



INVERTER

Plug-in option

FR-A7NP

INSTRUCTION MANUAL

PROFIBUS-DP
communication function

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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.
- If halogen-based materials (fluorine, chlorine, bromine, iodine, etc.) infiltrate into a Mitsubishi product, the product will be damaged. Halogen-based materials are often included in fumigant, which is used to sterilize or disinfest wooden packages. When packaging, prevent residual fumigant components from being infiltrated into Mitsubishi products, or use an alternative sterilization or disinfection method (heat disinfection, etc.) for packaging. Sterilization or disinfection of wooden package should also be performed before packaging the product.

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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MEMO

1 PRE-OPERATION INSTRUCTIONS

1.1 Inverter model

The inverter model, 55K and 75K stated in this Instruction Manual differs according to -NA, -EC, -CH(T) versions. Refer to the following correspondence table for each inverter model. (*Refer to the instruction manual of each inverter for the inverter model.*)

For example, "for the 75K or higher" indicates "for the FR-A740-01440-NA or higher" in the case of FR-A740 of NA version.

		NA	EC	CH
F700	FR-F720(P)-55K	FR-F720-02330-NA	—	—
	FR-F720(P)-75K	FR-F720-03160-NA	—	—
	FR-F740(P)-55K	FR-F740-01160-NA	FR-F740-01160-EC	FR-F740-55K-CH(T)
	FR-F740(P)-75K	FR-F740-01800-NA	FR-F740-01800-EC	FR-F740-S75K-CH(T)
A700	FR-A720-55K	FR-A720-02150-NA	—	—
	FR-A720-75K	FR-A720-02880-NA	—	—
	FR-A740-55K	FR-A740-01100-NA	FR-A740-01800-EC	FR-A740-55K-CHT
	FR-A740-75K	FR-A740-01440-NA	FR-A740-02160-EC	FR-A740-75K-CHT
A701	FR-A721-55K	—	—	—
	FR-A741-55K	—	—	—

1

1.2 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 for the FR-A700/FR-F700P series inverter and the FR-F700 series inverter assembled in and after December 2004.

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

● SERIAL number check

Refer to the inverter manual for the location of the rating plate.

Rating plate example

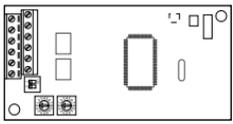
□ 4 2 ○○○○○○] SERIAL (Serial No.)
Symbol Year Month Control number

The SERIAL consists of one symbol, two characters indicating production year and month, and six characters indicating control number.

The last digit of the production year is indicated as the Year, and the Month is indicated by 1 to 9, X (October), Y (November), or Z (December).

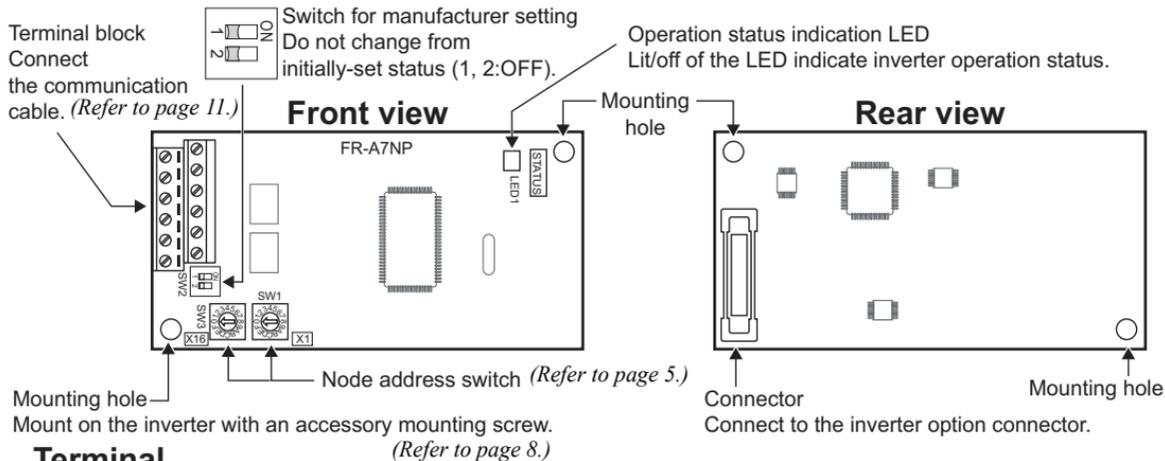
1.2.1 Product confirmation

Check the enclosed items.

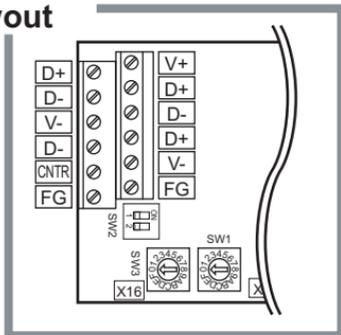
<p>Plug-in option 1</p> 	<p>Mounting screw (M3 × 6mm) 2 (Refer to page 10.)</p> 	<p>Hex-head screw for option mounting (5.5mm) 1 (Refer to page 10.)</p> 
<p>Communication option LED display cover 1 (Refer to page 8.)</p> 	<p>PROFIBUS® is a registered trademark of PROFIBUS User Organization.</p>	

1

1.2.2 Parts



Terminal layout



Name	Function	
Node address switch	Set the inverter address within the range of 00H to 7DH.	
Operation status indication LED	OFF	Inverter power OFF
	Red is lit	A communication error with the master occurred
	Green is lit	During communication with the master



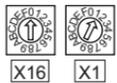
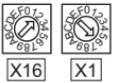
1.3 Node address setting

•Setting with node address switch

Set the node address between "0H to 7DH" using node address switches on FR-A7NP (refer to page 3). The setting is applied at the next power-ON.

Set the arrow (↑) of the corresponding switches to a number or an alphabet to set a desired address.

•Setting example

<p>Node address 1: Set the "↑" of X16(SW3) to "0" and the "↑" of X1(SW1) to "1".</p>		<p>Node address 38 (26H): Set the "↑" of X16(SW3) to "2" and the "↑" of X1(SW1) to "6".</p>	
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CAUTION

1. Set the node address switch to the switch number (alphabet) position correctly. If the switch is set between numbers, normal data communication cannot be established.

Good example	Bad example
	
2. Do not set the node addresses to 7EH through FFH. When these addresses are set, they are recognized as 7DH.
3. The node addresses, 0H, 1H, 2H, 7CH, and 7DH, may not be available for some master modules.
4. You cannot set the same node address to other devices on the network. (Doing so disables proper communication.)
5. Set the inverter node address before switching ON the inverter and do not change the setting while power is ON. Otherwise you may get an electric shock.

1.4 Specifications

1.4.1 Inverter option specifications

Type	Inverter plug-in option type
Number of nodes occupied	One inverter occupies one node.
Connection cable	Cable which supports 12.0Mbps communication (EIA-485(RS-485) standard)

1.4.2 Communication specifications

Communication speed	Wiring length 1200m or less	9600bps, 19.2Kbps, 93.75Kbps
	Wiring length 600m or less	187.5Kbps
	Wiring length 200m or less	500Kbps, 1.5Mbps
	Wiring length 100m or less	3.0Mbps, 6.0Mbps, 12.0Mbps

2 INSTALLATION

2.1 Pre-installation instructions

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

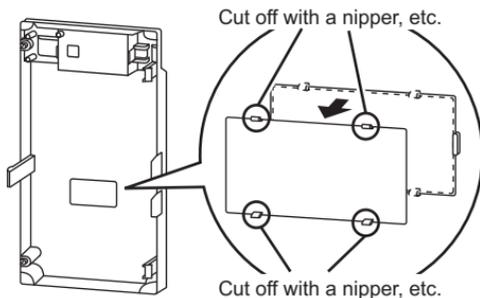
CAUTION

-  With input power ON, do not install or remove the 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.

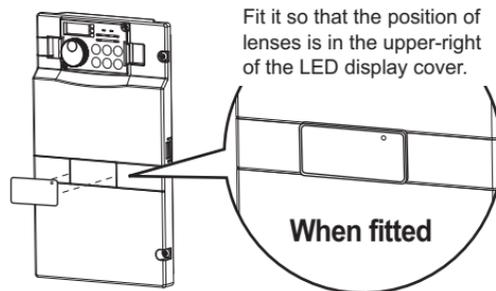
2.2 Installation of the communication option LED display cover

Mount the cover for displaying the operation status indication LED for the communication option on the inverter front cover.

- 1) Cut off hooks on the rear of the inverter front cover with nipper, etc. and open a window for fitting the LED display cover.



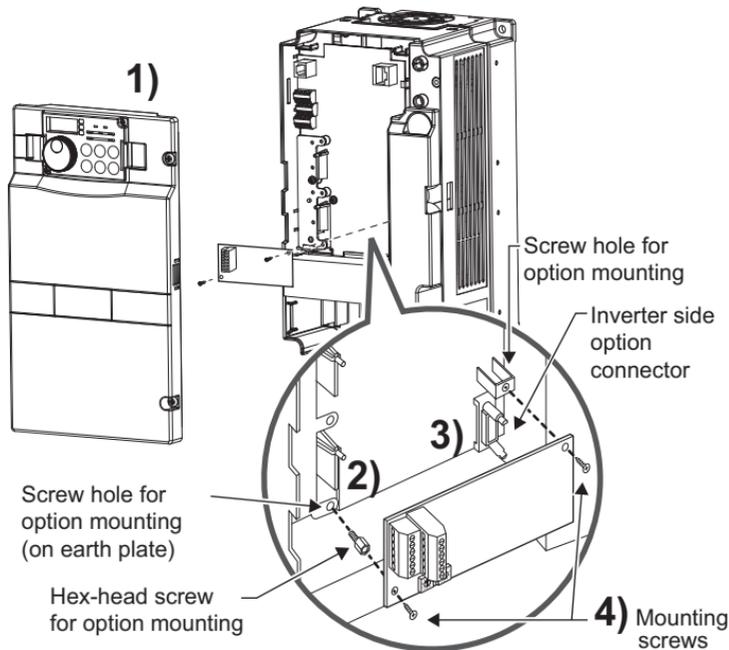
- 2) Fit the communication option LED display cover to the front of the inverter front cover and push it into until fixed with hooks.



⚠ CAUTION

⚠ Take care not to hurt your hand and such with portions left by cutting hooks of the rear of the front cover.

2.3 Installation procedure



- 1) Remove the inverter front cover.
 - 2) Mount the hex-head screw for option mounting into the inverter screw hole (on earth plate). (size 5.5mm, tightening torque 0.56N·m to 0.75N·m)
 - 3) Securely fit the connector of the plug-in option to the inverter connector along the guides.
 - 4) Securely fix the both right and left sides of the plug-in option to the inverter with the accessory mounting screws. (Tightening torque 0.45N·m to 0.55N·m)
- If the screw holes do not line-up, the connector may not have been plugged securely. Check for loose plugging.

2

REMARKS

- Remove a plug-in option after removing two screws on both left and right sides. (The plug-in option is easily removed if the control circuit terminal block is removed before.)

CAUTION

- When using this option unit with the FR-A700 series inverter, mount it in the "option connector 3 (lowermost connector)" of the inverter.

If it is fitted in option connector 1 or 2, "E. 1" or "E. 2" (option fault) is displayed and the inverter will not operate. In addition, when the inverter cannot recognize that the option is mounted due to improper installation, etc.,

"E. 3" (option fault) is displayed even if the option is fitted in the option connector 3.

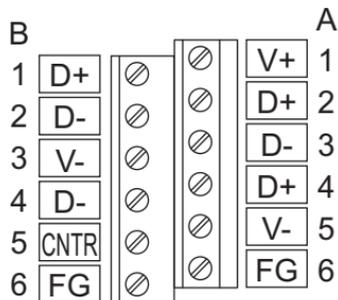
- The FR-F700(P) series has one connection connector for the plug-in option. When the inverter cannot recognize that the option unit is mounted due to improper installation, etc., "E. 1" (option fault) is displayed.
- Take caution not to drop a hex-head screw for option mounting or mounting screw during mounting and removal.
- Pull out the option straight to remove. Otherwise, the connector may be damaged.

Mounting Position	Fault Display
Connector 1	E. 1
Connector 2	E. 2
Connector 3	E. 3

3 WIRING

3.1 Terminal block

Terminal block layout



Terminal No.	Terminal Name	Definition
1-A	V+ (VP) *1	Voltage output (approx. 5V to V-)
1-B	D+ (RXD/TXD-P)	Sends and receives PROFIBUS signal+ (B-line)
2-A	D+ (RXD/TXD-P)	Sends and receives PROFIBUS signal+ (B-line)
2-B	D- (RXD/TXD-N)	Sends and receives PROFIBUS signal- (A-line)
3-A	D- (RXD/TXD-N)	Sends and receives PROFIBUS signal- (A-line)
3-B	V- (DGND) *1	GND of D+/D-
4-A	D+ (RXD/TXD-P) *1	(To connect a terminating resistor)
4-B	D- (RXD/TXD-N) *1	(To connect a terminating resistor)
5-A	V- (DGND) *1	GND of D+/D-
5-B	CNTR *2	Control signal (sending request from the inverter)
6-A	FG	(Connected to the earth of the inverter unit)
6-B	FG	(Connected to the earth of the inverter unit)

*1 Use this when connecting a terminating resistor.

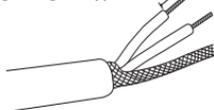
*2 It may not be necessary depending on the master used.

3.2 Wiring

Use the network connection cable which supports 12.0Mbps communication.

- (1) Strip off the sheath of the PROFIBUS communication dedicated cable and wind wires and shield cables to use. If the length of the sheath peeled is too long, a short circuit may occur among neighboring wires. If the length is too short, cables and shield cables might come off.

Cable stripping length Approx 5mm



Wire the stripped cable after twisting it to prevent it from becoming loose.

In addition, do not solder it.

