

E800



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

Please forward this Safety Guideline to the end user.

Thank you for choosing Mitsubishi Electric inverter. This Inverter

**INVERTER SAFETY GUIDELINE** FR-E820-0008(0.1K) to 0330(7.5K)

FR-E840-0016(0.4K) to 0170(7.5K)

For more information on the product 

IB-0600857ENG-A(1912)IP Specifications subject to change without notice

# MITSUBISHI ELECTRIC CORPORATION

ortation and installation product must be used indoors (without corrosive gas, flammable gas, oil , dust and dirl.) Otherwise the product may be damaged. ot use this product at an altitude above 3000 m. Wibration should not exceed to tuse this product at an altitude above 3000 m. Wibration should not exceed the rules the product may be

5.9 m/s<sup>2</sup> at 10 to 55 Hz in X, Y, and Z directions. Otherwise the product may be

Wiring

Do not install a power factor correction capacitor, surge absorber, or radio noise filter on the output side of this product. These devices may overheat or burn out.

The output terminals (terminals U, V, and W) must be connected to a motor. The output terminals (terminals U, V, and W) must be connected to a motor. Surgery of the product of the connected to a motor of the product of th

Usage
Slay away from the equipment after using the retry function in this product as the equipment will restart suddenly after the output shutoff of this product.
Access to the motor is allowed only after it is fully confirmed that the motor does not start unpring.

Access to the motor is allowed only after it is fully confirmed that the motor does not start running.

Depending on the function settings of this product, the product does not stop its output even when the STOP/RESET key on the operation panel is pressed. To prepare for it, provide a separate circuit and switch (to turn OFF the power of this product, or apply a mechanical brake, etc.) for an emergency stop, product, or apply a mechanical brake, etc.) for an emergency stop, to the stop of the

Usage

When installing the MC on the output side of the inverter, turn it ON/OFF while both the inverter and motor are at a stop.

The electronic thermal OJL relay function may not be enough for protection of a motor from overheating. It is recommended to install an external thermal relay for overheat protection.

side. Doing so may shorten the life of this product.

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Side Doing so may shorten the life of this product.

See a noise filter or other means to minimize electromagnetic interference with other electronic equipment used nearby this product.

Appropriate precautions must be taken to suppress harmonics. Otherwise power harmonics generated from this product may healt/damage a power factor correction capacitor or a generator.

To drive a 400 V class motor with this product, use an insulation-enhanced motor, or take measures to suppress surge voltage. Otherwise surge voltage, which is causing the motor insulation to deteriorate, may occur at the motor terminals, causing the motor insulation to deteriorate.

When a motor is driven by the inverter, axial voltage is generated on the motor shaft, which may cause electrical corrosion of the bearing. Take measures such as decreasing the carrier frequency.

As all parameters return to their initial values after Parameter clear or All parameter clear is performed, the parameters must be set again as required before the operation is started.

This product can be easily set such as the performance of a motor and equipment in a system before the setting change.

If the machine must not be restarted when power is restored after a power fallure, provide an MC on the input side of the inverter and also make up a sequence which will not switch ON the start signal.

When performing an inverter operation with frequent starts/stops, rise/fall in the temperature of the transistor element of the inverter and also make up a sequence which will not switch ON the start sign

Emergency stop

• A safety backup such as an emergency brake must be provided for devices or equipment in a system to prevent hazardous conditions in case of failure of this

If the breaker installed on the input side of this product trips, check for wiring faults (such as short circuits) and damage to internal parts of this product. Identify and remove the cause of the trip before resetting the tripped breaker and applying the power to the product again.

When any protective function is activated, take an appropriate corrective action before resetting this product to resume the operation.

Maintenance, inspection and parts replacement

Do not carry out a megger (insulation resistance) test on the control circuit of this product. Doing so will cause failure.

For clarity, illustrations in this Safety Guideline may be drawn with covers or safety guards removed. Ensure all covers and safety guards are properly instal prior to starting operation. For details on the PM motor, refer to the Instruction Manual of the PM motor.

defraiged.

If halogers (including fluorine, chlorine, bromine, and iodine) contained in furnigants for wood packages enter this product, the product may be dama Prevent the entry of furnigant residuals or use an alternative method such adisinfection. Note that sterilization or disinfection of wood packages should performed before packing the product.

