High-performance, Vector Control Inverter

FRENIC-VG

PROFINET-IRT Interface Card

OPC-VG1-PNET

Product Specifications

Detail description is omitted for the subjects described in the VG1S manuals.
Refer to the VG1S manual and catalog together with this specification document.
- FRENIC-VG USER'S MANUAL MHT286□
- Functional Vector Control Inverter FRENIC-VG Series MH659□

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Revision record

Revision	Date of revision	Revised by:	Description of revision
-	2012-10-02	-	Published DRAFT version.
-	2013-03-15	-	Published SI27-5731 as the official version.

Contents

1. Overview

1-1 Overview

This specification document describes PROFINET-IRT Interface Card “OPC-VG1-PNET” for FRENIC-VG. PROFINET-IRT communications on this product have the following features:

＜Features＞

1. Applicable with PROFINET-IRT
2. In conformity to PROFIdrive

1-2 Special Instruction

(1) Option card which is prohibited to mount together with PROFINET-IRT Interface Card

You cannot mount the following option cards while PROFINET-IRT Interface Card is mounted on the inverter unit.

[Option card prohibited to mount together with PROFINET-IRT Interface Card]

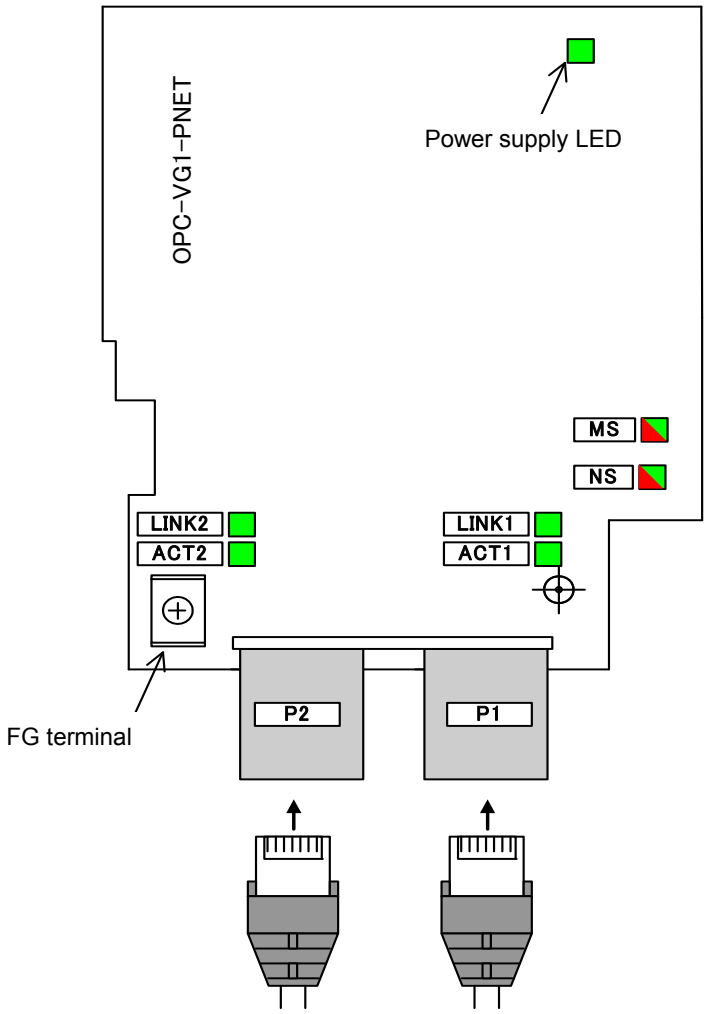
- CC-Link interface card (Model: OPC-VG1-CCL) (Er-5 alarm occurs when mounted together)
- T-link Interface Card (Model: OPC-VG1-TL) (Er-5 alarm occurs when mounted together)
- PROFIBUS-DP interface card (Model: OPC-VG1-PDP) (This card cannot be mounted together with PROFINET-IRT Interface Card for the structural reason.)
- DeviceNet Interface Card (Model: OPC-VG1-DEV) (This card cannot be mounted together with PROFINET-IRT Interface Card for the structural reason.)

2. General Specifications

Table 2.1 Hardware specifications

Item	Specification
Name	PROFINET-IRT interface card
Transmission mode	100BASE-TX
Baud rate	100Mbps
Cable length	100m / 1 segment
Number of words occupied for transmission	32 words max. (I area 16 words/ Q area 16 words)
Terminal/Bus cable	2 ports ／ PROFINET special cable
Status indicator LEDs	The indicator LEDs displays the status (communication status/error status) of the self-station.

(1) Appearance



(2) Status display LED

LEDs on the option card display the statuses of local stations.

Table 2-2 LED Display Statuses

Name	Color	Display	Status	Remarks
MS	Red/green	OFF	Resetting Interface Card CPU now	
		Red and green blink.	Initializing Interface Card CPU now	
		Red blinks. (1Hz)	PROFINET setting error	IP address error, etc.
		Red lights.	This card is failed or card is poorly inserted.	
		Green blinks. (1Hz)	Initializing connection with FRENIC-VG now	
		Green lights.	Normal operation	
NS	Red/green	OFF	No PROFINET communications	
		Red blinks.	Minor fault occurs in PROFINET communications .	When sending/receiving error occurs 3 times continuously.
		Red lights.	Serious fault occurs in PROFINETcommunications.	Master shuts down, etc.
		Green blinks.	Establishing PROFINET communications now. (PLC STOP)	
		Green lights.	Establishing PROFINET communications now. (PLC RUN)	
LINK1/2	Green	OFF	No Ethernet communications	
		Green lights.	Establising Ethernet communications now.	
ACT1/2	Green	OFF	No Ethernet sending/reception	
		Green lights.	Sending/receiving via Ethenet now.	
Power supply	Green	Green lights.	Interface of this card is ON.	

Table 2-3 Software Specifications

Item		Specifications
Data updating cycle		1ms(*1) min.
Data reflection delay (during synchronization with tact)(*3)		For 2-tact cycles (2ms delay for 1ms tact cycle)
Operation	Run command	Forward/Reverse rotation commands, alarm reset command X11 – X14 commands
	Speed /Torque command	1word data (Any function code can be allocated to Q area as other commands.)
	Operation running status output	Bit data, such as running, braking, torque limitation, and alarm relay output
		Any function code can be allocated to I area as output of motor speed (1word), torque current commands(1word), current returned position one-rotation data (2word), acceleration monitor (1 word, 2 words) or others.
Option function code		o30, o31, o101, o102, o122~o133, o160~o171
Protective function		Er-4: Network error (PROFINET communication error) (*2) ・Minor fault: The Er-4 alarm can be controlled with o30 or o31. ・Serious fault: Instantaneous alarm(Er-4)

*1 The data update cycle depends on the carrier frequency setting, PROFINET communication cycle and task cycle of the application program.

