detected for drive protection, and cause the drive to stop while triggering the fault output terminal MA-MB-MC. Remove the cause of the fault and manually clear the fault before attempting to run the drive again.

Table 6.8 Detailed Fault Displays, Causes, and Possible Solutions

Digital Operator Display		Fault Name
boL	boL	Braking Transistor Overload
		The braking transistor has reached its overload level.
Cause		**Possible Solution**
The wrong braking resistor is installed.		Make sure the rating of the braking resistor fits drive and application. Use an external braking transistor if necessary.
Digital Operator Display		**Fault Name**
bUS	bUS	Option Communication Error
		• The connection was lost after establishing initial communication. • Only detected when the Up/Down command speed reference is assigned to an option card.
Cause		**Possible Solution**
No signal was received from the PLC.		• Check for faulty wiring. • Correct the wiring. • Check for disconnected cables and short circuits and repair as needed.
Faulty communications wiring or an existing short circuit.		
A communications data error occurred due to noise.		• Check the various options available to minimize the effects of noise. • Counteract noise in the control circuit, main circuit, and ground wiring. • Ensure that other equipment such as switches or relays do not cause noise. Use surge absorbers if necessary. • Use only recommended cables or other shielded line. Ground the shield on the controller side or on the drive input power side. • Separate all communication wiring from drive power lines. Install an EMC noise filter to the drive power supply input.
The option card is damaged.		Replace the option card if there are no problems with the wiring and the error continues to occur.
The option card is not properly connected to the drive.		• The connector pins on the option card do not line up properly with the connector pins on the drive. • Reinstall the option card.
Digital Operator Display		**Fault Name**
CE	CE	MEMOBUS/Modbus Communication Error
		Communication data was not received for the amount of time set in parameter, H5-09 Communication Fault Detection Time.
Cause		**Possible Solution**
Faulty communications wiring or an existing short circuit.		• Check for faulty wiring. • Correct the wiring. • Check for disconnected cables and short circuits and repair as needed.
Communication data error occurred due to noise.		• Check the various options available to minimize the effects of noise. • Counteract noise in the control circuit, main circuit, and ground wiring. • Use only recommended cables or other shielded line. Ground the shield on the controller side or on the drive input power side. • Ensure that other equipment such as switches or relays do not cause noise. Use surge absorbers if required. • Separate all communication wiring from drive power lines. Install an EMC noise filter to the drive power supply input.
Digital Operator Display		**Fault Name**
CF	CF	Control Fault
		The torque limit was reached continuously for three seconds or longer while ramping to stop in OLV Control.
Cause		**Possible Solution**
Motor parameters are improperly set.		Check the motor parameter settings and repeat Auto-Tuning.
Torque limit is too low.		Set the torque limit to the most appropriate setting (L7-01 through L7-04).
Load inertia is too big.		• Adjust the deceleration ramp (C1-02, -04, -06, -08). • Set the speed reference to the minimum value and interrupt the Up/Down command when the drive finishes decelerating.
Digital Operator Display		**Fault Name**
CoF	CoF	Current Offset Fault
		The current sensor is damaged or there was residual induction current in the motor (e.g., during sudden deceleration or when coasting) when the drive attempted to start the motor.
Cause		**Possible Solution**
Due to residual induction current in the motor when the drive attempted to start the motor, the drive attempted to adjust the current offset value beyond the allowable range.		• Create a motor restart sequence that allows enough time for the residual induction voltage to dissipate. • Enable Speed Search at start (b3-01 = 1). Use the multi-function terminals to execute External Speed Search 1 and 2 (H1-□□ = 61 or 62). **Note:** When using a PM motor, both External Speed Search 1 and 2 perform the same operation.
Hardware is damaged. Replace the drive.		Replace the drive.
Digital Operator Display		**Fault Name**
CPF00 or CPF01 <1>	CPF00 or CPF01	Control Circuit Error
Cause		**Possible Solution**
There is a self diagnostic error in control circuit.		• Cycle power to the drive. • Set the frequency to the minimum value and interrupt the Run command when the drive finishes decelerating.
Connector on the operator is damaged.		Replace the operator.

Digital Operator Display		Fault Name
CPF02	CPF02	A/D Conversion Error
		An A/D conversion error or control circuit error occurred.
Cause		**Possible Solution**
Control circuit is damaged.		• Cycle power to the drive. • If the problem continues, replace the control board or the entire drive. Contact Yaskawa or a Yaskawa representative for instructions on replacing the control board.
Digital Operator Display		**Fault Name**
CPF03	CPF03	Control Board Connection Error
		Connection error between the control board and the drive
Cause		**Possible Solution**
There is a connection error.		• Turn off the power and check the connection between the control board and the drive • If the problem continues, replace the control board or the entire drive. Contact Yaskawa or a Yaskawa representative for instructions on replacing the control board.
Drive fails to operate properly due to noise interference.		• Check the various options available to minimize the effects of noise. • Counteract noise in the control circuit, main circuit, and ground wiring. • Use only recommended cables or other shielded line. Ground the shield on the controller side or on the drive input power side. • Ensure that other equipment such as switches or relays do not cause noise and use surge absorbers if required. • Separate all communication wiring from drive power lines. Install an EMC noise filter to the drive power supply input.
Digital Operator Display		**Fault Name**
CPF06	CPF06	EEPROM Memory Data Error
		An error in the data saved to EEPROM
Cause		**Possible Solution**
There is an error in EEPROM control circuit.		• Turn off the power and check the connection between the control board and the drive. • If the problem continues, replace the control board or the entire drive. Contact Yaskawa or a Yaskawa representative for instructions on replacing the control board.
The power supply was switched off while parameters were being saved to the drive.		Reinitialize the drive (A1-03).
Power to the control board was lost while writing parameter settings during Rescue Operation.		Reinitialize the drive (A1-03).
Digital Operator Display		**Fault Name**
CPF07	CPF07	Terminal Board Connection Error
CPF08	CPF08	
Cause		**Possible Solution**
There is a faulty connection between the terminal board and control board.		• Turn off the power and check the connection between the control board and the drive. • If the problem continues, replace the control board or the entire drive. Contact Yaskawa or a Yaskawa representative for instructions on replacing the control board.
Digital Operator Display		**Fault Name**
CPF11 to CPF14, CPF16 to CPF21 <1>	CPF11 to CPF14, CPF16 to CPF21	Control Circuit Error
Cause		**Possible Solution**
Hardware is damaged.		• Cycle power to the drive. • If the problem continues, replace the control board or the entire drive. Contact Yaskawa or a Yaskawa representative for instructions on replacing the control board.
Digital Operator Display		**Fault Name**
CPF22	CPF22	Hybrid IC Failure
Cause		**Possible Solution**
Hybrid IC failure on the power board		• Cycle power to the drive. *Refer to Diagnosing and Resetting Faults on page 314*. • If the problem continues, replace the control board or the entire drive. Contact Yaskawa or a Yaskawa representative for instructions on replacing the control board.
Digital Operator Display		**Fault Name**
CPF23	CPF23	Control Board Connection Error
		Connection error between the control board and the drive
Cause		**Possible Solution**
Hardware is damaged.		• Turn the power off and check the connection between the control board and the drive. • If the problem continues, replace the control board or the entire drive. Contact Yaskawa or a Yaskawa representative for instructions on replacing the control board.
Digital Operator Display		**Fault Name**
CPF24	CPF24	Drive Unit Signal Fault
		The drive capacity cannot be detected correctly (drive capacity is checked when the drive is powered up).
Cause		**Possible Solution**
Hardware is damaged.		If the problem continues, replace the control board or the entire drive. Contact Yaskawa or a Yaskawa representative for instructions on replacing the control board.

Digital Operator Display		Fault Name
CPF25	CPF25	Terminal Board not Connected
Cause		**Possible Solution**
Terminal board is not connected correctly.		Reconnect the terminal board to the connector on the drive, then cycle the power to the drive.
Digital Operator Display		**Fault Name**
CPF26 to CPF34	CPF26 to CPF34	Control Circuit Error CPU error
Cause		**Possible Solution**
Hardware is damaged.		If the problem continues, replace the control board or the entire drive. Contact Yaskawa or a Yaskawa representative for instructions on replacing the control board.
Digital Operator Display		**Fault Name**
CPF35	CPF35	A/D Conversion Error An A/D conversion error or control circuit error occurred.
Cause		**Possible Solution**
A/D conversion is damaged. Control circuit is damaged.		• Cycle power to the drive. • If the problem continues, replace the control board or the entire drive. For instructions on replacing the control board, contact Yaskawa or your nearest sales representative.
Digital Operator Display		**Fault Name**
dEv	dEv	Speed Deviation (for Control Mode with Encoder) The deviation between the speed reference and speed feedback is greater than the setting in F1-10 for longer than the time set to F1-11.
Cause		**Possible Solution**
Load is too heavy.		Reduce the load.
Accel/decel ramp is too short.		Increase the acceleration and deceleration times (C1-01 through C1-08).
The load is locked up.		Check the machine.
Parameters are not set appropriately.		Check the settings of parameters F1-10 and F1-11.
The motor brake is not applied.		Ensure the motor brake operates properly with a brake control command from the drive.
During Rescue Operation, either the DC bus voltage dropped below S4-12 × (S4-13 - 10%), or 100 ms after triggering Rescue Operation, the DC bus voltage did not reach S4-12 × S4-13 before the motor started.		• Check the DC bus voltage setting for Rescue Operation (S4-12). • Lower the speed reference set for Rescue Operation (S4-15). • Check the backup power supply. It may need to be replaced with another UPS if it has become worn and can no longer provide enough power.
Digital Operator Display		**Fault Name**
dv1	dv1	Encoder Z Pulse Fault The motor turned one full rotation without the Z Pulse being detected.
Cause		**Possible Solution**
Encoder is not connected, not wired properly, or is damaged.		• Make sure the encoder is properly connected and all shielded lines are properly grounded. • If the problem continues after cycling power, then replace either the PG option card or the encoder itself.
Digital Operator Display		**Fault Name**
dv2	dv2	Z Pulse Noise Fault Detection The Z pulse is out of phase by more than 5 degrees for the number of times specified in parameter F1-17.
Cause		**Possible Solution**
Noise interference along the encoder cable.		Separate the encoder cable lines from the source of the noise.
Encoder cable is not wired properly.		Rewire the encoder and make sure all shielded lines are properly grounded.
PG option card or the encoder is damaged.		If the problem continues after cycling power, replace the PG option card or the encoder.
Digital Operator Display		**Fault Name**
dv3	dv3	Inversion Detection The torque reference and acceleration are in opposite directions and the speed reference and actual motor speed differ by over 30% for the number of times set to F1-18.
Cause		**Possible Solution**
The encoder offset is not set properly to E5-11.		Set the encoder offset to E5-11 as specified on the motor nameplate. Replacing the encoder or changing the motor/encoder rotation direction requires readjustment of the encoder offset.
An external force on the load side has caused the motor to move.		• Make sure the motor is rotating in the right direction. • Look for any problems on the load side that might cause the motor to rotate in the opposite direction.
Noise interference along the encoder cable is disturbing the encoder signals.		Properly rewire the PG encoder and connect all lines including shielded line.
Encoder is disconnected, not wired properly, or the PG option card or the encoder itself is damaged.		
Rotational direction for the encoder set to F1-05 is the opposite of the order of the motor lines.		Properly connect the motor lines for each phase (U/T1, V/T2, W/T3).

Digital Operator Display		Fault Name
dv4	dv4	Inversion Prevention Detection
		Pulses indicate that the motor is rotating in the opposite direction of the speed reference. Set the number of pulses to trigger inverse detection to F1-19. **Note:** Set F1-19 to 0 to disable inverse detection in applications where the motor may rotate in the opposite direction of the speed reference.
Cause		**Possible Solution**
The encoder offset is not set properly to E5-11.		• Set the encoder offset to E5-11 as specified on the motor nameplate. • If the problem continues after cycling power, then replace either the PG option card or the encoder itself. Replacing the encoder or changing the motor/encoder rotation direction requires readjustment of the encoder offset.
Noise interference along the encoder cable is disturbing the encoder signals.		• Make sure the motor is rotating in the correct direction. • Look for any problems on the load side that might be causing the motor to rotate in the opposite direction.
Encoder is disconnected, not wired properly, or the PG option card or the encoder itself is damaged.		• Rewire the encoder and make sure all lines including shielded line are properly connected. • If the problem continues after cycling power, replace the PG option card or the encoder.
Digital Operator Display		**Fault Name**
dv6	dv6	Overacceleration Detection
		The acceleration of the elevator car exceeds the overacceleration detection level (S6-10)
Cause		**Possible Solution**
The encoder offset (E5-11) is incorrect.		Set E5-11 to the encoder offset value written on the motor nameplate. The encoder offset needs to be adjusted whenever the encoder is replaced or when reversing the direction of the motor.
Noise along the encoder cable.		Check the encoder wiring for any loose connections. Make sure that the shielded line is properly grounded.
Cables for the motor encoder are not wired properly, or the PG option card (or the encoder itself) is damaged.		
Incorrect motor data has been set to the E5 parameters.		Check the values set to the E5 parameters to make sure they match the information on the motor nameplate.
Mechanical data for the elevator have not been set up correctly.		Check parameters o1-20, o1-21, and o1-22 and set them to the correct values for the elevator.
The acceleration is too fast.		Check and adjust the acceleration rate and the jerk at acceleration start set in parameter C2-01.
Digital Operator Display		**Fault Name**
dv7	dv7	Rotor Polarity Detection Timeover
		Unable to detect the magnetic poles within the designated time.
Cause		**Possible Solution**
Battery voltage is too low.		Charge the battery.
The output cable is disconnected.		• Check for wiring errors and ensure the output cable is connected properly. • Correct the wiring.
The motor winding is damaged.		• Check the resistance between motor lines. • Replace the motor if the winding is damaged.
The output terminal is loose.		Apply the tightening torque specified in this manual to fasten the terminals.
Digital Operator Display		**Fault Name**
dv8	dv8	PM Rotor Position Estimation Error
		An invalid value resulted from Initial Pole Search. **Note:** Reset the fault and try Initial Pole Search again.
Cause		**Possible Solution**
Motor characteristics have changed.		Repeat the setup process. Perform Stationary Auto-Tuning or Initial Pole Search Auto-Tuning.
Parameters that control Initial Pole Search are set incorrectly (set up may be incomplete).		
Parameters for the motor encoder are set to the wrong values (set up may be incomplete).		
Brake was released during Initial Pole Search or during power loss.		Check the brake sequence. The brake must remain applied during Initial Pole Search and whenever the power supply is interrupted.
Initial Pole Search cannot be performed on the motor being used.		Use a PG option card that is compatible with both the drive and an absolute encoder.
Digital Operator Display		**Fault Name**
EF0	EF0	Option Card External Fault
		An external fault condition is present.
Cause		**Possible Solution**
An external fault was received from the PLC with other than F6-03 = 3 “alarm only” (the drive continued to run after external fault).		• Remove the cause of the external fault. • Remove the external fault input from the PLC.
Problem with the PLC program.		Check the PLC program and correct problems.
Digital Operator Display		**Fault Name**
EF3	EF3	External Fault (input terminal S3)
		External fault at multi-function input terminal S3.
EF4	EF4	External Fault (input terminal S4)
		External fault at multi-function input terminal S4.
EF5	EF5	External Fault (input terminal S5)
		External fault at multi-function input terminal S5.
EF6	EF6	External Fault (input terminal S6)
		External fault at multi-function input terminal S6.

EF7	EF7	External Fault (input terminal S7)
		External fault at multi-function input terminal S7
EF8	EF8	External Fault (input terminal S8)
		External fault at multi-function input terminal S8
Cause		**Possible Solution**
An external device has tripped an alarm function.		Remove the cause of the external fault and reset the fault.
Wiring is incorrect.		• Ensure the signal lines have been connected properly to the terminals assigned for external fault detection (H1-□□ = 20 to 2B). • Reconnect the signal line.
Incorrect multi-function contact input setting		• Check for unused terminals set for H1-□□ = 20 to 2B (External Fault). • Change the terminal settings.
Digital Operator Display		**Fault Name**
Err	Err	EEPROM Write Error
		Data cannot be written to the EEPROM.
Cause		**Possible Solution**
Noise has corrupted data while writing to the EEPROM.		• Press ENTER. • Correct the parameter setting. • Cycle power to the drive. *Refer to Diagnosing and Resetting Faults on page 314*. • If the problem continues, replace the control board or the entire drive. Contact Yaskawa or a Yaskawa representative for instructions on replacing the control board.
Hardware problem.		If the problem continues, replace the control board or the entire drive. Contact Yaskawa or a Yaskawa representative for instructions on replacing the control board.
Digital Operator Display		**Fault Name**
FrL	FrL	Speed Reference Missing
		Parameter d1-18 is set to 3, leveling speed detection is not assigned to a digital input (H1-□□ ≠ 53) and no speed was selected while an Up or Down command was entered.
Cause		**Possible Solution**
Parameter d1-18 is set to 1, H1-□□ is not set to 53 and no speed was selected at start.		• Make sure the selected speed selection method matches the elevator controller sequence. Check parameter d1-18 and H1-□□ settings. • Make sure the elevator controller is connected properly. • Make sure the elevator controller selects the speed properly.
Digital Operator Display		**Fault Name**
GF	GF	Ground Fault
		A current short to ground exceeded 50% of rated current on the output side of the drive.
Cause		**Possible Solution**
Motor insulation is damaged.		• Check the insulation resistance of the motor. • Replace the motor.
A damaged motor cable is creating a short circuit.		• Check the motor cable. • Remove the short circuit and turn the power back on.
		• Check the resistance between the cable and the ground terminal ⏚. • Replace the cable.
The leakage current at the drive output is too high.		• Reduce the carrier frequency. • Reduce the amount of stray capacitance.
The drive started to run during a current offset fault or while coasting to a stop.		The value set exceeds the allowable setting range while the drive automatically adjusts the current offset (this happens only when attempting to restart a PM motor that is coasting to stop).
Hardware problem.		If the problem continues, replace the control board or the entire drive. Contact Yaskawa or a Yaskawa representative for instructions on replacing the control board.
Digital Operator Display		**Fault Name**
LF	LF	Output Phase Loss
		• Phase loss on the output side of the drive. • Setting L8-07 to 1 or 2 enables Phase Loss Detection.
Cause		**Possible Solution**
The output cable is disconnected.		• Check for wiring errors and properly connect the output cable. • Correct the wiring.
The motor winding is damaged.		• Check the resistance between motor lines. • Replace the motor if the winding is damaged.
The output terminal is loose.		Apply the tightening torque specified in this manual to fasten the terminals.
The rated current of the motor being used is less than 5% of the drive rated current.		Check the drive and motor capacities.
An output transistor is damaged.		If the problem continues, replace the control board or the entire drive. Contact Yaskawa or a Yaskawa representative for instructions on replacing the control board.
A single-phase motor is being used.		The drive cannot operate a single phase motor.

Digital Operator Display		Fault Name
LF2	LF2	Output Current Imbalance (detected when L8-29 = 1)
		One or more of the phases in the output current is lost.
Cause		**Possible Solution**
Phase loss has occurred on the output side of the drive.		• Check for faulty wiring or poor connections on the output side of the drive. • Correct the wiring.
Terminal wires on the output side of the drive are loose.		Apply the tightening torque specified in this manual to fasten the terminals.
The output circuit is damaged.		If the problem continues, replace the control board or the entire drive. Contact Yaskawa or a Yaskawa representative for instructions on replacing the control board.
Motor impedance or motor phases are uneven.		• Measure the line-to-line resistance for each motor phase. Ensure all values are the same. • Replace the motor.
Digital Operator Display		**Fault Name**
oC	oC	Overcurrent
		Drive sensors have detected an output current greater than the specified overcurrent level.
Cause		**Possible Solution**
The motor has been damaged due to overheating or the motor insulation is damaged.		• Check the insulation resistance. • Replace the motor.
One of the motor cables has shorted out or there is a grounding problem.		• Check the motor cables. • Remove the short circuit and reapply power to the drive.
		• Check the resistance between the motor cables and the ground terminal ⏚. • Replace damaged cables.
The drive is damaged.		• Check the drive output side short circuit for broken output transistor. B1 and U/V/W - (negative) and U/V/W • Contact your Yaskawa representative or nearest Yaskawa sales office.
The load is too heavy.		• Measure the current flowing into the motor. • Replace the drive with a larger capacity drive if the current value exceeds the rated current. • Determine if there is sudden fluctuation in the current level. • Reduce the load to avoid sudden changes in the current level or switch to a larger drive.
Accel/decel ramp is too fast.		Calculate the amount of torque required for the desired acceleration and/or deceleration ramp relative to the inertia moment of the load. If the drive is not capable of producing that much torque in time, try the following setting changes: • Reduce the acceleration and/or deceleration ramp (i.e., increase the accel/decel time). • Use a larger capacity drive.
The drive is attempting to operate a specialized motor or a motor larger than the maximum size allowed.		• Check the motor capacity. • Ensure that the rated capacity of the drive is greater than or equal to the capacity rating found on the motor nameplate.
Magnetic contactor (MC) on the output side of the drive has turned on or off.		Set up the operation sequence so that the MC is not tripped while the drive is outputting current.
V/f setting is not operating as expected.		• Check the ratios between the voltage and frequency. • Set parameters E1-04 through E1-10 appropriately (E3-04 through E3-10 for motor 2). • Lower the voltage if it is too high relative to the frequency.
Excessive torque compensation.		• Check the amount of torque compensation. • Reduce the torque compensation gain (C4-01) until there is no speed loss and less current.
Drive fails to operate properly due to noise interference.		• Review the possible solutions provided for handling noise interference. • Review the section on handling noise interference and check the control circuit lines, main circuit lines, and ground wiring.
The overcurrent level has exceeded the value set to L8-27. (PM control modes)		Correct the value set to overcurrent detection gain (L8-27).
The motor control method and motor do not match.		• Check which motor control method the drive is set to (A1-02). • For IM motors, set A1-02 = “0”, “2”, or “3”. • For PM motors, set A1-02 = “7”.
The rated output current of the drive is too small		Use a larger drive.
Digital Operator Display		**Fault Name**
oFA00	oFA00	Option Card Connection Error at Option Connector CN5-A, Option Card Fault at Option Connector CN5-A
		Option compatibility error
Cause		**Possible Solution**
The option card installed into port CN5-A is incompatible with the drive.		Check if the drive supports the option card to be installed. Contact Yaskawa for assistance.
A PG option card is connected to option port CN5-A		PG option cards are supported by option ports CN5-B and CN5-C only. Place the PG option card into the correct option port.
Digital Operator Display		**Fault Name**
oFA01	oFA01	Option Card Fault at Option Connector CN5-A
		Option not properly connected
Cause		**Possible Solution**
The option board connection to port CN5-A is faulty.		• Turn the power off and reconnect the option card. • Check if the option card is properly plugged into the option port. Make sure the card is fixed properly. • If the option is not a communication option card, try to use the card in another option port. If the option card works properly in a different option port, replace the drive because port CN5-A is damaged. If the error persists (oFb01 or oFC01 occur), replace the option card.

Digital Operator Display		Fault Name
oFA05, oFA06	oFA05, oFA06	Option card error occurred at option port CN5-A
oFA10, oFA11	oFA10, oFA11	
oFA12 to oFA17	oFA12 to oFA17	
oFA30 to oFA43	oFA30 to oFA43	
Cause		**Possible Solution**
Option card or hardware is damaged.		• Cycle power to the drive. • If the problem continues, replace the control board or the entire drive. Contact Yaskawa or a Yaskawa representative for instructions on replacing the control board.
Digital Operator Display		**Fault Name**
oFb00	oFb00	Option Card Fault at Option Port CN5-B Option compatibility error
Cause		**Possible Solution**
The option card installed into port CN5-B is incompatible with the drive.		Make sure the drive supports the option card to be installed. Contact Yaskawa for assistance.
A communication option card has been installed in option port CN5-B.		Communication option cards are only supported by option port CN5-A. It is not possible to install more than one comm. option.
Digital Operator Display		**Fault Name**
oFb01	oFb01	Option Card Fault at Option Port CN5-B Option not properly connected
Cause		**Possible Solution**
The option board connection to port CN5-B is faulty.		• Turn off the power and reconnect the option card. • Check if the option card is properly plugged into the option port. Make sure the card is fixed properly. • Try to use the card in another option port (in case of a PG option use port CN5-C). If the option cards works in the other port, replace the drive because port CN5-B is damaged. If the error persists (oFA01 or oFC01 occur), replace the option board.
Digital Operator Display		**Fault Name**
oFb02	oFb02	Option Card Fault at Option Port CN5-B Same type of option card already connected
Cause		**Possible Solution**
An option card of the same type is already installed in option port CN5-A.		Except for PG options, each option card type can only be installed once. Make sure only one type of option card is connected.
An input option card is already installed in option port CN5-A.		Install a comm. option, a digital input option, or an analog input option. The same type of card cannot be installed twice.
Digital Operator Display		**Fault Name**
oFb03 to oFb11	oFb03 to oFb11	Option card error occurred at Option Port CN5-B
oFb12 to oFb17	oFb12 to oFb17	
Cause		**Possible Solution**
Option card or hardware is damaged.		• Cycle power to the drive. • If the problem continues, replace the control board or the entire drive. Contact Yaskawa or a Yaskawa representative for instructions on replacing the control board.
Digital Operator Display		**Fault Name**
oFC00	oFC00	Option Card Connection Error at Option Port CN5-C Option compatibility error
Cause		**Possible Solution**
The option card installed into port CN5-C is incompatible with the drive.		Confirm that the drive supports the option card to be installed. Contact Yaskawa for assistance.
A communication option card has been installed in option port CN5-C.		Communication option cards are only supported by option port CN5-A. It is not possible to install more than one comm. option.
Digital Operator Display		**Fault Name**
oFC01	oFC01	Option Card Fault at Option Port CN5-C Option not properly connected
Cause		**Possible Solution**
The option board connection to port CN5-C is faulty.		• Turn the power off and reconnect the option card. • Check if the option card is properly plugged into the option port. Make sure the card is fixed properly. • Try to use the card in another option port (in case of a PG option use port CN5-B). If the option card works in a different port, replace the drive because port CN5-C is damaged. If the error persists (oFA01 or oFb01 occur), replace the option board.
Digital Operator Display		**Fault Name**
oFC02	oFC02	Option Card Fault at Option Port CN5-C A maximum of two PG option boards can be used simultaneously. Remove the PG option board installed into option port CN5-A.
Cause		**Possible Solution**
An option card of the same type is already installed in option port CN5-A or CN5-B.		Except for PG options, each option card type can only be installed once. Make sure only one type of option card is connected.
An input option card is already installed in option port CN5-A or CN5-B.		Make sure that a comm. option, a digital input option, or an analog input option is installed. The same type of card cannot be installed twice.
Three PG option boards are installed.		A maximum of two PG option boards can be used simultaneously. Remove the PG option board installed into option port CN5-A.

Digital Operator Display		Fault Name
oFC03 to oFC11	oFC03 to oFC11	Option card error occurred at option port CN5-C
oFC12 to oFC17	oFC12 to oFC17	
Cause		**Possible Solution**
Option card or hardware is damaged.		• Cycle power to the drive. • If the problem continues, replace the control board or the entire drive. Contact Yaskawa or a Yaskawa representative for instructions on replacing the control board.
Digital Operator Display		**Fault Name**
oFC50	oFC50	Encoder Option AD Conversion Error
		Error with the A/D conversion level (VCC level), or A/D conversion timed out.
Cause		**Possible Solution**
The PG option card is damaged.		Replace the PG option card.
Digital Operator Display		**Fault Name**
oFC51	oFC51	Encoder Option Analog Circuit Error
		Incorrect signal level (+2.5 V signal)
Cause		**Possible Solution**
The PG option card is damaged.		Replace the PG option card.
Digital Operator Display		**Fault Name**
oFC52	oFC52	Encoder Communication Timeout
		Signal encoder timed out waiting to receive data
Cause		**Possible Solution**
Encoder cable wiring is wrong.		Correct the wiring.
Encoder cable is disconnected.		Reconnect the cable.
Parameters for Encoder Selection (F1-50) are set to the wrong values.		Set parameter F1-50 to the proper value.
Digital Operator Display		**Fault Name**
oFC53	oFC53	Encoder Communication Data Error
		Serial encoder CRC checksum error
Cause		**Possible Solution**
Encoder cable wiring is wrong.		Correct the wiring.
Encoder cable is disconnected.		Reconnect the cable.
Digital Operator Display		**Fault Name**
oFC54	oFC54	Encoder Error
		Alarm reading EnDat absolute position data from encoder (OR flag from EnDat error for overvoltage, undervoltage, etc.)
Cause		**Possible Solution**
Power supply to encoder is wired incorrectly.		Correct the wiring.
The power supply circuit of the PG option card is damaged.		Replace the PG option card.
Digital Operator Display		**Fault Name**
oH	oH	Heatsink Overheat
		The temperature of the heatsink exceeded the overheat pre-alarm level set to L8-02. Default value for L8-02 is determined by drive capacity (o2-04).
Cause		**Possible Solution**
Surrounding temperature is too high.		• Check the temperature surrounding the drive. Verify temperature is within drive specifications. • Improve the air circulation within the enclosure panel. • Install a fan or air conditioner to cool the surrounding area. • Remove anything near the drive that might be producing excessive heat.
Load is too heavy.		• Measure the output current. • Decrease the load. • Lower the carrier frequency (C6-03).
Internal cooling fan is stopped.		• Replace the cooling fan. *Refer to Cooling Fan Component Names on page 326*. • After replacing the drive, reset the cooling fan maintenance parameter (o4-03 = 0).
Digital Operator Display		**Fault Name**
oH1	oH1	Heatsink Overheat
		The temperature of the heatsink exceeded the drive overheat level. The overheat level is determined by drive capacity (o2-04).
Cause		**Possible Solution**
Surrounding temperature is too high.		• Check the temperature surrounding the drive. • Improve the air circulation within the enclosure panel. • Install a fan or air conditioner to cool the surrounding area. • Remove anything near the drive that might be producing excessive heat.
Load is too heavy.		• Measure the output current. • Lower the carrier frequency (C6-03). • Reduce the load.

