# MITSUBISHI ELECTRIC

800 series

# INVERTER
# FR-E800
# Instruction Manual (Maintenance)

*Compact, high functionality inverters*

**FR-E820-0008(0.1K) to 0900(22K)**
**FR-E840-0016(0.4K) to 0440(22K)**
**FR-E860-0017(0.75K) to 0120(7.5K)**
**FR-E820S-0008(0.1K) to 0110(2.2K)**
**FR-E810W-0008(0.1K) to 0050(0.75K)**
**FR-E820-0008(0.1K) to 0900(22K)E**
**FR-E840-0016(0.4K) to 0440(22K)E**
**FR-E860-0017(0.75K) to 0120(7.5K)E**
**FR-E820S-0008(0.1K) to 0110(2.2K)E**
**FR-E810W-0008(0.1K) to 0050(0.75K)E**
**FR-E820-0008(0.1K) to 0900(22K)SCE**
**FR-E840-0016(0.4K) to 0440(22K)SCE**
**FR-E860-0017(0.75K) to 0120(7.5K)SCE**
**FR-E820S-0008(0.1K) to 0110(2.2K)SCE**
**FR-E810W-0008(0.1K) to 0050(0.75K)SCE**
**FR-E846-0026(0.75K) to 0095(3.7K)SCE**

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# CHAPTER 1 Introduction

# 1 Introduction

The contents described in this chapter must be read before using this product.

Always read the instructions before use.

## ◆ Abbreviations

| Item | Description |
|---|---|
| PU | Operation panel, parameter unit (FR-PU07), LCD operation panel (FR-LU08), and enclosure surface operation panel (FR-PA07) |
| Parameter unit | Parameter unit (FR-PU07), LCD operation panel (FR-LU08), and enclosure surface operation panel (FR-PA07) |
| Inverter | Mitsubishi Electric FR-E800 series inverter |
| E800 | Standard model (RS-485 + SIL2/PLd functional safety) |
| E800-E | Ethernet model (Ethernet + SIL2/PLd functional safety) |
| E800-SCE | Safety communication model (Ethernet + SIL3/PLe functional safety) |
| E806 | IP67 model (Ethernet + SIL3/PLe functional safety + IP67) |
| FM type inverter | Standard model with terminal FM (pulse output) |
| AM type inverter | Standard model with terminal AM (voltage output) |
| Vector control compatible option | FR-A8AP E kit |
| Pr. | Parameter number (Number assigned to function) |
| PU operation | Operation using the PU (operation panel / parameter unit) |
| External operation | Operation using the control circuit signals |
| Combined operation | Combined operation using the PU (operation panel / parameter unit) and External operation |
| Mitsubishi Electric standard efficiency motor | SF-JR |
| Mitsubishi Electric constant-torque motor | SF-HRCA |
| Mitsubishi Electric high-performance energy-saving motor | SF-PR |
| Mitsubishi Electric high-performance energy-saving motor with encoder | SF-PR-SC |
| Mitsubishi Electric Vector control dedicated motor | SF-V5RU |
| Mitsubishi Electric geared motor | GM-[] |
| Mitsubishi Electric inverter-driven geared motor for encoder feedback control | GM-DZ, GM-DP |
| Mitsubishi Electric PM motor | MM-GKR, EM-A |

## ◆ Names of the parts on the operation panel

The following table shows the names of the keys and the dial on the operation panel in this document. (For details of the operation panel, refer to the FR-E800 Instruction Manual (Function).) For the IP67 model, the operation panel does not have the keys and the dial.

| Appearance | Name |
|---|---|
| PU/EXT | PU/EXT key |
| MODE | MODE key |
| SET | SET key |
| RUN | RUN key |
| STOP/RESET | STOP/RESET key |
| (dial) | Setting dial[*1] |
| ↑ ↓ | UP/DOWN key[*2] |

*1    The dial is provided for the standard model.
*2    The keys are provided for the Ethernet model and the safety communication model.

## ◆ Digital characters and their corresponding printed equivalents

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | b | C |

| D | E | F | G | H | I | J | K | L | M | N | O | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | E | F | G | H | ı | J | A | L | ⊓ | n | o | P |

| Q | R | S | T | U | V | W | X | Y | Z | - | _ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 | r | 5 | Γ | U | u | 8 | ıı | Y | 2 | - | _ | |

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- BACnet is a registered trademark of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).
- DeviceNet and EtherNet/IP are registered trademarks of ODVA (Open DeviceNet Vendor Association, INC).
- PROFIBUS and PROFINET are either trademarks or registered trademarks of PROFIBUS & PROFINET International.
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- EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.
- Other company and product names herein are either trademarks or registered trademarks of their respective owners.

## ◆ Notes on descriptions in this Instruction Manual

- Connection diagrams in this Instruction Manual appear with the control logic of the input terminals as sink logic, unless otherwise specified. (Refer to the FR-E800 Instruction Manual (Connection) for the switching of the control logic of the inverter.)

# 1.1 Product checking

## ◆ Inverter model

FR-E8 2 0 □ -0008 □ -1 □ □
A B C D E F G H

**Rating plate**

Inverter model ────→ MODEL :FR-E820-0008-1
Input rating ────→ INPUT :XXXXX
Output rating ────→ OUTPUT:XXXXX
SERIAL ────→ SERIAL:XXXXXXXXXXX
Country of origin ────────→ MADE IN XXXXX

MITSUBISHI ELECTRIC    INVERTER    PASSED
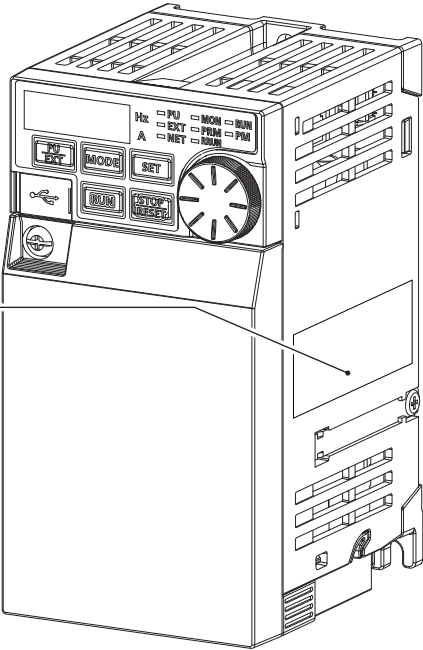
- A: The voltage class is shown.

| Symbol | Voltage class |
|--------|---------------|
| 1 | 100 V class |
| 2 | 200 V class |
| 4 | 400 V class |
| 6 | 575 V class |

- B: The protective structure is shown.

| Symbol | Protective structure |
|--------|----------------------|
| 0 | Open type (IP20) |
| 6 | Enclosed type (IP66/IP67, UL Type 4X, indoor use only) |

- C: The number of phases of the power source is shown.

| Symbol | Description |
|--------|-------------|
| None | Three-phase input |
| S | Single-phase input |
| W | Single-phase input (double voltage output) |

- D: The applicable motor capacity or the inverter rated current is shown.

| Symbol | Description |
|--------|-------------|
| 0.1K to 22K | Applicable motor capacity (ND) (kW) |
| 0008 to 0900 | Inverter rated current (ND) (A) |

- E: The communication type and the functional safety specification are shown.

| Symbol | Communication / functional safety |
|--------|-----------------------------------|
| None | RS-485 + SIL2/PLd |
| E | Ethernet + SIL2/PLd |
| SCE | Ethernet + SIL3/PLe |

- F: The output specification for monitoring and the rated frequency are shown for the standard model, and the communication protocol group is shown for the Ethernet model, safety communication model, and IP67 model. The control logic is fixed to the source logic for the safety communication model and IP67 model.

| Symbol | Monitoring/protocol specification | Rated frequency (initial setting) | Control logic | |
|---|---|---|---|---|
| | | | Input signal (initial status) | Safety stop signal |
| -1 | Pulse (terminal FM) | 60 Hz | Sink logic | Source logic (fixed) |
| -4 | Voltage (terminal AM) | 50 Hz | Source logic | |
| -5 | Voltage (terminal AM) | 60 Hz | Sink logic | |
| PA | Protocol group A (CC-Link IE TSN, CC-Link IE Field Network Basic, MODBUS/TCP, EtherNet/IP, and BACnet/IP) | 60 Hz | Sink logic | |
| PB | Protocol group B (CC-Link IE TSN, CC-Link IE Field Network Basic, MODBUS/TCP, PROFINET) | 50 Hz | Sink logic / source logic[*1] | |
| PC[*2] | Protocol group C (EtherCAT) | 50 Hz | Sink logic / source logic[*1] | |

*1 The initial status of the control logic differs depending on the inverter model.
    Sink logic for the models indicated with the applicable motor capacity (kW)
    Source logic for the models indicated with the rated current (A)
*2 Available for the Ethernet model only.

- G: Availability of circuit board coating / plated conductors / power ON/OFF switch is shown.

| Symbol | Circuit board coating[*1] | Plated conductors | Power ON/OFF switch |
|---|---|---|---|
| None | Without coating | Without plated conductors | Without switch |
| -60 | With coating | Without plated conductors | Without switch |
| -06[*2] | With coating | With plated conductors | Without switch |
| -S6[*3] | With coating | Without plated conductors | With switch |

*1 Conforming to IEC 60721-3-3:1994 3C2
*2 Applicable for the FR-E820-0470(11K) or higher, and the FR-E840-0380(18.5K) or higher.
*3 IP67 model only.

- H: Availability of an EMC filter is shown.

| Symbol | EMC filter |
|---|---|
| None | Without filter |
| C2[*1] | With filter (Class C2) |

*1 IP67 model only.

**● NOTE**

- In this Instruction Manual, the inverter model name consists of the inverter rated current and the applicable motor capacity.
  (Example) FR-E820-0008(0.1K)

## ◆ How to read the SERIAL number

**Rating plate example**

□□  ○○  ○  ○○○○○○
Symbol Year Month Control number
SERIAL

The SERIAL consists of two symbols, three characters indicating the production year and month, and six characters indicating the control number.
The last two digits of the production year are indicated as the Year, and the Month is indicated by 1 to 9, X (October), Y (November), or Z (December).

# 1.2 Related manuals

When using this inverter for the first time, prepare the following manuals as required and use the inverter safely. The latest version of e-Manual Viewer and the latest PDF manuals can be downloaded from the Mitsubishi Electric FA Global Website.

https://www.MitsubishiElectric.com/app/fa/download/search.do?kisyu=/inv&mode=manual

**Point**

- e-Manual refers to the Mitsubishi FA electronic book manuals that can be browsed using a dedicated tool.
- e-Manual has the following features:
  Required information can be cross-searched in multiple manuals.
  Pages that users often browse can be bookmarked.

Manuals related to the FR-E800 inverter are shown in the following table.

| | |
|---|---|
| Inverter Safety Guideline | |
| FR-E800 Instruction Manual (Connection) FR-E860 Instruction Manual (Connection) | Manuals describing installation, wiring, specifications, outline dimensions, standards, and how to connect options. |
| FR-E800 Instruction Manual (Function) | Manual describing details of the functions. |
| FR-E800 Instruction Manual (Communication) | Manual describing details of the communications. |
| FR-E800 Instruction Manual (Maintenance) | Manual describing how to identify causes of faults and warnings. |
| FR-E800(-E) Instruction Manual (Functional Safety) | Manual describing the functional safety. |
| FR-E800-SCE Instruction Manual (Functional Safety) | Manual describing details of the safety communication parameters. |
| FR Configurator2 Instruction Manual | Manual describing details of the software used to set inverter parameters using a personal computer. |
| PLC Function Programming Manual | Manual describing details of the PLC function. |

| Name | Manual number |
|---|---|
| FR-E800 Inverter Safety Guideline | IB-0600857ENG |
| FR-E800-E Inverter Safety Guideline | IB-0600860ENG |
| FR-E800-SCE Inverter Safety Guideline | IB-0600921ENG |
| FR-E860 Inverter Safety Guideline | IB-0600862ENG |
| FR-E860-E Inverter Safety Guideline | IB-0600863ENG |
| FR-E860-SCE Inverter Safety Guideline | IB-0600924ENG |
| FR-E806-SCE Inverter Safety Guideline | IB-0600984ENG |
| FR-E800 Instruction Manual (Connection) | IB-0600865ENG |
| FR-E860 Instruction Manual (Connection) | IB-0600906ENG |
| FR-E800 Instruction Manual (Function) | IB-0600868ENG |
| FR-E800 Instruction Manual (Communication) | IB-0600871ENG |
| FR-E800(-E) Instruction Manual (Functional Safety) | BCN-A23488-000(E) |
| FR-E800-SCE Instruction Manual (Functional Safety) | BCN-A23488-004(E) |
| FR Configurator2 Instruction Manual | IB-0600516ENG |
| PLC Function Programming Manual | IB-0600492ENG |

# CHAPTER 2  Protective Functions

# 2 Protective Functions

This chapter explains the "PROTECTIVE FUNCTIONS" that operate in this product.

Always read the instructions before use.

## 2.1 Inverter fault and alarm indications

- When the inverter detects a fault, depending on the nature of the fault, the operation panel displays an error message or warning, or a protective function is activated to shut off the inverter output.
- When any fault occurs, take an appropriate corrective action, then reset the inverter, and resume the operation. Restarting the operation without a reset may break or damage the inverter.
- When a protective function is activated, note the following points.

| Item | Description |
|---|---|
| Fault output signal | Opening the magnetic contactor (MC) provided on the input side of the inverter at a fault occurrence shuts off the control circuit power to the inverter, therefore, the fault output will not be retained. |
| Fault or alarm indication | When a protective function is activated, the operation panel displays a fault indication. |
| Operation restart method | While a protective function is activated, the inverter output is kept shutoff. Reset the inverter to restart the operation. |

- Inverter fault or alarm indications are categorized as follows.

| Displayed item | Description |
|---|---|
| Error message | A message regarding operational fault or setting fault on the operation panel is displayed. The inverter output is not shut off. |
| Warning | The inverter output is not shut off even when a warning is displayed. However, failure to take appropriate measures will lead to a fault. |
| Alarm | The inverter output is not shut off. An Alarm (LF) signal can also be output with a parameter setting. |
| Fault | When a protective function is activated, the inverter output is shut off and a Fault (ALM) signal is output. |

> **NOTE**
> - The last 10 faults can be displayed on the operation panel. (Fault history) (For operation, refer to page 12.)

# 2.2 Reset method for the protective functions

Reset the inverter by performing any of the following operations. Note that the accumulated heat value of the electronic thermal relay function and the number of retries are cleared (erased) by resetting the inverter.

The inverter recovers about 1 second after the reset is released.

- On the operation panel, press the STOP/RESET key to reset the inverter. (This may only be performed when a fault occurs. (Refer to of the Instruction Manual for faults.))
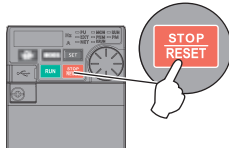


- Switch the power OFF once, then switch it ON again.
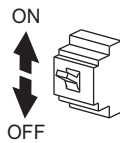


- Turn ON the Reset (RES) signal for 0.1 s or more. (If the RES signal is kept ON, "Err" appears (blinks) to indicate that the inverter is in a reset status.)



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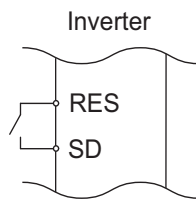
**NOTE**

- OFF status of the start signal must be confirmed before resetting the inverter fault. Resetting an inverter fault with the start signal ON restarts the motor suddenly.
- For the IP67 model, the operation panel does not have the STOP/RESET key.

---

# 2.3 Check and clear of the fault history

The operation panel stores the fault indications which appear when a protective function is activated to display the fault record for the past 10 faults. (Fault history)

## ◆ Check for the fault history

**Monitor mode** → MODE → **Parameter setting mode** → MODE → **Fault history mode**

**[Operation for displaying fault history]**
The last eight fault records can be displayed.

**Fault record 1**

**Fault record 2**

**Fault record 10**
When the fault history is empty, only the fault record number is displayed.

SET → **Output frequency** (Blinking) → SET → **Output current** *1 (Blinking) → SET → **Output voltage** (Blinking) → SET → **Cumulative energization time** *2 (Blinking) → SET → **Year** (Blinking) → SET → **Month** (Blinking) → SET → **Day** (Blinking) → SET → **Time** (Blinking) → SET → Fault record 1

*1    When an overcurrent trip occurs by an instantaneous overcurrent, the monitored current value saved in the fault history may be lower than the actual current that has flowed.

*2    The cumulative energization time is accumulated from 0 to 65535 hours, then cleared, and accumulated again from 0.

**NOTE**
• For the IP67 model, the fault history cannot be checked using the operation panel.

# ◆ Fault history clearing procedure

## Operating procedure

**1.** Turning ON the power of the inverter

The operation panel is in the monitor mode.

**2.** Selecting the parameter setting mode

Press the MODE key to choose the parameter setting mode. (The parameter number read previously appears.)

**3.** Selecting the parameter number

Turn the setting dial or press the UP/DOWN key until "ER.CL" (Fault history clear) appears. Press the SET key to read the present set value. "0" (initial value) appears.

**4.** Fault history clear

Turn the setting dial or press the UP/DOWN key to change the value to "1". Press the SET key to start clearing.

"1" and "ER.CL" are displayed alternately after the fault history is cleared.

- Turn the setting dial or press the UP/DOWN key to read another parameter.
- Press the SET key to show the setting again.
- Press the SET key twice to show the next parameter.

# 2.4 List of fault displays

If the displayed message does not correspond to any of the following or if you have any other problem, contact your sales representative.

## ◆ Error message

- A message regarding operational fault or setting fault on the operation panel is displayed. The inverter output is not shut off.

| Operation panel indication | | Name | Refer to page |
|---|---|---|---|
| HoLd | HOLD | Operation panel lock | 17 |
| LoCd | LOCD | Password locked | 17 |
| Er 1 to Er-4 | Er1 to Er4 | Parameter write error | 17 |
| Err. | Err. | Error | 18 |

## ◆ Warning

- The inverter output is not shut off even when a warning is displayed. However, failure to take appropriate measures will lead to a fault.

| Operation panel indication | | Name | Data code | Refer to page |
|---|---|---|---|---|
| oLC | OLC | Stall prevention (overcurrent) | 1 (H01) | 18 |
| oLu | OLV | Stall prevention (overvoltage) | 2 (H02) | 18 |
| rb | RB | Regenerative brake pre-alarm | 3 (H03) | 19 |
| TH | TH | Electronic thermal relay function pre-alarm | 4 (H04) | 19 |
| PS | PS | PU stop | 6 (H06) | 19 |
| MT | MT | Maintenance timer | 8 (H08) | 20 |
| SL | SL | Speed limit indication | 9 (H09) | 19 |
| CF | CF | Continuous operation during communication fault | 10 (H0A) | 20 |
| SA | SA | Safety stop | 12 (H0C) | 19 |
| LdF | LDF | Load fault warning | 26 (H1A) | 20 |
| EHr | EHR | Ethernet communication fault | 28 (H1C) | 20 |
| dIP | DIP | Duplicate IP address | 32 (H20) | 20 |
| IP | IP | IP address fault | 38 (H26) | 20 |
| SE | SE | Incorrect parameter setting | 48 (H30) | 21 |

| Operation panel indication | | Name | Data code | Refer to page |
|---|---|---|---|---|
| Cor | Cor | Corrosion warning | 50 (H32) | 21 |
| Uu | UV | Undervoltage | — | 21 |
| LP | LP | Stroke limit warning | 20 (H14) | 21 |
| HP1 | HP1 | Home position return setting error | 21 (H15) | 21 |
| HP2 | HP2 | Home position return uncompleted | 22 (H16) | 21 |
| Ed | ED | Emergency drive in operation | 24 (H18) | 21 |

## ◆ Alarm

- The inverter output is not shut off. An Alarm (LF) signal can also be output with a parameter setting.

| Operation panel indication | | Name | Refer to page |
|---|---|---|---|
| Fn | FN | Fan alarm | 22 |

## ◆ Fault

- When a protective function is activated, the inverter output is shut off and a Fault (ALM) signal is output.
- The data code is used for checking the fault detail via communication or with **Pr.997 Fault initiation**.

### ■ Data code 16 to 199

| Operation panel indication | | Name | Data code | Refer to page |
|---|---|---|---|---|
| E.oC1 | E.OC1 | Overcurrent trip during acceleration | 16 (H10) | 22 |
| E.oC2 | E.OC2 | Overcurrent trip during constant speed | 17 (H11) | 23 |
| E.oC3 | E.OC3 | Overcurrent trip during deceleration or stop | 18 (H12) | 23 |
| E.ou1 | E.OV1 | Regenerative overvoltage trip during acceleration | 32 (H20) | 24 |
| E.ou2 | E.OV2 | Regenerative overvoltage trip during constant speed | 33 (H21) | 24 |
| E.ou3 | E.OV3 | Regenerative overvoltage trip during deceleration or stop | 34 (H22) | 24 |
| E.THT | E.THT | Inverter overload trip (electronic thermal relay function) | 48 (H30) | 25 |
| E.THM | E.THM | Motor overload trip (electronic thermal relay function) | 49 (H31) | 25 |

| Operation panel indication | | Name | Data code | Refer to page |
|---|---|---|---|---|
| E.Fin | E.FIN | Heat sink overheat | 64 (H40) | 25 |
| E.UuT | E.UVT | Undervoltage | 81 (H51) | 26 |
| E.iLF | E.ILF | Input phase loss | 82 (H52) | 26 |
| E.oLT | E.OLT | Stall prevention stop | 96 (H60) | 26 |
| E.SoT | E.SOT | Loss of synchronism detection | 97 (H61) | 26 |
| E.LUP | E.LUP | Upper limit fault detection | 98 (H62) | 27 |
| E.Ldn | E.LDN | Lower limit fault detection | 99 (H63) | 27 |
| E.bE | E.BE | Brake transistor alarm detection | 112 (H70) | 27 |
| E.GF | E.GF | Output side earth (ground) fault overcurrent | 128 (H80) | 27 |
| E.LF | E.LF | Output phase loss | 129 (H81) | 27 |
| E.oHT | E.OHT | External thermal relay operation | 144 (H90) | 28 |
| E.PTC | E.PTC | PTC thermistor operation | 145 (H91) | 28 |
| E.oPT | E.OPT | Option fault | 160 (HA0) | 28 |
| E.oP1 | E.OP1 | Communication option fault | 161 (HA1) | 28 |
| E. 16 | E.16 | | 164 (HA4) | |
| E. 17 | E.17 | | 165 (HA5) | |
| E. 18 | E.18 | User definition error by the PLC function | 166 (HA6) | 29 |
| E. 19 | E.19 | | 167 (HA7) | |
| E. 20 | E.20 | | 168 (HA8) | |
| E.PE6 | E.PE6 | Internal storage device fault | 172 (HAC) | 29 |
| E.PE | E.PE | Parameter storage device fault (control circuit board) | 176 (HB0) | 30 |
| E.PUE | E.PUE | PU disconnection | 177 (HB1) | 30 |
| E.rET | E.RET | Retry count excess | 178 (HB2) | 30 |
| E.PE2 | E.PE2 | Parameter storage device fault (main circuit board) | 179 (HB3) | 30 |
| E.CPU | E.CPU | CPU fault | 192 (HC0) | 31 |
| E.Cdo | E.CDO | Abnormal output current detection | 196 (HC4) | 31 |
| E.ioH | E.IOH | Inrush current limit circuit fault | 197 (HC5) | 31 |
| E.AiE | E.AIE | Analog input fault | 199 (HC7) | 31 |

■ **Data code 200 or more**

| Operation panel indication | | Name | Data code | Refer to page |
|---|---|---|---|---|
| E.USb | E.USB | USB communication fault | 200 (HC8) | 31 |
| E.SAF | E.SAF | Safety circuit fault | 201 (HC9) | 32 |
| E.oS | E.OS | Overspeed occurrence | 208 (HD0) | 32 |
| E.oSd | E.OSD | Speed deviation excess detection | 209 (HD1) | 32 |
| E.ECT | E.ECT | Signal loss detection | 210 (HD2) | 33 |
| E.od | E.OD | Excessive position fault | 211 (HD3) | 33 |
| E.Mb1 | E.MB1 | | 213 (HD5) | |
| E.Mb2 | E.MB2 | | 214 (HD6) | |
| E.Mb3 | E.MB3 | | 215 (HD7) | |
| E.Mb4 | E.MB4 | Brake sequence fault | 216 (HD8) | 33 |
| E.Mb5 | E.MB5 | | 217 (HD9) | |
| E.Mb6 | E.MB6 | | 218 (HDA) | |
| E.Mb7 | E.MB7 | | 219 (HDB) | |
| E.EP | E.EP | Encoder phase fault | 220 (HDC) | 34 |
| E.oA | E.OA | Acceleration error | 221 (HDD) | 34 |
| E.iAH | E.IAH | Abnormal internal temperature | 225 (HE1) | 34 |
| E.Pid | E.PID | PID signal fault | 230 (HE6) | 36 |
| E.EHr | E.EHR | Ethernet communication fault | 231 (HE7) | 35 |
| E.CMb | E.CMB | Board combination fault | 232 (HE8) | 35 |
| E. 1 | E.1 | Option fault | 241 (HF1) | 36 |
| E. 5 | E.5 | | 245 (HF5) | |
| E. 6 | E.6 | CPU fault | 246 (HF6) | 31 |
| E. 7 | E.7 | | 247 (HF7) | |
| E. 10 | E.10 | Inverter output fault | 250 (HFA) | 36 |
| E. 11 | E.11 | Opposite rotation deceleration fault | 251 (HFB) | 36 |
| E. 13 | E.13 | Internal circuit fault | 253 (HFD) | 36 |

2

## ◆ Others

- The fault history and the operation status of the inverter are displayed. It is not a fault indication.

| Operation panel indication | Name | Refer to page |
|---|---|---|
| E - - - | Fault history | 12 |
| E. 0 | No fault history | 37 |
| Eu | 24 V external power supply operation | 37 |
| rd | Backup in progress | 37 |
| Hr | Restoration in progress | 37 |

# 2.5 Causes and corrective actions

## ◆ Error message

A message regarding operational troubles is displayed. Output is not shut off.

