

Thank you for choosing Mitsubishi Electric inverter. This Inverter Safety Guideline provides handling information and precautions for use of this product. Do not use this product until you have full knowledge of the product mechanism, safety information and instructions. Please forward this Safety Guideline to the end user.



IB-0600857ENG-G(2305)IP
 Specifications subject to change without notice.

MITSUBISHI ELECTRIC CORPORATION
 HEAD OFFICE: TOKYO BUILDING 2-3-3, MARUNOUCHI, CHYODOKU, TOKYO 100-8150, JAPAN

◆ Related manuals

Manual name	Manual number	Model code	Details
FR-E800 Instruction Manual (Connection)	IB-0600866ENG	IA2-P89	Manuals describing installation, wiring, specifications, outline dimensions, standards, and how to connect options.
FR-E800 Instruction Manual (Function)	IB-0600868ENG	IA2-P91	Manual describing details of the functions.
FR-E800 Instruction Manual (Communication)	IB-0600871ENG	IA2-P93	Manual describing details of the communications.
FR-E800 Instruction Manual (Maintenance)	IB-0600874ENG	IA2-P95	Manual describing how to identify causes of faults and warnings.
FR-E800 Instruction Manual (Functional Safety)	BCN-A23488-000	-	Manual describing the functional safety.
FR Configurator2 Instruction Manual	IB-0600516ENG	-	Manual describing details of the software used to set inverter parameters using a personal computer.
PLC Function Programming Manual	IB-0600492ENG	-	Manual describing details of the PLC function.

Safety Information

Do not attempt to install, operate, maintain or inspect this product until you have read through this Safety Guideline and supplementary documents carefully to use the equipment correctly. Do not use the product until you have full knowledge of the product mechanism, safety information and instructions.

Installation, operation, maintenance and safety must be performed by qualified personnel. Here, qualified personnel means a person who meets all the following conditions:
 • A person who possesses a certification in regard with electric appliance handling, or person took a proper engineering training. Such training may be available at your local Mitsubishi Electric office. Contact your local sales office for schedules and locations.
 • A person who can access operating manuals for the protective devices (for example, light curtain) connected to the safety control system, or a person who has read these manuals thoroughly and familiarized themselves with the protective devices.

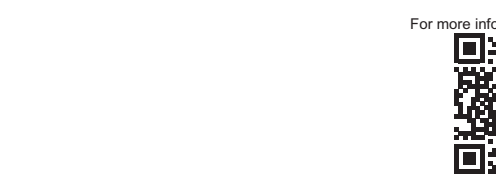
In this Safety Guideline, the safety instruction levels are classified into "WARNING" and "CAUTION".

WARNING Incorrect handling may cause hazardous conditions, resulting in death or severe injury.

CAUTION Incorrect handling may cause hazardous conditions, resulting in medium or slight injury, or may cause only material damage.

Note that even the **CAUTION** level may lead to a serious consequence depending on conditions. Be sure to follow the instructions of both levels as they are critical to personnel safety.

Read this guideline before use. In addition, scan the 2D code below to download the FR-E800 Instruction Manual (Connection) and read "Safety Instructions". The PDF manual can also be downloaded from the Mitsubishi Electric FA Global Website.



1 INVERTER INSTALLATION AND PRECAUTIONS

When installing the inverter on the enclosure surface, remove the front cover and wiring cover to fix the inverter.

Allow clearance

10 cm or more

1 cm or more +1±2

1 cm or more

10 cm or more

◆ Removal of the front cover

◆ Reinstallation of the front cover

(a) Loosen the mounting screws of the cover. (These screws cannot be removed.)

(b) Pull out the cover using its lower side as a support.

(c) With the cover removed, the control circuit terminals can be wired and the plug-in option can be installed.

(a) Install the lower front cover by inserting the upper hooks into the sockets on the inverter.

(b) Tighten the screws on the lower part of the lower front cover.

2 INSTALLATION AND WIRING

2.1 Removal and reinstallation of covers

◆ Removal of the lower front cover (FR-E820-0240(5.5K) or higher, FR-E840-0230(11K) or higher)

◆ Reinstallation of the lower front cover (FR-E820-0240(5.5K) or higher, FR-E840-0230(11K) or higher)

(a) Loosen the screws on the lower front cover. (These screws cannot be removed.)

(b) While holding the areas around the installation hooks on the sides of the lower front cover, pull out the cover using its upper side as a support.

(a) Install the lower front cover by inserting the upper hooks into the sockets on the inverter.

(b) Tighten the screws on the lower part of the lower front cover.

(c) With the lower front cover removed, wiring of the main circuit terminals and control circuit terminals can be performed.

◆ Removal of the wiring cover (FR-E820-0050(0.75K) or lower, FR-E820S-0030(0.4K) or lower, FR-E810W-0030(0.4K) or lower)

◆ Reinstallation of the wiring cover (FR-E820-0050(0.75K) or lower, FR-E820S-0030(0.4K) or lower, FR-E810W-0030(0.4K) or lower)

Remove the wiring cover by pulling it out along the guides in the direction shown by the arrow in the figure above.

Fit the cover to the inverter along the guides.

◆ Removal of the wiring cover (FR-E820-0080(1.5K) to FR-E820-0175(3.7K), FR-E840-0016(0.4K) to FR-E840-0095(3.7K), FR-E820S-0050(0.75K) or higher, FR-E810W-0050(0.75K))

◆ Reinstallation of the wiring cover (FR-E820-0080(1.5K) to FR-E820-0175(3.7K), FR-E840-0016(0.4K) to FR-E840-0095(3.7K), FR-E820S-0050(0.75K) or higher, FR-E810W-0050(0.75K))

Remove the wiring cover by pulling it out along the guides in the direction shown by the arrow in the figure above.