Use a blade terminal as required.

REMARKS

- Information on blade terminals...recommended product (as of January 2010)

Terminal Screw Size	Cable Size (mm ²)	Blade Terminal Model		Manufacturer
		With insulation sleeve	Without insulation sleeve	
M2	0.3 to 0.5	AI 0,5-6WH	A 0,5-6	Phoenix Contact Co.,Ltd.

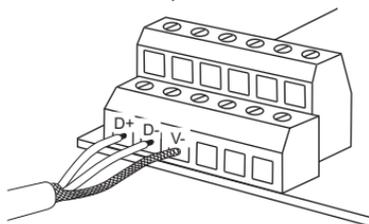
Blade terminal crimping tool: CRIMPFox 6 (Phoenix Contact Co., Ltd.)

When using the blade terminal (without insulation sleeve), use care so that the twisted wires do not come out.

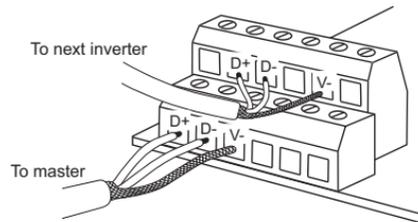


- (2) Loosen the terminal screw and insert the cable into the terminal.
Tighten each cable with fixing screws to the recommended tightening torque.

<Cable connection example>



<Connection example of multiple inverters>



Screw Size	Tightening Torque	Cable Size	Screwdriver
M2	0.22N·m to 0.25N·m	0.3mm ² to 0.75mm ²	Small ⊖ flat-blade screwdriver (Tip thickness: 0.4mm /tip width: 2.5mm)

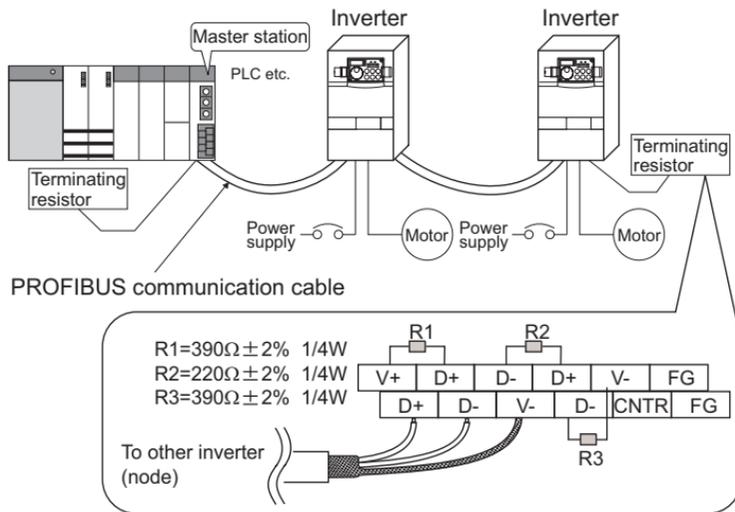
CAUTION

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

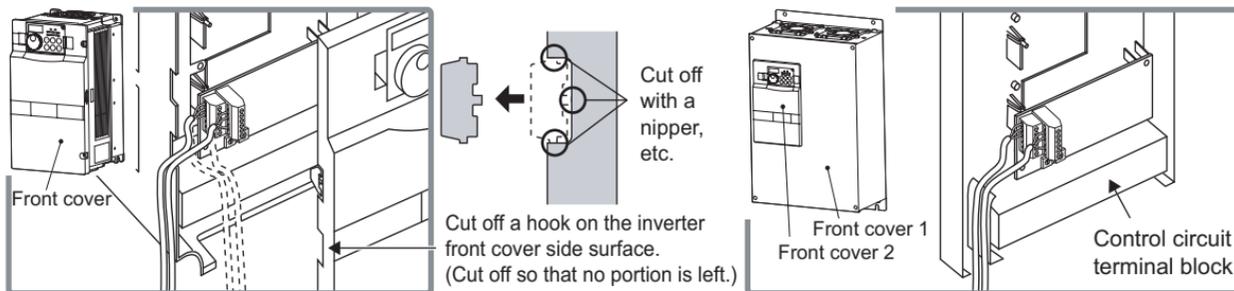
(3) Terminating resistor

Connect terminating resistors to the both ends of a network if the both ends are FR-A7NP-mounted inverters.

Connection example



- (4) For wiring of the inverter which has one front cover, route wires between the control circuit terminal block and front cover. If cables cannot be routed between the control circuit terminal block and front cover (approx. 7mm), remove a hook of the front cover, and use the space became available. For wiring of the inverter which has front cover 1 and 2, use the space on the left side of the control circuit terminal block.



Inverter which has one front cover

Inverter which has front cover 1 and 2

* The inverter models of 22K and 30K of the FR-A700 series, 30K and 37K of the FR-F700 series in -NA, -EC versions are as follows.

		NA	EC
A700	FR-A720-22K	FR-A720-00900-NA	—
	FR-A740-22K	FR-A740-00440-NA	FR-A740-00620-EC
	FR-A720-30K	FR-A720-01150-NA	—
	FR-A740-30K	FR-A740-00570-NA	FR-A740-00770-EC
F700	FR-F720(P)-30K	FR-F720-01250-NA	—
	FR-F740(P)-30K	FR-F740-00620-NA	FR-F740-00620-EC
	FR-F720(P)-37K	FR-F720-01540-NA	—
	FR-F740(P)-37K	FR-F740-00770-NA	FR-F740-00770-EC

REMARKS

- When the hook of the inverter front cover is cut off for wiring, the protective structure (JEM1030) changes to open type (IP00).

CAUTION

-  **When performing wiring using the space between the inverter front cover and control circuit terminal block, take care not to subject the cable to stress.**
-  **After wiring, wire offcuts must not be left in the inverter. They may cause an error, failure or malfunction.**

4 INVERTER SETTING

4.1 Parameter list

The following parameters are used for the communication option (FR-A7NP).
Set the values according to need.

Parameter Number	Name	Setting Range	Minimum Setting Increments	Initial Value	Refer to page
79	Operation mode selection	0 to 4, 6, 7	1	0	22
338	Communication operation command source	0, 1	1	0	25
339	Communication speed command source	0, 1, 2	1	0	25
340	Communication startup mode selection	0, 1, 2, 10, 12	1	0	22
342	Communication EEPROM write selection	0, 1	1	0	30
349*1	Communication reset selection	0, 1	1	0	38
500*1	Communication error execution waiting time	0 to 999.8s	0.1s	0	31
501*1	Communication error occurrence count display	0	1	0	32
502*1	Stop mode selection at communication error	0, 1, 2, 3	1	0	33
550	NET mode control source selection	0, 1, 9999	1	9999	25

*1 Parameters which can be displayed when the plug-in option (FR-A7NP) is mounted.

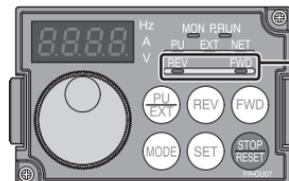
4.2 Operation mode setting

The inverter mounted with a communication option has three operation modes.

- (1) PU operation [PU]..... Controls the inverter from the keys of the operation panel on the inverter or parameter unit (FR-DU07/FR-PU07).
- (2) External operation [EXT] ... Controls the inverter by switching ON/OFF external signals connected to the control circuit terminals of the inverter.
(The inverter is factory-set to this mode.)
- (3) Network operation [NET] ... Controls the inverter with instructions from the network via the communication option.
(The operation signal and running frequency can be entered from the control circuit terminals depending on the *Pr. 338 Communication operation command source* and *Pr. 339 Communication speed command source* settings.
Refer to page 23.)

4.2.1 Operation mode indicator

FR-DU07



Operation mode indicators
(The inverter operates according to the LED lit mode.)
PU: PU operation mode
EXT: External operation mode
NET: Network operation mode

4.2.2 Operation mode switching and communication startup mode (Pr. 79, Pr. 340)

(1) Operation mode switching conditions

Before switching the operation mode, check that:

- 1) The inverter is at a stop;
- 2) Both the STF and STR signals are OFF; and
- 3) The *Pr. 79 Operation mode selection* setting is correct.
(Set with the operation panel of the inverter.)

Refer to *the Inverter Manual* for details of *Pr. 79*.

(2) Operation mode selection at power ON and at restoration from instantaneous power failure

The operation mode at power ON and at restoration from instantaneous power failure can be selected.

Set a value other than "0" in *Pr. 340* to select the Network operation mode.

After started in Network operation mode, parameter write from the network is enabled.

REMARKS

1. Change of the *Pr. 340* setting is applied at power ON or an inverter reset.
2. *Pr. 340* can be changed with the operation panel in any operation mode.

7 INVERTER SETTING

Pr. 340 Setting	Pr. 79 Setting	Operation Mode at Power ON or Power Restoration	Operation Mode Switchover
0 (initial value)	0 (initial value)	External operation mode	Switching among the External, PU, and NET operation mode is enabled *1
	1	PU operation mode	PU operation mode fixed
	2	External operation mode	Switching between the External and NET operation mode is enabled Switching to the PU operation mode is disallowed
	3, 4	External/PU combined operation mode	Operation mode switching is disallowed
	6	External operation mode	Switching among the External, PU, and NET operation mode is enabled while running.
	7	X12 (MRS) signal ON External operation mode	Switching among the External, PU, and NET operation mode is enabled *1
		X12 (MRS) signal OFF ... External operation mode	External operation mode fixed (Forcibly switched to External operation mode.)
1, 2 *2	0	NET operation mode	Same as when Pr. 340 = "0"
	1	PU operation mode	
	2	NET operation mode	
	3, 4	External/PU combined operation mode	
	6 *4	NET operation mode	
	7	X12 (MRS) signal ON NET operation mode	
		X12 (MRS) signal OFF ... External operation mode	
10, 12 *2	0	NET operation mode	Switching between the PU and NET operation mode is enabled *3
	1	PU operation mode	Same as when Pr. 340 = "0"
	2	NET operation mode	NET operation mode fixed
	3, 4	External/PU combined operation mode	Same as when Pr. 340 = "0"
	6 *4	NET operation mode	Switching between the PU and NET operation mode is enabled while running *3
	7	External operation mode	Same as when Pr. 340 = "0"

*1 Operation mode cannot be directly changed between the PU operation mode and Network operation mode.

*2 The Pr. 340 settings "2, 12" are mainly used for communication operation using the inverter RS-485 terminal.

When a value other than "9999" (selection of automatic restart after instantaneous power failure) is set in Pr. 57 Restart coasting time, the inverter will resume the same operation state which was in before after power has been restored from an instantaneous power failure.

When Pr.340 = "1, 10", a start command turns OFF if power failure has occurred and then restored during a start command is ON.

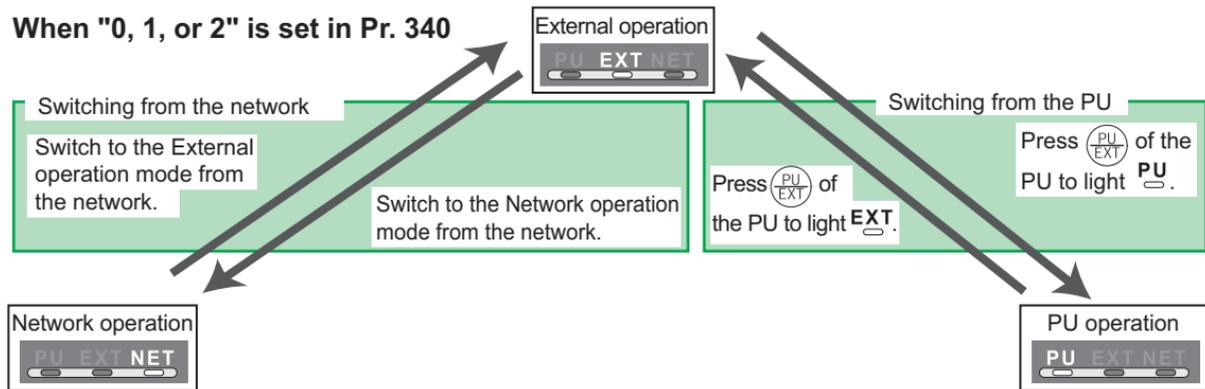
*3 Operation mode can be changed between the PU operation mode and Network operation mode with  of the operation panel (FR-DU07) and X65 signal.

*4 Pr: 79 = "6" and Pr: 128 to Pr: 134 (PID control) are not activated simultaneously. Switchover mode and PID control are made invalid, and the inverter performs the same operation as when "0" is set in Pr. 79.

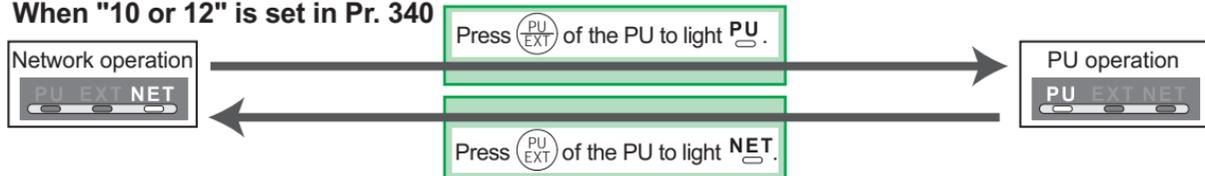


(3) Operation mode switching method

When "0, 1, or 2" is set in Pr. 340



When "10 or 12" is set in Pr. 340



For the switching method from the external terminal, refer to *the Inverter Manual*.
Refer to page 58 and 81 for a switching method from the network.

CAUTION

- When starting the inverter in the Network operation mode at power ON or an inverter reset, set a value other than "0" in Pr. 340. (Refer to page 19)
- When setting a value other than "0" in Pr. 340, make sure that the initial settings of the inverter are correct.

4.3 Start and speed command sources (Pr. 338, Pr. 339, Pr. 550)

(1) Select command source for the Network operation mode (Pr. 550)

A control location for the Network operation mode can be selected from either the inverter RS-485 terminals or a communication option.

