



INVERTER

Plug-in option

FR-A7AR E kit-SC

INSTRUCTION MANUAL

Relay output function

PRE-OPERATION INSTRUCTIONS

1

INSTALLATION AND WIRING

2

RELAY OUTPUT

3

Thank you for choosing this Mitsubishi Inverter plug-in option. This Instruction Manual gives handling information and precautions for use of this equipment. Incorrect handling might cause an unexpected fault. Before using the equipment, please read this manual carefully to use the equipment to its optimum. Please forward this manual to the end user.

This section is specifically about safety matters

Do not attempt to install, operate, maintain or inspect this product until you have read through this Instruction Manual and appended documents carefully and can use the equipment correctly. Do not use this product until you have a full knowledge of the equipment, safety information and instructions.

In this Instruction Manual, the safety instruction levels are classified into "WARNING" and "CAUTION".



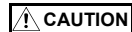
WARNING

Incorrect handling may cause hazardous conditions, resulting in death or severe injury.



CAUTION

Incorrect handling may cause hazardous conditions, resulting in medium or slight injury, or may cause only material damage.



The **CAUTION** level may even lead to a serious consequence according to conditions. Both instruction levels must be followed because these are important to personal safety.

SAFETY INSTRUCTIONS

1. Electric Shock Prevention



WARNING

- While power is ON or when the inverter is running, do not open the front cover. You may get an electric shock.
- Do not run the inverter with the front cover or wiring cover removed. Otherwise, you may access the exposed high-voltage terminals and charging part and get an electric shock.
- Even if power is OFF, do not remove the front cover except for wiring or periodic inspection. You may accidentally touch the charged inverter circuits and get an electric shock.
- Before wiring or inspection, power must be switched OFF. To confirm that, LED indication of the operation panel must be checked. (It must be OFF.) Any person who is involved in wiring or inspection shall wait for at least 10 minutes after the power supply has been switched OFF and check that there are no residual voltage using a tester or the like. The capacitor is charged with high voltage for some time after power OFF, and it is dangerous.
- Any person who is involved in wiring or inspection of this equipment shall be fully competent to do the work.
- The plug-in option must be installed before wiring. Otherwise, you may get an electric shock or be injured.
- Do not touch the plug-in option or handle the cables with wet hands. Otherwise you may get an electric shock.
- Do not subject the cables to scratches, excessive stress, heavy loads or pinching. Otherwise you may get an electric shock.

2. Injury Prevention

CAUTION

- The voltage applied to each terminal must be the ones specified in the Instruction Manual. Otherwise burst, damage, etc. may occur.
- The cables must be connected to the correct terminals. Otherwise burst, damage, etc. may occur.
- Polarity must be correct. Otherwise burst, damage, etc. may occur.
- While power is ON or for some time after power-OFF, do not touch the inverter as they will be extremely hot. Doing so can cause burns.

3. Additional Instructions

Also the following points must be noted to prevent an accidental failure, injury, electric shock, etc.

1) Transportation and mounting

CAUTION

- Do not install or operate the plug-in option if it is damaged or has parts missing.
- Do not stand or rest heavy objects on the product.
- The mounting orientation must be correct.
- Foreign conductive objects must be prevented from entering the inverter. That includes screws and metal fragments or other flammable substances such as oil.

2) Trial run

CAUTION

- Before starting operation, each parameter must be confirmed and adjusted. A failure to do so may cause some machines to make unexpected motions.

3) Usage

WARNING

- Do not modify the equipment.
- Do not perform parts removal which is not instructed in this manual. Doing so may lead to fault or damage of the inverter.

CAUTION

- When parameter clear or all parameter clear is performed, the required parameters must be set again before starting operations because all parameters return to the initial value.
- For prevention of damage due to static electricity, nearby metal must be touched before touching this product to eliminate static electricity from your body.

4) Maintenance, inspection and parts replacement

CAUTION

- Do not test the equipment with a megger (measure insulation resistance).

5) Disposal

CAUTION

- This inverter plug-in option must be treated as industrial waste.

6) General instruction

Many of the diagrams and drawings in this Instruction Manual show the inverter without a cover or partially open for explanation. Never operate the inverter in this manner. The cover must be reinstalled and the instructions in the inverter manual must be followed when operating the inverter.