Fit the cover to the inverter along the guides, and push the hook into the socket.

◆ Removal of the wiring cover (FR-E820-0240(5.5K) to 0600(15K), FR-E840-0230(11K), 0300(15K))

◆ Reinstallation of the wiring cover (FR-E820-0240(5.5K) to 0600(15K), FR-E840-0230(11K), 0300(15K))

Remove the wiring cover by pulling it out along the guides in the direction shown by the arrow in the figure above.

Fit the cover to the inverter along the guides.

◆ Removal of the wiring cover (FR-E840-0120(5.5K), 0170(7.5K))

◆ Reinstallation of the wiring cover (FR-E840-0120(5.5K), 0170(7.5K))

Remove the wiring cover by pulling it out along the guides in the direction shown by the arrow in the figure above.

Fit the cover to the inverter along the guides.

◆ Removal of the wiring cover (FR-E820-0760(18.5K), 0900(22K), FR-E840-0380(18.5K), 0440(22K))

◆ Reinstallation of the wiring cover (FR-E820-0760(18.5K), 0900(22K), FR-E840-0380(18.5K), 0440(22K))

Remove the wiring cover by pulling it out along the guides in the direction shown by the arrow in the figure above.

Fit the cover to the inverter along the guides.

2.2 Main circuit terminal layout and wiring to power supply and motor

◆ Three-phase 200/400 V class

FR-E820-0008(0.1K) to 0050(0.75K)

FR-E820-0080(1.5K) to 0175(3.7K)
 FR-E840-0016(0.4K) to 0095(3.7K)

FR-E820-0240(5.5K), 0300(7.5K)

FR-E840-0120(5.5K), 0170(7.5K)

FR-E820-0760(18.5K), 0900(22K)

FR-E840-0380(18.5K), 0440(22K)

FR-E820-0470(11K), 0600(15K)

Wiring diagrams showing terminal layouts for power supply and motor connections for various inverter models.

FR-E840-0230(11K), 0300(15K)

FR-E820-0760(18.5K), 0900(22K), FR-E840-0380(18.5K), 0440(22K)

Wiring diagrams for single-phase 200 V class and single-phase 100 V class inverters.

◆ Single-phase 200 V class / Single-phase 100 V class

FR-E820S-0008(0.1K) to 0030(0.4K)

FR-E820S-0050(0.75K) to 0110(2.2K)

FR-E810W-0008(0.1K) to 0030(0.4K)

FR-E810W-0050(0.75K)

Wiring diagrams for single-phase 200 V class and single-phase 100 V class inverters.

2.3 Applicable cables and wiring length

Select cables of recommended gauge size to ensure that the voltage drop is 2% or less. If the wiring distance is long between the inverter and motor, the voltage drop in the main circuit will cause the motor torque to decrease especially at a low speed. The following table shows a selection example for the wiring length of 20 m at the ND rating. When using the inverter with the LD rating, refer to the FR-E800 Instruction Manual (Connection).

Applicable inverter model	Terminal screw size *1	Tightening torque N·m	Crimp terminal		Cable gauge							
			R/L1, S/L2, T/L3	U, V, W	HV cables, etc. (mm ²) *1	AWG *2	PVC cables, etc. (mm ²) *3	Earthing (grounding) cable	R/L1, S/L2, T/L3	U, V, W	Earthing (grounding) cable	
FR-E820-0008(0.1K) to 0050(0.75K)	M3.5	1.2	2-3.5	2-3.5	2	2	2	14	14	2.5	2.5	2.5
FR-E820-0080(1.5K), 0110(2.2K)	M4	1.5	2-4	2-4	2	2	2	14	14	2.5	2.5	2.5
FR-E820-0175(3.7K)	M4	1.5	5-5.4	5-5.4	3.5	3.5	3.5	12	12	4	4	4
FR-E820-0240(5.5K)	M5	2.5	5-5.5	5-5.5	5.5	5.5	5.5	10	10	6	6	6
FR-E820-0300(7.5K)	M5	2.5	14-5	8-5	14	8	5.5	6	6	16	10	6
FR-E820-0470(11K)	M5	2.5	14-5	14-5	14	14	8	6	6	16	16	16
FR-E820-0600(15K)	M6(M5)	4.4	22-6	22-6	22	22	14	4	4	25	25	16
FR-E820-0760(18.5K)	M8(M6)	7.8	38-8	22-8	38	22	14	2	4	35	25	25
FR-E820-0900(22K)	M8(M6)	7.8	38-8	38-8	38	22	2	2	2	35	35	25
FR-E840-0016(0.4K) to 0095(3.7K)	M4	1.5	2-4	2-4	2	2	2	14	14	2.5	2.5	2.5
FR-E840-0120(5.5K)	M4	1.5	5-5.4	2-4	3.5	2	3.5	12	14	4	2.5	4
FR-E840-0170(7.5K)	M4	1.5	5-5.4	5-5.4	3.5	3.5	3.5	12	12	4	4	4
FR-E840-0230(11K)	M4	1.5	5-5.4	5-5.4	3.5	3.5	3.5	10	10	6	6	10
FR-E840-0300(15K)	M5	2.5	8-5	8-5	8	8	5.5	8	8	10	10	10
FR-E840-0380(18.5K)	M6	4.4	14-6	8-6	14	8	8	6	6	16	10	16
FR-E840-0440(22K)	M6	4.4	14-6	14-6	14	14	8	6	6	16	16	16
FR-E820S-0008(0.1K) to 0030(0.4K)	M3.5	1.2	2-3.5	2-3.5	2	2	2	14	14	2.5	2.5	2.5
FR-E820S-0050(0.75K)	M4	1.5	2-4	2-4	2	2	2	14	14	2.5	2.5	2.5
FR-E820S-0080(1.5K)	M4	1.5	2-4	2-4	2	2	2	14	14	2.5	2.5	2.5
FR-E820S-0110(2.2K)	M4	1.5	5-5.4	2-4	3.5	2	3.5	12	14	4	2.5	2.5
FR-E810W-0008(0.1K) to 0030(0.4K)	M3.5	1.2	2-3.5	2-3.5	2	2	2	14	14	2.5	2.5	2.5
FR-E810W-0050(0.75K)	M4	1.5	5-5.4	2-4	3.5	2	3.5	12	14	4	2.5	2.5