*2 For minor faults and serious faults, see “3-3 Protective Action”.

*3 Synchronization with tact will be supported soon.

3. Detail Specifications

3-1 Basic Connection

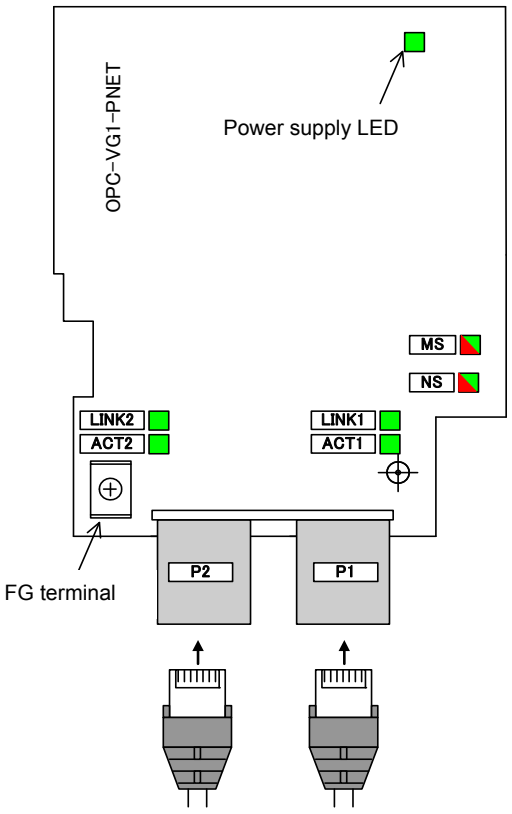


Figure 3-1 Connecting PROFINET Cable

With reference to "the attachment means of 6.1.4 incorporation form optional (OPC-VG1-□□)" of FRENIC-VG User's Manual (MHT286□), perform wiring, work of the connection.

⚠WARNING
- Improper wiring causes an electric shock, fire or other disasters. Wiring must be performed by a qualified person. Before touching the electric circuits for wire connection after the power has been turned ON, turn OFF (open) the power breaker to prevent an electric shock. - Even if the breaker is turned OFF (open), the smoothing capacitor is still charged. So, you get an electric shock if you touch it. Confirm that the CHARGE indicator lamp for the inverter is OFF, and check the DC voltage of the inverter with a tester to see that it has dropped to or below the safe level.

⚠CAUTION
- Do not use the product if any part is damaged or missing. Injury or damage may result. - Improper operation during mounting or removal of the product may cause damage to it.

Observe the following precautions when connecting the product.

[Precautions about connection]

(1) Use the cable dedicated to PROFINET (for example, a PROFINET cable manufactured by Siemens)

(2) Before starting operation, confirm that the power for the PLC and for the inverter is turned OFF.

(3) To prevent malfunction of the inverter due to noise, keep the PROFINET cable at least 30 cm away from the main circuit wire and other power lines of the inverter, and do not place these wires together in a single duct.

(4) Connect the PROFINET cable to either of two Ethernet connectors (P1, P2). Cascade wiring is also available.

Example of basic connection diagram

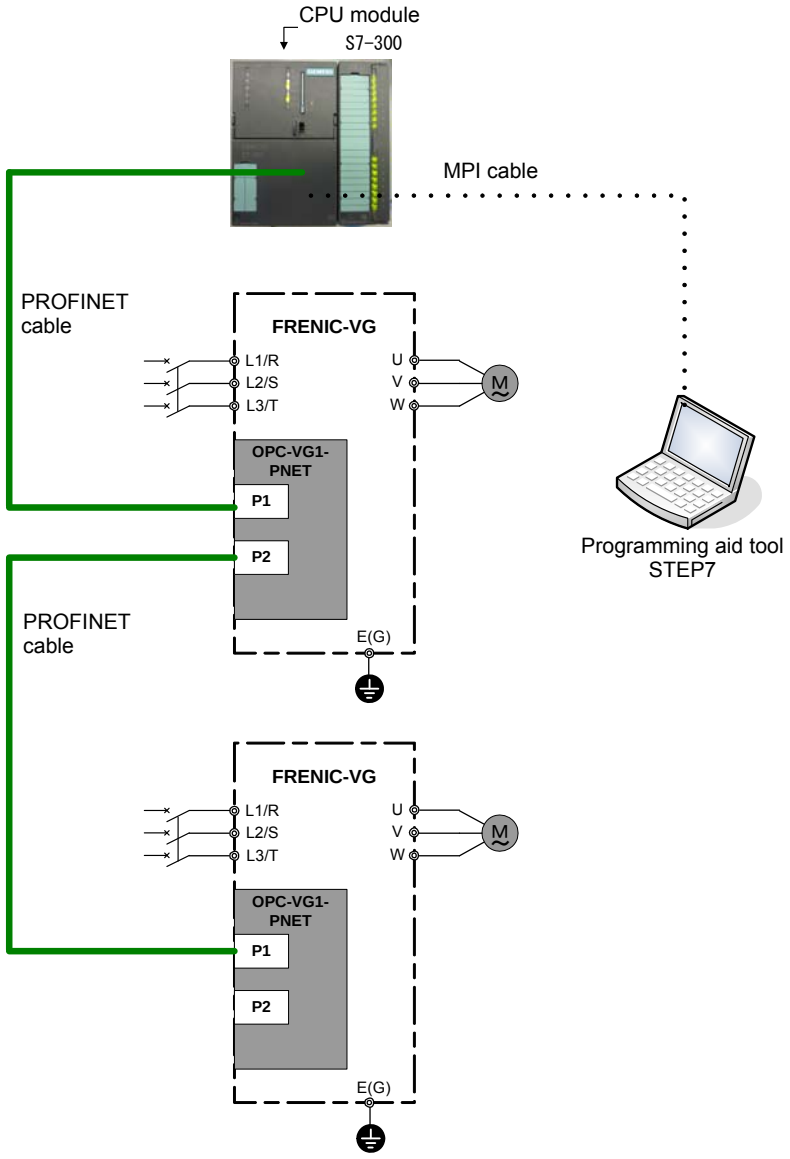


Figure 3-2 Example of basic connection diagram

3-2 Related function code

⚠WARNING
- If the data of a function code is incorrect, the system may fall into a dangerous status. Recheck data whenever you have finished setting or writing data. **An accident may occur.**

The list of the inverter function cords in conjunction with the PROFINET interface card is shown below.

