Yaskawa AC Drive L1000A
Supplement to the L1000A Technical Manual

No. SIEP C710616 32, SIEP C710616 33, and SIEP C710616 38

Introduction

This supplement to the L1000A Technical Manual describes features or functions that are changed with an L1000A software upgrade, and should be read to ensure proper usage. Read this supplement together with the L1000A Technical Manual.

Observer all safety messages and precautions to prevent injury to personnel and to ensure correct application of the product.

Applicable Software Version

This supplement applies to L1000A design revisions below.

Design Revision <1>	Software Version <1>	Page
A or B	PRG:701□	2 to 20
C	PRG:72□□	21 to 23 <2>

<1> The design revision and software version are indicated on the nameplate affixed on the side of the product.

<2> Also refer to page 2 to 20 for more information.

Model Number and Nameplate Check

◆ Nameplate

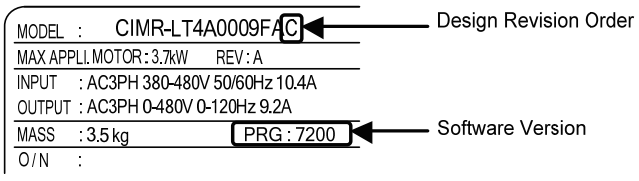

Figure 1 Nameplate Information

Document No. EZZ022270
Prepared in March, 2013

Supplemental information for L1000A software version: 701□

Chapter 4 Start-Up Programming & Operation

Addition to Section 4.5 Auto-Tuning

* ■: Added or changed in software version PRG: 701□.

◆Types of Auto-Tuning

■Auto-Tuning for Permanent Magnet Motors

Type	Setting	Requirements and Benefits	Control Mode
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.	Closed Loop Vector Control for PM

<1> 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).

◆Before Auto-Tuning the Drive

Table 4.10 Digital Input and Output Operation During Auto-Tuning

Motor Type	Auto-Tuning Type	Digital Input	Digital Output
PM Motor	Motor Data Input	Digital input functions are disabled.	Digital output functions are disabled.
	Stationary Auto-Tuning	Digital input functions are disabled.	Maintains the status at the start of Auto-Tuning
	Stationary Stator Resistance Auto-Tuning	Digital input functions are disabled.	Maintains the status at the start of Auto-Tuning
	Initial Magnet Pole Search Parameters Auto-Tuning	Digital input functions are disabled.	Maintains the status at the start of Auto-Tuning
	Stationary PG Encoder Offset Auto-Tuning	Digital input functions are disabled.	Maintains the status at the start of Auto-Tuning
	Rotational PG Encoder Offset Auto-Tuning	Digital input functions are disabled.	Maintains the status at the start of Auto-Tuning
	Rotational Back EMF Constant Auto-Tuning	Digital input functions are disabled.	Functions the same as during normal operation
	Auto-Tuning of PG-E3 Encoder Characteristics	Digital input functions are disabled.	Maintains the status at the start of Auto-Tuning

■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.

◆Parameter Settings during PM Motor Auto-Tuning: T2

■T2-01: PM Auto-Tuning Mode Selection

Selects the type of Auto-Tuning to be performed.

No.	Parameter Name	Setting Range	Default
T2-01	PM Auto-Tuning Mode Selection	0 to 4, 10 to 12 <1>	0

Setting 0: Motor Data Input
Setting 1: PM Stationary Auto-Tuning
Setting 2: PM Stationary Stator Resistance Auto-Tuning
Setting 3: Initial Magnet Pole Search Parameters Auto-Tuning
Setting 4: Stationary PG Encoder Offset Auto-Tuning
Setting 10: Rotational PG Encoder Offset Auto-Tuning
Setting 11: Rotational Back EMF Constant Auto-Tuning
Setting 12: Auto-Tuning of PG-E3 Encoder Characteristics

<1> 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).

■T2-08: Number of PM Motor Poles

Enter the number of motor poles.

No.	Parameter Name	Setting Range	Default
T2-08	Number of PM Motor Poles	2 to 120 <2>	6

<2> When PG-E3 option connected: Max setting = 48

■T2-18: Speed Reference for Auto-Tuning of PG-E3 Encoder Characteristics

Sets the speed reference for execution of Auto-Tuning of PG-E3 encoder characteristics (T2-01 = 12).

No.	Parameter Name	Setting Range	Default
T2-18	Speed Reference for Auto-Tuning of PG-E3 Encoder Characteristics	1 to 30 r/min	10 r/min

■T2-19: Rotation Direction for Auto-Tuning of PG-E3 Encoder Characteristics

Sets the direction of motor rotation for execution of Auto-Tuning of PG-E3 encoder characteristics (T2-01 = 12).

