

FACTORY AUTOMATION

New Product RELEASE

No.21-3E-A

INVERTER

FR-E800

Addition of the FR-E800-HVC Inverter
for the HVAC (Air Conditioning) Industry



Inverters that meet HVAC market standards and offer easier installation into HVAC systems

HVAC: Heating, Ventilation, and Air Conditioning

► Compliance with various standards

- To meet UL 50/UL 50E and UL 2043, a sheet metal conduit kit (wiring cover) is installed on the main circuit wiring section, a protective sheet is attached on the top of the inverter to prevent damage caused by flying objects, and a low fuming resin is used for the casing.
- The FR-E800-HVC inverters meet various standards, including safety (automatic electrical controls), harmonics, etc.

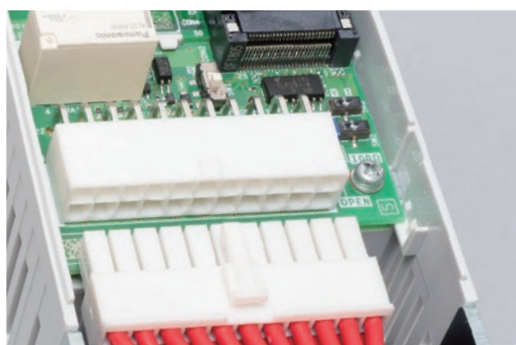
Item	Standard	Category
Protective structure	UL 50/UL 50E/IEC 60529	UL Type1
	UL 2043	Plenum Rating
	BS/EN 60529	IP21 ^{*1}
Automatic electrical controls	UL 60730-1	Class A
Harmonics	EN 61000-3-2/-12 ^{*2}	—

*1: Use the external option to be released.

*2: Use the external option FR-HEL.

► Easy wiring

Control circuit terminals use a pluggable connector for quick and easy connection.



► Application examples



Cooling tower



Pump



Compressor

• PID control

A sensor monitors a cooling water temperature, which enables the operation corresponding to the target temperature. The system cost can be reduced because no external PID controller is required.

• Automatic restart after instantaneous power failure

Frequency search is available at every start, enabling smooth starting even when the motor is coasting at a start.

• Network compatibility

The network such as BACnet[®]MS/TP or MODBUS[®]RTU is suitable for use with air conditioning controls. This makes it possible to achieve efficient air conditioning controls with all-in-one management of the air conditioning in the entire building.

• Load characteristics fault detection function

When a mechanical fault such as clogging of the filter occurs, the inverter outputs a warning or shuts off the output to prevent system damage.

• PM motor control

Driving a PM motor, which is more efficient than an induction motor, achieves more energy savings.

• High-speed operation

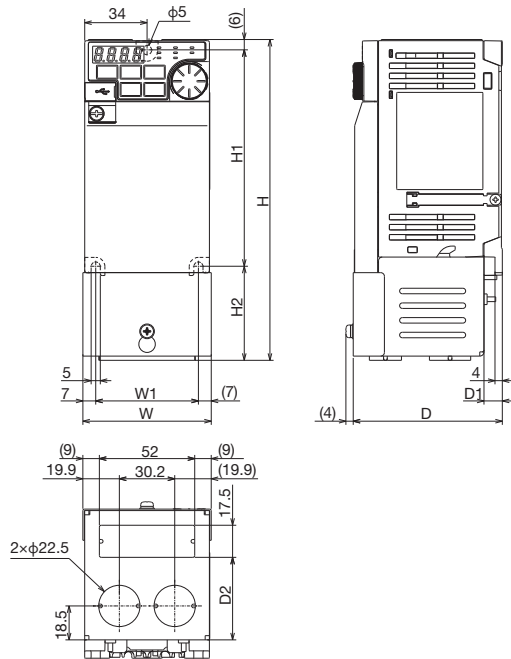
[Maximum output frequency]

V/F control 590 Hz

Advanced magnetic flux vector control 400 Hz

• Outline dimensions

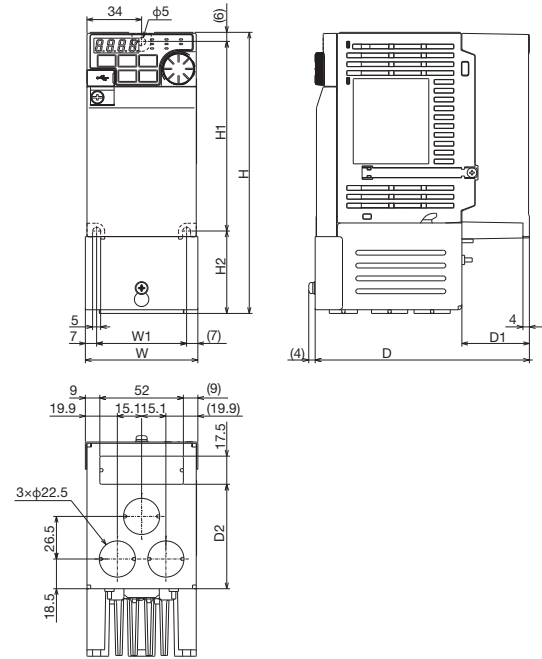
FR-E820-0011, FR-E820-0017, FR-E820-0030
FR-E820S-0011



