

TOSVERT VF-MB1/S15/AS3

PROFIBUS-DP Option Function Manual

PDP003Z

TOSHIBA INDUSTRIAL PRODUCTS AND SYSTEMS CORPORATION**NOTICE**

1. Read this manual before installing or operating. Keep this instruction 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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1. Introduction

Thank you for purchasing the PROFIBUS-DP option “PDP003Z” for the VF-MB1/S15/AS3. Before using the PROFIBUS-DP option, please familiarize yourself with the product and be sure to thoroughly read the instructions and precautions contained in this manual. This option needs the option adaptor to connect VF-S15 which type form is SBP009Z. Please match here and buy it when SBP009Z is not at hand yet.

In addition, please make sure that this manual and “Installation Manual” 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 “PDP003Z”.



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 “PDP003Z”:

- TOSVERT VF-MB1 Instruction Manual E6581697
- TOSVERT VF-S15 Instruction Manual E6581611
- TOSVERT VF-AS3 Instruction Manual E6582062
- TOSVERT VF-MB1/S15/AS3 PROFIBUS option Precautions Manual E6582158

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-MB1/S15/AS3 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 | <ul style="list-style-type: none"> ▼ Never disassemble, modify or repair. Doing so could result in electric shock, fire and injury. For repairs, call your sales agency. |
|  Prohibited | <ul style="list-style-type: none"> ▼ Do not attach this option to any drive other than the VF- MB1/S15/AS3. Doing so could result in electric shock or fire. ▼ When the drive is energized, never detach the this option from the VF- MB1/S15/AS3. Doing so could result in electric shock. ▼ Don't place or insert any kind of object into the PDP003Z (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 the PDP003Z. Doing so could result in electric shock or fire. |
|  Mandatory | <ul style="list-style-type: none"> ▼ Turn off the VF- MB1/S15/AS3 when installing and wiring this option. ▼ If the drive 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 | <ul style="list-style-type: none"> ▼ Do not operate the drive 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- MB1/S15/AS3 drive. If an accident occurs in which flame is emitted, this could lead to fire. ▼ Do not install in any location where the drive 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 | <ul style="list-style-type: none"> ▼ Operate under the environmental conditions prescribed in the instruction manual. Operations under any other conditions may result in malfunction. |




■ Wiring

|  Warning | |
|--|---|
|  Mandatory | <ul style="list-style-type: none"> ▼ Shut off power when installing and wiring this option. Wait at least 15 minutes and check to make sure that the charge lamp (VF-MB1/S15/AS3) 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 | <ul style="list-style-type: none"> ▼ Do not touch switches when the hands are wet and do not try to clean the drive 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 | <ul style="list-style-type: none"> ▼ 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 | <ul style="list-style-type: none"> ▼ Check PROFIBUS 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), Bt 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 PROFIBUS state is not checked. ▼ Make sure that the operation signals are STOP before clearing the drive's fault. The motor may suddenly start and that may result in injuries. |

■ Disposal

|  Caution | |
|--|--|
|  Mandatory | <ul style="list-style-type: none"> ▼ For safety's sake, do not dispose of the disused drive 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 drive where the temperature or the humidity will change rapidly.
- ▼ Keep a distance of 20cm or more between the drive 's power cable and the data transmission cable.
Or the drive might malfunction because of noise.
- ▼ Insert a magnetic contactor or similar device between the drive and the power supply to ensure that power is turned off if an emergency stop command is entered through the network.

1. Product version

It shows the differences by product version below.

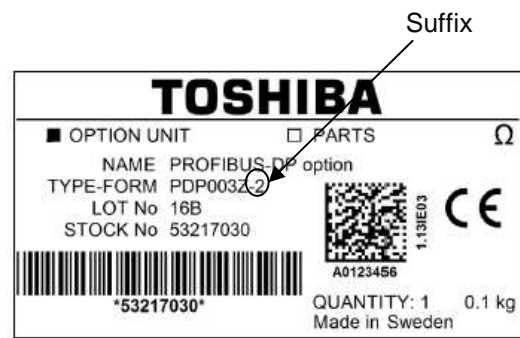
| TYPE-FORM | Suffix | Applicable model | Ident number | Manufacturer-ID |
|-----------|--------|------------------|--------------|-----------------|
| PDP003Z | | VF-MB1 | 0x0C24 | 0x0190 |
| | | VF-S15 | | |
| | "-2" | VF-MB1 | 0x0F88 | |
| | | VF-S15 | | |
| | | VF-AS3 | | |

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

Product label



Package label



The following GSD files can be used for this PROFIBUS option.

| | |
|------------------|--------------|
| VF-MB1 VF-S15 | TSIC0C24.gsd |
| VF-AS3 | TSIC0F88.gsd |

2. Overview

This product is PROFIBUS communication module that can be used in a PROFIBUS network.

2.1. Specification

Module specifications

| Item | Specification |
|---------------------|---|
| Type-form | PDP003Z |
| Applicable inverter | VF-MB1 VF-S15 with SBP009Z VF-AS3 |
| Connector | 9 pin D-sub |
| Supported network | PROFIBUS V0, V1 |
| Indicator | 2 LEDs indicating the Status and the Data exchange. |
| Protection degree | IP20 |
| Environments | Correspond to inverter. |

Network specifications

| Item | | Specification |
|---------------|----------------------------------|--|
| PROFIBUS | Baud rate | 12Mbit/s, 6Mbit/s, 3Mbit/s, 1.5Mbit/s, 500kbit/s, 187.5kbit/s, 93.75kbit/s, 19.2kbit/s, 9.6 kbit/s, 45.45 kbit/s (Only for the VF-AS3) |
| | Cyclic communication | PROFIdrive V.4.1 (Telegram1) |
| | | 4PKW and 2 PZD vendor format (Telegram100) |
| | | 4PKW and 6 PZD vendor format (Telegram101) |
| | Acyclic communication | 6 PZD vendor format (Telegram102) |
| | | Reading the PROFIdrive parameter Reading/writing the inverter parameters |
| | Configuration | Configured by PROFIBUS master |
| | I&M | I&M function 0 |
| Response time | *Cyclic communication About 10ms | |

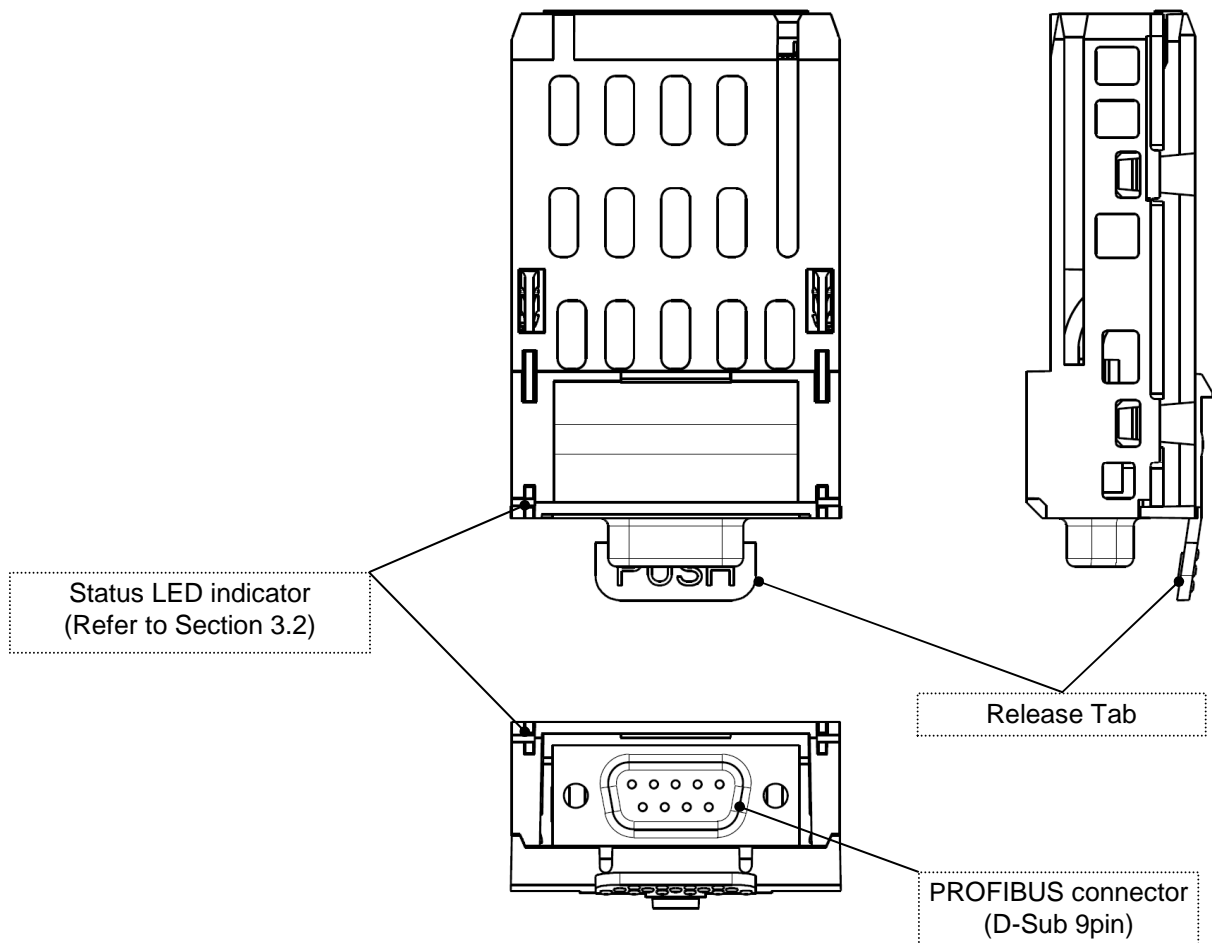
*Response time is the time until the inverter is operated by RUN command on the cyclic communication

3. Connection Information

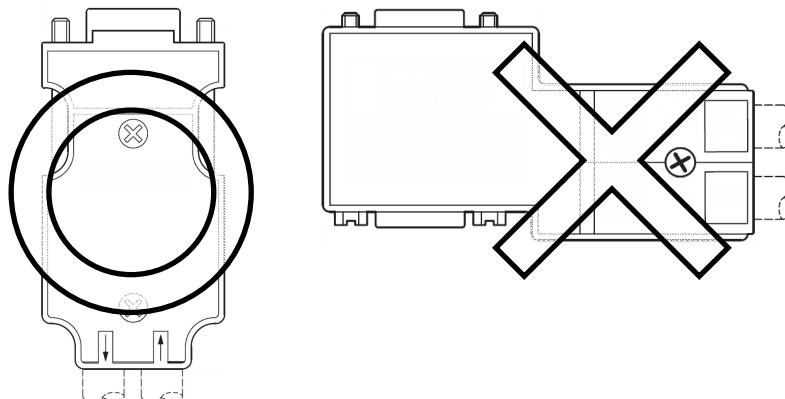
This option allows the VF-MB1/S15/AS3 drive to be communicated with the cyclic command transmission and monitoring of the original profile ("Vendor spec.", refer to Section 7) of our company other than application profile "Profile for Variable Speed Drives PROFdrive (3.072), refer to Section エラー! 参照元が見つかりません。" which PROFIBUS defines.