No.	Parameter Name	Setting Range	Default
T2-19	Rotation Direction for Auto-Tuning of PG-E3 Encoder Characteristic	0, 1	0

Setting 0: Forward (Up)
Setting 1: Reverse (Down)

Addition to Section 4.6 Setup Procedure for Elevator Applications

◆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 1.1 and Figure 1.2.

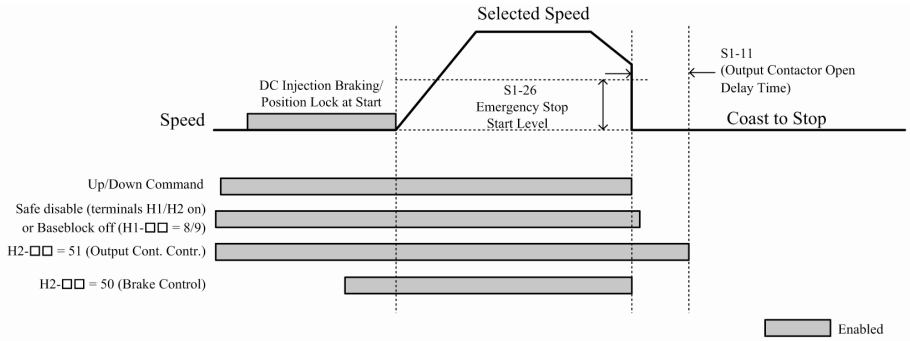

Figure 2 With Up/Down command cleared and U1-05 ≥ S1-26

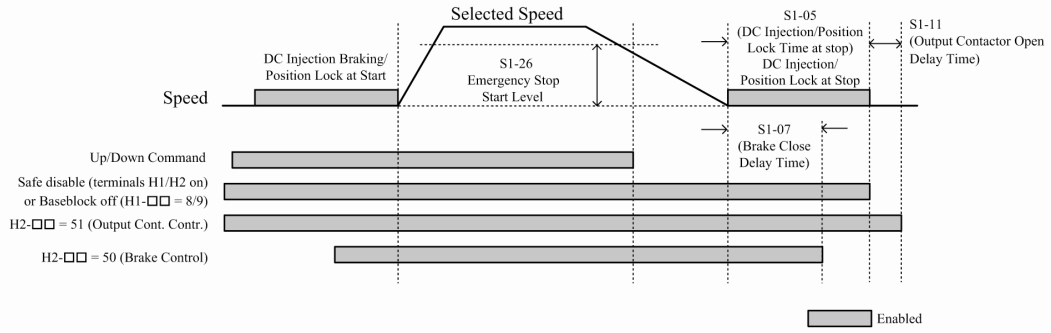

Figure 3 With Up/Down command cleared and U1-05 < S1-26

Addition to Section 4.7 Setup Troubleshooting and Possible Solutions

◆Encoder Offset (E5-11) Set During Auto-Tuning (Rotational or Stationary) Consistently Differs by 30 Degrees or More.

Cause	Possible Solutions
PG-E3 option position error with the ERN1387 encoder.	Perform Auto-Tuning of PG-E3 encoder characteristics (T2-01 = 12).

Chapter 5 Parameter Details

* ■: Added or changed in software version PRG: 701□.

Addition to Section 5.1 A: Initialization

◆A1: Initialization

■A1-00: Language Selection

Selects the display language for the digital operator.

No.	Parameter Name	Setting Range	Default
A1-00	Language Selection	0 to 12 <1>	1

Setting 0: English
Setting 1: Japanese
Setting 2: German
Setting 3: French
Setting 4: Italian
Setting 5: Spanish
Setting 6: Portuguese
Setting 7: Chinese
Setting 8: Czech
Setting 9: Russian
Setting 10: Turkish
Setting 11: Polish
Setting 12: Greek

<1>Language settings 8 to 12 can be selected from an LCD operator with software version 0102 or later. The version number of the LCD operator's PRG software is shown on the back of the LCD operator.

Note: This parameter is not reset when the drive is initialized using parameter A1-03.

Addition to Section 5.2 b: Application

◆b1: Operation Mode Selection

■b1-03: Stopping Method Selection

Selects the stopping method for the motor when the Up/Down command is removed or during a Stop command.

No.	Parameter Name	Setting Range	Default
b1-03	Stopping Method Selection	0 to 4	0

Setting 0: Ramp to stop

Ramps the motor to stop at the deceleration ramp set in C1-02. The actual time required for deceleration may vary by load conditions (mechanical loss, inertia).

