PD-01 USER MANUAL

PROFIBUS-DP Module for VFD Series Drives

Table of Contents

Preface

Thanks for using DELTA PD-01 PROFIBUS-DP Module. Please read this manual carefully prior to use the PD-01 to ensure its operation properly. Please keep this manual in handy place for quick reference.

📖 Getting Start

This manual is intended be used as an instruction manual and a reference guide. Detailed description of PROFIBUS and DP protocol will not be covered here. If you are interested in understanding and learning more about the PROFIBUS and DP protocol, we recommend you study the related comprehensive literatures.

The content in this manual is based upon the most updated hardware and software information that are published recently. Therefore, please understand no guarantee will be given that no any discrepancy in this manual. Moreover, We reserve the right to modify this manual without any written notice, or any obligation to notify the end users for revision changes.

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⚠ WARNING

⚠ **Failure to read, fully understand and implement the instructions contained in this manual may result in damage the equipment, the drive or a possible of plant personnel injury.**

⚠ **This equipment operates under higher voltages, to control of a running machine. Only suitable qualified personnel familiar with the operation and construction of the equipment are allowed for equipment operation, to prevent any damage or hazard of this equipment.**

⚠ **A successful and safe operation of this equipment depends upon the proper handling, storage, installation, operation and maintenance.**

  Receiving and Inspection

All Delta PD-01 have gone through rigorous quality control tests at the factory prior to the shipment. Upon the receive of PD-01, please check that the package includes:

◆ 1pcs PD-01,

◆ 1pcs 8cm disc (mini size compact disc),

◆ 1pcs communication cable (for RJ11, 6 pins),

◆ 1 instruction sheet

  Using this Manual

◆ This is the User Manual for PD-01.

◆ *Chapter 1* describes the overview of PD-01

◆ *Chapter 2* briefly describes the introduction to PROFIBUS and PROFIBUS-DP

◆ *Chapter 3* introduces how to install and remove the PD-01

◆ *Chapter 4* describes the communication with PROFIBUS-DP system

◆ *Chapter 5* introduces GSD file and parameter settings in GSD file of PD-01

◆ *Chapter 6* provides LEDs information, and corrective actions for problem solving.

◆ *Chapter 7* provides the dimensions of the PD-01

◆ Firmware version should conform with VFD Drives as table below:

Delta AC Drive	Firmware Version
VFD-B	Version 4.00 and above
VFD-M	Version 3.00and above
VFD-F	Version 1.09 and above
VFD-L 115V/200~400W 230V/200W~2HP	All Version
VFD-S	All Version

Chapter 1 Overview

PD-01, defined as a communication module for PROFIBUS-DP, is used to link VFD series Drives and PROFIBUS-DP system.
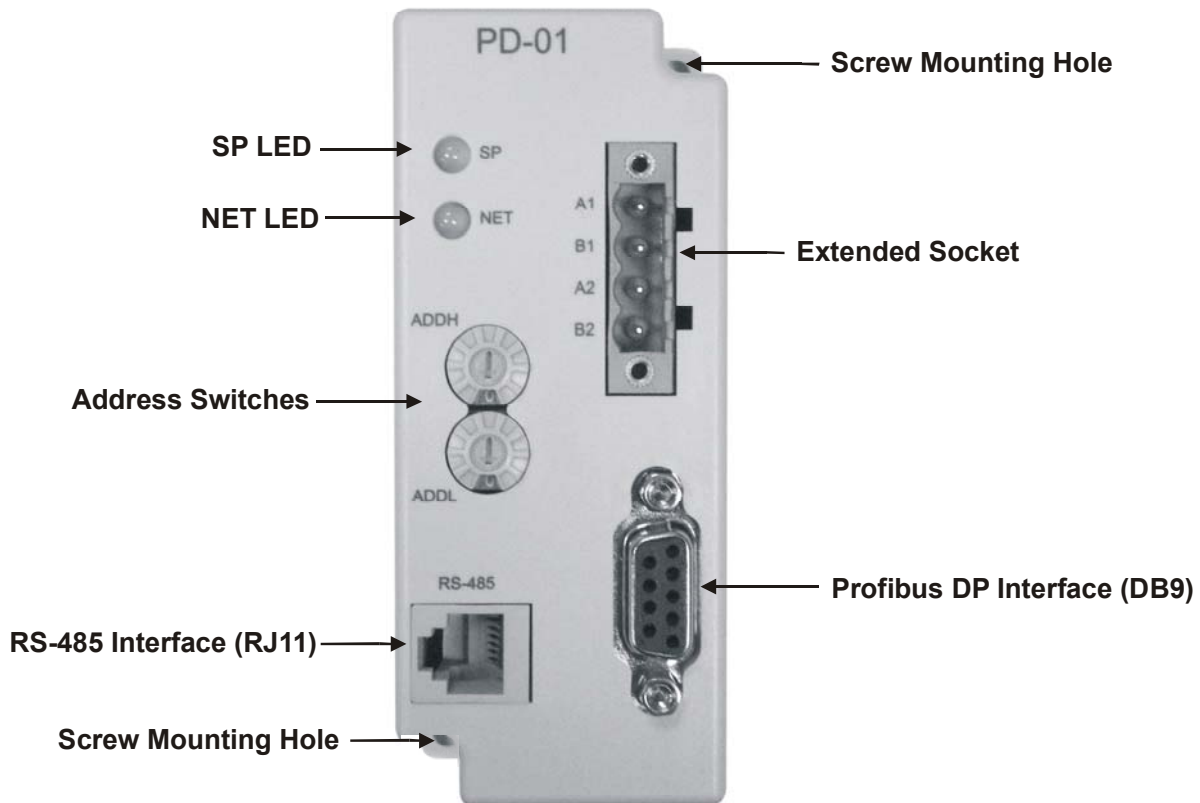
SP LED: Indicating the connection status between Drives and PD-01
NET LED: Indicating the connection status between PD-01 and PROFIBUS-DP
Address Switches: Setting the address of PD-01 on PROFIBUS-DP network
RS-485 Interface (RJ11): Connecting to VFD Drives, and supply power to PD-01
PROFIBUS-DP Interface (DB9): 9-PIN connector that connects PD-01 to PROFIBUS-DP network
Extended Socket: 4-PIN socket that connects PD-01 to PROFIBUS-DP network
Screw Mounting Hole: Used to mount PD-01

Technical information

◆ Two LEDs on PD-01 used to display the connection status of PD-01:
SP LED: indicating the connection status between PD-01 and VFD series Drives
NET LED: indicating the connection status between PD-01 and PROFIBUS-DP
➢ For more information of LEDs display, refer to *Chapter 6. Troubleshooting*.

◆ The address in PROFIBUS-DP can be set via two rotary address switches, ADDH and ADDL, on PD-01:
ADDH used as a high 4 bits of address, ADDL used as a low 4 bits of address.
➢ For more information of address switches, refer to *Chapter 4. Communication*.

◆ A specific 6-PIN communication cable for RJ11, is used to connect the PD-01 to VFD series Drives via RS-485 interface. VFD series Drives supply the 15V DC power to PD-01 through this cable.

◆ PROFIBUS-DP interface (DB9) uses a standard PROFIBUS-DP system interface. We recommend users use the standard connector to connect PD-01 to PROFIBUS-DP system. Besides, the PD-01 also provides a 4-PIN extended socket for users to connect it to PROFIBUS-DP system based upon the requirements. However, please pay attention to the assignment of A1, B1, and A2, B2 on the 4-PIN extended socket.

◆ PD-01 supports baud rates of 9.6kbaud to 12Mbaud.

Functionality

◆ Cyclical process data exchange (PZD).

◆ Parameter accessing: cyclical accessing of parameters (PKW).

◆ PROFIBUS supports the control commands SYNC and FREEZE for data synchronization between master and slaves.

◆ Support the configuration of data structure for data exchange with VFD series Drives.

Chapter 2 Introduction

PROFIBUS

PROFIBUS is an international, vendor- independent, opening filed bus standard for a wide range of applications in the fields of manufacturing, production, process and building automation, and other automation control field.

