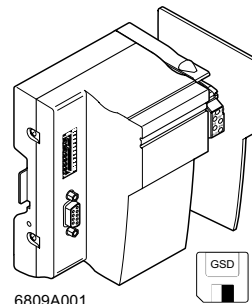


# VARIO BK DP/V1

## PROFIBUS-DP/V1 Bus Coupler



User Manual

02/2003



All modules will be delivered including connectors and labeling fields

### Function

The PROFIBUS-DP/V1 Bus Coupler is the link between PROFIBUS-DP and the VARIO installation system.

VARIO modules can be connected in any order to an existing PROFIBUS-DP using the PROFIBUS-DP/V1 Bus Coupler. In this way, all the advantages of the installation system created using these terminals can also be used on PROFIBUS-DP.

### Features

The PROFIBUS-DP/V1 Bus Coupler has the following properties:

- A maximum of 63 Inline devices or Loop 2 modules can be connected to PROFIBUS-DP via the bus coupler. The PROFIBUS-DP/V1 Bus Coupler and the Inline terminals create a station.
- The sum of all input and output data of the connected terminals must not exceed 176 bytes per station. (184 bytes when DIP switch 8 = OFF)
- DP/V1 for Class 1 and Class 2 masters

- Acyclic communication with, e.g., RS-232 modules also in the process data channel (\*)
- I/O module parameterization
- Failsafe values
- Various diagnostic formats
- Acknowledgment of I/O errors from the user program (\*)
- Adaptation of the high byte/low byte format in 16-channel input and output modules to the control system format (\*)
- The bus coupler can be installed with a data transmission speed of 9.6 kbps to 12 Mbps. The bus coupler is automatically set to the speed specified by the PROFIBUS master.
- The operating voltage of the VARIO BK DP/V1 bus coupler is 24 V DC. The operating temperature range is 0°C to +55°C (+32°F to +131°F).
- Diagnostics are provided locally by LEDs on the bus coupler, and on the Inline terminals and Loop 2 modules. All diagnostic information can be forwarded to the PROFIBUS master via PROFIBUS.

(\*) New functions not provided by IL PB BK

The intelligent wiring method used in the Inline terminals and Loop 2 modules enables the stations to be constructed quickly and easily because, for example, there is no need for time-consuming wiring of terminal power supplies. In the simplest case, it is only necessary for the power supply units integrated in the PROFIBUS-DP/V1 Bus Coupler to be supplied with 24 V DC. They then generate the operating voltage required for the PROFIBUS-DP/V1 Bus Coupler and the connected Inline terminals.

DIP switch 8 is particularly important, see Page 5. As default upon delivery, it is in the "OFF" position. This means that the device can directly replace the previous version IL PB BK (Order No. 27 40 05 4) although it also offers a few new functions, see above (\*). However, these functions can only be used on the new devices. When configuring the device, use the GSD "PXC\_00F0.GSD" and the device entry "IL PB BK DP/V1 (DIP 8 = OFF)" in the hardware list.

In the "ON" position, the device offers all the above functions and has a new PROFIBUS ID number. It should therefore be configured and parameterized using the GSD "PXC\_06CC.GSD" and the device entry "IL PB BK DP/V1 (DIP8 = ON)" in the hardware list. The stop response, which was specified by this switch in the old device, is then set in the parameterization.

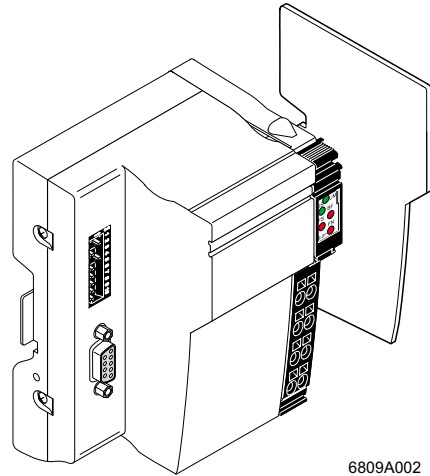
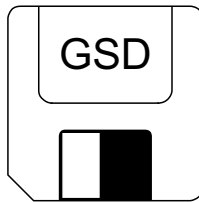


Figure 1 PROFIBUS-DP/V1 Bus Coupler with connector and end plate

The end plate is supplied with the PROFIBUS-DP/V1 Bus Coupler. Place this plate at the end of the Inline station. The end plate does not have any electrical function. It protects the station from ESD pulses and the user from dangerous voltage.



