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## 1. Introduction

The BB2 Profibus module is used to connect the BB2 central unit to a Profibus network as a slave. The user is assumed to be familiar with Profibus, and the Profibus configuration of the master.

## 2. A few words about this manual

The manual primarily contains information about the BB2 Profibus module. The operation and measuring principles of the sensors and the central unit is described in their respective manuals.

## 3. Fieldbus introduction

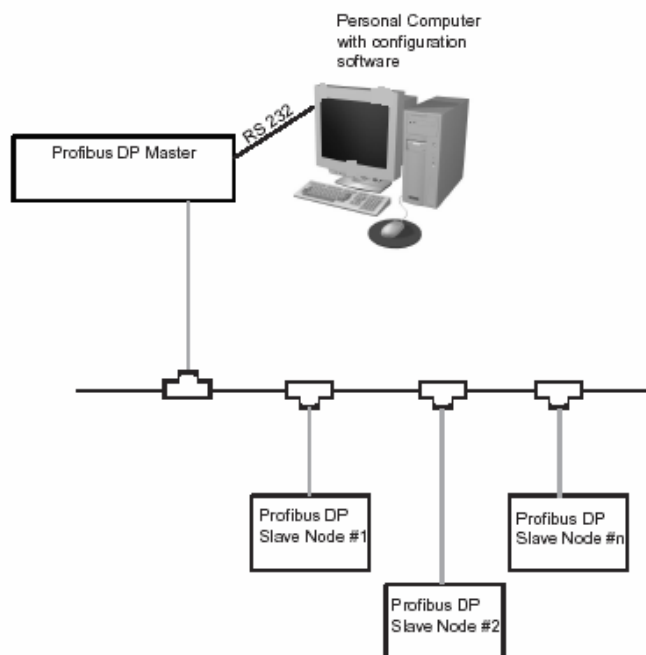
Profibus has an international user organisation called Profibus International, PI, and local national organisations, PNO. Technical questions regarding the fieldbus should be addressed to your local Profibus User Group in the first instance. Address list is available on the Profibus Internet site; [www.Profibus.com](http://www.Profibus.com). For general help on Profibus, contact Profibus International on e-mail; [Profibus\\_international@compuserve.com](mailto:Profibus_international@compuserve.com).

Profibus-DP is normally used in industrial automation, to transfer fast data for motor controllers, MMI, I/O units and other industrial equipment.

### NETWORK OVERVIEW

The media for the fieldbus is a shielded copper cable consisting of a twisted pair. The baudrate for the bus is between 9.6 kbaud to max. 12 Mbaud. The Profibus-DP network is able to carry 126 nodes and the total amount of data for a Profibus-DP node is 244 Byte out and 244 Byte in.

PLEASE NOTE: Node No. 126 is only used for commissioning purposes and should not be used to exchange user data. The figure below gives an overview of a Profibus-DP network.



## 4. Unpacking

The unit has been tested and approved before delivery from the supplier. Please check that no visible damages are apparent in this shipment.

### DAMAGES

If damages occurred during shipment, immediately contact the shipping company and the Cerlic representative. The shipment should be returned only after a return authorization number has been issued by Cerlic or representative.

### PACKAGING

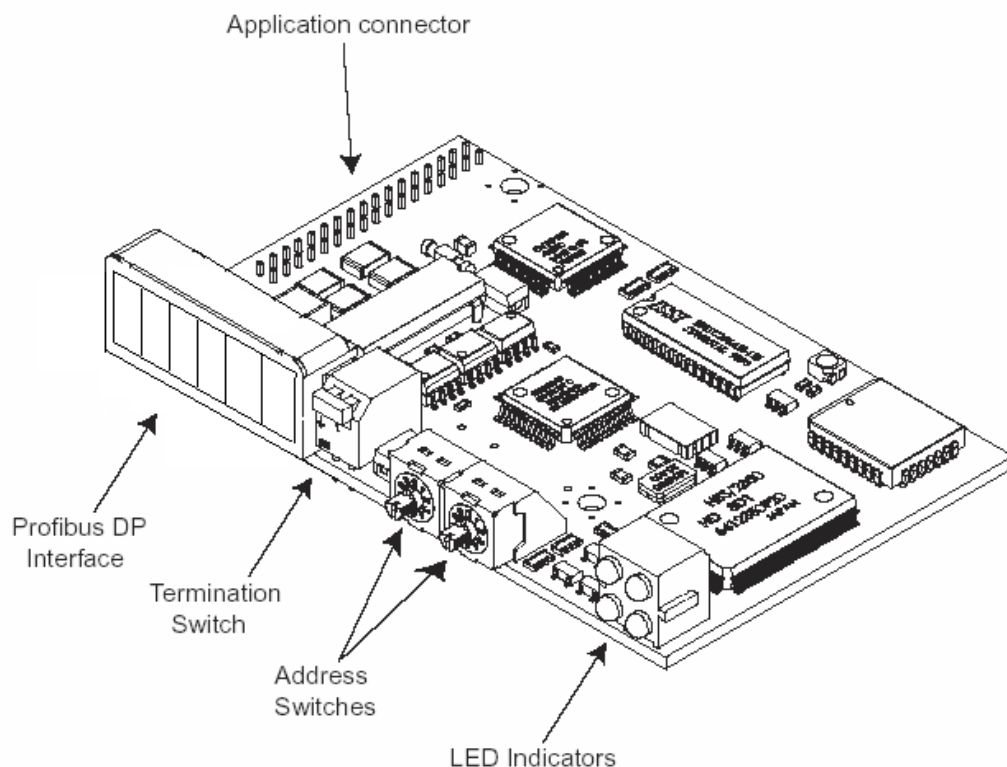
The original packaging is designed to protect the equipment and should be used for storage or if the product must be returned.