*1 The cable size is that of the HV cable (600 V grade heat-resistant PVC insulated wire) etc. with continuous maximum permissible temperature of 75°C. It assumes a surrounding air temperature of 50°C or lower and the wiring distance of 20 m or shorter.
 *2 For use in the United States or Canada, refer to the section 7.2 "Instructions for UL and cUL".
 *3 The cable size is that of the PVC cable with continuous maximum permissible temperature of 90°C. It assumes a surrounding air temperature of 40°C or lower and the wiring distance of 20 m or shorter.
 *4 The screw size for terminals R/L1, S/L2, T/L3, U, V, W, PR, P+, N-, and P1, and the earthing (grounding) terminal is shown. For the single-phase 200 V power input models, the screw size for terminals R/L1, S/L2, U, V, W, PR, P+, N-, and P1, and the earthing (grounding) terminal is shown. For the single-phase 100 V power input models, the screw size for terminals R/L1, S/L2, U, V, W, PR, P+, and N-, and the earthing (grounding) terminal is shown. The screw size for the earthing (grounding) terminal on FR-E820-0600(15K) to FR-E820-0900(22K) is indicated in parentheses. When using a single-phase power input model, terminals are R/L1 and S/L2.

The line voltage drop can be calculated by the following formula:
 Line voltage drop [V] = $\sqrt{3} \times$ wire resistance [mΩ/m] \times wiring distance [m] \times current [A] / 1000
 Use a larger diameter cable when the wiring distance is long or when it is desired to decrease the voltage drop (torque reduction) in the low speed range.

◆ Total wiring length

Connect one or more motors within the total wiring length (sum of the wiring lengths of the motor and the inverter) shown in the following table.

Cable type	Pr.72 setting (carrier frequency)	Voltage class	0.1K	0.2K	0.4K	0.75K	1.5K	2.2K	3.7K or higher
Shielded *1	1 (1 kHz) or lower	100 V, 200 V	50 m (200 m)	50 m (200 m)	75 m (300 m)	100 m (500 m)	100 m (500 m)	100 m (500 m)	100 m (500 m)
		400 V	—	—	50 m (200m)	50 m (200m)	75 m (300m)	100 m (500m)	100 m (500m)
Shielded *1	2 (2 kHz) or higher	100 V, 200 V	10 m (30 m)	25 m (100 m)	50 m (200 m)	75 m (300 m)	100 m (500 m)	100 m (500 m)	100 m (500 m)
		400 V	—	—	10 m (30 m)	25 m (100 m)	50 m (200 m)	75 m (300 m)	100 m (500 m)

*1 The value in the parentheses is the total wiring length when unshielded cables are used. When driving a 400 V class motor by the inverter, surge voltages attributable to the wiring constants may occur at the motor terminals, deteriorating the insulation of the motor. In this case, use a "400 V class inverter-driven insulation-enhanced motor" and set **Pr.72 PWM frequency selection** according to the wiring length: "14.5 kHz or less" when the wiring length is 50 m or shorter, "8 kHz or less" when the wiring length is from 50 m to 100 m, or "2 kHz or less" when the wiring length is longer than 100 m.

2.4 Terminal connection diagram

Terminal connection diagram showing power supply, control circuit, and motor connections. Includes source logic, sink logic, and various terminal assignments.

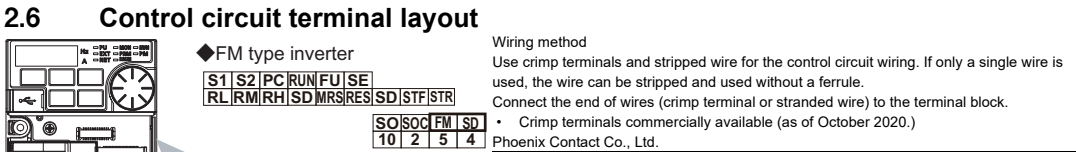
Control input signals (No voltage input allowed):
 *1 Terminal functions vary with the input terminal assignment (Pr. 178 to Pr. 184).
 *2 The initial setting varies depending on the specification.
 *3 It is recommended to use 2W/1KΩ when the frequency setting signal is changed frequently.

Output signals:
 *4 Terminal functions vary by the relay output selection.
 *5 Terminal functions vary with the output terminal assignment (Pr. 190 and Pr. 191).
 *6 It is not necessary when the output signal is selected from the operation panel.
 *7 It is recommended to use 2W/1KΩ when the frequency setting signal is changed frequently.

