



# INVERTER

Plug-in option

## FR-A7NP E kit

### INSTRUCTION MANUAL

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***PROFIBUS-DP***  
***communication function***

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PRE-OPERATION INSTRUCTIONS

1

INSTALLATION

2

WIRING

3

INVERTER SETTING

4

FUNCTIONS

5

PROFIBUS DEVICE DATA

6

PPO TYPE SUPPORT SPECIFICATION

7

PPO TYPE NON SUPPORT SPECIFICATION

8

TROUBLESHOOTING

9

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

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



### CAUTION

Assumes that incorrect handling may cause hazardous conditions, resulting in medium or slight injury, or may cause physical damage only.

Note that even the  **CAUTION** level may lead to a serious consequence according to conditions. Please follow the instructions of both levels because they are important to personnel safety.

## SAFETY INSTRUCTIONS

### 1. Electric Shock Prevention



### WARNING

- While power is on or when the inverter is running, do not open the front cover. You may get an electric shock.
- Do not run the inverter with the front cover or wiring cover removed. Otherwise, you may access the exposed high-voltage terminals and charging part and get an electric shock.
- If power is off, do not remove the front cover except for wiring or periodic inspection. You may access the charged inverter circuits and get an electric shock.
- Before starting wiring or inspection, check to make sure that the indication of the inverter operation panel is off, 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 the wiring or inspection of this equipment should be fully competent to do the work.
- Always install the plug-in option before wiring. Otherwise, you may get an electric shock or be injured.
- Do not touch the plug-in option 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

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

## 3. Additional Instructions

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

### 1) Transportation and mounting

### CAUTION

- Do not install or operate the plug-in option if it is damaged or has parts missing.
- Do not stand or rest heavy objects on the product.
- Check that the mounting orientation is correct.
- Prevent other conductive bodies such as screws and metal fragments or other flammable substance such as oil from entering the inverter.

### 2) Trial run

### CAUTION

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

## 3) Usage

### WARNING

- Do not modify the equipment.
- 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, reset the required parameters before starting operations. Each parameter returns to the initial value.
- For prevention of damage due to static electricity, touch nearby metal before touching this product to eliminate static electricity from your body.

### 4) Maintenance, inspection and parts replacement

### CAUTION

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

### 5) Disposal

### CAUTION

- Treat as industrial waste.

### 6) General instruction

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

# — CONTENTS —

<b>1</b>	<b>PRE-OPERATION INSTRUCTIONS</b>	<b>1</b>
<b>1.1</b>	<b>Unpacking and Product Confirmation</b>	<b>1</b>
1.1.1	SERIAL number	1
1.1.2	Packing confirmation	2
1.1.3	Parts	3
<b>1.2</b>	<b>Node Address Setting</b>	<b>4</b>
<b>1.3</b>	<b>Specifications</b>	<b>5</b>
1.3.1	Inverter option specifications	5
1.3.2	Communication specifications	5
<b>2</b>	<b>INSTALLATION</b>	<b>6</b>
<b>2.1</b>	<b>Pre-Installation Instructions</b>	<b>6</b>
<b>2.2</b>	<b>Installation Procedure</b>	<b>6</b>
<b>3</b>	<b>WIRING</b>	<b>12</b>
<b>3.1</b>	<b>Terminal Block</b>	<b>12</b>
<b>3.2</b>	<b>Wiring</b>	<b>13</b>
<b>4</b>	<b>INVERTER SETTING</b>	<b>18</b>
<b>4.1</b>	<b>Parameter List</b>	<b>18</b>

<b>4.2</b>	<b>Operation Mode Setting</b> .....	<b>19</b>
4.2.1	Operation mode indication.....	19
4.2.2	Operation mode switching and communication startup mode (Pr. 79, Pr. 340) .....	20
<b>4.3</b>	<b>Operation and Speed Command Source (Pr. 338, Pr. 339, Pr. 550)</b> .....	<b>23</b>
4.3.1	Communication EEPROM write selection (Pr. 342) .....	27
<b>4.4</b>	<b>Operation at Communication Error Occurrence</b> .....	<b>28</b>
4.4.1	Operation selection at communication error occurrence (Pr. 500 to Pr. 502) .....	28
4.4.2	Alarm and measures .....	32
<b>4.5</b>	<b>Inverter Reset</b> .....	<b>33</b>
<b>5</b>	<b>FUNCTIONS</b> .....	<b>35</b>
<hr/>		
<b>5.1</b>	<b>Output from the Inverter to the Network</b> .....	<b>35</b>
<b>5.2</b>	<b>Input to the Inverter from the Network</b> .....	<b>36</b>
<b>6</b>	<b>PROFIBUS DEVICE DATA</b> .....	<b>37</b>
<hr/>		
<b>6.1</b>	<b>Device Data (GSD file)</b> .....	<b>37</b>
<b>6.2</b>	<b>Slave User Parameter</b> .....	<b>41</b>
<b>7</b>	<b>PPO TYPE SUPPORT SPECIFICATION</b> .....	<b>42</b>
<hr/>		
<b>7.1</b>	<b>Profibus Profiles</b> .....	<b>42</b>
<b>7.2</b>	<b>ID Definitions</b> .....	<b>43</b>
<b>7.3</b>	<b>Buffer Memory Map</b> .....	<b>44</b>

<b>7.4</b>	<b>Buffer Memory Configuration .....</b>	<b>45</b>
<b>7.5</b>	<b>Buffer Memory Details .....</b>	<b>46</b>
<b>7.6</b>	<b>Outline of PNU.....</b>	<b>53</b>
<b>7.7</b>	<b>Profibus PNU.....</b>	<b>54</b>
7.7.1	Real-time monitor .....	54
7.7.2	Parameter clear .....	55
7.7.3	Operation mode read/write .....	55
7.7.4	Set frequency read .....	55
7.7.5	Terminal input read.....	56
7.7.6	Inverter reset .....	56
7.7.7	Node address read .....	56
7.7.8	Alarm definition read.....	57
7.7.9	PNU list read .....	61
<b>7.8</b>	<b>Standard Parameters .....</b>	<b>62</b>
<b>8</b>	<b>PPO TYPE NON SUPPORT SPECIFICATION</b>	<b>64</b>
<hr/>		
<b>8.1</b>	<b>Profibus Profiles .....</b>	<b>64</b>
<b>8.2</b>	<b>ID Definitions.....</b>	<b>65</b>
<b>8.3</b>	<b>Buffer Memory Map .....</b>	<b>65</b>
<b>8.4</b>	<b>Buffer Memory Configuration .....</b>	<b>66</b>
<b>8.5</b>	<b>Buffer Memory Details .....</b>	<b>67</b>
<b>8.6</b>	<b>Outline of PNU.....</b>	<b>72</b>
<b>8.7</b>	<b>Profibus PNU (Module Type E5NP).....</b>	<b>73</b>
8.7.1	Real time monitor area (IND=0000H (IND=00H, PP=00H)).....	73

8.7.2	System environment variable (sev) area (IND = 01PPH (IND = 01H, PP = 00H, 01H)) .....	74
<b>8.8</b>	<b>Standard Parameters .....</b>	<b>78</b>
8.8.1	Normal parameter area (IND = 0200H (IND = 02H, PP = 00H)) .....	78
8.8.2	Pr. 900 to calibration parameter (frequency) area (IND=0300H (IND=03H, PP=00H)).....	79
8.8.3	Pr. 900 to calibration parameter (%) area (IND=0400H (IND=04H, PP=00H)) .....	80
<b>9</b>	<b>TROUBLESHOOTING .....</b>	<b>81</b>

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# 1 PRE-OPERATION INSTRUCTIONS

## 1.1 Unpacking and Product Confirmation

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

This product is a plug-in option for the FR-E700 series inverter.

### 1.1.1 SERIAL number

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

For the 200V class of FR-E700, this option can be used with the inverter having the following SERIAL number or later. (For the 400V class of FR-E700, this option can be used with all inverters regardless of SERIAL number.)

Type	SERIAL number
FR-E720-0.1K to 0.75K	J7Y○○○○○○
FR-E720-1.5K to 5.5K	K7Y○○○○○○
FR-E720-7.5K	L7Y○○○○○○
FR-E720-11K, 15K	G7Y○○○○○○

#### ● SERIAL number check

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

#### Rating plate example

<u>□</u>	<u>7</u>	<u>Y</u>	<u>○○○○○○</u>
Symbol	Year	Month	Control number
SERIAL number			

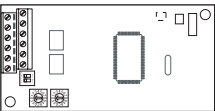

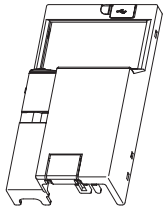
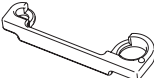
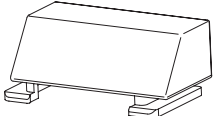
The SERIAL consists of 1 version symbol, 2 numeric characters or 1 numeric character and 1 alphabet letter indicating year and month, and 6 numeric characters indicating control number.

Month is indicated as 1 to 9, X (October), Y (November), and Z (December).



