MITSUBISHI ELECTRIC
Changes for the Better

for a greener tomorrow eco Changes

New Product RELEASE

INVERTER

FR-E800

Addition of 11K to 22K Models for Three-Phase 200/400 V Class Inverters

Released in December 2020

Design future manufacturing

Open network and functional safety functions in a compact size

E800

GOOD DESIGN AWARD 2020

FR-E840-11K FR-E840-22K

NEW

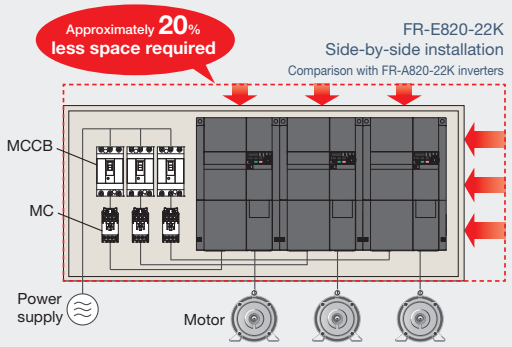
11K to 22K models available for three-phase 200/400 V class inverters, improving enclosure space efficiency

E800 E800-E E800-SCE

Expanded capacity range

The FR-E820-11K to 22K models and the FR-E840-11K to 22K models are added. The capacity range is extended as compared to the preceding FR-E700 inverters.
Approximately 20% less space is required for installation in an enclosure as compared to the layout using our FR-A820-22K inverters. Users can select the most suitable layout in a given space. (Note that the installation depth is greater when the plug-in option is connected.)

- When the surrounding air temperature is 40°C or less, multiple inverters can be installed side-by-side.
- Since multiple ratings are supported, the inverter can be used to drive a 30 kW motor.



NEW

Position control supported under Vector control, enabling accurate and stable transfer

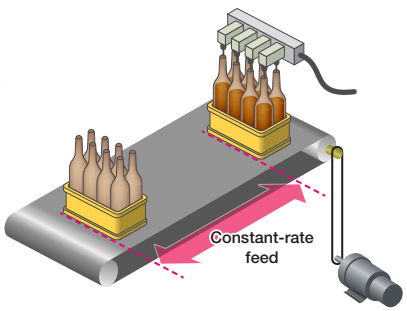
E800 E800-E E800-SCE

Position control

Vector control enables accurate transfer of glass or PET bottles to the filling position.

The specifications are shown on the next page.

Positioning function (point table method)
Position data (target position, speed, acceleration/deceleration time) and so on can be set in the parameters.
Positioning is possible for up to 7 points.
Positioning operation is performed by selecting point table numbers with external interface signals.
Continuous positioning is possible.



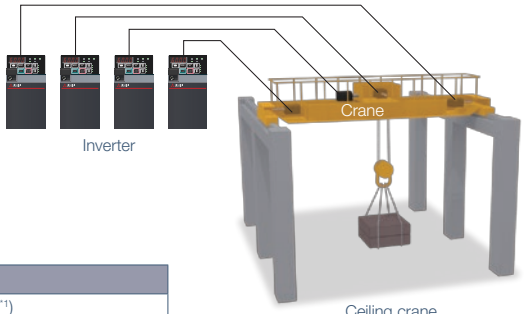
Products with or without this function may coexist in the market depending on the inventory and distribution conditions.

Same spare inverters for various applications

E800 E800-E E800-SCE

Vector control

The control method can be changed for each application in one inverter. This will reduce the number of required spare inverters.
For example, when the inverters are used for a ceiling crane, Vector control using the encoder feedback is available for the lift axis (plug-in option required), and Real sensorless vector control is available for the travel axis and the traverse axis.



Ceiling crane

Vector control specifications

Item		Description
Speed control	Speed control range	1:1500 (both driving/regeneration*1)
	Speed variation ratio	±0.01% (100% means 3000 r/min)
	Speed response	30 Hz
	Maximum speed	400 Hz (102400 pulse/s*2 or less encoder pulses)
Torque control	Torque control range	1:50
	Absolute torque accuracy	±10%*3
	Repeated torque accuracy	±5%*3
Position control	Repeated positioning accuracy	±1.5° (at motor shaft end)
	Positioning feedback pulse	Number of encoder pulses per motor rotation (Pr.369) × 4
	Electronic gear setting	1/900 to 900*4
	In-position width	0 to 32767 pulses
	Error excess	0 to 400K pulses
Function		• Signal loss detection enable/disable selection (protective function) • Zero speed control / servo lock selection (pre-excitation selection) • Control gain settings • Setting of the encoder rotation direction and the number of encoder pulses

Products with or without this function may coexist in the market depending on the inventory and distribution conditions.

