

TOSVERT VF-S15/AS3/MB1

PROFINET Option Function Manual

PNE001Z

TOSHIBA INDUSTRIAL PRODUCTS AND SYSTEMS CORPORATION

NOTICE

1. Read this manual before installing or operating. Keep this manual on hand of the end user, and make use of this manual in maintenance and inspection.
2. All information contained in this manual will be changed without notice. Please contact your Toshiba distributor to confirm the latest information.

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Introduction

Thank you for purchasing the PROFINET option “PNE001Z” for VF-S15 (CPU1 version 112 or later) ,VF-AS3 and VF-MB1 (CPU1 version 116 or later) . Before using the PROFINET option, please familiarize yourself with the product and be sure to thoroughly read the instructions and precautions contained in this manual.

In addition, please make sure that this manual and “Precautions Manual” (E6582052) is delivered to the customer, and keep this function manual in a safe place for future reference or drive/interface inspection.

This manual describes the supported functions for the “PNE001Z”.

In conjunction with this manual, the following manuals are supplied by Toshiba, and they are essential both for ensuring a safe, reliable system installation as well as for realizing the full potential of the “PNE001Z”:

- TOSVERT VF-S15 Instruction Manual	E6581611
- TOSVERT VF-MB1 Instruction Manual	E6581697
- VF-MB1/S15/AS3 communication option Precautions Manual	E6582052
- TOSVERT VF-AS3 Instruction Manual.....	E6582062

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Modbus is a registered trademark of Schneider Automation.

Other product names may be trademarks or registered trademarks of their respective owners.

Safety precautions

On the drive and in its instruction manual, important information is contained for preventing injuries to users and damages to assets and for proper use of the device. Read the instruction manual attached to VF-S15/AS3/MB1 along with this instruction manual for completely understanding the safety precautions and adhere to the contents of these manuals.

Explanation of markings

Marking	Meaning of marking
 Warning	Indicates that errors in operation may lead to death or serious injury.
 Caution	Indicates that errors in operation may lead to injury (*1) to people or that these errors may cause damage to physical property. (*2)

(*1) Such things as injury, burns or shock that will not require hospitalization or long periods of outpatient treatment.

(*2) Physical property damage refers to wide-ranging damage to assets and materials.

Meanings of symbols

Marking	Meaning of marking
	Indicates prohibition (Don't do it). What is prohibited will be described in or near the symbol in either text or picture form.
	Indicates something mandatory (must be done). What is mandatory will be described in or near the symbol in either text or picture form.
	Indicates warning. What is warned will be described in or near the symbol in either text or picture form. Indicates caution. What the caution should be applied to will be described in or near the symbol in either text or picture form.

■ General Operation

 Warning	
 Disassembly prohibited	▼ Never disassemble, modify or repair. Doing so could result in electric shock, fire and injury. For repairs, call your sales agency.
 Prohibited	▼ Do not attach this option to any inverter other than the VF-S15/AS3/MB1. Doing so could result in electric shock or fire. ▼ When the inverter is energized, never detach the this option from the VF-S15/AS3/MB1. Doing so could result in electric shock. ▼ Don't place or insert any kind of object into this product (electrical wire cuttings, rods, wires). Doing so could result in electric shock or fire. ▼ Do not allow water or any other fluid to come in contact with this product. Doing so could result in electric shock or fire.
 Mandatory	▼ Turn off the VF-S15/AS3/MB1 when installing and wiring this option. ▼ If the inverter begins to emit smoke or an unusual odor, or unusual sounds, immediately turn power off. If the equipment is continued in operation in such a state, the result may be fire. Call your local sales agency for repairs.

■ Transportation & installation

 Warning	
 Prohibited	▼ Do not operate the inverter if it is damaged or any component is missing. Doing so could result in electric shock or fire. Call your local sales agency for repairs. ▼ Do not place any inflammable substances near the VF-S15/AS3/MB1. If an accident occurs in which flame is emitted, this could lead to fire. ▼ Do not install in any location where the inverter could come into contact with water or other fluids. Doing so could result in electric shock or fire. ▼ When installing this option, be careful not to touch the leads from parts on the reverse side of its circuit board. Doing so could result in injury.
 Mandatory	▼ Operate under the environmental conditions prescribed in the instruction manual. Operations under any other conditions may result in malfunction.

■ Wiring

 Warning	
 Mandatory	▼ Shut off power when installing and wiring this option. Wait at least 15 minutes and check to make sure that the charge lamp (VF-S15/AS3/MB1) is no longer lit. ▼ Electrical construction work must be done by a qualified expert. Installation or connection of input power by someone who does not have that expert knowledge may result in fire or electric shock.

■ Operations

 Warning	
 Prohibited	▼ Do not touch switches when the hands are wet and do not try to clean the inverter with a damp cloth. Doing so could result in electric shock. ▼ Do not pull on any cable itself. Doing so could result in damage or malfunction.

■ Cautions for the communication

 Warning	
 Prohibited	▼ Do not set the value that exceeds an effective range as data. The motor may suddenly restart or stop and that could result in injury.
 Mandatory	▼ Check PROFINET state (using below status word bit) when the option unit is deactivated by an unusual event such as an operating error, power outage, failure, etc. - ZSW Status Word Bit 3 (Fault), Bit 7 (Warning) (The communication error occurs when "1" as value or this value cannot be read.) Deactivated option unit may cause an accident, if the PROFINET state is not checked. ▼ Make sure that the operation signals are STOP before clearing the inverter's fault. The motor may suddenly start and that may result in injuries.

■ Disposal

 Caution	
 Mandatory	▼ For safety's sake, do not dispose of the disused inverter yourself but ask an industrial waste disposal agent (*). If the collection, transport and disposal of industrial waste are done by someone who is not licensed for that job, it is a punishable violation of the law. (Laws in regard to cleaning and processing of waste materials) (*) Persons who specialize in the processing of waste and known as "industrial waste product collectors and transporters" or "industrial waste disposal persons."

■ Cautions for parameters

 Warning

Prohibited

- ▼ Do not use application of writing into same parameter more than 100,000 times.
The Life of EEPROM is approximately 100,000 times. Frequent writing to the EEPROM of inverter will cause a memory corruption.

Notes on use**Notes**

- ▼ Do not install the inverter where the temperature or the humidity will change rapidly.
- ▼ Keep a distance of 20cm or more between the inverter 's power cable and the data transmission cable.
Or the inverter might malfunction because of noise.
- ▼ Insert a magnetic contactor or similar device between the inverter and the power supply to ensure that power is turned off if an emergency stop command is entered through the network.

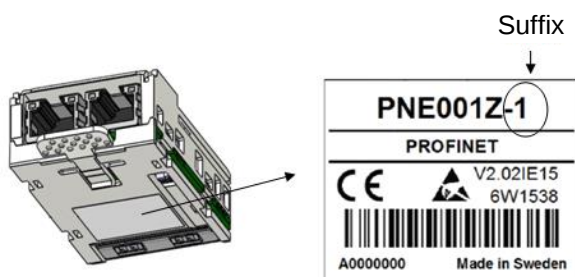
1. Combination of product version and GSDML file

It shows the differences by product version below.

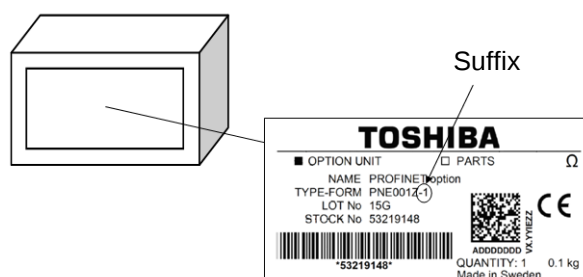
TYPE-FORM	Suffix	Applicable model	Manufacturer-ID	Support of JAVA8 of Web server
PNE001Z	"-2"	VF-S15 (CPU1 version 112 or more) VF-AS3 VF-MB1 (CPU1 version 116 or more)	0x31A	Supported
	"-1"	VF-S15 (CPU1 version 112 or more) VF-AS3	0x31A	Supported
	None	VF-S15 (CPU1 version 112 or more)	0x190	Not supported

Suffix can be checked by the labels on the product and the package.

Product label



Package label



When PNE001Z is used, please use following GSDML file and image file.

As for acquisition of a GSDML file and an image file for VF-S15/AS3/MB1, please contact your Toshiba distributor.

VF-S15	GSDML file	PNE001Z	GSDML-V2.3-Toshiba-VFS15-20150127.xml (The product family information is displayed as "VF-S15".)
		PNE001Z-1	GSDML-V2.31-Toshiba-VFS15_1-20170628.xml
		PNE001Z-2	(The product family information is displayed as "VF-S15_1".)
	Image file	PNE001Z	GSDML-0190-00E0-VF_S15.bmp
		PNE001Z-1 PNE001Z-2	GSDML-031A-00E0-VF_S15.bmp
VF-AS3	GSDML file	GSDML-V2.31-Toshiba-VFAS3-20170614.xml	
	Image file	GSDML-031A-00B2-VF_AS3.bmp	
VF-MB1	GSDML file	GSDML-V2.31-Toshiba-VFMB1-20170614.xml	
	Image file	GSDML-031A-00E1-VF_MB1.bmp	

2. Overview

This product is a dual port PROFINET communication module that can be used in a PROFINET Industrial Ethernet. This product also offers an embedded Web server which offers comfortable monitoring and setup directly from a standard web browser.

2.1. Specification

Module specifications

Item	Specification
Type-form	PNE001Z
Applicable inverter	VF-S15 CPU1 Ver.112 or later (With SBP009Z) VF-AS3 VF-MB1 CPU1 Ver.116 or later
Connector	Dual RJ45 shielded connector
Supported network	PROFINET, Modbus TCP
Indicator	4 LEDs indicating the communication status and error status.
Protection degree	IP20
Environments	Correspond to inverter. Note) The maximum ambient temperature for VF-AS3 is 50 degrees when the option is installed.

Network specifications

Item		Specification
PROFINET	Baud rate	100Mbps (Full duplex)
	Cyclic communication	PROFIdrive V.4.1 (Telegram1)
		4PKW and 2 PZD vendor format (Telegram100)
		4PKW and 6 PZD vendor format (Telegram101)
		6 PZD vendor format (Telegram102)
	Acyclic communication	Reading the PROFIdrive parameter
		Reading/writing the inverter parameters
	Configuration	Configure by PROFINET master
	IP configuration mode	Manual setup, DCP, DHCP, Embedded Web server
	PROFINET IO classes	Conformance Class-B
Modbus TCP	I&M	I&M function 0
	Response time	*Cyclic communication About 11ms on VF-AS3 Cyclic communication About 14ms on VF-S15/MB1
	Baud rate	10/100Mbps (Full/Half duplex)
		Read Holding Registers (03H)
		Write Single Register (06H)
		Write Multiple Registers (10H)
	Supported function	Read Device Identification (2BH)
		Manual setup, DHCP, Embedded Web server
Ethernet	MRP	Supported
	LLDP	Supported
	Web server	Inverter status monitor, inverter parameter monitor/configuration, Network status monitor, password lock

*Response time is the time until the inverter is operated by RUN command on the cyclic communication

2.2. PROFINET

This product supports the cyclic command transmission and monitoring by the “PROFIdrive” profile and 3 vendor profile.

- Telegram1: PROFIdrive
- Telegram100: 4 PKW and 2 PZD format.
- Telegram101: 4 PKW and 6 PZD format.
- Telegram102: 6 PZD format.

This product also supports The PROFIdrive parameters channel.

2.3. Modbus TCP

This product supports the following Modbus services.

- 03 (0x03): Read Holding Registers
- 06 (0x06): Write Single Register
- 16 (0x10): Write Multiple Registers
- 43 (0x2B): Read Device Identification

2.4. PROFINET and Ethernet Features

This product supports the following functions.

- Automatic IP address assignment via DHCP and DCP
- Support of MRP (Media Redundancy Protocol)
- Support of LLDP (Link Layer Discovery Protocol)
- Diagnostics and configuration via integrated Web server

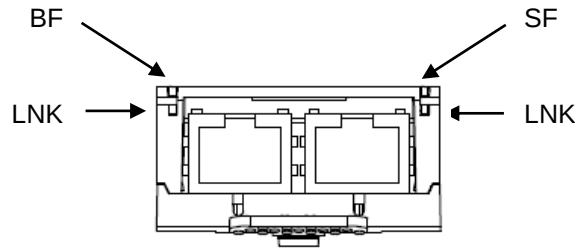
2.5. Web server

This product supports the following functions on Web server

- Drive monitor
- Drive parameters
- Network parameters
- Administration
- TCP/IP statistics
- Modbus statistics

2.6. LED indicator

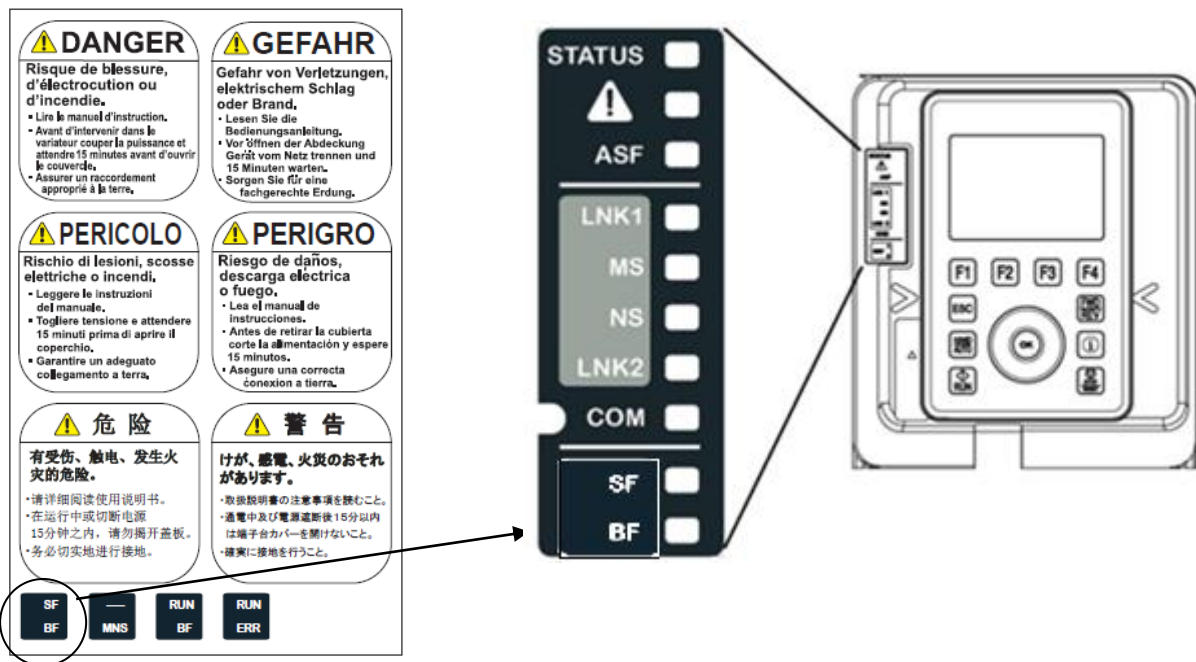
The LED shows the present status of the network and module.



When PROFINET option is mounted to VF-AS3, please attach the LED label(SF/BF*1) for PROFINET option to lower side of communication indicator of VF-AS3.

The LED label is included in danger label kit of VF-AS3.

SF (Network status) and BF (Module status) are displayed on communication indicator.



*1

■The behavior of LNK LED

Link Activity	
Color and behavior	Meaning
OFF	No link
Green Blink	Network Activity at 100 Mbps
Green ON	Link established at 100 Mbps

■The behavior of BF LED

Module Status	
Color and behavior	Meaning
OFF	The device is powered off
Green/Red blinking	Power up testing
Green flashing	In combination with other LEDs : DCP manual identification phase / DCP flash mode
Green ON	The device is ready and operational
Red Single flash	No connection to the PROFINET Controller
Red flickering	The option has detected a communication error (E r r B)
Red ON	The option has detected a option module error (E - 2 3)

■The behavior of SF LED

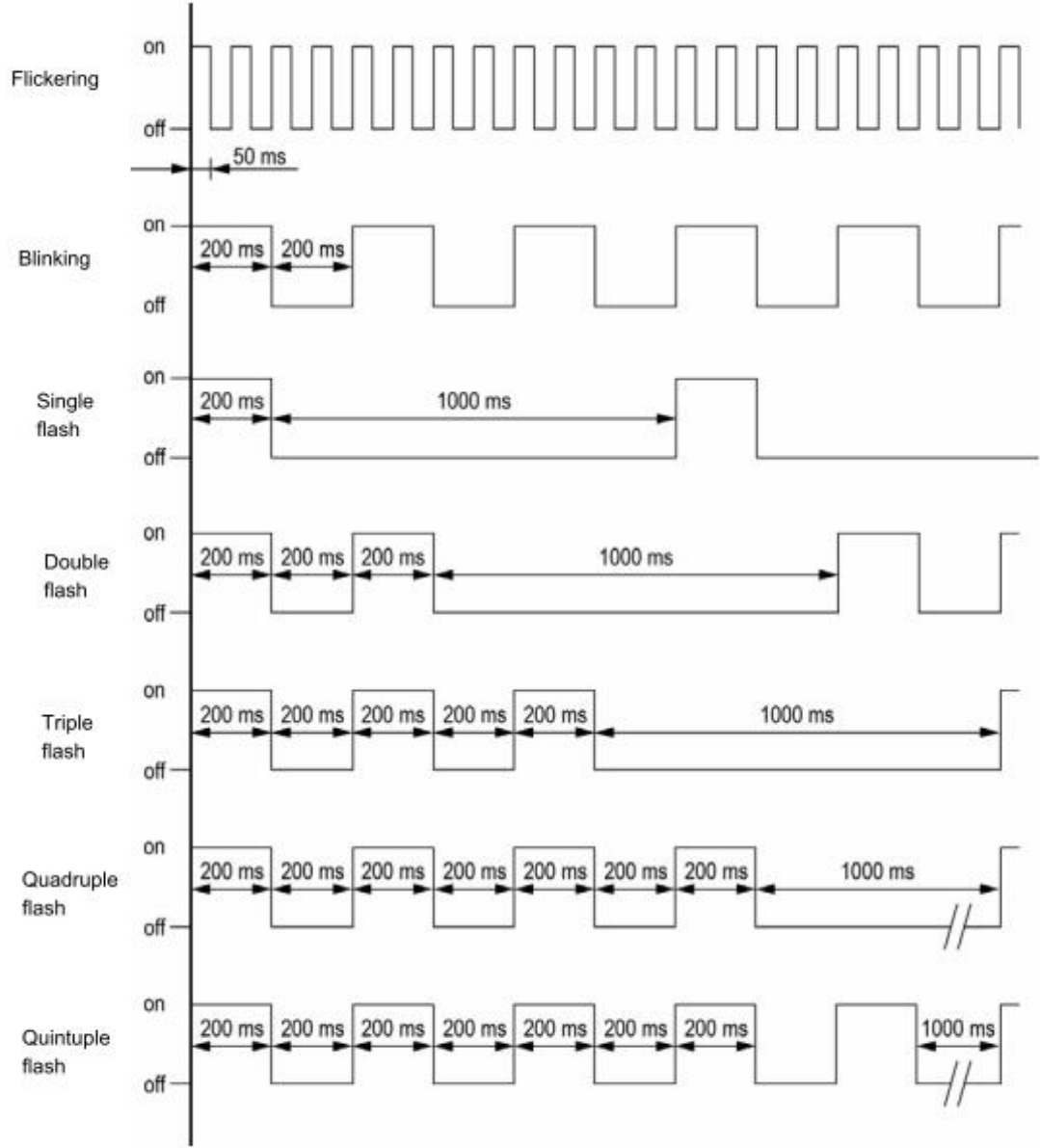
Network Status	
Color and behavior	Meaning
OFF	The option does not have IP address or powered off
Green/Red blinking	Power up testing
Green flickering	In combination with other LEDs: DCP manual identification phase / DCP flash mode
Green flashing 3 times	All ports are unplugged, but the card has an IP address
Green flashing 4 times	Error: duplicate IP address
Green flashing 5 times	The card is performing a DHCP sequence
Green ON	At least a port is connected and has a valid IP address.
Red ON	General error on the module

If the communication card operates as a Modbus TCP server only, LNK LEDs work as follows.