## 1.1.2 Packing confirmation

Check the enclosed items.

<p>Plug-in option ..... 1</p> 	<p>Mounting screw (M3 × 6mm) ..... 2 (Refer to page 8, 10.)</p> 	
<p>Front cover for plug-in option ..... 1</p> 	<p>Option protective cover ..... 1*</p> 	<p>Option small cover (Not used) ..... 1</p> 

\* Used with the FR-E720-3.7K (FR-E720-175) or less and FR-E740-7.5K (FR-E740-170) or less.

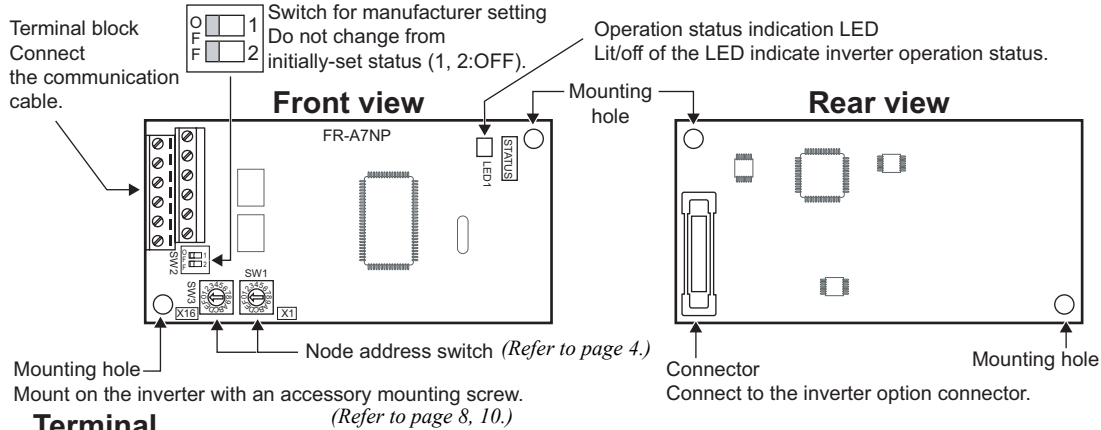
### CAUTION

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

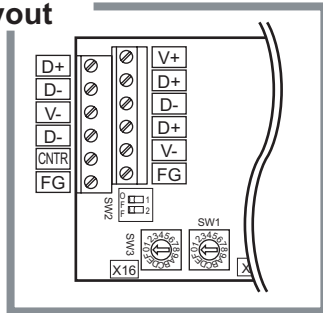
### REMARKS

- PROFIBUS® is a registered trademark of PROFIBUS User Organization.

### 1.1.3 Parts



#### Terminal layout





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

## 1.2 Node Address Setting

Set the node address between "00H to 7DH" using node address switches on the FR-A7NP (refer to page 3). The setting is reflected at the next power-on or inverter reset.

Set the arrow (↑) of the corresponding switches to the number and 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

- Set the node address switch to the switch number (alphabet) position correctly. If the switch is set between numbers, normal data communication can not be made.
- Do not set the node address to 7EH through FFH.
- Depending on the master module, 00H, 01H, 02H, 7CH, 7DH of node address may not be used.
- You cannot set the same node address to other devices on the network. (Doing so disables proper communication.)
- 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.



## 1.3 Specifications

### 1.3.1 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 (EEIA-485(RS-485) standard)

### 1.3.2 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.

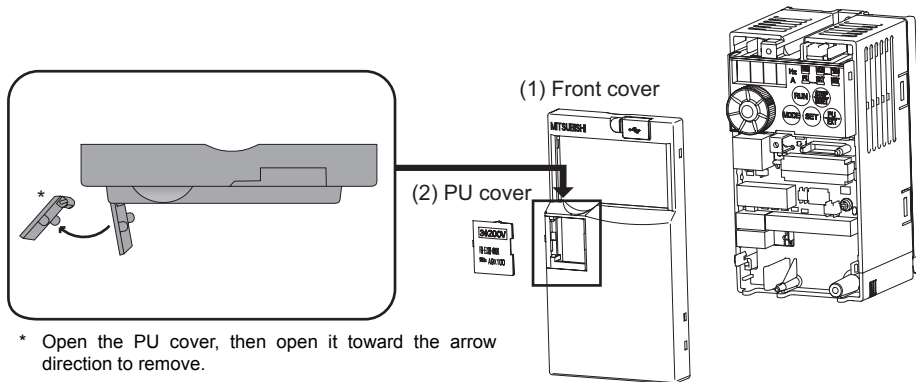
### 2.2 Installation Procedure

The FR-E700 series has one connection connector for the plug-in option.

#### CAUTION

- Always perform wiring to the main circuit terminals and control circuit terminals before installing the option. Wiring cannot be performed after installing the option.
- When the inverter can not recognize that the option unit is mounted due to improper installation, etc., "E. /" (option alarm) is displayed.
- Take care not to drop a mounting screw during mounting and removal.
- Pull out the option straight to remove. Otherwise, the connector may be damaged.

- For FR-E720-3.7K (FR-E720-175) or less and FR-E740-7.5K (FR-E740-170) or less
- (1) Remove the front cover from the inverter. (For removing the front cover, refer to the FR-E700 instruction manual.)
  - (2) Remove the PU cover from the front cover. Open the PU cover with a driver, etc. and remove it in the direction of arrow as shown below.



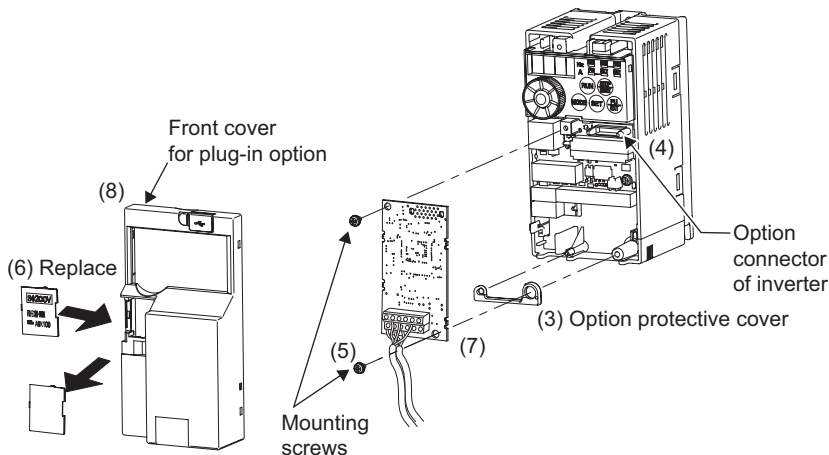
\* Open the PU cover, then open it toward the arrow direction to remove.

## REMARKS

- Because the voltage class, model name and serial (only voltage class is labeled for FR-E740-5.5K (FR-E740-120) or more) are stated on the PU cover, replace a PU cover of a plug-in option front cover with the removed PU cover from the inverter.

## 7 INSTALLATION

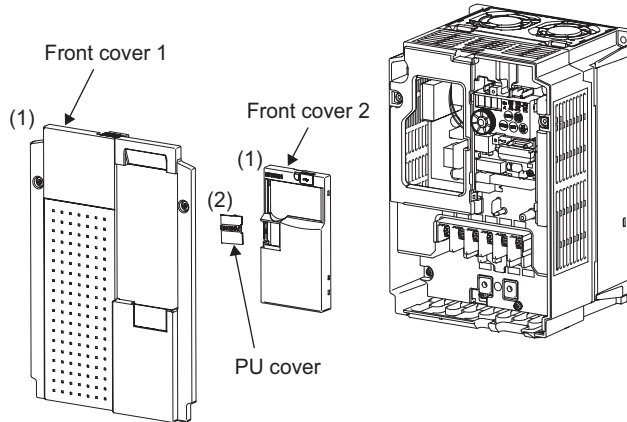
- (3) Install the option protective cover.
- (4) Securely fit the connector of the plug-in option to the inverter connector along the guides.
- (5) Securely fix the both top and bottom of the plug-in option to the inverter with the accessory mounting screws. (tightening torque  $0.45\text{N}\cdot\text{m}$  to  $0.55\text{N}\cdot\text{m}$ ) If the screw holes do not line-up, the connector may not have been plugged snugly. Check for loose plugging.
- (6) Remove the PU cover provided on the front cover for plug-in option and install the other PU cover, which was removed in (2).
- (7) Loosen the terminal screw and insert the cable into the terminal. Tighten each cable with fixing screws to the recommended tightening torque. (Refer to *the chapter 3* for wiring.)
- (8) Install the front cover for plug-in option to the inverter.



### REMARKS

- When the option protective cover is not installed, the protective structure (JEM1030) changes to open type (IP00).

- For FR-E720-5.5K (FR-E720-240) or more and FR-E740-11K (FR-E740-230) or more
- (1) Remove the front cover 1 and 2 from the inverter. (For removing the front cover, refer to the FR-E700 instruction manual.)
  - (2) Remove the PU cover from the front cover 2. For removing the PU cover, refer to *page 7*.