When using a communication option, set "0 or 9999 (initial value)" in Pr. 550.

Parameter Number	Name	Initial Value	Setting Range	Description
550	NET mode operation command source selection	9999	0	Command source is at a communication option (Command source is not at inverter RS-485 terminals)
			1	Command source is at inverter RS-485 terminals (Command source is not at a communication option)
			9999	Automatic recognition of the communication option Normally, command source is at RS-485 terminals. When a communication option is mounted, the command source is at a communication option.

Refer to the Inverter Manual for details.



(2) Selection of command source for the Network operation mode (Pr. 338, Pr. 339)

- There are two command types: the start command, which controls the signals related to the inverter start command and function selection, and the speed command, which controls signals related to frequency setting.
- In Network operation mode, commands from the external terminals and communication are as listed below.

Control Location Selection	Pr. 338 Communication operation command source		0:NET			1:External			Remarks	
	Pr. 339 Communication speed command source		0:NET	1: External	2: External	0:NET	1: External	2: External		
Fixed functions (Functions equivalent to terminals)	Running frequency from communication		NET	—	NET	NET	—	NET		
	Terminal 2		—	External	—	—	External	—		
	Terminal 4		—	External		—	External			
	Terminal 1		Compensation							
Selective functions Pr. 178 to Pr. 189 settings	0	RL	Low-speed operation command/remote setting clear	NET	External		NET	External		Pr. 59 = "0" (multi-speed) Pr. 59 = "1, 2" (remote)
	1	RM	Middle-speed operation command/remote setting deceleration	NET	External		NET	External		
	2	RH	High-speed operation command/remote setting acceleration	NET	External		NET	External		
	3	RT	Second function selection	NET			External			
	4	AU	Terminal 4 input selection	—	Combined		—	Combined		
	5	JOG	Jog operation selection	—			External			
	6	CS	Automatic restart after instantaneous power failure selection	External						
	7	OH	External thermal relay input	External						
	8	REX	15-speed selection	NET	External		NET	External		Pr. 59 = "0" (multi-speed)
	9	X9	Third function *1	NET			External			
10	X10	Inverter run enable signal	External							

7 INVERTER SETTING

Control Location Selection	Pr. 338 Communication operation command source		0:NET			1:External			Remarks	
	Pr. 339 Communication speed command source		0:NET	1: External	2: External	0:NET	1: External	2: External		
Selective functions Pr. 178 to Pr. 189 settings	11	X11	FR-HC connection, instantaneous power failure detection			External				
	12	X12	PU operation external interlock			External				
	13	X13	External DC injection brake operation is started *3			NET		External		
	14	X14	PID control valid terminal		NET	External		NET	External	
	15	BRI	Brake opening completion signal *1			NET		External		
	16	X16	PU-External operation switchover			External				
	17	X17	Load pattern selection forward rotation reverse rotation boost *1			NET		External		
	18	X18	V/F switchover *1			NET		External		
	19	X19	Load torque high speed frequency *1			NET		External		
	20	X20	S-pattern acceleration/deceleration C switching terminal *1			NET		External		
	22	X22	Orientation command *1, *2			NET		External		
	23	LX	Pre-excitation *1			NET		External		
	24	MRS	Output stop			Combined		External		Pr. 79 ≠ "7"
			PU operation interlock			External			Pr. 79 = "7" When the X12 signal is not assigned	
	25	STOP	Start self-holding selection			—		External		
	26	MC	Control mode switchover *1			NET		External		
	27	TL	Torque limit selection *1			NET		External		
	28	X28	Start time tuning *1			NET		External		
	37	X37	Traverse function selection *4			NET		External		
	42	X42	Torque bias selection 1 *1, *2			NET		External		
43	X43	Torque bias selection 2 *1, *2			NET		External			
44	X44	P/PI control switchover *1			NET		External			



Control Location Selection			Pr. 338 Communication operation command source		0:NET			1:External			Remarks
			Pr. 339 Communication speed command source		0:NET	1: External	2: External	0:NET	1: External	2: External	
Selective functions	Pr. 178 to Pr. 189 settings	50	SQ	Sequence start *5	External and NET*			External			* The signal is valid when there are inputs from external terminals and NET.
		60	STF	Forward rotation command	NET			External			
		61	STR	Reverse rotation command	NET			External			
		62	RES	Reset	External						
		63	PTC	PTC thermistor selection	External						
		64	X64	PID forward rotation action switchover	NET	External		NET	External		
		65	X65	PU/NET operation switchover	External						
		66	X66	External/NET operation switchover	External						
		67	X67	Command source switchover	External						
		68	NP	Conditional position pulse train sign *1, *2	External						
		69	CLR	Conditional position droop pulse clear *1, *2	External						
		70	X70	DC feeding operation permission *1	NET			External			
		71	X71	DC feeding cancel *1	NET			External			
74	X74	Magnetic flux decay output shutoff signal	NET			External					

*1 Setting can be made only for the FR-A700 series.

*2 Available only when used with the FR-A7AP.

*3 For the FR-F700 series, setting can be made only for the EC and NA versions.

*4 Setting can be made only for the EC and CH versions.

*5 Setting can be made only for the FR-A700 series NA and EC versions.

[Explanation of table]

External	:Control by signal from external terminal is only valid.
NET	:Control from network is only valid
Combined	:Operation from either external terminal or communication is valid.
—	:Operation from either external terminal or computer is invalid.
Compensation	:Control by signal from external terminal is only valid if <i>Pr. 28 Multi-speed input compensation</i> setting is "1".

REMARKS

The *Pr. 338* and *Pr. 339* settings can be changed while the inverter is running when *Pr. 77* = 2. Note that the setting change is applied after the inverter has stopped. Until the inverter has stopped, communication operation command source and communication speed command source before the setting change are valid.

4.3.1 Communication EEPROM write selection (Pr. 342)

When parameter write is performed from the communication option, write to RAM is enabled. Set when frequent parameter changes are necessary.

Parameter Number	Name	Initial Value	Setting Range	Description
342	Communication EEPROM write selection	0	0	Parameter values written by communication are written to the EEPROM and RAM.
			1	Parameter values written by communication are written to the RAM.

- When changing the parameter values frequently, set "1" in *Pr. 342* to write them to the RAM. Performing frequent parameter write with "0 (initial value)" (EEPROM write) set will shorten the life of the EEPROM.

REMARKS

When "1" (write to RAM only) is set in *Pr. 342*, powering OFF the inverter will erase the changed parameter values. Therefore, the parameter values available when power is switched ON again are the values stored in EEPROM previously.

4.4 Operation at communication error occurrence

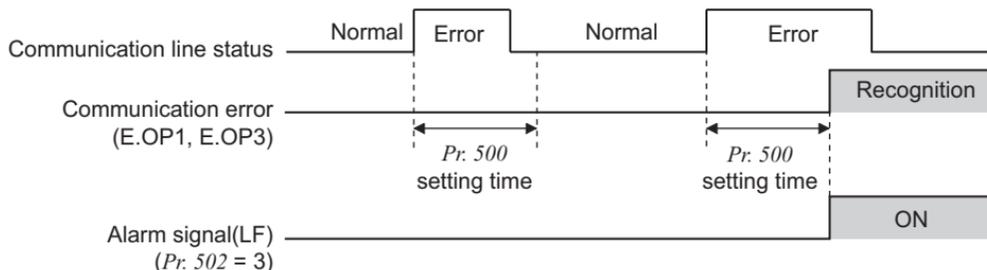
4.4.1 Operation selection at communication error occurrence (Pr. 500 to Pr. 502)

You can select operations at communication error occurrences by setting *Pr. 500 to Pr. 502* under network operation.

(1) Waiting time for the communication line error output after a communication error

Waiting time for the communication error output after a communication line error occurrence can be set.

Parameter Number	Name	Setting Range	Minimum Setting Increments	Initial Value
500	Communication error execution waiting time	0 to 999.8s	0.1s	0



When a communication line error occurs and lasts longer than the time set in *Pr. 500*, it is recognized as a communication error.

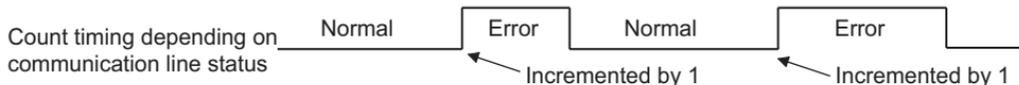
If the communication returns to normal within the time, it is not recognized as a communication error, and the operation continues.

(2) Displaying and clearing the communication error count

The cumulative count of communication error occurrences can be displayed.

Write "0" to clear this cumulative count.

Parameter Number	Name	Setting Range	Minimum Setting Increments	Initial Value
501	Communication error occurrence count display	0	1	0



At the point of communication line error occurrence, *Pr. 501 Communication error occurrence count display* is incremented by 1.

The cumulative count of communication error occurrences is counted from 0 to 65535. When the count exceeds 65535, the displayed value is cleared and the counting starts over from 0 again.

4

CAUTION

Communication error count is temporarily stored in the RAM. The error count is stored in EEPROM only once per hour. If power reset or converter reset is performed, *Pr. 501* setting will be the one that is last stored to EEPROM depending on the reset timing.

(3) Inverter operation at a communication error occurrence

How the inverter operates at a communication line error or an option unit fault can be set.

Parameter Number	Name	Setting Range	Minimum Setting Increments	Initial Value
502	Stop mode selection at communication error	0, 1, 2, 3	1	0

About setting

● Operation at an error occurrence

Fault record	Pr. 502 Setting	Operation	Indication	Fault Output
Communication line	0	Continued *	Normal indication *	Not provided *
	1			
	2			
	3			
Communication option itself	0, 3	Coast to stop	E. 1 or E. 3 lit	Provided
	1, 2	Decelerated to stop	E. 1 or E. 3 lit after stop	Provided after stop

* When the communication returns to normal within the time period set in Pr. 500, the communication option error (E.OP1 or E.OP3) does not occur.

● Operation at error recognition after elapse of Pr. 500 time

Fault record	Pr. 502 Setting	Operation	Indication	Fault Output
Communication line	0	Coast to stop	E.OP1 or E.OP3 lit	Provided
	1	Decelerated to stop	E.OP1 or E.OP3 lit after stop	Provided after stop
	2			Not provided
	3	Continued	Normal indication	
Communication option itself	0, 3	Coast to stop	E. 1 or E.3 lit	Provided
	1, 2	Decelerated to stop	E. 1 or E.3 lit after stop	Provided after stop



● Operation at error removal

Fault record	Pr. 502 Setting	Operation	Indication	Fault Output
Communication line	0	Kept stopped	E.OP1 or E.OP3 kept lit	Kept provided
	1			
	2	Restart	Normal indication	Not provided
	3	Continued		
Communication option itself	0, 3	Kept stopped	E. 1 or E.3 kept lit	Kept provided
	1, 2			

CAUTION

1. Communication line error [E.OP1 (fault data: HA1) or E.OP3 (fault data: HA3)] is an error that occurs on the communication line. Communication option error [E. 1 (fault data: HF1) or E. 3 (fault data: HF3)] is an error that occurs in the communication circuit inside the option.
2. Fault output indicates the fault output signal (ALM signal) and fault bit output.
3. When the fault output setting is active, fault records are stored in the faults history.
When the fault output setting is not active, fault record is overwritten to the faults history temporarily but not stored.
After the error is removed, the fault indication is reset, changing the display back to normal, and the last fault is displayed in the faults history.
4. When the Pr. 502 setting is "1" or "2", the deceleration time is the normal deceleration time setting (e.g. Pr. 8, Pr. 44, Pr. 45).
5. The acceleration time at a restart is the normal acceleration time setting (e.g. Pr. 7, Pr. 44).
6. When the Pr. 502 setting is "2", the operation/speed command at a restart is the one given before the error occurrence.
7. When a communication line error occurs at the Pr. 502 setting of "2", removing the error during deceleration causes acceleration to restart at that point. (Acceleration is not restarted if the error is that of the option unit itself.)

4.4.2 Fault and measures

(1) The inverter operates as follows at fault occurrences.

Fault Location	Status		Operation Mode		
			Network Operation	External Operation	PU Operation
Inverter	Inverter operation		Inverter trip	Inverter trip	Inverter trip
	Data communication		Continued	Continued	Continued
Communication line	Inverter operation		Inverter trip (depends on the Pr. 502 setting)	Continued	Continued
	Data communication		Stop	Stop	Stop
Communication option	Communication option connection error	Inverter operation	Inverter trip (depends on the Pr. 502 setting)	Inverter trip (depends on the Pr. 502 setting)	Inverter trip (depends on the Pr. 502 setting)
		Data communication	Continued	Continued	Continued
	Error of communication option itself	Inverter operation	Inverter trip (depends on the Pr. 502 setting)	Continued	Continued
		Data communication	Stop	Stop	Stop



(2) Measures at error occurrences

Fault Indication	Error Definition	Measures
E.OP1, E.OP3	Communication line error	Check the LED status of the option unit and remove the cause of the alarm. (Refer to <i>page 3</i> for LED indication status) Check the other nodes on the network. Inspect the master.
E.1, E.2, E.3	Option fault	Check the connection between the inverter and option unit for poor contact, etc. and remove the cause of the error. For the FR-A700 series, fit the communication option in the option connector 3.

When faults other than the above are displayed, refer to the inverter manual and remove the cause of the error.

4.5 Inverter reset

(1) Operation conditions of inverter reset

Which resetting method is allowed or not allowed in each operation mode is described below.

Resetting Method			Operation Mode		
			Network Operation	External Operation	PU Operation
Reset from the network	Inverter reset (Refer to page 59) *1		Allowed	Disallowed	Disallowed
	Error reset (STW(bit7))at inverter fault (Refer to page 49) *2	Pr.349 = 0	Allowed	Allowed	Allowed
		Pr.349 = 1		Disallowed	Disallowed
Turn ON the inverter terminal RES (RES signal)			Enabled	Enabled	Enabled
Switch OFF inverter power			Enabled	Enabled	Enabled
Reset from the PU/DU	Inverter reset		Enabled	Enabled	Enabled
	Reset at inverter fault		Enabled	Enabled	Enabled

*1 Inverter reset can be made any time.

