



# TRANSISTORIZED INVERTER

-INSTRUCTION MANUAL-

---

ANALOG OUTPUT/  
DIGITAL OUTPUT

---

# FR-A5AY

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".



Assumes that incorrect handling may cause hazardous conditions, resulting in death or severe injury.



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.



## WARNING

- 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

<b>1.PRE-OPERATION INSTRUCTIONS</b>	<b>1</b>
1.1 Unpacking and Product Confirmation .....	1
1.2 Packing Confirmation .....	1
1.3 Structure .....	2
<b>2.INSTALLATION</b>	<b>3</b>
2.1 Pre-Installation Instructions.....	3
2.2 Installation Procedure .....	3
2.3 Wiring.....	5
<b>3.EXTENSION ANALOG OUTPUT</b>	<b>6</b>
3.1 Wiring Example.....	6
3.2 Terminals .....	7
3.3 Parameter setting.....	7
3.4 Instructions.....	13
3.5 Specifications.....	14
<b>4.DIGITAL OUTPUT</b>	<b>15</b>
4.1 Terminals .....	15
4.2 Parameter List.....	15

# 1. PRE-OPERATION INSTRUCTIONS

---

## 1.1 Unpacking and Product Confirmation

---

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

Functions available differ between FR-A500(L)/F500(L) series and FR-V500 series, always check before using.

- SERIAL number check

This product may be used with the FR-A520-0.4K to 22K manufactured in and after July 1997. Any of the models may be used with this unit if its SERIAL number indicated on the rating plate and package has "J77○○○○○○" or later version.

SERIAL is made up of 1 version symbol and 8 numeric characters indicating year, month, and control number as shown below.

  J      7      7      ○○○○○○    
Symbol Year Month Control number  
SERIAL number

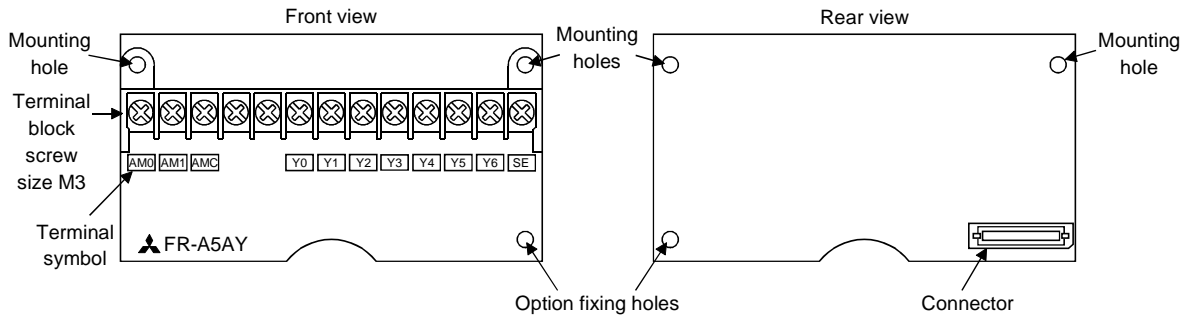
## 1.2 Packing Confirmation

---

Make sure that the package includes the following

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

## 1.3 Structure



## 2.INSTALLATION

---

---

### 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 option unit. Otherwise, the inverter and option unit may be damaged.**

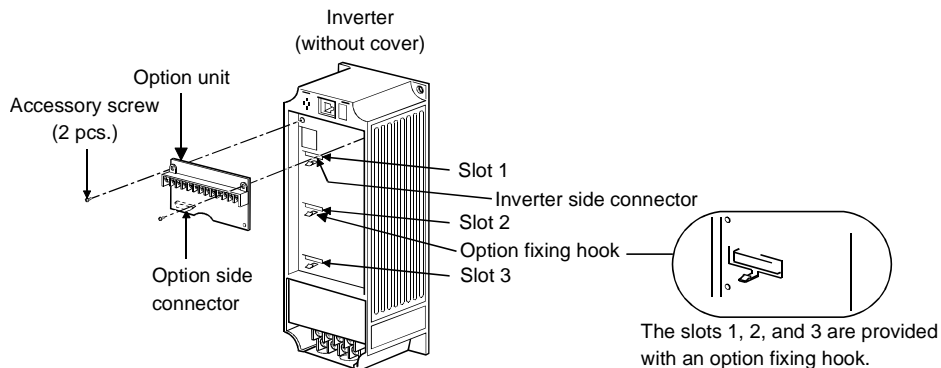
### 2.2 Installation Procedure

---

- (1) Securely insert the connector of the option unit far into the connector of the inverter. At this time, fit the option fixing holes snugly. For the position of slot, refer to the next page.  
Also be sure to fit the unit into the option fixing hook (For the FR-A500(L)/ FR-F500(L) series, it is available in Aug., 2000).
- (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.