The PROFIBUS family comprises three types of protocol, PROFIBUS-DP, PROFIBUS-PA and PROFIBUS-FMS, each of them is used for different tasks:

◆ PROFIBUS-DP (Decentralized Periphery): PROFIBUS-DP is a rapid and low cost communication connection designed for high-speed data transmission at field level. PROFIBUS-DP has widespread usage for such items as remote I/O systems, motor control centers, and variable speed drives. It is designed and optimized especially for communication between automation systems and decentralized peripheral devices.

◆ PROFIBUS-PA (Process Automation): PROFIBUS-PA is the PROFIBUS solution for process automation, typically with MBP-IS transmission technology. Based upon PROFIBUS-DP, PROFIBUS-PA is an extension of the PROFIBUS-DP protocol for data transmission. It is designed to support intrinsically safe applications and can be used within hazardous areas, with high explosion risk using intrinsic safe MBP-IS interface. PROFIBUS-PA is used to connect sensor and controller to the bus.

◆ PROFIBUS-FMS (Fieldbus Message Specification): PROFIBUS-FMS is multiple master communications designed for communication at the cell level. It is designed for acyclic or cyclic data transfers at medium speed between control equipment and cell-level controllers. FMS services open up a wide range of applications and offer a wide range of functionality and flexibility.

The Maximum cable length in a segment depends on the transmission speed. PROFIBUS-DP communicates at speeds from 9.6 Kbps to 12 Mbps over distances from 100 to 1,200 meters.

Baud Rate (bps)	9.6K	19.2K	93.75K	187.5K	500K	1.5M	12M
Length (m)	1200	1200	1200	1000	400	200	100

PROFIBUS-DP

PROFIBUS-DP is a PROFIBUS communication profile optimized for high-speed, time-critical data transmission at field level using low-cost connections. PROFIBUS-DP is a suitable substitute for conventional, costly parallel wiring of 24 V measurement signals in production and manufacturing automation, as well as for analog 4(0) to 20mA measurement signals in process automation.

Chapter 3 Installation

IMPORTANT NOTE:

Prior to the installation or remove the PD-01 from network, make sure the power of VFD series Drives is switched off (not-energized).

Installing the PD-01

Improper installation of the PD-01 will cost its life usage. Please follow the instructions to install your PD-01 carefully.

◆ DIN Rail Installation

PD-01 can be secured by mounting to DIN rail. There is a small retaining clip locates at the bottom of PD-01, place the PD-01 onto the DIN rail and gently push up on the clip to ensure the PD-01 is mounted to the DIN rail.

◆ Direct Mounting

Please use the specified M4 screws to install the PD-01. Also please ensure to tighten them properly.
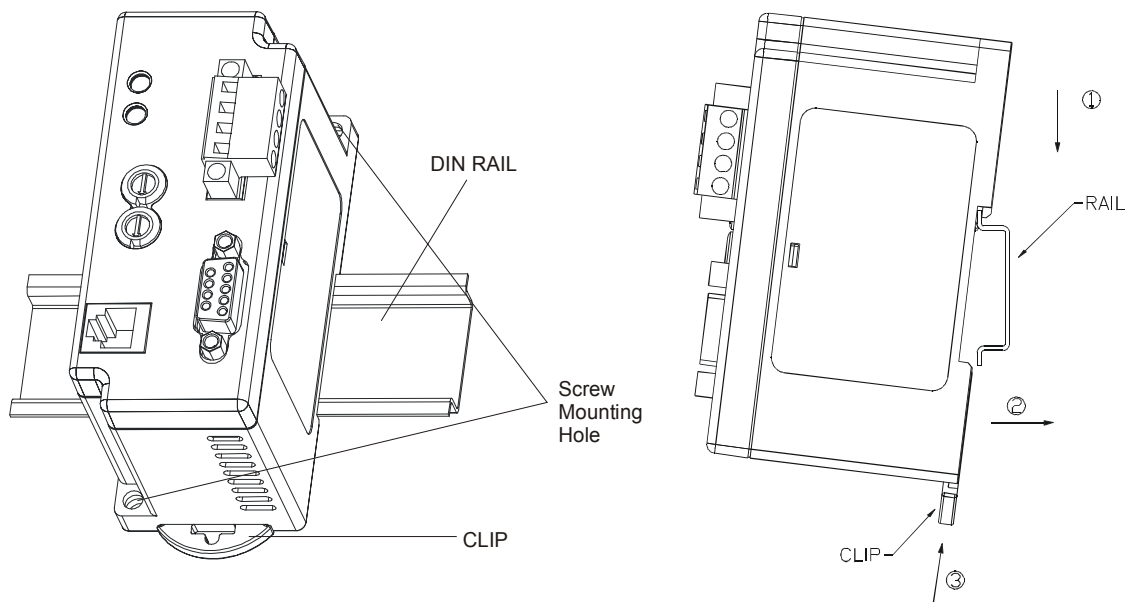
◆ Insert the connector into the PROFIBUS-DP Interface (DB9), and tighten screws to secure the connector in place.
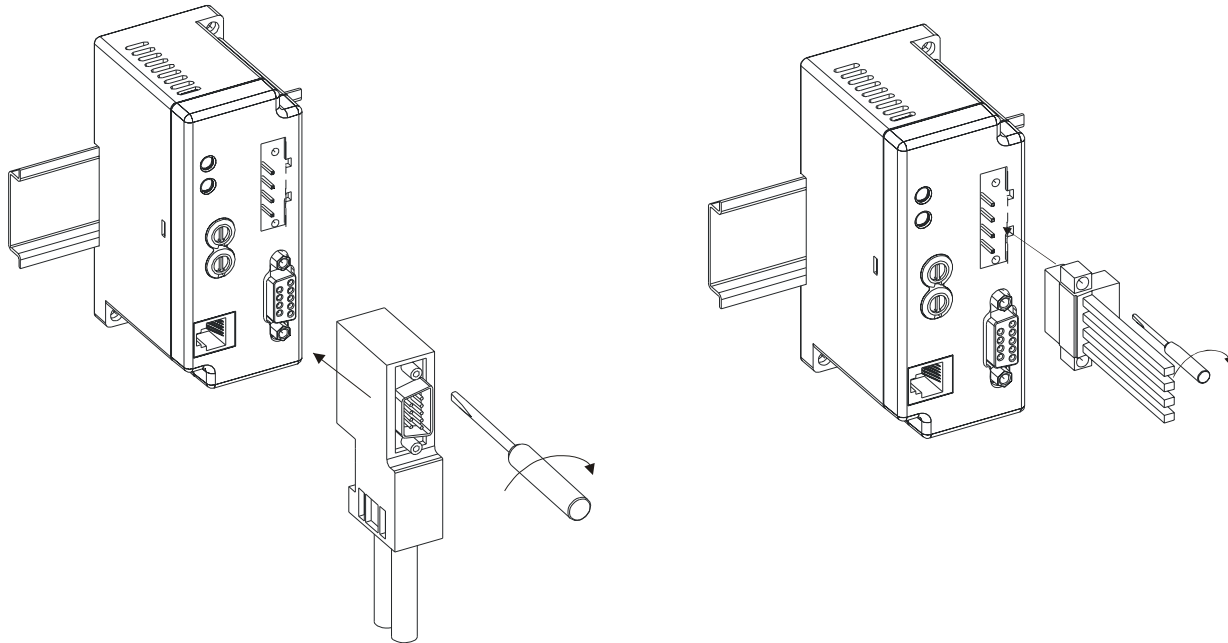
◆ Power Supply

The power of PD-01 is supplied from VFD series Drive. **Firmware version should conform the VFD series Drives as table listed in the page 2**. No external power needed. The +15VDC power is applied to PD-01 directly via a specific 6-PIN communication cable (This 6-PIN cable is packed together with PD-01).