Table 3-1 Related function codes

No.	Function code name		Setting range	Change in running	Setting contents
	Name	Keypad display			
H30	Link function	LINK FUNC	0 to 3	✓	Set 3 :run command , speed command via PROFINET are valid
H107	Definition for ,minor fault 2	L-ALM 2	0000 to 1111	✓	Select the alarm operation when Er4 occurs. Er4 is indicated in 100-digit value. In the appropriate digit, 0: Alarm arises, 1: Minor fault (L-AL)
o30 (*1)	Link setting (Action on communication error)	MODE ON ER	0	-	Forced to stop immediately after a communication error(minor fault) occurs (Er-4 alarm: coast-to-stop)
			1		Continue timer-controlled operation after communication error (minor fault) occurs. (HOLD the run command from the previous communication in the status of communication error.) Forced to stop after timer setting period is over (Er-4 alarm: coast-to-stop) When communication is recovered within timer setting period, follow the communication command. However, forced to stop after timer setting period is over.
			2		Continue timer-controlled operation after communication error (minor fault) occurs. (HOLD the run command from the previous communication in the status of communication error.) Forced to stop after the setting period is over if the communication has not recovered. When communication is recovered within timer setting period, follow the communication command and return to normal operation.
			3		Continue operation even if a communication error (minor fault) occurs. Holding the last run command directed through communication in the communication error state. When communication is recovered, follow the communication command and return to normal operation.
o31 (*1)	Link setting (Action time on communication error)	TIMER TL	0.01 to 20.00s	-	Timer for the operation period [s] after a communication error. Effective when o30=1, 2
o122 to o133(*4)	OUT area PZD allocation 1 to 12	Write code 1 to 12	0 to FFFF	-	Specify the function code to be allocated to the function code OUT area using RS485No. (Allocate the function code to be written.) (*3)

No.	Function code name		Setting range	Change in running	Setting contents
	Name	Keypad display			
o160 to o171(*4)	IN area PZD allocation 1 to 12	Read code 1 to 12	0 to FFFF	-	Specify the function code to be allocated to the function code IN area using RS485No. (Allocate the function code to be written.) (*3)
o101	Reflect all allocations	Enable allocation	0,1	-	By changing 0 to 1, reflect intermediate change of transfer format (o102) and PZD allocation setting (set in o122 or subsequent function codes to the master unit.) After setting to 1, return to 0.
o102 (*4)	Select PROFINET transmission format	Option function	1	-	Standard telegram1 (2 words +2 words)
			21		Free format (12 words +12 words + PCV)
			Other than above		Spare (Do not set here.) *Treat as o102=1

*1 For more information about o30, o31, please refer to “3-3-1-2 Operation Setting at occurrence of minor fault (o30, o31)”

*3 For the function codes and measures for RS485No. refer to “4.2.3 Function Code List” of FRENIC-VG User’s Manual (MHT286□) “.

*4 After changing o102, o122 to o133 or o160 to o171, you must set o101=1 or turn ON the inverter power supply again so as to reflect the setting details. If any one of these function codes is changed halfway, Y terminal function [AS-RDY]turns OFF and the system disables to send or receive transmission data until you set o101=1 or turn ON the inverter power supply again. (All the commands in OUT area are ignored and all the responses in IN area become 0.） By turning ON the inverter power supply, [AS-RDY]= ON and communications using the updated function code allocation data can be restarted. For details on[AS-RDY], see section 3-5.

3-3 Protective action

3-3-1 Minor fault and serious fault of the PROFINET communication

3-3-1-1 Factors of minor fault and serious fault (Er4)

The PROFINET interface card triggers minor fault or serious fault depending on the fault level.

If a fault occurs, the inverter issues Er4 “communication fault", and the motor coasts-to-stop. (*1)

*1 Depending on the setting of inverter function code H107, the operation can continue by displaying a generated fault as L-AL. Refer to chapter 3-2 “Related function code”.

Table 3-2 Factors of minor fault and serious fault (Er4)

Item	Minor fault	Serious fault 1	Serious fault 2
Card LED status	MS ■ (green lights) NS ▲ (red blinks)	MS ■ (green lights) NS ■ (red lights)	MS ■ (red lights) NS □ (No lights)
Cause (*2)	- Data is temporarily damaged by applying noises to communication line.	- Master unit shuts down. (Broken wire detected, PLC power supply is shut off)	- Card hardware fault - Improperly installed card - Setting error
Resetting method	Reset after the cause of alarm has been cleared (automatically cleared upon recovery of communication). Or reset after H30 is 0,1or[LE]=OFF (*3)		Turn ON the power to the inverter again after the cause of the alarm has been cleared. (Not resettable until power OFF)
Control of fault status	The alarm can be controlled with the function code o30 and o31.	The alarm Er4 is immediately issued when serious fault occurs.	
Keypad indication communication error code (*4)	1	2	3
Alarm subcord (*5)	01(hex)	02(hex)	04(hex)

*2 For a minor fault, Er4 is issued when the command via PROFINET is enabled (when H30=2, 3 and [LE] =ON: for details, see the explanation of H30 in FRENIC-VG User’s Manual (MHT286□)). For a serious fault 1, Er4 is issued when the command via PROFINET is enabled and the run command via PROFINET is ON. For a serious fault 2, Er4 is issued when an erroneous factor occurs, regardless of the above conditions.

*3 “Apply reset command” for minor fault and serious fault 1 means reset input to the inverter using any of the following methods:
- Enter (RESET) key on the keypad.
- Allocate abnormal reset [RST] when selecting X function and enter it as digital data.
- Reset alarm from PROFINET communications
  However, for a serious fault 1, you might have to reset the PROFINET master unit together with the alarm depending on the condition of the master unit.

*4 You can check the communication error codes for minor fault and serious fault on the communication status screen in Maintenance Information menu on the keypad. To see the communication status screen, click PRG key on the Operation Mode screen to change the screen to Menu. Then, move the arrow at the left end of the screen to “Maintenance” using ∧/∨ key and click FUNC/DATA key. Then, click ∨ key three times to display the following screen. This error code presents the first factor that generates Er-4. When serious fault 1 occurs, a minor fault must have occurred in advance. When o30=0, this code presents a minor fault code even if it is serious fault 1.

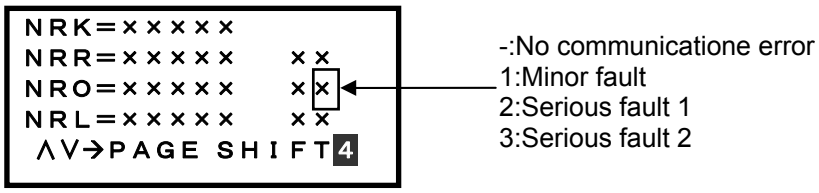


Figure 3-4 Communication error (Er-4) cord confirmation screen

*5 You can check the alarm sub code of Er-4 by selecting alarm history in Alarm Information program on the keypad. On the sub code check screen, click PRG key on the Operation Mode screen to change the screen to Menu. Then, move the arrow at the left end of the screen to “7. Alarm Information” using ∧/∨ key and click FUNC/DATA key. Select the alarm you want to see from the list of the latest alarm and previous three alarms and click FUNC/DATA key. Then, click ∧ key once to display the following screen. This sub code presents the first factor that generates Er-4. When serious fault 1 occurs, a minor fault must have occurred in advance. When o30=0, this code presents a minor fault code even if it is serious fault 1.

