5-1 Protective Functions and Troubleshooting

Error Code List

Name	Description		Error Code	Points to check and remedy	Reference page
Overcurrent trip	If the motor is restrained or rapidly accelerated or decelerated, a large current flows through the Inverter, which results in a malfunction. The current exceeding the specified level shuts off the output and an error appears. This protection function detects an overcurrent through the AC CT (current detector). The protection circuit is activated at approximately 220% of the Inverter rated output current and a trip occurs.	Constant speed	E01.0	Is there any rapid load fluctuation? (Eliminate load fluctuation.) Is there any output short-circuit? (Check the output wires.) Is there any ground fault? (Check the output wires and motor.)	—
		Deceleration	E02.0	Is there any rapid deceleration? (Increase the deceleration time.)	4-8 4-37
		Acceleration	E03.0	Is there any rapid acceleration? (Increase the acceleration time.) Has the motor shaft been locked? (Check the motor and wires.) Is the torque boost too high? (Lower the torque boost.)	4-8 4-37
		Others	E04.0	Is the DC injection braking too high? (Lower the injection breaking.) Is there any error on CT? (Replace or repair the CT.)	4-24
Overload trip *1	Monitors the Inverter output current and shuts off the output, displaying an error if the built-in electronic thermal function detects overload against the motor. Trips depending on the electronic thermal function settings.		E05.0	Is the load too large? (Reduce the loading factor.) Is the thermal level correct? (Adjust the thermal level to an appropriate level.) Note: The electronic thermal function is set to work easily at 5 Hz or lower. If a large load inertial moment is applied, the overload protect function works when the motor starts accelerating, and the load prevents it from accelerating. In this case, increase the torque boost or take other measures for adjustment.	4-46
Braking resistor overload trip	Shuts off the output and displays an error if the usage rate of regenerative braking circuit exceeds the b090 set value.		E06.0	Is there any rapid deceleration? (Increase the deceleration time.) Is the operation cycle frequent? (Decrease the number of operation cycles.) Is the usage rate setting of the regenerative braking function low? (Set to an appropriate level.) Note: Pay attention to the allowable power of the resistor.	4-8 4-74

Name	Description	Error Code	Points to check and remedy	Reference page
Overvoltage trip	Extremely high DC voltage between P/+ and N/- may result in failure. This function therefore shuts off the output and displays an error if the DC voltage between P/+ and N/- exceeds the specified level because of regenerative energy from the motor or increase of the incoming voltage during operation. Trips when the DC voltage between P/+ and N/- reaches approximately 400 V DC for 200-V class, and 800 V DC for 400-V class.	E07.0	Is there any rapid deceleration? (Increase the deceleration time.) Is there any ground fault? (Check the output wires and motor.) Has the motor been rotated/driven from the load side? (Reduce regenerative energy.)	—
EEPROM error *2 *3	Shuts off the output and displays an error if an error occurs in the built-in EEPROM because of external noise or abnormal temperature rise. Note: This may be a CPU error depending on the case.	E08.0	Is there any large electrical noise source around? (Countermeasures against electrical noise) Has the cooling efficiency been reduced? (Check that there is no clogging in the cooling fan and fin, if so clean it.) (Replace the cooling fan if faulty.)	—

*1. The reset command is not accepted until approximately 10 seconds after the trip occurs (protection function works).

*2. The reset command is not accepted if the EEPROM error E08.0 occurs. Turn off the power once. If you find E08 when turning on the power again, it is possible that the internal memory element of the drive has been damaged or the parameters have not been memorized correctly. Perform the user initialization to set the parameters again.

*3. The reset command through the RS terminal or STOP/RESET key is not accepted. Turn off the power.