2.5 Details on the main circuit terminals and the control circuit terminals

Type	Terminal symbol	Common	Terminal name	Terminal function description
Main circuit	R/L1, S/L2, T/L3	—	AC power input	Connected to the commercial power supply. Do not connect anything to these terminals when using the high power factor converter (FR-HC2) or the multifunction regeneration converter (FR-FC) in common bus regeneration mode.
	U, V, W	—	Inverter output	Connected to a three-phase squirrel cage motor or a PIM motor.
Main circuit	P+, PR	—	Brake resistor connection	Connect an optional brake transistor (MRS, MYS, FR-ABR) between terminal P+ and PR. (Not available for FR-E820-0008(0.1K), FR-E820-0016(0.4K), FR-E820S-0008(0.1K), FR-E820S-0016(0.4K), FR-E810W-0008(0.1K), and FR-E810W-0016(0.4K).)
	P+, N-,	—	Brake unit connection	Connect the brake unit (FR-BU2, FR-BU, or BU), multifunction regeneration converter (FR-FC), or high power factor converter (FR-HC2) to these terminals.
Main circuit	P+, P1/2	—	DC reactor connection	Remove the jumper across terminals P+ and P1, and connect a DC reactor. A DC reactor cannot be connected to the single-phase 100 V power input models. When a DC reactor is not connected, the jumper across terminals P+ and P1 should not be removed.
	—	—	Earth (ground)	For earthing (grounding) the inverter chassis. Be sure to earth (ground) the inverter.
Control input	STF*	—	Forward rotation start	Turn ON the STF signal to start forward rotation and turn it OFF to stop. When the STF and STR signals are turned ON simultaneously, the stop command is given.
	STR*	SD (sink, negative common)	Reverse rotation start	Turn ON the STR signal to start reverse rotation and turn it OFF to stop.
Control input	RH, RM, RL	—	Multi-speed selection	Multi-speed can be selected according to the combination of RH, RM and RL signals.
	MRS*	PC (source, positive common)	Output stop	Turn ON the MRS signal (5 ms or more) to stop the inverter output. Use this signal to reset a fault output provided when a protective function is activated. Turn ON the RES signal for 0.1 second or longer, then turn it OFF. In the initial setting, reset is always enabled. By setting Pr.73, reset can be enabled only at an inverter fault occurrence. The inverter will restart about 1 second after the reset.
Control input	RES*	—	Reset	Use this signal to reset a fault output provided when a protective function is activated. Turn ON the RES signal for 0.1 second or longer, then turn it OFF. In the initial setting, reset is always enabled. By setting Pr.73, reset can be enabled only at an inverter fault occurrence. The inverter will restart about 1 second after the reset.
	10	5	Power supply for a frequency setting potentiometer	As the power supply for an external frequency setting (speed setting) potentiometer.
Frequency setting	2	5	Frequency setting (voltage)	Inputting 0 to 5 VDC (or 0 to 10 VDC) provides the maximum output frequency at 5 (or 10) V and makes input and output proportional. Use Pr.73 to switch among the initial setting values depending on the specification. Set the voltage/current input switch to the "V" position to select current input (0 to 20 mA). Inputting 4 to 5 VDC (or 0 to 5 VDC, 0 to 10 VDC) provides the maximum output frequency at 20 mA and makes input and output proportional. This input signal is valid only when the AU signal is ON (terminal 2 input is invalid). Use the terminal 4 (current input at initial setting), assign "4" to any parameter from Pr.178 to Pr.184 (input terminal function selection) before turning ON the AU signal. The initial setting varies depending on the specification. Use Pr.287 to switch among input 4 to 20 mA (initial setting), 0 to 5 VDC, and 0 to 10 VDC. Set the voltage/current input switch in the "V" position to select voltage input (0 to 5 V / 0 to 10 V).
	4	5	Frequency setting (current)	Inputting 0 to 5 VDC (or 0 to 10 VDC) provides the maximum output frequency at 5 (or 10) V and makes input and output proportional. Use Pr.73 to switch among the initial setting values depending on the specification. Set the voltage/current input switch to the "I" position to select current input (0 to 20 mA). Inputting 4 to 5 VDC (or 0 to 5 VDC, 0 to 10 VDC) provides the maximum output frequency at 20 mA and makes input and output proportional. This input signal is valid only when the AU signal is ON (terminal 2 input is invalid). Use the terminal 4 (current input at initial setting), assign "4" to any parameter from Pr.178 to Pr.184 (input terminal function selection) before turning ON the AU signal. The initial setting varies depending on the specification. Use Pr.287 to switch among input 4 to 20 mA (initial setting), 0 to 5 VDC, and 0 to 10 VDC. Set the voltage/current input switch in the "V" position to select voltage input (0 to 5 V / 0 to 10 V).
Relay	A, B, C	—	Relay output (fault output)	1-changerover contact output indicates that the inverter protective function has activated and the outputs are stopper. Fault: discontinuity across A and C (continuity across A and C), Normal: continuity across B and C (discontinuity across A and C).
	RUN	SE	Inverter running	The output is in LOW state when the inverter output frequency is equal to or higher than the starting frequency (initial value: 0.5 Hz). The output is in HIGH state during stop or DC injection brake operation. *4
Output signal	FU	SE	Frequency detection	The output is in LOW state when the inverter output frequency is equal to or higher than the preset detection frequency, and is in HIGH state when it is less than the preset detection frequency. *4
	FM*	SD	For indication on external meters	Among several monitor items such as output frequency, select one to output it via these terminals. (The signal is not output during an inverter reset.)
Analog	AM*	5	Analog voltage output	Output item: Output frequency (initial setting). Output resistance: 0 ±10 VDC, permissible load current: 1 mA (load impedance: 10 kΩ or more), resolution: 12 bits.
	S1	PC	Safety stop input (Channel 1)	Use terminals S1 and S2 to receive the safety stop signal input from the safety relay module. Terminals S1 and S2 can be used at a time (dual channel). The inverter judges the condition of the internal safety circuit from the status (shorted/opened) between terminals S1 and PC, or between S2 and PC. When the status is opened, the inverter output is shut off. In the initial status, terminal S1 and S2 are shorted with terminal PC by shorting wires. Remove the shorting wires and connect the safety relay module when using the safety stop function.
Safety stop function	S2	PC	Safety stop input (Channel 2)	Use terminals S1 and S2 to receive the safety stop signal input from the safety relay module. Terminals S1 and S2 can be used at a time (dual channel). The inverter judges the condition of the internal safety circuit from the status (shorted/opened) between terminals S1 and PC, or between S2 and PC. When the status is opened, the inverter output is shut off. In the initial status, terminal S1 and S2 are shorted with terminal PC by shorting wires. Remove the shorting wires and connect the safety relay module when using the safety stop function.
	SO	SOC	Safety monitor output (open collector output)	The output status varies depending on the input status of the safety stop signals. The output is in HIGH state during occurrence of the internal safety circuit fault. The output is in LOW state otherwise. (The open collector transistor is ON (conductive) in LOW state. The transistor is OFF (not conductive) in HIGH state.) Refer to the FR-E800 Instruction Manual (Functional Safety) (BCN-A23488-000) when the signal is switched to HIGH while both terminals S1 and S2 are open. (Please contact your sales representative for the manual.) Permissible load: 24 VDC (at maximum), 0.1 A (The voltage drop is 3.4 V at maximum while the signal is ON.)
Common terminal	—	—	Contact input common (sink, negative common)	Common terminal for the contact input terminal (sink logic) and terminal FM.
	—	—	External transistor common (sink, negative common)	Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the sink logic to avoid malfunction by undesirable current.
Common terminal	—	—	Safety stop input terminal common (source, positive common)	Common terminal for the safety stop input terminals.
	—	—	Contact input common (source, positive common)	Common terminal for the contact input terminal (source logic).
Common terminal	—	—	24 VDC power supply common	Can be used as a 24 VDC 0.1 A power supply.
	—	—	Frequency setting common	Common terminal for the frequency setting signal (terminal 2 or 4). Do not earth (ground).
Common terminal	—	—	Open collector output common	

