PD 385 Profibus Terminal Box
For
PD 340 Flow Transmitter

Manual
GB

Contents

1   Preface

The PD 340 Flow Transmitter with Profibus DP interface makes measuring flow and volume as simple as measuring a temperature.
All data is transferred on Profibus. No analogue input or fast counters are needed.

The Profibus interface is universal for all PROCES-DATA flow transmitter sizes: C25, C38, C51, C63, C76 and C102.

During the specification and development of the Profibus interface, focus has been on providing a simple interface and easy configuration.
Configuration of the PD 340 Profibus-DP is only a matter of selecting the size and the preferred volume unit. The Profibus interface module automatically configures the flow transmitter electronics with the appropriate settings.

The Profibus address is set on a switch next to the Profibus cable terminals.

This manual only contains Profibus specific topics for the PD 340. For general information, installation, error codes, technical data etc., please refer to the PD 340 manual (document no. 502006).

2   Construction

The PD 340 Flow Transmitter with Profibus consists of three parts - the PD 385 Terminal Box with Profibus DP, the PD 340 Meterhead, and the PD 355 electronic module.
Please refer to the picture below.

- **PD 385 Terminal box with Profibus DP**

- **Meterhead**

- **PD 355 Electronic Module**
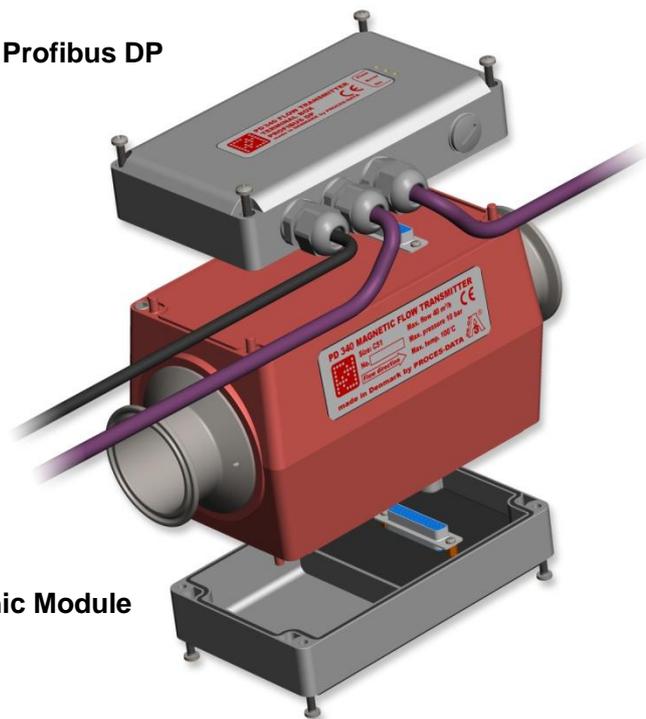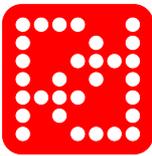
3 Terminal overview
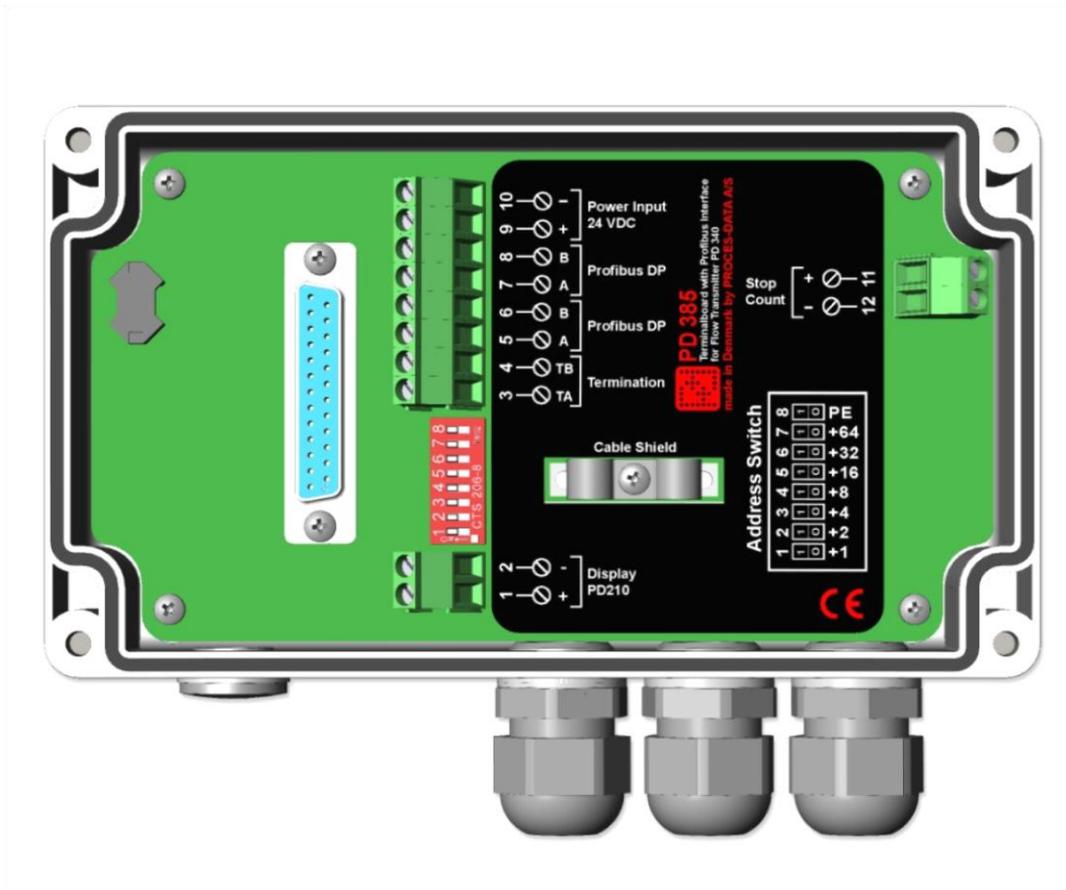
4 Electrical Connections