■The behavior of LNK LED for Modbus TCP

Link Activity	
Color and behavior	Meaning
OFF	No link
Green Blink	Network Activity at 100 Mbps
Green ON	Link established at 100 Mbps
Yellow Blink	Network Activity at 10 Mbps
Yellow ON	Link established at 10 Mbps

LED Behavior Detail



2.7. Diagnostic (PROFINET Service)

When the error occurs in the inverter, PROFINET diagnostic alarm is issued.

Diagnostic table

Byte	Name	Size	Value
1	User specific status information	1 byte	Length of the block
2		1 byte	Trip code
3		1 byte	Profile
4		1 byte	CPU1 version, LSB
5		1 byte	CPU1 version, MSB
6		1 byte	Option software version
7		1 byte	Communication network fault
8		1 byte	Internal link fault

3. Hardware Setup

When using this product with VF-S15, sold separately VF-S15 option adapter (SBP009Z) is required.

3.1. Mounting and removing

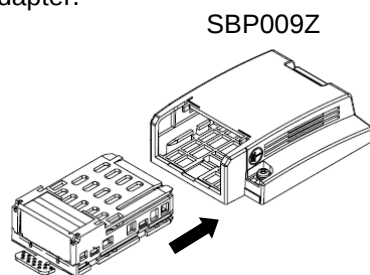
3.1.1. Mounting of option for VF-S15

Refer to [Optional external devices] of E6581611.

⚠ Warning	
 Mandatory action	▼ The mounting/removing of option must be performed without supplying power (Turn off all input power, wait at least 15 minutes, confirm that the charge lamp of inverter is no longer lit). The inverter and option can become damaged. ▼ Do not use tool for the mounting/removing of option. The inverter and option can become damaged.

3.1.1.1. Mounting of option

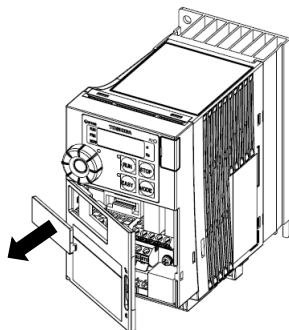
1. Insert option into option adapter.



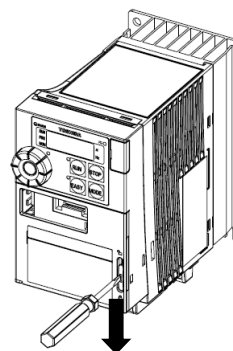
*Note: Mount option adapter to inverter after option insertion.

Insert the option straightly and slowly along the guide inside option adapter. Otherwise, the connector can become damaged.

2. Remove the option connector cover on control terminal cover.

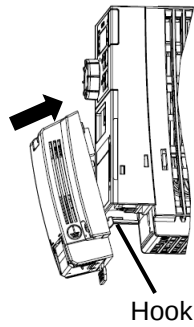


3. Lock the control terminal cover.

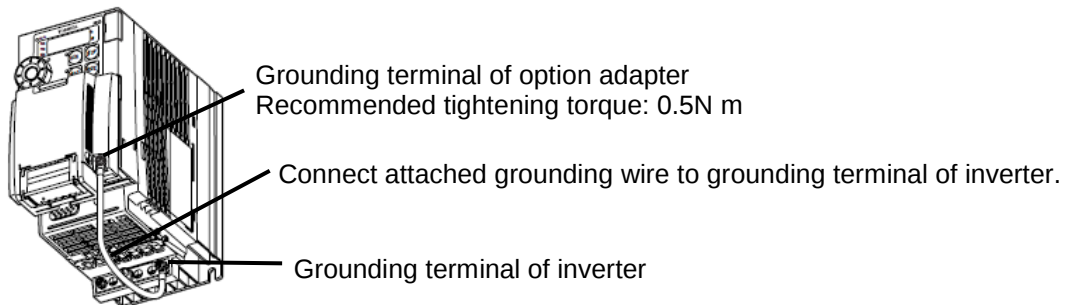


4. Hang the hook of option adapter on the control terminal cover.

Insert the connector in the direction of arrow

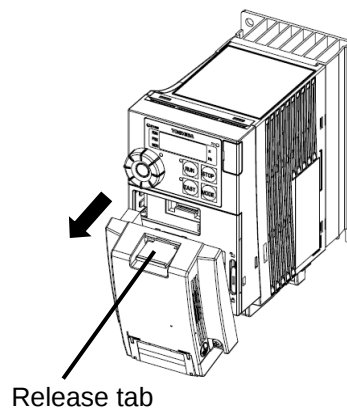


3.1.1.2. Earth wire wiring

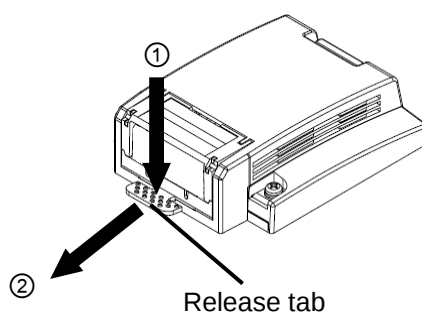


3.1.1.3. Removing of option

1. Remove the connector in the direction of arrow while pushing the release tab.



2. Remove an option in the direction of arrow ② while pushing the release tab in the direction of arrow ①.



3.1.2. Mounting of option for VF-AS3

Refer to [Mounting/removing insert type options] of E6582062.

⚠ Warning

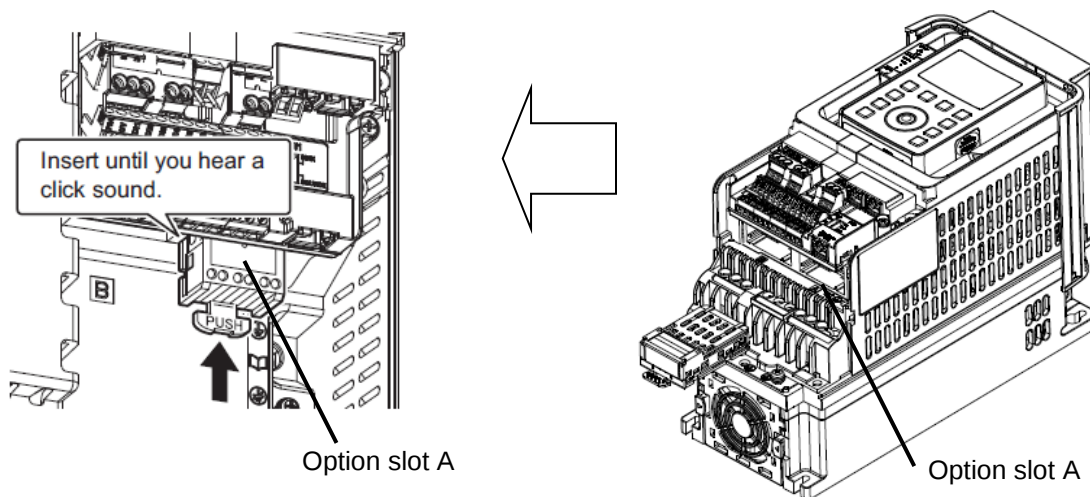


Mandatory
action

▼ The mounting/removing of option must be performed without supplying power (Turn off all input power, wait at least 15 minutes, confirm that the charge lamp of inverter is no longer lit). The inverter and option can become damaged.

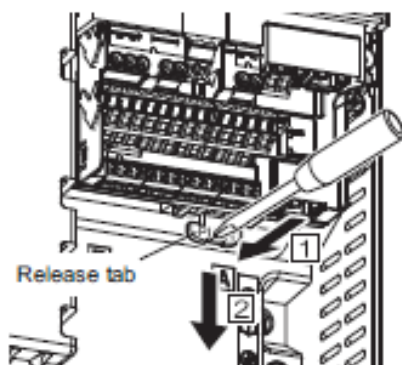
3.1.2.1. Mounting of option

Insert option to the option slot A until you hear a click sound.



3.1.2.2. Removing of option

While pressing the release tab down, pull the cassette option to remove from the option slot.



3.1.3. Mounting of option for VF-MB1

Refer to [Optional external devices] of E6581697.

Warning

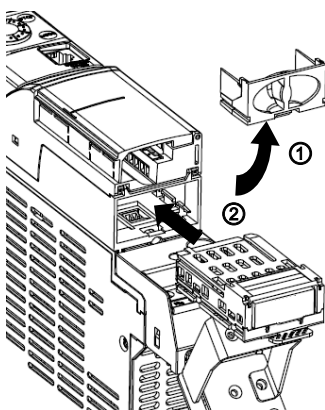


Mandatory
action

- ▼ The mounting/removing of option must be performed without supplying power(Turn off all input power, wait at least 15 minutes, confirm that the charge lamp of inverter is no longer lit). The inverter and option can become damaged.
- ▼ Do not use tool for the mounting/removing of option . The inverter and option can become damaged.

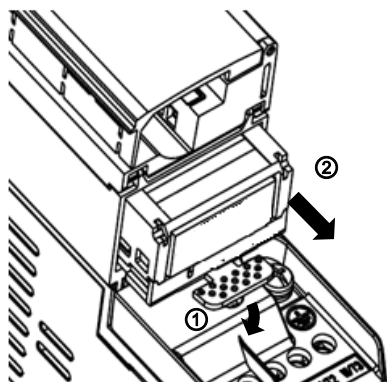
3.1.3.1. Mounting of option

1. Take out the option cover in the inverter ①
2. Insert the option into the inverter②.



3.1.3.2. Removing of option

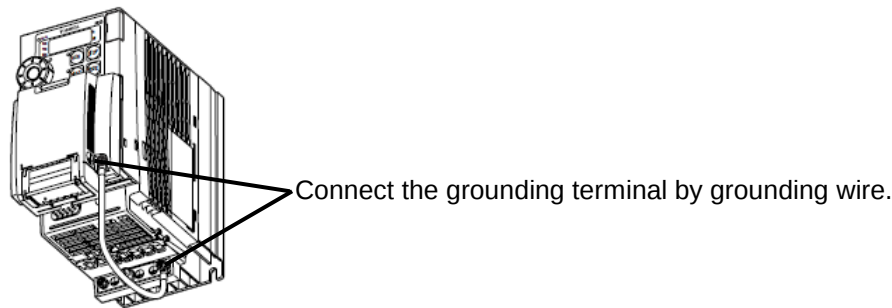
1. Push the tab for release①
2. Pull the option out at the same②



3.2. Wiring

This product is equipped with dual shielded RJ45 connectors. The shielding of RJ45 connectors are connected to the grounding terminal of inverter.

When you use this product with VF-S15, please connect the grounding terminal of SBP009Z to grounding terminal of inverter by attached grounding wire.

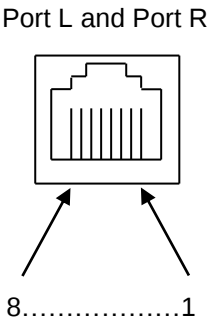


When you use this product with VF-AS3/MB1, you do not need the ground line wiring. Because when you attach this product to VF-AS3/MB1, Shielded RJ45 connector is connected to the ground terminal of the inverter

Communication cable specifications

- CAT 5e or more
- Connector RJ45, non-crossover cable
- Shielded twisted pair cable
- Maximum cable length = 100 m (328 ft)

The following table describes the pin layout of RJ45 connector.



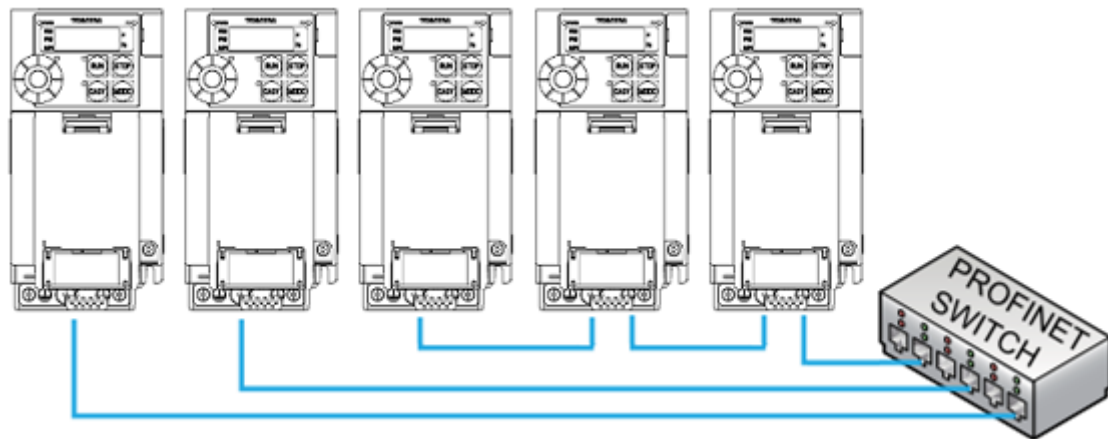
Pin	Signal
1	TD+
2	TD-
3	RD+
4	-
5	-
6	RD-
7	-
8	-

* Fix a cable so that a communication connector may be not taken the weight of wire.

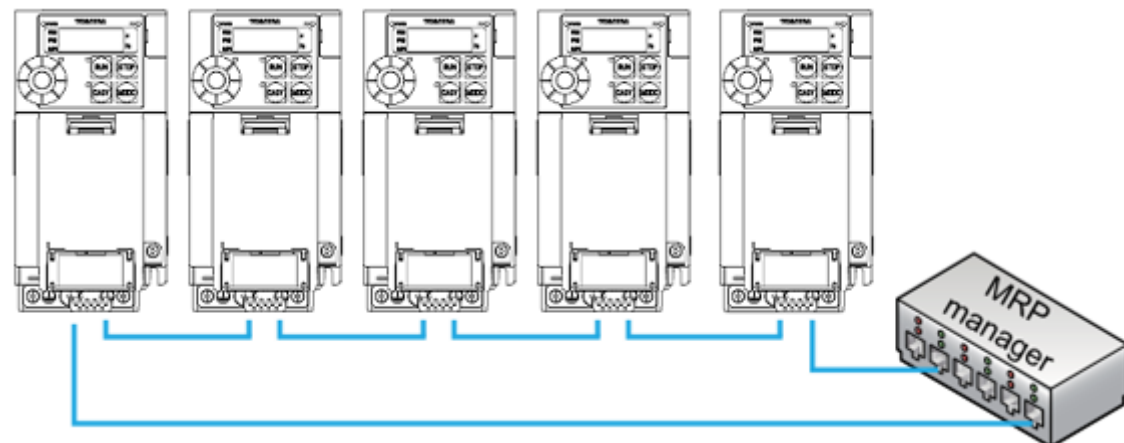
3.3. Installation Topology

This product support several wiring solutions:

Daisy Chain and/or Star topology



Ring topology



Note: The ring topology can only be used with a Media Redundancy Protocol (MRP) capable managed switch.

4. Parameters

4.1. Communication parameters

This option doesn't operate if these parameters are not correctly set.

4.1.1. Relation parameters for VF-S15/MB1

Title	Communication No.	Function	Description	Default setting
<i>C 003</i>	0003	Command mode selection	0: Terminal board 1: Panel keypad (including remote keypad) 2: RS485 communication 3: CANopen communication 4: Communication option	1
<i>F 004</i>	0004	Frequency setting mode selection 1	0: Setting dial 1 (save even if power is off) 1: Terminal board VIA 2: Terminal board VIB 3: Setting dial 2 (press in center to save) 4: RS485 communication 5: UP/DOWN from external logic input 6: CANopen communication 7: Communication option 8: Terminal board VIC 9, 10: - 11: Pulse train input 12, 13: - 14: <i>S r 0</i>	0
<i>F 5 19</i>	0519	Setting of acceleration / deceleration time unit	0: - 1: 0.01s unit (after execution: 0) 2: 0.1s unit (after execution: 0)	0 (*1)
<i>F 7 49</i>	0749	Integrating wattmeter display unit selection	0: 1.0=1kWh 1: 1.0=10kWh 2: 1.0=100kWh 3: 1.0=1000kWh 4: 1.0=10000kWh	(*2)
<i>F 8 56</i>	0856	Number of motor pole pair for communication	1: 2 poles 2: 4 poles 3: 6 poles 4: 8 poles 5: 10 poles 6: 12 poles 7: 14 poles 8: 16 poles	2
<i>F 8 98</i>	0898	Reset mode selection (*3)	0: Clear trip without disrupting communication by reset command from communication option. Reset and restart by reset command from panel keypad, terminal block or RS485 communication. 1: Reset 2: Clear trip 3 to 5: -	0
<i>F 8 99</i>	0899	Communication function reset	0: - 1: Reset (after execution: 0)	-

(*1): 0.1s unit is selected as default setting.

(*2): Default setting values vary depending on the capacity.

(*3): When you reset by *F 8 9 9*=1 setting, or trip is requires a reboot of inverter, the inverter is rebooted regardless of the parameter setting.

4.1.2. Relation parameters for VF-AS3

Title	Communication No.	Function	Description	Default setting
<i>C00d</i>	0003	Command mode selection	0: Terminal board 1: Operation panel, Extension panel 2: Embedded Ethernet 3: RS485 communication (connector 1) 4: RS485 communication (connector 2) 5: Communication option	0
<i>F00d</i>	0004	Frequency setting mode selection 1	0: - 1: Terminal RR 2: Terminal RX 3: Terminal II 4: Terminal AI4 (option) 5: Terminal AI5 (option) 6-9:- 10: Touch wheel 1 (power off or press OK to save) 11: Touch wheel 2 (press OK to save) 12: <i>5 r 0</i> 13,14:- 15: Terminal Up/Down frequency 16: Pulse train 17: High resolution pulse train (option) 18,19:- 20: Embedded Ethernet 21: RS485 communication (connector 1) 22: RS485 communication (connector 2) 23: Communication option	1
<i>F519</i>	0519	Setting of acceleration / deceleration time unit	0: - 1: 0.01s unit (0 after execution) 2: 0.1s unit (1 after execution)	0 (*1)
<i>F749</i>	0749	Integrating wattmeter display unit selection	0: 1.0=1kWh 1: 1.0=10kWh 2: 1.0=100kWh 3: 1.0=1000kWh 4: 1.0=10000kWh 5: 1.0=100000kWh	(*2)
<i>F856</i>	0856	Number of motor pole pair for communication	1: 2 poles 2: 4 poles 3: 6 poles 4: 8 poles 5: 10 poles 6: 12 poles 7: 14 poles 8: 16 poles	2
<i>F898</i>	0898	Reset mode selection (*3)	0: Clear trip by request from communication option. Reset by request except from communication option.. 1: Reset 2: Clear trip 3 to 5: -	0
<i>F899</i>	0899	Communication function reset	0: - 1: Reset option and inverter	-

(*1): 0.1s unit is selected as default setting.

(*2): Default setting values vary depending on the capacity.

(*3): When you reset by *F899*=1 setting, or trip is requires a reboot of inverter, the inverter is rebooted regardless of the parameter setting.

4.1.3. Communication parameters for VF-S15/AS3/MB1

Title	Communication No.	Function	Description	Default setting
C081 - C096	C081-C096	Device Name 1-16 (*1)	Max 16 characters The device name is required if the card uses DHCP to obtain its IP Address.	0
C100	C100	Communication error detection delay time	0.0 - 100.0 sec. The waiting time of network error detection can be adjusted. If a network error continues past the time set in C100 , it is recognized as a communication error, and inverter will operate according the setting of C101 . If network error was removed during C100 , inverter will continue normal operation.	0.0
C101	C101	Inverter operation at the communication loss action	0: Stop and controlled by C004 , F004 1: Operation continue 2: Deceleration stop 3: Coast stop 4: Network error stop (Error B trip) 5: Preset speed operation (by C102 setting)	4
C102	C102	Preset speed operation selection	0: None 1 to 15: Preset speed The operation frequency when the communication fault is occurred can be selected from preset speed. (Only when C101 is set to 5)	0
C103	C103	Communication error condition selection	0: Always 1: Communication command (Frequency reference and command from communication option) enabled 2: 1+during run	1
C154	C154	PROFIdrive JOG1 frequency	0.0 to 20.0Hz	5.0Hz
C155	C155	PROFIdrive JOG2 frequency	0.0 to 20.0Hz	5.0Hz
C156	C156	PROFIdrive Tmax	0.1 to 60.0s	10.0s
C157	C157	PROFIdrive Tolerance	0.1 to 99.0%	50.0%
C504	C504	IP mode (*2)	Use this parameter to select the IP address assignment method. 0: Manual 1: Invalid setting 2: DHCP 3: DCP	0
C505 - C508	C505-C508	IP address setting value (*2)	The IP address of the option module. These fields are effective settings at C504 = 0.	0.0.0.0
C509 - C512	C509-C512	Subnet mask setting value (*2)	The subnet mask of the option module. These fields are effective settings at C504 = 0.	0.0.0.0
C513 - C516	C513-C516	Default gateway setting value (*2)	The gateway IP address of the option module. These fields are effective settings at C504 = 0.	0.0.0.0
C554	C554	Web server (*2)	Enables web server. 0: Disable 1: Enable	1

(*1): (**EEP**) does not work for this parameter.

