MITSUBISHI
TRANSISTORIZED INVERTER
– INSTRUCTION MANUAL –

RELAY OUTPUT

FR-A5AR

MITSUBISHI ELECTRIC

Thank you for choosing the Mitsubishi transistorized inverter option unit.
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	Assumes that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠ CAUTION	Assumes that incorrect handling may cause hazardous conditions, resulting in medium or slight injury, or may cause physical damage only.

Note that the CAUTION level may lead to a serious consequence according to conditions. Please follow the instructions of both levels because they are important to personnel 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 removed. Otherwise, you may access the exposed high-voltage terminals and charging part and get an electric shock.
- If power is off, do not remove the front cover except for wiring or periodic inspection. You may access the charged inverter circuits and get an electric shock.
- Before starting wiring or inspection, switch power off, wait for more than 10 minutes, and check for no residual voltage with a tester or the like.
- Any person who is involved in the wiring or inspection of this equipment should be fully competent to do the work.
- Always install the option unit before wiring. Otherwise, you may get an electric shock or be injured.
- Handle this option unit with dry hands to prevent 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

- Apply only the voltage specified in the instruction manual to each terminal to prevent burst, damage, etc.
- Ensure that the cables are connected to the correct terminals.
  Otherwise, burst, damage, etc. may occur.
- Always make sure that polarity is correct to prevent burst, damage, etc.
- While power is on or for some time after power-off, do not touch the inverter as it is hot and you may get burnt.

3. Additional instructions

Also note the following points to prevent an accidental failure, injury, electric shock, etc.:

(1) Transportation and mounting

⚠ CAUTION
● Do not install or operate the option unit if it is damaged or has parts missing. ● Do not stand or rest heavy objects on the product. ● Check that the mounting orientation is correct. ● Prevent screws, metal fragments or other conductive bodies or oil or other flammable substance from entering the inverter.

(2) Test operation and adjustment

⚠ CAUTION
● Before starting operation, confirm and adjust the parameters. A failure to do so may cause some machines to make unexpected motions.

(3) Usage

⚠ WARNING
● Do not modify the equipment.

⚠ CAUTION
● When parameter clear or all parameter clear is performed, each parameter returns to the factory setting. Re-set the required parameters before starting operation. ● For prevention of damage due to static electricity, touch nearby metal 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
● Treat as industrial waste.

(6) General instruction

All illustrations given in this manual may have been drawn with covers or safety guards removed to provide in-depth description. Before starting operation of the product, always return the covers and guards into original positions as specified and operate the equipment in accordance with the manual.

CONTENTS

1. PRE-OPERATION INSTRUCTIONS

1.1 Unpacking and Product Confirmation

This product is an option unit designed for exclusive use in the Mitsubishi FR-A500 series transistorized inverter. Before using it, always make the following checks.

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

Note: This product may be used with the FR-A500 series transistorized inverter manufactured in and after July, 1997. Any of models FR-A520-0.4K to 22K may be used with this unit if its SERIAL number indicated on the rating plate and package plate has the following version or later. (The SERIAL number on the package plate uses the 3 most significant digits of the following 6-digit control number and is indicated in 6 digits including the version symbol.)

Model	SERIAL Number
FR-A520-0.4~22K	J 7 7 OOOOOO

J 7 7 OOOOOO
Symbol Year Month Control number
SERIAL number

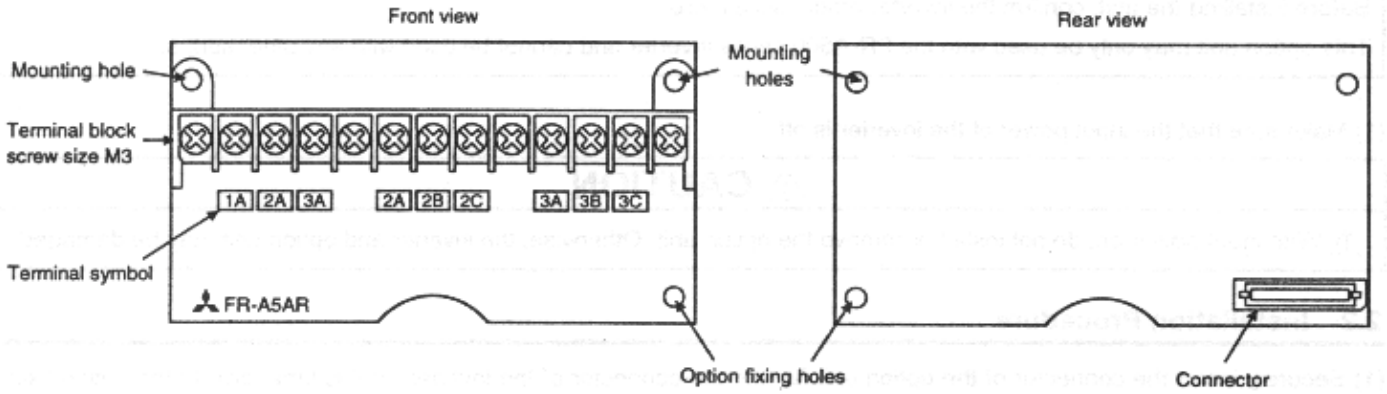
SERIAL is made up of 1 version symbol and 8 numeric characters as shown above.