Name	Description	Error Code	Check point and remedy	Reference page
Undervoltage trip	Shuts off the output if the incoming supply voltage drops below the specified level. This is because the control circuit stops working properly when the incoming supply voltage to the Inverter drops. Trips when the DC voltage between P/+ and N/- drops to approximately 175 V DC for 200-V class, and 345 V DC for 400-V class.	E09.0	Has the power supply voltage decreased? (Check the incoming power supply.) Is the power supply capacity sufficient? (Check the power supply.) Has the drives internal charge circuit thyristor been damaged? (Check the thyristor.)	4-28
CT error	Shuts off the output if an error occurs in the CT (current detector) built into the Inverter. Trips if the CT output is approximately 0.6 V or more when the power is turned on.	E10.0	The Inverter has a fault. (Repair/Replace)	—
CPU error *1	Shuts off the output and displays an error if the internal CPU has worked erroneously or abnormally. Note: If an abnormal value is read from EEPROM, it may become a CPU error depending on the case.	E11.0	Is there any large electrical noise source around? (Countermeasures against noise) The Inverter has a fault. (Repair/Replace)	—

*1. The reset command through the RS terminal or STOP/RESET key is not accepted. Turn off the power.

*2. The reset operation via the Digital Operator is not accepted. Be sure to reset via the RS terminal.

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Name	Description	Error Code	Check point and remedy	Reference page
External trip	If an error occurs in the external equipment or devices, the Inverter receives an input signal, then the drives output is shut off. (Available with the external trip function selected)	E12.0	Has any error occurred in the external devices when the external trip function is selected? (Correct the external device error.)	4-84
USP trip	Appears when the power is turned on with the RUN signal input into the Inverter. (Available with the USP function selected)	E13.0	When the USP function was selected, did you turn on the power with the RUN signal input into the Inverter? (Cancel the RUN command and turn on the power.)	4-84
Ground fault trip *1	Protects the Inverter if a ground fault between the Inverter output unit and the motor is detected when turning on the power. (This function does not work when there is residual voltage in the motor.)	E14.0	Is there any ground fault? (Check the output wires and motor.) Is there any error in the Inverter itself? (Disconnect the output wires to check.) Is there any error in the main circuit? (Check the main circuit. Refer to Chapter 6.) (Repair/Replace)	—
Incoming overvoltage trip	Appears if the incoming voltage continues to be higher than the specification value for 100 seconds while the Inverter is stopped. Trips when the main circuit DC voltage reaches approximately 390 V DC for 200-V class, and 780 V DC for 400-V class.	E15.0	Is the incoming supply voltage too high while the Inverter is stopped? (Lower the incoming voltage, correct the power supply fluctuation. Fit an AC reactor to power supply input if needed.)	—
Momentary power interruption trip	Shuts off the output when a momentary power interruption occurs for 15 ms or more. If the shutoff time is long, it is normally recognized as a power shutoff. Note that, when restart is selected, the Inverter restarts at power-on as long as the RUN command remains.	E16.0	Has the incoming power supply voltage dropped? (Power recovery) Is there a contact failure for MCCB and/or Mg? (Replace MCCB, Mg.)	4-60
Temperature error when the rotation speed of the cooling fan decreases	Appears if a decrease of the cooling fan rotation speed has been detected when a temperature error occurs.	E20.0	Has the cooling efficiency been reduced? (Replace the cooling fan.) Is there any clogging in the heatsink fin? (Clean the fin.)	—
Temperature error	Shuts off the output if the temperature has risen in the main circuit because of the high ambient temperature.	E21.0	Have you installed the Inverter vertically? (Installation check) Is the ambient temperature high? (Decrease the ambient temperature.)	—
Gate array communications error	Trips when a fault is detected in communication behavior between the built-in CPU and the gate array.	E23.0	Is there any large electrical noise source around? (Countermeasures against electrical noise) Has any internal cable been disconnected? (Check the connector.)	—

*1. The reset command through the RS terminal or STOP/RESET key is not accepted. Turn off the power.

*2. The reset operation via the Digital Operator is not accepted. Be sure to reset via the RS terminal.