Inverter model	W	W1	H	H1	H2	D	D1	D2
FR-E820-0011	70	56	174.9	118	51.3	81.3	10	45
FR-E820-0017						113.3	42	
FR-E820-0030						81.3	10	
FR-E820S-0011						81.3	10	

(Unit: mm)

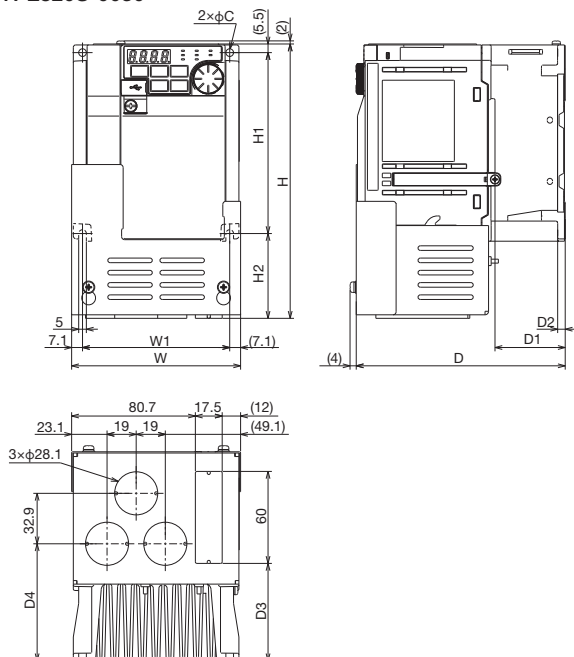
FR-E820-0051
FR-E820S-0017



Inverter model	W	W1	H	H1	H2	D	D1	D2
FR-E820-0051	70	56	174.9	118	51.3	133.3	42	65
FR-E820S-0017						143.3	42	75

(Unit: mm)

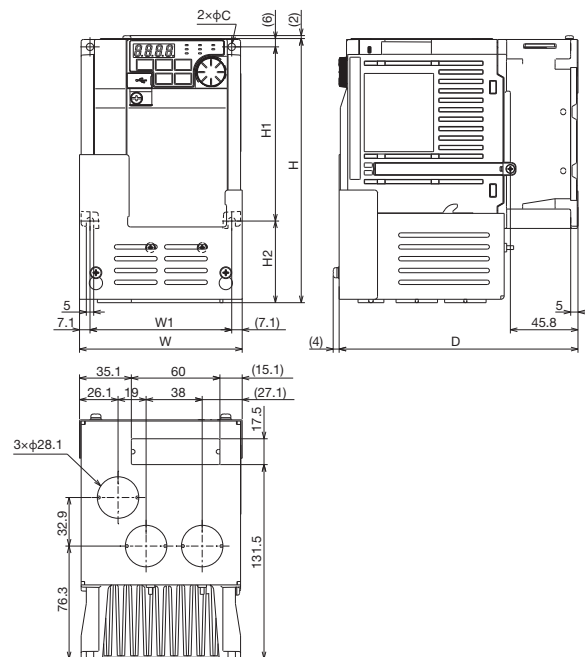
FR-E820-0082, FR-E820-0102
FR-E840-0018, FR-E840-0030, FR-E840-0047
FR-E820S-0030



Inverter model	W	W1	H	H1	H2	D	D1	D2	D3	D4	C
FR-E820-0082	110.2	96	178.9	118	55.3	136.3	46	5	63.5	76.3	5
FR-E820-0102						130.3	40		58	70.5	
FR-E840-0018						135.8	46		64	76.5	
FR-E840-0047						135.8	45.3		63	75.8	
FR-E820S-0030						135.8	45.3		63	75.8	

(Unit: mm)