When you use VF-MB1, the shielding is connected to the drive ground. When you use VF-S15, the shielding is connected to the grounding terminal of option adapter.

3.1. Exterior features



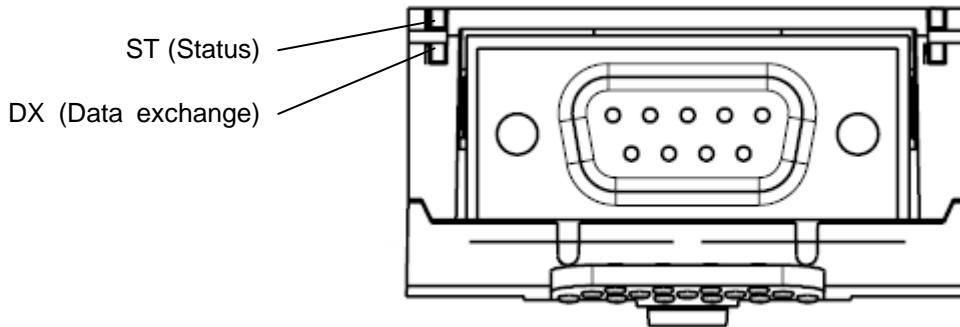
To align VF-MB1/S15/AS3 side-by-side horizontally, "Vertical" type PROFIBUS connector is necessary.



3.2. Status indicator

3.2.1. On the option

The PDP003Z has two LEDs, ST (Status) and DX (Data exchange) to indicate the statuses of PROFIBUS-DP and the PDP003Z itself.



ST (Status): Red LED

| LED | Meanings |
|---------|---|
| Off | No diagnostics present |
| Flashes | 8 Hz (Blinking 4 times/1sec.): Waiting for parameterization or configuration 2 Hz (Blinking 1 times/1sec.): PDP003Z station address is "126". (Refer to 5 section.) |
| Lights | DP status error * For example, a station address is not set correctly. |

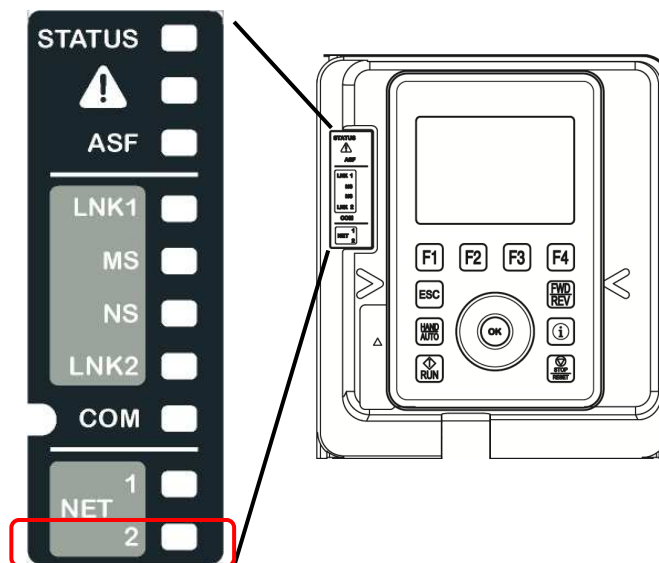
DX (Data exchange): Green LED.

The status of the PROFIBUS network is indicated.
It lights when the PDP003Z is on-line and data exchange is possible.

3.2.2. On the inverter

When PROFIBUS option is used, please attach the LED label for PROFIBUS option to lower side of communication indicator of VF-AS3.

ST (Status) is displayed to the NET2-LED together on communication indicator.



4. Hardware Setup

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

4.1. Mounting and removing

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.

4.1.1. Mounting and removing of option for VF-MB1

Way for mount and remove the option, refer to [Optional external devices] of E6581697.

4.1.2. Mounting and removing of option for VF-S15

Way for mount and remove the option, refer to [Optional external devices] of E6581611.

4.1.3. Mounting and removing of option for VF-AS3

Way for mount and remove the option, refer to [Mounting/removing insert type options] of E6582062.

5. VF-MB1/S15/AS3 Communication parameters

In a network, VF-MB1/S15/AS3 (PDP003Z) serves as a PROFIBUS slave device.
PDP003Z configuration is set by the following parameters.

| Parameter | Function | Adjustment range | Default setting |
|------------------|--|---|-----------------|
| $\zeta 150$ | PDP003Z Station address | 2 to 126 The station address "126" cannot exchange data. | 126 |
| $\zeta 151$ | PDP003Z Baud rate Monitor | 0: 12 Mbit/s 1: 6 Mbit/s 2: 3 Mbit/s 3: 1.5 Mbit/s 4: 500 kbit/s 5: 187.5 kbit/s 6: 93.75 kbit/s 7: 19.2 kbit/s 8: 9.6 kbit/s 9: 45.45 kbit/s (Only for the VF-AS3) | - |
| $\zeta 152$ | PDP003Z Profile Monitor | 0 : Telegram 1 (PROFIdrive) 1 : Telegram 100 (Vender Spec. 1) 2 : Telegram 101 (Vender Spec. 2) 3 : Telegram 102 (Vender Spec. 3) | - |
| $\zeta 154$ | JOG1 Frequency (STW.8) | 0.0 to 20.0Hz | 5.0Hz |
| $\zeta 155$ | JOG2 Frequency (STW.9) | 0.0 to 20.0Hz | 5.0Hz |
| $\zeta 156$ | Tmax (ZSW.8) | 0.1 to 60.0s | 10.0s |
| $\zeta 157$ | Tolerance (ZSW.8) | 0.1 to 99.0% | 50.0% |
| $\zeta 100$ | Communication error detection delay time | 0.0 to 100.0 sec | 0.0 |
| $\zeta 101$ | Drive operation at the communications loss action (Network wire breaks) | 0: Stop and Communication release * (follows $\zeta 100d$ and $F100d$ setting) 1: None 2: Deceleration stop 3: Coast stop 4: Emergency stop 5: Preset speed operation command (Operating at the preset speed operation frequency set with $\zeta 102$) | 4 |
| $\zeta 102$ | Preset speed operation selection | 0: None 1 to 15: Preset speed ($Sr 1 - Sr 7, F287 - F295$) | 0 |
| $\zeta 103^{**}$ | Communication time-out condition selection | 0: Disconnection detection 1: When communication mode enable (Both $\zeta 100d$ and $F100d$ are set CANopen or COM option) 2: 1+Driving operation | 1 |
| $F899$ | Network option reset setting | 0: None 1: Resetting the PDP003Z and the drive | 0 |
| $Fd67$ | PDP003Z version | PDP003Z firmware version (ex. 0x1101 means "V1.01") | - |

* Do not set at VF-MB1 **V1.00**.

** It is necessary to enable "Watchdog" function with the configurator.

*** When the parameters are changed or to reset Erb , the power must be cycled (or set $F899$ to 1).
After reset, the parameter changes become effective.

Set 1 to $F899$ by the PROFIBUS communication might not be able to be set.

**** When $F100d$ or $\zeta 100d$ is set to "Communication option", VF-MB1/S15/AS3 drives without Net Reference (STW Bit 13) or Net Control (STW Bit 12) at PROFIdrive.



Please note that drive keeps driving when the communication is lost if 1 (None) is set to the parameter $\zeta 101$ (Drive operation at the communications loss action).

6. 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 |
|--------------|--------------|--------------|--------------|--------------|--------------|

Telegram 102: Vendor Spec. (PPO TYPE 4, 6 ZD)

Telegram 101: Vendor Spec. (PPO TYPE 2, 4PKW / 6PZD)

Telegram 100: Vendor Spec. (PPO TYPE 1, 4PKW / 2PZD)

Telegram 1: PROFIdrive (PPO TYPE 3, 2PZD)

6.1. 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.

6.2. STW Control Word Data

PDP003Z supports only speed control mode.

| Bit | Value | Name | Note |
|--------------------|-------|-------------------------|---|
| 0 | 1 | ON | "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 setpoint. |
| | 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 *. |
| 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 ** | VF-MB1/S15/AS3 drives with JOG 1 speed 1 (L 154). |
| | 0 | JOG 1 OFF | Jogging stop, if "JOG 1" was previously ON. Stop drive according to VF-MB1/S15/AS3 setting parameter. |
| 9 | 1 | JOG 2 ON ** | VF-MB1/S15/AS3 drives with JOG 2 speed 2 (L 155). |
| | 0 | JOG 2 OFF | Jogging stop, if "JOG 2" was previously ON. Stop drive according to VF-MB1/S15/AS3 setting parameter. |
| 10 | 1 | Control By PLC | Activate control by STW. |
| | 0 | No Control By PLC | Inactivate control by STW. |
| 11 | --- | Device-specification | (Reserved.) |
| 12 ^{****} | 1 | Net Control | PDP003Z control is enabled. |
| | 0 | Local Control | PDP003Z control is disabled. |
| 13 ^{****} | 1 | Net Reference | PDP003Z reference is enabled. |
| | 0 | Local Reference | PDP003Z reference is disabled. |
| 14 | --- | Device-specification | (Reserved.) |
| 15 | --- | Device-specification | (Reserved.) |

* RFG: Ramp Function Generator

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

<Notes when replacing inverter from the VF-AS1 to the VF-AS3>

*** In order to enable the state of the 'RFG: ENABLE', bit4 and bit5 of STW1 should be set to '1'.

**** If the bit10 of STW1 is used for enabling the PROFIBUS command and reference in the VF-AS1, bit12 and bit13 of STW1 should be also set to '1'.

ZSW Status Word Data

| Bit | Value | Name | Note |
|-----|-------|---|--|
| 0 | 1 | Ready To Switch-on | Power supply is switched 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 | Drive follows setpoint. (Refer to control word 1, bit 3) |
| | 0 | Operation Disabled | - |
| 3 | 1 | Fault Present | VF-MB1/S15/AS3 tripped. |
| | 0 | No Fault | VF-MB1/S15/AS3 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 | Control word bit1 or 2 is set to 0 or fault trip has been acknowledged. |
| | 0 | Switching On Not Inhibited | - |
| 7 | 1 | Warning Present | Drive still operational: Alarm in service parameter: No acknowledgement. |
| | 0 | No Warning | Alarm not present or alarm has disappeared again |
| 8 | 1 | Speed Error Within Tolerance Range | Refer to section 6.2.1. |
| | 0 | Speed Error Out Of Tolerance Range | |
| 9 | 1 | Control Requested | VF-MB1/S15/AS3 is controlled by PROFIBUS master. |
| | 0 | No Control Requested | VF-MB1/S15/AS3 is controlled by another interface. |
| 10 | 1 | f Or n Reached Or Exceeded | Actual value \geq Comparison value (setpoint) |
| | 0 | f Or n Not Reached | - |
| 11 | ---- | (VF-MB1/S15) Factory specific bit (VF-AS3) FP terminal monitor | (VF-MB1/S15) Factory specific bit (VF-AS3) FP output terminal monitor |
| 12 | ---- | (VF-MB1/S15) Factory specific bit (VF-AS3) FL terminal monitor | (VF-MB1/S15) Factory specific bit (VF-AS3) FL output terminal monitor |
| 13 | ---- | (VF-MB1/S15) Factory specific bit (VF-AS3) R1 terminal monitor | (VF-MB1/S15) Factory specific bit (VF-AS3) R1 output terminal monitor |
| 14 | ---- | (VF-MB1/S15) (Reserved) (VF-AS3) R2 terminal monitor | (VF-MB1/S15) (Reserved) (VF-AS3) R2 output terminal monitor |
| 15 | ---- | (VF-MB1/S15) (Reserved) (VF-AS3) DQ11 terminal monitor | (VF-MB1/S15) (Reserved) (VF-AS3) DQ11 output terminal monitor |

Note: The bit described "(Reserved)" and "Factory specific bit" are unstable. Don't use the bit for the judgment.

