

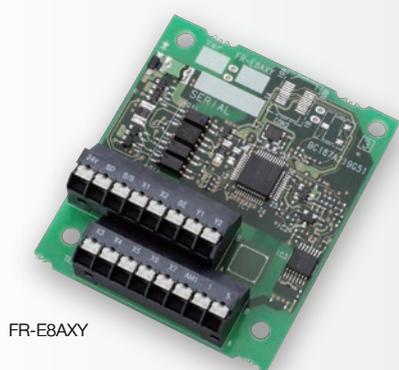
FACTORY AUTOMATION

New Product RELEASE

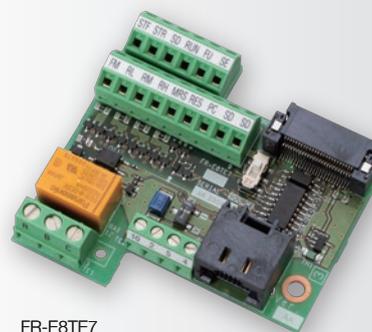
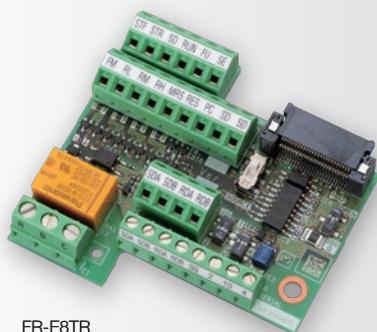
No.23-6E

FR-E800 Series

Release of the Plug-In Option (FR-E8AXY) and Control Terminal Options (FR-E8TR/FR-E8TE7)



Accessories for the FR-E8AXY



- **Supporting the replacement of the FR-E700-NE with the FR-E800 (Ethernet model or safety communication model)**

Adding control circuit input/output terminals (FR-E8AXY)

- **Supporting the replacement of the FR-E700 with the FR-E800 (standard model) using the existing wiring**

Providing two ports for RS-485 communication (FR-E8TR)

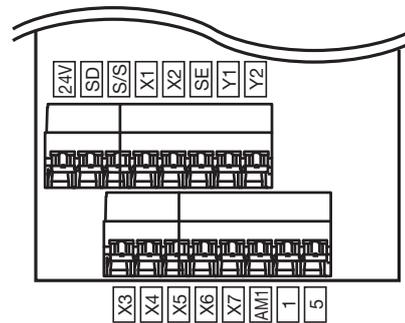
Providing the screw type terminal block (FR-E8TE7)