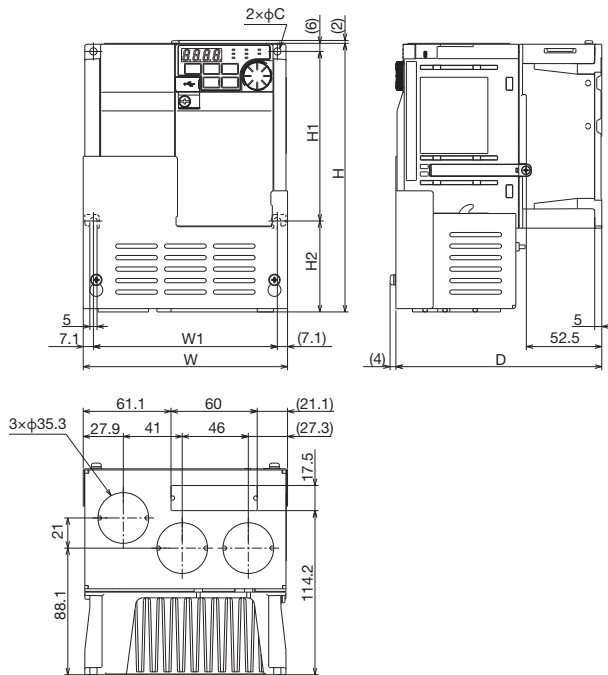
FR-E820S-0051



Inverter model	W	W1	H	H1	H2	D	C
FR-E820S-0051	110.2	96	178.9	118	55.3	161.8	5

(Unit: mm)

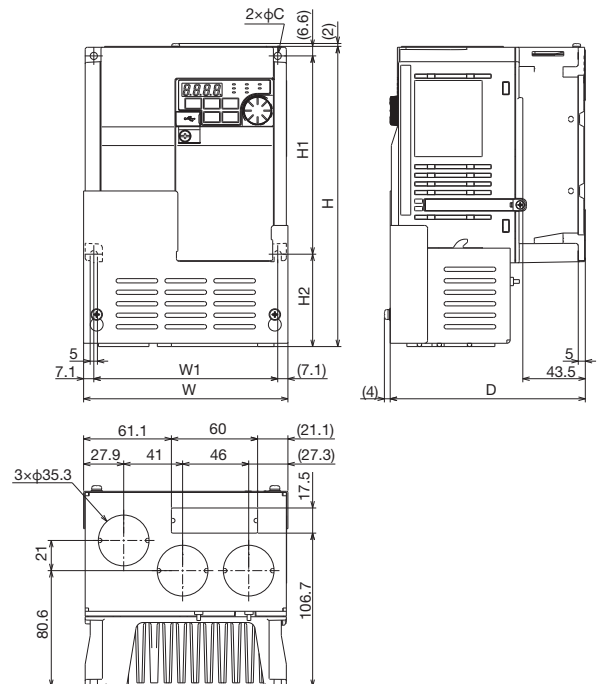
FR-E820-0167
FR-E820S-0082



Inverter model	W	W1	H	H1	H2	D	C
FR-E820-0167 FR-E820S-0082	142.2	128	186.9	118	63.3	143.3	5

(Unit: mm)

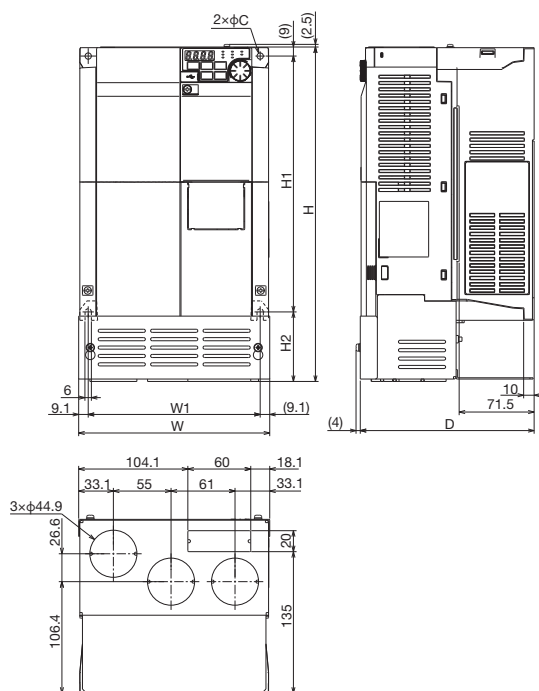
FR-E840-0059, FR-E840-0094
FR-E860-0021, FR-E860-0030, FR-E860-0048



Inverter model	W	W1	H	H1	H2	D	C
FR-E840-0059 FR-E840-0094 FR-E860-0021 FR-E860-0030 FR-E860-0048	142.2	128	208.9	138	64.3	135.8	5

(Unit: mm)