### ■ Operation panel lock

| Operation panel indication | HOLD | $HoLd$ |
|---|---|---|
| Description | Operation lock is set. Operation other than pressing the STOP/RESET key is disabled. | |
| Check point | -------------- | |
| Corrective action | Press the MODE key for 2 seconds to release the lock. | |
| Reference manual | FR-E800 Instruction Manual (Function) | |

### ■ Password locked

| Operation panel indication | LOCD | $LoCd$ |
|---|---|---|
| Description | Password function is active. Display and setting of parameters are restricted. | |
| Check point | -------------- | |
| Corrective action | Enter the password in **Pr.297 Password lock/unlock** to unlock the password function before operating. | |
| Reference manual | FR-E800 Instruction Manual (Function) | |

### ■ Write disable error

| Operation panel indication | Er1 | $Er1$ |
|---|---|---|
| Description | • Parameter setting was attempted while **Pr.77 Parameter write selection** is set to disable parameter write.<br>• Overlapping range has been set for the frequency jump.<br>• The PU and inverter cannot make normal communication. | |
| Check point | • Check the **Pr.77** setting.<br>• Check the settings of **Pr.31 to Pr.36 (frequency jump)**.<br>• Check the connection of PU and the inverter. | |
| Reference manual | FR-E800 Instruction Manual (Function) | |

### ■ Write error during operation

| Operation panel indication | Er2 | $Er2$ |
|---|---|---|
| Description | Parameter write was attempted while **Pr.77 Parameter write selection** = "0". | |
| Check point | • Check that the inverter is stopped. | |
| Corrective action | • After stopping the operation, make parameter setting.<br>• When setting **Pr.77** = "2", parameter write is enabled during operation. | |
| Reference manual | FR-E800 Instruction Manual (Function) | |

### ■ Calibration error

| Operation panel indication | Er3 | $Er3$ |
|---|---|---|
| Description | Analog input bias and gain calibration values have been set too close. | |
| Check point | Check the settings of the **calibration parameters C3, C4, C6, and C7** (calibration functions). | |
| Reference manual | FR-E800 Instruction Manual (Function) | |

### ■ Mode designation error

| Operation panel indication | Er4 | $Er4$ |
|---|---|---|
| Description | • Parameter setting was attempted in the External or NET operation mode while **Pr.77 Parameter write selection** = "1".<br>• Parameter write was attempted when the command source is not at the operation panel. | |
| Check point | • Check that the operation mode is the PU operation mode.<br>• Check that the **Pr.551 PU mode operation command source selection** setting is correct. | |
| Corrective action | • After setting the operation mode to the "PU operation mode", make parameter setting.<br>• When **Pr.77** = "2", parameter write is enabled regardless of the operation mode.<br>• Set **Pr.551** = "4". | |
| Reference manual | FR-E800 Instruction Manual (Function) | |

## ■Error

| Operation panel indication | Err. | $Err.$ | | |
|---|---|---|---|---|
| Description | • The RES signal is turned ON.<br>• This error may occur when the voltage at the input side of the inverter drops. | | | |
| Corrective action | • Turn OFF the RES signal. | | | |

## ◆Warning

Output is not shut off when a protective function is activated.

### ■Stall prevention (overcurrent)

| Operation panel indication | OLC | $oLC$ | FR-LU08 indication | OL |
|---|---|---|---|---|
| Description | • When the output current of the inverter increases, the stall prevention (overcurrent) function is activated.<br>• The following section explains about the stall prevention (overcurrent) function. | | | |
| | During acceleration | When the output current (output torque under Real sensorless vector control or Vector control) of the inverter exceeds the stall prevention level (**Pr.22 Stall prevention operation level**, etc.), this function stops the increase in frequency until the overload current decreases to prevent the inverter from resulting in overcurrent trip. When the overload current is reduced below stall prevention operation level, this function increases the frequency again. | | |
| | During constant-speed operation | When the output current (output torque under Real sensorless vector control or Vector control) of the inverter exceeds the stall prevention level (**Pr.22 Stall prevention operation level**, etc.), this function reduces frequency until the overload current decreases to prevent the inverter from resulting in overcurrent trip. When the overload current is reduced below stall prevention operation level, this function increases the frequency up to the set value. | | |
| | During deceleration | When the output current (output torque under Real sensorless vector control or Vector control) of the inverter exceeds the stall prevention level (**Pr.22 Stall prevention operation level**, etc.), this function stops the decrease in frequency until the overload current decreases to prevent the inverter from resulting in overcurrent trip. When the overload current is reduced below stall prevention operation level, this function decreases the frequency again. | | |
| Check point | • Check that the **Pr.0 Torque boost** setting is not too large.<br>• The **Pr.7 Acceleration time** and **Pr.8 Deceleration time** settings may be too short.<br>• Check that the load is not too heavy.<br>• Check for any failures in peripheral devices.<br>• Check that the **Pr.13 Starting frequency** is not too large.<br>• Check that **Pr.22 Stall prevention operation level** is appropriate. | | | |
| Corrective action | • Gradually increase or decrease the **Pr.0** setting by 1% at a time and check the motor status.<br>• Set a larger value in **Pr.7** and **Pr.8**.<br>• Reduce the load.<br>• Try Advanced magnetic flux vector control, Real sensorless vector control, or Vector control.<br>• Change the **Pr.14 Load pattern selection** setting.<br>• The stall prevention operation current can be set in **Pr.22 Stall prevention operation level**. (The initial value is 150% for the ND rating.) Acceleration/deceleration time may change. Increase the stall prevention operation level with **Pr.22 Stall prevention operation level**, or disable stall prevention with **Pr.156 Stall prevention operation selection**. (Use **Pr.156** to set either operation continued or not at OLC operation.) | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

### ■Stall prevention (overvoltage)

| Operation panel indication | OLV | $oLu$ | FR-LU08 indication | oL |
|---|---|---|---|---|
| Description | • When the output voltage of the inverter increases, the stall prevention (overvoltage) function is activated.<br>• The regeneration avoidance function is activated due to excessive regenerative power of the motor.<br>• The following section explains the stall prevention (overvoltage) function. | | | |
| | During deceleration | If the regenerative power of the motor becomes excessive to exceed the regenerative power consumption capability, this function stops decreasing the frequency to prevent overvoltage trip. As soon as the regenerative power has reduced, deceleration resumes. | | |
| Check point | • Check for sudden speed reduction.<br>• Check if the regeneration avoidance function (**Pr.882, Pr.883, Pr.885, and Pr.886**) is being used. | | | |
| Corrective action | The deceleration time may change. Increase the deceleration time using **Pr.8 Deceleration time**. | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

## ■Regenerative brake pre-alarm

| Operation panel indication | RB | r b | FR-LU08 indication | RB |
|---|---|---|---|---|
| Description | Appears if the actual regenerative brake duty reaches or exceeds 85% of the reference regenerative brake duty (100%) determined by the settings of **Pr.30 Regenerative function selection** and **Pr.70 Special regenerative brake duty**. If the regenerative brake duty reaches 100%, a regenerative overvoltage (E.OV[]) occurs. | | | |
| Check point | • Check if the brake resistor duty is not too high.<br>• Check that the **Pr.30 Regenerative function selection** and **Pr.70** settings are correct. | | | |
| Corrective action | • Set the deceleration time longer.<br>• Check the **Pr.30** and **Pr.70** settings. | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

## ■Electronic thermal relay function pre-alarm

| Operation panel indication | TH | ⌐H | FR-LU08 indication | TH |
|---|---|---|---|---|
| Description | Appears if the cumulative value of the electronic thermal O/L relay reaches or exceeds 85% of the preset level of **Pr.9 Electronic thermal O/L relay**. If the specified value is reached, the protection circuit is activated to shut off the inverter output. | | | |
| Check point | • Check for large load or sudden acceleration.<br>• Check that the **Pr.9** setting is appropriate. | | | |
| Corrective action | • Reduce the load and frequency of operation.<br>• Set an appropriate value in **Pr.9**. | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

## ■PU stop

| Operation panel indication | PS | PS | FR-LU08 indication | PS |
|---|---|---|---|---|
| Description | • The motor is stopped using the STOP/RESET key in the mode other than the PU operation mode. (To enable the STOP/RESET key in the mode other than the PU operation mode, set **Pr.75 Reset selection/disconnected PU detection/PU stop selection**.)<br>• The motor is stopped by the emergency stop function. | | | |
| Check point | • Check for a stop made by pressing the STOP/RESET key on the operation panel.<br>• Check for whether the X92 signal is OFF. | | | |
| Corrective action | • Turn OFF the start signal and press the PU/EXT key for release.<br>• Turn ON the X92 signal and OFF the start signal for release. | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

## ■Speed limit indication (output during speed limit)

| Operation panel indication | SL | SL | FR-LU08 indication | SL |
|---|---|---|---|---|
| Description | Output if the speed limit level is exceeded during torque control. | | | |
| Check point | • Check that the torque command is not larger than required.<br>• Check if the speed limit level is set too low. | | | |
| Corrective action | • Decrease the torque command value.<br>• Increase the speed limit level. | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

## ■Safety stop

| Operation panel indication | SA | SA | FR-LU08 indication | SA |
|---|---|---|---|---|
| Description | Appears when safety stop function is activated (during output shutoff). | | | |
| Check point | • Check if an emergency stop device is activated.<br>• Check if the shorting wire between S1 and PC or between S2 and PC is disconnected when not using the safety stop function. | | | |
| Corrective action | • An emergency stop device is activated when using the safety stop function. Identify the cause of emergency stop, ensure the safety and restart the system.<br>• When not using the safety stop function, short across terminals S1 and PC and across S2 and PC with shorting wire for the inverter to run.<br>• If "SA" is indicated when wires across S1 and PC and across S2 and PC are both conducted while using the safety stop function (drive enabled), internal failure might be the cause. Check the wiring of terminals S1, S2, and SIC and contact your sales representative if the wiring has no fault. | | | |
| Reference manual | FR-E800 Instruction Manual (Functional Safety) | | | |

### ■ Maintenance timer

| Operation panel indication | MT | *ΠΓ* | FR-LU08 indication | MT |
|---|---|---|---|---|
| Description | Appears when the inverter's cumulative energization time reaches or exceeds the parameter set value. Set the time until the "MT" is displayed using **Pr.504 Maintenance timer warning output set time** (MT). "MT" does not appear when the setting of **Pr.504** is the initial value ("9999"). ||||
| Check point | The set time of maintenance timer has been exceeded. ||||
| Corrective action | Take appropriate countermeasures according to the purpose of the maintenance timer setting.<br>Setting "0" in **Pr.503 Maintenance timer** clears the indication. ||||
| Reference manual | FR-E800 Instruction Manual (Function) ||||

### ■ Continuous operation during communication fault

| Operation panel indication | CF | *CF* | FR-LU08 indication | CF |
|---|---|---|---|---|
| Description | Appears when the operation continues while an error is occurring in the communication line or communication option (when **Pr.502** = "6"). ||||
| Check point | • Check for a break in the communication cable.<br>• Check for communication option faults. ||||
| Corrective action | • Check the connection of communication cable.<br>• Replace the communication option. ||||
| Reference manual | FR-E800 Instruction Manual (Function) ||||

### ■ Load fault warning

| Operation panel indication | LDF | *LdF* | FR-LU08 indication | LDF |
|---|---|---|---|---|
| Description | Appears when the load is deviated from the detection width set in **Pr.1488 Upper limit warning detection width** or **Pr.1489 Lower limit warning detection width**. ||||
| Check point | • Check if too much load is applied to the equipment, or if the load is too light.<br>• Check that the load characteristics settings are correct. ||||
| Corrective action | • Inspect the equipment.<br>• Set the load characteristics (**Pr.1481 to Pr.1487**) correctly. ||||
| Reference manual | FR-E800 Instruction Manual (Function) ||||

### ■ Ethernet communication fault

| Operation panel indication | EHR | *EHr* | FR-LU08 indication | EHR |
|---|---|---|---|---|
| Description | Appears when Ethernet communication is interrupted by physical factors while **Pr.1431 Ethernet signal loss detection function selection** = "1 to 3". ||||
| Check point | • Check for a break in the communication cable.<br>• Check for a break in the Ethernet cable. ||||
| Corrective action | • Connect the Ethernet board securely.<br>• Check that the Ethernet cable is connected to the Ethernet connector properly and the Ethernet cable is not damaged. ||||
| Reference manual | FR-E800 Instruction Manual (Communication) ||||

### ■ Duplicate IP address

| Operation panel indication | DIP | *d iP* | FR-LU08 indication | DIP |
|---|---|---|---|---|
| Description | Appears when duplicate IP address is detected. ||||
| Check point | Check that the specified IP address is not overlapping with the IP address of any other device on the network. ||||
| Corrective action | Enter a unique IP address. ||||
| Reference manual | FR-E800 Instruction Manual (Communication) ||||

### ■ IP address fault

| Operation panel indication | IP | *iP* | FR-LU08 indication | IP |
|---|---|---|---|---|
| Description | Appears when the IP address or the subnet mask is out of the specified range. ||||
| Check point | • Check that "0 or 255" is not set in the third or fourth octet of the IP address.<br>• Check that the subnet mask setting is appropriate.<br>• Check that the IP address settings are correct. ||||
| Corrective action | • Set "1 to 254" in the third or fourth octet of the IP address.<br>• Set the subnet mask (**Pr.1438 to Pr.1441**) correctly.<br>• Set the IP address (**Pr.1434 to Pr.1447**) correctly. ||||
| Reference manual | FR-E800 Instruction Manual (Communication) ||||

### ■ Incorrect parameter setting

| Operation panel indication | SE | $\bar{c}E$ | FR-LU08 indication | SE |
|---|---|---|---|---|
| Description | Appears when a start command is input while the condition to start operation is not satisfied in the motor setting (**Pr.71, Pr.450, Pr.80, Pr.453, Pr.81, or Pr.454**) for the control method selected in **Pr.800 or Pr.451**. | | | |
| Check point | Check that the motor setting is appropriate for the control method. | | | |
| Corrective action | Change the control method setting or the motor setting as appropriate. | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

### ■ Corrosion warning

| Operation panel indication | Cor | $\bar{c}or$ | FR-LU08 indication | Cor |
|---|---|---|---|---|
| Description | Appears when the corrosion level of the control circuit board becomes "3" (**Pr.198** = "3"). (Available only for the FR-E8[][]-[]-60 (with coating).) | | | |
| Check point | Check that the operating environment of the inverter is appropriate. | | | |
| Corrective action | • Improve the operating environment of the inverter (by a filter or ventilation).<br>• Consider replacing the inverter early. | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

### ■ Undervoltage

| Operation panel indication | UV | $Uu$ | FR-LU08 indication | — |
|---|---|---|---|---|
| Description | If the power supply voltage of the inverter decreases, the control circuit will not perform normal functions. In addition, the motor torque will be insufficient and/or heat generation will increase. To prevent this, if the power supply voltage decreases to about 115 VAC (230 VAC for the 400 V class, 330 VAC for the 575 V class, 58 VAC for the 100 V class) or below (when the PM sensorless vector control is selected: about 156 VAC (311 VAC for the 400 V class, 448 VAC for the 575 V class, 78 VAC for the 100 V class) or below), this function shuts off the inverter output and "UV" is displayed (on the operation panel only). The warning is removed when the voltage returns to normal. | | | |
| Check point | Check that the power supply voltage is normal. | | | |
| Corrective action | Check the devices on the power system such as the power supply itself. | | | |

### ■ Stroke limit warning

| Operation panel indication | LP | $LP$ | FR-LU08 indication | LP |
|---|---|---|---|---|
| Description | Appears when the Forward stroke end (LSP) signal or the Reverse stroke end (LSN) signal is assigned to the input terminal and the signal is turned OFF (normally closed input). The indication remains displayed while the signal is OFF. | | | |
| Check point | Check if the LSP/LSN signal is turned OFF (normally closed input). | | | |
| Corrective action | Turn ON the LSP/LSN signal (normally closed input). | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

### ■ Home position return error

| Operation panel indication | HP1, HP2 | $HP1,$<br>$HP2$ | FR-LU08 indication | HP1, HP2 |
|---|---|---|---|---|
| Description | Appears when an error occurs during the home position return operation under position control. | | | |
| Check point | Identify the cause of the error occurrence. | | | |
| Corrective action | Check the parameter setting, and check that the input signal is correct. | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

### ■ Emergency drive in operation (Standard model / Ethernet model)

| Operation panel indication | ED | $Ed$ | FR-LU08 indication | ED |
|---|---|---|---|---|
| Description | Appears during emergency drive operation. | | | |
| Check point | Emergency drive operation is performed by turning ON the X84 signal. | | | |
| Corrective action | The display is cleared when the emergency drive operation ends. | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

## ◆Alarm

Output is not shut off when a protective function is activated. The Alarm (LF) signal can be output depending on the parameter setting. (Set "98" in **Pr.190 to Pr.197 (Output terminal function selection)**. Refer to the FR-E800 Instruction Manual (Function).)

### ■Fan alarm

| Operation panel indication | FN | $F_{n}$ | FR-LU08 indication | FN |
|---|---|---|---|---|
| **Description** | For the inverter that contains a cooling fan, FN appears on the operation panel when the cooling fan stops due to a fault, low rotation speed, or different operation from the setting of **Pr.244 Cooling fan operation selection**. ||||
| **Check point** | When the cooling fan is replaced, check that the fan is not installed upside down.<br>Check the cooling fan for a failure. ||||
| **Corrective action** | Install the fan correctly. (Refer to page 53.)<br>If the fan alarm still occurs after the fan is installed correctly, the fan may be faulty. Contact your sales representative. ||||

## ◆Fault

When a protective function is activated, the inverter output is shut off and a fault signal is output.