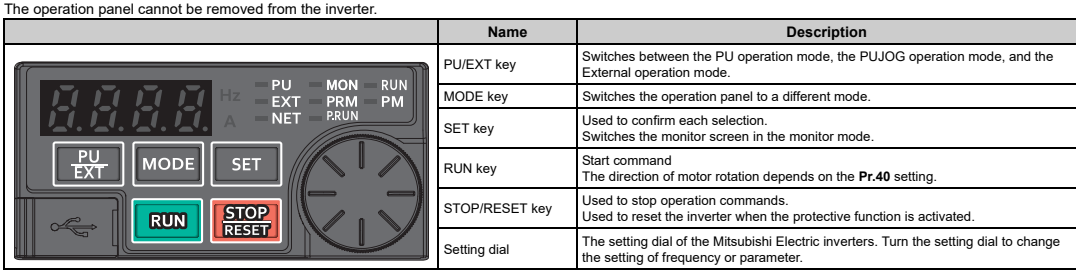
Type	Terminal symbol	Common	Terminal name	Terminal function description
Communication	---	---	PUJ connector	With the PUJ connector, communication can be made through RS-485. - Conforming standard: EIA-485 (RS-485) Transmission format: Multi-drop link - Communication speed: 300 to 115200 bps - Overall length: 500 m
			USB connector*6	Use the USB connector to communicate with a personal computer. Setting and monitoring of the inverter is enabled using FR Configurator2. * Interface: conforms to USB 1.1 (Transmission speed: 12 Mbps) * Connector: USB mini B connector (receptacle mini B type)



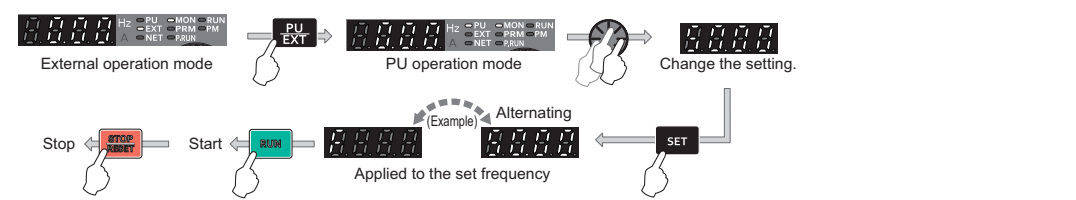
Wire gauge (mm ²)	With insulation sleeve	Without insulation sleeve	For UL wire*1	Crimping tool model No.
0.3	AI 0.34-10TW	---	---	---
0.5	AI 0.5-10WH	---	AI 0.5-10WH-GB	---
0.75	AI 0.75-10GV	A 0.75-10	AI 0.75-10GV-GB	CRIMPFOX 6
1	AI 1-10RD	A 1-10	AI 1-10RD/100GB	---
1.25, 1.5	AI 1, 5-10BK	A 1.5-10	AI 1.5-10BK/100GB*2	---
0.75 (for 2 wires)	AI-TWIN 2x0.75-10GV	---	---	---