### CONTENT

Please check that the content corresponds to your order and packing list.

## 5. Module Overview

The module for Profibus-DP is a slave node that can be read and written to, from a Profibus-DP master. The module will not initiate communication to other nodes, it will only respond to incoming commands. The module is connected to the control box via a 34 pin connector.



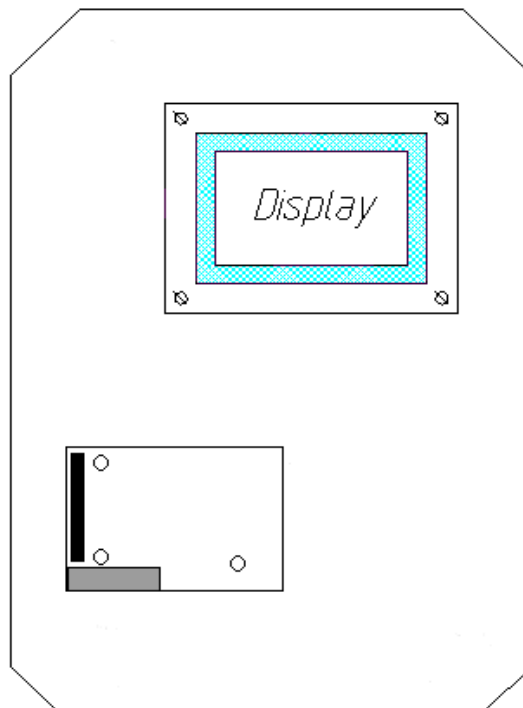
## 6. Mounting in the BB2 control box

The Profibus module shall be mounted in a BB2 control box. Make sure the power to the control box is switched off before mounting the Profibus module.



Connect yourself and the control box chassis to protective ground before opening the antistatic package of the module to avoid static discharges that can damage the module or the box.

Be careful to get all 32 pins into their sockets. Fasten the module using the three M 2,5x5 screws that comes with the module.



Mounting the module in the control box

## WIRING CONNECTIONS

Connect the Profibus network to the screw terminals according to the table below.

No	Name	Function
1	+5 V BUS	Isolated +5 V from RS 485 side*
2	GND BUS	Isolated GND from RS 485 side*
3	A-Line	Negative RxD/TxD according to RS 485 specification (green)
4	B-Line	Positive RxD/TxD according to RS 485 specification (red)
5	Shield	BUS cable shield, Connected to PE
6	RTS	Request To Send*

\* notes optional signals.

## 7. Configuration

### BAUDRATE

The baudrate on a Profibus-DP network is set during configuration of the master and only one baudrate is possible in a Profibus-DP installation. The Profibus-DP module has an auto baudrate detection function and the user does not have to configure the baudrate on the module. Baudrates supported by the Profibus-DP module are:

Supported baudrates
9.6 kbit/s
19.2 kbit/s
93.75 kbit/s
187.5 kbit/s
500 kbit/s
1.5 Mbit/s
3 Mbit/s
6 Mbit/s
12 Mbit/s

### TERMINATION OF DP NETWORK

The end nodes in a Profibus-DP network has to be terminated to avoid reflections on the bus line. The Profibus-DP module is equipped with a termination switch to accomplish this in an easy way. If the module is used as the first or last module in a network the termination switch has to be in ON position. Otherwise the switch has to be in OFF position.