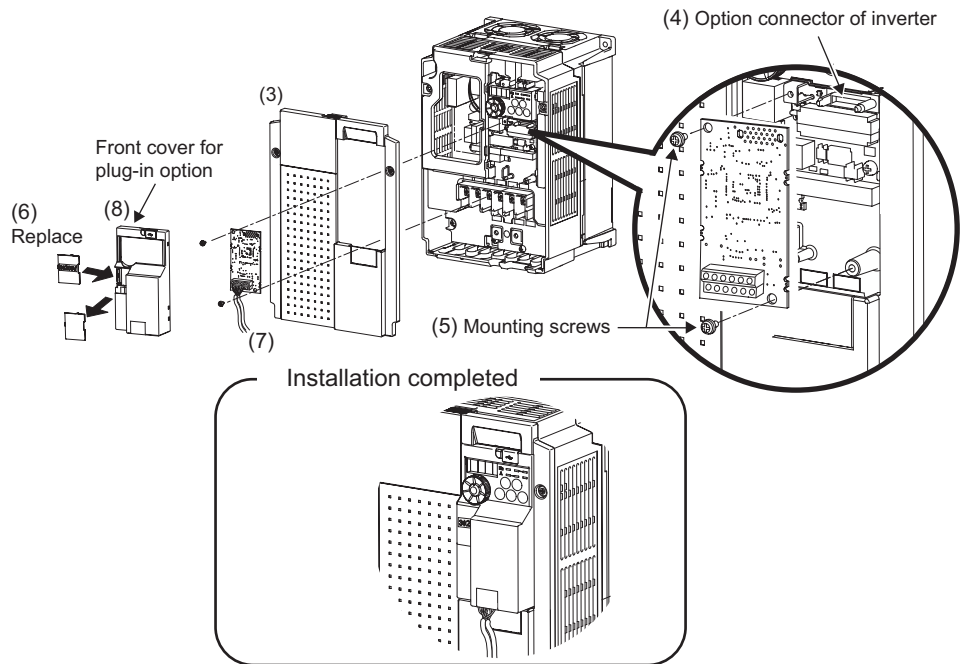


## REMARKS

- Because the voltage class is stated on the PU cover, replace a PU cover of a plug-in option front cover with the removed PU cover from the inverter.



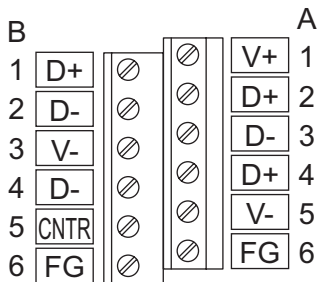
- (3) Install the front cover 1 to the inverter.
- (4) Securely fit the connector of the plug-in option to the inverter connector along the guides.
- (5) Securely fix the both top and bottom of the plug-in option to the inverter with the accessory mounting screws. (tightening torque 0.45N•m to 0.55N•m) If the screw holes do not line-up, the connector may not have been plugged snugly. Check for loose plugging.
- (6) Remove the PU cover provided on the front cover for plug-in option and install the other PU cover, which was removed in (2).
- (7) Loosen the terminal screw and insert the cable into the terminal. Tighten each cable with fixing screws to the recommended tightening torque. (Refer to *the chapter 3* for wiring.)
- (8) Install the front cover for plug-in option to the inverter.



# 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)	Send and receive profibus signal+
2-A	D+ (RXD/TXD-P)	Send and receive profibus signal+
2-B	D+ (RXD/TXD-N)	Send and receive profibus signal-
3-A	D+ (RXD/TXD-N)	Send and receive profibus signal-
3-B	V- (DGND) *1	GND of D+/D-
4-A	D+ (RXD/TXD-P)	Send and receive profibus signal+
4-B	D+ (RXD/TXD-N)	Send and receive profibus signal-
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 when selecting a terminating resistor. (Refer to page 15)

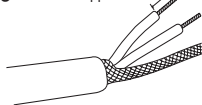
\*2 It may not be necessary depending on the master used.

## 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 size  Approx 5mm



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

**(Do not solder it.)**

**Use a bar type terminal as required.**

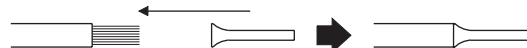
### REMARKS

- Information on bar terminals...recommended product (as of September, 2006)

Terminal Screw Size	Cable Size (mm <sup>2</sup> )	Bar Terminal Model		Maker
		With insulation sleeve	Without insulation sleeve	
M2	0.3 to 0.5	Al 0,5-6WH	A 0,5-6	Phoenix Contact Co.,Ltd.

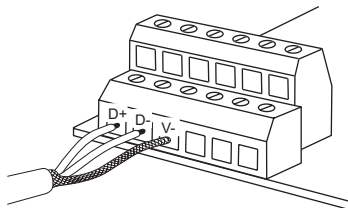
Bar terminal crimping tool: CRIMPFOX ZA3 (Phoenix Contact Co., Ltd.)

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

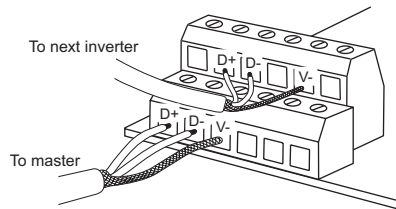


- (2) Loosen the terminal screw and insert the cable into the terminal.  
Tighten each cable with fixing screws to the recommended tightening torque.

<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 <sup>2</sup> to 0.75mm <sup>2</sup>	Small ⊖ flat-blade screwdriver (Tip thickness: 0.4mm /tip width: 2.5mm)

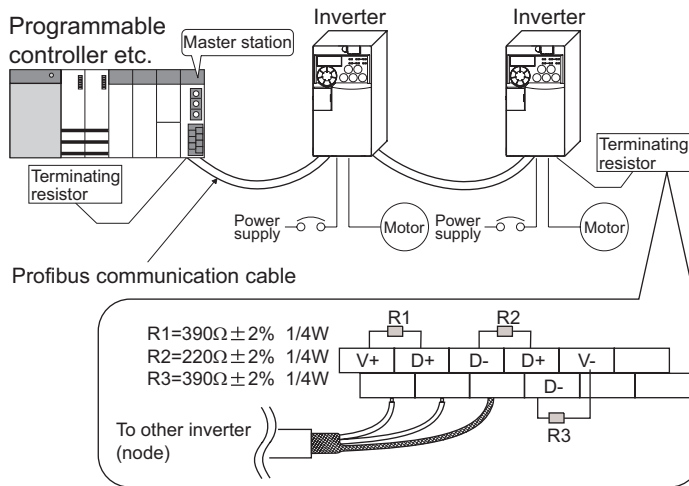
## CAUTION

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

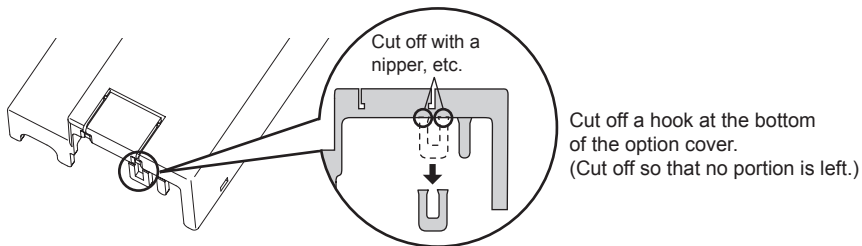
(3) Terminating resistor

If the node at both ends of the network are the FR-A7NP and inverter, connect a connector with a built-in terminating resistor.

Connection example



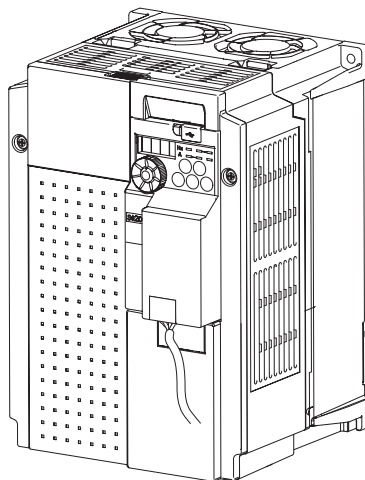
- (4) When wiring, if a hook of the front cover of the plug-in option impedes wiring, cut off the hook and perform wiring.





### REMARKS

- When the option protective cover is not fitted or wire is not passed through even if the hook of the front cover of the plug-in option has been cut off, the protective structure (JEM1030) changes to open type (IP00).

- (5) For wiring of FR-E720-5.5K (FR-E720-240) or more and FR-E740-11K (FR-E740-230) or more, pass a cable on the inverter front cover as shown below. If a PROFIBUS communication dedicated cable is passed through inside the inverter front cover, the bending radius of the cable becomes small, stressing the cable.



 **CAUTION**

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



# 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	20
338	Communication operation command source	0, 1	1	0	23
339	Communication speed command source	0, 1, 2	1	0	23
340	Communication startup mode selection	0, 1, 10	1	0	20
342	Communication EEPROM write selection	0, 1	1	0	27
349 *1	Communication reset selection	0, 1	1	0	34
500 *1	Communication error execution waiting time	0 to 999.8s	0.1s	0	28
501 *1	Communication error occurrence count display	0	1	0	29
502 *2	Stop mode selection at communication error	0, 1, 2, 3	1	0	30
550 *2	NET mode operation command source selection	0, 2, 9999	1	9999	23

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

\*2 The setting is reflected after inverter reset or at the next power-on.