# FR-E800 (Connection FR-E800 (Function FR-E800 (Communication FR-E800 (Mainter

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Manual name	Manual number	Manual name	Manual numb
00 Instruction Manual ection)	IB-0600865ENG	FR Configurator2 Instruction Manual	IB-0600516ENG
00 Instruction Manual on)	IB-0600868ENG	PLC Function Programming Manual	IB-0600492ENG
00 Instruction Manual nunication)	IB-0600871ENG	FR-E800 Instruction Manual (Functional safety)	BCN-A23488-000
00 Instruction Manual enance)	IB-0600874ENG		

**↑** CAUTION

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.

appliance handling, or person took a proper engineering training. Such training may be available at your local Mitsubishi Electric offic Contact your local sales office for schedules and locations.

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

**↑** CAUTION

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.

# ◆ Electric shock prevention

- Do not remove the front cover or the wiring cover while the power of this product is ON, and do not run this product with the front cover or the wiring cover removed, as the exposed high voltage terminals or the charging part of the circuitry can be touched. Doing so may cause an electric shock. Even if power is OFF, do not remove the front cover except for wiring or periodi inspection as the inside of this product is charged. Doing so may cause an electric shock. Even if power is OFF, do not remove the front cover except tor wiring or periodic inspection as the inside of this product is charged. Doing so may cause an electric shock.

  Before wiring or inspection, check that the 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 charge of the provided of the pro

- Thiur oduct body must be installed before wiring. Otherwise you may get an electric shock or be injured.

  Do not touch the setting dial or keys with wet hands. Doing so may cause an electric shock.

  Do not subject the cables to scratches, excessive stress, heavy loads or pinching. Doing so may cause an electric shock.

  Do not change the cooling fan while power is ON as it is dangerous to change the cooling fan while power is ON.

  Do not touch the printed circuit board or handle the cables with wet hands. Doing so may cause an electric shock.

  Never touch the motor terminals, etc. right after powering OFF as the DC voltage is applied to the motor for 1 second at powering OFF if the main circuit capacitor capacity is measured. Doing so may cause an electric shock.
- Fire prevention

# **↑** CAUTION

- This product must be installed on a nonflammable wall without holes in it so that its components cannot be touched from behind. Installing it on or near flammable material may cause a fire.

  If this product becomes faulty, the product power must be switched OFF. A continuous flow of large current may cause a fire.

  Do not connect a resistor directly to the DC terminals P/+ and N/-. Doing so could cause a fire.

  Across terminals P/+ and PR, connect only an external brake resistor.

  Be sure to perform daily and periodic inspections as specified in the instruction Manual. There is a possibility of explosion, damage, or fire if this product is used without inspection.

# Injury prevention

# **CAUTION**

- damage may occur.
  The polarity (+ and -) must be correct. Otherwise an explosion or damage may
- While power is ON or for some time after power OFF, do not touch the inverter as it will be extremely hot. Doing so may cause hume

# ◆ Additional instructions The following instructions must be also followed. If the product is handled incorrectly, it may cause unexpected fault, an injury, or an electric shock.

# **⚠** CAUTION

- Transportation and installation

   Use proper lifting techniques or a trolley when carrying products. Failure to do so may lead to injuries.

   Do not stack the boxes containing inverters higher than the number recommended.

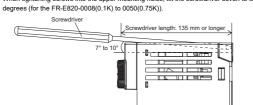
- Do not stack the boxes containing inverters higher than the number recommended.
  The product must be installed in a position where it withstands the weight of the product according to the information in the Instruction Manual.
  The product according to the information in the Instruction Manual.
  The product according to the information in the Instruction Manual.
  The product according to the information of the product.
  When the stall diverse heavy objects on the product.
  Do not stand or place heavy objects on the product.
  Ensure the mounting orientation of this product is correct.
  Ensure the mounting orientation of this product is correct.
  As this product is a precision instrument, do not drop or subject it to impact.
  The surrounding an temperature must be between -20°C and +60°C (non-time the interpretation of the interp

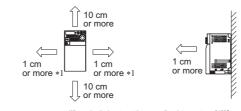
# wiring cover to fix the inverter.

