

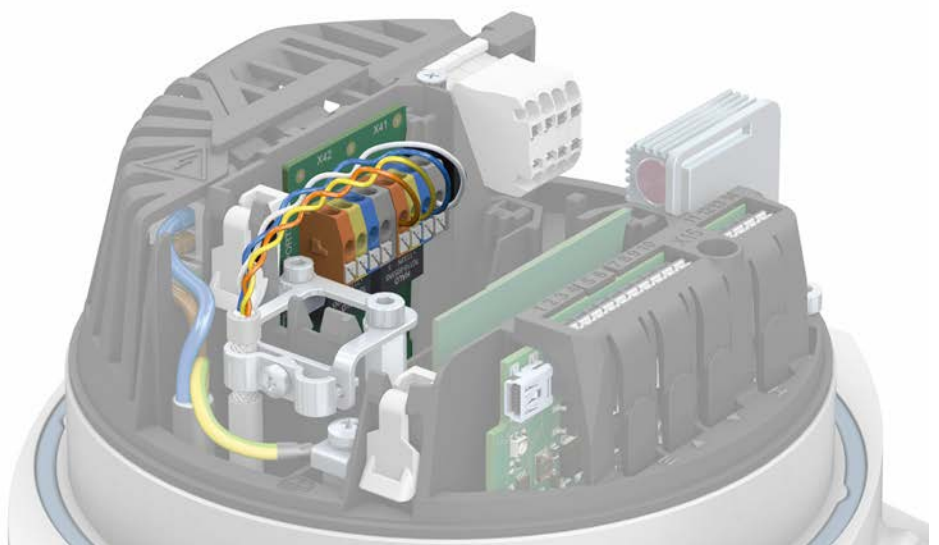
PROFOX actuators

PF-M5(X) – PF-M100(X)

PF-Q20(X) – PF-Q600(X)

PF-L2(X) – PF-L18(X)

Profinet



Use short instructions in combination with operation instructions only!

These short instructions are only complete with the respective operation instructions of the actuator. Safety and warning instructions contained in the actuator operation instructions must be heeded when performing work on the actuator!

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1 Basic information on network connection

Electrical connection The electrical connection of the actuator must be opened to be able to connect the network cables.

Refer to actuator operation instructions, "Electrical connection" chapter.

Information: The Electrical connection chapter of the operation instructions fully applies to the connection of the network cables. It is imperative to heed the safety and warning instructions of this chapter in particular.

Profinet cables For Profinet networks, the following minimum requirements with regard to the LAN cables used apply: Category 5 according to ISO/IEC 11801 Edition 2.0 Class D. Connector is suitable for wiring dual pair Profinet cables. The following tables list the available cable types, Profinet types A through C with regard to the respective application:

Table 1: Cable types for dual pair Profinet cables

Cable types	Application type A	Application type B	Application type C
Version	Dual pair data cable	Dual pair data cable	Dual pair data cable
Type of installation	Fixed installation, immobile after installation	Flexible installation, occasional movement, vibration or twisting after installation	Special applications (e.g. for continuous movement, vibration or torsion)
Cable parameter			
Marking	EtherNet/IP or PROFINET type A	EtherNet/IP or PROFINET type B	EtherNet/IP or PROFINET type C
Cross section	AWG 22/1 ≥ 0.318 mm²	AWG 22/7 ≥ 0.318 mm²	AWG 22/.. ≥ 0.318 mm²
Outer cable diameter	5.5 – 8.0 mm		depending on the application
Wire diameter	1.4 ± 0.2 mm		depending on the application
Colour of sheath	Green RAL6018		depending on the application
Colour of wire insulation	Pair 1: white, blue Pair 2: yellow, orange		
Number of wires	4		
Cable design	Dual pair or star quad		
Shield	Aluminium foil + copper braid		depending on the application
Communication requirements			
Applicable standards	ISO/IEC 11801 Edition 2.0 IEC 61140-1 IEC 61156-5 (minimum device group 5)		ISO/IEC 11801 Edition 2.0 IEC 61140-1 IEC 61156-6 (minimum device group 5)
Delay	≤20 ns/100 m		
Coupling attenuation	≥80 dB at 30 – 100 MHz “Channel Class D” according to EN 50174-2		

Minimum cable spacing The minimum spacing (according to IEC 61918) required between laying Profinet cables and other cables must be respected. They are shown in the table below.

