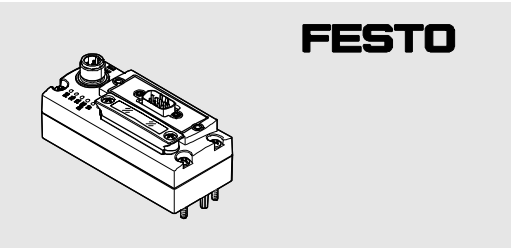


Universal bus node
CTEU-CO



Description
Original instructions
Installation and interfaces

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

1 Installation
1.1 General data
This description contains information about assembling the Busknoten on a suitable device (e.g. valve terminal) from Festo and about installing this combination in a higher-level control system.

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Note

- CANopen® and TORX® are registered trademarks of the respective trademark owners in certain countries.
- This description is part I of the complete product documentation for the bus node. For information about commissioning, control connection, diagnostics and error elimination for the bus node, see part II, “Function and maintenance description”, under ➔ www.festo.com ➔ Downloads ➔ Manual.

1.2 General information
The bus node type CTEU-CO described in this manual has been designed exclusively for use as a slave on the CAN-open 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 industrial areas. For residential use, measures may need to be taken to suppress interference.
This manual is intended for technicians trained in control and automation technology who have experience in installing slaves on the CANopen fieldbus.

Warning

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

Before working on the pneumatic components:

- Switch off the compressed air supply
- Vent valve terminals

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
- Unexpected and uncontrolled movements of the connected actuators
- Undefined switching states of the electronic components

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Note

The bus node contains electrostatically sensitive devices.

- Do not touch any electrical/electronic components.
- Observe the handling specifications for electrostatically sensitive devices.

They will help you avoid damage to the electronics.

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Note

Use protective caps or blanking plugs to seal unused connections. You will then comply with protection class IP65/67.

1.3 Assembly

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Note

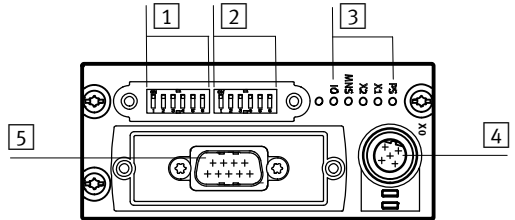
For information about connecting the bus node to the decentralised electrical connection box, type CAPC-..., see the assembly instructions included with the connection box.

To connect the bus node, you require a Festo valve terminal with an I-port interface.

1. Check the seals and sealing surfaces on the bus node and valve terminal.
2. Push the bus node onto the valve terminal in the correct position and without twisting it.
3. First, lightly tighten the three self-tapping screws with a TORX screwdriver (size T10). If present, use existing threads.
4. Tighten the screws at 1.0 Nm.

Bus node, type CTEU-CO en

2 Connection and display components
The following electrical connection and display components can be found on the bus node:



- 1** DIL switch group 1 (➔ chapter 5.1)
- 2** DIL switch group 2 (➔ chapter 5.1)
- 3** Status LEDs (status display and diagnostics ➔ chapter 6)
- 4** Power supply for bus node and any connected equipment (e.g. valve terminals) (➔ chapter 3)
- 5** Fieldbus connection (sub-D connector, ➔ chapter 4)

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

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Note

- Use only PELV **circuits** as per IEC/DIN EN 60204-1 for the electric power supply (protective extra-low voltage, PELV). Also comply with the general requirements for PELV circuits laid down in IEC/DIN EN 60204-1.
- Use only **power sources** that guarantee reliable electrical isolation of the operating voltage as per IEC/ DIN EN 60204-1.
- Always connect both the circuits for the signal and load voltage supplies.

Protection against electric shock (protection against direct and indirect contact) is guaranteed in accordance with IEC/DIN EN 60204-1 (electrical equipment of machines, general requirements) by using PELV power circuits.

M12 connection	Pin	Allocation
	1	24 V _{EL} /SEN
	2	24 V _{VAL} /OUT
	3	0 V _{EL} /SEN
	4	0 V _{VAL} /OUT
	5	FE ¹⁾
1) Connection to the functional earth must be guaranteed via the connected device or the CAPC-... electrical connection box.		

