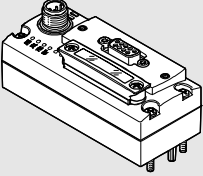


Universal bus node
CTEU-PB



Description
Original instructions
Installation and interfaces

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Bus node, type CTEU-PB
Fieldbus protocol PROFIBUS-DP

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1 Installation
1.1 Instructions on this description
This description contains information for mounting the Busknoten on an I-port-compatible device from Festo (e.g. valve terminal with I-port interface) and for installation of this combination in a higher-level control system.

..... **Note**

This description is part I of the total product documentation on the bus node. Information on commissioning, control connection, diagnostics and error elimination of the bus node can be found in part II of the description under → www.festo.com → Support Portal → User documentation.

1.2 General instructions
The bus node documented in this description has been designed exclusively for use as a station (slave) on the PROFIBUS-DP fieldbus. It may only be used in its original status without unauthorised modifications and only in perfect technical condition.
The bus node is intended for use in an industrial environment. Measures for interference suppression may need to be implemented in residential areas.
The target group of this description consists of trained specialists in control and automation technology who have experience with installation of stations on the PROFIBUS-DP fieldbus.



..... **Warning**

Danger of injury through uncontrolled movements of connected equipment.
Make sure that electrical and pneumatic equipment are in a de-energised and pressureless status.

Before working on the pneumatics:

- Switch off the compressed air supply
- Vent the valve terminal

Before working on the electrical components, e.g. before installation or maintenance work:

- Switch off power supply

In this way, you can avoid:

- uncontrolled movements of loose tubing
- accidental and uncontrolled movements of the connected actuators
- undefined switching states of the electronics

..... **Note**

The bus node includes electrostatically sensitive devices.

- Do not touch the electrical contacts of the components.
- Observe the handling specifications for electrostatically sensitive devices.

They will help you avoid damage to the electronics.

..... **Note**

Use protective caps or blanking plugs to seal unused connections. You will then achieve protection class IP65.

..... **Note**

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 For all available product documentation → www.festo.com/pk

1.3 Mounting

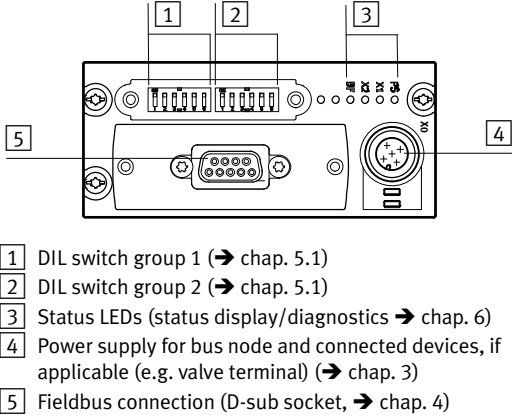
..... **Note**

Information on mounting the bus node on the decentralised electrical connection box type CAPC-... can be found in the assembly instructions that accompany the sub-base.

For mounting the bus node on a valve terminal with I-Port interface, proceed as follows:

1. Inspect the seals and sealing surfaces on bus node and valve terminal.
2. Plug the bus node onto the valve terminal in the right position and without tilting.
3. First, lightly screw in the three self-tapping screws with a Torx screwdriver (size T10). Use existing threads, if available.
4. Tighten the screws with 1.0Nm.

2 Connection, display and operator control element
The following electrical connection, display and operator control elements can be found on the bus node:

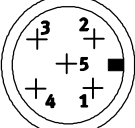


3 Power supply
The bus node has separate operating and load voltage supplies. The bus node also supplies voltage to equipment connected via the I-port interface.

..... **Note**

- Use for the electrical power supply only PELV circuits in accordance with IEC/EN 60204-1 (Protective Extra-Low Voltage, PELV). Also take into account the general requirements for PELV circuits per IEC/EN 60204-1.
- Only use power sources which guarantee reliable electrical isolation of the operating voltage in accordance with IEC/EN 60204-1.
- Always connect the circuits for both signal and load voltage supply.

Through the use of PELV circuits, protection against electric shock (protection against direct and indirect contact) is ensured in accordance with IEC/EN 60204-1.

Power supply connection (M12, A-coded)	Pin	Allocation	Function
	1	24 V _{EL} /SEN	Power supply (PS)
	2	24 V _{VAL} /OUT	Load voltage supply (PL)
	3	0 V _{EL} /SEN	Power supply (PS)
	4	0 V _{VAL} /OUT	Load voltage supply (PL)
	5	FU ¹⁾	Functional earth
¹⁾ The connection to functional earth must be ensured via the connected device or electrical connection box CAPC-....			

For the connection to power supply units or the power supply, use cables with M12 coupling (plug socket), A-coded, in accordance with IEC 61076-2 (→ Accessories → www.festo.com/catalogue).

Functional test:

- The “PS” LED is illuminated green if the operating and load voltage supplies for the valves are correct.
- The LEDs X1 or X2 are lit green when a device is connected (→ chap. 6).