FR-E8AXY: Additional control circuit input/output

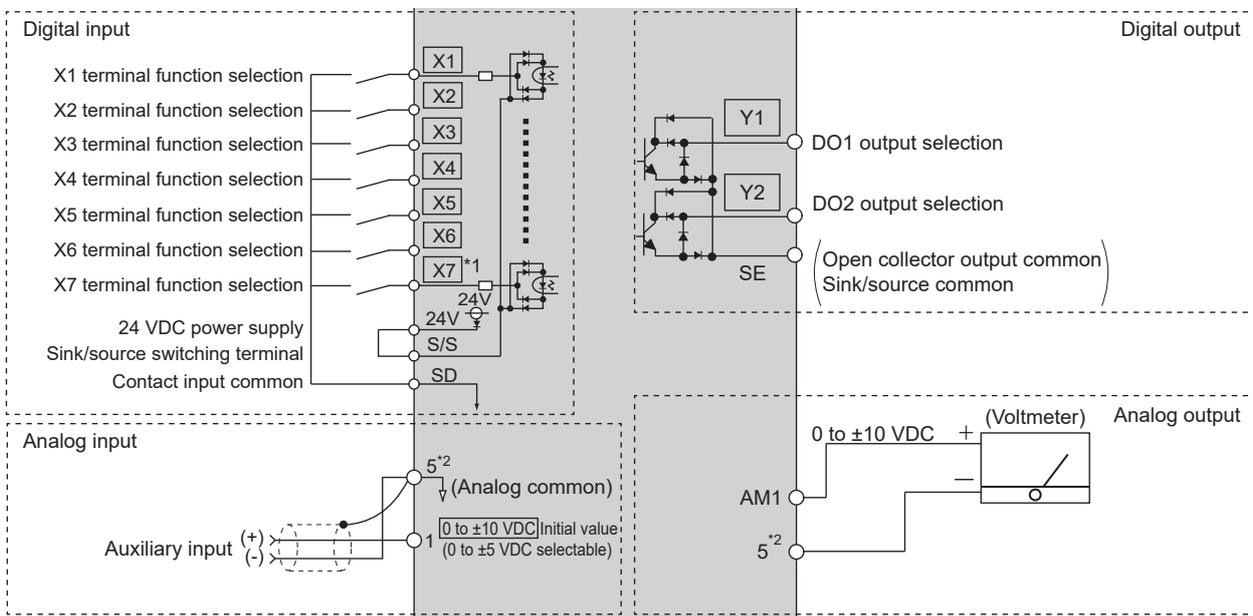
Benefits

Input/output terminals can be added. This option is useful when additional physical terminals are required, such as when an inverter with less input/output terminals such as the FR-E800-E (Ethernet model) or the FR-E800-SCE (safety communication model) is used.

Terminal layout



Connection diagram (sink logic)



*1: The function of terminal X7 can be switched between digital input and pulse train input using the parameter.

*2: Terminal 5 is a dual-purpose terminal, used for analog input or analog output. (One terminal is provided.)

Terminal specifications

Type	Terminal symbol	Common	Terminal function description / rated specification
Digital input	X1 to X7 (7 terminals ^{*1})	SD (sink (negative common)) 24V (source (positive common))	Input resistance: 4.7 kΩ Voltage when contacts are open: 21 to 26 VDC Current when contacts are short-circuited: 4 to 6 mADC
	S/S (Sink/source switching terminal)	—	When the sink logic is selected When using internal power supply: Connected to terminal 24V When using external power supply: Connected to the positive terminal of the external power supply When the source logic is selected When using internal power supply: Connected to terminal SD When using external power supply: Connected to the negative terminal of the external power supply
Pulse train input	X7 (1 terminal ^{*1})	SD (sink (negative common)) 24V (source (positive common))	Input resistance: 2 kΩ Current when contacts are short-circuited: 8 to 13 mADC Maximum input pulse: 100k pulses/s
Analog input	1 (1 terminal)	5 ^{*2}	Input resistance: 10 to 11 kΩ Input voltage range: 0 to ±10 VDC Permissible maximum voltage: ±20 VDC
Digital output	Y1, Y2 (2 terminals)	SE	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.)
Analog output	AM1 (1 terminal)	5 ^{*2}	Output signal: 0 to ±10 VDC max. (across terminals AM1 and 5) Output resolution: 3 mV Applicable meter: DC voltmeter Full-scale ±10 V (internal impedance: 10 kΩ or more) Wiring length: maximum 10 m

*1: The function of terminal X7 can be switched between digital input and pulse train input using the parameter.

*2: Terminal 5 is a dual-purpose terminal, used for analog input or analog output. (One terminal is provided.)

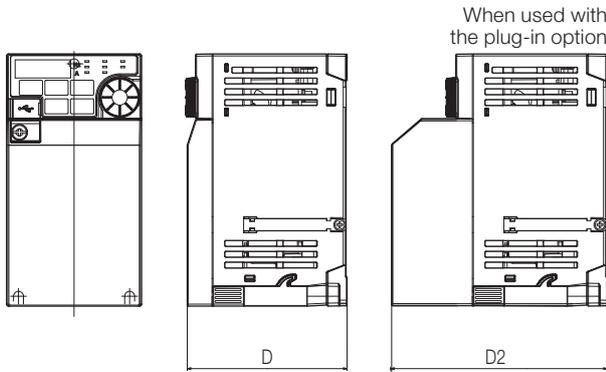
■ Pulse train input specification

Item		Specification
Supported pulse method		Open collector output Complementary output (24 V power supply voltage)
HIGH input level		20 V or more (voltage between X7 and SD)
LOW input level		5 V or less (voltage between X7 and SD)
Maximum input pulse rate		100k pulses/s
Minimum input pulse width		2.5 μs
Input resistance/load current		2 kΩ (typ) / 10 mA (typ)
Maximum wiring length (reference value)	Open collector output method	10 m (0.75 mm ² /twisted pair)
	Complementary output method	100 m (output resistance 50 Ω) ^{*1}

*1: The wiring length of complementary output is dependent on the output wiring specification of the complementary output unit. The stray capacitance of the wiring changes considerably according to what kind of cable is used and how the cable is laid, so the maximum wiring length is not a guaranteed value.