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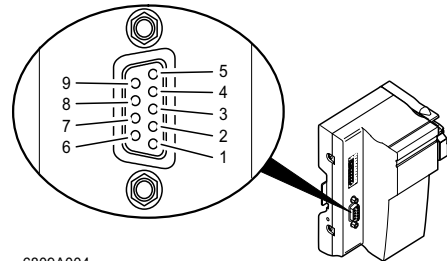
Figure 2 Floppy disk with device database file (GSD)

A disk is provided with the PROFIBUS-DP/V1 Bus Coupler. It contains the device database file (GSD) required by PROFIBUS and a bitmap file with an icon of the bus coupler and connected Inline terminals.



An up-to-date device database file (GSD) can be downloaded from the Internet at [www.pma-online.de](http://www.pma-online.de).

### Connecting PROFIBUS



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Figure 3 Pin assignment of the 9-pos. D-SUB female connector

Connect PROFIBUS to the PROFIBUS-DP/V1 Bus Coupler using a 9-pos. D-SUB connector (e.g., SUBCON-PLUS-PROFIB, Order No. 27 44 34 8). Please refer to the pin assignment in the following table:

Pin	Assignment
1	Reserved
2	Reserved
3	RxD/TxD-P (receive/send data +), cable B
4	CNTR-P (control signal for repeater), direction control
5	DGND (reference potential up to 5 V)
6	VP (supply voltage +5 V for terminal resistors)
7	Reserved
8	RxD/TxD-N (receive/send data -), cable A
9	Reserved

### Line Terminal Resistors

Since PROFIBUS-DP is a serial bus system in a line or tree structure, the individual branches must be terminated with a terminal resistor. The PROFIBUS-DP/V1 Bus Coupler does not have a resistor of this type. For additional information, please refer to your PROFIBUS documents. Phoenix Contact recommends using the PROFIBUS connector SUBCON-PLUS-PROFIB, Order No. 27 44 34 8. This connector has a terminal resistor that can be connected.

### Supplying the Operating Voltages

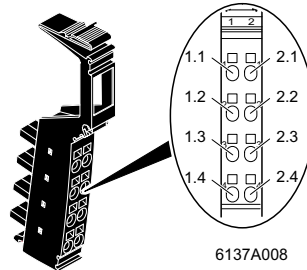


Figure 4 Terminal assignment for the PROFIBUS-DP/V1 Bus Coupler power connector

Terminal Points	Remark
1.1, 2.1	Segment supply (+24 V DC)
1.2, 2.2	Main supply, bus coupler supply, communications power, and interface supply (+24 V DC)
1.3, 2.3	Reference potential
1.4, 2.4	Functional earth ground (FE)

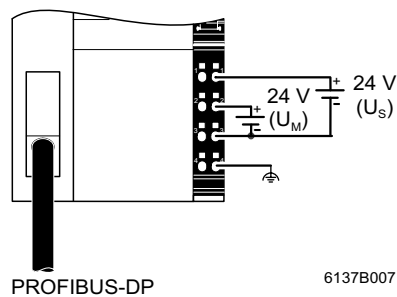
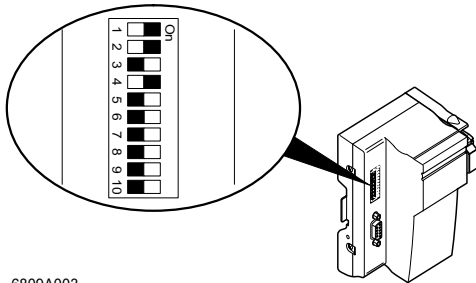


Figure 5 Connection wiring plan for the PROFIBUS-DP/V1 Bus Coupler

Connect the PROFIBUS-DP/V1 Bus Coupler according to Figure 5.

## Hardware Configuration

Configure the hardware on the PROFIBUS-DP/V1 Bus Coupler using the 10-pos. DIP switch. The PROFIBUS address and other PROFIBUS-DP/V1 Bus Coupler settings can be set using this switch. The meaning of the switches is given in the following table.

