MITSUBISHI ELECTRIC

TRANSISTORIZED INVERTER

-INSTRUCTION MANUAL-

Profibus DP COMMUNICATION OPTION

FR-E5NP

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

This section is specifically about safety matters

Do not attempt to install, operate, maintain or inspect this product until you have read through this instruction manual and appended documents carefully and can use the equipment correctly. Do not use this product until you have a full knowledge of the equipment, safety information and instructions.
In this instruction manual, the safety instruction levels are classified into "WARNING" and "CAUTION".

⚠ WARNING	Assumes that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠ CAUTION	Assumes that incorrect handling may cause hazardous conditions, resulting in medium or slight injury, or may cause physical damage only.

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

SAFETY INSTRUCTIONS

1. Electric Shock Prevention

⚠ WARNING

- **While power is on or when the inverter is running, do not open the front cover. You may get an electric shock.**
- **Do not run the inverter with the front cover removed. Otherwise, you may access the exposed high-voltage terminals and charging part and get an electric shock.**
- **Even if power is off, do not remove the front cover except for wiring or periodic inspection. You may access the charged inverter circuits and get an electric shock.**
- **Before starting wiring or inspection, switch power off, wait for more than 10 minutes, and check for no residual voltage with a tester or the like.**

⚠ WARNING

- Any person who is involved in the wiring or inspection of this equipment should be fully competent to do the work.
- Always install the option unit before wiring. Otherwise, you may get an electric shock or be injured.
- Handle this option unit with dry hands to prevent an electric shock.
- Do not subject the cables to scratches, excessive stress, heavy loads or pinching. Otherwise, you may get an electric shock.

2. Injury Prevention

⚠ CAUTION

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

3. Additional instructions

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

(1) Transportation and mounting

⚠ CAUTION

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

(2) Test operation and adjustment

⚠ CAUTION

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

(3) Usage

⚠ WARNING
● Do not modify the equipment.

⚠ CAUTION
● When parameter clear or all parameter clear is performed, each parameter returns to the factory setting. Re-set the required parameters before starting operation. ● For prevention of damage due to static electricity, touch nearby metal before touching this product to eliminate static electricity from your body.

(4) Maintenance, inspection and parts replacement

⚠ CAUTION
● Do not test the equipment with a megger (measure insulation resistance).

(5) Disposal

⚠ CAUTION
● Treat as industrial waste.

(6) General instruction

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

CONTENTS

1.PRE-OPERATION INSTRUCTIONS

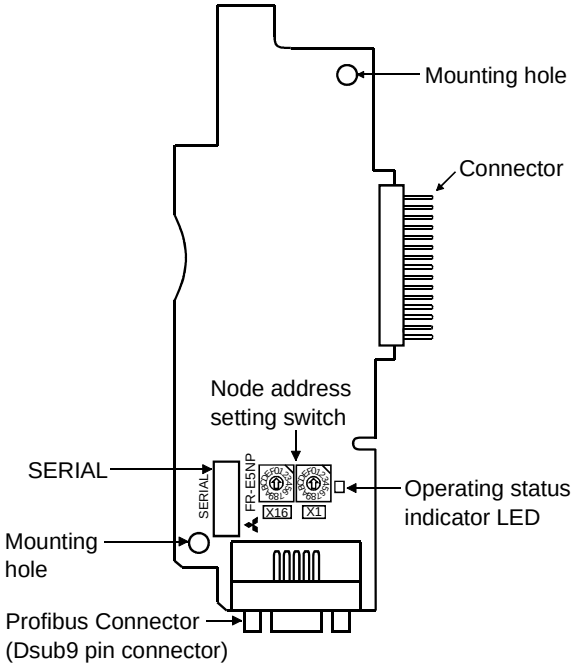
Take the option unit out of the package, check the unit name, and confirm that the product is as you ordered and intact.
This product is a plug-in option unit designed for exclusive use in the Mitsubishi FR-E500 series inverter (FR-E540-0.4K to 7.5K (-NA) (-EC) (-CH), FR-E520S-0.4K to 2.2K-EC (-CH)).

1.1 Packing Confirmation

Make sure that the package includes the following

- Instruction manual.....1
- Mounting screws M3 × 6 2
- LED indication sticker.....1

1.2 Structure



Name	Function	
Node address setting switches	Used to set the inverter node address between 0H and 7DH. For details, refer to page 4.	
Operating status indicator LED (green)	off	Communication stops
	on	During communication
Profibus connector (Dsub9 pin connector)	Used to connect a Profibus cable for Profibus communication (Refer to page 7.)	

1.3 Inverter Option Specifications

Type	Inverter inboard option, to be connected with a connector (can be mounted/dismounted to/from the inverter front face)
Number of node occupied	One inverter occupies one node.
Communication cable	For 12Mbps communication (compliant with EEIA-RS-485 standard)

* When the option unit (FR-E5NP) is plugged in, the protective structure (JEM1030) is open type (IP00).

1.4 Communication Specification

Communication speed	Wiring length 1200m maximum	9600bps, 19.2Kbps, 93.75Kbps
	Wiring length 600m maximum	187.5Kbps
	Wiring length 200m maximum	500Kbps, 1.5Mbps
	Wiring length 100m maximum	3Mbps, 6Mbps, 12Mbps

2.INSTALLATION

2.1 Pre-Installation Instructions

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

⚠ CAUTION

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

2.2 Inverter Node Address Setting

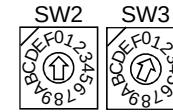
Set the node address of the inverter on the Profibus network.
Set the inverter node address before switching on the inverter and do not change the setting while power is on.
The node address may be set between 0_H and $7D_H$.

CAUTION

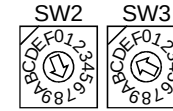
1. **Do not set the node address to $7E_H$ through FF_H.**
2. **Depending on the master module, 0_H, 1_H, 2_H, $7C_H$, $7D_H$ may not be used.**
3. **The node address changed while powering on the inverter is not made valid. The station number setting is made valid either after power is reapplied or when the RES signal turns on.**
4. **You cannot set the same node address to other devices on the network. (Such setting disables normal communication.)**

●Set the arrow (⇧) of the corresponding switch to the required numeral.
Example:

- For station number 1H: Set (⇧) of SW2 to "0" and (⇧) of SW3 to "1".

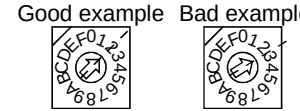


- For station number 7DH: Set (⇧) of SW2 to "7" and (⇧) of SW3 to "D".

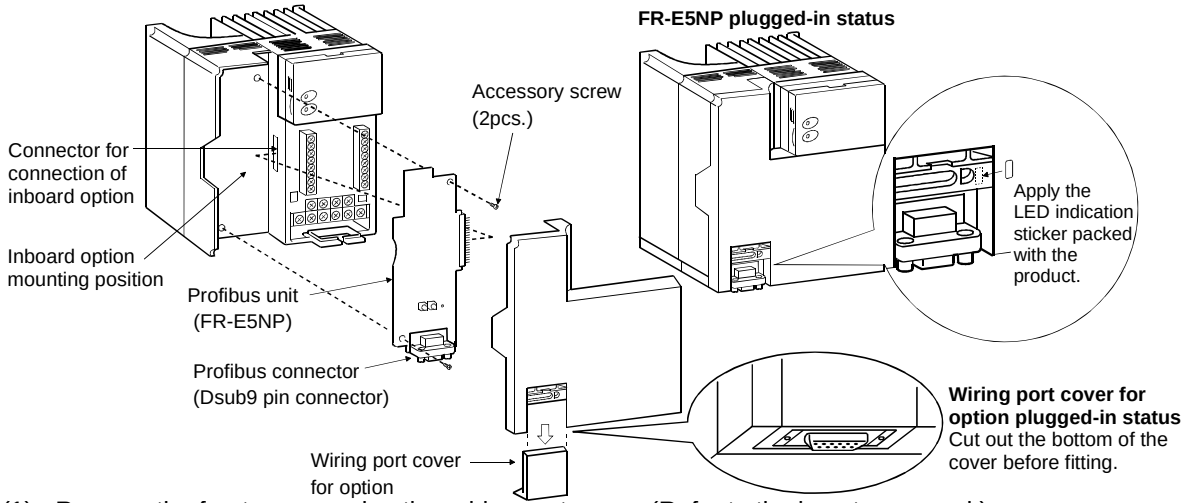


REMARKS

- Set each station number switch to the position of its numeral without error. If it is set to any position between numerals, normal data communication cannot be made.