Table 2: Minimum spacing for Profinet

	Distance to Profinet cable		
	Without or with non-metal cutoff bridge	Aluminium cutoff bridge	Steel cutoff bridge
Signal transmission cable			
E.g. other Profinet cables, Profibus cables, data cables for PCs, programming devices, shielded analogue inputs	0 mm	0 mm	0 mm
Power supply cables			
Unshielded power supply cables	200 mm	100 mm	50 mm
Shielded power cables	0 mm	0 mm	0 mm

Further references Ensure absence of equipotential earth bonding differences between the individual devices at Profinet (perform an equipotential earth bonding).

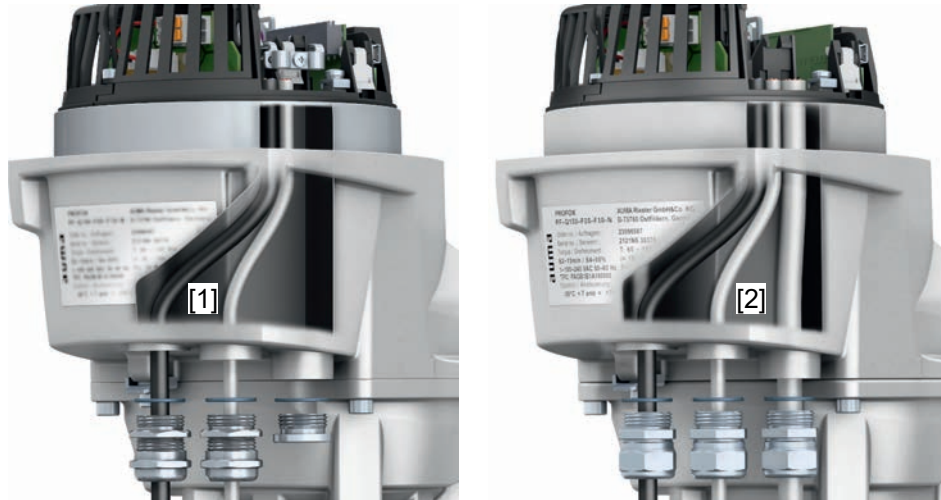
Available Profinet recommendations, particularly planning, assembly and commissioning guidelines of the Profibus User Organisation (PNO) (www.profibus.com) must be met.

2 Cable connection

Cable arrangement for actuators with fieldbus interface

Cable arrangement depends on the number of cables connected in addition to the mains cable. There are two options:

Figure 1: Cable arrangement of mains and fieldbus cables



[1] Cable arrangement for a mains cable and a fieldbus or a network cable

[2] Cable arrangement for a mains cable, a fieldbus or a network cable and a signal cable

NOTICE

Damage to spring clamp terminals by jamming of wire end sleeves with the housing!

Replacement of the complete component is required.

- Use wire end sleeve with **smooth surface!**
- To avoid unevenness at wire end sleeve, AUMA recommends using the CRIMP-FOX 6 model by Phoenix Contact as suitable crimping pliers.
- Unlock the spring clamp terminal: Unlock the respective spring clamp terminal with a screwdriver as shown and remove the signal cable.
- The signal cable can be pulled out **without resistance** if the spring clamp terminal is unlocked!



For better accessibility, we recommend heeding the following order.

1. If a signal cable is connected in addition to the fieldbus or network cable: Insert signal cable into cable gland on the right and push upward until the cable is visible.
2. Insert fieldbus or network cable into middle cable gland and push upward until the cable is visible.
3. Insert mains cable into cable gland on the left and also push upward until the cable is visible.
4. Remove cable sheathing.
5. Strip wires: Controls approx. 6 mm, power supply unit approx. 10 mm.
6. For flexible cables: Use wire end sleeves according to DIN 46228.

For the connection of mains and signal cables as well as for the protective earth connection refer to the operation instructions of the actuator.

3 Connect network cables

When connecting network cables, attention must be paid to the specialities of the deployed network topology.

When setting the cycle rate or the watchdog within Profinet controller, the delay times which result from the selected network topology must be considered.