*1: Regeneration unit (option) is necessary for regeneration
*2: Maximum frequency × 120 / number of poles / 60 s × number of encoder pulses (before multiplied by 4)
*3: When a High-performance energy-saving motor with encoder (SF-PR-SC) is used with the rated load
*4: Set the electronic gear ratio in the range of 1/50 to 20. If the setting value is too small, the speed command will also be too small; while if it is too large, the speed ripple will increase.

Toward smart factory with CC-Link IE TSN

E800-E E800-SCE

Various Ethernet networks such as CC-Link IE TSN, an open industrial network for the next generation, are supported.

Multi-protocols

Inverter models that support protocols of major global industrial Ethernet networks are available.
FR-E800 inverters support a variety of open networks without using any options, enabling the use of inverters on the existing network and assuring compatibility with various systems. Users can select a protocol group suitable for the intended system. It is possible to switch between protocols only by setting parameters. (Supported protocols differ depending on the model.)

Model	CC-Link IE TSN (100 Mbps)*1	CC-Link IE Field Network Basic	MODBUS®/TCP	PROFINET	EtherNet/IP	BACnet/IP	EtherCAT
FR-E800-[]EPA	●	●	●	—	●	●	—
FR-E800-[]EPB	●	●	●	●	—	—	—
FR-E800-[]EPC	—	—	—	—	—	—	○

*1: 1 Gbps is optional (to be supported).

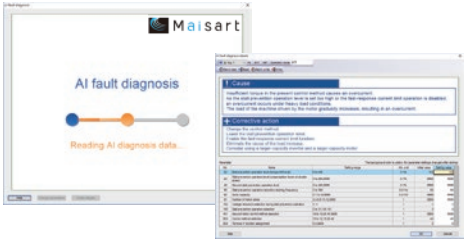
●: Supported ○: To be supported soon

Predictive and preventive maintenance of the system

E800 E800-E E800-SCE

AI technology of FR Configurator2 helps analyze and identify the cause of a fault when the inverter output is shut off.

Diagnosable faults: Overcurrent trip and overvoltage trip (other faults will be supported in the future.)
This function is available during speed control.



For the first time in the world*1, the Corrosion-Attack-Level Alert System (CALAS™)*2 is integrated in the inverter. Damage caused by corrosive gas around inverters can be predicted, urging operators to improve the environment.

*1: As of September 2019 (according to our investigation)
*2: Alert system for the risk of corrosive damage (degree of corrosion) of electrical equipment


Sewage treatment plant

Availability of described functions differs depending on the specification of the inverter. For the details, please contact your sales representative.

• Lineup

For the details of the lineup, please contact your sales representative.

FR-E8 2 0 ☐ - 0.1K -1 ☐

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

Symbol	Structure, functionality
0	Standard

Symbol	Description
0.1K to 22K	Inverter ND rated capacity (kW)
0008 to 0900	Inverter ND rated current (A) *1

Symbol	Voltage specifications
(None)	Three-phase
S	Single-phase 200 V input
W*6	Single-phase 100 V input (double voltage rectification)

Symbol	Circuit board coating*3	Plated conductor
None	Without coating	Without plated conductors
-60	With coating	Without plated conductors
-06*4	With coating	With plated conductors

Symbol	Communication /functional safety specifications	Monitoring/protocol specifications	Rated frequency (initial setting)	Control logic (initial status)
-1	RS-485 + SIL2/PLd	Pulse (terminal FM)	60 Hz	Sink logic
-4*1*5		Voltage (terminal AM)	50 Hz	Source logic
-5		Voltage (terminal AM)	60 Hz	Sink logic
EPA	Ethernet + SIL2/PLd	Protocol group A*2	60 Hz	Sink logic
EPB		Protocol group B*2	50 Hz	Sink logic / Source logic*7
EPC*6		Protocol group C*2	50 Hz	Source logic
SCEPA	Ethernet + SIL3/PLe	Protocol group A*2	60 Hz	Source logic*8
SCEPB		Protocol group B*2	50 Hz	Source logic*8
SCEPC*6		Protocol group C*2	50 Hz	Source logic*8