Power supply cable and Profibus cable(s) are connected to the terminals on the terminal board. All cables enter through PG cable glands.

It is important to ensure that the Profibus cable shield has good contact to the clamp bridge. The green Profibus wire is connected to "A" and the red to "B". Two parallel terminal sets allow a simple Profibus loop connection.
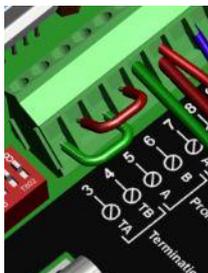
If the PD 340 is the last device on a bus, the termination is enabled by making bridge connections from terminal "A" to terminal "TA", and from terminal "B" to terminal "TB".
Please refer to the figure to the left.
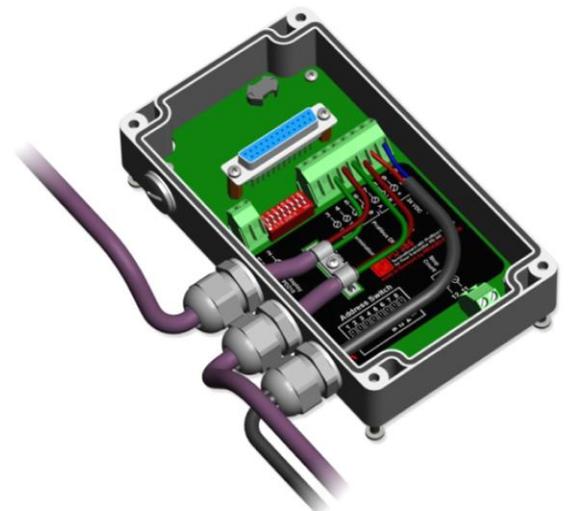
The termination and Profibus communication is active as long as power is supplied to the module, even when the module is removed from the flow transmitter meterhead.