Digital Operator Display		Fault Name
oH3	oH3	Motor Overheat Alarm (PTC thermistor input)
		• The motor overheat signal to analog input terminal A1 or A2 exceeded the alarm detection level. • Detection requires multi-function analog input H3-02 or H3-10 be set to “E”.
Cause		**Possible Solution**
Motor thermostat wiring is fault (PTC thermistor input).		Repair the PTC thermistor input wiring.
There is a fault on the machine side (e.g., the machine is locked up).		• Check the status of the machine. • Remove the cause of the fault.
Motor has overheated		• Check the size of the load, the accel/decel times, and the cycle times. • Decrease the load. • Increase the acceleration and deceleration times (C1-01 through C1-08).
		• Adjust the preset V/f pattern (E1-04 through E1-10). This will mainly involve reducing E1-08 and E1-10. • Be careful not to lower E1-08 and E1-10 too much, as this reduces load tolerance at low speeds.
		• Check the motor rated current. • Enter the motor rated current as indicated on the motor nameplate (E2-01). • Ensure the motor cooling system is operating normally. • Repair or replace the motor cooling system.
Digital Operator Display		**Fault Name**
oH4	oH4	Motor Overheat Fault (PTC thermistor input)
		• The motor overheat signal to analog input terminal A1 or A2 exceeded the fault detection level. • Detection requires that multi-function analog input H3-02 or H3-10 = “E”.
Cause		**Possible Solution**
Motor thermostat wiring is fault (PTC thermistor input).		Repair the PTC thermistor input wiring.
There is a fault on the machine side (e.g., the machine is locked up).		• Check the status of the machine. • Remove the cause of the fault.
Motor has overheated.		• Check the size of the load, the accel/decel times, and the cycle times. • Decrease the load. • Increase the acceleration and deceleration times (C1-01 through C1-08).
		Adjust the preset V/f pattern (E1-04 through E1-10). This will mainly involve reducing E1-08 and E1-10. Be careful not to lower E1-08 and E1-10 too much because this reduces load tolerance at low speeds.
		• Check the motor rated current. • Enter the motor rated current as indicated on the motor nameplate (E2-01). • Ensure the motor cooling system is operating normally. • Repair or replace the motor cooling system.
Digital Operator Display		**Fault Name**
oL1	oL1	Motor Overload
		The electronic motor overload protection tripped.
Cause		**Possible Solution**
Load is too heavy.		Reduce the load. **Note:** After the value of U4-16 has decreased to one less than 100, reset oL1. The value of U4-16 must be less than 100 before oL1 can be reset.
Cycle times are too short during acceleration and deceleration.		Increase the acceleration and deceleration times (C1-01 through C1-08).
A general purpose motor is driven below the rated speed with too high load.		• Reduce the load. • Increase the speed. • If the motor is supposed to operate at low speeds, either increase the motor capacity or use a motor specifically designed to operate in the desired speed range.
The output voltage is too high.		• Adjust the user-set V/f pattern (E1-04 through E1-10) by reducing E1-08 and E1-10. • Do not set E1-08 and E1-10 too low. This reduces load tolerance at low speeds.
The wrong motor rated current is set to E2-01.		• Check the motor-rated current. • Enter the value written on the motor nameplate to parameter E2-01.
The Base Frequency is set incorrectly.		• Check the rated frequency indicated on the motor nameplate. • Enter the rated frequency to E1-06 (Base Frequency).
Multiple motors are running off the same drive.		Disable the motor protection function (L1-01 = 0) and install a thermal relay to each motor.
The electrical thermal protection characteristics and motor overload characteristics do not match.		• Check the motor characteristics. • Correct the type of motor protection that has been selected (L1-01). • Install an external thermal relay.
The electrical thermal relay is operating at the wrong level.		• Check the current rating listed on the motor nameplate. • Check the value set for the motor rated current (E2-01).
Output current fluctuation due to power supply loss		Check the power supply for phase loss.

Digital Operator Display		Fault Name
oL2	oL2	Drive Overload
		The thermal sensor of the drive triggered overload protection.
Cause		**Possible Solution**
Load is too heavy.		Reduce the load.
Accel/decel ramp is too short.		Increase the settings for the acceleration and deceleration times (C1-01 through C1-08).
The output voltage is too high.		• Adjust the preset V/f pattern (E1-04 through E1-10) by reducing E1-08 and E1-10. • Do not lower E1-08 and E1-10 excessively. This reduces load tolerance at low speeds.
Drive capacity is too small.		Replace the drive with a larger model.
Overload occurred when operating at low speeds.		• Reduce the load when operating at low speeds. • Replace the drive with a model that is one frame size larger. • Lower the carrier frequency (C6-03).
Excessive torque compensation.		Reduce the torque compensation gain (C4-01) until there is no speed loss but less current.
Output current fluctuation due to input phase loss		Check the power supply for phase loss.
Digital Operator Display		**Fault Name**
oL3	oL3	Overtorque Detection 1
		The current has exceeded the value set for torque detection (L6-02) for longer than the allowable time (L6-03).
Cause		**Possible Solution**
Parameter settings are not appropriate for the load.		Check the settings of parameters L6-02 and L6-03.
Fault on the machine side (e.g., machine is locked up).		Check the status of the load. Remove the cause of the fault.
Digital Operator Display		**Fault Name**
oL4	oL4	Overtorque Detection 2
		The current has exceeded the value set for Overtorque Detection 2 (L6-05) for longer than the allowable time (L6-06).
Cause		**Possible Solution**
Parameter settings are not appropriate for the load.		Check the settings of parameters L6-05 and L6-06.
Digital Operator Display		**Fault Name**
oPr	oPr	External Digital Operator Connection Fault
		• The external operator has been disconnected from the drive. **Note:** An oPr fault will occur when all of the following conditions are true: • Output is interrupted when the operator is disconnected (o2-06 = 1). • The Up/Down command is assigned to the operator (b1-02 = 0 and LOCAL has been selected).
Cause		**Possible Solution**
External operator is not properly connected to the drive.		• Check the connection between the operator and the drive. • Replace the cable if damaged. • Turn off the drive input power and disconnect the operator. Then reconnect the operator and turn the drive input power back on.
Digital Operator Display		**Fault Name**
oS	oS	Overspeed
		The motor speed feedback exceeded the F1-08 setting.
Cause		**Possible Solution**
Overshoot is occurring.		• Reduce the settings for C5-01 (Speed Control Proportional Gain 1) and increase C5-02 (Speed Control Integral Time 1). • If using a closed loop vector mode, enable Inertia Compensation.
Inappropriate parameter settings.		Check the setting for the overspeed detection level and the overspeed detection time (F1-08 and F1-09).
Digital Operator Display		**Fault Name**
ov	ov	DC Bus Overvoltage
		Voltage in the DC bus has exceeded the overvoltage detection level. • For 200 V class: approximately 410 V • For 400 V class: approximately 820 V • For 600 V class: approximately 1040 V
Cause		**Possible Solution**
Deceleration ramp is too short and regenerative energy is flowing from the motor into the drive.		• Increase the deceleration ramp (C1-02, C1-04, C1-06, C1-08). • Make sure the braking resistor rating/external braking transistor rating fits the application. • If an external braking transistor is used, make sure it is connected properly and working as expected.
Fast acceleration ramp causes the motor to overshoot the speed reference.		• Check if sudden drive acceleration triggers an overvoltage alarm. • Increase the acceleration ramp (C1-01, C1-03, C1-05, C1-07). • Increase the jerk setting in C2-02 (decrease if o1-03 > 3)
Surge voltage entering from the drive input power.		Install a DC link choke. **Note:** Voltage surge can result from a thyristor convertor and phase advancing capacitor using the same input power supply.
Ground fault in the output circuit causes the DC bus capacitor to overcharge.		• Check the motor wiring for ground faults. • Correct grounding shorts and turn the power back on.
Drive input power voltage is too high.		• Check the voltage. • Lower drive input power voltage within the limits listed in the specifications.
The braking transistor is wired incorrectly.		• Check braking transistor wiring for errors. • Properly rewire the braking resistor device.
Encoder cable is disconnected.		Reconnect the cable.
Encoder cable wiring is wrong.		Correct the wiring.
Noise interference along the encoder wiring.		Separate the wiring from the source of the noise (often the output lines from the drive).
Drive fails to operate properly due to noise interference.		• Review the list of possible solutions provided for controlling noise. • Review the section on handling noise interference and check the control circuit lines, main circuit lines, and ground wiring.
Motor hunting occurs.		• Adjust the parameters that control hunting. • Adjust the AFR time constant (n2-02 and n2-03).

Digital Operator Display		Fault Name
PF	PF	Input Phase Loss
		Drive input power has an open phase or has a large imbalance of voltage between phases. Detected when L8-05 = 1 (enabled).
Cause		**Possible Solution**
There is phase loss in the drive input power.		• Check for wiring errors in the main circuit drive input power. • Correct the wiring.
There is loose wiring in the drive input power terminals.		• Ensure the terminals are tightened properly. • Apply the tightening torque as specified in this manual. *Refer to Wire Gauges and Tightening Torque on page 69*.
There is excessive fluctuation in the drive input power voltage.		• Check the voltage from the drive input power. • Review the possible solutions for stabilizing the drive input power.
There is poor balance between voltage phases.		• Stabilize drive input power or disable phase loss detection.
The main circuit capacitors are worn.		• Check the maintenance time for the capacitors (U4-05). • Replace the capacitor if U4-05 is greater than 90%. For instructions on replacing the capacitor, contact Yaskawa or a Yaskawa representative.
		Check for problems with the drive input power. If drive input power appears normal but the alarm continues to occur, replace either the control board or the entire drive. For instructions on replacing the control board, contact Yaskawa or a Yaskawa representative.
Digital Operator Display		**Fault Name**
PF5	PF5	Rescue Operation Power Supply Deterioration Error
Cause		**Possible Solution**
During Rescue Operation, either the DC bus voltage dropped below S4-12 × (S4-13 - 10%), or 100 ms after triggering Rescue Operation, the DC bus voltage did not reach S4-12 × S4-13 before the motor started.		• Check the DC bus voltage setting for Rescue Operation (S4-12). • Lower the speed reference set for Rescue Operation (S4-15). • Check the backup power supply. It may need to be replaced with another UPS if it has become worn and can no longer provide enough power.
Digital Operator Display		**Fault Name**
PGo	PGo	Encoder Disconnected (for Control Mode with Encoder)
		No encoder pulses are received for longer than the time set to F1-14.
Cause		**Possible Solution**
Encoder cable is disconnected.		Reconnect the cable.
Encoder cable wiring is wrong.		Correct the wiring.
Encoder has no power.		Check the power line to the encoder.
Motor brake is not released.		Ensure the motor brake releases properly.
During Rescue Operation, either the DC bus voltage dropped below S4-12 × (S4-13 - 10%), or 100 ms after triggering Rescue Operation, the DC bus voltage did not reach S4-12 × S4-13 before the motor started.		• Check the DC bus voltage setting for Rescue Operation (S4-12). • Lower the speed reference set for Rescue Operation (S4-15). • Check the backup power supply. It may need to be replaced with another UPS if it has become worn and can no longer provide enough power.
Digital Operator Display		**Fault Name**
PGoH	PGoH	Encoder Disconnected (detected when using an encoder)
		Encoder cable is not connected properly.
Cause		**Possible Solution**
Encoder cable is disconnected.		Reconnect the cable.
Digital Operator Display		**Fault Name**
rF	rF	Braking Resistor Fault
		The resistance of the braking resistor being used is too low.
Cause		**Possible Solution**
The proper braking resistor option has not been installed.		Select the braking resistor option so that fits to the drives braking transistor specification.
A regenerative converter, regenerative unit or braking unit is being used and the +1 or +3 terminal is connected to - terminal.		Disable the braking transistor protection selection (set L8-55 to 1).
Digital Operator Display		**Fault Name**
rr	rr	Dynamic Braking Transistor Fault
		The built-in dynamic braking transistor failed.
Cause		**Possible Solution**
The braking transistor is damaged.		• Cycle power to the drive and check if the fault reoccurs. *Refer to Diagnosing and Resetting Faults on page 314*. • Replace either the control board or the entire drive. For instructions on replacing the control board, contact Yaskawa or a Yaskawa representative.
The control circuit is damaged.		
Digital Operator Display		**Fault Name**
SC	SC	IGBT Short Circuit
		Short Circuit or Ground Fault is detected
Cause		**Possible Solution**
IGBT fault.		• Check the wiring to the motor. • Turn the power supply off and then on again to check operation. If the problem continues, contact your Yaskawa representative or nearest Yaskawa sales office.
IGBT short circuit detection circuit fault.		
The drive is damaged.		• Check the drive output side short circuit for broken output transistor. B1 and U/V/W - (negative) and U/V/W • Contact your Yaskawa representative or nearest Yaskawa sales office.

Digital Operator Display		Fault Name
SE 1	SE1	Motor Contactor Response Error
		Motor contactor does not respond within the time set to S1-10 (Run Command Delay Time).
Cause		**Possible Solution**
There is a problem with the motor contactor or auxiliary switch.		Check the motor contactor, auxiliary switches and the wiring of the contactor feedback signal.
Digital Operator Display		**Fault Name**
SE2	SE2	Starting Current Error
		The output current was lower than 25% of the motor no-load current at start.
Cause		**Possible Solution**
The motor contactor is open.		Check the contactor for any problems.
Digital Operator Display		**Fault Name**
SE3	SE3	Output Current Error
		The output current was lower than 25% of the motor no-load current during operation.
Cause		**Possible Solution**
The motor contactor opened.		Check the contactor for any problems.
Digital Operator Display		**Fault Name**
SE4	SE4	Brake Feedback Error
		The input terminal set for "Brake feedback" (H1-□□ = 79) or "Brake feedback 2" (H1-□□ = 5B) did not respond within the SE4 error time set to S6-05 after an output terminal set for "Brake release" (H2-□□ = 50) closed.
Cause		**Possible Solution**
The feedback contact on the brake is defective or the wiring is incorrect.		Check the brake feedback contact and the wiring.
The brake control circuit does not work properly.		Ensure the motor brake operates properly with a brake control command from the drive.
Digital Operator Display		**Fault Name**
SvE	SvE	Position Lock Error
		Position deviation during Position Lock.
Cause		**Possible Solution**
Torque limit is set too low.		Set the torque limit to an appropriate value using parameters L7-01 to L7-04.
Excessive load torque.		Reduce the amount of load torque.
Noise interference along encoder wiring.		Check the encoder signal for noise interference.
Digital Operator Display		**Fault Name**
STo	STo	Motor Pull Out or Step Out Detection
		Motor pull out or step out has occurred. Motor has exceeded its pull out torque.
Cause		**Possible Solution**
The wrong motor code has been set (Yaskawa motors only).		• Enter the correct motor code for the PM being used into the E5 parameters. • For special-purpose motors, enter the correct data to all E5 parameters according to the Test Report provided for the motor.
Load is too heavy.		• Reduce the load. • Increase the motor or drive capacity.
Accel/decel ramp is too short.		• Increase the acceleration and deceleration times (C1-01 through C1-08). • Increase the jerk setting in C2-02 through C2-05 (decrease if o1-03 > 3).
Digital Operator Display		**Fault Name**
UL3	UL3	Undertorque Detection 1
		The current has fallen below the minimum value set for torque detection (L6-02) for longer than the allowable time (L6-03).
Cause		**Possible Solution**
Parameter settings are not appropriate for the load.		Check the settings of parameters L6-02 and L6-03.
There is a fault on the machine side.		Check the load for any problems.
Digital Operator Display		**Fault Name**
UL4	UL4	Undertorque Detection 2
		The current has fallen below the minimum value set for torque detection (L6-05) for longer than the allowable time (L6-06).
Cause		**Possible Solution**
Parameter settings are not appropriate for the load.		Check the settings of parameters L6-05 and L6-06.
There is a fault on the machine side.		Check the load for any problems.

Digital Operator Display		Fault Name
Uv1	Uv1	DC Bus Undervoltage
		One of the following conditions occurred while the drive was running: • Voltage in the DC bus fell below the undervoltage detection level (L2-05) • For 200 V class: approximately 190 V • For 400 V class: approximately 380 V (350 V when E1-01 is less than 400) • For 600 V class: approximately 500 V
Cause		**Possible Solution**
Input power phase loss.		• The main circuit drive input power is wired incorrectly. • Correct the wiring.
One of the drive input power wiring terminals is loose.		• Ensure there are no loose terminals. • Apply the tightening torque specified in this manual to fasten the terminals. *Refer to Wire Gauges and Tightening Torque on page 69*.
There is a problem with the voltage from the drive input power.		• Check the voltage. • Correct the voltage to be within the range listed in drive input power specifications. • If there is no problem with the power supply to the main circuit, check for problems with the main circuit magnetic contactor.
The power has been interrupted.		Correct the drive input power.
The main circuit capacitors are worn.		• Check the maintenance time for the capacitors (U4-05). • Replace either the control board or the entire drive if U4-05 exceeds 90%. For instructions on replacing the control board, contact Yaskawa or a Yaskawa representative.
The relay or contactor on the soft-charge bypass circuit is damaged.		• Cycle power to the drive and see if the fault reoccurs. • If the problem continues, replace either the control board or the entire drive. For instructions on replacing the control board, contact Yaskawa or a Yaskawa representative. • Check monitor U4-06 for the performance life of the soft-charge bypass. • Replace either the control board or the entire drive if U4-06 exceeds 90%. For instructions on replacing the control board, contact Yaskawa or a Yaskawa representative.
Digital Operator Display		**Fault Name**
Uv2	Uv2	Control Power Supply Voltage Fault
		Voltage is too low for the control drive input power.
Cause		**Possible Solution**
Control power supply wiring is damaged.		• Cycle power to the drive. Check if the fault reoccurs. • If the problem continues, replace the control board, the entire drive, or the control power supply. For instructions on replacing the control board, contact Yaskawa or a Yaskawa representative.
Internal circuitry is damaged.		• Cycle power to the drive. Check if the fault reoccurs. • If the problem continues, replace either the control board or the entire drive. For instructions on replacing the control board, contact Yaskawa or a Yaskawa representative.
Digital Operator Display		**Fault Name**
Uv3	Uv3	Soft-Charge Bypass Circuit Fault
		The soft-charge bypass circuit failed.
Cause		**Possible Solution**
The relay or contactor on the soft-charge bypass circuit is damaged.		• Cycle power to the drive and see if the fault reoccurs. • If the problem continues, replace either the control board or the entire drive. For instructions on replacing the control board, contact Yaskawa or a Yaskawa representative. • Check monitor U4-06 for the performance life of the soft-charge bypass. • Replace either the control board or the entire drive if U4-06 exceeds 90%. For instructions on replacing the control board, contact Yaskawa or a Yaskawa representative.
Digital Operator Display		**Fault Name**
voF	voF	Output Voltage Detection Error
		Problem detected with the voltage on the output side of the drive.
Cause		**Possible Solution**
Hardware is damaged.		Replace either the control board or the entire drive. For instructions on replacing the control board, contact Yaskawa or a Yaskawa representative.

<1> Displayed as CPF00 or CPF20 when occurring at drive power up. When one of the faults occurs after successfully starting the drive, the display will show CPF01 or CPF21.

6.4 Alarm Detection

◆ Alarm Codes, Causes, and Possible Solutions

Alarms are drive protection functions that do not necessarily cause the drive to stop. Once the cause of an alarm is removed, the drive will return to the same status as before the alarm occurred.

When an alarm has been triggered, the ALM light on the digital operator display blinks and the alarm code display flashes. If a multi-function output is set for an alarm (H2-□□ = 10), that output terminal will be triggered for certain alarms. *Refer to Minor Faults and Alarms on page 283* for information on alarm that trigger an alarm output.

Note: If a multi-function output is set to close when an alarm occurs (H2-□□ = 10), it will also close when maintenance periods are reached, triggering alarms LT-1 through LT-4 (triggered only if H2-□□ = 2F).

Table 6.9 Alarm Codes, Causes, and Possible Solutions

Digital Operator Display		Minor Fault Name
AEr	AEr	Communication Option Node ID Setting Error (CANopen)
		Option card node address is outside the acceptable setting range.
Cause		**Possible Solutions**
Station number is set outside the possible setting range.		Set parameter F6-35 to the proper value if a CANopen option card is used.
Digital Operator Display		**Minor Fault Name**
bb	bb	Baseblock
		Drive output interrupted as indicated by an external baseblock signal.
Cause		**Possible Solutions**
External baseblock signal was entered via one of the multi-function input terminals (S3 to S8).		Check external sequence and baseblock signal input timing.
Digital Operator Display		**Minor Fault Name**
boL	boL	Braking Transistor Overload
		The braking transistor in the drive has been overloaded.
Cause		**Possible Solutions**
The proper braking resistor has not been installed.		Select the optimal braking resistor.
Digital Operator Display		**Minor Fault Name**
bUS	bUS	Option Communication Error
		• After initial communication was established, the connection was lost. • Assign a Up/Down command or speed reference to the option card.
Cause		**Possible Solutions**
Connection is broken or master controller stopped communicating.		• Check for faulty wiring. • Correct the wiring. • Check for disconnected cables and short circuits. Repair as needed.
Option card is damaged.		If there are no problems with the wiring and the fault continues to occur, replace the option card.
The option card is not properly connected to the drive.		• The connector pins on the option card are not properly lined up with the connector pins on the drive. • Reinstall the option card.
A data error occurred due to noise.		• Check options available to minimize the effects of noise. • Take steps to counteract noise in the control circuit wiring, main circuit lines and ground wiring. • Try to reduce noise on the controller side. • Use surge absorbers on magnetic contactors or other equipment causing the disturbance. • Use recommended cables or some other type of shielded line. Ground the shield to the controller side or on the input power side. • All wiring for comm. devices should be separated from drive input power lines. Install an EMC noise filter to the drive input power.
Digital Operator Display		**Minor Fault Name**
CALL	CALL	Serial Communication Stand By
		Communication has not yet been established.
Cause		**Possible Solutions**
Communications wiring is faulty, there is a short circuit, or something is not connected properly.		• Check for wiring errors. • Correct the wiring. • Check for disconnected cables and short circuits. Repair as needed.
Programming error on the master side.		Check communications at start-up and correct programming errors.
Communications circuitry is damaged.		• Perform a self-diagnostics check. • If the problem continues, replace either the control board or the entire drive. For instructions on replacing the control board, contact Yaskawa or your nearest sales representative.
Termination resistor setting is incorrect.		A termination resistor must be installed at both ends of a communication line. Slave drives must have the internal termination resistor switch set correctly. Place DIP switch S2 to the ON position.

Digital Operator Display		Minor Fault Name
CE	CE	MEMOBUS/Modbus Communication Error
		Control data was not received correctly for two seconds.
Cause		**Possible Solutions**
A data error occurred due to noise.		• Check options available to minimize the effects of noise. • Take steps to counteract noise in the control circuit wiring, main circuit lines, and ground wiring. • Reduce noise on the controller side. • Use surge absorbers for the magnetic contactors or other components that may be causing the disturbance. • Use only recommended shielded line. Ground the shield on the controller side or on the drive input power side. • Separate all wiring for comm. devices from drive input power lines. Install an EMC noise filter to the drive input power supply.
Communication protocol is incompatible.		• Check the H5 parameter settings as well as the protocol setting in the controller. • Ensure settings are compatible.
The Communication Fault Detection Time (H5-09) is set shorter than the time required for a communication cycle to take place.		• Check the PLC. • Change the software settings in the PLC. • Set a longer Communication Fault Detection Time (H5-09).
Incompatible PLC software settings or there is a hardware problem.		• Check the PLC. • Remove the cause of the error on the controller side.
Communications cable is disconnected or damaged.		• Check the connector to make sure the cable has a signal. • Replace the communications cable.
Digital Operator Display		**Minor Fault Name**
CrST	CrST	Cannot Reset
Cause		**Possible Solutions**
A fault reset command was entered while the Up/Down command was still present.		• Ensure that a Up/Down command cannot be entered from the external terminals or option card during fault reset. • Turn off the Up/Down command.
Digital Operator Display		**Minor Fault Name**
dEv	dEv	Speed Deviation (when using a PG option card)
		The deviation between the speed reference and speed feedback is greater than the setting in F1-10 for longer than the time in F1-11.
Cause		**Possible Solutions**
Load is too heavy		Reduce the load.
Accel/decel ramp is too short.		Increase the acceleration and deceleration times (C1-01 through C1-08).
The load is locked up.		Check the machine.
Parameter settings are inappropriate.		Check the settings of parameters F1-10 and F1-11.
The motor brake is not applied.		Ensure the motor brake operates properly with a brake control command from the drive.
Digital Operator Display		**Minor Fault Name**
EF	EF	Up/Down Command Error
		Both forward run and reverse run closed simultaneously for over 0.5 s.
Cause		**Possible Solutions**
Sequence error		Check the forward and reverse command sequence and correct the problem. **Note:** When minor fault EF detected, motor ramps to stop.
Digital Operator Display		**Minor Fault Name**
EF0	EF0	Option Card External Fault
		An external fault condition is present.
Cause		**Possible Solutions**
An external fault was received from the PLC with F6-03 = 3 (causing the drive to continue running when an external fault occurs).		• Remove the cause of the external fault. • Remove the external fault input from the PLC.
There is a problem with the PLC program.		Check the PLC program and correct problems.
Digital Operator Display		**Minor Fault Name**
EF3	EF3	External fault (input terminal S3)
		External fault at multi-function input terminal S3.
EF4	EF4	External fault (input terminal S4)
		External fault at multi-function input terminal S4.
EF5	EF5	External fault (input terminal S5)
		External fault at multi-function input terminal S5.
EF6	EF6	External fault (input terminal S6)
		External fault at multi-function input terminal S6.
EF7	EF7	External fault (input terminal S7)
		External fault at multi-function input terminal S7.
EF8	EF8	External fault (input terminal S8)
		External fault at multi-function input terminal S8.
Cause		**Possible Solutions**
An external device has tripped an alarm function.		Remove the cause of the external fault and reset the multi-function input value.
Wiring is incorrect.		• Ensure the signal lines have been connected properly to the terminals assigned for external fault detection (H1-□□ = 2C to 2F). • Reconnect the signal line.
Multi-function contact inputs are set incorrectly.		• Check if the unused terminals have been set for H1-□□ = 2C to 2F (External Fault). • Change the terminal settings.

Digital Operator Display		Minor Fault Name
Hbb	Hbb	Safe Disable Circuit Fault Signal (H1-HC, H2-HC) Release <1>
		Both Safe Disable Input channels are open.
Cause		**Possible Solutions**
Both Safe Disable Inputs H1 and H2 are open.		• Check signal status at the input terminals H1 and H2. • Check the Sink/Source Selection for the digital inputs. • If the Safe Disable function is not utilized, check if the terminals H1-HC, and H2-HC are linked.
Internally, both Safe Disable channels are broken.		Replace either the control board or the entire drive. For instructions on replacing the control board, contact Yaskawa or your nearest sales representative.
Digital Operator Display		**Minor Fault Name**
HbbF	HbbF	Safe Disable Circuit Fault Signal (H1-HC, H2-HC) Release <1>
		One Safe Disable channel is open while the other one is closed.
Cause		**Possible Solutions**
The signals to the Safe Disable inputs are wrong or the wiring is incorrect.		Check signal status at the input terminals H1 and H2. If the Safe Disable function is not utilized, the terminals H1-HC, and H2-HC must be linked.
One of the Safe Disable channels is faulty.		Replace either the control board or the entire drive. For instructions on replacing the control board, contact Yaskawa or your nearest sales representative.
Digital Operator Display		**Minor Fault Name**
HCA	HCA	High Current Alarm
		Drive current exceeded overcurrent warning level (150% of the rated current).
Cause		**Possible Solutions**
Load is too heavy.		Either reduce the load for applications with repetitive operation (repetitive stops and starts, etc.), or replace the drive.
Accel/decel ramp is too short.		Calculate the amount of torque required for the desired acceleration and/or deceleration ramp relative to the inertia moment of the load. If the torque level is not right for the load, take the following steps: • Increase the acceleration and deceleration times (C1-01 through C1-08). • Increase the capacity of the drive.
A special-purpose motor is being used, or the drive is attempting to run a motor greater than the maximum allowable capacity.		• Check the motor capacity. • Use a motor appropriate for the drive. Ensure the motor is within the allowable capacity range.
The current level increased due to a momentary power loss or while attempting to perform a fault reset.		The alarm will appear only briefly. There is no need to take action to prevent the alarm from occurring in such instances.
Digital Operator Display		**Minor Fault Name**
LT-1	LT-1	Cooling Fan Maintenance Time
		The cooling fan has reached its expected maintenance period and may need to be replaced. **Note:** An alarm output (H2-☐☐ = 10) will only be triggered if H2-☐☐ = 2F.
Cause		**Possible Solutions**
The cooling fan has reached 90% of its expected performance life.		Replace the cooling fan and reset the Maintenance Monitor by setting o4-03 to 0.
Digital Operator Display		**Minor Fault Name**
LT-2	LT-2	Capacitor Maintenance Time
		The main circuit and control circuit capacitors are nearing the end of their expected performance life. **Note:** An alarm output (H2-☐☐ = 10) will only be triggered if H2-☐☐ = 2F.
Cause		**Possible Solutions**
The main circuit and control circuit capacitors have reached 90% of their expected performance life.		Replace either the control board or the entire drive. For instructions on replacing the control board, contact Yaskawa or your nearest sales representative.
Digital Operator Display		**Minor Fault Name**
LT-3	LT-3	Soft Charge Bypass Relay Maintenance Time
		The DC bus soft charge relay is nearing the end of its expected performance life. **Note:** An alarm output (H2-☐☐ = 10) will only be triggered if H2-☐☐ = 2F.
Cause		**Possible Solutions**
The DC bus soft charge relay has reached 90% of expected performance life.		Replace either the control board or the entire drive. For instructions on replacing the control board, contact Yaskawa or your nearest sales representative.
Digital Operator Display		**Minor Fault Name**
LT-4	LT-4	IGBT Maintenance Time (90%)
		IGBTs have reached 90% of their expected performance life. **Note:** An alarm output (H2-☐☐ = 10) will only be triggered if H2-☐☐ = 2F.
Cause		**Possible Solutions**
IGBTs have reached 90% of their expected performance life.		Check the load, carrier frequency, and output speed. **NOTICE:** Optimize Performance Life. To maximize drive performance life, make sure the drive output current does not exceed 150% of the drive rated current. Expected performance life estimates the number of drive starts at three million times if output current does not exceed 150%. This assumes the carrier frequency is at its default setting (8 kHz for models CIMR-LU2A0008 to 2A0115, 4A0005 to 4A0091, 5A0003 to 5A0062, 5 kHz for models CIMR-LU2A0145 to 2A0283, 4A0112 to 4A216, 5A0077 and 2 kHz for models CIMR-LU2A0316, 2A0415, 5A0099 to 5A0200) and a peak current of less than 150% of the drive rated current.