(*2): These parameters are affected after reset.

4.2. Communication parameters for PROFINET

The following parameters can be used for cyclic transmission of this product.

4.2.1. Relation parameters for VF-S15/MB1

Title	Communication No.	Function	Description
<i>C001</i>	C001	Scanner input 1 address	0: - 1: <i>F A 0 6</i> (Communication command 1) 2: <i>F A 2 3</i> (Communication command 2) 3: <i>F A 0 7</i> (Frequency command, 0.01Hz) 5: <i>F A 5 0</i> (Terminal output data) 6: <i>F A 5 1</i> (FM analog output) 8: <i>F 6 0 1</i> (Stall prevention level, %) 13: <i>A C C</i> (Acceleration time 1, 0.1s) (*1) 14: <i>d E C</i> (Deceleration time 1, 0.1s) (*1) 15: <i>U L</i> (Upper limit, 0.01Hz) 16: <i>u b</i> (Torque boost value 1, 0.1%) 17: <i>u L u</i> (Base frequency voltage 1, 0.1V)
<i>C002</i>	C002	Scanner input 2 address	0-17 (Same as <i>C001</i>)
<i>C003</i>	C003	Scanner input 3 address	0-17 (Same as <i>C001</i>)
<i>C004</i>	C004	Scanner input 4 address	0-17 (Same as <i>C001</i>)
<i>C005</i>	C005	Scanner input 5 address	0-17 (Same as <i>C001</i>)
<i>C006</i>	C006	Scanner input 6 address	0-17 (Same as <i>C001</i>)
<i>C021</i>	C021	Scanner output 1 address	0: - 1: <i>F d 0 1</i> (Status information 1) 2: <i>F d 0 0</i> (Output frequency, 0.01Hz) 3: <i>F d 0 3</i> (Output current, 0.01%) 4: <i>F d 0 5</i> (Output voltage, 0.01%) 5: <i>F C 9 1</i> (Alarm information) 6: <i>F d 2 2</i> (PID feedback value, 0.01Hz) 7: <i>F d 0 6</i> (Input terminal status) 8: <i>F d 0 7</i> (Output terminal status) 9: <i>F E 3 6</i> (VIB input, 0.01%) 10: <i>F E 3 5</i> (VIA input, 0.01%) 11: <i>F E 3 7</i> (VIC input, 0.01%) 12: <i>F d 0 4</i> (Input voltage (DC detection), 0.01%) 13: <i>F d 1 6</i> (Estimated speed 0.01Hz) 14: <i>F d 1 8</i> (Torque, 0.01%) 15: - 16: - 17: - 18: - 19: <i>F 8 8 0</i> (Free notes) 20: <i>F d 2 9</i> (Input power, 0.01kW) 21: <i>F d 3 0</i> (Output power, 0.01kW) 22: <i>F E 1 4</i> (Cumulative operation time, 1 hour) 23: <i>F E 4 0</i> (FM terminal output monitor, 0.01%) 24: - 25: <i>F d 2 0</i> (Torque current, 0.01%) 26: <i>F d 2 3</i> (Motor overload factor, 0.01%) 27: <i>F d 2 4</i> (Drive overload factor, 0.01%) 28: <i>F d 2 5</i> (PBR overload factor, %) 29: <i>F d 2 6</i> (Motor load factor, %) 30: <i>F d 2 7</i> (Drive load factor, %) 31: <i>F E 5 6</i> (Pulse train input, pps) 32: <i>F E 7 0</i> (Drive rated current, 0.1A) 33: <i>F E 7 6</i> (Input Watt-hour, $0.1\text{kWh} \times 10^{F 7 4 9}$) 34: <i>F E 7 7</i> (Output Watt-hour, $0.1\text{kWh} \times 10^{F 7 4 9}$) 35: <i>F d 8 3</i> (IGBT temperature, degree C)
<i>C022</i>	C022	Scanner output 2 address	0-35 (Same as <i>C021</i>)
<i>C023</i>	C023	Scanner output 3 address	0-35 (Same as <i>C021</i>)
<i>C024</i>	C024	Scanner output 4 address	0-35 (Same as <i>C021</i>)
<i>C025</i>	C025	Scanner output 5 address	0-35 (Same as <i>C021</i>)
<i>C026</i>	C026	Scanner output 6 address	0-35 (Same as <i>C021</i>)

(*1): The unit depends on *F 5 1 9* setting

4.2.2. Relation parameters for VF-AS3

Title	Communication No.	Function	Description
C001	C001	Scanner input 1 address	0: - 1: $F A 0 6$ (Communication command 1) 2: $F A 2 3$ (Communication command 2) 3: $F A 0 7$ (Frequency command, 0.01Hz) 4: $F A 3 3$ (Torque command 0.01%) 5: $F A 5 0$ (Terminal output data) 6: $F A 5 1$ (Analog output(FM) data from comm.) 7: $F A 5 2$ (Analog output(AM) data from comm.) 8: $F 6 0 1$ (Stall prevention level, %) 9: $F 4 4 1$ (Power running torque limit 1 level, 0.01%) 10: $F 4 4 3$ (Regenerative braking torque limit 1 level, 0.01%) 11: $F 4 6 0$ (Speed loop proportional gain) 12: $F 4 6 1$ (Speed loop stabilization coefficient) 13: $A C C$ (Acceleration time 1, 0.1s) (*1) 14: $d E C$ (Deceleration time 1, 0.1s) (*1) 15: $U L$ (Upper limit, 0.01Hz) 16: $u b$ (Torque boost value 1, 0.01%) 17: $u L u$ (Base frequency voltage 1, 0.1V)
C002	C002	Scanner input 2 address	0-17 (Same as C001)
C003	C003	Scanner input 3 address	0-17 (Same as C001)
C004	C004	Scanner input 4 address	0-17 (Same as C001)
C005	C005	Scanner input 5 address	0-17 (Same as C001)
C006	C006	Scanner input 6 address	0-17 (Same as C001)
C021	C021	Scanner output 1 address	0: - 1: $F d 0 1$ (Status information 1) 2: $F d 0 0$ (Output frequency, 0.01Hz) 3: $F d 0 3$ (Output current, 0.01%) 4: $F d 0 5$ (Output voltage, 0.01%) 5: $F C 9 1$ (Inverter alarm) 6: $F d 2 2$ (PID feedback value, 0.01Hz) 7: $F d 0 6$ (Input terminal status) 8: $F d 0 7$ (Output terminal status) 9: $F E 3 5$ (RR input, 0.01%) 10: $F E 3 6$ (RX input, 0.01%) 11: $F E 3 7$ (LI input, 0.01%) 12: $F d 0 4$ (Input voltage (DC detection), 0.01%) 13: $F d 1 6$ (Estimated speed (real-time value), 0.01Hz) 14: $F d 1 8$ (Torque, 0.01%) 15: $F E 6 0$ (My monitor) 16: $F E 6 1$ (My monitor) 17: $F E 6 2$ (My monitor) 18: $F E 6 3$ (My monitor) 19: $F 8 8 0$ (Free notes) 20: $F d 2 9$ (Input power, 0.01kW) 21: $F d 3 0$ (Output power, 0.01kW) 22: $F E 1 4$ (Cumulative operation time, 1hour) 23: $F E 4 0$ (FM terminal output monitor, 0.01%) 24: $F E 4 1$ (AM terminal output monitor, 0.01%) 25: $F d 2 0$ (Torque current, 0.01%) 26: $F d 2 3$ (Motor overload factor, 0.01%) 27: $F d 2 4$ (Drive overload factor, 0.01%) 28: $F d 2 5$ (PBR overload factor, %) 29: $F d 2 6$ (Motor load factor, %) 30: $F d 2 7$ (Drive load factor, %) 31: $F E 5 6$ (Pulse train input, pps) 32: $F E 7 0$ (Drive rated current, 0.1A) 33: $F E 7 6$ (Input Watt-hour, $0.1\text{kWh} \times 10^{F 7 4 9}$) 34: $F E 7 7$ (Output Watt-hour, $0.1\text{kWh} \times 10^{F 7 4 9}$) 35: $F d 8 3$ (IGBT temperature, degree C)
C022	C022	Scanner output 2 address	0-35 (Same as C021)
C023	C023	Scanner output 3 address	0-35 (Same as C021)
C024	C024	Scanner output 4 address	0-35 (Same as C021)
C025	C025	Scanner output 5 address	0-35 (Same as C021)
C026	C026	Scanner output 6 address	0-35 (Same as C021)

(*1): The unit depends on $F 5 1 9$ setting

4.2.3. Relation common parameters for VF-S15/AS3/MB1

Title	Communi- cation No.	Function	Description
〔 152	C152	PROFIdrive Profile monitor	0 : Telegram 1 (PROFIdrive) 1 : Telegram 100 (Vender Spec. 1) 2 : Telegram 101 (Vender Spec. 2) 3 : Telegram 102 (Vender Spec. 3)
〔 517 - 〔 522	C517- C522	MAC address monitor (*1)	The MAC address of the option module. 〔 517 - 〔 518 - 〔 519 - 〔 520 - 〔 521 - 〔 522
〔 524 - 〔 527	C524- C527	IP address monitor	The current IP address of the option module.
〔 528 - 〔 531	C528- C531	Subnet mask monitor	The subnet mask actual of the option module. Refer to "4.3.2 Assigning IP addresses" for the details.
〔 532 - 〔 535	C532- C535	Default gateway monitor	The gateway IP address actual of the option module. Refer to "4.3.2 Assigning IP addresses" for the details.
〔 536	C536	Ethernet Error monitor	Monitor of the Ethernet error. 0: No error 1: PROFINET I/O timeout 2: Network overload 3: Loss of Ethernet carrier 9: duplicated IP address. 10: No valid IP. 17: Application I/O configuration error

(*1): These values are displayed by decimal number format on panel of VFS15/AS3/MB1.

4.3. The details of the parameter setting

4.3.1. Device name ([081-096])

This option module can set the "Device name" of 16 characters.

(Device name ([081-096]) is 1 character within one parameter.)

The device name is required if the option module uses DHCP to obtain its IP Address.

Please set the setting of the device name according to the following rules.

1. The parameter is displayed by the hexadecimal number.
2. One parameter shows an ASCII character.
3. The relation between the device name and the parameter is as follows.

Example for Device Name = 'VFS15-2004PM'

Chars No.	Parameter	Character (Ex.)	ASCII (Ex.)	Set point(Ex.)
1	[081]	'V'	56H	86
2	[082]	'F'	46H	70
3	[083]	'S'	53H	83
4	[084]	'1'	31H	49
5	[085]	'5'	35H	53
6	[086]	'.'	2DH	45
7	[087]	'2'	32H	50
8	[088]	'0'	30H	48
9	[089]	'0'	30H	48
10	[090]	'4'	34H	52
11	[091]	'P'	50H	80
12	[092]	'M'	4DH	77
13	[093]	-	-	-
14	[094]	-	-	-
15	[095]	-	-	-
16	[096]	-	-	-

4.3.2. Assigning IP addresses (C504, C505 - C516)

The address is assigned according to setting of C504 (IP mode).

C504	Comments
0	The option uses the address defined in C505-C516.
1	Don't use on this product.
2	The option receives its address from DHCP server. *Setting device name (C001-C096) is required.
3	The option receives its address from DCP server..

When you setup the IP address by manual (C504 = 0), inverter needs 4 settings.

- IP address of the inverter (C505 - C508)
- Subnet mask (C509 - C512)
- Gateway address (C513 - C516)

These parameters are effective settings at C504 = 0 (IP mode: Manual).

If you set a value other than 0 to C504, these parameters are invalid.

After dynamic addressing by DHCP server or DCP server, the new address values are displayed in the parameters C524 - C535.

Case of automatic switching of C504 (IP mode) to 3 (DCP)

Needed conditions:

- The device has a Station Name (*1) configuration and validation
- The device is connected to a PROFINET controller
- The PROFINET controller has the Station Name (*1) in its own configuration
- The settings are in local configuration of the PROFINET controller

If all of these conditions are fulfilled:

- C504 (IP mode) is automatically set to 3 (DCP), and C505 - C516 are set to 0.
- IP settings are replaced by the one set in local PROFINET controller
- The new configuration is applied immediately

(*1): Depending on the configuration tool you may be referred to as a "device name".

This is different from the device name that is set in the inverter parameters C001-C096. Station name will be set / assigned by the configuration tool for PROFINET.

5. PROFIdrive Profile

Transmission frame of each Telegram of this product is configured as shown below.

PKW: Parameter ID/value

PZD: Process Data, cyclically transferred

	PKW				PZD					
	PKW1	PKW2	PKW3	PKW4	Cyclic data1	Cyclic data2	Cyclic data3	Cyclic data4	Cyclic data5	Cyclic data6
Telegram 1					Cyclic data1	Cyclic data2				
Telegram 100	PKW1	PKW2	PKW3	PKW4	Cyclic data1	Cyclic data2				
Telegram 101	PKW1	PKW2	PKW3	PKW4	Cyclic data1	Cyclic data2	Cyclic data3	Cyclic data4	Cyclic data5	Cyclic data6
Telegram 102					Cyclic data1	Cyclic data2	Cyclic data3	Cyclic data4	Cyclic data5	Cyclic data6

5.1. Telegram 1: PROFIdrive

PROFIdrive standard

This telegram complies with PROFIdrive standard

	PLC → INV	INV → PLC
Cyclic data 1	STW	ZSW
Cyclic data 2	HSW	HIW

INV: Inverter

STW: Control word

HSW: Main setpoint

ZSW: Status word

HIW: Main actual value

Notes

- ▼ When you use this telegram, the value is written to the RAM.

5.2. STW Control Word Data

This product supports only speed control mode.

Bit	Value	Name	Note
0	1	ON	Transition to "Switched on" condition
	0	OFF	Normal stop.
1	1	No Coast Stop	All "Coast Stop (OFF2)" commands are withdrawn
	0	Coast Stop (OFF 2)	Coast stop.
2	1	No Quick Stop	All "Quick Stop (OFF3)" commands are withdrawn.
	0	Quick Stop (OFF 3)	Quick Stop
3	1	Enable Operation	The drive then runs-up to the set point.
	0	Disable Operation	Normal stop.
4	1	Enable Ramp Generator	-
	0	Reset Ramp Generator	Output of the RFG is set to 0.
5	1	Unfreeze Ramp Generator	-
	0	Freeze Ramp Generator	Freeze the actual setpoint entered by the RFG *1.
6	1	Enable Setpoint	The value selected at the input of the RFG is switched-in.
	0	Disable Setpoint	The value selected at the input of the RFG is set to 0.
7	1	Fault Acknowledge	Fault reset (0 -> 1)
	0	No meaning	-
8	1	JOG 1 ON **	Inverter drives with JOG 1 speed 1 ($\zeta 154$).
	0	JOG 1 OFF	Jogging stop, if "JOG 1" was previously ON. Stop drive according to setting parameter of inverter.
9	1	JOG 2 ON **	Inverter drives with JOG 2 speed 2 ($\zeta 155$).
	0	JOG 2 OFF	Jogging stop, if "JOG 2" was previously ON. Stop drive according to setting parameter of inverter.
10	1	Control By PLC	Activate control by STW.
	0	No Control By PLC	Inactivate control by STW.
11	---	Device-specification	(Reserved) *3
12	1	Net Control	Enable the Command from "communication option".
	0	Local Control	Enable the command mode of $\zeta 10d$ setting.
13	1	Net Reference	Enable the frequency setting from "communication option".
	0	Local Reference	Enable the frequency setting mode of $F10d$ setting.
14	---	Device-specification	(Reserved) *3
15	---	Device-specification	(Reserved) *3

*1: RFG: Ramp Function Generator

*2: Operation is enabled, drive is in standstill and STW1 bit 4, 5, 6 = 0.

*3: Set 0 to reserved bit.

5.3. ZSW Status Word Data

Bit	Value	Name	Note
0	1	Ready To Switch-on	-
	0	Not Ready To Switch-on	-
1	1	Ready To Operate	Refer to control word, bit 1.
	0	Not Ready To Operate	-
2	1	Operation Enabled	Inverter follows set point.
	0	Operation Disabled	-
3	1	Fault Present	Inverter is tripped.
	0	No Fault	Inverter is not tripped.
4	1	Coast Stop Not Activated	-
	0	Coast Stop Activated (OFF 2)	"Coast Stop (OFF 2)" command is present.
5	1	Quick Stop Not Activated	-
	0	Quick Stop Activated (OFF 3)	"Quick Stop (OFF 3)" command is present
6	1	Switching On Inhibited	STW bit1 or 2 is set to 0 Or fault trip has been acknowledged
	0	Switching On Not Inhibited	-
7	1	Warning Present	Alarm present
	0	No Warning	Alarm not present or alarm has disappeared again
8	1	Speed Error Within Tolerance Range	Refer to section 0.
	0	Speed Error Out Of Tolerance Range	
9	1	Control Requested	Control by STW is activated.
	0	No Control Requested	Control by STW is inactivated.
10	1	f Or n Reached Or Exceeded	Actual frequency $\geq$ frequency setpoint
	0	f Or n Not Reached	-
11	----	Device-specification	(Reserved) *1
12	----	Device-specification	(Reserved) *1
13	----	Device-specification	(Reserved) *1
14	----	Device-specification	(Reserved) *1
15	----	Device-specification	(Reserved) *1

*1: Don't use the "Reserved" bit for judgment.