Setting 1: Coast to stop

The drive will shut off output to the motor and allow it to coast freely to stop when the Up/Down command is removed.

Setting 4: Elevator Emergency Stop <2>

After the Up/Down command is cleared and when the value of U1-05 (Speed Feedback) is equal to or greater than the value of S1-26 (Emergency Stop Start Level), the drive coasts to a stop.
After the Up/Down command is cleared and when the value of U1-05 (Speed Feedback) is lower than the value of S1-26 (Emergency Stop Start Level), the drive ramps to a stop.

<2> Refer to ◆Elevator Emergency Stop on page 3 for details.

Addition to Section 5.5 E: Motor Parameters

◆E5: PM Motor Settings

■E5-04: Number of Motor Poles

Sets the number of motor poles. This value is set automatically during Auto-Tuning when the setting of T2-08 is entered.

No.	Parameter Name	Setting Range	Default
E5-04	Number of Motor Poles	2 to 120 <3>	12

<3> When PG-E3 option connected: Max setting = 48

Addition to Section 5.6 F: Option Settings

◆F1: Encoder/PG Feedback Settings

■F1-66 to F1-81: Encoder Adjust 1 to 16

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.

No.	Parameter Name	Setting Range	Default
F1-66 to F1-81	Encoder Adjust 1 to 16	0 to FFFF	0

Addition to Section 5.7 H: Terminal Functions

◆H1: Multi-Function Digital Inputs

■H1-03 to H1-08: Functions for Terminals S3 to S8

Setting	Function	Description
5A	Motor Contactor Feedback 2	Open : Motor contactor closed (N.C.) <4> Closed : Motor contactor open

<4> Motor Contactor Feedback (H1-□□ = 56) = Normally open (N.O.)

Setting 5A: Motor Contactor Feedback 2

The drive monitors this input signal to detect malfunctions with the motor contactor. When the contactor is closed, the terminal is open. When the contactor is open, the contactor is closed.

Setting	Function	Description
5B	Brake Feedback 2	Open : Brake open (N.C.) <5> Closed : Brake closed

<5> Brake Feedback (H1- □□ = 79) = Normally open (N.O.)

Setting 5B: Brake Feedback 2

The drive confirms brake operation with this input signal when a digital output is enabled (H2-□□ = 50). When the brake is activated, the terminal is closed. When the brake is not activated, the terminal is open.

◆H2: Multi-Function Digital Outputs

■H2-01 to H2-05: Terminals M1-M2, M3-M4, M5-M6, P1-C1, and P1-C2 Function Selection

Setting	Function	Description
5C	Motor Current Monitor	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.

Setting 5C: Motor Current Monitor

The digital output closes when motor current less than or equal to the value set in L8-99 is detected while the drive is baseblock.

◆H3: Multi-Function Analog Inputs

■H3-02, H3-10: Terminal A1, A2 Function Selection

Setting	Function	Description
E	Motor Temperature (PTC thermistor input)	A positive temperature coefficient (PTC) thermistor can be used for motor insulation protection.

Setting E: Motor Temperature (PTC thermistor input)

In addition to motor overload fault detection oL1, it is possible to use a PTC (Positive Temperature Coefficient) thermistor for motor insulation protection. Refer to ■Motor Protection Using a Positive Temperature Coefficient (PTC thermistor) on page 7 for details.

Addition to Section 5.8 L: Protection Functions

◆L1: Motor Protection

■Motor Protection Using a Positive Temperature Coefficient (PTC thermistor)

A motor PTC thermistor can be connected to an analog input of the drive. This input is used by the drive for motor overheat protection.

When the PTC thermistor input signal reaches the motor overheat alarm level, an oH3 alarm will be triggered and the drive will continue operation according to the setting of L1-03. When the PTC thermistor input signal reaches the overheat fault level, an oH4 fault will be triggered, a fault signal will be output, and the drive will stop the motor using the stop method setting in L1-04.

Connect the PTC thermistor between terminals AC and A2 as shown in Figure 2.1. Set parameter H3-09 to 0 and parameter H3-10 to E.