*2 Reset can be made only when the protective function of the inverter is activated. (Available with PPO type 1 to 5 only)

CAUTION

- When a communication line error has occurred, reset cannot be made from the network.
- The inverter is set to the External operation mode if it has been reset in Network operation mode in the initial status.
To resume the network operation, the inverter must be switched to the Network operation mode again.
Set a value other than "0" in Pr. 340 to start in the Network operation mode. (Refer to page 19.)
- The inverter cannot be controlled for about 1s after release of a reset command.

(2) Error reset operation selection at inverter fault

When used with the communication option (FR-A7NP), an error reset command* from network can be invalid in the External operation mode or PU operation mode.

Parameter Number	Name	Initial Value	Setting Range	Function
349	Communication reset selection	0	0	Error reset* is enabled independently of operation mode
			1	Error reset* is enabled only in the Network operation mode

* An error reset command (STW (bit7)) at inverter fault is available with PPO type 1 to 5. (Refer to page 49.)

5 FUNCTIONS

5.1 Output from the inverter to the network

Main items to be output from the inverter (FR-A7NP) to the network and their descriptions are explained below.

Item	Description	Refer to Page	
		PPO Type Support Specification	PPO Type Non-Support Specification
Inverter monitor	Monitor various items such as inverter output frequency and output current.	51, 55	77
Parameter read	Read parameter settings of the inverter.	47, 65	71, 83
Inverter status	Monitor output signal of the inverter.	50	74
Operation mode read	Read the operation mode of the inverter.	50, 58	—
Set frequency read	Read the frequency set in the inverter.	58	81
Terminal input read	Read the analog value of terminal 2, 4, 1.	59	81
Node address read	Read node address of the inverter.	59	—
Alarm definition read	Monitor alarm history occurred in the inverter and energization time, output frequency, output current and output voltage at alarm occurrence are monitored.	60	82
PNU list read	Read the available PNU number.	64	—

REMARKS

Refer to the *inverter manual* for functions controllable from the network in each operation mode.

5.2 Input to the inverter from the network

Main items which can be commanded from the network to the inverter and their descriptions are explained below.

Item	Description	Refer to page	
		PPO Type Support Specifications	PPO Type Non-Support Specifications
Frequency setting	Set the running frequency of the inverter.	51	81
Operation mode write	Set the operation mode of the inverter.	58	81
Run command	Set the control input command such as forward operation signal (STF) and reverse rotation signal (STR).	49	80
Inverter reset	Reset the inverter.	49, 59	79
Parameter write	Set parameters of the inverter.	47, 65	71, 83
Parameter clear	Return parameters to the initial values.	58	79
Input terminal function	Use the function of the inverter input terminal.	52	80

REMARKS

Refer to the *inverter manual* for functions controllable from the network in each operation mode.

6 PROFIBUS DEVICE DATA

6.1 Device data (GSD file)

melc08fa.gsd is a GSD file designed to recognize the features and functions of the PROFIBUS-DP devices of the FR-A7NP. You can obtain it from us.

GSD file can be downloaded from Mitsubishi Electric FA Network Service

MELFANS web: <http://www.MitsubishiElectric.co.jp/melfansweb> or obtained from your sales representative.

When editing this file, use a text editor.

For installation instructions, refer to the instruction manual of the PROFIBUS-DP Configuration Software.

Although this product complies with PPO type specification, it includes specifications which do not support PPO type specification (FR-A5NP intercompatibility protocol). This manual states the section supporting PPO type specification as PPO type support specification and the section not supporting PPO type as PPO type non-support specification.

CAUTION

You cannot use the device data which does not include PPO supporting specification (data for the FR-A5NP).

<melc08fa.gsd>

Parameter	Value	Description *1
#Profibus_DP		File header
GSD_Revision	1	ID version of GSD file
Vendor_Name	"Mitsubishi Electric"	Manufacturer name *2
Model_Name	"FR-A7NP"	Product name
Revision	"Revision 1.00"	Product version
Ident_Number	08FAH	Device number obtained from Profibus Nutzer Organization
Protocol_Ident	0	PROFIBUS-DP is 0 fixed.
Station_Type	0	DP slave is 0 fixed.
FMS_Supp	0	FMS (Field-Bus Message Specifications) not supported.



Parameter	Value	Description *1
Hardware_Release	"BC101B376"	Hardware version
Software_Release	"7732"	Software version
9.6_supp	1	Communication speed 9600bps support
19.2_supp	1	Communication speed 19.2Kbps support
93.75_supp	1	Communication speed 93.75Kbps support
187.5_supp	1	Communication speed 187.5Kbps support
500_supp	1	Communication speed 500Kbps support
1.5M_supp	1	Communication speed 1.5Mbps support
3M_supp	1	Communication speed 3.0Mbps support
6M_supp	1	Communication speed 6.0Mbps support
12M_supp	1	Communication speed 12.0Mbps support
MaxTsd_r_9.6	15	Longest time 15 bit times at communication speed 9600bps
MaxTsd_r_19.2	15	Longest time 15 bit times at communication speed 19.2Kbps
MaxTsd_r_93.75	15	Longest time 15 bit times at communication speed 93.75Kbps
MaxTsd_r_187.5	15	Longest time 15 bit times at communication speed 187.5Kbps
MaxTsd_r_500	15	Longest time 15 bit times at communication speed 500Kbps
MaxTsd_r_1.5M	25	Longest time 25 bit times at communication speed 1.5MKbps
MaxTsd_r_3M	50	Longest time 50 bit times at communication speed 3.0Mbps
MaxTsd_r_6M	100	Longest time 100 bit times at communication speed 6.0Mbps
MaxTsd_r_12M	200	Longest time 200 bit times at communication speed 12.0Mbps

Parameter	Value	Description *1
Redundancy	0	Redundancy not supported.
Repeater_Ctrl_Sig	2	Installed as TTL level via RTS signal from module.
24V_Pins	0	24V power supply for maintenance device connection is not used.
Freeze_Mode_supp	1	Freeze mode supported.
Sync_Mode_supp	1	Synchronous mode supported.
Auto_Baud_supp	1	Automatic baud rate detection support
Set_Slave_Add_supp	0	Slave address is not set.
Min_Slave_Intervall	1	100 µs interval between 2 polling cycles
Modular_Station	1	Modular device specified.
Max_Module	1	Maximum number of modules:1
Max_Input_Len	28	Input data: Maximum 28 bytes
Max_output_Len	28	Output data: Maximum 28 bytes
Max_Data_Len	56	Input and output data: Maximum 28 + 28 = 56 bytes
Fail_Safe	0	Failsafe not supported
Max_Diag_Data_Len	6	Diagnostic data of 6 bytes secured (no external diagnosis)
Slave_Family	1	Drives defined as function class (Main Family)
PrmText	1	Text selection 1 registration
Text(0)	"No byte swapping"	If Bit 0 = 0, "No byte swapping"
Text(1)	"Byte swapping"	If Bit 0 = 1, "Byte swapping"
EndPrmText		
ExtUserPrmData	1 "Byte swapping"	Byte swapping selection 1 registration on text base
Bit(0) 0 0-1		Bit 0 = default 0, range 0 to 1



Parameter	Value	Description *1
Prm_Text_Ref	1	Text selection 1 is used.
EndExtUserPrmData		
Max_User_Prm_Data_Len	2	User parameter of 2 bytes secured
Ext_User_Prm_Data_Const(0)	01H	Initial value of user parameter's 1 byte
Ext_User_Prm_Data_Const(1)	00H	Initial value of user parameter's 2 byte
Ext_User_Prm_Data_Ref(1)	1	Byte swapping selection 1 is used on text base in user parameter's 2 byte.
Module	"PPO type 1" F3H, F1H	PPO type 1 selection
EndModule		
Module	"PPO type 2" F3H, F5H	PPO type 2 selection
EndModule		
Module	"PPO type 3" F1H	PPO type 3 selection
EndModule		
Module	"PPO type 4" F5H	PPO type 4 selection
EndModule		
Module	"PPO type 5" F3H, F9H	PPO type 5 selection
EndModule		
Module	"500 series" 75H	FR-A5NP intercompatibility protocol selection
EndModule		

*1 Description is not included in the ASCII file itself.

*2 Use "Mitsubishi" if the maximum number of characters of the vendor-name of the master used is 10.

6.2 Slave user parameter

By changing the slave user parameter value, you can use the byte swapping function (byte inversion function).

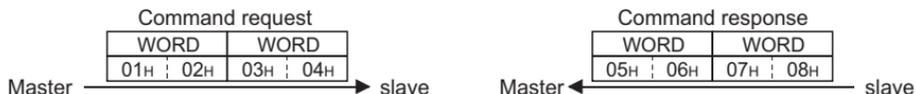
Setting "1" at Address 1H (Bit 0) makes the byte swapping function valid.

Since "-" is an unused bit, set "0".

Address	Functions							
0H	For manufacturer setting (Always set "1".)							
1H	7 Bit	6 Bit	5 Bit	4 Bit	3 Bit	2 Bit	1 Bit	0 Bit
	—	—	—	—	—	—	—	0:Byte swapping invalid 1:Byte swapping valid

Example

- Byte swapping invalid (When address 1H (Bit0)=0)



- Byte swapping valid (When address 1H (Bit0)=1)



The data is byte swapped in the slave to be a receiving/sending data.

7.2 ID definitions

ID		Definition
PKW	PKE	PNU number (PNU) and task or response Id (AK)
	IND	Sub-Index number and reserved area for extension
	PWE	Set 0 since high bits (Bits 16 to 31) are not used. Low bits (Bits 0 to 15): Parameter value
PZD	STW/ZSW	STW: Control Word (Command request)*
		ZSW: Status Word (command response)*
	HSW/HIW	HSW: Set frequency (command request)*
		HIW: Output frequency (command response)*
	ECW/ESW	ECW: Extended Control Word (Command request)*
		ECW: Extended Status Word (Command response)*
Reserved	Reserved area for extension	

*Command request: Message from the master to the slave
 Command response: Message from the slave to the master



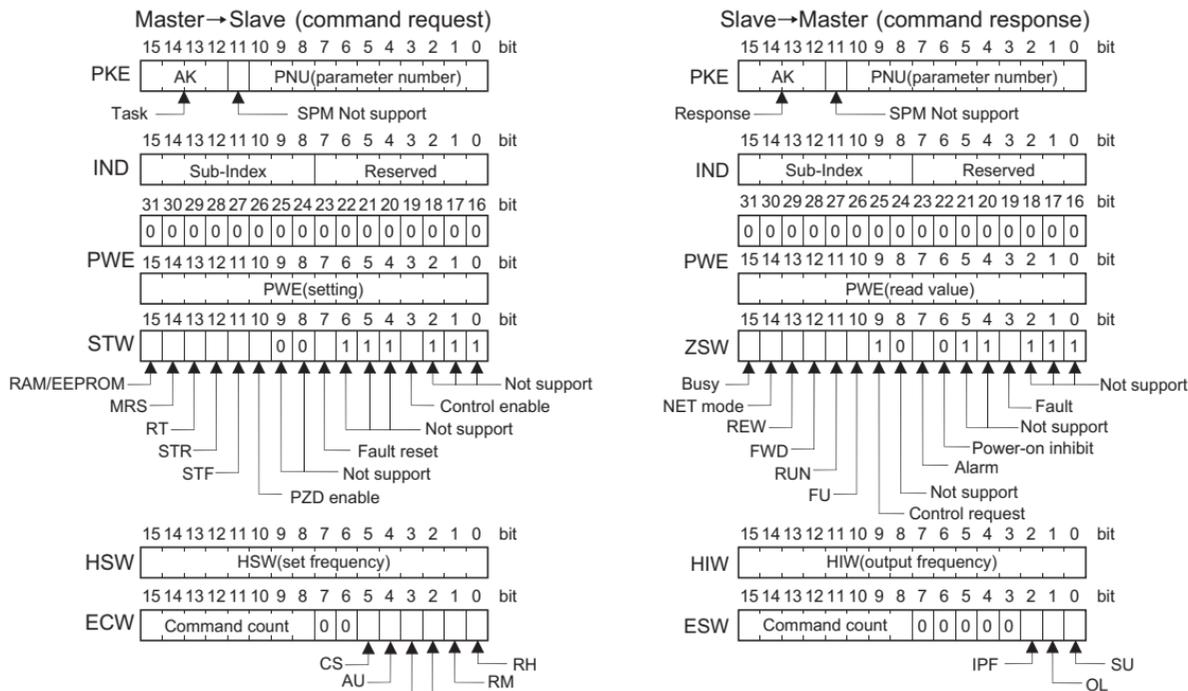
7.3 Buffer memory map

The following shows the buffer memory map of the PPO type1 to PPO type5 PROFIBUS profiles.

Module type	1Word	2Word	3Word	4Word	5Word	6Word	7Word	8Word	9Word	10Word	11Word	12Word	13Word	14Word
PPO type1	PKE	IND	PWE	STW / ZSW	HSW / HIW									
PPO type2	PKE	IND	PWE	STW / ZSW	HSW / HIW	ECW / ESW	Reserved	Reserved	Reserved					
PPO type3	STW / ZSW	HSW / HIW												
PPO type4	STW / ZSW	HSW / HIW	ECW / ESW	Reserved	Reserved	Reserved								
PPO type5	PKE	IND	PWE	STW / ZSW	HSW / HIW	ECW / ESW	Reserved							

7.4 Buffer memory configuration

The buffer memory configuration is shown below.



For buffer memory details, refer to *page 47*.



7.5 Buffer memory details

The following indicates the buffer memory details of the Profibus profiles.