4 Connecting the fieldbus

..... **Note**

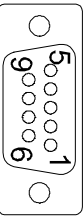
Faulty installation and high transmission rates may cause data transmission errors as a result of signal reflections and attenuations.

- Always use a bus terminal on both ends of the fieldbus segment in accordance with EN 50170.
- Connect the screening of the fieldbus cables continuously at all interfaces and earth at least one end of the fieldbus cable capacitively to avoid compensating currents.
- Observe the specifications in the manuals of your control system regarding cable type, usable T-adapters and max. length of branch lines.
- In calculating the max. permissible length of the fieldbus cable dependent on the baud rate used, also consider the sum of the length of the branch lines and branches.

4.1 Cable specification
For fieldbus communication, Festo recommends the following:

- For fieldbus communication, use at least a screened two-wire cable in accordance with EN 50170.
- Connect the screening of the fieldbus cable to the fieldbus plugs.

4.2 D-sub plug at the bus node
There is a 9-pin D-sub socket on the bus node for connecting the bus node to the fieldbus (for pin allocation, see table).

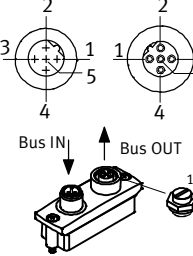
D-sub socket	Pin	Signal connection	Description
	1	Screening	Connection to functional earth FE
	2	n.c.	not connected
	3	RxD/TxD-P	Received/transmitted data P
	4	CNTR-P ¹⁾	Repeater control signal ¹⁾
	5	DGND	Data reference potential (M5V)
	6	VP	Supply voltage positive (P5V)
	7	n.c.	not connected
	8	RxD/TxD-N	Received/transmitted data N
	9	n.c.	not connected
Housing	Screening		Connection to functional earth FE

¹⁾ The repeater control signal CNTR-P is a TTL signal.

4.3 Connection technology
With fieldbus plugs or fieldbus adapters from Festo (→ subsequent table), you can separate the fieldbus connection from the bus node without interrupting the communication of the remaining fieldbus stations.

Fieldbus plug
Use the fieldbus plug type FBS-SUB-9-GS-DP-B from the Festo accessories if you use cables that are not pre-assembled.

Fieldbus adapter
You can use the following fieldbus adapters for connecting and forwarding the fieldbus connection.

Fieldbus adapter	Pin	Bus IN	Bus OUT
 Bus connection, type FBA-2-M12-5POL-RK, reverse key, B-coded	1	n. c.	VP (P5V)
	2	RxD/TxD-N	RxD/TxD-N
	3	n. c.	DGND (M5V)
	4	RxD/TxD-P	RxD/TxD-P
	5	FE	FE
M12 thread: functional earth FU, screening			
¹⁾ At a fieldbus segment: plug with bus termination resistor required if connection remains unused. At a branch line: protective cap required if this connection remains unused. In this way, you achieve protection class IP65.			

Connection with fibre-optic cables (FOC)
The PROFIBUS-DP interface of the bus node corresponds to the specification EN 50170-2 and supports the control of network components for fibre-optic cables.
Use fibre-optic cables for transmission in environments subject to heavy interference as well as for extending the working range at high baud rates.

Examples for fibre-optic cable network components:

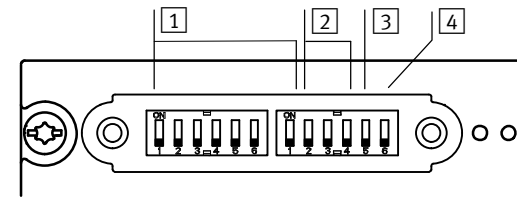
- Siemens Optical Link Module (OLM) for PROFIBUS plus
- Siemens Optical Link Plug (OLP) for PROFIBUS (IP 20)
- Harting Han-InduNet® media converter IP 65 (optical data transmission in the DESINA installation concept)

5 Basic settings for fieldbus communication
5.1 Removal of the DIL switch cover
To set the bus node, the cover of the DIL switches must be removed:

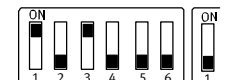
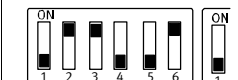
1. Switch off the power supply.
2. Unscrew the two mounting screws of the transparent cover and remove the cover.

5.2 Setting the DIL switches
Proceed as follows:

1. Assign a still unused station address to the bus node.
2. Set the diagnostics and fail-state mode.



Item	DIL switch ¹⁾	Function	
		ON	OFF
DIL switch group 1:			
[1]	1 ... 6: station address, binary-coded ²⁾		
DIL switch group 2:			
[1]	1: station address, binary-coded ²⁾		
[2]	2: reserved		
[3]	5: diagnostics	Diagnostic information is sent	Off (default)
[4]	6: Fail state ³⁾	Hold last state	Reset (default)
1) Switch setting "ON" = ON, switch is to the left or on top switch setting "OFF" = OFF switch is to the right or underneath 2) binary coding in ascending order from left to right 2⁰, 2¹, 2², ... 3) Applies for all outputs and is effective if the address monitoring via the fieldbus was previously activated.			