### ■Overcurrent trip during acceleration

| Operation panel indication | E.OC1 | $E.oC1$ | FR-LU08 indication | OC During Acc |
|---|---|---|---|---|
| **Description** | When the inverter output current reaches or exceeds approximately 230%[*1] of the rated current during acceleration, the protection circuit is activated and the inverter output is shut off. ||||
| **Check point** | • Check for sudden speed acceleration.<br>• Check if the downward acceleration time is too long in a lift application.<br>• Check for output short-circuit.<br>• Check that the **Pr.3 Base frequency** setting is not 60 Hz when the motor rated frequency is 50 Hz.<br>• Check if the stall prevention operation level is set too high. Check if the fast-response current limit operation is disabled.<br>• Check that the regenerative driving is not performed frequently. (Check if the output voltage becomes larger than the V/F reference voltage at regenerative driving and overcurrent occurs due to increase in the motor current.)<br>• Check that the encoder wiring and the specifications (encoder power supply, resolution, differential/ complementary) are correct. Check also that the motor wiring (U, V, W) is correct (under Vector control).<br>• Check that the rotation direction is not switched from forward to reverse rotation (or from reverse to forward) during torque control under Real sensorless vector control.<br>• Check that the inverter capacity matches with the motor capacity. (PM sensorless vector control)<br>• Check if a start command is given to the inverter while the motor is coasting. (PM sensorless vector control)<br>• Check if the inverter has restarted the motor after output shutoff due to power failure, undervoltage, the MRS signal, or the safety stop function. ||||
| **Corrective action** | • Set the acceleration time longer. (Shorten the downward acceleration time of the lift.)<br>• If "E.OC1" always appears at start, disconnect the motor once and restart the inverter. If "E.OC1" still appears, contact your sales representative.<br>• Check the wiring to make sure that output short circuit does not occur.<br>• Set 50 Hz in **Pr.3 Base frequency**.<br>• Lower the stall prevention operation level. Activate the fast-response current limit operation.<br>• Set the base voltage (rated voltage of the motor, etc.) in **Pr.19 Base frequency voltage**.<br>• Check the wiring and specifications of the encoder and the motor. Perform the setting according to the specifications of the encoder and the motor (under Vector control).<br>• Prevent the motor from switching the rotation direction from forward to reverse (or from reverse to forward) during torque control under Real sensorless vector control.<br>• Choose inverter and motor capacities that match. (PM sensorless vector control)<br>• Input a start command after the motor stops. Alternatively, use the automatic restart after instantaneous power failure / flying start function. (PM sensorless vector control)<br>• Remove the cause of output shutoff. (Check the power supply, and terminals MRS, S1, and S2.) ||||
| **Reference manual** | • FR-E800 Instruction Manual (Connection)<br>• FR-E860 Instruction Manual (Connection)<br>• FR-E800 Instruction Manual (Function) ||||

*1   Differs according to ratings and the inverter capacity. The rating can be changed using **Pr.570 Multiple rating setting**.
Three-phase input:
170% for LD rating, 230% for ND rating (initial setting) (FR-E820-0175(3.7K) or lower, FR-E820-0760(18.5K), FR-E820-0900(22K), FR-E840-0095(3.7K) or lower, FR-E840-0380(18.5K), FR-E840-0440(22K), FR-E860-0061(3.7K) or lower, FR-E846-0095(3.7K) or lower), and 235% for ND rating (FR-E820-0240(5.5K) to FR-E820-0600(15K), FR-E840-0120(5.5K) to FR-E840-0300(15K), FR-E860-0090(5.5K) or higher)
Single-phase input (ND rating only):
280% (FR-E820S-0015(0.2K) or lower,  or lower) and 230% (FR-E820S-0030(0.4K) or higher,  or higher)

## ■ Overcurrent trip during constant speed

| Operation panel indication | E.OC2 | $E.oC2$ | FR-LU08 indication | OC During Cnst Spd |
|---|---|---|---|---|
| Description | When the inverter output current reaches or exceeds approximately 230%[*2] of the rated current during constant-speed operation, the protection circuit is activated and the inverter output is shut off. | | | |
| Check point | • Check for sudden load change.<br>• Check for output short-circuit.<br>• Check if the stall prevention operation level is set too high. Check if the fast-response current limit operation is disabled.<br>• Check that the rotation direction is not switched from forward to reverse rotation (or from reverse to forward) during torque control under Real sensorless vector control.<br>• Check that the inverter capacity matches with the motor capacity. (PM sensorless vector control)<br>• Check if a start command is given to the inverter while the motor is coasting. (PM sensorless vector control) | | | |
| Corrective action | • Keep the load stable.<br>• Check the wiring to make sure that output short circuit does not occur.<br>• Lower the stall prevention operation level. Activate the fast-response current limit operation.<br>• Prevent the motor from switching the rotation direction from forward to reverse (or from reverse to forward) during torque control under Real sensorless vector control.<br>• Choose inverter and motor capacities that match. (PM sensorless vector control)<br>• Input a start command after the motor stops. Alternatively, use the automatic restart after instantaneous power failure / flying start function. (PM sensorless vector control) | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

*2 Differs according to ratings and the inverter capacity. The rating can be changed using **Pr.570 Multiple rating setting**.
Three-phase input:
170% for LD rating, 230% for ND rating (initial setting) (FR-E820-0175(3.7K) or lower, FR-E820-0760(18.5K), FR-E820-0900(22K), FR-E840-0095(3.7K) or lower, FR-E840-0380(18.5K), FR-E840-0440(22K), FR-E860-0061(3.7K) or lower, FR-E846-0095(3.7K) or lower), and 235% for ND rating (FR-E820-0240(5.5K) to FR-E820-0600(15K), FR-E840-0120(5.5K) to FR-E840-0300(15K), FR-E860-0090(5.5K) or higher)
Single-phase input (ND rating only):
280% (FR-E820S-0015(0.2K) or lower,  or lower) and 230% (FR-E820S-0030(0.4K) or higher,  or higher)

## ■ Overcurrent trip during deceleration or stop

| Operation panel indication | E.OC3 | $E.oC3$ | FR-LU08 indication | OC During Dec |
|---|---|---|---|---|
| Description | When the inverter output current reaches or exceeds approximately 230%[*3] of the rated current during deceleration (other than acceleration or constant speed), the protection circuit is activated and the inverter output is shut off. | | | |
| Check point | • Check for sudden speed reduction.<br>• Check for output short-circuit.<br>• Check for too fast operation of the motor's mechanical brake.<br>• Check if the stall prevention operation level is set too high. Check if the fast-response current limit operation is disabled.<br>• Check that the rotation direction is not switched from forward to reverse rotation (or from reverse to forward) during torque control under Real sensorless vector control.<br>• Check that the inverter capacity matches with the motor capacity. (PM sensorless vector control)<br>• Check if a start command is given to the inverter while the motor is coasting. (PM sensorless vector control) | | | |
| Corrective action | • Set the deceleration time longer.<br>• Check the wiring to make sure that output short circuit does not occur.<br>• Check the mechanical brake operation.<br>• Lower the stall prevention operation level. Activate the fast-response current limit operation.<br>• Prevent the motor from switching the rotation direction from forward to reverse (or from reverse to forward) during torque control under Real sensorless vector control.<br>• Choose inverter and motor capacities that match. (PM sensorless vector control)<br>• Input a start command after the motor stops. Alternatively, use the automatic restart after instantaneous power failure / flying start function. (PM sensorless vector control) | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

*3 Differs according to ratings and the inverter capacity. The rating can be changed using **Pr.570 Multiple rating setting**.
Three-phase input:
170% for LD rating, 230% for ND rating (initial setting) (FR-E820-0175(3.7K) or lower, FR-E820-0760(18.5K), FR-E820-0900(22K), FR-E840-0095(3.7K) or lower, FR-E840-0380(18.5K), FR-E840-0440(22K), FR-E860-0061(3.7K) or lower, FR-E846-0095(3.7K) or lower), and 235% for ND rating (FR-E820-0240(5.5K) to FR-E820-0600(15K), FR-E840-0120(5.5K) to FR-E840-0300(15K), FR-E860-0090(5.5K) or higher)
Single-phase input (ND rating only):
280% (FR-E820S-0015(0.2K) or lower,  or lower) and 230% (FR-E820S-0030(0.4K) or higher,  or higher)

# ■ Regenerative overvoltage trip during acceleration

| Operation panel indication | E.OV1 | $\mathcal{E}.o\cup 1$ | FR-LU08 indication | OV During Acc |
|---|---|---|---|---|
| **Description** | If regenerative power causes the inverter's internal main circuit DC voltage to reach or exceed the specified value, the protection circuit is activated to stop the inverter output. The circuit may also be activated by a surge voltage produced in the power supply system. | | | |
| **Check point** | • Check for too slow acceleration. (e.g. during downward acceleration in vertical lift load)<br>• Check that **Pr.22 Stall prevention operation level** is not set to the no load current or lower.<br>• Check if the stall prevention operation is frequently activated in an application with a large load inertia.<br>• Check if the inverter has restarted the motor after output shutoff due to power failure, undervoltage, the MRS signal, or the safety stop function. | | | |
| **Corrective action** | • Set the acceleration time shorter.<br>  Use the regeneration avoidance function **(Pr.882, Pr.883, Pr.885, and Pr.886)**.<br>• Set a value larger than the no load current in **Pr.22**.<br>• Set **Pr.154 Voltage reduction selection during stall prevention operation** = "11".<br>• Remove the cause of output shutoff. (Check the power supply, and terminals MRS, S1, and S2.) | | | |
| **Reference manual** | FR-E800 Instruction Manual (Function) | | | |

# ■ Regenerative overvoltage trip during constant speed

| Operation panel indication | E.OV2 | $\mathcal{E}.o\cup 2$ | FR-LU08 indication | OV During Cnst Spd |
|---|---|---|---|---|
| **Description** | If regenerative power causes the inverter's internal main circuit DC voltage to reach or exceed the specified value, the protection circuit is activated to stop the inverter output. The circuit may also be activated by a surge voltage produced in the power supply system. | | | |
| **Check point** | • Check for sudden load change.<br>• Check that the **Pr.22 Stall prevention operation level** is not set to the no load current or lower.<br>• Check if the stall prevention operation is frequently activated in an application with a large load inertia.<br>• Check that acceleration/deceleration time is not too short. | | | |
| **Corrective action** | • Keep the load stable.<br>• Use the regeneration avoidance function **(Pr.882, Pr.883, Pr.885, and Pr.886)**.<br>• Use a brake resistor or brake unit, or the multifunction regeneration converter (FR-XC) as required.<br>• Set a value larger than the no load current in **Pr.22**.<br>• Set **Pr.154 Voltage reduction selection during stall prevention operation** = "11".<br>• Set the acceleration/deceleration time longer. (Under Vector control or Advanced magnetic flux vector control, the output torque can be increased. However, sudden acceleration may cause an overshoot in speed, resulting in an occurrence of overvoltage.) | | | |
| **Reference manual** | FR-E800 Instruction Manual (Function) | | | |

# ■ Regenerative overvoltage trip during deceleration or stop

| Operation panel indication | E.OV3 | $\mathcal{E}.o\cup 3$ | FR-LU08 indication | OV During Dec |
|---|---|---|---|---|
| **Description** | If regenerative power causes the inverter's internal main circuit DC voltage to reach or exceed the specified value, the protection circuit is activated to stop the inverter output. The circuit may also be activated by a surge voltage produced in the power supply system. | | | |
| **Check point** | • Check for sudden speed reduction.<br>• Check if the stall prevention operation is frequently activated in an application with a large load inertia. | | | |
| **Corrective action** | • Set the deceleration time longer. (Set the deceleration time which matches the moment of inertia of the load.)<br>• Make the brake cycle longer.<br>• Use the regeneration avoidance function **(Pr.882, Pr.883, Pr.885, and Pr.886)**.<br>• Use a brake resistor or brake unit, or the multifunction regeneration converter (FR-XC) as required.<br>• Set **Pr.154 Voltage reduction selection during stall prevention operation** = "11". | | | |
| **Reference manual** | FR-E800 Instruction Manual (Function) | | | |

## ■Inverter overload trip (electronic thermal relay function)

Resetting the inverter initializes the internal cumulative heat value of the electronic thermal relay function.
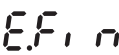
| Operation panel indication | E.THT | ᴇ.ᴦ Hᴦ | FR-LU08 indication | Inv. overload trip |
|---|---|---|---|---|
| Description | If the temperature of the output transistor elements exceeds the protection level with a rated output current or higher flowing without the overcurrent trip (E.OC[]), the inverter output is stopped. (Overload capacity 150% 60 s) | | | |
| Check point | • Check that acceleration/deceleration time is not too short.<br>• Check that torque boost setting is not too large (small).<br>• Check that load pattern selection setting is appropriate for the load pattern of the using machine.<br>• Check the motor for the use under overload.<br>• Check that the encoder wiring and the specifications (encoder power supply, resolution, differential/complementary) are correct. Check also that the motor wiring (U, V, W) is correct (under Vector control). | | | |
| Corrective action | • Set the acceleration/deceleration time longer.<br>• Adjust the torque boost setting.<br>• Set the load pattern selection setting according to the load pattern of the using machine.<br>• Reduce the load.<br>• Check the wiring and specifications of the encoder and the motor. Perform the setting according to the specifications of the encoder and the motor (under Vector control). | | | |
| Reference manual | • FR-E800 Instruction Manual (Connection)<br>• FR-E860 Instruction Manual (Connection)<br>• FR-E800 Instruction Manual (Function) | | | |

## ■Motor overload trip (electronic thermal relay function)

Resetting the inverter initializes the internal cumulative heat value of the electronic thermal relay function.

| Operation panel indication | E.THM | ᴇ.ᴦ Hᴍ | FR-LU08 indication | Motor overload trip |
|---|---|---|---|---|
| Description | The electronic thermal O/L relay function in the inverter detects motor overheat, which is caused by overload or reduced cooling capability during low-speed operation. When the cumulative heat value reaches 85% of the **Pr.9 Electronic thermal O/L relay** setting, pre-alarm (TH) is output. When the accumulated value reaches the specified value, the protection circuit is activated to stop the inverter output. When the inverter is used to drive a dedicated motor, such as a multiple-pole motor, or several motors, the motor cannot be protected by the electronic thermal O/L relay. Install an external thermal relay on the inverter output side. | | | |
| Check point | • Check the motor for the use under overload.<br>• Check that the setting of **Pr.71 Applied motor** for motor selection is correct.<br>• Check that the stall prevention operation setting is correct. | | | |
| Corrective action | • Reduce the load.<br>• For a constant-torque motor, set the constant-torque motor in **Pr.71**.<br>• Set the stall prevention operation level accordingly. | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

## ■Heat sink overheat

| Operation panel indication | E.FIN | ᴇ.ꜰ ı ᴎ | FR-LU08 indication | Heatsink overheat |
|---|---|---|---|---|
| Description | When the heat sink overheats, the temperature sensor is activated, and the inverter output is stopped.<br>The FIN signal can be output when the temperature becomes approximately 85% of the heat sink overheat protection operation temperature.<br>For the terminal used for the FIN signal output, assign the function by setting "26" (positive logic) or "126" (negative logic) in any parameter from **Pr.190 to Pr.197 (Output terminal function selection)**. | | | |
| Check point | • Check for too high surrounding air temperature.<br>• Check for heat sink clogging.<br>• Check that the cooling system is not stopped. (Check that FN is not displayed on the operation panel.)<br>• Check that the cooling fan is installed in correct orientation. | | | |
| Corrective action | • Set the surrounding air temperature to within the specifications.<br>• Clean the heat sink.<br>• Replace the cooling fan.<br>• Install the cooling fan in correct orientation. | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

## ■Undervoltage

| Operation panel indication | E.UVT | $E.U u\bar{r}$ | FR-LU08 indication | Under Voltage |
|---|---|---|---|---|
| **Description** | When a PM motor is used, the protective function is activated in the following case: a fault such as power failure or voltage drop occurs, the converter voltage drops to cause the motor to coast, and restarting and coasting are repeated by the automatic restart after instantaneous power failure function. ||||
| **Check point** | Check that no fault is found in the power supply. ||||
| **Corrective action** | Supply appropriate power. ||||
| **Reference manual** | FR-E800 Instruction Manual (Function) ||||

## ■Input phase loss

| Operation panel indication | E.ILF | $E. L F$ | FR-LU08 indication | Input phase loss |
|---|---|---|---|---|
| **Description** | When **Pr.872 Input phase loss protection selection** = "1" (function enabled) and one of the three-phase power input is lost, the inverter output is shut off. This protective function is not available when "0" is set in **Pr.872**. (Available only for the three-phase power input model.) ||||
| **Check point** | Check for a break in the cable for the three-phase power supply input. ||||
| **Corrective action** | • Wire the cables properly.<br>• Repair a break portion in the cable. ||||
| **Reference manual** | FR-E800 Instruction Manual (Function) ||||

## ■Stall prevention stop

| Operation panel indication | E.OLT | $E.oL\bar{r}$ | FR-LU08 indication | Stall prevention STP |
|---|---|---|---|---|
| **Description** | **V/F** **Magnetic flux**<br>If the output frequency has fallen to 1.0 Hz by stall prevention operation and remains for 3 seconds, a fault (E.OLT) appears and the inverter is shut off. OLC or OLV appears while stall prevention is being activated.<br><br>**Sensorless** **Vector** **PM**<br>When speed control is performed, a fault (E.OLT) appears and the inverter output is shut off if frequency drops to the **Pr.865 Low speed detection** (initial value is 1.5 Hz) setting by torque limit operation and the output torque exceeds the **Pr.874 OLT level setting** (initial value is 150%) setting and remains 3 seconds. ||||
| **Check point** | • Check the motor for the use under overload.<br>• Check that the **Pr.865** and **Pr.874** values are correct.<br>  (Check the **Pr.22 Stall prevention operation level** setting under V/F control and Advanced magnetic flux vector control.)<br>• Check if a motor is connected under PM sensorless vector control. ||||
| **Corrective action** | • Reduce the load.<br>• Change the **Pr.22, Pr.865,** and **Pr.874** values. (Check the **Pr.22** setting under V/F control and Advanced magnetic flux vector control.)<br>• For the test operation without connecting a motor, select the PM sensorless vector control test operation.<br>• Also check that the stall prevention (overcurrent) warning (OLC) or the stall prevention (overvoltage) warning (OLV) countermeasure is taken. ||||
| **Reference manual** | FR-E800 Instruction Manual (Function) ||||

## ■Loss of synchronism detection

| Operation panel indication<br>**E.SOT** **PM** | $E.5o\bar{r}$ | FR-LU08 indication | Motor Step Out |
|---|---|---|---|
| **Description** | The inverter output is shut off when the motor operation is not synchronized. (This function is only available under PM sensorless vector control.) |||
| **Check point** | • Check that the PM motor is not driven overloaded.<br>• Check if a start command is given to the inverter while the PM motor is coasting.<br>• Check if a motor is connected under PM sensorless vector control.<br>• Check if a motor other than PM motors is driven. |||
| **Corrective action** | • Set the acceleration time longer.<br>• Reduce the load.<br>• If the inverter restarts during coasting, set **Pr.57 Restart coasting time** ≠ "9999", and select the automatic restart after instantaneous power failure.<br>• Check the connection of the IPM motor.<br>• For the test operation without connecting a motor, select the PM sensorless vector control test operation.<br>• When driving a PM motor, offline auto tuning must be performed. |||
| **Reference manual** | FR-E800 Instruction Manual (Function) |||

## ■ Upper limit fault detection

| Operation panel indication | E.LUP | _E.L UP_ | FR-LU08 indication | Upper limit fault |
|---|---|---|---|---|
| Description | The inverter output is shut off when the load exceeds the upper limit fault detection range. This protective function is not available in the initial setting of **Pr.1490** (**Pr.1490** = "9999"). | | | |
| Check point | • Check if too much load is applied to the equipment.<br>• Check that the load characteristics settings are correct. | | | |
| Corrective action | • Inspect the equipment.<br>• Set the load characteristics (**Pr.1481 to Pr.1487**) correctly. | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

## ■ Lower limit fault detection

| Operation panel indication | E.LDN | _E.L dn_ | FR-LU08 indication | Lower limit fault |
|---|---|---|---|---|
| Description | The inverter output is shut off when the load falls below the lower limit fault detection range. This protective function is not available in the initial setting of **Pr.1491** (**Pr.1491** = "9999"). | | | |
| Check point | • Check if the equipment load is too light.<br>• Check that the load characteristics settings are correct. | | | |
| Corrective action | • Inspect the equipment.<br>• Set the load characteristics (**Pr.1481 to Pr.1487**) correctly. | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

## ■ Brake transistor alarm detection

| Operation panel indication | E.BE | _E.bE_ | ER-LU08 indication | Brake transistor err |
|---|---|---|---|---|
| Description | • The inverter output is shut off if a fault due to damage of the brake transistor and such occurs in the brake circuit.<br>  In such a case, the power supply to the inverter must be shut off immediately. | | | |
| Check point | • Reduce the load inertia.<br>• Check that the brake duty is proper. | | | |
| Corrective action | Replace the inverter. | | | |

## ■ Output side earth (ground) fault overcurrent

| Operation panel indication | E.GF | _E.GF_ | FR-LU08 indication | Ground Fault |
|---|---|---|---|---|
| Description | The inverter output is shut off if an earth (ground) fault overcurrent flows due to an earth (ground) fault that occurred on the inverter's output side (load side). | | | |
| Check point | Check for a ground fault in the motor and connection cable. | | | |
| Corrective action | Remedy the earth (ground) fault portion. | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

## ■ Output phase loss

| Operation panel indication | E.LF | _E.L F_ | FR-LU08 indication | Output phase loss |
|---|---|---|---|---|
| Description | The inverter output is shut off if one of the three phases (U, V, W) on the inverter's output side (load side) is lost. | | | |
| Check point | • Check the wiring. (Check that the motor is normally operating.)<br>• Check that the capacity of the motor used is not smaller than that of the inverter.<br>• Check if a start command is given to the inverter while the motor is coasting. (PM sensorless vector control) | | | |
| Corrective action | • Wire the cables properly.<br>• Input a start command after the motor stops. Alternatively, use the automatic restart after instantaneous power failure / flying start function. (PM sensorless vector control) | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

## ■ External thermal relay operation

| Operation panel indication | E.OHT | $E.oHT$ | FR-LU08 indication | Ext TH relay oper |
|---|---|---|---|---|
| Description | The inverter output is shut off if the external thermal relay provided for motor overheat protection or the internally mounted thermal relay in the motor, etc. switches ON (contacts open). This function is available when "7" (OH signal) is set in any parameter from **Pr.178 to Pr.184 (Input terminal function selection)**. This protective function is not available in the initial status. (OH signal is not assigned.) (This protective function is available for the standard model and the Ethernet model.) | | | |
| Check point | • Check for motor overheating.<br>• Check that the value "7" (OH signal) is set correctly to any parameter from **Pr.178 to Pr.184 (Input terminal function selection)**. | | | |
| Corrective action | • Reduce the load and operation duty.<br>• Even if the relay contacts are reset automatically, the inverter will not restart unless it is reset. | | | |

## ■ PTC thermistor operation

| Operation panel indication | E.PTC | $E.PTC$ | FR-LU08 indication | PTC thermistor oper |
|---|---|---|---|---|
| Description | The inverter output is shut off if resistance of the PTC thermistor connected between terminal 2 and terminal 10 is equal to or higher than the **Pr.561 PTC thermistor protection level** setting for a continuous time equal to or longer than the setting value in **Pr.1016 PTC thermistor protection detection time**. This protective function is not available in the initial setting of **Pr.561** (**Pr.561** = "9999"). | | | |
| Check point | • Check the connection with the PTC thermistor.<br>• Check the **Pr.561** and **Pr.1016** settings.<br>• Check the motor for operation under overload. | | | |
| Corrective action | Reduce the load. | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

## ■ Option fault

| Operation panel indication | E.OPT | $E.oPT$ | FR-LU08 indication | Option Fault |
|---|---|---|---|---|
| Description | • Appears when torque command by the plug-in option is selected using **Pr.804 Torque command source selection** and no plug-in option is mounted. This function is available under torque control.<br>• Appears when the switch for manufacturer setting of the plug-in option is changed.<br>• Appears when a communication option is connected while **Pr.296 Password lock level** = "0 or 100". | | | |
| Check point | • Check that the plug-in option for torque command setting is connected.<br>• Check for the password lock with a setting of **Pr.296** = "0, 100". | | | |
| Corrective action | • Check for connection of the plug-in option. Check the **Pr.804** setting.<br>• Set the switch on the plug-in option, which is for manufacturer setting, back to the initial setting.<br>• To apply the password lock when installing a communication option, set **Pr.296** ≠ "0, 100". | | | |
| Reference manual | • FR-E800 Instruction Manual (Function)<br>• Instruction Manual of each option | | | |

## ■ Communication option fault

| Operation panel indication | E.OP1 | $E.oP1$ | FR-LU08 indication | Option1 Fault |
|---|---|---|---|---|
| Description | • The inverter output is shut off if a communication line error occurs in the communication option. | | | |
| Check point | • Check for an incorrect option function setting and operation.<br>• Check that the plug-in option is plugged into the connector securely.<br>• Check for a break in the communication cable.<br>• Check that the terminating resistor is fitted properly. | | | |
| Corrective action | • Check the option function setting, etc.<br>• Connect the plug-in option securely.<br>• Check the connection of communication cable.<br>• If the fault occurs again when the inverter is reset, contact your sales representative. | | | |

## ■ User definition error by the PLC function

| Operation panel indication | E.16 to E.20 | $\begin{array}{c} E.\ 16 \\ E.\ 20 \end{array}$ to | FR-LU08 indication | Fault 16 to Fault 20 |
|---|---|---|---|---|
| Description | The protective function is activated by setting "16 to 20" in the special register SD1214 for the PLC function. The inverter output is shut off when the protective function is activated.<br>The protective function is activated when the PLC function is enabled. This protective function is not available in the initial setting (**Pr.414** = "0"). | | | |
| Check point | • Check if "16 to 20" is set in the special register SD1214. | | | |
| Corrective action | • Set a value other than "16 to 20" in the special register SD1214. | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

## ■ Internal storage device fault

| Operation panel indication | E.PE6 | $E.PE6$ | FR-LU08 indication | Fault |
|---|---|---|---|---|
| Description | This protective function is activated by an inverter reset if writing data fails due to power-OFF or a data fault occurs in the storage device during parameter operations[1] or while the set frequency is written. | | | |
| Check point | • Check if the power was turned OFF during parameter operations.<br>• Check if writing to EEPROM is performed frequently. | | | |
| Corrective action | Check the power supply or the devices on the power system to check that the devices have no fault.<br>• When E.PE6 occurs due to power-OFF during parameter operations, take the following actions according to the read value of **Pr.890**. (When **Pr.160** = "9999", parameter read is restricted. Set **Pr.160** = "0".)<br><br>When **Pr.890** = "7" or lower: Perform All parameter clear and then an inverter reset. The parameters that had been changed before All parameter clear must be set again.<br><br>When **Pr.890** = "8": Check that the setting values of the following parameters are the same as those set by the user.<br><br>**Pr.75 Reset selection/disconnected PU detection/PU stop selection**<br>**Pr.145 PU display language selection**<br>**Pr.414 PLC function operation selection**<br>**Pr.570 Multiple rating setting**<br>**Pr.888 Free parameter 1**<br>**Pr.889 Free parameter 2**<br><br>When the setting values of the above parameters are the same as those set by the user, set **Pr.890** = "9000". Then cycle the power or perform an inverter reset, and check that E.PE6 is not output. If these actions do not clear the fault, contact your sales representative.<br><br>When **Pr.890** = "9 to 15": Perform All parameter clear and then an inverter reset. The parameters that had been changed before All parameter clear must be set again. Then, take the same actions as when **Pr.890** = "8" as described above. If these actions do not clear the fault, contact your sales representative.<br><br>• Set **Pr.342 Communication EEPROM write selection** = "1" to perform writing to only RAM.<br>• When E.PE6 occurs due to other reasons (such as turning OFF/ON the power or an inverter reset):<br>Contact your sales representative. | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

*1    For example, when parameter clear, All parameter clear, Parameter copy, or offline auto tuning is performed in the inverter, or when parameter batch write is performed in FR Configurator2.