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1 PRE-OPERATION INSTRUCTIONS

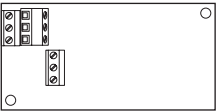
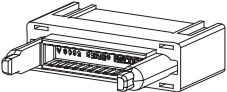
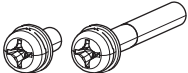
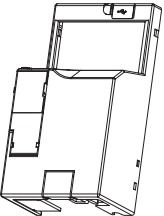
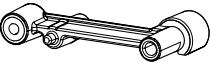
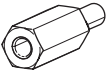
1.1 Unpacking and Product Confirmation

Take the plug-in option out of the package, check the product name, and confirm that the product is as you ordered and intact.

This product is a plug-in option dedicated for the FR-E700-SC series (safety stop function model).

1.1.1 Product confirmation

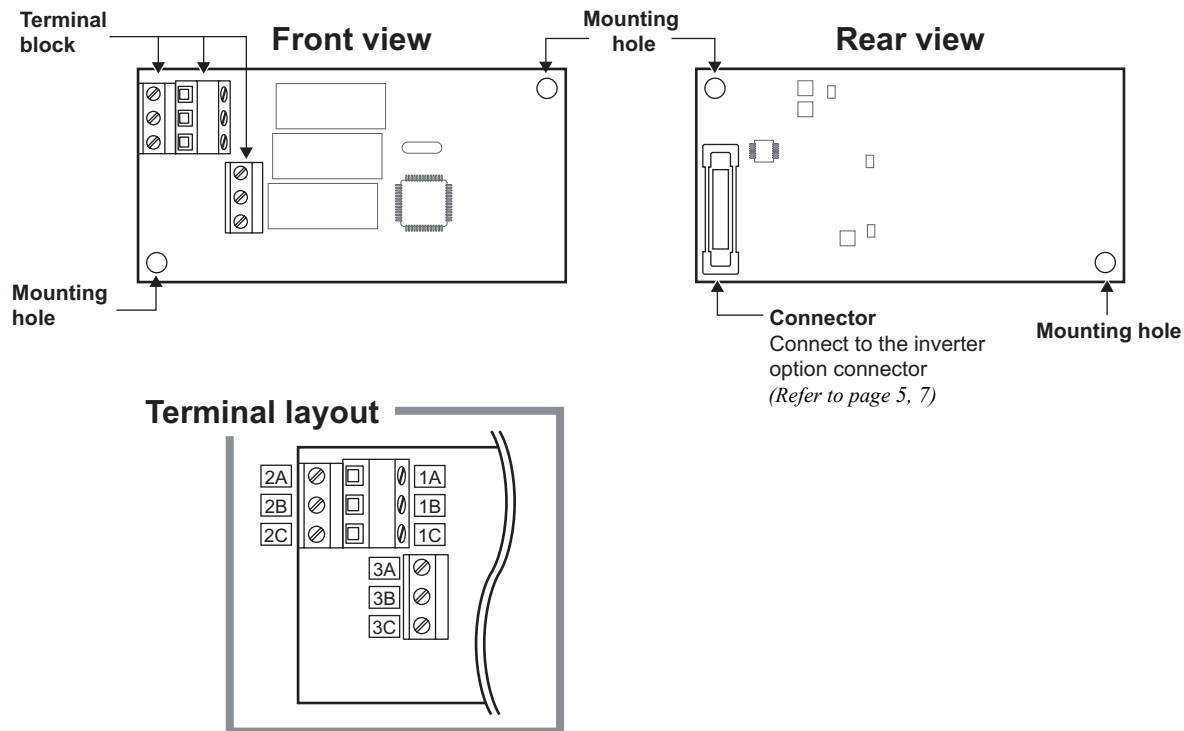
Check the enclosed items.

Plug-in option 1 	Junction connector 1 (Refer to page 5, 7.) 	M3 mounting screw (Long) (M3 × 20mm) 1 (Short) (M3 × 6mm) 1 (Refer to page 5, 7.) 
Front cover for plug-in option 1 (Refer to page 5, 7.) 	Spacer for plug-in option mounting ... 1 (Refer to page 5, 7.) 	Hexagon spacer 1 (Refer to page 5, 7.) 

CAUTION

- Install a provided front cover for plug-in option, in place of the inverter front cover.

1.2 Parts





1.3 Specifications

- (1) Types of output signal
1 changeover contact output (three relays are provided)

- (2) Contact capacity
230VAC 0.3A
30VDC 0.3A

CAUTION



- The contacts should be used within the rated capacity to prevent contacts weld resulting from faster contacts wearing.
-

2 INSTALLATION AND WIRING

2.1 Pre-Installation Instructions

Make sure that the input power of the inverter is off.