Name	Description	Error Code	Check point and remedy	Reference page
Input open phase trip	Prevents Inverter damage due to input phase loss when the input phase loss protection selection is enabled (b006=01), and trips. Trips when the phase loss time is approximately 1 s or more.	E24.0	Is there any input power supply phase loss? (Check the input wiring.) Is there a contact failure for MCCB and/or Mg? (Replace MCCB, Mg.)	—
Main circuit error *1	Trips when the gate array cannot confirm IGBT ON/OFF because of a main element failure, a load short circuit, or an erroneous operation resulting from radiated electrical noise.	E25.0	Is there any large electrical noise source around? (Countermeasures against electrical noise) Has the main element/IGBT been damaged? Is there any output short-circuit? (Check the IGBT.) The Inverter has a failure. (Repair/Replace)	—
IGBT error	Shuts off the Inverter output to protect the main element when a momentary overcurrent, temperature error in the main element, or drop of the main element driving power supply occurs. (Retry operation cannot be performed for this trip.)	E30.0	Is there any output short-circuit? (Check the output wires.) Is there any ground fault? (Check the output wires and motor.) Has the main element been damaged? (Check the IGBT.) Is there any clogging in the fin? (Clean the fin.)	—
Thermistor error	Shuts off the Inverter output when detecting the thermistor resistance value inside the motor has changed which is connected to the TH terminal, resulting motor temperature rise.	E35.0	Is the motor temperature too high? (Check the motor temperature.) Is there any damage to the thermister inside the motor? (Check the thermistor.) Is there any electrical noise being introduced in the thermister signal? (Separate the wiring.)	2-9 4-75
Brake error	When 01 is selected in b120 (brake control selection), this error appears if the brake ON/OFF cannot be confirmed within the b124 set time (brake confirmation wait time) after the Inverter outputs the brake release signal.	E36.0	Is the brake ON/OFF function working? (Brake check) Is the set time for b124 too short? (Increase b124.) Has the brake confirmation signal been input? (Wiring check)	4-76
Emergency shutoff *2	Shuts off the hardware output and displays an error when the EMR terminal (S3) is turned on with SW1 on the logic board ON.	E37.0	Did any error occur in the external devices when the emergency shutoff function was selected? (Correct the external device error.)	2-9
Overload trip in low speed range	If an overload is detected in the lowest speed range of 0.2 Hz max., an electronic thermal trip inside the Inverter works to shut off the Inverter output. (2nd electronic thermal) (However, a higher frequency could remain in the error history.)	E38.0	Is the load too large? (Reduce the loading factor.)	—
ModBus communications error	Appears when the timeout occurs because of disconnection during Modbus-RTU communication. (Trip by the C076 setting)	E41.0	Is the communication speed correct? Is the wiring distance appropriate? (Connection check)	4-147

*1. The reset command through the RS terminal or STOP/RESET key is not accepted. Turn off the power.

*2. The reset operation via the Digital Operator is not accepted. Be sure to reset via the RS terminal.

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Name	Description	Error Code	Check point and remedy	Reference page
Option 1 error	Detects an error on the board mounted on option port 1.	E60.0 to E69.0	Has the option board been securely mounted? (Check that the mounting is correct.)	—
Option 2 error	Detects an error on the board mounted on option port 2.	E70.0 to E79.0	Has the option board been securely mounted? (Check that the mounting is correct.)	—
Undervoltage standby	Shows the waiting status after the incoming Inverter voltage decreases and shuts off. This error also appears during momentary power interruption.	UV Wait	Has the incoming power supply voltage dropped? (Power recovery) Is there a contact failure for MCCB and/or Mg? (Replace MCCB, Mg.) Is the voltage between P/+ and N/- normal? (Check the voltage between P/+ and N/-.)	—
Communications error	Appears if an error occurs between the Digital Operator and the Inverter.	COM ERROR	Has the remote cable plug been inserted properly? (Check the remote cable inserted correctly.) Has the Digital Operator been inserted properly? (Check the Digital Operator contact.)	—
Retry standby	Appears in the restart standby status when the momentary power interruption/trip retry functions are enabled.	Restart Wait	In case of zero-start.	—
		F-adj Wait	In case of frequency matching.	
Power shutoff	Appears when the power is shut off.	Power OFF	—	—
RUN command is limited	Appears if the limited RUN command is received while the rotation direction is limited to one direction with b035.	RUN CMD. Disable	—	—

*1. The reset command through the RS terminal or STOP/RESET key is not accepted. Turn off the power.

