auma®
Solutions for a world in motion

Linear actuators
PROFOX
PF-L2 – PF-L18

Operation instructions
Assembly and commissioning

Read operation instructions first.

- Heed safety instructions.
- These operation instructions are part of the product.
- Store operation instructions during product life.
- Pass on instructions to any subsequent user or owner of the product.

Target group:

This document contains information for assembly, commissioning and maintenance staff.

Table of contents

1 Safety instructions

1.1 Prerequisites for the safe handling of the product

Standards/directives

The end user or the contractor must ensure that all legal requirements, directives, guidelines, national regulations and recommendations with respect to assembly, electrical connection, commissioning and operation are met at the place of installation.

Depending on the device version, this includes:

- Configuration guidelines for the respective fieldbus or network applications

Safety instructions/warnings

All personnel working with this device must be familiar with the safety and warning instructions in this manual and heed the instructions given. Safety instructions and warning signs on the device must be observed to avoid personal injury or property damage.

Qualification of staff

Assembly, electrical connection, commissioning, operation, and maintenance must be carried out by suitably qualified personnel authorised by the end user or contractor of the plant only.

Prior to working on this product, the staff must have thoroughly read and understood these instructions and, furthermore, know and observe officially recognised rules regarding occupational health and safety.

Commissioning

Prior to commissioning, imperatively check that all settings meet the requirements of the application. Incorrect settings might present a danger to the application, e.g. cause damage to the valve or the installation. The manufacturer will not be held liable for any consequential damage. Such risk lies entirely with the user.

Operation

Prerequisites for safe and smooth operation:

- Correct transport, proper storage, mounting and installation, as well as careful commissioning.
- Only operate the device if it is in perfect condition while observing these instructions.
- Immediately report any faults and damage and allow for corrective measures.
- Heed recognised rules for occupational health and safety.
- Heed national regulations.
- During operation, the housing warms up and surface temperatures > 60 °C may occur. To prevent possible burns, we recommend checking the surface temperature using an appropriate thermometer and wearing protective gloves, prior to working on the device.
- During operation, accelerating loads up to maximum 15 % of the maximum thrust may occur. Higher values might damage the electronics.

Protective measures

The end user or the contractor are responsible for implementing required protective measures on site, such as enclosures, barriers, or personal protective equipment for the staff.

Maintenance

To ensure safe device operation, the maintenance instructions included in this manual must be observed.

Any device modification requires prior written consent of the manufacturer.

1.2 Range of application

AUMA PF-L linear actuators are designed for the operation of industrial valves, e.g. globe valves.

Other applications require explicit (written) confirmation by the manufacturer.

The following applications are not permitted, e.g.:

- Industrial trucks according to EN ISO 3691
- Lifting appliances according to EN 14502
- Passenger lifts according to DIN 15306 and 15309

- Service lifts according to EN 81-1/A1
- Escalators
- Continuous duty
- Buried service
- Continuous underwater use (observe enclosure protection)
- Potentially explosive atmospheres
- Radiation exposed areas in nuclear power plants

No liability can be assumed for inappropriate or unintended use.

Observance of these operation instructions is considered as part of the device's designated use.

These operation instructions are only valid for the “clockwise closing”, standard version, i.e. driven shaft turns clockwise to close the valve. For “counterclockwise closing” version, a supplement must be observed in addition to these operation instructions.

1.3 Warnings and notes

The following warnings draw special attention to safety-relevant procedures in these operation instructions, each marked by the appropriate signal word (DANGER, WARNING, CAUTION, NOTICE).

⚠DANGER **Indicates an imminently hazardous situation with a high level of risk. Failure to observe this warning results in death or serious injury.**

⚠WARNING **Indicates a potentially hazardous situation with a medium level of risk. Failure to observe this warning could result in death or serious injury.**

⚠CAUTION **Indicates a potentially hazardous situation with a low level of risk. Failure to observe this warning could result in minor or moderate injury. May also be used with property damage.**

NOTICE **Potentially hazardous situation. Failure to observe this warning could result in property damage. Is not used for personal injury.**

The ⚠ safety symbol warns of a potential personal injury hazard.

The signal word (e.g. DANGER) indicates the level of hazard.

1.4 References and symbols

The following references and symbols are used in these instructions:

The ⓘ symbol stands for the **Information** concept. This text provides important notes and information.

Information: If the **Information** term is part of instruction, the text will give important notes and information to this action step.

Symbol for CLOSED (valve closed)

Symbol for OPEN (valve open)

M▷ **Via the menu to parameter**

Describes the menu path of AUMA Assistant App or the AUMA CDT software to the parameter/process data on the basis of the display texts. Display texts, parameters and process data are highlighted in grey: Example of Display, in addition, the object ID of the display text (DIS), of the parameter (PRM) or of the process date (PZD) is

mostly indicated. These object IDs can be shown in AUMA CDT software via **File > Options**. The search function of AUMA CDT software (Ctrl + F) can be used to find the display texts, parameters and process data.

⇨ **Result of a process step**

Describes the result of a preceding process step.

→ **Action step**

Describes one single action step.

▶ **Reference to the page number**

Refers to the page number for further information. To return from the target to the previous view, it is possible to jump back to the previous view within PDF documents: When using Adobe Acrobat via **Menu > Previous view** or using the key combination **Alt + left**.

2 Short description

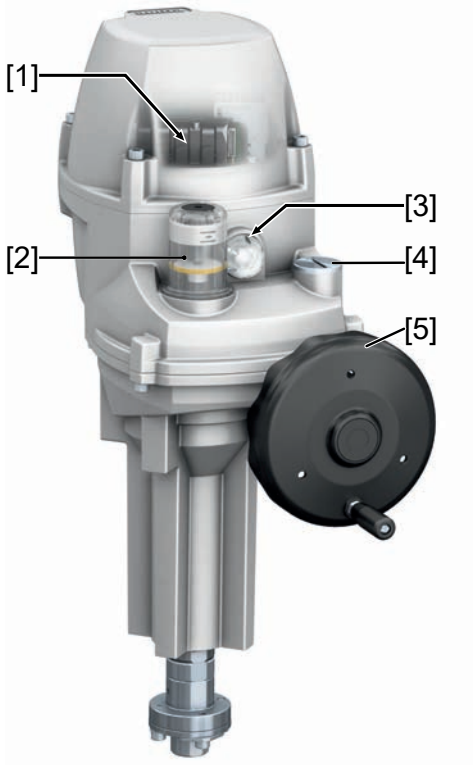
Linear actuator

Definition according to ISO 22153:

A linear actuator is an actuator which transmits thrust to the valve for a defined linear stroke.

AUMA linear actuator

Figure 1: AUMA PF-L10 linear actuator



[1]	Push buttons	[2]	Position indicator
[3]	FOX-EYE (indication LED)	[4]	Screw plug/protective cap
[5]	Handwheel		

The connection options for the tools (hexagon head or hexagon socket) for emergency operation are located below the screw plug/protective cover [4]. The manual emergency operation is available without handwheel function for sizes PF-L2 to PF-L6. For more information, refer to Manual emergency operation [▶ 35].

AUMA PF-L linear actuators are driven by an electric motor. For control in motor operation and for processing the actuator signals, controls are integrated within the housing. Push buttons allow for local actuator operation. A handwheel is provided for occasional manual operation. Manual operation is possible without change-over.

Seating in end positions is either via limit seating or thrust seating.

The self-locking of the actuator is ensured by means of the braking function. As soon as the actuator is at standstill, the motor takes over the brake function for the first 20 seconds. This period is defined through a parameter which can be set via Bluetooth. After this, the locking brake takes over the brake function by disconnection from power and renewed engagement. Brake engagement generates a noise and is part of the standard operating behaviour.

The actuator is equipped with a thrust measurement feature. The measured values can be read by means of the AUMA Assistant App or AUMA CDT. Measurement values are generated during motor operation. No measured value is generated during manual operation. The last measured value remains frozen and is displayed. This is not the case when starting from a thrust seating end position. In this case, the value is set to zero and also displayed as zero.

RSTX 100 remote control (accessory)

The AUMA remote control is designed for operation, configuration and parametrisation of AUMA actuators and AUMA actuator controls and well as for data transmission. The AUMA remote control connects via Bluetooth interface to the AUMA actuator.

Figure 2: AUMA RSTX 100 remote control

Scope of operation, main functions:

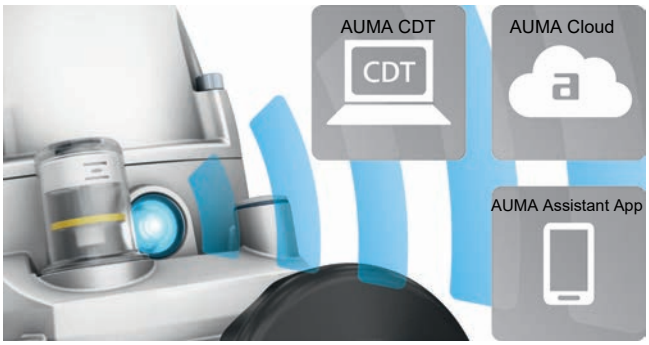
- Operation function (control actuator)
- Configure actuator
- End position setting
- Update firmware
- Create and share snapshot and parameter file

For further information, please refer to www.auma.com.

App and software

Using the **AUMA CDT** software for Windows-based computers (notebooks or tablets) and the **AUMA Assistant App**, actuator data can be uploaded and read, settings can be modified and stored. The connection between computer and AUMA actuator is established via a Bluetooth interface. With the **AUMA Cloud**, we provide an interactive platform to collect and assess e.g. detailed device data of all actuators within a plant.

Figure 3: Communication via Bluetooth



AUMA CDT

AUMA CDT is a user-friendly setting and operation program for AUMA actuators.

The AUMA CDT software is available for free download on our website www.auma.com.

AUMA Assistant App

The AUMA Assistant App enables commissioning, configuration and diagnostics of AUMA actuators via Bluetooth using either smartphone or tablet.

The AUMA Assistant App can be downloaded free of charge from the Play Store (Android) or App Store (iOS).

Figure 4: Link to AUMA Assistant App

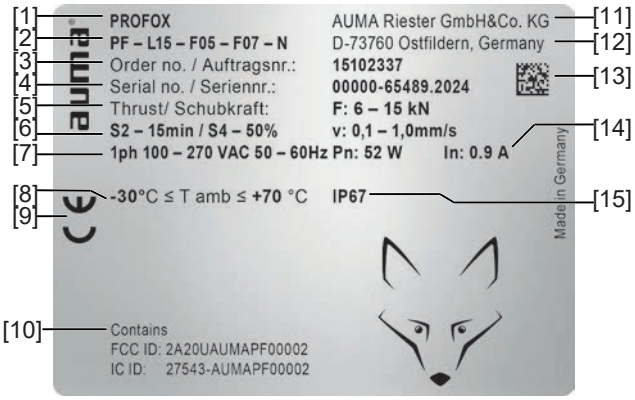
AUMA Cloud

The AUMA Cloud is the driving element of the digital AUMA world, acting as interactive platform for efficient maintenance of AUMA actuators at moderate cost. The AUMA Cloud collects all device data of all actuators within one site and provides a clear overview at a glance. Detailed analysis provides valuable information on potential maintenance requirements. Additional functions foster smooth asset management.

3 Name plate

Figure 5: Name plate arrangement

Figure 6: PROFOX name plate (example of I/O interface)



[1]	Product name	[2]	Type designation
[3]	Order number	[4]	Serial number
[5]	Thrust: F	[6]	Type of duty
[7]	Current type, mains voltage, mains frequency	[8]	Permissible ambient temperature
[9]	CE mark	[10]	Contains: FCC ID, IC ID
[11]	Name of manufacturer	[12]	Address of manufacturer
[13]	Data Matrix code	[14]	Nominal power and nominal current
[15]	Enclosure protection		

Type designation

Table 1: Description of the type designation with the example of PROFOX PF-L15-F05-F07-N

PROFOX	PF	L	15	F05-F07	N	
PROFOX						Product name
	PF					Type (abbreviation **PROFOX**)
		L				Type of movement: Linear actuator
			15			Size (max. thrust in kN)
				F05-F07		Flange sizes

PROFOX	PF	L	15	F05-F07	N	
					N	Flange surface flat, without spigot

Order number

The product can be identified using this number and the technical data as well as order-related data pertaining to the device can be requested.

Please always state this number for any product inquiries.

We offer the service **myAUMA** on our website www.auma.com: When indicating the order number, authorised users can download the order-related documents like wiring diagrams, technical data (in German and English), the inspection certificate, the operation instructions and further order-related information.

Actuator serial number

Table 2: Serial number, description with the example of 00000-12345

00000-12345	
00000-12345	Serial number of sales article 11-digit, internal number for unambiguous product identification

Data Matrix code

When registered as authorised user, you may use our **AUMA Assistant App** to scan the Data Matrix code and directly access the order-related product documents without having to enter order number or serial number.

Figure 7: Link to AUMA Assistant App

For further Service & Support, Software/Apps/..., refer to www.auma.com.

4 Transport and storage

4.1 Transport

DANGER

Suspended load!

Death or serious injury.

- → Do NOT stand below suspended load.
- → Attach ropes or hooks for the purpose of lifting by hoist only to housing and NOT to handwheel.
- → Actuators mounted on valves: Attach ropes or hooks for the purpose of lifting by hoist to valve and NOT to actuator.
- → Actuators mounted to gearboxes: Attach ropes or hooks for the purpose of lifting by hoist only to the gearbox using eyebolts and NOT to the actuator.
- → Respect total weight of combination (actuator, gearbox, valve)
- → Secure load against falling, sliding or tilting.
- → Perform lift trial at low height to eliminate any potential danger e.g. by tilting.

4.2 Storage

NOTICE

Danger of corrosion due to inappropriate storage!

- → Store in a well-ventilated, dry room.
- → Protect against floor dampness by storage on a shelf or on a wooden pallet.
- → Cover to protect against dust and dirt.
- → Apply suitable corrosion protection agent to uncoated surfaces.

Long-term storage

For long-term storage (more than 6 months), observe the following points:

1. Prior to storage: Protect uncoated surfaces, in particular output drive parts and mounting surfaces using long-term corrosion protection agents.
2. At an interval of approx. 6 months: Check uncoated surfaces for corrosion. Should traces of corrosion be detected, renew the corrosion protection.