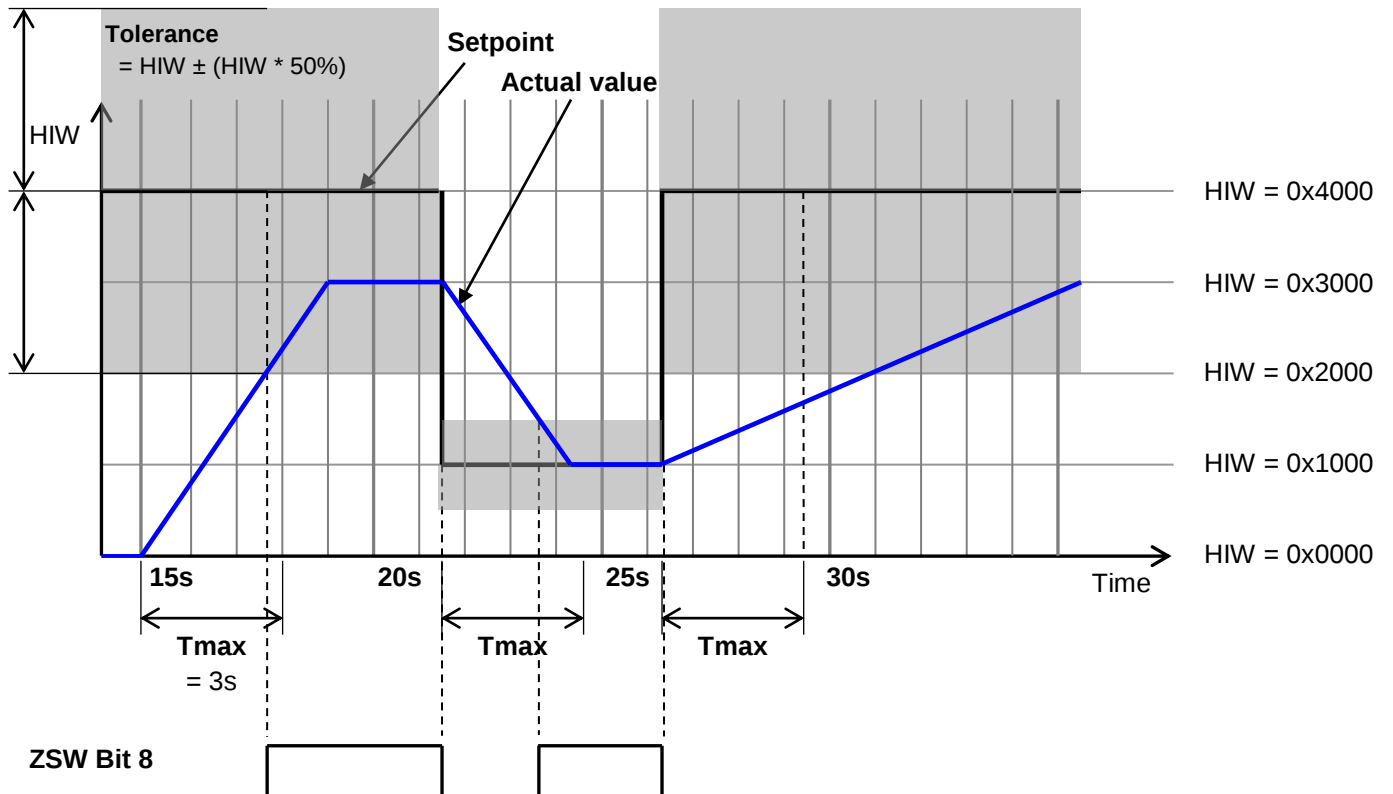
5.3.1. Tolerance Range (ZSW Bit 8)

If the setpoint is changed:

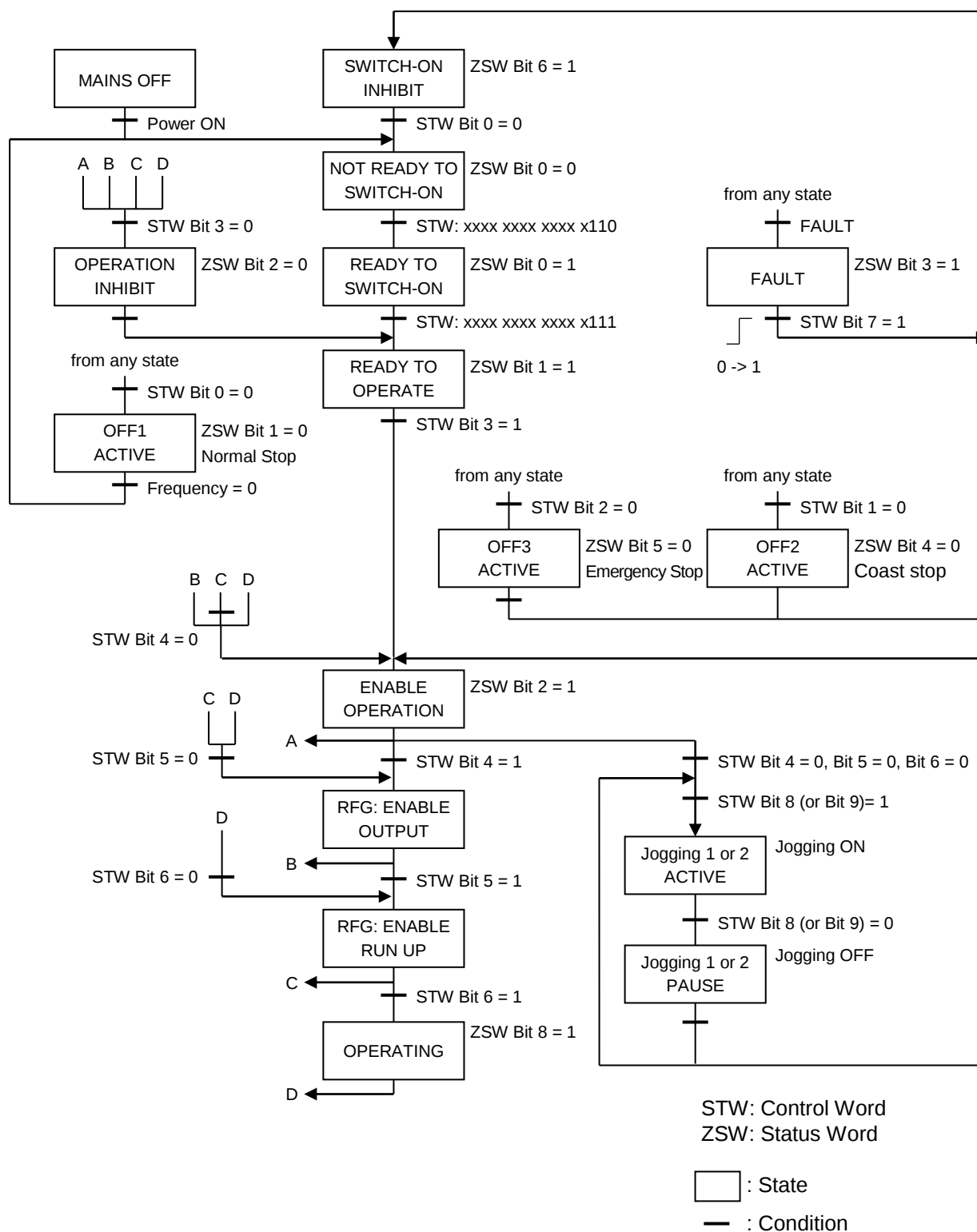
1. ZSW Bit 8 is set 0
2. Calculate the tolerance.
3. Start the timer which will time-out based on parameter Tmax.

This product checks that the timer (Tmax) has not timed-out and if the actual value is within the tolerance. If both conditions are fulfilled ZSW Bit 8 is set 1 and the timer is stopped.

The figure shows ZSW 8 when Tolerance ($\pm 15\%$) is 50% and Tmax ($\pm 15\%$) is 3s.



5.4. State Machine



Notes

- ▼ After set the STW Bit 10 = 1, STW Bit12 = 1 or $\text{[} \overline{00} \text{d} = 4$ setting is needed for above control by STW.
- ▼ Check ZSW always and take care to give the command to STW.

5.4.1. Examples of driving by the State Machine

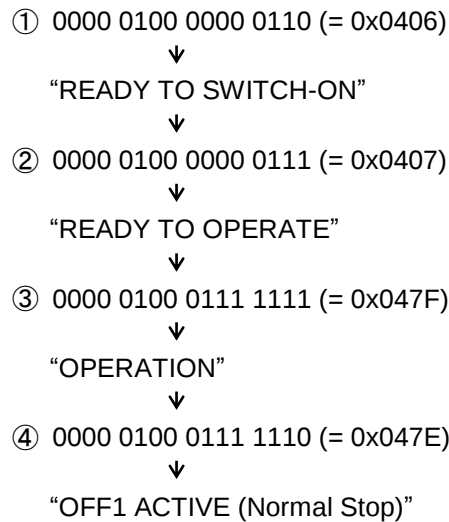
When using the PROFIdrive profile, the frequency reference is set to HSW. The setting value "0x0000" - "0x4000" is equivalent to "0" - "Base frequency (parameter FH)".

When the reverse operation, the frequency reference is set with two's complement of the forward frequency reference. During running, HIW shows a output frequency.

* FH and LI should be set to "Communication option" on these examples.

5.4.1.1. Example 1. 60Hz Forward running and Deceleration stop

Set "0x4000" to HSW and the following is set to STW in order.



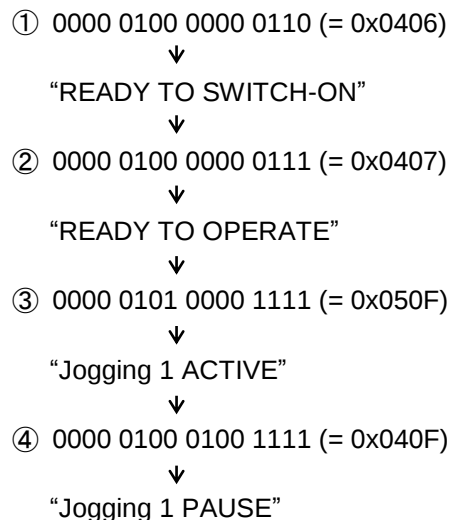
5.4.1.2. Example 2. 30Hz Reverse running

When the reverse operation, "0xE000" is set to HSW. "0xE000" is two's complement of the "0x2000" as the forward frequency reference 30Hz.

The Setup to STW is same as the Example 1.

5.4.1.3. Example 3. Inching and pause

the following is set to STW in order.



* The inching frequency is according to the parameter $LI4$, $LI5$ of inverter.

6. Vendor Specification Profile

Cyclic transmission of command and monitor is possible for this product by the original profile

Select the "Telegram 100", "Telegram 101" or "Telegram 102" as the profile on the configuration. Refer to the PLC configuration tool documents.

You will be able to select the command and monitor items from the following table.

Please execute these settings by the configuration tool of controller.

Notes

▼ When you use "Telegram 100", "Telegram101" or "Telegram102", the value is written to the RAM.

VF-S15/MB1 profile

Scanner input $\overline{C001} - \overline{C006}$	Scanner output $\overline{C021} - \overline{C026}$
0: No action 1: $\overline{F\overline{R}\overline{0}\overline{5}}$ (Communication command 1) 2: $\overline{F\overline{R}\overline{2}\overline{3}}$ (Communication command 2) 3: $\overline{F\overline{R}\overline{0}\overline{7}}$ (Frequency command, 0.01Hz) 5: $\overline{F\overline{R}\overline{5}\overline{0}}$ (Terminal output data) 6: $\overline{F\overline{R}\overline{5}\overline{1}}$ (FM analog output) 8: $\overline{F\overline{5}\overline{0}\overline{1}}$ (Stall prevention level, %) 13: $\overline{R\overline{L}\overline{L}}$ (Acceleration time 1, 0.1s)* 14: $\overline{d\overline{E}\overline{L}}$ (Deceleration time 1, 0.1s) * 15: $\overline{U\overline{L}}$ (Upper limit, 0.01Hz) 16: $\overline{u\overline{b}}$ (Torque boost value 1, 0.1%) 17: $\overline{u\overline{L}\overline{u}}$ (Base frequency voltage 1, 0.1V)	0: No action 1: $\overline{F\overline{d}\overline{0}\overline{1}}$ (Status information 1) 2: $\overline{F\overline{d}\overline{0}\overline{0}}$ (Output frequency, 0.01Hz) 3: $\overline{F\overline{d}\overline{0}\overline{3}}$ (Output current, 0.01%) 4: $\overline{F\overline{d}\overline{0}\overline{5}}$ (Output voltage, 0.01%) 5: $\overline{F\overline{L}\overline{9}\overline{1}}$ (Alarm information) 6: $\overline{F\overline{d}\overline{2}\overline{2}}$ (PID feedback value, 0.01Hz) 7: $\overline{F\overline{d}\overline{0}\overline{6}}$ (Input terminal status) 8: $\overline{F\overline{d}\overline{0}\overline{7}}$ (Output terminal status) 9: $\overline{F\overline{E}\overline{3}\overline{6}}$ (VIB input, 0.01%) 10: $\overline{F\overline{E}\overline{3}\overline{5}}$ (VIA input, 0.01%) 11: $\overline{F\overline{E}\overline{3}\overline{7}}$ (VIC input, 0.01%) 12: $\overline{F\overline{d}\overline{0}\overline{4}}$ (Input voltage (DC detection), 0.01%) 13: $\overline{F\overline{d}\overline{1}\overline{6}}$ (Estimated speed (real-time value), 0.01Hz) 14: $\overline{F\overline{d}\overline{1}\overline{8}}$ (Torque, 0.01%) 19: $\overline{F\overline{8}\overline{8}\overline{0}}$ (Free notes) 20: $\overline{F\overline{d}\overline{2}\overline{9}}$ (Input power, 0.01kW) 21: $\overline{F\overline{d}\overline{3}\overline{0}}$ (Output power, 0.01kW) 22: $\overline{F\overline{E}\overline{1}\overline{4}}$ (Cumulative operation time, 1hour) 23: $\overline{F\overline{E}\overline{4}\overline{0}}$ (FM terminal output monitor, 0.01%) 25: $\overline{F\overline{d}\overline{2}\overline{0}}$ (Torque current, 0.01%) 26: $\overline{F\overline{d}\overline{2}\overline{3}}$ (Motor overload factor, 0.01%) 27: $\overline{F\overline{d}\overline{2}\overline{4}}$ (Drive overload factor, 0.01%) 28: $\overline{F\overline{d}\overline{2}\overline{5}}$ (PBR overload factor, %) 29: $\overline{F\overline{d}\overline{2}\overline{6}}$ (Motor load factor, %) 30: $\overline{F\overline{d}\overline{2}\overline{7}}$ (Drive load factor, %) 31: $\overline{F\overline{E}\overline{5}\overline{6}}$ (Pulse train input, pps) 32: $\overline{F\overline{E}\overline{7}\overline{0}}$ (Drive rated current, 0.1A) 33: $\overline{F\overline{E}\overline{7}\overline{6}}$ (Input Watt-hour, $0.1\text{kWh} \times 10^{\overline{F\overline{7}\overline{4}\overline{9}}}$) ** 34: $\overline{F\overline{E}\overline{7}\overline{7}}$ (Output Watt-hour, $0.1\text{kWh} \times 10^{\overline{F\overline{7}\overline{4}\overline{9}}}$) ** 35: $\overline{F\overline{d}\overline{8}\overline{3}}$ (IGBT temperature, degree C)

* The unit of $\overline{R\overline{L}\overline{L}}$, $\overline{d\overline{E}\overline{L}}$ is according to the parameter $\overline{F\overline{5}\overline{1}\overline{9}}$.

** The unit of $\overline{F\overline{E}\overline{7}\overline{6}}$, $\overline{F\overline{E}\overline{7}\overline{7}}$ is according to the parameter $\overline{F\overline{7}\overline{4}\overline{9}}$.

VF-AS3 profile

Scanner input $\overline{C001} - \overline{C006}$	Scanner output $\overline{C021} - \overline{C026}$
0: No action 1: $\overline{F\dot{A}05}$ (Communication command 1) 2: $\overline{F\dot{A}23}$ (Communication command 2) 3: $\overline{F\dot{A}07}$ (Frequency command, 0.01Hz) 4: $\overline{F\dot{A}33}$ (Torque command 0.01%) 5: $\overline{F\dot{A}50}$ (Terminal output data) 6: $\overline{F\dot{A}51}$ (Analog output(FM) data from comm.) 7: $\overline{F\dot{A}52}$ (Analog output(AM) data from comm.) 8: $\overline{F\dot{6}01}$ (Stall prevention level, %) 9: $\overline{F\dot{4}41}$ (Power running torque limit 1 level, 0.01%) 10: $\overline{F\dot{4}43}$ (Regenerative braking torque limit 1 level, 0.01%) 11: $\overline{F\dot{4}60}$ (Speed loop proportional gain) 12: $\overline{F\dot{4}61}$ (Speed loop stabilization coefficient) 13: $\overline{A\dot{C}C}$ (Acceleration time 1, 0.1s) * 14: $\overline{d\dot{E}C}$ (Deceleration time 1, 0.1s) * 15: $\overline{U\dot{L}}$ (Upper limit, 0.01Hz) 16: $\overline{u\dot{b}}$ (Torque boost value 1, 0.01%) 17: $\overline{u\dot{L}u}$ (Base frequency voltage 1, 0.1V)	0: No action 1: $\overline{F\dot{d}01}$ (Status information 1) 2: $\overline{F\dot{d}00}$ (Output frequency, 0.01Hz) 3: $\overline{F\dot{d}03}$ (Output current, 0.01%) 4: $\overline{F\dot{d}05}$ (Output voltage, 0.01%) 5: $\overline{F\dot{C}91}$ (Inverter alarm) 6: $\overline{F\dot{d}22}$ (PID feedback value, 0.01Hz) 7: $\overline{F\dot{d}06}$ (Input terminal status) 8: $\overline{F\dot{d}07}$ (Output terminal status) 9: $\overline{F\dot{E}35}$ (RR input, 0.01%) 10: $\overline{F\dot{E}36}$ (RX input, 0.01%) 11: $\overline{F\dot{E}37}$ (II input, 0.01%) 12: $\overline{F\dot{d}04}$ (Input voltage (DC detection), 0.01%) 13: $\overline{F\dot{d}16}$ (Estimated speed (real-time value), 0.01Hz) 14: $\overline{F\dot{d}18}$ (Torque, 0.01%) 15: $\overline{F\dot{E}60}$ (My monitor) 16: $\overline{F\dot{E}61}$ (My monitor) 17: $\overline{F\dot{E}62}$ (My monitor) 18: $\overline{F\dot{E}63}$ (My monitor) 19: $\overline{F\dot{B}80}$ (Free notes) 20: $\overline{F\dot{d}29}$ (Input power, 0.01kW) 21: $\overline{F\dot{d}30}$ (Output power, 0.01kW) 22: $\overline{F\dot{E}14}$ (Cumulative operation time, 1hour) 23: $\overline{F\dot{E}40}$ (FM terminal output monitor, 0.01%) 24: $\overline{F\dot{E}41}$ (AM terminal output monitor, 0.01%) 25: $\overline{F\dot{d}20}$ (Torque current, 0.01%) 26: $\overline{F\dot{d}23}$ (Motor overload factor, 0.01%) 27: $\overline{F\dot{d}24}$ (Drive overload factor, 0.01%) 28: $\overline{F\dot{d}25}$ (PBR overload factor, %) 29: $\overline{F\dot{d}26}$ (Motor load factor, %) 30: $\overline{F\dot{d}27}$ (Drive load factor, %) 31: $\overline{F\dot{E}56}$ (Pulse train input, pps) 32: $\overline{F\dot{E}70}$ (Drive rated current, 0.1A) 33: $\overline{F\dot{E}76}$ (Input Watt-hour, $0.1\text{kWh} \times 10^{\overline{F\dot{7}49}}$) ** 34: $\overline{F\dot{E}77}$ (Output Watt-hour, $0.1\text{kWh} \times 10^{\overline{F\dot{7}49}}$) ** 35: $\overline{F\dot{d}83}$ (IGBT temperature, degree C)

* The unit of $\overline{A\dot{C}C}$, $\overline{d\dot{E}C}$ is according to the parameter $\overline{F\dot{5}19}$.

** The unit of $\overline{F\dot{E}76}$, $\overline{F\dot{E}77}$ is according to the parameter $\overline{F\dot{7}49}$.

6.1. Telegram 100: Vendor specific

The parameter access via PKW, and the transmission of two commands and monitors via cyclic data are supported by Telegram 100.

	PLC → INV	INV → PLC
PKW1	PKW1(PKE)	PKW1(PKE)
PKW2	PKW2(IND)	PKW2(IND)
PKW3	PKW3(PWE1)	PKW3(PWE1)
PKW4	PKW4(PWE2)	PKW4(PWE2)
Cyclic data 1	<i>⓪⓪⓪ 1</i>	<i>⓪⓪2 1</i>
Cyclic data 2	<i>⓪⓪⓪2</i>	<i>⓪⓪22</i>

INV: Inverter

PKW: Parameter ID/value

PKE: Parameter ID (1st and 2nd octet)

IND: Sub-index (3rd octet),
4th octet is reserved

PWE: Parameter value (5th until 8th octet)

6.2. Telegram 101: Vendor specific

The parameter access via PKW, and the transmission of six commands and monitors via cyclic data are supported by Telegram 101.

	PLC → INV	INV → PLC
PKW1	PKW1(PKE)	PKW1(PKE)
PKW2	PKW2(IND)	PKW2(IND)
PKW3	PKW3(PWE1)	PKW3(PWE1)
PKW4	PKW4(PWE2)	PKW4(PWE2)
Cyclic data 1	<i>⓪⓪⓪ 1</i>	<i>⓪⓪2 1</i>
Cyclic data 2	<i>⓪⓪⓪2</i>	<i>⓪⓪22</i>
Cyclic data 3	<i>⓪⓪⓪3</i>	<i>⓪⓪23</i>
Cyclic data 4	<i>⓪⓪⓪4</i>	<i>⓪⓪24</i>
Cyclic data 5	<i>⓪⓪⓪5</i>	<i>⓪⓪25</i>
Cyclic data 6	<i>⓪⓪⓪6</i>	<i>⓪⓪26</i>

INV: Inverter

PKW: Parameter ID/value

PKE: Parameter ID (1st and 2nd octet)

IND: Sub-index (3rd octet),
4th octet is reserved

PWE: Parameter value (5th until 8th octet)

6.3. Telegram 102: Vendor specific

The transmission of six commands and monitors via cyclic data is supported by Telegram 102.