## ■Parameter storage device fault (control circuit board)

| Operation panel indication | E.PE | $E.PE$ | FR-LU08 indication | Corrupt Memory |
|---|---|---|---|---|
| Description | • The inverter output is shut off if a fault occurs in the parameter stored. (EEPROM failure)<br>• The inverter output is shut off if an error occurs in access to SII (Slave Information Interface) via EtherCAT communication. | | | |
| Check point | • Check for too many number of parameter write times.<br>• Check that any attempted firmware update completed normally. | | | |
| Corrective action | • Reset the inverter.<br>• Contact your sales representative.<br>Set "1" in **Pr.342 Communication EEPROM write selection** (write to RAM) for the operation which requires frequent parameter writing via communication, etc. Note that writing to RAM goes back to the initial status at power OFF. | | | |
| Reference manual | • FR-E800 Instruction Manual (Function)<br>• FR-E800 Instruction Manual (Communication) | | | |

## ■PU disconnection

| Operation panel indication | E.PUE | $E.PUE$ | FR-LU08 indication | PU disconnection |
|---|---|---|---|---|
| Description | • The inverter output is shut off if communication between the inverter and PU is suspended, e.g. the cable is disconnected from the PU connector, when the disconnected PU detection function is valid in **Pr.75 Reset selection/disconnected PU detection/PU stop selection**.<br>• The inverter output is shut off if communication errors occurred consecutively for more than permissible number of retries when **Pr.121 PU communication retry count** ≠ "9999" during the RS-485 communication via the PU connector.<br>• The inverter output is shut off if communication is broken within the period of time set in **Pr.122 PU communication check time interval** during the RS-485 communication via the PU connector. (This protective function is available for the standard model.) | | | |
| Check point | Check the **Pr.75** setting. | | | |
| Corrective action | Change the **Pr.75** setting. | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

## ■Retry count excess

| Operation panel indication | E.RET | $E.rET$ | FR-LU08 indication | Retry count excess |
|---|---|---|---|---|
| Description | The inverter output is shut off if the operation cannot be resumed properly within the number of retries set in **Pr.67 Number of retries at fault occurrence**. This function is available when **Pr.67** is set. This protective function is not available in the initial setting (**Pr.67** = "0"). | | | |
| Check point | Find the cause of the fault occurrence. | | | |
| Corrective action | Eliminate the cause of the fault preceding this fault indication. | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

## ■Parameter storage device fault (main circuit board)

| Operation panel indication | E.PE2 | $E.PE2$ | FR-LU08 indication | PR storage alarm |
|---|---|---|---|---|
| Description | The inverter output is shut off if a fault occurs in the inverter model information. | | | |
| Check point | ———— | | | |
| Corrective action | Contact your sales representative. | | | |

## ■ CPU fault

| Operation panel indication | E.CPU | $E.CPU$ | FR-LU08 indication | CPU fault |
| --- | --- | --- | --- | --- |
| | E. 5 | $E. 5$ | | Fault 5 |
| | E. 6 | $E. 6$ | | Fault 6 |
| | E. 7 | $E. 7$ | | Fault 7 |
| Description | The inverter output is shut off if the communication fault of the built-in CPU occurs. | | | |
| Check point | • Check for devices producing excess electrical noises around the inverter.<br>• When Ethernet communication is used, check that the communication cable is connected properly.<br>• Check if a cable is connected between terminals PC and SD. (E.6, E.7) | | | |
| Corrective action | • Take measures against noises if there are devices producing excess electrical noises around the inverter.<br>• When Ethernet communication is used, connect the communication cable properly.<br>• When a cable is connected between terminals PC and SD, remove the cable. (E.6, E.7)<br>• Contact your sales representative. | | | |
| Reference manual | • FR-E800 Instruction Manual (Function)<br>• FR-E800 Instruction Manual (Communication) | | | |

## ■ Abnormal output current detection

| Operation panel indication | E.CDO | $E.Cdo$ | FR-LU08 indication | OC detect level |
| --- | --- | --- | --- | --- |
| Description | The inverter output is shut off if the output current exceeds the **Pr.150 Output current detection level** setting. This function is available when "1" is set in **Pr.167 Output current detection operation selection**. When the initial value (**Pr.167** = "0") is set, this protective function is not available. | | | |
| Check point | Check the settings of **Pr.150, Pr.151 Output current detection signal delay time, Pr.166 Output current detection signal retention time, and Pr.167**. | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

## ■ Inrush current limit circuit fault

| Operation panel indication | E.IOH | $E.oH$ | FR-LU08 indication | Inrush overheat |
| --- | --- | --- | --- | --- |
| Description | The inverter output is shut off when the resistor of the inrush current limit circuit is overheated. The inrush current limit circuit is faulty. | | | |
| Check point | • Check that frequent power ON/OFF is not repeated.<br>• Check if the input side fuse (5A) in the power supply circuit of the inrush current limit circuit contactor is blown.<br>• Check that the power supply circuit of inrush current limit circuit contactor is not damaged. | | | |
| Corrective action | Configure a circuit where frequent power ON/OFF is not repeated.<br>If the problem still persists after taking the above measure, contact your sales representative. | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

## ■ Analog input fault

| Operation panel indication | E.AIE | $E.A_i E$ | FR-LU08 indication | Analog input fault |
| --- | --- | --- | --- | --- |
| Description | The inverter output is shut off when a 30 mA or higher current or a 7.5 V or higher voltage is input to terminal 2 while the current input is selected by **Pr.73 Analog input selection**, or to terminal 4 while the current input is selected by **Pr.267 Terminal 4 input selection**. | | | |
| Check point | Check the **Pr.73, Pr.267**, and the voltage/current input switch settings. | | | |
| Corrective action | Either give a current less than 30 mA, or set **Pr.73, Pr.267**, and the voltage/current input switch to the voltage input and input a voltage. | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

## ■ USB communication fault

| Operation panel indication | E.USB | $E.USb$ | FR-LU08 indication | USB comm error |
| --- | --- | --- | --- | --- |
| Description | The inverter output is shut off when the communication is cut off for the time set in **Pr.548 USB communication check time interval**. | | | |
| Check point | • Check that the USB communication cable is connected securely. | | | |
| Corrective action | • Check the **Pr.548** setting.<br>• Connect the USB communication cable securely.<br>• Increase the **Pr.548** setting or set "9999." | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

## ■Safety circuit fault (Standard model / Ethernet model)

| Operation panel indication | E.SAF | *E.SAF* | FR-LU08 indication | Safety circuit fault |
|---|---|---|---|---|
| Description | • The inverter output is shut off when a safety circuit fault occurs.<br>• The inverter output is shut off if the either of the wire between S1 and PC or S2 and PC becomes non-conductive while using the safety stop function.<br>• When the safety stop function is not used, the inverter output is shut off when the shorting wire between terminals S1 and PC or across S2 and PC is disconnected. |||||
| Check point | • Check that the safety relay module or the connection has no fault when using the safety stop function.<br>• Check if the shorting wire between S1 and PC or between S2 and PC is disconnected when not using the safety stop function. |||||
| Corrective action | • When using the safety stop function, check that the wiring of terminals S1, S2 and PC is correct and the safety stop input signal source such as a safety relay module is operating properly.<br>• When the safety stop function is not used, short across terminals S1 and PC and across S2 and PC with shorting wires. |||||
| Reference manual | • FR-E800 Instruction Manual (Function)<br>• FR-E800 Instruction Manual (Functional Safety) |||||

## ■Safety circuit fault (Safety communication model)

| Operation panel indication | E.SAF | *E.SAF* | FR-LU08 indication | Safety circuit fault |
|---|---|---|---|---|
| Description | When a fault related to functional safety occurs, the inverter output is shut off by the protective function. For details, refer to the FR-E800-SCE Instruction Manual (Functional Safety). |||||
| Reference manual | FR-E800-SCE Instruction Manual (Functional Safety) |||||

## ■Overspeed occurrence

| Operation panel indication | E.OS | *E.oS* | FR-LU08 indication | Overspeed occurrence |
|---|---|---|---|---|
| Description | The inverter output is shut off when the motor speed exceeds the **Pr.374 Overspeed detection level** under encoder feedback control, Real sensorless vector control, Vector control, and PM sensorless vector control. When **Pr.374** = "9999 (initial value)", the inverter output is shut off when the motor speed exceeds the "maximum frequency + 20 Hz" for the induction motor (up to 420 Hz under Vector control or Real sensorless vector control), or when the motor speed exceeds the "maximum motor frequency + 10 Hz" for the PM motor. |||||
| Check point | • Check that the **Pr.374** setting is correct.<br>• Check that the setting of **Pr.369 Number of encoder pulses** does not differ from the actual number of encoder pulses. (Under encoder feedback control or Vector control)<br>• Check that the motor temperature is not increased under Real sensorless vector control. (The motor constant may vary due to increase in the motor temperature.) |||||
| Corrective action | • Set **Pr.374** correctly.<br>• Set **Pr.369** correctly. (Under encoder feedback control or Vector control)<br>• When the motor temperature increases, enable the online auto tuning at startup (set **Pr.95** (**Pr.574**) = "1") (under Real sensorless vector control). |||||
| Reference manual | FR-E800 Instruction Manual (Function) |||||

## ■Speed deviation excess detection

| Operation panel indication | E.OSD | *E.oSd* | FR-LU08 indication | Spd deviation fault |
|---|---|---|---|---|
| Description | • When **Pr.285 Speed deviation excess detection frequency** is set during Vector control or PM sensorless vector control, if the motor speed is increased or decreased by factors such as influence of the load and cannot be controlled in accordance with the speed command value, the deceleration check function (**Pr.690**) is activated to stop the inverter output. |||||
| Check point | • Check that the settings of **Pr.285** and **Pr.853 Speed deviation time** are correct.<br>• Check for sudden load change.<br>• Check that the setting of **Pr.369 Number of encoder pulses** does not differ from the actual number of encoder pulses. |||||
| Corrective action | • Set **Pr.285** and **Pr.853** correctly.<br>• Keep the load stable.<br>• Set **Pr.369** correctly. |||||
| Reference manual | FR-E800 Instruction Manual (Function) |||||
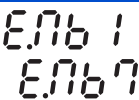
## ■ Signal loss detection

| Operation panel indication | E.ECT | $E.ECF$ | FR-LU08 indication | Encoder signal loss |
|---|---|---|---|---|
| Description | The inverter output is shut off when the encoder signal is shut off under orientation control, encoder feedback control, or Vector control. This protective function is not available in the initial status. | | | |
| Check point | • Check for the encoder signal loss.<br>• Check that the encoder specifications are correct.<br>• Check for a loose connector.<br>• Check that the switch setting of a Vector control compatible option is correct.<br>• Check that the power is supplied to the encoder. Alternatively, check that the power is not supplied to the encoder later than the inverter.<br>• Check that the voltage of the power supplied to the encoder is the same as the encoder output voltage. | | | |
| Corrective action | • Remedy the signal loss.<br>• Use an encoder that meets the specifications.<br>• Make connection securely.<br>• Make a switch setting of a Vector control compatible option correctly.<br>• Supply the power to the encoder. Or supply the power to the encoder at the same time when the power is supplied to the inverter.<br>If the power is supplied to the encoder later than the inverter, check that the encoder signal is properly sent and set "0 (initial value)" in **Pr.376 Encoder signal loss detection enable/disable selection** to disable signal loss detection.<br>• Make the voltage of the power supplied to the encoder the same as the encoder output voltage. | | | |
| Reference manual | • FR-E800 Instruction Manual (Connection)<br>• FR-E860 Instruction Manual (Connection) | | | |

## ■ Excessive position fault

| Operation panel indication | E.OD **Vector** | $E.od$ | FR-LU08 indication | Position fault |
|---|---|---|---|---|
| Description | The inverter output is shut off when the difference between the position command and position feedback exceeds **Pr.427 Excessive level error** during position control. This protective function is not available in the initial status. | | | |
| Check point | • Check that the position detecting encoder mounting orientation matches the parameter.<br>• Check that the load is not large.<br>• Check that correct values are set in **Pr.427** and **Pr.369 Number of encoder pulses**.<br>• When "11 or 12" is set in **Pr.538 Current position retention selection**, check that the power was not turned OFF or the inverter was not reset before completion of the position data writing to the EEPROM. | | | |
| Corrective action | • Check the parameters.<br>• Reduce the load.<br>• Set **Pr.427** and **Pr.369** correctly.<br>• While "11 or 12" is set in **Pr.538**, to turn OFF the power or reset the inverter after the output shutoff, wait at least one second. | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

## ■ Brake sequence fault

| Operation panel indication | E.MB1 to 7 | $E.Nb1$ to $E.Nb7$ | FR-LU08 indication | E.MB1 Fault to E.MB7 Fault |
|---|---|---|---|---|
| Description | The inverter output is shut off when a sequence error occurs during use of the brake sequence function **(Pr.278 to Pr.285)**. This protective function is not available in the initial status. (The brake sequence function is invalid.) | | | |
| Check point | Find the cause of the fault occurrence. | | | |
| Corrective action | Check the set parameters and perform wiring properly. | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

## ■Encoder phase fault

| Operation panel indication | E.EP Vector | E.EP | FR-LU08 indication | Encoder phase fault |
|---|---|---|---|---|
| **Name** | Encoder phase fault | | | |
| **Description** | The inverter output is shut off when the rotation command of the inverter differs from the actual motor rotation direction detected from the encoder during offline auto tuning. This protective function is not available in the initial status. | | | |
| **Check point** | • Check for mis-wiring of the encoder cable.<br>• Check if the **Pr.359 Encoder rotation direction** setting is incorrect. | | | |
| **Corrective action** | • Perform connection and wiring securely.<br>• Change the **Pr.359** setting. | | | |

## ■Acceleration error

| Operation panel indication | E.OA | E.oA | FR-LU08 | Acceleration Error |
|---|---|---|---|---|
| **Description** | The acceleration error (E.OA) occurs and the inverter output is shut off when the acceleration rate of the motor rotation speed has exceeded the faulty acceleration rate detection level (**Pr.375**). This protective function is not available in the initial status. | | | |
| **Check point** | • Check for sudden load change.<br>• Check that the **Pr.375 Faulty acceleration rate detection level** setting is correct.<br>• Check if the acceleration/deceleration rate setting is high. | | | |
| **Corrective action** | • Reduce the load.<br>• Set **Pr.375 Faulty acceleration rate detection level** correctly.<br>• If the acceleration/deceleration rate is great and an error occurs during normal operation, set **Pr.375** to "9999 (no error detection)". | | | |
| **Reference manual** | FR-E800 Instruction Manual (Function) | | | |

## ■Abnormal internal temperature (IP67 model)

| Operation panel indication | E.IAH | E.IAH | FR-LU08 | Abnormal Intnl Temp |
|---|---|---|---|---|
| **Description** | The inverter output is shut off when the inverter internal temperature reaches the specified value or higher. | | | |
| **Check point** | • Check for too high surrounding air temperature.<br>• Check if the cooling fan stops due to a fault. | | | |
| **Corrective action** | • Install an inverter suitable for the installation environment.<br>• Replace the cooling fan. | | | |
| **Reference manual** | FR-E800 Instruction Manual (Connection) | | | |

## ■Ethernet communication fault

| Operation panel indication | E.EHR | *E.EHr* | FR-LU08 indication | Ethernet communication fault |
|---|---|---|---|---|
| Description | • Appears when Ethernet communication is interrupted by physical factors while **Pr.1431 Ethernet signal loss detection function selection** = "3" or **Pr.1457 Extended setting for Ethernet signal loss detection function selection** = "3".<br>• The inverter output is shut off if Ethernet communication is broken for the time set in **Pr.1432 Ethernet communication check time interval** or longer for all devices with IP addresses in the range specified for Ethernet command source selection (**Pr.1449 to Pr.1454**).<br>• When the CC-Link IE Field Network Basic is used, the inverter output is shut off in the following cases: the data addressed to the own station is not received for the predetermined timeout period or longer, or the status bit of the cyclic transmission addressed to the own station turns OFF (when the master inverter gives a command to stop the cyclic transmission). (For details on the timeout period, status bit of the cyclic transmission, and command to stop the cyclic transmission, refer to the User's Manual of the master device which supports the CC-Link IE Field Network Basic.)<br>• When BACnet/IP is used, the inverter output will be shut off after the time period set in **Pr.1432** after power is supplied to the inverter if an IP address of any other inverter falls within the Ethernet IP address range set for command source selection. (This protective function is available for the Ethernet model and the safety communication model.)<br>• When PROFINET is used, the inverter output will be shut off regardless of the **Pr.502** setting in the following condition: PROFINET is selected as the command source (an Ethernet port is used as a command interface in the NET operation mode), and the state of the master is changed to a stop state while the inverter is running (in the state other than the stop state or error state).<br>• When EtherNet/IP is used and a message from the master is not received by the inverter within the time period set in Encapsulation Inactivity Timeout (Object class 0xF5, Instance 1, Attribute 13), a timeout will occur and the inverter output will be shut off. | | | |
| Check point | • Check for a break in the Ethernet cable.<br>• Check that the **Pr.1432** setting is not too small.<br>• Check for excessive noise around the inverter.<br>• When the CC-Link IE Field Network Basic is used, check that the timeout period set in the master is not shorter than the period during which the inverter does not receive the data addressed to the own station.<br>• When the CC-Link IE Field Network Basic is used, check that the status bit of the cyclic transmission addressed to the own station is not OFF.<br>• When BACnet/IP is used, check that IP addresses of other inverters are not included in the Ethernet IP address range set for command source selection.<br>• Check that the master is not in the stop state while the inverter is running during PROFINET communication.<br>• When EtherNet/IP is used, check that the connection between the master and the inverter is not disconnected. | | | |
| Corrective action | • Check that the Ethernet cable is connected to the Ethernet connector properly and the Ethernet cable is not damaged.<br>• Set a larger value in **Pr.1432**.<br>• When excessive noise occurs around the inverter, change the communication setting of the master. (The noise may be reduced by setting a shorter timeout period or increasing the number of retries in the communication setting of the master.)<br>• When the CC-Link IE Field Network Basic is used, set a timeout period longer than the period during which the inverter does not receive the data addressed to the own station. When the CC-Link IE Field Network Basic is used, turn ON the status bit of the cyclic transmission addressed to the own station.<br>• When BACnet/IP is used, do not include IP addresses of other inverters in the Ethernet IP address range set for command source selection.<br>• Check the status of the master.<br>• To disable a timeout when EtherNet/IP is used, set "0" for Encapsulation Inactivity Timeout. | | | |
| Reference manual | • FR-E800 Instruction Manual (Function)<br>• FR-E800 Instruction Manual (Communication) | | | |

## ■Board combination fault

| Operation panel indication | E.CMB | *E.CMb* | FR-LU08 indication | Board mismatch |
|---|---|---|---|---|
| Description | Appears when the combination of the inverter and its circuit board is not appropriate, or when the circuit board with the control circuit terminal block is not connected to the inverter. | | | |
| Check point | Check that the circuit board with the control circuit terminal block is connected to the inverter. | | | |
| Corrective action | • Connect the circuit board with the control circuit terminal block to the inverter. (Tightening torque when the circuit board is connected to the inverter: 0.33 to 0.40 N·m)<br>• Contact your sales representative. | | | |

## ■ PID signal fault

| Operation panel indication | E.PID | *EP.ı d* | FR-LU08 indication | PID signal fault |
|---|---|---|---|---|
| Description | The inverter output is shut off if the measured value exceeds the PID upper limit or PID lower limit parameter setting, or the absolute deviation value exceeds the PID deviation parameter setting during PID control. Set this function in **Pr.131 PID upper limit, Pr.132 PID lower limit, Pr.553 PID deviation limit and Pr.554 PID signal operation selection**. This protective function is not available in the initial status. | | | |
| Check point | • Check the meter for a failure or break.<br>• Check that the parameter settings are correct. | | | |
| Corrective action | • Check that the meter has no failure or break.<br>• Set the parameters correctly. | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

## ■ Option fault

| Operation panel indication | E.1 | *E. 1* | FR-LU08 indication | Fault 1 |
|---|---|---|---|---|
| Description | • The inverter output is shut off when a contact failure occurs between the inverter and the plug-in option.<br>• Appears when the switch for manufacturer setting of the plug-in option is changed. | | | |
| Check point | • Check that the plug-in option is plugged into the connector securely.<br>• Check for excessive noise around the inverter. | | | |
| Corrective action | • Connect the plug-in option securely.<br>• Set the switch on the plug-in option, which is for manufacturer setting, back to the initial setting.<br>• Take measures against noises if there are devices producing excessive electrical noises around the inverter. If the problem still persists after taking the above measure, contact your sales representative. | | | |
| Reference manual | • FR-E800 Instruction Manual (Function)<br>• Instruction Manual of each option | | | |

## ■ Inverter output fault

| Operation panel indication | E.10 | *E. 10* | FR-LU08 indication | Fault 10 |
|---|---|---|---|---|
| Description | The inverter output is shut off if the inverter detects an output current fault such as an earth (ground) fault that occurred on the inverter's output side (load side). | | | |
| Check point | Check for an earth (ground) fault in the motor and connection cable. | | | |
| Corrective action | Remedy the earth (ground) fault or other fault. | | | |

## ■ Opposite rotation deceleration fault

| Operation panel indication | E.11<br>Sensorless | *E. 11* | FR-LU08 indication | Opst rot dtct fault |
|---|---|---|---|---|
| Description | The speed may not decelerate during low speed operation if the rotation direction of the speed command and the estimated speed differ when the rotation is changing from forward to reverse or from reverse to forward during torque control under Real sensorless vector control. The inverter output is shut off when overload occurs due to the un-switched rotation direction. This protective function is not available in the initial status (V/F control). (This function is only available under Real sensorless vector control.) | | | |
| Check point | • Check that the rotation direction is not switched from forward to reverse rotation (or from reverse to forward) during torque control under Real sensorless vector control. | | | |
| Corrective action | • Prevent the motor from switching the rotation direction from forward to reverse (or from reverse to forward) during torque control under Real sensorless vector control.<br>• Contact your sales representative. | | | |
| Reference manual | FR-E800 Instruction Manual (Function) | | | |

## ■ Internal circuit fault

| Operation panel indication | E.13 | *E. 13* | FR-LU08 indication | Intrnl circuit fault |
|---|---|---|---|---|
| Description | Appears when the internal circuit is faulty. | | | |
| Check point | ———— | | | |
| Corrective action | Contact your sales representative. | | | |

## ◆Others

Indicate the status of the inverter. It is not a fault.