NOTE:

Though the PD-01 power is supplied from VFD series Drives, it will energized till power to VFD series Drives is applied

RJ11

1 → 6

1: +15V   2: GND
3: SG-   4: SG+
5: not used 6: not used

+15V
GND
SG-
SG+
Not used
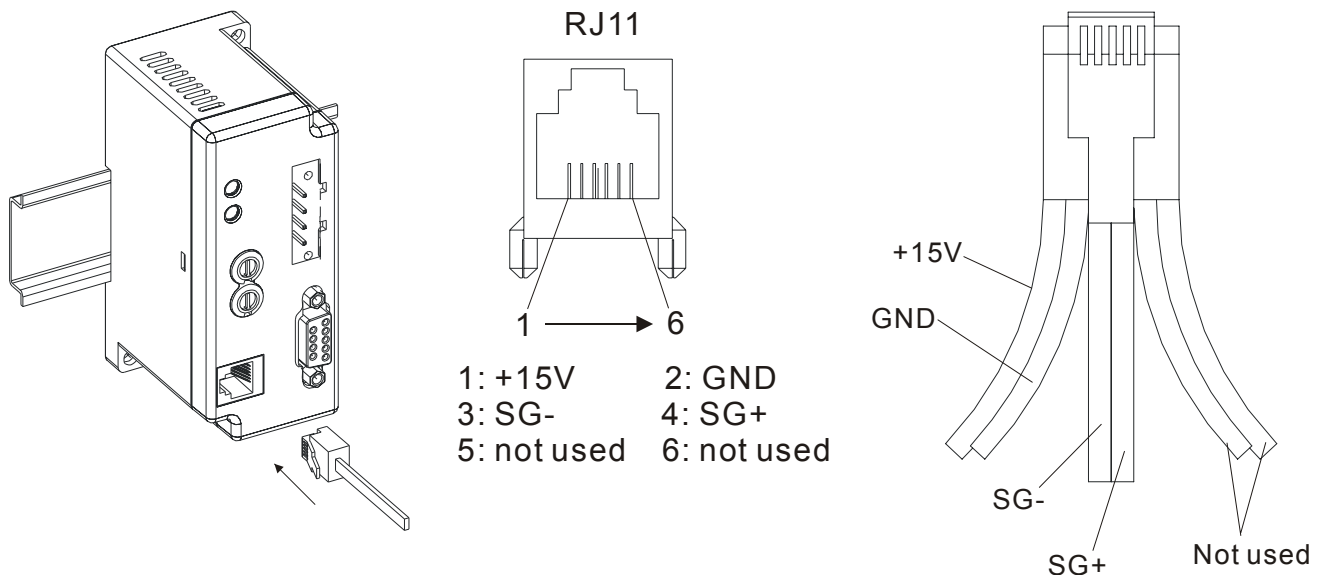
If the connection of PD-01 to VFD drives does not conform the table listed in page 2, users need to provide external 15VDC supply the power to PD-01 (not through the communication cable). Refer to the pin assignment of RJ11, it is allowed to supply power to PD-01 via RJ11.

◆ PD-01 is energized while the power is applied to the VFD series Drives, then the SP LED will be steady green.

Removing the PD-01

To remove the PD-01, users shall:

◆ Remove the connection cable between PD-01 and VFD series Drives.

◆ Loose the PD-01 screws and remove DP connector from PD-01.

◆ Pull down on the retaining clip and pull out the PD-01 from DIN rail gently.

Pin assignment of PROFIBUS-DP interface (DB9)

Use PROFIBUS-DP interface (DB9) of PD-01 connecting PD-01 to PROFIBUS DP system. The terminals are short-circuit-proof and isolated.
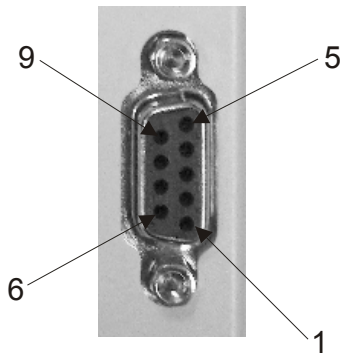
Pin	Designation	Meaning
1	-	Not assigned
2	-	Not assigned
3	Rxd/TxD-P	Receive/send data P (B)
4	-	Not assigned
5	DGND	Data reference potential (C)
6	VP	Supply voltage positive
7	-	Not assigned
8	RxD/TxD-N	Receive/send data N (A)
9	-	Not assigned

Terminator

Bus terminator is important when connects PD-01 to PROFIBUS-DP system. This terminator can be switched in and out via switches when the recommended bus connectors have been used.

If extended 4-PIN socket for the connection is used, user may use the internal terminator provided by PD-01 via setting the switch. If the switch is turned to "S" (Short), the internal terminator is disabled, then A1 and A2, B1 and B2 are all normally close. If the switch is turned to "R" (Resistor), the internal terminator between A1 and B1 is enabled, but A2 and B2 are disconnected from bus.
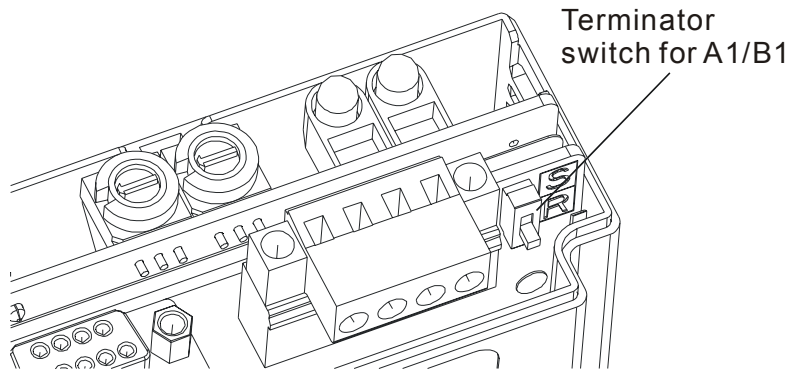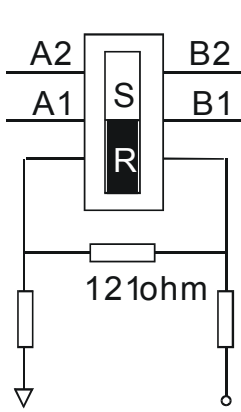
When user uses the extend socket, the bus topology is as follows:

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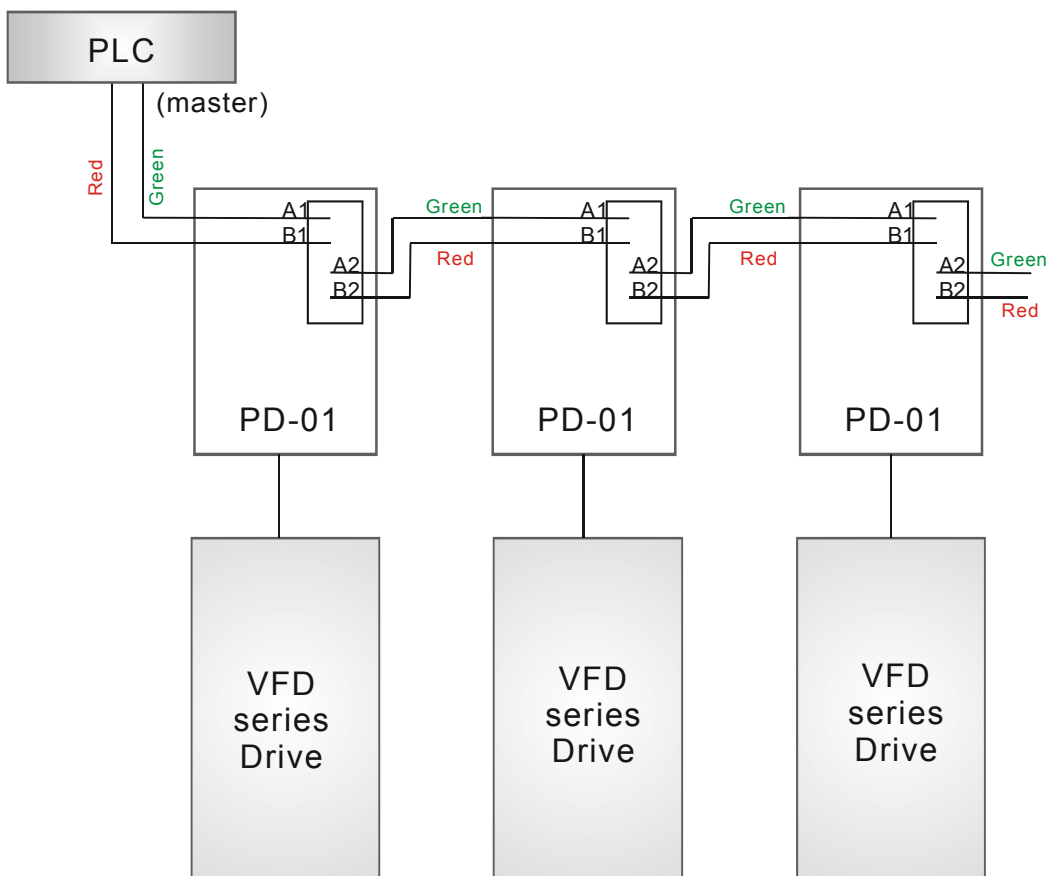
Chapter 4 Communication

NOTE:

Before reading this chapter, make sure you read chapter 3 and understand the installation of PD-01.