## 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 key of the operation panel on the inverter or parameter unit (FR-PU07/FR-PA07).
- (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* setting.  
*Refer to page 24.*)

### 4.2.1 Operation mode indication

Operation panel



Operation mode indication  
(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 using the operation panel of the inverter or parameter unit (FR-PU07/FR-PA07).)

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**

- Change of the *Pr. 340* setting is made valid when powering on or resetting the inverter.
- *Pr. 340* can be changed with the operation panel independently of the operation mode.

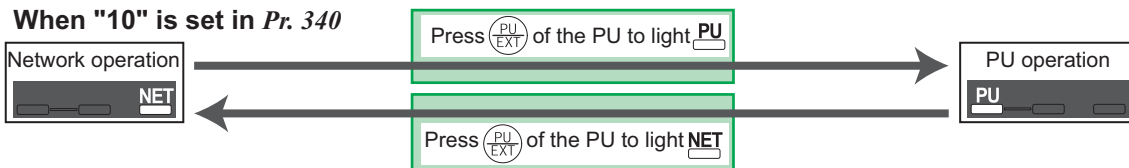
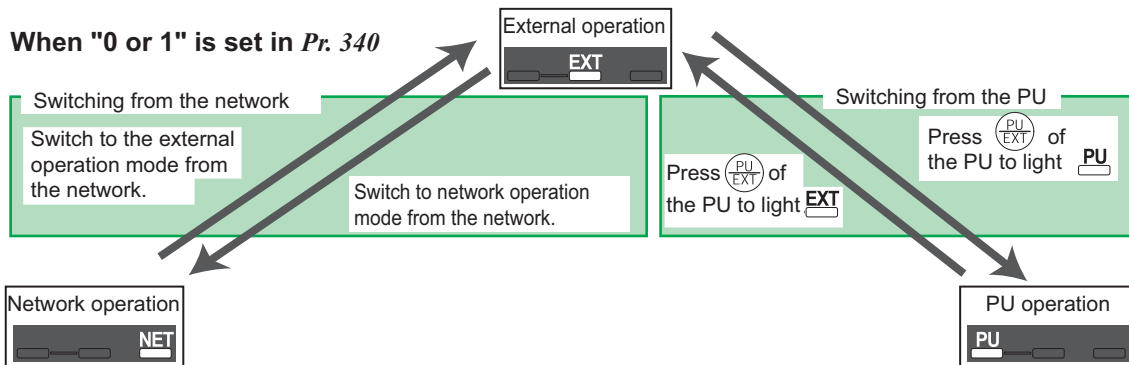
Pr. 340 Setting	Pr. 79 Setting	Operation Mode at Power on or Power Restoration	Operation Mode Switchover
0 (initial value)	0 (initial value)	External operation mode	Switching among the external, PU, and NET operation mode is enabled *1
	1	PU operation mode	PU operation mode fixed
	2	External operation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

\*1 Operation mode can not be directly changed between the PU operation mode and network operation mode.

\*2 Operation mode can be changed between the PU operation mode and network operation mode with of the operation panel and X65 signal.

\*3 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



For the switching method from the external terminal, refer to *the inverter manual*.  
Refer to page 55 and 76 for a switching method from the network.

### CAUTION

- When starting the inverter in network operation mode at powering on or an inverter reset, set a value other than 0 in Pr. 340. (Refer to page 20)
- When setting a value other than 0 in Pr. 340, make sure that the initial settings of the inverter are correct.

### 4.3 Operation and Speed Command Source (Pr. 338, Pr. 339, Pr. 550)

**(1) Select control source for the network operation mode (Pr. 550)**

A control location for the network operation mode can be selected from either the RS-485 communication with the PU connector or 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	Selects the communication option as NET operation mode command source.
			2	Selects the PU connector as the NET operation mode command source.
			9999	Automatic communication option recognition Normally, PU connector is the command source. When a communication option is mounted, the communication option is the command source.

*Refer to the inverter manual for details.*

## (2) Selection of control source for the network operation mode (Pr. 338, Pr. 339)

- As control sources, there are the operation command source that controls the signals related to the inverter start command and function selection and the speed command source that controls the signals related to frequency setting.
- In network operation mode, the commands from the external terminals and communication (PU connector or communication option) are as listed below.

Operation 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 function (terminal-equivalent function)	Running frequency from communication		NET	—	NET	NET	—	NET			
	Terminal 2		—	External	—	—	External	—			
	Terminal 4		—	External		—	External				
Selective function	Pr. 178 to Pr. 184 setting	0	RL	Low speed operation command/remote setting clear/stop-on contact selection 0	NET	External		NET	External		Pr. 59 = "0" (multi-speed) Pr. 59 = "1, 2" (remote) Pr. 270 = "1" (stop-on-contact)
		1	RM	Middle speed operation command/remote setting function	NET	External		NET	External		
		2	RH	High speed operation command/remote setting function	NET	External		NET	External		
		3	RT	Second function selection/stop-on contact selection 1	NET		External			Pr. 270 = "1" (stop-on-contact)	
		4	AU	Current input selection	—	Combined		—	Combined		
		5	JOG	Jog operation selection	—		External				

Operation 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 function	Pr. 178 to Pr. 184 setting	7	OH	External thermal relay input		External						
		8	REX	Fifteen speed selection		NET	External		NET	External		Pr. 59 = "0" (multi-speed)
		10	X10	Inverter operation enable signal		External						
		12	X12	PU operation external interlock		External						
		14	X14	PID control valid terminal		NET	External		NET	External		
		15	BRI	Brake opening completion signal		NET			External			
		16	X16	PU-external operation switchover		External						
		18	X18	V/F switching		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					
60	STF	Forward rotation command		NET			External					



## 7 INVERTER SETTING

Operation 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 function Pr. 178 to Pr. 184 setting	61	STR	Reverse rotation command	NET			External			
	62	RES	Reset				External			
	65	X65	PU/NET operation switchover				External			
	66	X66	NET-external operation switching				External			
	67	X67	Command source switchover				External			

### [Explanation of table]

External : Command is valid only from control terminal.

NET : Command only from communication is valid

Combined : Command from both control terminal and communication is valid.

— : Command from either of control terminal and communication is invalid.

### REMARKS

- The command source of communication is as set in Pr. 550 and Pr. 551.
- 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 reflected 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

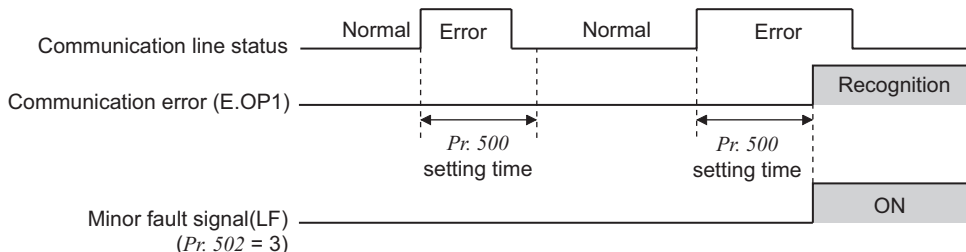
### 4.4.1 Operation selection at communication error occurrence (Pr. 500 to Pr. 502)

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

#### (1) The set time from when a communication line error occurrence until communication error output

You can set the waiting time from when a communication line error occurs until it is recognized as a communication error.

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



If the communication line error still persists after the time set in *Pr. 500* has elapsed, it is recognized as a communication error.

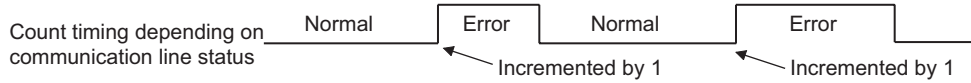
When the error is restored to normal communication within the set time, it is not regarded as a communication error and operation continues.

**(2) Display and erasure of communication error occurrence count**

The cumulative number of communication error occurrences can be indicated.

Write "0" to erase 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.

**CAUTION**

- The communication error count occurrence is stored into RAM temporarily. Since this data is stored in EEPROM at one-hour intervals, performing power-on reset or inverter may cause the *Pr. 501* data to be the value stored in EEPROM the last time depending on the reset timing.

## (3) Inverter operation selection at communication error occurrence

You can select the inverter operation if a communication line error or an error of the option unit itself occurs.

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 error occurrence

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

\* When the error returns to normal communication within the time set in Pr. 500, it is not regarded as a communication line error (E.OP1).

