

INVERTER

E800-E


INVERTER SAFETY GUIDELINE

FR-E820-0008(0.1K) to 0900(22K)E

FR-E840-0016(0.4K) to 0440(22K)E



FR-E820S-0008(0.1K) to 0110(2.2K)E

FR-E810W-0008(0.1K) to 0050(0.75K)E



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.

ModelFR-E800-E GAIYOUSETUIMEI E8UNModel code1A J033



IB-0600860ENG-J(2405)MEE
Specifications subject to change without notice.

◆ Related manuals

Manual name	Manual number	Model code	Details
FR-E800 Instruction Manual (Connection)	IB-060086ENG	1AJ048	Manuals describing installation, wiring, specifications, outline dimensions, standards, and how to connect options
FR-E800 Instruction Manual (Function)	IB-060086ENG	1AJ045	Manual describing details of the functions.
FR-E800 Instruction Manual (Communication)	IB-0600871ENG	1AJ051	Manual describing details of the communications.
FR-E800 Instruction Manual (Maintenance)	IB-0600874ENG	1AJ054	Manual describing how to identify causes of faults and warnings.
FR-E800 Instruction Manual (Functional Safety)	BCN-A23488-000	1AJ030	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 inspection 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.

1 INVERTER INSTALLATION AND PRECAUTIONS

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

- Install the inverter on a strong surface securely with screws.
- Leave enough clearances and take cooling measures.
- Avoid places where the inverter is subjected to direct sunlight, high temperature and high humidity.
- Install the inverter on a nonflammable wall surface.
- When tightening screws into the upper mounting holes, tilt the screwdriver seven to ten degrees (FR-E820-0050(0.75K) or lower, FR-E820S-0030(0.4K) or lower, FR-E810W-0030(0.4K) or lower).

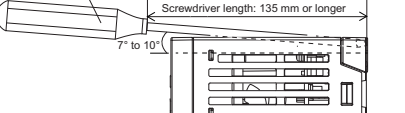
Allow clearance

10 cm or more

10 cm or more

10 cm or more

10 cm or more



F to 10°

Screwdriver length: 135 mm or longer

1 When using the inverter at the surrounding air temperature of 40°C or less, the inverter can be installed closely attached (5 cm clearance).
2 For the FR-E820-0470(1K) or higher and FR-E840-0230(1K) or higher, allow 5 cm or more clearance.

2 INSTALLATION AND WIRING

2.1 Removal and reinstallation of covers

◆ Removal 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.

◆ Reinstallation of the front cover

(a) Check the position of the hooks on the rear of the cover.

(b) Insert the hooks of the cover into the sockets of the wiring cover, and reinstall the cover to the inverter.

(c) Tighten the mounting screw of the front cover. (Tightening torque: 0.6 to 0.8 N·m)

◆ Removal of the lower front cover (FR-E820-0240(5.5K) or higher, FR-E840-0230(1K) 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.

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

◆ Reinstallation of the lower front cover (FR-E820-0240(5.5K) or higher, FR-E840-0230(1K) or higher)

(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 front cover.

◆ 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)

(a) Pull out the cover along the guides in the direction shown by the arrow in the figure above.

(b) Fit the cover to the inverter along the guides.

◆ 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)

(a) Insert a tool such as a flathead screwdriver into the half-hole above the "PUSH" mark on the wiring cover to push the stopper behind the wiring cover approx. 3 mm.

(b) Pull out the cover along the guides in the direction shown by the arrow in the figure above.

◆ 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-0.75K(0050)

(a) Insert a tool such as a flathead screwdriver into the half-hole above the "PUSH" mark on the wiring cover to push the stopper behind the wiring cover approx. 3 mm.

(b) Pull out the cover along the guides in the direction shown by the arrow in the figure above.

◆ 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-0.75K(0050)

(a) Insert a tool such as a flathead screwdriver into the half-hole above the "PUSH" mark on the wiring cover to push the stopper behind the wiring cover approx. 3 mm.

(b) Pull out the cover along the guides in the direction shown by the arrow in the figure above.

◆ Removal of the wiring cover (FR-E820-0240(5.5K) to 0600(15K), FR-E840-0230(1K), 0300(15K))

(a) Insert a tool such as a flathead screwdriver into the half-hole above the "PUSH" mark on the wiring cover to push the stopper behind the wiring cover approx. 3 mm.