Name		Bit	Definition
PKW	PKE	PNU	0 to 10 PNU number
		SPM	11 Not used (0 is set)
	AK	12 to 15	[Command request]
			0 : No task
			1 : Parameter value is requested (read request)
			2 : Parameter value (word) is changed (write request)
3 to 5 : Non-supported			
6 : Parameter value (array) is requested (read request)			
7 : Parameter value (array word) is changed (write request)			
8 to 15 : Non-supported			
[Command response]			
0 : No response (Busy status)			
1 : Parameter value (word) is transferred.			
2 to 3 : Non-supported			
4 : Parameter value (array word) is transferred.			
5 to 6 : Non-supported			
7 : Command execution error (error number is stored into PWE)			
8 to 15 : Non-supported			
IND		0 to 7	Reserved area for extension (0 is set)
		8 to 15	Sub-Index number At command request, set this number when AK =6, 7.

Name		Bit	Definition																	
PKW	PWE	0 to 15	PNU read value/write value When command response AK = 7 (command execution error), PWE definition is as follows.																	
			<table border="1"> <thead> <tr> <th colspan="2">Error Definition</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Invalid PNU</td> </tr> <tr> <td>1</td> <td>Parameter value unchangeable (This error also occurs when <i>Pr.77=1</i>)</td> </tr> <tr> <td>2</td> <td>Outside setting range</td> </tr> <tr> <td>3</td> <td>Invalid Sub-Index number</td> </tr> <tr> <td>4</td> <td>Without array</td> </tr> <tr> <td>11</td> <td>No parameter change right</td> </tr> <tr> <td>18</td> <td>Other error *</td> </tr> </tbody> </table>		Error Definition		0	Invalid PNU	1	Parameter value unchangeable (This error also occurs when <i>Pr.77=1</i>)	2	Outside setting range	3	Invalid Sub-Index number	4	Without array	11	No parameter change right	18	Other error *
			Error Definition																	
0	Invalid PNU																			
1	Parameter value unchangeable (This error also occurs when <i>Pr.77=1</i>)																			
2	Outside setting range																			
3	Invalid Sub-Index number																			
4	Without array																			
11	No parameter change right																			
18	Other error *																			
<table border="1"> <thead> <tr> <th colspan="2">* Error Definition</th> </tr> </thead> <tbody> <tr> <td>· Outside AK number range</td> <td>· Write data error</td> </tr> <tr> <td>· External operation error</td> <td>· Without option error</td> </tr> <tr> <td>· Instruction code error</td> <td>· With STF error</td> </tr> <tr> <td>· With STF error</td> <td>· With operation mode specification error</td> </tr> <tr> <td>· Outside AK number range</td> <td>· Outside AK number range</td> </tr> <tr> <td>· Parameter calibration error (<i>Pr. 900</i> and later)</td> <td></td> </tr> <tr> <td>· Reset disabled error (per <i>Pr. 75</i> reset input specification)</td> <td></td> </tr> </tbody> </table>		* Error Definition		· Outside AK number range	· Write data error	· External operation error	· Without option error	· Instruction code error	· With STF error	· With STF error	· With operation mode specification error	· Outside AK number range	· Outside AK number range	· Parameter calibration error (<i>Pr. 900</i> and later)		· Reset disabled error (per <i>Pr. 75</i> reset input specification)				
* Error Definition																				
· Outside AK number range	· Write data error																			
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· Outside AK number range	· Outside AK number range																			
· Parameter calibration error (<i>Pr. 900</i> and later)																				
· Reset disabled error (per <i>Pr. 75</i> reset input specification)																				
		16 to 31	Not used (0 is set)																	



Name		Bit	Definition
PZD	STW	—	0 to 2 Not used (1 is set)
		Control enable	3 0: Inverter output shutoff 1: Inverter output shutoff is cancelled
		—	4 to 6 Not used (1 is set)
		Fault reset (Reset)	7 [At inverter error] 0: No action 1: When <i>Pr. 349</i> =0, error reset can be made in any operation mode. When <i>Pr. 349</i> =1, error reset is enabled only in NET operation mode. [When inverter is normal] No action
		—	8 to 9 Not used (0 is set)
		PZD enable	10 0: Command request of PZD is not processed.*1 1: Command request of PZD is processed. · At power-on or inverter reset, set 1 once.
		STF signal	11 0: OFF 1: ON (forward rotation command)
		STR signal	12 0: OFF 1: ON (reverse rotation command)
		RT terminal	13 0: OFF 1: ON · Functions are changed according to the <i>Pr. 183</i> setting.
		MRS terminal	14 0: OFF 1: ON (output is shut off) · Functions are changed according to the <i>Pr.187</i> setting. However, do not change the factory-set value "6".
RAM/EEPROM	15 0: Set frequency (HSW) is written to RAM (Power-on reset returns the changed set frequency to the setting before it was written to RAM.) 1: Set frequency (HSW) is written to EEPROM.		

*1 PZD enable and command count request can be executed.

Name		Bit	Definition
PZD	ZSW	—	0 to 2 Not used (1 is returned)
		Fault	3 0: Inverter normal 1: Inverter alarm occurrence
		—	4 to 5 Not used (1 is returned)
		Power-on inhibit	6 0 is returned
		Alarm	7 Command execution normal Command execution error
		—	8 Not used (0 is returned)
		Control request	9 1 is returned
		FU signal	10 0: OFF 1: ON (output frequency being detected) (Refer to <i>Pr. 42</i> and <i>Pr. 43</i> in the inverter manual.)
		RUN signal	11 0: OFF 1: ON (inverter running)
		FWD	12 0: Other than forward running (during stop, reverse running) 1: Forward running
		REW	13 0: Other than reverse running (during stop, forward running) 1: Reverse running
		NET mode	14 0: Other than network operation mode 1: Network operation mode



Name		Bit	Definition									
PZD	ZSW	BUSY	0: Ready status 1: Busy status * * If it takes time to perform slave side processing, slave side busy status is announced since reply to the master will be delayed. During busy status, other response data are unfixed values. When the slave side is busy, request from the master is invalid. Therefore, the same request must be sent again. The response data of the FR-A7NP during Busy status is as follows.									
			<table border="1"> <tr> <td></td> <td>During Busy status and inverter reset</td> <td>During Busy status and other than inverter rest</td> </tr> <tr> <td>PKW</td> <td>0</td> <td>All 0 when AK=0 Reply data when AB ≠ 0</td> </tr> <tr> <td>PZD</td> <td>ZSW Bit15=1 Other error Bit=0</td> <td>ZSW Bit15=1 Other error Bit=inverter status data</td> </tr> </table>		During Busy status and inverter reset	During Busy status and other than inverter rest	PKW	0	All 0 when AK=0 Reply data when AB ≠ 0	PZD	ZSW Bit15=1 Other error Bit=0	ZSW Bit15=1 Other error Bit=inverter status data
		During Busy status and inverter reset	During Busy status and other than inverter rest									
	PKW	0	All 0 when AK=0 Reply data when AB ≠ 0									
PZD	ZSW Bit15=1 Other error Bit=0	ZSW Bit15=1 Other error Bit=inverter status data										
	HSW	0 to 15	Set frequency (0.01 Hz increments)									
	HIW	0 to 15	Output frequency (0.01 Hz increments) * * When a value other than 9999 is set in <i>Pr.430 Pulse monitor selection</i> under position control (<i>Pr.800 = 3, 4</i>), pulse monitor is selected. (<i>Refer to the inverter manual for pulse monitor.</i>)									

Name		Bit	Definition	
PZD	ECW	Terminal RH	0 High speed operation command*	
		Terminal RM	1 Middle-speed operation command*	
		Terminal RL	2 Low-speed operation command*	
		Terminal JOG	3 Jog operation command*	
		Terminal AU	4 Current input selection*	
		Terminal CS	5 Selection of automatic restart after instantaneous power failure*	
	—	6 to 7	Not used (0 is set)	
	Command count	8 to 15	Used by the master to recognize the command response.	
	ESW	SU signal	0	0: OFF 1: ON (up to frequency)
		OL signal	1	0: OFF 1: ON (overload alarm)
		IPF signal	2	0: OFF 1: ON (an instantaneous power failure or undervoltage occurs)
		—	3 to 7	Not used (0 is set)
		Command count	8 to 15	Echo back of the command request.
Reserved	0 to 15	Not used (0 is set, 0 is returned)		

Functions assigned to terminal RH, RM, RL, JOG, AU and CS are activated.
*Signal names are initial values. Using Pr.180 to Pr.182, Pr. 184 to Pr.186, you can change output signal functions.
Refer to the inverter manual for details of Pr. 180 to Pr.182, Pr. 184 to Pr. 186.



CAUTION

Only when the contents of the command request (request for changing the inverter setting: PKW, HSW, STW/ECW) from the master changed, the inverter processes the request. If the contents of the command request are identical with those of the last request, the inverter does not process the request. (The received request is cleared.)

For instance, while the master keeps sending the "network operation mode enabled" command, changing the mode to the PU operation mode with switchover function does not allow the "network operation mode enabled" command to be executed due to the same contents as that sent last time. Therefore, the operation mode remains the PU operation mode without changing to the Network operation mode. In this case, send another command as "PU operation mode enabled" from the master once, then send the "network operation mode enabled" command again.

7.6 Outline of PNU

You can use the PNU to make inverter settings from the network.

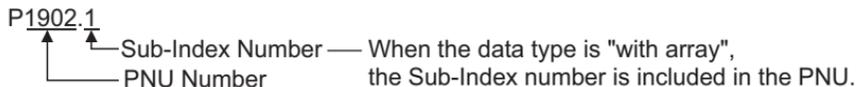
The data used with the network is denoted PNU(P) to differentiate it from the parameter (Pr.).

This chapter explains the module type "PPO type 1" to "PPO type 5".

CAUTION

Parameter definitions differ according to the module type selected. When using "A5NP", refer to *page 76*.

(1) PNU data definition



(2) PNU data type

The PNU has the data types of "Array Unsigned 16" and "Unsigned 16".

Array Unsigned 16 :(AUs16) P1902.1 ↑ Sub-Index Number	With array
Unsigned 16 :(Us16) P1240	Without array

CAUTION

When the data type is "with array", include the sub-index number in the PNU.



7.7 PROFIBUS PNU

7.7.1 Real-time monitor

The following items can be monitored from the master.

PNU	Item	Increments	Data Type
P1.1	Output frequency *9	0.01Hz	AUs16
P1.2	Output current	0.01A/ 0.1A *1	AUs16
P1.3	Output voltage	0.1V	AUs16
P1.5	Frequency setting	0.01Hz	AUs16
P1.6	Running speed	1r/min	AUs16
P1.7	Motor torque *2	0.1%	AUs16
P1.8	Converter output voltage	0.1V	AUs16
P1.9	Regenerative brake duty	0.1%	AUs16
P1.10	Electronic thermal relay function load factor	0.1%	AUs16
P1.11	Output current peak value	0.01A/ 0.1A *1	AUs16
P1.12	Converter output voltage peak value	0.1V	AUs16
P1.13	Input power	0.01kW/ 0.1kW *1	AUs16
P1.14	Output power	0.01kW/ 0.1kW *1	AUs16
P1.15	Input terminal status *4	—	AUs16
P1.16	Output terminal status *5	—	AUs16
P1.17	Load meter	0.1%	AUs16
P1.18	Motor excitation current *2	0.01A/ 0.1A *1	AUs16

PNU	Item	Increments	Data Type
P1.19	Position pulse *2, *3	—	AUs16
P1.20	Cumulative energization time	1h	AUs16
P1.22	Orientation status *2, *3	1	AUs16
P1.23	Actual operation time	1h	AUs16
P1.24	Motor load factor	0.1%	AUs16
P1.25	Cumulative power	1kWh	AUs16
P1.32	Torque command *2	0.1%	AUs16
P1.33	Torque current command *2	0.1%	AUs16
P1.34	Motor output *2	0.01kW/ 0.1kW *1	AUs16
P1.35	Feedback pulse *2, *3	—	AUs16
P1.50	Power saving effect	Differ according to Pr.	AUs16
P1.51	Cumulative saving power	Differ according to Pr.	AUs16
P1.52	PID set point	0.1%	AUs16
P1.53	PID measurement value	0.1%	AUs16
P1.54	PID deviation	0.1%	AUs16
P1.58	Option input terminal status1 *2, *6	—	AUs16
P1.59	Option input terminal status2 *2, *7	—	AUs16
P1.60	Option output terminal status *2, *8	—	AUs16

PNU	Item	Increments	Data Type
P1.65	Output power (with regenerative display)*10	0.1kW	AUs16
P1.66	Cumulative regenerative power*10	1kWh	AUs16
P1.77	32-bit cumulative power (lower 16 bits)*11	1kWh	AUs16
P1.78	32-bit cumulative power (upper 16 bits)*11	1kWh	AUs16
P1.79	32-bit cumulative power (lower 16 bits)*11	0.01kWh/ 0.1kWh*1	AUs16
P1.80	32-bit cumulative power (upper 16 bits)*11	0.01kWh/ 0.1kWh*1	AUs16

*1 The setting depends on the inverter capacity. (55K or lower / 75K or higher)
(The inverter model, 55K and 75K differ according to -NA and -EC versions. Refer to *page 1*.)

*2 These items can be monitored with the FR-A700 series only.

*3 Available only when the FR-A7AP is mounted.

*4 Input terminal monitor details

b15

b0

—	—	—	—	CS	RES	STOP	MRS	JOG	RH	RM	RL	RT	AU	STR	STF
---	---	---	---	----	-----	------	-----	-----	----	----	----	----	----	-----	-----

Functions of each terminal are assigned using *Pr.178 to Pr.189*. (Refer to the inverter manual for details.)

*5 Output terminal monitor details

b15

b0

—	—	—	—	—	—	—	—	—	—	ABC2	ABC1	FU	OL	IPF	SU	RUN
---	---	---	---	---	---	---	---	---	---	------	------	----	----	-----	----	-----

Functions of each terminal are assigned using *Pr.190 to Pr.196*. (Refer to the inverter manual for details.)