Inverter outline dimensions

Note that the depth increases after the front cover for plug-in option is installed.



(Unit:mm)

• Three-phase 200 V class

Inverter model	D	D2
FR-E820-0008(0.1K)	80.5	108.1
FR-E820-0015(0.2K)		108.1
FR-E820-0030(0.4K)	112.5	140.1
FR-E820-0050(0.75K)	132.5	160.1
FR-E820-0080(1.5K)	135.5	163.1
FR-E820-0110(2.2K)		163.1
FR-E820-0175(3.7K)	142.5	170.1
FR-E820-0240(5.5K)	165	192.6
FR-E820-0330(7.5K)		192.6
FR-E820-0470(11K)	190	217.6
FR-E820-0600(15K)		217.6
FR-E820-0760(18.5K)		217.6
FR-E820-0900(22K)		217.6

• Three-phase 400 V class

Inverter model	D	D2
FR-E840-0016(0.4K)	129.5	157.1
FR-E840-0026(0.75K)		157.1
FR-E840-0040(1.5K)	135	162.6
FR-E840-0060(2.2K)		162.6
FR-E840-0095(3.7K)	147	174.6
FR-E840-0120(5.5K)		174.6
FR-E840-0170(7.5K)	190	217.6
FR-E840-0230(11K)		217.6
FR-E840-0300(15K)		217.6
FR-E840-0380(18.5K)		217.6
FR-E840-0440(22K)		

• Three-phase 575 V class

Inverter model	D	D2
FR-E860-0017	135	162.6
FR-E860-0027		162.6
FR-E860-0040		162.6
FR-E860-0061	147	174.6
FR-E860-0090		174.6
FR-E860-0120		174.6

• Single-phase 200 V class

Inverter model	D	D2
FR-E820S-0008(0.1K)	80.5	108.1
FR-E820S-0015(0.2K)		108.1
FR-E820S-0030(0.4K)	142.5	170.1
FR-E820S-0050(0.75K)	135	162.6
FR-E820S-0080(1.5K)	161	188.6
FR-E820S-0110(2.2K)	142.5	170.1

• Single-phase 100 V class

Inverter model	D	D2
FR-E810W-0008(0.1K)	80.5	108.1
FR-E810W-0015(0.2K)	110.5	138.1
FR-E810W-0030(0.4K)	142.5	170.1
FR-E810W-0050(0.75K)	155	182.6

Applicable inverters

The FR-E8AXY can be used for the inverter models listed below with the following SERIAL number or later.

Check the SERIAL number indicated on the inverter rating plate or package.

For the location of the rating plate, refer to the FR-E800 Instruction Manual (Connection).

Model	Country of origin indication	SERIAL
FR-E800 (standard model) FR-E800-E (Ethernet model) FR-E800-SCE (safety communication model)	MADE in Japan	□□237○○○○○○ or later
	MADE in China	□□238○○○○○○ or later

Refer to the FR-E800 inverter catalog for the inverter model.