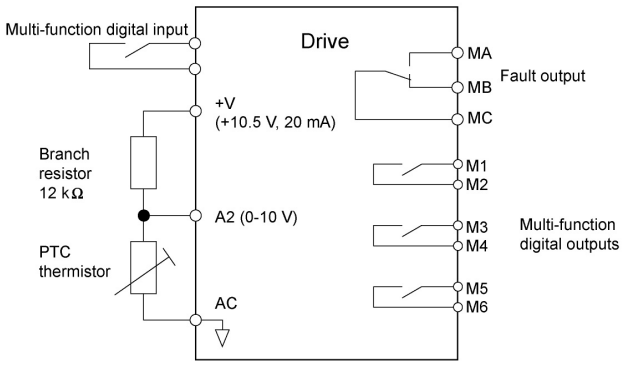

Figure 4 Connection of a Motor PTC Thermistor

The PTC thermistor must have the following characteristics for one motor phase. The drives motor overload detection requires three PTC thermistors to be connected in series.

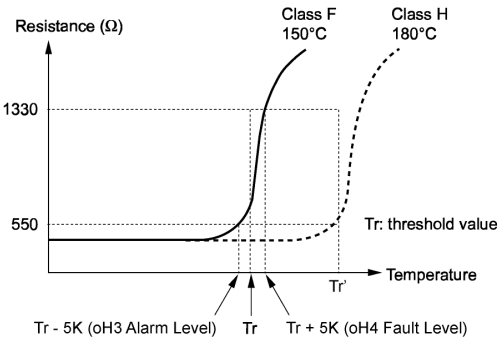

Figure 5 Motor PTC Thermistor Characteristics

Overheat detection using a PTC thermistor is configured with parameters L1-03, L1-04, and L1-05 as explained below.

■L1-03: Motor Overheat Alarm Operation Selection (PTC thermistor input)

Sets the drive operation when the PTC thermistor input signal reaches the motor overheat alarm level (oH3).

No.	Parameter Name	Setting Range	Default
L1-03	Motor Overheat Alarm Operation Selection (PTC thermistor input)	0 to 3	3

Setting 0: Ramp to stop

The drive stops the motor using the deceleration time 1 set in parameter C1-02.

Setting 1: Coast to stop

The drive output is switched off and the motor coasts to stop.

Setting 2: Emergency Stop (Fast Stop)

The drive stops the motor using the deceleration time set in parameter C1-09.

Setting 3: Alarm only

The operation is continued and an oH3 alarm is displayed on the digital operator.

■L1-04: Motor Overheat Fault Operation Selection (PTC thermistor input)

Sets the drive operation when the PTC thermistor input signal reaches the motor overheat fault level (oH4).

No.	Parameter Name	Setting Range	Default
L1-04	Motor Overheat Fault Operation Selection (PTC thermistor input)	0 to 2	1

Setting 0: Ramp to stop

The drive stops the motor using the deceleration time 1 set in parameter C1-02.

Setting 1: Coast to Stop

The drive output is switched off and the motor coasts to stop.

Setting 2: Emergency Stop (Fast Stop)

The drive stops the motor using the deceleration time set in parameter C1-09.

■L1-05: Motor Temperature Input Filter Time (PTC thermistor input)

Applies a filter on the PTC thermistor input signal to prevent inadvertent motor overheat faults.

No.	Parameter Name	Setting Range	Default
L1-05	Motor Temperature Input Filter Time (PTC thermistor input)	0.00 to 10.00 s	0.20 s

◆L4: Speed Detection

■L4-07: Speed Agree Detection Selection

Determines when speed detection is active using parameters L4-01 through L4-04.

No.	Parameter Name	Setting Range	Default
L4-07	Speed Agree Detection Selection	0 or 1	0

Setting 0: No detection during baseblock

Setting 1: Detection always enabled

◆L8: Drive Protection

■L8-89: Current Monitoring Selection

Enables or disables the Current Monitoring function. When this parameter is set to 1 (Enabled), the current monitoring level (L8-99) is added to the conditions required to turn off the Motor Contactor Feedback command at a stop.

No.	Parameter Name	Setting Range	Default
L8-89	Current Monitoring Selection	0, 1	0

Setting 0: Disabled

Setting 1: Enabled

■L8-99: Current Monitoring Level

Sets the current monitoring level as a percentage of the drive's rated current. When the output current is equal to or below the set level, the Motor Contactor Feedback command turns off. This parameter is also used to activate the Motor Current Monitor (H2-□□ = 5C).

No.	Parameter Name	Setting Range	Default
L8-99	Current Monitoring Level	0.0 to 50.0%	10.0%

Addition to Section 5.10 o: Operator Related Settings

◆o1: Digital Operator Display Selection

■o1-06: User Monitor Selection Mode

The digital operator display monitors shown directly below the active monitor are the next two sequential monitors. If o1-06 (User Monitor Selection Mode) is set to "1: 3 Monitor Selectable", those two monitors are locked as specified by parameters o1-07 and o1-08 and will not change as the top parameter is scrolled with the Up/Down Arrow keys.