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

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

● **Operation at error removal**

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

**CAUTION**

- A communication line error [E.OP1 (alarm data: HA1)] is an error that occurs on the communication line, and an error of the communication option unit itself [E. 1 (alarm data: HF1)] is a communication circuit error in the option.
- The alarm output indicates alarm output signal (ALM signal) or alarm bit output.
- When the setting was made to provide an alarm output, the error definition is stored into the alarm history. (The error definition is written to the alarm history when an alarm output is provided.)  
When no alarm output is provided, the error definition overwrites the alarm indication of the alarm history temporarily, but is not stored.  
After the error is removed, the alarm indication is reset and returns to the ordinary monitor, and the alarm history returns to the preceding alarm indication.
- When the Pr. 502 setting is "1" or "2", the deceleration time is the ordinary deceleration time setting (e.g. Pr. 8, Pr. 44, Pr. 45).
- The acceleration time at a restart is the ordinary acceleration time setting (e.g. Pr. 7, Pr. 44).
- When the Pr. 502 setting is "2", the operation/speed command at a restart is the one given before the error occurrence.
- 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 Alarm and measures

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

Alarm Location	Status		Operation Mode		
			Network Operation	External Operation	PU Operation
Inverter	Inverter operation		<b>Inverter trip</b>	Inverter trip	Inverter trip
	Data communication		<b>Continued</b>	Continued	Continued
Communication line	Inverter operation		<b>Inverter trip *</b>	Continued	Continued
	Data communication		<b>Stop</b>	Stop	Stop
Communication option	Communication option connection error	Inverter operation	<b>Inverter trip *</b>	Inverter trip *	Inverter trip *
		Data communication	<b>Continued</b>	Continued	Continued
	Error of communication option itself	Inverter operation	<b>Inverter trip *</b>	Continued	Continued
		Data communication	<b>Stop</b>	Stop	Stop

\* Depends on the Pr. 502 setting.

(2) Measures at alarm occurrences

Alarm Indication	Alarm Definition	Measures
E.OP1	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	Option alarm	Check the connection between the inverter and option unit for poor contact, etc. and remove the cause of the error.

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

## 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 56) *1		Allowed	Disallowed	Disallowed
	Error reset (STW(bit7)) at inverter fault (Refer to page 48) *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/operation panel	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 network operation mode. (Refer to page 20.)

- The inverter can not 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, an error reset command\* from network can be made 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 48.)

# 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.	54	73
Parameter read	Read parameter settings of the inverter.	46	67
Inverter status	Monitor output signal of the inverter.	49	70
Operation mode read	Read the operation mode of the inverter.	49, 55	—
Set frequency read	Read the frequency set in the inverter.	55	76
Terminal input read	Read the analog value of terminal 2, 4.	56	76
Node address read	Read node address of the inverter.	56	—
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.	57	77
PNU list read	Read the available PNU number.	61	—

### 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.	50	76
Operation mode write	Set the operation mode of the inverter.	55	76
Run command	Set the control input command such as forward operation signal (STF) and reverse rotation signal (STR).	48	75
Inverter reset	Reset the inverter.	48, 56	74
Parameter write	Set parameters of the inverter.	46, 62	67, 78
Parameter clear	Return parameters to the initial values.	55	74
Input terminal function	Use the function of the inverter input terminal.	51	75

### 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 specification which do not support PPO type specification (FR-E5NP 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 can not use the device data which does not include PPO type support specification (data for the FR-E5NP).

<melc08fa.gsd>

Parameter	Value	Description *1
#Profibus_DP		File header
GSD_Revision	1	ID version of GSD file
Vendor_Name	"Mitsubishi Electric"	Maker 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.

Parameter	Value	Description *1
FMS_Supp	0	FMS (Field-Bus Message Specifications) not supported.
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	60	Longest time 60 bit times at communication speed 9600bps
MaxTsd_r_19.2	60	Longest time 60 bit times at communication speed 19.2Kbps
MaxTsd_r_93.75	60	Longest time 60 bit times at communication speed 93.75Kbps
MaxTsd_r_187.5	60	Longest time 60 bit times at communication speed 187.5Kbps
MaxTsd_r_500	100	Longest time 100 bit times at communication speed 500Kbps
MaxTsd_r_1.5M	150	Longest time 150 bit times at communication speed 1.5MKbps
MaxTsd_r_3M	250	Longest time 250 bit times at communication speed 3.0Mbps
MaxTsd_r_6M	450	Longest time 450 bit times at communication speed 6.0Mbps

Parameter	Value	Description *1
MaxTsdrr_12M	800	Longest time 800 bit times at communication speed 12.0Mbps
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		

Parameter	Value	Description *1
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
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-E5NP 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".

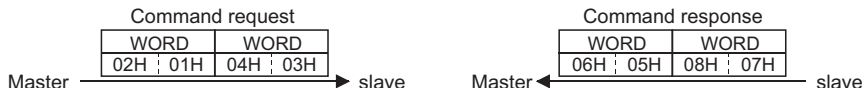
Address	Functions							
0H	For manufacturer setting (Always set "1".)							
1H	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
	—	—	—	—	—	—	—	0:Byte swapping invalid 1:Byte swapping valid

### 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.



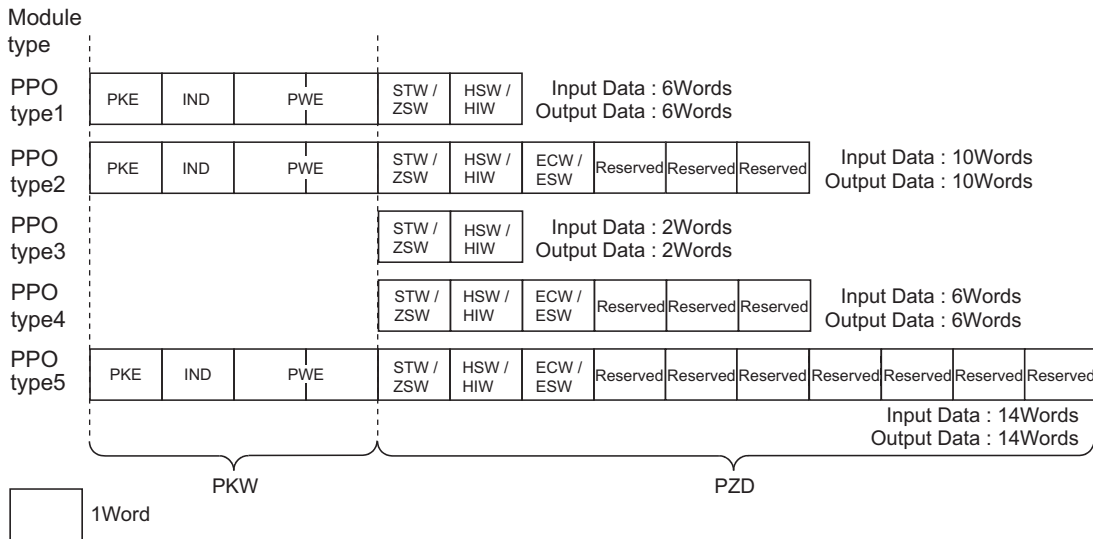
# 7 PPO TYPE SUPPORT SPECIFICATION

## 7.1 Profibus Profiles

The option unit operates as a "slave of the Profibus DP master" or a "controller equivalent to Profibus DP master class 1 on an RS-485 network".

The Profibus profile (data buffer) can be selected from among six different types, "PPO type1" to "PPO type5", "E5NP". This chapter explains the profile of Module type "PPO type1" to "PPO type5". (For the Module type "E5NP" profile, refer to *the chapter 8.*)

Module type is changed with the slave module setting. For details, refer to the instruction manual of the Module Master Configuration Software. The configuration of PPO type is as follows.



## 7.2 ID Definitions

ID		Definition
PKW <i>(Refer to page 46)</i>	PKE	PNU number (PNU) and task or response Id (AK)
	IND	Sub-Index number and reserved area for extension
	PWE	<ul style="list-style-type: none"> <li>• Set 0 since high bits (Bits 16 to 31) are not used.</li> <li>• Low bits (Bits 0 to 15): Parameter value</li> </ul>
PZD <i>(Refer to page 48)</i>	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

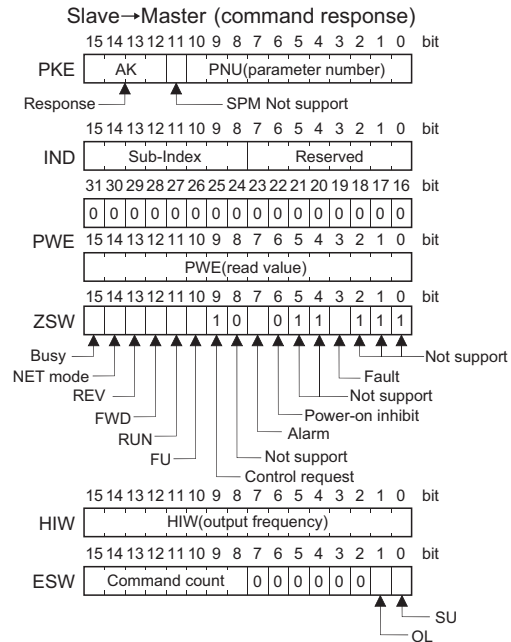
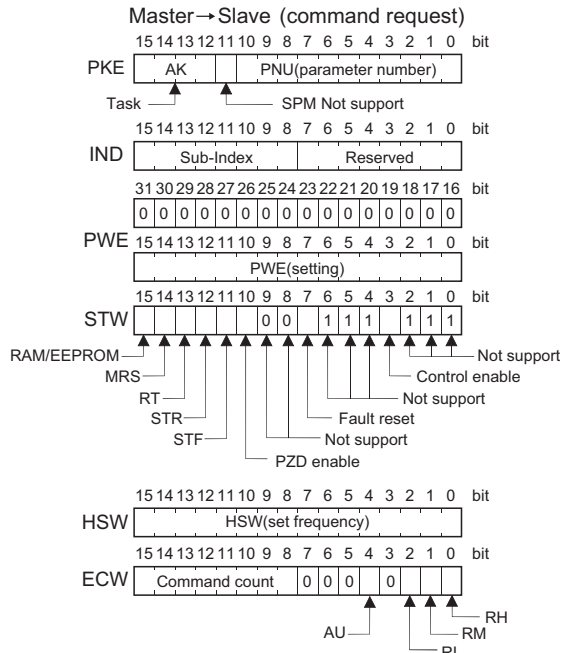
## 7.3 Buffer Memory Map

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	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

## 7.4 Buffer Memory Configuration

The buffer memory configuration is shown below.