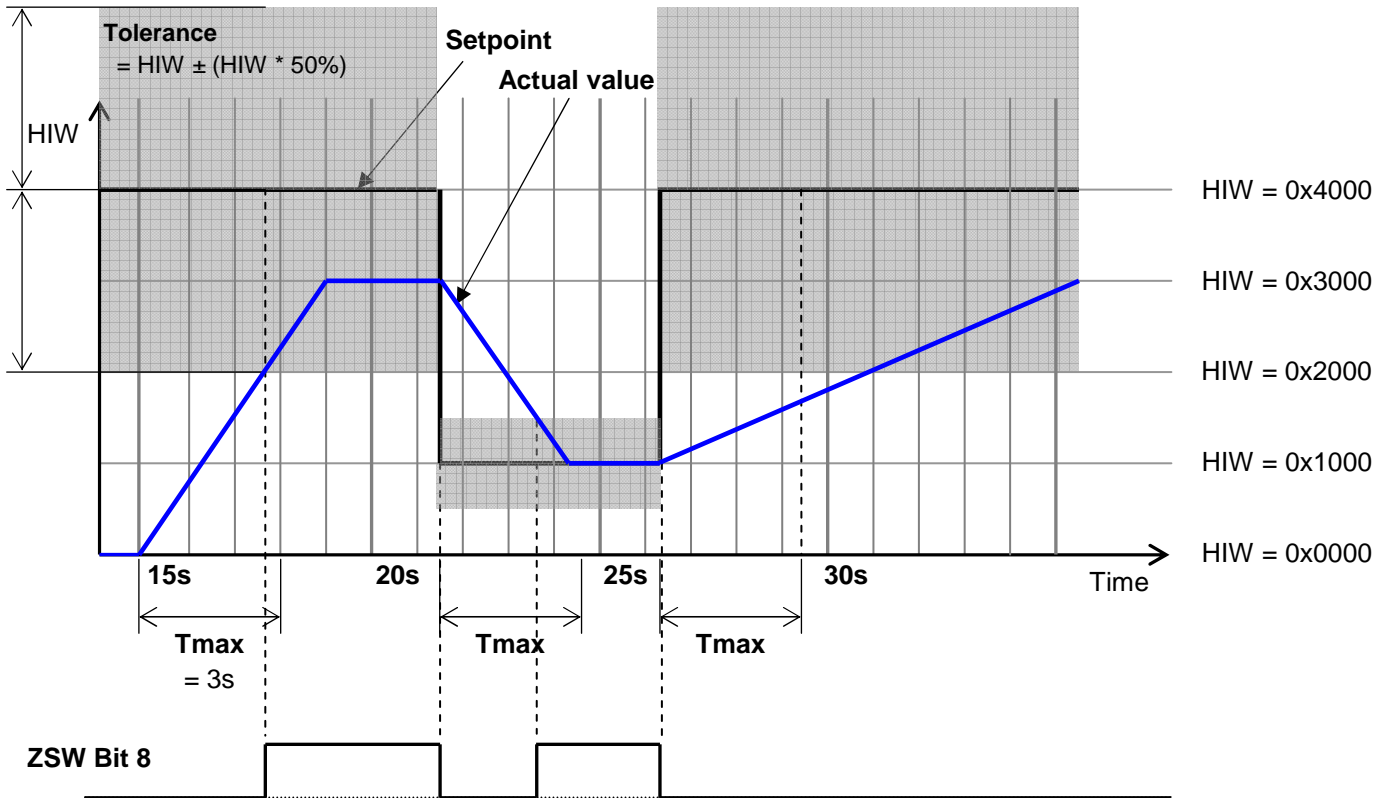
6.2.1. Tolerance Range (ZSW Bit 8)

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.

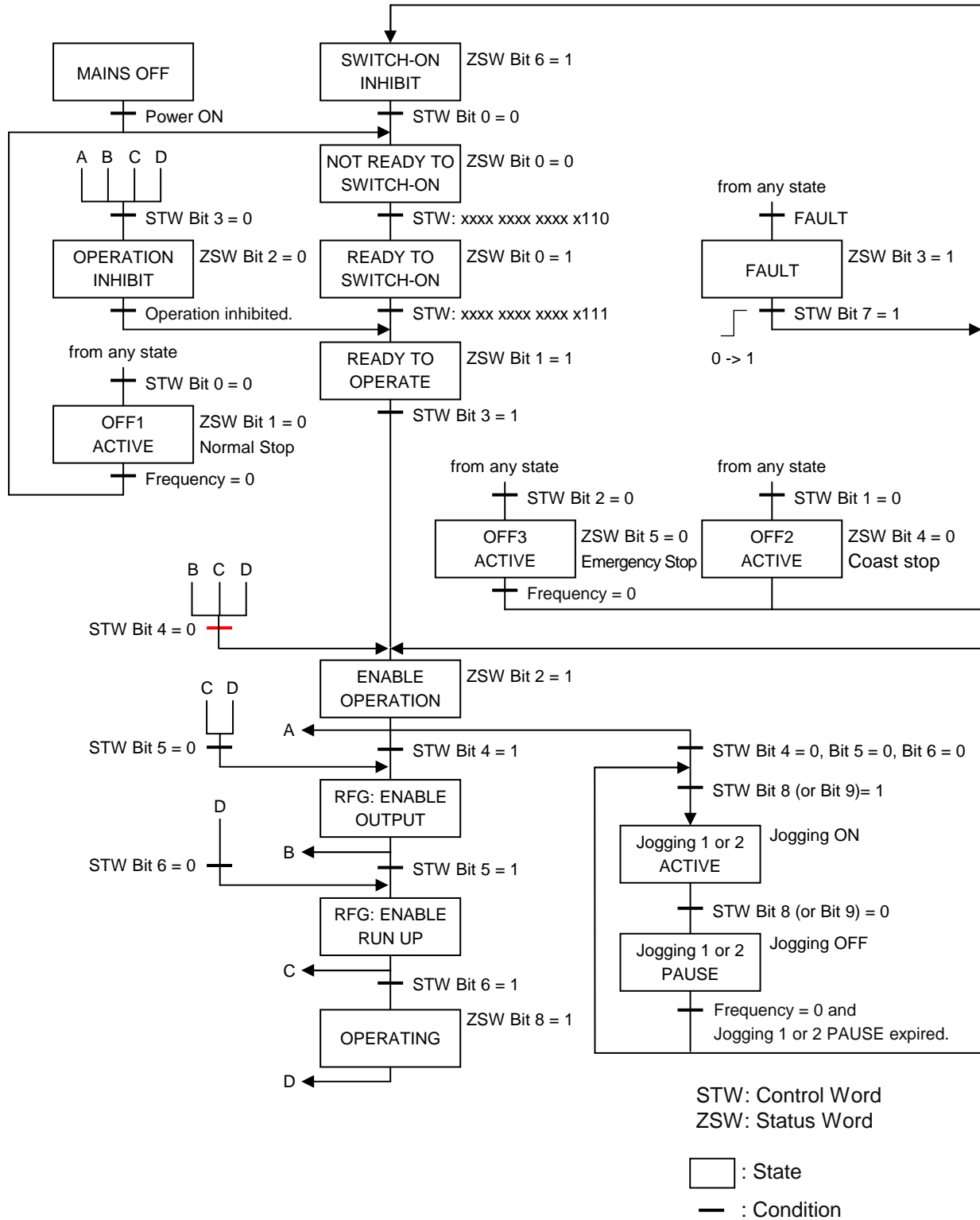
PDP003Z checks that the timer (Tmax) has not timed-out and if the actual value is within the tolerance. If both conditions are fulfilled ZSW Bit 8 is set 1 and the timer is stopped.

The figure shows ZSW 8 when Tolerance (⌈ 15 7) is 50% and Tmax (⌈ 15 1) is 3s.



Note: The status of this bit is NOT defined when immediately after the power is turned ON.

6.3. State Machine



Notes

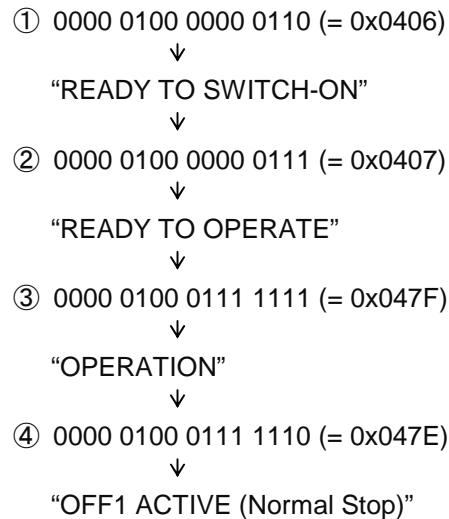
- ▼ STW Bit 10, 12 = 1 or $\overline{ENDD} = 4$ is needed for above control.
- ▼ If \overline{ENDD} is set to Local (0, 1, 2 or 3), set 1 to STW Bit10 and 12 first after turning on the power supply of VF-MB1/S15/AS3.
- ▼ Check ZSW always and take care to give the command to STW.

6.3.1. 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)". In order to the reverse operation, the frequency reference is set with two's complement of the forward frequency reference. During running, HIW shows an output frequency.
 * F_{ref} or ζ_{ref} is set to "Communication option" on these examples.

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

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

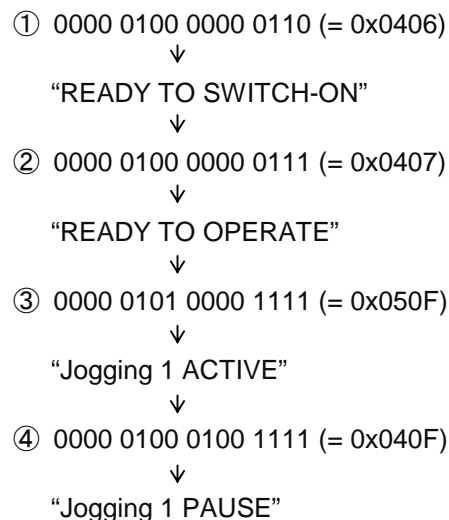


6.3.1.2. Example 2. 30Hz Reverse running

In order to 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.