2.3 Installation Procedure



(1) Remove the front cover and option wiring port cover. (Refer to the inverter manual.)

(2) Remove the sponge from the inboard option connector, align the option unit connector with the inboard option connector of the inverter, and securely insert it far enough into the inverter.

(3) Securely fix the two top and bottom places of the option unit to the inverter with the accessory mounting screws. If the screw holes do not line up, the connector may not have been plugged snugly. Check for looseness.

(4) Reinstall the front cover of the inverter. (Refer to the inverter manual.)

(5) Connect a Profibus communication cable to the Profibus connector (Dsub9 pin connector) of the option. (Refer to page 7 for a communication cable.)

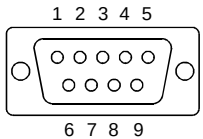
REMARKS

If the inverter cannot recognize the plugged-in option, the E.OPT error appears. (Refer to the inverter manual.)

2.3.1 Profibus Communication Cable

Make a network communication cable using a Dsub9 pin type male connector and a cable supporting 12Mbps communication.

(1) Pin arrangement of a connector

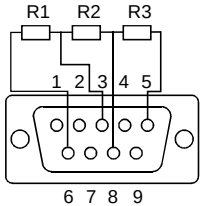


Dsub9 pin type male connector pin number	Signal	Application
1	SHIELD	Shield
2	N/C	Unconnected
3	RxD/TxD+	Receive/transmit + data
4	RTS *1	Control signal (transmission request from the inverter)
5	DGND *2	Data earth
6	+5VDC *2	Voltage output
7	N/C	Unconnected
8	RxD/TxD-	Receive/transmit - data
9	N/C	Unconnected

*1 It may not be necessary depending on the master module used.
*2 This signal is used to make the terminating resistor present.

(2) Terminating resistor

If the nodes at both ends of the network are the FR-E5NP and inverter, connect a connector with a built-in terminating resistor.



R1=390Ω±2% 1/4W
R2=220Ω±2% 1/4W
R3=390Ω±2% 1/4W

3. INVERTER SETTING

3.1 Parameter List

When this option unit is mounted, extended functions of the following parameters become available. Perform setting as required.

Parameter Number	Name	Setting Range	Minimum Setting Increments	Factory Setting	Refer to
338	Operation control command source	0, 1	1	0	17
339	Speed command source	0, 1	1	0	17
340	Link startup mode selection	0, 1, 10(*1)	1	0	13
500	Communication error recognition waiting time	0 to 999.8s	0.1s	0	19
501	Communication error occurrence count display	0	1	0	20
502	Communication error time stop mode selection	0, 1, 2	1	0	21

*1 The setting value of "10" is available with the upgraded inverter.
Refer to the inverter manual for the availability of this setting value.

3.2 Operation Mode

The inverter mounted with the option unit (FR-E5NP) has the following operation modes:

(1) PU operation [PU]..... Controls the inverter from the keyboard of the operation panel or parameter unit (FR-PU04) (referred to as the "PU") installed to the inverter.

(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 Profibus master module via the option unit (FR-E5NP). (The operation signal and running frequency can be entered from the control circuit terminals depending on the Pr. 338 "operation control command source" and Pr. 339 "speed command source" setting.)

3.2.1 Operation mode switching

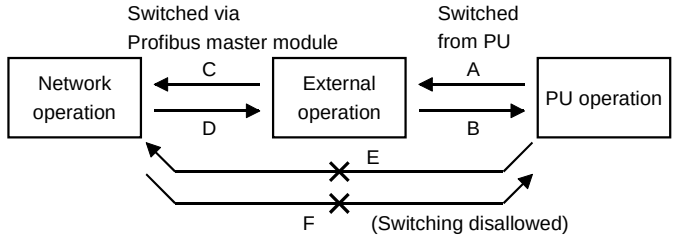
(1) Operation mode switching conditions

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.
   (For setting, use the inverter's operation panel or optional parameter unit.)

Pr. 79 Setting	Operation Mode Selection	Switching to Network Operation Mode
0	PU or external operation	Disallowed when the PU mode is selected. Allowed when the external mode is selected.
1	PU operation	Disallowed
2	External operation	Allowed
3, 4	External/PU combined operation	Disallowed
6	Switch-over	Allowed
7	External operation (PU operation interlock)	Allowed only in the external operation mode when the PU interlock signal (MRS) is on.
8	PU or external (signal switching)	Allowed only in the external operation mode (X16 on).

(2) Operation mode switching method



Symbol	Switching Type	Switching Method
A	PU operation → External operation	Operate the external operation key on the PU.
B	External operation → PU operation	Operate the PU operation key on the PU.
C	External operation → Network operation	Switched to the network operation mode via Profibus master module.
D	Network operation → External operation	Switched to the network operation mode via Profibus master module.
E	PU operation → Network operation	Switching disallowed. Allowed if external operation is selected in A and network operation is then selected in C. *1
F	Network operation → PU operation	Switching disallowed. Allowed if external operation is selected in D and PU operation is then selected in B. *1

*1 In the switch-over mode (Pr. 79 = 6) or when Pr. 340 = "10", switching in E and F is allowed. (Refer to page 16.)

CAUTION

1. **When "1" or "10" is set in Pr. 340 "link startup mode selection", the operation mode is network operation at power on or inverter reset.**
2. **When setting "1" or "10" in Pr. 340, the initial settings of the inverter must be made.**

(3) Link startup mode selection (Pr. 340)

The operation mode at power on and at restoration from instantaneous power failure can be selected.
To choose the network operation mode, set "1" or "10" in Pr. 340.
The Pr. 340 "link startup mode selection" value may be changed in any operation mode.
After the link has started, parameter write is enabled by the Profibus master module.

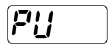
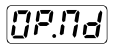
Pr. 340 Setting	Operation Mode		Mode at Power On or at Restoration from Instantaneous Power Failure
	Pr. 79		
0 (Factory Setting)	0	PU or external operation	Inverter operates in the external operation mode.
	1	PU operation	Inverter operates in the PU operation mode.
	2	External operation	Inverter operates in the external operation mode.
	3	External/PU combined operation	Inverter operates in the external/PU combined operation mode. Input running frequency from the PU and the start signal from outside.
	4	External/PU combined operation	Inverter operates in the external/PU combined operation mode. Input running frequency from outside and the start signal from the PU.
	6	Switch-over	Inverter operates in the external operation mode. Operation mode is switched while running.
	7	PU operation interlock	MRS signal ON ..... Inverter operates in the external operation mode. (Operation mode can be switched to the PU operation mode from the parameter unit.) MRS signal OFF ..... Inverter operates in the external operation mode.
	8	Operation mode switch-over by the external signal	X16 signal ON..... Inverter operates in the external operation mode. X16 signal OFF..... Inverter operates in the PU operation mode.

Pr. 340 Setting	Pr. 79	Operation Mode	Mode at Power On or at Restoration from Instantaneous Power Failure
1	0	PU or network operation	Inverter operates in the network operation mode. (Profibus master module need not be used for switching)
	1	PU operation	Inverter operates in the PU operation mode.
	2	Network operation	Inverter operates in the network operation mode. (Profibus master module need not be used for switching)
	3	External/PU combined operation	Inverter operates in the external/PU combined operation mode. Input running frequency from the PU and the start signal from outside.
	4	External/PU combined operation	Inverter operates in the external/PU combined operation mode. Input running frequency from outside and the start signal from the PU.
	6	Switch-over	Inverter operates in the network operation mode. Operation mode is switched while running. Refer to page 16 for details.
	7	PU operation interlock	MRS signal ON ..... Inverter operates in the network operation mode. (Operation mode can be switched to the external operation mode by the program.) MRS signal OFF ..... Inverter operates in the external operation mode.
	8	Operation mode switch-over by the external signal	X16 signal ON..... Inverter operates in the network operation mode. (Operation mode can be switched to the external operation mode by the program.) X16 signal OFF..... Inverter operates in the PU operation mode.