Check the
Instruction
Manual. ▶

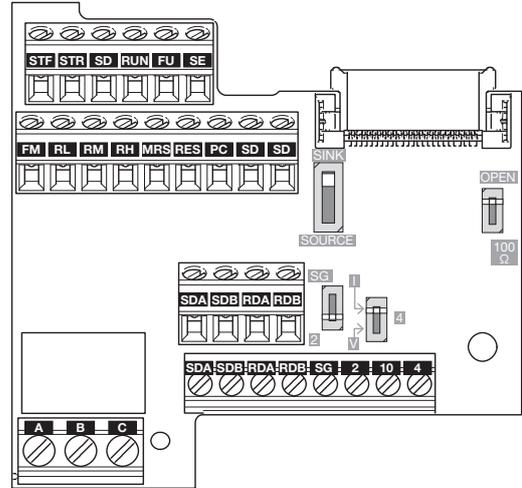


FR-E8TR: RS-485 2-port terminal block

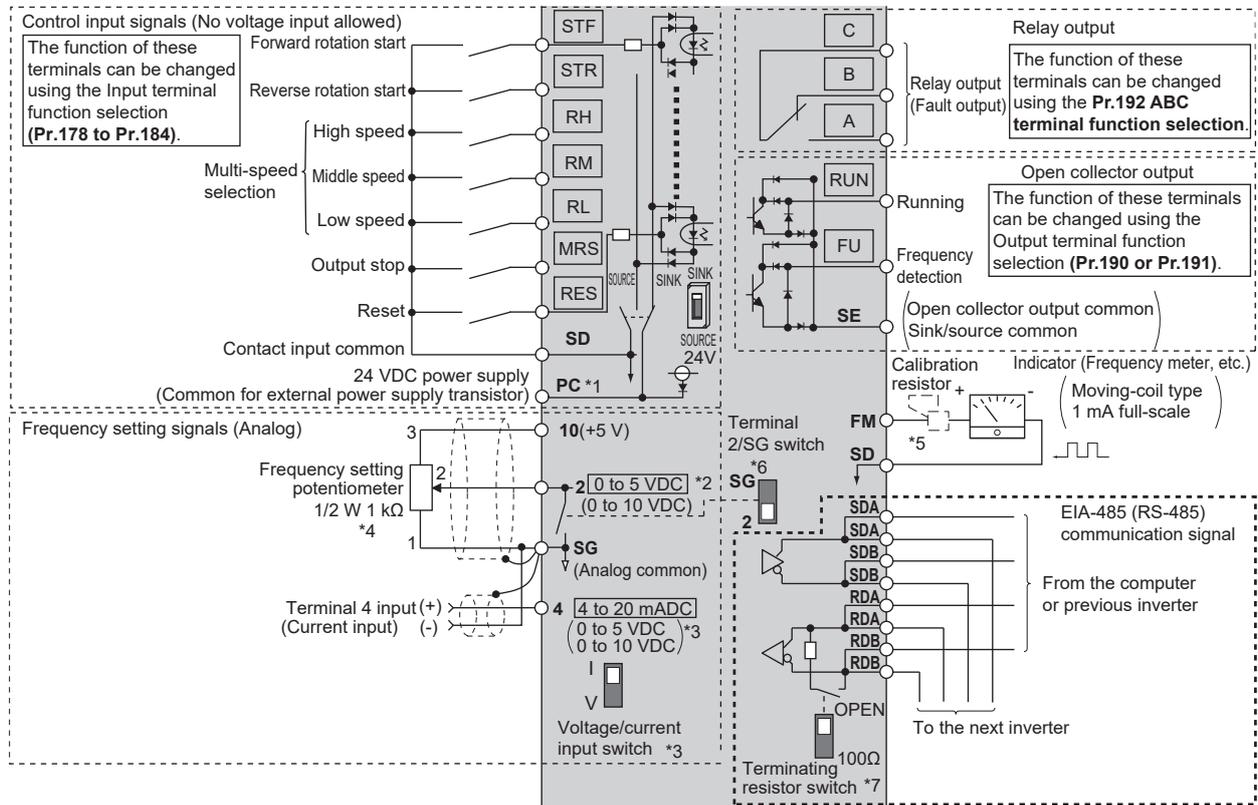
Benefits

Multi-drop connection can be made easily.
 The Mitsubishi inverter protocol (computer link), the MODBUS RTU protocol, and the BACnet MS/TP protocol are supported.
 This option has the screw type terminal block, useful for the replacement of the FR-E700 (with the FR-E7TR installed) with the FR-E800.
 As the removable FR-E8TR can be easily attached to replace the inverter's standard control circuit terminal block, it can be used immediately after the purchase of the inverter.

Terminal layout



Connection diagram (sink logic)



*1: To use terminals PC and SD for a 24 VDC power supply, check the wiring to avoid short circuit between these terminals.
 *2: Terminal input specifications can be changed by analog input specification switchover (Pr.73). This terminal is used for voltage input only.
 *3: Terminal input specifications can be changed by analog input specification switchover (Pr.267). To select voltage input (0 to 5 V / 0 to 10 V), set the voltage/current input switch to the "V" position. To select current input (4 to 20 mA), set the voltage/current input switch to the "I" position (initial setting). To use terminal 4 (current input at initial setting), assign "4" to any parameter from Pr.178 to Pr.184 (Input terminal function selection) before turning ON the AU signal.
 *4: It is recommended to use 2 W 1 kΩ when the frequency setting signal is changed frequently.
 *5: Not required when calibrating the scale with the operation panel.
 *6: Set the switch to the SG position to pass a shielded wire across terminal SG.
 *7: Set only the terminating resistor switch of the remotest inverter to the "100 Ω" position.