PROFIBUS address

PD-01 has two rotary switches to set the PROFIBUS address, the only way for user to set the address.

The address switches, ADDH and ADDL, allow user to set the address in a HEX format. ADDH is used to set high 4 bits of address, and ADDL is used to set low 4 bits of address. If both ADDH and ADDL are set to F, and PD-01 is power ON or re-power ON, then PD-01 will enter the TEST mode, the SP LED and NET LED will be in steady orange.

Address	Meaning
1..0x7D	Valid PROFIBUS address
0 or 0x7E..0xFE	Invalid PROFIBUS address
0xFF	Enter TEST mode

NOTE:

Setting changes via address switches will not effective when PD-01 is operating. This means the setting changes will effective after PD-01 power re-boot. Please understand this cold restart must be initiated by toggling the power to OFF and then ON.

Parameters setting in VFD series Drives

PD-01 is designed to communicate with VFD series Drives via MODBUS communication port. Prior to the connection, users have to set parameters below in VFD series Drives:

◆ Set the communication protocol of VFD series Drives to RTU 8, N, 2.

◆ Set the baud rate of VFD series Drives to 9600bps.

◆ Set the frequency source for VFD series Drives to operate via RS485.

◆ Set the operation source of VFD series Drives via MODBUS communication.

Refer to the following table for the above settings when connecting to VFD series Drives:

	VFD-M type	VFD-B / VFD-S type	VFD-F type	VFD-L type 115V/200~400W 230V/200W~2HP
Baud Rate 9600	P89=01	P09-01=1	P09-01=1	P09-01=1
RTU 8,N,2	P92=03	P09-04=3	P09-04=6	P09-04=2, P09-05=0
Freq. Source	P00=04	P02-00=4	P02-00=4	P02-00=4
Command Source	P01=03	P02-01=3	P02-01=3	P02-01=3

After these settings completed, connecting PD-01 and VFD series Drives via communication cable mentioned earlier, PD-01 is then energized. Two LED will be firstly in orange because PD-01 is initialized and test itself. SP LED will be then in steady green since that the connection is established between PD-01 and VFD series Drives.

Cyclical data of PD-01 via PROFIBUS-DP

PD-01 is controlled via cyclical PROFIBUS-DP channel. This channel can be used to access the parameters of VFD series Drives.

Useful data structure as defined in PROFIDrive Profile 2.0

The structure of useful data for the cyclical channel is defined in the PROFIDrive Profile, version 2.0. Please refer to the Parameter Process data Object (PPO).

PKW				PZD									
PKE	IND	PWE		PZD1 STW ZSW	PZD2 HSW HIW	PZD3	PZD4	PZD5	PZD6	PZD7	PZD8	PZD9	PZD10
1st word	2nd word	3rd word	4th word	1st word	2nd word	3rd word	4th word	5th word	6th word	7th word	8th word	9th word	10th word
PPO1													
PPO2													
				PPO3									
				PPO4									
PPO5													

PKW: Parameter ID/value   **STW**: Control word
PZD: Process data   **ZSW**: Status word
PKE: Parameter ID   **HSW**: Main setpoint
IND: Sub-index   **HIW**: Main actual value
PWE: Parameter value

NOTE:

PD-01 supports PPO1 and PPO3 structure only.

Extended configuration

In addition to the PPO types, cyclical data can also be configured to EXT CONF 1 or EXT CONF 2 (see table below). These two extended configuration both have four process data words. The areas of consistency can be set flexibly.

PKW				PZD									
PKE	IND	PWE		PZD1 STW ZSW	PZD2 HSW HIW	PZD3	PZD4	PZD5	PZD6	PZD7	PZD8	PZD9	PZD10
1st word	2nd word	3rd word	4th word	1st word	2nd word	3rd word	4th word	5th word	6th word	7th word	8th word	9th word	10th word
EXT CONF 1													
				EXT CONF 2									

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Default settings of PZD structure

PD-01 must receive the user parameters from master that configured via GSD file. The default settings of PZD structure are as follows:

STW1: Control Word, mapping to MODBUS address 0x2000 of VFD series Drives.

HSW: Main set point, mapping to MODBUS address 0x2001 of VFD series Drives.

ZSW: Drives status, mapping to MODBUS address 0x2101 of VFD series Drives.

HIW: Main command frequency, mapping to MODBUS address 0x2102 of VFD series Drives.

DP master -> VFD series Drives:

PZD3: No default assignment

PZD4: No default assignment

VFD series Drives-> DP master:

PZD3: Output frequency, mapping to MODBUS address 0x2103 of VFD series Drives.

PZD4: Output current, mapping to MODBUS address 0x2104 of VFD series Drives.

Control and Status words

PD-01 supports the PPO1 and PPO3 data structure. However, it does not support the bit assignments of control and status words in PROFIDRV. It only supports the DELTA VFD series Drives control and status words.

Control word (data from DP to VFD series Drives)

b1-b0	00: No function
	01: Stop
	10: Run
	11: JOG+Run
b3-b2	Not used
b5-b4	00: No function
	01: FWD
	10: REV
	11: Change direction
b7-b6	00: 1st Accel / Decel time
	01: 2nd Accel / Decel time
	10: 3rd Accel / Decel time
	11: 4th Accel / Decel time
b11-b8	0000: Main speed
	0001: 1st speed
	0010: 2nd speed
	0011: 3rd speed
	0100: 4th speed

b11-b8	0101: 5th speed
	0110: 6th speed
	0111: 7th speed
	1000: 8th speed
	1001: 9th speed
	1010: 10th speed
	1011: 11th speed
	1100: 12th speed
	1101: 13th speed
	1110: 14th speed
	1111: 15th speed
b12	1: Enable b11-b6
b14-b13	00: No function
	01:Operation command controlled by PU
	10:Operation command by Pr. setting
	11:Switch between PU and Pr. setting
b15	Not used

NOTE:

Table above is for reference only, please check VFD series Drives user manual for details. The control word that is mapping to the address of VFD series Drives can be carried out by PD-01, so the bit assignments in the user manual of VFD series Drives is valid.

Status word (data from VFD series Drives to DP)

b1-b0	00: RUN LED light off, STOP LED light up (Drive Stop)
	01: RUN LED blink, STOP LED light up (Drive Decelerate during the drive stopping)
	10: RUN LED light up, STOP LED blink (Drive standby)
	11: RUN LED light up, STOP LED light off (Drive Run)
b2	1: JOG is active
b4-b3	00: REV LED light off, FWD LED light up (Forward)
	01: REV LED blink, FWD LED light up (Reverse to Forward)
	10: REV LED light up, FWD LED blink (Forward to Reverse)
	11: REV LED light up, FWD LED light off (Reverse)
b5	1: Reserved parameters opened
b6	Reserved
b7	Reserved
b8	1: Main frequency controlled by communication
b9	1: Main frequency controlled by external terminal (EXT)
b10	1: Operation command controlled by communication (PU)
b11	1: Parameters have been locked
b12	Copy command enable
b15-b13	Reserved

NOTE:

Table above is for reference only, please check VFD series Drives user manual for details. PD-01 will get the status word from VFD series Drives, so the bit assignments in the user manual of VFD series Drives is valid.