Termination switch ON	Bus termination enabled. If the module is the last or first module, the bus termination has to be set on, or an external termination connector has to be used
Termination switch OFF	Bus termination disabled

**PLEASE NOTE:** If an external termination connector is used the switch must be in OFF position.

## Node Address

The profibus-DP node address has to be set in the field. This can be done in two ways:

1. Two rotary switches on module can be set for 1-99
2. Setting the switches to 00 tells the module to use the address configured in the BB2 menu. It can be set from 1-125. To set up address you go into BB2 menu by pressing “ENTER & ↑” for 5 seconds together. Then go down to “SETUP” and pressing “ENTER”. Scroll down to “EXP. Module” and press “ENTER”. Screen will say NODE ADDRESS 002 \*1)  
Change address between 2-125 and then press ENTER to exit. Do not forget to terminate box if this is 1<sup>st</sup> or last item in loop as shown above.

PLEASE NOTE: The node address is not changed just by adjusting the settings. The BB2 box must be turned off for 10 seconds and then powered up for address to be recognized.

## GSD file

Each device on a Profibus-DP network is associated with a GSD file, containing all necessary information about the device. This file is used by the network configuration program during configuration of the network. The latest version of GSD file can either be downloaded from the webpage [www.cerlic.com](http://www.cerlic.com) or received by contacting Cerlic.

See **Appendix I** for a print out of the file.

\*1) The reason to start with no 002 is that the main control system normally is addressed as 001.

## DATA STRUCTURE

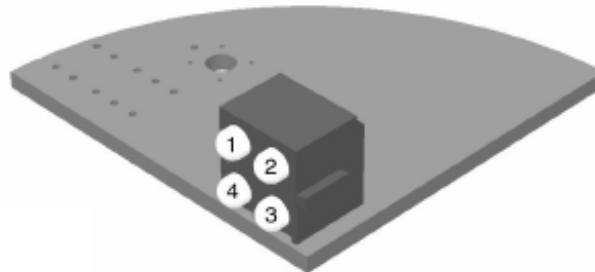
The data to and from the control box is structured as described in the table below. Total length for input data is 84 bytes, and for output data 4 bytes. We use “Big Endian”.

In/Out	Type	Length	Name	Content
In	57	16 byte	Id	Four bytes ID for each sensor. First byte (U8) is sensor type (which is also the first part of the serial number), second byte (U8) is middle part of serial number, the two last bytes (U16) is the second part of the serial number.
In	51	4 byte	Status	<p>One status byte per sensor slot.</p> <p>Bit 0    Online, sensor is connected and measures.</p> <p>Bit 1    Cleaning, the sensor is flushing or brushing.</p> <p>Bit 2    Frozen, the sensor value is frozen after cleaning.</p> <p>Bit 3    Alarm, the sensor has triggered a local alarm in the control box.</p> <p>Bit 4    Currently not used.</p> <p>Bit 5    Currently not used.</p> <p>Bit 6    Currently not used.</p> <p>Bit 7    Currently not used.</p>
In	40,5F	64 byte	Value	Four IEEE float values per sensor slot. First value is the sensor output value, the rest is sensor dependant.
Out	61	4 byte	Control	<p>One control byte per sensor slot.</p> <p>Currently not used.</p>



## 8. Indications

The module is equipped with four LED's mounted at the front and one LED on the board, used for debugging purposes. The front LED's can be mounted in two ways, either top mounted or angle mounted. The function of the LED's are described in the table and figure below.



No	Indication	Description
1	Not Used	
2	Green	Indicates that the module is On-Line on the fieldbus. Green - Module is On-Line and data exchange is possible. Turned Off - Module is not On-Line
3	Red	Indicates that the module is Off-Line on the fieldbus. Red - Module is Off-Line and no data exchange is possible. Turned Off - Module is not Off-Line
4	Red	Fieldbus Diagnostics Indicates certain faults on the Fieldbus side. Flashing Red 1 Hz - Error in configuration: IN and/or OUT length set during initialisation of the module is not equal to the length set during configuration of the network. Flashing Red 2 Hz - Error in User Parameter data: The length/contents of the User Parameter data set during initialisation of the module is not equal to the length/contents set during configuration of the network. Flashing Red 4 Hz - Error in initialisation of the Profibus communication ASIC. Turned Off - No diagnostics present

## 9. Getting started

A shortcut to get the Profibus communication up and running.

- Make sure the BB2 box \*2) to be used is switched off.
- Open the front and locate the fieldbus module connector.
- Connect yourself and the control box chassis to protective ground before opening the antistatic package of the module to avoid static discharges that can damage the module or the box.
- Mount the module into the box, be careful to fit all 34 pins into the socket.
- Fasten the three M2.5x5 screws
- Set the rotary switches to the desired node address, or to “0 0” if you want to configure the address in the BB2 menu Settings / Fieldbus.
- Set the bus termination switch in position “On” if this is the last unit on the bus, else set it to “Off”.
- Connect the Profibus network, A-line (negative) line to screw terminal 3, B-line (positive) to terminal 4, and shield to terminal 5.
- Switch on the power to the BB2 box and check that the green led on the module starts flashing.
- If you have not set the address switches on the module you must set the node address in the BB2 menu Settings / Fieldbus, exit the menu and then switch the power off at least 10 seconds before it is switched on again.
- Check in the BB2 menu System / Fieldbus / that the module is found and initiated.
- Configure the Master system (PC, PLC or DCS) to communicate with the BB2 at the selected node address using the data structure in previous chapter.
- When the communication starts working the red LEDs in the lower right corner of the module will go dark, and the green LED will light up. In the BB2 menu System / Fieldbus “Online” will shift to “Yes”.
- Now the Profibus communication should be working.