- Leave enough clearances and take cooling measures. Avoid places where the inverter is subjected to direct sunlight, high temperature and high

INVERTER INSTALLATION AND PRECAUTIONS

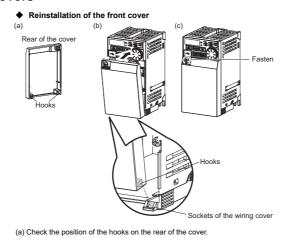
Install the inverter on a nonflammable wall surface When tightening screws into the upper mounting holes, tilt the screwdriver seven to ten





# Removal and reinstallation of covers

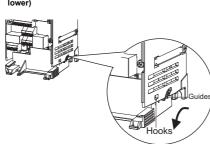
INSTALLATION AND WIRING



- (a) Loosen the mounting screws of the cover. (These screws cannot be
- (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.
- (b) Insert the hooks of the cover into the sockets of the wiring cover, and reinstall the
  - (c) Tighten the mounting screws of the front cover. (Tightening torque: 0.6 to 0.8

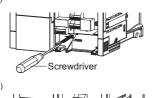
Reinstallation of the wiring cover (for FR-E820-0050(0.75K) or lower)

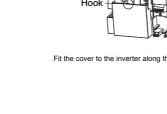
# ♦ Removal of the wiring cover (for FR-E820-0050(0.75K) or



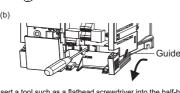
Pull out the cover along the guides in the direction shown by the arrow in the Fit the cover to the inverter along the guides





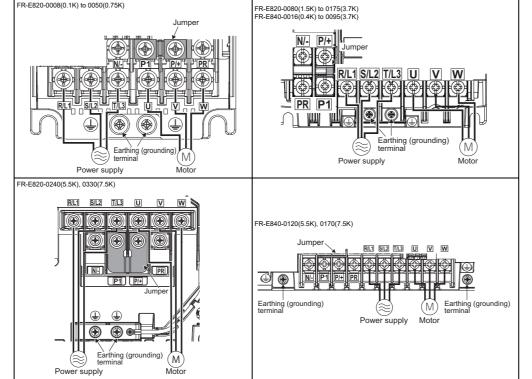


◆ Removal of the wiring cover (for the FR-E820-0080(1.5K) or ◆ Reinstallation of the wiring cover (for the FR-E820-0080(1.5K) or



- "PUSH" mark on the wiring cover to push the cover behind the wiring cover approx. 3 mm.
- (b) Pull out the cover along the guides in the direction shown by the arrow in

# 2.2 Main circuit terminal layout and wiring to power supply and motor ♦ Three-phase 200/400 V class



# 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

					Cable gauge								
Applicable Inverter model	Terminal	Tightening torque N·m	Crimp	Crimp terminal		HIV cables, etc. (mm <sup>2</sup> ) *1			AWG *2		PVC cables, etc. (mm <sup>2</sup> ) *3		
	screw size *4		R/L1, S/L2, T/L3	u, v, w	R/L1, S/L2, T/L3	u, v, w	Earthing (grounding) cable	R/L1, S/L2, T/L3	u, v, w	R/L1, S/L2, T/L3	U, V, W	Earthing (grounding) cable	
FR-E820-0008(0.1K) to 0050(0.75K)	M3.5	1.2	2-3.5	2-3.5	2	2	2	14	14	2.5	2.5	2.5	
FR-E820-0080(1.5K), 0110(2.2K)	M4	1.5	2-4	2-4	2	2	2	14	14	2.5	2.5	2.5	
FR-E820-0175(3.7K)	M4	1.5	5.5-4	5.5-4	3.5	3.5	3.5	12	12	4	4	4	
FR-E820-0240(5.5K)	M5	2.5	5.5-5	5.5-5	5.5	5.5	5.5	10	10	6	6	6	
FR-E820-0330(7.5K)	M5	2.5	14-5	8-5	14	8	5.5	6	8	16	10	6	
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	

- 50°C or lower and the wiring distance of 20 m or shorter. The cable size is that of the THM cable with continuous maximum permissible temperature of 75°C. It assumes a surrounding air temperature of 40°C or lower 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 oUL".)

  The cable size is that of the PUC cable with continuous maximum permissible temperature of 70°C. It assumes a surrounding air temperature of 40°C or lower and the wiring distance of 20 m or shorter (selection example mainly for use in Europe).

  The scriew size for terminals RL1, SL12, TL3, U, V, W, PR, P/+, N-, and P1, and the earthing (grounding) terminal is shown.
- le mainly for use in Europe).

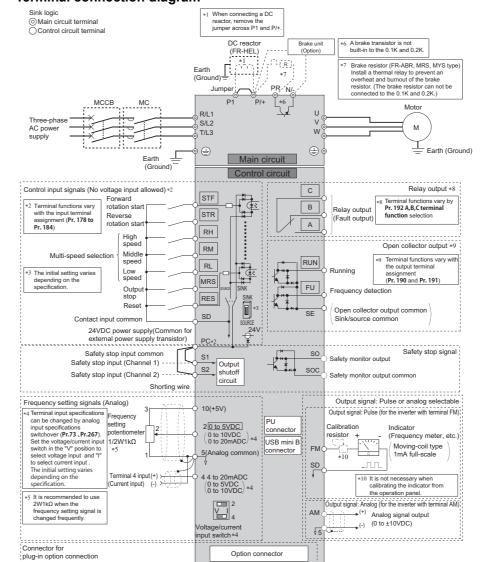
  le mainly for use in Europe).

  lals R/L1, S/L2, T/L3, U, V, W, PR, P/+, N/-, and P1, and the earthing (grounding) terminal is shown.
- Line voltage drop [V] =  $\sqrt{3}$  × wire resistance [m $\Omega$ /m] × wiring distance [m] × 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.