For connecting to power packs or power supplies, use cable with M12 sockets, B-coded, DIN EN 61076-2-101 (➔ Accessories ➔ www.festo.com/catalogue).
The “PS” LED lights up green if the power supply is present and correct in both circuits. LED X1 or X2 lights up if a device is connected (➔ chapter 6).

4 Connecting the fieldbus

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Note

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

- Always use a terminating resistor (120 Ω, 0.25 W) at either end of the fieldbus, between the wires for CAN_H and CAN_L.
- Connect the screening continuously to all the fieldbus cables and earth the screening once only, in order to avoid ground loops.
- Avoid transmitting signals over long distances.
- In the manuals for your control system, note the specifications for the cable type, usable T-adaptor and max. length of branch lines or branches.
- When calculating the max. permissible length of fieldbus cable, depending on the baud rate used, also take into account the total length of branch lines and branches.

Sub-D plug connector on the bus node
There is a 9-pin sub-D connector on the bus node for connecting the bus node to the fieldbus.

Sub-D plug connector	Pin	Signal connection	Description
	1	n.c.	Not connected
	2	CAN_L	CAN bus low
	3	CAN_GND	Bus power supply (0V) ¹⁾
	4	n.c.	Not connected
	5	CAN_SHLD	Connection to functional earth (FE)
	6	GND	Ground ¹⁾
	7	CAN_H	CAN bus high
	8	n.c.	Not connected
	9	CAN_V+	Bus power supply (24 V DC) ¹⁾
1) optional, not used by the bus node			

Fieldbus cable/line
Festo recommends using a twisted-pair screened 4-wire cable.

- For fieldbus communication, use at least one screened 2-wire cable (CAN_H/L).
- Connect the fieldbus cable's screening to the fieldbus plug.

Fieldbus plug from Festo
With the Festo fieldbus plug (type FBS-SUB-9-BU-2x5POL-B), you can separate the plug from the bus node without interrupting fieldbus communication.
Bus plug for further fieldbus communication
With the following fieldbus plugs/adapters you can implement a T-adaptor by using the two female connectors to transmit the fieldbus.

Fieldbus plug/adaptor	Pin	Allocation
Bus connection, type FBA-2-M12-5POL ¹⁾ 	1	Functional earth (FE)
	2	Bus power supply (24 V DC)
	3	Bus power supply (0 V)
	4	CAN_H
	5	CAN_L
Bus connection, type FBA-1-SL-5POL with type FBSD-KL-2X5POL ²⁾ 	1	Bus power supply (0 V)
	2	CAN_L
	3	Functional earth (FE)
	4	CAN_H
	5	Bus power supply (24 V DC)
1) Protective cap or plug with bus termination resistor needed if connection is not used. 2) Use cables with a minimum cross-section of 0.34 mm ² .		

5 Basic settings for fieldbus communication
5.1 Removing the DIL switch cover
To set the bus node, you have to remove the cover for the DIL switch:

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

5.2 Setting the DIL switches
With the DIL switches, you can set the following parameters for the bus node (incl./excl. connected equipment):

Item	DIL switch	Function	
		ON	OFF
DIL switch group 1:			
1	1 ... 6: Station number, binary coded		
DIL switch group 2:			
1	1: Station number, binary coded		
2	2: Reserved		
3	3 ... 4: Baud rate	4 1000 kBaud 3 500 kBaud	4 250 kBaud 3 125 kBaud
4	5: Diagnostics	Emergency message sent	Off (default)
5	6: Fail state ¹⁾	Hold last state	Reset (default)
1) Applies for all outputs and is only effective if it was previously activated via fieldbus (e.g. node guarding or heartbeat)			

Proceed as follows:

1. Assign an unused station number to bus node.
2. Set the baud rate.
3. Set the diagnostics and fail state mode.

The “MNS” LED lights up green if communication with the PLC is error free (➔ chapter 6).

