MITSUBISHI ELECTRIC

INVERTER

E800-SCE

INVERTER SAFETY GUIDELINE

FR-E820-0008(0.1K) to 0900(22K)SCE
FR-E840-0016(0.4K) to 0440(22K)SCE
FR-E820S-0008(0.1K) to 0110(2.2K)SCE
FR-E810W-0008(0.1K) to 0050(0.75K)SCE

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.

For more information on the product

IB-0600921ENG-G(2312)MEE
Specifications subject to change without notice.

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE: TOKYO BUILDING 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN

◆ **Related manuals**

Manual name	Manual number	Details
FR-E800 Instruction Manual (Connection)	IB-0600865ENG	Manuals describing installation, wiring, specifications, outline dimensions, standards, and how to connect options.
FR-E800 Instruction Manual (Function)	IB-0600868ENG	Manual describing details of the functions.
FR-E800 Instruction Manual (Communication)	IB-0600871ENG	Manual describing details of the communications.
FR-E800 Instruction Manual (Maintenance)	IB-0600874ENG	Manual describing how to identify causes of faults and warnings.
FR-E800-SCE Instruction Manual (Functional Safety)	BCN-A23488-004	Manual describing details of the safety communication parameters.
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.

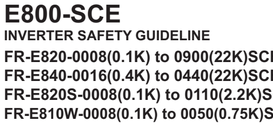
Read this Guideline before use. In addition, scan the 2D code below to download the FR-E800 Instruction Manual (Connection) and read "Safety Instructions". The PDF manual can also be downloaded from the Mitsubishi Electric FA Global Website.

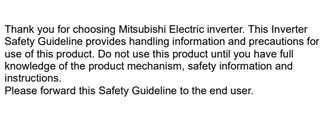
For more information on the product

1 INVERTER INSTALLATION AND PRECAUTIONS

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





*1 When using the inverters at the surrounding air temperature of 40°C or less, the inverters can be installed closely attached (0 cm clearance).
For the FR-E820-0470(11K) or higher and FR-E840-0230(11K) or higher, allow 5 cm or more clearance.

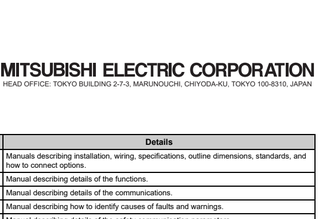
2 INSTALLATION AND WIRING

2.1 Removal and reinstallation of covers

◆ **Removal of the front cover**

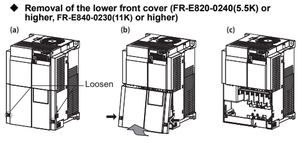
(a) Loosen the mounting screws of the cover. (These screws cannot be removed.)
(b) Pull out the cover using its lower side as a support.
With the cover removed, the control circuit terminals can be wired and the plug-in option can be installed.

◆ **Reinstallation of the front cover**



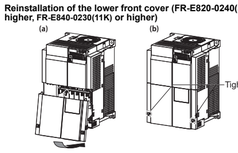
(a) Check the position of the hooks on the rear of the cover.
(b) Insert the hooks of the cover into the sockets of the wiring cover, and reinstall the cover to the inverter.
(c) Tighten the mounting screw of the front cover. (Tightening torque: 0.6 to 0.8 N·m)

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



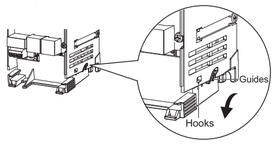
(a) Loosen the screws on the lower front cover. (These screws cannot be removed.)
(b) While holding the areas around the installation hooks on the sides of the lower front cover, pull out the cover using its upper side as a support.
(c) With the lower front cover removed, wiring of the main circuit terminals and control circuit terminals can be performed.

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

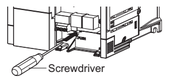
◆ **Removal of the wiring cover (FR-E820-0050(0.75K) or lower, FR-E820S-0030(0.4K) or lower, FR-E810W-0030(0.4K) or lower)**



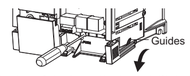
Pull out the cover along the guides in the direction shown by the arrow in the figure above.

◆ **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)

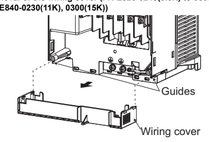


(b)



(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.

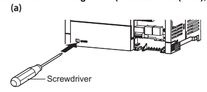
◆ **Removal of the wiring cover (FR-E820-0240(5.5K) to 0600(15K), FR-E840-0230(11K), 0300(15K))**



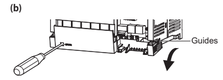
Pull out the cover along the guides in the direction shown by the arrow in the figure above.

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

(a)



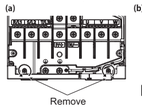
(b)



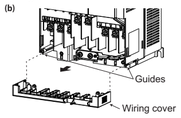
(a) Insert a tool such as a flathead screwdriver into the half-hole above the "PUSH" mark on the wiring cover to push the stopper behind the wiring cover approx. 3 mm.
(b) Pull out the cover along the guides in the direction shown by the arrow in the figure above.

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

(a)

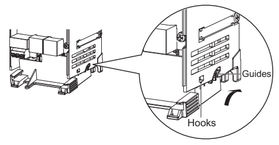


(b)



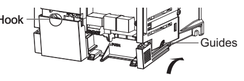
(a) Remove the mounting screws of the wiring cover.
(b) Pull out the cover along the guides in the direction shown by the arrow in the figure above.

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



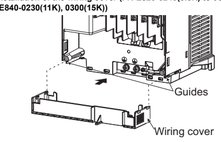
Fit the cover to the inverter along the guides.

◆ **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))**



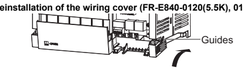
Fit the cover to the inverter along the guides, and push the hook into the socket.

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



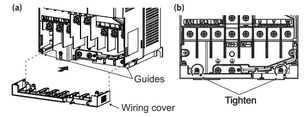
Fit the cover to the inverter along the guides.

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



Fit the cover to the inverter along the guides.

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

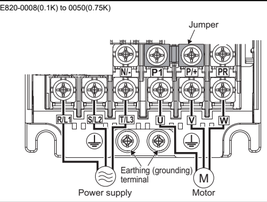


(a) Fit the cover to the inverter along the guides.
(b) Tighten the mounting screws of the wiring cover (tightening torque: 0.6 to 0.8 N·m).