Digital Operator Display		Minor Fault Name
oH	oH	Heatsink Overheat
		The temperature of the heatsink exceeded the overheat pre-alarm level set to L8-02 (90-100°C). Default value for L8-02 is determined by drive capacity (o2-04).
Cause		**Possible Solutions**
Surrounding temperature is too high		• Check the surrounding temperature. • Improve the air circulation within the enclosure panel. • Install a fan or air conditioner to cool surrounding area. • Remove anything near drive that may cause extra heat.
Internal cooling fan has stopped.		• Replace the cooling fan. *Refer to Cooling Fan Component Names on page 326*. • After replacing the drive, reset the cooling fan maintenance parameter to (o4-03 = "0").
Airflow around the drive is restricted.		• Provide proper installation space around the drive as indicated in the manual. *Refer to Installation Orientation and Spacing on page 43*. • Allow for the specified space and ensure that there is sufficient circulation around the control panel.
		• Check for dust or foreign materials clogging cooling fan. • Clear debris caught in the fan that restricts air circulation.
Digital Operator Display		**Minor Fault Name**
oH3	oH3	Motor Overheat Alarm (PTC thermistor input)
		• The motor overheat signal to analog input terminal A1 or A2 exceeded the alarm detection level. • Detection requires multi-function analog input H3-02 or H3-10 be set to "E".
Cause		**Possible Solutions**
Motor thermostat wiring is fault (PTC thermistor input).		Repair the PTC thermistor input wiring.
There is a fault on the machine side (e.g., the machine is locked up).		• Check the status of the machine. • Remove the cause of the fault.
Motor has overheated		• Check the size of the load, the accel/decel times, and the cycle times. • Decrease the load. • Increase the acceleration and deceleration times (C1-01 through C1-08).
		• Adjust the preset V/f pattern (E1-04 through E1-10). This will mainly involve reducing E1-08 and E1-10. • Be careful not to lower E1-08 and E1-10 too much, as this reduces load tolerance at low speeds.
		• Check the motor rated current. • Enter the motor rated current as indicated on the motor nameplate (E2-01). • Ensure the motor cooling system is operating normally. • Repair or replace the motor cooling system.
Digital Operator Display		**Minor Fault Name**
oL3	oL3	Overtorque Detection 1
		Drive output current (or torque in OLV, CLV, CLV/PM) was greater than L6-02 for longer than the time set in L6-03.
Cause		**Possible Solutions**
Inappropriate parameter settings.		Check parameters L6-02 and L6-03.
There is a fault on the machine side (e.g., the machine is locked up).		• Check the status of the machine. • Remove the cause of the fault.
Digital Operator Display		**Minor Fault Name**
oL4	oL4	Overtorque Detection 2
		Drive output current (or torque in OLV, CLV, CLV/PM) was greater than L6-05 for longer than the time set in L6-06.
Cause		**Possible Solutions**
Parameter settings are not appropriate.		Check parameters L6-05 and L6-06.
There is a fault on the machine side (e.g., the machine is locked up).		• Check the status of the machine being used. • Remove the cause of the fault.
Digital Operator Display		**Minor Fault Name**
oS	oS	Overspeed (for Control Mode with Encoder)
		The motor speed feedback exceeded the F1-08 setting.
Cause		**Possible Solutions**
Inappropriate parameter settings.		Check the setting for the overspeed detection level and the overspeed detection time (F1-08 and F1-09).
Digital Operator Display		**Minor Fault Name**
ov	ov	DC Bus Overvoltage
		The DC bus voltage exceeded the trip point. For 200 V class: approximately 410 V For 400 V class: approximately 820 V For 600 V class drives: approximately 1040 V
Cause		**Possible Solutions**
Surge voltage present in the drive input power.		• Install a DC link choke or an AC reactor. • Voltage surge can result from a thyristor convertor and a phase advancing capacitor operating on the same drive input power system.
The motor is short-circuited.		• Check the motor power cable, relay terminals and motor terminal box for short circuits. • Correct grounding shorts and turn the power back on.
Ground current has over-charged the main circuit capacitors via the drive input power.		

Noise interference causes the drive to operate incorrectly.	• Review possible solutions for handling noise interference. • Review section on handling noise interference and check control circuit lines, main circuit lines and ground wiring. • If the magnetic contactor is identified as a source of noise, install a surge protector to the MC coil.
	Set number of fault reset (L5-01) to a value other than 0.
Encoder cable is disconnected.	Reconnect the cable.
Encoder cable wiring is wrong.	Correct the wiring.
Noise interference along encoder wiring.	Separate encoder wiring from the source of the noise (often output wiring from the drive).
Digital Operator Display	**Minor Fault Name**
PASS	MEMOBUS/Modbus Communication Test Mode Complete
Cause	**Possible Solutions**
MEMOBUS/Modbus test has finished normally.	This verifies that the test was successful.
Digital Operator Display	**Minor Fault Name**
PGo	Encoder Disconnected (for Control Mode with Encoder)
	Detected when no encoder signal is received for a time longer than setting in F1-14.
Cause	**Possible Solutions**
Encoder cable is disconnected.	Reconnect the cable.
Encoder cable wiring is wrong.	Correct the wiring.
Encoder does not have enough power.	Make sure the correct power supply is properly connected to the encoder.
Motor brake is not released.	Ensure the brake releases properly
Digital Operator Display	**Minor Fault Name**
PGoH	Encoder Disconnected (detected when using an encoder)
	Encoder cable has become disconnected.
Cause	**Possible Solutions**
Encoder cable is disconnected.	Reconnect the cable.
Digital Operator Display	**Minor Fault Name**
SE	MEMOBUS/Modbus Self Test Failed
Cause	**Possible Solutions**
A digital input set to 67H (MEMOBUS/Modbus test) was closed while the drive was running.	Stop the drive and run the test again.
Digital Operator Display	**Minor Fault Name**
TrPC	IGBT Maintenance Time (90%)
	IGBTs have reached 90% of their expected performance life. **Note:** This alarm will not trigger a multi-function output terminal that is set for alarm output (H2-□□ = 10).
Cause	**Possible Solutions**
IGBTs have reached 90% of their expected performance life.	Replace the drive.
Digital Operator Display	**Minor Fault Name**
UL3	Undertorque Detection 1
	Drive output current (or torque in OLV, CLV, CLV/PM) less than L6-02 for longer than L6-03 time.
Cause	**Possible Solutions**
Inappropriate parameter settings.	Check parameters L6-02 and L6-03.
Load has dropped or decreased significantly.	Check for broken parts in the transmission system.
Digital Operator Display	**Minor Fault Name**
UL4	Undertorque Detection 2
	Drive output current (or torque in OLV, CLV, CLV/PM) less than L6-05 for longer than L6-06 time.
Cause	**Possible Solutions**
Inappropriate parameter settings.	Check parameters L6-05 and L6-06.
The load has dropped or decreased significantly.	Check for broken parts in the transmission system.
Digital Operator Display	**Minor Fault Name**
Uv	Undervoltage
	One of the following conditions was true when the drive was stopped and a Up/Down command was entered: • DC bus voltage dropped below the level specified in L2-05. • Contactor to suppress inrush current in the drive was opened. • Low voltage in the control drive input power. This alarm outputs only if L2-01 is not 0 and DC bus voltage is under L2-05.
Cause	**Possible Solutions**
Phase loss in the drive input power.	Check for wiring errors in the main circuit drive input power. Correct the wiring.
Loose wiring in the drive input power terminals.	• Ensure the terminals have been properly tightened. • Apply the tightening torque to the terminals as specified. *Refer to Wire Gauges and Tightening Torque on page 69*.
There is a problem with the drive input power voltage.	• Check the voltage. • Lower the voltage of the drive input power so that it is within the limits listed in the specifications.
Drive internal circuitry is worn.	• Check the maintenance time for the capacitors (U4-05). • Replace either the control board or the entire drive if U4-05 exceeds 90%. For instructions on replacing the control board, contact Yaskawa or your nearest sales representative.

The drive input power transformer is too small and voltage drops when the power is switched on.	• Check for an alarm when the magnetic contactor, line breaker, and leakage breaker are closed. • Check the capacity of the drive input power transformer.
Air inside the drive is too hot.	• Check the temperature inside the drive.
The CHARGE light is broken or disconnected.	Replace either the control board or the entire drive. For instructions on replacing the control board, contact Yaskawa or your nearest sales representative.
Digital Operator Display	**Minor Fault Name**
uoF voF	Output Voltage Detection Error
	There is a problem with the output voltage.
Cause	**Possible Solutions**
Hardware is damaged.	Replace either the control board or the entire drive. For instructions on replacing the control board, contact Yaskawa or your nearest sales representative.

<1> Terminals H1, H2, DM+, and DM- on 600 V class models are designed to the functionality, but are not certified to IEC/EN 61800-5-1, ISO/EN 13849 Cat. 3, IEC/EN 61508 SIL2, Insulation coordination: class 1.

6.5 Operator Programming Errors

◆ oPE Codes, Causes, and Possible Solutions

An Operator Programming Error (oPE) occurs when a contradictory parameter is set or an individual parameter is set to an inappropriate value.

The drive will not operate until the parameter or parameters causing the problem are set correctly. An oPE, however, does not trigger an alarm or fault output. If an oPE occurs, investigate the cause and refer to *Table 6.10* for the appropriate action. When an oPE appears on the operator display, press the ENTER button to view U1-18 and see which parameter is causing the oPE.

Table 6.10 oPE Codes, Causes, and Possible Solutions

Digital Operator Display		Error Name
oPE01	oPE01	Drive Capacity Setting Fault Drive capacity and the value set to o2-04 do not match.
Cause		**Possible Solutions**
The drive model selection (o2-04) and the actual capacity of the drive are not the same.		Correct the value set to o2-04.
Digital Operator Display		**Error Name**
oPE02	oPE02	Parameter Range Setting Error Use U1-18 to find parameters set outside the range.
Cause		**Possible Solutions**
Parameters were set outside the possible setting range.		Set parameters to the proper values.
Note: When multiple errors occur at the same time, other errors are given precedence over oPE02.		
Digital Operator Display		**Error Name**
oPE03	oPE03	Multi-function Digital Input Selection Error A contradictory setting is assigned to multi-function contact inputs H1-03 to H1-08.
Cause		**Possible Solutions**
• The same function is assigned to two multi-function inputs. • Excludes "Brake feedback" and "Brake feedback 2."		• Ensure all multi-function inputs are assigned to different functions. • Re-enter the multi-function settings to ensure this does not occur.
The Brake Feedback (H1-□□ = 79) or Brake Feedback 2 (H1-□□ = 5B) function is assigned to three or more multi-function inputs.		
Motor contactor feedback and Motor contactor feedback 2 (56 vs. 5A) are selected simultaneously.		Check for contradictory settings assigned to the multi-function input terminals simultaneously. Correct setting errors.
Digital Operator Display		**Error Name**
oPE04	oPE04	Terminal Board Mismatch Error
Cause		**Possible Solutions**
The drive, control board, or terminal board has been replaced and the parameter settings between the control board and the terminal board no longer match.		To load the parameter settings to the drive that are stored in the terminal board, set A1-03 to 5550. Initialize parameters after drive replacement by setting A1-03 to 1110 or 2220.
Digital Operator Display		**Error Name**
oPE05	oPE05	Reference Source Selection Error
Cause		**Possible Solutions**
Speed reference is assigned to an option card (b1-01 = 3) but an input option card is not connected to the drive.		Reconnect the input option card to the drive.
The Up/Down command is assigned to an option card (b1-02 = 3) but an input option card is not connected to the drive.		
Although the digital card input is set for BCD special for a 5 digit input (F3-01 = 6), the data length is set for 8 bit or 12 bit (F3-03 = 0, 1).		Set the input data for 16 bit (F3-03 = 2).
Digital Operator Display		**Error Name**
oPE06	oPE06	Control Mode Selection Error Correct the setting for the control method.
Cause		**Possible Solutions**
A control mode has been selected that requires a PG option card to be installed, but no option card is installed (A1-02 = 3 or 7).		• Connect a PG option card. • Correct the value set to A1-02.
Digital Operator Display		**Error Name**
oPE07	oPE07	Multi-function Analog Input Selection Error A contradictory setting is assigned to multi-function analog inputs H3-02 and H3-10.
Cause		**Possible Solutions**
At least two analog input terminals are set to the same function (i.e., parameters H3-02 and H3-10 have the same setting).		Change the settings to H3-02 and H3-10 so that functions no longer conflict. **Note:** Both 0 (speed reference bias) and F (not used) can be set to H3-02 and H3-10 at the same time.

Digital Operator Display		Error Name
oPE08	oPE08	Parameter Selection Error
		A function has been set that cannot be used in the motor control method selected.
Cause		**Possible Solutions**
Attempted to use a function that is not valid for the selected control mode.		Check the motor control method and the functions available.
In Open Loop Vector Control, n2-02 is greater than n2-03		Correct parameter settings so that n2-02 is less than n2-03.
b1-14 (Phase Order Selection) is set to 1 (Switch phase order) when in using a PG option card.		Correct the parameter settings.
Note: Use U1-18 to find parameters that are set outside the specified setting range. Other errors are given precedence over oPE08 when multiple errors occur simultaneously.		
Digital Operator Display		**Error Name**
oPE10	oPE10	V/f Pattern Setting Error
		The following setting errors have occurred where: E1-04 is greater than or equal to E1-06, E1-06 is greater than or equal to E1-07, E1-07 is greater than or equal to E1-09, or E1-09 is greater than or equal to E1-11.
Cause		**Possible Solutions**
–		Correct the settings for E1-04, E1-06, E1-07, E1-09, and E1-11 (for motor 2, correct E3-04, E3-06, E3-07, E3-09, and E3-11).
Digital Operator Display		**Error Name**
oPE16	oPE16	Energy Savings Constants Error
Cause		**Possible Solutions**
Energy saving coefficients are out of the allowable range.		Check and correct the motor data in E5 parameters.
Digital Operator Display		**Error Name**
oPE18	oPE18	Parameter Setting Error, Online Tuning Parameter Setting Error
		• The input from load cell with load condition 1 (S3-29) is set to the same value as load condition 2 (S3-30). • DWELL 2 related parameters are not set correctly. • Parameters that control Online Tuning are not set correctly.
Cause		**Possible Solutions**
S3-29 and S3-30 are set to the same value, meaning that the input from load cell with load condition 1 (S3-29) is set to the same value as load condition 2 (S3-30).		Correct the values set to S3-29 and S3-30.
The Dwell 2 speed reference in S3-20 is greater than 0.00 but is still less than the Dwell 2 End Speed in S3-21.		Correct the values set to S3-20 and S3-21.
Open Loop Vector Control is selected (A1-02 = 2), Online Tuning is enabled (n6-01 = 2), and one of the following contradictory settings exists: • E2-02 is set to 30% or less of its factory default. • E2-06 is set to 50% or less of its factory default. • E2-03 = 0		Correct the values set to E2-02, E2-03, or/and E2-06.
Digital Operator Display		**Error Name**
oPE20	oPE20	PG-F3 Setting Error
		The encoder signal frequency is too high.
Cause		**Possible Solutions**
With the entered encoder resolution (F1-01), maximum output frequency (E1-04), and motor pole number (E5-04,) the calculation encoder signal frequency exceeds 50 kHz (with PG-F3 option) or 20 kHz (with PG-E3 option).		• Set F1-01 to the correct encoder resolution. • Reduce the maximum output frequency of the drive in parameter E1-04 so the encoder signal frequency at maximum speed is lower than 50 kHz.
Digital Operator Display		**Error Name**
oPE21	oPE21	Elevator Parameter Setting Fault
		Elevator parameters are not set correctly.
Cause		**Possible Solutions**
The DC Injection / Position Lock Time at Stop (S1-05) is set to a value lower than the Brake Close Delay Time (S1-07).		Correct parameter settings so that S1-05 > S1-07.
• The deceleration distance (S5-11) is set to value lower than the minimum deceleration distance (U4-43). • The stop distance (S5-12) is set to a value lower than the minimum stop distance (U4-44).		• Correct parameter settings so that S5-11 > U4-43. • Correct parameter settings so that S5-12 > U4-44.
Both S5-10 and S5-01 are enabled at the same time.		Correct the setting in parameters S5-01 and S5-10.

6.6 Auto-Tuning Fault Detection

Auto-Tuning faults in this section are displayed on the digital operator and will cause the motor to coast to a stop. Auto-Tuning faults do not trigger a multi-function digital output set for fault or alarm output.

An End☐ error on the digital operator display indicates Auto-Tuning has successfully completed with discrepancies in the calculations. Check the cause of the End☐ error using the tables in this section and perform Auto-Tuning again after fixing the cause.

The drive may be used in the application if no cause can be identified despite the existence of an End☐ error.

An Er☐ error indicates that Auto-Tuning has not completed successfully. Check for the cause of the error using the tables in this section, and perform Auto-Tuning again after fixing the cause.

◆ Auto-Tuning Codes, Causes, and Possible Solutions

Table 6.11 Auto-Tuning Codes, Causes, and Possible Solutions

Digital Operator Display		Error Name
End1	End1	Excessive V/f Setting (detected only during Rotational Auto-Tuning, and displayed after Auto-Tuning is complete)
Cause		**Possible Solutions**
The torque reference exceeded 20% during Auto-Tuning.		• Before Auto-Tuning the drive, verify the information written on the motor nameplate and enter that data to T1-03 through T1-05. • Enter proper information to parameters T1-03 to T1-05 and repeat Auto-Tuning.
The results from Auto-Tuning the no-load current exceeded 80%.		
Digital Operator Display		**Error Name**
End2	End2	Motor Iron-Core Saturation Coefficient (detected only during Rotational Auto-Tuning and displayed after Auto-Tuning is complete)
Cause		**Possible Solutions**
Motor data entered during Auto-Tuning was incorrect.		• Make sure the data entered to the T1 parameters match the information written on the motor nameplate. • Restart Auto-Tuning and enter the correct information.
Results from Auto-Tuning are outside the parameter setting range, assigning the iron-core saturation coefficient (E2-07, E2-08) a temporary value.		Check and correct faulty motor wiring.
Digital Operator Display		**Error Name**
End3	End3	Rated Current Setting Alarm (displayed after Auto-Tuning is complete)
Cause		**Possible Solutions**
The correct current rating printed on the nameplate was not entered into T1-04.		• Check the setting of parameter T1-04. • Check the motor data and repeat Auto-Tuning.
Digital Operator Display		**Error Name**
End4	End4	Adjusted Slip Calculation Error
Cause		**Possible Solutions**
The slip that was calculated is outside the allowable range.		• Make sure the data entered for Auto-Tuning is correct. • Execute Rotational Auto-Tuning instead. If not possible, try Stationary Auto-Tuning 2.
Digital Operator Display		**Error Name**
End5	End5	Resistance Tuning Error
Cause		**Possible Solutions**
The resistance value that was calculated is outside the allowable range.		• Double-check the data that was entered for the Auto-Tuning process. • Check the motor and motor cable connection for faults.
Digital Operator Display		**Error Name**
End6	End6	Leakage Inductance Alarm
Cause		**Possible Solutions**
A1-02 setting error		• Check the setting of parameter A1-02. • Check the control mode and repeat Auto-Tuning.
The leakage inductance value that was calculated is outside the allowable range.		Double-check the data that was entered for the Auto-Tuning process.
Digital Operator Display		**Error Name**
End7	End7	No-Load Current Alarm
Cause		**Possible Solutions**
The entered no-load current value was outside the allowable range.		Check and correct faulty motor wiring.
Auto-Tuning results were less than 5% of the motor rated current.		Double-check the data that was entered for the Auto-Tuning process.

Digital Operator Display		Error Name
End8	End8	Rescue Operation Speed Warning
Cause		**Possible Solutions**
High frequency injection calculations for the battery power supply were below 10 Hz.		For Rescue Operation, either switch to a larger battery (at least 280 Vdc for a 200 V class drive, 560 Vdc for the 400 V class, or 700 Vdc for the 600 V class) or switch to an absolute encoder and the PG-F3 option card.
Digital Operator Display		**Error Name**
End9	End9	Rescue Operation Rotor Pole Position Search Warning
Cause		**Possible Solutions**
While operating from the backup battery, pole diversion exceeded 40 degrees.		For Rescue Operation, either switch to a larger battery (at least 280 Vdc for a 200 V class drive, 560 Vdc for the 400 V class, or 700 Vdc for the 600 V class) or switch to an absolute encoder and the PG-F3 option card.
Digital Operator Display		**Error Name**
End 10	End10	Rescue Operation Rotor Polarity Detection Warning
Cause		**Possible Solutions**
While operating from the backup battery, the Id value between poles was less than 5%.		For Rescue Operation, either switch to a larger battery (at least 280 Vdc for a 200 V class drive, 560 Vdc for the 400 V class, or 700 Vdc for the 600 V class) or switch to an absolute encoder and the PG-F3 option card.
Digital Operator Display		**Error Name**
Er-01	Er-01	Motor Data Error
Cause		**Possible Solutions**
Motor data or data entered during Auto-Tuning was incorrect.		• Check that the motor data entered to T1 parameters matches motor nameplate input before Auto-Tuning. • Start Auto-Tuning over again and enter the correct information.
Motor output power and motor-rated current settings (T1-02 and T1-04) do not match.		• Check the drive and motor capacities. • Correct the settings of parameters T1-02 and T1-04.
Motor rated current and detected no-load current are not consistent with another.		• Check the motor rated current and no-load current. • Correct the settings of parameters T1-04 and E2-03.
Base frequency and motor rated speed (T1-05 and T1-07) do not match.		• Set T1-05 and T1-07 to the correct value. • Check if the correct pole number was entered to T1-06.
Digital Operator Display		**Error Name**
Er-02	Er-02	Alarm
Cause		**Possible Solutions**
An alarm was triggered during Auto-Tuning.		Exit the Auto-Tuning menu, check the alarm code, remove the alarm cause, and repeat Auto-Tuning.
Digital Operator Display		**Error Name**
Er-03	Er-03	STOP Button Input
Cause		**Possible Solutions**
Auto-Tuning canceled by pressing STOP button.		Auto-Tuning did not complete properly and will have to be performed again.
Digital Operator Display		**Error Name**
Er-04	Er-04	Line-to-Line Resistance Error
Cause		**Possible Solutions**
Motor data entered during Auto-Tuning was incorrect.		• Make sure the data entered to the T1 parameters match the information written on the motor nameplate. • Restart Auto-Tuning and enter the correct information.
Results from Auto-Tuning are outside the parameter setting range or the tuning process took too long.		Check and correct faulty motor wiring.
Motor cable or cable connection faulty.		
Digital Operator Display		**Error Name**
Er-05	Er-05	No-Load Current Error
Cause		**Possible Solutions**
Motor data entered during Auto-Tuning was incorrect.		• Make sure the data entered to the T1 parameters match the information written on the motor nameplate. • Restart Auto-Tuning and enter the correct information.
Results from Auto-Tuning are outside the parameter setting range or the tuning process took too long.		• Check and correct faulty motor wiring. • Perform Rotational Auto-Tuning. Remember that the rope must be fully removed from the motor and the brake must be released to perform Rotational Auto-Tuning.
The load during Rotational Auto-Tuning was too high.		• Disconnect the motor from machine and restart Auto-Tuning. If motor and load cannot be uncoupled make sure the load is lower than 30%. • If a mechanical brake is installed, make sure it is fully lifted during tuning.

5. For the PG-B3 and PG-X3 Option, wire the motor PG encoder to the terminal block. Refer to ***Figure 8.8*** and ***Figure 8.12*** for wiring instructions.
Refer to Terminal Functions on page 360 for a detailed description of the option terminal functions.

Connecting PG-B3 Option

Parameter Settings and Connections for Different Encoder Types

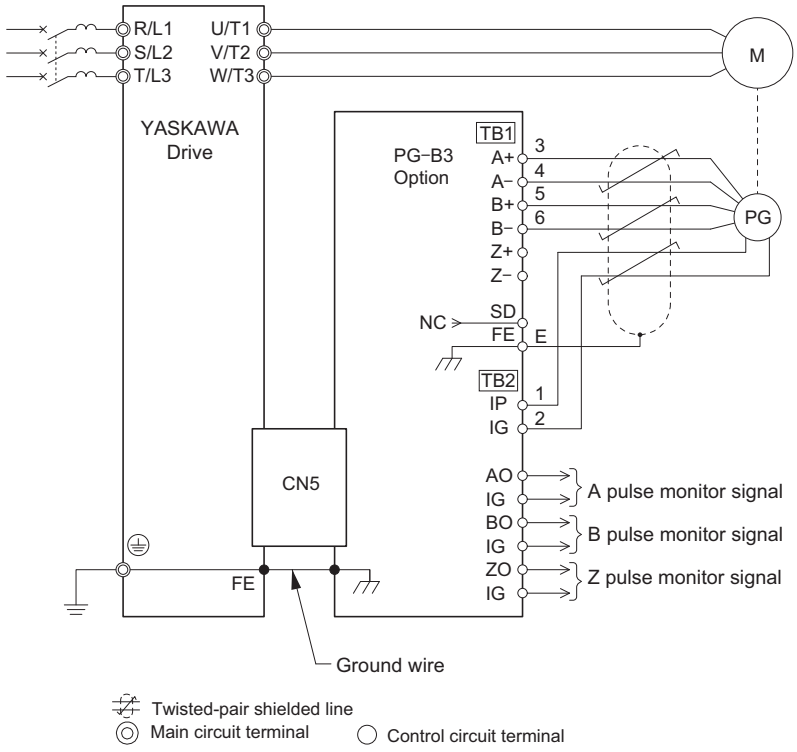
- Connecting a Single-Pulse Encoder
  When using a single-pulse encoder in V/f with PG control mode, connect the pulse output from the PG to the option and set drive parameter F1-21 to 0.
- Connecting a Two-Pulse Encoder
  When using a two-pulse encoder, connect the A and B pulse outputs on the PG to the option and set F1-21 to 1.
  When using a two-pulse encoder in Closed Loop Vector control mode, connect pulse outputs A and B from the encoder to the corresponding terminals on the option.
- Connecting a Two-Pulse Encoder with Z Marker Pulse
  When using a two-pulse encoder with Z marker pulse, connect the A, B, and Z pulse outputs to the corresponding terminals on the option.

Control Method	V/f with PG		Closed Loop Vector	
No. of Encoders	1 (CN5-C)	2 (CN5-B)	1 (CN5-C)	2 (CN5-B)
Single Pulse (A)	F1-21 = 0	F1-37 = 0	N/A	N/A
Two Pulse (AB Quadrature)	F1-21 = 1	F1-37 = 1	No setting required	No setting required
Two Pulse with Marker (ABZ)	F1-21 = 1	F1-37 = 1	No setting required	No setting required

Connection Diagram of PG-B3

Refer to ***Table 8.3*** for a detailed description of the option board terminal functions.

Refer to ***Wire Gauges and Tightening Torques on page 361*** for information on making cables.



<1> Ground the shield on the PG side and the drive side. If noise problems arise in the PG signal, remove the shield ground from one end of the signal line or remove the shield ground connection on both ends.

Figure 8.8 PG-B3 Option and Encoder Connection Diagram

Note: The PG-B3 Option reads a maximum input frequency from the PG encoder of 50 kHz. Be sure to select an PG encoder with an output pulse frequency of maximum 50 kHz when operating at maximum speed.

B.3 Parameter Table

◆ A: Initialization Parameters

The A parameter group creates the operating environment for the drive. This includes the parameter Access Level, Motor Control Method, Password, User Parameters and more.

■ A1: Initialization Parameters

No.(Addr.)	Name	Description	Setting	Page
A1-00 (100H) RUN <1>	Language Selection	All Modes 0: English 1: Japanese 2: German 3: French 4: Italian 5: Spanish 6: Portuguese 7: Chinese 8: Czech 9: Russian 10: Turkish 11: Polish 12: Greek **Note: 1.** Language selection settings 8 to 12 can be selected from an LCD operator with version (REV) F or later. The version number of the LCD operator's PRG software is shown on the back of the digital operator. **2.** Language selection settings 8 to 12 are available in drive software PRG: 7017 or later.	Default: 0 Min: 0 Max: 12	*160*
A1-01 (101H) RUN	Access Level Selection	All Modes 0: View and set A1-01 and A1-04. U□-□□ parameters can also be viewed. 1: User Parameters (access to a set of parameters selected by the user, A2-01 to A2-32) 2: Advanced Access (access to view and set all parameters)	Default: 2 Min: 0 Max: 2	*160*
A1-02 (102H) <1>	Control Method Selection	All Modes 0: V/f Control 2: Open Loop Vector Control 3: Closed Loop Vector Control 7: Closed Loop Vector Control for PM Motors	Default: 2 Min: 0 Max: 7	*161*
A1-03 (103H)	Initialize Parameters	All Modes 0: No initialization 1110: User Initialize (parameter values must be stored using parameter o2-03) 2220: 2-wire initialization 5550: oPE04 error reset	Default: 0 Min: 0 Max: 5550	*161*
A1-04 (104H)	Password	All Modes When the value set into A1-04 does not match the value set into A1-05, parameters A1-01 through A1-03, and A2-01 through A2-33 cannot be changed.	Default: 0000 Min: 0000 Max: 9999	*162*
A1-05 (105H)	Password Setting			

<1> Parameter setting value is not reset to the default value when the drive is initialized.

■ A2: User Parameters

No.(Addr.)	Name	Description	Setting	Page
A2-01 to A2-32 (106 to 125H)	User Parameters 1 to 32	All Modes Parameters that were recently edited are listed here. The user can also select parameters to appear here for quick access.	Default: <5> Min: A1-00 Max: S6-16	*165*
A2-33 (126H)	User Parameter Automatic Selection	All Modes 0: Parameters A2-01 through A2-32 are reserved for the user to create a list of User Parameters. 1: Save history of recently viewed parameters. Recently edited parameters will be saved to A2-17 through A2-32 for quick access.	Default: 1 Min: 0 Max: 1	*165*

<5> Default setting is determined by the control mode (A1-02).

◆ b: Application

Application parameters configure the source of the Up/Down command, timer functions, the Dwell function, the Droop Control function, Energy Savings, and a variety of other application-related settings.