Terminal specifications

Type	Terminal symbol	Common	Terminal name	Terminal function description	Rated specification
RS-485 communication	SDA (2 terminals)	—	Inverter send +	Output terminal for inverter sending signals.	—
	SDB (2 terminals)		Inverter send -	Output terminal for inverter inverse sending signals.	
	RDA (2 terminals)		Inverter receive +	Input terminal for inverter receiving signals. Changing the terminating resistor switch to "100 Ω" position connects the inverter to the 100 Ω terminating resistor.	
	RDB (2 terminals)		Inverter receive -	Input terminal for inverter inverse receiving signals. Changing the terminating resistor switch to "100 Ω" position connects the inverter to the 100 Ω terminating resistor.	

Terminal specifications

Type	Terminal symbol	Common	Terminal name	Terminal function description	Rated specification	
Frequency setting	10	SG	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		Frequency setting (voltage) / common terminal	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 ¹ to switch between input 0 to 5 VDC (initial setting) and 0 to 10 VDC. This terminal can be used for voltage input only. When a shielded wire is passed across terminal SG during the RS-485 communication, terminal 2 can be used as terminal SG by setting the terminal 2/SG switch to the SG position. In that setting, 0 V is input to terminal 2.	Input resistance: 10 to 11 kΩ Maximum permissible voltage: 20 VDC When selecting SG: Common terminal	
	4		Frequency setting (current)	Inputting 4 to 20 mADC (or 0 to 5 V, 0 to 10 V) 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). Use Pr.267 ¹ 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 to the "V" position to select voltage input (0 to 5 V or 0 to 10 V).	For current input, Input resistance 245 ±5 Ω Permissible maximum current: 30 mA For voltage input, Input resistance: 10 to 11 kΩ Maximum permissible voltage: 20 VDC	
Input signal (contact input)	STF ²	SD (sink (negative common)) PC (source (positive common))	Forward rotation start	Turn ON the STF signal to start forward rotation and turn it OFF to stop.	Input resistance: 4.7 kΩ Voltage when contacts are open: 21 to 26 VDC Current when contacts are short-circuited: 4 to 6 mADC	
	STR ²		Reverse rotation start	Turn ON the STR signal to start reverse rotation and turn it OFF to stop.		
	RH, RM, RL ²		Multi-speed selection	Multi-speed can be selected according to the combination of RH, RM and RL signals.		
	MRS ²		Output stop	Turn ON the MRS signal (2 ms or more) to stop the inverter output. Use this signal to shut off the inverter output when stopping the motor with an electromagnetic brake.		
	RES ²		Reset	Use this signal to reset a fault output provided when a protective function is activated. Turn ON the RES signal for 0.1 second or more, then turn it OFF. In the initial setting, reset is always enabled. By setting Pr.75 , reset can be enabled only at an inverter fault occurrence. The inverter recovers about 1 second after the reset is released. (For details of Pr.75 , refer to the FR-E800 Instruction Manual (Function).)		
Output signal	Relay	A, B, C ^{3,4}	—	Relay output (fault output)	1 changeover contact output that indicates that an inverter's protective function has been 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: 230 VAC 0.3 A (power factor = 0.4) 30 VDC 0.3 A
	Open collector	RUN ³	SE	Inverter running	The output is in LOW state when the inverter output frequency is equal to or higher than the starting frequency (initial value: 0.5 Hz). The output is in HIGH state during stop or DC injection brake operation. ⁵	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.)
		FU ³		Frequency detection	The output is in LOW state when the inverter output frequency is equal to or higher than the preset detection frequency, and is in HIGH state when it is less than the preset detection frequency. ⁵	
Pulse	FM	SD	For meter	Among several monitor items such as output frequency, select one to output it via this terminal. (The signal is not output during an inverter reset.) The size of output signal is proportional to the magnitude of the corresponding monitor item.	Output item: Output frequency (initial setting)	Permissible load current: 1 mA 1440 pulses/s at 60 Hz

*1: For details of **Pr.73**, **Pr.267**, refer to the FR-E800 Instruction Manual (Function).

*2: Terminal functions can be selected using **Pr.178** to **Pr.184** (Input terminal function selection). (Refer to the FR-E800 Instruction Manual (Function).)

*3: Terminal functions can be selected using **Pr.190** to **Pr.192** (Output terminal function selection). (Refer to the FR-E800 Instruction Manual (Function).)