6.3.1.3. Example 3. Inching and pause

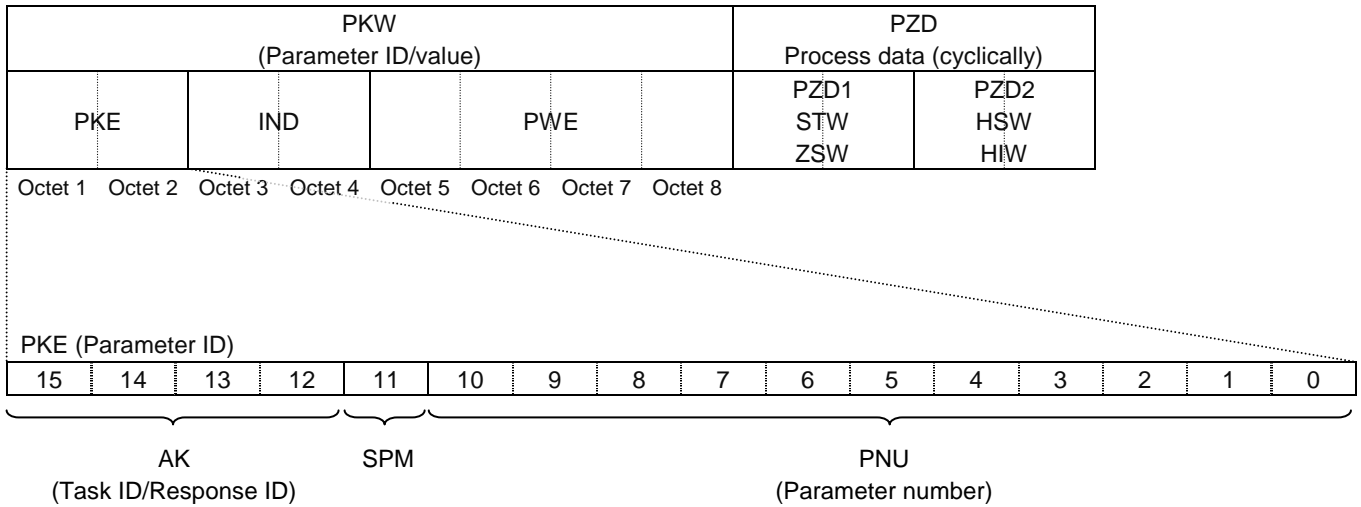
The following is set to STW in order.



* The inching frequency is according to the parameter ζ_{154} , ζ_{155} on VF-MB1/S15/AS3.

6.4. Access to the PROFIBUS parameter

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



AK (Request from Master to PDP003Z)

| 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, VF-MB1/S15/AS3 parameter access |
| 7 | Change parameter value (array) | for PNU access, VF-MB1/S15/AS3 parameter access |

AK (Response from PDP003Z to Master)

| Response ID | Function |
|-------------|---|
| 0 | No response |
| 1 | Transfer parameter value (word) |
| 4 | Transfer parameter value (array) |
| 7 | Task cannot 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.

6.5. PROFIBUS parameter (PNU)

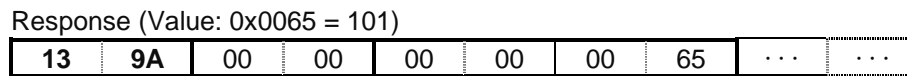
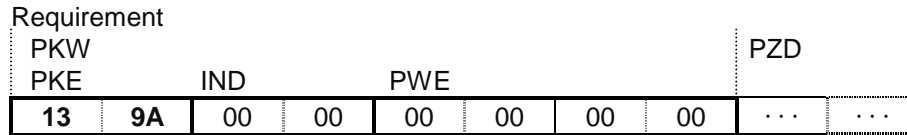
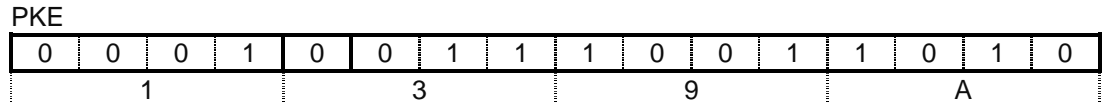
| PNU | R/W | data type | Note |
|-----|-----|-------------------------|--|
| 915 | R | Array [6] Unsigned16 | PNU 915, IND 0 = the drive parameter $\llcorner 001$ PNU 915, IND 1 = the drive parameter $\llcorner 002$ PNU 915, IND 2 = the drive parameter $\llcorner 003$ PNU 915, IND 3 = the drive parameter $\llcorner 004$ PNU 915, IND 4 = the drive parameter $\llcorner 005$ PNU 915, IND 5 = the drive parameter $\llcorner 006$ |
| 916 | R | Array [6] Unsigned16 | PNU 916, IND 0 = the drive parameter $\llcorner 021$ PNU 916, IND 1 = the drive parameter $\llcorner 022$ PNU 916, IND 2 = the drive parameter $\llcorner 023$ PNU 916, IND 3 = the drive parameter $\llcorner 024$ PNU 916, IND 4 = the drive parameter $\llcorner 025$ PNU 916, IND 5 = the drive parameter $\llcorner 026$ |
| 918 | R | Unsigned16 | Station address monitor (same as the drive parameter $\llcorner 150$). |
| 922 | R | Unsigned16 | Telegram selection 1, 100, 101, 102 |
| 927 | R/W | Unsigned16 | Operator control rights (parameter identification, PKW). Value: Mode 0: Parameters cannot be written, only read (927 can be written). 1: Parameters can be written and read (default). |
| 928 | R | Unsigned16 | Control rights (process data, PZD). 1: PZD part is enabled. |
| 930 | R | Unsigned16 | Operating mode 1 : supports the speed control mode and the speed setpoint channel comprises RFG functionality. |
| 939 | R/W | Unsigned16 | (VF-MB1/S15) Factory specific PNU (VF-AS3) FP output terminal selection (same as $F 130$). Monitor is enabled using Status word bit 11. |
| 940 | R/W | Unsigned16 | (VF-MB1/S15) Factory specific PNU (VF-AS3) FL relay output terminal selection (same as $F 132$). Monitor is enabled using Status word bit 12. |
| 941 | R/W | Unsigned16 | (VF-MB1/S15) Factory specific PNU (VF-AS3) R1 relay output terminal selection (same as $F 133$) Monitor is enabled using Status word bit 13. |
| 942 | R/W | Unsigned16 | (VF-MB1/S15) No function (VF-AS3) R2 relay output terminal selection (same as $F 134$) Monitor is enabled using Status word bit 14. |
| 943 | R/W | Unsigned16 | (VF-MB1/S15) No function (VF-AS3) DQ11 output terminal selection (same as $F 159$) Monitor is enabled using Status word bit 15. |
| 944 | R | Unsigned16 | Fault message counter |
| 947 | R | Array [1] Unsigned16 | Fault number |
| 963 | R | Unsigned16 | Detected baud rate: 0 = 9.6 kbit/s 1 = 19.2 kbit/s 2 = 93.75 kbit/s 3 = 187.5 kbit/s 4 = 500 kbit/s |

| | | | |
|-----|---|-------------------------|--|
| | | | 6 = 1.5 Mbit/s 7 = 3 Mbit/s 8 = 6 Mbit/s 9 = 12 Mbit/s 11 = 45.45 kbit/s (Only for the VF-AS3) |
| 964 | R | Array [5] Unsigned16 | Drive Unit identification (VF-MB1/S15) IND 0 = PDP003Z ID (0x0C24) (VF-AS3) IND 0 = PDP003Z ID (0x0F88) IND 1 = Manufacturer-ID (0x0190) IND 2 = VF-MB1/S15/AS3 CPU1 version IND 3 = VF-MB1/S15/AS3 firmware release year (yyyy) IND 4 = VF-MB1/S15/AS3 firmware release date (ddmm) |
| 965 | R | Octet String2 | Profile number of the PDP003Z (Profidrive, V4.1) |
| 967 | R | Unsigned16 | (VF-MB1/S15) Factory specific PNU (VF-AS3) Control word |
| 968 | R | Unsigned16 | (VF-MB1/S15) Factory specific PNU (VF-AS3) Status word |

6.5.1. Examples of reading the PROFIdrive parameter

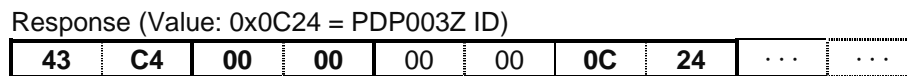
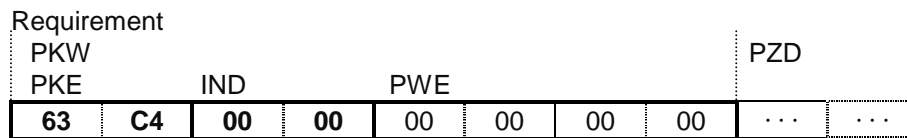
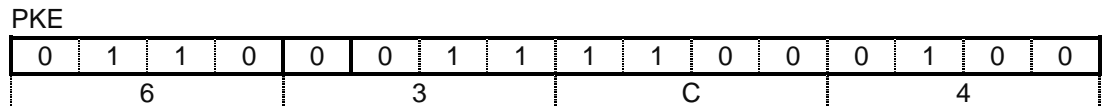
6.5.1.1. Example 1. Reading the PNU 922 (Telegram)

AK = 1 (Request parameter value)
 SPM = 0
 PNU = 922 (0x039A)



6.5.1.2. Example 2. Reading the PNU 964, IND 0

AK = 6 (Request parameter value (array))
 SPM = 0
 PNU = 964 (0x03C4)
 IND = 0 (PDP003Z ID)



6.6. Access to VF-MB1/S15/AS3 parameter

When access to VF-MB1/S15/AS3 parameter, set “1” to the PNU. The communication number of the drive parameter is set to the sub-index IND.

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

* This procedure changes the value of VF-MB1/S15/AS3 EEPROM.

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

6.6.1. Examples of reading or changing VF-MB1/S15/AS3 parameter

6.6.1.1. Example 1. Reading the basic parameter (CND (command mode selection))

AK = 6 (Request parameter value (array))

SPM = 0

PNU = 1

IND = 0x0003 (CND communication number)

PKE

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 1 | 0 | 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 | ... | ... |
|-----------|-----------|-----------|-----------|----|----|-----------|-----------|-----|-----|

6.6.1.2. Example 2. Reading the extended parameter (F219 (VIC(MB1,S15) / II(AS3) input point 2 frequency))

AK = 6 (Request parameter value (array))

SPM = 0

PNU = 1

IND = 0x0219 (F219 communication number)

PKE

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 1 | 0 | 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 | 02 | 19 | 00 | 00 | 00 | 00 | ... | ... | | | | |

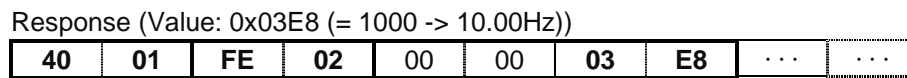
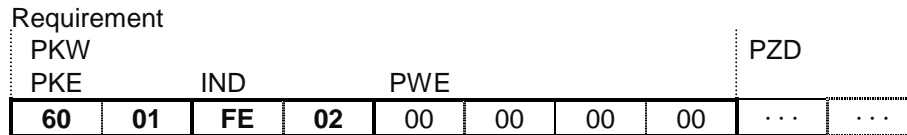
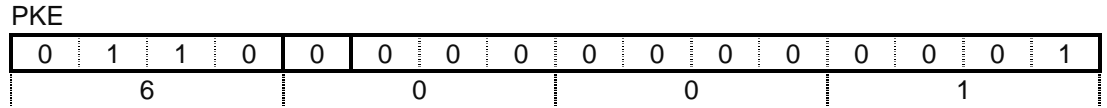
Response (Value: 0x1770 (= 6000 -> 60.00Hz *))

| | | | | | | | | | |
|-----------|-----------|-----------|-----------|----|----|-----------|-----------|-----|-----|
| 40 | 01 | 02 | 19 | 00 | 00 | 17 | 70 | ... | ... |
|-----------|-----------|-----------|-----------|----|----|-----------|-----------|-----|-----|