	PLC → INV	INV → PLC
Cyclic data 1	<i>L001</i>	<i>L021</i>
Cyclic data 2	<i>L002</i>	<i>L022</i>
Cyclic data 3	<i>L003</i>	<i>L023</i>
Cyclic data 4	<i>L004</i>	<i>L024</i>
Cyclic data 5	<i>L005</i>	<i>L025</i>
Cyclic data 6	<i>L006</i>	<i>L026</i>

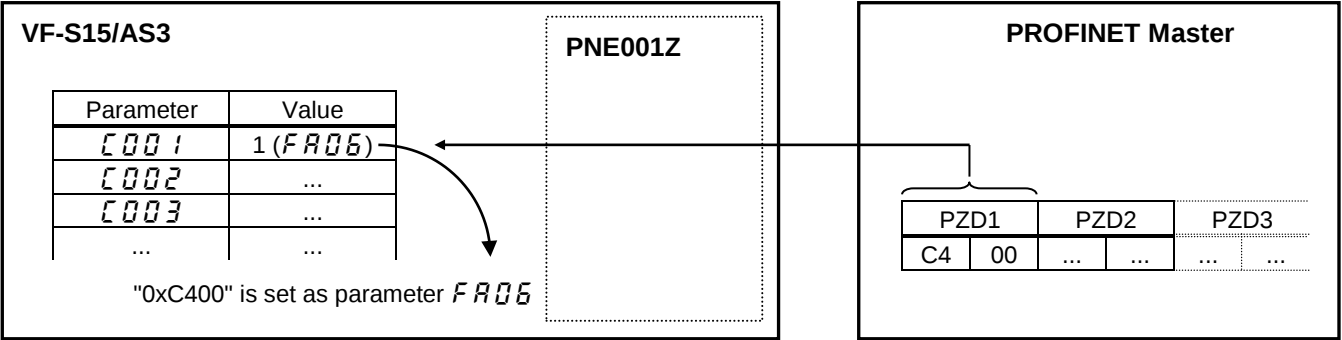
INV: Inverter

6.4. How to use the PZD1 to 6

The purposes are adjustment by real time command transmission, and the monitor of an operation state by using cyclic communication of PROFINET.

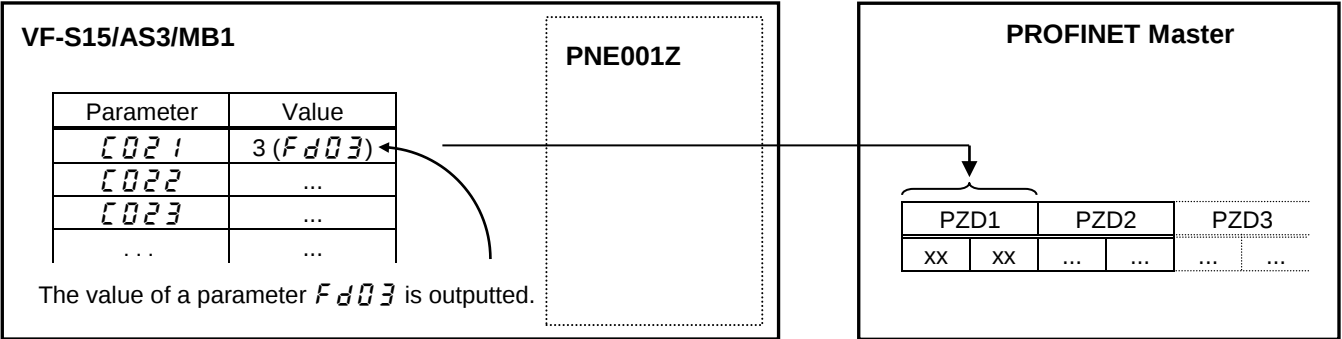
Example 1: Command transmitting

When you want to set "0xC400" to parameter *FD06*, set "1 (*FD06*)" to parameter *LD01*. And Since 0 and 1 byte of the PZD1 supports the parameter *LD01*, if "0xC400" is set up here, "0xC400" will be set as *FD06*.



Example 2: State monitoring

When you want to monitor the output current, set "3 (*FD03*)" to parameter *LD02*. The value of the parameter *FD03* specified as 0 and 1 byte of the PZD1 with the parameter *LD02* is inputted.



6.5. The overview of the VF-S15/AS3/MB1 parameter

6.5.1. *F706* (Communication command1) (VF-S15/MB1)

bit	Function	0	1	Note
0	Preset speed operation frequencies 1	Preset speed operation is disabled or preset speed operation frequencies (1-15) are set by specifying bits for preset speed operation frequencies 1-4. (0000: Preset speed operation OFF*, 001-1111: Setting of preset speed operation frequencies (1-15))		
1	Preset speed operation frequencies 2			
2	Preset speed operation frequencies 3			
3	Preset speed operation frequencies 4			
4	Motor selection (1 or 2) (THR 2 selection)	Motor 1 (THR 1)	Motor 2 (THR 2)	THR 1: $Pt = \text{setting value, } uL, uLu, ub, tHr$ THR 2: $Pt = 0, F170, F171, F172, F173$
5	PI D control	Normal operation	PI D off	-
6	Acceleration/deceleration pattern selection (1 or 2) (AD2 selection)	Acceleration/deceleration pattern 1 (AD1)	Acceleration/deceleration pattern 2 (AD2)	AD1: Acc, dec AD2: $F500, F501$
7	DC braking	OFF	Forced DC braking	-
8	Jog run	OFF	Jog run	-
9	Forward/reverse run selection	Forward run	Reverse run	-
10	Run/stop	Stop	Run	-
11	Coast stop command	Standby	Coast stop	-
12	Emergency stop	OFF	Emergency stop	Always enable, "E" trip
13	Fault reset	OFF	Reset	No data is returned from the drive
14	Frequency priority selection	OFF	Enabled	Enabled regardless of the setting of $F70d$
15	Command priority selection	OFF	Enabled	Enabled regardless of the setting of $C70d$

* When 14($Sr0$) is set to $F70d$, preset speed operation frequency 0 is selected.

6.5.2. *FAD* (Communication command1) (VF-AS3)

bit	Function	0	1	Note
0	Preset speed switching 1	0000: Preset speed operation OFF(*1) 0001-1111: Setting of preset speed operation frequencies (1-15)		Preset speed operation is disabled or preset speed operation frequencies (1-15) are set by specifying bits for preset speed operation frequencies 1-4.
1	Preset speed switching 2			
2	Preset speed switching 3			
3	Preset speed switching 4			
4	V/f switching 1 (*2)	V/f 1	V/f 2	V/f 1: P_L = setting value, $u_L, u_{Lv}, u_b, t_{HrA}$ V/f 2: P_L = 0, $F170, F171,$ $F172, F182$
5	PID control	Normal operation	PID off	-
6	Acc/Dec switching 1 (*3)	AD mode 1	AD mode 2	AD mode 1: ACC, DEC AD mode 2: $F500, F501$
7	DC braking	OFF	Forced DC braking	-
8	Jog run	OFF	Jog run	-
9	Forward/Reverse	Forward run	Reverse run	-
10	Run/stop	Stop	Run	-
11	Coast stop command	Standby	Cost stop	-
12	Emergency stop	OFF	Emergency stop	Always enable, "E" trip
13	Fault reset	OFF	Reset	No data is returned from the drive
14	Frequency priority	OFF	Enabled	Enabled regardless of the setting of FND
15	Command priority	OFF	Enabled	Enabled regardless of the setting of CND

(*1): When 12($Sr0$) is set to FND , preset speed operation frequency 0 is selected.

(*2): The V/f switching ORs with Bit 10 of $FAD3$.

(*3): The Acc/Dec switching ORs with Bit 8 of $FAD3$

6.5.3. *F A 2 3* (Communication command 2) (VF-S15/MB1)

bit	Function	0	1	Note
0	(Reserved)	-	-	-
1	Electric power quantity reset	OFF	Reset	Electric power quantity (<i>F E 7 6</i> , <i>F E 7 7</i>) reset
2	(Reserved)	-	-	-
3	(Reserved)	-	-	-
4	(Reserved)	-	-	-
5	(Reserved)	-	-	-
6	(Reserved)	-	-	-
7	Maximum deceleration forced stop	Normal	Enabled	-
8	Acceleration/deceleration selection 1	00: Acceleration/deceleration 1 01: Acceleration/deceleration 2 10: Acceleration/deceleration 3		Select acceleration/deceleration 1-4 by combination of two bits. AD1: <i>A C C</i> , <i>d e c</i> AD2: <i>F 5 0 0</i> , <i>F 5 0 1</i> AD3: <i>F 5 1 0</i> , <i>F 5 1 1</i>
9	Acceleration/deceleration selection 2			
10	(Reserved)	-	-	-
11	(Reserved)	-	-	-
12	OC stall level switch	OC stall 1	OC stall 2	OC stall 1: <i>F 6 0 1</i> OC stall 2: <i>F 1 8 5</i>
13	(Reserved)	-	-	-
14	(Reserved)	-	-	-
15	(Reserved)	-	-	-

Note: Set 0 to reserved bit.

6.5.4. *FA23* (Communication command 2) (VF-AS3)

bit	Function	0	1	Note
0	Control switching	Speed control	Torque control	-
1	Electric power quantity reset	OFF	Reset	Electric power quantity (<i>FE76</i> , <i>FE77</i>) reset
2	(Reserved)	-	-	-
3	Braking request (BC)	Normal	Forcibly braked	-
4	Preliminary excitation	Normal	Enabled	-
5	(Reserved)	-	-	-
6	Braking answer (BA)	Brake applied	Brake released	-
7	Quick deceleration 2	Normal	Enabled	-
8	Acc/dec switching 1 (*1)	00: AD mode 1 01: AD mode 2 10: AD mode 3 11: AD mode 4		Select Acc/Dec mode 1-4 by combination of two bits. AD mode 1: <i>ACC</i> , <i>dec</i> AD mode 2: <i>F500</i> , <i>F501</i> AD mode 3: <i>F510</i> , <i>F511</i> AD mode 4: <i>F514</i> , <i>F515</i>
9	Acc/dec switching 2			
10	V/f switching 1 (*2)	00: V/f 1 01: V/f 2 10: V/f 3 11: V/f 4		Select V/f pattern 1 - 4 by combination of two bits V/f 1: <i>Pt</i> = setting value, <i>uL</i> , <i>uLu</i> , <i>ub</i> , <i>tHrA</i> V/f 2: <i>Pt</i> = "0", <i>F170</i> , <i>F171</i> , <i>F172</i> , <i>F182</i> V/f 3: <i>Pt</i> = "0", <i>F174</i> , <i>F175</i> , <i>F176</i> , <i>F183</i> V/f 4: <i>Pt</i> = "0", <i>F178</i> , <i>F179</i> , <i>F180</i> , <i>F184</i>
11	V/f switching 2			
12	OC stall level switching and Torque limit switching 1	00: Torque limit 1 / OC stall 1 01: Torque limit 2 / OC stall 2 10: Torque limit 3 / OC stall 1 11: Torque limit 4 / OC stall 2		OC stall 1: <i>F601</i> OC stall 2: <i>F185</i> Select torque limit 1 - 4 by combination of two bits Torque limit 1: <i>F441</i> , <i>F443</i> Torque limit 2: <i>F444</i> , <i>F445</i> Torque limit 3: <i>F446</i> , <i>F447</i> Torque limit 4: <i>F448</i> , <i>F449</i>
13	Torque limit switching 2			
14	Speed gain switching	Gain 1	Gain 2	Gain 1: <i>F460</i> , <i>F461</i> , <i>F462</i> Gain 2: <i>F462</i> , <i>F463</i> , <i>F465</i>
15	(Reserved)	-	-	-

Note: Set 0 to reserved bit

(*1): The Acc/Dec switching ORs with Bit 6 of *FA06*. When changing Acc/Dec in four types, set Bit 6 of *FA06* to "0" and use *FA23*.

(*2): The V/f switching ORs with Bit 4 of *FA06*. When changing V/f in four types, set Bit 4 of *FA06* to "0" and use *FA23*.

6.5.5. *F R 0 7* (frequency reference from communication option)

Frequency reference is set up by 0.01Hz unit and the hexadecimal number.

For example, when "Frequency reference" is set up to 80Hz, since the minimum unit is 0.01Hz,
 $80 / 0.01 = 8000 = 0x1F40$ (Hex.)

6.5.6. *F R 3 3* (Torque command setting from communication option)

Torque reference is set up by 0.01% unit and the hexadecimal number.

For example: when "torque command" is set up to 50%, since the minimum unit is 0.01%,
 $50\% = 50 \div 0.01 = 5000 = 1388H$

6.5.7. *F R 5 0* (Terminal output data from communication option)

By setting up the data of the bit 0 - 1 of terminal output data (*F R 5 0*) from communication, setting data (OFF or ON) can be outputted to the output terminal.

(VF-S15/MB1)

Please select the functional number 92 - 95 as the selection (*F 1 3 0 - F 1 3 8*) of the output terminal function before using it.

(VF-AS3)

Please select the functional number 92 - 105 as the selection (*F 1 3 0 - F 1 3 4, F 1 5 9 - F 1 6 3*) of the output terminal function before using it

bit	Output TB function name	0	1
0	Specified data output 1 (Output terminal No.: 92, 93)	OFF	ON
1	Specified data output 2 (Output terminal No.: 94, 95)	OFF	ON
2	(VF-S15/MB1) (Reserved) (VF-AS3) Specified data output 3 (Output terminal No.: 96, 97)	OFF	ON
3	(VF-S15/MB1) (Reserved) (VF-AS3) Specified data output 4 (Output terminal No.: 98, 99)	OFF	ON
4	(VF-S15/MB1) (Reserved) (VF-AS3) Specified data output 5 (Output terminal No.: 100, 101)	OFF	ON
5	(VF-S15/MB1) (Reserved) (VF-AS3) Specified data output 6 (Output terminal No.: 102, 103)	OFF	ON
6	(VF-S15/MB1) (Reserved) (VF-AS3) Specified data output 7 (Output terminal No.: 104, 105)	OFF	ON
7-15	(Reserved)	-	-

Note: Set 0 to reserved bit

6.5.8. *F R 5 1* (Terminal FM output data), *F R 5 2* (Terminal AM output data)(Only for the VF-AS3),

Use this function, set the Terminal FM function (*F 7 5 1*) or Terminal AM function (*F 6 7 0*) to communication data output (18 for VF-S15/MB1 / 31 for VF-AS3).

It possible to send out the data specified as FM analog output data (*F R 5 1*) though the FM analog output terminal. Data can be adjusted in a range of 0 to 1000.

Please refer to "Meter setting and adjustment" Section of the VF-S15/MB1 instruction manual for details.
Please refer to "Adjusting the meter connected to the inverter" Section of the VF-AS3 instruction manual for more details.

- 6.5.9. **F441** Power running torque limit level 1(Only for the VF-AS3)
F443 Regenerative torque limit level 1(Only for the VF-AS3)
-

Torque limit level is set up by 0.01% unit and the hexadecimal number.
For example: when "Torque limit level " is set up to "250%", since the minimum unit is 0.01%,
 $250\% = 250 \div 0.01 = 25000 = 61A8H$

- 6.5.10. **F4E0** Speed control response 1(Only for the VF-AS3)
-

Speed control response is set up by 0.01% unit and the hexadecimal number.
For example: when "Speed control response " is set up to "1.0%", since the minimum unit is 0.1%,
 $1\% = 1 \div 0.1 = 10 = 000AH$

- 6.5.11. **F4E1** Speed control stabilization coefficient 1(Only for the VF-AS3)
-

Speed control stabilization coefficient is set up by 0.01% unit and the hexadecimal number.
For example: when "Speed control stabilization coefficient " is set up to "1.00%", since the minimum unit is 0.01%,
 $1\% = 1 \div 0.01 = 100 = 0064H$

6.5.12. *F d 1* (Inverter operating status 1 (real time)) (VF-S15/MB1)

bit	Function	0	1	Note
0	Failure FL	No output	Under in progress	-
1	Failure	Not tripped	Tripped	Trip status includes <i>r t r y</i> and the trip retention status are also regarded as tripped statuses.
2	Alarm	No alarm	Alarm issued	-
3	Under voltage (<i>n o f f</i>)	Normal	Under voltage	-
4	Motor selection (1 or 2) (THR 2 selection)	Motor 1 (THR1)	Motor 2 (THR2)	THR1: <i>P t</i> = setting value, <i>u L</i> , <i>u L u</i> , <i>u b</i> , <i>t H r</i> THR2: <i>P t</i> = <i>0</i> , <i>F 170</i> , <i>F 171</i> , <i>F 172</i> , <i>F 173</i>
5	PID control off	PID control permitted	PID control prohibits	-
6	Acceleration/deceleration pattern selection (1 or 2)	Acceleration/deceleration pattern 1 (AD1)	Acceleration/deceleration pattern 2 (AD2)	AD1: <i>A c c</i> , <i>d e c</i> AD2: <i>F 500</i> , <i>F 501</i>
7	DC braking	OFF	Forced DC braking	-
8	Jog run	OFF	Jog run	-
9	Forward / reverse run	Forward run	Reverse run	-
10	Run/stop	Stop	Run	-
11	Coast stop (ST = OFF)	ST=ON	ST=OFF	-
12	Emergency stop	No emergency stop status	Emergency stop status	-
13	Standby ST=ON	Start-up process	Standby	Standby: Initialization completed, not failure stop status, not alarm stop status (<i>n o f f</i> , <i>L L</i> forced stop), ST=ON, and RUN=ON
14	Standby	Start-up process	Standby	Standby: Initialization completed, not failure stop status and not alarm stop status (<i>n o f f</i> , <i>L L</i> forced stop)
15	(Undefined)	-	-	-

Note: The bit described "Undefined" is unstable. Don't use the bit for the judgment.

6.5.13. *Fd01* (Inverter operating status 1 (real time)) (VF-AS3)

bit	Function	0	1	Note
0	Failure FL	No output	Under in progress	-
1	Failure	Not tripped	Tripped	Trip status includes <i>rtr</i> and the trip retention status are also regarded as tripped statuses.
2	Alarm	No alarm	Alarm issued	-
3	Under voltage (<i>NOFF</i>)	Normal	Under voltage	-
4	V/f switching status	V/f 1	V/f 2	V/f 1: <i>Pt</i> = setting value, <i>uL</i> , <i>uLv</i> , <i>ub</i> , <i>tHrA</i> V/f 2: <i>Pt</i> = 0, <i>F170</i> , <i>F171</i> , <i>F172</i> , <i>F182</i>
5	PID control off	PID control permitted	PID control prohibits	-
6	Acc/Dec switching status	AD mode 1	AD mode 2	AD mode 1: <i>ACC</i> , <i>dec</i> AD mode 2: <i>F500</i> , <i>F501</i>
7	DC braking	OFF	Forced DC braking	-
8	Jog run	OFF	Jog run	-
9	Forward / reverse run	Forward run	Reverse run	-
10	Run/stop	Stop	Run	-
11	Coast stop (ST = OFF)	ST=ON	ST=OFF	-
12	Emergency stop	No emergency stop status	Emergency stop status	-
13	Standby ST=ON	Start-up process	Standby	Standby: Initialization completed, not failure stop status, not alarm stop status (<i>NOFF</i> , <i>LL</i> forced stop), ST=ON, and RUN=ON
14	Standby	Start-up process	Standby	Standby: Initialization completed, not failure stop status and not alarm stop status (<i>NOFF</i> , <i>LL</i> forced stop)
15	HAND/AUTO (LOC/REM)	AUTO (REM)	HAND (LOC)	Enabled with <i>F750</i> ="2" HAND: Panel operation is enabled AUTO: Operation method selected <i>CNOd</i> and <i>FNOd</i> are enabled. Enabled with <i>F732</i> ="0" LOC: Panel operation is enabled REM: Operation method selected <i>CNOd</i> and <i>FNOd</i> are enabled.

6.5.14. *F d 0 0* (Output frequency (real time))

The current output frequency is read into 0.01Hz of units and by the hexadecimal number.
For example, when the output frequency is 80Hz, 0x1F40 (hexadecimal number) are read.

Since the minimum unit is 0.01%,
 $0x1F40 \text{ (Hex.)} = 8000 \text{ (Dec.)} * 0.01 = 80 \text{ (Hz)}$

Also about the following parameters, these are the same as this.