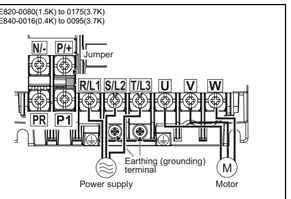
2.2 Main circuit terminal layout and wiring to power supply and motor

◆ **Three-phase 200/400 V class**

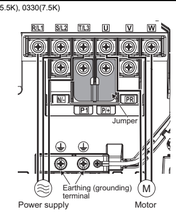
FR-E820-0008(0.1K) to 0050(0.75K)



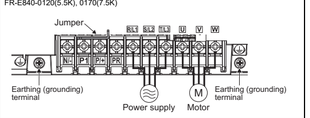
FR-E820-0080(1.5K) to 0175(3.7K)
FR-E840-0016(0.4K) to 0095(3.7K)



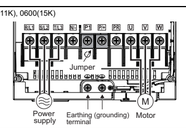
FR-E820-0240(5.5K), 0330(7.5K)



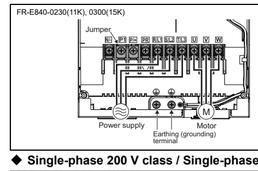
FR-E840-0120(5.5K), 0170(7.5K)



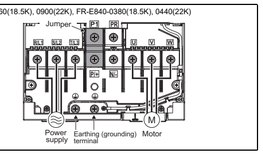
FR-E820-0470(11K), 0600(15K)



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

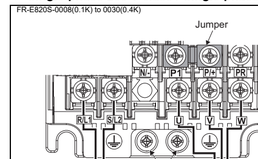


FR-E820-0760(18.5K), 0900(22K), FR-E840-0380(18.5K), 0440(22K)

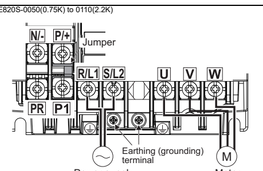


◆ **Single-phase 200 V class / Single-phase 100 V class**

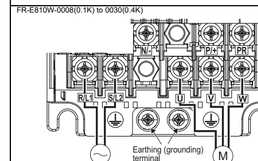
FR-E820S-0008(0.1K) to 0030(0.4K)



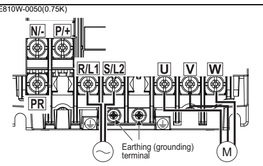
FR-E820S-0050(0.75K) to 0110(2.2K)



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



FR-E810W-0050(0.75K)



- Make sure the power cables are connected to terminals R/L1, S/L2, and T/L3 (the phases need not be matched). Never connect the power cable to terminals U, V, or W of the inverter. Doing so will damage the inverter.
- Connect the motor to terminals U, V, and W. The motor rotates counterclockwise when viewed from the motor load side when the forward rotation switch (signal) turns ON.

2.3 Recommended 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 the recommended cable size for cables that are 20 m in length 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 *4	Tightening torque N·m	Crimp terminal	Cable gauge							
				HIV cables, etc. (mm²) *1			AWG *2		PVC cables, etc. (mm²) *3		
			R/L1, S/L2, T/L3 *5	U, V, W	Earthing (grounding) cable	R/L1, S/L2, T/L3 *5	U, V, W	Earthing (grounding) cable	R/L1, S/L2, T/L3 *5	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-E820-0330(7.5K)	M5	2.5	14-5	8-5	14	8	5.5	6	8	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	38	22	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	5.5	5.5	5.5	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	8	16	10	16
FR-E840-0440(22K)	M6	4.4	14-6	14-6	14	14	14	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	2	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	2	14	14	2.5	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 THHW 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. (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 70°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 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.
*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] = $\sqrt{3}$ × wire resistance [mΩ/m] × wiring distance [m] × current [A] / 1000

Use a larger diameter cable when the wiring distance is long or when the voltage drop (torque reduction) in the low speed range needs to be reduced.

◆ **Total wiring length**

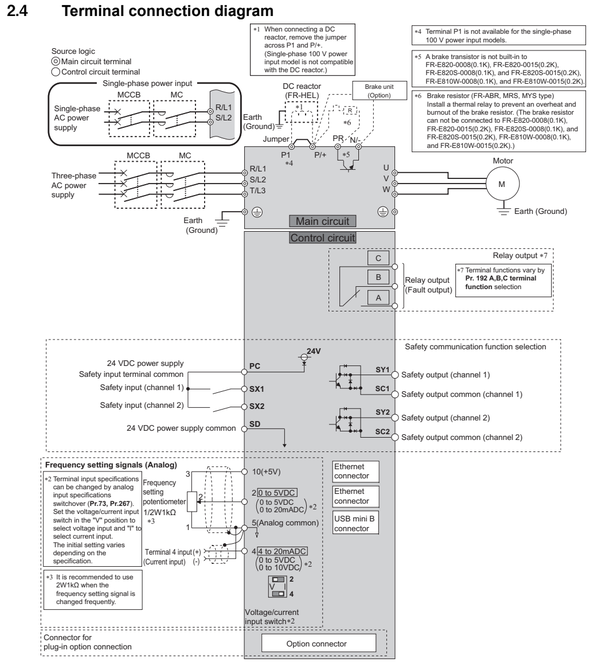
Connect one or more motors within the total wiring length (sum of the wiring lengths of the motor and the inverter) shown in the following table.

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 (200 m)	50 m (200 m)	75 m (300 m)	100 m (500 m)	100 m (500 m)
	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