- *6 Details of option input terminal monitor 1 (input terminal status of FR-A7AX)
— all terminals are OFF when an option is not fitted.

b15

X15	X14	X13	X12	X11	X10	X9	X8	X7	X6	X5	X4	X3	X2	X1	X0
-----	-----	-----	-----	-----	-----	----	----	----	----	----	----	----	----	----	----

b0

- *7 Details of option input terminal monitor 2 (input terminal status of FR-A7AX)
— all terminals are OFF when an option is not fitted.

b15

—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	DY
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	----

b0

- *8 Details of option output terminal monitor (output terminal status of FR-A7AY/A7AR)
— all terminals are OFF when an option is not fitted.

b15

—	—	—	—	—	—	—	RA3	RA2	RA1	Y6	Y5	Y4	Y3	Y2	Y1	Y0
---	---	---	---	---	---	---	-----	-----	-----	----	----	----	----	----	----	----

b0

- *9 When a value other than 9999 is set in *Pr.430 Pulse monitor selection* under position control (*Pr.800* = 3, 4), pulse monitor is selected. (*Refer to the inverter manual for pulse monitor.*)
- *10 This can be monitored only for the FR-A701 series.
- *11 This can be monitored only for the FR-F700P series.

7.7.2 Parameter clear

Parameter clear can be performed from the master.

PNU	Item	Data Definition	Data Type
P2.2	Parameter clear	965AH	AUs16
P2.3	All parameter clear	99AAH	AUs16
P2.5	Parameter clear *1	5A96H	AUs16
P2.6	All parameter clear *1	AA99H	AUs16
P2.8	Error history clear	0000H	AUs16

*1 Communication parameters (*Pr. 117 to Pr. 124, Pr. 331 to Pr. 341, Pr. 343, Pr. 349, Pr. 549 to Pr. 551*) are not cleared.

7.7.3 Operation mode read/write

Read/write of the operation mode can be performed from the master.

PNU	Item	Data Definition	Data Type
P3	Operation mode read/write	External operation mode:10 H PU operation mode: 11H (<i>Pr.79="6"</i>) Network operation mode:14H	Us16

7.7.4 Set frequency read

The frequency set to the inverter can be read from the master.

PNU	Item	Data Definition	Data Type
P4.1	Set frequency (RAM) read	Set frequency (RAM) is read.	AUs16
P4.2	Set frequency (EEPROM) read	Set frequency (EEPROM) is read.	AUs16



7.7.5 Terminal input read

Analog input values of terminals 2, 4, and 1 can be read.

PNU	Item	Data Definition	Data Type
P5.1	Terminal 2 input value read	Terminal 2 input value (%) is read.	AUs16
P5.2	Terminal 4 input value read	Terminal 4 input value (%) is read.	AUs16
P5.3	Terminal 1 input value read	Terminal 1 input value (%) is read.	AUs16

7.7.6 Inverter reset

The inverter can be reset from the master.

PNU	Item	Data Definition	Data Type
P6	Inverter reset	The inverter is reset after the data was written from the master.	Us16

- The inverter maintains the resetting status while reset is requested.
- When *Pr.75* ≠ "0, 2, 14, 16", reset is enabled only during an inverter error.

7.7.7 Node address read

The node address of the inverter can be read.

PNU	Item	Data Definition	Data Type
P918	Node address read	Set node address is read.	Us16

7.7.8 Fault records read

(1) Fault records of past eight faults occurred in the inverter can be read. (Refer to page 61 for error number.)

PNU	Item	Data Definition	Data Type
P947.1 to P947.8	Latest fault is read	P947.1 :error number P947.2 to P947.8 :all 0	AUs16
P947.9 to P947.16	Second fault in past is read	P947.9 :error number P947.10 to P947.16 :all 0	AUs16
P947.17 to P947.24	Third fault in past is read	P947.17 :error number P947.18 to P947.24 :all 0	AUs16
P947.25 to P947.32	Forth fault in past is read	P947.25 :error number P947.26 to P947.32 :all 0	AUs16
P947.33 to P947.40	Fifth fault in past is read	P947.33 :error number P947.34 to P947.40 :all 0	AUs16
P947.41 to P947.48	Sixth fault in past is read	P947.41 :error number P947.42 to P947.48 :all 0	AUs16
P947.49 to P947.56	Seventh fault in past is read	P947.49 :error number P947.50 to P947.56 :all 0	AUs16
P947.57 to P947.64	Eighth fault in past is read	P947.57 :error number P947.58 to P947.64 :all 0	AUs16



<Fault data>

Error Number	Definition	Error Number	Definition	Error Number	Definition
00H	No fault present	91H	E.PTC	D3H	E.OD *2
10H	E.OC1	A0H	E.OPT	D5H	E.MB1 *1
11H	E.OC2	A1H	E.OP1 *3	D6H	E.MB2 *1
12H	E.OC3	A3H	E.OP3 *1	D7H	E.MB3 *1
20H	E.OV1	B0H	E.PE	D8H	E.MB4 *1
21H	E.OV2	B1H	E.PUE	D9H	E.MB5 *1
22H	E.OV3	B2H	E.RET	DAH	E.MB6 *1
30H	E.THT	B3H	E.PE2	DBH	E.MB7 *1
31H	E.THM	C0H	E.CPU	DCH	E.EP *2
40H	E.FIN	C1H	E.CTE	E6H	E.PID *4
50H	E.IPF	C2H	E.P24	F1H	E. 1
51H	E.UVT	C4H	E.CDO	F2H	E. 2 *1
52H	E.ILF	C5H	E.IOH	F3H	E. 3 *1
60H	E.OLT	C6H	E.SER	F5H	E. 5
61H	E.SOT*4	C7H	E.AIE	F6H	E. 6
70H	E.BE	C8H	E.USB *1	F7H	E. 7
80H	E.GF	D0H	E.OS *2	FBH	E. 11 *1
81H	E.LF	D1H	E.OSD *2	FDH	E. 13
90H	E.OHT	D2H	E.ECT *2		

*1 Displayed only for the FR-A700 series.

*2 Appears when the FR-A7AP (option) is fitted.

*3 Displayed on the FR-F700(P) series.

*4 Displayed on the FR-F700P series.

Refer to *the inverter manual* for details of alarm definitions.

(2) Energization time (fault monitor) for past eight alarms at the inverter alarm occurrence can be read.

PNU	Item	Data Definition	Data Type
P948.1 to P948.8	Latest fault monitor energization time read	P948.1 :energization time P948.2 to P948.8 :all 0	AUs16
P948.9 to P948.16	Energization time of second fault monitor in past read	P948.9 :energization time P948.10 to P948.16 :all 0	AUs16
P948.17 to P948.24	Energization time of third fault monitor in past read	P948.17 :energization time P948.18 to P948.24 :all 0	AUs16
P948.25 to P948.32	Energization time of forth fault monitor in past read	P948.25 :energization time P948.26 to P948.32 :all 0	AUs16
P948.33 to P948.40	Energization time of fifth fault monitor in past read	P948.33 :energization time P948.34 to P948.40 :all 0	AUs16
P948.41 to P948.48	Energization time of sixth fault monitor in past read	P948.41 :energization time P948.42 to P948.48 :all 0	AUs16
P948.49 to P948.56	Energization time of seventh fault monitor in past read	P948.49 :energization time P948.50 to P948.56 :all 0	AUs16
P948.57 to P948.64	Energization time of eighth fault monitor in past read	P948.57 :energization time P948.58 to P948.64 :all 0	AUs16



(3) Output frequency, output current and output voltage for past eight alarms at the inverter alarm occurrence can be read.

PNU	Item	Data Definition	Data Type
P949.1 to P949.8	Latest fault monitor frequency, current and voltage read	P949.1 :output frequency P949.2 :output current P949.3 :output voltage P949.4 to P949.8 :all 0	AUs16
P949.9 to P949.16	Second fault monitor frequency, current and voltage in past read	P949.9 :output frequency P949.10 :output current P949.11 :output voltage P949.12 to P949.16 :all 0	AUs16
P949.17 to P949.24	Third fault monitor frequency, current and voltage in past read	P949.17 :output frequency P949.18 :output current P949.19 :output voltage P949.20 to P949.24 :all 0	AUs16
P949.25 to P949.32	Forth fault monitor frequency, current and voltage in past read	P949.25 :output frequency P949.26 :output current P949.27 :output voltage P949.28 to P949.32 :all 0	AUs16
P949.33 to P949.40	Fifth fault monitor frequency, current and voltage in past read	P949.33 :output frequency P949.34 :output current P949.35 :output voltage P949.36 to P949.40 :all 0	AUs16
P949.41 to P949.48	Sixth fault monitor frequency, current and voltage in past read	P949.41 :output frequency P949.42 :output current P949.43 :output voltage P949.44 to P949.48 :all 0	AUs16
P949.49 to P949.56	Seventh fault monitor frequency, current and voltage in past read	P949.49 :output frequency P949.50 :output current P949.51 :output voltage P949.52 to P949.56 :all 0	AUs16
P949.57 to P949.64	Eighth fault monitor frequency, current and voltage in past read	P949.57 :output frequency P949.58 :output current P949.59 :output voltage P949.60 to P949.64 :all 0	AUs16

7.7.9 PNU list read

The usable PNU numbers can be read.

PNU	Item	Data Definition	Data Type
P980.1 to 116 P981.1 to 116 P982.1 to 116 P983.1 to 116 P984.1 to 116 P985.1 to 116 P986.1 to 116 P987.1 to 116 P988.1 to 116 P989.1 to 116	PNU list read	Usable PNU numbers are read in sorted status.	AUs16

PNU list read example

PNU	Usable PNU number	REMARKS
P980.1	1	Inverter command parameter
P980.2	2	
P980.3	3	
⋮	⋮	
P980.116	1000	Inverter standard parameter
P981.1	1001	
P981.2	1002	
⋮	⋮	
P982.111	0*1	

*1 When 0 is stored, read is terminated.



7.8 Standard parameters

You can use the PNU to make parameter settings from the network.

The table below lists PNU numbers corresponding to parameter numbers.

Standard parameter examples are introduced below. Refer to the examples and make parameter settings. Refer to *the inverter manual* for details of the parameters.

Representation of the PNU for standard parameters (Example: *Pr.902*)



Example of parameter list

Parameter Number	PNU	Name	Minimum Setting Increments	Setting Range		Data Type
				Decimal	Hexadecimal	
0	P1000	Torque boost	0.1%	0 to 30	0 to 12C	Us16
1	P1001	Maximum frequency	0.01Hz	0 to 120	0 to 2EE0	Us16
2	P1002	Minimum frequency	0.01Hz	0 to 120	0 to 2EE0	Us16
3	P1003	Base Frequency	0.01Hz	0 to 400	0 to 9C40	Us16
4	P1004	Multi-speed setting (high speed)	0.01Hz	0 to 400	0 to 9C40	Us16
5	P1005	Multi-speed setting (middle speed)	0.01Hz	0 to 400	0 to 9C40	Us16
6	P1006	Multi-speed setting (low speed)	0.01Hz	0 to 400	0 to 9C40	Us16
⋮	⋮	⋮	⋮	⋮	⋮	⋮

CAUTION

Write to *Pr. 77* and *Pr. 79* is not allowed from the network with FR-A7NP. (Read is allowed.)

The following parameters require the sub-index number for the PNU.

Parameter Number	PNU	Name	Minimum Setting Increments	Setting Range		Data Type
				Decimal	Hexadecimal	
900	P1900.1	FM terminal calibration *2	—	—	—	AUs16
901	P1901.1	AM terminal calibration	—	—	—	AUs16
902	P1902.1	Terminal 2 frequency setting bias frequency	0.01Hz	0 to 400	0 to 9C40	AUs16
	P1902.2	Terminal 2 frequency setting bias	0.1%	0 to 300	0 to BB8	AUs16
903	P1903.1	Terminal 2 frequency setting gain frequency	0.01Hz	0 to 400	0 to 9C40	AUs16
	P1903.2	Terminal 2 frequency setting gain	0.1%	0 to 300	0 to BB8	AUs16
904	P1904.1	Terminal 4 frequency setting bias frequency	0.01Hz	0 to 400	0 to 9C40	AUs16
	P1904.2	Terminal 4 frequency setting bias	0.1%	0 to 300	0 to BB8	AUs16
905	P1905.1	Terminal 4 frequency setting gain frequency	0.01Hz	0 to 400	0 to 9C40	AUs16
	P1905.2	Terminal 4 frequency setting gain	0.1%	0 to 300	0 to BB8	AUs16
917 *1	P1917.1	Terminal 1 bias frequency (speed)	0.01Hz	0 to 400	0 to 9C40	AUs16
	P1917.2	Terminal 1 bias (speed)	0.1%	0 to 300	0 to BB8	AUs16
918 *1	P1918.1	Terminal 1 gain frequency (speed)	0.01Hz	0 to 400	0 to 9C40	AUs16
	P1918.2	Terminal 1 gain (speed)	0.1%	0 to 300	0 to BB8	AUs16
919 *1	P1919.1	Terminal 1 bias command (torque/magnetic flux)	0.1%	0 to 400	0 to 9C40	AUs16
	P1919.2	Terminal 1 bias (torque/magnetic flux)	0.1%	0 to 300	0 to BB8	AUs16
920 *1	P1920.1	Terminal 1 gain command (torque/magnetic flux)	0.1%	0 to 400	0 to 9C40	AUs16
	P1920.2	Terminal 1 gain (torque/magnetic flux)	0.1%	0 to 300	0 to BB8	AUs16
930 *3	P1930.1	Current output bias signal	0.1%	0 to 100	0 to 3E8	AUs16
	P1930.2	Current output bias current	0.1%	0 to 100	0 to 3E8	AUs16
931 *3	P1931.1	Current output gain signal	0.1%	0 to 100	0 to 3E8	AUs16
	P1931.2	Current output gain current	0.1%	0 to 100	0 to 3E8	AUs16
932 *1	P1932.1	Terminal 4 bias command (torque/magnetic flux)	0.1%	0 to 400	0 to 9C40	AUs16
	P1932.2	Terminal 4 bias (torque/magnetic flux)	0.1%	0 to 300	0 to BB8	AUs16
933 *1	P1933.1	Terminal 4 gain command (torque/magnetic flux)	0.1%	0 to 400	0 to 9C40	AUs16
	P1933.2	Terminal 4 gain (torque/magnetic flux)	0.1%	0 to 300	0 to BB8	AUs16



- *1 These parameters can be set for the FR-A700 series only.
- *2 For the NA (FR-F700 series), EC and CH versions, the terminal name is CA terminal calibration.
- *3 These parameters can be set for the NA (FR-F700 series), EC and CH versions only.