5 Assembly

5.1 Mounting position

The product described can be operated without restriction in any mounting position. However, operation is not possible with thrust rod pointing vertically upward.

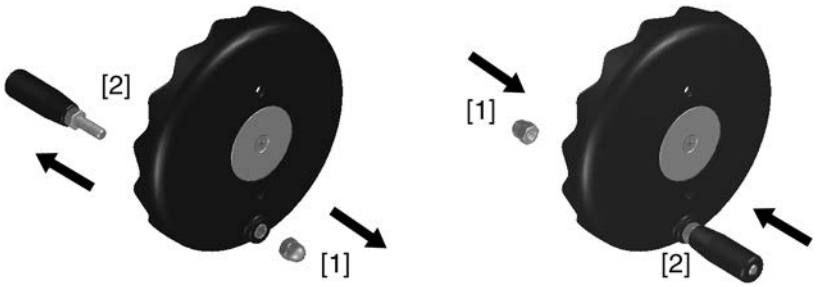
For any mounting position with horizontally placed thrust rod, ensure that the actuators is mounted so that both pillars (not included in the scope of delivery) are arranged at vertical level on top of each other.

Figure 8: Arrangement with pillars

5.2 Fit ball handle to handwheel

To avoid transport damage, the ball handle is mounted upside down at the handwheel.

Prior to commissioning, mount the ball handle in the correct position.



1. Remove cap nut [1] and pull out ball handle [2].
2. Insert ball handle [2] in the correct position and fasten with cap nut [1].

When turning the handwheel, the preset position will be changed. On delivery, the position is in end position CLOSED. Both actuator and valve must be in the same position when assembled. Therefore, we recommend refraining from rotating the handwheel several times prior to mounting the actuator to the valve.

5.3 Mount actuator to valve

Actuator mounting onto the valve is made either via flange connection according to EN ISO 5210 (e.g. for mounting brackets) or alternatively via the attachment frame (option) with pillars.

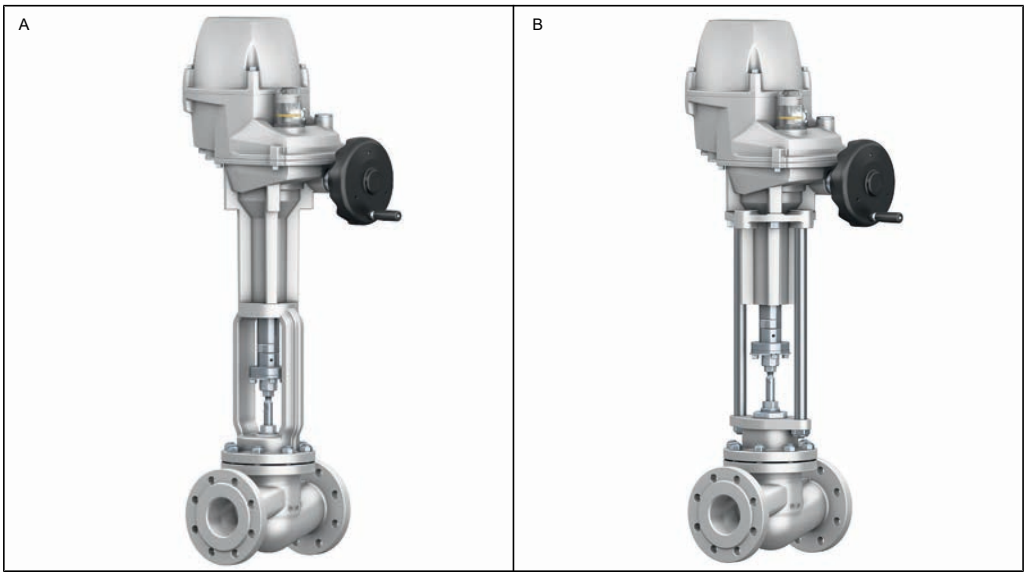
NOTICE

Corrosion due to damage to paint finish and condensation!

→ Touch up damage to paint finish after work on the device.

→ After mounting, immediately perform electrical connection of the device to minimise condensation caused by standby current.

5.3.1 Overview of valve attachments



A with mounting bracket

B with attachment frame and pillars

- for rising, non-rotating valve stem

Application

- **A (standard)** Flange connection according to EN ISO 5210, for valves and e.g. for mounting a suitable mounting bracket equipped with F flange.
- **B (alternative)** Attachment frame for preparing the connection of up to 4 pillars. Valve attachment, refer to table: --- FEHLENDER LINK ---

Refer to

Technical data [▸ 52]

5.3.2 Mount actuator with pillars

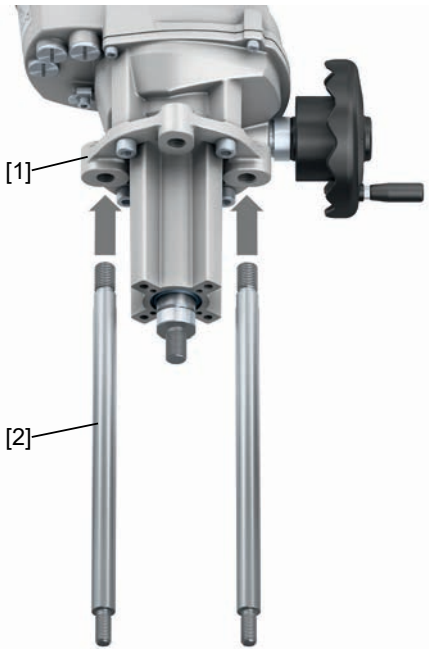
The arrangement with pillars can include up to four pillars.

The pillars are not part of the scope of delivery and have to be provided by the end user.

Ensure that there is no offset between thrust rod of the actuator and the valve stem. This can lead either to a performance loss or premature wear.

Prior to and when mounting/dismantling the actuator and the valve, make sure that both thrust rod and valve stem are not in direct contact. Otherwise, damage may occur!

Figure 9: Pillars at attachment frame



[1] Attachment frame [2] Pillars

Assembly steps

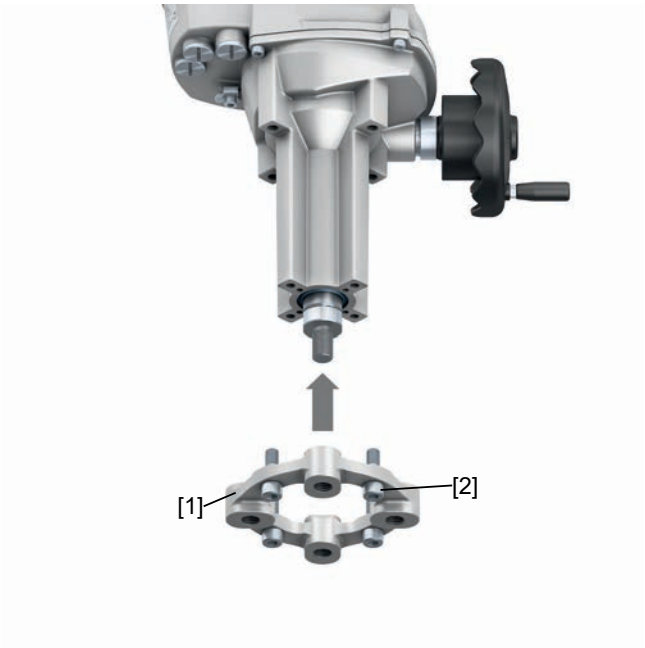
1. Mount the attachment frame [1] to the actuator, refer to Mount attachment frame to actuator (option) [▶ 16].
2. Mount the pillars [2] to the attachment frame and fasten.
3. Mount the actuator with the pillars to the valve.
4. Mount and manually tighten the nuts (of the pillars at the valve).
5. Mount AUMA coupling, refer to Mount AUMA coupling [▶ 17].
6. Fasten the nuts (of the pillars at the valve), ensuring that valve stem and thrust rod perfectly align.

Figure 10: Arrangement via pillars with attachment frame and AUMA coupling

5.3.3 Mount attachment frame to actuator (option)

When ordering a PROFOX linear actuator with optional attachment frame, the attachment frame is mounted to the actuator in the factory.

Figure 11: Mount attachment frame to actuator



[1] Attachment frame [2] Screws

Assembly steps

1. Mount the attachment frame [1] to actuator.
2. Place screws [2].
3. Fasten screws applying the appropriate torque, refer to chapter Tightening torques for screws [▶ 56].

5.3.4 Mount actuator with coupling

Couplings without bores or with pilot bores must be finish-machined to suit the valve shaft prior to mounting the actuator to the valve.

⚠CAUTION

When mounting make sure that the valve stem and the thrust rod of the actuator are at a distance from each other, i.e. both in retracted position. As standard, the actuator is supplied in retracted position (usually OPEN).

Otherwise, damage to actuator or valve might occur, and in particular at the stems.

NOTICE

Threads may neither be modified nor damaged.

Loss of tensile strength of screws when reworking the threads!

We recommend applying liquid thread sealing material to the screws to avoid contact corrosion.

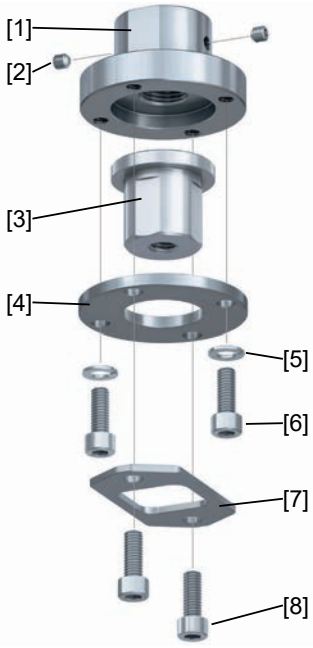
When ordering a PROFOX linear actuator with optional AUMA coupling, the AUMA coupling is mounted to the actuator prior to leaving the factory.

Mount AUMA coupling

The mounting of an alternative coupling is possible while heeding the operation instructions.

Figure 12: AUMA coupling

Figure 13: Exploded view



[1]	Coupling flange	[2]	Grub screw
[3]	Stem nut	[4]	Retaining ring
[5]	Lock washer	[6]	Screws
[7]	Locking plate	[8]	Screws

Assembly steps

1. Operate the thrust rod of the actuator manually to mid-stroke.
2. Position the valve stem to ensure sufficient space for mounting the coupling.
3. Unscrew the screws [6] + [8].
4. Remove locking plate [7], retaining ring [4] and stem nut [3] and place at appropriate location.
5. Unscrew the grub screws [2] to allow mounting the coupling flange[1].
6. Mount the coupling flange [1] to actuator thrust rod.
7. Fasten the grub screws [2].
8. Screw lock nut onto the valve stem.
9. Mount the locking plate [7] and the retaining ring [4] to valve stem.

10. Screw the stem nut [3] onto the valve stem.
11. Operate the valve in direction of the coupling flange [1] until the stem nut [3] is seated on the coupling flange [1].
12. Align the retaining ring bores [4] with the bores of the coupling flange [1].
13. Manually tighten the screws [6] with curved spring lock washer [5].
14. Align the locking plate [7] with the stem nut [3] and mount.
15. Screw in the screws [8], fasten the screws [6] + [8], refer to chapter Tightening torques for screws.
16. Affix lock nut with stem nut [3].

6 Electrical connection

6.1 Basic information

⚠WARNING

Electric shock due to the presence of hazardous voltage!

Failure to observe this warning could result in death, serious injury, or property damage.

→ The electrical connection must be carried out exclusively by suitably qualified personnel.

→ Prior to connection, heed basic information contained in this chapter.

⚠CAUTION

Risk of immediate actuator operation when connecting to mains!

Risk of personal injuries or damage to the valve.

→ Check operation signals and operation behaviour prior to switching on the mains voltage.

→ Ensure that the tripping conditions for the failure behaviour are not fulfilled when switching on.

→ Ensure that the tripping conditions for the EMERGENCY behaviour are not fulfilled when switching on.

Reasons for immediate operation:

- The signal and fieldbus cables are connected and a respective operation command has been issued.
- The “Failure behaviour” function was configured as to ensure that this state results in an operation once the mains voltage is applied. Factory setting of parameter Failure operation: STOP (the actuator stops).
- The “EMERGENCY behaviour” function was configured as to ensure that this state results in an operation once the mains voltage is applied. Factory setting of EMERGENCY behaviour function: Function not activated.

Wiring diagram/terminal plan

The pertaining wiring diagram/terminal plan (in German or English) is attached to the device in a weather-proof bag, together with these operation instructions. It can also be requested from AUMA when indicating the order number (refer to name plate) or downloaded directly from our website (www.auma.com).

Permissible networks (supply networks)

The actuators are suitable for use in TN and TT networks. For IT networks, a suitable, approved insulation monitor is required, e.g. an insulation monitor measuring the pulse code.

Current type, mains voltage, mains frequency

Type of current, mains voltage and mains frequency must match the data on the name plate, Name plate [▶ 10].

Protection and sizing on site

For short-circuit protection and for disconnecting the actuator from the mains, fuses and disconnect switches or circuit breakers have to be provided by the customer.

- When using DC current, select circuit breakers suitable for DC applications.

For circuit breakers, the following sizing/characteristics are recommended:

Table 3: Sizing of circuit breakers

Number of actuators	100 – 240 V AC/50 – 60 Hz 180 – 300 V DC	24 V DC
1	B06	B06
2	B10	B10
4	C13	B20

Refer to the electrical data for the maximum current values of individual models and versions.

Potential of customer connections

For options of isolated potentials, refer to Technical data [▶ 52].

Safety standards

Safety measures and safety equipment must comply with the respectively valid national on site specifications. All externally connected devices shall comply with the relevant safety standards applicable for the place of installation.