An external sensor for detecting air in the flow tube may be connected to the Stop count input (terminals 11 and 12). Please refer to chapter 9.

As an option, a PD 210 Display Unit can be connected and used for monitoring flow and volume (terminals 1 and 2).

5   Profibus Address

The node address is set on the binary switch. The address is set on switches 1 to 7. Switch 8 is not used as part of the address. The address is calculated by adding the value of all switches that are in the "ON" position.

Profibus address switches are only scanned at power-on. If the address switches have been changed, a power cycle must be performed before the new address is effective.

The values for the switches are: 1, 2, 4, 8, 16, 32, 64. Legal addresses are 1 through 125. The addresses 126 and 127 are reserved for system use.

Example:
The address "52" is "4+16+32" which is the equivalent of "0,0,1,0,1,1,0" on the switches 1-7.

6   Parameters

The flow transmitter needs only two parameters for defining its function. Profibus communication is only possible when both parameters are set to a valid value.
When the Profibus master initialises Profibus communication to the flow transmitter, the two parameters are automatically transferred to the Profibus Terminal Box.
By means of these two parameters, the Profibus Terminal Box is able to configure all registers in the flow transmitter electronic module correctly. This automatic configuration guarantees that the flow transmitter is always configured correctly, even if a flow transmitter has been replaced.

6.1   Size
Select the physical size of the flow meter. Size is selected from the list:
C25, C38, C51, C63, C76, and C102.
The size can be read from the type plate on the meterhead.

6.2   Unit
Select the unit of measurement.
The unit is selected from the list:
m^3/hour, HL/hour, L/hour, UK gallon/hour, UK gallon/minute, US gallon/hour, US gallon/minute.

6.3 User Defined Flow Meter Configuration

It is possible for the user to configure the flow transmitter registers manually. In this case, both Size and Unit must be set to "user defined". In this mode, the Profibus module does not configure any registers in the flow transmitter electronic module.

The user must manually configure all registers, for example by using a PD 210 display.

7 Configuration

The configuration defines which data to exchange between the flow transmitter and the Profibus master in the control system. Real values are IEEE float format.

The PD 340 has 5 data items available. The user can freely select from 1 to 5 of these.

7.1 Flow

A 4-byte real value. Flow is shown in the unit defined by the parameters that have been set. Flow rate readout can be disabled by the "Hold and Zero flow rate" command. In this mode the read out is 0. Hold and zero flow rate is for readout only and has thus no influence on the volume counting internally in the PD 340.

Hold and Zero flow can be used to suppress misreading when e.g. the measuring pipe is empty or the production process is idle.

7.2 Volume1 / Volume2

4-byte real values. Volume is counted in the unit defined by the set parameters. Volume counts to a maximum value of 999999.

Each volume counter can be individually zeroed, or zeroed and put on hold. This allows one volume counter to be used for e.g. batch measurements, while the other one is used for the total volume.

When a volume counter is released from the hold state it starts counting from 0.

7.3 Error No.

The error No. is updated at 10 second intervals. When no error is pending, the Error No. is 0. The error number is automatically removed when the error condition ends. An error code will be present for a minimum of 10 seconds.

In addition to the error codes from the PD 385 Profibus terminal box, two error codes belong to the PD 355 electronic module (please refer to the PD 340 manual, document no. 502006):
0x60 (decimal 96) : Internal communication error between PD 355 and PD 385,
0x61 (decimal 97) : PD 355 restarted.

At power-on the error hex code 0x61 (97 decimal) will be present for 10 seconds, followed by 0xF0 (240 decimal) for another 10 seconds, then the error code change to 0x00, provided that no further error is present.

7.4 Command – Response

Allow the Profibus master to send commands to the PD 340 as well as reading the status from the PD 340.

Two bytes (16 bit) are used for both control and response.