3 BASIC OPERATION

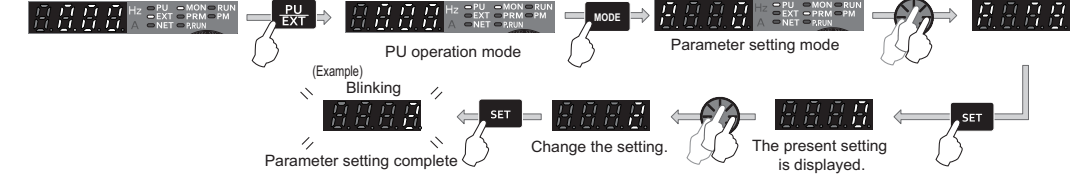
3.1 Components of the operation panel



Starting/stopping the inverter on the operation panel



Parameter setting



4 PARAMETERS

For details, refer to the FR-E800 Instruction Manual (Function). The PDF manual can also be downloaded from the Mitsubishi Electric FA Global Website.

5 LIST OF FAULT DISPLAYS

For details, refer to the FR-E800 Instruction Manual (Maintenance). The PDF manual can also be downloaded from the Mitsubishi Electric FA Global Website.



6 SPECIFICATIONS

6.1 Inverter installation environment

Item	Description
Surrounding air temperature*1	-20°C to +60°C *1 (The rated current must be reduced at a temperature above 50°C. To meet the UL/EN standards, use the product at temperatures from -20°C to 50°C.)
Ambient humidity	95% RH or less (non-condensing) (With circuit board coating (IEC 60721-3-11994 3C2 compatible)) 90% RH or less (non-condensing) (Without circuit board coating)
Storage temperature	-40°C to +70°C
Atmosphere	Indoors (free from corrosive gas, flammable gas, oil mist, dust and dirt)
Altitude/vibration	Maximum 3000 m, 5.9 m/s ² or less (For installation at an altitude above 1000 m, consider a 3% reduction in the rated current per 500 m increase in altitude.)

6.2 Inverter rating

◆ Three-phase 200 V class

Model FR-E820-□	0008 0015 0030 0050 0080 0110 0175 0240 0330 0470 0600 0760 0900														
	0.1K	0.2K	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K		
Applicable motor capacity (kW)*1	LD	0.2	0.4	0.75	1.1	2.2	3.0	5.5	7.5	11.0	15.0	18.5	22.0	30.0	
	ND	0.1	0.2	0.4	0.75	1.1	2.2	3.0	5.5	7.5	11.0	15.0	18.5	22.0	
Rated capacity (kVA)*2	LD	0.5	0.8	1.4	2.4	3.8	4.8	7.8	12.0	15.0	22.3	27.5	35.1	45.8	
	ND	0.3	0.6	1.2	2.0	3.2	4.4	7.0	9.6	13.1	18.7	23.9	30.3	35.9	
Rated current (A)*7	LD	1.3	2.0	3.5	6.0	9.6	12.0	19.6	30.0	40.0	56.0	69.0	88.0	115.0	
	ND	1.1	1.7	3.0	5.1	8.2	10.2	16.7	25.5	34.0	47.6	58.7	74.8	97.8	
Output	LD	0.8	1.5	3.0	5.0	8.0	11.0	17.5	24.0	33.0	47.0	60.0	76.0	90.0	
	ND	0.8	1.5	3.0	5.0	8.0	11.0	17.5	24.0	33.0	47.0	60.0	76.0	90.0	
Overload current rating*3	LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C													
	ND	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C													
Voltage*4	Three-phase 200 to 240 V														
	Built-in														
Regenerative braking	Not installed	Built-in													
	Maximum brake torque (ND reference)*5	100%	100%	50%	20%										
Rated input AC (DC) voltage/frequency	Three-phase 200 to 240 V 50/60 Hz (283 to 339 V/50 Hz)*9														
	Permissible AC (DC) voltage fluctuation 170 to 264 V, 50/60 Hz (240 to 373 V/50 Hz)*9														
Permissible frequency fluctuation	±5%														
	Rated input current (A)*8	Without DC reactor	LD	1.9	3.0	5.1	8.2	12.5	16.1	25.5	37.1	48.6	74.3	90.5	112.9
With DC reactor		ND	1.4	2.3	4.5	7.0	10.7	15.0	23.1	30.5	41.0	63.6	79.9	99.0	114.3
Power supply capacity (kVA)*6	Without DC reactor	LD	0.8	1.5	3.0	5.0	8.0	11.0	17.5	24.0	33.0	47.0	60.0	76.0	90.0
	With DC reactor	ND	0.8	1.5	3.0	5.0	8.0	11.0	17.5	24.0	33.0	47.0	60.0	76.0	90.0
Protective structure (IEC 60529)	Open type (IP20)														
	Cooling system Natural Forced air														
Approx. mass (kg)	0.5	0.5	0.7	1.0	1.4	1.4	1.8	3.3	3.3	5.4	5.6	11.0	11.0		