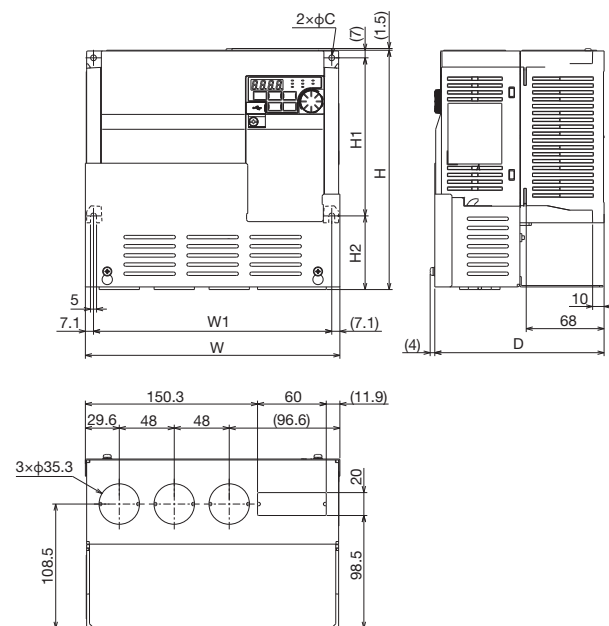
FR-E820-0255, FR-E820-0340



Inverter model	W	W1	H	H1	H2	D	C
FR-E820-0255 FR-E820-0340	182.2	164	318.9	244	66.3	165.8	6

(Unit: mm)

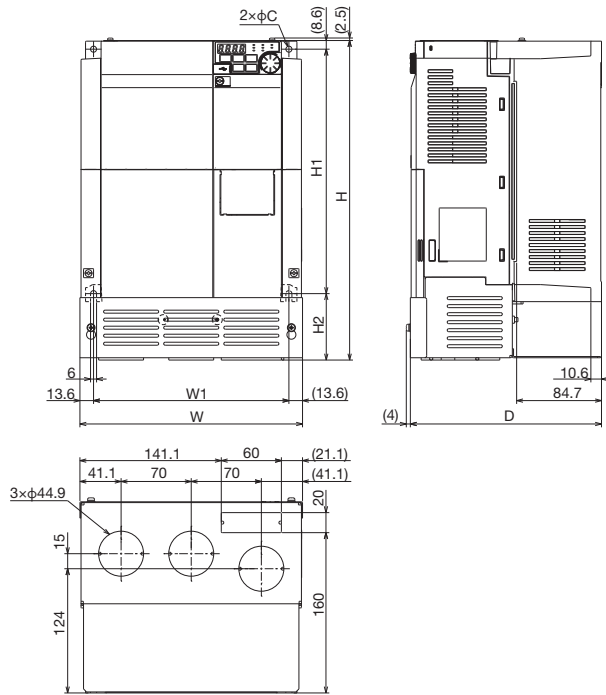
FR-E840-0149, FR-E840-0196
FR-E860-0070, FR-E860-0090, FR-E860-0136



Inverter model	W	W1	H	H1	H2	D	C
FR-E840-0149 FR-E840-0196 FR-E860-0070 FR-E860-0090 FR-E860-0136	222.2	208	208.9	138	64.3	147.8	5

(Unit: mm)

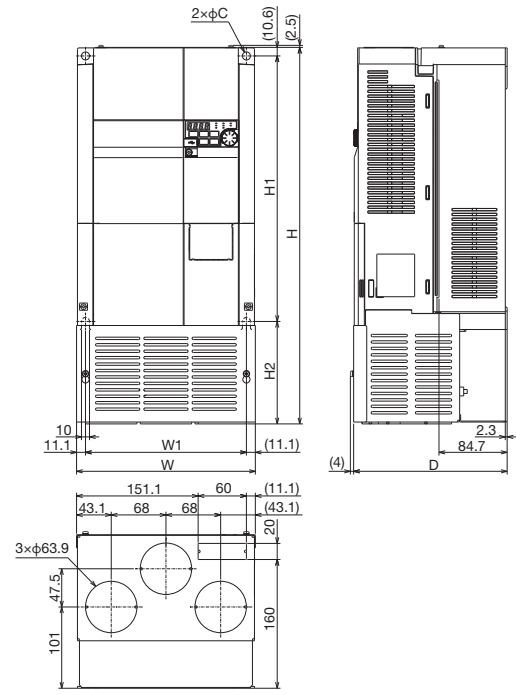
FR-E820-0476, FR-E820-0587
FR-E840-0298, FR-E840-0349



Inverter model	W	W1	H	H1	H2	D	C
FR-E820-0476 FR-E820-0587 FR-E840-0298 FR-E840-0349	222.2	195	318.9	244	66.3	190.8	6

(Unit: mm)