For buffer memory details, refer to *page 46*.

## 7.5 Buffer Memory Details

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

### (1) PKW

Name		Bit	Definition															
PKE	PNU	0 to 10	PNU number															
	SPM	11	Not used (0 is set)															
	AK	12 to 15	[Command request]															
			<table border="1"> <thead> <tr> <th>Value</th> <th>Operation</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No task</td> </tr> <tr> <td>1</td> <td>Parameter value is requested (read request)</td> </tr> <tr> <td>2</td> <td>Parameter value (word) is changed (write request)</td> </tr> <tr> <td>6</td> <td>Parameter value (array) is requested (read request)</td> </tr> <tr> <td>7</td> <td>Parameter value (array word) is changed (write request)</td> </tr> <tr> <td>Other than the above</td> <td>Non-supported</td> </tr> </tbody> </table>		Value	Operation	0	No task	1	Parameter value is requested (read request)	2	Parameter value (word) is changed (write request)	6	Parameter value (array) is requested (read request)	7	Parameter value (array word) is changed (write request)	Other than the above	Non-supported
			Value	Operation														
			0	No task														
			1	Parameter value is requested (read request)														
			2	Parameter value (word) is changed (write request)														
			6	Parameter value (array) is requested (read request)														
			7	Parameter value (array word) is changed (write request)														
Other than the above			Non-supported															
[Command response]																		
<table border="1"> <thead> <tr> <th>Value</th> <th>Operation</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No response (Busy status)</td> </tr> <tr> <td>1</td> <td>Parameter value (word) is transferred.</td> </tr> <tr> <td>4</td> <td>Parameter value (array word) is transferred.</td> </tr> <tr> <td>7</td> <td>Command execution error (error number is stored into PWE <i>(Refer to page 47)</i>)</td> </tr> <tr> <td>Other than the above</td> <td>Non-supported</td> </tr> </tbody> </table>		Value	Operation	0	No response (Busy status)	1	Parameter value (word) is transferred.	4	Parameter value (array word) is transferred.	7	Command execution error (error number is stored into PWE <i>(Refer to page 47)</i> )	Other than the above	Non-supported					
Value	Operation																	
0	No response (Busy status)																	
1	Parameter value (word) is transferred.																	
4	Parameter value (array word) is transferred.																	
7	Command execution error (error number is stored into PWE <i>(Refer to page 47)</i> )																	
Other than the above	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																
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" data-bbox="428 249 1307 536"> <thead> <tr> <th data-bbox="428 249 535 282">Value</th> <th data-bbox="535 249 1307 282">Error Definition</th> </tr> </thead> <tbody> <tr> <td data-bbox="428 282 535 322">0</td> <td data-bbox="535 282 1307 322">Invalid PNU</td> </tr> <tr> <td data-bbox="428 322 535 361">1</td> <td data-bbox="535 322 1307 361">Parameter value unchangeable (This error also occurs when <i>Pr:77</i> = "1")</td> </tr> <tr> <td data-bbox="428 361 535 400">2</td> <td data-bbox="535 361 1307 400">Outside setting range</td> </tr> <tr> <td data-bbox="428 400 535 440">3</td> <td data-bbox="535 400 1307 440">Invalid Sub-Index number</td> </tr> <tr> <td data-bbox="428 440 535 479">4</td> <td data-bbox="535 440 1307 479">Without array</td> </tr> <tr> <td data-bbox="428 479 535 519">11</td> <td data-bbox="535 479 1307 519">No parameter change right</td> </tr> <tr> <td data-bbox="428 519 535 536">18</td> <td data-bbox="535 519 1307 536">Other error *</td> </tr> </tbody> </table> <p>* Indicates outside AK number range, write data error, external operation error, without option error, instruction code error, with STF error, with STR error, with operation mode specification error, parameter calibration error (<i>Pr: 900 or later</i>), reset disabled error (with reset input specification of <i>Pr: 75</i>), etc.</p>	Value	Error Definition	0	Invalid PNU	1	Parameter value unchangeable (This error also occurs when <i>Pr:77</i> = "1")	2	Outside setting range	3	Invalid Sub-Index number	4	Without array	11	No parameter change right	18	Other error *
	Value	Error Definition																
0	Invalid PNU																	
1	Parameter value unchangeable (This error also occurs when <i>Pr:77</i> = "1")																	
2	Outside setting range																	
3	Invalid Sub-Index number																	
4	Without array																	
11	No parameter change right																	
18	Other error *																	
	16 to 31	Not used (0 is set)																

## (2) PZD

		Name	Bit	Definition
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 Pr. 349 = "0", error reset can be made in any operation mode. When Pr. 349 = "1", error reset is enabled only in NET operation mode. [When inverter is normal] No action
		—	8, 9	Not used (0 is set)
		PZD enable	10	0: Command request of PZD is not processed. (Note that PZD enable and command count request can be executed.) 1: Command request of PZD is processed. * At power-on or inverter reset, set 1 once.
		Forward rotation command (STF signal)	11	0: OFF (Stop command) 1: ON (Forward rotation start)
		Reverse rotation command (STR signal)	12	0: OFF (Stop command) 1: ON (Reverse rotation start)
		Second function selection (RT signal)	13	0: OFF 1: ON (Second function is selected)
		Output stop (MRS signal)	14	0: OFF 1: ON (output is shut off)
		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.

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



Name		Bit	Definition										
ZSW	BUSY	15	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"> <thead> <tr> <th></th> <th>[During Busy status] and [inverter reset]</th> <th>[During Busy status] and [other than inverter rest]</th> </tr> </thead> <tbody> <tr> <td>PKW</td> <td>0</td> <td>All 0 when AK = 0 Reply data when AK ≠ 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> </tbody> </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 AK ≠ 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 AK ≠ 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) (Always set frequency (Hz) regardless of the Pr. 37 setting.)										
	HIW	0 to 15	Output frequency (0.01 Hz increments) (It is always displayed as frequency (Hz) regardless of the Pr. 37 setting.)										

Name		Bit	Definition
ECW	High speed operation command (Terminal RH function)	0	Functions assigned to terminal RH, RM, RL are activated. (Signal names are initial values. Using <i>Pr.180 to Pr.182</i> , you can change output signal functions. Refer to the inverter manual for details of <i>Pr.180 to Pr.182</i> .)
	Middle-speed operation command (Terminal RM function)	1	
	Low-speed operation command (Terminal RL function)	2	
	—	3	Not used (0 is set)
	Terminal 4 input selection (AU signal)	4	0: OFF 1: ON (Terminal 4 input is the main speed setting)
	—	5 to 7	Not used (0 is set)
	Command count	8 to 15	Used by the master to recognize the command response.
ESW	Up to frequency (SU signal)	0	0: OFF 1: ON (Output frequency has reached the set frequency)
	Overload alarm (OL signal)	1	0: OFF 1: ON (Overload alarm occurrence)
	—	2 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)

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### **CAUTION**

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- 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.

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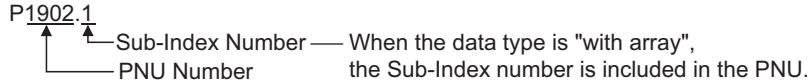
## 7.6 Outline of PNU

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 "E5NP", refer to *page 72*.

(1) PNU data definition



(2) PNU data type

The PNU has the data types of "Array Unsigned 16 (AUs16)" and "Unsigned 16 (Us16)".