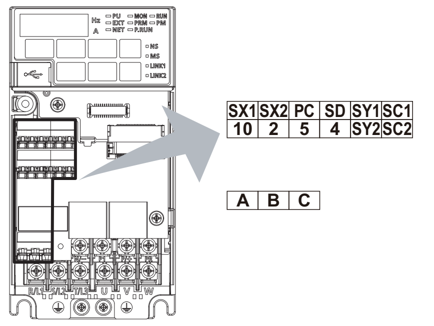


2.5 Details on the main circuit terminals and the control circuit terminals

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.	
		U, V, W	—	Inverter output	Connected to a three-phase squirrel cage motor or a PM 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-BU, or BU) or the multifunction regeneration converter (FR-XC in power regeneration mode) to these terminals.	
		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.	
Input signal	Frequency setting	10	5	Power supply for a frequency setting potentiometer	Used as the power supply for an external frequency setting (speed setting) potentiometer.	5 ±0.5 VDC, Permissible load current: 10 mA
		2	5	Frequency setting (voltage)	Inputting 0 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. Set the voltage/current input switch to the "I" position to select current input (0 to 20 mA).	For voltage input, Input resistance: 10 to 11 kΩ Maximum permissible voltage: 20 VDC For current input, Input resistance: 245 ±5 Ω Permissible maximum current: 30 mA
		4	5	Frequency setting (current)	Inputting 4 to 20 mADC (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 terminal 4 (current input at initial setting), assign "4" to **Pr.178 to Pr.189** (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).	
Output signal	Relay	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)	Contact capacity: 240 VAC 2A (power factor = 0.4) or 30 VDC 1 A
Safety input/output signal	Contact input	SX1	PC	Safety input (channel 1)	Terminal functions can be selected using **Pr.S061 SX1/SX2 terminal function selection**. For details, refer to the FR-E800-SCE Instruction Manual (Functional Safety).	Input resistance: 4.7 kΩ, voltage when contacts are open; 21 to 26 VDC, current when contacts are short-circuited: 4 to 6 mADC
		SX2	PC	Safety input (channel 2)		
	Open collector	SY1	SC1	Safety output (channel 1)	Terminal functions can be selected using **Pr.S055 SY1/SY2 terminal function selection**. For details, refer to the FR-E800-SCE Instruction Manual (Functional Safety).	Permissible load: 24 VDC (27 VDC at maximum), 0.1 A (The voltage drop is 3.4 V at maximum while the signal is ON.)
		SY2	SC2	Safety output (channel 2)		
Common terminal		SD	—	24 VDC power supply common	Common output terminal for 24 VDC 0.1A power supply (terminal PC). Isolated from terminal 5.	
			—	External transistor common (source (positive common))		
		PC	—	Safety input terminal common	Common terminal for terminals SX1 and SX2.	Power supply voltage range: 22 to 26.5 VDC Permissible load current: 100 mA
			SD	24 VDC power supply	Can be used as a 24 VDC 0.1 A power supply.	
		5	—	Frequency setting common	Common terminal for the frequency setting signal (terminal 2 or 4). Do not earth (ground).	
		SC1	—	Safety output common (channel 1)	Common terminal for terminals SY1 and SY2. For details, refer to the FR-E800-SCE Instruction Manual (Functional Safety).	
		SC2	—	Safety output common (channel 2)		
Communication		—	—	Ethernet connector (2 ports)*3	Communication can be made via Ethernet. · Category: 100BASE-TX/10BASE-T· Transmission method: Baseband · Data transmission speed: 100 Mbps (100BASE-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 (100BASE-TX) / up to 4 (10BASE-T) · Number of interfaces available: 2· IP version: IPv4	
		—	—	USB connector*4	By connecting an inverter to the personal computer through USB, FR Configurator2 can be used for setting the inverter and monitoring the operation. · Interface: conforms to USB 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 SCCR is 500 mA.

2.6 Control circuit terminal layout



Wiring method
Use crimp terminals and stripped wire for the control circuit wiring. If only a single wire is used, the wire can be stripped and used without a ferrule.
Connect the end of wires (crimp terminal or stranded wire) to the terminal block.

· Crimp terminals commercially available (as of April 2023.)
Phoenix Contact Co., Ltd.

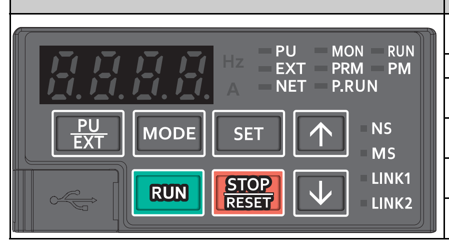
Wire gauge (mm^2)	Ferrule part No. With insulation sleeve	Ferrule part No. Without insulation sleeve	Ferrule part No. For UL wire*1	Crimping tool model No.
0.3	AI 0,34-10TQ	—	—	CRIMPFOX 6
0.5	AI 0,5-10WH	—	AI 0,5-10WH-GB	
0.75	AI 0,75-10GY	A 0,75-10	AI 0,75-10GY-GB	
1	AI 1-10RD	A 1-10	AI 1-10RD/1000GB	
1.25, 1.5	AI 1, 5-10BK	A 1,5-10	AI 1,5-10BK/1000GB*2	
0.75 (for 2 wires)	AI-TWIN 2×0,75-10GY	—	—	

*1 A ferrule terminal with an insulation sleeve compatible with the MTW wire which has a thick wire insulation.
*2 Applicable for terminals A, B, C.

3 BASIC OPERATION

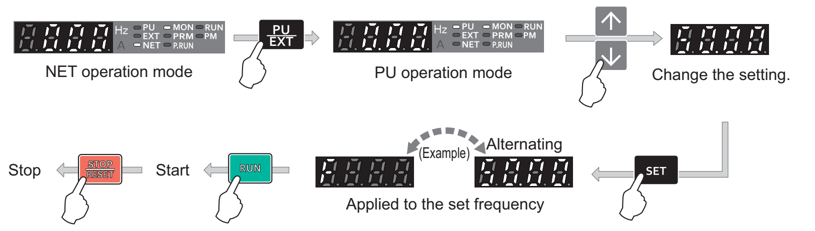
3.1 Components of the operation panel

The operation panel cannot be removed from the inverter.

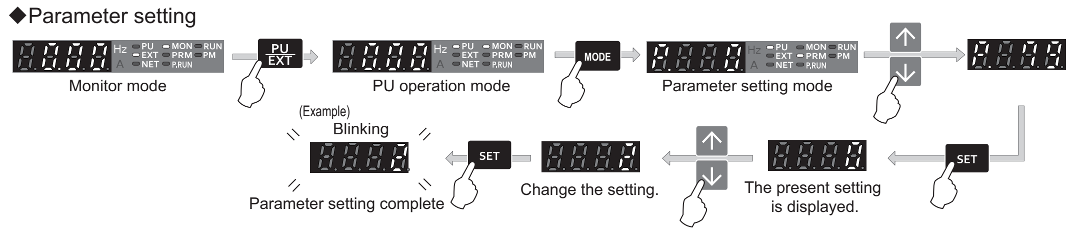


Name	Description
PU/EXT key	Switches between the PU operation mode, the PUJOG operation mode, and the External operation mode.
MODE key	Switches the operation panel to a different mode.
SET key	Used to confirm each selection. Switches the monitor screen in the monitor mode.
RUN key	Start command The 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	Used 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.

For more information on the product

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.