*2. The reset operation via the Digital Operator is not accepted. Be sure to reset via the RS terminal.

LCD Digital Operator Error Message

Display	Cause	Check item	Action	Resetting method
COM ERROR	-No signal is received from the inverter within 4 sec.	-Reset the inverter. -Check inverter type. -Check the connector for loseness/disconnection. -Check the cable for break.	-Avoid issuing the RESET signal continuously for more than 5 sec. -Change the correct inverter type. -Replace the cable and the connector.	Press STOP/ RESET key
INV in RUN mode	-The WRITE key is pressed while the inverter is running. -Soft-lock is turned ON.	-Check if the WRITE key is pressed while the inverter is running. -Check if the WRITE key is pressed while soft-lock is ON.	-The WRITE key should be pressed only while the inverter stops. -Release the Soft-Lock (of the inverter).	
INV in TRIP mode	-WRITE key is pressed while inverter trips.	-Check if the inverter trips.	-Reset the inverter from trip status.	
INV Type Un-match	-An attempt was made writing parameters between different inverter type.	-	-Writing is possible only between the same type inverters,	
Read lock enabled	-In case of display "READ LOCK".	-	-Release the Read Lock.	
Data Check Sum Error	-EEPROM of LCD digital operator is overloaded. It reaches the EEPROM's Write Limitation.	-	-If the same error appears after the power is supplied several times, the operator is defective.	Supply the power again
INV Check Sum Error	-The parameters in LCD digital operator and the parameters written into the inverter are unmatched.	-	-If the same error appears several times, the inverter is defective. (**Note**)	

Note: It will happen sometimes when you try to write data into an inverter with different voltage class and capacity. (Please refer to each inverter instruction manual).

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Option Board Protection Function List

E6*.□(OP1-*) appears when the option board is mounted on option port 1 (Digital Operator connecter side) , and E7*.□(OP2-*) appears when it is mounted on option port 2 (control circuit terminal block side).

•Protection function list when the PG board (3G3AX-PG01) is mounted

Name	Description	Error Code	
Encoder disconnection	Shuts off the output and displays an error when the encoder wiring disconnection or connection failure is detected, the encoder is damaged, or an encoder except for line driver output is used.	E60.0	E70.0
Excess speed	Shuts off the output and displays an error when the motor rotation exceeds the maximum frequency (A004) × the overspeed error detection level (P026).	E61.0	E71.0
Positioning error	Shuts off the output and displays an error when the current position deviation against the position reference value exceeds 1,000,000 pulses during position control.	E62.0	E72.0
Position control range trip	Shuts off the output and displays an error when the current position exceeds the setting values of the position limit range specification for Forward (P072) and Reverse (P073) during absolute position control.	E63.0	E73.0
3G3AX-PG01 connection error	Shuts off the output and displays an error if a connection (mounting) failure of the PG board is detected.	E69.0	E79.0

Note: Check the DIP switch settings on the PG board for any abnormal operation.

Function List of the DIP Switches on the PG Board (3G3AX-PG01)

DIP switch	Switch No.		Description
SWENC	1	ON	Disconnection detection enabled when the encoder A/B-phase is not connected
		OFF	Disconnection detection disabled when the encoder A/B-phase is not connected
	2	ON	Disconnection detection enabled when the encoder Z-phase is not connected
		OFF	Disconnection detection disabled when the encoder Z-phase is not connected
SWR	1	ON	With the termination resistor between SAP and SAN (150 Ω)
		OFF	Without the termination resistor between SAP and SAN
	2	ON	With the termination resistor between SBP and SBN (150 Ω)
		OFF	Without the termination resistor between SBP and SBN

•Protection function display when the digital command board (3G3AX-DI01) is mounted

Name	Description	Error Code	
3G3AX-DI01 error	Shuts off the output and displays an error if a timeout occurs in communication between the Inverter and digital command board.	E60.0	E70.0

Note: Input mode is determined by the combination of DIP and rotary switches. Check the settings of the DIP and rotary switches on the digital command board for any abnormal operation.