1.2 Packing Confirmation

Make sure that the package includes the following accessories:

- Instruction manual ····· 1
- Mounting screws M3 × 10 ····· 2

1.3 Structure



2. INSTALLATION

2.1 Pre-Installation Instructions

Before installing the unit, confirm the inverter model once more.
This option unit may only be used with the FR-A500 series inverter and cannot be used with any other series.

(1) Make sure that the input power of the inverter is off.

⚠ CAUTION

⚠ With input power on, do not install or remove the option unit. Otherwise, the inverter and option unit may be damaged.

2.2 Installation Procedure

(1) Securely insert the connector of the option unit far into the connector of the inverter. At this time, also fit the option fixing holes snugly.

(2) Securely fix the option unit to the inverter on both sides with the accessory mounting screws. If the screw holes do not match, the connector may not have been plugged snugly. Check for loose plugging.

⚠ CAUTION

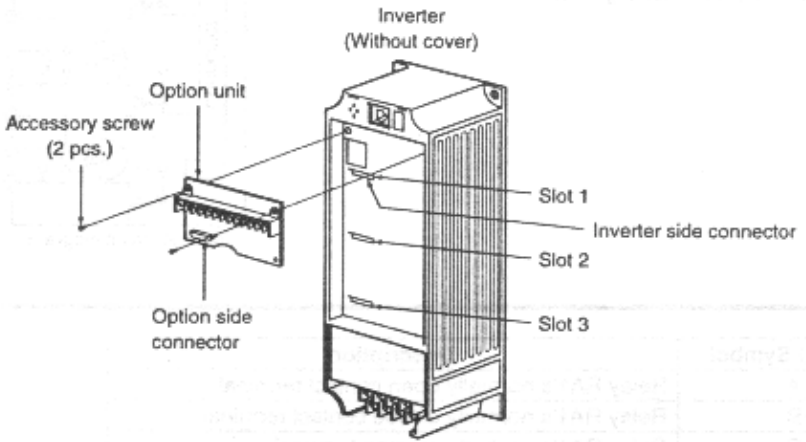
⚠ Since empty terminals are used in the option, they should not be used as junction terminals. If they are used as the junction terminals, the option unit may be damaged.

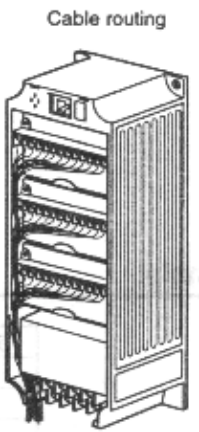
⚠ When installing the inverter front cover, the cables to the inverter's control circuit terminals and option terminals should be routed properly in the wiring space to prevent them from being caught between the inverter and its cover.

2.3 Wiring

Route the cables so that they do not take up a large space in the control circuit terminal block wiring area of the option unit.

Note: During wiring, do not leave wire off-cuts in the inverter. They may cause a fault, failure or malfunction.





Note:1. Only one type of option per inverter may be used. When two or more options are mounted, priority is in order of slots 1, 2 and 3, and the options having lower priority are inoperative.

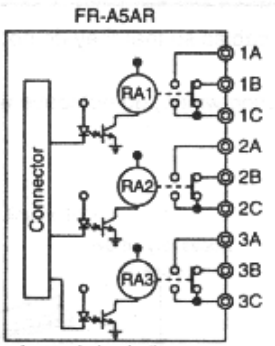
2. When the inverter cannot recognize that the option is mounted, it displays the E.OPT error. The errors shown differ with the mounting slots 1, 2, 3.

Mounting Position	Error Display
Slot 1	E.OP1
Slot 2	E.OP2
Slot 3	E.OP3

3. FUNCTIONS

3.1 Internal Block Diagram

You can select any three output signals from among the 27 standard output signals (RUN, SU, IPF, OL, FU, FU2, FU3, RBP, THP, PRG, PU, RY, Y12, Y13, FDN, FUP, RL, MC1, MC2, MC3, BOF, FAN, FIN, ORA, ORM, LF, ABC) of the inverter, and output them as relay contact signals.