Command byte 1 (from PLC to PD 340):

		Bit value
Bit 0	Zero volume1 counter	LSB
Bit 1	Zero volume2 counter	
Bit 2	Zero and Hold volume counter 1	
Bit 3	Zero and Hold volume counter 2	
Bit 4	Zero and Hold flow rate	
Bit 5		
Bit 6	Simulate flow	
Bit 7	Simulate flow rate: 0=40% 1=80% of maximum flow	MSB

Response byte 1: (from PD 340 to PLC):

		Bit value
Bit 0	Volume1 counter zeroed	LSB
Bit 1	Volume2 counter zeroed	
Bit 2	Volume counter 1 is held on zero	
Bit 3	Volume counter 2 is held on zero	
Bit 4	Flow rate readout is held on zero	
Bit 5		
Bit 6	Simulation of flow active	
Bit 7	Communication active	MSB

Command byte 2 (from PLC to PD 340):

		Bit value
Bit 0	CommandBit1	LSB
Bit 1	CommandBit2	
Bit 2	CommandBit3	
Bit 3		
Bit 4		
Bit 5		
Bit 6		
Bit 7		MSB

Response byte 2: (from PD 340 to PLC):

		Bit value
Bit 0	CommandBit1 echo	LSB
Bit 1	CommandBit2 echo	
Bit 2	CommandBit3 echo	
Bit 3		
Bit 4	Input1 (stop flowcounter) is active	
Bit 5		
Bit 6		
Bit 7		MSB

The functions defined in the command byte are activated when the bit changes from 0 to 1. When the function is finished, the corresponding bit is set in the response byte. The response bit signals to the PLC that the action has been accomplished and the command bit can be reset.

The simulation flow rate is only set once when the Simulate flow bit is changed from 0 to 1. Thus the wanted simulation rate must be selected before the simulate bit is set.

The response bit 7 "Communication active" is always high in the PD 340. In the event of a Profibus failure, the Profibus master will normally write "0" to all inputs and thus the "Communication active" signal will be removed.

The CommandBit1 to 3 are used to activate different functions in the PD 340:
000 : No function active, thus the flow rate is shown in the flow value.
001 : Show the software version number in the flow value
010 : Show the hardware version number in the flow value.

The CommandBit1 to 3 echo in the response byte identify the current active function.
111: the command is unknown.

8 Status LEDs

The Profibus interface has 3 status LEDs, which are visible from the outside.

The LEDs are placed at the right hand side of the terminal box label.

Status LEDs

Power (green)	Constant light: Power connected, microprocessor running and Profibus in data exchange mode.
	Fast flashing: Error.
Error (red)	No light: Processor, Profibus and internal P-NET OK.
	Red constant light: Microprocessor not running.
	Red flash sequence with 5 seconds interval:
	1 x flash: Baud rate not detected.
	2 x flash: Profibus configuration or parameter error –> no data exchange.
	3 x flash: Profibus configuration or parameter error – >no data exchange.
	5 x flash: No communication to this node.
	6 x flash: Unspecified error.
	7 x flash: Internal communication error between PD 355 and PD 385.
Flow (yellow):	Duty cycle as indication of % of max. flow.
	Flow < 5% : no light.
	Flow >95%: constant light.

9 Error LED flash

The flash sequences are separated by a constant red light for approximately 2 seconds.

If more errors are present, only the highest priority error is shown on the red LED. Highest priority is the alarm with lowest number of flashes.

Example of flash sequence for 3 x flash:

| Separator | Flash sequence | Separator |
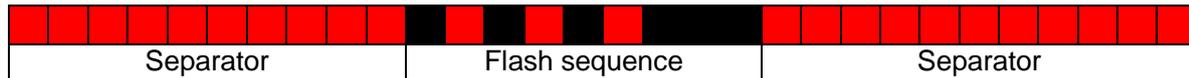
10 Pause volume counting

The two terminals marked "Stop Count" (Terminals 11&12) is a galvanic isolated input.

If a voltage between 18V and 28V with the right polarity is applied, the flow transmitter will ignore any measured signal (Flow rate = 0, volume counting stopped).
The contents of volume registers will remain untouched, and will continue counting when the input goes off.
The Stop Count input can, for example, be controlled by an "empty pipe" sensor.