Connecting cables, cable glands, reducers, blanking plugs

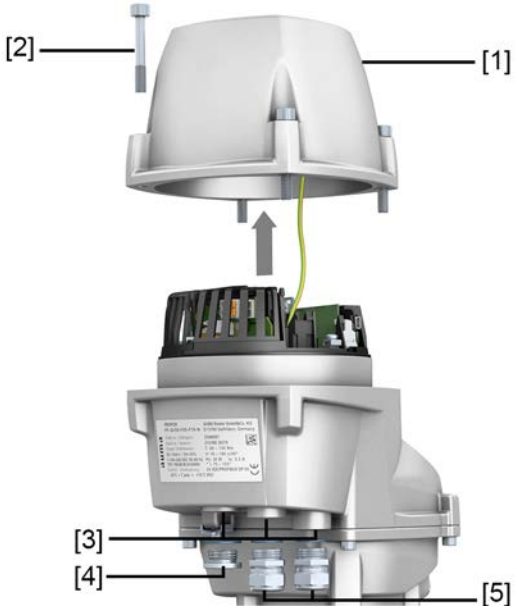
- We recommend using connecting cables and connecting terminals according to nominal current (I_N). Refer to Name plate [▶ 10] or electrical data sheet.
- For device insulation, appropriate (voltage-proof) cables must be used. Specify cables for the highest occurring rated voltage.
- To avoid contact corrosion, we recommend the use of sealing agents for cable glands and blanking plugs made of metal.
- Use connecting cable with appropriate minimum rated temperature.
- For connecting cables exposed to UV radiation (outdoor installation), use UV resistant cables.
- For connecting electronic position transmitters, only use screened cables.
- For connecting fieldbus cables or network cables, respect the cable recommendations for the respective fieldbus connection or network connection. Further information is provided in the short instructions for fieldbus connection or network connection (as far as available).

Cable installation in accordance with EMC

- Lay cables susceptible to interference or cables as sources of interference at a large distance from each other.
- Lay cables in areas subject to low interference.
- Avoid parallel paths with little cable distance of cables being either susceptible to interference or interference sources.

6.2 Open terminal compartment

Figure 14: Open terminal compartment



[1]	Cover	[2]	Screws
[3]	Cable arrangement	[4]	Blanking plug
[5]	Cable gland (option)		

DANGER

Electric shock due to the presence of hazardous voltage!

Death or serious injury.

→ Disconnect from mains before opening.

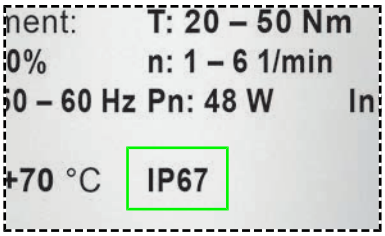
→ Wait for minimum 60 seconds after power cut-off prior to opening the housing.

NOTICE

Corrosion by ingress of humidity when using unsuitable cable glands/ blanking plugs!

→ Use suitable cable glands/blanking plugs according to the IP enclosure protection specified on the name plate.

Figure 15: Enclosure protection IP67 (example)



For shielded cables: Use EMC cable glands.

The supplied blanking plugs fulfil the IP protection of the actuator.

How to proceed

1. Loosen screws [2] and remove cover [1].
2. Insert cable glands [5] suitable for connecting cables.
3. Tighten cable glands and blanking plugs at the housing. Respect torques according to manufacturer's specifications.

6.3 Cable connection

Table 4: Terminal cross sections and tightening torques of PE connection

Designation	Terminal cross sections	Tightening torque
Protective earth connection ⏚ (PE)	1.5 − 2.5 mm² (flexible) direct 1.5 − 6 mm² (solid) direct 1.0 – 6 mm² (flexible) via spade lug or wire end sleeve	3 − 4 Nm

Table 5: Cross sections mains cable

Designation	Wire type	Cross section	
		min [mm²]	max [mm²]
Mains cable	solid/flexible	0.08	2.5
	AWG	AWG 28	AWG 12

Table 6: Cross sections for signal cables (at spring clamp terminals)

Designation	Wire type	Cross section	
		min [mm²]	max [mm²]
I/O signal cable	solid	0.2	1.5
	flexible	0.2	1.5
	flexible with wire end sleeve without plastic sleeve	0.2	1.5
	AWG	AWG 28	AWG 16

⚠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.

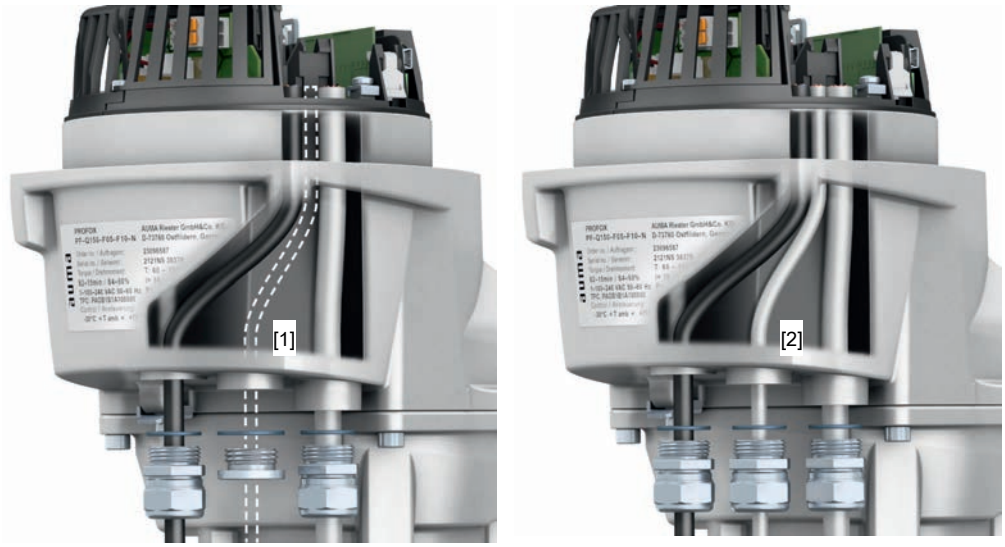
Cable arrangement

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

The cable arrangement shown in the picture below only applies for actuators with I/O interface!

For actuators with fieldbus interface, please refer to appropriate short instructions (if available).

Figure 16: Cable arrangement of mains and signal cables



[1] Cable arrangement for one mains cable and one signal cable

[2] Cable arrangement for one mains cable and two additional cables

For better accessibility, we recommend heeding the following order.

How to proceed

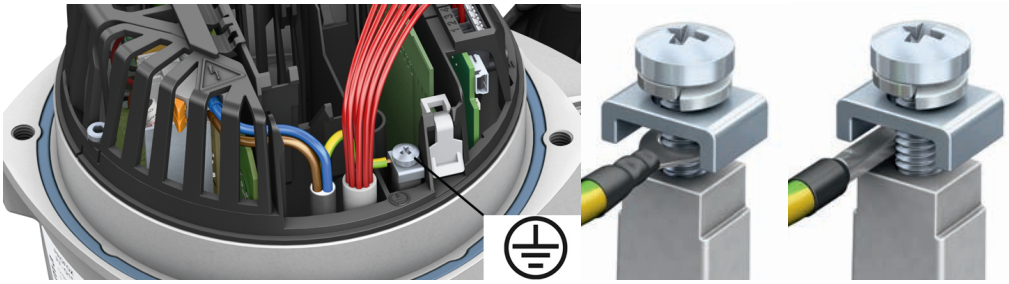
1. Insert signal cable into cable gland on the right and push upward until the cable is visible.
2. In case a further signal cable is connected: Insert second signal cable into middle cable gland and push upward until the cable is visible.
3. Insert mains cable into cable gland on the left and also push upward until the cable is visible.
4. Remove cable sheathing.
5. Strip wires.
   → Signal cable approx. 6 mm, mains cable approx. 10 mm.
6. For flexible cables: Use wire end sleeves according to DIN 46228.

Protective earth connection

7. Unfasten and remove screw at protective earth connection (⏚).

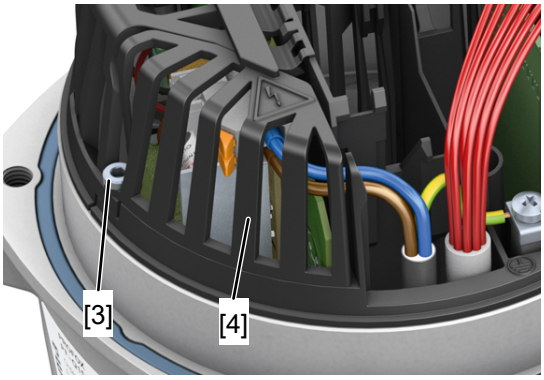
8. Remove powder coating on the surface of the actuator below the U-bracket (file off).
9. Mount and tighten PE conductor with spade lug or wire end sleeve at protective earth connection (⏚) as shown.

Figure 17: Protective earth connection



Mains cable connection

Figure 18: Contact protection of mains cable

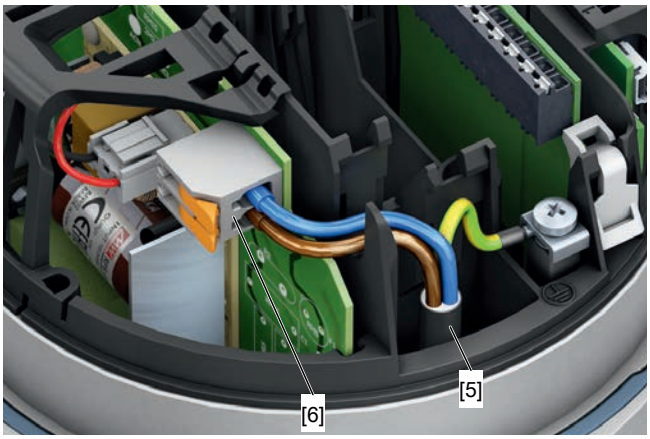


[3] Screw

[4] Contact protection of mains cable

10. Unfasten and remove screw [3].
11. Remove contact protection of mains cable [4].
12. Connect mains cable [5] to connection terminal [6] in compliance with the order-related wiring diagram.

Figure 19: Mains cable connection



[6] Connection terminal

[5] Mains cable

13. Fit contact protection of mains cable [4].
14. Place and fasten screw [3].

Signal cable connection

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**!

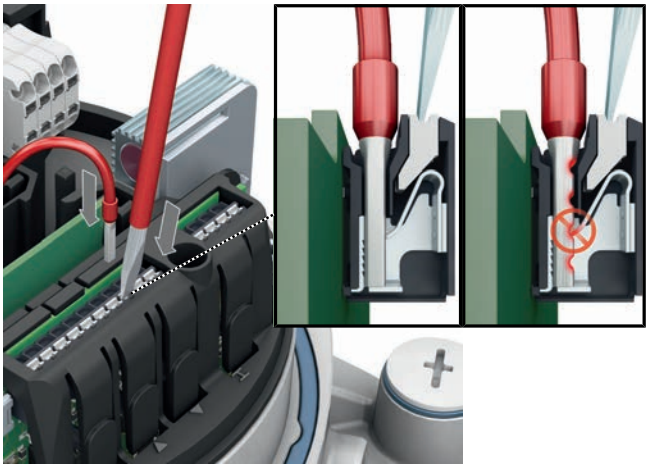
→ To avoid unevenness at wire end sleeve, AUMA recommends using the CRIMPFOX 6 model by Phoenix Contact as suitable crimping pliers.

→ 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!

If the end position setting is carried out with the internal operation push buttons following the connection to the power supply: Leave the cover open!

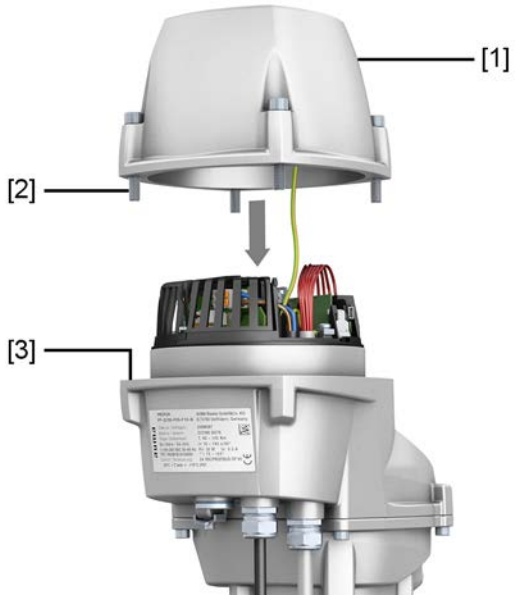
Figure 20: Connect signal cables to spring clamp terminals



15. Connect signal cables to spring clamp terminals in compliance with the order-related wiring diagram.
16. For shielded cables: Link the cable shield end via the cable gland to the housing (earthing).
17. 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.
18. Fasten cable glands with the torque as specified by the manufacturer to ensure respect of required enclosure protection.
19. Connect power supply.

6.4 Close terminal compartment

Figure 21: Close terminal compartment (example of I/O interface)



[1] Cover
[2] Screws
[3] O-ring

⚠WARNING

Electric shock due to the presence of hazardous voltage!

Risk of death or serious injury!

→ If the PE conductor was separated from the cover: Reconnect PE conductor to cover. Tighten screw with a torque of 2.2 Nm.

→ Ensure not to pinch any cables when placing the cover.

NOTICE

Loss of IP protection or the explosion protection due to a damaged O-ring!

→ When mounting the cover onto the housing, make sure that the O-ring is correctly inserted into the groove to ensure that it is not damaged when mounting the cover.

How to proceed

1. Remove the O-ring [3].
2. Check if O-ring is in order and replace if damaged.
3. Clean sealing faces of cover [1] and housing.
4. Slightly grease the O-ring with acid-free grease (e.g. petroleum jelly).
5. Insert the O-ring in provided groove.
6. Place the cover and fasten the screws [2] evenly crosswise at a torque of 10 Nm. For tightening torques, refer to Tightening torques for screws [▶ 56] chapter.

6.5 External earth connection

Figure 22: External earth connection

Application

External earth connection, with U-bracket for connection to equipotential compensation.

Standard: Without earth connection, with plastic plate and screw only.

Option: With earth connection, consisting of U-bracket and hexagon socket cap head screw, for explosion-proof version additionally with metal washer.

Strip powder from actuator surface below the U-bracket (file down).

Table 7: Terminal cross sections and earth connection tightening torques

Conductor type	Terminal cross sections	Tightening torques
solid	2.5 mm² to 6 mm²	3 – 4 Nm
flexible	1.5 mm² to 4 mm²	3 – 4 Nm
For fine stranded (flexible) wires, connection is made via cable lugs/ring terminals. When connecting two individual wires with a U-bracket, cross sections have to be identical.		

7 Commissioning

Commissioning is made in three steps:

1. End position setting
2. Position indicator setting
3. Configuration of further parameters

⚠WARNING

Moving parts!

Danger of jamming

→ Do not reach into the lifting area of the arrangement.

→ If possible, attach protective fixture.

Besides end position settings, all other settings have already been made in the factory in compliance with the order.