Function List of the DIP and Rotary Switches on the digital command board (3G3AX-DI01)

DIP switch (TYPE)		Rotary switch (CODE)	Resolution setting							Torque limit setting	Position setting
			Set frequency				Acceleration/Deceleration time setting				
Switch No.		Setting code	0.01 Hz	0.1 Hz	1 Hz	Rate	0.01 sec	0.1 sec	1 sec	1%	1 pulse
1	2										
ON: BCD input (BCD) OFF: Binary input (BIN)	OFF: Batch input mode (PAC)	0	○								
		1		○							
		2			○						
		3				○					
		4								○	
		5	For factory adjustment (Do not set)								
		6									○
		7 to F	For factory adjustment (Do not set)								
	ON: Dividing input mode (DIV)	0					○			○	○
		1	○					○			
		2							○		
		3					○				
		4		○				○			
		5							○		
		6					○				
		7			○			○			
		8							○		
		9					○				
		A				○		○			
		B							○		
		C to F	For factory adjustment (Do not set)								

How to Read the Input Mode List

Example 1. Switch setting when setting the frequency with a resolution of 1 Hz, via binary input (BIN) in the batch input mode (PAC)
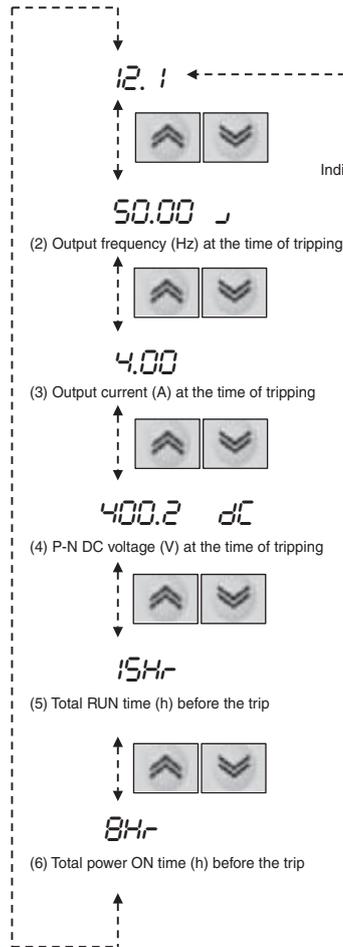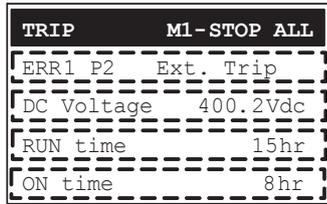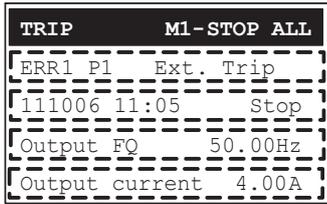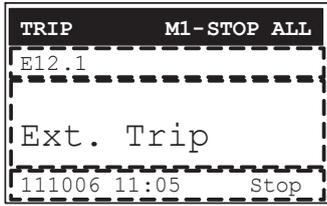
TYPE		CODE
1	2	
OFF: BIN	OFF: PAC	2

Example 2. Switch setting when setting the frequency with a resolution of 0.1 Hz, via BCD input, and setting the acceleration/deceleration time with a resolution of 0.1 sec, via BCD input in the dividing input mode (DIV)
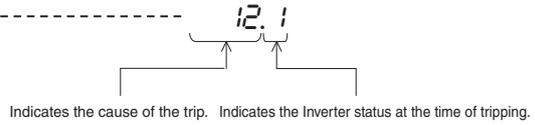
TYPE		CODE
1	2	
ON: BCD	ON: DIV	4

For the communication option boards, refer to the specific user manual of each option.