* “0x1770” as reading value of “VIC(VF-MB1,VF-S15) / II(VF-AS3) input point 2 frequency” is 0x1770 = 6000 (decimal number)
 Since the unit of “VIC(VF-MB1,VF-S15) / II(VF-AS3) input point 2 frequency” is 0.01Hz, set the following value. 6000×0.01 = 60.00Hz

6.6.1.3. Example 3. Reading the status monitor parameter (*F E 0 2* (The operation frequency))

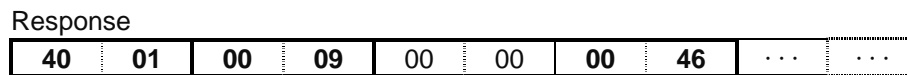
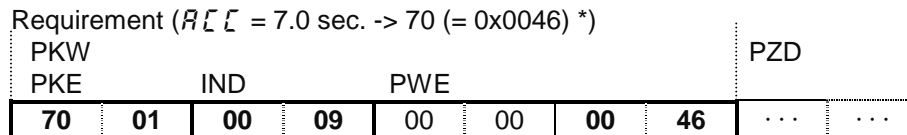
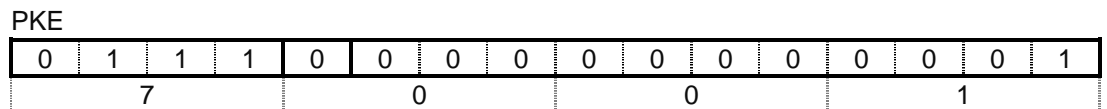
AK = 6 (Request parameter value (array))
 SPM = 0
 PNU = 1
 IND = 0xFE02(*F E 0 2* communication number)



* The status monitor parameter cannot be changed.

6.6.1.4. Example 4. Changing the basic parameter (*R 0 0* (acceleration time))

AK = 7 (Change parameter value (array))
 SPM = 0
 PNU = 1
 IND = 0x0009 (*R 0 0* communication number)



* 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 19*.)
 7.0/0.1 = 70 = 0x0046 (hexadecimal number)

| Notes | |
|--------------|---|
| | <ul style="list-style-type: none"> ▼ When the control power is shut off by the instantaneous power failure, communication will be unavailable for a while. ▼ The Life of EEPROM is approximately 100,000 times. Avoid writing a command more than 100,000 times to the same parameter of the drive and the communication board. |

7. Vendor Spec. Profile

Cyclic command transmission (the value of the parameter $\text{C001} - \text{C006}$) and monitoring (the value of the parameter $\text{C021} - \text{C026}$) are possible for PDP003Z by the original profile

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

VF-MB1/S15 profile

| Scanner input $\text{C001} - \text{C006}$ | Scanner output $\text{C021} - \text{C026}$ |
|---|---|
| 0: No action | 0: No action |
| 1: FR06 (Communication command 1) | 1: Fd01 (Status information 1) |
| 2: FR23 (Communication command 2) | 2: Fd00 (Output frequency, 0.01Hz) |
| 3: FR07 (Frequency command, 0.01Hz) | 3: Fd03 (Output current, 0.01%, With filter) |
| 5: FR50 (Terminal output data) | 4: Fd05 (Output voltage, 0.01%, With filter) |
| 6: FR51 (FM analog output) | 5: FE91 (Alarm information) |
| 8: FS01 (Stall prevention level, %) | 6: Fd22 (PID feedback value, 0.01Hz) |
| 13: ACC (Acceleration time 1, 0.1s)* | 7: Fd06 (Input terminal board status) |
| 14: DEC (Deceleration time 1, 0.1s) * | 8: Fd07 (Output terminal status) |
| 15: UL (Upper limit, 0.01Hz) | 9: FE36 (VIB input, 0.01%) |
| 16: ub (Torque boost value 1, 0.1%) | 10: FE35 (VIA input, 0.01%) |
| 17: uLu (Base frequency voltage 1, 0.1V) | 11: FE37 (VIC input, 0.01%) |
| | 12: Fd04 (Input voltage (DC detection), 0.01%, With filter) |
| | 13: Fd16 (Estimated speed (real-time value), 0.01Hz) |
| | 14: Fd18 (Torque, 0.01%, With filter) |
| | 19: F880 (Free notes) |
| | 20: Fd29 (Input power, 0.01kW, With filter) |
| | 21: Fd30 (Output power, 0.01kW, With filter) |
| | 22: FE14 (Cumulative operation time, hour) |
| | 23: FE40 (FM terminal output monitor, 0.01%) |
| | 25: Fd20 (Torque current, 0.01%, With filter) |
| | 26: Fd23 (Motor overload factor, 0.01%) |
| | 27: Fd24 (Drive overload factor, 0.01%) |
| | 28: Fd25 (PBR overload factor, %) |
| | 29: Fd26 (Motor load factor, %) |
| | 30: Fd27 (Drive load factor, %) |
| | 31: FE56 (Pulse train input, pps) |
| | 32: FE70 (Drive rated current, 0.1A) |
| | 33: FE76 (Input Watt-hour, $0.1\text{kWh} \times 10^{\text{F749}}$) ** |
| | 34: FE77 (Output Watt-hour, $0.1\text{kWh} \times 10^{\text{F749}}$) ** |
| | 35: Fd83 (IGBT temperature, degree C) |

* The unit of ACC , DEC is according to the parameter F519 .

** The unit of FE76 , FE77 is according to the parameter F749 .

*** The value which is transferred by the cyclic command transmission will not be stored to EEPROM.

VF-AS3 profile

| Scanner input <i>C001 - C006</i> | Scanner output <i>C021 - C026</i> |
|---|--|
| 0: No action 1: <i>F A 0 5</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) 4: <i>F A 3 3</i> (Torque command 0.01%) 5: <i>F A 5 0</i> (Terminal output data) 6: <i>F A 5 1</i> (Analog output(FM) data from comm.) 7: <i>F A 5 2</i> (Analog output(AM) data from comm.) 8: <i>F 6 0 1</i> (Stall prevention level, %) 9: <i>F 4 4 1</i> (Power running torque limit 1, level,0.01%) 10: <i>F 4 4 3</i> (Regenerative braking torque limit 1, level 0.01%) 11: <i>F 4 6 0</i> (Speed loop proportional gain) 12: <i>F 4 6 1</i> (Speed loop stabilization coefficient) 13: <i>A C C</i> (Acceleration time 1, 0.1s) * 14: <i>d E C</i> (Deceleration time 1, 0.1s) * 15: <i>U L</i> (Upper limit, 0.01Hz) 16: <i>u b</i> (Torque boost value 1, 0.01%) 17: <i>u L u</i> (Base frequency voltage 1, 0.1V) | 0: No action 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%, With filter) 4: <i>F d 0 5</i> (Output voltage, 0.01%, With filter) 5: <i>F C 9 1</i> (Inverter alarm) 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 5</i> (RR input, 0.01%) 10: <i>F E 3 6</i> (RX input, 0.01%) 11: <i>F E 3 7</i> (II input, 0.01%) 12: <i>F d 0 4</i> (Input voltage (DC detection), 0.01%, With filter) 13: <i>F d 1 6</i> (Estimated speed (real-time value), 0.01Hz) 14: <i>F d 1 8</i> (Torque, 0.01%, With filter) 15: <i>F E 6 0</i> (My monitor) 16: <i>F E 6 1</i> (My monitor) 17: <i>F E 6 2</i> (My monitor) 18: <i>F E 6 3</i> (My monitor) 19: <i>F 8 8 0</i> (Free notes) 20: <i>F d 2 9</i> (Input power, 0.01kW, With filter) 21: <i>F d 3 0</i> (Output power, 0.01kW, With filter) 22: <i>F E 1 4</i> (Cumulative operation time, 1hour) 23: <i>F E 4 0</i> (FM terminal output monitor, 0.01%) 24: <i>F E 4 1</i> (AM terminal output monitor, 0.01%) 25: <i>F d 2 0</i> (Torque current, 0.01%, With filter) 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, 0.1kWh × 10 ^{F 749}) ** 34: <i>F E 7 7</i> (Output Watt-hour, 0.1kWh × 10 ^{F 749}) ** 35: <i>F d 8 3</i> (IGBT temperature, degree C) |

* The unit of *A C C*, *d E C* is according to the parameter *F 5 1 9*.

** The unit of *F E 7 6*, *F E 7 7* is according to the parameter *F 7 4 9*.

*** The value which is transferred by the cyclic command transmission will not be stored to EEPROM.

7.1. 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>C001</i> | <i>C021</i> |
| Cyclic data 2 | <i>C002</i> | <i>C022</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)

7.2. 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) | INV: Inverter PKW: Parameter ID/value |
| PKW2 | PKW2(IND) | PKW2(IND) | PKE: Parameter ID (1st and 2nd octet) |
| PKW3 | PKW3(PWE1) | PKW3(PWE1) | IND: Sub-index (3rd octet), 4th octet is reserved |
| PKW4 | PKW4(PWE2) | PKW4(PWE2) | PWE: Parameter value (5th until 8th octet) |
| Cyclic data 1 | <i>C001</i> | <i>C021</i> | |
| Cyclic data 2 | <i>C002</i> | <i>C022</i> | |
| Cyclic data 3 | <i>C003</i> | <i>C023</i> | |
| Cyclic data 4 | <i>C004</i> | <i>C024</i> | |
| Cyclic data 5 | <i>C005</i> | <i>C025</i> | |
| Cyclic data 6 | <i>C006</i> | <i>C026</i> | |

7.3. Telegram 102: Vendor specific

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

| | PLC → INV | INV → PLC | INV: Inverter |
|---------------|-------------|-------------|---------------|
| Cyclic data 1 | <i>C001</i> | <i>C021</i> | |
| Cyclic data 2 | <i>C002</i> | <i>C022</i> | |
| Cyclic data 3 | <i>C003</i> | <i>C023</i> | |
| Cyclic data 4 | <i>C004</i> | <i>C024</i> | |
| Cyclic data 5 | <i>C005</i> | <i>C025</i> | |
| Cyclic data 6 | <i>C006</i> | <i>C026</i> | |

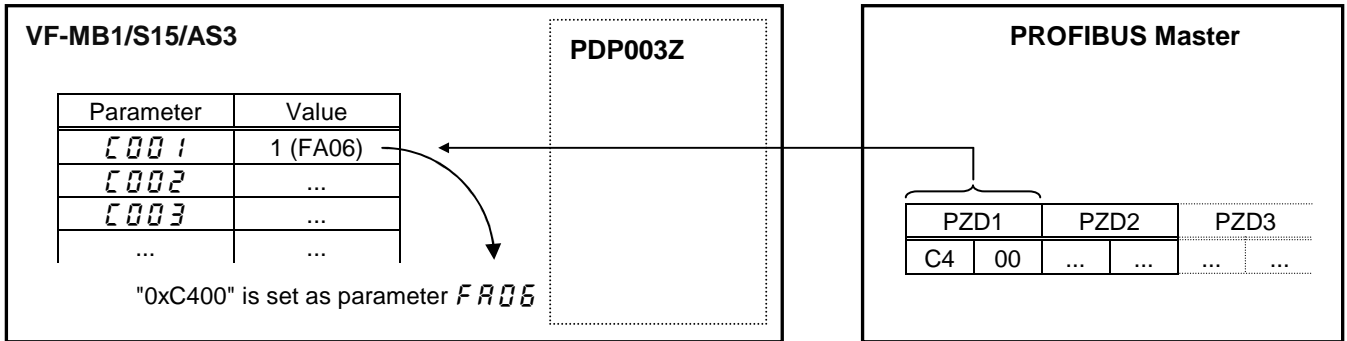
7.4. How to use

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

Example 1: Command transmitting

When you want to set "0xC400" to parameter *FA06*, set "1 (*FA06*)" to parameter *LD01*.