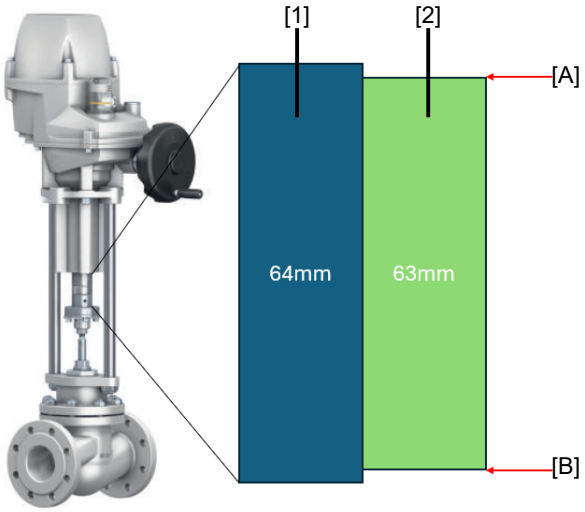
If correctly ordered, the end positions and the position indicator must be set.

NOTICE

Motor operation into the mechanical stops of the actuator is not permitted.

Modifications at the gearing or deletion of the firmware parameters (e.g. due to a boot-up) might change these stops and may only be performed by the AUMA Service.

Figure 23: Maximum stroke / setting range for the stroke



[1]	Maximum mechanical stroke	[2]	Permissible setting range for the stroke
[A]	Setting limit for retracted end position (OPEN)	[B]	Setting limit for extended end position (CLOSED)

Delivery setting

- The actuator is supplied in retracted end position (OPEN).
- The end positions of the actuator are set to the maximum stroke. For this reason, the end user has to set both end positions once the valve has been mounted.
- The stroke of the mechanical position indicator is set to the maximum stroke and synchronously to the retracted end position (OPEN). The user has to adjust the two end positions of the mechanical position indicator to the actual end positions of the mounted valve.

The following table shows the most important parameters and how they can be configured.

Table 8: Parameter configuration

Step	Setting	Parameter/designation	At the actuator	AUMA Assistant App and AUMA CDT	AUMA RSTX 100 remote control	Refer to chapter
End position setting	Positions	Set end position CLOSED	Yes	Yes	Yes	Set end position CLOSED [▶ 29]
		Set end position OPEN	Yes	Yes	Yes	Set end position OPEN [▶ 30]
Position indicator setting	Indication for the end positions	Indication end position CLOSED	Yes	No	No	"Position indicator" chapter
		Indication end position OPEN	Yes	No	No	
Configuration of further parameters	Type of seating	End position CLOSED	No	Yes	Yes	—
		End position OPEN	No	Yes	Yes	
	Thrust switching	Tripping torque CLOSE	No	Yes	Yes	
		Tripping torque OPEN	No	Yes	Yes	
	Speeds	Speed	No	Yes	Yes	Speed setting [▶ 32]
	I/O signals (binary/analogue)	Type and assignment	No	Yes	Yes	—
	Positioner	Various parameters	No	Yes	Yes	—

Many further parameters can be configured using the AUMA Assistant App, AUMA CDT or the RSTX 100 remote control. Refer to Manual (Parameters and functions) PROFOX.

7.1 End position setting (via push buttons)

NOTICE

Damage at valve/gearbox due to incorrect setting!

→ When setting in motor operation: Interrupt travel in time prior to reaching the end stop.

If the actuator is thrust seated: Check thrust set in the factory!

The end positions may also be set using the AUMA Assistant App or the AUMA CDT software.

When setting the end positions, the actuator acts in accordance with the selected type of seating:

Limit seating

The limit position of the end position is set to the exact current position. Once the limit position is reached, the actuator switches off.

Seating via thrust

The limit position of the end position is set to <1 % before the mechanical stop of the valve. Once the thrust is reached, the actuator switches off.

7.1.1 Set end position CLOSED

DANGER

Electric shock due to the presence of hazardous voltage!

Failure to observe this warning results in death or serious injury.

→ Electrical connection and commissioning must be carried out exclusively by suitably qualified personnel if circuit is live.

→ Do not touch any cables.

The set end position can be overrun!

During operation in directions OPEN/CLOSE, the actuator stops when reaching the set end position. When pressing the push button again (briefly), the actuator exceeds the end position. When pressing the push button again (hold down), the actuator operates to a mechanical valve stop or the end of the permissible setting range of the actuator, refer to figure Maximum stroke /maximum setting range for the stroke.

How to proceed

1. Remove cover from actuator.
2. Operate in direction CLOSE via ▼ push button until the valve is closed.
   ⇨ The operation in direction CLOSE is signalled by the LED blinking in red.

Figure 24: Operate in direction CLOSE (example with I/O interface)

3. Once the desired end position CLOSED is reached, release the ▼ push button.
   ⇨ The LED is blinking in blue for approx. 10 seconds. This time span allows for end position setting.
4. While LED is blinking in blue, hold down ⤓ push button for at least two seconds until the LED is illuminated in red.

Figure 25: Set end position CLOSED (example with I/O interface)

⇨ The end position CLOSED setting has been successfully completed.

7.1.2 Set end position OPEN

DANGER

Electric shock due to the presence of hazardous voltage!

Failure to observe this warning results in death or serious injury.

→ Electrical connection and commissioning must be carried out exclusively by suitably qualified personnel if circuit is live.

→ Do not touch any cables.

The set end position can be overrun!

During operation in directions OPEN/CLOSE, the actuator stops when reaching the set end position. When pressing the push button again (briefly), the actuator exceeds the end position. When pressing the push button again (hold down), the actuator operates to a mechanical valve stop or the end of the permissible setting range of the actuator, refer to figure Maximum stroke /maximum setting range for the stroke.

How to proceed

1. Remove cover from actuator.
2. Operate in direction OPEN via ▲ push button until the valve is open.
   ⇨ The operation in direction OPEN is signalled by the LED blinking in green.

Figure 26: Operate in direction OPEN (example with I/O interface)

3. Once the desired end position OPEN is reached, release the ▲ push button.
   ⇨ The LED is blinking in blue for approx. 10 seconds. This time span allows for end position setting.
4. While LED is blinking in blue, hold down ⎓ push button for at least two seconds until the LED is illuminated in green.

Figure 27: Example with I/O interface

⇨ Set end position OPEN (example with I/O interface)

7.2 Position indicator

NOTICE

Risk of damage at the position indicator in case of incorrectly selected stroke range of the position indicator!

Order position indicator suitable for the valve.

The following description applies for clockwise closing standard version.

Separate instructions are available for counterclockwise special version.

The position indicator shows the valve position by means of a yellow position indication disc moving up and down. The white end position indication ring indicates the retracted end position OPEN. The lower end position of the position indicator stands for extended end position CLOSED.

Figure 28: Delivery setting

[1] End position indication ring with symbol for OPEN

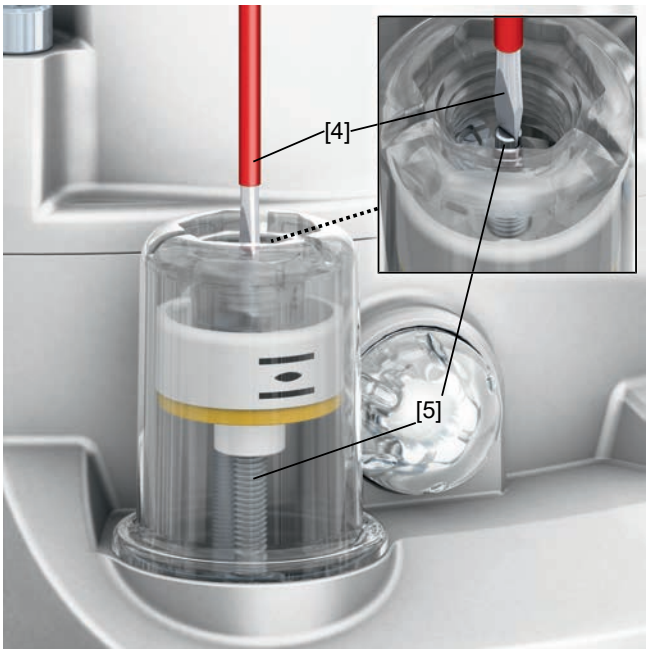
[2] Position indication disc

[3] Screw plug

Position indicator setting

For problems with the position indication, refer to Corrective actions chapter.

Figure 29: Position indicator setting



[4] Screwdriver [5] Shaft

Procedure: Synchronisation with the **extended** end position (usually CLOSED):

1. The end positions have to be set in advance, refer to End position setting (via push buttons) [▶ 28].
2. Operate the actuator with the valve into the extended end position.
3. Remove screw plug [3] from the indicator glass of the position indicator.
4. Set position indication disc [2] using a suitable screwdriver [4]: turn shaft [5] of the position indicator clockwise (disc moves downwards in direction CLOSE) or counterclockwise (disc moves upward in direction OPEN).
5. Continue turning the position indication disc [2] down to the stop and then turn back for one or two rotations to prevent jamming.

Synchronisation with **retracted** end position (usually OPEN):

1. Operate the actuator with the valve into the retracted end position.
2. Carefully press down the end position indication ring with symbol for OPEN [1] with the screwdriver until it is flush on the position indication disc [2].
3. Place screw plug [3] of the indicator glass of the position indicator again ensuring that the O-ring fits completely in the groove of the screw plug.
4. Tighten screw plug [3] with a torque of 2.5 Nm.

7.3 Configuration of further parameters

Either the AUMA Assistant App or AUMA CDT software is required to use the complete range of configuration options. The user level defines which parameters are displayed or can be changed.

For information on the user levels and their passwords, please refer to User level and password [▶ 39]

7.3.1 Speed setting

The speeds are determined by the motor speed. The motor speed and consequently the actuator speed can be modified by means of the AUMA Assistant App, AUMA CDT or the AUMA RSTX 100 remote control.

Setting is made using a percentage value within the range of 10 % and 100 %. Thereby, 100 % corresponds to the maximum motor speed and thus to the maximum actuator speed.

Table 9: Assignment of power levels to the motors and power supply units used

Power level	Motor	Power supply unit
V1	18 W	65 W
V2	25 W	65 W
V3	50 W	85 W

The speed can be set individually for the following functions:

- Standard speed for operations in directions OPEN and CLOSE and back (parameter: [PRM_5587] Motor speed 1).
- Alternative standard speed if different speeds are required for operation in directions OPEN and CLOSE or if continuous changes between two specified speeds are required (parameter: [PRM_5588] Motor speed 2).
- Speeds for “Failure behaviour” and “EMERGENCY behaviour” functions:
  - For operation in direction CLOSE (parameter: [PRM_5592] Motor speed for failure behaviour CLOSE and emergency operation CLOSE)
  - For operation in direction OPEN (parameter: [PRM_5591] Motor speed for failure behaviour OPEN and emergency operation OPEN)

Variable speeds

For operations between OPEN and CLOSE, the speed can be specified via an analogue input or the fieldbus. The analogue input must be configured to interpret this signal.

The speed can be set within the range of 10 % and 100 % of the maximum motor speed:

0/4 mA = 10 % of the maximum motor speed

20 mA = 100 % of the maximum motor speed

The applicable scaling limits are identical for the fieldbus. A respective field within the process representation is available.

Table 10: Example values for setting the sizes L2 / L2X

	Operating speed in % of the maximum motor speed	
Operating speed in mm/s	**V2 0.3 mm/s – 2.5 mm/s**	**V1 0.2 mm/s – 1.8 mm/s**
0.2 mm/s	—	11 %
0.3 mm/s	12 %	17 %
0.4 mm/s	16 %	22 %
0.5 mm/s	20 %	28 %
0.6 mm/s	24 %	33 %
0.8 mm/s	32 %	44 %
1.0 mm/s	40 %	56 %
1.2 mm/s	48 %	67 %
1.5 mm/s	60 %	83 %
1.8 mm/s	72 %	100 %
2.0 mm/s	80 %	—
2.3 mm/s	92 %	—
2.5 mm/s	100 %	—

Table 11: Example values for setting the sizes L6 / L6X

	Operating speed in % of the maximum motor speed	
Operating speed in mm/s	**V3 0.3 mm/s – 2.3 mm/s**	**V2 0.2 mm/s – 1.2 mm/s**
0.2 mm/s	—	17 %
0.3 mm/s	12 %	25 %

	Operating speed in % of the maximum motor speed	
Operating speed in mm/s	**V3 0.3 mm/s – 2.3 mm/s**	**V2 0.2 mm/s – 1.2 mm/s**
0.4 mm/s	16 %	33 %
0.5 mm/s	20 %	42 %
0.6 mm/s	24 %	50 %
0.8 mm/s	32 %	67 %
1.0 mm/s	40 %	83 %
1.2 mm/s	48 %	100 %
1.5 mm/s	60 %	—
1.8 mm/s	72 %	—
2.0 mm/s	80 %	—
2.3 mm/s	92 %	—
2.5 mm/s	100 %	—

Table 12: Example values for setting the sizes L10 / L10X

	Operating speed in % of the maximum motor speed	
Operating speed in mm/s	**V3 0.2 mm/s – 1.2 mm/s**	**V2 0.1 mm/s – 0.6 mm/s**
0.1 mm/s	—	17 %
0.2 mm/s	17 %	33 %
0.3 mm/s	25 %	50 %
0.4 mm/s	33 %	67 %
0.5 mm/s	42 %	83 %
0.6 mm/s	50 %	100 %
0.8 mm/s	67 %	—
1.0 mm/s	83 %	—
1.2 mm/s	100 %	—

Table 13: Example values for setting the sizes L15 / L15X and L18 / L18X

	Operating speed in % of the maximum motor speed
Operating speed in mm/s	**V3 0.1 mm/s – 1.0 mm/s**
0.1 mm/s	10 %
0.2 mm/s	20 %
0.3 mm/s	30 %
0.4 mm/s	40 %
0.5 mm/s	50 %
0.6 mm/s	60 %
0.8 mm/s	80 %
1.0 mm/s	100 %

8 Operation

8.1 Manual operation

For purposes of setting and commissioning, in case of motor or power failure, the actuator may be operated manually. The handwheel is used to move the output drive. The handwheel is permanently engaged and prioritised over motor operation if both handwheel and motor are simultaneously operated. Otherwise, the handwheel does not rotate during motor operation.