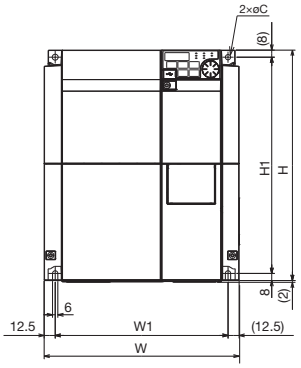
*1: Models with circuit board coating (-60/-06) only.
*2: Selectable protocols differ depending on the group.
Protocol group A: CC-Link IE TSN, CC-Link IE Field Network Basic, MODBUS/TCP, EtherNet/IP, and BACnet/IP
Protocol group B: CC-Link IE TSN, CC-Link IE Field Network Basic, MODBUS/TCP, and PROFINET
Protocol group C: EtherCAT
*3: Compatible with IEC 60721-3-3 3C2.
*4: Available for the 11K or higher.
*5: The kW indication is not available for models with a suffix "-4". When the kW indication is required, purchase the applicable model with a suffix "-5" and change the initial settings with reference to the Instruction Manual. (Refer to the Instruction Manual (Connection) for the switching of the control logic of the inverter, and the Instruction Manual (Function) for the rated frequency.)
*6: To be released
*7: The initial status of the control logic differs depending on the inverter model.
Sink logic for the models indicated with the rated capacity (kW)
Source logic for the models indicated with the rated current (A)
*8: The control logic is fixed to the source logic.

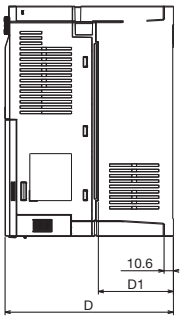
Three-phase 200 V	0.1K	0.2K	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K
	0008	0015	0030	0050	0080	0110	0175	0240	0330	0470	0600	0760	0900
FR-E820-[](E/SCE)	●	●	●	●	●	●	●	●	●	●	●	●	●
Three-phase 400 V	–	–	0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K
	–	–	0016	0026	0040	0060	0095	0120	0170	0230	0300	0380	0440
FR-E840-[](E/SCE)	–	–	●	●	●	●	●	●	●	●	●	●	●
Three-phase 575 V	–	–	–	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	–	–	–	–
	–	–	–	0017	0027	0040	0061	0090	0120	–	–	–	–
FR-E860-[](E/SCE)	–	–	–	●	●	●	●	●	●	–	–	–	–
Single-phase 200 V	0.1K	0.2K	0.4K	0.75K	1.5K	2.2K	–	–	–	–	–	–	–
	0008	0015	0030	0050	0080	0110	–	–	–	–	–	–	–
FR-E820S-[](E/SCE)	●	●	●	●	●	●	–	–	–	–	–	–	–
Single-phase 100 V	0.1K	0.2K	0.4K	0.75K	–	–	–	–	–	–	–	–	–
	0008	0015	0030	0050	–	–	–	–	–	–	–	–	–
FR-E810W-[](E/SCE)	○	○	○	○	–	–	–	–	–	–	–	–	–

: Released in December 2020 ●:Released ○: To be released –: Not applicable

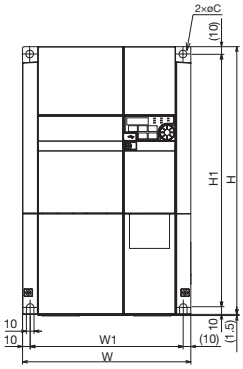
• Outline dimensions

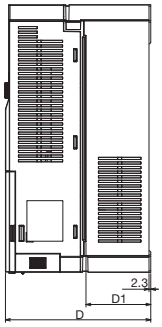
FR-E820-11K, FR-E820-15K
FR-E840-11K, FR-E840-15K





FR-E820-18.5K, FR-E820-22K
FR-E840-18.5K, FR-E840-22K





Inverter model	W	W1	H	H1	D	D1	C
FR-E820-11K, FR-E820-15K	220	195	260	244	190	84.7	6
FR-E840-11K, FR-E840-15K							
FR-E820-18.5K, FR-E820-22K	220	200	350	330	190	84.7	10
FR-E840-18.5K, FR-E840-22K							

(Unit: mm)