◆ Three-phase 400 V class

Model FR-E840-□	0016 0026 0040 0060 0095 0120 0170 0230 0300 0380 0440												
	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K		
Applicable motor capacity (kW)*1	LD	0.75	1.5	2.2	3.0	5.5	7.5	11.0	15.0	18.5	22.0	30.0	
	ND	0.4	0.75	1.5	2.2	3.0	5.5	7.5	11.0	15.0	18.5	22.0	
Rated capacity (kVA)*2	LD	1.6	2.7	4.2	5.3	8.5	13.3	17.5	26.7	31.2	34.3	45.7	
	ND	1.2	2.0	3.0	4.6	7.2	9.1	13.0	17.5	22.9	29.0	33.5	
Rated current (A)*7	LD	2.1	3.5	5.5	6.9	11.1	17.5	23.0	35.0	41.0	45.0	60.0	
	ND	1.8	3.0	4.7	5.9	9.4	14.9	19.6	29.8	34.9	38.3	51.0	
Output	LD	1.6	2.6	4.0	6.0	9.5	12.0	17.0	23.0	30.0	38.0	44.0	
	ND	1.4	2.2	3.8	5.4	8.7	11.0	16.0	21.0	27.0	34.0	40.0	
Overload current rating*3	LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C											
	ND	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C											
Voltage*4	Three-phase 380 to 480 V												
	Built-in												
Regenerative braking	Not installed	Built-in											
	Maximum brake torque (ND reference)*5	100%	50%	20%									
Rated input AC (DC) voltage/frequency	Three-phase 380 to 480 V 50/60 Hz (537 to 679V/50 Hz)*9												
	Permissible AC (DC) voltage fluctuation 323 to 528 V, 50/60 Hz (457 to 740V/50 Hz)*9												
Permissible frequency fluctuation	±5%												
	Rated input current (A)*8	Without DC reactor	LD	3.3	6.0	8.9	10.7	16.2	24.9	32.4	46.7	54.2	59.1
With DC reactor		ND	2.7	4.4	6.7	9.5	14.1	17.8	24.7	32.1	41.0	50.8	57.3
Power supply capacity (kVA)*6	Without DC reactor	LD	2.1	3.5	5.5	6.9	11.0	18.0	23.0	35.0	41.0	45.0	60.0
	With DC reactor	ND	1.8	2.6	4.0	6.0	9.5	12.0	17.0	23.0	30.0	38.0	44.0
Protective structure (IEC 60529)	Open type (IP20)												
	Cooling system Natural Forced air												
Approx. mass (kg)	1.2	1.2	1.4	1.8	1.8	2.4	2.4	4.8	4.9	11.0	11.0		

◆ Single-phase 200 V class

Model FR-E820S-□	0008 0015 0030 0050 0080 0110							
	0.1K	0.2K	0.4K	0.75K	1.5K	2.2K		
Applicable motor capacity (kW)*1	LD	0.1	0.2	0.4	0.75	1.5	2.2	
	ND	0.1	0.2	0.4	0.75	1.5	2.2	
Rated capacity (kVA)*2	LD	0.3	0.6	1.2	2.0	3.2	4.4	
	ND	0.3	0.6	1.2	2.0	3.2	4.4	
Rated current (A)*7	LD	0.8	1.5	3.0	5.0	8.0	11.0	
	ND	0.8	1.5	3.0	5.0	8.0	11.0	
Output	LD	0.5	0.9	1.7	2.5	3.9	5.5	
	ND	0.3	0.6	1.1	1.9	3.0	4.2	
Overload current rating*3	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C							
	Three-phase 200 to 240 V							
Voltage*4	Three-phase 200 to 240 V							
	Not installed							
Regenerative braking	Not installed	Built-in						
	Maximum brake torque (ND reference)*5	150%	100%	50%	20%			
Rated input AC voltage/frequency	Single-phase 200 to 240 V 50/60 Hz							
	Permissible AC voltage fluctuation 170 to 264 V, 50/60 Hz							
Permissible frequency fluctuation	±5%							
	Rated input current (A)*8	Without DC reactor	LD	2.3	4.1	7.9	11.2	17.9
With DC reactor		ND	1.4	2.6	5.2	8.7	13.9	19.1
Power supply capacity (kVA)*6	Without DC reactor	LD	0.5	0.9	1.7	2.5	3.9	5.5
	With DC reactor	ND	0.3	0.6	1.1	1.9	3.0	4.2
Protective structure (IEC 60529)	Open type (IP20)							
	Cooling system Natural Forced air							
Approx. mass (kg)	0.5	0.5	0.8	1.3	1.4	1.9		

◆ Single-phase 100 V class

Model FR-E810W-□	0008 0015 0030 0050					
	0.1K	0.2K	0.4K	0.75K		
Applicable motor capacity (kW)*1	LD	0.1	0.2	0.4	0.75	
	ND	0.1	0.2	0.4	0.75	
Rated capacity (kVA)*2	LD	0.3	0.6	1.2	2.0	
	ND	0.3	0.6	1.2	2.0	
Rated current (A)*7	LD	0.8	1.5	3.0	5.0	
	ND	0.8	1.5	3.0	5.0	
Output	LD	0.5	0.9	1.7	2.5	
	ND	0.3	0.6	1.1	1.9	
Overload current rating*3	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C					
	Three-phase 100 to 120 V 50/60 Hz					
Voltage*10*11	Three-phase 200 to 240 V					
	Not installed					
Regenerative braking	Not installed	Built-in				
	Maximum brake torque (ND reference)*5	150%	100%			
Rated input AC voltage/frequency	Single-phase 100 to 120 V 50/60 Hz					
	Permissible AC voltage fluctuation 90 to 132 V, 50/60 Hz					
Permissible frequency fluctuation	±5%					
	Rated input current (A)*8	Without DC reactor	LD	3.7	6.8	12.4
With DC reactor		ND	3.7	6.8	12.4	19.6
Protective structure (IEC 60529)	Open type (IP20)					
	Cooling system Natural					
Approx. mass (kg)	0.5	0.6	0.8	1.4		