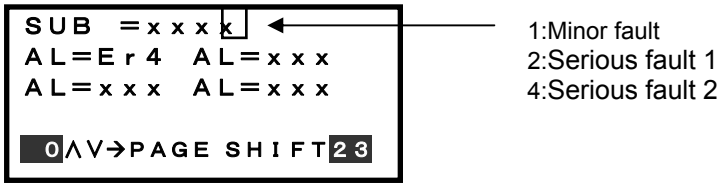


Figure 3-5 Subcord confirmation screen

3-3-1-2 Operation Setting at occurrence of minor fault (o30, o31)

This subsection describes how to control the Er-4 alarm using the inverter function codes o30, o31 when a communication error (in the state of minor fault) arises while applying an run command via PROFINET from PLC.

(1) o30 = 0 (Forced to stop immediately after a communication error (minor fault) occurs (Er4 alarm: coast-to-stop))

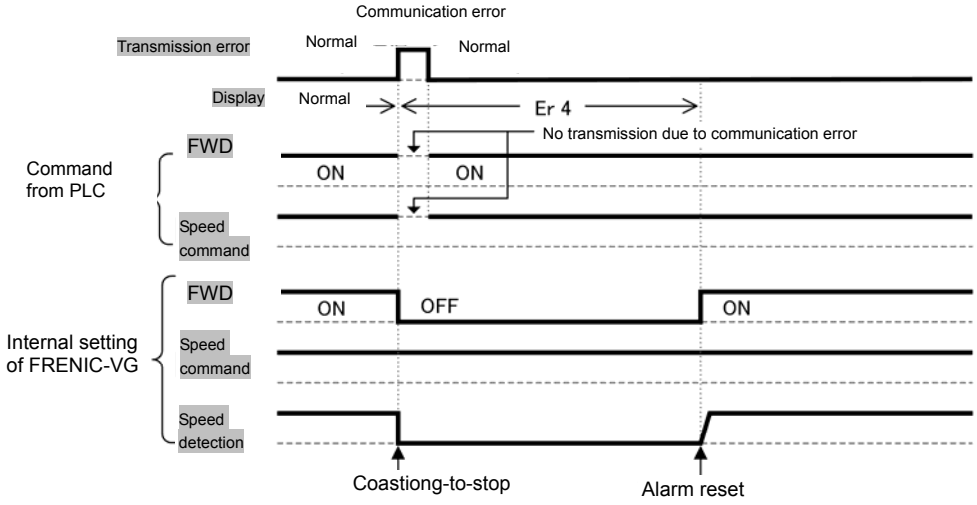


Figure 3-6

(2) o30 = 1, o31 = 5.0 (The mode to stop the inverter for five seconds after a communication error(minor fault).)

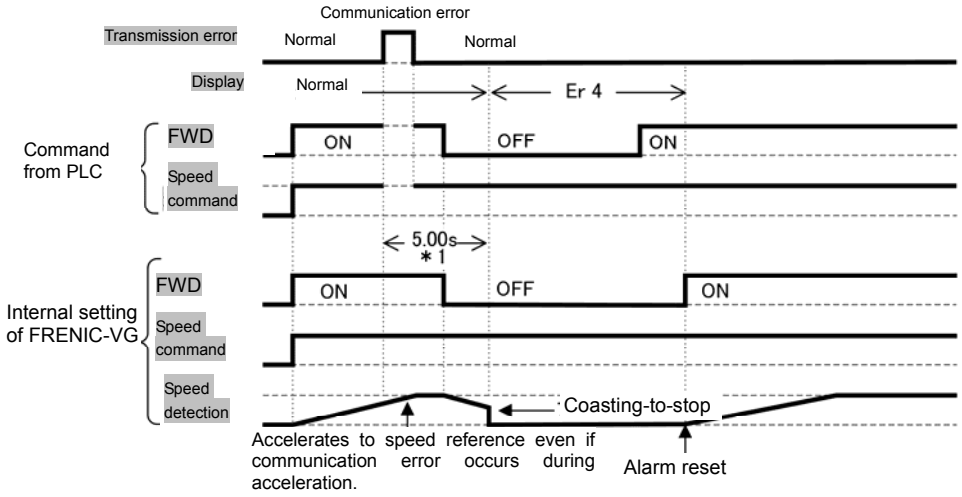


Figure 3-7

(3) o30 = 2, o31 = 5.0 (The communication does not recover from a communication error (minor fault) in five seconds and trips on Er4.)

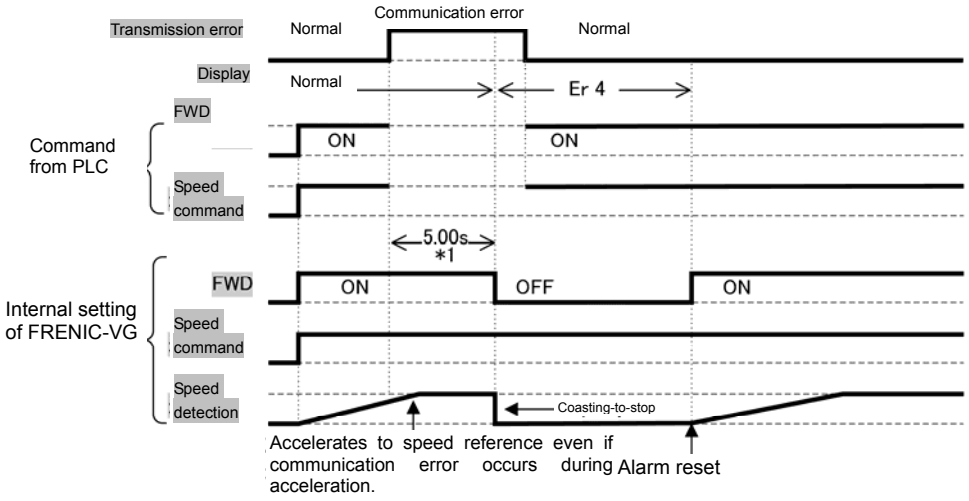


Figure 3-8

(4) o30 = 2, o31 = 5.0 (The communication recovers from a communication error (minor fault) in five seconds.)