*4: To comply with the Low Voltage Directive (conforming standard EN 61800-5-1) and UL or cUL standards (conforming standard UL 61800-5-1), the operating capacity of the relay outputs (terminal symbols A, B, and C) should be 30 VDC, 0.3 A. (Relay output has basic isolation from the inverter internal circuit.)

*5: The open collector transistor is ON (conductive) in LOW state. The transistor is OFF (not conductive) in HIGH state.

Communication specifications

Item	Communication protocol		
	Mitsubishi inverter protocol (computer link)	MODBUS RTU protocol	BACnet MS / TP protocol
Conforming standard	EIA-485 (RS-485)		
Number of connectable units	1:N (maximum 32 units), for stations No. 0 to 31	1:N (maximum 32 units), for stations No. 0 to 247	255 (up to 32 for one segment, addition with a repeater available)
Communication speed	Selected among 4800/9600/19200/38400/57600/76800/115200 bps.		Selected among 9600/19200/38400/57600/76800/115200 bps.
Control procedure	Asynchronous method		—
Communication method	Half-duplex system, full-duplex system		—
Terminating resistor	100 Ω (The availability can be switched by terminating resistor switch.)		

Applicable inverters

The FR-E8TR can be used for the inverter models listed below with the following SERIAL number or later.

Check the SERIAL number indicated on the inverter rating plate or package.

For the location of the rating plate, refer to the FR-E800 Instruction Manual (Connection).

Check the Instruction Manual. ▶



Model	Country of origin indication	SERIAL
FR-E800 (standard model)	MADE in Japan	□□237○○○○○ or later
	MADE in China	□□238○○○○○ or later

Refer to the FR-E800 inverter catalog for the inverter model.

When this product is used, the inverter does not support functional safety functions as the safety stop input/output terminals (S1, S2, SO, and SOC) on the inverter cannot be used.