■ b1: Operation Mode Selection

No.(Addr.)	Name	Description	Setting	Page
b1-01 (180H)	Speed Reference Selection	All Modes 0: Digital operator 1: Analog input terminals 2: MEMOBUS/Modbus communications 3: Option card	Default: 0 Min: 0 Max: 3	166
b1-02 (181H)	Up/Down Command Selection	All Modes 0: Digital operator 1: Digital input terminals 2: MEMOBUS/Modbus communications 3: Option card	Default: 1 Min: 0 Max: 3	167
b1-03 (182H)	Stopping Method Selection	All Modes 0: Ramp to stop 1: Coast to stop 4: Elevator Emergency Stop **Note:** Setting 4 is available in the control mode CLV or CLV/PM for drives with software versions PRG: 7017 or later. The setting is 0 or 1 for software version PRG: 7016.	Default: 0 Min: 0 Max: 4	167
b1-06 (185H)	Digital Input Reading	All Modes 0: Input status is read once and processed immediately (for quick response). 1: Input is read twice and processed only if the status is the same in both readings (robust against noisy signals).	Default: 1 Min: 0 Max: 1	168
b1-08 (187H)	Up/Down Command Selection while in Programming Mode	All Modes 0: Up/Down command not accepted while in the Programming Mode. 1: Up/Down command accepted while in the Programming Mode. 2: Prohibit entering Programming Mode during run.	Default: 0 Min: 0 Max: 2	168
b1-14 (1C3H)	Phase Order Selection	All Modes 0: U-V-W 1: U-W-V	Default: 0 Min: 0 Max: 1	168

■ b2: Magnetic Flux Compensation

No.(Addr.)	Name	Description	Setting	Page
b2-08 (190H)	Magnetic Flux Compensation Value	V/f OLV CLV CLV/PM Sets the magnetic flux compensation as a percentage of the no-load current value (E2-03).	Default: 0% Min: 0% Max: 1000%	169

■ b4: Delay Timers

No.(Addr.)	Name	Description	Setting	Page
b4-01 (1A3H)	Timer Function On-Delay Time	All Modes Used to set the on-delay and off-delay times for a digital timer output (H2-□□=12). The output is triggered by a digital input programmed to H1-□□=18).	Default: 0.0 s Min: 0.0 s Max: 3000.0 s	169
b4-02 (1A4H)	Timer Function Off-Delay Time		Default: 0.0 s Min: 0.0 s Max: 3000.0 s	169

■ b6: Dwell Function

No.(Addr.)	Name	Description	Setting	Page
b6-01 (1B6H)	Dwell Speed at Start	All Modes Parameters b6-01 and b6-02 set the speed to hold and the time to maintain that speed at start. Parameters b6-03 and b6-04 set the speed to hold and the time to maintain that speed at stop.	Default: 0.0% Min: 0.0% Max: 100.0%	170
b6-02 (1B7H)	Dwell Time at Start		Default: 0.0 s Min: 0.0 s Max: 10.0 s	170
b6-03 (1B8H)	Dwell Speed at Stop		Default: 0.0% Min: 0.0% Max: 100.0%	170
b6-04 (1B9H)	Dwell Time at Stop		Default: 0.0 s Min: 0.0 s Max: 10.0 s	170

■ b7: Droop Control

No.(Addr.)	Name	Description	Setting	Page
b7-01 (1CAH) RUN	Droop Control Gain	V/f OLV CLV CLV/PM Sets the speed reduction gain applied at a torque reference of 100%. Set as a percentage of motor base speed.	Default: 0.0% Min: 0.0% Max: 100.0%	*170*
b7-02 (1CBH) RUN	Droop Control Delay Time	V/f OLV CLV CLV/PM Used to adjust the responsiveness of Droop Control.	Default: 0.05 s Min: 0.03 s Max: 2.00 s	*171*

■ b8: Energy Saving

No.(Addr.)	Name	Description	Setting	Page
b8-01 (1CCH)	Energy Saving Control Selection	V/f OLV CLV CLV/PM 0: Disabled 1: Enabled	Default: 0 Min: 0 Max: 1	*171*
b8-16 (1F8H)	Energy Saving Control Constant (Ki)	V/f OLV CLV CLV/PM Enter the Energy Saving value (Ki) as specified on the motor name plate. (for IPM motors only)	Default: 0.10 Min: 0.00 Max: 2.00	*171*
b8-17 (1F9H)	Energy Saving Control Constant (Kt)	V/f OLV CLV CLV/PM Enter the Energy Saving value (Kt) as specified on the motor name plate. (for IPM motors only)	Default: 1.00 Min: 0.00 Max: 2.00	*171*

◆ C: Tuning

C parameters are used to adjust the acceleration and deceleration ramps, jerk settings, slip compensation, torque compensation, and carrier frequency selections.

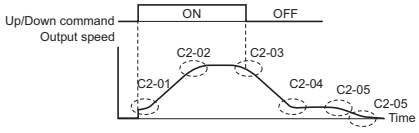
■ C1: Acceleration and Deceleration Ramps

No.(Addr.)	Name	Description	Setting	Page
C1-01 (200H) RUN	Acceleration Ramp 1	All Modes Sets the ramp to accelerate from 0 to maximum speed.	Default: 1.50 s *<6> <8>* Min: 0.00 s Max: 600.00 s *<6> <8>*	*172*
C1-02 (201H) RUN	Deceleration Ramp 1	All Modes Sets the ramp to decelerate from maximum speed to 0.		*172*
C1-03 (202H) RUN	Acceleration Ramp 2	All Modes Sets the ramp to accelerate from 0 to maximum speed.		*172*
C1-04 (203H) RUN	Deceleration Ramp 2	All Modes Sets the ramp to decelerate from maximum speed to 0.		*172*
C1-05 (204H) RUN	Acceleration Ramp 3 (Motor 2 Accel Time 1)	All Modes Sets the ramp to accelerate from 0 to maximum speed.		*172*
C1-06 (205H) RUN	Deceleration Ramp 3 (Motor 2 Decel Time 1)	All Modes Sets the ramp to decelerate from maximum speed to 0.		*172*
C1-07 (206H) RUN	Acceleration Ramp 4 (Motor 2 Accel Time 2)	All Modes Sets the ramp to accelerate from 0 to maximum speed.		*172*
C1-08 (207H) RUN	Deceleration Ramp 4 (Motor 2 Decel Time 2)	All Modes Sets the ramp to decelerate from maximum speed to 0.		*172*
C1-09 (208H)	Fast Stop Ramp	All Modes Sets the ramp for the Fast Stop function.		*173*
C1-10 (209H)	Accel/Decel Setting Resolution	All Modes 0: 0.01 s unit 1: 0.1 s unit	Default: 0 Min: 0 Max: 1	*174*

No.(Addr.)	Name	Description	Setting	Page
C1-11 (20AH)	Accel/Decel Switching Speed	All Modes Sets the speed to switch between accel/decel ramp settings.	Default: 0.0% Min: 0.0% Max: 100.0%	173
C1-12 (246H)	Motor 2 Acceleration Time	V/f OLV CLV CLV/PM Sets the acceleration time for motor 2. **Note:** Parameter C1-12 determines the acceleration time for motor 2 as long as d1-27 is not set to 0.00 Hz.	Default: 1.0 s Min: 0.0 s Max: 600.0 s	174
C1-13	Motor 2 Acceleration Time	V/f OLV CLV CLV/PM Sets the deceleration time for motor 2.	Default: 1.0 s Min: 0.0 s Max: 600.0 s	174
C1-15 (260H)	Inspection Deceleration Ramp	All Modes Sets the deceleration ramp used for inspection run.	Default: 0.00 s <6> <8> Min: 0.00 s Max: 2.00 s <6> <8>	174

<6> Setting ranges and defaults vary by the setting units determined by parameter o1-03.
Refer to *Defaults and Setting Ranges by Display Unit Selection (o1-03) on page 442*.
<8> Setting range value is dependent on parameter C1-10, Accel/Decel Setting Resolution. When C1-10 = 0 (units of 0.01 seconds), the setting range becomes 0.00 to 600.00 seconds.

■ C2: Jerk Settings

No.(Addr.)	Name	Description	Setting	Page
C2-01 (20BH)	Jerk at Accel Start	All Modes Five different jerk values can be set. They are automatically applied as shown in the figure below.  	Default: 0.50 s <6> Min: 0.00 s Max: 10.00 s <6>	174
C2-02 (20CH)	Jerk at Accel End		Default: 0.50 s <6> Min: 0.00 s Max: 10.00 s <6>	174
C2-03 (20DH)	Jerk at Decel Start		Default: 0.50 s <6> Min: 0.00 s Max: 10.00 s <6>	174
C2-04 (20EH)	Jerk at Decel End		Default: 0.50 s <6> Min: 0.00 s Max: 10.00 s <6>	174
C2-05 (25FH)	Jerk below Leveling Speed	All Modes Sets the jerk used when the speed reference is lower than the leveling speed setting.	Default: 0.50 s <6> Min: 0.00 s Max: 10.00 s <6>	174

<6> Setting ranges and defaults vary by the setting units determined by parameter o1-03.
Refer to *Defaults and Setting Ranges by Display Unit Selection (o1-03) on page 442*.

■ C3: Slip Compensation

No.(Addr.)	Name	Description	Setting	Page
C3-01 (20FH) RUN	Slip Compensation Gain	V/f OLV CLV CLV/PM Sets the gain for the motor slip compensation function.	Default: 1.0 Min: 0.0 Max: 2.5	175
C3-02 (210H) RUN	Slip Compensation Primary Delay Time	V/f OLV CLV CLV/PM Adjusts the slip compensation function delay time.	Default: 2000 ms Min: 0 ms Max: 10000 ms	175
C3-03 (211H)	Slip Compensation Limit	V/f OLV CLV CLV/PM Sets an upper limit for the slip compensation function as a percentage of motor rated slip for motor 1 (E2-02).	Default: 200% Min: 0% Max: 250%	175
C3-04 (212H)	Slip Compensation Selection during Regeneration	V/f OLV CLV CLV/PM 0: Disabled. 1: Enabled above 6 Hz. 2: Enabled whenever slip compensation is possible.	Default: 0 Min: 0 Max: 2	176
C3-05 (213H)	Output Voltage Limit Operation Selection	V/f OLV CLV CLV/PM 0: Disabled. 1: Enabled. Automatically decreases motor flux when output voltage saturation is reached. **Note:** Available control modes for parameter C3-05 vary by drive model: Models CIMR-LU2A0008 to 2A0415, 4A0005 to 4A0605, and 5A0003 to 5A0200: Available when A1-02 = 2, 3	Default: <5> Min: 0 Max: 1	176

<5> Default setting is determined by the control mode (A1-02).

■ C4: Torque Compensation

No.(Addr.)	Name	Description	Setting	Page
C4-01 (215H) RUN	Torque Compensation Gain	V/f OLV CLV CLV/PM Sets the gain for the automatic torque (voltage) boost function and helps to produce better starting torque.	Default: 1.00 Min: 0.00 Max: 2.50	177
C4-02 (216H) RUN	Torque Compensation Primary Delay Time	V/f OLV CLV CLV/PM Sets the torque compensation filter time.	Default: <5> Min: 0 ms Max: 60000 ms	178
C4-03 (217H)	Torque Compensation at Forward Start	V/f OLV CLV CLV/PM Sets torque compensation at forward start as a percentage of motor torque.	Default: 0.0% Min: 0.0% Max: 200.0%	178
C4-04 (218H)	Torque Compensation at Reverse Start	V/f OLV CLV CLV/PM Sets torque compensation at reverse start as a percentage of motor torque.	Default: 0.0% Min: -200.0% Max: 0.0%	178
C4-05 (219H)	Torque Compensation Time Constant	V/f OLV CLV CLV/PM Sets the time constant for torque compensation at forward start and reverse start (C4-03 and C4-04).	Default: 10 ms Min: 0 ms Max: 200 ms	178

<5> Default setting is determined by the control mode (A1-02).

■ C5: Speed Control Loop Settings

No.(Addr.)	Name	Description	Setting	Page
C5-01 (21BH) RUN	Speed Control Loop Proportional Gain 1	V/f OLV CLV CLV/PM Sets the proportional gain 1 of the speed control loop.	Default: <5> Min: 0.00 Max: 300.00	180
C5-02 (21CH) RUN	Speed Control Loop Integral Time 1	V/f OLV CLV CLV/PM Sets the integral time 1 of the speed control loop.	Default: <5> Min: 0.000 s Max: 10.000 s	180
C5-03 (21DH) RUN	Speed Control Loop Proportional Gain 2	V/f OLV CLV CLV/PM Sets the proportional gain 2 of the speed control loop.	Default: <5> Min: 0.00 Max: 300.00	180
C5-04 (21EH) RUN	Speed Control Loop Integral Time 2	V/f OLV CLV CLV/PM Sets the integral time 2 of the speed control loop.	Default: 0.500 s Min: 0.000 s Max: 10.000 s	180
C5-06 (220H)	Speed Control Loop Primary Delay Time Constant	V/f OLV CLV CLV/PM Sets the filter time constant for the time from the speed loop to the torque command output.	Default: 0.004 s Min: 0.000 s Max: 0.500 s	180
C5-07 (221H)	Speed Control Settings Switching Speed	V/f OLV CLV CLV/PM Sets the speed for switching between proportional gain 1, 2, 3 and integral time 1, 2, 3.	Default: <5> Min: 0.0% Max: 100.0%	180
C5-08 (222H)	Speed Control Loop Integral Limit	V/f OLV CLV CLV/PM Sets the speed control loop integral upper limit as a percentage of rated torque.	Default: 400% Min: 0% Max: 400%	181
C5-13 (272H) RUN	Speed Control Loop Proportional Gain 3	V/f OLV CLV CLV/PM Sets the proportional gain 3 of the speed control loop.	Default: <5> Min: 0.00 Max: 300.00	180
C5-14 (273H) RUN	Speed Control Loop Integral Time 3	V/f OLV CLV CLV/PM Sets the integral time 3 of the speed control loop.	Default: <5> Min: 0.000 s Max: 10.000 s	180
C5-16 (271H)	Speed Control Loop Delay Time during Position Lock	V/f OLV CLV CLV/PM Sets a delay to the torque command output from speed control loop during Position Lock.	Default: 0.000 s Min: 0.000 s Max: 0.500 s	181
C5-17 (276H)	Motor Inertia	V/f OLV CLV CLV/PM Sets the motor inertia.	Default: <4> Min: 0.0001 kgm^2 Max: 600.00 kgm^2	181
C5-18 (277H)	Load Inertia Ratio	V/f OLV CLV CLV/PM Sets the ratio between the motor and load inertia.	Default: 1.0 Min: 0.0 Max: 6000.0	181
C5-19 (274H) RUN	Speed Control Loop Proportional Gain Time during Position Lock	V/f OLV CLV CLV/PM Sets the Speed Control Loop Proportional gain used during Position Lock.	Default: <5> Min: 0.00 Max: 300.00	181

No.(Addr.)	Name	Description	Setting	Page
C5-20 (275H) RUN	Speed Control Loop Integral Time during Position Lock	V/f OLV CLV CLV/PM Sets the Speed Control Loop Integral time used during Position Lock.	Default:0.100 s Min: 0.000 s Max: 10.000 s	181
C5-50 (B14H) <45>	Set Vibrational Frequency Filter	V/f OLV CLV CLV/PM Sets the mechanical vibration filter frequency in units of 1 Hz. **Note:** Set C5-50 to 0 (Hz) to disable the filter. The frequencies from 1 to 19 Hz cannot be set. Test equipment may be required to determine the mechanical resonance frequency. Setting C5-50 to an improper frequency will result in ineffective filtering of the effects of mechanical resonance.	Default: 0 Hz Min: 20 Hz Max: 1000 Hz	181

<4> Default setting value varies by the drive model (o2-04).
<5> Default setting is determined by the control mode (A1-02).
<45> Available in drive software versions PRG: 7200 or later.

■ C6: Carrier Frequency

No.(Addr.)	Name	Description	Setting	Page
C6-03 (225H)	Carrier Frequency	All Modes Sets the carrier frequency.	Default: <4> Min: 1.0 kHz Max: 15.0 kHz	182
C6-06 (228H)	PWM Method	All Modes Selects PWM modulation method. 0: 2-phase/3-phase conversion 1: 2-phase modulation 2: 3-phase modulation	Default: 0 Min: 0 Max: 2	182
C6-09 (22BH)	Carrier Frequency during Rotational Auto-Tuning	V/f OLV CLV CLV/PM 0: Carrier Frequency = 5 kHz 1: Setting value for C6-03	Default: 0 Min: 0 Max: 1	182
C6-21 (245H)	Inspection Operation Carrier Frequency	All Modes Sets the carrier frequency during Inspection Run. 0: Setting value for C6-03 1: Carrier Frequency = 2 kHz	Default: 1 Min: 0 Max: 1	182
C6-23 (25EH)	Carrier Frequency during Initial Motor Pole Search	V/f OLV CLV CLV/PM Sets the carrier frequency when estimating the initial polarity. 0: Carrier Frequency = 2 kHz 1: Setting value for C6-03	Default: 0 Min: 0 Max: 1	182
C6-31 (77AH) <39>	Carrier Frequency during Rescue Operation	All Modes Sets the carrier frequency during Rescue Operation. 0: C6-03 setting 1: 2 kHz	Default: 0 Min: 0 Max: 1	182

<4> Default setting value varies by the drive model (o2-04).
<39> Available in drive software versions PRG: 7016 or later.

◆ d: Speed References

Speed Reference parameters are used to set the various speed reference values during operation.

■ d1: Speed Reference

No.(Addr.)	Name	Description	Setting	Page
d1-01 (280H) RUN	Speed Reference 1	All Modes Sets the Speed reference for the drive when d1-18 is set to 0 or 3. Setting units are determined by parameter o1-03.	Default: 0.00% <6> Min: 0.00% Max: 100.00% <6>	183
d1-02 (281H) RUN	Speed Reference 2			183
d1-03 (282H) RUN	Speed Reference 3			183
d1-04 (283H) RUN	Speed Reference 4			183
d1-05 (284H) RUN	Speed Reference 5			183
d1-06 (285H) RUN	Speed Reference 6			183
d1-07 (286H) RUN	Speed Reference 7			183
d1-08 (287H) RUN	Speed Reference 8			183
d1-18 (2C0H)	Speed Reference Selection Mode	All Modes Sets the mode of speed reference selection by digital inputs. 0: Use multi-speed references (d1-01 to d1-08) 1: High speed reference has priority (d1-19 to d1-23, d1-26) 2: Leveling speed reference has priority (d1-19 to d1-23, d1-26) 3: Use multi-speed references d1-02 to d1-08, no speed selection stops the drive. Drive will stop when all input terminals programmed for speed references (H1-□□ = 3, 4, 5) are open.	Default: 0 Min: 0 Max: 3	183
d1-19 (2C1H) RUN	Nominal Speed	All Modes Sets the nominal speed reference when d1-18 = 1 or 2.	Default: 100.00% <6> Min: 0.00% Max: 100.00% <6>	184
d1-20 (2C2H) RUN	Intermediate Speed 1	All Modes Sets intermediate speed reference 1 when d1-18 = 1 or 2.	Default: 0.00% <6> Min: 0.00% Max: 100.00% <6>	184
d1-21 (2C3H) RUN	Intermediate Speed 2	All Modes Sets intermediate speed reference 2 when d1-18 = 1 or 2.	Default: 0.00% <6> Min: 0.00% Max: 100.00% <6>	184
d1-22 (2C4H) RUN	Intermediate Speed 3	All Modes Sets intermediate speed reference 3 when d1-18 = 1 or 3.	Default: 0.00% <6> Min: 0.00% Max: 100.00% <6>	184
d1-23 (2C5H) RUN	Releveling Speed	All Modes Sets speed reference for releveling when d1-18 = 1 or 2.	Default: 0.00% <6> Min: 0.00% Max: 100.00% <6>	184
d1-24 (2C6H) RUN	Inspection Operation Speed	All Modes Sets speed reference when inspection operation is enabled.	Default: 50.00% <6> Min: 0.00% Max: 100.00% <6>	184
d1-25 (2C7H) RUN	Rescue Operation Speed	All Modes Sets the speed reference during inspection operation.	Default: 10.00% <6> Min: 0.00% Max: 100.00% <6>	184

No.(Addr.)	Name	Description	Setting	Page
d1-26 (2C8H) RUN	Leveling Speed	All Modes Sets leveling speed reference when d1-18 = 1 or 2.	Default: 8.00% <6> Min: 0.00% Max: 100.00% <6>	184
d1-27 (2C9H)	Motor 2 Speed Reference	V/f OLV CLV CLV/PM Sets the speed reference for motor 2. **Note:** 1. If set to 0.00, the drive will control motor 1 instead. 2. When using motor 2, be sure that the accel/decel times are set in parameters C1-12 and C1-13.	Default: 0.00 Hz Min: 0.00 Hz Max: 200.00 Hz	185
d1-28 (2CAH)	Leveling Speed Detection Level	All Modes Used when d1-18 = 0 or 3. If the speed reference selected is lower than d1-28, then the drive uses the leveling speed as the speed reference.	Default: 0.0% Min: 0.0% Max: 100.0%	185
d1-29 (2CBH)	Inspection Speed Detection Level	All Modes Used when d1-18 = 0 or 3. If the speed reference selected is higher than d1-28 but lower or equal to d1-29, then the drive uses inspection speed as the speed reference.	Default: 0.0% Min: 0.0% Max: 100.0%	185

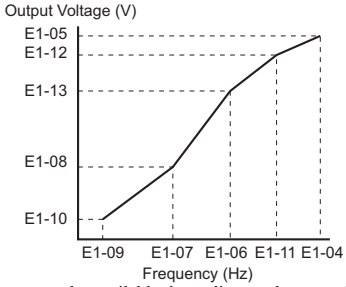
<6> Setting ranges and defaults vary by the setting units determined by parameter o1-03.
Refer to *Defaults and Setting Ranges by Display Unit Selection (o1-03) on page 442*.

■ d6: Field Forcing

No.(Addr.)	Name	Description	Setting	Page
d6-03 (2A2H)	Field Forcing Selection	V/f OLV CLV CLV/PM 0: Disabled 1: Enabled	Default: 0 Min: 0 Max: 1	186
d6-06 (2A5H)	Field Forcing Limit	V/f OLV CLV CLV/PM Sets the upper limit of the excitation current command during magnetic field forcing. A setting of 100% is equal to motor no-load current. Disabled only during DC Injection Braking.	Default: 400% Min: 100% Max: 400%	186

◆ E: Motor Parameters

■ E1: V/f Pattern

No.(Addr.)	Name	Description	Setting	Page
E1-01 (300H)	Input Voltage Setting	All Modes This parameter must be set to the power supply voltage. **WARNING!** Electrical Shock Hazard. Drive input voltage (not motor voltage) must be set in E1-01 for the protective features of the drive to function properly. Failure to do so may result in equipment damage and/or death or personal injury.	Default: 230 V <9> Min: 155 V Max: 255 V <9>	187
E1-03 (302H)	V/f Pattern Selection	V/f OLV CLV CLV/PM F: Custom V/f, E1-04 through E1-13 settings define the V/f pattern	Default: F Min: – Max: F	187
E1-04 (303H)	Maximum Output Frequency	All Modes To set linear V/f characteristics, set the same values for E1-07 and E1-09. In this case, the setting for E1-08 will be disregarded. Ensure that the five frequencies are set according to these rules: E1-09 ≤ E1-07 < E1-06 ≤ E1–11 ≤ E1-04 Note that if E1-11 = 0, then both E1-11 and E1-12 are disabled, and the above conditions do not apply.  **Note:** Some parameters may not be available depending on the control mode. • E1-07, E1-08 and E-10 are available only in the V/f control and Open Loop Vector control modes. • E1-11, E1-12 and E-13 are available only in the V/f control and Closed Loop Vector control modes.	Default: <5> Min: <23> Max: 200.0 Hz	187
E1-05 (304H)	Maximum Voltage		Default: 230.0 V <9> Min: 0.0 V Max: 255.0 V <9>	187
E1-06 (305H)	Base Frequency		Default: <5> Min: 0.0 Hz Max: 200.0 Hz	187
E1-07 (306H)	Middle Output Frequency		Default: 3.0 Hz Min: 0.0 Hz Max: 200.0 Hz	187
E1-08 (307H)	Middle Output Frequency Voltage		Default: <2> <9> Min: 0.0 V Max: 255.0 V <9>	187
E1-09 (308H)	Minimum Output Frequency		Default: <5> Min: 0.0 Hz Max: 200.0 Hz	187
E1-10 (309H)	Minimum Output Frequency Voltage		Default: <2> <9> Min: 0.0 V Max: 255.0 V <9>	187
E1-11 (30AH) <11>	Middle Output Frequency 2		Default: 0.0 Hz Min: 0.0 Hz Max: 120.0 Hz	187
E1-12 (30BH) <11>	Middle Output Frequency Voltage 2		Default: 0.0 V <9> Min: 0.0 V Max: 255.0 V <9>	187
E1-13 (30CH) <13>	Base Voltage		Default: 0.0 V <9> Min: 0.0 V Max: 255.0 V <9>	187

<2> Default setting is dependent on the control mode (A1-02) and the drive model (o2-04).
<5> Default setting is determined by the control mode (A1-02).
<9> Values shown here are for 200 V class drives. The default is 400 V when using a 400 V class drive. Multiply value by 2.875 for 600 V class drives.
<11> Parameter is ignored when E1-11 and E1-12 are set to 0.0.
<13> When E1-13 (Base Voltage) is set to 0.0, output voltage is controlled with E1-05 (Maximum Voltage) = E1-13. When Auto-Tuning is performed, E1-05 and E1-13 are automatically set to the same value.
<23> Setting range depends on the type of motor being used. CLV allows a setting range of 10.0 to 200.0 Hz, while CLV/PM allows a setting range of 4.0 to 200.0 Hz.

■ E2: Motor Parameters

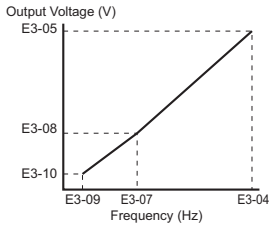
No.(Addr.)	Name	Description	Setting	Page
E2-01 (30EH)	Motor Rated Current	V/f OLV CLV CLV/PM Sets the motor nameplate full load current in Amps. Automatically set during Auto-Tuning.	Default: <4> Min: 10% of drive rated current Max: 200% of drive rated current <10>	188
E2-02 (30FH)	Motor Rated Slip	V/f OLV CLV CLV/PM Sets the motor rated slip. Automatically set during Auto-Tuning.	Default: <4> Min: 0.00 Hz Max: 20.00 Hz	188
E2-03 (310H)	Motor No-Load Current	V/f OLV CLV CLV/PM Sets the no-load current for the motor. Automatically set during Auto-Tuning.	Default: <4> Min: 0 A Max: E2-01 <10>	189
E2-04 (311H)	Number of Motor Poles	V/f OLV CLV CLV/PM Sets the number of motor poles. Automatically set during Auto-Tuning.	Default: 4 Min: 2 Max: 48	189

No.(Addr.)	Name	Description	Setting	Page
E2-05 (312H)	Motor Line-to-Line Resistance	V/f OLV CLV CLV/PM Sets the phase-to-phase motor resistance. Automatically set during Auto-Tuning.	Default: <4> Min: 0.000 Ω Max: 65.000 Ω	189
E2-06 (313H)	Motor Leakage Inductance	V/f OLV CLV CLV/PM Sets the voltage drop due to motor leakage inductance as a percentage of motor rated voltage. Automatically set during Auto-Tuning.	Default: <4> Min: 0.0% Max: 40.0%	189
E2-07 (314H)	Motor Iron-Core Saturation Coefficient 1	V/f OLV CLV CLV/PM Sets the motor iron saturation coefficient at 50% of magnetic flux. Automatically set during Auto-Tuning.	Default: 0.50 Min: 0.00 Max: 0.50	189
E2-08 (315H)	Motor Iron-Core Saturation Coefficient 2	V/f OLV CLV CLV/PM Sets the motor iron saturation coefficient at 75% of magnetic flux. Automatically set during Auto-Tuning.	Default: 0.75 Min: E2-07 Max: 0.75	189
E2-09 (316H)	Motor Mechanical Loss	V/f OLV CLV CLV/PM Sets the motor mechanical loss as a percentage of motor rated power (kW).	Default: 0.0% Min: 0.0% Max: 10.0%	190
E2-10 (317H)	Motor Iron Loss for Torque Compensation	V/f OLV CLV CLV/PM Sets the motor iron loss.	Default: <4> Min: 0 W Max: 65535 W	190
E2-11 (318H)	Motor Rated Power	V/f OLV CLV CLV/PM Sets the motor rated power in kilowatts (1 HP = 0.746 kW). Automatically set during Auto-Tuning.	Default: <4> Min: 0.00 kW Max: 650.00 kW	190

<4> Default setting value varies by the drive model (o2-04).
<10> The display resolution depends on the rated output power of the drive. Models CIMR-LU2A0008 to 2A0033, 4A0005 to 4A0018, and 5A0003 to 5A0013 display values in 0.01 A units, while models CIMR-LU2A0047 to 2A0415, 4A0024 to 4A0605, and 5A0017 to 5A0200 display values in 0.1 A units.

■ E3: V/f Pattern for Motor 2

These parameters are hidden when a PM motor control mode has been selected for motor 1 (A1-02 = 7).

No.(Addr.)	Name	Description	Setting	Page
E3-04 (31AH) <31>	Motor 2 Maximum Output Frequency	V/f OLV CLV CLV/PM These parameters are only applicable when E1-03 is set to F. To set linear V/f characteristics, set the same values for E3-07 and E3-09. In this case, the setting for E3-08 will be disregarded. Ensure that the four frequencies are set according to these rules or an oPE10 fault will occur: E3-09 ≤ E3-07 < E3-06 ≤ E3-04  	Default: 60.0 Hz Min: 10.0 Hz Max: 200.0 Hz	191
E3-05 (31BH) <31>	Motor 2 Maximum Voltage		Default: 230.0 V <9> Min: 0.0 V Max: 255.0 V <9>	191
E3-06 (31CH) <31>	Motor 2 Base Frequency		Default: 60.0 Hz Min: 0.0 Hz Max: 200.0 Hz	191
E3-07 (31DH) <31>	Motor 2 Mid Output Frequency		Default: 3.0 Hz Min: 0.0 Hz Max: 200.0 Hz	191
E3-08 (31EH) <31>	Motor 2 Mid Output Frequency Voltage		Default: <4> <9> Min: 0.0 V Max: 255.0 V <9>	191
E3-09 (31FH) <31>	Motor 2 Minimum Output Frequency		Default: 1.5 Hz Min: 0.0 Hz Max: 200.0 Hz	191
E3-10 (320H) <31>	Motor 2 Minimum Output Frequency Voltage		Default: <4> <9> Min: 0.0 V Max: 255.0 V <9>	191

<4> Default setting value is dependent on the drive model (o2-04).
<9> Values shown here are for 200 V class drives. Double the value when using a 400 V class drive. Multiply value by 2.875 for 600 V class drives.
<31> Available in drive software versions PRG: 7012 or later.

■ E4: Motor 2 Parameters

These parameters are hidden when a PM motor control mode has been selected for motor 1 (A1-02 = 7).