FR-E820-0748, FR-E820-0978
FR-E840-0383, FR-E840-0510



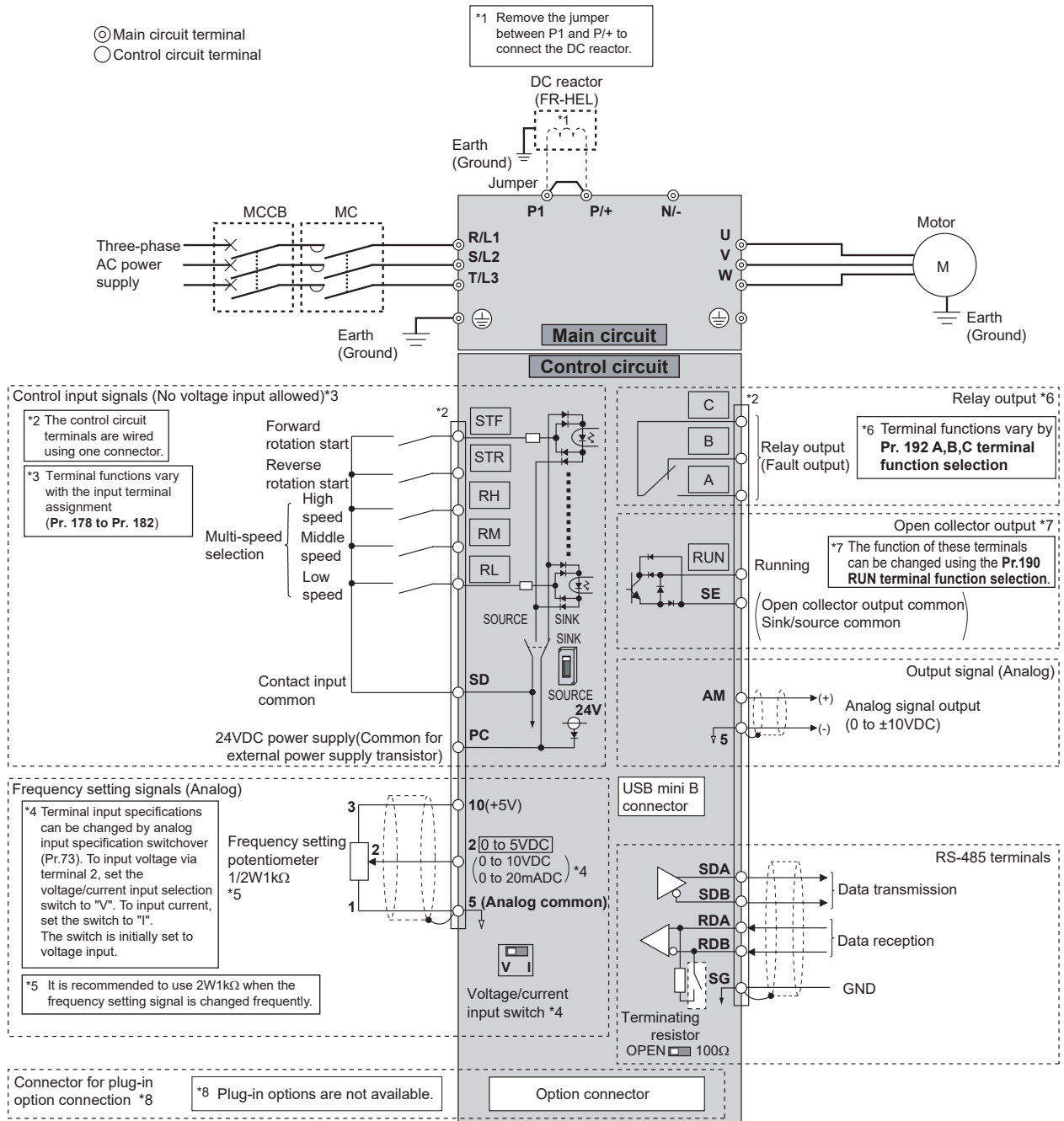
Inverter model	W	W1	H	H1	H2	D	C
FR-E820-0748 FR-E820-0978 FR-E840-0383 FR-E840-0510	222.2	200	467.9	330	127.3	190.8	10

(Unit: mm)

• Major differences from the FR-E800 standard model

Item	Description
PU/EXT key on the operation panel	Changed to the HAND/AUTO key.
Compatible option	For details, refer to page 7.
Main circuit terminal	Terminal PR is not provided. (A brake resistor is unavailable.)
Control circuit terminal	The following terminals are not provided. Input signal: MRS, RES, and 4 Output signal: FU and FM Safety stop signal: S1, S2, SO, and SOC
PU connector	Not provided. (The RS-485 terminals (connector) are added.)
Multiple rating	LD rating only.
Load pattern selection	The initial value of Pr.14 changed to "1 (variable torque load)".
Estimated lifespan of parts	8 years for cooling fan, main circuit smoothing capacitor, and on-board smoothing capacitor