(b) Pull out the cover along the guides in the direction shown by the arrow in the figure above.

◆ Reinstallation of the wiring cover (FR-E820-0240(5.5K) to 0600(15K), FR-E840-0230(1K), 0300(15K))

(a) Fit the cover to the inverter along the guides.

(b) Tighten the mounting screws of the wiring cover (tightening torque: 0.6 to 0.8 N·m).

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

(a) Remove the mounting screws of the wiring cover.

(b) Pull out the cover along the guides in the direction shown by the arrow in the figure above.

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

(a) Fit the cover to the inverter along the guides.

(b) Tighten the mounting screws of the wiring cover (tightening torque: 0.6 to 0.8 N·m).

◆ Removal of the lower front cover (FR-E820-0240(5.5K) or higher, FR-E840-0230(1K) 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.

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

◆ Reinstallation of the lower front cover (FR-E820-0240(5.5K) or higher, FR-E840-0230(1K) or higher)

(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 front cover.

◆ 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)

2.3 Applicable cables and wiring length

Select cables of recommended gauge size to ensure that the voltage drop will be 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 *1.5				AWG *2				
			U, V, W	Earth (grounding) terminal	Earth (grounding) terminal	Earth (grounding) terminal	U, V, W	Earth (grounding) terminal	Earth (grounding) terminal	Earth (grounding) terminal	
FR-E820-0008(0.1K) to 0050(0.75K)	M3.5	1.2	2-3.5	2-3.5	2	2	14	14	2.5	2.5	
FR-E820-0008(0.1K), 0110(2.2K)	M4	1.5	2-4	2-4	2	2	14	14	2.5	2.5	
FR-E820-0175(3.7K)	M4	1.5	5-5.4	5-5.4	3.5	3.5	12	12	4	4	
FR-E820-0240(5.5K)	M5	2.5	5-5.5	5-5.5	5.5	5.5	10	10	6	6	
FR-E820-0307(5.5K)	M5	2.5	14-5	8-5	14	8	5.5	6	8	16	
FR-E820-0470(1K)	M5	2.5	14-5	14-5	14	14	8	6	16	16	
FR-E820-0600(15K)	M5(M5)	4.4	22-6	22-6	22	22	14	4	25	25	
FR-E820-0760(18.5K)	M5(M5)	7.8	38-8	22-8	38	22	14	2	35	25	
FR-E820-0900(22K)	M5(M5)	7.8	38-8	38-8	38	38	22	2	35	35	
FR-E840-0016(0.4K) to 0095(3.7K)	M4	1.5	2-4	2-4	2	2	14	14	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	
FR-E840-0170(7.5K)	M4	1.5	5-5.4	5-5.4	3.5	3.5	3.5	12	12	4	
FR-E840-0230(1K)	M4	1.5	5-5.4	5-5.4	5.5	5.5	5.5	10	10	8	
FR-E840-0380(18.5K)	M5	2.5	8-5	8-5	8	8	5.5	8	10	10	
FR-E840-0380(18.5K)	M5	4.4	14-6	8-6	14	8	8	6	16	16	
FR-E840-0440(22K)	M5	4.4	14-6	14-6	14	14	14	8	16	16	
FR-E820S-0008(0.1K) to 0030(0.4K)	M3.5	1.2	2-3.5	2-3.5	2	2	14	14	2.5	2.5	
FR-E820S-0030(0.4K)	M4	1.5	2-4	2-4	2	2	14	14	2.5	2.5	
FR-E820S-0080(1.5K)	M4	1.5	2-4	2-4	2	2	14	14	2.5	2.5	
FR-E820S-0900(22K)	M4	1.5	5-5.4	2-4	3.5	2	2	12	14	4	
FR-E810W-0008(0.1K) to 0030(0.4K)	M3.5	1.2	2-3.5	2-3.5	2	2	14	14	2.5	2.5	
FR-E810W-0050(0.75K)	M4	1.5	5-5.4	2-4	3.5	2	2	14	14	2.5	2.5