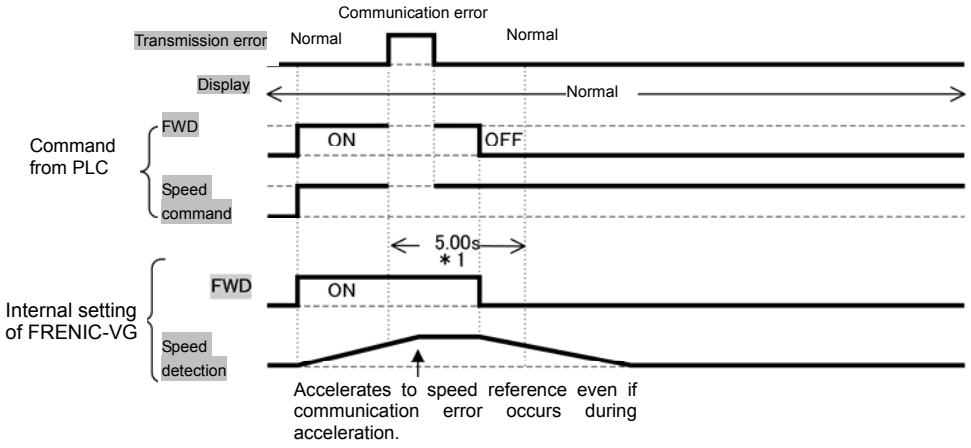


Figure 3-9

(5) o30 = 3, (Driving continuation)

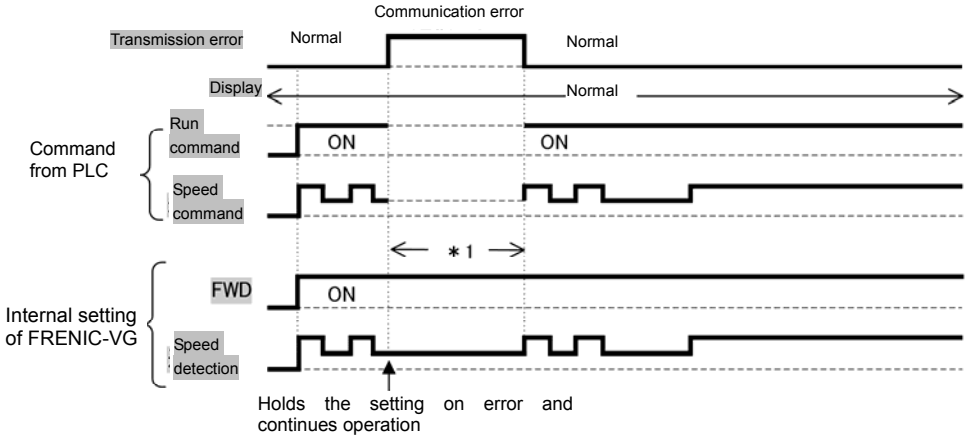


Figure 3-10

*1 During this period, the system retains the commands (run commands, speed commands or both) from communications at occurrence of communication error unless communications recover and new commands or settings are sent.

3-4 Communication Formats

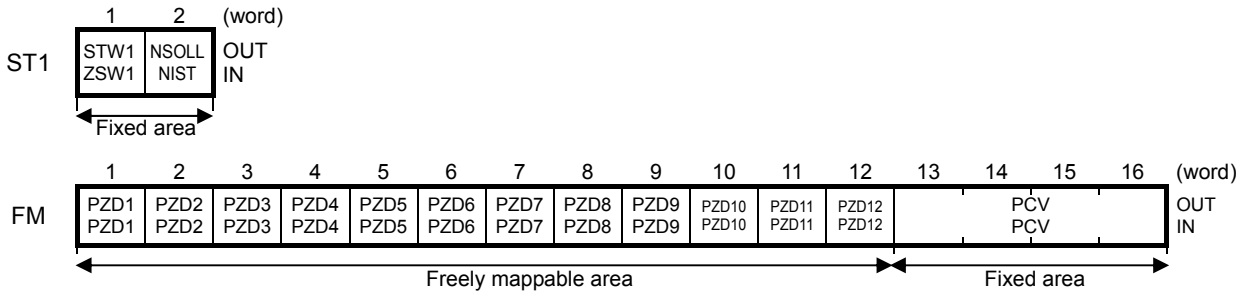
3-4-1 Applicable formats

You can select the following transmission formats using function code o102 “Select Transmission Format”.

Table 3-4 Applicable Transmission Formats

o102	Format name	Number of words occupied
1	Standard telegram 1(ST1)	OUT area: 2 words, IN area: 2 words
21	Freely mappable format (FM) (Manufacturer-specific telegram)	OUT area: 16 words, IN area: 16 words

* When you set any value other than above to o102, the system assumes o102=1.



OUT	:	Output area (data direction PLC→VG)
IN	:	Input area (data direction VG→PLC)
STW1	:	Control word
ZSW1	:	Status word
NSOLL	:	Speed command value (Nmax=4000Hex)
NIST	:	Speed detection value (Nmax=4000Hex)
PZD1-12	:	Process data (You can change allocation using function code o122 to 133 or o160 to 171)
PCV	:	Read/write per parameter (Read/write function code)

3-4-2 Data format details

3-4-2-1 Standard telegram 1（o102=1）

	bit15	bit0
OUT area	STW1 control word	
(PLC→VG)	NSOLL_A speed command (Nmax=4000Hex)	
IN area	ZSW1 status word	
(VG→PLC)	NIST_A speed detection value (Nmax=4000hex)	

Figure 3-11 Standard Telegram 1 (ST1)

(1) STW1 control word

This area is used to issue run commands from PLC to the inverter.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	(bit)
b15	b14	b13	b12	b11	b10	b9	b7	b7	b6	b5	b4	b3	b2	b1	b0	

Table 3-5 Explanation of STW1

bit		False (0)	True (1)
b0	ON/OFF	Turn a run command OFF	Turn a run command ON
b1	ON2/OFF2	OFF2: Coast to a stop	ON2: Request the inverter to be ready for turning a run command ON (1)
b2	ON3/OFF3	OFF3: Stop command following the deceleration time specified by the function code H56	ON3: Request the inverter to be ready for turning a run command ON (2)
b3	Enable operation	Disable inverter operation	Enable inverter operation
b4	Enable Ramp generator	Fix speed command to 0	Enable the ramp frequency generator (RFG)
b5	Unfreeze Ramp generator	Freeze ramp generator (accelerator/decelerator). Fix speed command to the value at that time.	Unfreeze RFG command
b6	Enable setpoint	Disable	Enable ON-bit
b7	ALM RST	Do not reset alarm	Reset alarm (Resetting an alarm makes the communications card unready to turn a run command ON.)
b8, b9	-	-	-
b10	Enable PZD	Disable input of PCD, STW1 and NSOLL_A. Retain previous status.	Enable input of PCD, STW1 and NSOLL_A.
b11	Run direction	Run in the forward direction	Reverse direction
b12 to b15	-	-	-

(2) ZSW1 status word

STW is a word area for monitoring the inverter's running status.

🕮 STW indicates the status transition of the PROFIdrive. The status transition details are shown in Figure 3-12.