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
4.4	4 (4 111-) 1	200 V	50 m (200 m)	50 m (200 m)	75 m (300 m)	100 m (500 m)			
Shielded *1	1 (1 kHz) or lower	400 V	_	_	50 m (200 m)	50 m (300 m)	75 m (500 m)	100 m (500 m)	100 m (500 m)
	2 (2 kHz) or higher	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)

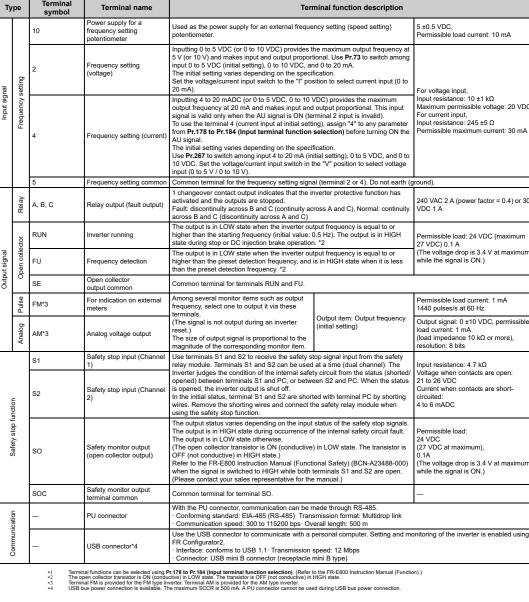
When driving a 400 V class motor by the inverter, surge voltages attributable to the wiring constants may occur at the motor terminals, deteriorating the insulation of the motor. In this case, use a "400 V class inverter-driven insulation-enhanced motor" and set **Pr.72 PWM frequency selection** according 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

## 2.4 Terminal connection diagram

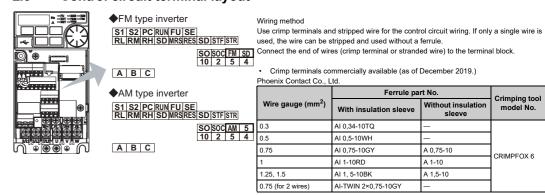


# Details on the main circuit terminals and the control circuit terminals

Type	symbol	Terminal name	Terminal function description								
	R/L1, S/L2, T/L3	AC power input	Connected to the commercial power supply. Do converter (FR-HC2) or the multifunction regener								
	U, V, W	Inverter output	Connected to a three-phase squirrel cage motor	r 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 0.1K and 0.2K.)								
Main circuit	D/+ N/	Brake unit connection	Connect the brake unit (FR-BU2, FR-BU, or BU), multifunction regeneration converter (FR-XC), or high power factor converter (FR-HC2) to these terminals.								
	P/+, P1	DC reactor connection	Remove the jumper across terminals P/+ and P jumper across terminals P/+ and P1 should not		n a DC reactor is not connected, the						
		Earth (ground)	For earthing (grounding) the inverter chassis. Be sure to earth (ground) the inverter.								
	STF*1 Forward rotation start		Turn ON the STF signal to start forward rotation and turn it OFF to stop.	When the STF and STR signals are turned ON simultaneously.							
	STR*1	Reverse rotation start	Turn ON the STR signal to start reverse rotation and turn it OFF to stop.	the stop command is given.							
	RH, RM, RL*1	Multi-speed selection	Multi-speed can be selected according to the co signals.	ombination of RH, RM and RL	Input resistance: 4.7 kΩ Voltage when contacts are open: 21 to 26 VDC						
	MRS*1	Output stop	Turn ON the MRS signal (20 ms or more) to sto Use this signal to shut off the inverter output wh electromagnetic brake.	Current when contacts are short- circuited: 4 to 6 mADC							
nal su t	RES*1	Reset	Use this signal to reset a fault output provided v activated. Turn ON the RES signal for 0.1 secor In the initial setting, reset is always enabled. By enabled only at an inverter fault occurrence. Th second after reset.								
Input signal	ac	Contact input common (sink)	Common terminal for the contact input terminal (sink logic) and terminal FM.								
=   3	SD	External transistor common (source)	Connect this terminal to the power supply comm programmable controller, in the source logic to a								
		24 VDC power supply common	Common output terminal for 24 VDC 0.1 A power	er supply (terminal PC). Isolated fr	om terminals 5 and SE.						
		External transistor common (sink)	Connect this terminal to the power supply comm (open collector output) device, such as a progra logic to avoid malfunction by undesirable curren	mmable controller, in the sink	ī.						
	PC	Safety stop input terminal common	Common terminal for safety stop input terminals	3	Power supply voltage range: 22 to 26.5 VDC						
		Contact input common (source)	Common terminal for the contact input terminal	(source logic).	Permissible load current: 100 mA						
		24 VDC power supply common	Can be used as a 24 VDC 0.1 A power supply.								