Pr. 340 Setting	Pr. 79	Operation Mode	Mode at Power On or at Restoration from Instantaneous Power Failure
10	0	PU or network operation	Inverter operates in the network operation mode. Operation mode can be switched between the PU operation and the network operation.
	1	PU operation	Inverter operates in the PU operation mode.
	2	Network operation	Inverter operates in the network operation mode.
	3	External/PU combined operation	Inverter operates in the external/PU combined operation mode. Input running frequency from the PU and the start signal from outside.
	4	External/PU combined operation	Inverter operates in the external/PU combined operation mode. Input running frequency from outside and the start signal from the PU.
	6	Switch-over	Inverter operates in the network operation mode. Operation mode can be switched between the PU operation and the network operation.
	7	PU operation interlock	MRS signal ON ..... Inverter operates in the external operation mode. (Operation mode can be switched to the PU operation mode by the parameter unit.) MRS signal OFF ..... Inverter operates in the external operation mode.
	8	Operation mode switch-over by the external signal	X16 signal ON..... Inverter operates in the external operation mode. X16 signal OFF..... Inverter operates in the PU operation mode.

When "0" or "6" is set in Pr. 79 when Pr. 340 = "10", the operation can be switched between the PU operation and the network operation from the operation panel or the parameter unit (FR-PU04).

• Operation panel

Use  display on the operation mode switching menu to change the operation mode to the PU operation mode and  display to the network operation mode.

• FR-PU04

Use PU to change the operation mode to the PU operation and EXT to the network operation.

(4) Switch-over mode

You can select between PU operation, external operation and network operation.

Operation Mode Switching	Switching Operation/Operating Status
External operation to PU operation	Change the operation mode to the PU operation mode from the operation panel or parameter unit. •Rotation direction is the same as that of external operation. •Set frequency is as set by the potentiometer (frequency setting potentiometer). (Note that the setting will disappear when power is switched off or the inverter is reset.)
External operation to network operation	Mode change command to the network operation mode is transmitted from the network. •Rotation direction is the same as that of external operation. •Set frequency is as set by the potentiometer (frequency setting potentiometer). (Note that the setting will disappear when power is switched off or the inverter is reset.)
PU operation to external operation	Press the external operation key of the parameter unit. •Rotation direction is determined by the external operation input signal. •Set frequency is determined by the external frequency setting signal.
PU operation to network operation	Mode change command to the network operation mode is transmitted from the network. •Rotation direction and set frequency are the same as those of PU operation.
Network operation to external operation	The switch-over command to the external operation mode is sent from the network. •Rotation direction is determined by the external operation input signal. •Set frequency is determined by the external frequency setting signal.
Network operation to PU operation	Select the PU operation mode with the operation panel or parameter unit. •Rotation direction and set frequency are the same as those of network operation.

3.3 Operation and Speed Command Source

In the network operation mode, commands from the external terminals and Profibus master module are as listed below.

Control location selection	Pr. 338 "operation control command source"	0: NET	0: NET	1: External	1: External	Remarks
	Pr. 339 "speed command source"	**0: NET**	**1: External**	**0: NET**	**1: External**	
Fixed functions (Functions equivalent to terminals)	Forward rotation command (STF)	NET	NET	External	External	
	Reverse rotation command (STR)	NET	NET	External	External	
	Reset (RES)	Combined	Combined	Combined	Combined	
	Network operation frequency	NET	—	NET	—	
	2	—	External	—	External	
	4	—	External	—	External	

Control location selection			Pr. 338 "operation control command source"	0: NET	0: NET	1: External	1: External	Remarks
			Pr. 339 "speed command source"	**0: NET**	**1: External**	**0: NET**	**1: External**	
Selective functions	Pr. 180 to Pr. 183 settings	0	Low-speed operation command/ Remote setting clear (RL)	NET	External	NET	External	Pr. 59≠"0": Remote setting
		1	Middle-speed operation command/ Remote setting deceleration (RM)	NET	External	NET	External	
		2	High-speed operation command/ Remote setting acceleration (RH)	NET	External	NET	External	
		3	Second function selection (RT)	NET	NET	External	External	
		4	Current input selection (AU)	—	Combined	—	Combined	
		5	Start self-holding selection (STOP)	—	—	External	External	
		6	Output shut-off (MRS)	Combined	Combined	External	External	*1
		7	External thermal relay input (OH)	External	External	External	External	
		8	15-speed selection (REX)	NET	External	NET	External	Pr. 59 = 0
		16	PU operation-external (network) operation switching (X16)	External	External	External	External	
		18	Magnetic flux-V/F switching (X18)	NET	NET	External	External	

External : Control by signal from external terminal is only valid.
NET : Control from network is only valid.
Combined : Control from both external terminal and network is valid.
— : Control from both external terminal and network is invalid.

*1 When "7" (PU operation interlock function) is set in Pr. 79 "operation mode selection", only the external terminal is made valid independently of the Pr. 338 and Pr. 339 settings, since this function is also used by terminal MRS.

3.4 Operation at Communication Error Occurrence

3.4.1 Operation selection at communication error occurrence

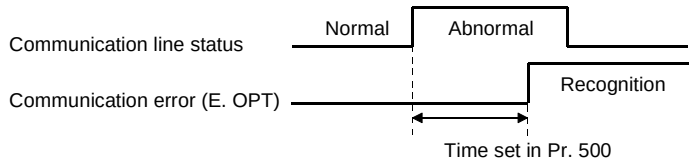
You can select operations at communication error occurrences by setting Pr. 500 to Pr. 502 under network operation.

- Parameter setting

1) Pr. 500 "communication error recognition waiting time"

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

Parameter Number	Setting Range	Minimum Setting Increments	Factory Setting
500	0 to 999.8s	0.1s	0

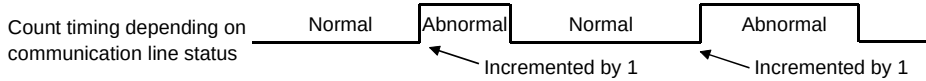


If the communication line fault still persists after the time set in Pr. 500 has elapsed, it is recognized as a communication error.
When the fault is restored to normal communication within the set time, it is not regarded as a communication error and operation continues.

2) Pr. 501 "communication error occurrence count display"

The cumulative number of communication error occurrences can be indicated. Write 0 to erase this cumulative count.

Parameter Number	Setting Range	Minimum Setting Increments	Factory Setting
501	0	1	0



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

CAUTION

The communication error occurrence count is stored into RAM temporarily. Since this data is stored in E^2PROM at one-hour intervals, performing power-on reset or inverter reset may cause the Pr. 501 data to be the value stored in E^2PROM the last time depending on the reset timing.

3) Pr. 502 "communication error-time stop mode selection"

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

Parameter Number	Setting Range	Minimum Setting Increments	Factory Setting
502	0, 1, 2	1	0

(About setting)

Fault	Pr. 502 Setting	At Fault Occurrence			At Error Recognition after Elapse of Pr. 500 Time			At Fault Removal		
		Operation	Indication	Alarm output	Operation	Indication	Alarm output	Operation	Indication	Alarm output
Communication line	0	Continued *	Normal indication *	Not provided *	Coast to stop	E.OPT lit	Provided	Kept stopped	E.OPT kept lit	Kept provided
	1				Decelerated to stop	E.OPT lit after stop	Provided after stop			
	2						Not provided	Restart	Normal indication	Not provided
Option itself	0	Coast to stop	E. 3 lit	Provided	Coast to stop	E. 3 lit	Provided	Kept stopped	E. 3 kept lit	Kept provided
	1, 2	Decelerated to stop	E. 3 lit after stop	Provided after stop	Decelerated to stop	E. 3 lit after stop	Provided after stop			

* If the fault status returns to the normal communication status within the time set in Pr. 500, communication line fault (E.OPT) does not occur.

CAUTION

1. **A communication line fault [E.OPT (alarm data: HA0)] is a fault that occurs on the communication line, and a fault of the option unit itself [E. 3 (alarm data: HF3)] is a communication circuit fault in the option.**
2. **The alarm output is the ABC contact output or alarm bit output.**
3. **When the setting was made to provide an alarm output, the fault definition is stored into the alarm history.**
   (The fault definition is written to the alarm history when an alarm output is provided.)
   When no alarm output is provided, the fault definition overwrites the alarm indication of the alarm history temporarily, but is not stored.
   After the fault is removed, the alarm indication is reset and returns to the ordinary monitor, and the alarm history returns to the preceding alarm indication.
4. **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).**
5. **The acceleration time at a restart is the ordinary acceleration time setting (e.g. Pr. 7, Pr. 44).**
6. **When the Pr. 502 setting is "2", the operation/speed command at a restart is the one given before the fault occurrence.**
7. **When a communication line fault occurs at the Pr. 502 setting of "2", removing the fault during deceleration causes acceleration to restart at that point.**
   (Acceleration is not restarted if the fault is that of the option unit itself.)