For more information on the product

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
Output	Rated capacity (kVA)*2	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
		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 (1.1)	2.0 (1.7)	3.5 (3.0)	6.0 (5.1)	9.6 (8.2)	12.0 (10.2)	19.6 (16.7)	30.0 (25.5)	40.0 (34.0)	56.0 (47.6)	69.0 (58.7)	88.0 (74.8)	115.0 (97.8)
		ND	0.8 (0.8)	1.5 (1.4)	3.0 (2.5)	5.0 (4.1)	8.0 (7.0)	11.0 (10.0)	17.5 (16.5)	24.0 (23.0)	33.0 (31.0)	47.0 (44.0)	60.0 (57.0)	76.0 (72.0)	90.0 (86.0)
	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												
	Regenerative braking	Brake transistor	Not installed		Built-in										
		Maximum brake torque (ND reference)*5	150%		100%		50%	20%							
Power supply	Rated input AC (DC) voltage/ frequency		Three-phase 200 to 240 V 50/60 Hz (283 to 339 VDC *9)												
	Permissible AC (DC) voltage fluctuation		170 to 264 V, 50/60 Hz (240 to 373 VDC *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	139.5
		Without 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
		With DC reactor LD	1.3	2.0	3.5	6.0	9.6	12.0	20.0	30.0	40.0	56.0	69.0	88.0	115.0
		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
	Power supply capacity (kVA)*6	Without DC reactor LD	0.7	1.1	1.9	3.1	4.8	6.2	9.7	15.0	19.0	29.0	35.0	43.0	54.0
		Without DC reactor ND	0.5	0.9	1.7	2.7	4.1	5.7	8.8	12.0	16.0	25.0	31.0	38.0	44.0
		With DC reactor LD	0.5	0.8	1.3	2.3	3.7	4.6	7.5	11.0	15.0	21.0	26.0	34.0	44.0
		With DC reactor ND	0.3	0.6	1.1	1.9	3.0	4.2	6.7	9.1	13.0	18.0	23.0	29.0	34.0
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	3.7	5.5	7.5	11.0	15.0	18.5	22.0
Output	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 (1.8)	3.5 (3.0)	5.5 (4.7)	6.9 (5.9)	11.1 (9.4)	17.5 (14.9)	23.0 (19.6)	35.0 (29.8)	41.0 (34.9)	45.0 (38.3)	60.0 (51.0)
		ND	1.6 (1.4)	2.6 (2.2)	4.0 (3.8)	6.0 (5.4)	9.5 (8.7)	12.0	17.0	23.0	30.0	38.0	44.0
	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										
	Regenerative braking	Brake transistor	Built-in										
		Maximum brake torque (ND reference)*5	100%		50%	20%							
Power supply	Rated input AC (DC) voltage/ frequency		Three-phase 380 to 480 V 50/60 Hz (537 to 679VDC *9)										
	Permissible AC (DC) voltage fluctuation		323 to 528 V, 50/60 Hz (457 to 740VDC *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	75.6
		Without 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
		With 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	1.6	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	Without DC reactor LD	2.5	4.5	6.8	8.2	12.4	19.0	25.0	36.0	42.0	45.0	58.0
		Without DC reactor ND	2.1	3.4	5.1	7.2	10.8	14.0	19.0	25.0	32.0	39.0	44.0
		With DC reactor LD	1.6	2.7	4.2	5.3	8.5	13.0	18.0	27.0	31.0	34.0	46.0
		With DC reactor ND	1.2	2.0	3.0	4.6	7.2	9.1	13.0	18.0	23.0	29.0	34.0
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

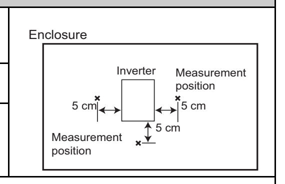
Model FR-E820S-[]			0008	0015	0030	0050	0080	0110
			0.1K	0.2K	0.4K	0.75K	1.5K	2.2K
Applicable motor capacity (kW)*1		ND	0.1	0.2	0.4	0.75	1.5	2.2
Output	Rated capacity (kVA)*2	ND	0.3	0.6	1.2	2.0	3.2	4.4
	Rated current (A)*7	ND	0.8 (0.8)	1.6 (1.4)	3.0 (2.5)	5.0 4.1)	8.0 (7.0)	11.0 (10.0)
	Overload current rating*3	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					
	Regenerative braking	Brake transistor	Not installed		Built-in			
		Maximum brake torque (ND reference)*5	150%		100%		50%	20%
Power supply	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 ND	2.3	4.1	7.9	11.2	17.9	25.0
		With DC reactor ND	1.4	2.6	5.2	8.7	13.9	19.1
	Power supply capacity (kVA)*6	Without DC reactor ND	0.4	0.8	1.5	2.5	4.5	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		ND	0.1	0.2	0.4	0.75
Output	Rated capacity (kVA)*2	ND	0.3	0.6	1.2	2.0
	Rated current (A)*7	ND	0.8 (0.8)	1.5 (1.4)	3.0 (2.5)	5.0 (4.1)
	Overload current rating*3	ND	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C			
	Voltage*10*11		Three-phase 200 to 240 V			
	Regenerative braking	Brake transistor	Not installed		Built-in	
		Maximum brake torque (ND reference)*5	150%		100%	
Power supply	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	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

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi Electric 4-pole standard efficiency motor.
To drive a Mitsubishi Electric high-performance energy-saving motor, use the 200 V class 0.75K inverter for a 1.1 kW motor, or 200/400 V class 2.2K inverter for a 3 kW motor.
*2 The rated output capacity assumes that the output voltage is 230 V for three-phase 200 V class and single-phase 200/100 V class, and 440 V for three-phase 400 V class.
*3 The percentage of the overload current rating is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load. In a single-phase 200 V class inverter with the automatic restart after the instantaneous power failure (**Pr.57**) and the power failure stop (**Pr.261**) functions are set valid, a voltage drop at the power supply and a large load may bring down the bus voltage to the level recognized as a power failure, disabling the inverter to drive a load 100% or higher.
*4 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. The maximum point of the voltage waveform at the output side of the inverter is approximately the power supply voltage multiplied by $\sqrt{2}$.
*5 The amount of braking torque is the average short-term torque (which varies depending on motor loss) 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 from 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 (Not available for FR-E820-0008(0.1K), FR-E820-0015(0.2K), FR-E820S-0008(0.1K), FR-E820S-0015(0.2K), FR-E810W-0008(0.1K), and FR-E810W-0015(0.2K).). Brake unit (FR-BU2) can be also used.
*6 The power supply capacity varies with the value of the input power impedance (including those of the input reactor and cables).
*7 The value in parentheses is the rated output current when the low acoustic noise operation is performed with the surrounding air temperature exceeding 40°C while 2 kHz or higher value is selected in **Pr.72 PWM frequency selection**.
*8 The rated input current is the value at a rated output current. The input power impedances (including those of the input reactor and cables) affect the value.
*9 • Connect the DC power supply to the inverter terminals P/+ and N/-. Connect the positive terminal of the power supply to terminal P/+ and the negative terminal to terminal N/-.
• When the energy is regenerated from the motor, the voltage between terminals P/+ and N/- may temporarily rise to 415 V or more. Use a DC power supply resistant to the regenerative voltage/energy. When a power supply that cannot resist the regenerative voltage/energy is used, connect a reverse current prevention diode in series.
• Powering ON produces up to four times as large current as the inverter rated current. Prepare a DC power supply resistant to the inrush current at power ON, although an inrush current limit circuit is provided in the FR-E800 series inverter.
• The power capacity depends on the output impedance of the power supply. Select a power capacity around the AC power supply capacity.
*10 For the single-phase 100 V power input models, the maximum output voltage is twice the amount of the power supply voltage.
*11 For the single-phase 100 V power input models, output voltage decreases by applying motor load, and output current increases compared to the three-phase power input models. The load must be reduced so that output current does not exceed the rated motor current.