No.(Addr.)	Name	Description	Setting	Page
E4-01 (321H)	Motor 2 Rated Current	V/f OLV CLV CLV/PM Sets the full load current for motor 2. Automatically set during Auto-Tuning.	Default: <4> Min: 10% of drive rated current Max: 200% of drive rated current <10>	192

No.(Addr.)	Name	Description	Setting	Page
E4-02 (322H)	Motor 2 Rated Slip	V/f OLV CLV CLV/PM Sets the rated slip for motor 2. Automatically set during Auto-Tuning.	Default: <4> Min: 0.00 Hz Min: 20.00 Hz	192
E4-03 (323H)	Motor 2 Rated No-Load Current	V/f OLV CLV CLV/PM Sets the no-load current for motor 2. Automatically set during Auto-Tuning.	Default: <4> Min: 0 A Min: [E4-01] <10>	192
E4-04 (324H)	Motor 2 Motor Poles	V/f OLV CLV CLV/PM Sets the number of poles of motor 2. Automatically set during Auto-Tuning.	Default: 4 Min: 2 Max: 48	192
E4-05 (325H)	Motor 2 Line-to-Line Resistance	V/f OLV CLV CLV/PM Sets the phase-to-phase resistance for motor 2. Automatically set during Auto-Tuning.	Default: <4> Min: 0.000 Ω Max: 65.000 Ω	193
E4-06 (326H)	Motor 2 Leakage Inductance	V/f OLV CLV CLV/PM Sets the voltage drop for motor 2 due to motor leakage inductance as a percentage of rated voltage. Automatically set during Auto-Tuning.	Default: <4> Min: 0.0% Max: 40.0%	193

<4> Default setting value is dependent on the drive model (o2-04).
<10> The display resolution depends on the rated output power of the drive. Models CIMR-LU2A0008 to 2A0033, 4A0005 to 4A0018, and 5A0003 to 5A0013 display values in 0.01 A units, while models CIMR-LU2A0047 to 2A0415, 4A0024 to 4A0605, and 5A0017 to 5A0200 display values in 0.1 A units.

■ E5: PM Motor Settings

No.(Addr.)	Name	Description	Setting	Page
E5-02 (32AH) <1>	Motor Rated Power	V/f OLV CLV CLV/PM Sets the rated capacity of the motor.	Default: <4> Min: 0.10 kW Max: 650.00 kW	193
E5-03 (32BH) <1>	Motor Rated Current	V/f OLV CLV CLV/PM Sets the motor rated current.	Default: <4> Min: 10% of drive rated current Max: 200% of drive rated current <10>	193
E5-04 (32CH) <1>	Number of Motor Poles	V/f OLV CLV CLV/PM Sets the number of motor poles.	Default: 12 Min: 2 Max: 120 <43>	193
E5-05 (32DH) <1>	Motor Stator Resistance (Single Phase)	V/f OLV CLV CLV/PM Sets the stator resistance (1 phase value).	Default: <4> Min: 0.000 Ω Max: 65.000 Ω	193
E5-06 (32EH) <1>	Motor d-Axis Inductance	V/f OLV CLV CLV/PM Sets the d-axis inductance.	Default: <4> Min: 0.00 mH Max: 600.00 mH	194
E5-07 (32FH) <1>	Motor q-Axis Inductance	V/f OLV CLV CLV/PM Sets the q-axis inductance.	Default: <4> Min: 0.00 mH Max: 600.00 mH	194
E5-09 (331H) <1>	Motor Induction Voltage Constant 1	V/f OLV CLV CLV/PM Sets the induced phase peak voltage in units of 0.1 mV (rad/s) [electrical angle]. When setting this parameter, E5-24 should be set to 0.0.	Default: <4> Min: 0.0 mV/(rad/s) Max: 6500.0 mV/(rad/s)	194
E5-11 (333H)	Encoder Offset	V/f OLV CLV CLV/PM Sets the offset between the rotor magnetic axis and the encoder zero position. Set during Encoder Offset Tuning.	Default: 0.0 deg Min: -180 deg Max: 180 deg	194
E5-24 (353H)	Motor Induction Voltage Constant 2	V/f OLV CLV CLV/PM Sets the induced phase-to-phase rms voltage in units of 0.1 mV/(r/min) [mechanical angle]. When setting this parameter, E5-09 should be set to 0.0.	Default: 0.0 mV/(r/min) Min: 0.0 mV/(r/min) Max: 6500.0 mV/(r/min)	194

<1> Parameter setting value is not reset to the default value when the drive is initialized.
<4> Default setting value is determined by the drive model (o2-04).
<10> The display resolution depends on the rated output power of the drive. Models CIMR-LU2A0008 to 2A0033, 4A0005 to 4A0018, and 5A0003 to 5A0013 display values in 0.01 A units, while models CIMR-LU2A0047 to 2A0415, 4A0024 to 4A0605, and 5A0017 to 5A0200 display values in 0.1 A units.
<43> When PG-E3 option connected: Max setting = 48

◆ F: Option Settings

F parameters are used to program the drive for Encoder and PG feedback from the motor and to function with option cards.

■ F1: PG Speed Control Card

No.(Addr.)	Name	Description	Setting	Page
F1-01 (380H)	Encoder 1 Resolution	V/f OLV **CLV** **CLV/PM** Sets the encoder resolution (number of pulses per revolution)	Default: <5> Min: 1 ppr Max: 60000 ppr <34>	195
F1-02 (381H)	Operation Selection at PG Open Circuit (PGo)	V/f OLV **CLV** **CLV/PM** 0: Ramp to stop. Decelerate to stop using the deceleration ramp in C1-02. 1: Coast to stop. 2: Fast Stop. Decelerate to stop using the deceleration ramp in C1-09. 3: Alarm only.	Default: 1 Min: 0 Max: 3	195
F1-03 (382H)	Operation Selection at Overspeed (oS)	V/f OLV **CLV** **CLV/PM** 0: Ramp to stop. Decelerate to stop using the deceleration ramp in C1-02. 1: Coast to stop. 2: Fast Stop. Decelerate to stop using the deceleration ramp in C1-09. 3: Alarm only.	Default: 1 Min: 0 Max: 3	195
F1-04 (383H)	Operation Selection at Deviation	V/f OLV **CLV** **CLV/PM** 0: Ramp to stop. Decelerate to stop using the deceleration ramp in C1-02. 1: Coast to stop. 2: Fast Stop. Decelerate to stop using the deceleration ramp in C1-09. 3: Alarm only.	Default: 3 Min: 0 Max: 3	196
F1-05 (384H)	Encoder 1 Rotation Direction Selection	V/f OLV **CLV** **CLV/PM** 0: A phase leads B in the up direction 1: B phase leads A in the up direction	Default: <5> Min: 0 Max: 1	196
F1-06 (385H)	PG 1 Pulse Monitor Output Division Ratio	V/f OLV **CLV** **CLV/PM** Sets the division ratio for the pulse monitor used of the PG option card installed to connector CN5-C. By setting “xyz”, the division ratio becomes = [(1 + x) / yz]. If only using the A pulse for one track input, then the input ratio will be 1:1, regardless of what F1-06 is set to.	Default: 1 Min: 1 Max: 132	196
F1-08 (387H)	Overspeed Detection Level	V/f OLV **CLV** **CLV/PM** Sets the overspeed detection level as a percentage of the maximum output frequency.	Default: 115% Min: 0% Max: 120%	195
F1-09 (388H)	Overspeed Detection Delay Time	V/f OLV **CLV** **CLV/PM** Sets the time in seconds for an overspeed situation to trigger a fault (oS).	Default: 0.0 s Min: 0.0 s Max: 2.0 s	195
F1-10 (389H)	Excessive Speed Deviation Detection Level	V/f OLV **CLV** **CLV/PM** Sets the speed deviation detection level as a percentage of the maximum output frequency.	Default: 10% Min: 0% Max: 50%	196
F1-11 (38AH)	Excessive Speed Deviation Detection Delay Time	V/f OLV **CLV** **CLV/PM** Sets the time in seconds for a speed deviation situation to trigger a fault (dEv).	Default: 0.5 s Min: 0.0 s Max: 10.0 s	196
F1-14 (38DH)	PG Open-Circuit Detection Time	V/f OLV **CLV** **CLV/PM** Sets the time required to trigger a PG Open fault (PGo).	Default: 2.0 s Min: 0.0 s Max: 10.0 s	195
F1-18 (3ADH)	dv3 Detection Selection	V/f OLV CLV **CLV/PM** 0: Disabled n: Sets the number of dv3 situations that may be detected before triggering an actual dv3 fault.	Default: 10 Min: 0 Max: 10	196
F1-19 (3AEH)	dv4 Detection Selection	V/f OLV CLV **CLV/PM** 0: Disabled n: Number of pulses that the A and B pulse are reversed that triggers dv4 detection.	Default: 128 Min: 0 Max: 5000	197
F1-20 (3B4H)	PG Option Card Disconnect Detection 1	V/f OLV **CLV** **CLV/PM** 0: Disabled 1: Enabled	Default: 1 Min: 0 Max: 1	197
F1-29 (3BFH)	dEv Detection Condition Selection	V/f OLV CLV **CLV/PM** Selects when DEV is active. 0: After speed reference, soft starter output and motor speed have matched once. 1: After speed reference and soft starter output have matched once. 2: Always during Run	Default: 2 Min: 0 Max: 2	197

No.(Addr.)	Name	Description	Setting	Page
F1-50 (3D2H) <39>	Encoder Selection	V/f OLV CLV **CLV/PM** Selects the encoder connected the PG-F3 option. 0: EnDat 2.1/01, 2.2/01 Serial Communication + Sin/Cos 1: EnDat 2.2/22 Serial Communication 2: HIPERFACE	Default: 0 Min: 0 Max: 2	*197*
F1-51 (3D3H)	PGoH Detection Level	V/f OLV CLV **CLV/PM** Sets the level for detecting PG Hardware Fault (PGoH). Available when F1-20 = 1	Default: 80% Min: 1% Max: 100%	*198*
F1-52 (3D4H) <39>	Communication Speed of Serial Encoder Selection	V/f OLV CLV **CLV/PM** Selects the communication speed between the PG-F3 option and serial encoder. 0: 1M bps/9600 bps 1: 500k bps/19200 bps 2: 1M bps/38400 bps 3: 1M bps/38400 bps	Default: 0 Min: 0 Max: 3	*198*
F1-63 (2DFH)	PG-E3 R Track Selection	V/f OLV CLV **CLV/PM** 0: Disabled 1: Enabled	Default: 0 Min: 0 Max: 1	*198*
F1-66 to F1-81 (B9AH to BA9H) <44>	Encoder Adjust 1 to 16	V/f OLV CLV **CLV/PM** Sets encoder offsets 1 to 16 for the PG-E3 option card. These parameters are automatically set by the execution of Auto-Tuning of PG-E3 encoder characteristics.	Default: 0 Min: 0 Max: FFFF	*198*

<5> Default setting is determined by the control mode (A1-02).
<34> Setting range is 1 to 15000 ppr when the drive is set for CLV/PM.
<39> Available in drive software versions PRG: 7016 or later.
<44> Available in drive software versions PRG: 7017 or later.

■ F3: Digital Input Card (DI-A3)

No.(Addr.)	Name	Description	Setting	Page
F3-01 (390H)	DI-A3 Option Card Input Selection	**All Modes** 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 customized setting (5 digit), 0.02 Hz units 7: Binary input The unit and the setting range are determined by F3-03. F3-03 = 0: 255/100% (-255 to +255) F3-03 = 1: 40961/100% (-4095 to +4095) F3-03 = 2: 30000/100% (-33000 to +33000) When the digital operator units are set to be displayed in Hertz or user-set units (o1-03 = 2 or 3), the units for F3-01 are determined by parameter o1-03.	Default: 0 Min: 0 Max: 7	*198*
F3-03 (3B9H)	DI-A3 Option Card Data Length Selection	**All Modes** 0: 8 bit 1: 12 bit 2: 16 bit	Default: 2 Min: 0 Max: 2	*199*

■ F4: Analog Monitor Card (AO-A3)

No.(Addr.)	Name	Description	Setting	Page
F4-01 (391H)	Terminal V1 Function Selection	**All Modes** Sets the monitor signal for output from terminal V1. Set this parameter to the last three digits of the desired U□-□□ monitor. Some U parameters are available only in certain control modes.	Default: 102 Min: 000 Max: 999	*199*
F4-02 (392H) RUN	Terminal V1 Gain	**All Modes** Sets the gain for voltage output via terminal V1.	Default: 100.0% Min: -999.9% Max: 999.9%	*199*
F4-03 (393H)	Terminal V2 Function Selection	**All Modes** Sets the monitor signal for output from terminal V2. Set this parameter to the last three digits of the desired U□-□□ monitor. Some U parameters are available only in certain control modes.	Default: 103 Min: 000 Max: 999	*199*
F4-04 (394H) RUN	Terminal V2 Gain	**All Modes** Sets the gain for voltage output via terminal V2.	Default: 50.0% Min: -999.9% Max: 999.9%	*199*

No.(Addr.)	Name	Description	Setting	Page
F4-05 (395H) RUN	Terminal V1 Bias	All Modes Sets the amount of bias added to the voltage output via terminal V1.	Default: 0.0% Min: -999.9% Max: 999.9%	199
F4-06 (396H) RUN	Terminal V2 Bias	All Modes Sets the amount of bias added to the voltage output via terminal V2.	Default: 0.0% Min: -999.9% Max: 999.9%	199
F4-07 (397H)	Terminal V1 Signal Level Selection	All Modes 0: 0 to 10 V 1: -10 to 10 V	Default: 1 Min: 0 Max: 1	200
F4-08 (398H)	Terminal V2 Signal Level Selection		Default: 1 Min: 0 Max: 1	200

■ F5: Digital Output Card (DO-A3)

No.(Addr.)	Name	Description	Setting	Page
F5-01 (399H)	Terminal P1-C1 Output Selection	All Modes Sets the function for contact output terminals M1-M2, M3-M4, and photocoupler output terminals P1 through P6.	Default: 0 Min: 0 Max: 161	200
F5-02 (39AH)	Terminal P2-C2 Output Selection		Default: 1 Min: 0 Max: 161	200
F5-03 (39BH)	Terminal P3-C3 Output Selection		Default: 2 Min: 0 Max: 161	200
F5-04 (39CH)	Terminal P4-C4 Output Selection		Default: 4 Min: 0 Max: 161	200
F5-05 (39DH)	Terminal P5-C5 Output Selection		Default: 6 Min: 0 Max: 161	200
F5-06 (39EH)	Terminal P6-C6 Output Selection		Default: 37 Min: 0 Max: 161	200
F5-07 (39FH)	Terminal M1-M2 Output Selection		Default: F Min: 0 Max: 161	200
F5-08 (3A0H)	Terminal M3-M4 Output Selection		Default: F Min: 0 Max: 161	200
F5-09 (3A1H)	DO-A3 Output Mode Selection	All Modes 0: Output terminals are each assigned separate output functions. 1: Binary code output 2: Use output terminal functions selected by parameters F5-01 through F5-08.	Default: 0 Min: 0 Max: 2	200

■ F6: Communication Option Card

For more details on a specific option card, refer to the instruction manual for the option card.

No.(Addr.)	Name	Description	Setting	Page
F6-01 (3A2H)	Operation Selection after Communications Error	All Modes 0: Ramp to stop. Decelerate to stop using the deceleration ramp in C1-02. 1: Coast to stop. 2: Fast Stop. Decelerate to stop using the deceleration ramp in C1-09. 3: Alarm only.	Default: 1 Min: 0 Max: 3	201
F6-02 (3A3H)	External Fault from Communication Option Detection Selection	All Modes 0: Always detected 1: Detection during run only	Default: 0 Min: 0 Max: 1	201
F6-03 (3A4H)	External Fault from Communication Option Operation Selection	All Modes 0: Ramp to stop. Decelerate to stop using the deceleration ramp in C1-02. 1: Coast to stop. 2: Fast Stop. Decelerate to stop using the deceleration ramp in C1-09. 3: Alarm only.	Default: 1 Min: 0 Max: 3	201
F6-04 (3A5H)	bUS Error Detection Time	All Modes Sets the delay time for error detection if a bus error occurs.	Default: 2.0 s Min: 0.0 s Max: 5.0 s	–

No.(Addr.)	Name	Description	Setting	Page
F6-06 (3A7H)	Torque Limit Selection from Communications Option	V/f OLV CLV CLV/PM 0: Disabled. Torque limit from option card disabled. 1: Enabled. Torque limit from option card enabled.	Default: 0 Min: 0 Max: 1	201
F6-08 (36AH) <1>	Reset Communication Parameter	All Modes 0: Communication-related parameters (F6-☐☐) are not reset when the drive is initialized using A1-03. 1: Reset all communication-related parameters (F6-☐☐) when the drive is initialized using A1-03.	Default: 0 Min: 0 Max: 1	202
F6-35 (3D0H)	CANopen Node ID	All Modes Sets the node address.	Default: 0 Min: 0 Max: 126	–
F6-36 (3D1H)	CANopen Communication Speed	All Modes 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	Default: 6 Min: 0 Max: 8	–

<1> Parameter setting value is not reset to the default value when the drive is initialized.

◆ H: Multi-Function Terminals

H parameters assign functions to the multi-function input and output terminals.

■ H1: Multi-Function Digital Inputs

No.(Addr.)	Name	Description	Setting	Page
H1-03 (400H)	Terminal S3 Function Selection	All Modes Assigns a function to the multi-function digital inputs. Refer to page 408 to page 410 for a description of setting values. **Note:** Unused terminals should be set to F.	Default: <19> Min: 3 Max: 79	203
H1-04 (401H)	Terminal S4 Function Selection		Default: <19> Min: 3 Max: 79	203
H1-05 (402H)	Terminal S5 Function Selection		Default: <19> Min: 3 Max: 79	203
H1-06 (403H)	Terminal S6 Function Selection		Default: <19> Min: 3 Max: 79	203
H1-07 (404H)	Terminal S7 Function Selection		Default: <19> Min: 3 Max: 79	203
H1-08 (405H)	Terminal S8 Function Selection		Default: F Min: 3 Max: 79	203

<19> With the speed reference priority d1-18 is set to 0 or 3, the default settings for parameters H1-03 to H1-07 governing input terminals S3 to S7 are: 24, 14, 3, 4, and 5 respectively. When d1-18 is set to 1 or 2, the default settings for H1-03 to H1-07 become 50, 54, 51, 53, and F respectively.

H1 Multi-Function Digital Input Settings			
H1-☐☐ Setting	Function	Description	Page
3	Multi-Step Speed Reference 1	All Modes When input terminals are set to Multi-Step Speed References 1 through 3, switching combinations of those terminals will create a multi-step speed sequence using the speed references set in d1-01 through d1-08.	203
4	Multi-Step Speed Reference 2		203
5	Multi-Step Speed Reference 3		203
6	Jog reference selection	All Modes Closed: Jog frequency reference (d1-17) selected. The Jog frequency can be used when the speed reference selection is not assigned to input terminals (b1-01 ≠ 1) and the speed reference priority is set to use the multi-step speed reference (d1-18 = 0 or 3).	203

H1 Multi-Function Digital Input Settings			
H1-☐☐ Setting	Function	Description	Page
7	Accel/decel Ramp Selection 1	All Modes Used to switch between accel/decel ramp 1 (set in C1-01, C1-02) and accel/decel ramp 2 (set in C1-03, C1-04). When combined with another input terminal set for "Accel/Decel ramp 2" (H1-☐☐ = 1A), the drive can also switch between accel/decel ramp 3 (set in C1-05, C1-06) and accel/decel ramp 4 (set in C1-07, C1-08).	*204*
8	Baseblock Command (N.O.)	All Modes Closed: No drive output	*204*
9	Baseblock Command (N.C.)	All Modes Open: No drive output	*204*
F	Not Used (Through Mode)	All Modes Select this setting when the terminal is not used or when using the terminal in the pass-through mode. The terminal does not trigger a drive function but can be used as digital input for the controller the drive is connected to.	*204*
14	Fault Reset	All Modes Closed: Resets faults if the cause is cleared and the Up/Down command is removed.	*204*
15	Fast Stop (N.O.)	All Modes Closed: Decelerates to stop at the Fast Stop ramp set to C1-09.	*204*
16	Motor 2 Selection	All Modes Open: Motor 1(E1-☐☐, E3-☐☐) Closed: Motor 2 (E2-☐☐, E4-☐☐)	*205*
17	Fast Stop (N.C.)	All Modes Open: Decelerates to stop at the Fast Stop ramp set to C1-09.	*204*
18	Timer Function Input	All Modes Triggers the timer set up by parameters b4-01 and b4-02. Must be set in conjunction with the timer function output (H2-☐☐ = 12).	*205*
1A	Accel/decel Ramp Selection 2	All Modes Used in conjunction with an input terminal set for “Accel/decel ramp selection 1” (H1-☐☐ = 7), and allows the drive to switch between accel/decel ramp 3 and 4.	*205*
20 to 2F	External Fault	All Modes 20: N.O., Always detected, ramp to stop 21: N.C., Always detected, ramp to stop 22: N.O., During run, ramp to stop 23: N.C., During run, ramp to stop 24: N.O., Always detected, coast to stop 25: N.C., Always detected, coast to stop 26: N.O., During run, coast to stop 27: N.C., During run, coast to stop 28: N.O., Always detected, Fast Stop 29: N.C., Always detected, Fast Stop 2A: N.O., During run, Fast Stop 2B: N.C., During run, Fast Stop 2C: N.O., Always detected, alarm only (continue running) 2D: N.C., Always detected, alarm only (continue running) 2E: N.O., During run, alarm only (continue running) 2F: N.C., During run, alarm only (continue running)	*206*
50	Nominal Speed	All Modes Closed: Activates the nominal speed (d1-19).	*206*
51	Intermediate Speed	All Modes Closed: Activates the Intermediate Speed (d1-20).	*206*
52	Releveling Speed	All Modes Closed: Activates the Releveling Speed (d1-23).	*206*
53	Leveling Speed	All Modes Closed: Activates the Leveling Speed (d1-26).	*206*
54	Inspection Operation	All Modes Closed: Activates Inspection operation using the speed set in d1-24.	*207*
55	Rescue Operation	All Modes Closed: Activates rescue operation.	*207*

H1 Multi-Function Digital Input Settings			
H1-□□ Setting	Function	Description	Page
56	Motor Contactor Feedback	All Modes Open: Motor contactor open Closed: Motor contactor closed (N.O.)	207
57	High Speed Limit (Up)	All Modes Closed: Uses the leveling speed as the maximum speed when going up.	207
58	High Speed Limit (Down)	All Modes Closed: Uses the leveling speed as the maximum speed when going down.	207
5A <44>	Motor Contactor Feedback 2	All Modes Open: Motor contactor closed (N.C.) Closed: Motor contactor open	207
5B <44>	Brake Feedback 2	All Modes Open: Brake open (N.C.) Closed: Brake closed	207
5C	Floor Sensor	V/f OLV CLV CLV/PM Closed: Initiate Direct Landing (S5-10 = 1)	207
67	Communications Test Mode	All Modes Tests the MEMOBUS/Modbus RS-485/422 interface. Displays “PASS” if the test completes successfully.	207
79	Brake Feedback	All Modes Open: Brake closed Closed: Brake open (N.O.)	207

<44> Available in drive software versions PRG: 7017 or later.

■ H2: Multi-Function Digital Outputs

No.(Addr.)	Name	Description	Setting	Page
H2-01 (40BH)	Terminals M1-M2 Function Selection (relay)	All Modes Refer to *H2 Multi-Function Digital Output Settings on page 410* for a description of setting values.	Default: 50 Min: 0 Max: 161	207
H2-02 (40CH)	Terminals M3-M4 Function Selection (relay)		Default: 51 Min: 0 Max: 161	207
H2-03 (40DH)	Terminals M5-M6 Function Selection (relay)		Default: 6 Min: 0 Max: 161	207
H2-04 (40EH)	Terminal P1-C1 Function Selection (photocoupler)		Default: 37 Min: 0 Max: 161	207
H2-05 (40FH)	Terminal P2-C2 Function Selection (photocoupler)		Default: F Min: 0 Max: 161	207

H2 Multi-Function Digital Output Settings			
H2-□□ Setting	Function	Description	Page
0	During Run	All Modes Closed: An Up/Down command is active or voltage is output.	208
1	Zero Speed	All Modes Open: Output speed is greater than the value of E1-09 (Minimum Output Frequency) or S1-01 (Zero Speed Level at Stop). Closed: Output frequency is less than or equal to the value of E1-09 (Minimum Output Frequency) or S1-01 (Zero Speed Level at Stop).	208
2	Speed Agree 1	All Modes Closed: Output speed equals the speed reference (plus or minus the hysteresis set to L4-02).	209
3	User-set Speed Agree 1	All Modes Closed: Output speed and speed reference equal L4-01 (plus or minus the hysteresis set to L4-02).	209
4	Speed Detection 1	All Modes Closed: Output speed is less than or equal to the value in L4-01 with hysteresis determined by L4-02.	209

H2 Multi-Function Digital Output Settings			
H2-□□ Setting	Function	Description	Page
5	Speed Detection 2	All Modes Closed: Output speed is greater than or equal to the value in L4-01 with hysteresis determined by L4-02.	210
6	Drive Ready (READY)	All Modes Closed: Power up is complete and the drive is ready to accept an Up/Down command.	210
7	DC Bus Undervoltage	All Modes Closed: DC bus voltage is below the Uv trip level set in L2-05.	211
8	During Baseblock (N.O.)	All Modes Closed: Drive has entered the baseblock state (no output voltage).	211
9	Speed Reference Source	All Modes Open: The speed reference is supplied by an external reference (set in b1-01). Closed: Digital operator supplies the speed reference.	211
A	Up/Down Command Source	All Modes Open: The Up/Down command is supplied by an external reference (set in b1-02). Closed: Digital operator supplies the Up/Down command.	211
B	Torque Detection 1	All Modes Closed: An overtorque or undertorque situation has been detected.	211
E	Fault	All Modes Closed: Fault occurred. (excluding CPF00 and CPF01)	211
F	Not used (Through Mode)	All Modes Set this value when the terminal is not used or when using the terminal in the pass-through mode.	211
10	Minor Fault	All Modes Closed: An alarm has been triggered, or the IGBTs have reached 90% of their expected life span.	211
11	Fault Reset Command Active	All Modes Closed: The drive has received a reset command from the multi-function input terminals or from serial network, or the digital operator's RESET key has been pressed.	212
12	Timer Output	All Modes Closed: Timer output.	212
13	Speed Agree 2	All Modes Closed: When drive output frequency equals the speed reference ±L4-04.	212
14	User-set Speed Agree 2	All Modes Closed: When the drive output speed is equal to the value in L4-03 ±L4-04.	212
15	Speed Detection 3	All Modes Closed: When the drive output speed is less than or equal to the value in L4-03 ±L4-04.	213
16	Speed Detection 4	All Modes Closed: When the output speed is greater than or equal to the value in L4-03 ±L4-04.	213
18	Torque Detection 2	All Modes Closed: Overtorque or undertorque has been detected.	211
1A	During Down Direction	All Modes Closed: Drive is running in the down direction.	214
1B	During Baseblock 2 (N.C.)	All Modes Open: Drive has entered the baseblock state (no output voltage).	214
1C	Motor 2 Selection	V/f OLV CLV CLV/PM Open: Motor 1 is selected Closed: Motor 2 is selected	214
1D	During Regeneration	V/f OLV CLV CLV/PM Closed: Motor is operated in regenerative mode.	214
1E	Reset Enabled	All Modes Closed: An automatic reset is performed	214
1F	Motor Overload Alarm (oL1)	All Modes Closed: oL1 is at 90% of its trip point or greater. An oH3 situation also triggers this alarm.	214

H2 Multi-Function Digital Output Settings			
H2-□□ Setting	Function	Description	Page
20	Drive Overheat Pre-alarm (oH)	All Modes Closed: Heatsink temperature exceeds the parameter L8-02 value.	215
2F	Maintenance Period	All Modes Closed: Cooling fan, electrolytic capacitors, IGBTs, or the soft charge bypass relay may require maintenance.	215
30	During Torque Limit	V/f OLV CLV CLV/PM Closed: When the torque limit has been reached.	215
33	Within Position Lock Bandwidth	V/f OLV CLV CLV/PM Closed: Position deviation is within the Position Lock Bandwidth.	215
37	During Frequency Output	All Modes Open: No frequency output from drive when stopped with baseblock, stopped with DC injection braking during initial excitation, or stopped with short circuit braking. Closed: Drive is outputting a frequency.	215
47	Input Phase Loss	All Modes Closed: Input phase loss has occurred Open: Normal operation (no phase loss detected)	215
4E	Braking Transistor Fault (rr)	All Modes Closed: The built-in dynamic braking transistor failed. **Note:** This function is not available in models CIMR-LU2A0145 to 2A0415, 4A0075 to 4A0216, or 5A0052 to 5A0200.	215
50	Brake Control	All Modes Close: Release brake Open: Apply brake	215
51	Output Contactor Control	All Modes Closed: Close output contactor	215
52	Door Zone Reached	All Modes Closed: Indicates that the door zone has been reached.	216
53	Not Zero Speed	All Modes Closed: Speed is greater than the zero speed level set to S1-01 Open: Operating at zero speed level	216
54	Light Load Direction	All Modes Closed: Light load direction is up Open: Light load direction is down	216
55	Light Load Direction Detection Status	All Modes Closed: Ready for Light Load Direction Search Open: Light Load Detection in progress	216
58	Safe Disable Status	All Modes Closed: Safe Disable terminals H1-HC and H2-HC are open, drive is in a baseblock state Open: Safe Disable terminals H1-HC and H2-HC are closed (normal operation)	216
5C <44>	Motor Current Monitor	All Modes Open: Output current is greater than the value of L8-99. Closed: Output current is less than or equal to the value of L8-99.	216
60	Internal Cooling Fan Alarm	All Modes Closed: Internal cooling fan alarm	216
61	Motor Pole Search Status	V/f OLV CLV CLV/PM Closed: Motor pole search successful	216
100 to 161	Function 0 to 61 with Inverse Output	All Modes Inverts the output switching of the multi-function output functions. Sets the last two digits of 1□□ to reverse the output signal of that specific function.	216

<44> Available in drive software versions PRG: 7017 or later.