# Control circuit terminal layout



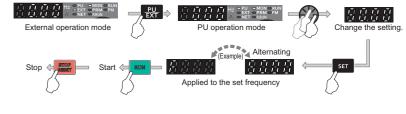
# **BASIC OPERATION**

# 3.1 Components of the operation panel

◆Parameter setting

	Name	Description
- NI - MON- NIN	PU/EXT key	Switches between the PU operation mode, the PUJOG operation mode, and the External operation mode.
Hz PRM PRM	MODE key	Switches the operation panel to a different mode.
D. D. D. A PRET PRUN	SET key	Used to confirm each selection. Switches the monitor screen in the monitor mode.
PU MODE SET	RUN key	Start command The direction of motor rotation depends on the <b>Pr.40</b> setting.
RUN STOP V J	STOP/RESET key	Used to stop operation commands. Used to reset the inverter when the protective function is activated.
THE REPORT OF THE PARTY OF THE	Setting dial	The setting dial of the Mitsubishi Electric inverters. Turn the setting dial to change the setting of frequency or parameter.

◆Starting/stopping the inverter on the operation panel



SET — SET — SET — SET — Parameter setting complete Change the setting. The present setting is displayed

## 4 PARAMETERS 5 LIST OF FAULT DISPLAYS For details, refer to the FR-F800 Instruction Manual (Maintenance)

TITITI HZ =PU -MON -RUN

PU STT =RRM =RM

EXT = PU -MON -RUN

A NET =RRM =RM

A NET =RRM =RM

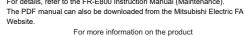
A NET =RRM =RM

A NET =RRM =RM

PU operation mode

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









## 6 SPECIFICATIONS

## 6.1 Inverter rating

## ♦ Three-phase 200 V class

	Model FR-E820-[]				0015	0030	0050	0080	0110	0175	0240	0330		
	Model FR-	E820-[]		0.1K	0.2K	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K		
Applic	able motor capa	acity	LD	0.2	0.4	0.75	1.1	2.2	3.0	5.5	7.5	11		
	(kW)*1		ND	0.1	0.2	0.4	0.75	1.5	2.2	3.7	5.5	7.5		
	Rated capac	city	LD	0.5	0.5		2.4	3.8	4.8	7.8	12.0	15.9		
	(kVA)*2		ND	0.3	0.6	1.2	2.0	3.2	4.4	7.0	9.6	13.1		
	Rated current		LD	1.3 (1.1)	2 (1.7)	3.5 (3.0)	6.0 (5.1)	9.6 (8.2)	12 (10.2)	19.6 (16.7)	30 (25.5)	40 (34)		
Rated current (A)*7  Output Overload current		(A) 1	ND	0.8 (0.8)	1.5 (1.4)	3 (2.5)	5 (4.1)	8 (7)	11 (10)	17.5 (16.5)	24 (23)	33 (31)		
		rent	LD	120% 60	s, 150% 3	s (inverse-	time chara	cteristics)	at surround	ding air ten	nperature	of 50°C		
	rating*3		ND	150% 60	s, 200% 3	s (inverse-	time chara	cteristics)	at surround	ding air ten	nperature	of 50°C		
	Vo	oltage*4		Three-ph	ase 200 to	240 V								
		Brak	e transistor	Not instal	led	Built-in								
	Regenerative braking					100%		50%	20%					
	Rated input AC voltage/frequency				ase 200 to	240 V 50/	60 Hz							
	Permissible AC	170 to 26	4 V, 50/60	Hz										
	Permissible frequency fluctuation			±5%	±5%									
		LD	Without DC reactor	1.9	3.0	5.1	8.2	13	16	26	37	49		
	Rated input	LD	With DC reactor	1.3	2.0	3.5	6.0	9.6	12	20	30	40		
Power	current (A)*8	ND	Without DC reactor	1.4	2.3	4.5	7.0	11	15	23	30	41		
supply		ND	With DC reactor	0.8	1.5	3.0	5.0	8.0	11	17.5	24	33		
		LD	Without DC reactor	0.7	1.1	1.9	3.1	4.8	6.2	9.7	14	19		
	Power supply capacity	L	With DC reactor	0.5	0.8	1.3	2.3	3.7	4.6	7.5	11	15		
	(kVA)*6	ND	Without DC reactor	0.5	0.9	1.7	2.7	4.1	5.7	8.8	12	16		
		ND	With DC reactor	0.3	0.6	1.1	1.9	3.0	4.2	6.7	9.1	13		
Pr	rotective structu	re (IEC	60529)	Enclosed	type (IP20	))								
	Cooling system				Natural				Forced air					
	Cooling s	yoteiii												