11 Linearizing function

Linearization is used to improve accuracy, especially at very low flow rates. This function is by default disabled. However, it can be enabled by editing the GSD file, so that the enable/disable linearization parameter becomes an option. Only enable this function when it has been confirmed that the meterhead and the electronic module were factory calibrated together. Read more about the linearizing function in the PD 340 manual.

12 PD 210 Display Unit
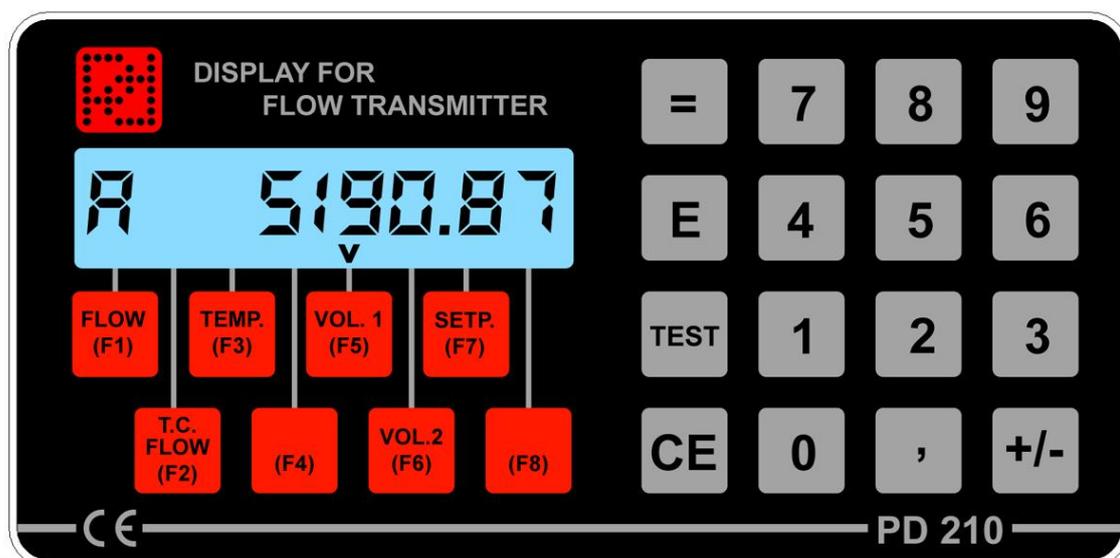
Changing values in E-registers is only possible when allowed by the PLC parameters. E-registers are unlocked from the PLC if both parameters are set to "user defined".

If an alarm is unacknowledged, an "A" is shown at the left side of the display. Press the "test" key to display the alarm number.
Alarms are automatically acknowledged by the Profibus module. However, the PD 210 retains the "A" symbol until the "Test" key is pressed and the alarm number is displayed. If the alarm is no longer active, the "A" symbol disappears.

"P. FAIL" is shown following power-on or a power interrupt. "P. FAIL" is shown until a key is pressed.

13 Function keys

F1   **Flow**
F2   Hours since power on
F3   Hardware version number
F4   Actual flow as % of maximum flow
F5   **Volume 1**
F6   **Volume 2**
F7   For internal use
F8   Software version No.

Test   Display alarm

Note: The function key names (F1 to F8) refer to the figure in chapter 11, PD 210 Display Unit (top of this page), but are not present on to the hardware.

14 Specifications

All electric characteristics are valid at an ambient temperature of -10 °C to +50 °C, unless otherwise stated.

14.1　Power Supply

Supply	24 V DC
Power consumption	Max. 6 W

14.2　Communication

Fieldbus	Profibus DP
Fieldbus profile	DP-V0
Maximum communication speed	12 Mbps (Automatic detection)
Address range	1 to 125
IDENT No.	0D18 HEX
GSD file name	PD__0D18.GSD

14.3　Environment

Ambient temperature	-10 °C to +50 °C
Protection class	IP 67

15 Related documents

PD 340 Flow Transmitter Manual (document no.: 50201006).