3.4.2 Alarm and measures

(1) The inverter operates as follows at alarm occurrences

Fault Location	Status		Operation Mode		
			PU operation	External operation	Network operation
Inverter alarm	Inverter operation		Inverter trip	Inverter trip	Inverter trip
	Data communication		Continued	Continued	Continued
Communication line	Inverter operation		Continued	Continued	Inverter trip (Depends on the Pr. 502 setting)
	Data communication		Stop	Stop	Stop
Option itself	Communication option connection fault	Inverter operation	Inverter trip (Depends on the Pr. 502 setting)	Inverter trip (Depends on the Pr. 502 setting)	Inverter trip (Depends on the Pr. 502 setting)
		Data communication	Continued	Continued	Continued
	FR-E5NP alarm	Inverter operation	Continued	Continued	Inverter trip (Depends on the Pr. 502 setting)
		Data communication	Stop	Stop	Stop

(2) Measures at alarm occurrences

Alarm Indication	Alarm Definition	Measures
E. OPT	Communication line alarm	Check the LED states of the option unit (FR-E5NP) and remove the cause of the alarm. (Refer to page 2 for the LED indication status) Check the Profibus master module.
E. 3	Option alarm	Check the connection between the inverter and option unit (FR-E5NP) for poor contact, etc. and remove the cause of the alarm.

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

3.4.3 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
Profibus master module	Inverter reset • Inverter reset can be made any time.	Allowed	Disallowed	Disallowed
	Error reset at inverter fault • Reset can be made only when the protective function of the inverter is activated.	Allowed	Allowed	Allowed
Connect terminals RES-SD		Allowed	Allowed	Allowed
Switch off inverter power		Allowed	Allowed	Allowed

CAUTION

1. **When a communication line fault has occurred, reset cannot be made from the Profibus master module.**
2. **The inverter is set to the external operation mode if it has been reset in the network operation mode.**
   To resume the network operation, the inverter must be switched to the network operation again.
   (When "1" or "10" is set in Pr. 340 "link startup mode selection", switching is not needed. Refer to page 13.)
3. **Communication stops for about 1s during inverter reset.**

4. FUNCTION OVERVIEW

4.1 Function Overview

The following table lists the functions which can be executed from the master module:

Control Location	Item	Operation Mode		
		PU operation	External operation	Network operation
Profibus	Operation command	Disallowed	Disallowed	Allowed (*4)
	Running frequency setting	Disallowed	Disallowed	Allowed (*4)
	Monitoring	Allowed	Allowed	Allowed
	Parameter write	Disallowed (*3)	Disallowed (*3)	Allowed (*3)
	Parameter read	Allowed	Allowed	Allowed
	Inverter reset	Disallowed	Disallowed	Allowed (*1)
	Error reset at inverter fault	Allowed (*1)	Allowed (*1)	Allowed (*1)
	Stop command (*2)	Disallowed	Disallowed	Allowed
Control circuit terminal	Inverter reset terminal	Allowed	Allowed	Allowed
	Operation command	Disallowed	Allowed	Allowed (*4)
	Frequency setting	Disallowed	Allowed	Allowed (*4)

*1 At occurrence of a communication line fault, the inverter cannot be reset from the master module. (For inverter reset, refer to the inverter manual.)
*2 As set in Pr. 75 "PU stop selection".
*3 As set in Pr. 77 "parameter write disable selection".
For parameters write-enabled during operation, refer to the inverter manual.
*4 As set in Pr. 338 and Pr. 339 (Refer to page 17.)

REMARKS

1. The inverter operates in the external operation mode if it is reset from the master module in the network operation mode.
The setting any one of "1 or 10" in Pr. 340 selects network operation mode.

4.1.1 Output from inverter to master module

- Monitor function

  The following items can be monitored by the master module:

  (1)Output frequency ..... 0.01Hz/bit (Refer to pages 42, 53, 60)
  (2)Output current ..... 0.01A/bit (Refer to pages 53, 60.)
  (3)Output voltage..... 0.1V/bit (Refer to pages 53, 60.)
  (4)Alarm definition ..... (Refer to pages 55, 64.)
  (5)Inverter status

  Inverter output signal can be monitored by the PNU. (Refer to pages 41, 50.)

Output Definition (Signal)	Output Definition (Signal)
Forward running	Overload alarm (OL)
Reverse running	Inverter running (RUN)
Frequency detection (FU)	Up to frequency (SU)
Alarm output (ABC)	

- Parameter read

  Parameters of the inverter can be read to the master module. (Refer to pages 38, 47.)
  For the parameter data code list, refer to the inverter manual.

4.1.2 Input from master module to inverter

- Operation command
  Any of the following commands can be output from the master module to the inverter as an operation command any time (Refer to pages 40, 42, 62.):

Terminal	Operation Command (Signal)	Terminal	Operation Command (Signal)
STF	Forward rotation command (STF)	STR	Reverse rotation command (STR)
RH	High speed operation command (RH) *1	RM	Middle speed operation command (RM) *1
RL	Low speed operation command (RL) *1	MRS	Output stop (MRS)

*1 These are factory-set signals. Input signals can be changed by input terminal function selection (Pr. 180 to Pr. 182). Note that some signals do not accept a command from the master module according to the settings. Refer to page 17 for details.

CAUTION

Input signals from the MRS terminal can be changed using Pr. 183. However, use the factory-set signal to prevent malfunction.

- Set frequency
  The set frequency is written from the master module to the inverter when it is changed. (Refer to pages 42, 63.)

- Parameter write
  Functions can be written from the master module to the inverter. Note that write during inverter operation will result in a mode error. (Refer to pages 38, 47.)
  For the parameter data code list, refer to the inverter manual.

- Inverter reset
  You can reset the inverter or reset an inverter error. (Refer to pages 40, 54, 61.)

5.Profibus Device Data

5.1 Device Data (GSD file)

MEAU089E.GSD is a GSD file designed to recognize the features and functions of the Profibus DP devices of the FR-E5NP.
You can obtain it from us. Please contact your sales representative.
When editing this file, use a text editor.
For the way to install it, refer to the instruction manual of the Profibus-DP Configuration Software.
Although this product complies with PPO specification, it includes specification which do not support PPO specification. This manual states the section supporting PPO specification as PPO specification and the section not supporting PPO as PPO non support specification.

CAUTION

You can not use the device data which does not include PPO support specification (data produced before May 2002).

<MEAU089E.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-E5NP"	Product name
Revision	"Revision 2.00"	Product version
Ident_Number	089EH	Device number obtained from Profibus Nutzer Organization
Protocol_Ident	0	Profibus-DP is 0 fixed.
Station_Type	0	DP slave is 0 fixed.
FMS_Supp	0	FMS (Field-Bus Message Specifications) not supported.
Hardware_Release	"Series A"	Hardware version

Parameter	Value	Description*1
Software_Release	"Revision 2.00"	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
3.0M_supp	1	Communication speed 3.0Mbps support
6.0M_supp	1	Communication speed 6.0Mbps support
12.0M_supp	1	Communication speed 12.0Mbps support
MaxTsdr_9.6	60	Longest time 60 bit times at communication speed 9600bps
MaxTsdr_19.2	60	Longest time 60 bit times at communication speed 19.2Kbps
MaxTsdr_93.75	60	Longest time 60 bit times at communication speed 93.75Kbps
MaxTsdr_187.5	60	Longest time 60 bit times at communication speed 187.5Kbps
MaxTsdr_500	100	Longest time 100 bit times at communication speed 500Kbps
MaxTsdr_1.5M	150	Longest time 150 bit times at communication speed 1.5MKbps
MaxTsdr_3.0M	250	Longest time 250 bit times at communication speed 3.0Mbps
MaxTsdr_6.0M	450	Longest time 450 bit times at communication speed 6.0Mbps
MaxTsdr_12.0M	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.