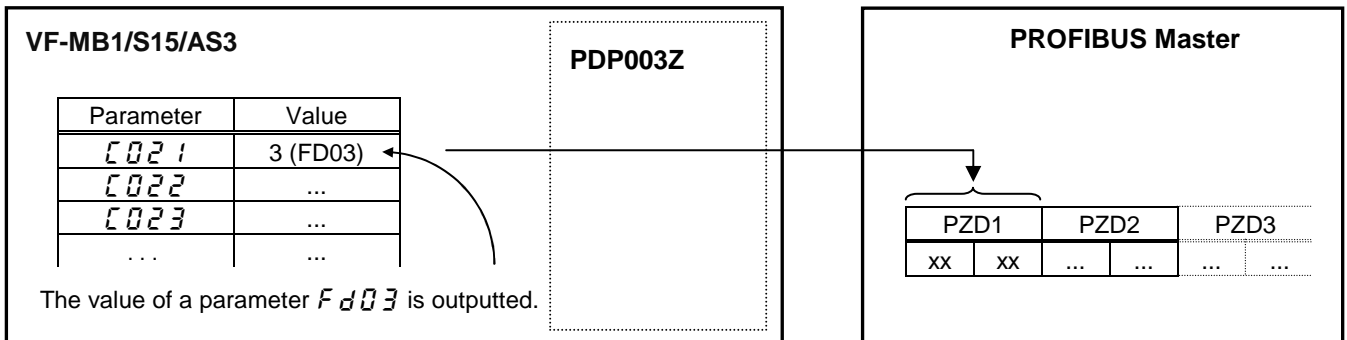
And since 0 and 1 byte of the PZD1 supports the parameter *LD01*, if "0xC400" is set up here, "0xC400" will be set as *FA06*.



Example 2: State monitoring

When you want to monitor the output current, set "3 (FD03)" to parameter *LD01*.

The value of the parameter *FD03* specified as 0 and 1 byte of the PZD1 with the parameter *LD01* is inputted.



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

7.5.1. *FAD6* (Communication command1)

VF-MB1/S15

| 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) | THR1: <i>Pt</i> = setting value, <i>uL</i> , <i>uLu</i> , <i>ub</i> , <i>tHr</i> THR2: <i>Pt</i> = 0, <i>F170</i> , <i>F171</i> , <i>F172</i> , <i>F173</i> |
| 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: <i>ACC</i> , <i>DEC</i> AD2: <i>F500</i> , <i>F501</i> |
| 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 | 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 selection | OFF | Enabled | Enabled regardless of the setting of <i>FNoD</i> |
| 15 | Command priority selection | OFF | Enabled | Enabled regardless of the setting of <i>CNoD</i> |

* VF-S15: When 14(*Sr0*) is set to *FNoD*, preset speed operation frequency 0 is selected.

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: <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> |
| 5 | PID control | Normal operation | PID off | - |
| 6 | Acc/Dec switching 1 (*3) | 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 | Forward run | Reverse run | - |

| | | | | |
|----|--------------------|---------|---------------|---|
| 10 | Run/Stop | Stop | Run | - |
| 11 | Coast stop | Standby | Cost stop | - |
| 12 | Emergency off | OFF | Emergency off | Always enable, [E] trip |
| 13 | Fault reset | OFF | Reset | Trip reset |
| 14 | Frequency priority | OFF | Enabled | Enabled regardless of the setting of <i>F_{NOd}</i> |
| 15 | Command priority | OFF | Enabled | Enabled regardless of the setting of <i>C_{NOd}</i> |

(*1): When set "12(*Sr0*)" to *F_{NOd}*, preset speed operation frequency 0 is selected.

(*2): The V/f switching ORs with Bit 10 of [*FR23*].

(*3): The Acc/Dec switching ORs with Bit 8 of [*FR23*]

7.5.2. *FR23* (Communication command 2)

VF-MB1/S15

| bit | Function | 0 | 1 | Note |
|-----|---------------------------------------|---|------------|--|
| 0 | (Reserved) | - | - | - |
| 1 | Electric power quantity reset | OFF | Reset | Electric power quantity (<i>FE76</i> , <i>FE77</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>ACC, DEC</i> AD2: <i>F500, F501</i> AD3: <i>F510, F511</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>F601</i> OC stall 2: <i>F185</i> |
| 13 | (Reserved) | - | - | - |
| 14 | (Reserved) | - | - | - |
| 15 | (Reserved) | - | - | - |

Note: Set 0 to reserved bit.

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) (*3) | - | - | - |
| 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, DEC</i> AD mode 2: <i>F500, F501</i> AD mode 3: <i>F510, F511</i> AD mode 4: <i>F514, 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 | | Select V/f pattern 1 - 4 by combination of two bits V/f 1: <i>Pt</i> = setting value, <i>uL, uLv</i> , |

| | | | | |
|----|---|--|--------|--|
| 11 | V/f switching 2 | 11: V/f 4 | | $ub, tHrA$ V/f 2: $Pt = "0", F 170, F 171, F 172, F 182$ V/f 3: $Pt = "0", F 174, F 175, F 176, F 183$ V/f 4: $Pt = "0", F 178, F 179, F 180, F 184$ |
| 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: $F 601$ OC stall 2: $F 185$ Select torque limit 1 - 4 by combination of two bits Torque limit 1: $F 441, F 443$ Torque limit 2: $F 444, F 445$ Torque limit 3: $F 446, F 447$ Torque limit 4: $F 448, F 449$ |
| 13 | Torque limit switching 2 | | | |
| 14 | Speed gain switching | Gain 1 | Gain 2 | Gain 1: $F 460, F 461, F 462$ Gain 2: $F 463, F 464, F 465$ |
| 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].

<Notes when replacing inverter from the VF-AS1 to the VF-AS3>

(*3): Bit 5 of the FA23 is used to then Brake open command in the VF-AS1. But this bit was changed to reserved bit in the VF-AS3. Therefore DO NOT use this bit in the VF-AS3.

7.5.3. FA07 (frequency reference from internal 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.)

7.5.4. FA33 (Torque command) (Only for the VF-AS3)

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%, $50\% = 50 \div 0.01 = 5000 = 1388H$

7.5.5. FA50 (Terminal output data from communication)

By setting up the data of the bit 0 - 1 of terminal output data (FA50) from communication, setting data (OFF or ON) can be outputted to the output terminal.

[VF-MB1/S15]

Please select the functional number 92 - 95 as the selection (F 130 - F 138) of the output terminal function before using it.

[VF-AS3]

Please select the functional number 92 - 105 as the selection (F 130 - F 134, F 159 - F 163) 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-MB1/S15] (Reserved) [VF-AS3] Specified data output 3 (Output terminal No.: 96, 97) | OFF | ON |
| 3 | [VF-MB1/S15] (Reserved) [VF-AS3] Specified data output 4 (Output terminal No.: 98, 99) | OFF | ON |
| 4 | [VF-MB1/S15] (Reserved) [VF-AS3] Specified data output 5 (Output terminal No.: 100, 101) | OFF | ON |
| 5 | [VF-MB1/S15] (Reserved) [VF-AS3] Specified data output 6 (Output terminal No.: 102, 103) | OFF | ON |
| 6 | [VF-MB1/S15] (Reserved) [VF-AS3] Specified data output 7 (Output terminal No.: 104, 105) | OFF | ON |
| 7-15 | (Reserved) | - | - |

Note: Set 0 to reserved bit

- 7.5.6. *F A 5 1* (Analog output (FM) data from communication)
F A 5 2 (Terminal AM output data) (Only for the VF-AS3)

Use this function, set the Terminal FM function (*F A 5 L*) or Terminal AM function (*F 6 7 0*) to communication data output (18 for VF-S15 / 31 for VF-AS3).
It possible to send out the data specified as FM/AM analog output data (*F A 5 1*/*F A 5 2*) though the FM/AM analog output terminal. Data can be adjusted in a range of 0 to 100.0% (resolution of 10 bit).

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.

- 7.5.7. *F 4 4 1* Power running torque limit level 1(Only for the VF-AS3)
F 4 4 3 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%,
 $250\% = 250 \div 0.01 = 25000 = 61A8H$

- 7.5.8. *F 4 5 0* 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%,
 $1\% = 1 \div 0.1 = 10 = 000AH$

- 7.5.9. *F 4 5 1* 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%,
 $1\% = 1 \div 0.01 = 100 = 0064H$

7.5.10. *Fd01* (Inverter operating status 1 (real time))

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| bit | Function | 0 | 1 | Note |
|-----|--|---|---|--|
| 0 | Failure FL | No output | Under in progress | - |
| 1 | Failure | Not tripped | Tripped | Trip status includes <i>tr y</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 | Motor selection (1 or 2) (THR 2 selection) | Motor 1 (THR1) | Motor 2 (THR2) | THR1: <i>Pt</i> = setting value, <i>uL</i> , <i>uLv</i> , <i>ub</i> , <i>tHr</i> THR2: <i>Pt</i> = 0, <i>F170</i> , <i>F171</i> , <i>F172</i> , <i>F173</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>ACC</i> , <i>DEC</i> AD2: <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 | (Undefined) | - | - | - |

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

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| bit | Function | 0 | 1 | Note |
|-----|-------------------------------|-----------------------|-----------------------|---|
| 0 | Failure FL | No output | Under in progress | - |
| 1 | Failure | Not tripped | Tripped | Trip status includes [<i>tr y</i>] and the trip retention status is also regarded as tripped statuses. |
| 2 | Alarm | No alarm | Alarm issued | When DeviceNet network is disconnected, this bit becomes "1" |
| 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 (moff), , [L O F F], [L O F F], [L S t P]), ST =ON and RUN=ON |
| 14 | Standby | Start-up process | Standby | Standby: Initialization completed, not failure stop status and not alarm stop status ([M O F F], [L O F F], [L O F F], [L S t P]) |
| 15 | HAND/AUTO (LOC/REM) | AUTO (LOC) | HAND (REM) | Enabled with [F 7 5 0]="2" HAND: Panel operation is enabled AUTO: Operation method selected [L N O d] and [F N O d] are enabled. Enabled with [F 7 3 2]="0" LOC: Panel operation is enabled REM: Operation method selected [L N O d] and [F N O d] are enabled. |

7.5.11. 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

7.5.12. 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.