• Connection example



• Option list

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

	Name	Type	Applicable Inverter	
			E800-HVC	Remarks
Plug-in type	Vector control Orientation control Encoder feedback control	FR-A8AP E kit	–	
	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	–	
	Additional control circuit input/output	FR-E8AXY	–	
Control terminal	Screw type terminal block	FR-E8TE7	–	
	RS-485 2-port terminal block	FR-E8TR	–	
Stand-alone type	LCD operation panel	FR-LU08(-01)	–	
	Parameter unit	FR-PU07	–	
	Parameter unit with battery pack	FR-PU07BB(-L)	–	
	Enclosure surface operation panel	FR-PA07	–	
	Parameter unit connection cable	FR-CB20[]	–	
	Encoder cable for Mitsubishi Electric vector control dedicated motor (SF-V5RU)	FR-V7CBL[]	–	
	USB cable	MR-J3USBCBL3M Cable length: 3 m	●	
	Intercompatibility attachment	FR-E7AT01/02/03	–	
		FR-E8AT03	–	
		FR-E8AT04	–	
	DIN rail attachment	FR-UDA01 to 03	–	
	Panel through attachment	FR-E8CN01 to 08	–	
	Totally enclosed structure specification attachment (IP40)	FR-E8CV01 to 04	–	
	AC reactor	FR-HAL	●	The option's model varies with the inverter's model.
	DC reactor	FR-HEL	●	
	EMC Directive compliant noise filter	SF, FR-E5NF, FR-S5NFA	●	
	EMC filter installation attachment	FR-A5AT03 FR-AAT02 FR-E5T(-02)	●	Installation to the rear panel of the inverter is not available
	Radio noise filter	FR-BIF(H)	●	
	Line noise filter	FR-BSF01, FR-BLF	●	
	Filterpack	FR-BFP2	●	The option's model varies with the inverter's model.
	Brake resistor	MRS type, MYS type	–	
	High-duty brake resistor	FR-ABR	–	
	Brake unit, Resistor unit, Discharging resistor	FR-BU2, FR-BR, GZG, GRZG type	–	
	Multifunction regeneration converter Dedicated stand-alone reactor Dedicated box-type reactor	FR-XC FR-XCL/FR-XCG FR-XCB	–	
	High power factor converter	FR-HC2	–	
	Surge voltage suppression filter	FR-ASF	●	400 V only. The option's model varies with the inverter's model.
		FR-BMF	●	FR-E840-0149 to 0349 only. The option's model varies with the inverter's model.
Others	Pilot generator	QVAH-10	●	
	Deviation sensor	YVGC-500WNS	●	
	FR Configurator2 (Inverter setup software)	SW1DND-FRC2	●	Supported by Ver.1.30G or later.
	FR Configurator Mobile (Mobile App for Inverters)	–	–	

●: Supported –: Not supported

• Inverter rating

Three-phase 200 V class

Model: FR-E820-[]-HVC			0011	0017	0030	0051	0082	0102	0167	0255	0340	0476	0587	0748	0978	
Output	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	30
	Rated capacity (kVA) ²		LD	0.4	0.7	1.2	2.0	3.3	4.1	6.7	10.2	13.5	19.0	23.4	29.8	39.0
	Rated current (A) ³		LD	1.1	1.7	3.0	5.1	8.2	10.2	16.7	25.5	34.0	47.6	58.7	74.8	97.8
	Overload current rating ⁴		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C												
Power supply	Voltage ⁵		Three-phase 200 to 240 V													
	Rated input AC (DC) voltage/frequency		Three-phase 200 to 240 V 50/60 Hz (283 to 339 VDC ⁶)													
	Permissible AC (DC) voltage fluctuation		170 to 264 V, 50/60 Hz (240 to 373 VDC ⁶)													
	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
		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
	Power supply capacity (kVA) ⁷	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
		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
Protective structure (UL 50/UL 50E/IEC 60529)			UL Type1 (Enclosed Type ⁹)/IP20													
Cooling system			Natural					Forced air								
Approx. mass (kg)			0.7	0.7	0.9	1.1	1.9	1.9	2.3	4.2	4.2	6.6	6.8	12.3	12.3	