Parameter	Value	Description*1
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 non-support
Max_Diag_Data_Len	6	Diagnostic data of 6 bytes secured (no external diagnosis)
Slave_Family	1	Drives defined as function class (Main Family)
PrmText	1	Text selection 1 registration
Text(0)	"No byte swapping"	If Bit 0 = 0, "No byte swapping"
Text(1)	"Byte swapping"	If Bit 0 = 1, "Byte swapping"
EndPrmText		
ExtUserPrmData	1 "Byte swapping"	Byte swapping selection 1 registration on text base
Bit(0) 0 0-1		Bit 0 = default 0, range 0 to 1
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

Parameter	Value	Description*1
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	"E5NP" 75H	E5NP 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.

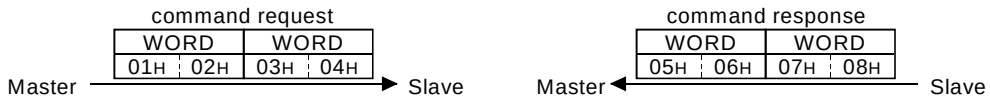
5.2 Slave User Parameter

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".

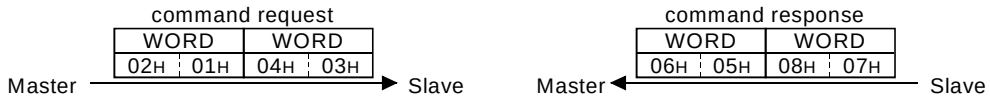
Address	Function															
0H	For maker setting (Value should be "1" fixed.)															
1H	15 Bit	14 Bit	13 Bit	12 Bit	11 Bit	10 Bit	9 Bit	8 Bit	7 Bit	6 Bit	5 Bit	4 Bit	3 Bit	2 Bit	1 Bit	0 Bit
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0:Byte swapping invalid 1:Byte swapping valid

Example

•Byte swapping invalid (address1H(Bit0)=0)



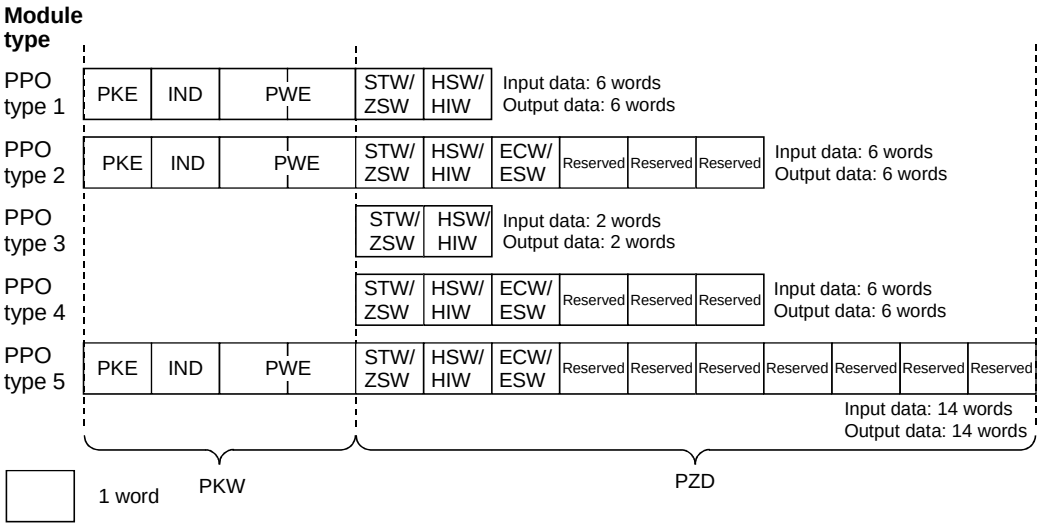
•Byte swapping valid (address1H(Bit0)=1)



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

6.Profibus PROFILES—PPO Support Specification

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, Module type "PPO type 1" to "PPO type 5", "E5NP". This chapter explains the profiles of Module type "PPO type1" to "PPO type 5". Refer to page 44 for the profile of Module type "E5NP". Module type is changed with the slave module setting. For details, refer to the instruction manual of the Network Master Configuration Software.
The configuration of PPO type is as follows.



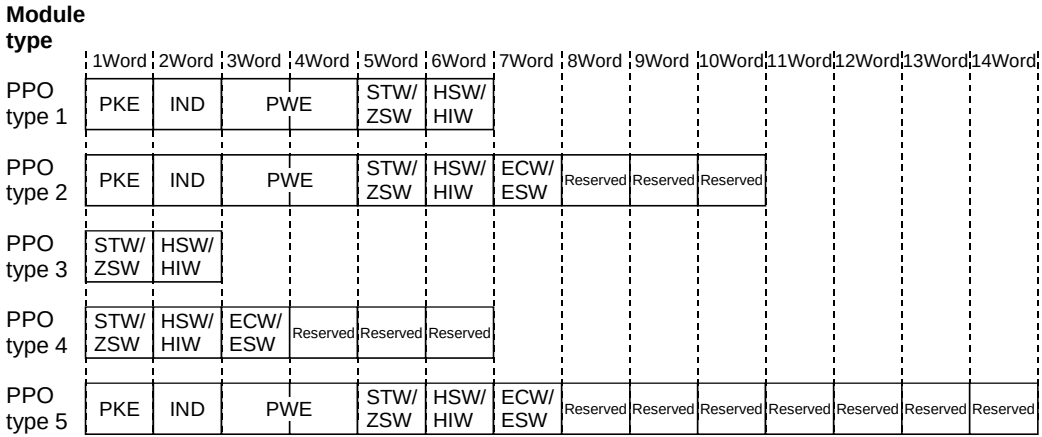
6.1 ID definitions

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

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

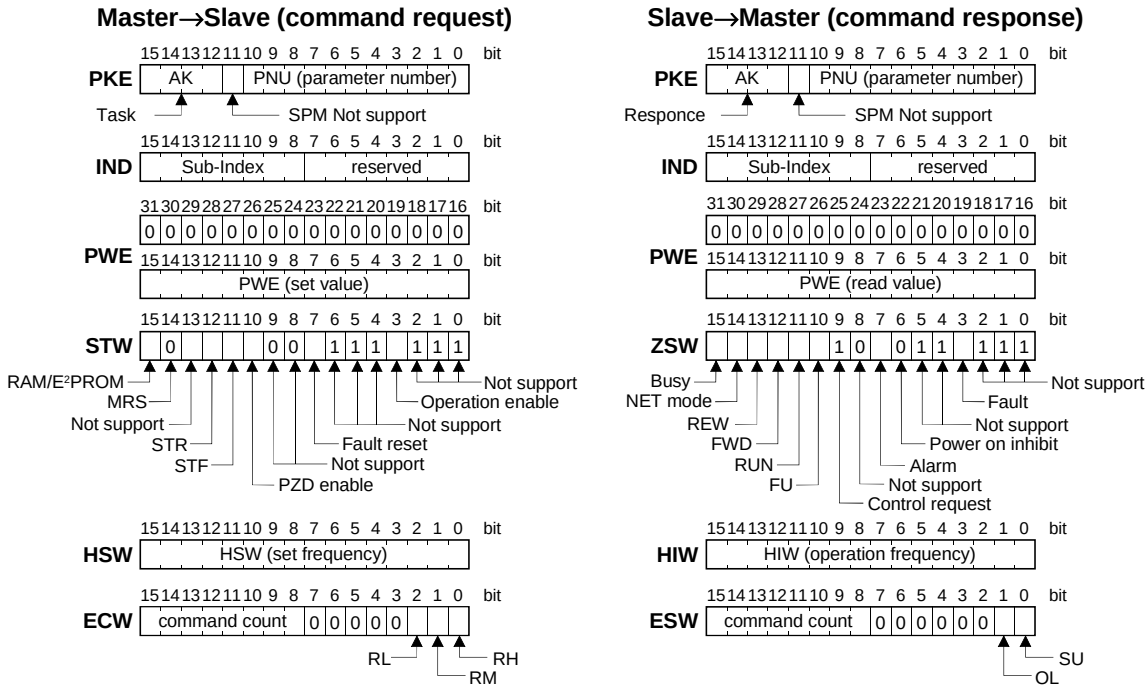
6.2 Buffer memory map

The following shows the buffer memory map of the PPO type 1 to PPO type 5 Profibus profiles.



6.3 Buffer Memory Configuration

The buffer memory configuration is shown below.



For buffer memory details, refer to page 38.