- *F d 2 2* (Feedback value of PID (real time)) Unit: 0.01Hz
- *F d 1 6* (Estimated speed (real time)) Unit: 0.01Hz
- *F d 2 9* (Input power (real time)) Unit: 0.01kW
- *F d 3 0* (Output power (real time)) Unit: 0.01kW

6.5.15. *F d 0 3* (Output current (real time))

The output current is read into 0.01% of units and by the hexadecimal number.
For example, when the output current of the rated current 4.8A drive is 50% (2.4A), 0x1388 (hexadecimal number) is read out.

Since the minimum unit is 0.01%,
 $0x1388 \text{ (Hex.)} = 5000 \text{ (Dec.)} * 0.01 = 50 \text{ (%)}$

Also about the following parameters, these are the same as this.

- *F d 0 5* (Output voltage (real time)) Unit: 0.01% (V)
- *F d 0 4* (Voltage at DC bus (real time)) Unit: 0.01% (V)
- *F d 1 8* (Torque) Unit: 0.01% (Nm)*

* When the motor information connected to the drive set to the parameter (*F 4 0 5* - *F 4 1 5*), torque monitor value "100%" is same as the rated torque of a motor in general.

6.5.16. *FE35, FE36, FE37* (Monitoring of the analog input VIA, VIB, VIC) (VF-S15/MB1)

VIA terminal board monitor: "Communication Number *FE35*"

VIB terminal board monitor: "Communication Number *FE36*"

VIC terminal board monitor: "Communication Number *FE37*"

These monitors can also be used as A/D converters irrespective of the drive's control.

VIA / VIC terminal board monitor is capable of reading the data from external devices in a range of 0.01 to 100.00% (unsigned data: 0x0000 to 0x2710).

VIB terminal board monitor is capable of reading the data from external devices in a range of -100.00 to 100.00% (signed data: 0xD8F0 to 0x2710).

If analog input mode is selected with the frequency setting mode selection parameter, however, keep in mind that any data entered via an analog terminal is regarded as a frequency command.

6.5.17. *FE35, FE36, FE37* (Monitoring of the analog input RR, RX, II) (VF-AS3)

FE35: RR terminal board monitor

FE36: RX terminal board monitor

FE37: II terminal board monitor

These monitors can also be used as A/D converters irrespective of the drive's control.

RR / II terminal board monitor is capable of reading the data from external devices in a range of 0.01 to 100.00% (unsigned data: 0x0000 to 0x2710).

RX terminal board monitor is capable of reading the data from external devices in a range of -100.00 to 100.00% (signed data: 0xD8F0 to 0x2710).

If analog input mode is selected with the frequency setting mode selection parameter, however, keep in mind that any data entered via an analog terminal is regarded as a frequency command.

6.5.18. *FE14* (Cumulative run time)

The operated cumulative time is read by the hexadecimal number.

For example, when cumulative operation time is 18 hours, 0x12 (18 hours) is read.

0x12 (Hex.) = 18 (Dec., hour)

6.5.19. *FE40* (FM output monitor), *FE41* (AM output monitor) (Only for the VF-AS3)

The output value of FM terminal or AM terminal are read are read.

The value range is set to 0 to 10000 (0x2710).

6.5.20. *F L G I* (Alarm code)(VF-S15/MB1)

bit	Function	0	1	Panel display
0	Over-current alarm	Normal	Alarming	<i>FL</i> flicking
1	Inverter over load alarm	Normal	Alarming	<i>L</i> flicking
2	Motor over load alarm	Normal	Alarming	<i>L</i> flicking
3	Over heat alarm	Normal	Alarming	<i>H</i> flicking
4	Over voltage alarm	Normal	Alarming	<i>P</i> flicking
5	Main circuit under voltage alarm	Normal	Alarming	-
6	main device overheat alarm	Normal	Alarming	<i>L</i> flicking
7	Under current alarm	Normal	Alarming	-
8	Over-torque alarm	Normal	Alarming	-
9	Braking resistor overload alarm	Normal	Alarming	-
10	Cumulative operation hours alarm	Normal	Alarming	-
11	Option communication alarm	Normal	Alarming	<i>L</i> flicking
12	Serial communication alarm	Normal	Alarming	<i>L</i> flicking
13	Power circuit voltage error alarm	Normal	Alarming	<i>NOFF</i> flicking
14	Stop after instantaneous power off	-	Dec., Under stop	<i>STOP</i> flicking
15	Stop after LL continuance time (During sleep)	-	Dec., Under stop	<i>L STOP</i> flicking

6.5.21. *F L G I* (Alarm code)(VF-AS3)

bit	Function	0	1	Panel display
0	Over-current alarm	Normal	Alarming	<i>FL</i> flicking
1	Inverter over load alarm	Normal	Alarming	<i>L</i> flicking
2	Motor over load alarm	Normal	Alarming	<i>L</i> flicking
3	Over heat alarm	Normal	Alarming	<i>H</i> flicking
4	Over voltage alarm	Normal	Alarming	<i>P</i> flicking
5	(Undefined)	-	-	-
6	main device overheat alarm	Normal	Alarming	<i>L</i> flicking
7	Under current alarm	Normal	Alarming	-
8	Over-torque alarm	Normal	Alarming	-
9	Braking resistor overload alarm	Normal	Alarming	-
10	Cumulative operation hours alarm	Normal	Alarming	-
11	Option communication alarm	Normal	Alarming	<i>L</i> flicking
12	Serial communication alarm	Normal	Alarming	<i>L</i> flicking
13	Power circuit under voltage alarm	Normal	Alarming	<i>NOFF</i> flicking
14	Stop after instantaneous power off	-	Dec., Under stop	<i>STOP</i> flicking
15	During sleep	-	Dec., Under stop	<i>L STOP</i> flicking

Note: The bit described "Undefined" is unstable. Do not use the bit for the judgment.

6.5.22. *F 106* (Input TB Status) (VF-S15/MB1)

bit	TB Name	Function (Parameter)	0	1
0	F	Input terminal function selection 1 (<i>F 111</i>)	OFF	ON
1	R	Input terminal function selection 2 (<i>F 112</i>)		
2	RES	Input terminal function selection 3 (<i>F 113</i>)		
3	S1	Input terminal function selection 4 (<i>F 114</i>)		
4	S2	Input terminal function selection 5 (<i>F 115</i>)		
5	S3	Input terminal function selection 6 (<i>F 116</i>)		
6	VIB*1	Input terminal function selection 7 (<i>F 117</i>)		
7	VIA*1	Input terminal function selection 8 (<i>F 118</i>)		
8 to 15	(Undefined)	-	-	-

Note: The bit described "Undefined" is unstable. Do not use the bit for the judgment.

*1: VIA/ VIB are input terminal function when *F 109* is logic input.

*The input terminal function is selected by each parameter.

6.5.23. *F 106* (Input TB Status) (VF-AS3)

bit	TB Name	Function (Parameter)	0	1
0	F	<i>F 111</i> : Input terminal function selection 1	OFF	ON
1	R	<i>F 112</i> : Input terminal function selection 2		
2	RES	<i>F 113</i> : Input terminal function selection 3		
3	S1	<i>F 114</i> : Input terminal function selection 4		
4	S2	<i>F 115</i> : Input terminal function selection 5		
5	S3	<i>F 116</i> : Input terminal function selection 6		
6	S4*1	<i>F 117</i> : Input terminal function selection 7		
7	S5*2	<i>F 118</i> : Input terminal function selection 8		
8	DI11*3	<i>F 119</i> : Input terminal function selection 9		
9	DI12*3	<i>F 120</i> : Input terminal function selection 10		
10	DI13*3	<i>F 121</i> : Input terminal function selection 11		
11	DI14*3	<i>F 122</i> : Input terminal function selection 12		
12	DI15*3	<i>F 123</i> : Input terminal function selection 13		
13	DI16*3	<i>F 124</i> : Input terminal function selection 14		
14 to 15	(Undefined)	-	-	-

Note: The bit described "Undefined" is unstable. Do not use the bit for the judgment.

*1: Only when the contact input has been selected with *F 147* (Digital/ Pulse train/PG input), it is an effective value.

*2: Only when the contact input has been selected with *F 148* (Digital/ Pulse train/PG input), it is an effective value.

*3: DI11 – DI16 are the terminals of I/O extension.

6.5.24. *F d 7* (Output TB Status) (VF-S15/MB1)

bit	TB Name	Function (Parameter)	0	1
0	RY-RC	Output terminal function selection 1A (<i>F 130</i>)	OFF	ON
1	OUT	Output TB Function select 2A (<i>F 131</i>)	OFF	ON
2	FL	Output TB Function select 3 (<i>F 132</i>)	OFF	ON
3 - 15	(Undefined)	-	-	-

Note: The bit described "Undefined" is unstable. Do not use the bit for the judgment.

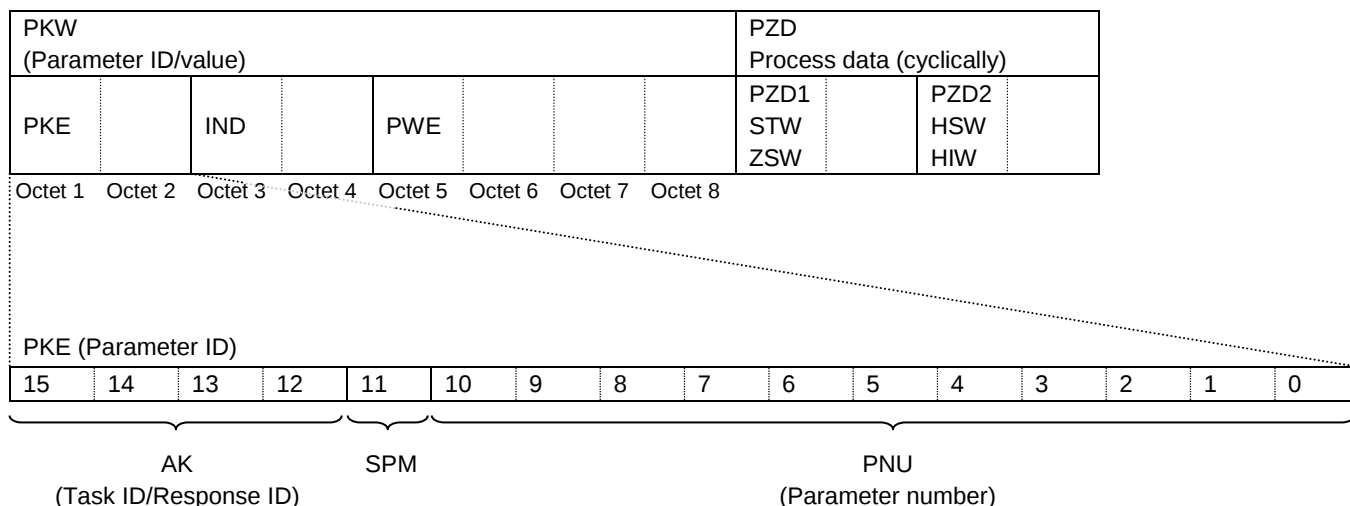
6.5.25. *F d 7* (Output TB Status) (VF-AS3)

bit	TB Name	Function (Parameter)	0	1
0	FP	<i>F 130</i> : Terminal FP function 1	OFF	ON
1	(Undefined)	-	-	-
2	FL	<i>F 132</i> : Terminal FL function	OFF	ON
3	R1	<i>F 133</i> : Terminal R1 function 1	OFF	ON
4	R2	<i>F 134</i> : Terminal R2 function	OFF	ON
5	DQ11	<i>F 159</i> : Terminal DQ11 function	OFF	ON
6	DQ12	<i>F 160</i> : Terminal DQ12 function	OFF	ON
7	R4	<i>F 161</i> : Terminal R4 function	OFF	ON
8	R5	<i>F 162</i> : Terminal R5 function	OFF	ON
9	R6	<i>F 163</i> : Terminal R6 function	OFF	ON
10	R4(B)	<i>A201</i> : Terminal R4 (B) function	OFF	ON
11	R5(B)	<i>A202</i> : Terminal R5 (B) function	OFF	ON
12	R6(B)	<i>A203</i> : Terminal R6 (B) function	OFF	ON
13 to 15	(Undefined)	-	-	-

Note: The bit described "Undefined" is unstable. Do not use the bit for the judgment.

6.6. Access to the PROFIdrive parameter

In the cyclic PROFINET communication, the parameter data is transferred via Telegram 100 or 101. If the requirement is not executed, the cause is distinguished by octet 7 and 8.



AK (Request from Master to this product)

Request ID	Function	Note
0	No task	
1	Request parameter value	for PNU access
2	Change parameter value (word)	for PNU access
6	Request parameter value (array)	for PNU access or inverter parameter access
7	Change parameter value (array)	for PNU access or inverter parameter access

AK (Response from this product to Master)

Response ID	Function
0	No response
1	Transfer parameter value (word)
4	Transfer parameter value (array)
7	Task can not be executed, followed by error number 0 = Illegal parameter number 1 = Parameter value cannot be changed 2 = Lower or upper limit violated 3 = Erroneous sub index 11 = No parameter change rights 17 = Task cannot be executed due to operating status (e.g. parameter is currently read-only) 18 = Other error 102 = Request not supported

SPM: always 0.

6.7. PROFIdrive parameter (PNU)

PNU	R/W	data type	Note
915	R	Array [6] Unsigned16	PNU 915, IND 0 = the inverter parameter $\mathcal{L}001$ PNU 915, IND 1 = the inverter parameter $\mathcal{L}002$ PNU 915, IND 2 = the inverter parameter $\mathcal{L}003$ PNU 915, IND 3 = the inverter parameter $\mathcal{L}004$ PNU 915, IND 4 = the inverter parameter $\mathcal{L}005$ PNU 915, IND 5 = the inverter parameter $\mathcal{L}006$
916	R	Array [6] Unsigned16	PNU 916, IND 0 = the inverter parameter $\mathcal{L}021$ PNU 916, IND 1 = the inverter parameter $\mathcal{L}022$ PNU 916, IND 2 = the inverter parameter $\mathcal{L}023$ PNU 916, IND 3 = the inverter parameter $\mathcal{L}024$ PNU 916, IND 4 = the inverter parameter $\mathcal{L}025$ PNU 916, IND 5 = the inverter parameter $\mathcal{L}026$
922	R	Unsigned16	Telegram selection (same as the inverter parameter $\mathcal{L}152$) 1, 100, 101, 102
923	R	Array [156] Unsigned16	List of all the parameters for signals
930	R	Unsigned16	Operating mode 1: supports the speed control mode and the speed setpoint channel comprises RFG functionality.
944	R	Unsigned16	Fault message counter
947	R	Array [1] Unsigned16	Currently failure code
964	R	Array [5] Unsigned16	Inverter Unit identification IND 0 = Manufacturer-ID PNE001Z : 0x190 PNE001Z-1,-2: 0x031A IND 1 = Model number IND 2 = Inverter CPU1 version IND 3 = Inverter firmware release year (yyyy) IND 4 = Inverter firmware release date (ddmm)
965	R	Array [1] Octet String2	Profile number (PROFIdrive, V4.1)

6.7.1. Examples of reading the PROFIdrive parameter

6.7.1.1. Example 1. Reading the PNU 922 (Telegram)

AK = 1 (Request parameter value)

SPM = 0

PNU = 922 (0x039A)

PKE

0	0	0	1	0	0	1	1	1	0	0	1	1	0	1	0
1				3				9				A			

Requirement

PKW								PZD	
PKE		IND		PWE					
13	9A	00	00	00	00	00	00	...	...

Response (Value: 0x0065 = Telegram101)

13	9A	00	00	00	00	00	65	...	...
----	----	----	----	----	----	----	----	-----	-----

6.7.1.2. Example 2. Reading the PNU 964, IND 1

AK = 6 (Request parameter value (array))

SPM = 0

PNU = 964 (0x03C4)

IND = 1 (Model number)

PKE

0	1	1	0	0	0	1	1	1	1	0	0	0	1	0	0
6				3				C				4			

Requirement

PKW								PZD	
PKE		IND		PWE					
63	C4	00	01	00	00	00	00	...	...

Response (Value: 0x00E0 = VF-S15)

43	C4	00	01	00	00	00	E0	...	...
----	----	----	----	----	----	----	----	-----	-----

6.8. Access to inverter parameter

When access to inverter parameter, set "1" to the PNU. The communication number of the inverter parameter is set to the sub index IND.

Refer to the inverter instruction manual about the communication number and unit.

Notes

▼ When you use this method for parameter writing, the value is written to the EEPROM.

6.8.1. Examples of reading or changing inverter parameter

6.8.1.1. Example1. Reading the basic parameter (読出し (command mode selection))

AK = 6 (Request parameter value (array))

SPM = 0

PNU = 1

IND = 0x0003 (読出し communication number)

PKE

0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1
6				0				0				1			

Requirement

PKW								PZD	
PKE				IND				PWE	
60	01	00	03	00	00	00	00	...	...

Response (Value: 0x0001 = Operation panel)

40	01	00	03	00	00	00	01	...	...
----	----	----	----	----	----	----	----	-----	-----

6.8.1.2. Example2. Reading the basic parameter (読出し (Preset-speed frequency 1))

AK = 6 (Request parameter value (array))

SPM = 0

PNU = 1

IND = 0x0018 (読出し communication number)

PKE

0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1
6				0				0				1			

Requirement

PKW								PZD	
PKE				IND				PWE	
60	01	00	18	00	00	00	00	...	...

Response (Value: 0x1770 (= 6000 -> 60.00Hz *))

40	01	00	18	00	00	17	70	...	...
----	----	----	----	----	----	----	----	-----	-----

* "0x1770" as reading value of "Preset-speed frequency 1" is 0x1770 = 6000 (decimal number)

Since the unit of "Preset-speed frequency 1" is 0.01Hz, setting value is 6000 × 0.01 = 60.00Hz.

6.8.1.3. Example3. Reading the status monitor parameter ($F E 0 2$ (The operation frequency))

AK = 6 (Request parameter value (array))

SPM = 0

PNU = 1

IND = 0xFE02 ($F E 0 2$ communication number)

PKE

0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1
6				0				0				1			

Requirement

PKW								PZD	
PKE				IND				PWE	
60	01	FE	02	00	00	00	00	...	...

Response (Value: 0x03E8 (= 1000 -> 10.00Hz))

40	01	FE	02	00	00	03	E8	...	...
----	----	----	----	----	----	----	----	-----	-----

* The status monitor parameter can not be changed.

6.8.1.4. Example4. Changing the basic parameter ($7 0$ (acceleration time))

AK = 7 (Change parameter value (array))

SPM = 0

PNU = 1

IND = 0x0009 ($7 0$ communication number)

PKE

0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	1
7				0				0				1			

Requirement ($7 0$ = 7.0 sec. -> 70 (= 0x0046) *)

PKW								PZD	
PKE				IND				PWE	
70	01	00	09	00	00	00	46	...	...

Response

40	01	00	09	00	00	00	46	...	...
----	----	----	----	----	----	----	----	-----	-----

* When the "Acceleration time" is set to 7.0 sec., set the following value.

(The unit of the "Acceleration time" is according to the parameter $F 5 1 9$.)

7.0 / 0.1 = 70 = 0x0046 (hexadecimal number)

Notes

- ▼ When the control power is shut off by the instantaneous power failure, communication will be unavailable for a while.

7. PROFIdrive acyclic parameter access

In this product, inverter parameters and PROFIdrive parameters are accessible by acyclic communications in addition to the cyclic communication via Telegram 100 or 101.

Notes

▼ When you use acyclic parameter access, the value is written to the EEPROM.