## ◆ Three-phase 400 V class

	Model CD	E040 F		0016	0026	0040	0060	0095	0120	0170
	Model FR-	E840-[]		0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K
Applic	able motor capa	acity	LD	0.75	1.5	2.2	3.0	5.5	7.5	11
	(kW)*1		ND	0.4	0.75	1.5	2.2	3.7	5.5	7.5
	Rated capacity	(kVA)	LD	1.6	2.7	4.2	5.3	8.5	13.3	17.5
	*2		ND	1.2	2.0	3.0	4.6	7.2	9.1	13.0
	Rated current (A)		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 (19.6)
	*7		ND	1.6 (1.4)	2.6 (2.2)	4 (3.8)	6 (5.4)	9.5 (8.7)	12	17
Output	Overload cur		LD		s, 150% 3 ure of 50°0		-time chara	acteristics)	at surroun	ding air
	rating *3		ND		s, 200% 3 ure of 50°0		-time chara	acteristics)	at surroun	ding air
	Vo	ltage *4		Three-ph	ase 380 to	480 V				
			e transistor	Built-in	Built-in					
	Regenerative braking			100% 50% 20%						
	Rated input A	Rated input AC voltage/frequency				480 V 50/	60 Hz			
	Permissible AC	323 to 52	28 V, 50/60	Hz						
	Permissible from	±5%								
			Without DC reactor	3.3	6.0	8.9	11	16	25	32
	Rated input	LD	With DC reactor	2.1	3.5	5.5	6.9	11	18	23
Power	current (A) *8		Without DC reactor	2.7	4.4	6.7	9.5	14	18	25
supply		ND	With DC reactor	1.6	2.6	4.0	6.0	9.5	12	17
		LD	Without DC reactor	2.5	4.5	6.8	8.2	12	19	25
	Power supply	LD	With DC reactor	1.6	2.7	4.2	5.3	8.5	13	18
	capacity (kVA) *6	ND	Without DC reactor	2.1	3.4	5.1	7.2	11	14	19
		ND	With DC reactor	1.2	2.0	3.0	4.6	7.2	9.1	13
Pr	otective structu	re (IEC	60529)	Enclosed	type (IP20	0)				
	Cooling s	ystem		Natural		Forced a	ir			
Approx. mass (kg)				1.2	1.2	1.4	1.8	1.8	2.4	2.4

- The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi Electric 4-pole standard efficiency motor.

  The rated output capacity indicated assumes that the output voltage is 230 V for three-phase 200 V class and 400 V class.

  The percentage of the overland 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
- es 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 \$\varphi^{\text{C}}\$. The amount of braking forque is the average short-term forque (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 lorque. 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 validle for 0.1K and QSK). Brake unit (FR-BU/C) and be also used.

  The power supply capacity varies with the value of the power supply side impedance (including those of the input reactor and cables). The power supply capacity varies with the value of the power supply side impedance (including those of the input reactor and cables). The power supply capacity varies with the value of related output current when the low accounts notes operation is performed with the surrounding air temperature exceeding 40°C while 2 kHz or higher value is selected.
- The Value in parentineses is the rated capture content when to be seen in Pr.27 PWM frequency selection.

  The rated input current is the value when at the rated output current. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.