• Inverter rating

Model				FR-E820-[]				FR-E840-[]			
				11K	15K	18.5K	22K	11K	15K	18.5K	22K
				0470	0600	0760	0900	0230	0300	0380	0440
Applicable motor capacity (kW)*1			LD	15.0	18.5	22.0	30.0	15.0	18.5	22.0	30.0
			ND	11.0	15.0	18.5	22.0	11.0	15.0	18.5	22.0
Output	Rated capacity (kVA)*2		LD	22.3	27.5	35.1	45.8	26.7	31.2	34.3	45.7
			ND	18.7	23.9	30	35.9	17.5	22.9	29.0	33.5
	Rated current (A)*3		LD	56.0 (47.6)	69.0 (58.7)	88.0 (74.8)	115.0 (97.8)	35.0 (29.8)	41.0 (34.9)	45.0 (38.3)	60.0 (51.0)
			ND	47.0 (44.0)	60.0 (57.0)	76.0 (72.0)	90.0 (86.0)	23.0	30.0	38.0	44.0
	Overload current rating*4		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C				120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C			
			ND	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C				150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C			
	Voltage*5			Three-phase 200 to 240 V				Three-phase 380 to 480 V			
	Regenerative braking	Brake transistor		Built-in				Built-in			
		Maximum brake torque (ND reference)*6		20%				20%			
Power supply	Rated input AC (DC) voltage/frequency			Three-phase 200 to 240 V 50/60 Hz (283 to 339 VDC*9)				Three-phase 380 to 480 V 50/60 Hz (537 to 679VDC*9)			
	Permissible AC (DC) voltage fluctuation			170 to 264 V, 50/60 Hz (240 to 373 VDC*9)				323 to 528 V, 50/60 Hz (457 to 740VDC*9)			
	Permissible frequency fluctuation			±5%				±5%			
	Rated input current (A)*7	Without DC reactor	LD	74.3	90.5	112.9	139.5	46.7	54.2	59.1	75.6
			ND	63.6	79.9	99.0	114.3	32.1	41.0	50.8	57.3
		With DC reactor	LD	56.0	69.0	88.0	115.0	35.0	41.0	45.0	60.0
			ND	47.0	60.0	76.0	90.0	23.0	30.0	38.0	44.0
	Power supply capacity (kVA)*8	Without DC reactor	LD	29.0	35.0	43.0	54.0	36.0	42.0	45.0	58.0
			ND	25.0	31.0	38.0	44.0	25.0	32.0	39.0	44.0
		With DC reactor	LD	21.0	26.0	34.0	44.0	27.0	31.0	34.0	46.0
			ND	18.0	23.0	29.0	34.0	18.0	23.0	29.0	34.0
Protective structure (IEC 60529)				Open type (IP20)				Open type (IP20)			
Cooling system				Forced air				Forced air			
Approx. mass (kg)				5.4	5.6	11.0	11.0	4.8	4.9	11.0	11.0

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

*2: The rated output capacity indicated assumes that the output voltage is 230 V for three-phase 200 V class and 440 V for three-phase 400 V class.

*3: 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.

*4: 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.

*5: 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 √2 .

*6: 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 builtin brake resistor. Use an option brake resistor for an operation with large regenerative power. Brake unit (FR-BU2) can be also used.

*7: 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.

*8: The power supply capacity varies with the value of the power supply side impedance (including those of the input reactor and cables).

*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.

• Option list (plug-in option, operation panel)

By fitting the following options to the inverter, the inverter is provided with more functions.

For other options, refer to the FR-E800 inverter catalog.

Name		Type	Applicable Inverter			Remarks
			E800	E800-E	E800-SCE	
Plug-in Option	Vector control (speed/torque/position control) Encoder feedback control	FR-A8AP E kit	●	●	●	Inverters manufactured in August 2020 or later
	16-bit digital input	FR-A8AX E kit	●	●	●	
	Digital output Extension analog output	FR-A8AY E kit	●	●	●	
	Relay output	FR-A8AR E kit	●	●	●	
	CC-Link communication	FR-A8NC E kit	●	●	●	
	DeviceNet communication	FR-A8ND E kit	●	●	●	
	PROFIBUS-DP communication	FR-A8NP E kit	●	●	●	
Operation Panel	LCD operation panel	FR-LU08(-01)*1	●	–	–	Inverters manufactured in May 2020 or later
	Parameter unit	FR-PU07*2	●	–	–	
	Parameter unit with battery pack	FR-PU07BB(-L)*2	●	–	–	
	Enclosure surface operation panel	FR-PA07	●	–	–	

*1: Use the FR-LU08(-01) manufactured in June 2020 or later.

*2: Use the FR-PU07 or FR-PU07BB(-L) manufactured in August 2020 or later.

●: Supported –: Not supported

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE: TOKYO BLDG., 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN

L(NA)06127ENG-D(2012) MEE