During manual operation/manual emergency operation, the thrust cannot be measured but the last measured value remains valid (motor operation) and thus constant.

The sizes PF-L2 to PF-L6 cannot be equipped with a handwheel. Only the manual emergency operation refer to Manual emergency operation [▶ 35] is available.

The following description applies for clockwise closing standard version.

Separate instructions are available for counterclockwise special version.

How to proceed

1. Close valve: Turn handwheel clockwise.

⇨ Drive shaft (valve) turns clockwise in direction CLOSE.

2. Open valve: Turn handwheel counterclockwise.

⇨ Drive shaft (valve) turns counterclockwise in direction OPEN.

Turning the handwheel during motor operation extends or reduces the operating time, depending on the direction of rotation.

Thrust seating

The thrust switching may also trip during manual operation.

If the actuator is operated beyond the end position when thrust seating is selected, the “End position reached” signal is set even prior to reaching the mechanical stop.

8.2 Manual emergency operation

The actuator may be operated in manual emergency operation for setting and commissioning as well as in case of motor or power failure.

Actuators of sizes PF-L2 to PF-L6 are not equipped with a handwheel. The manual operation is carried out by means of the manual emergency operation.

The manual emergency operation is manually activated and deactivated. As soon as the manual emergency operation is activated/deactivated, the actuator motor is disengaged/engaged.

Figure 30: Manual emergency operation overview

[1] Protective cap [2] Nut
[3] Screw

Manual emergency operation

⚠CAUTION

Rotating tool if the tool is fitted during running motor!

Risk of finger or hand injuries.

→ Only place tool if the outer nut [2] is in the lower end position and the motor is thus disengaged.

NOTICE

Self-locking will be cancelled once the motor has been disengaged via the outer nut [2].

NOTICE

The enclosure protection IP... stated on the name plate is not ensured while the tool is fitted!

Ingress of humidity.

→ Do not spray the device with water while the tool is fitted.

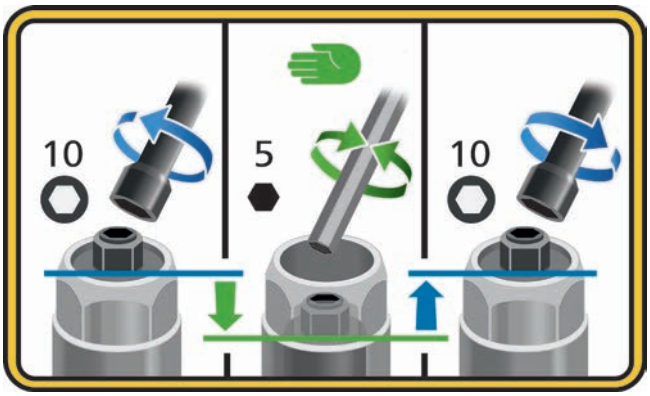
→ To ensure full IP enclosure protection, the protective cap must be fitted.

Table 14: Max. torque and speed (using cordless screwdriver)

Actuator	Max. torque	Max. speed
PROFOX Q	2 Nm	150 rpm
PROFOX M		400 rpm
PROFOX L		

In manual emergency operation, the actuator is protected by a slip clutch against short-term excessive torque. This emergency function is only available for short-term application. When used over a longer time, the slip clutch will be damaged.

Figure 31: Activate/deactivate the manual emergency operation



activate

The required tools, i.e. hexagon socket spanner AF10 and Allen key AF5, are included in the AUMA tool kit (article number: Z007.735).

1. Remove protective cap [1].
2. Turn the nut [2] clockwise until the stop using the hexagon socket spanner AF10.

Manual emergency operation

3. Turn the screw [3] in directions OPEN/CLOSE using the Allen key AF5.

deactivate

The required tools, i.e. hexagon socket spanner AF10 and Allen key AF5, are included in the AUMA tool kit (article number: Z007.735).

4. Turn the nut [2] counterclockwise until the stop using the hexagon socket spanner AF10.
5. Place protective cap [1].

8.3 Motor operation

⚠CAUTION

Motor operation with open cover is only permitted during commissioning.

Danger of burns when touching the motor.

NOTICE

Damage at valve due to incorrect settings!

→ Check the parameters configured in the factory prior to electrical actuator operation.

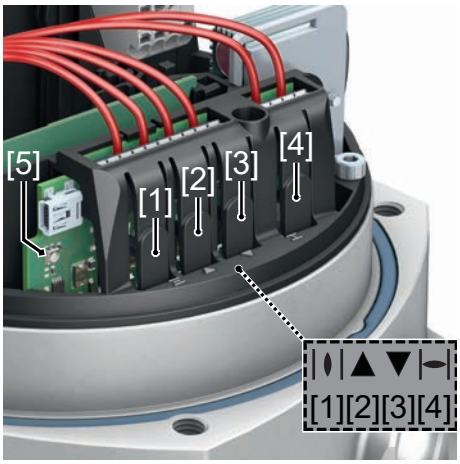
→ In case of deviations, adapt the parameters according to the valve and application requirements.

8.3.1 Actuator operation via push buttons

The actuator can be locally operated by means of four push buttons.

To perform actuator operation via push buttons, please connect to power supply.

Figure 32: Push button and LED (example with I/O interface)



[1]	Push button for setting end position OPEN	[2]	Push button for operation in direction OPEN
[3]	Push button for operation in direction CLOSE	[4]	Push button for setting end position CLOSED
[5]	LED		

The set end position can be overrun!

During operation in directions OPEN/CLOSE, the actuator stops when reaching the set end position. When pressing the push button again (briefly), the actuator exceeds the end position. When pressing the push button again (hold down), the actuator operates to a mechanical valve stop or the end of the permissible setting range of the actuator, refer to figure Maximum stroke /maximum setting range for the stroke.

How to proceed

1. Run actuator in direction OPEN: Hold down push button [2].
   ⇨ The LED is blinking in green during operation in direction OPEN.
2. Run actuator in direction CLOSE: Hold down push button [3].
   ⇨ The LED is blinking in red during operation in direction CLOSE.

8.3.2 Actuator operation via AUMA Assistant App

Functions

Alternatively, actuator operation is possible using the “AUMA Assistant App” smartphone application or via the AUMA CDT software. The following table shows an overview of the menus of the AUMA Assistant App and the AUMA CDT software.

Table 15: Menu overview and description

Menu	Description
Diagnostics	Display of all available warnings and faults including respective details. Actuator diagnostics and detailed diagnostics
Operation function	Operation in direction of end positions Resetting the fault log
Setting end positions	Setting the positions for end positions CLOSED and OPEN
Device ID	Device designation Order number, serial number
Configuration	Configuration of all parameters
Service functions	Factory settings Rebooting the actuator

User level

User level (1), (2), (3), ... defines which menu items or parameters can be displayed or modified by the active user.

6 different users/user levels are available. The user level (1), (2), (3), ... is indicated in the top display line.

Figure 33: User level display (example of user level 4)

Password

A specific password is assigned to each user level and allows different actions. The password must comprise 6 characters.

Table 16: User level and password

User levels and authorisations	
User (user level)	**Authorisation/password**
Observer (1)	Verify settings No password required
Operator (2)	Change configuration parameters (low level) Factory password: 000000
Maintenance (3)	Reserved for future use
Specialist (4)	Change configuration parameters (high level) e.g. type of seating, assignment of output contacts Factory password: 000000
Service (5)	Service staff Modify configuration parameters (scope of service)
AUMA (6)	AUMA administrator

Unauthorised access is made easier due to insecure password! Therefore, we recommend changing the password during initial commissioning.

8.3.3 Actuator operation from Remote

CAUTION

Risk of immediate actuator operation when connecting to mains!

Risk of personal injuries or damage to the valve.

→ Check operation signals and operation behaviour prior to switching on the mains voltage.

→ Ensure that the tripping conditions for the failure behaviour are not fulfilled when switching on.

→ Ensure that the tripping conditions for the EMERGENCY behaviour are not fulfilled when switching on.

Operation mode REMOTE setting

Operation mode REMOTE is the preliminary condition for actuator control via digital inputs, analogue inputs or via fieldbus.

The operation mode can be changed via the AUMA Assistant App, the AUMA CDT software, the RSTX 100 remote control or at the local controls:

AUMA Assistant App

M▷ [DIS_53] Configuration
[DIS_2919] Operation mode
[PRM_5535] Selector

Or in the Remote control window under [DIS_2250] Operation function.

Default setting: Operation mode = REMOTE

AUMA CDT

M▷ [DIS_53] Configuration
[DIS_2919] Operation mode
[PRM_5535] Selector

Or via the **Device** tab in the Connection information window under [PRM_5535] Selector or in the Remote control window.

Default setting: Operation mode = REMOTE

The actuator only reacts to the currently selected command source. However, the command source can be changed during running operation. The OPEN/CLOSE operation is performed via the digital inputs. Setpoint control (e.g. for modulating duty) can be made via the analogue inputs or the fieldbus.

Change-over between OPEN-CLOSE control and setpoint control

For all PROFOX actuators, it is possible to select between **OPEN-CLOSE control** (REMOTE OPEN-CLOSE) and **setpoint control** (REMOTE SETPOINT).

For the change-over, a digital input must be available and configured for the [PZD_22] MODE signal.

- [PZD_22] MODE input = High level (default: +24 V DC) = REMOTE OPEN-CLOSE

  Control is made via digital OPEN, STOP, CLOSE commands.
- Input [PZD_22] MODE = Low level (0 V or input open) = REMOTE SETPOINT

  Control is made via an analogue signal (e.g. 0/4 − 20 mA).

Table 17: Meaning of coding

Signal DIN	DIN coding (factory setting)	Input assigned (24 V)	Input not assigned (0 V)
MODE	Low active	Operation: OPEN, CLOSE, STOP	Modulating duty via analogue input

Configuration of digital input

Required user level: Specialist (4).

M▷ [DIS_53] Configuration
[DIS_139] I/O interface
[DIS_116] Digital inputs

Example: Use Signal DIN1 input for the change-over:

Parameter: [PRM_873] Signal DIN1

Setting value: MODE

EMERGENCY operation

An EMERGENCY operation is triggered by a signal at EMERGENCY input or the Fieldbus EMERGENCY command bit. The actuator moves to a predefined EMERGENCY position (e.g. End position OPEN or End position CLOSED). During EMERGENCY operation, the actuator does not react to other operation commands such as Remote OPEN/Remote CLOSE, Remote SETPOINT, Fieldbus OPEN/Fieldbus/CLOSE or Fieldbus SETPOINT.

8.3.4 Actuator operation from Local (local controls)

⚠CAUTION

Hot surfaces, e.g. due to higher ambient temperatures or due to strong direct sunlight!

Risk of burns

→ Check surface temperature and wear protective gloves.

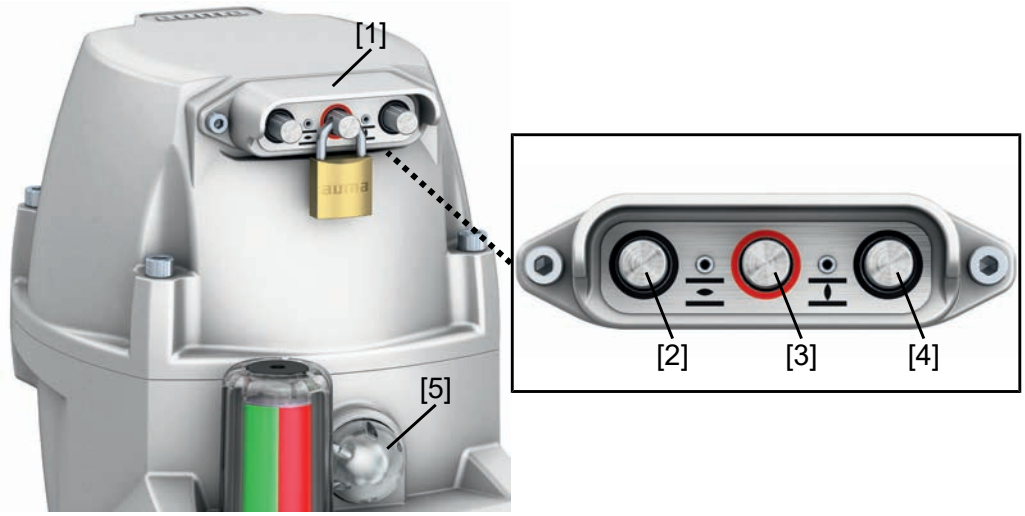
The OPEN and CLOSE operation commands can be given either in push-to-run or in self-retaining operation mode. In self-retaining mode, the actuator runs to the defined end position after pressing the button, unless another command has been received beforehand. For further information, please refer to the Manual (Operation and setting).

Rule for the operation commands from the internal push buttons, the local controls and via Bluetooth:

A new operation command is executed immediately and resets the previous valid command.

Figure 34: Example: Local controls at PF-Q

Figure 35: Operation at local controls



[1]	Local controls	[2]	Push button OPEN
[3]	Push button STOP – operation mode LOCAL/REMOTE	[4]	Push button CLOSE
[5]	FOX-EYE indication light, operation mode LOCAL (cyan)		

Operate the actuator in directions OPEN and CLOSE while in operation mode LOCAL

The actuator can be operated via the local controls using the external push buttons. Signalling is made via the FOX-EYE.

- **Change to operation mode LOCAL** (change from REMOTE or OFF to LOCAL)

  Hold down push button STOP [3] for approx. 3 seconds until the FOX-EYE indication light [5] is blinking in cyan.
- **Operation in direction CLOSE**
- Press push button CLOSE [4].
- **Operation in direction OPEN**
- Press push button OPEN [2].
- **Stop actuator in self-retaining**

  Press push button STOP [3].
- **Change between operation mode LOCAL and REMOTE**

  Press and hold down push button STOP [3] for 3 seconds.
- **Push-to-run operation and self-retaining**

  Push-to-run operation and self-retaining is set via the software. Refer to <Software AUMA CDT (accessories)> chapter. However, self-retaining can also be activated temporarily (for an operation command) using the push buttons:

  Hold down push button OPEN [2] or CLOSE [4] for 3 seconds.

  Self-retaining is not saved with this procedure. The setting programmed in the software is adopted again with the next operation command.

Set end position in commissioning operation mode

- **Change from operation mode LOCAL to commissioning operation mode**

  Hold down push button STOP [3] and press push buttons OPEN [2] and CLOSE [4] simultaneously.
- **Operation in direction OPEN or CLOSE**

  The actuator stops when reaching an end position. When pressing the operation push button again, the end position can be exceeded. In operation mode LOCAL, it is not possible to exceed the end position.