6.2 Inverter installation environment

Item	Description	
Surrounding air temperature*1	-20°C to +60°C (The rated current must be reduced at a temperature above 50°C. For details, refer to the FR-E800 Instruction Manual (Connection). To meet the UL/EN standards, use the product at temperatures from -20°C to 50°C.)	Enclosure 
Ambient humidity	95% RH or less (non-condensing) (With circuit board coating (IEC 60721-3-3:1994 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.)	

*1 Surrounding air temperature is a temperature measured at a measurement position in an enclosure. Ambient temperature is a temperature outside an enclosure.

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

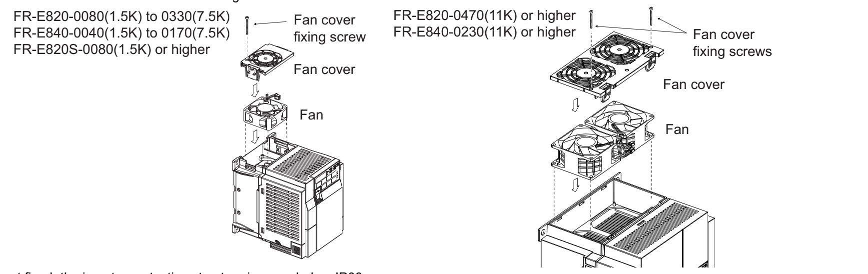
- The authorized representative in the EU
  The authorized representative in the EU is shown below.
  Name: Mitsubishi Electric Europe B.V.
  Address: Mitsubishi-Electric-Platz 1, 40882 Ratingen, Germany

◆ **EMC Directive**
We declare that this inverter conforms with the EMC Directive and affix the CE marking on the inverter.
- EMC Directive: 2014/30/EU
- Standard: IEC 61800-3 (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.

◆ **Notes**
- Set the EMC Directive compliant EMC filter to the inverter. Insert 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 and controller cable found in the EMC Installation Guidelines (BCN-A21041-204) and Technical News (MF-S-175 and 176) 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-confirmed 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

◆ **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.)
- Select appropriate wire according to EN 60204-1 or IEC 60364-5-52. (Refer to the selection examples of cable sizes in 2.3 Applicable cables and wiring length.)
- Use a tinned (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.
- Use PVC cables for I/O wiring.
- Use the molded 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 (AC/DC 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 for protection against electric shock and fire.
- Attach the fan cover to the fan with the fan cover fixing screws enclosed with the inverter.



If the cover is not fixed, the inverter protective structure is regarded as IP00.
- When using the relay output terminals A, B, and C with voltage of 230 VAC, use a power supply classified as overvoltage category II specified in IEC 60664.

◆ **Fuse selection for branch circuit protection**
Use the following semiconductor fuses for branch circuit protection.

Inverter model	Cat. No	Manufacturer	Rating
FR-E820-0008(0.1K), 0015(0.2K)	170M1408, 170M1308 or 170M1358	Bussmann	700 V, 10 A
FR-E820-0030(0.4K)	170M1409, 170M1309 or 170M1359	Bussmann	700 V, 16 A
FR-E820-0050(0.75K)	170M1411, 170M1311 or 170M1361	Bussmann	700 V, 25 A
FR-E820-0080(1.5K)	170M1413, 170M1313 or 170M1363	Bussmann	700 V, 40 A
FR-E820-0110(2.2K)	170M1414, 170M1314 or 170M1364	Bussmann	700 V, 50 A
FR-E820-0175(3.7K)	170M1416, 170M1316 or 170M1366	Bussmann	700 V, 80 A
FR-E820-0240(5.5K)	170M1418, 170M1318 or 170M1368	Bussmann	700 V, 125 A
FR-E820-0330(7.5K)	170M1419, 170M1319 or 170M1369	Bussmann	700 V, 160 A
FR-E820-0470(11K)	170M1420, 170M1320 or 170M1370	Bussmann	700 V, 200 A
FR-E820-0600(15K)	170M1421, 170M1321 or 170M1471	Bussmann	700 V, 250 A
FR-E820-0760(18.5K)	170M1422, 170M1322 or 170M1472	Bussmann	700 V, 315 A
FR-E820-0900(22K)	170M1422, 170M1322 or 170M1472	Bussmann	700 V, 315 A
FR-E840-0016(0.4K)	170M1408, 170M1308 or 170M1358	Bussmann	700 V, 10 A
FR-E840-0026(0.75K)	170M1410, 170M1310 or 170M1360	Bussmann	700 V, 20 A
FR-E840-0040(1.5K)	170M1411, 170M1311 or 170M1361	Bussmann	700 V, 25 A
FR-E840-0060(2.2K)	170M1312, 170M1362 or 170M1412	Bussmann	700 V, 32 A

Inverter model	Cat. No	Manufacturer	Rating
FR-E840-0095(3.7K)	170M1414, 170M1314 or 170M1364	Bussmann	700 V, 50 A
FR-E840-0120(5.5K), 0170(7.5K)	170M1416, 170M1316 or 170M1366	Bussmann	700 V, 80 A
FR-E840-0230(11K)	170M1419, 170M1319 or 170M1469	Bussmann	700 V, 160 A
FR-E840-0300(15K)	170M1419, 170M1319 or 170M1469	Bussmann	700 V, 160 A
FR-E840-0380(18.5K)	170M1420, 170M1320 or 170M1370	Bussmann	700 V, 200 A
FR-E840-0440(22K)	170M1421, 170M1321 or 170M1471	Bussmann	700 V, 250 A
FR-E820S-0008(0.1K)	170M1408, 170M1308 or 170M1358	Bussmann	700 V, 10 A
FR-E820S-0015(0.2K)	170M1409, 170M1309 or 170M1359	Bussmann	700 V, 16 A
FR-E820S-0030(0.4K)	170M1411, 170M1311 or 170M1361	Bussmann	700 V, 25 A
FR-E820S-0050(0.75K)	170M1413, 170M1313 or 170M1363	Bussmann	700 V, 40 A
FR-E820S-0080(1.5K)	170M1415, 170M1315 or 170M1365	Bussmann	700 V, 63 A
FR-E820S-0110(2.2K)	170M1417, 170M1317 or 170M1367	Bussmann	700 V, 100 A
FR-E810W-0008(0.1K)	170M1409, 170M1309 or 170M1359	Bussmann	700 V, 16 A
FR-E810W-0015(0.2K)	170M1410, 170M1310 or 170M1360	Bussmann	700 V, 20 A
FR-E810W-0030(0.4K)	170M1413, 170M1313 or 170M1363	Bussmann	700 V, 40 A
FR-E810W-0050(0.75K)	170M1415, 170M1315 or 170M1365	Bussmann	700 V, 63 A

◆ **Motor overload protection**
For details, refer to 7.2 Instructions for UL and cUL: Motor overload protection.