No.	Parameter Name	Setting Range	Default
o1-06	User Monitor Selection Mode	0, 1	0

Setting 0: 3 Monitor Sequential (Displays the next 2 sequential monitors)

Setting 1: 3 Monitor Selectable (o1-07, and o1-08 selected monitor is displayed)

■o1-07: Second Line Monitor Selection

Selects the monitor displayed on the second line. The monitor parameter number is entered into the spaces provided: U□-□□.

For example, set "104" to display monitor parameter U1-04.

No.	Parameter Name	Setting Range	Default
o1-07	Second Line Monitor Selection	101 to 699 U1-01(Speed Reference) to U6-99 (Option Monitor 20)	102

■o1-08: Third Line Monitor Selection

Selects the monitor displayed on the third line. The monitor parameter number is entered into the spaces provided: U□-□□.

For example, set "104" to display monitor parameter U1-04.

No.	Parameter Name	Setting Range	Default
o1-08	Third Line Monitor Selection	101 to 699 U1-01 (Speed Reference) to U6-99 (Option Monitor 20)	103

Addition to Section 5.11 S: Elevator Parameters

◆S1: Brake Sequence

■S1-12: Motor Contactor Control During Auto-Tuning Selection

Determines the state of the output contactor control command (H2-□□ = 51) during Auto-Tuning. The contactor closes as soon as the Enter key is pressed in the Auto-Tuning start menu.

No.	Parameter Name	Setting Range	Default
S1-12	Motor Contactor Control during Auto-Tuning	0 to 2	0

Setting 0: Disabled

Setting 1: Enabled

Setting 2: Enabled during Auto-Tuning and HBB

■S1-26: Emergency Stop Start Level

Sets the Emergency Stop Start Level as a percentage of the Maximum Output Frequency. This setting is available when the control mode is set to Closed Loop Vector Control (A1-02 = 3) or Closed Loop Vector Control for PM Motors (A1-02 = 7) and the stopping method is set to Elevator Emergency Stop (b1-03 = 4).

The drive coasts to a stop after the Up/Down command is cleared and when the value of U1-05 (Speed Feedback) is equal to or greater than the value of S1-26 (Emergency Stop Start Level).

The drive ramps to a stop after the Up/Down command is cleared and when the value of U1-05 (Speed Feedback) is lower than the value of S1-26 (Emergency Stop Start Level).

No.	Parameter Name	Setting Range	Default
S1-26	Emergency Stop Start Level	0.0 to 100.0%	10.0%

◆S6: Faults for Elevator Applications

■S6-03: SE2 Detect Current Level

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). A Starting Current Error (SE2) occurs when the drive's output current is less than the value in S6-03 after both the Brake Release Delay Time (S1-06) and the SE2 Detection Delay Time (S6-02) have passed after a RUN command.

No.	Parameter Name	Setting Range	Default
S6-03	SE2 Detect Current Level	0 to 100%	25%

Chapter 6 Troubleshooting

* ■: Added in software version PRG: 701□.

Addition to Section 6.3 Fault Detection

◆Fault Displays, Causes, and Possible Solutions

Table 6.8 Detailed Fault Displays, Causes, and Possible Solutions

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.
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
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.

Addition to Section 6.4 Alarm Detection

◆Alarm Codes, Causes, and Possible Solutions

Table 6.9 Alarm Codes, Causes, and Possible Solutions

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 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.

Addition to Section 6.5 Operator Programming Errors

Table 6.10 oPE Codes, Causes, and Possible Solutions

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 Solution**
・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 the setting errors.

Addition to Section 6.6 Auto-Tuning Fault Detection

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

Digital Operator Display		Fault Name
Er-21	Er-21	Z Pulse Correction Error
Cause		**Possible Solution**
Motor is coasting when Auto-Tuning is initiated.		Make sure the motor is stopped. Repeat Auto-Tuning.
Either the motor or the encoder on the motor is not properly wired.		Check the wiring for the motor and the encoder. Repeat Auto-Tuning.
The direction for the encoder is set incorrectly, or the number of pulses set for the encoder is incorrect.		Check the direction setting by F1-05 and b1-14 and number of pulses (F1-01) set for the encoder. Repeat Auto-Tuning.
Encoder is damaged.		Check the signal output from the encoder attached to the motor. Replace the encoder if damaged.
Excess position error detected for the PG-E3 speed-control option card with the ERN1387 encoder.		If other possible solutions are not successful, perform Auto-Tuning of PG-E3 encoder characteristics.
Er-24	Er-24	Auto-Tuning Error for PG-E3 Encoder Characteristics
Cause		**Possible Solution**
The signal lines between the PG-E3 option card and encoder are disconnected at the R+ and R- terminals.		Refer to the installation manual for the PG-E3 option card for information on correct connection of signal lines.
Excessive electrical interference at the PG-E3 option card		
The software for the PG-E3 option card does not support the Auto-Tuning of PG-E3 encoder characteristics.		Check the software version (PRG) for the PG-E3 option card. The software version PRG: 1102 and later support Auto-Tuning of PG-E3 encoder characteristics.