  Press push button OPEN [2] or CLOSE [4] (cyan and end position colour alternating).
- **Setting end position CLOSED or OPEN**

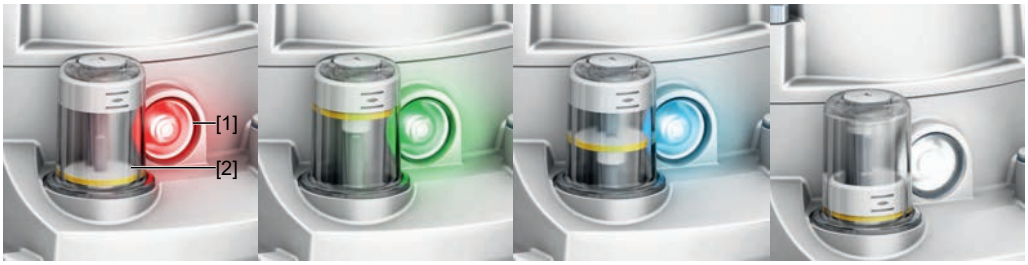
  After pressing an operation push button, a window is displayed for 20 s in which an end position can be set. After 20 s, the end position setting is no longer possible (identical time span as for the internal push buttons!). Then, press again an operation push button and the window is displayed again for 20 s.

  Hold down push button STOP [3] and press either push button OPEN [2] or CLOSE [4] simultaneously.
- **Return from commissioning operation mode to REMOTE**

  Press and hold down push button STOP [3] for 3 seconds.

9 FOX-EYE indication light and position indication

Figure 36: FOX-EYE LED colours (PF-L)



[1] FOX-EYE indication light

[2] Position indicator

FOX-EYE indication light

Various profiles can be selected for the FOX-EYE indication light. Depending on the profile, colours and states of the indication light provide a different signal.

Use the following menu for active profile setting:

M▷ [DIS_53] Configuration
[DIS_2269] Indication
[DIS_2684] Actuator internal control unit
[PRM_5506] Configuration FOX-EYE (blinking behaviour/colours)

The following profiles can be selected by means of the AUMA Assistant App or AUMA CDT:

Setting values: CUSTOMER, AUMA, NAMUR, FLEXIBLE

Default value on delivery: CUSTOMER

Colours and states of the signals can be selected within the FLEXIBLE profile. Most signals can be activated and deactivated. Also refer to the table at the end of the section.

Table 18: Customer profile (signalling)

	FOX-EYE (LED)		Signal status		Operation mode from REMOTE
	Permanent illumination	Blinking signal	Description	Operation mode	
1	White	-	Intermediate position	REMOTE	Yes
2	Red	-	End position CLOSED		
3	Green	-	End position OPEN		
4	-	Red	Operation in direction CLOSE		
5	-	Green	Operation in direction OPEN		
6	-	White (double)	Signal (fieldbus or analogue) missing or incorrect.	REMOTE	not ready
			Operation mode OFF	OFF	
7	-	Cyan	Intermediate position	LOCAL	
8	-	Cyan, colour of the end position in the background	End position CLOSED or OPEN		
9	-	Alternating: Colour of the end position and cyan	Operation in direction CLOSE or OPEN		

	FOX-EYE (LED)		Signal status		Operation mode from REMOTE
	Permanent illumination	Blinking signal	Description	Operation mode	
10	-	Cyan (double)	Intermediate position	Commissioning	not ready
11	-	Cyan (double), colour of the end position in the background	End position CLOSED or OPEN		
12	-	Alternating: Colour of the end position and cyan	Operation in direction CLOSE or OPEN		
13	-	Blue	Operation via internal push buttons: Time window for “Setting end position via internal push buttons” is active once one of the internal operation push buttons has been operated.		
14	-	Red (fast)	Fault, refer to Corrective actions chapter.	REMOTE / OFF / LOCAL / Commissioning	not ready
15	-	Orange (fast)	Ping via Profinet	REMOTE	Yes
16	Blue	-	The actuator is connected via Bluetooth.	REMOTE	Yes
				OFF / LOCAL / Commissioning	not ready
17	-	Blue	The Bluetooth interface is provisionally activated. Safety function: refer to Manual (Parameters and functions) PROFOX.	REMOTE	Yes
				OFF / LOCAL / Commissioning	not ready

Table 19: AUMA profile (signalling)

	FOX-EYE (LED)		Signal status		Operation mode from REMOTE
	Permanent illumination	Blinking signal	Description	Operation mode	
1	White	-	Actuator OK	REMOTE	Yes
6	-	White (double)	Signal (fieldbus or analogue) missing or incorrect.	REMOTE	not ready
			Operation mode OFF / LOCAL / Commissioning	OFF / LOCAL / Commissioning	
14	-	Red (fast)	Fault, refer to Corrective actions chapter.	REMOTE / OFF / LOCAL / Commissioning	
15	-	Orange (fast)	Ping via Profinet	REMOTE	Yes
				OFF / LOCAL / Commissioning	not ready
16	Blue	-	The actuator is connected via Bluetooth.	REMOTE	Yes
				OFF / LOCAL / Commissioning	not ready
17	-	Blue	The Bluetooth interface is provisionally activated. Safety function: refer to manual	REMOTE	Yes
18	-	Red (double)	Warning	REMOTE	Yes
				OFF / LOCAL / Commissioning	not ready

Table 20: NAMUR profile (signalling)

	FOX-EYE (LED)		Signal status		Operation mode from REMOTE
	Permanent illumination	Blinking signal	Description	Operation mode	
15	-	Orange (fast)	Ping via Profinet	REMOTE	Yes
				OFF / LOCAL / Commissioning	not ready
16	Blue	-	The actuator is connected via Bluetooth.	REMOTE	Yes
				OFF / LOCAL / Commissioning	not ready
17	-	Blue	The Bluetooth interface is provisionally activated. Safety function: refer to manual	REMOTE	Yes
				OFF / LOCAL / Commissioning	not ready
19	Green	-	Actuator OK	REMOTE	Yes

	FOX-EYE (LED)		Signal status		Operation mode from REMOTE
	Permanent illumination	Blinking signal	Description	Operation mode	
20	Red	-	Failure, refer to Corrective actions chapter.	REMOTE / OFF / LOCAL / Commissioning	not ready
21	-	Red	Function check or Out of specification, refer to Corrective actions chapter.	REMOTE	Yes
				OFF / LOCAL / Commissioning	not ready
22	-	Green	Maintenance required	REMOTE	Yes
				OFF / LOCAL / Commissioning	not ready

Table 21: Flexible profile: Alternative settings (signalling)

	FOX-EYE (LED)		Signal status	Alternative LED signalling	
	Permanent illumination	Blinking signal	Description	Permanent illumination	Blinking signal
1	White	-	Intermediate position	Green	-
2	Red	-	End position CLOSED	Orange Magenta Green	-
3	Green	-	End position OPEN	Orange Magenta Red	-
4	-	Red	Operation in direction CLOSE	-	Orange Magenta Green
5	-	Green	Operation in direction OPEN	-	Orange Magenta Red
6	-	White (double)	Signal (fieldbus or analogue) missing or incorrect.	-	Red Red (double)
			Operation mode OFF		Orange
14	-	Red (fast)	Fault, refer to Corrective actions chapter.	Red	-
18	-	Red (double)	Warning	-	Red Orange

Position indicator

Mechanical position indicator:

- Independent of power supply
- Continuously indicates the valve position
- Indicates whether the actuator is moving (running indication)
- Indicates that end positions have been reached

First, perform the position indicator setting to match the valve!

Refer to Commissioning [▶ 27] chapter.

Table 22: Position indicator

Colour/state	Signification	Description
Completely down	CLOSED	The actuator is in end position CLOSED.
Completely up	OPEN	The actuator is in end position OPEN.
Mid position	Intermediate position	The actuator is not in any of the end positions.

10 Corrective actions

10.1 Faults during commissioning

Table 23: Faults during operation and commissioning

Faults	Description/cause	Remedy
Actuator exceeds the end position.	Overrun due to excessive speed.	Advance electronic end position switch by the overrun margin or adapt the parameters to an extended speed reduction curve in the “Speed red.pr.end pos.” [speed reduction prior to end position] section.
Actuator repeatedly corrects the setpoint position during positioning.	Overrun due to excessive speed.	Adapt the speed reduction prior to setpoint position parameters to an extended speed reduction curve in the positioner menu or improve the parameter settings for the positioner.
The signals for “Torque/thrust fault” and “End position reached” occur simultaneously!	A “Torque/thrust fault” is issued briefly prior to reaching the end position. However, due to an overrun, the actuator exceeds the end position.	Test plan: • Check whether the end position is correctly set. • Reduce speed. • Remedy cause for “Torque/thrust fault".
Mechanical position indicator stops; however, the actuator continues operation. This can cause the position indicator to break.	Incorrect position indicator selection when placing the order.	Replace position indicator.
The position indication disc jams at the upper or lower edge of the position indicator and does no longer move in the event of a change of direction.	In relation to the actuator stroke range, the position indicator has been incorrectly set. This causes the position indicator to be pressed to the end stop and the slip clutch is activated. Damage to the thread of the position indication disc or the shaft is prevented by means of the slip clutch. The position indication disc jams in the event of high speeds.	Unscrew screw plug of the position indicator using a screwdriver. • Position indication disc jams at the top (end position OPEN): Briefly turn the spindle shaft with slotted screwdriver clockwise. • Position indication disc jams at the bottom (end position CLOSED): Briefly turn the spindle shaft with slotted screwdriver counterclockwise.
The yellow position indication disc stops before the end position indication ring.	The setting range of the position indication disc is larger than the actual stroke range of the actuator.	Operate the actuator sufficiently in opposite direction. Unscrew screw plug of the position indicator using a screwdriver. Press end position indication ring downward using a screwdriver. Approach the end position again so that the end position indication ring is moved to the respective end position by means of the position indication disc.

10.2 Fault indications and warning indications

Faults interrupt or prevent the electrical actuator operation. If a fault occurs, the FOX-EYE indication light is quickly blinking in red.

Warnings have no influence on the electrical actuator operation. They only serve for information purposes. The FOX-EYE remains white.

Further signals are comprised in **collective signals**. The FOX-EYE remains white. For the content of the respective collective signals, refer to the Manual PROFOX “Parameters and functions”.

Fault and warnings can be read via the AUMA Assistant App, the AUMA CDT software or the AUMA RSTX 100 remote control. A preliminary condition for the AUMA RSTX 100 remote control is firmware version 01.06.00 or higher for the actuator.

The individual signals are listed in the subsequent tables.

Table 24: Fault / NAMUR failure

Display (App or CDT)	Description/cause	Remedy
Torque/thrust fault in CLOSE	The actuator has reached the preset tripping torque in direction CLOSE.	Perform one of the following measures: • Issue operation command in direction OPEN. • Reset the fault signal either via AUMA Assistant App or AUMA CDT software. • For control via fieldbus: Execute reset command via fieldbus.
Torque/thrust fault in OPEN	The actuator has reached the preset tripping torque in direction OPEN.	Perform one of the following measures: • Issue operation command in direction CLOSE. • Reset the fault signal either via AUMA Assistant App or AUMA CDT software. • For control via fieldbus: Execute reset command via fieldbus.
Fault no reaction	No actuator reaction to operation commands within the set reaction time.	Check movement at actuator.
Incorrect rotary direction	Contrary to the configured direction of rotation and the active operation command, the motor turns into the wrong direction.	• Check operation command control. • Check the parameter PRM_5515 Rotary direction of motor whether it is suitable for the fitted gearbox. The fault may only occur after modification of the actuator/gearbox. • Check the parameter PRM_79 Closing rotation.
Internal error	Collective signal 14: Internal error has occurred. Different causes can be the reason: Memory overflow in firmware, firmware error, electronic sub-assembly defective.	Use AUMA Assistant App or AUMA CDT to visualise the individual signals by means of the Diagnostics menu. If a memory overflow occurs, reboot the actuator. In case the problem persists: Contact AUMA Service.
	IE logic	Check logic.
	IE fieldbus	Check fieldbus interface.
	IE MWG	Check MWG.
	IE version	Check configuration.
	IE EEPROM	Check configuration.
	IE parameter	Check configuration.
	IE file access	Check configuration.
	IE registration	Check configuration.
	IE startup FB	Check configuration.
	IE CAN Overflow	Check configuration.
	IE MWG measurement system defective	Check configuration.
	Wrn signal loss actual position	Check configuration.
Configuration error	Collective signal 11: A configuration fault has occurred preventing actuator operation.	Use AUMA Assistant App or AUMA CDT to visualise the individual signals by means of the Diagnostics menu. Check the applicable configuration parameters. In case the problem persists: Contact AUMA Service.
	IE parameter configuration	Check position transmitter parameter.
Configuration error REMOTE	Collective signal 22: Configuration error REMOTE has occurred. The fieldbus or I/O board fails either due to incorrectly set configuration parameters or caused by defective hardware	Use AUMA Assistant App or AUMA CDT to visualise the individual signals by means of the Diagnostics menu. Check the configuration parameters for the sub-assembly. In case the problem persists: Contact AUMA Service.
	IE remote parameter configuration	Check configuration.
	IE fieldbus	Check configuration.

Display (App or CDT)	Description/cause	Remedy
Fault motor controls	Collective signal 28: Hardware and software faults at motor or motor controls	Contact AUMA Service.
	Motor shutdown	Contact AUMA Service.
	Motor overvoltage	Contact AUMA Service.
	Motor overcurrent	Contact AUMA Service.
	Motor overtemp.	Contact AUMA Service.
	MotCtrl Fault control	Contact AUMA Service.