- *1 Hiv cable (600 V grade heat-resistant PVC insulated wire) with a continuous maximum permissible temperature of 75°C. It is assumed that the cables will be used in a surrounding air temperature of 50°C or less and the wiring distance of 20 m or shorter.
- *2 THW cable with a continuous maximum permissible temperature of 75°C. It is assumed that the cables will be used in a surrounding air temperature of 40°C or less and the wiring distance of 20 m or shorter. For use in the United States or Canada, refer to the section 7.2 "Instructions for UL and cUL."
- *3 PVC cable with continuous maximum permissible temperature of 75°C. It is assumed that the cables will be used in a surrounding air temperature of 40°C or less and the wiring distance of 20 m or shorter (selection example mainly for use in Europe).
- *4 The cable 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. The screw size for the earthing (grounding) terminal on FR-E820-0600(15K) to FR-E820S-0900(22K) is indicated in parentheses. When using a single-phase power input model, terminals are R/L1 and S/L2.
- *5 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)
	2 (2 kHz) or higher	100 V	—	—	50 m (200 m)	50 m (200 m)	75 m (300 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)	100 m (500 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, "5 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

Single-phase power input

Single-phase AC power supply

Three-phase AC power supply

Control input signals (No voltage input allowed)

Source logic

Frequency setting signals (Analog)