Three-phase 400 V class

Model: FR-E840-[-]-HVC			0018	0030	0047	0059	0094	0149	0196	0298	0349	0383	0510	
Applicable motor capacity (kW) [†]			LD	0.75	1.5	2.2	3.0	5.5	7.5	11.0	15.0	18.5	22	30
Output	Rated capacity (kVA) [‡]		LD	1.4	2.3	3.6	4.5	7.2	11.4	14.9	22.7	26.6	29.2	38.9
	Rated current (A) [‡]		LD	1.8	3.0	4.7	5.9	9.4	14.9	19.6	29.8	34.9	38.3	51.0
	Overload current rating [‡]		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C										
	Voltage [‡]			Three-phase 380 to 480 V										
Power supply	Rated input AC (DC) voltage/frequency			Three-phase 380 to 480 V, 50/60 Hz (537 to 679 VDC [®])										
	Permissible AC (DC) voltage fluctuation			323 to 528 V, 50/60 Hz (457 to 740 VDC [®])										
	Permissible frequency fluctuation			±5%										
	Rated input current (A) [®]	Without DC reactor	LD	3.3	6.0	8.9	10.7	16.2	24.9	32.4	46.7	54.2	59.1	75.5
		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
	Power supply capacity (kVA) [‡]	Without DC reactor	LD	2.5	4.5	6.8	8.2	12.0	19.0	25.0	36.0	42.0	45.0	58.0
		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
	Protective structure (UL 50/UL 50E/IEC 60529)				UL Type1 (Enclosed Type [®])/IP20									
Cooling system				Natural					Forced air					
Approx. mass (kg)				1.6	1.6	1.8	2.4	2.4	3.2	3.2	6.0	6.1	12.3	12.3

Single-phase 200 V

Model: FR-E820S-[]-HVC				0011	0017	0030	0051	0082	
Applicable motor capacity (kW) ¹				LD	0.2	0.4	0.75	1.1	2.2
Output	Rated capacity (kVA) ²			LD	0.4	0.7	1.2	2.0	3.3
	Rated current (A) ³			LD	1.1	1.7	3.0	5.1	8.2
	Overload current rating ⁴			LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C				
	Voltage ⁵			Three-phase 200 to 240 V					
Power supply	Rated input AC (DC) voltage/frequency			Single-phase 200 to 240 V, 50/60 Hz					
	Permissible AC (DC) voltage fluctuation			170 to 264 V, 50/60 Hz					
	Permissible frequency fluctuation			±5%					
	Rated input current (A) ⁶	Without DC reactor	LD	3	4.5	6.7	11.4	18.6	
		With DC reactor	LD	1.8	2.8	5.0	9.1	14.7	
	Power supply capacity (kVA) ⁷	Without DC reactor	LD	0.9	1.7	2.5	3.9	5.5	
With DC reactor		LD	0.6	1.1	1.9	3.0	4.2		
Protective structure (UL 50/UL 50E/IEC 60529)				UL Type1 (Enclosed Type*)/IP20					
Cooling system				Natural			Forced air		
Approx. mass (kg)				0.8	1.1	1.9	2.0	2.3	

Three-phase 575 V

Model: FR-E860-[]-HVC			0021	0030	0048	0070	0090	0136	
Applicable motor capacity (kW) ¹		LD	1.5	2.2	3.7	5.5	7.5	11.0	
Output	Rated capacity (kVA) ²	LD	2.1	3.0	4.8	7.0	9.0	13.5	
	Rated current (A) ³	LD	2.1	3.0	4.8	7.0	9.0	13.6	
	Overload current rating ⁴	LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature of 50°C						
	Voltage ⁵		Three-phase 525 to 600 V						
Power supply	Rated input AC (DC) voltage/frequency		Three-phase 575 V 60 Hz						
	Permissible AC (DC) voltage fluctuation		490 to 632 V, 60 Hz						
	Permissible frequency fluctuation		±5%						
	Rated input current (A) ⁶	Without DC reactor	LD	4.3	5.9	8.9	12.4	15.9	22.4
		With DC reactor	LD	2.5	3.6	5.6	8.2	11.0	16.0
	Power supply capacity (kVA) ⁷	Without DC reactor	LD	4.3	5.9	8.9	12.3	16.0	23.0
		With DC reactor	LD	2.5	3.6	5.6	8.2	11.0	16.0
Protective structure (UL 50/UL 50E/IEC 60529)			UL Type1 (Enclosed Type ⁸)/IP20						
Cooling system			Natural	Forced air					
Approx. mass (kg)			2.3	2.3	2.3	3.3	3.3	3.3	

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

To drive a Mitsubishi Electric high-performance energy-saving motor, use the 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 440 V for three-phase 400 V class, and 575 V for three-phase 575 V class.