CAUTION

-  With input power on, do not install or remove the plug-in option. Otherwise, the inverter and plug-in option may be damaged.
-  For prevention of damage due to static electricity, touch nearby metal before touching this product to eliminate static electricity from your body.

2.2 Installation Procedure

CAUTION

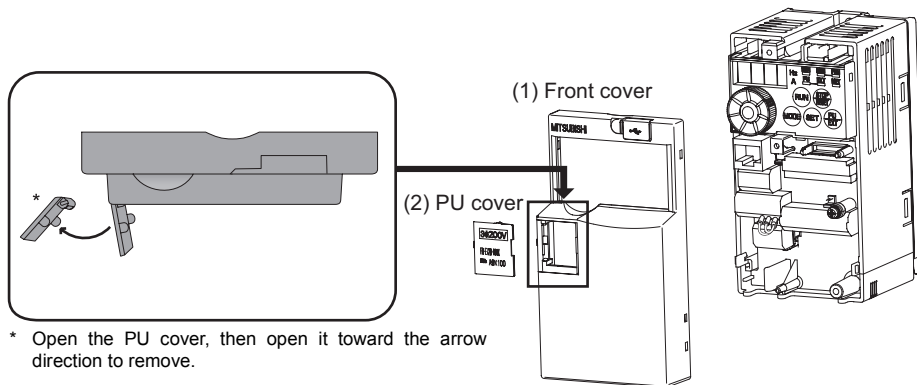
- Always perform wiring to the main circuit terminals and control circuit terminals before installing the option. Wiring cannot be performed after installing the option.
- When mounting the plug-in option, do not let wires get caught in the plug-in option or the spacer for option mounting. If a wire gets caught, the inverter and the plug-in option may be damaged.
- When the inverter cannot recognize that the option is mounted due to improper installation, etc., "E. 1" (option fault) is displayed.
- Take care not to drop a mounting screws during mounting and removal.
- Pull out the option straight to remove. Otherwise, the connector may be damaged.

REMARKS

- Because the voltage class, model name and serial number (only voltage class is labeled for FR-E720-5.5KSC (FR-E720-240SC), FR-E740-5.5KSC (FR-E740-120SC) or higher) are written on the PU cover, replace the PU cover of the plug-in option with the removed PU cover of the inverter.

● Inverter with one front cover

- (1) Remove the front cover from the inverter. (For removing the front cover, refer to the FR-E700 series instruction manual.)
- (2) Remove the PU cover from the front cover. Open the PU cover with a driver, etc. and remove it in the direction of arrow as shown below.

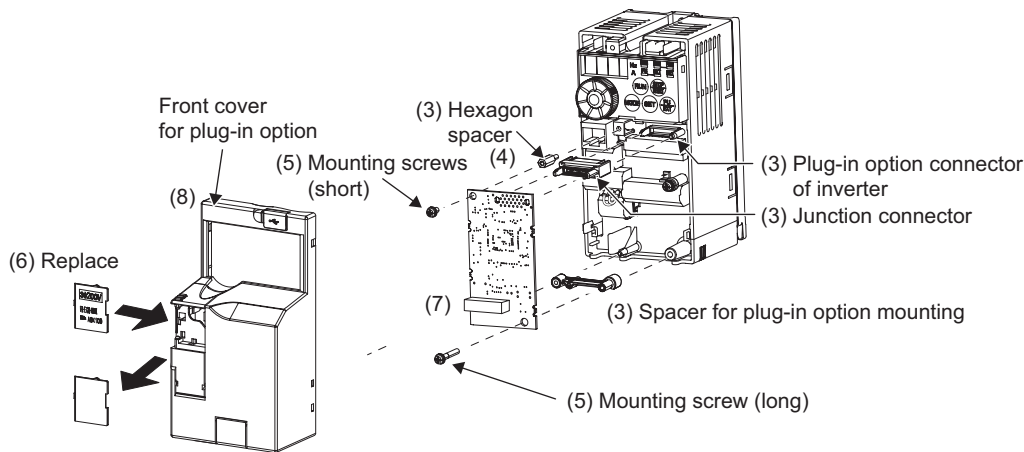


- (3) Fit the spacer for plug-in option mounting, the hexagon spacer, and the junction connector into their designated positions shown in the diagram on the next page. Fit the junction connector along the guide of the connector of the inverter and insert it as far as it goes.
- (4) Fit the connector of the plug-in option along the guide of the junction connector and insert it as far as it goes.
- (5) Fix the plug-in option securely by using the supplied mounting screw (short) to the upper screw hole and the other supplied mounting screw (long) to the lower screw hole of the plug-in option. If the screw holes do not line up, the connector may not have been plugged properly. Check for loose plugging.