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	0.01Hz	AUs16
P1.2	Output current	0.01A	AUs16
P1.3	Output voltage	0.1V	AUs16
P1.5	Frequency setting	0.01Hz	AUs16
P1.7	Motor torque	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	AUs16
P1.12	Converter output voltage peak value	0.1V	AUs16

PNU	Item	Increments	Data Type
P1.14	Output power	0.01kW	AUs16
P1.15	Input terminal status *1	—	AUs16
P1.16	Output terminal status *2	—	AUs16
P1.20	Cumulative energization time	1h	AUs16
P1.23	Actual operation time	1h	AUs16
P1.24	Motor load factor	0.1%	AUs16
P1.25	Cumulative power	1kWh	AUs16
P1.52	PID set point	0.1%	AUs16
P1.53	PID measurement value	0.1%	AUs16
P1.54	PID deviation	0.1%	AUs16
P1.61	Motor thermal load factor	0.1%	AUs16
P1.62	Inverter thermal load factor	0.1%	AUs16

#### \*1 Input terminal monitor details

b15														b0	
—	—	—	—	—	RES	—	MRS	—	RH	RM	RL	—	—	STR	STF

Functions of each terminal are assigned using Pr.178 to Pr.184. (Refer to the inverter manual for details)

#### \*2 Output terminal monitor details

b15														b0		
—	—	—	—	—	—	—	—	—	—	—	ABC	FU	—	—	—	RUN

Functions of each terminal are assigned using Pr.190 to Pr.192. (Refer to the inverter manual for details)

### 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	5A96H	AUs16
P2.6	All parameter clear	AA99H	AUs16
P2.8	Error history clear	0000H	AUs16

\* Communication parameters (*Pr. 117 to Pr. 124, Pr. 338 to Pr. 340, 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:10H 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

\* It is always displayed as frequency (Hz) regardless of the *Pr. 37* setting.

### 7.7.5 Terminal input read

Analog input value of terminal 2, 4 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

### 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  $Pr.75 = "1, 3, 15, 17"$ , 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 Alarm definition read

(1) Alarm definitions of past eight alarms occurred in the inverter can be read. (refer to page 58 for error number)

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



<Alarm data>

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

<b>Error Number</b>	<b>Definition</b>
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
52H	E.ILF
60H	E.OLT
70H	E.BE
80H	E.GF
81H	E.LF
90H	E.OHT
A1H	E.OP1

<b>Error Number</b>	<b>Definition</b>
B0H	E.PE
B1H	E.PUE
B2H	E.RET
B3H	E.PE2
C0H	E.CPU
C5H	E.IOH
C7H	E.AIE
C8H	E.USB
D8H	E.MB4
D9H	E.MB5
DAH	E.MB6
DBH	E.MB7
F1H	E. 1
F6H	E. 6
F7H	E. 7
FDH	E. 13

(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*	

\* 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 the 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 *1	—	—	—	AUs16
901	P1901.1	AM terminal calibration *2	—	—	—	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
922	P1922.1	Frequency setting voltage bias frequency (built-in potentiometer) *1	0.01Hz	0 to 400	0 to 9C40	AUs16
	P1922.2	Frequency setting voltage bias (built-in potentiometer) *1	0.1%	0 to 300	0 to BB8	AUs16
923	P1923.1	Frequency setting voltage gain frequency (built-in potentiometer) *1	0.01Hz	0 to 400	0 to 9C40	AUs16
	P1923.2	Frequency setting voltage gain (built-in potentiometer) *1	0.1%	0 to 300	0 to BB8	AUs16

\*1 These parameters can be set for the Japanese version only.

\*2 This parameter can be set for the NA, EC and CH version only.

## 8.1 Profibus Profiles

The option unit operates as a "slave of the Profibus DP master" or a "controller equivalent to Profibus DP master class 1 on an RS-485 network".

The Profibus profile (data buffer) can be selected from among six different types, "PPO type1" to "PPO type5", "E5NP". This chapter explains the Module type "E5NP" profile. (For the Module type "PPO type1" to "PPO type5" profiles, refer to *the chapter 7.*)

Module type is changed with the slave module setting. For details, refer to the instruction manual of the Network Master Configuration Software.

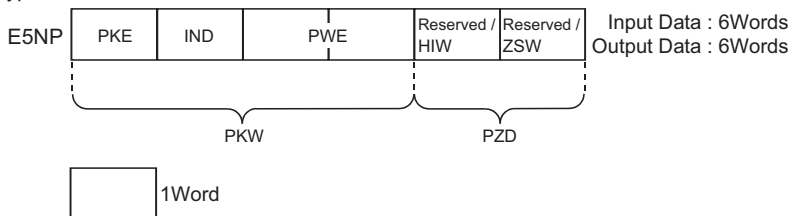
### REMARKS

The "E5NP" profile is compatible with the FR-E5NP profile.

Use "E5NP" profile when replacing the FR-E5NP with FR-A7NP, etc.

The configuration of the "E5NP" is as follows.

Module  
type



## 8.2 ID Definitions

ID		Definition
PKW <i>(Refer to page 67)</i>	PKE	PNU number (PNU) and task or response Id (AK)
	IND	Index number
	PWE	<ul style="list-style-type: none"> <li>• Set 0 since high bits (Bits 16 to 31) are not used.</li> <li>• Lower (Bits 0 to 15): Parameter value</li> </ul>
PZD <i>(Refer to page 70)</i>	ZSW	<ul style="list-style-type: none"> <li>• Bits 0 to 7: Inverter status (Command response)</li> <li>• Set 0 since Bits 8 to 15 are not used.</li> </ul>
	HIW	Reserved area for extension

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

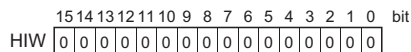
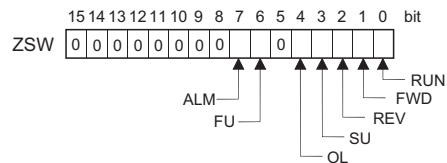
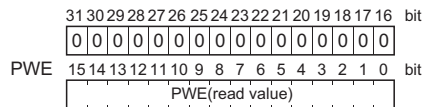
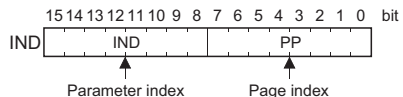
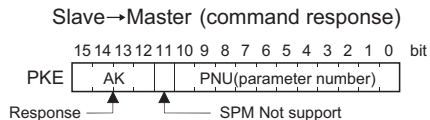
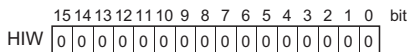
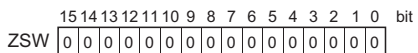
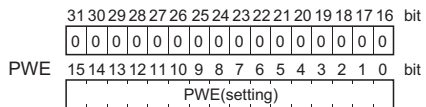
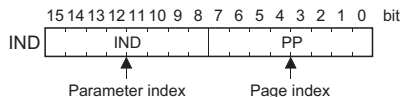
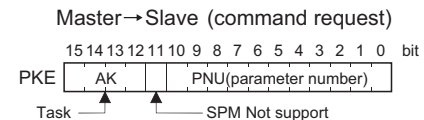
## 8.3 Buffer Memory Map

The following shows the buffer memory map of the E5NP Profibus profiles.

Module type	1Word	2Word	3Word	4Word	5Word	6Word
E5NP	PKE	IND	PWE		Reserved/ HIW	Reserved/ ZSW



## 8.4 Buffer Memory Configuration



For buffer memory details, refer to *page 67*.

## 8.5 Buffer Memory Details

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

### (1) PKW

Name		Bit	Definition												
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]												
			<table border="1"> <thead> <tr> <th>Value</th> <th>Operation</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No task</td> </tr> <tr> <td>1</td> <td>Parameter value is requested (read request)</td> </tr> <tr> <td>2</td> <td>Parameter value (word) is changed (write request)</td> </tr> <tr> <td>Other than the above</td> <td>Non-supported</td> </tr> </tbody> </table>		Value	Operation	0	No task	1	Parameter value is requested (read request)	2	Parameter value (word) is changed (write request)	Other than the above	Non-supported	
Value			Operation												
0			No task												
1			Parameter value is requested (read request)												
2			Parameter value (word) is changed (write request)												
Other than the above			Non-supported												
[Command response]															
<table border="1"> <thead> <tr> <th>Value</th> <th>Operation</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>No response (Busy status)</td> </tr> <tr> <td>1</td> <td>Inverter can accept data (Ready status)</td> </tr> <tr> <td>7</td> <td>Command execution error (error number is stored into PWE (<i>Refer to page 69.</i>))</td> </tr> <tr> <td>8</td> <td>No operation change rights</td> </tr> <tr> <td>Other than the above</td> <td>Not used</td> </tr> </tbody> </table>			Value	Operation	0	No response (Busy status)	1	Inverter can accept data (Ready status)	7	Command execution error (error number is stored into PWE ( <i>Refer to page 69.</i> ))	8	No operation change rights	Other than the above	Not used	
Value			Operation												
0	No response (Busy status)														
1	Inverter can accept data (Ready status)														
7	Command execution error (error number is stored into PWE ( <i>Refer to page 69.</i> ))														
8	No operation change rights														
Other than the above	Not used														