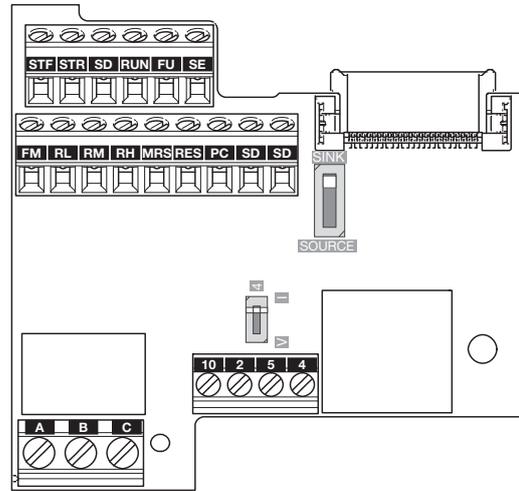
FR-E8TE7: Screw type terminal block

Benefits

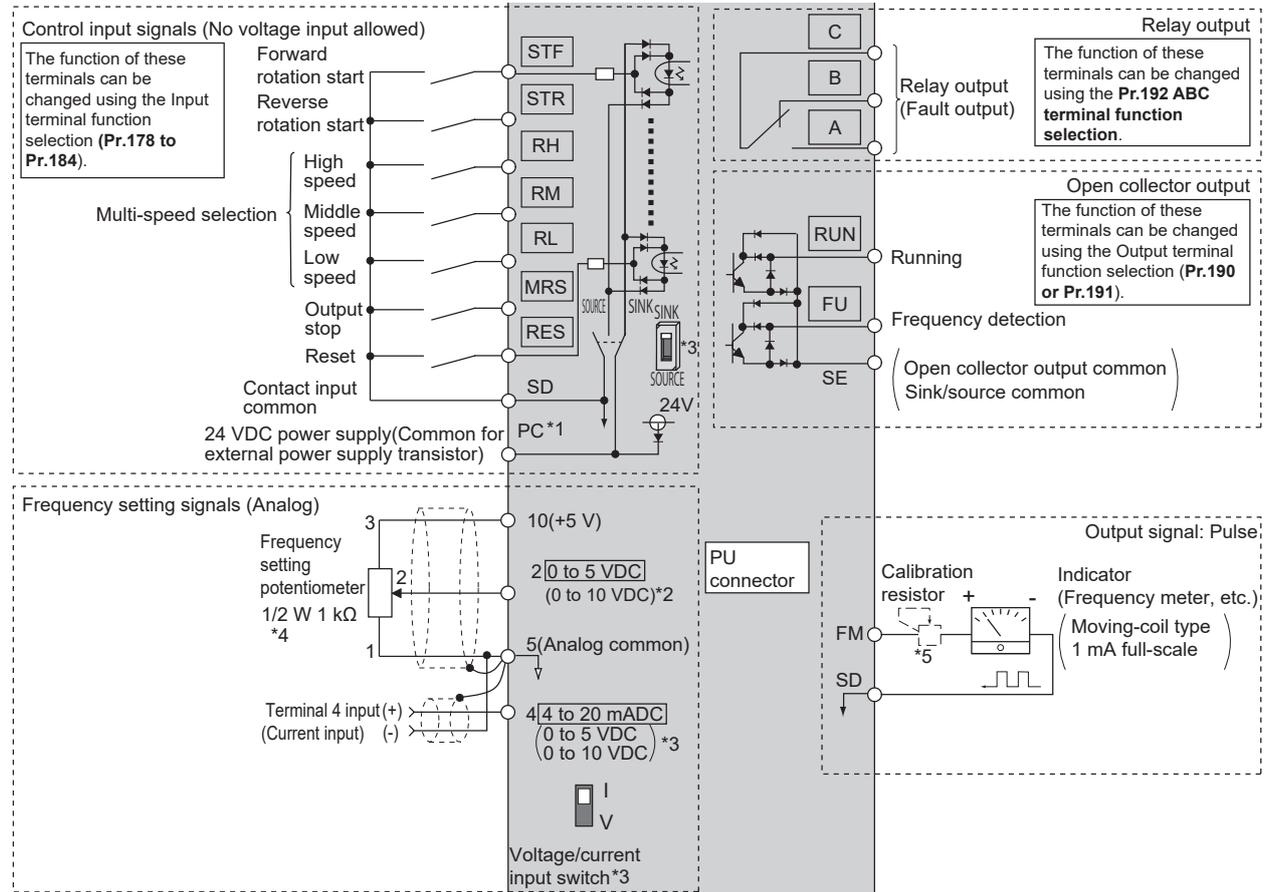
This option has the screw type terminal block. This option is useful for the replacement of the FR-E700 (standard control circuit terminal model) with the FR-E800.

As the removable FR-E8TE7 can be easily attached to replace the inverter's standard control circuit terminal block, it can be used immediately after the purchase of the inverter.

Terminal layout



Connection diagram (sink logic)



*1: To use terminals PC and SD for a 24 VDC power supply, check the wiring to avoid short circuit between these terminals.
 *2: Terminal input specifications can be changed by analog input specification switchover (Pr.73). This terminal is used for voltage input only.
 *3: Terminal input specifications can be changed by analog input specification switchover (Pr.267). To select voltage input (0 to 5 V / 0 to 10 V), set the voltage/current input switch to the "V" position. To select current input (4 to 20 mA), set the voltage/current input switch to the "I" position (initial setting). To use terminal 4 (current input at initial setting), assign "4" to any parameter from Pr.178 to Pr.184 (Input terminal function selection) before turning ON the AU signal.
 *4: It is recommended to use 2 W 1 kΩ when the frequency setting signal is changed frequently.
 *5: Not required when calibrating the scale with the operation panel.