Table 3: Explanation of symbols for topology

↑	from the previous device	↓	to the next device
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Figure 2: Point-to-point or star topology

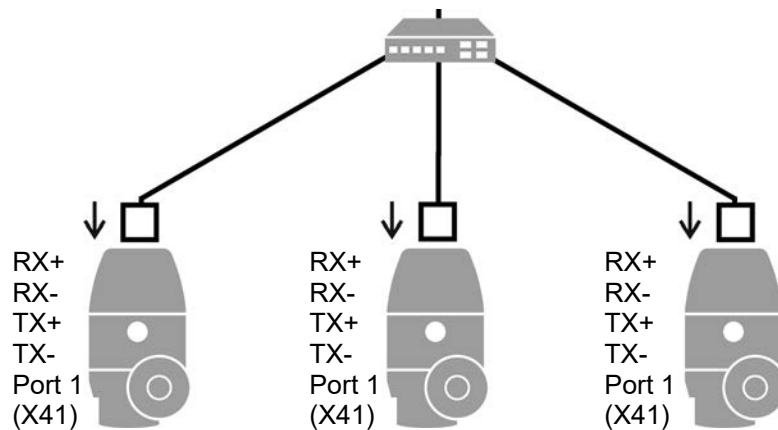
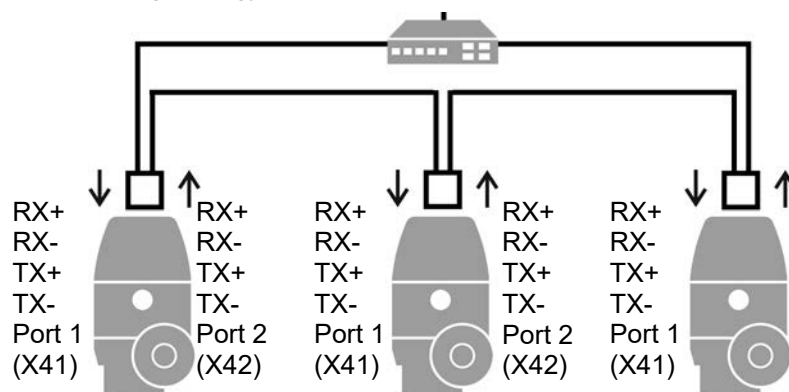
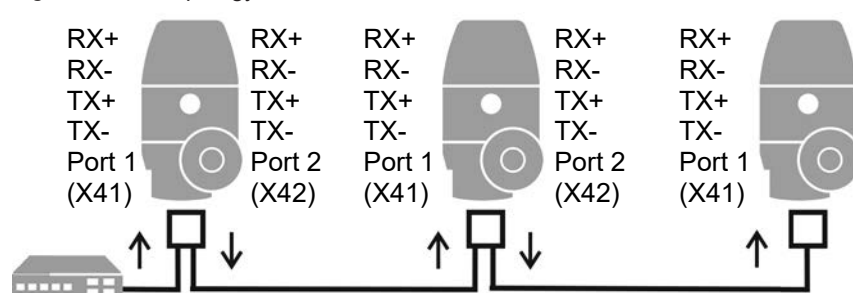


Figure 3: Ring topology



i If an actuator is part of a complete ring topology, the connection to other participants within the ring remains, even if the actuator is not supplied or defective. However, the ring is then interrupted, and a fault of a further ring participant leads to connection loss.

Figure 4: Line topology



i For Profinet, line topology is not recommended. If one participant fails, the other participants along the line are no longer accessible. Use ring topology instead.

WARNING

Risk of explosion!

Risk of death or serious injury!

- Prior to opening the device (removing the plug) ensure that the device is free of gas and voltage.
- Do NOT switch on voltage in potentially explosive atmospheres.

WARNING

In case of a fault: Hazardous voltage while protective earth conductor is NOT connected!

Electrical shock, risk of injuries or death.

- Connect all protective earth conductors.
- Connect PE connection to external protective earth conductor of connection cable.
- Power the device only once the protective earth conductor has been connected.

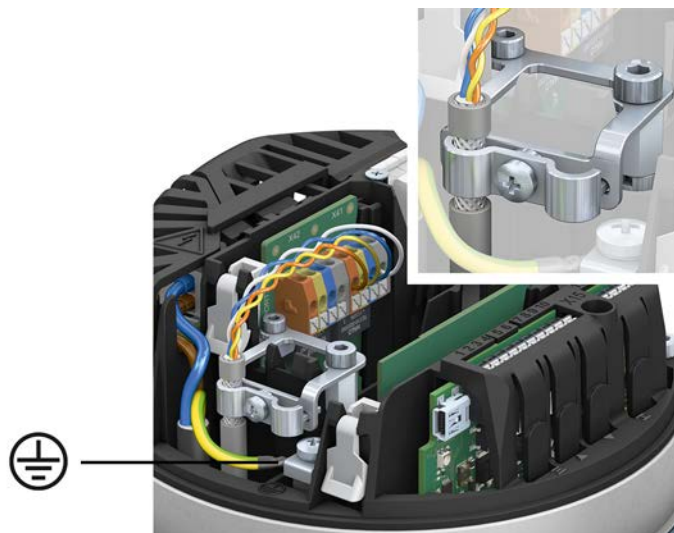


Stripped cables must be exposed for as short as possible. Leave the wires twisted until just before the terminal or do not untwist them.