# Inverter installation environment

Item	Item Description								
Surrounding air temperature *1	-20°C to +60°C (The rated current must be reduced at a temperature above 50°C. To meet the UL/EN standards, use the product at temperatures from -20°C to 50°C.)	Enclosure							
Ambient humidity	95% RH or less (non-condensing) (With circuit board coating (IEC 60721-3-3 3C2/3S2 compatible)) 90% RH or less (non-condensing) (Without circuit board coating)	Inverter Measurement position							
Storage temperature	-40°C to +70°C	5 cm → 5 cm  Measurement → 5 cm  position							
Atmosphere	Indoors (free from corrosive gas, flammable gas, oil mist, dust and dirt)								
Altitude/vibration	Maximum 3000 m, $5.9\text{m/s}^2$ or less (For installation at an altitude above 1000 m, consider a 3% reduction altitude.)	on in the rated current per 500 m increase in							

# 7 APPENDIX

# 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 61800-3:2017 (Category "C3" / Second environment)

  This inverter is not intended to be used on a low-voltage public network which supplies domestic premises. When using the inverter in a residential area, take appropriate meaning the inverter in a residential area.
- and ensure the conformity of the inverter used in the residential area.
- Radio frequency interference is expected if used on such a network.

  The installer shall provide a guide for installation and use, including recom

- 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, EU Directive compliant EMC filter, and controller cable found in the EMC Installation Guidelines (BCN-A21041-204) according to the instructions. (Contact your sales representative for the manual.)

  To make full use of the EMC Directive compliant noise filter, motor cable lengths should not exceed 20 m.

  Ensure that the finalized system which includes an inverter complies with the EMC Directive.

- ♦ Low Voltage Directive

  We have self-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 61800-5-1:2007

## · Outline of instructions

- Do not use an earth leakage circuit breaker as an electric shock protector without connecting the equipment to the earth. Connect the equipment to the earth (ground)

- Do not use an earth leakage circuit breaker as an elecuric shock protected mistable states.

  Wire the earth terminal independently. (Do not connect two or more cables to one terminal.)

  Use the cable whose size is indicated in Section 2.3 at the surrounding air temperature up to 40°C.

  If conditions are different from above, select appropriate wire according to EN 60204.

  Use a 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 cable whose size is indicated in Section 2.3.

  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.

  Attach the fan cover to the fan with the fan cover fixing screws enclosed with the inverter.

  FR-E820-0080(1.5K) or higher 1 —Fan cover fixing screws

FR-E820-0080(1.5K) or higher FR-E840-0040(1.5K) or higher FR-E840-0040(1.5K) or higher

If the cover is not fixed, the inverter protective structure is regarded as IP00.

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.

For installation in the United States, branch circuit protection must be provided in accordance with the National Electrical Code and any applicable provincial codes. For installation in Canada, branch circuit protection must be provided in accordance with the Canadian Electrical Code and any applicable provincial 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 code.

• 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).

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

For installation in the United States, the semiconductor fuses shown in the following table must be provided, in accordance with the National Electrical Code and any applicable

	local codes. For installation in Canada, the semiconductor fuses shown in the following table must be provided, in accordance with the Canadian Electrical Code and any applicable local codes. The following semiconductor fuses cannot be used as branch circuit protection. For branch circuit protection, use appropriate fuses or install a breaker.										
Inverter model	Cat. No	Manufacturer	Rating		Inverter model	Cat. No	Manufacturer	Rating			
FR-E820-0008(0.1K), 0015(0.2K)	170M1408	Bussmann	700 V, 10 A		FR-E820-0330(7.5K)	170M1419	Bussmann	700 V, 160 A			
FR-E820-0030(0.4K)	170M1409	Bussmann	700 V, 16 A		FR-E840-0016(0.4K)	170M1408	Bussmann	700 V, 10 A			
FR-E820-0050(0.75K)	170M1410	Bussmann	700 V, 20 A		FR-E840-0026(0.75K), 0040(1.5K)	170M1409	Bussmann	700 V, 16 A			
FR-E820-0080(1.5K)	170M1312	Bussmann	700 V, 32 A		FR-E840-0060(2.2K)	170M1312	Bussmann	700 V, 32 A			
FR-E820-0110(2.2K)	170M1414	Bussmann	700 V, 50 A		FR-E840-0095(3.7K)	170M1413	Bussmann	700 V, 40 A			
FR-E820-0175(3.7K)	170M1416	Bussmann	700 V, 80 A		FR-E840-0120(5.5K)	170M1414	Bussmann	700 V, 50 A			
FR-E820-0240(5.5K)	170M1417	Bussmann	700 V, 100 A	ı	FR-E840-0170(7.5K)	170M1416	Bussmann	700 V, 80 A			

# 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

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

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

The following table shows examples when the inverter rating is the LD rating, when the cable is the THHW cable with continuous maximum permissible temperature of 7.5 75°C, when the surrounding air temperature is 30°C or less, and the wiring length is 20 m or shorter.