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Trip Monitor Display

```
TRIP        M1-STOP ALL
E12.1

Ext. Trip

111006 11:05      Stop
```

```
TRIP        M1-STOP ALL
ERR1 P1   Ext. Trip
111006 11:05      Stop
Output FQ      50.00Hz
Output current  4.00A
```

```
TRIP        M1-STOP ALL
ERR1 P2   Ext. Trip
DC Voltage    400.2Vdc
RUN time         15hr
ON time           8hr
```

(1) Trip factor   Explanation of display

12.1

Indicates the cause of the trip.   Indicates the Inverter status at the time of tripping.

50.00 ⌐

(2) Output frequency (Hz) at the time of tripping

4.00

(3) Output current (A) at the time of tripping

400.2 dC

(4) P-N DC voltage (V) at the time of tripping

15Hr

(5) Total RUN time (h) before the trip

8Hr

(6) Total power ON time (h) before the trip

0 : During initialization at power-on or with the reset terminal set to ON.

1 : During stop

2 : During deceleration

3 : During constant speed

4 : During acceleration

5 : The RUN command is turned on at frequency: 0.

6 : During startup

7 : During DC injection braking

8 : During overload limit

9 : During forcing/servo ON

Note: The trip monitor display shows the Inverter status at the time of tripping, not the actual motor operation.
(Example)
While PID control is used or the frequency reference is input using analog signals (voltage/current), the Inverter may alternate frequently between acceleration and deceleration because of the signal fluctuations, even if the motor seems to operate at a constant speed.
In this case, the onscreen Inverter status at the time of tripping may differ from the actual operation.

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5-2 Warning Function

•The following table shows the details of warning display and parameter correction.

Target code	Condition	Base code
Frequency upper limit A061/A261	>	Maximum frequency A004/A204/A304
Frequency lower limit A062/A262	>	
Base frequency A003/A203/A303 [*1]	>	
Output frequency F001, Multi-step speed reference 0 A020/A220/A320 [*2]	>	
Multi-step speeds 1 to 15 A021 to A035	>	
Orientation speed setting P015	>	
Frequency lower limit A062/A262	>	Frequency upper limit A061/A261
Output frequency F001, Multi-step speed reference 0 A020/A220 [*2]	>	
Multi-step speeds 1 to 15 A021 to A035	>	
Frequency upper limit A061/A261	<	Orientation speed P015
	<	Frequency lower limit A062/A262
Output frequency F001, Multi-step speed reference 0 A020/A220/A320 [*2]	<	
Frequency upper limit A061/A261	<	Starting frequency b082
Frequency lower limit A062/A262	<	
Output frequency F001, Multi-step speed reference 0 A020/A220/A320 [*2]	<	
Multi-step speeds 1 to 15 A021 to A035	<	
Jogging frequency A038	<	
Output frequency F001, Multi-step speed reference 0 A020/A220/A320 [*2]	< >	Jump frequency 1/2/3 ± Jump width A063 ± A064 A065 ± A066 A067 ± A068 [*3]
Multi-step speeds 1 to 15 A021 to A035	< >	
Frequency upper limit A061/A261	>	Free V/f frequency 7 b112
Frequency lower limit A062/A262	>	
Output frequency F001, Multi-step speed reference 0 A020/A220 [*2]	>	
Multi-step speed reference 1 to 15 A021 to A035	>	
Free V/f frequencies 1 to 6 b100, b102, b104, b106, b108, b110	>	
Free V/f frequencies 2 to 6 b102, b104, b106, b108, b110	<	Free V/f frequency 1 b100
Free V/f frequency 1 b100	>	Free V/f frequency 2 b102
Free V/f frequencies 3 to 6 b104, b106, b108, b110	<	
Free V/f frequencies 1, 2 b100, b102	>	Free V/f frequency 3 b104
Free V/f frequencies 4 to 6 b106, b108, b110	<	

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