### ■No fault history

| Operation panel indication | E.0 | E. 0 | FR-LU08 indication | No faults |
|---|---|---|---|---|
| Description | Appears when no fault records are stored. (Appears when the fault history is cleared after the protective function has been activated.) | | | |

### ■24 V external power supply operation

| Operation panel indication | EV | Eu | FR-LU08 indication | — |
|---|---|---|---|---|
| Description | Blinks when the main circuit power supply is OFF and the 24 V external power supply is being input in either of the following conditions:<br>• When the FR-E8DS is installed<br>• IP67 model | | | |
| Check point | • Power is supplied from a 24 V external power supply. | | | |
| Corrective action | • Turning ON the power supply (main circuit) of the inverter clears the indication.<br>• If the indication is still displayed after turning ON of the power supply (main circuit) of the inverter, the power supply voltage may be low, or the jumper between terminals P/+ and P1 may be disconnected. | | | |
| Reference manual | FR-E8DS E Kit Instruction Manual | | | |

### ■Backup in progress

| Operation panel indication | RD | rd | FR-LU08 indication | Rd |
|---|---|---|---|---|
| Description | Backup operation is in progress to back up inverter parameters and the data used in the PLC function to a computer. | | | |
| Reference manual | FR-E800 Instruction Manual (Communication) | | | |

### ■Restoration in progress

| Operation panel indication | WR | Ur | FR-LU08 indication | WR |
|---|---|---|---|---|
| Description | Restore operation is in progress to restore the backup data stored in the computer in the inverter. | | | |
| Reference manual | FR-E800 Instruction Manual (Communication) | | | |

**NOTE**

• If protective functions with indication of "Fault" on the FR-LU08 are activated, "ERR" appears in the fault history of the FR-LU08.
• If any other indication not listed appear, contact your sales representative.

# 2.6 Check first when you have a trouble

For Real sensorless vector control and Vector control, also refer to the troubleshooting on speed control, torque control, and position control in the FR-E800 Instruction Manual (Function).

*Point*

- If the cause is still unknown after every check, it is recommended to initialize the parameters, set the required parameter values and check again.

## 2.6.1 Motor does not start

| Check point | Possible cause | Countermeasure |
|---|---|---|
| **Main circuit** | An appropriate power supply voltage is not applied. (The operation panel display is not operating.) | Power on a molded case circuit breaker (MCCB), an earth leakage circuit breaker (ELB), or a magnetic contactor (MC). |
| | | Check for the decreased input voltage, input phase loss, and wiring. |
| | | If only the control circuit power is ON when using a separate power source for the control circuit, turn ON the main circuit power. |
| | The motor is not connected properly. | Check the wiring between the inverter and the motor. If the electronic bypass function is active, check the wiring of the magnetic contactor (MC) between the inverter and the motor. |
| | The jumper across P/+ to P1 is disconnected. A DC reactor (FR-HEL) is not connected. | Securely fit a jumper across P/+ and P1. When using a DC reactor (FR-HEL), remove the jumper across P/+ to P1, and then connect the DC reactor. |

| Check point | Possible cause | Countermeasure |
|---|---|---|
| Input signal | A start signal is not input. | Check the start command source, and input a start signal. |
| | Both the forward and reverse rotation start signals (STF and STR) are input simultaneously. | Turn ON either one of the signals.<br>When the STF and STR signals are turned ON simultaneously in the initial setting, a stop command is given. |
| | Frequency command is zero. (The [RUN] LED indicator on the operation panel is blinking.) | Check the frequency command source and input a frequency command. |
| | The Terminal 4 input selection (AU) signal is not ON when terminal 4 is used for frequency setting. (The [RUN] indicator on the operation panel is blinking.) | Turn ON the AU signal.<br>Turning ON the AU signal activates terminal 4 input. |
| | The Output stop (MRS) signal or Inverter reset (RES) signal is ON.<br>(The [RUN] LED indicator on the operation panel is blinking.) | Turn the MRS or RES signal OFF.<br>The inverter starts the operation with a given start command and a frequency command after turning OFF the MRS or RES signal.<br>Before turning OFF, ensure the safety. |
| | The switch setting for selecting sink logic or source logic is incorrect. (The [FWD] or [REV] LED indicator on the operation panel is blinking.) | Check that the control logic switch is set correctly.<br>If it is not set correctly, the input signal is not recognized. |
| | The wiring of the encoder is incorrect. (Under encoder feedback control or Vector control) | Check the wiring of the encoder. |
| | The voltage/current input switch is not correctly set for the analog input signal (0 to 5 V, 0 to 10 V, or 4 to 20 mA). (The [RUN] LED indicator on the operation panel is blinking.) | Set **Pr.73 Analog input selection, Pr.267 Terminal 4 input selection**, and the voltage/current input switch correctly, then input an analog signal in accordance with the setting. |
| | The STOP/RESET key was pressed. (The operation panel indication is "PS".) | During the External operation mode, check the method of restarting after the operation is stopped using the STOP/RESET key on the PU. |
| | During position control, the Pre-excitation (LX) signal is not input. | Assign the LX signal to an input terminal and turn ON the signal. |
| | During position control, the Position control sudden stop (X87) signal is input. | Turn OFF the X87 signal.<br>Check the **Pr.1292 Position control terminal input selection** setting. |
| | During position control, the Forward stroke end (LSP) signal or the Reverse stroke end (LSN) signal is assigned to the input terminal, but the signal is not input. | Turn ON the LSP/LSN signal.<br>Check the **Pr.1292 Position control terminal input selection** setting. |
| | Two-wire or three-wire type connection is incorrect. | Check the connection.<br>Use the Start self-holding selection (STP (STOP)) signal when the three-wire type is used. |

| Check point | Possible cause | Countermeasure |
|---|---|---|
| **Parameter setting** | Under V/F control, **Pr.0 Torque boost** setting is not appropriate. | Increase the **Pr.0** setting by 0.5% increments while observing the rotation of a motor. If that makes no difference, decrease the setting. |
| | **Pr.78 Reverse rotation prevention selection** is set. | Check the **Pr.78** setting. Set **Pr.78** when you want to limit the motor rotation to only one direction. |
| | The **Pr.79 Operation mode selection** setting is incorrect. | Select the operation mode suitable for the input methods of the start command and frequency command. |
| | The bias and gain **(the calibration parameter C2 to C7)** settings are not appropriate. | Check the bias and gain **(the calibration parameter C2 to C7)** settings. |
| | The **Pr.13 Starting frequency** setting is greater than the set frequency. | Set the frequency higher than the one set in **Pr.13**. The inverter does not start if the frequency setting signal has a value lower than that of **Pr.13**. |
| | Zero is set in frequency settings (such as for multi-speed operation). Especially, **Pr.1 Maximum frequency** is zero. | Set the frequency command according to the application. Set **Pr.1** equal to or higher than the actual frequency used. |
| | **Pr.15 Jog frequency** is lower than **Pr.13 Starting frequency** for JOG operation. | The **Pr.15** setting should be equal to or higher than the **Pr.13** setting. |
| | The **Pr.359 Encoder rotation direction** setting is incorrect under encoder feedback control or Vector control. | When the [RUN] indicator on the operation panel is blinking slowly (1.4-second cycle) while the forward rotation command is given, set **Pr.359** = "1". |
| | Operation mode and a writing device do not correspond. | Check **Pr.79 Operation mode selection, Pr.338 Communication operation command source, Pr.339 Communication speed command source, Pr.550 NET mode operation command source selection** and **Pr.551 PU mode operation command source selection**, and select an operation mode suitable for the purpose. |
| | The start signal operation selection is set by **Pr.250 Stop selection**. | Check the **Pr.250** setting and the connection of the STF and STR signals. |
| | The motor has decelerated to a stop when the power failure time deceleration-to-stop function is selected. | When power is restored, ensure the safety, and turn OFF the start signal once, then turn ON again to restart. When **Pr.261 Power failure stop selection** = "2", the motor automatically restarts after the power is restored. |
| | Auto tuning is being performed. | When offline auto tuning ends, press the STOP/RESET key on the operation panel during PU operation. For the External operation, turn OFF the start signal (STF or STR). This operation resets the offline auto tuning, and the PU's monitor display returns to the normal indication. (Without this operation, next operation cannot be started.) |
| | The automatic restart after instantaneous power failure function or power failure stop function has been activated. (Performing overload operation by the single-phase power input model or during input phase loss may cause voltage insufficiency, and that may result in detection of power failure.) | Set **Pr.872 Input phase loss protection selection** = "1" (input phase loss protection active). Disable the automatic restart after instantaneous power failure function and power failure stop function. Reduce the load. Increase the acceleration time if the function was activated during acceleration. |
| | The motor test operation is selected under Vector control or PM sensorless vector control. | Check the **Pr.800 Control method selection** setting. |
| **Load** | Load is too heavy. | Reduce the load. |
| | The shaft is locked. | Inspect the machine (motor). |
| **Others** | During position control, point table position control based on the absolute position does not operate. | Perform home position return. |

## 2.6.2　Motor or machine is making abnormal acoustic noise

| Check point | Possible cause | Countermeasure |
|---|---|---|
| Input signal | Disturbance due to EMI when the frequency or torque command is given through analog input terminal 2 or 4. | Take countermeasures against EMI. |
| Parameter setting | | Increase the **Pr.74 Input filter time constant** setting if steady operation cannot be performed due to EMI or the like. |
| Parameter setting | No carrier frequency noises (metallic noises) are generated. | In the initial setting, **Pr.240 Soft-PWM operation selection** is enabled to change motor noise to an unoffending complex tone. Therefore, no carrier frequency noises (metallic noises) are generated. Set **Pr.240** = "0" to disable this function. |
| | The motor noise increases due to activation of the carrier frequency automatic reduction function when the motor is driven overloaded. | Reduce the load. Disable the automatic reduction function by setting **Pr.260 PWM frequency automatic switchover** = "0". (As the load remains excessive, overload may cause a protective function E.THT.) |
| | Resonance occurs. (Output frequency) | Set **Pr.31 to Pr.36**, and **Pr.552** (frequency jump). When it is desired to avoid resonance attributable to the natural frequency of a mechanical system, these parameters allow resonant frequencies to be jumped. |
| | Resonance occurs. (Carrier frequency) | Change the **Pr.72 PWM frequency selection** setting. Changing the PWM carrier frequency produces an effect on avoiding the resonance frequency of a mechanical system or a motor. |
| | Auto tuning is not performed under Advanced magnetic flux vector control, Real sensorless vector control, or Vector control. | Perform offline auto tuning. |
| | Gain adjustment during PID control is insufficient. | To stabilize the measured value, change the proportional band (**Pr.129**) to a larger value, the integral time (**Pr.130**) to a slightly longer time, and the differential time (**Pr.134**) to a slightly shorter time. Check the calibration of set point and measured value. |
| | The gain is too high under Real sensorless vector control, Vector control, or PM sensorless vector control. | During speed control, check the setting of **Pr.820 Speed control P gain**. |
| | | During torque control, check the setting of **Pr.824 Torque control P gain**. |
| | During position control, the position control gain is too high. | Check the **Pr.422 Position control gain** setting. |
| Others | Mechanical looseness | Adjust machine/equipment so that there is no mechanical looseness. |
| | Contact the motor manufacturer. | |
| Motor | Operating with output phase loss | Check the motor wiring. |

## 2.6.3　Inverter generates abnormal noise

| Check point | Possible cause | Countermeasure |
|---|---|---|
| Fan | The fan cover was not correctly installed when a cooling fan was replaced. | Install the fan cover correctly. |

## 2.6.4　Motor generates heat abnormally

| Check point | Possible cause | Countermeasure |
|---|---|---|
| Motor | The motor fan is not working. (Dust is accumulated.) | Clean the motor fan. Improve the environment. |
| | Phase to phase insulation of the motor is insufficient. | Check the insulation of the motor. |
| Main circuit | The inverter output voltage (U, V, W) are unbalanced. | Check the output voltage of the inverter. Check the insulation of the motor. |
| Parameter setting | The **Pr.71 Applied motor** setting is incorrect. | Check the **Pr.71 Applied motor** setting. |
| — | Motor current is too large | Refer to "Motor current is too large" (page 44). |

## 2.6.5　Motor rotates in the opposite direction

| Check point | Possible cause | Countermeasure |
|---|---|---|
| **Main circuit** | The phase sequence of output terminals U, V and W is incorrect. | Connect the output side terminals (terminals U, V, and W) correctly. |
| **Input signal** | The start signals (STF and STR signals) are connected improperly. | Check the connection. (STF: forward rotation, STR: reverse rotation) |
| | The polarity of the frequency command is negative during the polarity reversible operation set by **Pr.73 Analog input selection**. | Check the polarity of the frequency command. |
| **Input signal, parameter setting** | The torque command is negative during torque control under Vector control. | Check the torque command value. |
| | During position control, the sign of the position command is incorrect. | Check the sign settings in **Pr.1225 to Pr.1249** for positioning sub-functions. |

## 2.6.6　Speed greatly differs from the setting

| Check point | Possible cause | Countermeasure |
|---|---|---|
| **Input signal** | The frequency setting signal is incorrect. | Measure the input signal level. |
| | The input signal lines are affected by external EMI. | Take countermeasures against EMI, such as using shielded wires for input signal lines. |
| **Parameter setting** | **Pr.1 Maximum frequency, Pr.2 Minimum frequency, Pr.18 High speed maximum frequency**, and the **calibration parameter C2 to C7** settings are not appropriate. | Check the settings of **Pr.1, Pr.2**, and **Pr.18**. |
| | | Check the **calibration parameter C2 to C7** settings. |
| | **Pr.31 to Pr.36** (frequency jump) settings are not appropriate. | Narrow down the range of frequency jump. |
| | During position control, the maximum speed setting in any of **Pr.4 to Pr.6** and **Pr.24 to Pr.27** is incorrect. | Check the maximum speed settings of **Pr.4 to Pr.6** and **Pr.24 to Pr.27**. |
| **Load** | The stall prevention (torque limit) function is activated due to a heavy load. | Reduce the load weight. |
| **Parameter setting** | | Set **Pr.22 Stall prevention operation level (Torque limit level)** higher according to the load. (If **Pr.22** is set too high, an overcurrent trip (E.OC[]) is likely to occur.) |
| **Motor** | | Check the capacities of the inverter and the motor. |

## 2.6.7　Acceleration/deceleration is not smooth

| Check point | Possible cause | Countermeasure |
|---|---|---|
| **Parameter setting** | The acceleration/deceleration time is too short. | Increase the acceleration/deceleration time. |
| | The torque boost (**Pr.0, Pr.46**) setting is not appropriate under V/F control, so the stall prevention function is activated. | Increase/decrease the **Pr.0 Torque boost** setting value by 0.5% increments so that stall prevention does not occur. |
| | The base frequency does not match the motor characteristics. | Under V/F control, set **Pr.3 Base frequency** and **Pr.47 Second V/F (base frequency)**. |
| | | Under Vector control, set **Pr.84 Rated motor frequency**. |
| | Regeneration avoidance operation is performed. | If the frequency becomes unstable during regeneration avoidance operation, decrease the setting of **Pr.886 Regeneration avoidance voltage gain**. |
| **Load** | The stall prevention (torque limit) function is activated due to a heavy load. | Reduce the load. |
| **Parameter setting** | | Set **Pr.22 Stall prevention operation level (Torque limit level)** higher according to the load. (If **Pr.22** is set too high, an overcurrent trip (E.OC[]) is likely to occur.) |
| **Motor** | | Check the capacities of the inverter and the motor. |

# 2.6.8 Speed varies during operation

Under Advanced magnetic flux vector control, Real sensorless vector control, Vector control, and encoder feedback control, the output frequency varies between 0 and 2 Hz as the load fluctuates. This is a normal operation and not a fault.

| Check point | Possible cause | Countermeasure |
|---|---|---|
| Load | The load varies during an operation. | Select Advanced magnetic flux vector control, Real sensorless vector control, Vector control, or encoder feedback control. |
| Input signal | The frequency setting signal is varying. | Check the frequency setting signal. |
| | The frequency setting signal is affected by EMI. | Set filter to the analog input terminal using **Pr.74 Input filter time constant**, Pr.822 Speed setting filter 1. |
| | | Take countermeasures against EMI, such as using shielded wires for input signal lines. |
| | A malfunction is occurring due to the undesirable current generated when the transistor output unit is connected. | Use terminal PC (terminal SD when source logic) as a common terminal to prevent a malfunction caused by undesirable current. |
| | An input signal is chattering. | Take countermeasures to suppress chattering. Use relay contacts with high contact reliability. When the chattering is caused by noises, take measures against noises. Design a ladder program to prevent chattering. |
| | The feedback signal from the encoder is affected by EMI. | Run the encoder cable away from any EMI source such as the main circuit and power supply voltage. Earth (ground) the shield of the encoder cable to the enclosure using a metal P-clip or U-clip. |
| Parameter setting | Fluctuation of power supply voltage is too large. | Under V/F control, change the **Pr.19 Base frequency voltage** setting (approximately by 3%). |
| | The **Pr.80 Motor capacity** and **Pr.81 Number of motor poles** settings are not appropriate for the motor capacity under Advanced magnetic flux vector control, Real sensorless vector control, Vector control, or PM sensorless vector control. | Check the settings of **Pr.80** and **Pr.81**. |
| | The wiring length exceeds 30 m when Advanced magnetic flux vector control, Real sensorless vector control, Vector control, or PM sensorless vector control is selected. | Perform offline auto tuning. |
| | Under V/F control, wiring is too long and a voltage drop occurs. | In the low-speed range, adjust the **Pr.0 Torque boost** setting by 0.5% increments. |
| | | Change the control method to Advanced magnetic flux vector control or Real sensorless vector control. |
| | Hunting occurs by the generated vibration, for example, when structural rigidity of the load is insufficient. | Disable automatic control functions, such as the energy saving operation, fast-response current limit operation, torque limit, regeneration avoidance function, Advanced magnetic flux vector control, Real sensorless vector control, Vector control, encoder feedback control, droop control, stall prevention, online auto tuning, and orientation control. For PID control, set smaller values to **Pr.129 PID proportional band** and **Pr.130 PID integral time**. Lower the control gain to increase the stability. |
| | | Change the **Pr.72 PWM frequency selection** setting. |

# 2.6.9 Operation mode is not changed properly

| Check point | Possible cause | Countermeasure |
|---|---|---|
| Input signal | The start signal (STF or STR) is ON. | Check that the STF and STR signals are OFF. When either is ON, the operation mode cannot be changed. |
| Parameter setting | The **Pr.79 Operation mode selection** setting is not appropriate. | When the **Pr.79** is set to "0 (initial value)", the operation mode is the External operation mode at power ON. To switch to the PU operation mode, press the PU/EXT key on the operation panel. At other settings (1 to 4, 6, 7), the operation mode is limited accordingly. |
| | Operation mode and a writing device do not correspond. | Check **Pr.79 Operation mode selection, Pr.338 Communication operation command source, Pr.339 Communication speed command source, Pr.550 NET mode operation command source selection** and **Pr.551 PU mode operation command source selection**, and select an operation mode suitable for the purpose. |

## 2.6.10 Operation panel display is not operating

| Check point | Possible cause | Countermeasure |
|---|---|---|
| **Main circuit, control circuit** | The power is not input. | Input the power. |
| **Front cover** | The operation panel is not properly connected to the inverter. | Check if the inverter front cover is installed securely. |

## 2.6.11 The motor current is too large

| Check point | Possible cause | Countermeasure |
|---|---|---|
| **Parameter setting** | The torque boost (**Pr.0, Pr.46**) setting is not appropriate under V/F control, so the stall prevention function is activated. | Increase/decrease the **Pr.0 Torque boost** setting value by 0.5% increments so that stall prevention does not occur. |
| | The V/F pattern is not appropriate when V/F control is performed. **(Pr.3, Pr.14, Pr.19)** | Set the rated frequency of the motor to **Pr.3 Base frequency**. Use **Pr.19 Base frequency voltage** to set the base voltage (for example, rated motor voltage). |
| | | Change the **Pr.14 Load pattern selection** setting according to the load characteristic. |
| | The stall prevention (torque limit) function is activated due to a heavy load. | Reduce the load weight. |
| | | Set **Pr.22 Stall prevention operation level (Torque limit level)** higher according to the load. (If **Pr.22** is set too high, an overcurrent trip (E.OC[]) is likely to occur.) |
| | | Check the capacities of the inverter and the motor. |
| | Offline auto tuning is not performed under Advanced magnetic flux vector control, Real sensorless vector control, or Vector control. | Perform offline auto tuning. |
| | When PM sensorless vector control is selected for an IPM motor other than the MM-GKR or E-MA, offline auto tuning is not performed. | Performing the offline auto tuning for a PM motor |

# 2.6.12　Speed does not accelerate

| Check point | Possible cause | Countermeasure |
|---|---|---|
| **Input signal** | The start command or frequency command is chattering. | Check if the start command and the frequency command are correct. |
| | The wiring length is too long for the analog frequency command, causing a voltage (current) drop. | Perform the bias and gain calibration for the analog input. |
| | The input signal lines are affected by external EMI. | Take countermeasures against EMI, such as using shielded wires for input signal lines. |
| **Parameter setting** | **Pr.1 Maximum frequency, Pr.2 Minimum frequency, Pr.18 High speed maximum frequency, and the calibration parameter C2 to C7** settings are not appropriate. | Check the settings of **Pr.1** and **Pr.2**. To operate at 120 Hz or higher, set **Pr.18 High speed maximum frequency**. |
| | | Check the **calibration parameter C2 to C7** settings. |
| | The maximum voltage (current) input value is not set during the External operation. **(Pr.125, Pr.126, Pr.18)** | Check the settings of **Pr.125 Terminal 2 frequency setting gain frequency** and **Pr.126 Terminal 4 frequency setting gain frequency**. To operate at 120 Hz or higher, set **Pr.18**. |
| | The torque boost (**Pr.0, Pr.46**) setting is not appropriate under V/F control, so the stall prevention function is activated. | Increase/decrease the **Pr.0 Torque boost** setting value by 0.5% increments so that stall prevention does not occur. |
| | The V/F pattern is not appropriate when V/F control is performed. **(Pr.3, Pr.14, Pr.19)** | Set the rated frequency of the motor to **Pr.3 Base frequency**. Use **Pr.19 Base frequency voltage** to set the base voltage (for example, rated motor voltage). |
| | | Change the **Pr.14 Load pattern selection** setting according to the load characteristic. |
| | The stall prevention (torque limit) function is activated due to a heavy load. | Reduce the load weight. |
| | | Set **Pr.22 Stall prevention operation level (Torque limit level)** higher according to the load. (If **Pr.22** is set too high, an overcurrent trip (E.OC[]) is likely to occur.) |
| | | Check the capacities of the inverter and the motor. |
| | Auto tuning is not performed under Advanced magnetic flux vector control, Real sensorless vector control, or Vector control. | Perform offline auto tuning. |
| | During PID control, the output frequency is automatically controlled so that the measured value equals the set point. | |
| **Main circuit** | A brake resistor is connected across terminals P/+ and P1 or across P1 and PR by mistake. | Connect an optional brake resistor across terminals P/+ and PR. |