## INSTALLATION



### CAUTION

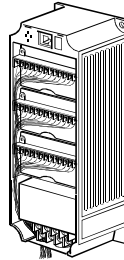
1. Only one type of option per inverter may be used. When two or more options are mounted, priority is in order of slots 1, 2 and 3, the options having lower priority are inoperative.
2. When the inverter cannot recognize that the option is mounted, it displays the option error. The errors shown differ according to the mounting slots 1, 2, 3.

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

## 2.3 Wiring

Route the wires so that they do not take up a large space in the control circuit terminal block of the option unit. During wiring, do not leave wire off-cuts in the inverter. They may cause a fault, failure or malfunction. Use the space on the left side of the control circuit terminal unit to route the wires.

Cable routing



### REMARKS

The wires with large gauge may not be connected to the terminal block. When connected in parallel, all wires may not fit in the wiring space due to the increased number of wires. In such cases, perform wiring by using a junction terminal block.



### CAUTION



**Do not use empty terminals as junction terminals because they are used in the option unit. If they are used as the junction terminals, the option unit may be damaged.**



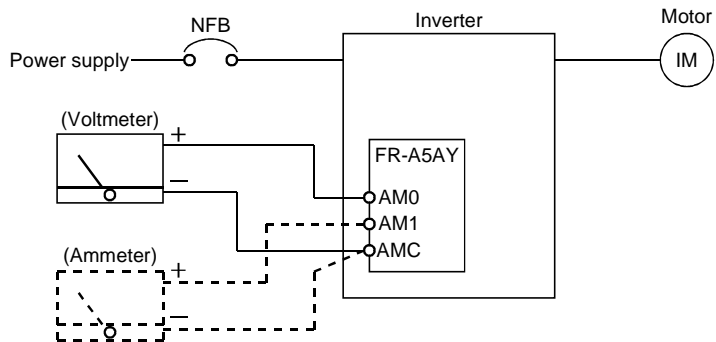
**When installing the inverter front cover, the cables to the inverter's control circuit terminals and option terminals should be routed properly in the wiring space to prevent them from being caught between the inverter and its cover.**

## 3.EXTENSION ANALOG OUTPUT

### 3.1 Wiring Example

By setting the Pr. 306 to Pr. 312 values, analog signals such as the output frequency and output current can be output from the voltage output terminal (AM0) and current output terminal (AM1).

Connect the voltmeter or ammeter as shown below:



#### CAUTION

The wiring length between the FR-A5AY and the voltmeter / ammeter should be wired 10m.

## 3.2 Terminals

Terminal Symbol	Terminal Name	Description
AM0	Voltage output terminal	Connect a DC voltmeter (10VDC).
AM1	Current output terminal	Connect a DC ammeter (20mADC).
AMC	Common terminal	Common to AM0 and AM1

## 3.3 Parameter setting

Select and set the types of analog output signal output from terminals AM0 and AM1 in Pr. 306 "Analog output signal selection" and Pr. 310 "Analog meter voltage output selection".

For signal types and setting values, refer to the inverter instruction manual (Pr. 158 "AM terminal function selection").

When outputting the same signal from terminals AM0 and AM1 (Pr. 309 = 0, 10), select the analog signal to set the signal number in Pr.306. (The setting of Pr. 310 is made invalid.). For FR-V500 series, Pr.158 is "DA2 terminal function selection".