Examples of binary coded station numbers

Example: station number set: 05	Example: station number set: 38

5.3 Fitting 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 fastening screws at first by hand and then with torque 0.4 Nm.

6 Status display/diagnostics via LEDs	
PS (power system) — power sensor/signal supply	
LED display	Status and meaning
	LED lights up green: – Normal operating status – Signal voltage is applied (in permitted range) – Load voltage is applied ¹⁾ (in permitted range)
	LED flashes green (flash frequency OFF to ON is 1 to 1) – Signal voltage is below the necessary level – Load voltage is below the necessary level ¹⁾ – Short circuit at I-port ¹⁾
	LED is off: – Signal voltage is not applied
1) Display depends on whether the connected device monitors the load voltage and reports it to the CTEU.	

X1 or X2 ¹⁾ - internal communication between bus node and device 1 or 2 ¹⁾	
LED display	Status and meaning
	LED lights up green: – Normal operating status – Device is connected correctly to the bus node – Load voltage is applied. – No error present.
	LED flashes green: – Diagnostics running or diagnostic data available. – Undervoltage applied at additional power supply. – Connection between bus node and device OK
	LED lights up red: – Device is connected to bus node but communication is interrupted. – After commissioning, the wrong device was connected.
	LED flashes red: – Incorrect device connected during commissioning (device is not I-port-compatible) – Additionally, for LED X1: error in the bus module
	LED is off: – Connection in progress. – No device connected to bus node
1) Separate accessory with two interfaces needed to connect an additional device.	

MNS (network status)	
LED display	Status and meaning
	LED lights up red: – Fieldbus communication not present or failed. – Power supply to/via fieldbus failed.
	LED flashes red: – Communication error - fieldbus communication interrupted
	LED is off: – Normal operating status, no communication error to the fieldbus

I/O (I/O status)	
LED display	Status and meaning
	LED lights up green: – Normal operating status, communication with PLC OK.
	LED flashes green quickly: – Ready status in preparation LED flashes green slowly: – Bus interruption – Incorrect station number in node (DIL-switch) or in master (control system)
	LED is off: – Fieldbus has not been commissioned – No bus connected

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Note

For more information about the status display, diagnostics and error elimination, see part II, “Function and maintenance description”.

7 Technical data	
General information	
Protection class (to EN 60529)	IP65/67 ¹⁾ 2)
Corrosion protection	CRC 2
Protection against electric shock (protection against direct and indirect contact as per EN 60204-1/IEC 204)	With a PELV power pack (Protected Extra Low Voltage)
Vibration and shock (acc. to DIN/ IEC 68/EN 60 068) – Vibration (parts 2 – 6) – Shock (parts 2 – 27) – Continuous shock resistance (parts 2 – 29)	Severity level (SL) when fitted to Wall: SL 2, H-rail: SL 1 Wall: SL 2, H-rail: SL 1 Wall and H-rail: SL 1
Temperature range – Storage/transport – Ambient, operation	-20 ... +70 °C -5 ... +50 °C
Materials	PA-reinforced, PC, silicone rubber seals, RoHS-compliant circuit boards

- 1) Requirement: bus node fitted completely, plug connector inserted or provided with protective cap.
- 2) Note that, under certain circumstances, the connected equipment may have a lower protection class, a lower temperature range, etc.

Operating voltage supply	
Fieldbus interface operating voltage ¹⁾ – Signal voltage (nominal value, polarity-safe) – Load voltage (range)	DC 24 V (18 ... 30 V) DC (18 ... 30 V) ²⁾
Intrinsic current consumption – Electronics bus node – Bus node on device (e.g. valve terminal) – Bus node on electrical connection box, type CAPC-... (X₁ and X₂)	max. 65 mA max. 120 mA max. 175 mA
Current consumption (resultant current) for signal and load voltage supply	max. 4 A
1) An external fuse is required for signal and load voltage. 2) Depending on the device connected (e.g. valves)	

The technical data for the connected equipment can be found in the relevant product documentation.