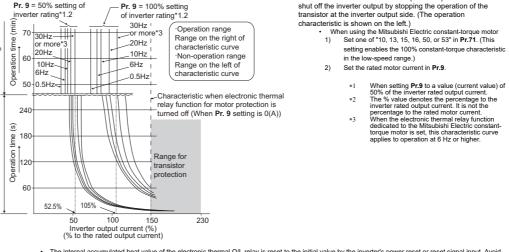
			0-1 4		Cable gauge AWG		
Applicable inverter model	Terminal screw size	Tightening torque (N·m)	Crimp term	ınaı			
	·	(14 111)	R/L1, S/L2, T/L3	U, V, W	R/L1, S/L2, T/L3	U, V, W	
FR-E820-0008(0.1K) to 0050(0.75K)	M3.5	1.2	2-3.5	2-3.5	14	14	
FR-E820-0080(1.5K)	M4	1.5	3.5-4	2-4	12	14	
FR-E820-0110(2.2K)	M4	1.5	5.5-4	2-4	10	14	
FR-E820-0175(3.7K)	M4	1.5	8-4	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-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	8-4	5.5-4	8	10	

# 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.

# \*1 The screw size for terminals Ric1, Sic2, IrL3, U, V, W, PT, PT\*, N°-, alto F1, and the earning (globinous) remines a anoma. ◆ Short circuit ratings • 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



- . 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
- A dedicated motor cannot be protected by the electronic thermal relay. Use an external thermal relay.
   Motor over temperature sensing is not provided by the drive.

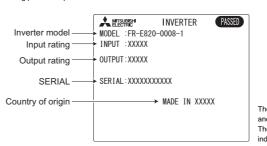
will be deteriorated. Use an external thermal relay in such cases.

# SERIAL number check

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

Rating plate example

7.3





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 are indicated as the Year, and the Month is

## 7.4 Instructions for EAC

rtified in compliance with the Eurasian Conformity has the EAC marking.

In 2010, three countries (Russia, Belarus, and Kazakhstan) established a Customs Union for the purposes of revitalizing the economy by forming a large economic bloc by abolishing or reducing tariffs and unifying regulatory procedures for the handling of articles. Products to be distributed over these three countries of the Customs Union must comply with the Customs Union Technical Regulations (CU-TR), and the EAC marking

For information on the country of origin, manufacture year and month, and authorized sales representative (importer) in the CU area of this product, refer to the

· Country of origin indication

Check the rating plate of the product. Example: MADE IN JAPAN

Check the SERIAL number indicated on the rating plate of the product

· Authorized sales representative (importer) in the CU area The authorized sales representative (importer) in the CO area
The authorized sales representative (importer) in the CU area is shown below.
Name: Mitsubishi Electric (Russia) LLC
Address: 52, bld 1 Kosmodamianskaya Nab 115054, Moscow, Russia
Phone: +7 (495) 721-2071
Fax: +7 (495) 721-2071

# Restricted Use of Hazardous Substances in Electronic and Electrical **Products**

The mark of restricted use of hazardous substances in electronic and electrical products is applied to the product as follows based on the "Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products" of the People's Republic of China. 电器电子产品有害物质限制使用标识要求



本产品中所含有的有害物质的名称、含量、含有部件如下表所示。

# 产品中所含有害物质的名称及含量

	有害物质 *1									
部件名称 *2	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr (VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)				
电路板组件 (包括印刷电路板及其构成的零部件, 如电阻、电容、集成电路、连接器等)、电子部件	×	0	×	0	0	0				
金属壳体、金属部件	X	0	0	0	0	0				
树脂壳体、树脂部件	0	0	0	0	0	0				
<b></b>	0	0	0	0	0	0				

〇:表示该有害物质在该部件所有均质材料中的含量均在 GB/T26572 规定的限量要求以下

## 7.6 Referenced Standard (Requirement of Chinese standardized law) This Product is designed and manufactured accordance with following Chinese standards

Machinery safety: GB/T 16855.1

GB/T 12668.502 GB 28526

GB/T 12668.3 Electrical safety: GB/T 12668.501

# 7.7 Application of caution labels

Caution labels are used to ensure safety during use of Mitsubishi Electric inverters.

Make copies of the following labels and apply them to the inverter if the "retry function" and/or "automatic restart after instantaneous power failure" have been enabled.

For the retry function

EMC: GB/T 12668.3

For automatic restart after instantaneous power failure