7.5.13. F E 3 5, F E 3 6, F E 3 7 (Monitoring of the analog input)

VF-MB1/S15

- VIA input value: "Communication Number F E 3 5"
- VIB input value: "Communication Number F E 3 6"
- VIC input value: "Communication Number F E 3 7"

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

VIA / VIC input value monitor is capable of reading the data from external devices in a range of 0.00 to 100.00% (unsigned data: 0x0000 to 0x2710).

VIB input value 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.

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RR input value: "Communication Number *FE35*"

RX input value: "Communication Number *FE36*"

II input value: "Communication Number *FE37*"

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

RR / II input value monitor is capable of reading the data from external devices in a range of 0.00 to 100.00% (unsigned data: 0x0000 to 0x2710).

RX input value 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.

7.5.14. *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)

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

The output value of FM/AM terminal is read.

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

For example, when FM/AM output value is 50.00%, 0x1388 (Hex.) is read.

0x1388 (Hex) = 50.00 (Dec %)

* If the parameter *FE81* (Analog output) is set to 0, FM output monitor cannot be used.

Please set 1 or 2 to *FE81*.

7.5.16. *F C 9 1* (Alarm code)

VF-S15/MB1

| bit | Function | 0 | 1 | Remarks (Code displayed on the panel) |
|-----|------------------------------------|--------|------------------|--|
| 0 | Over-current alarm | Normal | Alarming | <i>[C]</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 undervoltage 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 | - |
| 12 | Serial communication alarm | Normal | Alarming | - |
| 13 | MOFFMS (MS-relay off or MOFF) | Normal | Alarming | - |
| 14 | Stop after instantaneous power off | - | Dec., Under stop | Refer to <i>F 3 0 2</i> value |
| 15 | Stop after LL continuance time | - | Dec., Under stop | Refer to <i>F 2 5 5</i> value |

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| bit | Function | 0 | 1 | Panel display |
|-----|------------------------------------|--------|------------------|---------------------------|
| 0 | Over-current alarm | Normal | Alarming | <i>[C]</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 | Overheat alarm | Normal | Alarming | <i>[H]</i> flicking |
| 4 | Overvoltage alarm | Normal | Alarming | <i>[P]</i> flicking |
| 5 | (Undefined) | - | - | - |
| 6 | Inverter overheat alarm | Normal | Alarming | <i>[L]</i> flicking |
| 7 | Undercurrent alarm | Normal | Alarming | - |
| 8 | Over-torque alarm | Normal | Alarming | - |
| 9 | Braking resistor overload alarm | Normal | Alarming | - |
| 10 | Cumulative run time alarm | Normal | Alarming | - |
| 11 | Communication option alarm | Normal | Alarming | <i>[E]</i> flicking |
| 12 | Serial communication alarm | Normal | Alarming | <i>[E]</i> flicking |
| 13 | Power circuit under voltage alarm | Normal | Alarming | <i>[MOFF]</i> flicking |
| 14 | Stop after instantaneous power off | - | Dec., Under stop | <i>[5 E 0 P]</i> flicking |
| 15 | During sleep | - | Dec., Under stop | <i>[5 E 0 P]</i> flicking |

7.5.17. *F d06* (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>) | | |
| 5 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.

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| 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.

7.5.18. *Fd07* (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.

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| 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 ^{*1} | <i>F 159</i> : Terminal DQ11 function | OFF | ON |
| 6 | DQ12 ^{*1} | <i>F 160</i> : Terminal DQ12 function | OFF | ON |
| 7 | R4 ^{*1} | <i>F 161</i> : Terminal R4 function | OFF | ON |
| 8 | R5 ^{*1} | <i>F 162</i> : Terminal R5 function | OFF | ON |
| 9 | R6 ^{*1} | <i>F 163</i> : Terminal R6 function | OFF | ON |
| 10 | R4(B) ^{*1} | <i>A201</i> : Terminal R4 (B) function | OFF | ON |
| 11 | R5(B) ^{*1} | <i>A202</i> : Terminal R5 (B) function | OFF | ON |
| 12 | R6(B) ^{*1} | <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.

*1: DQ11, DQ12, R4, R5, R6, R4(B), R5(B) and R6(B) are the terminal of I/O extension.

8. Diagnostic

When the communication loss occurs, PDP003Z returns the diagnosis telegram including the following information.

Byte 1: Station Status 1
 Byte 2: Station Status 2
 Byte 3: Station Status 3
 Byte 4: Master station address

(VF-MB1/S15)

Byte 5: PDP003Z Ident Number high byte (0x0C)
 Byte 6: PDP003Z Ident Number low byte (0x24)

(VF-AS3)

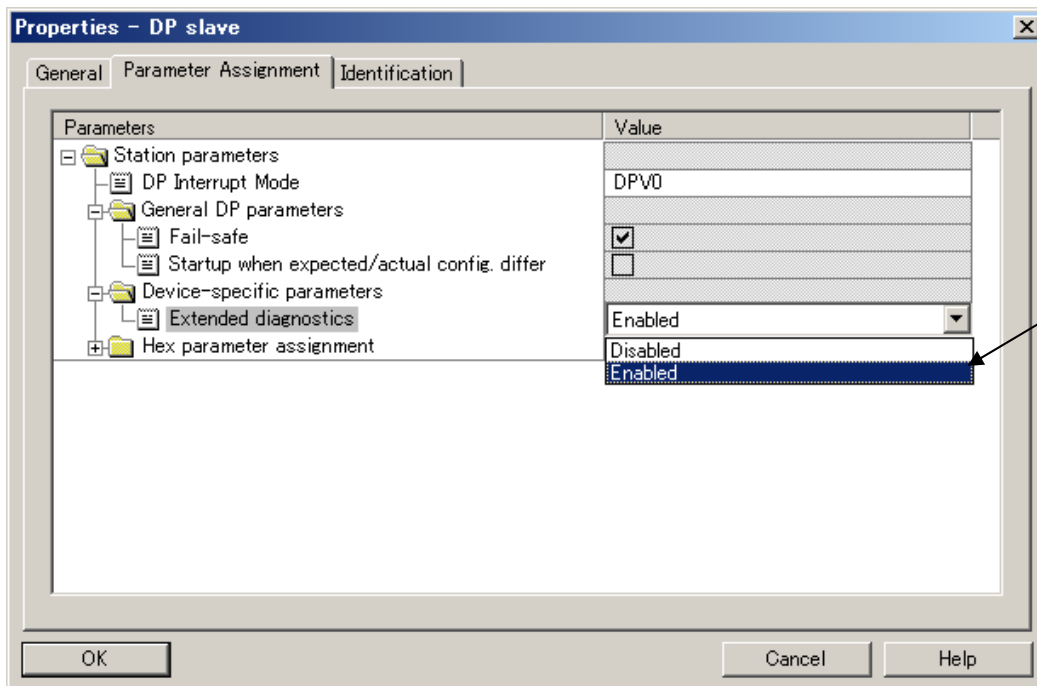
Byte 5: PDP003Z Ident Number high byte (0x0F)
 Byte 6: PDP003Z Ident Number low byte (0x88)

Byte 7: Diagnostic data length
 Byte 8: Status Type (Status message = 0x81)
 Byte 9: Slot Number (Slot number = 0x00)
 Byte 10: Specifier (0=No further diff, 1=Status comes, 2=Status goes)

Byte 11: External diagnostic data length
 Byte 12: PDP003Z Station Address
 Byte 13: PDP003Z Profile
 Byte 14: Drive CPU1 Major version
 Byte 15: Drive CPU1 Minor version
 Byte 16: PDP003Z software version
 Byte 17: PDP003Z communication network Fault
 Byte 18: PDP003Z internal link Fault

* It is necessary to set the parameter $\zeta 101$ to "4".

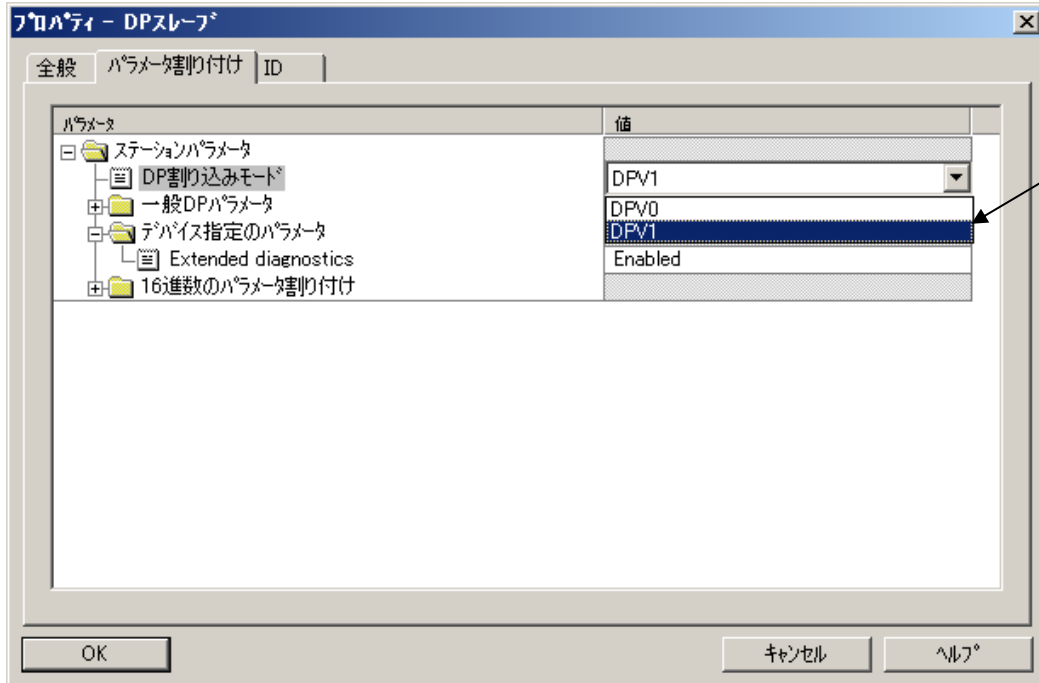
* It is necessary to set it by the configuration to include Byte 7 or more in the response.
 (The figure below is a setting for SIMATEC Step7.)