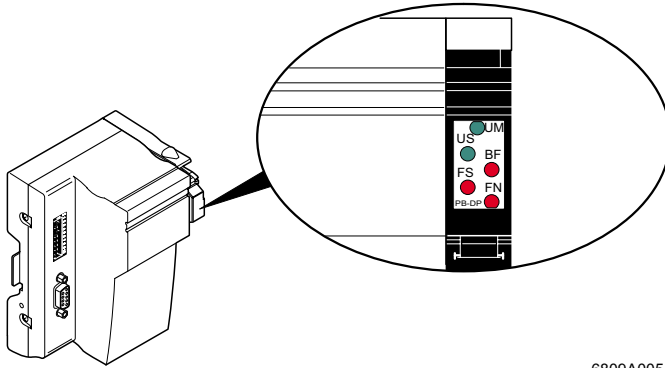


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Figure 6 PROFIBUS-DP/V1 Bus Coupler DIP switches

DIP Switch	Meaning
1 to 7	PROFIBUS address in binary format (0 - 127 in decimal format) Switch 1 defines the least significant bit ( $2^0$ ) and switch 7 defines the most significant bit ( $2^6$ ).
8	Inline station operating mode: ON = DP/V1 mode with acyclic communication, parameterization, safety values, etc. OFF = Can directly replace the previous version IL PB BK (Order No. 27 40 05 4) (Configuration of the stop response via parameter message)
9 to 10	Reserved; both switches <b>must</b> be in the OFF position.

Local LED Diagnostic Indicators



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Figure 7 Indicators on the PROFIBUS-DP/V1 Bus Coupler

LED	Color	Meaning	State	Description of the LED States
UM	Green	U <sub>Main</sub>	ON	24 V main circuit supply present
			OFF	Main circuit supply not present
US	Green	U <sub>Segment</sub>	ON	24 V segment supply present
			OFF	Segment supply not present
BF	Red	Bus Fault	ON	No communication on PROFIBUS
			OFF	No error
BF	Red	Bus Fault	Flashing	Outputting safety values.
			ON	If FS is on, FN indicates the error type
			OFF	If FS is not on, FN indicates the error number
FN	Red	Failure Number	Flashing	The number of flashing pulses indicates the type of error or the error number, depending on whether FS is on or not
			OFF	No error

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**Standard and Device-Related Diagnostics for PROFIBUS**

<b>Error Type</b>	<b>Meaning</b>
<b>1</b>	<b>Parameter Error on PROFIBUS (SET_PRM Telegram)</b>
<b>2</b>	<b>Configuration Error on PROFIBUS (CHK_CFG Telegram)</b> Detailed information about the PROFIBUS configuration error is represented by eleven different error numbers.
<b>3</b>	<b>Configuration Error in the Inline Station</b> Detailed information about the Inline station configuration error is represented by seven different error numbers.
<b>4</b>	<b>Local Bus Error Within the Station</b> Detailed information about INTERBUS errors within the station is represented by six different error numbers.
<b>5</b>	<b>Module Error</b>
<b>6</b>	<b>Parameter Error on the Local Bus</b>
More detailed information about error causes and remedies can be found in the user manual.	

## Explanation of Station Error Messages

Abbrev	Meaning
K	Indicates short circuit and overload of an output or an initiator supply
A	Indicates failure of the Loop 2 main power, segment voltage or sensor supply
S	Indicates faulty fuse
O	Indicates output overload
P	Indicates failure of the internal supply voltage
D	Indicates open circuit in TC operation
L	Indicates failure of or insufficient communications power $U_L$
T	Temperature warning protocol chip
U	Loop 2 undervoltage
H	Hardware fault
M	Motor overtemperature
ST	Indicates selftest error




## Technical Data


General Data	
Order designation	VARIO BK DP/V1
Housing dimensions (width, including latching x height x depth)	91 mm x 120 mm x 71.5 mm (3.583 x 4.724 x 2.815 in.)
Weight	210 g (without connectors)
Degree of protection	IP 20 according to IEC 60529
Class of protection	Class 3, according to VDE 0106, IEC 60536



System Data	
Number of devices per station	63, maximum
Sum of all I/O data per station	184 bytes, maximum in compatible mode 176 bytes, maximum in DP/V1 mode
Maximum bus coupler current for supplying the logic of I/O terminals	2 A at $U_L$
Maximum current for supplying the analog terminals	0.5 A at $U_{ANA}$

PROFIBUS-DP Interface
Copper cable (RS-485), connected via D-SUB shield connector; supply electrically isolated, shielding directly connected with functional earth ground.