\*2) Make sure that the program version of the BB2 box to be used has a program version of 2.23 or higher. Before open the front, make sure that the main power supply is switched off.

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## Technical specification for the Profibus module

Fieldbus type: PROFIBUS-DP EN 50 170 (DIN 19245)

- Protocol version: ver. 1.10
- Protocol stack supplier: SIEMENS
- Auto baudrate detection supported. Baudrate range: 9.6 kbit-12Mbit

### PHYSICAL INTERFACE

- Transmission media: Profibus bus line, type A or B specified in EN50170
- Topology: Master-Slave communication
- Fieldbus connectors: Screw terminal.
- Cable: Shielded copper cable, Twisted pair
- Isolation: The bus is galvanically separated from the other electronics with an on board DC/DC converter. Bus signals (A-line and B-line) are isolated via optocouplers.

### CONFIGURATION & INDICATIONS

- Address range: 1-99 using switches on the module or 1-126 via BB2 menus.
- Bus termination switch onboard.
- LED-indications: ON-line, OFF-line, Fieldbus related diagnostic.

## Appendix I

```

;=====
; Profibus Device Database of HMS Industrial Networks.
; Model : ANYBUS-S PDP
; Description : ANYBUS-S Profibus DP slave
; Language : English
; Date : 14 May 2003
; Author : HMS Industrial Networks AB
;
; MODIFICATIONS:
; 05 February 2001:
; -Version changes
; -Added support for baudrate 45.45 kbit
;
; 08 May 2003:
; - Corrected 'GSD_Revision' to '2'.
; - Corrected 'MaxTsdr_45.45' from 250 to 60.
; - Changed 'Revision' to 1.2
;
; 14 May 2003:
; - Corrected 'MaxTsdr_xxx' for all baudrates according to the new
specification.
; - Changed 'Revision' to 1.3
;
; 11 July 2007
; - Ported to Cerlic BB2
;=====
#Profibus_DP

GSD_Revision          = 2

; Device identification
Vendor_Name           = "Cerlic AB"
Model_Name            = "ANYBUS-S PDP"
Revision              = "Version 1.3"
Ident_Number          = 0x1003
Protocol_Ident        = 0                ; DP protocol
Station_Type          = 0                ; Slave device
FMS_supp              = 0                ; FMS not supported
Hardware_Release      = "Version 1.4"
Software_Release      = "Version 1.1"

; Supported baudrates
9.6_supp              = 1
19.2_supp             = 1
45.45_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

```

```
; Maximum responder time for supported baudrates
MaxTsdr_9.6           = 15
MaxTsdr_19.2          = 15
MaxTsdr_45.45         = 15
MaxTsdr_93.75         = 15
MaxTsdr_187.5         = 15
MaxTsdr_500           = 15
MaxTsdr_1.5M          = 25
MaxTsdr_3M            = 50
MaxTsdr_6M            = 100
MaxTsdr_12M           = 200

; Supported hardware features
Redundancy             = 0           ; not supported
Repeater_Ctrl_Sig     = 2           ; TTL
24V_Pins               = 0           ; not connected
Implementation_Type    = "SPC3"

; Supported DP features
Freeze_Mode_supp      = 1           ; supported
Sync_Mode_supp        = 1           ; supported
Auto_Baud_supp        = 1           ; supported
Set_Slave_Add_supp    = 0           ; not supported

; Maximum polling frequency
Min_Slave_Intervall   = 1           ; 100 us

; Maximum supported sizes
Modular_Station       = 1           ; modular
Max_Module             = 24
Max_Input_Len         = 244
Max_Output_Len        = 244
Max_Data_Len          = 416
Modul_Offset          = 1

Fail_Safe              = 0           ; Slave does not accept data frames with
zero data length in state CLEAR.

Slave_Family           = 0
Max_Diag_Data_Len     = 6

; Definition of modules
Module = "ID: 16 bytes / 8 words IN" 0x57

EndModule
;
Module = "Status: 4 bytes / 2 words IN" 0x51

EndModule
;
Module = "Value: 4*4 IEEE float IN" 0x40,0x5F

EndModule
;
Module = "Control: 4 bytes / 2 words OUT" 0x61

EndModule
```