Terminal specifications

Type	Terminal symbol	Common	Terminal name	Terminal function description	Rated specification	
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		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 ^{*1} to switch between input 0 to 5 VDC (initial setting) and 0 to 10 VDC. This terminal can be used for voltage input only.	Input resistance: 10 to 11 kΩ Maximum permissible voltage: 20 VDC	
	4		Frequency setting (current)	Inputting 4 to 20 mADC (or 0 to 5 V, 0 to 10 V) 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). Use Pr.267 ^{*1} 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 to the "V" position to select voltage input (0 to 5 V or 0 to 10 V).	For current input, Input resistance: 245 ±5 Ω Permissible maximum current: 30 mA For voltage input, Input resistance: 10 to 11 kΩ Maximum permissible voltage: 20 VDC	
Input signal (contact input)	STF ^{*2}	SD (sink (negative common)) PC (source (positive common))	Forward rotation start	Turn ON the STF signal to start forward rotation and turn it OFF to stop.	Input resistance: 4.7 kΩ Voltage when contacts are open: 21 to 26 VDC Current when contacts are short-circuited: 4 to 6 mADC	
	STR ^{*2}		Reverse rotation start	Turn ON the STR signal to start reverse rotation and turn it OFF to stop.		
	RH, RM, RL ^{*2}		Multi-speed selection	Multi-speed can be selected according to the combination of RH, RM and RL signals.		
	MRS ^{*2}		Output stop	Turn ON the MRS signal (2 ms or more) to stop the inverter output. Use this signal to shut off the inverter output when stopping the motor with an electromagnetic brake.		
	RES ^{*2}		Reset	Use this signal to reset a fault output provided when a protective function is activated. Turn ON the RES signal for 0.1 second or more, then turn it OFF. In the initial setting, reset is always enabled. By setting Pr.75 , reset can be enabled only at an inverter fault occurrence. The Inverter will restart about 1 second after reset. (For details of Pr.75 , refer to the FR-E800 Instruction Manual (Function).)		
Output signal	Relay	A, B, C ^{*4}	—	Relay output (fault output)	1 changeover contact output that indicates that an inverter's protective function has been 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: 230 VAC 0.3 A (power factor = 0.4) 30 VDC 0.3 A
	Open collector	RUN ^{*3}	SE	Inverter running	The output is in LOW state when the inverter output frequency is equal to or higher than the starting frequency (initial value: 0.5 Hz). The output is in HIGH state during stop or DC injection brake operation. ^{*5}	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.)
		FU ^{*3}		Frequency detection	The output is in LOW state when the inverter output frequency is equal to or higher than the preset detection frequency, and is in HIGH state when it is less than the preset detection frequency. ^{*5}	
Pulse	FM	SD	For meter	Among several monitor items such as output frequency, select one to output it via this terminals. (The signal is not output during an inverter reset.) The size of output signal is proportional to the magnitude of the corresponding monitor item.	Output item: Output frequency (initial setting)	Permissible load current: 1 mA 1440 pulses/s at 60 Hz
Communication	RS-485	—	PU connector	RS-485 communication can be made through the PU connector. • Conforming standard: EIA-485 (RS-485) • Transmission format: Multidrop link • Communication speed: 4800 to 115200 bps • Wiring length: 500 m	—	

*1: For details of **Pr.73**, **Pr.267**, refer to the FR-E800 Instruction Manual (Function).

*2: Terminal functions can be selected using **Pr.178 to Pr.184 (Input terminal function selection)**. (Refer to the FR-E800 Instruction Manual (Function).)

*3: Terminal functions can be selected using **Pr.190 to Pr.192 (Output terminal function selection)**. (Refer to the FR-E800 Instruction Manual (Function).)

*4: To comply with the Low Voltage Directive (conforming standard EN 61800-5-1) and UL and cUL standards (conforming standard UL 61800-5-1), the operating capacity of the relay outputs (terminal symbols A, B, and C) should be 30 VDC, 0.3 A. (Relay output has basic isolation from the inverter internal circuit.)

*5: The open collector transistor is ON (conductive) in LOW state. The transistor is OFF (not conductive) in HIGH state.

Communication specifications

Item	Communication protocol		
	Mitsubishi inverter protocol (computer link)	MODBUS RTU protocol	BACnet MS / TP protocol
Conforming standard	EIA-485 (RS-485)		
Number of connectable units	1:N (maximum 32 units), for stations No. 0 to 31	1:N (maximum 32 units), for stations No. 0 to 247	255 (up to 32 for one segment, addition with a repeater available)
Communication speed	Selected among 4800/9600/19200/38400/57600/76800/115200 bps.		Selected among 9600/19200/38400/57600/76800/115200 bps.
Control procedure	Asynchronous method		—
Communication method	Half-duplex system, full-duplex system		—
Terminating resistor	100 Ω (The availability can be switched by terminating resistor switch.)		

Applicable inverters

The FR-E8TE7 can be used for the inverter models listed below with the following SERIAL number or later.

Check the SERIAL number indicated on the inverter rating plate or package.

For the location of the rating plate, refer to the FR-E800 Instruction Manual (Connection).

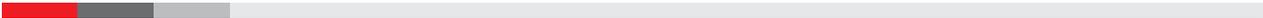
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Model	Country of origin indication	SERIAL
FR-E800 (standard model)	MADE in Japan	□□237○○○○○ or later
	MADE in China	□□238○○○○○ or later

Refer to the FR-E800 inverter catalog for the inverter model.

When this product is used, the inverter does not support functional safety functions as the safety stop input/output terminals (S1, S2, SO, and SOC) on the inverter cannot be used.



mitsubishi **ELECTRIC CORPORATION**

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