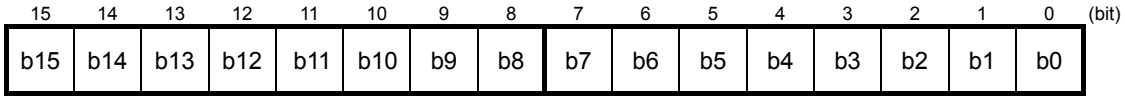
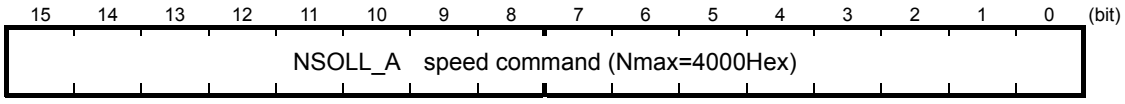


Table 3-6 Bit Definition in STW

bit		False (0)	True (1)
b0	Ready to switch ON	Not ready to turn a run command ON	Ready to turn a run command ON
b1	Ready to run	Not ready to run	Ready to run
b2	Running state	Running disabled	Running
b3	ALM	No inverter alarm	Inverter alarm activating now
b4	ON2/OFF2	OFF2: ON2 bit in CTW is "0"	ON2: ON2 bit in CTW is "1"
b5	ON3/OFF3	OFF3: ON3 bit in CTW is "0"	ON3: ON3 bit in CTW is "1"
b6	Run command ON inhibited	Ready to turn a run command ON (logical negation of bit0)	Not ready to turn a run command ON (logical negation of bit)
b7	-	-	-
b8	N-AR	Not reached to the specified speed	Reached to the specified speed
b9	R/L	Both speed command and run command from PROFIBUS are disabled. (H30=0)	Either speed command or run command from PROFIBUS-DP is enabled. (H30=1, 2, 3)
b10	N-DT1	Detected speed is less than the value set by inverter function code E39.	Detected speed is greater than the value set by inverter function code E39.
b11 to b15	-	-	-

(3) NSOLL_A speed command

This area issues speed commands from PLC. It is indicated as the value of ratio by setting the maximum speed F03 (r/min) of the inverter function code to 4000Hex.



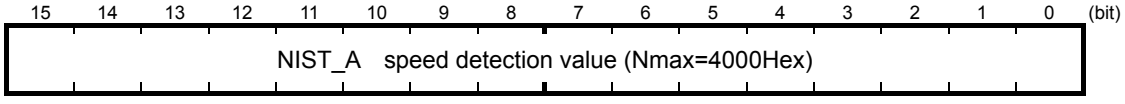
$$\text{NSOLL\_A} = \frac{\text{Speed command (r/min)}}{\text{Function code F03 (r/min)}} \times 4000\ \text{Hex}$$

or

$$\text{Speed command (r/min)} = \text{Function code F03 (r/min)} \times \frac{\text{NSOLL\_A}}{4000\ \text{Hex}}$$

(4) NIST_A speed detection value

This is a motor speed detection value. Like the speed command value, this is indicated as the value of ratio by setting the maximum speed F03 (r/min) of the inverter function code to 4000Hex.



$$\text{NIST\_A} = \frac{\text{Speed command (r/min)}}{\text{Function code F03 (r/min)}} \times 400\ \text{Hex}$$

or

$$\text{Speed command (r/min)} = \text{Function code F03 (r/min)} \times \frac{\text{NIST\_A}}{4000\ \text{Hex}}$$

Figure 3-12 shows a status transition diagram of the PROFIdrive profile. Immediately after the inverter is turned ON, the status first moves to S1 "Not ready to turn a run command ON." Bit manipulation in STW1 shifts the status to S2 "Ready to turn a run command ON," S3 "Ready to run" and finally S4 "Running" in sequence. In S4 state, the inverter enters the running state. Turning a run command OFF in S4 state shifts the status to S5 "Turn a run command OFF." After the motor stops, the status moves to S2 or S1 state.

Note In Figure 3-12, to simplify the description, values of Bit 4 to Bit 6 and Bit 10 in STW1 are always "1." If any one of these bit values is not "1," the inverter will not enter the running state even if the status transition properly proceeds.

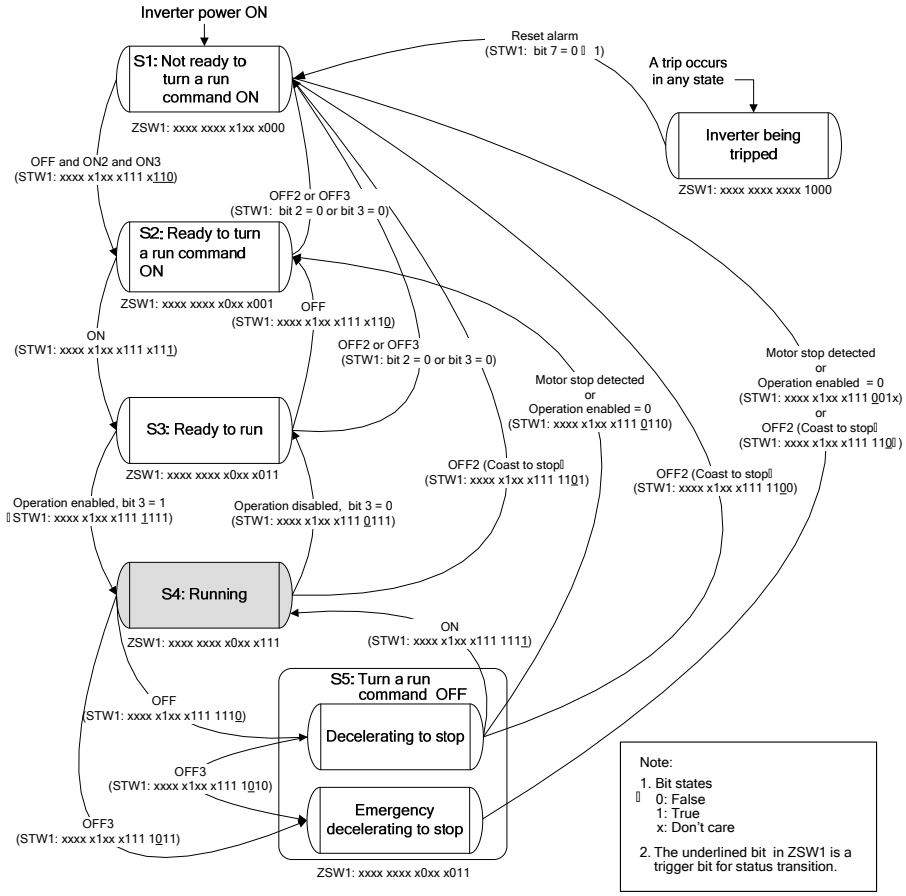


Figure 3-12 STW1/ ZSW1 Status Transition Diagram

3-4-2-1 Free allocation format（12W+12W+PCV4W）(o102=21)

	bit15	bit0
OUT area (PLC→VG)	PZD 1	
	PZD 2	
	PZD 3	
	PZD 4	
	PZD 5	
	PZD 6	
	PZD 7	
	PZD 8	
	PZD 9	
	PZD 10	
	PZD 11	
	PZD 12	
	PCV	(PCA)
	(IND)	
	(PVA)	
	(PVA)	
IN area (VG→PLC)	PZD 1	
	PZD 2	
	PZD 3	
	PZD 4	
	PZD 5	
	PZD 6	
	PZD 7	
	PZD 8	
	PZD 9	
	PZD 10	
	PZD 11	
	PZD 12	
	PCV	(PCA)
	(IND)	
	(PVA)	
	(PVA)	

Figure 3-13 Freely mappable Format (FM)

(1) PZD1-PZD12 Process Data 1-12

These settings always write to the function codes preset in o122 to 133 (OUT area). Also, the settings always monitor the function codes specified in o160 to 171 (IN area).