Shield connection

1. Strip network cables.
2. Remove network cable shield at a short section and connect to the shield connection. Ensure that the shield has electrical contact to the terminal.
Information: Should cables be too thin for clamping, fold over the shielding and clamp it underneath.
Information: Strain relief must always be made via cable glands. For this, the shielding connection may not be used.

Figure 5: Shield connection



Connect network cable

3. Profinet Connect cables separately via Ethernet capable spring clamp terminals. The colour coding of the connection terminals matches the colours of the Ethernet cable (white/blue/yellow/orange).
 ⇒ Refer to Terminal cross sections table below.
 ⇒ Refer to Connection terminals table below.
4. If the PE conductor has been removed from the cover, it must be tightened applying 2.2 Nm tightening torque prior to re-placing the cover.
5. Fasten cable glands with the torque as specified by the manufacturer to ensure respect of required enclosure protection.
6. Connect power supply.



If the end position setting is carried out with the internal operation push buttons following the connection to the power supply: Do not close cover!

Table 4: Terminal cross sections

Designation	Wire type	Cross section	
		min. [mm ²]	max. [mm ²]
Network cables	solid	0.5	1.5
	flexible	0.5	1.5
	flexible with wire end sleeve without plastic sleeve	0.5	1.0
	AWG	AWG 20	AWG 16

Table 5: Connection terminal assignment

Signal	Function	Colour of wire insulation
TD +	Transmit Data +	Yellow
TD –	Transmit Data –	Orange
RD +	Receive Data +	White
RD –	Receive Data –	Blue

4 Parameters (Profinet)

Notifications

Feedback signals via Profinet can be configured using the engineering tool of the DCS/PLC and the GSD file of actuator (available for download at www.auma.com).

Refer to Manual PROFOX "Device integration Profinet" for information on control commands and feedback signals via Profinet.

Change-over between Profinet control and OPEN-CLOSE via I/O signals

As standard, the actuator is supplied with Profinet interface and digital inputs. A digital input is used to define which source is active, this means whether the actuator is controlled via Profinet or via I/O signals. It is not possible to use both sources to active simultaneously. The [PRM926] **Signal DIN3** signal is assigned to [PZD275] **I/O interface** as factory setting:

Not live (= 0 V) means that control is made from REMOTE via Profinet.

Live (= 24 V) means that control is made from REMOTE via binary I/O signals.

Commands for the operation function:

OPEN-CLOSE operation commands can be issued via Profinet or a setpoint can be sent for any position. Change-over is made via the [PZD332] **Fieldbus SETPOINT** command.

- Setpoint control:

Fieldbus SETPOINT command bit = 1 = REMOTE SETPOINT

The actuator reacts to the setpoint E1 transmitted via Profinet.

- OPEN-CLOSE control:

Fieldbus SETPOINT command bit = 0 = REMOTE OPEN-CLOSE

Actuator can be operated via **Fieldbus OPEN/Fieldbus CLOSE** command bits in direction OPEN or CLOSE.