24 V Main Supply $U_M$ (Main Supply, Bus Coupler Supply, Communications Power, and Interface Supply)	
Connection method	Spring-clamp terminals
Recommended cable lengths	30 m (98.43 ft.), maximum; do not route cable through outdoor areas
Voltage continuation	Through potential routing
Nominal value	24 V DC
Tolerance	-15%/+20% (according to EN 61 13 1-2)
Ripple	±5%
Permissible range	19.2 V to 30 V (ripple included)
Minimum current consumption at nominal voltage	0.1 A DC (no-load operation, i.e., incoming PROFIBUS is plugged in, no Inline devices are connected)

24 V Main Supply $U_M$ (Main Supply, Bus Coupler Supply, Communications Power, and Interface Supply)	
Maximum current consumption at nominal voltage	1.25 A DC, consists of: 0.75 A DC for communications power 0.5 A DC for analog voltage supply
Safety measures	
Surge voltage	Yes
Polarity reversal	Yes
	<p><b>Provide an external fuse for the 24 V area</b></p> <p>This 24 V area must be externally protected. The power supply unit must be able to supply 4 times the nominal current of the external fuse, to ensure that it trips in the event of an error.</p>

24 V Segment Supply $U_S$	
Connection method	Spring-clamp terminals
Recommended cable lengths	30 m (98.43 ft.), maximum; do not route cable through outdoor areas
Voltage continuation	Through potential routing
Nominal value	24 V DC
Tolerance	-15%/+20% (according to EN 61 13 1-2)
Ripple	±5%
Permissible range	19.2 V to 30 V (ripple included)
Current carrying capacity	8 A, maximum
Safety measures	
Surge voltage	Yes
Polarity reversal	Yes
	<p><b>Provide an external fuse for the 24 V area</b></p> <p>This 24 V area must be externally protected. The power supply unit must be able to supply 4 times the nominal current of the external fuse, to ensure that it trips in the event of an error.</p>

Ambient conditions	
Ambient temperature (operation) VARIO BK DP/V1	0°C to +55°C (+32°F to +131°F)
Ambient temperature (storage)	-25°C to +85°C (-13°F to +185°F)
Humidity (operation)	75% on average, 85% occasionally
 In the range from 0°C to +55°C (+32°F to +131°F) appropriate measures against increased humidity (> 85%) must be taken.	
Humidity (storage)	75% on average, 85% occasionally
 For a short period, slight condensation may appear on the outside of the housing if, for example, the terminal is brought into a closed room from a vehicle.	
Air pressure (operation)	80 kPa to 106 kPa (up to 2000 m [6562 ft.] above sea level)
Air pressure (storage/transport)	70 kPa to 106 kPa (up to 3000 m [9843 ft.] above sea level)

Conformance With EMC Directive 89/336/EEC		
Noise Immunity Test According to EN 50082-2		
Electrostatic discharge (ESD)	EN 61000-4-2/ IEC 61000-4-2	Criterion B 6 kV contact discharge 8 kV air discharge
Electromagnetic fields	EN 61000-4-3 IEC 61000-4-3	Criterion A Field strength: 10 V/m
Fast transients (burst)	EN 61000-4-4/ IEC 61000-4-4	Criterion A All interfaces: 1 kV
Surge voltage	EN 61000-4-5/ IEC 61000-4-5	Criterion B DC supply lines: 0.5 kV/1 kV (symmetrical/asymmetrical) Fieldbus cable shielding 1 kV
Conducted interference	EN 61000-4-6 IEC 61000-4-6	Criterion A Test voltage 10 V
Noise Emission Test According to EN 50081-2		
Noise emission of housing	EN 55011	Class A

## Ordering Data

Description	Order Designation	Order No.
PROFIBUS-DP/V1 Bus Coupler (with end plate, disk with GSD file, connector, and labeling field)	VARIO BK DP/V1	KSVC-101-00011

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