6.4 Buffer Memory Details

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

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

<table>
<tr><th colspan="2">Name</th><th>Bit</th><th>Description</th></tr>
<tr><td rowspan="2">PKW</td><td rowspan="2">PWE</td><td>0 to 15</td><td>PNU read value/write value
When command response AK = 7 (command execution error), PWE definition is as follows.
<table>
<tr><th></th><th>Error Definition</th></tr>
<tr><td>0</td><td>Invalid PNU</td></tr>
<tr><td>1</td><td>Parameter value unchangeable (This error also occurs when Pr. 77 = 1)</td></tr>
<tr><td>2</td><td>Outside setting range</td></tr>
<tr><td>3</td><td>Invalid Sub-Index number</td></tr>
<tr><td>4</td><td>No array</td></tr>
<tr><td>11</td><td>No parameter change right</td></tr>
<tr><td>18</td><td>Other error *1</td></tr>
</table>
<table>
<tr><th>*1 Error Definition</th></tr>
<tr><td>• 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
• Calibration error (Pr. 900 and later)
• Reset disabled error (per Pr. 75 reset input specification)</td></tr>
</table></td></tr>
<tr><td>16 to 31</td><td>Not used (0 is set)</td></tr>
</table>

Name			Bit	Description
PZD	STW	-	0 to 2	Not used (1 is set)
		Control enable	3	0: Inverter output shutoff 1: Inverter output shutoff is cancelled
		-	4 to 6	Not used (1 is set)
		Fault reset	7	[At inverter error] 0: No action 1: Inverter reset (error reset) [When inverter is normal] No action
		-	8 to 9	Not used (0 is set)
		PZD enable	10	0: Command request of PZD is not processed. (*1) 1: Command request of PZD is processed. • At power-on or inverter reset, set 1 once.
		STF signal	11	0: OFF 1: ON (Forward rotation command)
		STR signal	12	0: OFF 1: ON (Reverse rotation command)
		-	13	Not used (0 is set)
		MRS terminal	14	0: MRS-OFF 1: MRS-ON (Output shutoff) Functions are changed depending on the Pr.183 setting. However, do not change the factory-set value "6".
		RAM/ E^2PROM	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 E^2PROM.

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

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

Name			Bit	Description
PZD	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. During busy status, 0 is returned for all Bits except for Bit 15.
	HSW		0 to 15	Set frequency (0.01 Hz increments)
	HIW		0 to 15	Running frequency (0.01 Hz increments)
	ECW	RH terminal	0	0:RH-OFF 1:RH-ON Factory-set to high-speed operation command Pr. 182 can be used to change the signal. *1
		RM terminal	1	0:RM-OFF 1:RM-ON Factory-set to middle-speed operation command Pr. 181 can be used to change the signal. *1
		RL terminal	2	0:RL-OFF 1:RL-ON Factory-set to low-speed operation command Pr. 180 can be used to change the signal. *1
		-	3 to 7	Not used (0 is set)
		Command count	8 to 15	Used by the master to recognize the command response.

*1 Refer to the inverter manual for details of the input terminal function selection (Pr. 180 to Pr. 183).

Name			Bit	Description
PZD	ESW	SU signal	0	0: OFF 1: ON (Up to frequency)
		OL signal	1	0: OFF 1: ON (Overload alarm)
		-	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)

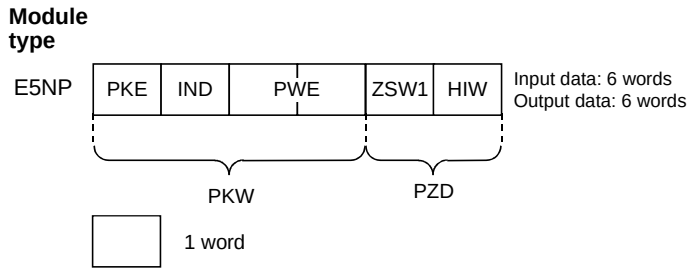
6.4.1 Points to note

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

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

7.Profibus PROFILES—PPO Non Support Specification

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 type 1" to "PPO type 5", "E5NP". This chapter expalins the Module type "E5NP" profile. For the Module type "PPO type 1" to "PPO type 5" profiles, refer to page 34. Module type is changed with the slave module setting. For details, refer to the instruction manual of the Network Master Configuration Software.
The configuration of "E5NP" is as follows.



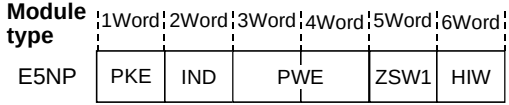
7.1 ID definitions

ID		Description
PKW	PKE	PNU number (PNU) and task or response Id (AK)
	IND	Index number
	PWE1	Not used and must be set to 0
	PWE2	Parameter value
PZD	ZSW1	Bits 0 to 7: Inverter Status (command response) Bits 8 to 14: Command Count (command request/response)
	HIW	Reserved area for extension

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

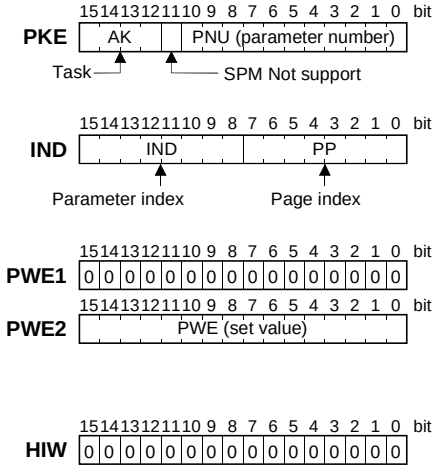
7.2 Buffer memory map

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

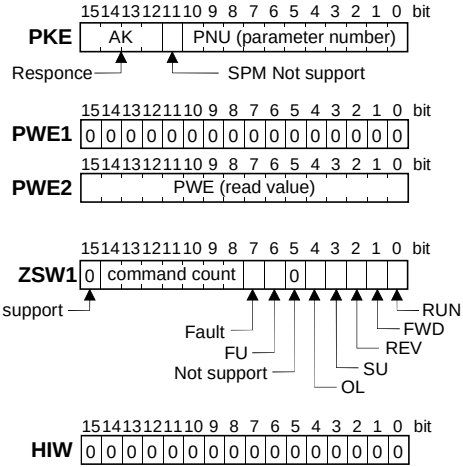


7.3 Buffer Memory Configuration

Master→Slave (command request)



Slave→Master (command response)



For buffer memory details, refer to page 47.

7.4 Buffer Memory Details

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

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

Name			Bit	Description
PKW	IND	PP	0 to 7	Page Index: If IND = 01 (system environment variables(sev)), the PP values specify different blocks of sev's: PP=0 : sev_I, block I PP=1 : sev_II, block II (alarm history) PP=2 : sev_III, block III For details, refer to page 61. If IND is other than 01, set PP to 0.
		IND	8 to 15	Parameter Index: Specifies the area from which the Specific Parameter Number (PNU) is being accessed (Refer to page 60.): IND = 0_H: real-time monitor area IND = 1_H: system environment variable area (3 blocks) IND = 2_H: normal parameter area IND = 3_H: Pr. 900 to frequency parameter area IND = 4_H: Pr. 900 to % parameter area

<table>
<tr><th colspan="2">Name</th><th>Bit</th><th>Description</th></tr>
<tr><td rowspan="2">PKW</td><td>PWE1</td><td>0 to 15</td><td>Not used (0 is set)</td></tr>
<tr><td>PWE2</td><td>0 to 15</td><td>PNU read value/write value
When command response AK = 7 (command execution error), PWE definition is as follows.
<table><tr><th></th><th>Error Definition</th></tr><tr><td>0H</td><td>No error</td></tr><tr><td>1H</td><td>Unsupported task (including busy writing state)</td></tr><tr><td>2H</td><td>Invalid Index (IND)</td></tr><tr><td>3H</td><td>Invalid PNU</td></tr><tr><td>4H</td><td>Dual-port RAM read failure</td></tr><tr><td>5H</td><td>Dual-port RAM write failure</td></tr><tr><td>6H</td><td>Invalid page index (PP)</td></tr><tr><td>41H</td><td>Mode error</td></tr><tr><td>42H</td><td>Instruction code error</td></tr><tr><td>43H</td><td>Data setting range error</td></tr></table></td></tr>
</table>

Name			Bit	Description	
PZD	ZSW1	RUN signal	0	0: OFF 1: ON (Inverter running)	For master-to-slave messages, Bits 0-7 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).
		FWD signal	1	0: OFF 1: ON (Forward rotation operation being performed)	
		REV signal	2	0: OFF 1: ON (Reverse rotation operation being performed)	
		SU signal	3	0: OFF 1: ON (Up to frequency)	
		OL signal	4	0: OFF 1: ON (Overload alarm)	
		-	5	Not used	
		FU signal	6	0: OFF 1: ON (Output frequency being detected)	
		Fault	7	0: Inverter normal 1: Inverter alarm occurrence	
		-	8 to 14	Command count. The command count is an optional feature maintained by the Profibus master and can range from 00H-7FH. The option unit copies the command count from the command it receives to the same byte offset in the response it sends. The master may use this to synchronize commands and responses.	
		-	15	Not used (0 is set)	
	HIW		0 to 15	Not used (0 is set)	

7.4.1 Points to note

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

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

8.PARAMETER DEFINITIONS—PPO Support Specification

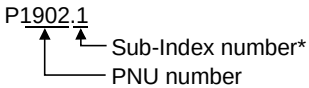
8.1 Outline of PNU

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 60.