◆ **EU RoHS Directive**
We have declared that our inverters are compliant to the EU RoHS Directive and affix the CE marking on the inverters.

For other information, refer to the FR-E800 Instruction Manual (Connection).

7.2 Instructions for UL and cUL

(Standard to comply with: UL 61800-5-1, CSA C22.2 No. 274)

◆ **Product handling information / Informations sur la manipulation du produit**
-WARNING- Operation of this product requires detailed installation and operation instructions provided in this Safety Guideline and the Instruction Manual (Connection) intended for use with this product. Please forward relevant manuals to the end user. The manuals can also be downloaded in PDF form from the Mitsubishi Electric FA Global Website. To order manuals, please contact your sales representative.

-AVERTISSEMENT-
L'utilisation de ce produit nécessite des instructions détaillées d'installation et d'utilisation fournies dans le présent document de la Directive de sécurité et le Manuel d'instructions (Connexion) destiné à être utilisé avec ce produit. Veuillez transmettre les manuels correspondants à l'utilisateur final. Les manuels peuvent également être téléchargés au format PDF sur Mitsubishi Electric FA Global Website. Pour commander des manuels, veuillez contacter votre représentant commercial.

◆ **Branch circuit protection**
For installation in the United States, use the branch circuit protection equipment specified in Technical News MF-S-187, in accordance with the National Electrical Code and any applicable local codes.
For installation in Canada, use the branch circuit protection equipment specified in Technical News MF-S-187, in accordance with the Canadian Electrical Code and any applicable local codes.
Short circuit protection of the inverter cannot be used as branch circuit protection. Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the National Electrical Code and any additional local codes.
The installation/operation manual is available via the internet at https://www.mitsubishielectric.com/fa/products/drv/inv/support/e800/e800sce.html.
A hard copy of this information may be ordered at +1 (847) 478-2100 (Mitsubishi Electric Automation, Inc. in USA).

◆ **Precautions for opening the branch-circuit protective device / Précautions pour ouvrir le dispositif de protection du circuit de dérivation**
-WARNING- If the fuse melts down or the breaker trips on the input side of this product, check for wiring faults (such as short circuits). Identify and remove the cause of melting down or the trip before replacing the fuse or resetting the tripped breaker (or before applying the power to the inverter again).

-AVERTISSEMENT-
Si le fusible fond ou si le disjoncteur se déclenche du côté entrée de ce produit, vérifier les défauts de câblage (tels que les courts-circuits). Identifier et éliminer la cause de la fonte ou du déclenchement avant de remplacer le fusible ou de réinitialiser le disjoncteur déclenché (ou avant de remettre sous tension l'onduleur).

◆ **Capacitor discharge time / Temps de décharge du condensateur**
CAUTION - Risk of Electric Shock -
Before wiring or inspection, check that the LED display of the operation panel is OFF. Any person who is involved in wiring or inspection shall wait for 10 minutes or longer after power OFF, and check that there are no residual voltage using a digital multimeter or the like. The capacitor is charged with high voltage for some time after power OFF, and it is dangerous.

ATTENTION - Risque de choc électrique -
Avant le câblage ou l'inspection, vérifier que le témoin LED s'éteint. Toute personne impliquée dans le câblage ou l'inspection doit attendre 10 minutes ou plus après la mise hors tension et vérifier l'absence de tension résiduelle à l'aide d'un multimètre numérique ou similaire. Le condensateur est chargé avec une haute tension pendant un certain temps après la mise hors tension, ce qui est dangereux. Précautions pour ouvrir le dispositif de protection du circuit de dérivation

◆ **Wiring to the power supply and the motor**
- Refer to the National Electrical Code (Article 310) regarding the allowable current of the cable. Select the cable size for 125% of the rated current according to the National Electrical Code (Article 430). For wiring the input (R/L1, S/L2, T/L3) and output (U, V, W) terminals of the inverter, use the UL listed copper, stranded wires (rated at 75°C) and round crimp terminals. Crimp the terminals with the crimping tool recommended by the terminal manufacturer.

The following table shows examples when the inverter rating is 125% of the LD rating, when the cable is the THHW cable with continuous maximum permissible temperature of 75°C, when the surrounding air temperature is 40°C or less, and when the wiring length is 20 m or shorter.

Applicable inverter model	Terminal screw size *1	Tightening torque (N·m)	Crimp terminal R/L1, S/L2, T/L3	Crimp terminal U, V, W	Cable gauge AWG R/L1, S/L2, T/L3	Cable gauge AWG U, V, W
FR-E820-0008(0.1K) to 0050(0.75K)	M3.5	1.2	2-3.5	2-3.5	14	14
FR-E820-0080(1.5K)	M4	1.5	3.5-4	2-4	12	14
FR-E820-0110(2.2K)	M4	1.5	5.5-4	2-4	10	14
FR-E820-0175(3.7K)	M4	1.5	8-NK4	5.5-4	8	10
FR-E820-0240(5.5K)	M5	2.5	8-5	8-5	8	8
FR-E820-0330(7.5K)	M5	2.5	14-5	8-5	6	8
FR-E820-0470(11K)	M5	2.5	38-S5	22-5	3	4
FR-E820-0600(15K)	M6(M5)	4.4	38-S6	38-S6	2	3
FR-E820-0760(18.5K)	M8(M6)	7.8	60-8	38-8	1/0	2
FR-E820-0900(22K)	M8(M6)	7.8	60-8	60-8	1/0×2	1/0
FR-E840-0016(0.4K) to 0060(2.2K)	M4	1.5	2-4	2-4	14	14
FR-E840-0095(3.7K)	M4	1.5	5.5-4	2-4	10	14
FR-E840-0120(5.5K), 0170(7.5K)	M4	1.5	8-NK4	5.5-4	8	10
FR-E840-0230(11K)	M4	1.5	14-4	8-4	6	8
FR-E840-0300(15K)	M5	2.5	22-S5	14-5	4	6
FR-E840-0380(18.5K)	M6	4.4	22-6	14-6	4	6
FR-E840-0440(22K)	M6	4.4	38-6	22-6	3	4

*1 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 single-phase power input, the terminal screw size indicates the size of terminal screw for R/L1, S/L2, U, V, W, PR, P/+, N/-, P1 and a screw for earthing (grounding). The screw size for the earthing (grounding) terminal on FR-E820-0600(15K) to FR-E820-0900(22K) is indicated in parentheses.