8.2 ID definitions

ID		Definition
PKW	PKE	PNU number (PNU) and task or response Id (AK)
	IND	Index number
	PWE	Set 0 since high bits (Bits 16 to 31) are not used. Lower (Bits 16 to 31): Parameter value
PZD	ZSW	Bits 0 to 7: Inverter status (Command response) Bits 8 to 14: Command count (command request/response)
	HIW	Reserved area for extension

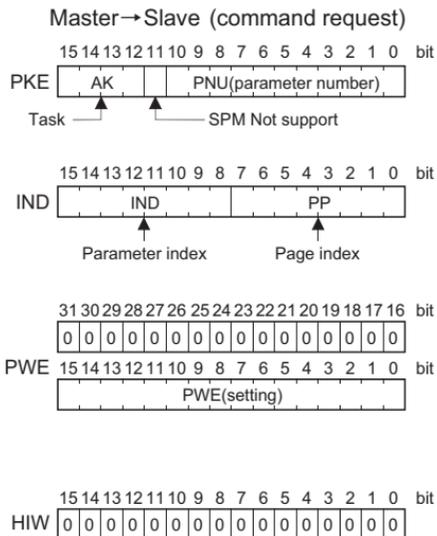
*Command request: Message from the master to the slave
Command response: Message from the slave to the master

8.3 Buffer memory map

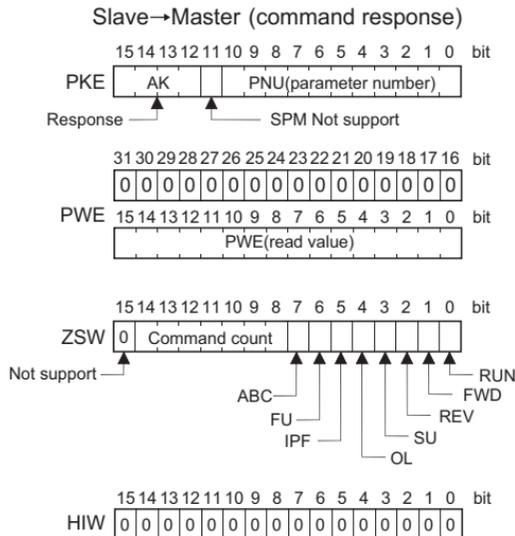
The following shows the buffer memory map of the A5NP PROFIBUS profiles.

Module type	1 Word	2 Word	3 Word	4 Word	5 Word	6 Word
A5NP	PKE	IND	PWE	ZSW	HIW	

8.4 Buffer memory configuration



For buffer memory details, refer to *page 71*.





8.5 Buffer memory details

The following indicates the buffer memory details of the PROFIBUS profiles.

Name		Bit	Definition
PKW	PKE	PNU	0 to 10 PNU number (Together, the PNU and the IND define which data word is being accessed.)
		SPM	11 Not used (0 is set)
		AK	12 to 15 [Command request] 0 : No task 1 : Parameter value is requested (read request) 2 : Parameter value (word) is changed (write request) 3 to 15: Non-supported [Command response] 0 : No response (Busy status) 1 : Inverter can accept data (Ready status) 2 to 6 : Not-used 7 : Command execution error (error number is stored into PWE) 8 : No operation change rights 9 to 15: Not used

Name		Bit	Definition
PKW	IND	0 to 7	Page Index : If IND = 01 (system environment variables(sev)), the PP values specify different blocks of sev's: PP = 0 : sev_I, block I PP = 1 : sev_II, block II (alarm history) PP = 2 : sev_III, block III (For details, refer to <i>page 79</i> .) If IND is other than 01, set PP to 0.
	IND	8 to 15	Parameter Index : Specifies the area from which Parameter Number (PNU) is being accessed. (For details, refer to <i>page 77</i> .) IND = 0: real-time monitor area IND = 1: system environment variable(sev) area (3 blocks) IND = 2: normal parameter area IND = 3: <i>Pr. 900</i> to frequency parameter area IND = 4: <i>Pr. 900</i> to % parameter area



Name		Bit	Definition																		
PKW	PWE	0 to 15	<p>PNU read value/write value When command response AK = 7 (command execution error), PWE definition is as follows.</p> <table border="1"> <thead> <tr> <th>PNU</th> <th>Error Definition</th> </tr> </thead> <tbody> <tr> <td>0H</td> <td>Without error</td> </tr> <tr> <td>1H</td> <td>Unsupported task (includes writing)</td> </tr> <tr> <td>2H</td> <td>Invalid Index (IND)</td> </tr> <tr> <td>3H</td> <td>Invalid PNU</td> </tr> <tr> <td>6H</td> <td>Invalid page index (PP)</td> </tr> <tr> <td>41H</td> <td>Mode error</td> </tr> <tr> <td>42H</td> <td>Instruction code error</td> </tr> <tr> <td>43H</td> <td>Data setting range error</td> </tr> </tbody> </table>	PNU	Error Definition	0H	Without error	1H	Unsupported task (includes writing)	2H	Invalid Index (IND)	3H	Invalid PNU	6H	Invalid page index (PP)	41H	Mode error	42H	Instruction code error	43H	Data setting range error
		PNU	Error Definition																		
0H	Without error																				
1H	Unsupported task (includes writing)																				
2H	Invalid Index (IND)																				
3H	Invalid PNU																				
6H	Invalid page index (PP)																				
41H	Mode error																				
42H	Instruction code error																				
43H	Data setting range error																				
		16 to 31	Not used (0 is set)																		

Name		Bit	Definition
PZD	ZSW	RUN signal	0 : OFF 1 : ON (inverter running)
		FWD signal	0 : OFF 1 : ON (forward rotation operation being performed)
		REV signal	0 : OFF 1 : ON (reverse rotation operation being performed)
		SU signal	0 : OFF 1 : ON (up to frequency)
		OL signal	0 : OFF 1 : ON (overload alarm)
		IPF signal	0 : OFF 1 : ON (an instantaneous power failure or undervoltage occurs)
		FU signal	0 : OFF 1 : ON (output frequency being detected)
		ABC signal	0 : Inverter normal 1 : Inverter alarm occurrence
		Command count	8 to 14
	—	15	Not used (0 is set)
HIW	0 to 15	Not used (0 is set)	

For master-to-slave messages (command request), bits 0 to 7 are not used and must be set to 0. The bit-wise data here do not reflect *Pr.190 to Pr. 196* (output terminal function selection).

At command response, signals are the same. Signals are not affected by settings of *Pr.190 to Pr.196* (output terminal function selection).



CAUTION

Only when the contents of the command request (request for changing the inverter setting: PKW) from the master changed, the inverter processes the request. If the contents of the command request are identical with those of the last request, the inverter does not process the request. (The received request is cleared.)

For instance, while the master keeps sending the "network operation mode enabled" command, changing the mode to the PU operation mode with switchover function does not allow the "network operation mode enabled" command to be executed due to the same contents as that sent last time. Therefore, the operation mode remains the PU operation mode without changing to the Network operation mode.

In this case, send another command as "PU operation mode enabled" from the master once, then send the "network operation mode enabled" command again.

8.6 Outline of PNU

You can use the PNU to make inverter settings from the network.

The data used with the network is denoted PNU(P) to differentiate it from the parameter (Pr.).

This chapter explains the module type "A5NP".

CAUTION

Parameter definitions differ according to the module type selected. When using "PPO type1" to "PPO type5", refer to *page 54*.



8.7 PROFIBUS PNU (module type A5NP)

8.7.1 Real-time monitor area (IND=0000H (IND=00H, PP=00H))

The following items can be monitored from the master.

IND	PNU	Item	Increments	IND	PNU	Item	Increments
0000H	0H	Output frequency *9	0.01Hz	0000H	18H	Cumulative power	0.01kWh
0000H	1H	Output current	0.01A/0.1A *3	0000H	1FH	Torque command *1	0.1%
0000H	2H	Output voltage	0.1V	0000H	20H	Torque current command *1	0.1%
0000H	4H	Frequency setting	0.01Hz	0000H	21H	Motor output *1	0.01kW/0.1kW *3
0000H	5H	Running speed	1r/min	0000H	22H	Feedback pulse *1, *2	—
0000H	6H	Motor torque *1	0.1%	0000H	31H	Power saving effect	Differ according to Pr.
0000H	7H	Converter output voltage	0.1V	0000H	32H	Cumulative saving power	Differ according to Pr.
0000H	8H	Regenerative brake duty	0.1%	0000H	33H	PID set point	0.1%
0000H	9H	Electronic thermal relay function load factor	0.1%	0000H	34H	PID measured value	0.1%
0000H	AH	Output current peak value	0.01A/0.1A *3	0000H	35H	PID deviation	0.1%
0000H	BH	Converter output voltage peak value	0.1V	0000H	39H	Option input terminal status1 *1, *6	—
0000H	CH	Input power	0.01kW/0.1kW *3	0000H	3AH	Option input terminal status2 *1, *7	—
0000H	DH	Output power	0.01kW/0.1kW *3	0000H	3BH	Option output terminal status *1, *8	—
0000H	EH	Input terminal status *4	—	0000H	40H	Output power (with regenerative display) *10	0.1kW
0000H	FH	Output terminal status *5	—	0000H	41H	Cumulative regenerative power *10	1kWh
0000H	10H	Load meter	0.1%	0000H	4CH	32-bit cumulative power (lower 16 bits) *11	1kWh
0000H	11H	Motor excitation current *1	0.01A/0.1A *3	0000H	4DH	32-bit cumulative power (upper 16 bits) *11	1kWh
0000H	12H	Position pulse *1, *2	—	0000H	4EH	32-bit cumulative power (lower 16 bits) *11	0.01kWh/ 0.1kWh
0000H	13H	Cumulative energization time	1Hr				
0000H	15H	Orientation status *1, *2	1				
0000H	16H	Actual operation time	1Hr				
0000H	17H	Motor load factor	0.1%				

IND	PNU	Item	Increments
0000H	4FH	32-bit cumulative power (upper 16 bits) *11	0.01kWh/ 0.1kWh

*1 These items can be monitored with the FR-A700 series only.

*2 Available only when the FR-A7AP is mounted.

*3 The setting depends on the inverter capacity. (55K or less / 75K or more)
(The inverter model, 55K and 75K differ according to -NA and -EC versions. Refer to *page 1*.)

*4 Input terminal monitor details

b15

b0

—	—	—	—	CS	RES	STOP	MRS	JOG	RH	RM	RL	RT	AU	STR	STF
---	---	---	---	----	-----	------	-----	-----	----	----	----	----	----	-----	-----

*5 Output terminal monitor details

b15

b0

—	—	—	—	—	—	—	—	—	—	ABC2	ABC1	FU	OL	IPF	SU	RUN
---	---	---	---	---	---	---	---	---	---	------	------	----	----	-----	----	-----

*6 Details of option input terminal monitor 1 (input terminal status of FR-A7AX)

— all terminals are OFF when an option is not fitted.

b15

b0

X15	X14	X13	X12	X11	X10	X9	X8	X7	X6	X5	X4	X3	X2	X1	X0
-----	-----	-----	-----	-----	-----	----	----	----	----	----	----	----	----	----	----

*7 Details of option input terminal monitor 2 (input terminal status of FR-A7AX)

— all terminals are OFF when an option is not fitted.

b15

b0

—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	DY
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	----

*8 Details of option output terminal monitor (output terminal status of FR-A7AY/A7AR)

— all terminals are OFF when an option is not fitted.

b15

b0

—	—	—	—	—	—	RA3	RA2	RA1	Y6	Y5	Y4	Y3	Y2	Y1	Y0
---	---	---	---	---	---	-----	-----	-----	----	----	----	----	----	----	----

*9 When a value other than 9999 is set in *Pr.430 Pulse monitor selection* under position control (*Pr.800* = 3, 4), pulse monitor is selected. (Refer to the inverter manual for pulse monitor.)

*10 This can be monitored only for the FR-A701 series.

*11 This can be monitored only for the FR-F700P series.



8.7.2 System environment variable (sev) area (IND = 01PP_H (IND = 01_H, PP = 00_H, 01_H))

SEV Interface (IND = 01_H, PP = 00_H, SEV_I, Block I)

(1) Parameter clear

Parameter clear can be performed from the master.

IND	PNU	Item	Data Definition
0100H	1H	Inverter reset	
0100H	2H	Parameter clear	WriteVal = 965AH
0100H	3H	All parameter clear	WriteVal = 99AAH
0100H	5H	Parameter clear *1	WriteVal = 5A96H
0100H	6H	All parameter clear *1	WriteVal = AA99H

*1 Communication parameters (Pr. 117 to Pr. 124, Pr. 331 to Pr.341, Pr.343, Pr. 349, Pr.549 to Pr.551) are not cleared.

(2) Inverter status/operation command

The inverter status can be monitored and operation command can be given from the master.