(1) PNU data definition



* When the data type is "with array", the Sub-Index number is included in the PNU.

(2) PNU data type
The PNU has the data types of "Array Unsigned 16" and "Unsigned 16".

Array Unsigned 16 Abbreviation:AUs16 P1902.1 Sub-Index number	With array
Unsigned 16 Abbreviation:Us16 P1200	Without array

CAUTION

When the data type is "with array", include the Sub-Index number in the PNU.

8.2 Profibus PNU

8.2.1 Real-time monitor

The following items can be monitored from the master.

PNU	Item	Unit	Data Type
P1.1	Output frequency	0.01Hz	AUs16
P1.2	Output current	0.01A	AUs16
P1.3	Output voltage	0.1V	AUs16

8.2.2 Parameter clear

Parameter clear can be performed from the master.

PNU	Item	Data Definition	Data Type
P2.2	Parameter clear	$965A_H$	AUs16
P2.3	Parameter all clear	$99AA_H$	AUs16
P2.5	Parameter clear *	$5A96_H$	AUs16
P2.6	Parameter all clear *	$AA99_H$	AUs16
P2.8	Error history clear	0000_H	AUs16

* Communication parameters (Pr. 117 to Pr. 124, Pr. 331 to Pr. 342) are not cleared.

8.2.3 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 : 10_H PU : 11_H (Pr. 79 = "6") NET : 14_H	Us16

8.2.4 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 (E^2PROM) read	Set frequency (E^2PROM) is read.	AUs16

8.2.5 Terminal input read

The setting of the No. 2 terminal can be read.

PNU	Item	Data Definition	Data Type
P5	No. 2 terminal input value read	No. 2 terminal input value (%) is read.	Us16

8.2.6 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 to the master.	Us16

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

8.2.7 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

8.2.8 Alarm history

The eight past error definitions of the inverter can be read.

PNU	Item	Data Definition	Data Type
P947.1 to P947.8	Error history No. 1 read	P947.1 :Error number P947.2 to P947.8 :All 0	AUs16
P947.9 to P947.16	Error history No. 2 read	P947.9 :Error number P947.10 to P947.16 :All 0	AUs16
P947.17 to P947.24	Error history No. 3 read	P947.17 :Error number P947.18 to P947.24 :All 0	AUs16
P947.25 to P947.32	Error history No. 4 read	P947.25 :Error number P947.26 to P947.32 :All 0	AUs16
P947.33 to P947.40	Error history No. 5 read	P947.33 :Error number P947.34 to P947.40 :All 0	AUs16
P947.41 to P947.48	Error history No. 6 read	P947.41 :Error number P947.42 to P947.48 :All 0	AUs16
P947.49 to P947.56	Error history No. 7 read	P947.49 :Error number P947.50 to P947.56 :All 0	AUs16
P947.57 to P947.64	Error history No. 8 read	P947.57 :Error number P947.58 to P947.64 :All 0	AUs16

(1) Error numbers

Error Number	Definition
00H	No alarm
10H	E.OC1
11H	E.OC2
12H	E.OC3
20H	E.OV1
21H	E.OV2
22H	E.OV3
30H	E.THT

Error Number	Definition
31H	E.THM
40H	E.FIN
60H	E.OLT
70H	E.BE
80H	E.GF
81H	E.LF
90H	E.OHT
A0H	E.OPT

Error Number	Definition
B0H	E.PE
B1H	E.PUE
B2H	E.RET
C0H	E.CPU
F3H	E. 3
F6H	E. 6
F7H	E. 7

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

8.2.9 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

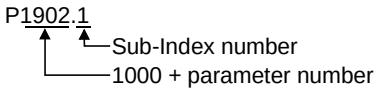
PNU	Usable PNU number
P980.1	P.1
P980.2	P.2
P980.3	P.3
⋮	⋮
P981.87	0 (*1)

*1 When 0 is stored, read is terminated.

8.3 Standard Parameters

You can use the PNU to make parameter settings from the network.
Standard parameter examples are introduced below. Refer to the examples and make parameter settings.
For the parameter data and details, refer to the inverter and option manuals.

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



Parameter Number	PNU	Name	Minimum Setting Increments	Setting Range		Data Type	Remarks
				Decimal	Hexadec-imal		
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-E5NP. (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	Remarks
				Decimal	Hexadec-imal		
902	P1902.1	Frequency setting voltage bias (frequency)	0.01Hz	0 to 60	0 to 1770	AUs16	
	P1902.2	Frequency setting voltage bias (%)	0.1%	-	-	AUs16	
903	P1903.1	Frequency setting voltage gain (frequency)	0.01Hz	1 to 400	64 to 9C40	AUs16	
	P1903.2	Frequency setting voltage gain (%)	0.1%	-	-	AUs16	
904	P1904.1	Frequency setting current bias (frequency)	0.01Hz	0 to 60	0 to 1770	AUs16	
	P1904.2	Frequency setting current bias (%)	0.1%	-	-	AUs16	
905	P1905.1	Frequency setting current gain (frequency)	0.01Hz	1 to 400	64 to 9C40	AUs16	
	P1905.2	Frequency setting current gain (%)	0.1%	-	-	AUs16	

9.PARAMETER DEFINITIONS—PPO Non Support Specification

9.1 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 "E5NP".

CAUTION

Parameter definitions differ according to the Module type selected. When using "PPO type 1" to "PPO type 5", refer to page 52.

9.2 Profibus PNU (Module type E5NP)

9.2.1 Real-time monitor (IND = 0000H)

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

9.2.2 System environment variable (sev) area (IND = 01PP$_H$)

SEV Interface (IND = 0100$_H$, PP = 00, SEV_I, Block I)

(1) Parameter clear

Parameter clear can be performed from the master.

IND	PNU	Item	Data Definition
0100$_H$	1$_H$	Inverter reset	
0100$_H$	2$_H$	Parameter clear	WriteVal = 965A$_H$
0100$_H$	3$_H$	Parameter all clear	WriteVal = 99AA$_H$
0100$_H$	5$_H$	Parameter clear *	WriteVal = 5A96$_H$
0100$_H$	6$_H$	Parameter all clear *	WriteVal = AA99$_H$

* Communication parameters (Pr. 117 to Pr.124, Pr. 331 to Pr. 342) are not cleared.

(2) Inverter status/operation command

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

<table>
<tr><th>IND</th><th>PNU</th><th>Item</th></tr>
<tr><td rowspan="2">0100H</td><td rowspan="2">AH</td><td>Inverter status
Refer to page 50.</td></tr>
<tr><td>Operation command
<table>
<tr><th>Name</th><th>Bit</th><th>Description</th></tr>
<tr><td>-</td><td>0</td><td>Reserved (0 is set)</td></tr>
<tr><td>STF terminal</td><td>1</td><td>0: STF-OFF 1: STF-ON (forward rotation command)</td></tr>
<tr><td>STR terminal</td><td>2</td><td>0: STR-OFF 1: STR-ON (reverse rotation command)</td></tr>
<tr><td>RH terminal</td><td>3</td><td>0: RH-OFF 1: RH-ON (high-speed operation command)*1</td></tr>
<tr><td>RM terminal</td><td>4</td><td>0: RM-OFF 1: RM-ON (middle-speed operation command)*1</td></tr>
<tr><td>RL terminal</td><td>5</td><td>0: RL-OFF 1: RL-ON (low-speed operation command)*1</td></tr>
<tr><td>-</td><td>6 to 9</td><td>Not used (0 is set)</td></tr>
<tr><td>MRS terminal</td><td>10</td><td>0: OFF 1: ON (Output shutoff)*1</td></tr>
<tr><td>-</td><td>11 to 15</td><td>Not used (0 is set)</td></tr>
</table>
*1 These are factory-set signals. Input signals can be changed by input terminal function selection (Pr. 180 to Pr. 183).</td></tr>
</table>

(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 (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 (E^2PROM) *1, 2	Set frequency is written to E^2PROM.