Appendix B Parameter List

Addition to Section B.3 Parameter Table

* ■: Added or changed in software version PRG: 701□.

◆A: Initialization Parameters

No. (Addr.)	Name	Description	Setting
A1: Initialization Parameters			
A1-00 (100H)	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	Default: <1> Min: 0 Max: 12 <2>

<1> Default setting value is dependent on Initialization Specification Selection (o2-09).
<2> Language setting 8 to 12 can be selected from an LCD operator with software version 0102 or later. The version number of the LCD operator's PRG software is shown on the back of the LCD operator.

◆b: Application

No. (Addr.)	Name	Description	Setting
b1: Operation Mode Selection			
b1-03 (182H)	Stopping Method Selection	All Modes 0: Ramp to stop 1: Coast to stop 4: Elevator Emergency Stop	Default: 0 Min: 0 Max: 4 <3>

<3> V/f Control and Open Loop Vector Control: Max setting = 1

◆d: Speed References

No. (Addr.)	Name	Description	Setting
d1: Speed Reference			
d1-27 (2C9H)	Motor 2 Speed Reference	V/f OLV CLV CLV/PM Sets the speed reference for motor 2.	Default: 0.00 Hz Min: 0.00 Hz Max: 200.00 Hz

◆E: Motor Parameters

No. (Addr.)	Name	Description	Setting
E1: V/f Pattern			
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.	Default: <4> Min: <5> Max: 200.0 Hz
E1-06 (305H)	Base Frequency		Default: <4> Min: 0.0 Hz Max: 200.0 Hz
E1-07 (306H)	Middle Output Frequency		Default: <1> Min: 0.0 Hz Max: 200.0 Hz
E1-09 (308H)	Minimum Output Frequency		Default: <4> Min: 0.0 Hz Max: 200.0 Hz

No. (Addr.)	Name	Description	Setting
E3: V/f Pattern for Motor 2			
E3-04 (31AH)	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: <1> Min: 10.0 Hz Max: 200.0 Hz
E3-06 (31CH)	Motor 2 Base Frequency		Default: <1> Min: 0.0 Hz Max: 200.0 Hz
E3-07 (31DH)	Motor 2 Mid Output Frequency		Default: <1> Min: 0.0Hz Max: 200.0 Hz
E3-09 (31FH)	Motor 2 Minimum Output Frequency		Default: <1> Min: 0.0 Hz Max: 200.0 Hz
E5: PM Motor Settings			
E5-04 (32CH)	Number of Motor Poles	V/f OLV CLV CLV/PM Sets the number of motor poles.	Default: 12 Min: 2 Max: 120 <6>

<1> Default setting value is dependent on Initialization Specification Selection (o2-09).
<4> Default setting is determined by the control mode (A1-02).
<5> 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.
<6> When PG-E3 option connected: Max setting = 48

◆F: Option Settings

No. (Addr.)	Name	Description	Setting
F1: PG Speed Control Card			
F1-66 to F1-81 (B9AH to BA9H)	PG-E3 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

◆H: Multi-Function Terminals

H1-□□ Setting	Function	Description
H1: Multi-Function Digital Inputs		
5A	Motor Contactor Feedback 2	All Modes Open: Motor contactor closed (N.C.) Closed: Motor contactor open
5B	Brake Feedback 2	All Modes Open: Brake open (N.C.) Closed: Brake closed
H2-□□ Setting	**Function**	**Description**
H2: Multi-Function Digital Outputs		
5C	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.
H3-□□ Setting	**Function**	**Description**
H3: Multi-Function Analog Inputs		
E	Motor Temperature (PTC thermistor input)	All Modes oH3 Alarm detection level: 1.18 V oH4 Fault detection level: 2.293 V