# 2.6.13　Unable to write parameter setting

| Check point | Possible cause | Countermeasure |
|---|---|---|
| **Input signal** | Operation is being performed (the STF or STR signal is ON). | Stop the operation. When **Pr.77 Parameter write selection** = "0 (initial value)", writing is enabled only during a stop. |
| **Parameter setting** | Parameter setting was attempted in External operation mode. | Choose the PU operation mode. Or, set **Pr.77 Parameter write selection** = "2" to enable parameter writing regardless of the operation mode. |
| | Parameter write is disabled by the **Pr.77 Parameter write selection** setting. | Check the **Pr.77** setting. |
| | The key lock mode is enabled by the **Pr.161 Frequency setting/key lock operation selection** setting. | Check the **Pr.161** setting. |
| | Operation mode and a writing device do not correspond. | Check **Pr.79, Pr.338, Pr.339, Pr.550** and **Pr.551**, and select an operation mode suitable for the purpose. |

# 2.6.14 Unable to establish Ethernet communication

| Check point | Possible cause | Countermeasure |
|---|---|---|
| **Wiring** | The Ethernet cable has a break. | Check that the Ethernet cable is connected to the Ethernet connector properly and the Ethernet cable is not damaged. |
| | Excessive electrical noise is present around the inverter. | When excessive noise occurs around the inverter, change the communication setting of the master. (The noise may be reduced by setting a shorter timeout period or increasing the number of retries in the communication setting of the master.) |
| | The FR-A8NC is installed when CC-Link IE TSN or CC-Link IE Field Network Basic is used for communication. | Remove the FR-A8NC. |
| **Parameter setting** | Communication protocols that cannot be used together are selected. | Check the settings of **Pr.1427 to Pr.1430**. (Refer to the FR-E800 Instruction Manual (Communication).) |
| | The **Pr.1432** setting is too small when CC-Link IE Field Network Basic, MODBUS/TCP, BACnet/IP, or EtherNet/IP is selected. | Set a larger value in **Pr.1432**. |
| | When the CC-Link IE Field Network Basic is used, the timeout period set in the master is shorter than the period during which the inverter does not receive the data addressed to the own station. | When the CC-Link IE Field Network Basic is used, set a timeout period longer than the period during which the inverter does not receive the data addressed to the own station. |
| | When the CC-Link IE Field Network Basic is used, the status bit of the cyclic transmission addressed to the own station is OFF. | When the CC-Link IE Field Network Basic is used, turn ON the status bit of the cyclic transmission addressed to the own station. |
| | When CC-Link IE Field Network Basic, MODBUS/TCP, BACnet/IP, or EtherNet/IP is used, IP addresses of other inverters are included in the Ethernet IP address range set for command source selection. | When CC-Link IE Field Network Basic, MODBUS/TCP, BACnet/IP, or EtherNet/IP is used, do not include IP addresses of other inverters in the Ethernet IP address range set for command source selection. |

# CHAPTER 3 Precautions for Maintenance and Inspection

# 3 Precautions for Maintenance and Inspection

This chapter explains the precautions for maintenance and inspection of this product.
Always read the instructions before use.

## 3.1 Inspection item

The inverter is a static unit mainly consisting of semiconductor devices. Daily inspection must be performed to prevent any fault from occurring due to the adverse effects of the operating environment, such as temperature, humidity, dust, dirt and vibration, changes in the parts with time, service life, and other factors.

### ◆ Precautions for maintenance and inspection

A high voltage remains in smoothing capacitors in the inverter for some time after the power supply is shut off. Wait 10 minutes or longer after the shutoff, then confirm that the voltage across the main circuit terminals P/+ and N/- of the inverter is 30 VDC or less using a digital multimeter, etc.
If "EV" is displayed on the operation panel when the FR-E8DS is installed, turn OFF the 24 V external power supply before an inspection.

### 3.1.1 Daily inspection

Basically, check for the following faults during operation.
- Motor operation fault
- Improper installation environment
- Cooling system fault
- Abnormal vibration, abnormal noise
- Abnormal overheat, discoloration

### 3.1.2 Periodic inspection

Check the areas inaccessible during operation and requiring periodic inspection. For a periodic inspection, contact your sales representative.

| | |
|---|---|
| Check and clean the cooling system: | Clean the air filter, etc. |
| Check the tightening and retighten: | The screws and bolts may become loose due to vibration, temperature changes, etc. Check and tighten them. Tighten them according to the specified tightening torque. (Refer to the FR-E800 Instruction Manual (Connection) or the FR-E860 Instruction Manual (Connection).) |

Check the conductors and insulating materials for corrosion and damage.
Measure the insulation resistance.
Check and change the cooling fan and relay.

> **NOTE**
> - When using the safety stop function, periodic inspection is required to confirm that safety function of the safety system operates correctly. For details, refer to the FR-E800 Instruction Manual (Functional Safety).

# 3.1.3    Daily and periodic inspection

| Area of inspection | Inspection item | | Description | Inspection interval | | Corrective action at fault occurrence | Check by user |
|---|---|---|---|---|---|---|---|
| | | | | Daily | Periodic[*3] | | |
| General | Surrounding environment | | Check the surrounding air temperature, humidity, dirt, corrosive gas, oil mist, etc. | ○ | | Improve the environment. | |
| | Overall unit | | Check for unusual vibration and noise. | ○ | | Check fault location and retighten. | |
| | | | Check for dirt, oil, and other foreign material.[*1] | ○ | | Clean. | |
| | Power supply voltage | | Check that the main circuit voltage and control circuit voltage are normal.[*2] | ○ | | Inspect the power supply. | |
| Main circuit | General | | • Check with megger (between main circuit terminals and earth (ground) terminal). | | ○ | Contact the manufacturer. | |
| | | | • Check for loose screws and bolts. | | ○ | Retighten. | |
| | | | • Check for overheat traces on the parts. | | ○ | Contact the manufacturer. | |
| | | | • Check for stains. | | ○ | Clean. | |
| | Conductors and cables | | • Check conductors for distortion. | | ○ | Contact the manufacturer. | |
| | | | • Check cable sheaths for breakage and deterioration (crack, discoloration, etc.). | | ○ | Contact the manufacturer. | |
| | Transformer/ reactor | | Check for unusual odor and abnormal increase of whining sound. | ○ | | Stop the equipment and contact the manufacturer. | |
| | Terminal block | | Check for a damage. | | ○ | Stop the equipment and contact the manufacturer. | |
| | Smoothing aluminum electrolytic capacitor | | • Check for liquid leakage. | | ○ | Contact the manufacturer. | |
| | | | • Check for safety valve projection and bulge. | | ○ | Contact the manufacturer. | |
| | | | • Visual check and judge by the life check of the main circuit capacitor. (Refer to page 53.) | | ○ | | |
| | Relay/contactor | | Check that the operation is normal and no chattering sound is heard. | | ○ | Contact the manufacturer. | |
| | Resistor | | • Check for cracks in the resistor insulator. | | ○ | Contact the manufacturer. | |
| | | | • Check for a break in the cable. | | ○ | Contact the manufacturer. | |
| Control circuit, protection circuit | Operation check | | • Check for an output voltage imbalance between phases while operating the inverter alone. | | ○ | Contact the manufacturer. | |
| | | | • Check that no fault is found in protective and display circuits in a sequence protective operation test. | | ○ | Locate the fault and check the wiring. | |
| | Components check | Overall | • Check for unusual odor and discoloration. | | ○ | Stop the equipment and contact the manufacturer. | |
| | | | • Check for serious rust development. | | ○ | Contact the manufacturer. | |
| | | Aluminum electrolytic capacitor | • Check for liquid leakage in a capacitor and deformation trace. | | ○ | Contact the manufacturer. | |
| | | | • Visual check and judge by the life check of the control circuit capacitor. (Refer to page 53.) | | ○ | | |
| Cooling system | Cooling fan | | • Check for unusual vibration and noise. | ○ | | Replace the fan. | |
| | | | • Check for loose screws and bolts. | | ○ | Fix with the fan cover fixing screws. | |
| | | | • Check for stains. | | ○ | Clean. | |
| | Heat sink | | • Check for clogging. | | ○ | Clean. | |
| | | | • Check for stains. | | ○ | Clean. | |

| Area of inspection | Inspection item | Description | Inspection interval | | Corrective action at fault occurrence | Check by user |
|---|---|---|---|---|---|---|
| | | | Daily | Periodic[*3] | | |
| Display | Indication | • Check that indications are correct. | ○ | | Contact the manufacturer. | |
| | | • Check for stains. | | ○ | Clean. | |
| | Meter/counter | Check that readouts are correct. | ○ | | Stop the equipment and contact the manufacturer. | |
| Load motor | Operation check | Check for vibration and abnormal increase in operation noise. | ○ | | Stop the equipment and contact the manufacturer. | |
| Waterproof performance Dustproof performance [*4] | Resin cap | • Check for damage. | | ○ | Stop the equipment and contact the manufacturer. | |
| | | • Check parts such as the gasket for degradation (crack, discoloration, or deformation). | | ○ | Stop the equipment and contact the manufacturer. | |
| | Connector | • Check for improper connection. | | ○ | Connect the cable properly. | |
| | | • Check if the cap of an unused connector is removed. | | ○ | Install the caps to the unused connectors. | |

*1 Oil component of the heat dissipation grease used inside the inverter may leak out. The oil component, however, is not flammable, corrosive, nor conductive and is not harmful to humans. Wipe off such oil component.

*2 It is recommended to install a voltage monitoring device for checking the voltage of the power supplied to the inverter.

*3 One to two years of periodic inspection cycle is recommended. However, it differs according to the installation environment.
For a periodic inspection, contact your sales representative.

*4 Inspections for the IP67 model.

**NOTE**

• Continuous use of a leaked, deformed, or degraded smoothing aluminum electrolytic capacitor (as shown in the table above) may lead to a burst, breakage, or fire. Replace such capacitor without delay.

# 3.1.4 Checking the inverter and converter modules

## ◆ Preparation

• Disconnect the external power supply cables (R/L1, S/L2, T/L3) and motor cables (U, V, W).

• Prepare a continuity tester. (For the resistance measurement, use the 100 Ω range.)

## ◆ Checking method

Change the polarity of the tester alternately at the inverter terminals R/L1, S/L2, T/L3, U, V, W, P/+, and N/- and check the electric continuity.

**NOTE**

• Before measurement, check that the smoothing capacitor is discharged.

• At the time of electric discontinuity, the measured value is almost ∞. When there is an instantaneous electric continuity, due to the smoothing capacitor, the tester may not indicate ∞. At the time of electric continuity, the measured value is several Ω to several tens of Ω. When all measured values are almost the same (although values may not be constant depending on the tester type), it shows that there are no electrical paths with problems.

# ◆ Module device numbers and terminals to be checked

## ■ Three-phase 200 V class, three-phase 400 V class, single-phase 200 V class

| | | Tester polarity | | Continuity | | Tester polarity | | Continuity |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | | ⊕ | ⊖ | | | ⊕ | ⊖ | |
| Converter module | D1 | R/L1 | P/+ | No | D4 | R/L1 | N/- | Yes |
| | | P/+ | R/L1 | Yes | | N/- | R/L1 | No |
| | D2 | S/L2 | P/+ | No | D5 | S/L2 | N/- | Yes |
| | | P/+ | S/L2 | Yes | | N/- | S/L2 | No |
| | D3 | T/L3[*1] | P/+ | No | D6 | T/L3[*1] | N/- | Yes |
| | | P/+ | T/L3[*1] | Yes | | N/- | T/L3[*1] | No |
| Inverter module | TR1 | U | P/+ | No | TR4 | U | N/- | Yes |
| | | P/+ | U | Yes | | N/- | U | No |
| | TR3 | V | P/+ | No | TR6 | V | N/- | Yes |
| | | P/+ | V | Yes | | N/- | V | No |
| | TR5 | W | P/+ | No | TR2 | W | N/- | Yes |
| | | P/+ | W | Yes | | N/- | W | No |

(Assuming that an analog meter is used.)

*1    Terminals T/L3, D3, and D6 are provided only on the three-phase power input model.
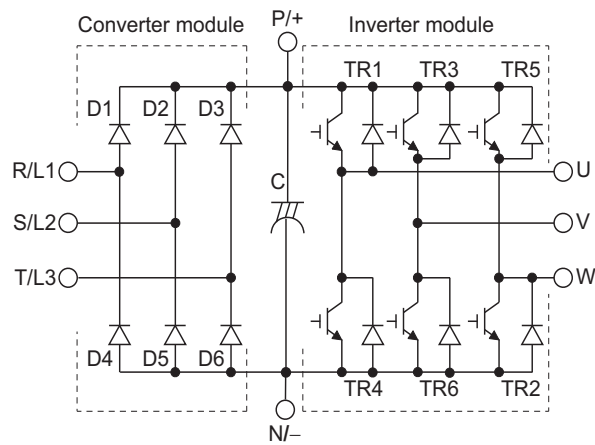
## ■Single-phase 100 V class

| | | Tester polarity | | Continuity | | Tester polarity | | Continuity |
|---|---|---|---|---|---|---|---|---|
| | | ⊕ | ⊖ | | | ⊕ | ⊖ | |
| Converter module | D1 | S/L2 | P/+ | No | — | R/L1 | P/+ | No |
| | | P/+ | S/L2 | Yes | | P/+ | R/L1 | No |
| | D2 | S/L2 | N/- | Yes | | R/L1 | N/- | No |
| | | N/- | S/L2 | No | | N/- | R/L1 | No |
| Inverter module | TR1 | U | P/+ | No | TR4 | U | N/- | Yes |
| | | P/+ | U | Yes | | N/- | U | No |
| | TR3 | V | P/+ | No | TR6 | V | N/- | Yes |
| | | P/+ | V | Yes | | N/- | V | No |
| | TR5 | W | P/+ | No | TR2 | W | N/- | Yes |
| | | P/+ | W | Yes | | N/- | W | No |

(Assuming that an analog meter is used.)



# 3.1.5　Cleaning

Always run the inverter in a clean status.

When cleaning the inverter, gently wipe dirty areas with a soft cloth immersed in neutral detergent or ethanol.

> **NOTE**
> • Do not use solvent, such as acetone, benzene, toluene and alcohol, as these will cause the inverter surface paint to peel off.
> • The display, etc. of the operation panel are vulnerable to detergent and alcohol. Therefore, avoid using them for cleaning.

# 3.1.6 Replacement of parts

The inverter consists of many electronic parts such as semiconductor devices.

The following parts may deteriorate with age because of their structures or physical characteristics, leading to reduced performance or fault of the inverter. For preventive maintenance, the parts must be replaced periodically. Use the life check function as a guidance of parts replacement.

| Part name | Estimated lifespan[1] | Description |
|---|---|---|
| Cooling fan | 10 years | Replace (as required) |
| Main circuit smoothing capacitor | 10 years[2] | Replace (as required) |
| On-board smoothing capacitor | 10 years[2] | Replace the board (as required). |
| ABC/ABC2[3] relay contact | — | As required |
| Large resin cap (with gasket)[3][4] | 5 years | Replace (as required) |
| Small resin cap (with gasket)[3][4] | 5 years | Replace (as required) |
| Resin cap (male) (with gasket)[3][4] | 10 years | Replace (as required) |
| Resin cap (female)[3][4] | 10 years | Replace (as required) |
| Gasket of the front cover[3][4] | 10 years | Replace (as required) |
| Power ON/OFF switch[3][4] | 10 years | Replace (as required) |

*1 Estimated lifespan for when the yearly average surrounding air temperature is 40°C (30°C for the FR-E806)
(without corrosive gas, flammable gas, oil mist, dust and dirt etc.)

*2 Output current: 80% of the inverter ND rating

*3 For IP67 model only.

*4 The life check function is not available for this part. Replace the part when the estimated lifespan has elapsed, or check whether the part needs to be replaced during periodic inspection.

**NOTE**

• For parts replacement, contact the nearest Mitsubishi Electric FA center.

## ◆ Inverter parts life display

The inverter diagnoses the main circuit capacitor, control circuit capacitor, cooling fan, inrush current limit circuit, inverter module, and relay contacts of terminals A, B, and C, and estimates their lives.

The self-diagnostic warning is output when the life span of each part is near its end. It gives an indication of replacement time.

**Guideline for life judgment using the life warning output**

| Part name | Judgment level |
|---|---|
| Main circuit capacitor | 85% of the initial capacity |
| Control circuit capacitor | Estimated remaining life 10% |
| Inrush current limit circuit | Estimated remaining life 10% (Power ON: 100,000 times left) |
| Cooling fan | Less than the specified speed |
| Inverter module | Estimated remaining life 15% |
| ABC/ABC2 relay contact[1] | Estimated remaining life 10% |

*1 Life check of ABC2 relay contact is applicable only for the IP67 model.

**NOTE**

• Refer to the FR-E800 Instruction Manual (Function) to perform the life check of the inverter parts.

## ◆ Replacement procedure of the cooling fan

The replacement interval of the cooling fan used for cooling the parts generating heat such as the main circuit semiconductor is greatly affected by the surrounding air temperature. When unusual noise and/or vibration are noticed during inspection, the cooling fan must be replaced immediately.

## ■ Removal of the fan (standard model, Ethernet model, and safety communication model)

*1.* Push the hooks from above and remove the fan cover.
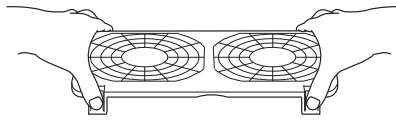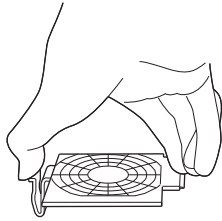


**FR-E820-0080(1.5K) to 0330(7.5K)**
**FR-E840-0040(1.5K) to 0170(7.5K)**
**FR-E860-0027(1.5K) to 0120(7.5K)**
**FR-E820S-0080(1.5K), 0110(2.2K)**

**FR-E820-0470(11K) to 0900(22K)**
**FR-E840-0230(11K) to 0440(22K)**

*2.* Disconnect the fan connectors.

*3.* Remove the fan.
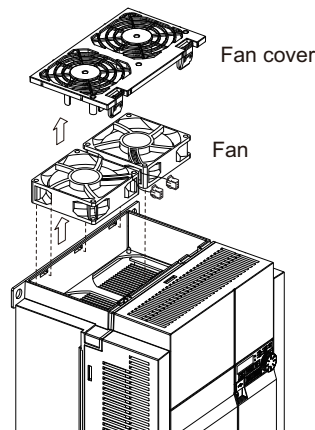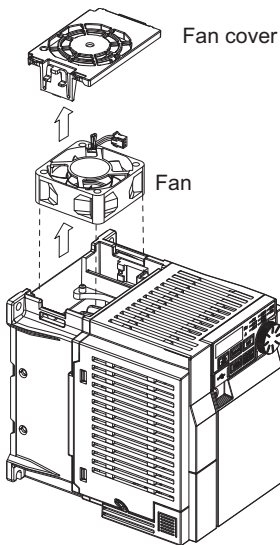


Fan cover

Fan

Fan cover

Fan

**FR-E820-0080(1.5K) to 0330(7.5K)**
**FR-E840-0040(1.5K) to 0170(7.5K)**
**FR-E860-0027(1.5K) to 0120(7.5K)**
**FR-E820S-0080(1.5K) to 0110(2.2K)**

**FR-E820-0470(11K) to 0900(22K)**
**FR-E840-0230(11K) to 0440(22K)**

## ■ Reinstallation of the fan (standard model, Ethernet model, and safety communication model)

*1.* Install the fan so that the air outlet side with the rating plate attached faces up. (The manufacturer name, model, and specifications of the fan are described on the rating plate.) Incorrect installation will shorten the life of the inverter or cause a fault. Disconnect the fan connector, and remove the fan itself.



Rating plate (description includes
the manufacturer name, model,
and specifications)

MODEL: XXXXX
XXXXXXXXXXX

**2.** Connect the fan connectors.



FR-E820-0080(1.5K) to 0330(7.5K)
FR-E840-0040(1.5K) to 0170(7.5K)
FR-E860-0027(1.5K) to 0120(7.5K)
FR-E820S-0080(1.5K), 0110(2.2K)
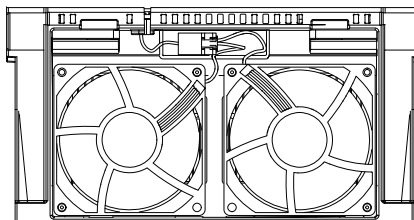
FR-E820-0470(11K) to 0900(22K)
FR-E840-0230(11K) to 0440(22K)

**3.** Install the fan cover.



2. Push until it clicks.
1. Insert hooks into holes.

FR-E820-0080(1.5K) to 0330(7.5K)
FR-E840-0040(1.5K) to 0170(7.5K)
FR-E860-0027(1.5K) to 0120(7.5K)
FR-E820S-0080(1.5K), 0110(2.2K)
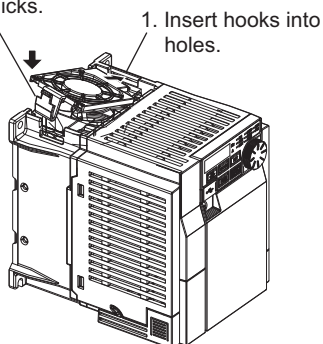
1. Insert hooks into holes.
2. Push until it clicks.
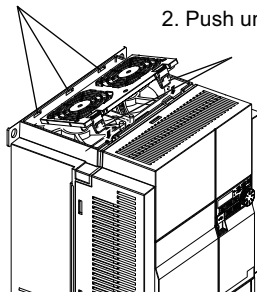
FR-E820-0470(11K) to 0900(22K)
FR-E840-0230(11K) to 0440(22K)

■ **Removal of the fan (IP67 model)**

**1.** Remove the screws to disconnect the fan cover, then disconnect the fan connector and remove the fan itself.



Fan cover

Fan

Fan connector
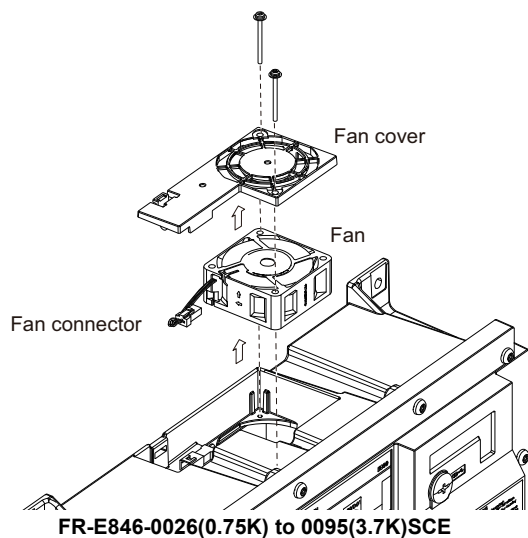
FR-E846-0026(0.75K) to 0095(3.7K)SCE

## ■ Reinstallation of the fan (IP67 model)

**1.** Install the fan so that the air outlet side with the rating plate attached faces up. (The manufacturer name, model, and specifications of the fan are described on the rating plate.) Incorrect installation will shorten the life of the inverter or cause a fault.
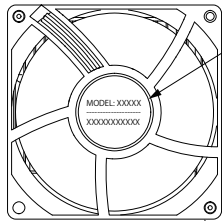
Rating plate (description includes the manufacturer name, model, and specifications)

**2.** Connect the fan connector, and reinstall the fan itself.

Fan cover

Fan

Fan connector
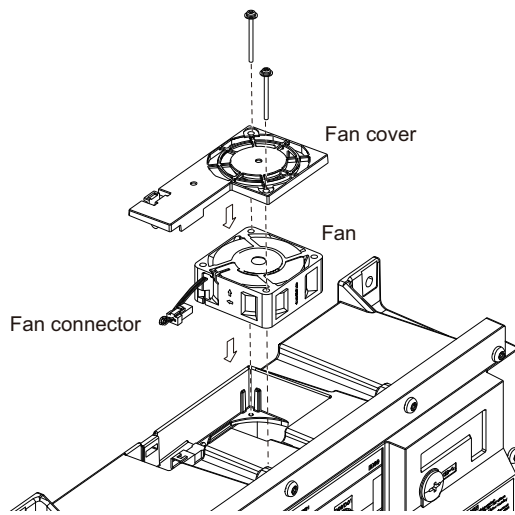
**FR-E846-0026(0.75K) to 0095(3.7K)SCE**

> **NOTE**
>
> Installing the fan in the opposite direction of air flow may shorten the inverter life.
>
> Ensure that the cables are not caught when the fan is installed.
>
> Switch OFF the power before starting the fan replacement work. To prevent an electric shock accident, power off the inverter and wait for at least 10 minutes as the inverter circuits are charged with voltage even after power OFF.