Example: set station address: 05	Example: set station address: 38
	

5.3 Mounting of the DIL switch cover
1. Place the cover carefully on the bus node. Make sure that the seal is seated correctly!
2. Tighten the two mounting screws with max. torque of 0.4 Nm.

6 Switching on the power supply
From the perspective of the bus node, any sequence can be used to switch on the voltage supply within the fieldbus system.

Functional test:
The “PS” LED und “X1” or “X2“-LED light green and the “BF” LED is off if communication is built up to the master and a connected device.

7 Status display/diagnostics via LEDs	
PS (power system) – power sensor/signal supply	
LED display	Status and significance
	LED illuminated green: – normal operating status – Operating and load voltage present and in the permissible range ¹⁾
	LED flashes green (flashing frequency OFF to ON is 1 to 1) – Undervoltage in operating or load voltage supply
	LED is off: – Operating voltage is not present or not in the permissible range.
¹⁾ Requirement: the connected device uses and monitors the load voltage	

X1 or X2 ¹⁾ - Internal communication between bus node and device 1 or 2 ¹⁾	
LED display	Status and significance
	LED illuminated green: – normal operating status – Device is connected correctly to the bus node.
	LED flashes green: – Diagnostics are running and/or diagnostic data are on hand. – Data connection between bus node and device OK
	LED illuminated red: – Device is connected to the bus node, but communication is disrupted. – An incorrect device has been removed after commissioning.
	LED flashes red: – During commissioning, non-I-port-compatible or non-configured device recognised – If X1 and X2 flash red simultaneously: no device is connected to the bus node or configuration error
	LED is off: – Connection is being established. – No device is connected to the corresponding I-port interface
¹⁾ Electrical connection box CAPC with two interfaces for connecting a second device is required.	

BF (bus error)	
LED display	Status and significance
	LED illuminated red: – Hardware error at the bus node – Fieldbus communication is not available or has failed. – Voltage supply at the master or the controller has failed.
	LED flashes red (with high frequency): – Station address assignment is defective.
	LED flashes red (with low frequency): – Fieldbus communication is interrupted.
	LED is off: – Normal operating status, fieldbus communication is built up.

..... **Note**

Further information on the status indicator, diagnostics and error elimination can be found in part II of the description.

8 Technical data	
General	
Degree of protection (in accordance with EN 60529)	IP65/67 ¹⁾ ²⁾
Corrosion protection	CRC 2 Medium protection against moderate corrosion through contact with typical industrial atmosphere (e.g. water vapour condensation, coolant and lubricants).
Protection against electric shock (protection against direct and indirect contact to IEC/EN 60204-1)	by means of PELV circuit (Protected Extra Low Voltage)
Vibration and shock resistance (in accordance with EN 60068) – Vibration (part 2 - 6) – Shock (part 2 - 27) – Continuous shock (part 2 – 29)	Severity level (SL) ³⁾ for mounting on Wall: SL 2, H-rail: SL 1 Wall: SL 2, H-rail: SL 1 Wall and H-rail: SG 1
Temperature range – Environment, operation – Storage/transport	-5 ... +50°C -20 ... +70°C
Materials	PA reinforced, PC, NBR, RoHS-compliant circuit boards, galvanized steel, nickel-plated brass
¹⁾ Requirement: Bus node mounted completely, plug connector in the plugged-in status or provided with protective cap. ²⁾ Observe that connected devices may only satisfy a lower protection class, a smaller temperature range, etc. ³⁾ Explanation of the severity level → following table “Explanation on vibration and shock – severity level”	

Explanation on vibration and shock – severity level	
Severity level 1 (SG1, in accordance with EN 60068, part 2 – 29)	Vibration: 0.15 mm path at 10 ... 58 Hz; 2 g acceleration at 58 ... 150 Hz Shock: ±15 g at 11 ms duration; 5 shocks per direction Continuous shock: ± 15 g at 6 ms duration; 1000 shocks per direction
Severity level 2 (SG2, in accordance with EN 60068, part 2 – 27)	Vibration: 0.35 mm path at 10 ... 60 Hz; 5 g acceleration at 60 ... 150 Hz Shock: ± 30 g at 11 ms duration; 5 shocks per direction Continuous shock: n. a.

Power supply	
Power supply to bus node/equipment ¹⁾ – Operating voltage (nominal value/tolerance range, polarity-safe) – Load voltage (range)	DC 24 V (18 ... 30 V) DC 18 ... 30 V ²⁾
Intrinsic current consumption of bus node at DC 24 V	Max. 100 mA
Load capacity of the operating and load voltage supply – Bus node on device (e.g. valve terminal) – Bus node on electrical connection plate, type CAPC-... (X ₁ u. X ₂)	max. 4 A max. 2 A
Mains buffering time	10 ms
Isolation of fieldbus interface at V _{EL} /SEN	Galvanically isolated
1) Separate, external fuses are required for operating and load voltage supply. 2) Dependent on the connected device (e.g. valve terminal)	

Technical data of the connected equipment can be found in the respective product documentation.