*3: The following tables show the current value initially set in Pr.9 Electronic thermal O/L relay, Pr.56 Current monitoring reference, and Pr.557 Current average value monitor signal output reference current. The value in the table is also used as the reference current value (100% value) for Pr.22 Stall prevention operation level (Torque limit level), Pr.874 OLT level setting, Pr.150 Output current detection level, and Pr.165 Stall prevention operation level for restart.

Model: FR-E820-[-]-HVC	0011	0017	0030	0051	0082	0102	0167	0255	0340	0476	0587	0748	0978
Current value (A)	1.3	2.0	3.5	6.0	9.6	12.0	19.6	30.0	40.0	56.0	69.0	88.0	115.0

Model: FR-E840-[-]-HVC	0018	0030	0047	0059	0094	0149	0196	0298	0349	0383	0510
Current value (A)	2.1	3.5	5.5	6.9	11.1	17.5	23.0	35.0	41.0	45.0	60.0

Model: FR-E860-[-]-HVC	0021	0030	0048	0070	0090	0136
Current value (A)	2.5	3.6	5.6	8.2	11.0	16.0

Model: FR-E820S-[-]-HVC	0011	0017	0030	0051	0082
Current value (A)	1.3	2.0	3.5	6.0	9.6

*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 $\sqrt{2}$.

*6: 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.

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

*8: - 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 (810 V or more for the 400 V class).

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.

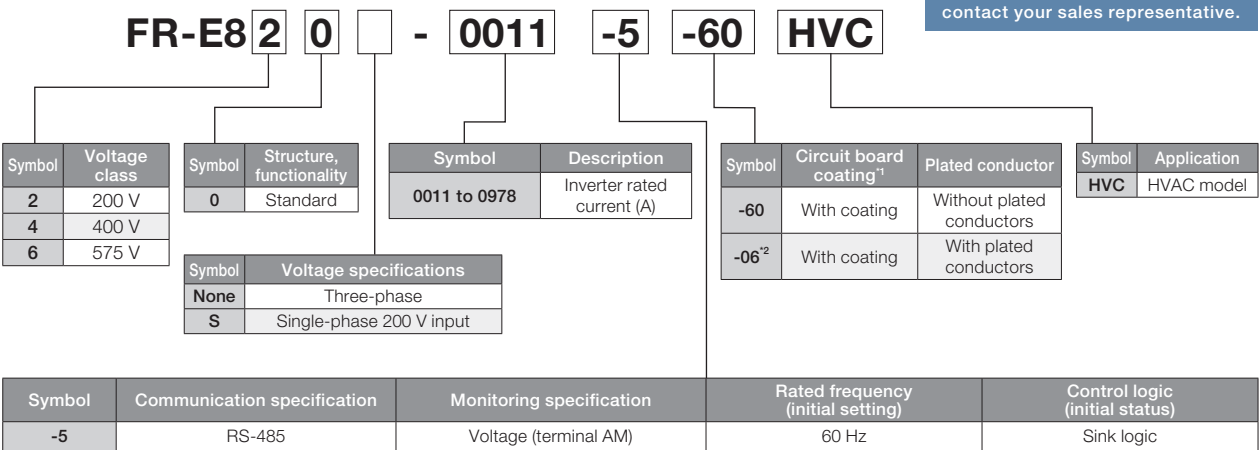
- Powering ON produces up to four times as large current as the inverter rated current.

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.

*9: The structure is suitable for installation in a compartment handling conditioned air (plenum).

• Lineup



*1: Compatible with IEC 60721-3-3: 1994 3C2.
*2: Available for the FR-E820-0476 or higher, FR-E840-0298 or higher

Applicable motor capacity (LD rating) [kW]		0.2	0.4	0.75	1.1	1.5	2.2	3.0	3.7	5.5	7.5	11.0	15.0	18.5	22.0	30.0
Three-phase 200 V	FR-E820-□-HVC	0011	0017	0030	0051	—	0082	0102	—	0167	0255	0340	0476	0587	0748	0978
		●	●	●	●	—	●	●	—	●	●	●	●	●	●	●
Three-phase 400 V	FR-E840-□-HVC	—	—	0018	—	0030	0047	0059	—	0094	0149	0196	0298	0349	0383	0510
		—	—	●	—	●	●	●	—	●	●	●	●	●	●	●
Three-phase 575 V	FR-E860-□-HVC	—	—	—	—	0021	0030	—	0048	0070	0090	0136	—	—	—	—
		—	—	—	—	●	●	—	●	●	●	●	—	—	—	—
Single-phase 200 V	FR-E820S-□-HVC	0011	0017	0030	0051	—	0082	—	—	—	—	—	—	—	—	—
		●	●	●	●	—	●	—	—	—	—	—	—	—	—	—

● : Newly released model
● : Released
— : Not applicable

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