Accessing parameters via PKW area

In cyclical data, PD-01 can provide request and response (read / write) message to access the parameters of VFD series Drives. Due to the request and response mechanism, the master must send the request until it receives a corresponding response.

PKW have at least 4 words:

Word 1	Parameter ID (PKE)			
	15 12 AK	11 SPM	10 Parameter number (PNU)	0
Word 2	Parameter sub-index (IND)			
	15 8	7		0
Word 3	PWE1 reserved in PD-01			
Word 4	PWE2 parameter value of read/write			

PKE

Bits 0 to 10 (PNU) contain the number of the relevant parameter.

Bit 11 is reserved.

Bits 12 to 15 (AK) contain the request or the response identifier.

Request identifier (master → PD-01)

Request Identifier	Meaning
0	No request
1	Request parameter value
2	Modify parameter value (word)

Response identifier (PD-01 → master)

Response Identifier	Meaning
0	No response
1	Transfer parameter value (word)
7	Cannot process request (with error number)

Fault numbers for "Cannot process request" response

NO.	Meaning	
0	Illegal Parameter number	Parameter does not exist
1	Parameter value cannot be modified	Parameter is a read-only parameter or can not change in current state
2	Minimum/maximum not reached / exceeded	
18	Other error	

IND

Structure of IND for cyclical communication via PPOs

PKE		IND		PWE1		PWE2	
HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW

15	14	13	12	11-8	7				0
Para Page selection				Not used					
2^0	2^3	2^2	2^1		0				
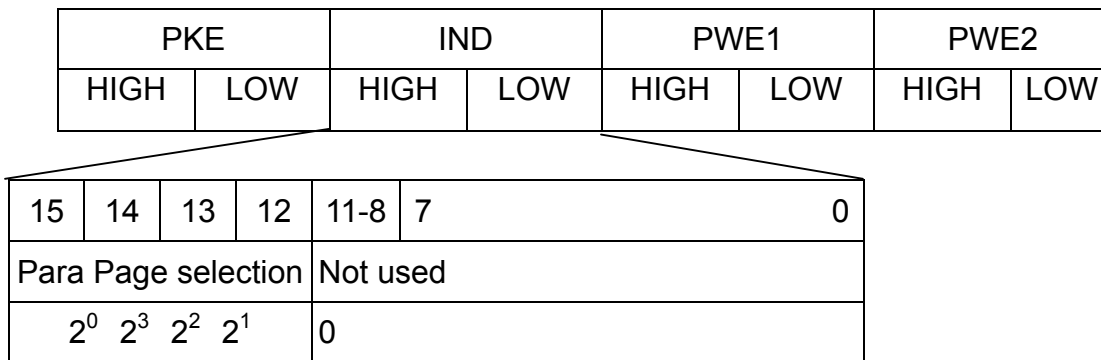
Function of Parameter Page Selection

Basic PNU (B.PNU bit 10-0 of PKE)	Page selection (P.PNU)	Total PNU (B.PNU+P.PNU*2000)
0…1999	0	0…1999
0…1999	1	2000…3999
0…1999	2	4000…4999
…	…	…
0…1999	15	30000…31999

NOTE:

In IND, Bit 15 uses a multiplier of 2^0, so the value of Bit 15 for the access P2000-P3999 must be set to 1.

Parameter value (PWE) 3rd and 4th word

All parameters in VFD series Drives are 16-bit. A 16-bit parameter value is transferred in PWE2 (4th word). PWE1 (3rd word) must be set to 0 on the PROFIBUS-DP master in this case.

Examples for PKW mechanism

Example 1: Read data of parameter P0003

To read value of P0003, set the request ID to 1 (request parameter value - word). Because P0003 is less than 2000, the Para Page Select is 0, thus, the data sequence are as follows:

Master → PD-01 : 1003 0000 0000 0000   request value of P0003

PD-01 → Master : 1003 0000 0000 1770

Request	
Word 1 (PKE)	1003
Word 2 (IND)	0000
Word 3 (PWE1)	0000
Word 4 (PWE2)	0000

Response	
Word 1 (PKE)	1003
Word 2 (IND)	0000
Word 3 (PWE1)	0000
Word 4 (PWE2)	1770

PD-01 responds the value of P0003. All parameters in VFD series Drives are 16-bit value, so the value is transferred in PWE2 (4th word). The value of P0003 is 0x1770 (6000 decimal), in VFD-M series Drives, it is "Maximum Output Frequency".

Example 2: Read command frequency in VFD series Drives (0x2102)

To read value of command frequency, set the request ID to1, we should set the Para Page Select because the parameter address is greater than 2000. The address 0x2102 is 8450 in decimal, if set Page Select to 4, then the Basic PNU is 8450 – 4*2000 = 450 (0x1c2), thus, the data sequence are as follows:

Master → PD-01 : 11C2 2000 0000 0000   request value of address 0x2102

PD-01 → Master : 11C2 2000 0000 0868

Request	
Word 1 (PKE)	11C2
Word 2 (IND)	2000
Word 3 (PWE1)	0000
Word 4 (PWE2)	0000

Response	
Word 1 (PKE)	11C2
Word 2 (IND)	2000
Word 3 (PWE1)	0000
Word 4 (PWE2)	0868

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Example 3: Write data 2 to parameter P0804

To write data to P0804, request ID is set to 2 (Modify parameter value - word), Para Page Select should be set because the parameter address is greater than 2000. The address of P0804 is 0x0804, which is 2052 in decimal, if set Page Select to 1 (bit 15 of IND is 1), then the Basic PNU is 2052 – 1*2000 = 052 (0x34), thus, the data sequence are as follows:

Master → PD-01 : 2034800000000002   write data to P0804

PD-01 → Master : 1034800000000002

Request	
Word 1 (PKE)	2034
Word 2 (IND)	8000
Word 3 (PWE1)	0000
Word 4 (PWE2)	0002

Response	
Word 1 (PKE)	1034
Word 2 (IND)	8000
Word 3 (PWE1)	0000
Word 4 (PWE2)	0002

All parameters values in VFD series Drives are 16-bit, so the data may be transferred in PWE2 (4th word).

NOTE:

VFD series Drives will write the data to EEPROM. When using PKW to change the value of parameter, the data will be written to EEPROM directly. **However, if this action is too often, the EEPROM will have no capability of directly saving data.** So please pay close attention on it.

Example 4: Read diagnostic data

User can use the special address to read the current diagnostic data. Please refer to Section 6.2 for details. The diagnostic address starts from 0x7500 to 0x7504 (5 words). To read diagnostic data in these addresses, request ID is set to 1, Para Page Select should be set because the parameter address is greater than 2000. The address 0x7500, which is 29952 in decimal, if set Page Select to 14, then the Basic PNU is 29952-14*2000=1952(0x7A0), thus, the data sequence are as follows:

Master - > PD-01 : 17A0700000000000   read data from 0x7500

PD-01 - > Master : 17A0700000000300

Request			Response		
Word 1 (PKE)	17A0		Word 1 (PKE)	17A0	
Word 2 (IND)	7000		Word 2 (IND)	7000	
Word 3 (PWE1)	0000		Word 3 (PWE1)	0000	
Word 4 (PWE2)	0000		Word 4 (PWE2)	0300	

If PD-01 returns the data 0x0300, it indicates that Scan port is disconnected. Please refer to Section 6.2 for details.

Example 5: Access error

If take any action using PKW to access parameter in AC Drives and it fails, PD-01 will response error information. Suppose that Master send data sequence is 202D 8000 0000 0002, if VFD series Drives does not find this address (0x07FD), it will respond the data sequence 702D 8000 0000 0000, response ID is 7 which means cannot process request (with error number), and error number is 0 (Illegal Parameter Number).