◆L: Protection Functions

No. (Addr.)	Name	Description	Setting
L1: Motor Protection			
L1-03 (482H)	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
L1-04 (483H)	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
L1-05 (484H)	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
L4: Speed Detection			
L4-07 (470H)	Speed Agree Detection Selection	All Modes 0: No detection during baseblock. 1: Detection always enabled.	Default: 0 Min: 0 Max: 1
L8: Drive Protection			
L8-89 (B97H)	Current Monitoring Selection	All Modes Enables or disables the Current Monitoring function. 0: Disabled 1: Enabled	Default: 0 Min: 0 Max: 1
L8-99 (B98H)	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 to monitor the status of the current (H2-□□ = 5C) when the Current Monitoring Selection (L8-89) is enabled and set to 1.	Default: 10.0% Min: 0.0% Max: 50.0%

◆o: Operator Related Parameters

No. (Addr.)	Name	Description	Setting
o1: Digital Operator Display Selection			
o1-06 (517H)	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
o1-07 (518H)	Second Line Monitor Selection	All Modes Selects the monitor displayed on the second line.	Default: 102 Min: 101 Max: 699
o1-08 (519H)	Third Line Monitor Selection	All Modes Selects the monitor displayed on the third line.	Default: 103 Min: 101 Max: 699

◆S: Elevator Parameters

No. (Addr.)	Name	Description	Setting
S1: Brake Sequence			
S1-12 (6E0H)	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	Default: 0 Min: 0 Max: 2
S1-26 (6D7H)	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%
S3: Start/Stop Optimization			
S3-14 (69FH)	Torque Compensation Fade Out 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 Hz Min: 0.0 Hz Max: 200.0 Hz
S6: Error Detection			
S6-03 (6B5H)	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%

◆T: Motor Tuning

No. (Addr.)	Name	Description	Setting
T1: Induction Motor Auto-Tuning			
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: 60.0 Hz Min: 0.0 Hz Max: 200.0 Hz
T2: PM Motor Auto-Tuning			
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	Default: 0 Min: 0 Max: 12 <7>
T2-08 (32CH)	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 <6>
T2-18 (BB0H)	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
T2-19 (BB1H)	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

<6> When PG-E3 option connected: Max setting = 48

<7> 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).

Appendix C MEMOBUS/Modbus Communications

Addition to Section C.9 MEMOBUS/Modbus Data Table

◆Monitor Data

Register No.	Contents	
00E4H	oFC5x Contents (CN5-C)	
	bit 0	oFC50 (Encoder Option AD Conversion Error)
	bit 1	oFC51 (Encoder Option Analog Circuit Error)
	bit 2	oFC52 (Encoder Communication Timeout)
	bit 3	oFC53 (Encoder Communication Data Error)
	bit 4	oFC54 (Encoder Error)
	bit 5 to F	Reserved

Supplemental information for L1000A software version: 72□□

Chapter 1 Receiving

* ■: Added or Changed in software version PRG: 72□□.

Addition to Section 1.2 General Description

◆ Control Mode Selection

Control Mode		CLV	CLV/PM	Comments
Parameter Setting		A1-02 = 3	A1-02 = 7	–
Basic Description		Closed Loop Vector control	Closed Loop Vector control for PM motors	–
Control Characteristics	Speed Response	100 Hz	100 Hz	Max. frequency of a speed reference signal that the drive can follow. May fluctuate with characteristics and motor temperature.

Chapter 5 Parameter Details

Addition to Section 5.3 C: Tuning

◆ C5: Speed Control Loop

■ C5-50: Set Vibrational Frequency

Mechanical resonance may cause a humming sound or vibration while the motor is running. A vibrational frequency filter can be used to suppress certain audible noise or vibration due to mechanical resonance.
Sets the mechanical vibration filter frequency in units of 1 Hz. A setting of 0 will disable this parameter.

No.	Parameter Name	Setting Range	Default
C5-50	Set Vibrational Frequency	0 Hz, 20 to 1000 Hz (Cannot be set in the range of 1 to 19 Hz.)	0 Hz

NOTICE: 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.

Addition to 5.8 L: Protection Functions

◆ L8: Drive Protection

■ L8-07: Output Phase Loss Protection

Enables or disables the output phase loss detection, which is triggered when the output current falls below 5% of the drive's rated output.

Note: 1. Output phase loss detection can mistakenly be triggered if the motor's rated current is very small compared to the drive rating. Disable this parameter in such cases.
2. Output phase loss detection is not possible when the drive is running a PM motor with light load.

No.	Parameter Name	Setting Range	Default
L8-07	Output Phase Loss Protection	0 to 3	0

Setting 0: Disabled

Setting 1: Fault when one phase is lost

An output phase loss fault (LF) is triggered when one phase is lost. The output shuts off and the motor coasts to stop.

Setting 2: Fault when two phases are lost

An output phase loss fault (LF) is triggered when two output phases are lost. The output shuts off and the motor coasts to stop.