Control circuit

Control circuit

Control circuit

Option connector

Option connector

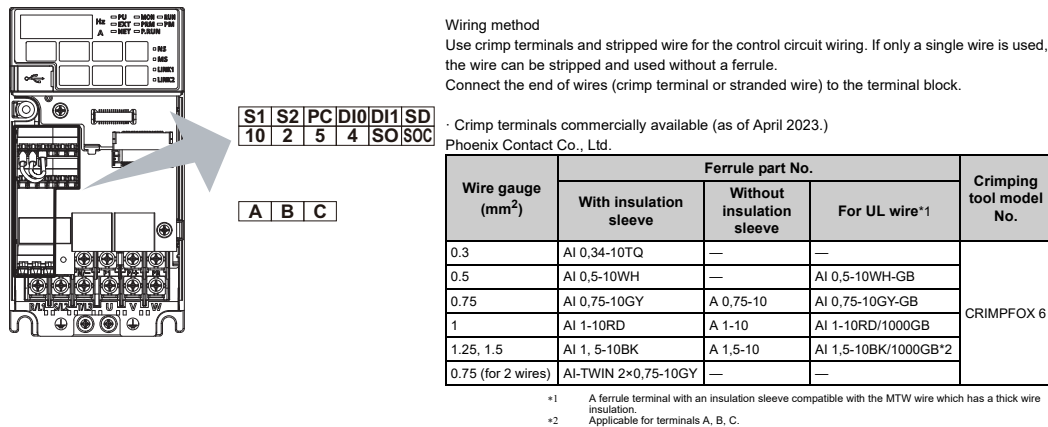
Option connector

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*1	—	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-XC) in common bus regeneration mode.
	U, V, W	—	Inverter output	Connected to a three-phase squirrel cage motor or a 2M motor.
	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-E820-0015(0.2K), FR-E820S-0008(0.1K), and FR-E820S-0015(0.2K), FR-E810W-0008(0.1K), and FR-E810W-0015(0.2K).)
	P+, N-	—	Brake unit connection	Connect the brake unit (FR-BU2, FR-BU3, or BU), multifunction regeneration converter (FR-XC), or high power factor converter (FR-HC2) to these terminals.
Input signal	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.
	DIO*3	SD (sink (negative common))	Forward rotation start	Turn ON the DIO signal to start forward rotation and turn it OFF to stop.
	D1*3	PC (source (positive common))	Reverse rotation start	Turn ON the D1 signal to start reverse rotation and turn it OFF to stop.
Frequency setting	10	5	Power supply for a frequency setting potentiometer	Used as the power supply for an external frequency setting (speed setting) potentiometer.
	2	5	Frequency setting (voltage)	Inputting to 5 VDC (or 0 to 10 VDC) provides the maximum output frequency at 5 V (or 10 V) and makes input and output proportional. Use Pr.73 to switch among input 0 to 5 VDC (initial setting), 0 to 10 VDC, and 0 to 20 mA. The initial setting varies depending on the specification.
	4	5	Frequency setting (current)	Inputting to 20 mA DC (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). To use the terminal 4 (current input at initial setting), assign "4" to Pr.178 or Pr.179 . (Input terminal function selection) before turning ON the AU signal. The initial setting varies depending on the specification. Use Pr.267 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)).
	A, B, C	—	Relay output (fault output)	1 changeover contact output indicates that the inverter protective function has activated and the outputs are stopped. Fault: discontinuity across B and C (continuity across A and C). Normal: continuity across B and C (discontinuity across A and C).
Safety stop function	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.
	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. 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.)
	SD	—	Contact input common (sink (negative common))	Common terminal for the contact input terminal (sink logic).
Common terminal	—	—	External transistor common (source (positive 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 source logic to avoid malfunction by undesirable current.
	—	—	External transistor common (sink (negative common))	Common output terminal for 24 VDC 0.1 A power supply (terminal PC). Isolated from terminals 5 and SE.
	PC	—	Safety stop input terminal common	Common terminal for safety stop input terminals.
	—	—	Contact input common (source (positive common))	Common terminal for the contact input terminal (source logic).
Communication	5	—	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).
	—	—	Safety monitor output terminal common	Common terminal for terminal SO.
	—	—	Ethernet connector (2 ports)*4	Communication can be made via Ethernet. Category: 10BASE-TX/10BASE-T Data transmission speed: 100 Mbps (10BASE-TX) / 10 Mbps (10BASE-T) Maximum segment length: 100 m between the hub and the inverter. Interface: RJ-45 Number of cascade connection stages: Up to 2 (10BASE-TX) / up to 4 (10BASE-T) Number of interfaces available: 1 (IP version: IPv4)
—	—	—	USB connector*5	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 V.1.1. Transmission speed: 12 Mbps Connector: USB mini B connector (receptacle mini B type)

- *1 Terminal T/L3 is not available for the single-phase power input models.
- *2 Terminal P1 is not available for the single-phase 100 V power input models.
- *3 Do not connect the parameter unit. The inverter may be damaged.
- *4 USB bus power connection is available. The maximum DCOR is 500 mA.
- *5 The open collector transistor is ON (conductive) in LOW state. The transistor is OFF (not conductive) in HIGH state.

2.6 Control circuit terminal layout



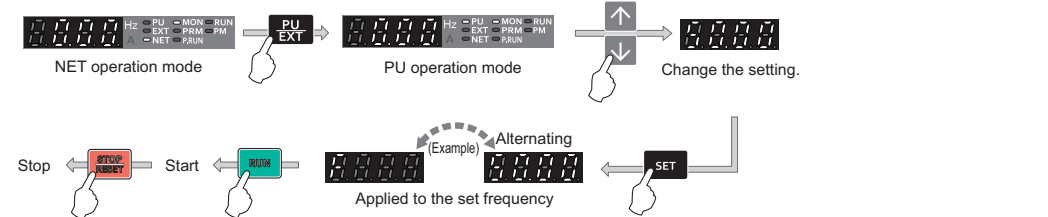
3 BASIC OPERATION

3.1 Components of the operation panel

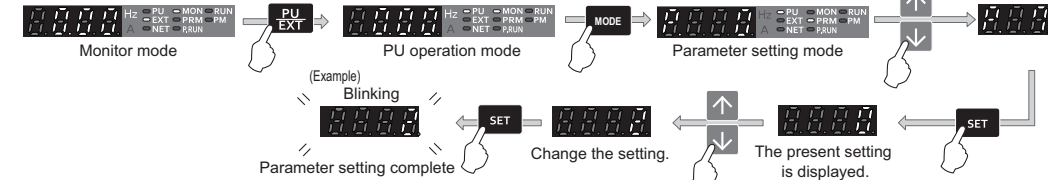
The operation panel cannot be removed from the inverter.

	Name	Description
	PU/EXT key	Switches between the PU operation mode, the PUJOG operation mode, and the External operation mode.
	MODE key	Switches the operation panel to a different mode.
	SET key	Used to confirm each selection. Switches the monitor screen in the monitor mode.
	RUN key	Start command. The direction of motor rotation depends on the Pr.40 setting.
	STOP/RESET key	Used to stop operation commands. Used to reset the inverter when the protective function is activated.
	UP/DOWN key(↑/↓)	Press this key to change the setting of frequency or parameter.