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

*2 Due to the data write operation limits inherent to E^2PROM, it is recommended that running frequency be written to RAM whenever possible.

(5) Terminal input read

The setting of the No. 2 terminal can be read.

IND	PNU	Item	Data Definition
0100H	FH	No. 2 terminal input value read	No. 2 terminal input value (%) is read.

Alarm History (IND = 0101H, PP = 01, SEV_II, Block II)

The past eight inverter alarm definitions can be read.

IND	PNU	Item	IND	PNU	Item
0101H	0H	Error history No. 1 read *1	0101H	4H	Error history No. 5 read
0101H	1H	Error history No. 2 read	0101H	5H	Error history No. 6 read
0101H	2H	Error history No. 3 read	0101H	6H	Error history No. 7 read
0101H	3H	Error history No. 4 read	0101H	7H	Error history No. 8 read

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

- Error numbers

Error Number	Definition
00H	No alarm
10H	E.OC1
11H	E.OC2
12H	E.OC3
20H	E.OV1
21H	E.OV2
22H	E.OV3
30H	E.THT

Error Number	Definition
31H	E.THM
40H	E.FIN
60H	E.OLT
70H	E.BE
80H	E.GF
81H	E.LF
90H	E.OHT
A0H	E.OPT

Error Number	Definition
B0H	E.PE
B1H	E.PUE
B2H	E.RET
C0H	E.CPU
F3H	E. 3
F6H	E. 6
F7H	E. 7

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

9.3 Standard Parameters

9.3.1 Normal parameter area (IND = 0200H)

You can use the PNU to make parameter settings from the network.
The table below lists PNU numbers corresponding to parameter numbers. Refer to the table to set parameters.
For the parameter data and details, refer to the inverter and option manuals.

IND	PNU	Pr. Number
0200H	0H	Pr.0
	1H	Pr.1
	2H	Pr.2
	3H	Pr.3
	4H	Pr.4
	5H	Pr.5
	6H	Pr.6
	7H	Pr.7
	8H	Pr.8
	9H	Pr.9
	AH	Pr.10
	BH	Pr.11
	CH	Pr.12
	DH	Pr.13
	EH	Pr.14
	FH	Pr.15
	10H	Pr.16

IND	PNU	Pr. Number
0200H	12H	Pr.18
	13H	Pr.19
	14H	Pr.20
	15H	Pr.21
	16H	Pr.22
	17H	Pr.23
	18H	Pr.24
	19H	Pr.25
	1AH	Pr.26
	1BH	Pr.27
	1DH	Pr.29
	1EH	Pr.30
	1FH	Pr.31
	20H	Pr.32
	21H	Pr.33
	22H	Pr.34
	23H	Pr.35

IND	PNU	Pr. Number
0200H	24H	Pr.36
	25H	Pr.37
	26H	Pr.38
	27H	Pr.39
	29H	Pr.41
	2AH	Pr.42
	2BH	Pr.43
	2CH	Pr.44
	2DH	Pr.45
	2EH	Pr.46
	2FH	Pr.47
	30H	Pr.48
	34H	Pr.52
	36H	Pr.54
	37H	Pr.55
	38H	Pr.56
	39H	Pr.57

IND	PNU	Pr. Number
0200H	3AH	Pr.58
	3BH	Pr.59
	3CH	Pr.60
	3DH	Pr.61
	3EH	Pr.62
	3FH	Pr.63
	41H	Pr.65
	42H	Pr.66
	43H	Pr.67
	44H	Pr.68
	45H	Pr.69
	46H	Pr.70
	47H	Pr.71
	48H	Pr.72
	49H	Pr.73
	4AH	Pr.74
	4BH	Pr.75

IND	PNU	Pr. Number
0200H	4DH	Pr.77
	4EH	Pr.78
	4FH	Pr.79
	50H	Pr.80
	51H	Pr.81
	52H	Pr.82
	53H	Pr.83
	54H	Pr.84
	56H	Pr.86
	57H	Pr.87
	5AH	Pr.90
	60H	Pr.96
	61H	Pr.97
	75H	Pr.117
	76H	Pr.118
	77H	Pr.119
	78H	Pr.120
	79H	Pr.121
	7AH	Pr.122
	7BH	Pr.123
	7CH	Pr.124
	80H	Pr.128
	81H	Pr.129
	82H	Pr.130
	83H	Pr.131

IND	PNU	Pr. Number
0200H	84H	Pr.132
	85H	Pr.133
	86H	Pr.134
	91H	Pr.145
	92H	Pr.146
	96H	Pr.150
	97H	Pr.151
	98H	Pr.152
	99H	Pr.153
	9CH	Pr.156
	9EH	Pr.158
	A0H	Pr.160
	A8H	Pr.168
	A9H	Pr.169
	ABH	Pr.171
	ADH	Pr.173
	AEH	Pr.174
	AFH	Pr.175
	B0H	Pr.176
	B4H	Pr.180
	B5H	Pr.181
	B6H	Pr.182
	B7H	Pr.183
	BEH	Pr.190
	BFH	Pr.191

IND	PNU	Pr. Number
0200H	C0H	Pr.192
	E8H	Pr.232
	E9H	Pr.233
	EAH	Pr.234
	EBH	Pr.235
	ECH	Pr.236
	EDH	Pr.237
	EEH	Pr.238
	EFH	Pr.239
	F0H	Pr.240
	F4H	Pr.244
	F5H	Pr.245
	F6H	Pr.246
	F7H	Pr.247
	F8H	Pr.248
	FAH	Pr.250
	126H	Pr.338
	127H	Pr.339
	128H	Pr.340
	12AH	Pr.342

CAUTION

Write to Pr. 77 and Pr. 79 is not allowed from the network with the FR-E5NP. (Read is allowed.)

9.3.2 Pr. 900 and later-frequency parameter area (IND = 0300H)

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

Parameter Number	IND	PNU	Name	Minimum Setting Increments	Setting Range	
					Decimal	Hexadeci-mal
902	0300H	149H	Frequency setting voltage bias (frequency)	0.01Hz	0 to 60	0 to 1770
903	0300H	14AH	Frequency setting voltage gain (frequency)	0.01Hz	1 to 400	64 to 9C40
904	0300H	14BH	Frequency setting current bias (frequency)	0.01Hz	0 to 60	0 to 1770
905	0300H	14CH	Frequency setting current gain (frequency)	0.01Hz	1 to 400	64 to 9C40

9.3.3 Pr. 900 and later-% parameter area (IND = 0400H)

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

Parameter Number	IND	PNU	Name	Minimum Setting Increments
902	0400H	2H	Frequency setting voltage bias (%)	0.1%
903	0400H	3H	Frequency setting voltage gain (%)	0.1%
904	0400H	4H	Frequency setting current bias (%)	0.1%
905	0400H	5H	Frequency setting current gain (%)	0.1%

10.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 Indication	Option Unit LED Status	Assumed Cause	Check Point
0.00	Off	Option unit does not function.	Make sure that the option is fitted properly.
			Reset the inverter.
			Perform parameter all clear to return the parameters to the factory settings, and switch power off once, then on 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.
			Check the other nodes for a network error.
		Network master does not exist or does not function properly.	Check the connection and operation of the Profibus-DP master.
E.***	Off/on	Inverter in error	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.

Print Date	*Manual Number	Revision
Apr., 1999	IB(NA)-0600007-A	First edition
	IB(NA)-0600007-B	Mistakes corrected
May, 2002	IB(NA)-0600007-C	Additions • PPO type specifications
Mar., 2003	IB(NA)-0600007-D	Additions • Command count (PPO support specification) • Inverter reset command (PPO support specification) • Setting value of Pr. 340 "10"