■ H3: Multi-Function Analog Inputs

No.(Addr.)	Name	Description	Setting	Page
H3-01 (410H)	Terminal A1 Signal Level Selection	All Modes 0: 0 to 10 V 1: –10 to 10 V	Default: 0 Min: 0 Max: 1	217
H3-02 (434H)	Terminal A1 Function Selection	All Modes Sets the function of terminal A1.	Default: 0 Min: 0 Max: 1F	217
H3-03 (411H) RUN	Terminal A1 Gain Setting	All Modes Sets the level of the input value selected in H3-02 when 10 V is input at terminal A1.	Default: 100.0% Min: -999.9% Max: 999.9%	217
H3-04 (412H) RUN	Terminal A1 Bias Setting	All Modes Sets the level of the input value selected in H3-02 when 0 V is input at terminal A1.	Default: 0.0% Min: -999.9% Max: 999.9%	217
H3-09 (417H)	Terminal A2 Signal Level Selection	All Modes 0: 0 to 10 V 1: –10 to 10 V **Note:** Use DIP switch S1 to set input terminal A2 for a current or a voltage input signal.	Default: 0 Min: 0 Max: 0	218
H3-10 (418H)	Terminal A2 Function Selection	All Modes Sets the function of terminal A2.	Default: 0 Min: 0 Max: 1F	218
H3-11 (419H) RUN	Terminal A2 Gain Setting	All Modes Sets the level of the input value selected in H3-10 when 10 V is input at terminal A2.	Default: 100.0% Min: -999.9% Max: 999.9%	218
H3-12 (41AH) RUN	Terminal A2 Bias Setting	All Modes Sets the level of the input value selected in H3-10 when 0 V is input at terminal A2.	Default: 0.0% Min: -999.9% Max: 999.9%	218
H3-13 (41BH)	Analog Input Filter Time Constant	All Modes Sets a primary delay filter time constant for terminals A1 and A2. Used for noise filtering.	Default: 0.03 s Min: 0.00 s Max: 2.00 s	219
H3-16 (2F0H)	Offset for Terminal A1	All Modes Applies an offset to analog input A1. Can be used for zero adjustment of the analog input.	Default: 0 Min: -500 Max: 500	219
H3-17 (2F1H)	Offset for Terminal A2	All Modes Applies an offset to analog input A2. Can be used for zero adjustment of the analog input.	Default: 0 Min: -500 Max: 500	219

H3 Multi-Function Analog Input Settings (H3-02 and H3-10)			
Setting	**Function**	**Description (For when output is 100%)**	**Page**
0	Speed Reference Bias (value added to input signal when multiple analog terminals supply the speed reference)	All Modes E1-04 (maximum output frequency)	219
2	Auxiliary Speed Reference 1 (used as a second speed reference)	All Modes E1-04 (maximum output frequency)	219
3	Auxiliary Speed Reference 2 (used as third speed reference)	All Modes E1-04 (maximum output frequency)	219
E <44>	Motor Temperature (PTC thermistor input)	All Modes oH3 Alarm detection level: 1.18 V oH4 Fault detection level: 2.293 V	219
14	Torque Compensation (load cell input)	V/f OLV CLV CLV/PM 10 V = Motor rated torque	220
1F	Not used (Through Mode)	All Modes Sets this value when the terminal is not used or when using the terminal in the pass-through mode.	220

<44> Available in drive software versions PRG: 7017 or later.

■ H4: Analog Outputs

No.(Addr.)	Name	Description	Setting	Page
H4-01 (41DH)	Terminal FM Monitor Selection	All Modes Selects the data to be output through multi-function analog output terminal FM. Set the desired monitor parameter to the digits available in U□-□□. For example, enter “103” for U1-03.	Default: 102 Min: 000 Max: 999	220
H4-02 (41EH) RUN	Terminal FM Gain	All Modes Sets the signal level at terminal FM that is equal to 100% of the selected monitor value.	Default: 100.0% Min: -999.9% Max: 999.9%	220
H4-03 (41FH) RUN	Terminal FM Bias	All Modes Sets the bias value added to the terminal FM output signal.	Default: 0.0% Min: -999.9% Max: 999.9%	220
H4-04 (420H)	Terminal AM Monitor Selection	All Modes Selects the data to be output through multi-function analog output terminal AM. Set the desired monitor parameter to the digits available in U□-□□. For example, enter “103” for U1-03.	Default: 103 Min: 000 Max: 999	220
H4-05 (421H) RUN	Terminal AM Gain	All Modes Sets the signal level at terminal AM that is equal to 100% of the selected monitor value.	Default: 50.0% Min: -999.9% Max: 999.9%	220
H4-06 (422H) RUN	Terminal AM Bias	All Modes Sets the bias value added to the terminal AM output signal.	Default: 0.0% Min: -999.9% Max: 999.9%	220
H4-07 (423H)	Terminal FM Signal Level Selection	All Modes 0: 0 to 10 V 1: –10 to 10 V	Default: 0 Min: 0 Max: 1	222
H4-08 (424H)	Terminal AM Signal Level Selection	All Modes 0: 0 to 10 V 1: –10 to 10 V	Default: 0 Min: 0 Max: 1	222

■ H5: MEMOBUS/Modbus Serial Communication

Note: The settings for MEMOBUS/Modbus communications become effective when the drive is restarted.

No.(Addr.)	Name	Description	Setting	Page
H5-01 (425H) <14>	Drive Node Address	All Modes Selects drive station node number (address) for MEMOBUS/Modbus terminals R+, R-, S+, S-. Cycle power for the setting to take effect.	Default: 1 Min: 0 Max: FF	448
H5-02 (426H)	Communication Speed Selection	All Modes 0: 1200 bps 1: 2400 bps 2: 4800 bps 3: 9600 bps 4: 19200 bps 5: 38400 bps 6: 57600 bps 7: 76800 bps 8: 115200 bps Cycle power for the setting to take effect.	Default: 3 Min: 0 Max: 8	448
H5-03 (427H)	Communication Parity Selection	All Modes 0: No parity 1: Even parity 2: Odd parity Cycle power for the setting to take effect.	Default: 0 Min: 0 Max: 2	448
H5-04 (428H)	Stopping Method After Communication Error (CE)	All Modes 0: Ramp to stop 1: Coast to stop 2: Fast Stop 3: Alarm only	Default: 3 Min: 0 Max: 3	449
H5-05 (429H)	Communication Fault Detection Selection	All Modes 0: Disabled 1: Enabled. If communication is lost for more than two seconds, a CE fault will occur.	Default: 1 Min: 0 Max: 1	449

No.(Addr.)	Name	Description	Setting	Page
H5-06 (42AH)	Drive Transmit Wait Time	All Modes Sets the wait time between receiving and sending data.	Default: 5 ms Min: 5 ms Max: 65 ms	449
H5-07 (42BH)	RTS Control Selection	All Modes 0: Disabled. RTS is always on. 1: Enabled. RTS turns on only when sending.	Default: 1 Min: 0 Max: 1	449
H5-09 (435H)	Communication Fault Detection Time	All Modes Sets the time required to detect a communications error. Adjustment may be needed when networking several drives.	Default: 2.0 s Min: 0.0 s Max: 10.0 s	450
H5-10 (436H)	Unit Selection for MEMOBUS/ Modbus Register 0025H	All Modes 0: 0.1 V units 1: 1 V units	Default: 0 Min: 0 Max: 1	450
H5-11 (43CH)	Communications ENTER Function Selection	All Modes 0: Drive requires an Enter command before accepting any changes to parameter settings. 1: Parameter changes are activated immediately without the Enter command.	Default: 0 Min: 0 Max: 1	450

<14> If this parameter is set to 0, the drive will be unable to respond to MEMOBUS/Modbus commands.

◆ L: Protection Functions

L parameters provide protection to the drive and motor, including control during momentary power loss, Stall Prevention, frequency detection, fault reset, overtorque detection, torque limits, and other types of hardware protection.

■ L1: Motor Protection

No. (Addr.)	Name	Description	Setting	Page
L1-01 (480H)	Motor Overload Protection Selection	All Modes 0: Disabled 1: General purpose motor (standard fan cooled) 2: Drive dedicated motor with a speed range of 1:10 3: Vector motor with a speed range of 1:100 5: PM motor with constant torque characteristics	Default: <5> Min: 0 Max: 5	223
L1-02 (481H)	Motor Overload Protection Time	All Modes Sets the motor thermal overload protection (oL1) time.	Default: 1.0 min Min: 0.1 min Max: 5.0 min	225
L1-03 (482H) <44>	Motor Overheat Alarm Operation Selection (PTC thermistor input)	All Modes Sets operation when the motor temperature analog input (H3-02 or H3-10 = E) exceeds the oH3 alarm level. 0: Ramp to stop 1: Coast to stop 2: Emergency Stop (Fast Stop) (decelerate to stop using the deceleration time in C1-09) 3: Alarm only ("oH3" will flash)	Default: 3 Min: 0 Max: 3	226
L1-04 (483H) <44>	Motor Overheat Fault Operation Selection (PTC thermistor input)	All Modes Sets stopping method when the motor temperature analog input (H3-02 or H3-10 = E) exceeds the oH4 fault level. 0: Ramp to stop 1: Coast to stop 2: Emergency Stop (Fast Stop) (decelerate to stop using the deceleration time in C1-09)	Default: 1 Min: 0 Max: 2	227
L1-05 (484H) <44>	Motor Temperature Input Filter Time (PTC thermistor input)	All Modes Adjusts the filter for the motor temperature analog input (H3-02 or H3-10 = E).	Default: 0.20 s Min: 0.00 s Max: 10.00 s	227
L1-13 (46DH)	Continuous Electrothermal Operation Selection	All Modes 0: Disabled 1: Enabled	Default: 1 Min: 0 Max: 1	227

<5> Default setting is determined by the control mode (A1-02).
<44> Available in drive software versions PRG: 7017 or later.

■ L2: Undervoltage Detection

No. (Addr.)	Name	Description	Setting	Page
L2-05 (489H)	Undervoltage Detection Level (Uv)	All Modes Sets the DC bus undervoltage trip level.	Default: <9> <15> Min: 150 Vdc Max: 210 Vdc <9>	227

<9> Values shown here are for 200 V class drives. Double the value when using a 400 V class drive. Multiply value by 2.875 for 600 V class drives.
<15> Default setting value is dependent on the setting for the input voltage (E1-01).

■ L3: Stall Prevention

No. (Addr.)	Name	Description	Setting	Page
L3-01 (48FH)	Stall Prevention Selection during Acceleration	V/f OLV CLV CLV/PM 0: Disabled. 1: General purpose. Acceleration is paused as long as the current is above the L3-02 setting. 2: Intelligent. Accelerate in the shortest possible time without exceeding the L3-02 level.	Default: 1 Min: 0 Max: 2	228
L3-02 (490H)	Stall Prevention Level during Acceleration	V/f OLV CLV CLV/PM Used when L3-01 = 1 or 2. 100% is equal to the drive rated current.	Default: <16> Min: 0% Max: 150% <16>	228
L3-05 (493H)	Stall Prevention Selection during Run	V/f OLV CLV CLV/PM 0: Disabled. Drive runs at a set frequency. A heavy load may cause speed loss. 1: Decel time 1. Uses the deceleration ramp set to C1-02 while Stall Prevention is performed. 2: Decel time 2. Uses the deceleration ramp set to C1-04 while Stall Prevention is performed.	Default: 1 Min: 0 Max: 2	229
L3-06 (494H)	Stall Prevention Level during Run	V/f OLV CLV CLV/PM Enabled when L3-05 is set to 1 or 2. 100% is equal to the drive rated current.	Default: <16> Min: 30% Max: 150% <16>	229

<16> The setting value is dependent on the setting for the carrier frequency reduction (L8-38).

■ L4: Speed Detection

No. (Addr.)	Name	Description	Setting	Page
L4-01 (499H)	Speed Agreement Detection Level	All Modes L4-01 sets the speed detection level for digital output functions H2-□□ = 3, 4, 5. L4-02 sets the hysteresis or allowable margin for speed detection.	Default: 0.0% Min: 0.0% Max: 100.0%	229
L4-02 (49AH)	Speed Agreement Detection Width		Default: 4.0% Min: 0.0% Max: 40.0%	229
L4-03 (49BH)	Speed Agreement Detection Level (+/-)	All Modes L4-03 sets the speed detection level for digital output functions H2-□□ = 13, 14, 15, 16. L4-04 sets the hysteresis or allowable margin for speed detection.	Default: 0.0% Min: –100.0% Max: 100.0%	229
L4-04 (49CH)	Speed Agreement Detection Width (+/-)		Default: 4.0% Min: 0.0% Max: 40.0%	229
L4-05 (49DH)	Speed Reference Loss Detection Selection	All Modes 0: Stop. Drive stops when the speed reference is lost. 1: Run. Drive runs at a reduced speed when the speed reference is lost.	Default: 0 Min: 0 Max: 1	230
L4-06 (4C2H)	Speed Reference at Reference Loss	All Modes Sets the percentage of the speed reference that the drive should run with when the speed reference is lost.	Default: 80% Min: 0.0% Max: 100.0%	230
L4-07 (470H) <44>	Speed Agree Detection Selection	All Modes 0: No detection during baseblock. 1: Detection always enabled.	Default: 0 Min: 0 Max: 1	230
L4-13 (4F6H)	Door Zone Level	All Modes Sets the door zone speed level. The "door zone" multi-function digital output is closed when the speed falls below this level.	Default: 0.0% Min: 0.0% Max: 100.0%	230

<44> Available in drive software versions PRG: 7017 or later.

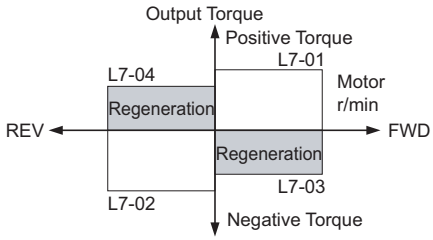
■ L5: Automatic Fault Reset

No. (Addr.)	Name	Description	Setting	Page
L5-01 (49EH)	Number of Auto Reset Attempts	All Modes Sets the number of times the drive may attempt to reset after the following faults occur: GF, LF, oC, ov, rr, oH1, oL1, oL2, oL3, oL4, UL3, UL4.	Default: 0 Min: 0 Max: 10	231
L5-02 (49FH)	Fault Output Operation during Auto Reset	All Modes 0: Fault output not active. 1: Fault output active during reset attempt.	Default: 0 Min: 0 Max: 1	232
L5-06 (522H)	Undervoltage Fault Reset Selection	All Modes 0: Same as L5-01 condition 1: Always automatically reset UV1	Default: 0 Min: 0 Max: 1	232

■ L6: Torque Detection

No. (Addr.)	Name	Description	Setting	Page
L6-01 (4A1H)	Torque Detection Selection 1	All Modes 0: Disabled 1: oL3 detection only active during speed agree, operation continues after detection 2: oL3 detection always active during run, operation continues after detection 3: oL3 detection only active during speed agree, output shuts down on an oL3 fault 4: oL3 detection always active during run, output shuts down on an oL3 fault 5: UL3 detection only active during speed agree, operation continues after detection 6: UL3 detection always active during run, operation continues after detection 7: UL3 detection only active during speed agree, output shuts down on an oL3 fault 8: UL3 detection always active during run, output shuts down on an oL3 fault	Default: 0 Min: 0 Max: 8	233
L6-02 (4A2H)	Torque Detection Level 1	All Modes Sets the overtorque and undertorque detection level.	Default: 150% Min: 0% Max: 300%	234
L6-03 (4A3H)	Torque Detection Time 1	All Modes Sets the time an overtorque or undertorque condition must exist to trigger torque detection 1.	Default: 0.1 s Min: 0.0 s Max: 10.0 s	234
L6-04 (4A4H)	Torque Detection Selection 2	All Modes 0: Disabled 1: oL4 detection only active during speed agree, operation continues after detection 2: oL4 detection always active during run, operation continues after detection 3: oL4 detection only active during speed agree, output shuts down on an oL4 fault 4: oL4 detection always active during run, output shuts down on an oL4 fault 5: UL4 detection only active during speed agree, operation continues after detection 6: UL4 detection always active during run, operation continues after detection 7: UL4 detection only active during speed agree, output shuts down on an oL4 fault 8: UL4 detection always active during run, output shuts down on an oL4 fault	Default: 0 Min: 0 Max: 8	233
L6-05 (4A5H)	Torque Detection Level 2	All Modes Sets the overtorque and undertorque detection level.	Default: 150% Min: 0% Max: 300%	234
L6-06 (4A6H)	Torque Detection Time 2	All Modes Sets the time an overtorque or undertorque condition must exist to trigger torque detection 2.	Default: 0.1 s Min: 0.0 s Max: 10.0 s	234

■ L7: Torque Limit

No. (Addr.)	Name	Description	Setting	Page
L7-01 (4A7H)	Forward Torque Limit	V/f OLV CLV CLV/PM Sets the torque limit value as a percentage of the motor rated torque. Four individual quadrants can be set. 	Default: 200% Min: 0% Max: 300%	234
L7-02 (4A8H)	Reverse Torque Limit		Default: 200% Min: 0% Max: 300%	234
L7-03 (4A9H)	Forward Regenerative Torque Limit		Default: 200% Min: 0% Max: 300%	234
L7-04 (4AAH)	Reverse Regenerative Torque Limit		Default: 200% Min: 0% Max: 300%	234
L7-16 (44DH)	Torque Limit Process at Start	V/f OLV CLV CLV/PM 0: Disabled 1: Enabled	Default: 1 Min: 0 Max: 1	235

■ L8: Drive Protection

No. (Addr.)	Name	Description	Setting	Page
L8-02 (4AEH)	Overheat Alarm Level	All Modes An overheat alarm will occur if the heatsink temperature exceeds the level set in L8-02.	Default: <4> Min: 50°C Max: 150°C	235
L8-03 (4AFH)	Overheat Pre-Alarm Operation Selection	All Modes 0: Ramp to stop. A fault is triggered. 1: Coast to stop. A fault is triggered. 2: Fast Stop. Decelerate to stop using the deceleration ramp in C1-09. A fault is triggered. 3: Continue operation. An alarm is triggered.	Default: 3 Min: 0 Max: 3	235

No. (Addr.)	Name	Description	Setting	Page
L8-05 (4B1H)	Input Phase Loss Protection Selection	All Modes Selects the detection of input current phase loss, power supply voltage imbalance, or main circuit electrolytic capacitor deterioration. 0: Disabled 1: Enabled always 2: Enabled during operation 3: Enabled during constant speed Setting 1 cannot be selected for 600 V class drives.	Default: <4> Min: 0 Max: 3	236
L8-06 (4B2H)	Input Phase Loss Detection Level	All Modes When ripple is observed in the DC bus, expansion of the input bias is calculated and becomes the input phase if the difference between the max and minimum values of the ripple are greater than L8-06. Detection Level = 100% = Voltage class × $\sqrt{2}$ (determines standards for setting values)	Default: <4> Min: 0.0% Max: 50.0%	236
L8-07 (4B3H)	Output Phase Loss Protection Selection	All Modes 0: Disabled 1: Enabled (triggered by a single phase loss) 2: Enabled (triggered when two phases are lost) 3: Fault at phase loss at start or when two phases lost mid-operation **Note:** Setting 3 is available in the control mode V/f or OLV for drives with software versions PRG: 7200 or later.	Default: 0 Min: 0 Max: 3	236
L8-09 (4B5H)	Output Ground Fault Detection Selection	All Modes 0: Disabled 1: Enabled	Default: 1 Min: 0 Max: 1	237
L8-10 (4B6H)	Heatsink Cooling Fan Operation Selection	All Modes 0: Run with timer (Fan operates only during run and for L8-11 seconds after stop.) 1: Run always (Cooling fan operates whenever the drive is powered up.) 2: Temperature controlled (Cooling fan operated depending on the temperature of the drives heatsink.)	Default: 0 Min: 0 Max: 2	237
L8-11 (4B7H)	Heatsink Cooling Fan Off Delay Time	All Modes Sets a delay time to shut off the cooling fan after the Up/Down command is removed when L8-10 = 0.	Default: 60 s Min: 0 s Max: 300 s	237
L8-12 (4B8H)	Ambient Temperature Setting	All Modes Enter the ambient temperature. This value adjusts the oL2 detection level.	Default: 40°C Min: -10°C Max: 50°C	237
L8-15 (4BBH)	oL2 (drive overload) Characteristics Selection at Low Speeds	All Modes 0: No oL2 level reduction below 6 Hz. 1: oL2 level is reduced linearly below 6 Hz. It is halved at 0 Hz.	Default: 1 Min: 0 Max: 1	238
L8-27 (4DDH)	Overcurrent Detection Gain	V/f OLV CLV CLV/PM Sets the gain for overcurrent detection as a percentage of the motor rated current. Overcurrent is detected using the drive's overcurrent level or the value set to L8-27, whichever is lower.	Default: 300.0% Min: 0.0% Max: 300.0%	238
L8-29 (4DFH)	Current Unbalance Detection (LF2)	V/f OLV CLV CLV/PM 0: Disabled 1: Enabled	Default: 1 Min: 0 Max: 1	238
L8-35 (4ECH) <1>	Installation Selection	All Modes 0: IP00 enclosure drive 2: IP00 enclosure drive with top protective cover	Default: <4> Min: 0 Max: 2	238
L8-38 (4EFH)	Automatic Torque Boost Selection	All Modes Torque Boost increases the output current limit while decreasing the carrier frequency when the output current exceeds a certain value. 0: Disabled 3: Enabled	Default: 0 Min: 0 Max: 3	239
L8-39 (4F0H)	Reduced Carrier Frequency	All Modes Sets the reduced carrier frequency used by the Torque Boost function.	Default: 3.0 kHz Min: 1.0 kHz Max: 15.0 kHz	239
L8-55 (45FH)	Internal Braking Transistor Protection	All Modes 0: Disabled. L8-55 should be disabled when using a regen converter or an optional braking unit. 1: Protection enabled.	Default: 1 Min: 0 Max: 1	239
L8-62 (529H)	Operation Selection at Input Phase Loss	All Modes Sets stopping method when a Input phase loss fault (PF) occurs. See parameter L8-05. 0: Ramp to Stop - Decelerate to stop using the deceleration ramp in C1-02. 1: Coast to Stop 2: Fast Stop - Decelerate to stop using the deceleration ramp in C1-09. 3: Alarm only - Drive continues operation.	Default: 1 Min: 0 Max: 3	236

No. (Addr.)	Name	Description	Setting	Page
L8-77 (61EH)	Oscillation Suppression	All Modes Used to suppress speed oscillations that occur with an unloaded motor and that have the same frequency as the output frequency.	Default: 0 Min: -100 Max: 100	240
L8-88 (2F5H)	Safe Disable Operation Mode	All Modes 0: Mode 0 1: Mode 1	Default: 1 Min: 0 Max: 1	240
L8-89 (B97H) <44>	Current Monitoring Selection	All Modes Enables or disables the Current Monitoring function. 0: Disabled 1: Enabled	Default: 0 Min: 0 Max: 1	241
L8-99 (B98H) <44>	Current Monitoring Level	All Modes Sets the current monitoring level as a percentage of the drive's rated current. Sets the level of current used for L8-89 and H2-□□ = 5C.	Default: 10.0% Min: 0.0% Max: 50.0%	241

<1> Parameter setting value is not reset to the default value when the drive is initialized.
<4> Default setting is determined by the drive model (o2-04).
<44> Available in drive software versions PRG: 7017 or later.

◆ n: Advanced Performance Set-Up

The n parameters are used to adjust more advanced performance characteristics such as speed feedback detection, Online Tuning for motor line-to-line resistance, and PM motor control tuning.

■ n1: Hunting Prevention

No. (Addr.)	Name	Description	Setting	Page
n1-08 (1105H) <45>	Leakage Current Vibration Control Selection	All Modes 0: Method 1 1: Method 2	Default: 0 Min: 0 Max: 1	242

<45> Available in drive software versions PRG: 7200 or later.

■ n2: Speed Feedback Detection Control (AFR) Tuning

No. (Addr.)	Name	Description	Setting	Page
n2-01 (584H)	Speed Feedback Detection Control (AFR) Gain	V/f OLV CLV CLV/PM Sets the internal speed feedback detection control gain in the automatic frequency regulator (AFR). If hunting occurs, increase the set value. If response is low, decrease the set value.	Default: 1.00 Min: 0.00 Max: 10.00	242
n2-02 (585H)	Speed Feedback Detection Control (AFR) Time Constant 1	V/f OLV CLV CLV/PM Sets the time constant used for speed feedback detection control (AFR).	Default: 50 ms Min: 0 ms Max: 2000 ms	242
n2-03 (586H)	Speed Feedback Detection Control (AFR) Time Constant 2	V/f OLV CLV CLV/PM Sets the AFR time constant to be used during regen.	Default: 750 ms Min: 0 ms Max: 2000 ms	242

■ n5: Inertia Compensation

No. (Addr.)	Name	Description	Setting	Page
n5-01 (5B0H)	Inertia Compensation Selection	V/f OLV CLV CLV/PM 0: Disabled 1: Enabled	Default: 0 Min: 0 Max: 1	243
n5-02 (5B1H)	Motor Acceleration Time	V/f OLV CLV CLV/PM Sets the time required to accelerate the motor at 100% torque from 0 to the nominal speed.	Default: <4> Min: 0.001 s Max: 10.000 s	243
n5-03 (5B2H)	Inertia Compensation Gain	V/f OLV CLV CLV/PM Sets the ratio between motor and load inertia. Lower this setting if overshoot occurs at the end of acceleration.	Default: 1.00 Min: 0.00 Max: 100.00	244
n5-07 (170H)	Speed Feedback Compensation Selection	V/f OLV CLV CLV/PM 0: Disabled 1: Enabled 2: Test Mode	Default: 1 Min: 0 Max: 2	245

No. (Addr.)	Name	Description	Setting	Page
n5-08 (171H)	Speed Feedback Compensation Gain (P)	V/f OLV CLV **CLV/PM** Sets the proportional gain for the Speed Feedback Compensation.	Default: 12.00 Min: 0.00 Max: 300.00	*245*

<4> Default setting value is dependent on the drive model (o2-04).

■ n6: Online Tuning

No. (Addr.)	Name	Description	Setting	Page
n6-01 (570H)	Online Tuning Selection	V/f **OLV** CLV CLV/PM 0: Disabled 1: Line-to-line resistance tuning 2: Voltage correction.	Default: 2 Min: 0 Max: 2	*246*
n6-05 (5C7H)	Online Tuning Gain	V/f **OLV** CLV CLV/PM Decrease this setting for motors with a relatively large rotor time constant. If overload occurs, increase this setting slowly in increments of 0.1.	Default: 1.0 Min: 0.1 Max: 50.0	*246*

■ n8: PM Motor Control Tuning

No. (Addr.)	Name	Description	Setting	Page
n8-01 (540H)	Initial Polarity Estimation Current	V/f OLV CLV **CLV/PM** Sets the current used for initial rotor position estimation as a percentage of the motor rated current (E5-03). If the motor nameplate lists an "Si" value, that value should be entered here.	Default: 50% Min: 0% Max: 100%	*246*
n8-02 (541H)	Pole Attraction Current	V/f OLV CLV **CLV/PM** Sets the current during initial polar attraction as a percentage of the motor rated current. Enter a high value when attempting to increase starting torque.	Default: 80% Min: 0% Max: 150%	*247*
n8-29 (55CH)	q-Axis Current Control Gain during Normal Operation	V/f OLV CLV **CLV/PM** Sets the q axis proportional gain for the normal control range.	Default: 1000 rad/s Min: 0 rad/s Max: 2000 rad/s	*248*
n8-30 (55DH)	q-Axis Current Control Integral Time during Normal Operation	V/f OLV CLV **CLV/PM** Sets the q axis integral time for the normal control range.	Default: 10.0 ms Min: 0.0 ms Max: 100.0 ms	*248*
n8-32 (55FH)	d-Axis Current Control Gain during Normal Operation	V/f OLV CLV **CLV/PM** Sets the d axis proportional gain for the normal control range.	Default: 1000 rad/s Min: 0 rad/s Max: 2000 rad/s	*248*
n8-33 (560H)	d-Axis Current Control Integral Time during Normal Operation	V/f OLV CLV **CLV/PM** Sets the d axis integral time for the normal control range.	Default: 10.0 ms Min: 0.0 ms Max: 100.0 ms	*248*
n8-35 (562H)	Initial Rotor Position Detection Selection	V/f OLV CLV **CLV/PM** 1: High frequency injection 2: Pulse injection	Default: 1 Min: 1 Max: 2	*247*
n8-36 (563H)	High Frequency Injection Level	V/f OLV CLV **CLV/PM** Sets the frequency in Hz for the superimposed signal used for superimposed harmonics.	Default: 500 Hz Min: 25 Hz Max: 1000 Hz	*247*
n8-37 (564H)	High Frequency Injection Amplitude	V/f OLV CLV **CLV/PM** Sets the amplitude for superimposed harmonics according to the voltage class of the motor. Adjust this value when there is too much or too little current as a result of the settings assigned to motor parameters.	Default: 20.0% Min: 0.0% Max: 99.9%	*247*
n8-62 (57DH)	Output Voltage Limit	V/f OLV CLV **CLV/PM** Prevents output voltage saturation. Should be set just below the voltage provided by the input power supply.	Default: 200.0 V *<9>* Min: 0.0 V Max: 230.0 V *<9>*	*248*
n8-81 (2D0H)	High Frequency Injection during Rescue Operation	V/f OLV CLV **CLV/PM** Sets the frequency used for Polar Detection Method 1 during Rescue Operation.	Default: 90 Hz Min: 25 Hz Max: 1000 Hz	*247*
n8-82 (2D1H)	High Frequency Injection Amplitude during Rescue Operation	V/f OLV CLV **CLV/PM** Sets the amplitude for High Frequency Injection during Rescue Operation as a percentage of the voltage (200 V or 400 V).	Default: 15.0% Min: 0.1% Max: 99.9%	*247*
n8-84 (2D3H)	Polarity Detection Current	V/f OLV CLV **CLV/PM** Sets the current level (E5-03) as a percentage for detecting polarity during Initial Polarity Estimation.	Default: 100% Min: 0% Max: 150%	*247*
n8-86 (2D5H)	Magnet Pole Search Error Detection Selection	V/f OLV CLV **CLV/PM** 0: Disabled 1: Enabled	Default: 0 Min: 0 Max: 1	*247*

<9> Values shown here are for 200 V class drives. Double the value when using a 400 V class drive. Multiply value by 2.875 for 600 V class drives.

■ n9: Current Detection Adjustments

No. (Addr.)	Name	Description	Setting	Page
n9-60 (64DH)	A/D Conversion Start Delay	V/f OLV CLV **CLV/PM** Sets a delay time for starting the current signal A/D conversion. This value seldom needs to be changed.	Default: <4> Min: 0.0 µs Max: 40.0 µs	248

<4> Default setting is determined by the drive model (o2-04).

◆ o: Operator Related Parameters

The o parameters set up the digital operator displays.

■ o1: Digital Operator Display Selection

For more details on the digital operator displays, refer to *Digital Operator Display Unit Selection on page 108*.