Request			Response		
Word 1 (PKE)	202D		Word 1 (PKE)	702D	
Word 2 (IND)	8000		Word 2 (IND)	8000	
Word 3 (PWE1)	0000		Word 3 (PWE1)	0000	
Word 4 (PWE2)	0002		Word 4 (PWE2)	0000	

Response time about PD-01

The update time via PROFIBUS connection can be divided in 3 parts:

◆ T1: Communication time in transmit data from the master to PD-01, and

◆ T2: Wait processing in data buffer of PD-01, and

◆ T3: Communication time in transmit data from PD-01 to VFD Drives.
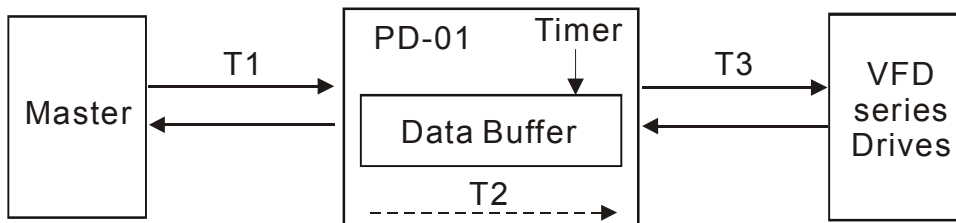
T1 depends on the actual transmission speed and the type of master in use.

T2 depends on the internal timer of PD-01. Data is transmitted to VFD series Drives per 70ms triggered by a timer. User cannot change the time-out interval.

T3 depends on the Modbus communication between PD-01 and VFD series Drives.

So the update time is,

Max update time = T1 + T2 (70ms) + T3

In fact, the actual update time is less than the Max update time. If the timer time-out when the data arrive PD-01, PD-01 will save the data to data buffer, and transmit the data to VFD series Drives immediately.

Chapter 5 User Parameters Setting in GSD file

GSD file

A GSD file is a text file used to identify PROFIBUS-DP device (Master or Slave), which contains the necessary data for the configuration of DP slaves within a standard DP master. Typical information in a GSD file are Vendor information, Baud rates supported, Timing information, Options/features supported and Available I/O signals. The GSD file is the fundamental building block for the master parameter record.

GSD-File for Delta VFD series Drives
File: DELT08DB.GSD
File start: ==

#Profibus_DP

; Unit-Definition-List:

GSD_Revision   = 1
Vendor_Name   = "Delta Electronics"
Model_Name   = "VFD DRIVES"
Revision   = "Rev. 1"
Ident_Number   = 0x08DB
Protocol_Ident   = 0
Station_Type   = 0
FMS_supp   = 0
Hardware_Release   = "V1.0"
Software_Release   = "V1.0"
Redundancy   = 0
Repeater_Ctrl_Sig   = 2
24V_Pins   = 0
Implementation_Type   = "SPC3"
Bitmap_Device   = "VFDDRV"
Bitmap_Diag   = "VFDDRV"
Bitmap_SF   = "VFDDRV"
Slave_Family   = 1@TdF@Delta VFD Drives

Auto_Baud_supp   = 1

9.6_supp	= 1
19.2_supp	= 1
93.75_supp	= 1
187.5_supp	= 1
500_supp	= 1
1.5M_supp	= 1
3M_supp	= 1
6M_supp	= 1
12M_supp	= 1
MaxTsdr_9.6	= 60
MaxTsdr_19.2	= 60
MaxTsdr_93.75	= 60
MaxTsdr_187.5	= 60
MaxTsdr_500	= 100
MaxTsdr_1.5M	= 150
MaxTsdr_3M	= 250
MaxTsdr_6M	= 450
MaxTsdr_12M	= 800
Freeze_Mode_supp	= 1
Sync_Mode_supp	= 1
Set_Slave_Add_supp	= 0
Min_Slave_Intervall	= 1
Modular_Station	= 1
Max_Module	= 1
Max_Input_Len	= 32
Max_Output_Len	= 32
Max_Data_Len	= 64
Modul_Offset	= 0
Fail_Safe	= 0
Max_Diag_Data_Len	= 16
ORDERNUMBER	= "PD-01"
Max_User_Prm_Data_Len	= 26
User_Prm_Data_Len	= 26
User_Prm_Data	= 0x20,0x00,\

```
                    0x20,0x01,\
                    0x00,0x00,\
                    0x00,0x00,\
                    0x21,0x01,\
                    0x21,0x02,\
                    0x21,0x03,\
                    0x21,0x04,\
                    0x00,0x01,\
                    0x00,0x02,\
                    0x00,0x02,\
                    0x00,0x01,\
                    0x00,0x00
```

Module = "4 PKW,   2 PZD   (PPO 1)   " 0xF3, 0xF1
EndModule
Module = "0 PKW,   2 PZD   (PPO 3)   " 0x00, 0xF1
EndModule
Module = "4 PKW,   4 PZD   " 0xF3, 0xF3
EndModule
Module = "0 PKW,   4 PZD   " 0x00, 0xF3
EndModule

PrmText = 1
Text(0) = "Address discontinuous"
Text(1) = "Address continue"
EndPrmText
PrmText = 2
Text(0) = "Ignore and Continue"
Text(1) = "Stop accord to Pr.STOP METHOD"
EndPrmText
PrmText = 3
Text(0) = "Stop DataExchange & Report Fault"
Text(1) = "Continue & Report Alarm"
Text(2) = "Ignore & Continue DataExchange"
EndPrmText

ExtUserPrmData = 1 "Data Input 1(PD-01 -> VFD)"

Unsigned16 0x2000 0-65535

EndExtUserPrmData

ExtUserPrmData = 2 "Data Input 2"

Unsigned16 0x2001 0-65535

EndExtUserPrmData

ExtUserPrmData = 3 "Data Input 3"

Unsigned16 0x0000 0-65535

EndExtUserPrmData

ExtUserPrmData = 4 "Data Input 4"

Unsigned16 0x0000 0-65535

EndExtUserPrmData

ExtUserPrmData = 5 "Data Output 1(VFD -> PD-01)"

Unsigned16 0x2101 0-65535

EndExtUserPrmData

ExtUserPrmData = 6 "Data Output 2"

Unsigned16 0x2102 0-65535

EndExtUserPrmData

ExtUserPrmData = 7 "Data Output 3"

Unsigned16 0x2103 0-65535

EndExtUserPrmData

ExtUserPrmData = 8 "Data Output 4"

Unsigned16 0x2104 0-65535

EndExtUserPrmData

ExtUserPrmData = 9 "d_state"

Unsigned16 1 0-1

Prm_Text_Ref = 1

EndExtUserPrmData

ExtUserPrmData = 10 "din_len"

Unsigned16 2 0-4

EndExtUserPrmData

ExtUserPrmData = 11 "dout_len"

Unsigned16 2 0-4

EndExtUserPrmData

ExtUserPrmData = 12 "LossDPComTreat"

Unsigned16 1 0-1

Prm_Text_Ref = 2

EndExtUserPrmData

ExtUserPrmData = 13 "LossSPComTreat"

Unsigned16 0 0-2

Prm_Text_Ref = 3

EndExtUserPrmData

Ext_User_Prm_Data_Ref(0) = 1

Ext_User_Prm_Data_Ref(2) = 2

Ext_User_Prm_Data_Ref(4) = 3

Ext_User_Prm_Data_Ref(6) = 4

Ext_User_Prm_Data_Ref(8) = 5

Ext_User_Prm_Data_Ref(10) = 6

Ext_User_Prm_Data_Ref(12) = 7

Ext_User_Prm_Data_Ref(14) = 8

Ext_User_Prm_Data_Ref(16) = 9

Ext_User_Prm_Data_Ref(18) = 10

Ext_User_Prm_Data_Ref(20) = 11

Ext_User_Prm_Data_Ref(22) = 12

Ext_User_Prm_Data_Ref(24) = 13

File END: ==

NOTE:

The required GSD file is available and can be downloaded from the DELTA web site http://www.delta.com.tw, or you can copy this text to a text editor such as NOTEPAD, and save it as a GSD file named "DELT08DB.GSD". Please make sure to specify the file name extension as ".GSD", **PLEASE DO NOT SAVE IT extension** ".GSD.TXT".