5 Technical data PROFOX

Features and functions		
Profinet (acyclic services)	Access to parameters, the electronic name plate and the operating and diagnostic services with acyclic write/read services. Galvanically isolated towards I/O interfaces.	
Control via Profinet (input signals)	Operation commands and setpoint via Profinet interface	
I/O interface control (input signals)	Digital Inputs:	If in addition to Profinet, digital inputs (OPEN/CLOSE) are also used for positioning, the definition which command source in REMOTE is active for positioning is made via a digital input with the "I/O interface" signal. In the factory settings, this signal is assigned to the DIN3 digital input with the following values: 0 V = Profinet is active 24 V DC = I/O inputs are active
	Analogue input: (option)	If in addition to Profinet, an analogue input is used for positioning, the definition which command source in REMOTE is active for positioning is made via 2 digital inputs with these two signals. In the factory settings, the "I/O interface" is assigned to the DIN3 input and "MODE" to the DIN2 input with the following values: - I/O interface: Selection between fieldbus and I/O signals 0 V = Profinet is active 24 V DC = I/O inputs are active - MODE: Selection for I/O signals between analogue input and digital inputs 0 V = analogue input is active 24 V DC = digital inputs are active
Profinet status indications (output signals)	Via Profinet interface	
Functions (actuators with Profinet interface)	- Switch-off mode adjustable: Limit or torque seating for end positions OPEN and CLOSED - Torque monitoring across the whole travel - Function for excessive torque in defined situations - Programmable EMERGENCY behaviour: - Digital input low active, - Reaction can be selected: Stop, run to end position CLOSED, run to end position OPEN - Speed control - Ramps - Program operation profiles - Program specific speed for OPEN and CLOSE operations or one digital input - Positioner - Automatic adaptation of the dead band (adaptive behaviour can be selected)	

Settings/programming the Profinet interface

The Profinet interface is set (assignment of device name as well as assignment of the IP address) using the Profinet engineering tool of the DCS.

General data of the Profinet interface

Communication protocol	Profinet according to IEC 61158 and IEC 61784
Network topology	Star topology, point-to-point wiring. Due to the integrated switch function, both line topologies and redundant ring topologies (MRP) are available.
Connection	Ethernet IEEE 802.3 Dual pair cabling in compliance with IEC 61784-5-3, Auto Negotiation and Auto Crossover are supported.
Profinet connection	2 x Ethernet connection terminals, integral screen with strain relief, suitable for all Ethernet cable types
Transmission rate	100 Mbits/s (100BASE-TX), full duplex
Cable length	Max. 100 m
Device classes	I/O controller (typically the PLC/DCS) I/O devices (field devices) I/O supervisor (programming device, PC or HMI for diagnostics/commissioning)
Communication model	Provider - consumer model

General data of the Profinet interface	
Supported Profinet specification	Version V2.32
Supported Profinet functions	Cyclic Profinet communication (RT) Acyclic Profinet communication (Read/Write Record)
Supported Profinet alarms	Status Alarm Update Alarm Port Data Change Notification Alarm Sync Data Change Notification Alarm
Supported network diagnostics and management protocols	ACD (Address Conflict Detection) ARP (Address Resolution Protocol) DCP (Discovery and Basic Configuration Protocol) SNMP (Simple Network Management Protocol) LLDP (Link Layer Discovery Protocol) in accordance with IEEE 802.1AB These functions allow assignment of the Profinet device name, a graphic representation of the plant topology, port-granular diagnostics as well as neighbourhood detection as the basis for quick commissioning and easy device replacement.
Profinet redundancy	Standard: MRP (Media Redundancy Protocol) in compliance with IEC 62439 (switch function integrated in PROFOX)
	Option: System redundancy S2 Single NAP
Vendor ID	319
Ident code	14
Profinet device type	AUMA PROFOX
Identification & Maintenance Characteristics	I&M0 Profile ID: 62976 I&M0 Profile Specification Type: 4 I&M0 Version: 257 I&M0 Supported: 30
Profinet ident no.	0x013F; 0x000E
DAP (Device Access Point)	0x80010000
Conformance class	CC-B (Conformance Class B) for the Profinet application of PROFOX CC-C (Conformance Class C) for the integral switch function
Netload Class	III
Device diagnostics via Ethernet	Via TCP/IP and integral web server possible Via FDI package & software for diagnostics/commissioning (e.g. Siemens PDM, Emerson AMS)
Device integration	Via GSD (ml) file (available for download at www.auma.com)
Commands and signals of the Profinet interface	
Process representation output (command signals)	OPEN, STOP, CLOSE, position setpoint, RESET, EMERGENCY operation command, OPEN/CLOSE, start torque comparative operation
Process representation input (feedback signals)	End positions OPEN, CLOSED Actual position value Actual torque value Selector in position LOCAL/REMOTE/OFF Running indication (directional) Torque switches OPEN, CLOSE Limit switches OPEN, CLOSED Analogue (1) and digital (3) customer inputs
Process representation input (fault signals)	Thermal fault Torque switch tripped prior to reaching the end position Failure of analogue customer inputs
Behaviour on loss of communication	The behaviour of the actuator is programmable: • Stop at current position • Travel to end position OPEN or CLOSED • Travel to any intermediate position • Execute last received operation command



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