Setting 3: Fault at phase loss at start or when two phases lost mid-operation

An output phase loss fault (LF) is triggered when one phase is lost at motor start or when two phases are lost while running at speed. The output shuts off, the motor coasts to a stop.

Note: Set parameters S1-02 and S1-04 as follows when setting L8-07 to 3. An incorrect setting may result in poor performance or nuisance faults or alarms.
• Set S1-02 (DC Injection Current at Start) to a value greater than 15%.
• Set S1-04 (DC Injection/Position Lock Time at Start) to a value greater than 100 ms.

Addition to Section 5.9 n: Special Adjustments

◆ n1: Hunting Prevention

■n1-08: Leakage Current Vibration Control Selection

Selects the method of Leakage-Current Vibration Control. Parameter n1-08 does not typically require adjustment from it's default value.

No.	Parameter Name	Setting Range	Default
n1-08	Leakage Current Vibration Control Selection	0 or 1	0

Setting 0: Method 1

Setting 1: Method 2

Addition to 5.10 o: Operator Related Settings

◆ o1: Digital Operator Display Selection

■o1-05: LCD Contrast Control

Adjusts the brightness and contrast for the LCD screen of the digital operator. Lower the setting to make the LCD brighter or raise the setting to make the LCD darker.

No.	Parameter Name	Setting Range	Default
o1-05	LCD Contrast Control	0 to 5	3

■o1-22: Mechanical Gear Ratio

Sets the gear ratio of the mechanical gear.

No.	Parameter Name	Setting Range	Default
o1-22	Mechanical Gear Ratio	0.10 to 100.00	Determined by A1-02

■o1-23: HBB Non Display Select

Shows or hides the HBB command on the digital operator while the safety signal is being input.

No.	Parameter Name	Setting Range	Default
o1-23	HBB Non Display Select	0 or 1	0

Setting 0: Show HBB

Setting 1: Hide HBB

HBB is not displayed on the digital operator while the safety signal is being input.

Appendix B Parameter List

Addition to Section B.3 Parameter Table

* ■: Added or changed in software version RPG: 72□□.

◆ C: Tuning

No.(Addr.)	Name	Description	Setting
		C5: Speed Control Loop	
C5-50 (B14H)	Set Vibrational Frequency	V/f OLV **CLV** **CLV/PM** Sets the mechanical vibration filter frequency in units of 1 Hz. **NOTICE: 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<1> Min: 0 Hz Max: 1000 Hz

<1> Set C5-50 to 0 (Hz) to disable the notch filter. The frequencies from 1 to 19 Hz cannot be set.

◆L: Protection Functions

No.(Addr.)	Name	Description	Setting
		L8: Drive Protection	
L8-07 (4B3H)	Output Phase Loss Protection	**All Modes** 0: Disabled 1: Enabled (triggered by a single phase loss) 2: Enabled (triggered when two phases are lost) 3: Enabled (triggered at phase loss at start or when two phases lost mid-operation) <2> Output phase loss fault (LF) is triggered when the output current falls below 5% of the drive's rated output current. Output phase loss fault can mistakenly be triggered if the motor's rated current is very small compared to the drive rating. Disable this parameter in such cases.	Default: 0 Min: 0 Max: 3

<2> Only V/f and OLV allow the setting 3.

◆n: Special Adjustments

No.(Addr.)	Name	Description	Setting
		n1: Hunting Prevention	
n1-08 (1105H)	Leakage Current Vibration Control Selection	**All Modes** 0: Method 1 1: Method 2 Parameter n1-08 does not typically require adjustment from it's default value.	Default: 0 Min: 0 Max: 1

◆o: Operator Related Settings

No.(Addr.)	Name	Description	Setting
		o1: Digital Operator Display Selection	
o1-05 (504H)	LCD Contrast Control	**All Modes** Adjusts the brightness and contrast in the LCD screen of the digital operator.	Default: 3 Min: 0 Max: 5
o1-22 (577H)	Mechanical Gear Ratio	V/f OLV **CLV** **CLV/PM** Sets the ratio of the gear installed for display unit calculations.	Default: Determined by A1-02 Min: 0.10 Max: 100.00
o1-23 (174H)	HBB Non Display Select	**All Modes** 0: Shows HBB 1: Hide HBB Shows or hides HBB on the digital operator while the safety signal is being input.	Default: 0 Min: 0 Max: 1

For questions and comments, refer to the contact information listed on the back of the Quick Start Guide.

YASKAWA

Document No. EZZ022270
Prepared in March, 2013