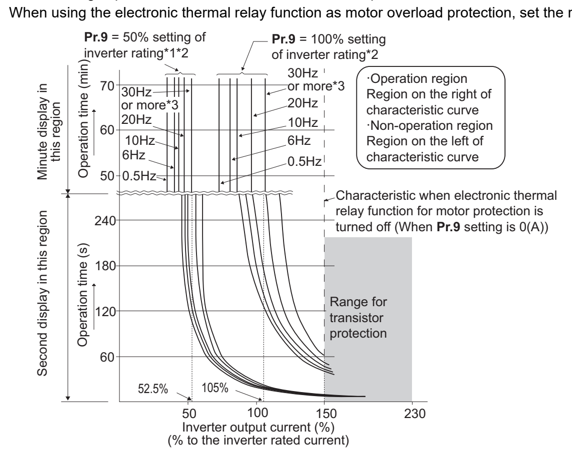
The following table shows examples when the inverter rating is 125% of the ND rating, when the cable is the THHW cable with continuous maximum permissible temperature of 75°C, when the surrounding air temperature is 40°C or less, and when the wiring length is 20 m or shorter.

Applicable inverter model	Terminal screw size *1	Tightening torque (N·m)	Crimp terminal R/L1, S/L2	Crimp terminal U, V, W	Cable gauge AWG R/L1, S/L2	Cable gauge AWG U, V, W
FR-E820S-0008(0.1K) to 0030(0.4K)	M3.5	1.2	2-3.5	2-3.5	14	14
FR-E820S-0050(0.75K)	M4	1.5	2-4	2-4	14	14
FR-E820S-0080(1.5K)	M4	1.5	5.5-4	2-4	10	14
FR-E820S-0110(2.2K)	M4	1.5	8-NK4	2-4	8	14
FR-E810W-0008(0.1K), 0015(0.2K)	M3.5	1.2	2-3.5	2-3.5	14	14
FR-E810W-0030(0.4K)	M3.5	1.2	5.5-S3	2-3.5	12	14
FR-E810W-0050(0.75K)	M4	1.5	5.5-4	2-4	10	14

*1 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.

◆ **Short circuit ratings**
- 100 V class: Suitable for use in a circuit capable of delivering not more than 65 kA rms symmetrical amperes, 120 V maximum.
- 200 V class: Suitable for use in a circuit capable of delivering not more than 100 kA rms symmetrical amperes, 240 V maximum.
- 400 V class: Suitable for use in a circuit capable of delivering not more than 100 kA rms symmetrical amperes, 480 Y / 277 V maximum.

◆ **Motor overload protection**
The following explains the details of the motor overload protection.
When using the electronic thermal relay function as motor overload protection, set the rated motor current in **Pr.9 Electronic thermal O/L relay**.

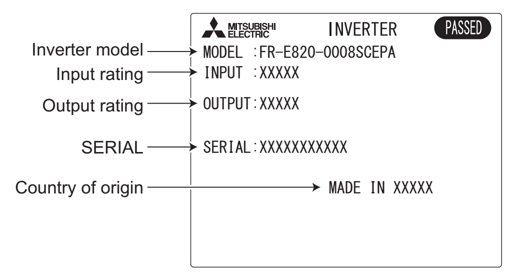


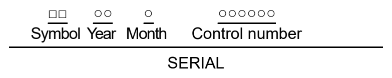
This function detects the overload (overheat) of the motor and shut off the inverter output by stopping the operation of the transistor at the inverter output side. (The operation characteristic is shown on the left.)
- When using the Mitsubishi Electric constant-torque motor
  1) Set one of "10, 13, 15, 16, 50, 53, 70, 73, 1800 or 1803" in **Pr.71**. (This setting enables the 100% constant-torque characteristic in the low-speed range.)
  2) Set the rated motor current in **Pr.9**.

  *1 When setting **Pr.9** to a value (current value) of 50% of the inverter rated output current.
  *2 The % value denotes the percentage to the inverter rated output current. It is not the percentage to the rated motor current.
  *3 When the electronic thermal relay function dedicated to the Mitsubishi Electric constant-torque motor is set, this characteristic curve applies to operation at 6 Hz or higher.
- The internal accumulated heat value of the electronic thermal O/L relay is reset to the initial value by the inverter's power reset or reset signal input. Avoid unnecessary reset and power-OFF.
- Install an external thermal relay (OCR) between the inverter and motors to operate several motors, a multi-pole motor or a dedicated motor with one inverter. When configuring an external thermal relay, note that the current indicated on the motor rating plate is affected by the line-to-line leakage current. (Refer to the Instruction Manual (Function).) The cooling effect of the motor drops during low-speed operation. Use a motor with built-in thermal protector. When the difference between the inverter and motor capacities is large and the set value is small, the protective characteristics of the electronic thermal relay function will be deteriorated. Use an external thermal relay in such cases.
- The cooling effect of the motor drops during low-speed operation. Use a motor with built-in thermal protector.
- A dedicated motor cannot be protected by the electronic thermal relay. Use an external thermal relay.
- When using a Vector-control-dedicated motor (SF-V5RU) with built-in thermal protector, set **Pr.9** = "0" if another thermal protector is connected.
- Motor over temperature sensing is not provided by the drive.
- The electronic thermal memory retention function is not provided by the drive.
- The electronic thermal relay function is not a speed sensing function.