- The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi Electric 4-pole standard efficiency motor.
- The rated output capacity assumes that the output voltage is 230 V for three-phase 200 V class and single-phase 200V/100 V class, and 440 V for three-phase 400 V class.
- The value of the overload current is the maximum value of the rated output current. For detailed data, refer to the FR-E800-0001(1K), FR-E800-0001(1.5K), FR-E800-0001(2K), FR-E800-0001(3K), FR-E800-0001(4K), FR-E800-0001(5.5K), FR-E800-0001(7.5K), FR-E800-0001(11K), FR-E800-0001(15K), FR-E800-0001(18.5K), FR-E800-0001(22K).
- The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. The maximum part of the voltage waveform at the output side of the inverter is approximately the power supply voltage multiplied by 1.1.
- The amount of braking torque is the average short-term torque (which varies depending on motor loads) that is generated when a motor decelerates in the shortest time by itself from 60 Hz. It is not continuous regenerative torque. The average deceleration torque becomes lower when a motor decelerates in a frequency higher than the base frequency. The inverter is not equipped with a built-in brake resistor. Use an option brake resistor for an operation with large regenerative power. For detailed data, refer to the FR-E800-0001(1K), FR-E800-0001(1.5K), FR-E800-0001(2K), FR-E800-0001(3K), FR-E800-0001(4K), FR-E800-0001(5.5K), FR-E800-0001(7.5K), FR-E800-0001(11K), FR-E800-0001(15K), FR-E800-0001(18.5K), FR-E800-0001(22K).
- The value of the power supply capacity is the value of the power supply side impedance (including those of the input reactor and cables).
- The value of the power supply capacity is the value of the power supply side impedance (including those of the input reactor and cables).
- When the input current is regulated from the value when at the rated output current, the impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
- When the input current is regulated from the value when at the rated output current, the impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
- When the input current is regulated from the value when at the rated output current, the impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
- When the input current is regulated from the value when at the rated output current, the impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
- When the input current is regulated from the value when at the rated output current, the impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
- When the input current is regulated from the value when at the rated output current, the impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
- When the input current is regulated from the value when at the rated output current, the impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
- When the input current is regulated from the value when at the rated output current, the impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.

7 APPENDIX

For information on other applicable standards not found in this document, refer to the FR-E800 Instruction Manual (Connection).

7.1 Instructions for compliance with the EU Directives

- The authorized representative in the EU
- The authorized representative in the EU is shown below.
- Name: Mitsubishi Electric Europe B.V.
- Address: Mitsubishi-Electro-Platz 1, 40882 Ratingen, Germany
- EMC Directive
- This inverter conforms with the EMC Directive and affix the CE marking on the inverter.
- EMC Directive: 2014/53/EU
- Standard: IEC 61800-3:2017 (Category 'C3' / Second environment)
- This inverter is not intended to be used on a low-voltage public network which supplies domestic premises. When using the inverter in a residential area, take appropriate measures and ensure the conformity of the inverter used in the residential area.
- Radio frequency interference is expected if used on such a network.
- The installer shall provide a guide for installation and use, including recommended mitigation devices.
- Notes
- Set the EMC Directive compliant EMC filter to the inverter. Install in-line noise filters and ferrite cores to the power and control cables as required.
- Connect the inverter to an earthed power supply.
- Install the motor, EU Directive compliant EMC filter, and controller cable found in the EMC Installation Guidelines (BCN-A2104-204) according to the instructions. (Contact your sales representative for the manual.)
- To make full use of the EMC Directive compliant noise filter, motor cable lengths should not exceed 20 m.
- Ensure that the finalized system which includes an inverter complies with the EMC Directive.
- Low Voltage Directive
- We have self-certified our inverters as products compliant to the Low Voltage Directive and affix the CE marking on the inverters.
- Low Voltage Directive: 2014/35/EU
- Standard: EN 61800-5-1:2007
- Outline of instructions
- Do not use an earth leakage circuit breaker as an electric shock protector without connecting the equipment to the earth. Connect the equipment to the earth (ground) securely.
- Wire the earth terminal independently. (Do not connect two or more cables to one terminal.)
- Use the cable whose size is indicated in Section 2.3 at the surrounding air temperature up to 40°C.
- If conditions are different from above, select appropriate wire according to EN 60204.
- Use a ferrite (plating should not include zinc) crimping terminal to connect the earth (ground) cable. When tightening the screw, be careful not to damage the threads. For use as a product compliant with the Low Voltage Directive, use PVC cables for I/O wiring.
- Use PVC cables for I/O wiring.
- Use the modified case circuit breaker and magnetic contactor which conform to the EN or IEC standard.
- If an earth leakage circuit breaker is required, use a type-B earth leakage circuit breaker (ACDC detection compatible).
- Use the inverter under the conditions of overvoltage category III specified in IEC 60664.
- To use the inverter under the conditions of pollution degree 3, install it in the enclosure of IP54 or higher.