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 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	1.5	2.2	3.7	5.5	7.5	11.0	15.0	18.5	22.0
	LD	0.5	0.8	1.4	2.4	3.8	4.8	7.8	12.0	15.9	22.3	27.5	35.1	45.8
Rated capacity (kVA) *2	LD	0.3	0.6	1.2	2.0	3.2	4.4	7.0	9.6	13.1	18.7	23.9	30.3	35.0
	ND	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
	LD	(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)
Rated current (A) *7	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)	(1.4)	(2.5)	(4.1)	(7.0)	(10.0)	(16.5)	(23.0)	(31.0)	(44.0)	(57.0)	(72.0)	(86.0)
Output	LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	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	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C
Overload current rating *3	LD	Three-phase 200 to 240 V	Three-phase 200 to 240 V	Three-phase 200 to 240 V	Three-phase 200 to 240 V	Three-phase 200 to 240 V	Three-phase 200 to 240 V	Three-phase 200 to 240 V	Three-phase 200 to 240 V	Three-phase 200 to 240 V	Three-phase 200 to 240 V	Three-phase 200 to 240 V	Three-phase 200 to 240 V	Three-phase 200 to 240 V
	ND	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V
	LD	Three-phase 380 to 480 V 50/60 Hz (537 to 679VDC *9)	Three-phase 380 to 480 V 50/60 Hz (537 to 679VDC *9)	Three-phase 380 to 480 V 50/60 Hz (537 to 679VDC *9)	Three-phase 380 to 480 V 50/60 Hz (537 to 679VDC *9)	Three-phase 380 to 480 V 50/60 Hz (537 to 679VDC *9)	Three-phase 380 to 480 V 50/60 Hz (537 to 679VDC *9)	Three-phase 380 to 480 V 50/60 Hz (537 to 679VDC *9)	Three-phase 380 to 480 V 50/60 Hz (537 to 679VDC *9)	Three-phase 380 to 480 V 50/60 Hz (537 to 679VDC *9)	Three-phase 380 to 480 V 50/60 Hz (537 to 679VDC *9)	Three-phase 380 to 480 V 50/60 Hz (537 to 679VDC *9)	Three-phase 380 to 480 V 50/60 Hz (537 to 679VDC *9)	Three-phase 380 to 480 V 50/60 Hz (537 to 679VDC *9)
Permissible AC (DC) voltage fluctuation	LD	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%
	ND	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%
	LD	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%
Permissible frequency fluctuation	LD	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%
	ND	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%
	LD	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%
Rated input current (A) *8	LD	2.7	4.4	6.7	9.5	14.1	17.8	24.7	32.1	41.0	50.8	57.3	73.0	87.3
	ND	2.1	3.5	5.5	9.6	11.0	18.0	23.0	35.0	41.0	45.0	60.0	60.0	60.0
	LD	1.6	2.6	4.0	6.0	9.5	12.0	17.0	23.0	30.0	38.0	44.0	58.0	58.0
Power supply capacity (kVA) *6	LD	2.5	4.5	6.8	8.2	12.4	19.0	25.0	36.0	42.0	45.0	58.0	58.0	58.0
	ND	2.1	3.4	5.1	7.2	10.8	14.0	19.0	25.0	32.0	39.0	44.0	46.0	46.0
	LD	1.6	2.7	4.2	5.3	8.5	13.0	18.0	27.0	31.0	34.0	46.0	46.0	46.0
Protective structure	LD	2.0	3.0	4.6	7.2	9.1	13.0	18.0	23.0	29.0	34.0	34.0	34.0	34.0
	ND	2.0	3.0	4.6	7.2	9.1	13.0	18.0	23.0	29.0	34.0	34.0	34.0	34.0
Cooling system	LD	Open type (IP20 for IEC 60529 only)	Open type (IP20 for IEC 60529 only)	Open type (IP20 for IEC 60529 only)	Open type (IP20 for IEC 60529 only)	Open type (IP20 for IEC 60529 only)	Open type (IP20 for IEC 60529 only)	Open type (IP20 for IEC 60529 only)	Open type (IP20 for IEC 60529 only)	Open type (IP20 for IEC 60529 only)	Open type (IP20 for IEC 60529 only)	Open type (IP20 for IEC 60529 only)	Open type (IP20 for IEC 60529 only)	Open type (IP20 for IEC 60529 only)