## ◆ Smoothing capacitors

A large-capacity aluminum electrolytic capacitor is used for smoothing in the DC section of the main circuit, and an aluminum electrolytic capacitor is used for stabilizing the control circuit power in the control circuit power supply. Adverse effects from ripple currents deteriorate capacitors. Replacement intervals of capacitors vary greatly with surrounding temperatures and operating conditions. Replace them roughly every 10 years when used in normal air-conditioned environments.

Inspecting the product visually:

- Case: Check that the sides and bottom of the capacitor have not ruptured.
- Rubber seal: Check for any noticeable bulging or severe cracks.
- Check for external cracks, discoloration, leakage, etc. It is assumed that the capacitor has reached the end of its life when its capacity has dropped below 80% of its rated capacity.

> **NOTE**
>
> - The inverter diagnoses the main circuit capacitor and control circuit capacitor by itself and estimates its remaining life. (Refer to the FR-E800 Instruction Manual (Function).)

## ◆ Relay output terminals

- The contacts of relays deteriorate over time. To prevent faults from occurring, relays must be replaced when they have reached the maximum of switching operations (switching life).
- The control circuit terminal block must be replaced in case of failure of the relay connected to the relay output terminals A, B, and C. (Refer to page 58.) (After replacing the control circuit terminal block, set the switch to the correct position in accordance with the control logic of input signals.) (Refer to the FR-E800 Instruction Manual (Connection) or FR-E860 Instruction Manual (Connection).) For the IP67 model, two sets of relay output terminals are provided. If the relay becomes faulty, contact your sales representative.

## ◆ Resin cap (IP67 model)

- When the resin cap or resin gasket deteriorates with age, IP67 requirements cannot be met. Replace the large/small resin cap after five years of use, and the resin cap (male/female) after 10 years of use.

| Part | Model name | Manufacturer | Tightening torque |
|------|-----------|--------------|-------------------|
| Large resin cap (with gasket) | A-INSP-M25-65N-P-BK - 1415207 | Phoenix Contact GmbH & Co. KG | 1.5 N·m |
| Small resin cap (with gasket) | A-INSP-M16-68N-P-BK - 1045817 | | 1.5 N·m |
| Resin cap (male) (with gasket) | P5407601200-000 | Tyco Electronics | 0.7 N·m |
| Resin cap (female) | T4104000000-00 | | 0.7 N·m |

- Appearance of resin cap

Large resin cap
（A-INSP-M25-65N-P-BK-1415207）

Small resin cap
（A-IN-P-M16-68N-P-BK-1045817）



Gasket

Gasket
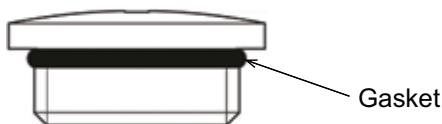
Resin cap (male)
(P5407601200-000)

Resin cap (female)
(T4104000000-00)



Gasket
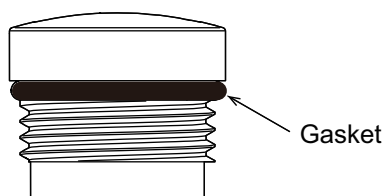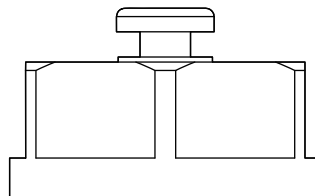
# 3.1.7 Inverter replacement

This product has a removable control circuit terminal block, which can be replaced with a new one (except for the IP67 model).

## ◆Removal and reinstallation

1. Loosen the fixing screw of the control circuit terminal block.
Slide down the control circuit terminal block to remove it.

Loosen the screws
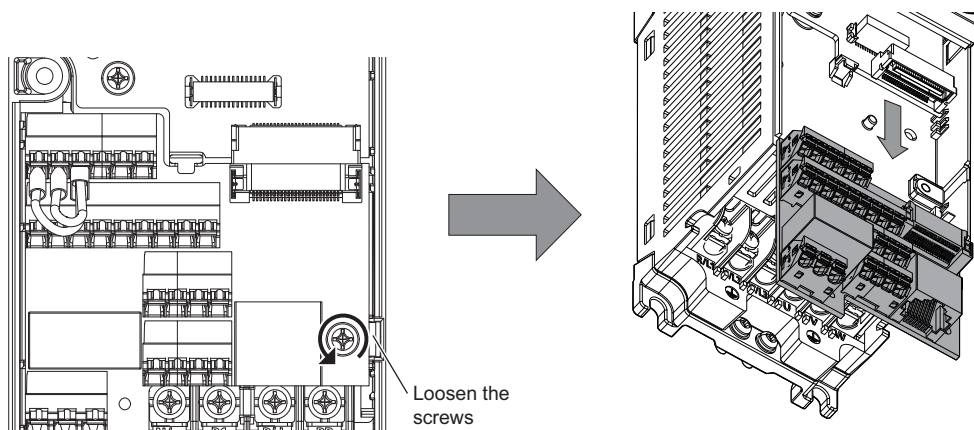
2. Be careful not to bend the pins of the inverter's control circuit connector, reinstall the control circuit terminal block and fix it with the mounting screws.

> **NOTE**
> • Before starting the replacement, power OFF the inverter and wait for at least 10 minutes to ensure safety.

## ◆Removal and reinstallation precautions

The following are the precautions to remove or reinstall the control circuit terminal block. Observe the following precautions and handle the inverter properly to avoid malfunctions or failures.

- To remove or reinstall the control circuit terminal block, keep it upright so that it is parallel with the inverter.
- Check that the terminal block is parallel to the inverter and the pins on the inverter control circuit connector are not bent. After checking proper connection, tighten the screw to fix the terminal block.

Insert the terminal block parallel to the inverter.

A

Fasten the screws.

Control circuit terminal block

Inverter's control circuit connector

Control circuit terminal block

Inverter's control circuit connector

**View from side A**
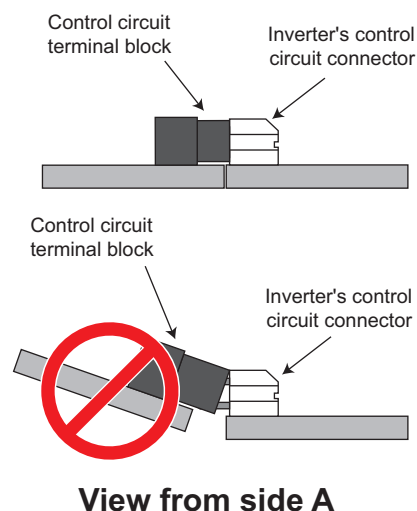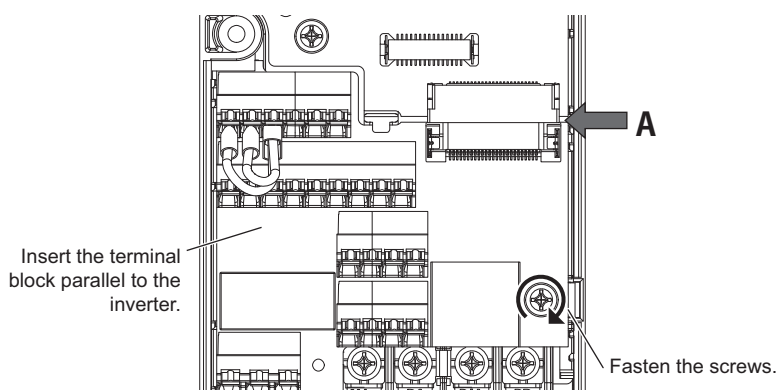
- Do not tilt the terminal block while tightening the screws or removing it from the inverter. (Otherwise, a stress applied to the control circuit terminal block or the control circuit connector may cause damage to them.)
- After replacing the control circuit terminal block, set the switch to the correct position in accordance with the control logic of input signals. (Refer to the FR-E800 Instruction Manual (Connection) or FR-E860 Instruction Manual (Connection).)
- When the control circuit terminal block is not connected to the inverter properly, a board combination fault (E.CMB) occurs.

# 3.2 Measurement of main circuit voltages, currents, and powers

Since the voltages and currents on the inverter power supply and output sides include harmonics, measurement data depends on the instruments used and circuits measured. When instruments for commercial frequency are used for measurement, measure the following circuits with the instruments given on the next page.
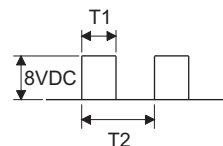
> **NOTE**
> - When installing meters etc. on the inverter output side
>   When the inverter-to-motor wiring length is long, especially in the 400/575 V class, small-capacity models, the meters and CTs may generate heat due to line-to-line leakage current. Therefore, choose the equipment which has enough allowance for the current rating.
>   To measure and display the output voltage and output current of the inverter, it is recommended that the terminal AM and FM output functions of the inverter are used.
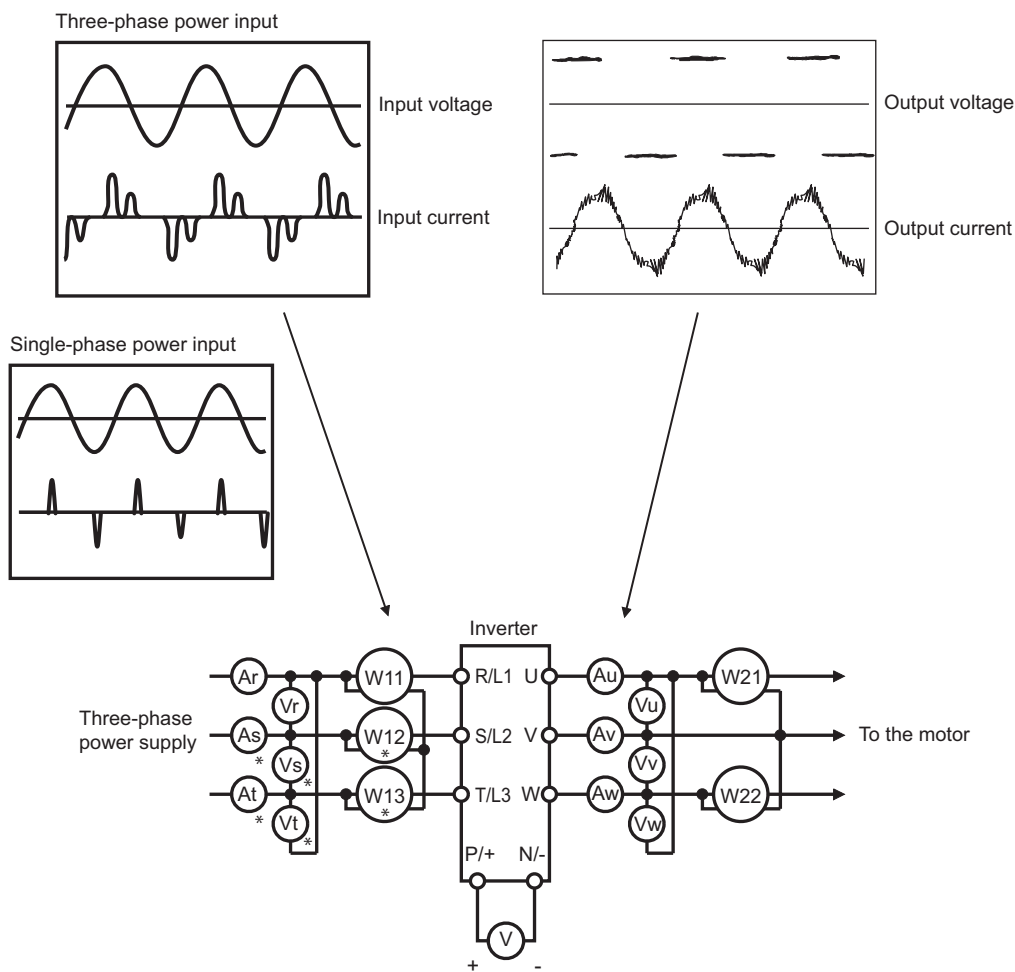


\* At, As, Vt, Vs, W12, W13 are only for the three-phase power input specification models.

## ◆ Measuring points and instruments

| Item | Measuring point | Measuring instrument | Remarks (reference measured value) | |
|---|---|---|---|---|
| Input voltage V1 | Between R/L1 and S/L2, S/L2 and T/L3, and T/L3 and R/L1[*3] | Digital power meter (designed for inverter) | Commercial power Within permissible AC voltage fluctuation. (Refer to the FR-E800 Instruction Manual (Connection) or FR-E860 Instruction Manual (Connection).) | |
| Input current I1 | R/L1, S/L2, T/L3 line current[*3] | | | |
| Input power P1 | At R/L1, S/L2, and T/L3, and between R/L1 and S/L2, S/L2 and T/L3, and T/L3 and R/L1[*3] | | P1 = W11 + W12 + W13 (3-wattmeter method) | |
| Input power factor Pf1 | Calculate after measuring input voltage, input current and input power. [Three-phase power supply] $$Pf_1 = \frac{P_1}{\sqrt{3}V_1 \times I_1} \times 100\%$$ [Single-phase power supply] $$Pf_1 = \frac{P_1}{V_1 \times I_1} \times 100\%$$ | | | |
| Output voltage V2 | Between U and V, V and W, and W and U | Digital power meter (designed for inverter)[*1] | Difference between the phases must be within 1% of the maximum output voltage. | |
| Output current I2 | Line current at U, V, and W | | Difference between the phases must be within 10%. | |
| Output power P2 | At U, V, and W, and between U and V, and V and W | Digital power meter (designed for inverter) | P2 = W21 + W22 2-wattmeter method (or 3-wattmeter method) | |
| Output power factor Pf2 | Calculate in similar manner to the input power factor. $$Pf_2 = \frac{P_2}{\sqrt{3}V_2 \times I_2} \times 100\%$$ | | | |
| Converter output | Between P/+ and N/- | Digital multimeter or some other tester | 1.35 × V1 | |
| Frequency setting signal | 2, and between 4(+) and 5 | | 0 to 10 VDC, 4 to 20 mA | Terminal 5 is a common terminal. |
| Power supply for a frequency setting potentiometer | Between 10(+) and 5 | | 5.2 VDC | |
| Frequency meter signal | [E800] Between AM(+) and 5 | | Approximately 10 VDC at maximum frequency (without frequency meter) | |
| | [E800] Between FM(+) and SD | Digital multimeter or some other tester, or moving-coil type instrument (internal resistance 50 kΩ or more) | Approximately 5 VDC at maximum frequency (without frequency meter) Pulse width T1: Adjust with **C0 (Pr.900)**. Pulse cycle T2: Set with **Pr.55** (for frequency monitor only). | Terminal SD is a common terminal. |
| Start terminal Multi-speed selection terminal Reset terminal Output stop terminal | [E800] Between terminal SD and each of terminal STF, STR, RH, RM, RL, RES, and MRS(+) (for sink logic) [E800-E] Between DI0 and SD, and DI1 and SD (for sink logic) | | Voltage when terminal is open: 20 to 30 VDC. Voltage when signal is ON: 1 V or less. | |
| Relay output (fault output) terminal | Between A and C Between B and C | Digital multimeter or some other tester | Continuity check[*2] Fault: discontinuity across B and C (continuity across A and C), normal: continuity across B and C (discontinuity across A and C) | |
| Relay output 2 terminal[*4] | Between A2 and C2 Between B2 and C2 | | Continuity check[*2] Being output: discontinuity across B2 and C2 (continuity across A2 and C2), not being output: continuity across B2 and C2 (discontinuity across A2 and C2) | |

**3**

*1 Use an FFT to measure the output voltage accurately. A digital multimeter or general measuring instrument cannot measure accurately.
*2 When the setting of **Pr.192 ABC terminal function selection** or **Pr.197 ABC2 terminal function selection** is the positive logic.
*3 Terminal T/L3 is provided only on the three-phase power input model.
*4 IP67 model only.

## 3.2.1 Measurement of powers

Use digital power meters (for inverter) both on the inverter's input and output sides.

## 3.2.2 Measurement of voltages and use of PT

### ◆ Inverter input side

Use a digital power meter (for inverter) on the inverter's input side.

### ◆ Inverter output side

When using a measuring instrument, use a digital power meter for inverters as the inverter outputs PWM-controlled square wave voltage. The value monitored on the operation panel is the inverter-controlled voltage itself. Monitoring values via the operation panel or by outputting the analog signal is recommended as these values are accurate.

## 3.2.3 Measurement of currents

Use a digital power meter (for inverter) both on the inverter's input and output sides.

Since the inverter input current tends to be unbalanced, measurement of three phases is recommended. The correct value cannot be obtained by measuring only one or two phases. On the other hand, the unbalanced ratio of each phase of the output current should be within 10%.

The inverter output current can be monitored on the operation panel. The value displayed on the operation panel is accurate even if the output frequency varies. Hence, it is recommended to monitor values on the operation panel or by outputting the analog signal.

## 3.2.4 Measurement of inverter input power factor

Calculate the factor from the effective power and the apparent power. A power-factor meter cannot indicate an exact value.

[Three-phase power supply]

$$\text{Total power factor of the inverter} = \frac{\text{Effective power}}{\text{Apparent power}}$$

$$= \frac{\text{Three-phase input power found by the 3-wattmeter method}}{\sqrt{3} \times V \text{ (power supply voltage)} \times I \text{ (input current effective value)}}$$

[Single-phase power supply]

$$\text{Total power factor of the inverter} = \frac{\text{Effective power}}{\text{Apparent power}}$$

$$= \frac{\text{Three-phase input power found by the 3-wattmeter method}}{V \text{ (power supply voltage)} \times I \text{ (input current effective value)}}$$

## 3.2.5 Measurement of converter output voltage (between terminals P and N)

The output voltage of the converter can be measured with a voltmeter (such as a digital multimeter) between terminals P and N. The voltage varies according to the power supply voltage. Approximately 270 to 300 V for the 100/200 V class, approximately 540 to 600 V for the 400 V class, and approximately 800 to 900 V for the 575 V class is output when no load is connected. The voltage decreases when a load is applied.

When energy is regenerated from the motor during deceleration, for example, the converter output voltage rises to nearly 400 to 450 V for the 100/200 V class, nearly 800 to 900 V for the 400 V class, and nearly 1100 to 1300 V for the 575 V class maximum.

## 3.2.6    Measurement of inverter output frequency

In the initial setting of the FM type inverter, a pulse train proportional to the output frequency is output across the pulse train output terminals FM and SD on the inverter. This pulse train output can be counted by a frequency counter, or a digital multimeter can be used to read the mean value of the pulse train output voltage. When a digital multimeter is used to measure the output frequency, approximately 5 VDC is indicated at the maximum frequency. In the initial setting of the AM type inverter, a voltage proportional to the output frequency is output across the analog voltage output terminals AM and 5 on the inverter. Measure the voltage using a digital multimeter.

The output frequency can be checked using the operation panel for all models including Ethernet models.

For detailed specifications of the pulse train output terminal FM and analog voltage output terminal AM, refer to the FR-E800 Instruction Manual (Function), FR-E800 Instruction Manual (Connection), and FR-E860 Instruction Manual (Connection).

## 3.2.7    Insulation resistance test using megger

- For the inverter, conduct the insulation resistance test on the main circuit only as follows and do not perform the test on the control circuit.
  (Use a 500 VDC megger.)

### NOTE

- Before performing the insulation resistance test on the external circuit, disconnect the cables from all terminals of the inverter so that the test voltage is not applied to the inverter.
- For the continuity test of the control circuit, use a tester for high resistance range and do not use the megger or buzzer.
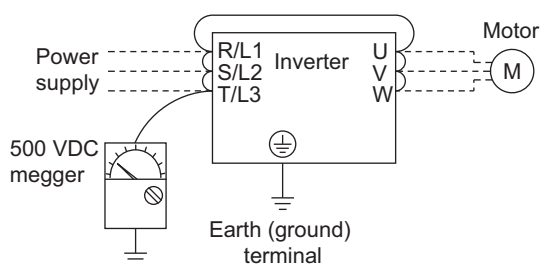


## 3.2.8    Withstand voltage test

Do not conduct a withstand voltage test. Deterioration may occur.

# MEMO

# CHAPTER 4 Appendix

# 4 Appendix

## 4.1 How to check specification changes

Check the SERIAL number indicated on the inverter rating plate or packaging. For how to read the SERIAL number, refer to .

The inverter firmware can be updated by using Firmware Update Tool of FR Configurator2. The functions added due to specification changes are available. For details on firmware update, refer to the FR Configurator2 Instruction Manual.