Tightening torque: 0.33 to 0.4N·m

7 INSTALLATION AND WIRING

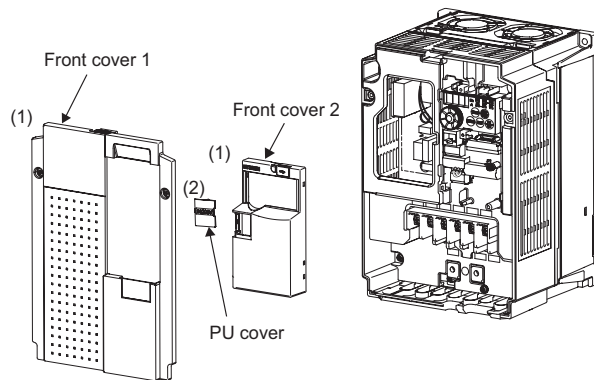
- (6) Remove the PU cover provided on the front cover for plug-in option and mount the other PU cover, which was removed in (2).
- (7) Loosen the terminal screws and insert the wires into the terminals. After that, fasten the terminal screws to the recommended tightening torque. (*Refer to page 9*)
- (8) After wiring of the plug-in option has been completed, mount the front cover for the plug-in option to the inverter.

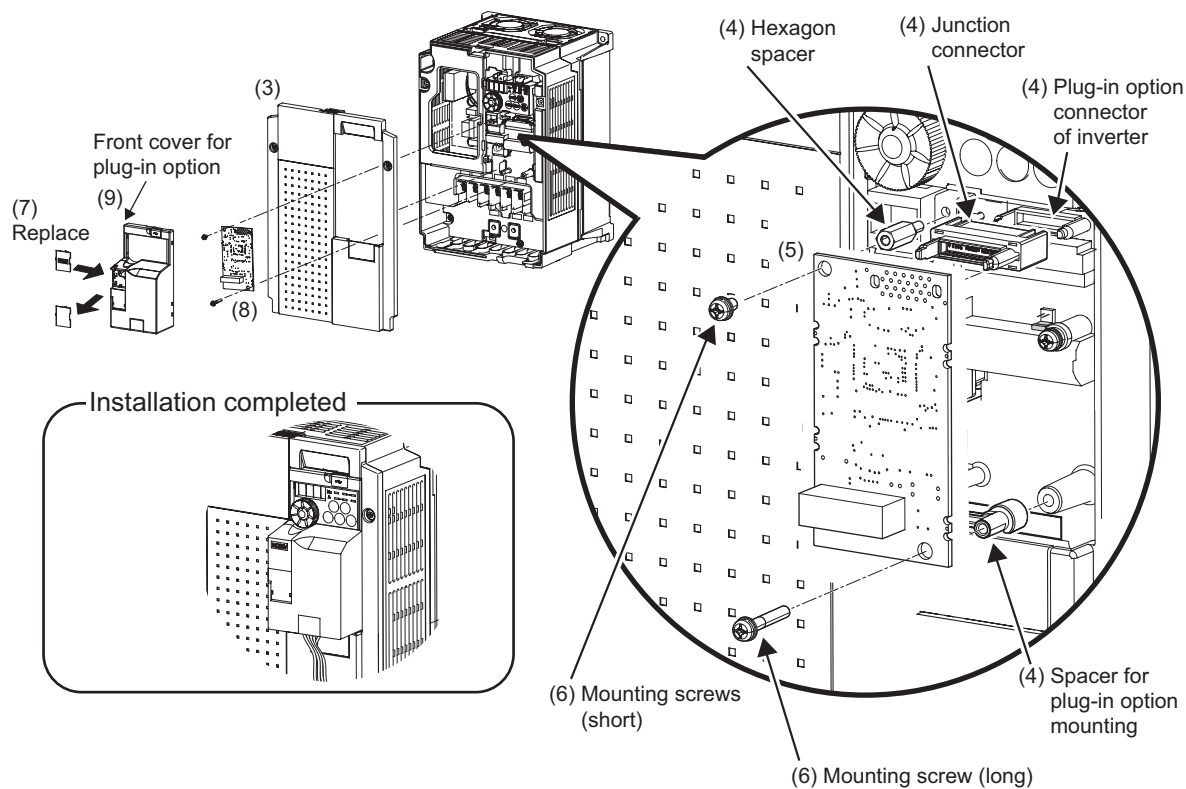




● Inverter with front covers 1 and 2

- (1) Remove the front cover 1 and 2 from the inverter. (For removing the front cover, refer to the FR-E700 series instruction manual.)
- (2) Remove the PU cover from the front cover 2.
For removing the PU cover, refer to *page 5*.
- (3) Mount the front cover 1 to the inverter.
- (4) Fit the spacer for plug-in option mounting, the hexagon spacer, and the junction connector into their designated positions shown in the diagram on the next page. Fit the junction connector along the guide of the connector of the inverter and insert it as far as it goes.
- (5) Fit the connector of the plug-in option along the guide of the junction connector and insert it as far as it goes.
- (6) Fix the plug-in option securely by using the supplied mounting screw (short) to the upper screw hole and the other supplied mounting screw (long) to the lower screw hole of the plug-in option. If the screw holes do not line up, the connector may not have been plugged properly. Check for loose plugging.
Tightening torque : 0.33 to 0.4N·m
- (7) Remove the PU cover provided on the front cover for plug-in option and mount the other PU cover, which was removed in (2).
- (8) Loosen the terminal screws and insert the wires into the terminals. After that, fasten the terminal screws to the recommended tightening torque. (*Refer to page 9*)