Table 25: Warning / NAMUR Out of specification

Display (App or CDT)	Description/cause	Remedy
Internal warning	Collective signal 15: Device warnings. The device can still be operated with restrictions.	Use AUMA Assistant App or AUMA CDT to visualise the individual signals by means of the Diagnostics menu.
24 V DC customer	Part of collective signal 15: The 24 V DC customer auxiliary supply (to control the digital inputs) has failed.	Check 24 V DC inputs (DIN).
24 V DC internal	Part of collective signal 15: The internal 24 V DC power supply of integral controls to supply the electronics components is outside the supply voltage limits.	Check internal 24 V DC power supply.
Configuration warning	Collective signal 06: Faulty configuration. The device can still be operated with restrictions.	Use AUMA Assistant App or AUMA CDT to visualise the individual signals by means of the Diagnostics menu.
	Wrn Setpoint Source	Configure analogue inputs AIN 1 or AIN 2.
	Wrn dead bands	Check the positioner setting.
	Wrn Fieldbus configuration	Check the configuration of the fieldbus interface.
	Warning configuration Nm/kN in CLOSE	Verify torque switching setting.
	Warning configuration Nm/kN in OPEN	Verify torque switching setting.
	Configuration EMERGENCY	Check EMERGENCY configuration.
	Configuration reaction monitoring	Check configuration of reaction monitoring.
Wrn operation mode run time	Warning on time max. running time/h exceeded.	• Check modulating behaviour of actuator. • Check PRM_2122 Permissible run time and reset if required.
Wrn operation mode starts	Warning on time max. number of motor starts (starts) exceeded.	• Check modulating behaviour of actuator. • Check PRM_2123 Permissible starts and reset if required.
Failure behaviour active	The failure behaviour is active since all required setpoints and actual values are incorrect.	Check signals: • Setpoint E1 • Actual value E2 • Actual process value E4 • Check connection to master. For Profibus or Profinet: Check (clear) state of master.
Wrn input AIN 1	Warning: Loss of signal analogue input 1	Check wiring.
Wrn setpoint position	Warning: Loss of signal setpoint position. Possible causes: For an adjusted setpoint range of e.g. 4 – 20 mA, the input signal = 0 (signal loss). For a setpoint range of 0 – 20 mA , monitoring is not possible.	Check setpoint signal.
Operating time warning	The set time has been exceeded. The preset operating time is exceeded for a complete travel from end position OPEN to end position CLOSED.	The warning is automatically cleared once a new operation command is executed. • Check valve. • Check PRM_2547 Permissible operating time, manual.
Time not set	Real time clock has not yet been set.	Set time.
RTC voltage	The voltage of the RTC button cell is too low.	Replace button cell.
Warning, no reaction	No actuator reaction to operation commands within the set reaction time.	• Check movement at actuator. • Check PRM_3158 Reaction time.

Display (App or CDT)	Description/cause	Remedy
Maintenance required	Maintenance is due.	Perform maintenance.
Torque/thrust warnings in OPEN	Limit value for torque warning in direction OPEN exceeded.	Check PRM_3657 Value for Warning torque/thrust OPEN and reset if required.
Torque/thrust warning in OPEN	Limit value for torque warning in direction CLOSE exceeded.	Check PRM_3667 Value for Warning torque/thrust OPEN and reset if required.

10.3 Not ready REMOTE

Table 26: Not ready REMOTE / NAMUR Function check

Display (App or CDT)	Description/cause	Remedy
OFF active	The actuator is in operation mode OFF.	Change operation mode.
Operation mode Local	The actuator is in operation mode LOCAL.	Change operation mode.
Operating mode Commissioning	The actuator is in operation mode Commissioning.	End commissioning and change the operation mode.
EMCY behav. active	Operation mode EMERGENCY is active (EMERGENCY signal was sent). 0 V are applied at the EMERGENCY input.	• Detect cause for the EMERGENCY signal. • Verify failure source. • Apply +24 V DC at EMERGENCY input.
Service active	Operation via service interface (Bluetooth) and AUMA CDT service software.	Exit service software.
Disabled	The actuator is in operation mode Disabled.	Check configuration.
Fail state fieldbus	The fieldbus connection is available, however no process data transmission by the master is executed.	Verify master configuration.
Wrong operation cmd	Collective signal 13: Possible causes: • Several operation commands (e.g. OPEN and CLOSE simultaneously or OPEN and SETPOINT operation simultaneously) • A setpoint is present and the positioner is not active	Use AUMA Assistant App or AUMA CDT to visualise the individual signals by means of the Diagnostics menu. • Check operation commands (reset/clear all operation commands and send one operation command only). • Activate parameter PRM_1169 Positioner. • Check setpoint.
	Incorrect operation command REMOTE1	Correct operation command, i.e. delete and set anew.
	Wrong operation command fieldbus	Correct operation command.
	Setpoint position disabled	Check availability of function (Activation menu).
I/O interface (only for option with fieldbus/Profinet)	The actuator is controlled via the I/O interface	Check I/O interface.

11 Servicing and maintenance

⚠CAUTION

Damage caused by inappropriate maintenance!

→ Servicing and maintenance must be carried out exclusively by suitably qualified personnel having been authorised by the end user or the contractor of the plant. We recommend contacting our service for any interventions.

→ Only perform servicing and maintenance tasks when the device is switched off.

Service & Support

AUMA offers extensive service such as servicing and maintenance as well as customer product training. Contact addresses are indicated on our website (www.auma.com).

11.1 Preventive measures for servicing and safe operation

The following actions are required to ensure safe device function during operation:

6 months after commissioning and then once a year

- Carry out visual inspection:

  Cable entries, cable glands, blanking plugs, etc. have to be checked for correct tightness and sealing. If required, tighten cable glands and blanking plugs with torque in compliance with the manufacturer's specifications.

  Check actuator for damage as well as for grease or oil leakage.
- When deployed in areas where dust formation represents a potential explosion hazard, perform visual inspection for deposit of dirt or dust on a regular basis. Clean devices if required.
- Check fastening screws between actuator and gearbox/valve for tightness. If required, fasten screws while applying the tightening torques as indicated in Tightening torques for screws [▶ 56] chapter.
- When rarely operated: Perform test run.

For enclosure protection IP68

After immersion:

- Check actuator.
- In case of ingress of water, locate leaks and repair. Dry device correctly and check for proper function.

11.2 Test and maintenance

Lubrication

Within the device lifecycle, no additional lubrication of the gear housing is required during operation. For further information on the lifecycle refer to: Actuator lifecycle [▶ 51]

Seals, maintaining the IP protection degree

Preventive actions to ensure the IP protection degree. The seals of S1 seal kit should be replaced within a period of 4 – 8 years:

After 4 years: In case of outdoor installation (frequent changes of temperature and humidity, extreme weather)

After 8 years: In case of indoor installation (constant or virtually constant environmental conditions)

Mechanical position indicator

Both indicator glass and screw plug of mechanical position indicator are made of plastic. To ensure enclosure protection and a long lifetime, both components must be fastened at a defined torque:

Indicator glass cover: 4 Nm (special tool art. no. V004.027-02, available with AUMA).

Screw plug: 2.5 Nm

11.3 Actuator lifecycle

The lifecycle depends on the number of operating cycles or the number of starts (refer to technical data) as well as the respectively applicable AUMA load profiles. Distinction is made between actuators in open-close and modulating duty:

Modulating duty

The load is measured by means of the switching frequency, i.e. the number of starts/hour at a defined thrust, the AUMA load profile.

One start corresponds to a movement of 1° in both directions.

AUMA load profile:

35 % of the maximum thrust of the actuator.

Determination Figures

Operating cycles and number of starts for PROFOX actuators can be determined using the AUMA CDT software.

Operating cycles

By means of the AUMA CDT software and the AUMA Cloud, the number of operating cycles can be roughly determined. For this, create an actuator snapshot and upload it to the AUMA Cloud. The AUMA Cloud menu “My devices” indicates the value for “Number of Full Stroke Equivalent” for the actuator.

Number of starts

The number of starts in indicated in starts/h. The exact sum of this key figure is made in the actuator and can be read via AUMA Assistant App or the AUMA CDT software in “Operational info”.

AUMA recommendation

We recommend contacting the AUMA Service for an inspection of the actuator if one of the following conditions is reached:

- The actuator life is more than 12 years
- The maximum number of operating cycles has been reached at a lower load profile than specified by AUMA (for open-close duty).
- The maximum number of starts has been reached at a lower load profile than specified by AUMA (for modulating duty).

An inspection by the AUMA Service can also be made by means of digital snapshots of the AUMA Assistant App or the AUMA CDT software.

11.4 Disposal and recycling

Our devices have a long service life. However, they have to be replaced at one point in time. The devices have a modular design and may therefore easily be disassembled, separated, and sorted according to materials, i.e.:

- Electronic scrap
- Various metals
- Plastic materials
- Greases and oils

The following generally applies:

- Generally, greases and oils are hazardous to water and must not be released into the environment.
- Arrange for controlled waste disposal of the disassembled material or for separate recycling according to materials.
- Heed the national regulations for waste disposal.

12 Technical data

The following tables include standard and optional features. For detailed information on the specific version, refer to the order-related data sheet. The order-related data sheet can be downloaded from our website at www.auma.com in both German and English (please state the order number).

12.1 Technical data Linear actuators

Features and functions		
Type of duty	Open-close duty:	Classes A and B according to ISO 22153, short-time duty S2 - 15 min
	Modulating duty:	Class C according to ISO 22153, intermittent duty S4 - 50 %, with maximum number of starts up to 1,200 starts/h
	For nominal voltage and +40 °C ambient temperature and at load with 35 % of the maximum thrust. The type of duty must not be exceeded.	
Motor	Variable speed, brushless motor Soft start/soft stop. The progress characteristics can be configured as requested.	
Insulation class	F (motor winding)	
Motor protection	Via short-circuit protection and current measurement	
Self-locking	At standstill with spring-applied brake	
Limit switching	Via Hall sensors	
Thrust switching	Via electronic current measurement. Tripping torques are infinitely adjustable via Bluetooth. 8 levels can be selected when placing the order.	
Mechanical position indicator	Standard:	Continuous indication via an indicator moving on an axis. Versions: • PF-L2 – PF-L6: 5 – 27 mm/stroke 28 – 40 mm/stroke 41 – 60 mm/stroke • PF-L10 – PF-L18: 20 – 36 mm/stroke 37 – 56 mm/stroke 57 – 80 mm/stroke
	Option:	Without mechanical position indicator
Manual operation	PF-L2 – PF-L6:	
	Manual emergency operation possible using additional tools: • Hexagon socket spanner AF10 (coupling change-over) • Allen key AF5 (for turning)	
	PF-L10 – PF-L18:	
	Standard:	Manual drive for setting and emergency operation, handwheel does not rotate during electrical operation.
	Option:	Without handwheel, i.e. handwheel and handwheel shaft are obsolete.
Coupling (option)	The following internal threads for connecting the valve shaft are available: • Unbored • M8 x 1.25 • M10 x 1.50 • M12 x 1.75 • M16 x 2.00 • M20 x 2.50	
Valve attachment	Standard:	Dimensions according to ISO 5210
	Option:	Prepared for fixing up to 4 pillars via an attachment frame. For bores, refer to table: Valve attachment (option) [▶ 53]

Table 27: Valve attachment (option)

Pitch circle [mm]	Bores
90	4 x M12
100	4 x M12
100	4 x M16
110	4 x M16
120	4 x M16

Features and functions		
Power supply	Refer to name plate	
Overvoltage category	Category III according to IEC 60364-4-44 Category II in compliance with IEC 60364-4-44 (according to cDEKRAus for the North American market)	
Power electronics	With integral motor controller (current consumption in standby mode < 3 W)	
I/O interface control (input signals)	3 digital inputs:	• Via opto-isolator, with one common • Control voltage 24 V DC, current consumption: approx. 15 mA per input • Minimum pulse duration for shortest operation pulse: 100 ms • All digital inputs must be supplied with the same potential • All inputs can be configured as required • Standard assignment (without positioner and without fieldbus interface): CLOSE, OPEN, STOP • Assignment for option with positioner: MODE, OPEN, CLOSE • Assignment for option with fieldbus interface: OPEN, CLOSE, I/O interface I/O interface: Selection of the control source (fieldbus interface or I/O input signals) Factory setting of “I/O Interface” signal: Input signal 0 V = fieldbus interface is active
	Analogue input: (option)	• 0/4 – 20 mA or 0 – 10 V • No galvanic isolation • For option with positioner: Used as input signal for position setpoint or as input signal for motor speed • For option with fieldbus interface: Used as input for the position setpoint (definition via 2 digital inputs which command source is active for the positioning: fieldbus or analogue input) or for a sensor signal which can be further transmitted via fieldbus.
Status signals of I/O interface (output signals)	3 digital outputs:	• Freely configurable semi-conductor output contacts, per contact max. 24 V DC, 100 mA (resistive load) • Outputs can be configured as required • Default assignment: End position CLOSED (high active), end position OPEN (high active), collective fault signal (low active)
	Analogue output:	• Position feedback signal 0/4 – 20 mA (load maximum 500 Ω) or 0 – 10 V • No galvanic isolation
Additional I/O signals for control and signalling (option)	2 digital inputs:	2 digital inputs (via opto-isolator, galvanically isolated) • Control voltage 115 V DC, current consumption: approx. 15 mA per input • Minimum pulse duration for shortest operation pulse: 100 ms • All inputs can be configured as required; however, a signal may only be assigned to maximum one input (irrespective of the type, 24 V DC or 115 V AC). • Assignment as specified in the order, e.g.: CLOSE, OPEN (push-to-run operation) or CLOSE/OPEN, EMERGENCY
	3 digital outputs:	Freely configurable output contacts, max. 240 V AC / 30 V DC, 1 A (resistive load) • 2 x type SPST NO, 1 type SPDT • Outputs can be configured as required • Default assignment: End position CLOSED (high active), end position OPEN (high active), collective fault signal (SPDT)
Voltage output (option)	Auxiliary voltage 24 V DC, max. 80 mA for supply of control inputs, without galvanic isolation.	