### 4.1.1 Details of specification changes

#### ◆ Number of connectable units on the CC-Link IE Field Network Basic

| Number of connectable units | SERIAL |
|---|---|
| Master: 1<br>Remote: up to 16 stations (16 stations × 1 group) | □□ 204 ○○○○○○ or earlier |
| Master: 1<br>Remote: up to 64 stations (16 stations × 4 groups) | □□ 205 ○○○○○○ or later |

#### ◆ Functions available for the inverters manufactured in May 2020 or later

• Firmware version: 1 or later

| Item | Details |
|---|---|
| Mitsubishi Electric geared motor | GM-[] |
| Plug-in option | FR-A8ND E kit, FR-A8NP E-kit |
| Stand-alone option | Parameter unit (FR-PU07), LCD operation panel (FR-LU08) |
| Added parameters | **Pr.1499, P.E107 (Pr.75)** |
| Changed parameter setting range | • Setting value "13" added for **Pr.52, Pr.54, Pr.158, Pr.774 to Pr.776, Pr.992, Pr.1027 to Pr.1034**<br>• Setting values "1800 and 1803" added for **Pr.71 and Pr.450** (for 200/400 V class only)<br>• Setting values "10000 to 10003, and 10014 to 10017" added for **Pr.75** (for the safety communication model only) |

# ◆ Functions available for the inverters manufactured in August 2020 or later

- Firmware version: 2 or later

| Item | Details |
|---|---|
| Mitsubishi Electric Vector control dedicated motor (SF-V5RU (1500 r/min series)) | The SF-V5RU 1.5 to 5.5 kW motors can be driven by the FR-E820-0110(2.2K) to 0330(7.5K) inverters.<br>The SF-V5RUH 1.5 to 5.5 kW motors can be driven by the FR-E840-0060(2.2K) to 0170(7.5K) inverters. |
| Mitsubishi Electric high-performance energy-saving motor with encoder | SF-PR-SC |
| Mitsubishi Electric inverter-driven geared motor for encoder feedback control | GM-DZ, GM-DP |
| Plug-in option | FR-A8AP E kit |
| EtherNet/IP communication specifications | Access to the parameters, monitor data, and terminals is available.<br>Inverter Configuration Object (64h)<br>• Inverter Parameters (12288 to 16383)<br>• Monitor Data (16384 to 20479)<br>• Inverter Control Parameters (20480 to 24575) |
| PROFINET communication specifications | Access to the parameters, monitor data, and terminals is available.<br>• Inverter Parameters (12288 to 16383)<br>• Monitor Data (16384 to 20479)<br>• Inverter Control Parameters (20480 to 24575) |
| Added parameters | **Pr.284, Pr.359, Pr.367, Pr.368, Pr.369, Pr.376, Pr.422, Pr.552, Pr.600 to Pr.604, Pr.607, Pr.608, Pr.690, Pr.692 to Pr.696, Pr.802, Pr.823, Pr.828, Pr.833, Pr.840 to Pr.848, Pr.854, Pr.873, Pr.877 to Pr.881, P.A107 (Pr.285)** |
| Changed parameter setting range | • Setting value "8888" added for **Pr.11**<br>• Setting values "19 and 35" added for **Pr.52, Pr.774 to Pr.776, Pr.992, and Pr.1027 to Pr.1034**<br>• Setting values "30 and 33" added for **Pr.71 and Pr.450**<br>• Setting values "13, 23, 42, 43, and 74" added for **Pr.178 to Pr.189**<br>• Setting values "30 to 33, and 130 to 133" added for **Pr.190 to Pr.196, and Pr.313 to Pr.319**<br>• Setting values "30 to 33" added for **Pr.320 to Pr.322**<br>• Setting values "0 to 2, and 9" added for **Pr.800**<br>• Setting value "2" added for **Pr.850**<br>• Setting value "6" added for **Pr.858** |
| Added faults | • Signal loss detection (E.ECT)<br>• Brake sequence fault (E.MB1 to E.MB3) |

**4**

# ◆ Functions available for the inverters manufactured in January 2021 or later

- Firmware version: 3 or later

| Item | Details | Related manuals |
|---|---|---|
| Position control (Vector control) | Position control (Vector control) is supported for induction motors.<br>• The following parameters are added: **Pr.420, Pr.421, Pr.423, Pr.425 to Pr.427, Pr.430, Pr.446, Pr.464 to Pr.478, Pr.510, Pr.511, Pr.538, Pr.698, Pr.1222, Pr.1223, Pr.1225 to Pr.1227, Pr.1229 to Pr.1231, Pr.1233 to Pr.1235, Pr.1237 to Pr.1239, Pr.1241 to Pr.1243, Pr.1245 to Pr.1247, Pr.1249, Pr.1282, Pr.1283, Pr.1285, Pr.1286, Pr.1289, Pr.1290, Pr.1292 to Pr.1297**. | Connection/<br>Function/<br>Communication/<br>Maintenance |
| | Position control is available.<br>• Setting values "3 to 5" added for **Pr.800** | |
| | Signals for position control can be assigned to I/O terminals.<br>• Setting values "76, and 87 to 89" added for **Pr.178 to Pr.189**<br>• Setting values "24, 36, 38, 56, 60 to 63, 84, 124, 136, 138, 156, 160 to 163, and 184" added for **Pr.190 to Pr.196 and Pr.313 to Pr.319**<br>• Setting values "24, 36, 38, 56, 60 to 63, and 84" added for **Pr.320 to Pr.322** | |
| | Monitoring during position control is available (multifunction monitor).<br>• Setting values "26 to 31, and 65" added for **Pr.52, Pr.774 to Pr.776, and Pr.992**<br>• Setting value "65" added for **Pr.54 and Pr.158**<br>• Setting values "65, 222 to 227, and 229" added for **Pr.1027 to Pr.1034** | |
| | The following warnings are added: LP (Stroke limit warning), HP1 (Home position return setting error), and HP2 (Home position return uncompleted) | |
| | The following faults are added: E.OD (Excessive position fault) and E.OA (acceleration error). | |
| CC-Link IE TSN communication specifications | User defined cyclic communication is supported.<br>• Setting values "38 and 138" of **Pr.544** are available for remote registers. | Function/<br>Communication |
| EtherNet/IP communication specifications | User defined cyclic communication is supported.<br>• "Configurable" is added for the connections of Class 1 communication (I/O Message communication) (Instances 100 and 150). | Communication |
| PROFINET communication specifications | User defined cyclic communication is supported.<br>• Telegram 102 is added for Process Data (Cyclic Data Exchange). | Communication |
| MODBUS/TCP communication specifications | CiA402 drive profile (24642 to 24644, 24646, 24648, 24649, and 26623) is added for MODBUS registers. | Communication |
| PTC thermistor | Motor overheat protection by the motor's built-in PTC thermistor is supported.<br>• **Pr.561 and Pr.1016** are added.<br>• Setting value "64" of **Pr.52, Pr.774 to Pr.776, Pr.992, Pr.1027 to Pr.1034** is available (multifunction monitor).<br>• E.PTC (PTC thermistor operation) is added. | Connection/<br>Function/<br>Maintenance |
| Backup/restore function | Inverter parameters and the data used in the PLC function of inverter can be backed up and restored.<br>• RD (Backup in progress) and WR (Restoration in progress) indications are added. | Communication/<br>Maintenance |
| Increased magnetic excitation deceleration | Added functions<br>• **Pr.660 to Pr.662** are added. | Function |
| Optimum excitation control | The control can be enabled under Advanced magnetic flux vector control. | Function |
| PLC function | The structured text (ST) language is supported, and jump commands are supported. | PLC Function Programming Manual |
| Capacity | 200 V class: 11K to 22K are added.<br>400 V class: 11K to 22K are added. | Connection/<br>Function/<br>Communication/<br>Maintenance |
| Parameters | **Pr.375** added<br>User Defined Cyclic Communication Input/Output Mapping parameters (**Pr.1318 to Pr.1343**) added | Function/<br>Communication |

## ◆ Functions available for the inverters manufactured in May 2021 or later

- Firmware version: 5 or later

| Item | Details | Related manuals |
|---|---|---|
| PM motor (MM-GKR 0.4kW and 0.75kW, and EM-A 5.5kW and 7.5kW) | Applied motor setting<br>• Setting values "540 and 1140" (200 V class) added for **Pr.71** and **Pr.450** | Connection/ Function/ Communication/ Maintenance |
| | Parameter initial setting<br>• Setting values "3024, 3044, 3124, and 3144" (200 V class) added for **Pr.998** | |
| | Position control (Vector control) is supported for PM motors (MM-GKR and EM-A). Control mode setting<br>• Setting values "13 and 14" added for **Pr.451 and Pr.800** | |
| Orientation control | Added parameters<br>• **Pr.350 to Pr.358, Pr.361 to Pr.366, Pr.393, Pr.396 to Pr.399** | Function/ Communication/ Maintenance |
| | Setting values<br>• Setting value "22" added for **Pr.52**<br>• Setting value "22" added for **Pr.178 to Pr.189**<br>• Setting values "27, 28, 127, and 128" added for **Pr.190 to Pr.196**<br>• Setting values "27, 28, 127, and 128" added for **Pr.313 to Pr.319**<br>• Setting values "27 and 28" added for **Pr.320 to Pr.322**<br>• Setting value "22" added for **Pr.774 to Pr.776**<br>• Setting value "22" added for **Pr.992**<br>• Setting value "22" added for **Pr.1027 to Pr.1034** | |
| EtherCAT communication specifications | The FR-E800-EPC models are added. | Connection/ Function/ Communication/ Maintenance |
| | Added parameter<br>• **Pr.1305** | |
| Emergency drive (except for the E800-SCE inverters) | Added parameters<br>• **Pr.136, Pr.139, Pr.514, Pr.515, Pr.523, Pr.524, and Pr.1013** | Connection/ Function/ Maintenance |
| | Setting values<br>• Setting value "68" added for **Pr.52**<br>• Setting value "84" added for **Pr.178 to Pr.189**<br>• Setting values "18, 19, 65, 66, 165, and 166" added for **Pr.190 to Pr.196**<br>• Setting values "18, 19, 65, 66, 165, and 166" added for **Pr.313 to Pr.319**<br>• Setting values "18, 19, 65, and 66" added for **Pr.320 to Pr.322**<br>• Setting value "68" added for **Pr.774 to Pr.776**<br>• Setting value "68" added for **Pr.992**<br>• Setting value "68" added for **Pr.1027 to Pr.1034** | |
| | ED (Emergency drive) warning added | |
| Ethernet communication specifications | Simple positioning using CiA402 drive profile<br>Added parameter<br>• **Pr.1220**<br>Setting values<br>• Setting values added for **Pr.1320 to Pr.1329**<br>[E800-(SC)EPA][E800-(SC)EPB] "24672, 24689, 24698, 24703, 24705, 24707, 24708, 24719, 24721, and 24728 to 24730"<br>[E800-EPC] "12288 to 13787, 20488, 20489, 24642, 24646, 24648 to 24650, 24672, 24677 to 24680, 24689, 24698, 24702, 24703, 24705, 24707 to 24709, 24719, 24721, 24728 to 24730, 24831, and 9999"<br>• Setting values added for **Pr.1330 to Pr.1343**<br>[E800-(SC)EPA][E800-(SC)EPB] "20992, 24639, 24643, 24644, 24673 to 24676, 24692, 24695, 24820, 24826, 24828, and 25858"<br>[E800-EPC] "12288 to 13787, 16384 to 16483, 20488, 20489, 20981 to 20990, 20992, 24639, 24643, 24644, 24673 to 24676, 24692, 24695, 24820, 24826, 24828, 25858, and 9999" | Communication |
| | User defined cyclic communication specifications<br>Added parameters<br>• **Pr.1389 to Pr.1398** | |
| | Ethernet relay operation at reset selection<br>Added parameter<br>• **Pr.1386** | |
| Parameters | Parameters added for the second functions<br>• **Pr.1298** and **Pr.1299** | Function |

# ◆ Functions available for the inverters manufactured in September 2021 or later

• Firmware version: 6 or later

| Item | Details | Related manuals |
|------|---------|-----------------|
| BACnet MS/TP communication specifications | Added parameters<br>• **Pr.726 and Pr.727** | Function/<br>Communication |
| | Setting values<br>• Setting values "81, 82, and 84 to 86" added for **Pr.52, Pr.774 to Pr.776, and Pr.1027 to Pr.1034**<br>• Setting values "81 to 86" added for **Pr.992**<br>• Setting value "85" added for **Pr.54**<br>• Setting value "86" added for **Pr.158**<br>• Setting values "82 and 182" added for **Pr.190 and Pr.191**<br>• Setting value "2" added for **Pr.549** | |

# ◆ Functions available for the inverters manufactured in December 2021 or later

• Firmware version: 7 or later

| Item | Details | Related manuals |
|------|---------|-----------------|
| Cumulative pulse monitoring | Added parameters<br>• **Pr.635, Pr.636, and Pr.638** | Function |
| | Setting values<br>• Setting values "71 and 72" added for **Pr.52, Pr.774 to Pr.776, Pr.992, and Pr.1027 to Pr.1034**<br>• Setting value "52" added for **Pr.178 to Pr.189** | |
| 24 V external power supply operation | Plug-in option FR-E8DS E kit is available. | Function/<br>Maintenance/<br>FR-E8DS E Kit Instruction Manual |
| | Setting values<br>• Setting values "68 and 168" added for **Pr.190 to Pr.196, and Pr.313 to Pr.319**<br>• Setting value "68" added for **Pr.320 to Pr.322** | |
| | Operation panel indication "EV" (24 V external power supply operation) is added. | |
| Internal storage device status indication | Added parameter<br>• **Pr.890** | Function/<br>Maintenance |
| | E.PE6 (Internal storage device fault) fault added | |
| MM-GKR motor capacity | 0.1 kW and 0.2 kW are added. | Connection/<br>Function |
| Environmental impact diagnosis function | Cor (Corrosion warning) warning added | Maintenance |

# ◆ Functions available for the inverters manufactured in May 2022 or later

• Firmware version: 9 or later

| Item | Details | Related manuals |
|------|---------|-----------------|
| EM-A motor capacity | 200 V class: 0.75 kW to 3.7 kW are added.<br>400 V class: 3.7 kW and 5.5 kW are added. | Connection/<br>Function |
| Anti-sway control | Added parameters<br>• **Pr.1072 to Pr.1079** | Function |
| CC-Link IE TSN communication specifications | Added parameter<br>• **Pr.1210** | Function/<br>Communication |
| EtherNet/IP communication specifications | Instance 21216 (Speed scale (numerator)) and instance 21217 (Speed scale (denominator)) are added for Inverter Configuration Object (64h) | Communication |

# ◆ Functions available for the inverters manufactured in October 2022 or later

• Firmware version: 11 or later

| Item | Details | Related manuals |
|------|---------|-----------------|
| Inverter capacity | 100 V class: 0.1K to 0.75K are added. | Connection/<br>Function/<br>Communication/<br>Maintenance |

## ◆ Functions available for the inverters manufactured in November 2022 or later

- Firmware version: 11 or later

| Item | Details | Related manuals |
|------|---------|-----------------|
| EM-A motor capacity | 200 V class: 0.1 kW to 0.4 kW are added.<br>400 V class: 2.2 kW is added. | Connection/<br>Function |
| Position accuracy compensation gain tuning | Added parameters<br>• **Pr.979 to Pr.981** | Function |
| | Setting values<br>• Setting value "301" added for **Pr.96** | |
| Anti-sway control function | Setting values<br>• Setting value "54" added for **Pr.178 to Pr.189** | Function |
| BACnet/IP and BACnet MS/TP communication specifications | Network Port Object is added. | Communication |
| PROFINET communication specifications | E.SAF can be reset by bit 7 of Control word 1 (STW1). | Communication |

## ◆ Functions available for the inverters manufactured in July 2023 or later

- Firmware version: 12 or later

| Item | Details | Related manuals |
|------|---------|-----------------|
| SF-PR motor capacity | 200 V class: 0.2 kW and 0.4 kW are added.<br>400 V class: 0.2 kW and 0.4 kW are added. | Function |
| EM-A motor capacity | 400 V class: 0.4 kW to 1.5 kW, and 7.5 kW are added. | Connection/<br>Function |
| Position control function | Added parameters<br>• **Pr.1095 to Pr.1097** | Function |
| | Setting values<br>• Setting values "21 and 22" added for **Pr.538** | |
| SLMP communication specifications | Added link registers<br>• W5807 and W5808 (inverter status)<br>• W5900 to W5969 (fault history) | Communication |
| Plug-in option | FR-E8AXY E kit | FR-E8AXY E Kit Instruction Manual |
| Control terminal option | FR-E8TR and FR-E8TE7 | FR-E8TR Instruction Manual<br>FR-E8TE7 Instruction Manual |

## ◆ Functions available for the inverters manufactured in October 2023 or later

- Firmware version: 12 or later

| Item | Details | Related manuals |
|------|---------|-----------------|
| IP67 model | 400 V class: 0.75 kW to 3.7 kW | Connection/<br>Function/<br>Communication/<br>Maintenance |
| | Added parameter<br>• **Pr.508** | |
| | BACnet/IP communication specifications<br>• Binary input: object identifiers 100, 104, and 106 added.<br>• Binary output: object identifiers 0, 4, and 6 added. | |
| | E.IAH (Abnormal internal temperature) fault added | |
| Parameters | **Pr.197** added | Function |

## ◆ Functions available for the inverters manufactured in September 2024 or later

- Firmware version: 13 or later

| Item | Details | Related manuals |
|---|---|---|
| Selection between resetting or not resetting during power supply to main circuit | Setting values<br>• Setting values "100 to 102" added for **Pr.30** | Function |

- Firmware version: 14 or later

| Item | Details | Related manuals |
|---|---|---|
| FSoE | The FR-E800-SCEPC models are added. | Function/ Communication/ Functional Safety |
| Parameter available for the Ethernet model, the safety communication model, and the IP67 model | **Pr.56** can be read or written regardless of whether the plug-in option is installed. | Function |
| Parameter available for the FR-E800-EPC | **Pr.1457** added (FR-E800-EPC inverters manufactured in August 2024 or earlier do not support this parameter even if the firmware is updated to version 14 or later.) | Function/ Communication |

## ◆ Functions available for the inverters with firmware version 15 or later

| Item | Details | Related manuals |
|---|---|---|
| Offline auto tuning (with the motor rotating) | Setting value<br>• Setting value "101" added for **Pr.96** | Function |
| Online L compensation | Setting value<br>• Setting value "131" added for **Pr.96**<br>Added parameters<br>• **Pr.221 to Pr.228** | Function |
| Excitation current low-speed scaling factor | Added parameters<br>• **Pr.85, Pr.86, Pr.565, and Pr.566** | Function |
| Added faults | Encoder phase fault (E.EP) | Connection/ Function/ Maintenance |

# Warranty

When using this product, make sure to understand the warranty described below.

1. **Warranty period and coverage**

   We will repair any failure or defect (hereinafter referred to as "failure") in our FA equipment (hereinafter referred to as the "Product") arisen during warranty period at no charge due to causes for which we are responsible through the distributor from which you purchased the Product or our service provider. However, we will charge the actual cost of dispatching our engineer for an on-site repair work on request by customer in Japan or overseas countries. We are not responsible for any on-site readjustment and/or trial run that may be required after a defective unit are repaired or replaced.

   **[Term]**

   The term of warranty for Product is twelve months after your purchase or delivery of the Product to a place designated by you or eighteen months from the date of manufacture whichever comes first ("Warranty Period"). Warranty period for repaired Product cannot exceed beyond the original warranty period before any repair work.

   **[Limitations]**

   (1) You are requested to conduct an initial failure diagnosis by yourself, as a general rule. It can also be carried out by us or our service company upon your request and the actual cost will be charged.
   However, it will not be charged if we are responsible for the cause of the failure.

   (2) This limited warranty applies only when the condition, method, environment, etc. of use are in compliance with the terms and conditions and instructions that are set forth in the instruction manual and user manual for the Product and the caution label affixed to the Product.

   (3) Even during the term of warranty, the repair cost will be charged on you in the following cases;
   - a failure caused by your improper storing or handling, carelessness or negligence, etc., and a failure caused by your hardware or software problem
   - a failure caused by any alteration, etc. to the Product made on your side without our approval
   - a failure which may be regarded as avoidable, if your equipment in which the Product is incorporated is equipped with a safety device required by applicable laws and has any function or structure considered to be indispensable according to a common sense in the industry
   - a failure which may be regarded as avoidable if consumable parts designated in the instruction manual, etc. are duly maintained and replaced
   - any replacement of consumable parts (condenser, cooling fan, etc.)
   - a failure caused by external factors such as inevitable accidents, including without limitation fire and abnormal fluctuation of voltage, and acts of God, including without limitation earthquake, lightning and natural disasters
   - a failure caused by using the emergency drive function
   - a failure generated by an unforeseeable cause with a scientific technology that was not available at the time of the shipment of the Product from our company
   - any other failures which we are not responsible for or which you acknowledge we are not responsible for

2. **Term of warranty after the stop of production**

   (1) We may accept the repair at charge for another seven (7) years after the production of the product is discontinued. The announcement of the stop of production for each model can be seen in our Sales and Service, etc.

   (2) Please note that the Product (including its spare parts) cannot be ordered after its stop of production.

3. **Service in overseas**

   Our regional FA Center in overseas countries will accept the repair work of the Product; however, the terms and conditions of the repair work may differ depending on each FA Center. Please ask your local FA center for details.

4. **Exclusion of loss in opportunity and secondary loss from warranty liability**

   Regardless of the gratis warranty term, Mitsubishi Electric shall not be liable for compensation to:

   (1) Damages caused by any cause found not to be the responsibility of Mitsubishi Electric.

   (2) Loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi Electric products.

   (3) Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi Electric products.

   (4) Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

5. **Change of Product specifications**

   Specifications listed in our catalogs, manuals or technical documents may be changed without notice.

6. **Application and use of the Product**

   (1) For the use of our product, its applications should be those that may not result in a serious damage even if any failure or malfunction occurs in product, and a backup or fail-safe function should operate on an external system to product when any failure or malfunction occurs.

   (2) Our product is designed and manufactured as a general purpose product for use at general industries.
   Therefore, applications substantially influential on the public interest for such as atomic power plants and other power plants of electric power companies, and also which require a special quality assurance system, including applications for railway companies and government or public offices are not recommended, and we assume no responsibility for any failure caused by these applications when used.
   In addition, applications which may be substantially influential to human lives or properties for such as airlines, medical treatments, railway service, incineration and fuel systems, man-operated material handling equipment, entertainment machines, safety machines, etc. are not recommended, and we assume no responsibility for any failure caused by these applications when used.
   We will review the acceptability of the abovementioned applications, if you agree not to require a specific quality for a specific application. Please contact us for consultation.

# Revisions

*The manual number is given on the bottom left of the back cover.

| Revision date | *Manual number | Revision |
|---|---|---|
| Dec. 2019 | IB(NA)-0600874ENG-A | First edition |
| Apr. 2020 | IB(NA)-0600874ENG-B | Added<br>• FR-E820S-0008(0.1K) to 0110(2.2K)(E)(SCE)<br>• FR-E800-SCE (safety communication model) |
| Jun. 2020 | IB(NA)-0600874ENG-C | Added<br>• Vector control |
| Nov. 2020 | IB(NA)-0600874ENG-D | Added<br>• FR-E820-0470(11K) to 0900(22K)(E)(SCE)<br>• FR-E840-0230(11K) to 0440(22K)(E)(SCE)<br>• Position control<br>• PTC thermistor |
| Jan. 2021 | IB(NA)-0600874ENG-E | Edited<br>• Models listed on the front cover |
| Apr. 2021 | IB(NA)-0600874ENG-F | Added<br>• Compatibility with the MM-GKR and E-MA motors<br>• Orientation function<br>• Emergency drive |
| Oct. 2021 | IB(NA)-0600874ENG-G | Added<br>• 24 V external power supply operation<br>• Internal storage device status indication<br>• Environmental impact diagnosis function |
| Aug. 2022 | IB(NA)-0600874ENG-H | Added<br>• FR-E810W-0008(0.1K) to 0050(0.75K)(E)(SCE) |
| Jul. 2023 | IB(NA)-0600874ENG-J | Added<br>• Pr.197<br>• FR-E806 (IP67 model) |
| Jul. 2024 | IB(NA)-0600874ENG-K | Added<br>• Corrective actions for E.PE6 |
| Jan. 2025 | IB(NA)-0600874ENG-L | Added<br>• E.EP: Encoder phase fault |

| Model | FR-E800 TORISETSU HOSYU EIBUN |
|---|---|
| Model code | 1AJ054 |

# MITSUBISHI ELECTRIC CORPORATION

Specifications subject to change without notice.