- (9) Mount the front cover for plug-in option to the inverter.





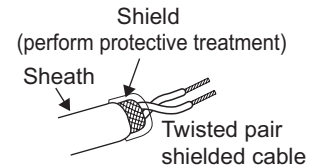
2.3 Wiring

- (1) Untwist the twisted pair shielded cables after stripping its sheath.

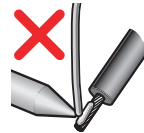
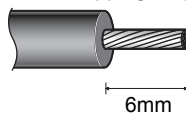
Also, perform protective treatment of the shield to ensure that it will not make contact with the conductive area.

Strip off the sheath about the size as in the right figure. If the length of the sheath peeled is too long, a short circuit may occur among neighboring wires. If the length is too short, wires might come off.

Wire the stripped cable after twisting it to prevent it from becoming loose. (Do not solder it.)



Cable stripping length



Use a blade type terminal as required.

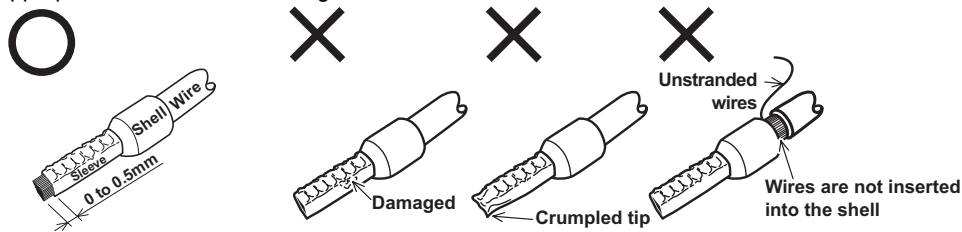
REMARKS

- Information on blade terminals
Commercially available product examples (as of Jan. 2010)

Terminal Screw Size	Wire Size (mm ²)	Blade Terminal Model		Maker
		With insulation sleeve	Without insulation sleeve	
M3	0.3, 0.5	AI 0,5-6WH	A 0,5-6	Phoenix Contact Co.,Ltd.
	0.75	AI 0,75-6GY	A 0,75-6	

Blade terminal crimping tool: CRIMPFOX 6T-F/6 (Phoenix Contact Co., Ltd.)

Insert wires to a blade terminal, and check that the wires come out for about 0 to 0.5 mm from a sleeve.
Check the condition of the blade terminal after crimping. Do not use a blade terminal of which the crimping is inappropriate, or the face is damaged.



- (2) Loosen the terminal screw and insert the cable into the terminal.

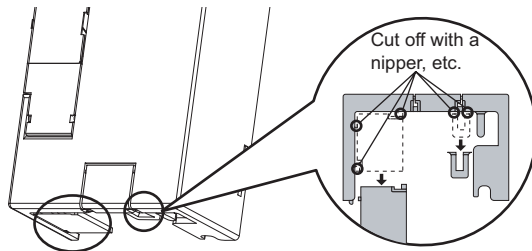
Screw Size	Tightening Torque	Cable Size	Screwdriver
M3	0.5N·m to 0.6N·m	0.3mm ² to 0.75mm ²	Small ⊖ flat-blade screwdriver (Tip thickness: 0.4mm/tip width: 2.5mm)

CAUTION

- Undertightening can cause cable disconnection or malfunction. Overtightening can cause a short circuit or malfunction due to damage to the screw or unit.