Function Number	Function Name	Setting Range	Minimum Increment	Factory Setting	Remarks
306	Analog output signal selection	1 to 36	1	2	Output signal at AM1 terminal
307	Setting for zero analog output	0 to 100%	0.1	0%	
308	Setting for maximum analog output	0 to 100%	0.1	100%	
309	Voltage/current selection for analog output signal	0, 1, 10, 11	1	0	
310	Analog meter voltage output	1 to 36	1	2	Output signal at AM0 terminal
311	Setting for zero analog meter voltage output	0 to 100%	0.1	0%	
312	Setting for maximum analog meter voltage output	0 to 100%	0.1	100%	

### REMARKS

For Pr.306 and Pr.310, write is enabled even when "0" is set in Pr.77.

## EXTENSION ANALOG OUTPUT

[Adjustment procedures]

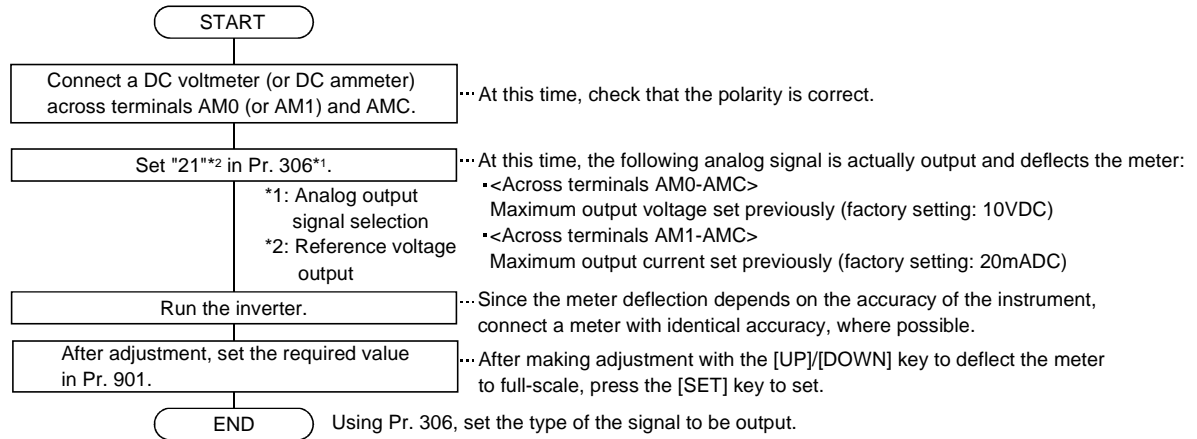
### (1) Setting of the voltage/current selection for analog output signal [Pr. 309]

Use Pr. 309 to select whether the same or different signals are output from the voltage output terminal (AM0) and current output terminal (AM1).

<b>Voltage/Current Selection for Analog Output Signal [Pr. 309]</b>	<b>Description</b>	<b>Parameters for Setting</b>		<b>Parameter for Adjustment</b>
0 (factory setting)	The same select signals are output from the voltage output terminal (AM0) and current output terminal (AM1).	AM0	Pr. 306: Select the output signal.	Pr. 901
		AM1	Pr. 307: Output signal value for zero analog output Pr. 308: Output signal value for maximum analog output	
10	The signal set in Pr. 306 "Analog output signal selection" is made valid. (The setting of Pr. 310 is made invalid.)	AM0	Pr. 306: Select the output signal.	
		AM1	Pr. 307: Analog output value for zero output signal Pr. 308: Analog output value for maximum output signal	
1	Different select signals are output from the voltage output terminal (AM0) and current output terminal (AM1).	AM0	Pr. 310: Select the output signal. Pr. 311: Output signal value for zero analog output Pr. 312: Output signal value for maximum analog output	Pr.900
		AM1	Pr. 306: Select the output signal. Pr. 307: Output signal value for zero analog output Pr. 308: Output signal value for maximum analog output	Pr.901
11		AM0	Pr. 310: Select the output signal. Pr. 311: Analog output value for zero output signal Pr. 312: Analog output value for maximum output signal	Pr.900
		AM1	Pr. 306: Select the output signal. Pr. 307: Analog output value for zero output signal Pr. 308: Analog output value for maximum output signal	Pr.901