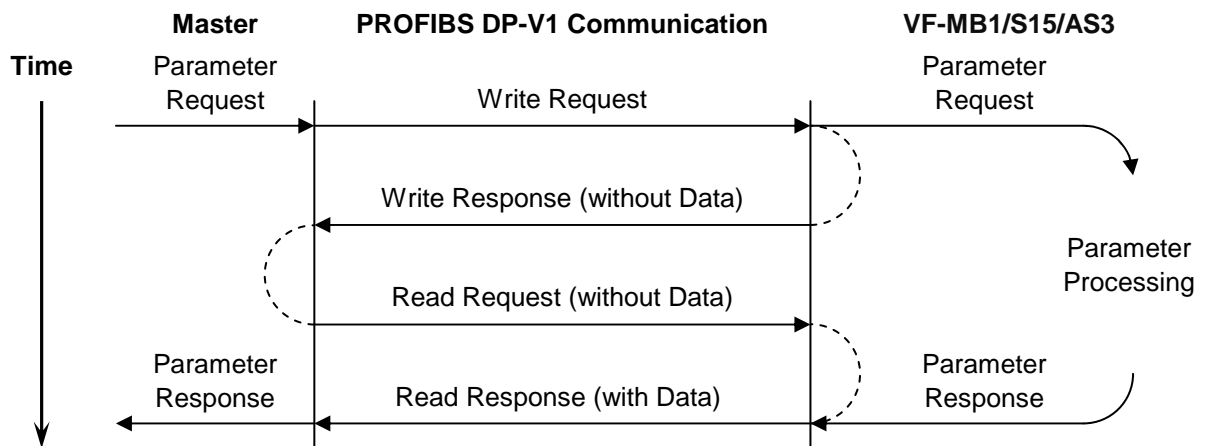
9. PROFdrive acyclic parameter access

DP-V1 acyclic communication is mainly used to read/write the parameter.
VF-MB1/S15/AS3 parameter and the PROFIBUS parameter can be read/written using PDP003Z.

The following setting is necessary in the configuration to communicate DP-V1.
(The figure below is a setting for SIMATEC Step7.)



Parameter access sequence to VF-MB1/S15/AS3 takes place as described in the following figure.



Notes

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

9.1. Example1. Read the PROFdrive parameter

9.1.1. Write Request data table (Read PNU 964 (0x03C4) IND 4)

| Field | Description | Value |
|----------------------------|-----------------------------------|-------------|
| Header DU0 | Function number | 0x5F |
| Header DU1 | Slot number (0) | 0x00 |
| Header DU2 | Index (47) | 0x2F |
| Header DU3 | Length | 0x0E |
| 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 | 0x04 |

9.1.2. Read Response data table (positive)

| Field | Description | Value |
|--------------------------|------------------------------|----------------|
| Header DU0 | Function number | 0x5E |
| Header DU1 | Slot number (0) | 0x00 |
| Header DU2 | Index (47) | 0x2F |
| Header DU3 | Length | 0x08 |
| 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 | 0x0A ** |
| Parameter Value (Byte 4) | Values, Low byte | 0x90 ** |

* Refer to Appendix.

** Value 0x0A90 is "2704" in decimal. This means "April 27".

9.2. Example 2. Change the PROFIdrive parameter

9.2.1. Write Request data table (Change, set 0 to PNU 927 (0x039F))

| Field | Description | Value |
|----------------------------|-----------------------------------|-------------|
| Header (DU0) | Function number | 0x5F |
| Header (DU1) | Slot number (0) | 0x00 |
| Header (DU2) | Index (47) | 0x2F |
| Header (DU3) | Length | 0x0E |
| 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 | 0x9F |
| Parameter Address (Byte 5) | Sub-index (IND), High byte | 0x00 |
| Parameter Address (Byte 6) | Sub-index (IND), Low byte | 0x00 |
| Parameter Value (Byte 1) | Format * | 0x06 |
| Parameter Value (Byte 2) | Number of Value | 0x01 |
| Parameter Value (Byte 3) | Values, High byte | 0x00 |
| Parameter Value (Byte 4) | Values, Low byte | 0x00 |

* Refer to Appendix.

Read Response data table (positive)

| Field | Description | Value |
|-------------------------|------------------------------|-------------|
| Header DU0 | Function number | 0x5E |
| Header DU1 | Slot number (0) | 0x00 |
| Header DU2 | Index (47) | 0x2F |
| Header DU3 | Length | 0x04 |
| Request Header (Byte 1) | Request Reference (mirrored) | 0x01 |
| Request Header (Byte 2) | Response ID (0x02: Positive) | 0x02 |
| Request Header (Byte 3) | Axis (mirrored) | 0x01 |
| Request Header (Byte 4) | Number of Parameters | 0x01 |

9.2.2. Read Response data table (negative, set 2 to PNU 927)

| Field | Description | Value |
|--------------------------|--------------------------------|-------------|
| Header DU0 | Function number | 0x5E |
| Header DU1 | Slot number (0) | 0x00 |
| Header DU2 | Index (47) | 0x2F |
| Header DU3 | Length | 0x08 |
| Request Header (Byte 1) | Request Reference (mirrored) | 0x01 |
| Request Header (Byte 2) | Response ID (0x82: Negative) * | 0x82 |
| Request Header (Byte 3) | Axis (mirrored) | 0x01 |
| Request Header (Byte 4) | Number of Parameters | 0x01 |
| Parameter Value (Byte 1) | Format (0x44: 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 | 0x01 |

* Refer to Appendix.

9.3. Example 3. Read the VF-MB1/S15/AS3 parameter

When access to VF-MB1/S15/AS3 parameter, set "1000" to the PNU.

9.3.1. Write Request data table (Read F d 0 4 (Input voltage))

| Field | Description | Value |
|----------------------------|--|-------------|
| Header DU0 | Function number | 0x5F |
| Header DU1 | Slot number (0) | 0x00 |
| Header DU2 | Index (47) | 0x2F |
| Header DU3 | Length | 0x0A |
| 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, High byte ** | 0x03 |
| Parameter Address (Byte 4) | Parameter number, Low byte ** | 0xE8 |
| Parameter Address (Byte 5) | VF-MB1/S15/AS3 Parameter number, High byte | 0xFD |
| Parameter Address (Byte 6) | VF-MB1/S15/AS3 Parameter number, Low byte | 0x04 |

* Refer to Appendix.

** Parameter number is fixed to 0x03E8 (1000) for accessing to VF-MB1/S15/AS3 parameter.

9.3.2. Read Response data table (positive)

| Field | Description | Value |
|--------------------------|------------------------------|----------------|
| Header DU0 | Function number | 0x5E |
| Header DU1 | Slot number (0) | 0x00 |
| Header DU2 | Index (47) | 0x2F |
| Header DU3 | Length | 0x08 |
| 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 * | 0x42 |
| 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 Appendix.

** Value 0x31EC is "12780" in decimal. This means "127.80 (%)".

9.4. Example 4. Change the VF-MB1/S15/AS3 parameter

When access to VF-MB1/S15/AS3 parameter, set "1000" to the PNU.

* This procedure changes the value of VF-MB1/S15/AS3 EEPROM.

9.4.1. Write Request data table (Change, set 7 to VF-MB1/S15/AS3 parameter $F\ 130$)

| Field | Description | Value |
|----------------------------|--|-------------|
| Header DU0 | Function number | 0x5F |
| Header DU1 | Slot number (0) | 0x00 |
| Header DU2 | Index (47) | 0x2F |
| Header DU3 | Length | 0x0E |
| 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, High byte ** | 0x03 |
| Parameter Address (Byte 4) | Parameter number, Low byte ** | 0xE8 |
| Parameter Address (Byte 5) | VF-MB1/S15/AS3 Parameter number, High byte | 0x01 |
| Parameter Address (Byte 6) | VF-MB1/S15/AS3 Parameter number, Low byte | 0x30 |
| Parameter Value (Byte 1) | Format * | 0x42 |
| 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 Appendix.

** Parameter number is fixed to 0x03E8 (1000) for accessing to VF-MB1/S15/AS3 parameter.

9.4.2. Read Response data table (positive)

| Field | Description | Value |
|-------------------------|------------------------------|-------------|
| Header DU0 | Function number | 0x5E |
| Header DU1 | Slot number (0) | 0x00 |
| Header DU2 | Index (47) | 0x2F |
| Header DU3 | Length | 0x04 |
| 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 Appendix.

9.4.3. Read Response data table (negative, at set 256 to $F\ 130$)

| Field | Description | Value |
|--------------------------|------------------------------|-------------|
| Header DU0 | Function number | 0x5E |
| Header DU1 | Slot number (0) | 0x00 |
| Header DU2 | Index (47) | 0x2F |
| Header DU3 | Length | 0x08 |
| 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 Appendix.

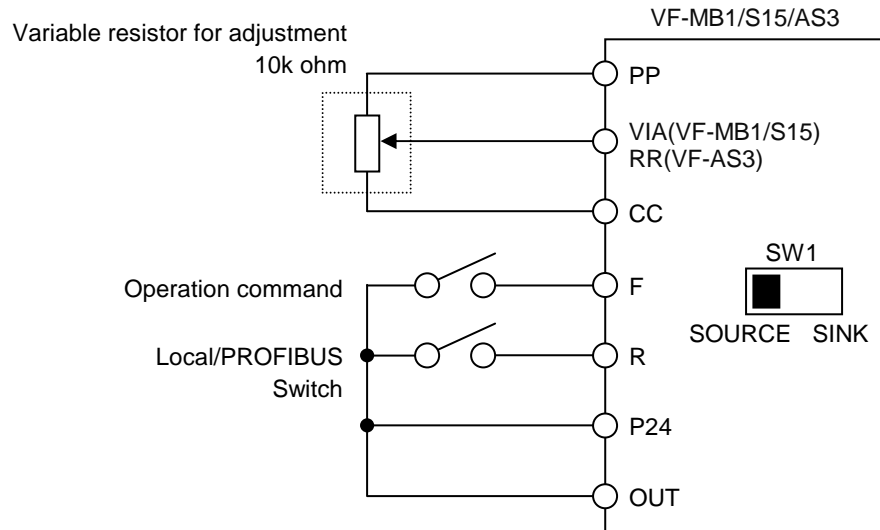
10. PROFIBUS Local/Remote Operation

The example below shows how to configure the VF-MB1/S15/AS3 for local/remote operation.

<Terminal function>

F terminal RUN command
 R terminal Local (Terminal in this example) / PROFIBUS switching
 VIA(VF-MB1/S15) / RR(VF-AS3) terminal Operation frequency command

<Wiring>



<Parameter setting>

$\overline{C} \overline{M} \overline{D}$ (command mode selection) = 0 (terminal board)
 $\overline{F} \overline{M} \overline{D}$ (frequency setting mode selection 1) = 1 (VIA(VF-MB1/S15) / RR(VF-AS3))
 $\overline{F} \overline{I} \overline{Z}$ (input terminal selection 2 (R)) = 48 (Local/PROFIBUS control)

<Operation>

R-CC terminal open:

VF-MB1/S15/AS3 is controlled as slave device of PROFIBUS.

R-CC terminal closed:

F-CC terminal short to RUN

F-CC terminal open to STOP

Output frequency is set up by the VIA VF-MB1/S15) / RR(VF-AS3)) signal input.

11. GSD file

As for acquisition of a GSD file for VF-MB1, VF-S15 and VF-AS3, please contact your Toshiba distributor.

12. Appendix

Function number

0x5E: Read Request

0x5F: Write Request

0x5E: Positive response for Read request

0x5F: Positive response for Write request

0xDE: Negative response for Read request

0xDF: Negative response for Write request

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

0x00: (Fixed for PDP003Z)

Error number

0x00: Impermissible parameter number

0x01: Impermissible parameter number

0x02: Low or High limit exceeded

0x03: Faulty subindex

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

01: Boolean

02: Integer 8

03: Integer 16

04: Integer 32

05: Unsigned 8

06: Unsigned 16

07: Unsigned 32

08: FloatingPoint

09: VisibleString

10: OctetString

12 TimeOfDay (with date indication)

13: TimeDifference

40: Zero

41: Byte

42: Word

43: Double word

44: Error