7.1. Example1. Read the PROFIdrive parameter

7.1.1. Request Format (Read the value of PNU 964 (0x03C4) IND 0)

Field	Description	Value
Request Header (Byte 1)	Request Reference	0x01
Request Header (Byte 2)	Request ID (0x01: Request)	0x01
Request Header (Byte 3)	Axis	0x01
Request Header (Byte 4)	Number of Parameters	0x01
Parameter Address (Byte 1)	Attribute (0x10: Value)	0x10
Parameter Address (Byte 2)	Number of Elements	0x01
Parameter Address (Byte 3)	Parameter number (PNU), High byte	0x03
Parameter Address (Byte 4)	Parameter number (PNU), Low byte	0xC4
Parameter Address (Byte 5)	Sub index (IND), High byte	0x00
Parameter Address (Byte 6)	Sub index (IND), Low byte	0x00

7.1.2. Response format

Field	Description	Value
Request Header (Byte 1)	Request Reference (mirrored)	0x01
Request Header (Byte 2)	Response ID	0x01
Request Header (Byte 3)	Axis (mirrored)	0x01
Request Header (Byte 4)	Number of Parameters	0x01
Parameter Value (Byte 1)	Format	0x06
Parameter Value (Byte 2)	Number of Values	0x01
Parameter Value (Byte 3)	Values, High byte	0x01
Parameter Value (Byte 4)	Values, Low byte	0x90

7.2. Example2. Read the inverter parameter

When access to inverter parameter, set "0x03E8" (1000) to the PNU, and set the communication No. of inverter parameter to IND.

7.2.1. Request Format (Read the value of F_{d04} (Input voltage))

Field	Description	Value
Request Header (Byte 1)	Request Reference	0x01
Request Header (Byte 2)	Request ID (0x01: Request) *	0x01
Request Header (Byte 3)	Axis	0x01
Request Header (Byte 4)	Number of Parameters	0x01
Parameter Address (Byte 1)	Attribute	0x10
Parameter Address (Byte 2)	Number of Elements	0x01
Parameter Address (Byte 3)	Parameter number (PNU), High byte	0x03
Parameter Address (Byte 4)	Parameter number (PNU), Low byte	0xE8
Parameter Address (Byte 5)	Sub index (IND), High byte	0xFD
Parameter Address (Byte 6)	Sub index (IND), Low byte	0x04

* Refer to section 0.

7.2.2. Response format

Field	Description	Value
Request Header (Byte 1)	Request Reference (mirrored)	0x01
Request Header (Byte 2)	Response ID *	0x01
Request Header (Byte 3)	Axis (mirrored)	0x01
Request Header (Byte 4)	Number of Parameters	0x01
Parameter Value (Byte 1)	Format *	0x06
Parameter Value (Byte 2)	Number of Values	0x01
Parameter Value (Byte 3)	Values, High byte	0x31 **
Parameter Value (Byte 4)	Values, High byte	0xEC **

* Refer to section 0.

** Value 0x31EC is "12780" in decimal, and minimum setting unit of F_{d04} (Input voltage) is 0.01%. Therefore, this value means "127.80 (%)".

7.3. Example3. Change the inverter parameter

When access to inverter parameter, set "0x03E8" (1000) to the PNU, and set the communication No. of inverter parameter to IND.

* This procedure changes the value of inverter' EEPROM.

7.3.1. Request Format (Set 7 to inverter parameter *F 130*)

Field	Description	Value
Request Header (Byte 1)	Request Reference	0x01
Request Header (Byte 2)	Request ID (0x02: Change) *	0x02
Request Header (Byte 3)	Axis	0x01
Request Header (Byte 4)	Number of Parameters	0x01
Parameter Address (Byte 1)	Attribute	0x10
Parameter Address (Byte 2)	Number of Elements	0x01
Parameter Address (Byte 3)	Parameter number (PNU), High byte	0x03
Parameter Address (Byte 4)	Parameter number (PNU), Low byte	0xE8
Parameter Address (Byte 5)	Sub index (IND), High byte	0x01
Parameter Address (Byte 6)	Sub index (IND), Low byte	0x30
Parameter Value (Byte 1)	Format *	0x06
Parameter Value (Byte 2)	Number of Value	0x01
Parameter Value (Byte 3)	Value, High byte	0x00
Parameter Value (Byte 4)	Value, Low byte	0x07

* Refer to section 0.

7.3.2. Response format

Field	Description	Value
Request Header (Byte 1)	Request Reference (mirrored)	0x01
Request Header (Byte 2)	Response ID *	0x02
Request Header (Byte 3)	Axis (mirrored)	0x01
Request Header (Byte 4)	Number of Parameters	0x01

* Refer to section 0.

7.3.3. Exception response format (In case of set 256 to *F 130*)

Field	Description	Value
Request Header (Byte 1)	Request Reference (mirrored)	0x01
Request Header (Byte 2)	Response ID *	0x82
Request Header (Byte 3)	Axis (mirrored)	0x01
Request Header (Byte 4)	Number of Parameters	0x01
Parameter Value (Byte 1)	Format * (= Error)	0x44
Parameter Value (Byte 2)	Number of Values	0x01
Parameter Value (Byte 3)	Error number, High byte *	0x00
Parameter Value (Byte 4)	Error number, Low byte *	0x02

* Refer to section 0.

7.4. Code Table for acyclic communication

Request ID

0x01: Request the value

0x02: Change the value

Response ID

0x01: Positive response for Request the value

0x02: Positive response for Change the value

0x81: Negative response for Request the value

0x82: Negative response for Change the value

Axis

0x01: (Fixed for this product)

Error number

0x00: Impermissible parameter number

0x01: Impermissible parameter number

0x02: Low or High limit exceeded

0x03: Faulty sub index

0x04: No array

0x05: Incorrect data type

0x06: Setting not permitted (may only be reset)

0x07: Description element cannot be changed

0x09: No description data available

0x0B: No operation priority

0x0F: No text array available

0x11: Request cannot be executed because of operating state

0x14: Value impermissible

0x15: Response too long

0x17: Write Req., Illegal format/format of the parameter data is not supported

0x18: Number of values are not consistent

0x19: Axis/DO non existent

0x20: Parameter text element cannot be changed

Format

0x01: Boolean

0x02: Integer 8

0x03: Integer 16

0x04: Integer 32

0x05: Unsigned 8

0x06: Unsigned 16

0x07: Unsigned 32

0x08: FloatingPoint

0x09: VisibleString

0x10: OctetString

0x12 TimeOfDay (with date indication)

0x13: TimeDifference

0x40: Zero

0x41: Byte

0x42: Word

0x43: Double word

0x44: Error

8. Modbus TCP

8.1. Header format

Byte	Description		Comments
0	Transaction identifier	high order	Same transaction ID is returned from Modbus TCP server. Fixed at 0 if it is not required.
1		low order	
2	Protocol identifier	high order	This identifier always equals 0.
3		low order	
4	Length of data	high order	Number of bytes after the Unit ID (Byte 6). The value of the high order should be "0", because the frame length is always less than 256 bytes.
5		low order	
6	Unit ID (Destination identifier)		Chose from Unit ID described in Section 8.2.
7	Modbus request function code		Chose from Function code described in Section 8.3.

8.2. Setting of Unit ID

The Unit ID (destination identifier) is used to access inverter Modbus TCP servers:

Unit ID	Modbus TCP server	Accessible data
0-248	Inverter (VF-S15/AS3/MB1)	Inverter parameter Device identification of inverter
251	Communication module (this product)	Device identifications of module

8.3. List of Modbus functions supported

Function code	Function name	Description	Size of data
03 (0x03)	Read Holding Register	Read N output words	63 words max.
06 (0x06)	Write Single Register	Write one output word	-
16 (0x10)	Write Multiple Registers	Write N output words	63 words max.
43 (0x2B)	Read Device Identification	Identification	-

8.4. "03 (0x03) Read Holding Registers" function

This Modbus request is used to read a value continuously from contiguous inverter parameters.

Communication number of inverter parameter is set in hexadecimal. However, in the case of continuous reading, communication number is rounded up at 0xA. For example, if you read inverter parameter continuously from the parameter *F 109* (Communication No. is 0x0109), the next reading parameter is *F 110* (Communication No. is 0x0110).

Request Format:

Byte	Meaning
0	Function Code = 03h
1	Communication No. of Starting Parameter Hi
2	Communication No. of Starting Parameter Lo
3	Number of Parameters Hi (0)
4	Number of Parameters Lo (1 - 125)

Response format:

Byte	Meaning
0	Function Code = 03h
1	Byte Count (B = 2 × Number of Points)
2	First Parameter Data Hi
3	First Parameter Data Lo
...	
B	Last Parameter Data Hi
B+1	Last Parameter Data Lo

Exception response format:

Byte	Meaning
0	Function Code = 83h
1	Exception Code 01: Illegal Function 02: Illegal Data Address 03: Illegal Data Value

Notes

▼ If the communication number that doesn't exist is read, This product returns 0x8000.

8.5. "06 (0x06) Write Single Register" function

This Modbus request is used to write the value to the inverter parameter.

Request format:

Byte	Meaning
0	Function Code = 06h
1	Communication No. of Parameter Hi
2	Communication No. of Parameter Lo
3	Write Data Hi
4	Write Data Lo

Response format:

Byte	Meaning
0	Function Code = 06h
1	Communication No. of Parameter Hi
2	Communication No. of Parameter Lo
3	Write Data Hi
4	Write Data Lo

Exception response format:

Byte	Meaning
0	Function Code = 86h
1	Exception Code 01: Illegal Function 02: Illegal Data Address 03: Illegal Data Value 04: Slave Device Failure

Notes

- ▼ When you use this Modbus request, the value is written to the EEPROM.

8.6. "16 (0x10) Write Multiple Registers" function

This Modbus request is used to write a value continuously to contiguous inverter parameter.

Communication number of inverter parameter is set in hexadecimal. However, in the case of continuous writing, communication number is rounded up at 0xA. For example, if you write inverter parameter continuously from the parameter *F 109* (Communication No. is 0x0109), the next writing parameter is *F 110* (Communication No. is 0x0110).

Request format:

Byte	Meaning
0	Function Code = 10h
1	Communication No. of Starting Parameter Hi
2	Communication No. of Starting Parameter Lo
3	Number of Parameters Hi (0)
4	Number of Parameters Lo (1 - 100)
5	Byte Count (B = 2 × Number of Registers)
6	First Parameter Data (Hi)
7	First Parameter Data (Lo)
...	
B+4	Last Parameter Data (Hi)
B+5	Last Parameter Data (Lo)

Response format:

Byte	Meaning
0	Function Code = 10h
1	Communication No. of Starting Parameter Hi
2	Communication No. of Starting Parameter Lo
3	Number of Parameters Hi (0)
4	Number of Parameters Lo (1 - 100)

Exception response format:

Byte	Meaning
0	Function Code = 90h
1	Exception Code 01: Illegal Function 02: Illegal Data Address 03: Illegal Data Value 04: Slave Device Failure

Notes

- ▼ When you use this Modbus request, the value is written to the EEPROM.

8.7. "43 (0x2B) Read Device identification" function

The Modbus request is used to read the device identification.

Example in VFS15-2004PM with device name "PROFINET" is shown below.

Inverter supports Basic Device ID and Regular Device ID.

Request format:

Byte	Meaning	
0	Function Code = 2Bh	0x2B
1	Type of MEI	0x0E
2	Read Device ID code	0x01: Basic 0x02: Regular
3	Object ID	0x00

Response format: Unit ID = 0 – 248 (Inverter)

Byte	Meaning	Example value	
0	Function Code = 2Bh	0x2B	
1	Type of MEI	0x0E	
2	Read Device ID code	01: Basic 02: Regular	
3	Conformity Level	0x02*	
4	More Follows	0: No more Object	
5	Next Object Id	0	
6	Number Of Objects	3 for Basic. 6 for Regular or Extended	
7	Obj 0 Id → Vendor Name	0	
8	Obj 0 length	7	
9-15	Obj 0 value	"TOSHIBA"	
16	Obj 1 Id → ProductCode	1	
17	Obj 1 length	13	
18-30	Obj 1 value	"VFS15-2004PM"	
31	Obj 2 Id → Version	2	
32	Obj 2 length	5	
33-37	Obj 2 value	"11200"	
38	Obj 4 Id → Product Name	4	Only for Regular
39	Obj 4 length	6	
40-45	Obj 4 value	"VF-S15"	
46	Obj 5 Id → Model Name	5	
47	Obj 5 length	3	
44-58	Obj 5 value	"TSB"	
59	Obj 6 Id → UserApplicationName	6	
60	Obj 6 length	16	
61-80	Obj 6 value	"PROFINET"	

*When PNE001Z (no suffix) is used, Conformity Level is 0x81 (basic identification stream access and individual access), but please use it as 0x02 (regular identification stream access only).

Example in this product is shown below.

This product supports only Basic Device ID.

Response format: Unit ID = 251 (Communication module)

Byte	Meaning	Example value
0	Function Code = 2Bh	0x2B
1	Type of MEI	0x0E
2	Read Device ID code	0x01: Basic
3	Conformity Level	0x02
4	More Follows	0: No more Object
5	Next Object Id	0
6	Number Of Objects	3 for Basic. 6 for Regular or Extended
7	Obj 0 Id → Vendor Name	0
8	Obj 0 length	7
9-15	Obj 0 value	"TOSHIBA"
16	Obj 1 Id → ProductCode	1
17	Obj 1 length	7
18-24	Obj 1 value	"PNE001Z"
25	Obj 2 Id → Version	2
26	Obj 2 length	4
27-30	Obj 2 value	"0201"

Exception response format:

Byte	Meaning
0	Function Code = 0xAB
1	Exception Code 01: Illegal Function 02: Illegal Data Address 03: Illegal Data Value

9. Web server

The option has Web server function. Writing and reading the inverter parameter and monitoring the drive's status can be done by using this function through network.

This chapter describes the Web server function.

9.1. Access to the Web server

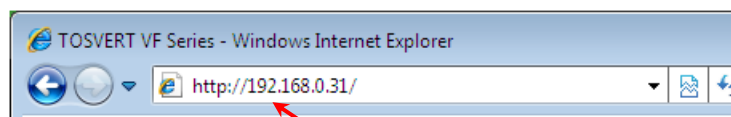
In order to access the Web server, please use the version 8.0 and 11.0 of Internet Explorer.

In addition, because the Web server uses a Java applet, please use the PC that supports the Java runtime environment.

Java7 and 8 can be used with Web server.

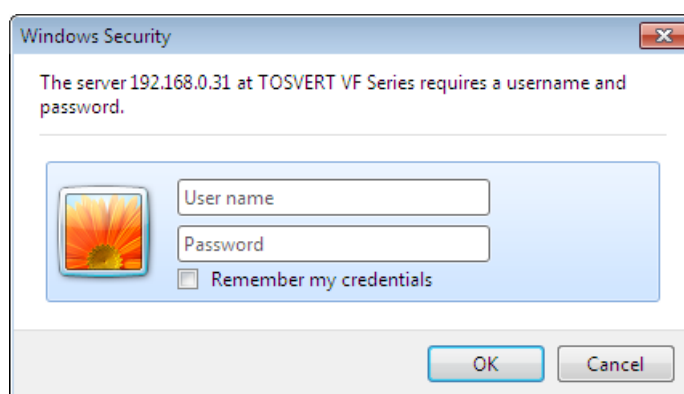
However, operation of Web server may not be guaranteed depending on the revision of the Internet Explorer or Java.

Startup the web browser and input IP address of the inverter as the homepage address.



IP address of the inverter

Enter the user name and password ("Web read password"), default password is "USER".



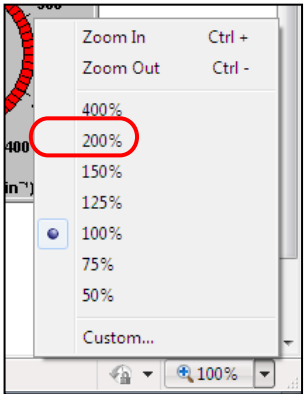
When you enter the correct user name and password, Home page of web server will be shown.



From the Home page, you can access to 3 main menus:

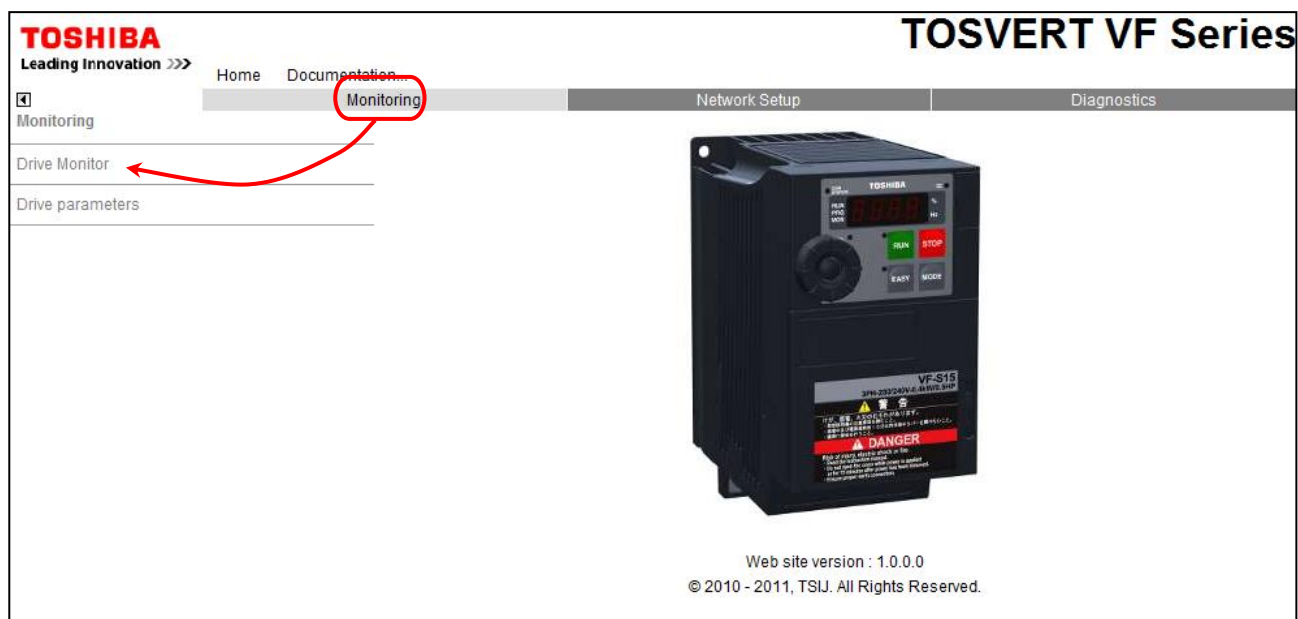
Home	Main menu	Sub menu
	Monitoring	Drive Monitor Drive parameters
	Network Setup	Network Parameters Administration
	Diagnostics	TCP/IP Statistics Modbus Statistics

- If the screen does not appear well, please try to return the magnification of IE7 to 100%



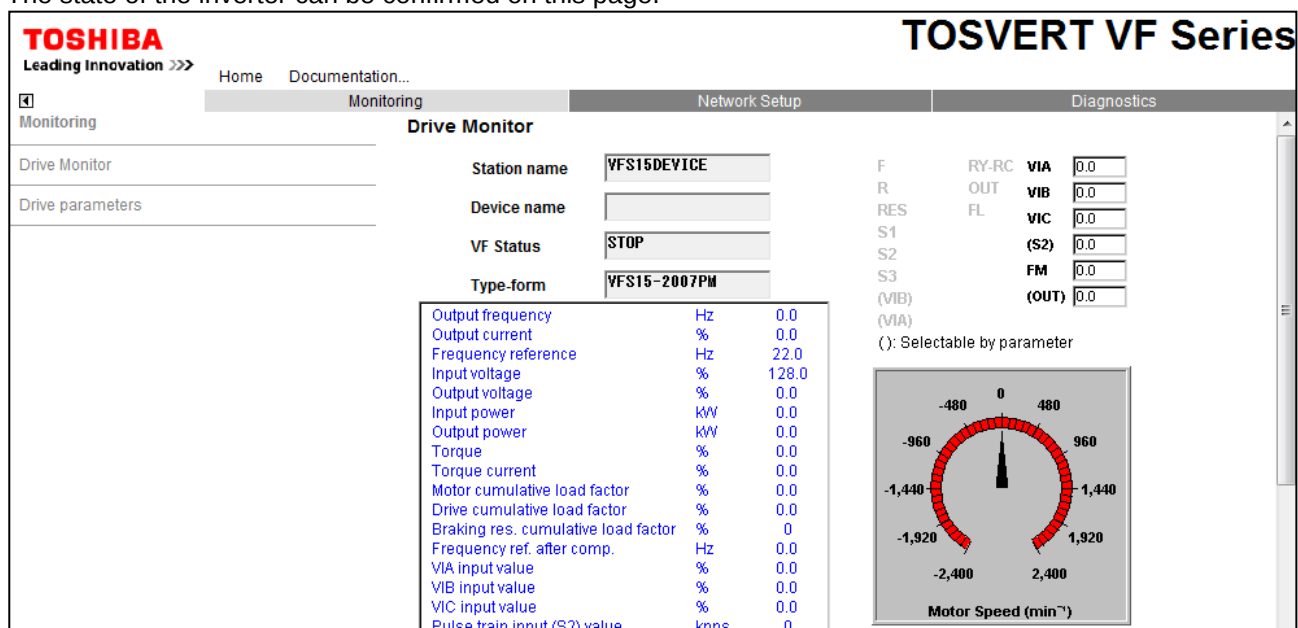
9.2. Web pages structure

Each main menu, "Monitoring", "Network Setup" and "Diagnostics" contains each own sub menu. Sub menus are displayed on the left side of main menu page.