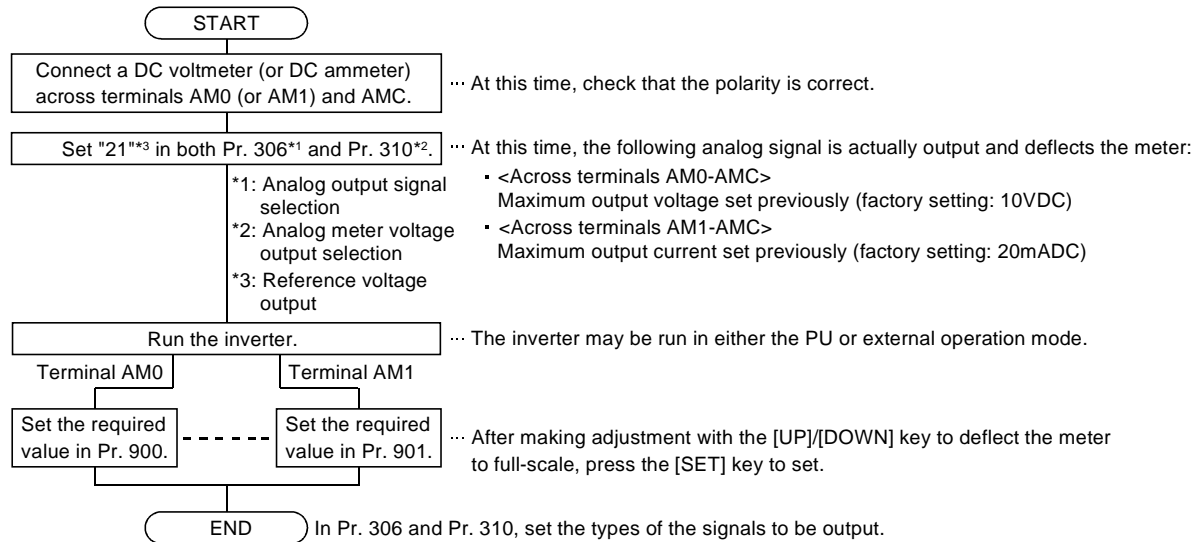
## (2) Meter calibration (Pr. 306, Pr. 310, Pr. 900, Pr. 901, [UP]/[DOWN] key)

## 1) Outputting the same select signals from terminals AM0 and AM1



## EXTENSION ANALOG OUTPUT

### 2) Outputting different select signals from terminals AM0 and AM1



### REMARKS

At the beginning, when pressing the [UP]/[DOWN] key, the meter deflects slowly. Hence, it can be used for fine adjustment. Hold down the key longer to deflect the meter faster.

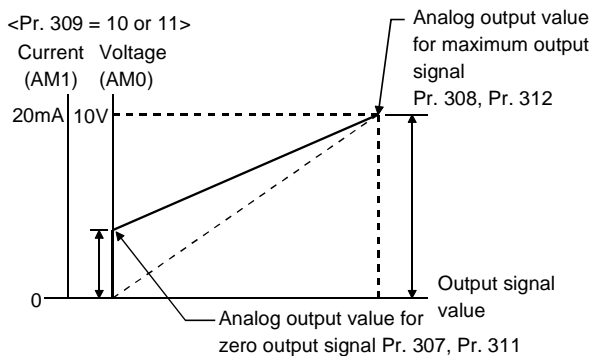
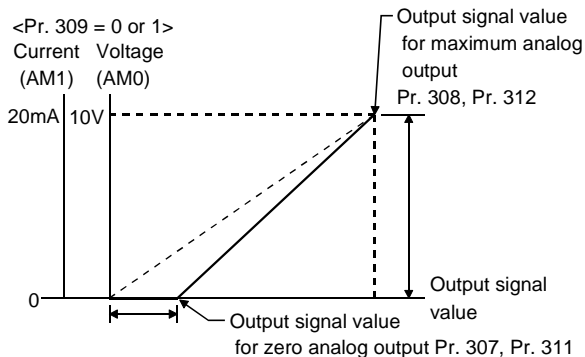
**(3) Analog signal adjustment [Pr. 307, Pr. 308, Pr. 311, Pr. 312]**

To provide the output signal in the form of a 0-10VDC or 0-20mADC analog output signal (output signal for meter), set the zero analog output (meter zero) and maximum analog output (full-scale) points as indicated below in accordance with the following table:

<b>Analog Output Signal/Current Selection Pr. 309</b>	<b>Description</b>	<b>Parameters for Setting</b>		<b>Parameter for Adjustment</b>
0 (factory setting)	Same select signals are output from voltage output terminal (AM0) and current output terminal (AM1). The signal set in Pr. 306 "Analog output signal selection" is made valid. (The setting of Pr. 310 is made invalid.)	AM0	Pr. 307: Output signal value for zero analog output Pr. 308: Output signal value for maximum analog output	Pr. 901
		AM1		
10		AM0	Pr. 307: Analog output value for zero output signal Pr. 308: Analog output value for maximum output signal	
		AM1		
1	Different select signals are output from voltage output terminal (AM0) and current output terminal (AM1).	AM0	Pr. 311: Output signal value for zero analog output Pr. 312: Output signal value for maximum analog output	Pr. 900
		AM1	Pr. 307: Output signal value for zero analog output Pr. 308: Output signal value for maximum analog output	Pr. 901
11		AM0	Pr. 311: Analog output value for zero output signal Pr. 312: Analog output value for maximum output signal	Pr. 900
	AM1	Pr. 307: Analog output value for zero output signal Pr. 308: Analog output value for maximum output signal		Pr. 901



## EXTENSION ANALOG OUTPUT



### REMARKS

When the same values are set for zero and maximum outputs, i.e. Pr. 307 = Pr. 308 and Pr. 311 = Pr. 312, the output values of output terminals AM0 and AM1 are always zero.

### 3.4 Instructions

- (1) A voltmeter having smaller internal impedance (or an ammeter having larger internal impedance) than the value indicated in the Specifications may not deflect to full-scale and may not be calibrated.
- (2) If calibration is made without "21" (reference voltage output) set in Pr. 306, the AM/DA2 terminal of the inverter is calibrated.  
To calibrate the extension analog output, always use "21" in Pr. 306.
- (3) When calibrating a meter which has a small full-scale value, set the output of terminal AM0 (or AM1) to the minimum without the meter connected. Then, connect the meter and make calibration.



### CAUTION



**This option unit is factory-set to provide the full-scale output of 10VDC and 20mADC. Hence, a voltmeter (7VDC or less) or an ammeter (14mADC or less) with a small full-scale value may be damaged accidentally during calibration.**

## **3.5 Specifications**

---

### (1) Output signals

Voltage output (across terminals AM0-AMC) 0 to 10VDC maximum

Current output (across terminals AM1-AMC) 0 to 20mADC

### (2) Output resolution

Voltage output 3mV

Current output 1 $\mu$ A

### (3) Output accuracy (reference value)

$\pm 10\%$  of the full-scale output value

Depends on the output signal type.

### (4) Meters used

- Voltmeter

DC voltmeter full-scale 10V (internal impedance 10k $\Omega$  or more)

- Ammeter

DC ammeter full-scale 20mA (internal impedance 300 $\Omega$  or less)

- Wiring length

Maximum 10m

## 4.DIGITAL OUTPUT

### 4.1 Terminals

By setting the Pr. 313 to Pr. 319 values, output signals available with an inverter as standard can be output from the open collector terminals. Output signals differ according to the inverter. For selection of output terminal function, refer to the inverter instruction manual (Pr.190 to).

With this function, output signals can be set redundantly.

- (1) Open collector output specifications: Permissible load 24V, 0.1ADC
- (2) The circuit logic is the same as that of the inverter (factory-set to sink). To change the logic, refer to the inverter instruction manual.
- (3) Terminal SE is a common terminal (common to sink and source).

### 4.2 Parameter List

Parameter Number	Description	Factory Setting	Setting Range
313	Y0 output selection	9999	0 to 199, 9999
314	Y1 output selection	9999	0 to 199, 9999
315	Y2 output selection	9999	0 to 199, 9999
316	Y3 output selection	9999	0 to 199, 9999
317	Y4 output selection	9999	0 to 199, 9999
318	Y5 output selection	9999	0 to 199, 9999
319	Y6 output selection	9999	0 to 199, 9999

#### REMAKS

For Pr.313 to Pr.319, write is disabled during operation even when "2" is set in Pr.77. When changing the parameter setting, stop the operation.

## REVISIONS

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

Print Date	*Manual Number	Revision	
Sep., 1997	IB(NA)-66809-A	First edition	
Jan., 2002	IB(NA)-66809-B	<table border="1"><tr><td>Addition</td></tr></table> Adaptable inverters	Addition
Addition			