Features and functions		
Local controls (external)	Standard:	Without
	Options:	• Push buttons OPEN, STOP (LOCAL - REMOTE), CLOSE • Signalling the operation via the FOX-EYE: – Change between the operation modes: REMOTE (OK), OFF, LOCAL and COMMISSIONING – End positions CLOSED and OPEN – Running CLOSE, running OPEN
Functions (actuators with I/O interface)	Standard:	• 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
	Option:	• Positioner – Position setpoint via analogue input E1 = 0/4 – 20 mA or 0 – 10 V – Programmable behaviour on loss of signal – Automatic adaptation of dead band (adaptive behaviour selectable) – Selection between open-close duty and modulating duty via digital MODE input
Bluetooth communication interface	Permanently active/inactive, deactivation/activation from REMOTE. Required accessories: • AUMA Assistant App (Commissioning and Diagnostic Tool for Android and iOS devices) • AUMA RSTX 100 remote control • AUMA CDT (Commissioning and Diagnostic Tool for Windows-based PCs)	
Electrical connection	Cable entry: 3 x M20x1.5 threads for cable glands. Inside rail with spring clamp terminals for wire connection.	
Wiring diagram (basic version)	TPC P00A1A1A100000, standard TPC P00A1B1A100000, version with positioner	
Operation and display		
At the actuator	Status indication:	FOX-EYE (indication LED) Display of operation modes and states: • REMOTE: System OK or not ready REMOTE LOCAL COMMISSIONING (only in combination with outside local controls) • End positions • Faults • Bluetooth connection active
	Set end positions:	4 buttons and 1 LED are located below the hood, as well as 3 external buttons for local controls (option) and signalling via FOX-EYE: Run actuator in directions OPEN and CLOSE. Set end position once mounted to the valve.

Operation and display		
Via Bluetooth using AUMA Assistant App or AUMA CDT software	Set end positions:	Run actuator in directions OPEN and CLOSE. Set end position once mounted to the valve.
	Configuration:	Basic settings for operation: • Operating speed • Type of seating for end positions, thrust switching • Assignment of signal inputs and signal outputs • Fieldbus parameters (if fieldbus option has been selected)
		Additional functions: For applications, safety and service, e.g.: • Positioner • EMERGENCY behaviour • Torque bypass • Failure behaviour • Signal configuration
	Diagnostics:	Monitoring key indicators and measured values for preventive maintenance and consequently increasing process safety. Limit values can be set. Deviations generate warning signals which can be transmitted to the DCS via digital outputs or fieldbus.
		Actuator: Temperature value within actuator Key indicators regarding lifetime of electronics, brake, gearbox and seals.
		Actuator and valve: Method for identifying changes in thrust requirement: Perform reference operation and save thrust as reference profile. Define tolerance range. Perform comparative operations if required. Values outside tolerance initiate a signal which is communicated as described above.
		Further key figures: Furthermore, the actuator monitors and records further indicators and conditions. The generated fault and warning signals are saved within the event log. These signals can be configured as requested. An overview in the AUMA Assistant App or the CDT software shows all available fault/warning signals with option to enter the details.

Service conditions		
Installation altitude	≤ 2,000 m above sea level > 2,000 m above sea level on request	
Ambient temperature	Refer to actuator name plate	
Ambient temperature	–30 °C to +70 °C	
Humidity	Up to 100 % relative humidity across the entire permissible temperature range	
Enclosure protection in accordance with IEC 60529	Standard:	IP67
	Option:	IP68 According to AUMA definition, enclosure protection IP68 meets the following requirements: • Depth of water: maximum 8 m head of water • Continuous immersion in water: maximum 96 hours • Up to 10 operations during immersion • Modulating duty is not possible during immersion.
Pollution degree according to IEC 60664-1	Pollution degree 4 (when closed), pollution degree 2 (internal)	
Vibration resistance according to IEC 60068-2-6	1 g, for 10 to 200 Hz Refers to the fastening of the actuator to the valve (via flange F05 or F07). Resistant to vibration during start-up or for plant failures. However, a fatigue strength may not be derived from this.	
Corrosion protection	Housing:	KS Suitable for use in areas with high salinity, almost permanent condensation, and high pollution.
	Thrust rod:	Stainless steel, 1.4305
	Coupling (option):	Steel with zinc-nickel coating
Coating	Double layer powder coating	
Colour	Standard:	AUMA silver-grey (similar to RAL 7037)
	Option:	Available colours on request

Service conditions		
Lifetime	Open-close duty:	10,000 operating cycles OPEN - CLOSE - OPEN One operating cycle consists of one stroke of 40 mm in both directions (OPEN - CLOSE - OPEN)
	Modulating duty:	1.8 million modulating steps
	The lifetime depends on the load and the number of starts. A high starting frequency will rarely improve the modulating accuracy. To reach the longest possible maintenance and fault-free operating time, the number of starts per hour chosen should be as low as permissible for the process.	
Sound pressure level	< 70 dB (A)	

Further information	
EU Directives	Machinery Directive 2006/42/EC Low Voltage Directive 2014/35/EU EMC Directive 2014/30/EU RoHS Directive 2011/65/EU

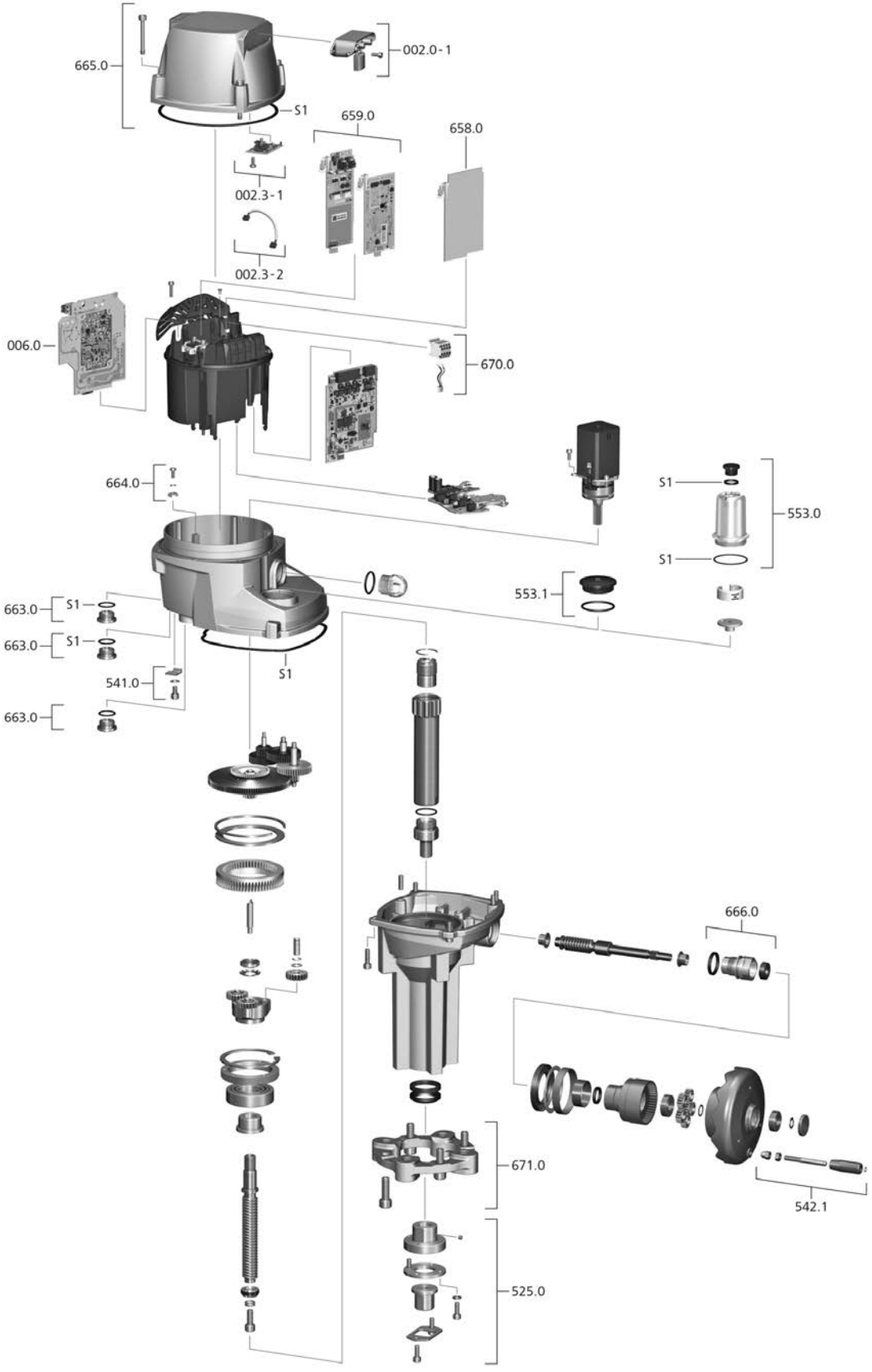
12.2 Tightening torques for screws

Table 28: Tightening torques for screws

Threads	Tightening torque [Nm]	
	Strength class	
	A2-70/A4-70	A2-80/A4-80
M4	2.2	3
M5	4.3	5.7
M6	7.4	10
M8	18	24
M10	36	48
M12	61	82
M16	150	200
M20	294	392
M30	1,015	1,057
M36	1,769	2,121

13 Spare parts list

13.1 Linear actuators PF-L10 – PF-L18

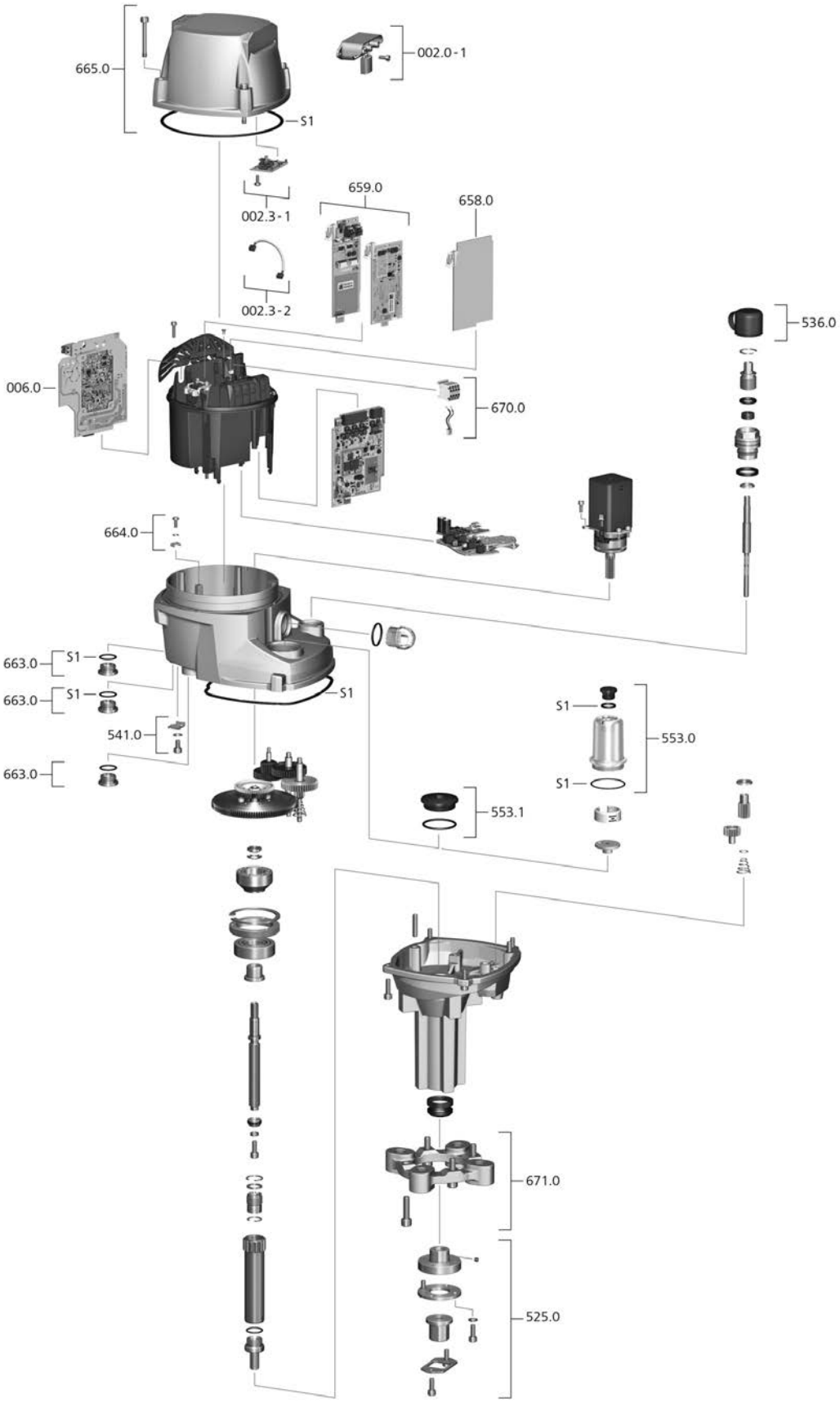


Please state device type and our order number (see name plate) when ordering spare parts. Only original AUMA spare parts should be used. Failure to use original spare parts voids the warranty and exempts AUMA from any liability. Only the designated spare parts with reference numbers or spare parts sets for replacement are available for the customer. They are specified in the following list. The parts shown in the exploded view without reference numbers may only be replaced by AUMA. Representation of spare parts may slightly vary from actual delivery.

Ref. No.	Designation
002.3-2	Cable harness of local control unit for 002.0-1
541.0	Earth connection
542.1	Ball handle
553.0	Mechanical position indicator
658.0	I/O board as option
663.0	Screw plug for cable gland
664.0	Protective earth connection
665.0	Cover for electronics housing
666.0	Handwheel bearing flange
670.0	Auxiliary voltage output 24 V DC
671.0	Attachment frame for pillars or mounting bracket
S1	Seal kit

Note to ref. no. 553.0 Mechanical position indicator: A special tool is required for disassembly/assembly of mechanical position indicator. This can be ordered from AUMA (article number: V004.027-02).

13.2 Linear actuators PF-L2 – PF-L6



Please state device type and our order number (see name plate) when ordering spare parts. Only original AUMA spare parts should be used. Failure to use original spare parts voids the warranty and exempts AUMA from any liability. Only the designated spare parts with reference numbers or spare parts sets for replacement are available for the customer. They are specified in the following list. The parts shown in the exploded view without reference numbers may only be replaced by AUMA. Representation of spare parts may slightly vary from actual delivery.

Ref. No.	Designation
002.3-2	Cable harness of local control unit for 002.0-1
536.0	Protective cap
541.0	Earth connection
553.0	Mechanical position indicator
658.0	I/O board as option
663.0	Screw plug for cable gland
664.0	Protective earth connection
665.0	Cover for electronics housing
670.0	Auxiliary voltage output 24 V DC
671.0	Attachment frame for pillars or mounting bracket
S1	Seal kit

Note to ref. no. 553.0 Mechanical position indicator: A special tool is required for disassembly/assembly of mechanical position indicator. This can be ordered from AUMA (article number: V004.027-02).

Solutions for a world in motion

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