7.3 SERIAL number check

The SERIAL number can be checked on the inverter rating plate or package.
Rating plate example





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

7.4 EU ErP Directive (Ecodesign Directive)

The following table shows the power loss data according to Ecodesign Directive. The regulation covers 3-phase variable speed drives from 0.12 kW ≤ Pn ≤ 1 000 kW.
(LD rated / ND rated)

Model name	Rated Apparent power (kVA)	Stand by loss (W)	load point 1 (90;100) (%)	load point 2 (50;100) (%)	load point 3 (0;100) (%)	load point 4 (90;50) (%)	load point 5 (50;50) (%)	load point 6 (0;50) (%)	load point 7 (50;25) (%)	load point 8 (0;25) (%)	IE class
FR-E820-0015(0.2K)	0.8 / 0.6	5.1	3.1 / 3.2	3.1 / 3.2	3.1 / 3.3	2.6 / 2.8	2.6 / 2.8	2.6 / 2.8	2.5 / 2.7	2.5 / 2.8	IE2
FR-E820-0030(0.4K)	1.4 / 1.2	5.1	2.9 / 2.9	2.9 / 2.9	3.0 / 2.9	2.3 / 2.3	2.3 / 2.3	2.4 / 2.4	2.3 / 2.3	2.3 / 2.3	IE2
FR-E820-0050(0.75K)	2.4 / 2	5.1	2.7 / 2.6	2.7 / 2.6	2.7 / 2.7	1.8 / 1.8	1.8 / 1.8	1.8 / 1.8	1.5 / 1.5	1.5 / 1.5	IE2
FR-E820-0080(1.5K)	3.8 / 3.2	9.2	2.7 / 2.6	2.7 / 2.6	2.7 / 2.7	1.8 / 1.8	1.8 / 1.8	1.9 / 1.9	1.5 / 1.5	1.5 / 1.5	IE2
FR-E820-0110(2.2K)	4.8 / 4.4	9.2	2.5 / 2.5	2.5 / 2.5	2.5 / 2.5	1.7 / 1.7	1.7 / 1.7	1.7 / 1.7	1.4 / 1.4	1.4 / 1.4	IE2
FR-E820-0175(3.7K)	7.8 / 7	10.2	2.5 / 2.5	2.5 / 2.5	2.5 / 2.5	1.7 / 1.7	1.7 / 1.7	1.7 / 1.7	1.4 / 1.3	1.4 / 1.4	IE2
FR-E820-0240(5.5K)	12 / 9.6	16.9	2.4 / 2.3	2.4 / 2.3	2.4 / 2.3	1.3 / 1.3	1.3 / 1.3	1.3 / 1.3	1.0 / 1.0	1.0 / 1.0	IE2
FR-E820-0330(7.5K)	15.9 / 13.1	16.9	2.4 / 2.3	2.4 / 2.3	2.4 / 2.3	1.3 / 1.3	1.3 / 1.3	1.3 / 1.3	0.9 / 0.9	0.9 / 0.9	IE2
FR-E820-0470(11K)	22.3 / 18.7	28.9	2.2 / 2.2	2.2 / 2.2	2.2 / 2.2	1.2 / 1.2	1.2 / 1.2	1.2 / 1.2	0.9 / 0.9	0.9 / 0.9	IE2
FR-E820-0600(15K)	27.5 / 23.9	28.9	2.3 / 2.2	2.3 / 2.2	2.3 / 2.2	1.2 / 1.2	1.2 / 1.2	1.2 / 1.2	0.9 / 0.9	0.9 / 0.9	IE2
FR-E820-0760(18.5K)	35.1 / 30.3	23.0	2.3 / 2.3	2.3 / 2.2	2.3 / 2.2	1.2 / 1.2	1.2 / 1.2	1.2 / 1.2	0.9 / 0.9	0.9 / 0.9	IE2
FR-E820-0900(22K)	45.8 / 35.9	23.0	2.5 / 2.3	2.5 / 2.3	2.5 / 2.3	1.3 / 1.2	1.3 / 1.2	1.3 / 1.2	0.9 / 0.9	0.9 / 0.9	IE2
FR-E840-0016(0.4K)	1.6 / 1.2	5.7	2.2 / 2.2	2.1 / 2.2	2.2 / 2.2	1.8 / 1.9	1.8 / 1.9	1.8 / 1.9	1.7 / 1.8	1.8 / 1.9	IE2
FR-E840-0026(0.75K)	2.7 / 2	5.7	2.2 / 2.0	2.1 / 2.0	2.2 / 2.0	1.4 / 1.5	1.4 / 1.4	1.4 / 1.5	1.2 / 1.2	1.2 / 1.2	IE2
FR-E840-0040(1.5K)	4.2 / 3	9.7	2.1 / 2.0	2.1 / 2.0	2.1 / 2.0	1.4 / 1.4	1.4 / 1.4	1.4 / 1.4	1.2 / 1.2	1.2 / 1.2	IE2
FR-E840-0060(2.2K)	5.3 / 4.6	9.8	1.8 / 1.8	1.8 / 1.8	1.8 / 1.8	1.3 / 1.3	1.3 / 1.3	1.3 / 1.3	1.1 / 1.1	1.1 / 1.1	IE2
FR-E840-0095(3.7K)	8.5 / 7.2	9.8	1.7 / 1.7	1.7 / 1.7	1.7 / 1.7	1.2 / 1.2	1.2 / 1.2	1.2 / 1.2	1.0 / 1.1	1.0 / 1.1	IE2
FR-E840-0120(5.5K)	13.3 / 9.1	14.5	1.7 / 1.6	1.6 / 1.6	1.7 / 1.6	0.9 / 0.9	0.9 / 0.9	0.9 / 0.9	0.7 / 0.7	0.7 / 0.7	IE2
FR-E840-0170(7.5K)	17.5 / 13	14.5	1.7 / 1.6	1.7 / 1.6	1.7 / 1.6	0.9 / 0.9	0.9 / 0.9	0.9 / 0.9	0.7 / 0.7	0.7 / 0.7	IE2
FR-E840-0230(11K)	26.7 / 17.5	26.5	1.7 / 1.6	1.7 / 1.6	1.7 / 1.6	0.9 / 0.9	0.9 / 0.9	0.9 / 0.9	0.7 / 0.7	0.7 / 0.7	IE2
FR-E840-0300(15K)	31.2 / 22.9	26.5	1.7 / 1.6	1.7 / 1.6	1.7 / 1.6	0.9 / 0.9	0.9 / 0.9	0.9 / 0.9	0.7 / 0.7	0.7 / 0.7	IE2
FR-E840-0380(18.5K)	34.3 / 29	26.5	1.6 / 1.2	1.6 / 1.2	1.6 / 1.2	0.9 / 0.7	0.9 / 0.7	0.9 / 0.7	0.7 / 0.5	0.7 / 0.5	IE2
FR-E840-0440(22K)	45.7 / 33.5	26.5	1.3 / 1.2	1.3 / 1.2	1.3 / 1.2	0.7 / 0.7	0.7 / 0.7	0.7 / 0.7	0.5 / 0.5	0.5 / 0.5	IE2

8 WARRANTY

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.