No. (Addr.)	Name	Description	Setting	Page
o1-01 (500H) RUN	Drive Mode Unit Monitor Selection	**All Modes** Switches the display after the power has been turned on. When using an LED operator, pressing the up arrow key will display the following data: frequency reference → rotational direction → output frequency → output current → output voltage → U1-□□. (This is done by entering the 1□□ part of U1-□□. Certain monitors are not available in some control modes.)	Default: 106 (Monitor U1-06) Min: 105 Max: 699	249
o1-02 (501H) RUN	User Monitor Selection after Power Up	**All Modes** o1-02 selects the information that is displayed when the power is turned on. 1: Speed reference (U1-01) 2: Direction 3: Output speed (U1-02) 4: Output current (U1-03) 5: User-selected monitor (set by o1-01)	Default: 1 Min: 1 Max: 5	249
o1-03 (502H)	Digital Operator Display Unit Selection	**All Modes** Sets the units the drive should use to display the frequency reference and motor speed monitors. 0: 0.01 Hz 1: 0.01% (100% = E1-04) 2: r/min (calculated using the number of motor poles setting in E2-04, E4-04, or E5-04) 3: User-selected units (set by o1-10 and o1-11) 4: Elevator units 1 (speed in m/s, accel/decel rate and jerk in s) 5: Elevator units 2 (speed in m/s, accel/decel rate in m/s^2, jerk in m/s^3) 6: Elevator units 3 (speed in ft/min, accel/decel rate in ft/s^2, jerk in ft/s^3)	Default: 1 Min: 0 Max: 6 <21>	249
o1-04 (503H)	V/f Pattern Setting Units	V/f OLV **CLV** **CLV/PM** 0: Hz 1: r/min	Default: <5> Min: 0 Max: 1	250
o1-05 (504H) RUN	LCD Contrast Control	**All Modes** Sets the brightness of the LCD operator (option).	Default: 3 Min: 0 Max: 5	250
o1-06 (517H) <44>	User Monitor Selection Mode	**All Modes** 0: 3 Monitor Sequential (Displays the next 2 sequential monitors) 1: 3 Monitor Selectable (o1-07 and o1-08 selected monitor is displayed)	Default: 0 Min: 0 Max: 1	250
o1-07 (518H) <44>	Second Line Monitor Selection	**All Modes** Selects the monitor displayed on the second line.	Default: 102 Min: 101 Max: 699	250
o1-08 (519H) <44>	Third Line Monitor Selection	**All Modes** Selects the monitor displayed on the third line.	Default: 103 Min: 101 Max: 699	250
o1-10 (520H)	User-Set Display Units Maximum Value	**All Modes** These settings define the display values when o1-03 is set to 3. o1-10 sets the display value that is equal to the maximum output frequency. o1-11 sets the position of the decimal position.	Default: <20> Min: 1 Max: 60000	251
o1-11 (521H)	User-Set Display Units Decimal Display		Default: <20> Min: 0 Max: 3	251
o1-12 (739H)	Length Units	V/f OLV **CLV** **CLV/PM** 0: Millimeter unit 1: Inch unit	Default: 0 Min: 0 Max: 1	251

No. (Addr.)	Name	Description	Setting	Page
o1-20 (575H)	Traction Sheave Diameter	V/f OLV CLV CLV/PM Sets the traction sheave diameter for display unit calculations.	Default: 400 mm <38> Min: 100 mm Max: 2000 mm <38>	251
o1-21 (576H)	Roping Ratio	V/f OLV CLV CLV/PM Sets the roping ratio. 1: 1:1 2: 1:2 3: 1:3 4: 1:4	Default: 2 Min: 1 Max: 4	251
o1-22 (577H)	Mechanical Gear Ratio	V/f OLV CLV CLV/PM Sets the ratio of the gear installed for display unit calculations.	Default: <5> Min: 0.10 Max: <46>	252
o1-23 (174H) <45>	HBB Non Display Select	All Modes Shows or hides the HBB command on the digital operator while the safety signal is being input. 0: Shows HBB 1: Hide HBB	Default: 0 Min: 0 Max: 1	252

<5> Default setting is determined by the control mode (A1-02).
<20> This parameter appears when the drive displays user-set units (o1-03 = 3).
<21> The control mode determines the selections available. In V/f Control, only settings 1 through 3 are permitted.
<38> Default setting and setting range changes when inches are selected for the length units (o1-12 = 1). The setting range becomes 3.70 to 78.00 inches, and the default becomes 15.70 inches.
<44> Available in drive software versions PRG: 7017 or later.
<45> Available in drive software versions PRG: 7200 or later.
<46> The setting range changes depending on drive software versions.
PRG: 7017 or earlier: 0.10 to 50.00
PRG: 7200 or later: 0.10 to 100.00

■ o2: Digital Operator Keypad Functions

No. (Addr.)	Name	Description	Setting	Page
o2-01 (505H)	LO/RE Key Function Selection	All Modes 0: Disabled 1: Enabled. LO/RE key switches between LOCAL and REMOTE operation.	Default: 0 Min: 0 Max: 1	252
o2-02 (506H)	STOP Key Function Selection	All Modes 0: Disabled. STOP key is disabled in REMOTE operation. 1: Enabled. STOP key is always enabled.	Default: 0 Min: 0 Max: 1	252
o2-03 (507H)	User Parameter Default Value	All Modes 0: No change. 1: Set defaults. Saves parameter settings as default values for a User Initialization. 2: Clear all. Clears the default settings that have been saved for a User Initialization.	Default: 0 Min: 0 Max: 2	253
o2-04 (508H) <1>	Drive Model Selection	All Modes Enter the drive model. Setting required only if installing a new control board.	Default: Determined by drive capacity Min: – Max: –	253
o2-05 (509H)	Speed Reference Setting Method Selection	All Modes 0: ENTER key must be pressed to enter a speed reference. 1: ENTER key is not required. The speed reference can be adjusted using the up and down arrow keys only.	Default: 0 Min: 0 Max: 1	253
o2-06 (50AH)	Operation Selection when Digital Operator is Disconnected	All Modes 0: The drive continues operating if the digital operator is disconnected. 1: A fault is triggered (oPr) and the motor coasts to stop.	Default: 0 Min: 0 Max: 1	254
o2-09 (50DH)	Reserved	–	–	–

<1> Parameter setting value is not reset to the default value when the drive is initialized.

■ o3: Copy Function

No. (Addr.)	Name	Description	Setting	Page
o3-01 (515H)	Copy Function Selection	All Modes 0: Copy select 1: INV → OP READ (Read parameters from the drive, saving them onto the digital operator.) 2: OP → INV WRITE (Copy parameters from the digital operator, writing them to the drive.) 3: OP ↔ INV VERIFY (Verify parameter settings on the drive to check if they match the data saved on the operator.) To read the drive's parameter settings into the digital operator, set o3-02 to 1 (to allow reading).	Default: 0 Min: 0 Max: 3	254
o3-02 (516H)	Copy Allowed Selection	All Modes Selects whether the read operation (o3-01 = 1) is enabled or disabled. 0: Read operation prohibited 1: Read operation allowed	Default: 0 Min: 0 Max: 1	254

■ o4: Maintenance Monitor Settings

No. (Addr.)	Name	Description	Setting	Page
o4-01 (50BH)	Cumulative Operation Time Setting	All Modes Sets the value for the cumulative operation time of the drive in units of 10 h.	Default: 0 Min: 0 Max: 9999	255
o4-02 (50CH)	Cumulative Operation Time Selection	All Modes 0: Logs power-on time 1: Logs operation time when the drive output is active (output operation time).	Default: 0 Min: 0 Max: 1	255
o4-03 (50EH)	Cooling Fan Operation Time Setting	All Modes Sets the value of the fan operation time monitor U4-03 in units of 10 h.	Default: 0 h Min: 0 h Max: 9999 h	255
o4-05 (51DH)	Capacitor Maintenance Setting	All Modes Sets the value of the Maintenance Monitor for the capacitors. See U4-05 to check when the capacitors may need to be replaced.	Default: 0% Min: 0% Max: 150%	255
o4-07 (523H)	DC bus Pre-charge Relay Maintenance Setting	All Modes Sets the value of the Maintenance Monitor for the soft charge bypass relay. See U4-06 to check when the bypass relay may need to be replaced.	Default: 0% Min: 0% Max: 150%	255
o4-09 (525H)	IGBT Maintenance Setting	All Modes Sets the value of the Maintenance Monitor for the IGBTs. See U4-07 to check when the IGBTs may need to be replaced.	Default: 0% Min: 0% Max: 150%	256
o4-11 (510H)	U2, U3 Initialization	All Modes 0: U2-□□ and U3-□□ monitor data is not reset when the drive is initialized (A1-03). 1: Resets the data for the U2-□□ and U3-□□ monitors. Once o4-11 is set to 1 and the ENTER key is pressed, fault data is erased and the display returns to 0.	Default: 0 Min: 0 Max: 1	256
o4-12 (512H)	kWh Monitor Initialization	All Modes 0: U4-10 and U4-11 monitor data is not reset when the drive is initialized (A1-03). 1: Resets the kWh counter. The monitors U4-10 and U4-11 will display "0" after they are initialized. Once o4-12 is set to 1 and the ENTER key is pressed, kWh data is erased and the display returns to 0.	Default: 0 Min: 0 Max: 1	256
o4-13 (528H)	Number of Travels Counter Reset	All Modes 0: Keep the number of travels counter value. The counter is not reset when the drive is initialized (A1-03). 1: Resets the number 0 travels counter. The monitor U4-24/25 will show 0. Once o4-13 is set to 1 and the ENTER key is pressed, the counter value is erased and the display returns to 0.	Default: 0 Min: 0 Max: 1	256
o4-15 (537H) <1>	Maintenance Alarm Snooze Period	All Modes After a maintenance alarm output has been triggered, o4-15 determines the level that will trigger the next alarm for the same component. The same alarm will be triggered by the detection level that triggered the original alarm plus the level set in o4-15.	Default: 2% Min: 0% Max: 20%	257
o4-16 (176H) <1>	Maintenance Monitoring Selection	All Modes Selects the Maintenance Monitor using bits 0 to 3. 0: LT1 (cooling fan) 1: LT2 (DC bus capacitors) 2: LT3 (soft-charge bypass relay) 3: LT4 (IGBTs have passed 90% of the their life expectancy)	Default: 1000 Min: 0000 Max: 1111	257

<1> Parameter setting value is not reset to the default value during drive initialization (A1-03).

◆ S: Elevator Parameters

This section describes various functions and faults needed to operate an elevator application: braking sequence, slip compensation for elevators, start/stop optimization, Rescue Operation, and elevator-related faults.

■ S1: Brake Sequence

No. (Addr.)	Name	Description	Setting	Page
S1-01 (680H)	Zero Speed Level at Stop	All Modes Determines the speed to begin applying DC Injection (or Position Lock) when the drive is ramping to stop (b1-03 = 0). Set as a percentage of the maximum output frequency (E1-04).	Default: <5> Min: 0.000% Max: 9.999%	258
S1-02 (681H)	DC Injection Current at Start	V/f OLV CLV CLV/PM Determines the amount of current to use for DC Injection at start. Set as a percentage of the drive rated current.	Default: 50% Min: 0% Max: 100%	258
S1-03 (682H)	DC Injection Current at Stop	V/f OLV CLV CLV/PM Determines the amount of current to use for DC Injection at stop. Set as a percentage of the drive rated current.	Default: 50% Min: 0% Max: 100%	258
S1-04 (683H)	DC Injection/Position Lock Time at Start	All Modes Determines how long the drive should perform DC Injection at start. In CLV and CLV/PM, S1-04 determines how long Position Lock should be performed. A setting of 0.00 disables S1-04.	Default: 0.40s Min: 0.00 s Max: 10.00 s	258
S1-05 (684H)	DC Injection/Position Lock Time at Stop	All Modes Determines how long the drive should perform DC Injection at stop. In CLV and CLV/PM, S1-05 determines how long Position Lock should be performed. A setting of 0.00 disables S1-05.	Default: 0.60s Min: 0.00 s Max: 10.00 s	259
S1-06 (685H)	Brake Release Delay Time	All Modes Determines the delay time between the start of DC injection/Position Lock and setting the brake control command (H2-□□=50) in order to release the brake at the beginning of the ride.	Default: 0.20s Min: 0.00 s Max: 10.00 s	259
S1-07 (686H)	Brake Close Delay Time	All Modes Determines the delay time between reaching Zero Speed (S1-01) and resetting the brake control command (H2-□□ = 50) in order to apply the brake at the end of the ride.	Default: 0.10s Min: 0.00 s Max: [S1-05]	259
S1-10 (687H)	Run Command Delay Time	All Modes Sets the time that must pass after the Up/Down command is entered until the drive internal Run command is set and the ride is started.	Default: 0.10s Min: 0.00 s Max: 1.00 s	259
S1-11 (688H)	Output Contactor Open Delay Time	All Modes Determines the delay time between shutting off the output of the drive and resetting the contactor control command (H2-□□ = 51) in order to release the motor contactor after a ride has finished.	Default: 0.10s Min: 0.00 s Max: 1.00 s	259
S1-12 (6E0H) <39>	Motor Contactor Control During Auto-Tuning	All Modes Determines the state of the output contactor control command (H2-□□ = 51) during Auto-Tuning. 0: Disabled 1: Enabled 2: Enabled during Auto-Tuning and HBB **Note:** Setting 2 is available in the control mode CLV or CLV/PM for drives with software versions PRG: 7017 or later. The setting is 0 or 1 for software version PRG: 7016.	Default: 0 Min: 0 Max: 2	259
S1-26 (6D7H) <44>	Emergency Stop Start Level	V/f OLV CLV CLV/PM Sets the Emergency Stop Start Level as a percentage of the Maximum Output Frequency.	Default: 10.0% Min: 0.0% Max: 100.0%	260

<5> Default setting is determined by the control mode (A1-02).
<39> Available in drive software versions PRG: 7016 or later.
<44> Available in drive software versions PRG: 7017 or later.

■ S2: Slip Compensation for Elevators

No. (Addr.)	Name	Description	Setting	Page
S2-01 (68FH)	Motor Rated Speed	V/f OLV CLV CLV/PM Sets the motor rated speed.	Default: 1380 rpm Min: 300 rpm Max: 1800 rpm	260
S2-02 (690H) RUN	Slip Compensation Gain in Motoring Mode	V/f OLV CLV CLV/PM Slip compensation for leveling speed can be set separately for motoring and regenerative states. This can help improve the accuracy of leveling.	Default: 0.7 Min: 0.0 Max: 5.0	260
S2-03 (691H) RUN	Slip Compensation Gain in Regenerative Mode		Default: 1.0 Min: 0.0 Max: 5.0	260
S2-05 (693H)	Slip Compensation Torque Detection Delay Time	V/f OLV CLV CLV/PM Sets a delay time before detecting torque for slip compensation.	Default: 1000 ms Min: 0 ms Max: 10000 ms	260
S2-06 (694H)	Slip Compensation Torque Detection Filter Time Constant	V/f OLV CLV CLV/PM Sets the filter time constant applied to the torque signal used for the slip compensation value calculation.	Default: 500 ms Min: 0 ms Max: 2000 ms	260

■ S3: Start/Stop Optimization

No. (Addr.)	Name	Description	Setting	Page
S3-01 (697H) RUN	Position Lock Gain at Start 1	V/f OLV CLV CLV/PM Sets gain levels 1 and 2 for the Position Lock function. Position Lock at start attempts to keep the car position when opening the brake in order to avoid roll back.	Default: 5 Min: 0 Max: 100	261
S3-02 (698H) RUN	Position Lock Gain at Start 2 (Anti Rollback Gain)		Default: 0.00 Min: 0.00 Max: 100.00	261
S3-03 (699H) RUN	Position Lock Gain at Stop	V/f OLV CLV CLV/PM Sets the Position Lock gain at stop. Position Lock at stop keeps the car in position until the brake has been applied entirely.	Default: 5 Min: 0 Max: 100	261
S3-04 (69AH)	Position Lock Bandwidth	V/f OLV CLV CLV/PM Determines the bandwidth around the stop position in which a digital output programmed for "Within Position Lock Bandwidth" (H2-□□ = 33) is closed.	Default: 10 Min: 0 Max: 16383	261
S3-10 (69BH)	Starting Torque Compensation Increase Time	V/f OLV CLV CLV/PM Sets a time constant for the torque reference to reach 300%. Enabled by setting an analog input terminal for torque compensation (H3-□□ = 14).	Default: 500 ms Min: 0 ms Max: 5000 ms	261
S3-12 (69DH)	Starting Torque Compensation Bias in Down Direction	V/f OLV CLV CLV/PM Adds a bias to torque compensation value from the load cell when moving in the down direction.	Default: 0 Min: -40.0% Max: 40.0%	261
S3-14 (69FH)	Torque Compensation Diminish Speed	V/f OLV CLV CLV/PM Sets the speed level for torque compensation to diminish during the time determined by S3-15. Sets as a percentage of the maximum output frequency (E1-04). A setting of 0.0% disables this function.	Default: 0.0% Min: 0.0% Max: 200.0%	262
S3-15 (6A0H)	Torque Compensation Diminish Time	V/f OLV CLV CLV/PM Sets the time for torque compensation to diminish once motor speed reaches the level set in S3-14.	Default: 1000 ms Min: 0 ms Max: 5000 ms	262
S3-16 (6A1H)	Torque Limit Reduction Time	V/f OLV CLV CLV/PM Determines the reduction rate used bring the internal torque reference value down to zero after Position Lock at Stop has finished. Rate = $\frac{\text{Torque 300\%}}{\text{S3-16}}$	Default: 100 ms Min: 0 ms Max: 10000 ms	262
S3-20 (6A2H)	Dwell 2 Speed Reference	All Modes Sets the speed reference for the Dwell 2 function. **Note:** A setting of 0.00 essentially disables the Dwell 2 function.	Default: 0.00% Min: 0.00% Max: 100.00%	262
S3-21 (6A5H)	Dwell 2 End Speed	All Modes The Dwell 2 function will end when the drive reaches this speed. **Note:** A setting of 0.00 will disable the acceleration rate switch that occurs at the end of Dwell 2.	Default: 0.00% Min: 0.00% Max: 100.00%	262

No. (Addr.)	Name	Description	Setting	Page
S3-25 (6A3H)	DC Injection Gain in Regenerative Operation	V/f OLV CLV CLV/PM Sets the gain level applied to the DC injection current at stop (S1-03) for when the load is 100% regenerative. The current applied during DC Injection at stop is determined as S1-03 × S3-25.	Default: 100% Min: 0% Max: 400%	262
S3-26 (6A4H)	DC Injection Gain in Motoring Operation	V/f OLV CLV CLV/PM Sets the gain level applied to the DC injection current at stop (S1-03) for when the load is 100% motoring. The current applied during DC Injection at stop is determined as S1-03 × S3-26.	Default: 20% Min: 0% Max: 400%	263
S3-27 (6BDH)	Torque Compensation Value with Load Condition 1	V/f OLV CLV CLV/PM Used for starting torque compensation utilizing a load cell signal. Sets the torque compensation value for load condition 1.	Default: –50% Min: –100% Max: 100%	263
S3-28 (6BEH)	Torque Compensation Value with Load Condition 2	V/f OLV CLV CLV/PM Used for starting torque compensation utilizing a load cell signal. Sets the torque compensation value for load condition 2.	Default: 50% Min: –100% Max: 100%	263
S3-29 (6BFH)	Analog Input from Load Cell with Load Condition 1	V/f OLV CLV CLV/PM Used for starting torque compensation utilizing a load cell signal. Sets the analog signal level from the load cell for load condition 1.	Default: 0.0% Min: –100% Max: 100%	263
S3-30 (6C0H)	Analog Input from Load Cell with Load Condition 2	V/f OLV CLV CLV/PM Used for starting torque compensation utilizing a load cell signal. Sets the analog signal level from the load cell for load condition 2.	Default: 100.0% Min: –100.0% Max: 100%	263
S3-34 (6C4H)	Anti-Rollback Torque Bias 1	V/f OLV CLV CLV/PM Sets the Anti-Rollback Bias applied at small position deviations during Position Lock at start.	Default: 0.0% Min: 0.0% Max: 100.0%	263
S3-35 (6C5H)	Anti-Rollback Torque Bias 2	V/f OLV CLV CLV/PM Sets the Anti-Rollback Bias applied at large position deviations during Position Lock at start.	Default: 0.0% Min: 0.0% Max: 100.0%	263
S3-37 (6C7H)	Position Deviation Level to Apply ARB Torque Bias 1	V/f OLV CLV CLV/PM Sets the position deviation level to active at Anti-Rollback Torque Bias 1 (S3-34).	Default: 0 Min: 0 Max: 32767	264
S3-38 (6C8H)	Position Deviation Level to Apply ARB Torque Bias 2	V/f OLV CLV CLV/PM Determines the position deviation level for when the drive should switch from the torque bias set in S3-34 to the torque bias set in S3-35.	Default: 0 Min: 0 Max: 32767	264
S3-39 (6C9H)	Anti-Rollback Integral Gain	V/f OLV CLV CLV/PM Determines the drive's responsiveness for Anti-Rollback during Position Lock.	Default: 0.00 Min: –30.00 Max: 30.00	264
S3-40 (6CAH)	Anti-Rollback Movement Detection	V/f OLV CLV CLV/PM Sets the amount of pulses for movement detection during Anti-Rollback.	Default: 1 pulse Min: 0 pulse Max: 100 pulses	264
S3-41 (6CBH)	Position Lock Gain at Start 2 Reduction	V/f OLV CLV CLV/PM Sets a reduction factor for the Position Lock Gain at Start 2 (Anti-Rollback Gain) set in parameter S3-02.	Default: 0.50 Min: 0.00 Max: 1.00	264

■ S4: Rescue Operation

No. (Addr.)	Name	Description	Setting	Page
S4-01 (6A6H)	Light Load Direction Search Selection	All Modes 0: Disabled 1: Enabled 2: Enabled for Motor 1 only	Default: 0 Min: 0 Max: 2	264
S4-02 (6A7H)	Light Load Direction Search Method	V/f OLV CLV CLV/PM Determines how the drive detects the light load direction. 0: Output Current 1: Regenerative direction detection	Default: 1 Min: 0 Max: 1	265
S4-03 (6A8H)	Light Load Direction Search Time	All Modes Sets the time to perform Light Load Direction Search.	Default: 1.0 s Min: 0.0 s Max: 5.0 s	265
S4-04 (6A9H)	Light Load Direction Search Speed Reference	All Modes Sets the speed reference to use during Light Load Direction Search.	Default: <5> Min: 0.00% Max: 20.00%	265
S4-05 (6AAH)	Rescue Operation Torque Limit	All Modes Sets the torque limit used during Rescue Operation.	Default: 100% Min: 0% Max: 300%	265
S4-06 (6CCH)	Rescue Operation Power Supply Selection	All Modes 0: Battery 1: UPS (single-phase) 2: UPS (3-phase)	Default: 0 Min: 0 Max: 2	265

No. (Addr.)	Name	Description	Setting	Page
S4-07 (6CDH)	UPS Power	All Modes Sets the capacity of the UPS.	Default: 0.0 kVA Min: 0.0 kVA Max: 100.0 kVA	265
S4-08 (6CEH)	UPS Operation Speed Limit Selection	All Modes Determines how a speed limit should be applied to the Rescue Operation speed (S4-15) when operating from a UPS. 0: Disabled 1: Enabled until Light Load Direction Search is complete 2: Enabled until stop	Default: 2 Min: 0 Max: 2	265
S4-12 (6D2H)	DC Bus Voltage during Rescue Operation	All Modes Sets the DC bus voltage during Rescue Operation.	Default: 0 V Min: 0 V Max: 1150 V	266
S4-13 (6D3H)	Rescue Operation Power Supply Deterioration Detection Level	All Modes Determines at which level of backup power supply deterioration a PF5 fault is triggered.	Default: 80% Min: 10% Max: 100%	266
S4-15 (6DAH) <39>	Speed Reference Selection for Rescue Operation	All Modes Selects the speed reference used for Rescue Operation.	Default: 0 Min: 0 Max: 1	266

<5> Default setting is determined by the control mode (A1-02).
<39> Available in drive software versions PRG: 7016 or later.

■ S5: Short Floor Operation

No. (Addr.)	Name	Description	Setting	Page
S5-01 (6ABH)	Short Floor Operation Selection	All Modes 0: Disabled 1: Enabled (Short Floor) 2: Enabled (Advance Short Floor)	Default: 0 Min: 0 Max: 2	269
S5-02 (6ACH)	Nominal Speed for Short Floor Calculation	All Modes When d1-18 (Speed Priority Selection) is set to 0 or 3, S5-02 determines the rated speed used during Short Floor.	Default: 0.0% Min: 0.0% Max: 100.0%	269
S5-03 (6ADH)	Short Floor Minimum Constant Speed Time	All Modes Sets the minimum operation time when the Advanced Short Floor function is enabled (S5-01 = 2).	Default: 0.0 s Min: 0.0 s Max: 2.0 s	269
S5-04 (6AEH)	Distance Calculation Acceleration Time Gain	All Modes Set for acceleration jerk compensation in Distance Calculation.	Default: 150.0% Min: 50.0% Max: 200.0%	269
S5-05 (6AFH)	Distance Calculation Deceleration Time Gain	All Modes Set for deceleration jerk compensation in Distance Calculation.	Default: 150.0% Min: 50.0% Max: 200.0%	269
S5-10 (6B0H)	Stopping Method Selection	V/f OLV CLV CLV/PM 0: Disabled 1: Direct Landing 2: Leveling Distance Control	Default: 0 Min: 0 Max: 2	272
S5-11 (6B1H)	Deceleration Distance	V/f OLV CLV CLV/PM Sets the deceleration distance when Stop Distance Control is enabled.	Default: 0 mm Min: 0 mm Max: 32767 mm <36>	272
S5-12 (6B2H)	Stop Distance	V/f OLV CLV CLV/PM Sets the stopping distance when Stop Distance Control is enabled.	Default: 0 mm Min: 0 mm Max: 10000 mm <37>	272
S5-13 (6D6H)	Direct Landing Minimum Speed Level	V/f OLV CLV CLV/PM Sets the speed level for the start of Direct Landing. Direct Landing is essentially disabled if the starting speed for Direct Landing is less than the maximum output speed multiplied by this parameter (E1-04 × S5-13).	Default: 20% Min: 0% Max: 100%	272

<36> When the length units are set for inches (o1-12 = 1), the setting range becomes 0.00 to 650.00 inches.
<37> When the length units are set for inches (o1-12 = 1), the setting range becomes 0.00 to 393.00 inches.

■ S6: Error Detection

No. (Addr.)	Name	Description	Setting	Page
S6-01 (6B3H)	Motor Contactor Response Error (SE1) Detection/Reset Selection	All Modes 0: Detect during stop, SE1 must be manually reset 1: Detect during stop, SE1 can be automatically reset 2: No SE1 detection	Default: 0 Min: 0 Max: 2	273
S6-02 (6B4H)	Starting Current Error (SE2) Detection Delay Time	V/f OLV CLV CLV/PM Sets a delay time for detecting SE2.	Default: 200 ms Min: 0.00 ms Max: [S1-04]-[S1-06]	273
S6-03 (6B5H) <44>	SE2 Detect Current Level	V/f OLV CLV CLV/PM Sets the level of current applied to the motor when the Brake Control command is activated, as a percentage of the Motor No-load Current (E2-03).	Default: 25% Min: 0% Max: 100%	273
S6-04 (6B6H)	Output Current Error (SE3) Detection Delay Time	V/f OLV CLV CLV/PM Sets a delay time for detecting SE3.	Default: 200 ms Min: 0 ms Max: 5000 ms	273
S6-05 (6B7H)	Brake Response Error (SE4) Detection Time	All Modes Sets a delay time for detecting SE4.	Default: 500 ms Min: 0 ms Max: 10000 ms	273
S6-10 (6B8H)	Overacceleration Detection Level	V/f OLV CLV CLV/PM If the elevator car accelerates at an abnormal rate, the drive triggers an overspeed fault (dv6) and has the motor coast to stop. Parameter S6-10 determines the acceleration rate that triggers a fault.	Default: <7> Min: 0.0 m/s^2 Max: 20.0 m/s^2 <7>	274
S6-11 (6B9H)	Overacceleration Detection Time	V/f OLV CLV CLV/PM Sets a primary delay for detecting overacceleration.	Default: 50 ms Min: 0 ms Max: 5000 ms	274
S6-12 (6BAH)	Overacceleration Detection Selection	V/f OLV CLV CLV/PM 0: Always enabled 1: During run only	Default: 0 Min: 0 Max: 1	274
S6-15 (6BBH)	Speed Reference Loss Detection	All Modes Enabled or disables detection for speed reference missing (FrL). 0: Disabled 1: Enabled	Default: 1 Min: 0 Max: 1	274
S6-16 (6BCH)	Restart after Baseblock Selection	All Modes 0: No restart after Baseblock/Safe Torque-Off 1: Restart after Baseblock/Safe Torque-Off	Default: 0 Min: 0 Max: 1	274

<7> Default setting value is determined by the digital operator display unit selection (o1-03). The default is normally 1.5 m/s^2, but when o1-03 = 6, the default becomes 5.0 ft/s^2 (Setting Range: 0.0 to 50.0 ft/s^2).
<44> Available in drive software versions PRG: 7017 or later.

◆ T: Motor Tuning

Enter data into the following parameters to tune the motor and drive for optimal performance.

■ T1: Induction Motor Auto-Tuning

No. (Addr.)	Name	Description	Setting	Page
T1-01 (701H)	Auto-Tuning Mode Selection	V/f OLV CLV CLV/PM 0: Rotational Auto-Tuning 1: Stationary Auto-Tuning 1 2: Stationary Auto-Tuning for Line-to-Line Resistance 4: Stationary Auto-Tuning 2	Default: 0 <5> Min: 0 Max: 4 <18>	118
T1-02 (702H)	Motor Rated Power	V/f OLV CLV CLV/PM Sets the motor rated power as specified on the motor nameplate. **Note:** Use the following formula to convert horsepower into kilowatts: kW = HP × 0.746.	Default: <4> Min: 0.00 kW Max: 650.00 kW	118
T1-03 (703H)	Motor Rated Voltage	V/f OLV CLV CLV/PM Sets the motor rated voltage as specified on the motor nameplate.	Default: 200.0 V <9> Min: 0.0 V Max: 255.0 V <9>	118
T1-04 (704H)	Motor Rated Current	V/f OLV CLV CLV/PM Sets the motor rated current as specified on the motor nameplate.	Default: <4> Min: 10% of drive rated current Max: 200% of drive rated current <10>	119
T1-05 (705H)	Motor Base Frequency	V/f OLV CLV CLV/PM Sets the rated frequency of the motor as specified on the motor nameplate.	Default: 50.0 Hz Min: 0.0 Hz Max: 200.0 Hz	119

No. (Addr.)	Name	Description	Setting	Page
T1-06 (706H)	Number of Motor Poles	V/f OLV CLV CLV/PM Sets the number of motor poles as specified on the motor nameplate.	Default: 4 Min: 2 Max: 48	119
T1-07 (707H)	Motor Base Speed	V/f OLV CLV CLV/PM Sets the rated speed of the motor as specified on the motor nameplate.	Default: 1450 r/min Min: 0 r/min Max: 24000 r/min	119
T1-08 (708H)	Encoder Resolution (pulses per revolution)	V/f OLV CLV CLV/PM Set the number of pulses per revolution for the PG being used (pulse generator or encoder).	Default: 1024 ppr Min: 0 ppr Max: 60000 ppr	119
T1-09 (709H)	Motor No-Load Current (Stationary Auto-Tuning 1 and 2)	V/f OLV CLV CLV/PM Sets the no-load current for the motor. After setting the motor capacity to T1-02 and the motor rated current to T1-04, this parameter will automatically display the no-load current for a standard 4 pole Yaskawa motor. Enter the no-load current as indicated on the motor test report.	Default: – Min: 0 A Max: Up to T1-04 <10>	119
T1-10 (70AH)	Motor Rated Slip (Stationary Auto-Tuning 2)	V/f OLV CLV CLV/PM Sets the motor rated slip. After setting the motor capacity to T1-02, this parameter will automatically display the motor slip for a standard 4 pole Yaskawa motor. Enter the motor slip as indicated on the motor test report.	Default: – Min: 0.00 Hz Max: 20.00 Hz	119

<4> Default setting value varies by the drive model (o2-04).
<5> Default setting is determined by the control mode (A1-02).
<9> Values shown here are for 200 V class drives. Double the value when using a 400 V class drive. Multiply value by 2.875 for 600 V class drives.
<10> The display resolution depends on the rated output power of the drive. Models CIMR-LU2A0008 to 2A0033, 4A0005 to 4A0018, and 5A0003 to 5A0013 display values in 0.01 A units, while models CIMR-LU2A0047 to 2A0415, 4A0024 to 4A0605, and 5A0017 to 5A0200 display values in 0.1 A units.
<18> The variety of Auto-Tuning methods depends on the control mode setting. V/f Control allows T1-01 to be set to 2 or 3, while vector control modes (OLV and CLV) allow T1-01 to be set to 0 through 4.