	ND	Natural	Natural	Natural	Natural	Natural	Natural	Natural	Natural	Natural	Natural	Natural	Natural	Natural
	LD	1.2	1.2	1.4	1.8	1.8	2.4	2.4	4.8	4.9	11.0	11.0	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	3.7	5.5	7.5	11.0	15.0	18.5	22.0
	LD	1.6	2.7	4.2	5.3	8.5	13.0	17.5	26.7	31.2	34.3	45.7
Rated capacity (kVA) *2	LD	1.2	2.0	3.0	4.6	7.2	9.1	13.0	17.5	22.9	29.0	33.5
	ND	2.1	3.5	5.5	9.9	11.1	17.5	23.0	35.0	41.0	45.0	60.0
	LD	(1.8)	(3.0)	(4.7)	(5.9)	(9.4)	(14.9)	(19.6)	(29.8)	(34.9)	(38.3)	(51.0)
Rated current (A) *7	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)						
Output	LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	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	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C
Overload current rating *3	LD	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V
	ND	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V	Three-phase 380 to 480 V
	LD	Three-phase 380 to 480 V 50/60 Hz (537 to 679VDC *9)	Three-phase 380 to 480 V 50/60 Hz (537 to 679VDC *9)	Three-phase 380 to 480 V 50/60 Hz (537 to 679VDC *9)	Three-phase 380 to 480 V 50/60 Hz (537 to 679VDC *9)	Three-phase 380 to 480 V 50/60 Hz (537 to 679VDC *9)	Three-phase 380 to 480 V 50/60 Hz (537 to 679VDC *9)	Three-phase 380 to 480 V 50/60 Hz (537 to 679VDC *9)	Three-phase 380 to 480 V 50/60 Hz (537 to 679VDC *9)	Three-phase 380 to 480 V 50/60 Hz (537 to 679VDC *9)	Three-phase 380 to 480 V 50/60 Hz (537 to 679VDC *9)	Three-phase 380 to 480 V 50/60 Hz (537 to 679VDC *9)
Permissible AC (DC) voltage fluctuation	LD	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%
	ND	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%
	LD	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%
Permissible frequency fluctuation	LD	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%
	ND	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%
	LD	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%	±5%
Rated input current (A) *8	LD	2.7	4.4	6.7	9.5	14.1	17.8	24.7	32.1	41.0	50.8	57.3
	ND	2.1	3.5	5.5	9.6	11.0	18.0	23.0	35.0	41.0	45.0	60.0
	LD	1.6	2.6	4.0	6.0	9.5	12.0	17.0	23.0	30.0	38.0	44.0
Power supply capacity (kVA) *6	LD	2.5	4.5	6.8	8.2	12.4	19.0	25.0	36.0	42.0	45.0	58.0
	ND	2.1	3.4	5.1	7.2	10.8	14.0	19.0	25.0	32.0	39.0	44.0
	LD	1.6	2.7	4.2	5.3	8.5	13.0	18.0	27.0	31.0	34.0	46.0
Protective structure	LD	2.0	3.0	4.6	7.2	9.1	13.0	18.0	23.0	29.0	34.0	34.0
	ND	2.0	3.0	4.6	7.2	9.1	13.0	18.0	23.0	29.0	34.0	34.0
Cooling system	LD	Open type (IP20 for IEC 60529 only)	Open type (IP20 for IEC 60529 only)	Open type (IP20 for IEC 60529 only)	Open type (IP20 for IEC 60529 only)	Open type (IP20 for IEC 60529 only)	Open type (IP20 for IEC 60529 only)	Open type (IP20 for IEC 60529 only)	Open type (IP20 for IEC 60529 only)	Open type (IP20 for IEC 60529 only)	Open type (IP20 for IEC 60529 only)	Open type (IP20 for IEC 60529 only)
	ND	Natural	Natural	Natural	Natural	Natural	Natural	Natural	Natural	Natural	Natural	Natural
	LD	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-E820-□