9.3. Drive Monitor (Main menu: Monitoring)

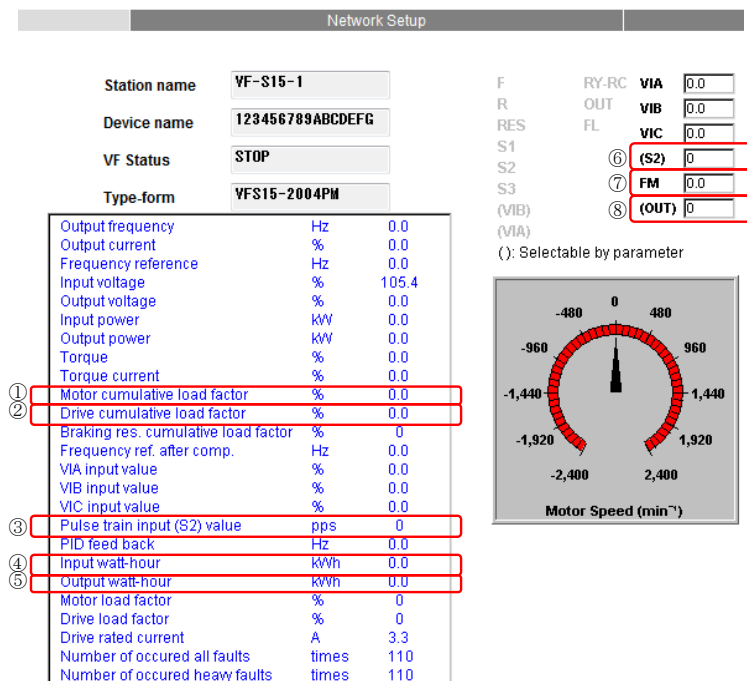
The state of the inverter can be confirmed on this page.



Notes:

There are problems of display on the Drive Monitor in PNE001Z (no suffix).

These problems are corrected in PNE001Z-1,-2.



There is a problem in the display of the above ① - ⑧.

The following table shows an example of the display and countermeasures.

	Display title	Problem	Example of the display (Wrong data)	Example of the display (Correct data)	Countermeasures
①	Motor cumulative load factor	The value is displayed in 1/10 times	6.8	67.9	Please calculate the value at 10 times
②	Drive cumulative load factor	The value is not displayed correctly	1.3	45.7	About Inverter cumulative load factor(%), please check the information by the key pad etc.
③	Pulse train input (S2) value	The value is displayed in 1000 times	1920	1.9	Please calculate the value at 1/1000 times
④	Input watt-hour	The value is displayed in 1/10 times	1.2	12.3	Please calculate the value at 10 times
⑤	Output watt-hour	The value is displayed in 1/10 times	3.2	32.1	Please calculate the value at 10 times
⑥	(S2)	The value is not displayed correctly	0.0	1920	About Pulse train input value (pps), please check the information by the key pad etc.
⑦	FM	The value is not displayed correctly	97.0	97.6	About FM output value (%), please check the information by the key pad etc.
⑧	(OUT)	The value is not displayed correctly	9.0	9.9	About Pulse train output value (pps), please check the information by the key pad etc.

9.4. Drive parameters (Main menu: Monitoring)

The parameters of the inverter can be confirmed / set on this page.

The left column is used to select a modify group (or list) of parameters. The right column displays the parameters, its Modbus address and its current value.

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TOSVERT VF Series

Monitoring Network Setup Diagnostics

Drive parameters

Rate 1000 IP address 192.168.0.31

Start the monitor

Parameter	Address	UnitId	Description
AU1	0	0	Automatic acceleration/deceleration
AU2	1	0	Torque boost setting macro function
CMOd	3	0	Command mode selection
FMOd	4	0	Frequency setting mode selection 1
FMSL	5	0	Meter selection
FM	6	0	Meter adjustment gain
Fr	8	0	Forward/reverse run selection (Panel key)
ACC	9	0	Acceleration time 1
dEC	16	0	Deceleration time 1
FH	17	0	Maximum frequency
UL	18	0	Upper limit frequency
LL	19	0	Lower limit frequency
vL	20	0	Base frequency 1
vLv	1033	0	Base frequency voltage 1
Pt	21	0	V/F control mode selection

■Set the parameters

When you modify the inverter parameter from the Web server, please press the set button, and input the "Web write password". (The default password is "USER.")

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TOSVERT VF Series

Monitoring Network Setup Diagnostics

Drive parameters

Rate 1000 IP address 192.168.0.31

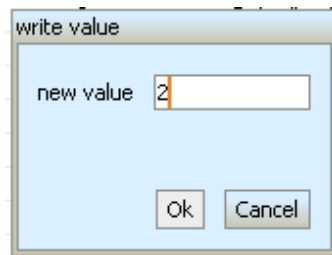
Set the parameter

Parameter	Address	UnitId	Description
AU1	0	0	Automatic acceleration/deceleration
AU2	1	0	Torque boost setting macro function
CMOd	3	0	Command mode selection
FMOd	4	0	Frequency setting mode selection 1
FMSL	5	0	Meter selection
FM	6	0	Meter adjustment gain
Fr	8	0	Forward/reverse run selection (Panel key)
ACC	9	0	Acceleration time 1
dEC	16	0	Deceleration time 1
FH	17	0	Maximum frequency
UL	18	0	Upper limit frequency
LL	19	0	Lower limit frequency
vL	20	0	Base frequency 1
vLv	1033	0	Base frequency voltage 1
Pt	21	0	V/F control mode selection

Started, number of requests = 9 | 125ms | 125ms | 140ms

■Set the parameters value

Input the write value to popup window.



9.5. Network parameters (Main menu: Network Setup)

The network parameters of the inverter can be confirmed / changed on this page.

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Home Documentation...

Monitoring

Network Setup

Diagnostics

TOSVERT VF Series

Network Setup

Network Parameters

Administration

Network Parameters

Network Settings

Profile: Telegram 1

IP Mode: Manual

IP address: 192.168.0.31

Subnet mask: 255.255.255.0

Gateway address: 0.0.0.0

Device Name:

Station Name: VFS15DEVICE

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When you modify the network parameters from the Web server, please press the “Password” button, and input the “Web write password”. (The default password is "USER.")

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Home Documentation...

Monitoring

Network Setup

Diagnostics

TOSVERT VF Series

Network Setup

Network Parameters

Administration

Network Parameters

Network Settings

Profile: Telegram 1

IP Mode: Manual

IP address: 192.168.0.31

Subnet mask: 255.255.255.0

Gateway address: 0.0.0.0

Device Name:

Station Name: VF-S15DEVICE

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9.6. Administration (Main menu: Network Setup)

The "web read password" and "web write password" of the Web server can be modified on this page.

Press the "Password" button, and enter the "Web write password".

The screenshot shows the TOSHIBA TOSVERT VF Series Administration interface. The top navigation bar includes 'Home', 'Documentation...', 'Monitoring', 'Network Setup', and 'Diagnostics'. The 'Network Setup' section is active, and the 'Administration' sub-section is selected. The 'Web read password' and 'Web write password' fields are visible, each with a 'Save' button. The 'Password' button is highlighted with a red circle. The footer indicates '© 2010 - 2011, TSJ. All Rights Reserved.'

After that, press the Enter key.

The screenshot shows the TOSHIBA TOSVERT VF Series Administration interface. The 'Web read password' and 'Web write password' fields are visible, each with a 'Save' button. The 'Enter your password' field is highlighted with a red circle. The footer indicates '© 2010 - 2011, TSJ. All Rights Reserved.'

Enter the new password, and press the "Save" button.

The screenshot shows the TOSHIBA TOSVERT VF Series Administration interface. The 'Web read password' and 'Web write password' fields are visible, each with a 'Save' button. The 'Save' buttons are highlighted with a red circle. The footer indicates '© 2010 - 2011, TSJ. All Rights Reserved.'

9.7. TCP/IP statistics (Main menu: Diagnostics)

You can check TCP/IP status on this page.

TOSHIBA
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Home Documentation...

Diagnostics

TCP/IP Statistics

Modbus Statistics

TOSVERT VF Series

Monitoring Network Setup Diagnostics

TCP/IP Statistics

TCP/IP parameters		Receive statistics	
IP address	192.168.0.31	Frames received OK	27134
Subnet mask	255.255.255.0	CRC errors	0
Default gateway	0.0.0.0	Transmit statistics	
IP Mode	Manual	Frames transmitted OK	29632
Ethernet parameters		Collisions	0
MAC address	00-80-F4-D9-1B	Carrier sense errors	0
Ethernet frame format		Excessive collisions	0
Ethernet II, IEEE 802.3 sender, IEEE 802.3 receiver		Late collisions	0

[Reset counters](#)

9.8. Modbus statistics (Main menu: Diagnostics)

You can check Modbus status on this page.

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Home Documentation...

Diagnostics

TCP/IP Statistics

Modbus Statistics

TOSVERT VF Series

Monitoring Network Setup Diagnostics

Modbus Statistics

Inbound/Outbound Statistics	
Opened TCP Connections	1
Send Modbus msg	14639
Received Modbus msg	14639
Modbus error message	0

[Reset Counters](#)

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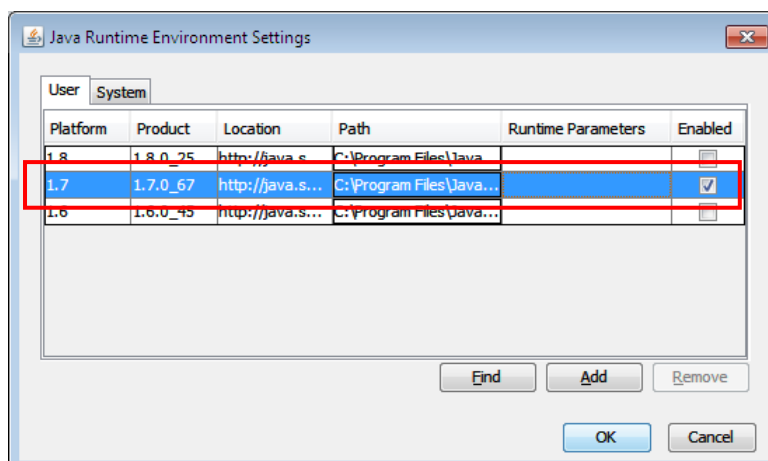
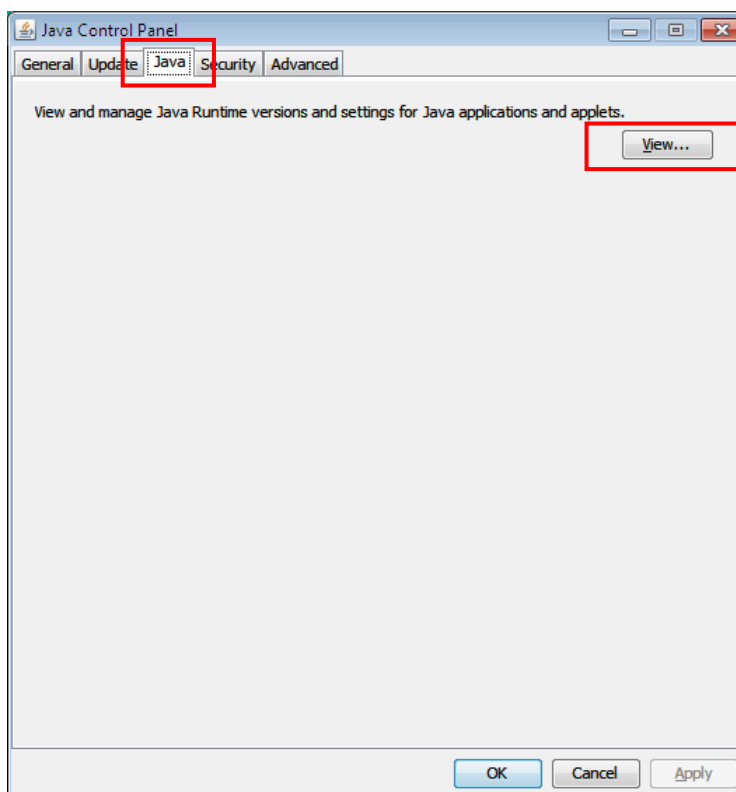
9.9. Activation of Java7

When you use PNE001Z-1,-2, these procedures are unnecessary.

To observe the Web server, the version of Java must be at least 1.7.67 in the bits version of your internet browser. If the version 1.8.25 or other 1.8 version are already installed on your computer, you can install the 1.7.67 too.

9.9.1. Activate JAVA1.7 version

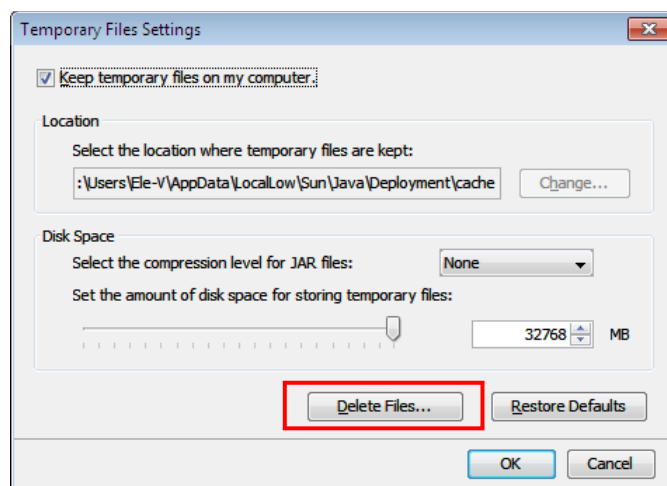
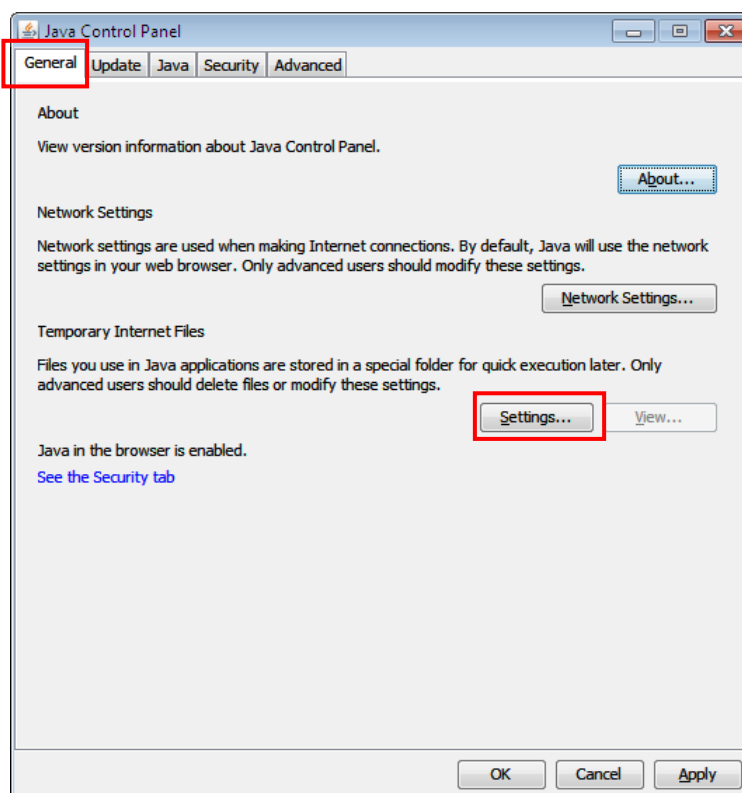
To configure your Java, please do following instructions:



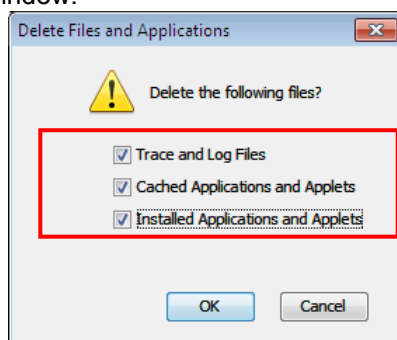
After activation of 1.7.67 you can close this window with "OK".

9.9.2. Delete temporary files

If you had started a web server in the JAVA8, you will need to delete the temporary file with the following procedure.



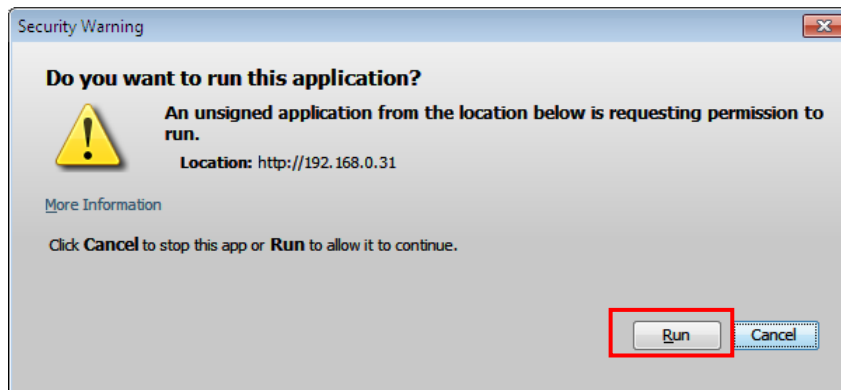
“OK” to validate and close this window.



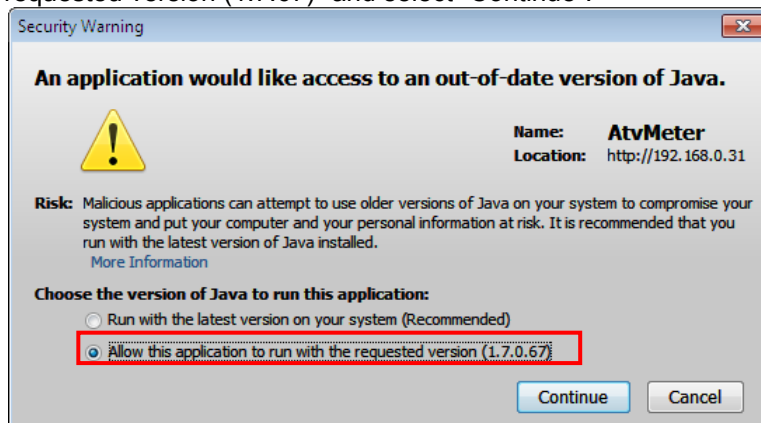
9.9.3. Launch Web server after activation

Launch the Web server and enter your username and password. After the loading of Java application, you will see bellow window.

Please select “Execute”.



After that, you will see a new window, please select “Authorize the execution of the application with the requested version (1.7.67)” and select “Continue”.



You will see the Web server correctly.

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Home Documentation...

Monitoring

Drive Monitor

Drive parameters

TOSVERT VF Series

Drive Monitor

Station name: VFS15DEVICE

Device name:

VF Status: STOP

Type-form: VFS15-2007PM

Output frequency	Hz	0.0
Output current	%	0.0
Frequency reference	Hz	22.0
Input voltage	%	128.0
Output voltage	%	0.0
Input power	kW	0.0
Output power	kW	0.0
Torque	%	0.0
Torque current	%	0.0
Motor cumulative load factor	%	0.0
Drive cumulative load factor	%	0.0
Braking res. cumulative load factor	%	0
Frequency ref. after comp.	Hz	0.0
VIA input value	%	0.0
VIB input value	%	0.0
VIC input value	%	0.0
Pulse train input (S2) value	kons	0

F	RY-RC	VIA	0.0
R	OUT	VIB	0.0
RES	FL	VIC	0.0
S1		(S2)	0.0
S2		FM	0.0
S3		(OUT)	0.0
(VIB)			
(VIA)			

(): Selectable by parameter

Motor Speed (min⁻¹)