📖 For individual formats of the inverter function codes, see Chapter 4 “4.2 Function Code List” of FRENIC-VG User’s Manual.

Allocate the function code to each PZD by referring to the inverter function codes or PNU given below.

Table 3-7 Allocation of Function Codes to PCD1 to 12

Item	PZD	Function code	PNU	Remarks
OUT area (Function code is always written)	PZD1	o122	PNU915[0]	Specify the function code using 485No.
	PZD2	o123	PNU915[1]	
	PZD3	o124	PNU915[2]	
	PZD4	o125	PNU915[3]	
	PZD5	o126	PNU915[4]	
	PZD6	o127	PNU915[5]	
	PZD7	o128	PNU915[6]	
	PZD8	o129	PNU915[7]	
	PZD9	o130	PNU915[8]	
	PZD10	o131	PNU915[9]	
	PZD11	o132	PNU915[10]	
	PZD12	o133	PNU915[11]	
IN area (Function code is always monitored)	PZD1	o160	PNU916[0]	
	PZD2	o161	PNU916[1]	
	PZD3	o162	PNU916[2]	
	PZD4	o163	PNU916[3]	
	PZD5	o164	PNU916[4]	
	PZD6	o165	PNU916[5]	
	PZD7	o166	PNU916[6]	
	PZD8	o167	PNU916[7]	
	PZD9	o168	PNU916[8]	
	PZD10	o169	PNU916[9]	
	PZD11	o170	PNU916[10]	
	PZD12	o171	PNU916[11]	

📖 For the correspondence between the function code and 485No., see Chapter 4 “4.2 Function Code List” of FRENIC-VG User’s Manual.

You can also allocate the dedicated 485No. given in the list below to PZD besides those given in the above user’s manual.

Table 3-8 485No. Dedicated to the Card

485No.	Signal	Remarks
F001	STW1	Same as the signal for ST1
F002	NSOLL_A	
F101	ZSW1	
F102	NIST_A	

Note By allocating STW1 to OUT area PZD, the run command issued by the inverter function code S06 will be disabled. In the same manner, by allocating NSOLL_A, the speed command issued by the inverter function code S01 will be disabled.

Note After changing o122 to o171, set the function code o101 to 1 or turn ON the inverter power supply again so as to reflect the settings to the inverter.

Note When specifying the same function code to two or more OUT area PZD (o122 to o133), the allocation to the one having the largest o code number will be enabled and others are treated as no allocation.
（Ex.: When specifying the same function code to be written to o122 and o124, the function code is specified to o124 only and o122 is treated as no function code specified.） However, there is no restriction when allocating the same function code to two or more N area PZD (o160 to o171).

(2) Reading/writing PCV parameters
PCV is an area where parameters (inverter function codes and PNU) are read and written sporadically.
Because the PCV area is fixed, you cannot change the allocation.

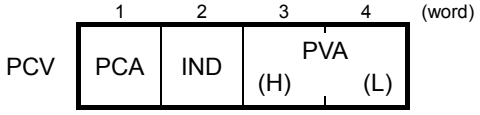
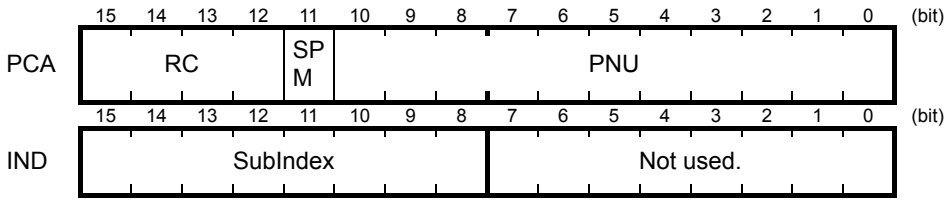


Figure 3-14 PCV Area Total Structure

(i) PCA and IND
These two word areas specify a parameter. Their structures are shown below.



RC:	Request code/response code (See Table 3-9)
SPM:	Not used. Fixed at "0."
PNU:	Specify 485No. high-order Byte or PNU number of the function code to be accessed.
SubIndex:	Specify 485No. low-order Byte or PNU allocation number of the function code to be accessed.

Table 3-9 RC Part

RC part	Request/response	Descriptions
0	Request (Master → Slave)	No request
1		Read parameter value
2		Write parameter value in word
3 to 5		Not used.
6		Read array parameter value
7		Write array parameter in array word
8		Not used.
9		Read element count of array parameter
10 to 15		Not used.
0	Response (Slave → Master)	No response
1		Parameter value in word sent normally
2, 3		Not used.
4		Parameter value in array word sent normally
5		Not used.
6		Normal response to the request of array element count
7		Transmission error (Error code stored in PVA)*1
8 to 15		Not used.

*1 For error codes and information, see Table 3-10.

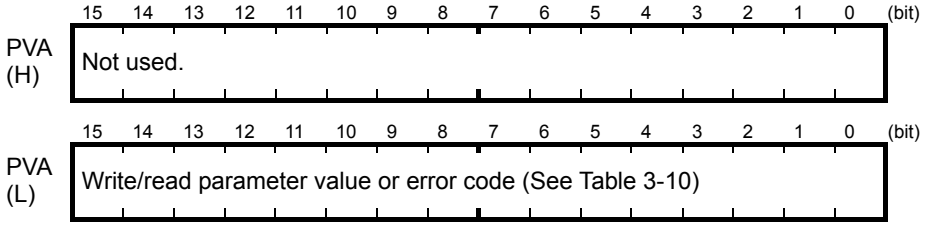
Table 3-10 List of Error Codes for Parameter Access Errors

RC part	Error code stored in PVA word	Error information
7	0	Nonexistent parameter specified
	1	Inhibited to write the parameter value
	2	Specified parameter value out of range
	3	Invalid Subindex specified
	11	Parameter write-inhibited error during inverter running or digital input terminal (for run command) being ON
	17	Read process not executable
	104	Busy error during parameter writing

(ii) PVA word area

PVA is a two-word area that represents write/read parameter values. The communications card uses the lower one word (the fourth word counted from the PCV word head).

To write a parameter value into an inverter (slave node), enter the value to the master node and send the word to the slave. To read a parameter value, refer to this area of the slave node in response to the previous request. If a parameter access error occurs (Response to RC part is "7"), the slave node outputs an error code (Table 3-10) to this area and returns the response to the master node.