■ T2: PM Motor Auto-Tuning

No. (Addr.)	Name	Description	Setting	Page
T2-01 (750H)	Motor Auto-Tuning Mode Selection	V/f OLV CLV CLV/PM 0: Motor Data input 1: Stationary Auto-Tuning 2: Stationary stator resistance Auto-Tuning 3: Initial magnet pole search parameters Auto-Tuning 4: Encoder offset stationary Auto-Tuning 10: Encoder offset rotational Auto-Tuning 11: Rotational back EMF constant Auto-Tuning 12: Auto-Tuning of PG-E3 encoder characteristics Setting 12 is available in drive software versions PRG: 7017 or later. Auto-Tuning of PG-E3 encoder characteristics requires a PG-E3 option with software version 1102 or later. To identify the PG-E3 software version, refer to the PG-E3 labeling on the option, in the field designated "C/N" (S + four digit number).	Default: 0 Min: 0 Max: 12	120
T2-04 (730H)	Motor Rated Power	V/f OLV CLV CLV/PM Sets the motor rated power as indicated on the motor nameplate.	Default: <4> Min: 0.00 kW Max: 650.00 kW	120
T2-05 (732H)	Motor Rated Voltage	V/f OLV CLV CLV/PM Enter the motor rated voltage as indicated on the motor nameplate.	Default: 200.0 V <9> Min: 0.0 V Max: 255.0 V <9>	120
T2-06 (733H)	Motor Rated Current	V/f OLV CLV CLV/PM Enter the motor rated current as indicated on the motor nameplate.	Default: <4> Min: 10% of drive rated current Max: 200% of drive rated current <10>	120
T2-08 (734H)	Number of Motor Poles	V/f OLV CLV CLV/PM Enter the number of motor poles for the motor as indicated on the motor nameplate.	Default: 6 Min: 2 Max: 120 <43>	120
T2-09 (731H)	Motor Base Speed	V/f OLV CLV CLV/PM Enter the base speed for the motor as indicated on the motor nameplate.	Default: 150 r/min Min: 0 r/min Max: 24000 r/min	121
T2-10 (754H)	Single Phase Stator Resistance	V/f OLV CLV CLV/PM Enter the 1-phase resistance of the stator winding.	Default: – Min: 0.000 Ω Max: 65.000 Ω	121
T2-11 (735H)	Motor d-Axis Inductance	V/f OLV CLV CLV/PM Enter the d-axis inductance for the motor as indicated on the motor nameplate.	Default: – Min: 0.00 mH Max: 600.00 mH	121
T2-12 (736H)	Motor q-Axis Inductance	V/f OLV CLV CLV/PM Enter the q-axis inductance for the motor as indicated on the motor nameplate.	Default: – Min: 0.00 mH Max: 600.00 mH	121

No. (Addr.)	Name	Description	Setting	Page
T2-13 (755H)	Induced Voltage Constant Unit Selection	V/f OLV CLV **CLV/PM** 0: mV/(r/min). E5-09 will automatically be set to 0.0, and E5-24 will be used. 1: mV/(rad/sec). E5-24 will automatically be set to 0.0, and E5-09 will be used.	Default: 1 Min: 0 Max: 1	*121*
T2-14 (737H)	Motor Induced Voltage Constant	V/f OLV CLV **CLV/PM** Enter the induced voltage coefficient for the motor as indicated on the motor nameplate.	Default: – Min: 0.0 Max: 6500.0 *<30>*	*121*
T2-16 (738H)	Encoder Resolution	V/f OLV CLV **CLV/PM** Sets the number of pulses per revolution for the PG being used (pulse generator or encoder).	Default: 1024 ppr Min: 1 ppr Max: 15000 ppr	*121*
T2-17 (757H)	Encoder Offset	V/f OLV CLV **CLV/PM** Sets the offset between encoder offset and the rotor magnetic axis.	Default: 0.0 deg Min: -180.0 deg Max: 180.0 deg	*121*
T2-18 (BB0H) *<44>*	Speed Reference for Auto-Tuning of PG-E3 Encoder Characteristics	V/f OLV CLV **CLV/PM** Sets the speed reference for execution of Auto-Tuning of PG-E3 encoder characteristics (T2-01 = 12).	Default: 10 r/min Min: 1 r/min Max: 30 r/min	*122*
T2-19 (BB1H) *<44>*	Rotation Direction for Auto-Tuning of PG-E3 Encoder Characteristics	V/f OLV CLV **CLV/PM** Sets the direction of motor rotation for execution of Auto-Tuning of PG-E3 encoder characteristics (T2-01 = 12). 0: Forward (Up) 1: Reverse (Down)	Default: 0 Min: 0 Max: 1	*122*

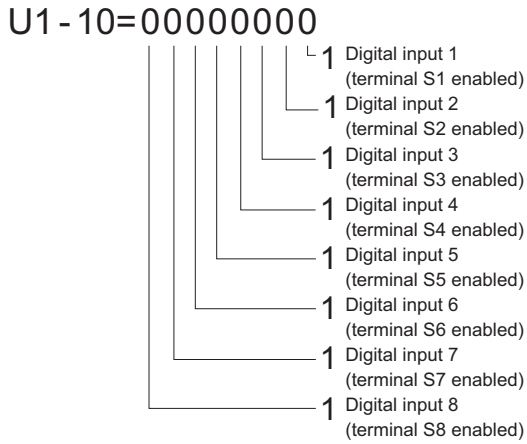
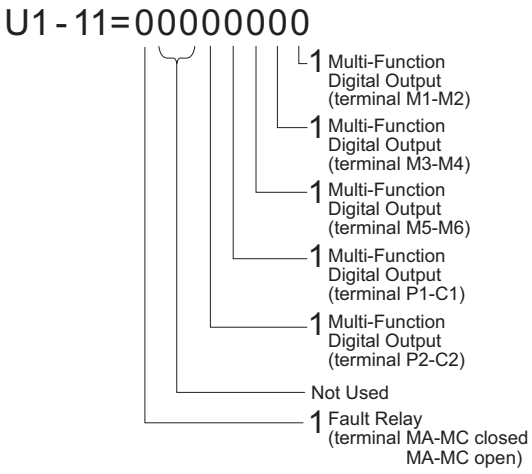
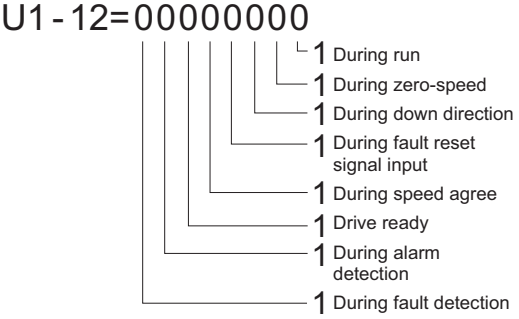
<4> Default setting value varies by the drive model (o2-04).
<9> Values shown here are for 200 V class drives. Double the value when using a 400 V class drive. Multiply value by 2.875 for 600 V class drives.
<10> The display resolution depends on the rated output power of the drive. Models CIMR-LU2A0008 to 2A0033, 4A0005 to 4A0018, and 5A0003 to 5A0013 display values in 0.01 A units, while models CIMR-LU2A0047 to 2A0415, 4A0024 to 4A0605, and 5A0017 to 5A0200 display values in 0.1 A units.
<30> Setting units are determined by the induced voltage constant unit selection for PM motors set to T2-13.
<43> When PG-E3 option connected: Max setting = 48
<44> Available in drive software versions PRG: 7017 or later.

◆ U: Monitors

Monitor parameters allow the user to view drive status, fault information, and other data concerning drive operation.

■ U1: Operation Status Monitors

No. (Addr.)	Name	Description	Analog Output Level	Unit	Page
U1-01 (40H)	Speed Reference	**All Modes** Monitors the speed reference.	10 V: Max frequency (-10 to +10 V)	0.01% *<29>*	–
U1-02 (41H)	Output Speed	**All Modes** Displays the output speed.	10 V: Max frequency (-10 to +10 V)	0.01% *<29>*	–
U1-03 (42H)	Output Current	**All Modes** Displays the output current.	10 V: Drive rated current	*<10> <40>*	–
U1-04 (43H)	Control Method	**All Modes** 0: V/f Control 2: Open Loop Vector Control 3: Closed Loop Vector Control 7: Closed Loop Vector Control for PM	No signal output available	–	–
U1-05 (44H)	Speed Feedback	V/f **OLV** **CLV** **CLV/PM** Displays the motor speed feedback.	10 V: Max Frequency (-10 to +10 V)	0.01% *<29>*	–
U1-06 (45H)	Output Voltage Reference	**All Modes** Displays the output voltage.	10 V: 200 Vrms *<9>*	0.1 Vac	–
U1-07 (46H)	DC Bus Voltage	**All Modes** Displays the DC bus voltage.	10 V: 400 V *<9>*	1 Vdc	–
U1-08 (47H)	Output Power	**All Modes** Displays the output power (this value is calculated internally).	10 V: Drive rated power (kW) (-10 to +10 V)	*<12>*	–
U1-09 (48H)	Torque Reference	V/f **OLV** **CLV** **CLV/PM** Monitors the internal torque reference.	10 V: Motor rated torque (-10 to +10 V)	0.1%	–

No. (Addr.)	Name	Description	Analog Output Level	Unit	Page
U1-10 (49H)	Input Terminal Status	All Modes Displays the input terminal status. 	No signal output available	–	–
U1-11 (4AH)	Output Terminal Status	All Modes Displays the output terminal status. 	No signal output available	–	–
U1-12 (4BH)	Drive Status	All Modes Displays the drive operation status. 	No signal output available	–	–
U1-13 (4EH)	Terminal A1 Input Voltage	All Modes Displays the voltage input to terminal A1.	10 V: 100% (-10 to +10 V)	0.1%	–
U1-14 (4FH)	Terminal A2 Input Voltage	All Modes Displays the voltage input to terminal A2.	10 V: 100% (-10 to +10 V)	0.1%	–
U1-16 (53H)	Output Speed after Soft Start	All Modes Displays output speed with ramp time and jerk settings. Units determined by o1-03.	10 V: Max frequency (-10 to +10 V)	0.01% <29>	–

No. (Addr.)	Name	Description	Analog Output Level	Unit	Page
U1-17 (58H)	DI-A3 Option Card Input Status	All Modes Displays the reference value input from the DI-A3 option card. Display will appear in hexadecimal as determined by the digital card input selection in F3-01. 3FFFF: Set (1 bit) + sign (1 bit) + 16 bit	No signal output available	–	–
U1-18 (61H)	oPE Fault Parameter	All Modes Displays the parameter number that caused the oPE02 or oPE08 (Operation error).	No signal output available	–	–
U1-19 (66H)	MEMOBUS/Modbus Error Code	All Modes Displays the contents of a MEMOBUS/Modbus error. U1-19=00000000 1 CRC Error 1 Data Length Error 0 Not Used 1 Parity Error 1 Overrun Error 1 Framing Error 1 Timed Out 0 Not Used	No signal output available	–	–
U1-25 (4DH)	Software Number (Flash)	All Modes FLASH ID	No signal output available	–	–
U1-26 (5BH)	Software No. (ROM)	All Modes ROM ID	No signal output available	–	–

<9> Values shown here are for 200 V class drives. Double the value when using a 400 V class drive. Multiply value by 2.875 for 600 V class drives.
<10> The display resolution depends on the rated output power of the drive. Models CIMR-LU2A0008 to 2A0033, 4A0005 to 4A0018, and 5A0003 to 5A0013 display values in 0.01 A units, while models CIMR-LU2A0047 to 2A0415, 4A0024 to 4A0605, and 5A0017 to 5A0200 display values in 0.1 A units.
<12> The display resolution depends on the rated output power of the drive. Models CIMR-LU2A0008 to 2A0033, 4A0005 to 4A0018, and 5A0003 to 5A0013 display values in 0.01 kW units, while models CIMR-LU2A0047 to 2A0415, 4A0024 to 4A0605, and 5A0017 to 5A0200 display values in 0.1 kW units.
<29> Setting units are determined by the digital operator display unit selection (o1-03). When o1-03 = 0, the value is set in Hertz. When o1-03 = 4 or 5, the value is displayed in m/s. When o1-03 = 6, the value is displayed in ft/min.
<40> When checking the values of U1-03, U2-05 and U4-13 with the digital operator they are displayed in units of amperes, but when they are checked using MEMOBUS communications, the monitor value in MEMOBUS communications is: displayed numeric value / 8192 × drive's rated current (A), from the condition "8192 (maximum value) = drive's rated current (A)".

■ U2: Fault Trace

No. (Addr.)	Name	Description	Analog Output Level	Unit	Page
U2-01 (80H)	Current Fault	All Modes Displays the current fault.	No signal output available	–	–
U2-02 (81H)	Previous Fault	All Modes Displays the previous fault.	No signal output available	–	–
U2-03 (82H)	Speed Reference at Previous Fault	All Modes Displays the speed reference at the previous fault.	No signal output available	0.01% <29>	–
U2-04 (83H)	Output Speed at Previous Fault	All Modes Displays the output speed at the previous fault.	No signal output available	0.01% <29>	–
U2-05 (84H)	Output Current at Previous Fault	All Modes Displays the output current at the previous fault.	No signal output available	<10> <40>	–
U2-06 (85H)	Motor Speed at Previous Fault	V/f OLV CLV CLV/PM Displays the motor speed at the previous fault.	No signal output available	0.01% <29>	–
U2-07 (86H)	Output Voltage at Previous Fault	All Modes Displays the output voltage at the previous fault.	No signal output available	0.1 Vac	–
U2-08 (87H)	DC Bus Voltage at Previous Fault	All Modes Displays the DC bus voltage at the previous fault.	No signal output available	1 Vdc	–

No. (Addr.)	Name	Description	Analog Output Level	Unit	Page
U2-09 (88H)	Output Power at Previous Fault	All Modes Displays the output power at the previous fault.	No signal output available	0.1 kW	–
U2-10 (89H)	Torque Reference at Previous Fault	V/f OLV CLV CLV/PM Displays the torque reference at the previous fault.	No signal output available	0.1%	–
U2-11 (8AH)	Input Terminal Status at Previous Fault	All Modes Displays the input terminal status at the previous fault. Displayed as in U1-10.	No signal output available	–	–
U2-12 (8BH)	Output Terminal Status at Previous Fault	All Modes Displays the output status at the previous fault. Displayed as in U1-11.	No signal output available	–	–
U2-13 (8CH)	Drive Operation Status at Previous Fault	All Modes Displays the operation status of the drive at the previous fault. Displayed as in U1-12.	No signal output available	–	–
U2-14 (8DH)	Cumulative Operation Time at Previous Fault	All Modes Displays the cumulative operation time at the previous fault.	No signal output available	1 h	–
U2-15 (7E0H)	Soft Starter Output at Previous Fault	All Modes Displays the run speed after a soft start when a previous fault occurred. Displayed as in U1-16.	No signal output available	0.01% <29>	–
U2-16 (7E1H)	Motor q-Axis Current at Previous Fault	V/f OLV CLV CLV/PM Displays the q-axis current for the motor at the previous fault. Displayed as in U6-01.	No signal output available	0.1%	–
U2-17 (7E2H)	Motor d-Axis Current at Previous Fault	V/f OLV CLV CLV/PM Displays the d-axis current for the motor at the previous fault. Displayed as in U6-02.	No signal output available	0.1%	–
U2-20 (8EH)	Heatsink Temperature at Previous Fault	All Modes Displays the temperature of the heatsink when the most recent fault occurred. Displayed as in U4-08.	No signal output available	1°C	–
U2-21 (7E6H)	Peak Hold Current during Fault	All Modes Displays the peak current that occurred just prior to the previous fault.	No signal output available	0.01 A	–
U2-22 (7E7H)	Peak Hold Frequency during Fault	All Modes Displays the output frequency when the peak current displayed in U2-21 occurred.	No signal output available	0.01 Hz	–

<10> The display resolution depends on the rated output power of the drive. Models CIMR-LU2A0008 to 2A0033, 4A0005 to 4A0018, and 5A0003 to 5A0013 display values in 0.01 A units, while models CIMR-LU2A0047 to 2A0415, 4A0024 to 4A0605, and 5A0017 to 5A0200 display values in 0.1 A units.
<29> Setting units are determined by the digital operator display unit selection (o1-03). When o1-03 = 0, the value is set in Hertz. When o1-03 = 4 or 5, the value is displayed in m/s. When o1-03 = 6, the value is displayed in ft/min.
<40> When checking the values of U1-03, U2-05 and U4-13 with the digital operator they are displayed in units of amperes, but when they are checked using MEMOBUS communications, the monitor value in MEMOBUS communications is: displayed numeric value / 8192 × drive's rated current (A), from the condition "8192 (maximum value) = drive's rated current (A)".

■ U3: Fault History

No. (Addr.)	Name	Description	Analog Output Level	Unit	Page
U3-01 to U3-04 (90H to 93H (800H to 803H))	First to 4th Most Recent Fault	All Modes Displays the first to the fourth most recent faults.	No signal output available	–	–
U3-05 to U3-10 (804H to 809H)	5th to 10th Most Recent Fault	All Modes Displays the fifth to the tenth most recent faults. After ten faults have occurred in the drive, data for the oldest fault is deleted. The most recent fault appears in U3-01, with the next most recent fault appearing in U3-02. The data is moved to the next monitor parameter every time a fault occurs.	No signal output available	–	–
U3-11 to U3-14 (94H to 97H (80AH to 80DH))	Cumulative Operation Time at 1st to 4th Most Recent Fault	All Modes Displays the cumulative operation time when the first to the fourth most recent faults occurred.	No signal output available	1 h	–
U3-15 to U3-20 (80EH to 813H)	Cumulative Operation Time at 5th to 10th Most Recent Fault	All Modes Displays the cumulative operation time when the fifth to the tenth most recent faults occurred.	No signal output available	1 h	–

■ U4: Maintenance Monitors

No. (Addr.)	Name	Description	Analog Output Level	Unit	Page
U4-01 (4CH, 98H, 99H) <41>	Cumulative Operation Time	All Modes Displays the cumulative operation time of the drive. The value for the cumulative operation time counter can be reset in parameter o4-01. Use parameter o4-02 to determine if the operation time should start as soon as the power is switched on or only while the Up/Down command is present. The maximum number displayed is 99999, after which the value is reset to 0.	No signal output available	1 h	–
U4-03 (67H, 94H, 9BH) <42>	Cooling Fan Operation Time	All Modes Displays the cumulative operation time of the cooling fan. The default value for the fan operation time is reset in parameter o4-03. This value will reset to 0 and start counting again after reaching 99999.	No signal output available	1 h	–
U4-04 (7EH)	Cooling Fan Maintenance	All Modes Displays main cooling fan usage time in as a percentage of its expected performance life. Parameter o4-03 can be used to reset this monitor. The fan should be replaced when this monitor reaches 90%.	No signal output available	1%	–
U4-05 (7CH)	Capacitor Maintenance	All Modes Displays main circuit capacitor usage time in as a percentage of their expected performance life. The capacitors should be replaced when this monitor reaches 90%. Parameter o4-05 can be used to reset this monitor.	No signal output available	1%	–
U4-06 (7D6H)	Soft Charge Bypass Relay Maintenance	All Modes Displays the soft charge bypass relay maintenance time as a percentage of its estimated performance life. The soft charge relay should be replaced when this monitor reaches 90%. Parameter o4-07 can be used to reset this monitor.	No signal output available	1%	–
U4-07 (7D7H)	IGBT Maintenance	All Modes Displays IGBT usage time as a percentage of the expected performance life. The IGBTs should be replaced when this monitor reaches 90%. Parameter o4-09 can be used to reset this monitor.	No signal output available	1%	–
U4-08 (68H)	Heatsink Temperature	All Modes Displays the heatsink temperature.	10 V: 100°C	1°C	–
U4-09 (5EH)	LED Check	All Modes Lights all segments of the LED to verify that the display is working properly.	No signal output available	–	–
U4-10 (5CH)	kWh, Lower 4 Digits	All Modes Monitors the drive output power. The value is shown as a 9 digit number displayed across two monitor parameters, U4-10 and U4-11. Example: 12345678.9 kWh is displayed as: U4-10: 678.9 kWh U4-11: 12345 MWh	No signal output available	1 kWh	–
U4-11 (5DH)	kWh, Upper 5 Digits		No signal output available	1 MWh	–
U4-13 (7CFH)	Peak Hold Current	All Modes Displays the highest current value that occurred during a ride.	No signal output available	0.01 A <40>	–
U4-14 (7D0H)	Peak Hold Output Frequency	All Modes Displays the output frequency when the current value shown in U4-13 occurred.	No signal output available	0.01 Hz	–
U4-16 (7D8H)	Motor Overload Estimate (oL1)	All Modes Shows the value of the motor overload detection accumulator. 100% is equal to the oL1 detection level.	10 V: 100%	0.1%	–
U4-17 (7D9H)	Drive Overload Calculations (OL2)	All Modes Displays the level of the drive overload detection (oL2). A value of 100% is equal to the oL2 detection level.	10 V = 100%	0.1%	–
U4-18 (7DAH)	Speed Reference Selection Results	All Modes Displays the source for the speed reference as XY-nn. X: indicates which reference is used: 1 = Reference 1 (b1-01) Y-nn: indicates the reference source 0-01 = Digital operator 1-01 = Analog (terminal A1) 1-02 = Analog (terminal A2) 2-02 to 8 = Digital Inputs (d1-02 to 8) 3-01 = MEMOBUS/Modbus communications 4-01 = Communication option card	No signal output available	–	–
U4-19 (7DBH)	Speed Reference from MEMOBUS/Modbus Comm.	All Modes Displays the speed reference provided by MEMOBUS/Modbus (decimal).	No signal output available	0.01% <29>	–
U4-20 (7DCH)	Speed Reference From Option Card	All Modes Displays the speed reference input by an option card (decimal).	No signal output available	0.01% <29>	–

No. (Addr.)	Name	Description	Analog Output Level	Unit	Page
U4-21 (7DDH)	Up/Down Command Source Selection	All Modes Displays the source for the Up/Down command as XY-nn. X: Indicates which Up/Down command source is used: 1 = Reference 1 (b1-02) Y: Input power supply data 0 = Digital operator 1 = External terminals 3 = MEMOBUS/Modbus communications 4 = Communication option card nn: Up/Down command limit status data 00: No limit status. 01: Up/Down command was left on when stopped in the PRG mode 02: Up/Down command was left on when switching from LOCAL to REMOTE operation 03: Waiting for soft charge bypass contactor after power up (Uv or Uv1 flashes after 10 s) 04: Waiting for "Up/Down Command Prohibited" time period to end 05: Fast Stop (multi-function input, operator) 07: During baseblock while coast to stop with timer 08: Speed reference is below minimal reference during baseblock 09: Waiting for Enter command	No signal output available	–	–
U4-22 (7DEH)	MEMOBUS/Modbus Communications Reference	All Modes Displays the drive control data set by MEMOBUS/Modbus communications register no. 0001H as a four-digit hexadecimal number.	No signal output available	–	–
U4-23 (7DFH)	Communication Option Card Reference	All Modes Displays drive control data set by an option card as a four-digit hexadecimal number.	No signal output available	–	–
U4-24 (7E6H)	Number of Travels (Lower 4 digit)	All Modes Displays the lower four digits for the number of trips the drive has made.	No signal output available	1 time	–
U4-25 (7E7H)	Number of Travels (Higher 4 digit)	All Modes Displays the upper four digits for the number of trips the drive has made.	No signal output available	1 time	–
U4-26 (7E8H)	Max. Current during Acceleration	All Modes Shows the maximum current that occurred during acceleration.	No signal output available	0.1 A	–
U4-27 (7E9H)	Max. Current during Deceleration	All Modes Shows the maximum current that occurred during deceleration.	No signal output available	0.1 A	–
U4-28 (7EAH)	Max. Current during Constant Speed	All Modes Shows the maximum current that occurred during ride at top speed.	No signal output available	0.1 A	–
U4-29 (7EDH)	Max. Current during Leveling Speed	All Modes Shows the maximum current that occurred during ride at leveling speed.	No signal output available	0.1 A	–
U4-30 (7EEH)	Slip Compensation Value	V/f OLV CLV CLV/PM Shows the slip compensation value.	No signal output available	0.01%	–
U4-31 (7EFH)	Car Acceleration Rate	V/f OLV CLV CLV/PM Shows the car acceleration rate.	No signal output available	0.01 m/s²	–
U4-40 (7FDH)	Speed Reference Limit at Rescue Operation	All Modes Displays the speed limit for Rescue Operation based on how much power the backup battery or UPS has. Displays 0% when Rescue Operation is not being performed.	No signal output available	1%	–
U4-42 (855H) <35>	Remaining Distance	V/f OLV CLV CLV/PM Displays the remaining distance according to the stopping method selected.	10 V: S5-10 = 1: S5-11 S5-10 = 2: S5-12	1 mm	–
U4-43 (856H) <35>	Minimum Deceleration Distance	V/f OLV CLV CLV/PM Displays the Minimum Deceleration Distance calculated by E1-04.	No signal output available	1 mm	–
U4-44 (857H) <35>	Minimum Stop Distance	V/f OLV CLV CLV/PM Displays the Minimum Stop Distance calculated by d1-26.	No signal output available	1 mm	–

<29> Setting units are determined by the digital operator display unit selection (o1-03). When o1-03 = 0, the value is set in Hertz. When o1-03 = 4 or 5, the value is displayed in m/s. When o1-03 = 6, the value is displayed in ft/min.
<35> o1-12 (Length Units) determines the units. When o1-12 is set to 0, the unit is millimeters. When o1-12 is set to 1, the unit is inch.
<40> When checking the values of U1-03, U2-05 and U4-13 with the digital operator they are displayed in units of amperes, but when they are checked using MEMOBUS communications, the monitor value in MEMOBUS communications is: displayed numeric value / 8192 × drive's rated current (A), from the condition "8192 (maximum value) = drive's rated current (A)".
<41> The MEMOBUS communications data is in 10 h units. If data in 1 h units are also required, refer to register number 0099H.
<42> The MEMOBUS communications data is in 10 h units. If data in 1 h units are also required, refer to register number 009BH.

Note: Fault trace (i.e., the fault history) is not maintained when CPF00, CPF01, CPF06, CPF24, oFA00, oFb00, oFC00, Uv1, Uv2, or Uv3 occur.

■ U6: Control Monitors

No. (Addr.)	Name	Description	Analog Output Level	Unit	Page
U6-01 (51H)	Motor Secondary Current (Iq)	All Modes Displays the value of the motor secondary current (Iq). Motor rated secondary current is 100%.	10 V: Motor secondary rated current (-10 to +10 V)	0.1%	–
U6-02 (52H)	Motor Excitation Current (Id)	V/f OLV CLV CLV/PM Displays the value calculated for the motor excitation current (Id). Motor rated secondary current is 100%.	10 V: Motor secondary rated current (-10 to +10 V)	0.1%	–
U6-03 (54H)	Speed Control Loop Input	V/f OLV CLV CLV/PM Displays the input and output values of the speed control loop.	10 V: Max frequency (-10 to +10 V)	0.01%	–
U6-04 (55H)	Speed Control Loop Output		10 V: Motor secondary rated current (-10 to +10 V)		
U6-05 (59H)	Output Voltage Reference (Vq)	V/f OLV CLV CLV/PM Output voltage reference (Vq) for the q-axis.	10 V: 200 Vrms <9> (-10 to +10 V)	0.1 Vac	–
U6-06 (5AH)	Output Voltage Reference (Vd)	V/f OLV CLV CLV/PM Output voltage reference (Vd) for the d-axis.	10 V: 200 Vrms <9> (-10 to +10 V)	0.1 Vac	–
U6-07 (5FH)	q-Axis Current Controller Output	V/f OLV CLV CLV/PM Displays the output value for current control relative to motor secondary current (q-axis).	10 V: 200 Vrms <9> (-10 to +10 V)	0.1%	–
U6-08 (60H)	d-Axis Current Controller Output	V/f OLV CLV CLV/PM Displays the output value for current control relative to motor secondary current (d-axis).	10 V: 200 Vrms <9> (-10 to +10 V)	0.1%	–
U6-13 (7CAH)	Flux Position Detection (sensor)	V/f OLV CLV CLV/PM Monitors the value of the flux position detection (sensor).	10 V: 180 deg -10 V: -180 deg	0.1 deg	
U6-18 (7CDH)	Speed Detection PG1 Counter	All Modes Monitors the number of pulses for speed detection (PG1).	10 V: 65536	1 pulse	
U6-22 (62H)	Position Lock Deviation Counter	V/f OLV CLV CLV/PM Displays how far the rotor has moved from its last position in PG pulses (multiplied by 4).	10 V: No. of pulses per revolution (-10 to +10 V)	1 pulse	–
U6-25 (6BH)	Feedback Control Output	V/f OLV CLV CLV/PM Output monitor for the speed control loop.	10 V: Motor secondary rated current (-10 to +10 V)	0.01%	–
U6-26 (6CH)	Inertia Compensation Output	V/f OLV CLV CLV/PM Output monitor for Inertia Compensation.	10 V: Motor secondary rated current (-10 to +10 V)	0.01%	–
U6-56 (7C3H)	Speed Feedback Compensation Output	V/f OLV CLV CLV/PM Displays observed speed when n5-07=1 or 2.	10 V: Max output frequency	0.01%	–
U6-80 to U6-99 (7B0 to 7B9, 7F0 to 7F9H)	Option Monitor 1 to 20	All Modes Monitors reserved to display data from option cards.	No signal output available	–	–

<9> Values shown here are for 200 V class drives. Double the value when using a 400 V class drive. Multiply value by 2.875 for 600 V class drives.