IND	PNU	Item																																							
0100H	AH	Inverter status Refer to <i>page 74</i> for details.																																							
		Run command																																							
		<table border="1"> <thead> <tr> <th>Name</th> <th>Bit</th> <th>Definition</th> </tr> </thead> <tbody> <tr> <td>—</td> <td>0</td> <td>Reserved (0 is set)</td> </tr> <tr> <td>Terminal STF</td> <td>1</td> <td>Forward rotation command</td> </tr> <tr> <td>Terminal STR</td> <td>2</td> <td>Reverse rotation command</td> </tr> <tr> <td>Terminal RH</td> <td>3</td> <td>High-speed operation command *</td> </tr> <tr> <td>Terminal RM</td> <td>4</td> <td>Middle-speed operation command *</td> </tr> <tr> <td>Terminal RL</td> <td>5</td> <td>Low-speed operation command *</td> </tr> <tr> <td>Terminal JOG</td> <td>6</td> <td>JOG operation selection *</td> </tr> <tr> <td>Terminal RT</td> <td>7</td> <td>Second function selection *</td> </tr> <tr> <td>Terminal AU</td> <td>8</td> <td>Terminal 4 input selection *</td> </tr> <tr> <td>Terminal CS</td> <td>9</td> <td>Restart after instantaneous power failure selection *</td> </tr> <tr> <td>Terminal MRS</td> <td>10</td> <td>Inverter output shut off *</td> </tr> <tr> <td>—</td> <td>11 to 15</td> <td>Not used (0 is set)</td> </tr> </tbody> </table>	Name	Bit	Definition	—	0	Reserved (0 is set)	Terminal STF	1	Forward rotation command	Terminal STR	2	Reverse rotation command	Terminal RH	3	High-speed operation command *	Terminal RM	4	Middle-speed operation command *	Terminal RL	5	Low-speed operation command *	Terminal JOG	6	JOG operation selection *	Terminal RT	7	Second function selection *	Terminal AU	8	Terminal 4 input selection *	Terminal CS	9	Restart after instantaneous power failure selection *	Terminal MRS	10	Inverter output shut off *	—	11 to 15	Not used (0 is set)
		Name	Bit	Definition																																					
		—	0	Reserved (0 is set)																																					
		Terminal STF	1	Forward rotation command																																					
		Terminal STR	2	Reverse rotation command																																					
		Terminal RH	3	High-speed operation command *																																					
		Terminal RM	4	Middle-speed operation command *																																					
		Terminal RL	5	Low-speed operation command *																																					
		Terminal JOG	6	JOG operation selection *																																					
		Terminal RT	7	Second function selection *																																					
		Terminal AU	8	Terminal 4 input selection *																																					
Terminal CS	9	Restart after instantaneous power failure selection *																																							
Terminal MRS	10	Inverter output shut off *																																							
—	11 to 15	Not used (0 is set)																																							
		<p>Functions assigned to the terminals RH, RM, RL, JOG, RT, AU, CS and MRS are activated. *Signal names are initial values. Using <i>Pr. 180 to Pr. 187</i>, you can change output signal functions. Refer to <i>the inverter manual</i> for details of <i>Pr. 180 to Pr. 187</i>.</p>																																							



(3) Operation mode write

Write of the operation mode can be performed from the master.

IND	PNU	Item	Data Definition
0100H	BH	Operation mode	External operation mode:10H PU operation mode:11H (When Pr.79 = "6") Network operation mode:14H

(4) Set frequency read/write

The frequency set to the inverter can be read/written from the master.

IND	PNU	Item	Data Definition
0100H	DH	Set frequency (RAM) *1	Set frequency (RAM) is read or written.
0100H	EH	Set frequency (EEPROM) *1,2	Write set frequency to EEPROM.

*1 Writing to PNU = DH or PNU = EH can be read out from PNU = DH.

*2 To change the running frequency consecutively, always write data to the inverter RAM.

(5) Terminal input read

The analog input values of terminals 2, 4, and 1 can be read.

IND	PNU	Name	Minimum Setting Increments
0100H	FH	Terminal 2 input value read	0.1%
0100H	10H	Terminal 4 input value read	0.1%
0100H	11H	Terminal 1 input value read	0.1%

Faults History (IND = 01H, PP = 01H, SEV_II, Block II)

The past eight inverter fault records can be read.

IND	PNU	Item
0101H	0H	Latest fault *1
0101H	1H	Second fault in past is read
0101H	2H	Third fault in past is read
0101H	3H	Forth fault in past is read

IND	PNU	Item
0101H	4H	Fifth fault in past is read
0101H	5H	Sixth fault in past is read
0101H	6H	Seventh fault in past is read
0101H	7H	Eighth fault in past is read

*1 Writing a value of 0000H to this parameter resets all fault history. All other parameters at this index are read only.

<Fault data>

Error Number	Definition
00H	No fault present
10H	E.OC1
11H	E.OC2
12H	E.OC3
20H	E.OV1
21H	E.OV2
22H	E.OV3
30H	E.THT
31H	E.THM
40H	E.FIN
50H	E.IPF
51H	E.UVT
52H	E.ILF
60H	E.OLT

Error Number	Definition
61H	E.SOT *4
70H	E.BE
80H	E.GF
81H	E.LF
90H	E.OHT
91H	E.PTC
A0H	E.OPT
A1H	E.OP1 *3
A3H	E.OP3 *1
B0H	E.PE
B1H	E.PUE
B2H	E.RET
B3H	E.PE2
C0H	E.CPU

Error Number	Definition
C1H	E.CTE
C2H	E.P24
C4H	E.CDO
C5H	E.IOH
C6H	E.SER
C7H	E.AIE
C8H	E.USB *1
D0H	E.OS *2
D1H	E.OSD *2
D2H	E.ECT *2
D3H	E.OD *2
D5H	E.MB1 *1
D6H	E.MB2 *1
D7H	E.MB3 *1

Error Number	Definition
D8H	E.MB4 *1
D9H	E.MB5 *1
DAH	E.MB6 *1
DBH	E.MB7 *1
DCH	E.EP *2
E6H	E.PID *4
F1H	E. 1
F2H	E. 2 *1
F3H	E. 3 *1
F5H	E. 5
F6H	E. 6
F7H	E. 7
FBH	E. 11 *1
FDH	E. 13

*1 Displayed only for the FR-A700 series.

*2 Appears when the FR-A7AP (option) is fitted.

*3 Displayed on the FR-F700(P) series.

*4 Displayed on the FR-F700P series.

Refer to *the inverter manual* for details of alarm definitions.



8.8 Standard parameters

8.8.1 Normal parameter area (IND = 0200H (IND = 02H, PP = 00H))

You can use the PNU to make parameter settings from the network.

The table below lists PNU numbers corresponding to parameter numbers.

Standard parameter examples are introduced below. Refer to the examples and make parameter settings.

Refer to *the inverter manual* for details of the parameters.

Example of parameter list

IND	PNU	Parameter Number	Name	Minimum Setting Increments	Setting Range	
					Decimal	Hexadecimal
0200H	0H	0	Torque boost	0.1%	0 to 30	0 to 12C
	1H	1	Maximum frequency	0.01Hz	0 to 120	0 to 2EE0
	2H	2	Minimum frequency	0.01Hz	0 to 120	0 to 2EE0
	3H	3	Base Frequency	0.01Hz	0 to 400	0 to 9C40
	4H	4	Multi-speed setting (high speed)	0.01Hz	0 to 400	0 to 9C40
	5H	5	Multi-speed setting (middle speed)	0.01Hz	0 to 400	0 to 9C40
	6H	6	Multi-speed setting (low speed)	0.01Hz	0 to 400	0 to 9C40
	:	:	:	:	:	:

CAUTION

Write to Pr. 77 and Pr. 79 is not allowed from the network with FR-A7NP. (Read is allowed.)

8.8.2 Pr. 900 to calibration parameter (frequency) area (IND=0300H (IND=03H, PP=00H))

The following parameters can be set with IND=0300H.

IND	PNU	Parameter Number	Name	Minimum Setting Increments	Setting Range	
					Decimal	Hexadecimal
0300H	0H	900	FM terminal calibration	1	0 to 8191	0 to 1FFF
0300H	1H	901	AM terminal calibration *2	1	0 to 8191	0 to 1FFF
0300H	2H	902	Terminal 2 frequency setting bias frequency	0.01Hz	0 to 400	0 to 9C40
0300H	3H	903	Terminal 2 frequency setting gain frequency	0.01Hz	0 to 400	0 to 9C40
0300H	4H	904	Terminal 4 frequency setting bias frequency	0.01Hz	0 to 400	0 to 9C40
0300H	5H	905	Terminal 4 frequency setting gain frequency	0.01Hz	0 to 400	0 to 9C40
0300H	11H	917 *1	Terminal 1 bias frequency (speed)	0.01Hz	0 to 400	0 to 9C40
0300H	12H	918 *1	Terminal 1 gain frequency (speed)	0.01Hz	0 to 400	0 to 9C40
0300H	13H	919 *1	Terminal 1 bias command (torque/magnetic flux)	0.1%	0 to 300	0 to BB8
0300H	14H	920 *1	Terminal 1 gain command (torque/magnetic flux)	0.1%	0 to 300	0 to BB8
0300H	1EH	930 *3	Current output bias signal	0.1%	0 to 100	0 to 3E8
0300H	1FH	931 *3	Current output gain signal	0.1%	0 to 100	0 to 3E8
0300H	20H	932 *1	Terminal 4 bias command (torque/magnetic flux)	0.1%	0 to 300	0 to BB8
0300H	21H	933 *1	Terminal 4 gain command (torque/magnetic flux)	0.1%	0 to 300	0 to BB8

*1 These parameters can be set for the FR-A700 series only.

*2 For the NA (FR-F700 series), EC and CH versions, the terminal name is CA terminal calibration.

*3 These parameters can be set for the NA (FR-F700 series), EC and CH versions only.



8.8.3 Pr. 900 to calibration parameter (%) area (IND=0400H (IND=04H, PP=00H))

The following parameters can be set with IND=0400H.

IND	PNU	Parameter Number	Name	Minimum Setting Increments
0400H	2H	902	Terminal 2 frequency setting bias	0.1%
0400H	3H	903	Terminal 2 frequency setting gain	0.1%
0400H	4H	904	Terminal 4 frequency setting bias	0.1%
0400H	5H	905	Terminal 4 frequency setting gain	0.1%
0400H	11H	917 *1	Terminal 1 bias (speed)	0.1%
0400H	12H	918 *1	Terminal 1 gain (speed)	0.1%
0400H	13H	919 *1	Terminal 1 bias (torque/magnetic flux)	0.1%
0400H	14H	920 *1	Terminal 1 gain (torque/magnetic flux)	0.1%
0400H	1EH	930 *2	Current output bias current	0.1%
0400H	1FH	931 *2	Current output gain current	0.1%
0400H	20H	932 *1	Terminal 4 bias (torque/magnetic flux)	0.1%
0400H	21H	933 *1	Terminal 4 gain (torque/magnetic flux)	0.1%

*1 These parameters can be set for the FR-A700 series only.

*2 These parameters can be set for the NA (FR-F700 series), EC and CH versions only.

9 TROUBLESHOOTING

When a fault occurs where the inverter trips itself and the option unit, check the inverter's operation panel, the LED on the option unit, and the following checkpoints to identify the cause, then take appropriate countermeasures. If the fault does not correspond to any of the following faults or if you have any other problem, please contact your sales representative.

Operation Panel Display on the Inverter	LED on FR-A7NP	Possible Cause		Checkpoint / Troubleshooting
0.00	Off	The option unit is not operating.	The option unit is not mounted properly.	Check if the option unit is mounted properly.
			PROFIBUS communication is not established with the master. (Incorrect node address setting)	Set the same node address with the master on A7NP using the node address switches. (Turn OFF, then ON the power supply after changing the node address setting on A7NP.)
			PROFIBUS communication is not established with the master. (Incorrect GSD file has been registered.)	Register the correct GSD file with a configuration software, and set the network configuration to the master.
			PROFIBUS communication is not established with the master. (Incorrect wiring)	Check the wiring of the option unit. D+ PROFIBUS transmitting/receiving data+ (B line) D- PROFIBUS transmitting/receiving data- (A line)
			—	Reset the inverter. Perform all parameter clear to initialize all parameter settings, then turn ON the inverter power again.
	The network is unstable.	The network cables are not connected correctly.	Check if the network cables are connected properly between the nodes.	
		The PROFIBUS communication is not established with the master. (Unstable bus line)	Connect a terminating resistor. If a terminating resistor has been already connected, check if it is connected properly.	
		The network setting is incorrect.	Check the network setting with the PROFIBUS-DP network configuration software.	
		The inverter is affected by the other nodes.	Check if any network error has occurred in the other nodes.	
	Lit in red	No master is present in the network, or the master is not properly operating.	Check the connection and the operation of the PROFIBUS-DP master.	



Operation Panel Display on the Inverter	LED on FR-A7NP	Possible Cause	Checkpoint / Troubleshooting
E.OP□*	Lit in red	The PROFIBUS communication had been established (the green LED had been lit), but the master stopped transmitting data to the option unit during an inverter stop.	Check the connection and the wiring of the communication cable.
		Communication errors occurred consecutively after the PROFIBUS communication had been established (green LED had been ON).	Connect a terminating resistor. If a terminating resistor has been already connected, check if it is connected properly.
		The PROFIBUS communication had been established (the green LED had been lit), but the master stopped transmitting data to the option unit during an inverter stop.	Check the master ladder, etc., and remove the causes that disconnect the data transmission between the master and the option unit.

* Varies by inverter model.

REVISIONS

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

Print Date	*Manual Number	Revision
Nov. 2004	IB(NA)-0600214ENG-A	First edition
Oct. 2005	IB(NA)-0600214ENG-B	Addition Compatible with the FR-A700 series
Nov. 2010	IB(NA)-0600214ENG-C	Addition Compatible with the FR-F700P series
Jun. 2016	IB(NA)-0600214ENG-D	Modification Terminal Name

INVERTER

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