POINT

If a hook of the front cover for plug-in option impedes wiring, cut the hooks off and perform wiring.



Cut off hooks at the bottom of the option cover.
(Cut off so that no portion is left.)

REMARKS

- The protective structure (JEM1030) is the open type (IP00).

! CAUTION

- ! When wiring, take care not to subject the cable to stress.**
- ! After wiring, wire offcuts must not be left in the inverter. They may cause a fault, failure or malfunction.**

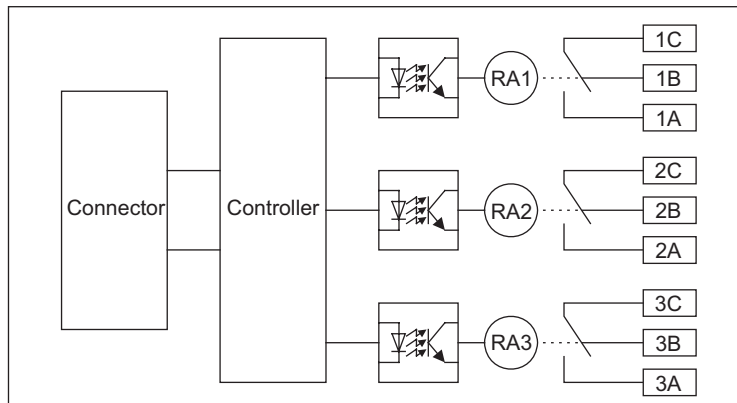
3 RELAY OUTPUT

3.1 Internal Block Diagram

You can select any three output signals (RUN, SU, FU, etc.) available with an inverter as standard, and output them as relay contact signals.

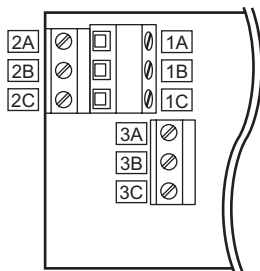
Refer to *page 14* of the Instruction Manual (detailed) for details.

The following is the internal block diagram of the FR-A7AR.





3.2 Terminals



Terminal Symbol	Description
1A	Relay RA1's normally open contact terminal
1B	Relay RA1's normally closed contact terminal
1C	Relay RA1's contact common terminal
2A	Relay RA2's normally open contact terminal
2B	Relay RA2's normally closed contact terminal
2C	Relay RA2's contact common terminal
3A	Relay RA3's normally open contact terminal
3B	Relay RA3's normally closed contact terminal
3C	Relay RA3's contact common terminal

*The operation of each relay depends on the output signal selected.

3.3 Parameter List

By installing this plug-in option, the parameters below are extended.
Set the values according to need.

Parameter Number	Name	Initial Value
320	RA1 output selection	0
321	RA2 output selection	1
322	RA3 output selection	4

Use *Pr. 320* to *Pr. 322* to select signals used for relay output. (Refer to *page 14* for signal types.)

REMARKS

- When an option fault (E, I) occurs, all outputs are tuned off.

3.4 Output Signal List

For details of signal definitions, refer to *Pr. 190 to Pr. 192 (Output terminal function selection)* of the inverter instruction manual.

Setting	Signal Name	Function
Positive logic		
0	RUN	Inverter running
1	SU	Up to frequency
3	OL	Overload warning
4	FU	Output frequency detection
7	RBP	Regenerative brake pre-alarm
8	THP	Electronic thermal O/L relay pre-alarm
11	RY	Inverter operation ready
12	Y12	Output current detection
13	Y13	Zero current detection
14	FDN	PID lower limit
15	FUP	PID upper limit
16	RL	PID forward/reverse rotation output
20	BOF	Brake opening request
25	FAN	Fan fault output

Setting	Signal Name	Function
Positive logic		
26	FIN	Heatsink overheat pre-alarm
46	Y46	During deceleration at occurrence of power failure (retained until release)
47	PID	During PID control activated
64	Y64	During retry
80	SAFE	Safety monitor output
81	SAFE2	Safety monitor output 2
90	Y90	Life alarm
91	Y91	Fault output 3 (power-off signal)
95	Y95	Maintenance timer signal
96	REM	Remote output
98	LF	Alarm output
99	ALM	Fault output
9999	—	No function

REMARKS

- Negative logic can not be set.

REVISIONS

*The manual number is given on the bottom left of the back cover.

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