(iii) Accessing inverter function code and PNU

1. Specify 485No. or PNU number of the function code to access PNU area.
2. Specify how to access the specified parameter, for example, Write or Read, in the RC area. For details about the RC area, see Table 3-9.
3. To write a parameter value, enter the write data into the PVA lower area and send the word to the salve node. To read a parameter value from the slave, refer to the PVA lower area in the response from the slave node. If a parameter access error occurs, the RC part of the response is filled with "7" and the PVA area contains one of the error codes listed in Table 3-10.

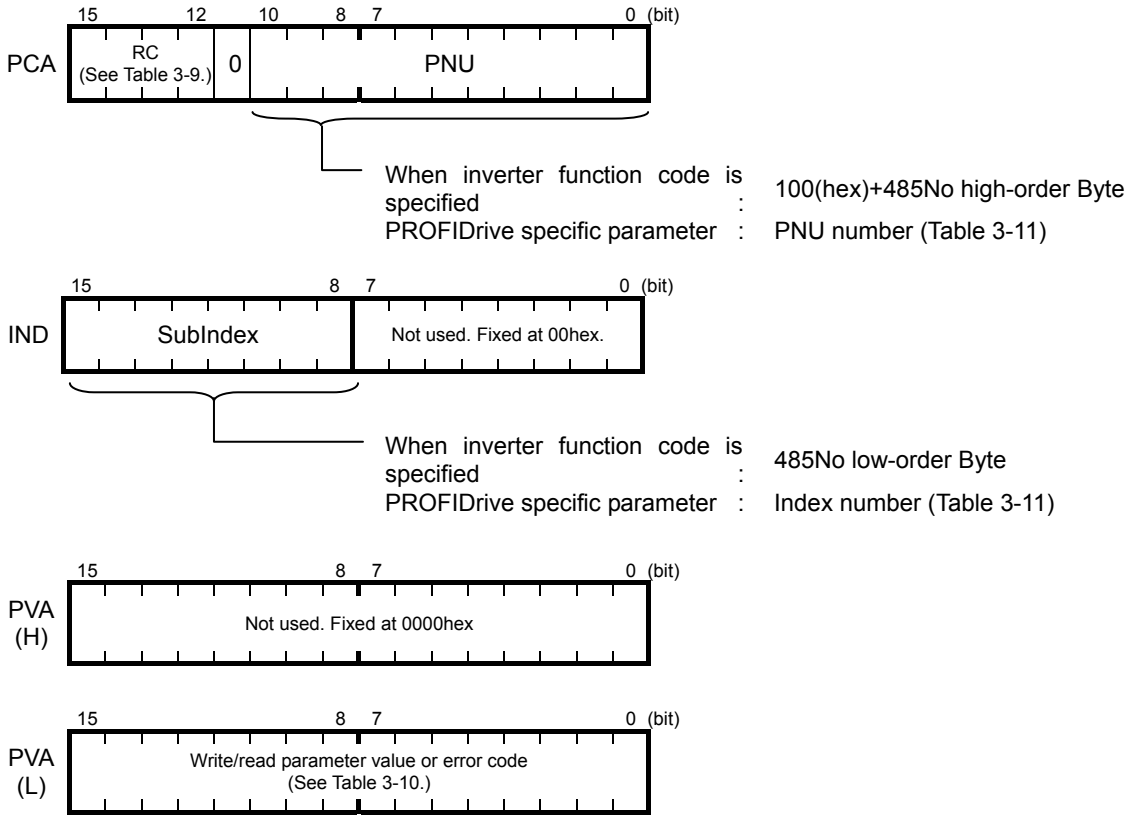


Figure 3-14 How to Access Parameters

(iv) PROFIdrive specific parameters

Table 3-11 shows the PROFIBUS specific parameters supported by this card.

Table 3-11 List of PROFIdrive Specific Parameters

PNU	Index	Description	Range	R/W	Remarks
915	0 to 11	Function code allocation to OUT area PZD1 to 12	0000 to FFFFHex	R/W	Same as for o122 to o133
916	0 to 11	Function code allocation to IN area PZD1 to 12	0000 to FFFFHex	R/W	Same as for o160 to o171
922	None	Select telegram (ReadOnly)	1, 21	R	Same as for o102
930	None	Operation mode	TBD	R	Speed control, torque control
944	None	Error occurrence count (inverter alarm count)	0 to 65535	R	
947	0	Alarm history (latest alarm or current alarm)	0 to 65535	R	Fuji Electric alarm code Response in format
	1	Alarm history (previous alarm)	0~65535	R	
	2	Alarm history (alarm 2 times before)	0 to 65535	R	
	3	Alarm history (alarm 3 times before)	0 to 65535	R	
965	None	PROFIdrive version	4	R	PROFIdrive V4 is indicated.

3-5 Operation when Transmission Format or PZD Allocation Is Changed Halfway

3-5-1 Restrictions when transmission format or PZD allocation is changed halfway

When any one of the following function keys is changed halfway, the system assumes that the transmission format is not determined and sets Y terminal function [AS-RDY]=OFF and operates with restrictions given in Table 3-12:

- o102 transmission format
- PZD allocation to OUT area from o122 to o133 and PZD allocation (*1) to IN area from o160 to o171

Even if you return the value to the original one after changing it once, the system assumes that the value is still changed and operates with restrictions.

* 1 A transmission format where PZD area does not exist (ST1) is excluded from the above condition.

Table 3-12 Restriction Operation when Function Code Allocation Is Changed Halfway (during[AS-RDY]=OFF)

Restriction during [AS-RDY]=OFF		Remarks
Free allocation format (FM1) (o102=21)	IN area: Set all response data to be read from function code to 0.	
Standard telegram 1(ST1) (o102=1)	OUT area: Ignore all command data to be written to function code.	For ST1, restriction occurs only when o102 is changed halfway.

3-5-2 Resetting restriction and checking transmission format determination status

You can reset the restriction by executing any one of the following actions:

- Set 1 to function code o101.
- Turn ON the inverter main power supply again.

After the above operations, the transmission format and PZD allocation details are checked and Y terminal function is set as [AS-RDY]=ON.

You can check [AS-RDY] signal using the method given in Table 3-12.

Table 3-13 Checking Transmission Format Determination Status Signal [AS-RDY]

Check method	Operation
Y terminal function [AS-RDY]	Determining the function code allocation now. [AS-RDY] *1 [AS-RDY]= ON : Determining function code allocation details now (without restriction) [AS-RDY]= OFF: Function code allocation details not determined (with restriction given in Table 3-13)
Function code M143	M143 bit0=1 : [AS-RDY]= ON *2 M143 bit0=0 : [AS-RDY]= OFF

*1 To allocate [AS-RDY]to Y terminal , select “64:AS-RDY” from “Select Y function from function codes E15 to E27 “.

*2 Even if [AS-RDY] is not allocated to Y terminal, you can check the status by monitoring M143.