Name		Bit	Definition
IND	PP	0 to 7	<p>Page Index :</p> <ul style="list-style-type: none"> <li>If IND = 1 (system environment variable (sev) area ), the PP values specify different blocks of sev's:               <ul style="list-style-type: none"> <li>PP = 0 : sev_I, block I</li> <li>PP = 1 : sev_II, block II (alarm history)</li> <li>PP = 2 : sev_III, block III</li> </ul>               (For details, refer to <i>page 74.</i>)             </li> <li>If IND is other than 1 (system environment variable (sev) area), set PP to 0.</li> </ul>
	IND	8 to 15	<p>Parameter Index :</p> <p>Specifies the area from which Parameter Number (PNU) is being accessed. (For details, refer to <i>page 73.</i>)</p> <ul style="list-style-type: none"> <li>IND = 0: real-time monitor area</li> <li>IND = 1: system environment variable (sev) area (3 blocks)</li> <li>IND = 2: normal parameter area</li> <li>IND = 3: <i>Pr. 900</i> to calibration parameter (frequency) area</li> <li>IND = 4: <i>Pr. 900</i> to calibration parameter (%) area</li> </ul>

Name	Bit	Definition	
PWE	0 to 15	PNU read value/write value When command response AK = "7 (command execution error)", PWE definition is as follows.	
		Value	Error Definition
		0	Without error
		1	Unsupported task (includes writing)
		2	Invalid Parameter Index (IND)
		3	Invalid PNU
		6	Invalid Page Index (PP)
		65	Mode error
		66	Instruction code error
		67	Data setting range error
	16 to 31	Not used (0 is set)	

## (2) PZD

Name		Bit	Definition
ZSW	Inverter running (RUN signal)	0	0 : OFF 1 : ON (inverter running)
	Forward running	1	0 : Other than forward running (during stop or reverse rotation) 1 : Forward running
	Reverse running	2	0 : Other than reverse running (during stop or forward rotation) 1 : Reverse running
	Up to frequency (SU signal)	3	0 : OFF 1 : ON (up to frequency)
	Overload alarm (OL signal)	4	0 : OFF 1 : ON (overload alarm)
	—	5	Not used (0 is returned)
	Output frequency detection (FU signal)	6	0 : OFF 1 : ON (output frequency being detected)
	Fault output (ALM signal)	7	0 : Inverter normal 1 : Inverter alarm occurrence
	—	8 to 15	Not used (0 is returned)
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.192 (output terminal function selection).
- At command response, signals are the same. Signals are not affected by settings of Pr.190 to Pr.192 (output terminal function selection).

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**CAUTION**

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- 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.

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## **8.6 Outline of PNU**

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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 "E5NP".

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### **CAUTION**

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- **Parameter definitions differ according to the Module type selected. When using "PPO type1" to "PPO type5", refer to *page 53*.**
- 
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## 8.7 Profibus PNU (Module Type E5NP)

### 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
0000H	0H	Output frequency	0.01Hz
0000H	1H	Output current	0.01A
0000H	2H	Output voltage	0.1V
0000H	4H	Frequency setting	0.01Hz
0000H	6H	Motor torque	0.1%
0000H	7H	Converter output voltage	0.1V
0000H	8H	Regenerative brake duty	0.1%
0000H	9H	Electronic thermal relay function load factor	0.1%
0000H	AH	Output current peak value	0.01A
0000H	BH	Converter output voltage peak value	0.1V
0000H	DH	Output power	0.01kW

IND	PNU	Item	Increments
0000H	EH	Input terminal status *1	—
0000H	FH	Output terminal status *2	—
0000H	13H	Cumulative energization time	1h
0000H	16H	Actual operation time	1h
0000H	17H	Motor load factor	0.1%
0000H	18H	Cumulative power	1kWh
0000H	33H	PID set point	0.1%
0000H	34H	PID measured value	0.1%
0000H	35H	PID deviation	0.1%
0000H	3CH	Motor thermal load factor	0.1%
0000H	3DH	Inverter thermal load factor	0.1%

#### \*1 Input terminal monitor details

b15

b0

—	—	—	—	—	RES	—	MRS	—	RH	RM	RL	—	—	STR	STF
---	---	---	---	---	-----	---	-----	---	----	----	----	---	---	-----	-----

Functions of each terminal are assigned using Pr.178 to Pr.184. (Refer to the inverter manual for details)

#### \*2 Output terminal monitor details

b15

b0

—	—	—	—	—	—	—	—	—	—	—	ABC	FU	—	—	—	RUN
---	---	---	---	---	---	---	---	---	---	---	-----	----	---	---	---	-----

Functions of each terminal are assigned using Pr.190 to Pr.192. (Refer to the inverter manual for details)



**8.7.2 System environment variable (sev) area (IND = 01PPH (IND = 01H, PP = 00H, 01H))****● sev Interface (IND = 01H, PP = 00H, 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	965AH
0100H	3H	All parameter clear	99AAH
0100H	5H	Parameter clear *	5A96H
0100H	6H	All parameter clear *	AA99H

\* Communication parameters (Pr. 117 to Pr. 124, Pr. 338 to Pr.340, 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 ZSW on <i>page 70</i> for details.			
		• Run command			
		Bit	Name	Definition	
		1	Forward rotation command (STF signal)	0: OFF (Stop command) 1: ON (Forward rotation start)	A starting command is input to the inverter when the signal turns on. A stop command is given when both signals turn on simultaneously.
		2	Reverse rotation command (STR signal)	0: OFF (Stop command) 1: ON (Reverse rotation start)	
		3	High-speed operation command (terminal RH function) *1	Functions assigned to terminals RH, RM and RL are activated.	
		4	Middle-speed operation command (terminal RM function) *1		
		5	Low-speed operation command (terminal RL function) *1		
		7	Second function selection (RT signal)	1: Second function is selected	
		8	Terminal 4 input selection (AU signal)	1: Terminal 4 input is the main speed setting	
		10	Output stop (terminal MRS function) *1	Functions assigned to terminal MRS is activated.	
12	Inverter reset (terminal RES function) *1	Functions assigned to terminal RES is activated. *2			
Other than the above	–	Not used (0 is set)			
*1		Signal names are initial values. Using <i>Pr. 180 to Pr. 184</i> , you can change output signal functions. Refer to the inverter manual for details of <i>Pr. 180 to Pr. 184</i> .			
*2		Inverter reset function is invalid.			

### (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 terminal 2, 4 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%

● **Alarm History (IND = 01H, PP = 01H, sev\_II, block II)**

The past eight inverter alarm definitions can be read.

IND	PNU	Item	IND	PNU	Item
0101H	0H	Latest alarm *1	0101H	4H	Fifth alarm in past is read
0101H	1H	Second alarm in past is read	0101H	5H	Sixth alarm in past is read
0101H	2H	Third alarm in past is read	0101H	6H	Seventh alarm in past is read
0101H	3H	Forth alarm in past is read	0101H	7H	Eighth alarm in past is read

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

<Alarm data>

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

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
52H	E.ILF

Error Number	Definition
60H	E.OLT
70H	E.BE
80H	E.GF
81H	E.LF
90H	E.OHT
A1H	E.OP1
B0H	E.PE
B1H	E.PUE
B2H	E.RET
B3H	E.PE2
C0H	E.CPU

Error Number	Definition
C5H	E.IOH
C7H	E.AIE
C8H	E.USB
D8H	E.MB4
D9H	E.MB5
DAH	E.MB6
DBH	E.MB7
F1H	E. 1
F6H	E. 6
F7H	E. 7
FDH	E. 13

## 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 the 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	-	-	-
0300H	1H	901	AM terminal calibration *2	-	-	-
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	16H	922	Frequency setting voltage bias frequency (built-in potentiometer) *1	0.01Hz	0 to 400	0 to 9C40
0300H	17H	923	Frequency setting voltage gain frequency (built-in potentiometer) *1	0.01Hz	0 to 400	0 to 9C40

\*1 These parameters can be set for the Japanese version only.

\*2 This parameter can be set for the NA, EC and CH version 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	16H	922	Frequency setting voltage bias (built-in potentiometer) *	0.1%
0400H	17H	923	Frequency setting voltage gain (built-in potentiometer) *	0.1%

\* These parameters can be set for the Japanese version only.

# 9 TROUBLESHOOTING

If an alarm occurred in the inverter and the inverter and option unit do not function, refer to the following check points, find the cause from the operation panel indication of the inverter and the LED status of the option unit, and take an adequate action. If any of the causes does not apply to the alarm, a failure may have occurred. In that case, contact your sales representative.

Operation Panel of Inverter	LED of FR-A7NP	Possible Causes	Check Point
0.00	Off	Option unit does not function	Make sure that the option is fitted properly.
			Reset the inverter.
			Perform all parameter clear to return parameters to the initial value, then power on the inverter again.
		Network is instable	Make sure that the network cables between the nodes are connected properly.
			Make sure that the network cables are terminated.
			Check the network setting from the Profibus-DP Network Configuration Software.
Master does not exist in the network or does not function properly.	Check the other nodes for a network error.		
E.***	Red is lit	Inverter in error	Check the connection and operation of the Profibus-DP master.
			Refer to the inverter manual.

\* The error code of the inverter enters.



## REVISIONS

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

<b>Print Date</b>	<b>*Manual Number</b>	<b>Revision</b>
Feb., 2008	IB(NA)-0600346ENG-A	First edition