User parameters in GSD file

The user parameters in GSD file are used for the configuration of the PROFIBUS network. The description of the user parameters are shown in the following table:

Item	Name	Type	Description	Default
1	Data Input 1	UINT	This is a MODBUS address. The 1st word in PZD of cyclic output data will be sent to this address.	0x2000
2	Data Input 2	UINT	This is a MODBUS address. The 2nd word in PZD of cyclic output data will be sent to this address.	0x2001

Item	Name	Type	Description	Default
3	Data Input 3	UINT	This is a MODBUS address. The 3rd word in PZD of cyclic output data will be sent to this address if select Module = "4 PKW, 4 PZD".	0x0000
4	Data Input 4	UINT	This is a MODBUS address. The 4th word in PZD of cyclic output data will be sent to this address if select Module = "4 PKW, 4 PZD".	0x0000
5	Data Output 1	UINT	This is a MODBUS address. PD-01 will monitor this address, and copy the return data to the 1st word in PZD of cyclic input data.	0x2101
6	Data Output 2	UINT	This is a MODBUS address. PD-01 will monitor this address, and copy the return data to the 2nd word in PZD of cyclic input data.	0x2102
7	Data Output 3	UINT	This is a MODBUS address. PD-01 will monitor this address, and copy the return data to the 3rd word in PZD of cyclic input data if select Module = "4 PKW, 4 PZD".	0x2103
8	Data Output 4	UINT	This is a MODBUS address. PD-01 will monitor this address, and copy the return data to the 4th word in PZD of cyclic input data if select Module = "4 PKW, 4 PZD".	0x2104
9	d_state	UINT	This is a flag. If address in Data Output 1 ~ Data Output 4 is continuous, set it to 1, and set the others to 0.	0x0001
10	din_len	UINT	This is a length, and unit is word. It specifies the length of PD-01 to process data in PZD, if user select the Module = "4 PKW, 4 PZD", but din_len is 3, PD-01 will process 3 word and ignore the 4th word.	0x0002
11	dout_len	UINT	This is a length, and unit is word. It specifies the length of PD-01 to monitor data from AC Drive, if user select Module = "4 PKW, 4 PZD", but dout_len is 3, PD-01 will monitor 3 word and ignore the 4th address.	0x0002
12	LossDPComTreat	UINT	This variable indicates that the PD-01 will take action when communication with Profibus network is lost, the value can be assigned as follows: 00 – Ignore event and continue; 01 – Stop according to Pr "Stop Method" in VFD series Drives.	0x0001

| Item	Name	Type	Description	Default
13	LossSPComTreat	UINT	This variable indicates that the PD-01 will take action when the SP communication (SCANport communication) is lost, the value can be assigned as follows: 00 – Stop data exchange and report fault; 01 – Continue data exchange and report alarm; 02 – Ignore and continue data exchange.	0x0000

If the address in Data Output 1 ~ Data Output 4 is continuous, then set d_state to 1, PD-01 will get starting address from Data Output 1. The next data will be got from the address next to the starting address, and the reading length is determined by dout_len. If the MODBUS address for reading is discontinuous, please set d_state to 0, PD-01 will also get starting address from Data Output 1, but the difference is the other data will be got from the address saved in Data Output 2, Data Output 3 and Data Output 4 in order.

Example, if

Data Output 1   = 0x2100;
Data Output 2   = 0x2101;
Data Output 3   = 0x2102;
Data Output 4   = 0x2103;
dout_len   = 0x0003;

The MODBUS address in Data Output 1~Data Output 4 is continuous, so you can set the d_state to 1, then PD-01 will monitor the address starting from Data Output 1, and monitor 3 words from VFD series Drives one time. When the dout_len is 3, PD-01 will ignore the address in Data Output 4. If d_state is set to 0, PD-01 will read data from the address in Data Output 1, and read data from the address in Data Output 2, and so forth.

Edit the user parameters in S7 Step hardware configuration tools shown below:
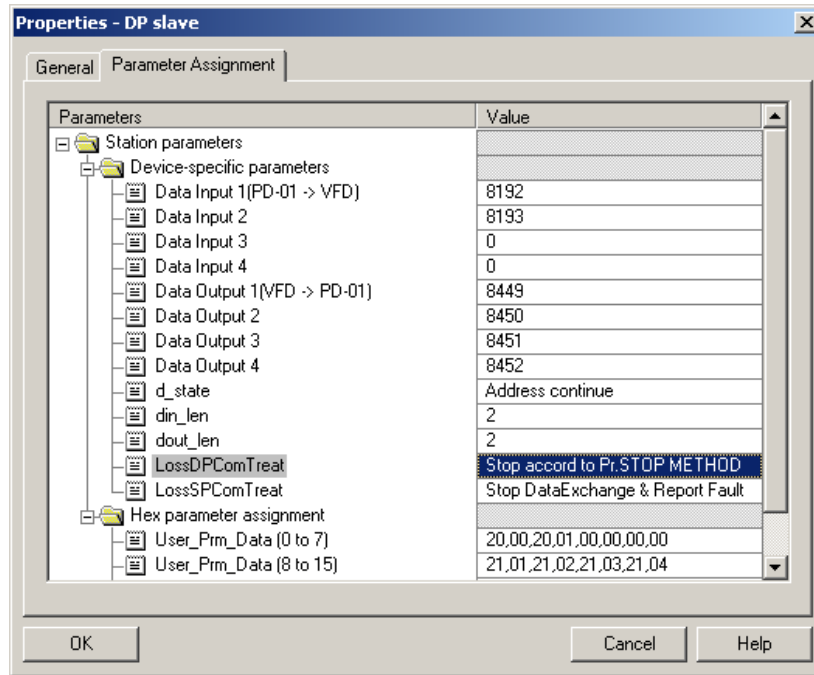
NOTE:

Please do not set d_state to 1 when the address in Data Output 1 ~ Data Output 4 is non-continuous to avoid Parameterization error and IO disconnect. The PD-01 just check the address starting from Data Output 1 to Data Output [dout_len-1], in other words, if the address in Data Output 1 ~ Data Output 3 is continuous, but the address in Data Output 4 is not, and dout_len is 0x0003, then the check still can pass.

Chapter 6 Troubleshooting

Troubleshooting via LED displays

Two LEDs, SP and NET LED, are used to monitor the PD-01 communication status.

◆ Possible LED displays of NET LED:

LED	Indication	Corrective Actions
OFF	No Power Supply	Verify that the power supply of PD-01. Check whether the power supply is connected and that power is applied to the PD-01 through the connector.
Red, flickering (rapid blinking)	Invalid PROFIBUS address set via switch	Check whether the switch value is valid, valid value of slave is within 1-125. Set the valid value and re-power
Red, blinking	Communication link to PROFIBUS, but No cyclical data exchanged, or Extended user parameter error	User parameter are sent by master (from GSD file), for example, if d_state is set 1, ensure the data in Data Output 1 ~ Data Output 1 + dout_len are continuous addresses. Otherwise, PD-01 will not be able to pass the Parameterization check.
Red ON	No connection to PROFIBUS	1. Verify that network installation is OK. 2. Verify that PLC is working. 3. Verify that switch address setting is correct.
Green, blinking	"Master" is in "Stop" mode, and cyclical process data exchange in progress, but set-points invalid (control word = 0)	Turn the KEY of PLC to RUN mode, and send the control command to PD-01.
Green ON	Cyclic data exchange in progress and OK	

◆ Possible LED displays of SP LED:

LED	Indication	Corrective Actions
OFF	No Power Supply	Verify that the power supply of PD-01. Check whether the power supply is connected and that power is applied to the PD-01 through the connector.
Red, blinking	CRC check fault	Check your communication setting in AC Drive (9600, <8,N,2>, RTU)
Red ON	Connection failure, or No connection	1. Check whether the connections between AC Drive and RS485 of PD-01 are all correct 2. Re-wire the connections between AC Drive and ensure that the wire specification is correct.
Green, blinking	AC Drive returns error code	1. Check the AC Drive type and version. Not all Delta VFD series Drive are supported. 2. Check the PLC program, and ensure the operating address in PD-01 is correct.
Green ON	Normal	

NOTE:

If both SP LED and NET LED are in steady orange, it indicates that PD-01 has entered into the "test mode". Please do not set the value of address switch of PD-01 to 0XFF at this time. Be sure to set other value and energize PD-01 again.