Internal circuit diagram

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.

4.1 Related Parameter List

Parameter Number	Name	Setting Range	Factory Setting
320	RA1 output selection	0~99,9999	0
321	RA2 output selection	0~99,9999	1
322	RA3 output selection	0~99,9999	2

4.2 Setting of Related Parameters

(1) Output signal selection

Set the Pr. 320, Pr. 321 and Pr. 322 values to select the output signals of relays RA1, RA2 and RA3.

(2) Definition of output signals

Refer to the following table and set the corresponding parameter values. Unlike the output signals from the inverter, there is no negative logic setting. For the related parameters, refer to the inverter instruction manual.

Setting	Signal Name	Function	Operation	Related Parameters
0	RUN	Inverter running	Output during operation when the inverter output frequency reaches or exceeds the starting frequency.	——
1	SU	Up to frequency	Refer to Pr. 41 "up-to-frequency sensitivity".(Note 1)	Pr.41
2	IPF	Instantaneous power failure or undervoltage	Output when an instantaneous power failure or undervoltage occurs.	——
3	OL	Overload alarm	Output while stall prevention function is activated.	Pr.22, 23, 66, 148, 149, 154
4	FU	Output frequency detection	Refer to Pr. 42 and Pr. 43 (output frequency detection).	Pr.42, 43
5	FU2	Second output frequency detection	Refer to Pr. 50 (second output frequency detection).	Pr.50
6	FU3	Third output frequency detection	Refer to Pr. 116 (third output frequency detection).	Pr.116
7	RBP	Regenerative brake pre-alarm	Output when 85% of the regenerative brake duty set in Pr. 70 is reached.	Pr.70
8	THP	Electronic overcurrent protection pre-alarm	Output when the cumulative electronic overcurrent protection value reaches 85% of the preset level.	Pr.9
9	PRG	Programmed mode	Output in the programmed mode. (Note 2)	Pr.79, 200~231

Setting	Signal Name	Function	Operation	Related Parameters
10	PU	PU operation mode	Output when the PU operation mode is selected.	Pr.17=0~3
11	RY	Inverter operation ready	Output when the inverter can be started by switching the start signal on or while it is running.	——
12	Y12	Output current detection	Refer to Pr. 150 and 151 (output current detection).	Pr.150,151
13	Y13	Zero current detection	Refer to Pr. 152 and 153 (zero current detection).	Pr.152,153
14	FDN	PID lower limit	Refer to Pr. 128 to 134 (PID control).	Pr.128~134
15	FUP	PID upper limit		
16	RL	PI forward-reverse rotation output		
17	MC1	Commercial power supply-inverter switch-over MC1	Refer to Pr. 135 to 139 (commercial power supply-inverter switch-over).	Pr.135~139
18	MC2	Commercial power supply-inverter switch-over MC2		
19	MC3	Commercial power supply-inverter switch-over MC3		
20	BOF	Brake opening request	Refer to Pr. 278 to 285 (brake sequence functions).	Pr.278~285
25	FAN	Fan fault output	Output when a fan fault occurs.	——
26	FIN	Fin overheat pre-alarm	Output when the heat sink temperature reaches about 85% of the fin overheat protection temperature.	——
27	ORA	In-position	Only when orientation is valid (FR-A5AP option is mounted)	——
28	ORM	Orientation error		
98	LF	Minor fault output	Output when a minor fault occurs.	——
99	ABC	Alarm output	Output when the inverter's protective function is activated to stop the output (major fault).	——
9999	——	No function	No output.	——

Note: 1. When the analog signal or PU's [UP]/[DOWN] key is used to change the frequency setting, the output of the SU (up-to-frequency) signal may alternate between ON and OFF according to its changing speed and the timing of the changing speed which depends on the acceleration/deceleration time setting.
(This ON-OFF alternation does not occur when the acceleration/deceleration time setting is "0 seconds".)
2. This signal is output when "5" is set in Pr. 79 "operation mode selection" and the external operation mode is selected (the inverter goes into the programmed mode).
3. The same function may be set to more than one terminal.

Example: When Pr. 321 = 1 (factory setting), up-to-output frequency (SU) is selected for RA2.

5. SPECIFICATIONS

5.1 Specifications

(1) Output signal type: contact output (three relays mounted)

(2) Contact output: 230VAC 0.3A
30VDC 0.3A

5.2 Instruction

(1) The contacts should be used within the rated capacity to ensure long contact life.

REVISIONS

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

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Sep, 1997	IB(NA)-66810-A	First edition

TRANSISTORIZED INVERTER

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE MITSUBISHI DENKI BLDG MARUNOUCHI TOKYO 100

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