Troubleshooting via diagnostic data

PD-01 provides 16 bytes diagnostic data when the alarm occurs and when user parameter setting "LossSPComTreat" is set to "Continue data exchange and report alarm". It includes 6 bytes standard diagnostic data and 10 bytes device related diagnostic data. The following table shows the meanings of the 16 bytes:

Byte 1-6	Byte 7	Byte 8	Byte 9	Byte 10 Byte 16
Standard diagnostic data	Length in bytes	SP communication status	Error code	Reserved

Byte 7 indicates the length of device related diagnostic data including itself, so if byte 7 is 10 (0Ahex), it indicate device related to diagnostic data have 10 bytes (including byte 7).

Byte 8 indicates the SP communication status when the alarm occurs, and the valid value should be as follows:

00 – Normal

01 – CRC check failure

02 – VFD series Drive returns error code

03 – Communication is time out and disconnected

Byte 9 indicates the error code when byte 8 is 02 (VFD series Drive returns error code). Refer to the Section 6.3 for the meanings of invalid code.

Other word, user can get the diagnostic data via PZD area any time. PD-01 provides some special MODBUS addresses to indicate the diagnostic status, the address assignments are as following:

Address	0x7500		0x7501		0x7502		0x7503		0x7504	
	High byte	Low byte	High byte	Low byte	High byte	Low byte	High byte	Low byte	High byte	Low byte
Meaning	SP comm status	Error code	Reserved, read to 0							

User can get these data through "Data Output 1", or 2, or 3, or 4 in user parameters. For example, if set the "Data Output 1" to 0x7500 means get the diagnostic data from 0x7500, and get the return data from address 0x7500 in 1st word of PZD area.

NOTE:

These special addresses are read-only, it will fail if user tries to write data to it.

Troubleshooting via error codes

If there is a communication error detected between PD-01 and VFD series Drives, the error code will be displayed on the digital keypad of VFD series Drives.

VFD series Drives can process the message from PD-01 if the communication setting is valid. But if the command of message is invalid, the VFD series Drives will respond a report message that has error codes listed in table below, to PD-01.
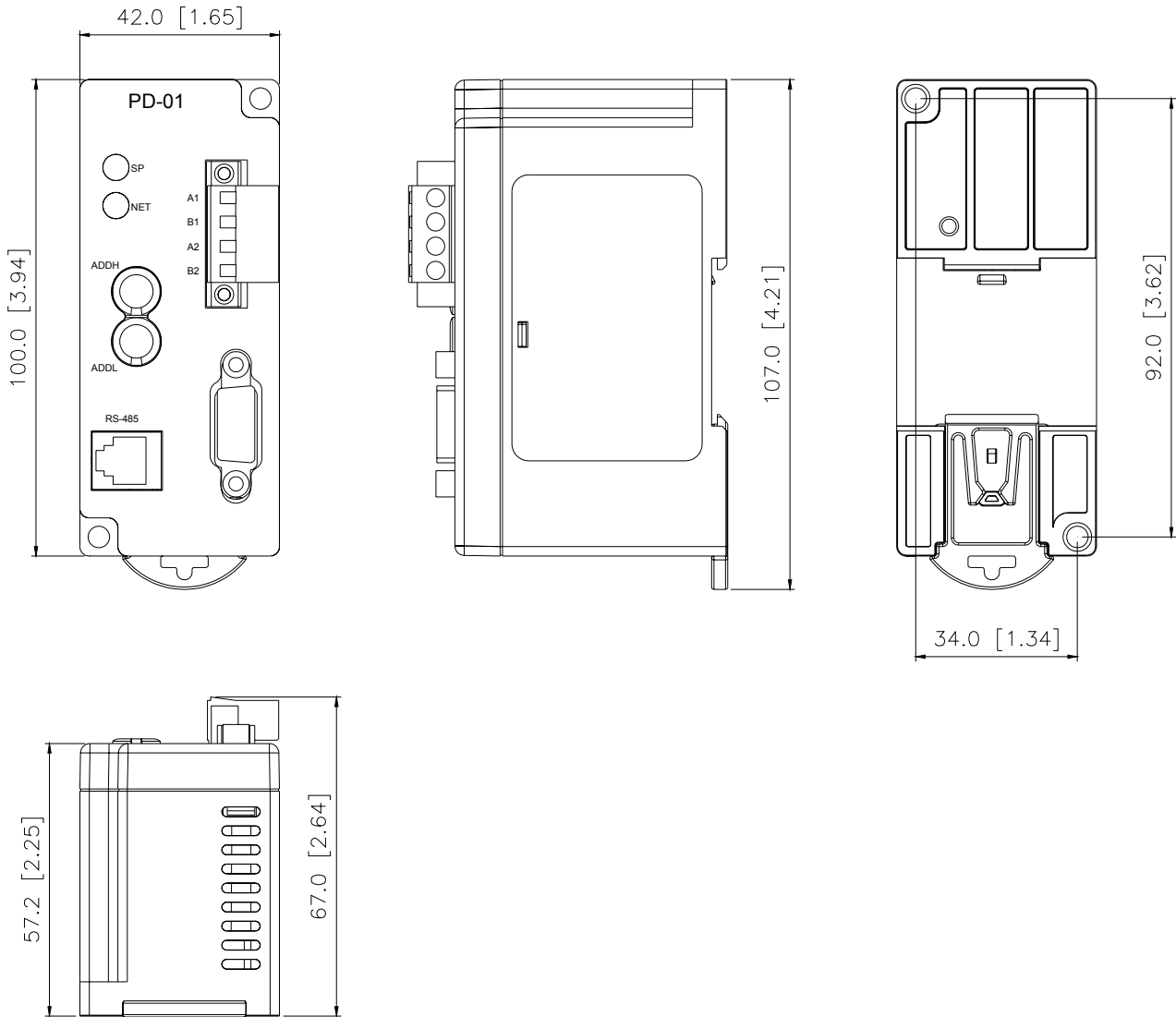
Code	Meaning	Corrective actives
01	Illegal command code The command code received in the command message is not available for the drives.	1. Check the Request Identifier in PKW area. PD-01 just supports ID 0, 1, 2. 2. Re-supply power to PD-01.
02	Illegal data address The data address received in the command message is not available for the drives.	1. Check the Parameter number in PKW area, and refer the user manual of VFD Drives. 2. Check the settings of user parameters "Data Input 1" to "Data Input 4" and "Data Output 1" to "Data Output 4", and refer to the user manual of VFD series Drives. 3. Re-supply power to PD-01.

Code	Meaning	Corrective actives
03	Illegal data value The data value received in the command message is not available for the drives.	1. Check the parameter data (PWE2) in PKW area, and refer the user manual of VFD series Drives. 2. Check the PLC program to confirm the data that transmitted to PD-01 from master is valid. 3. Re-supply power to PD-01.
04	Slave device failure The drive is unable to perform the requested action.	1. Check all data in PKW. 2. Re-supply power to PD-01.

VFD series Drives will not respond message to PD-01 if it receives an invalid message from PD-01, but error code shown in the table below will be displayed on the digital keypad.

Code	Meaning	Corrective actives
05	Reserved	
06	AC Drive is busy	
07	Reserved	
08	Reserved	
09	Check sum is error	1. Please refer to section 4.2 in this manual and check the setting of VFD series Drives. 2. If the error still exists, return it to factory.
10	Time out	
11	Baud rate or protocol is invalid	
12	Message is too short	
13	Message is too long	
14	Message contain invalid character	

Chapter 7 Dimensions

42.0 [1.65]

PD-01

SP
NET

A1
B1
A2
B2

ADDH

ADDL

RS-485

100.0 [3.94]

107.0 [4.21]

92.0 [3.62]

34.0 [1.34]

57.2 [2.25]

67.0 [2.64]

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