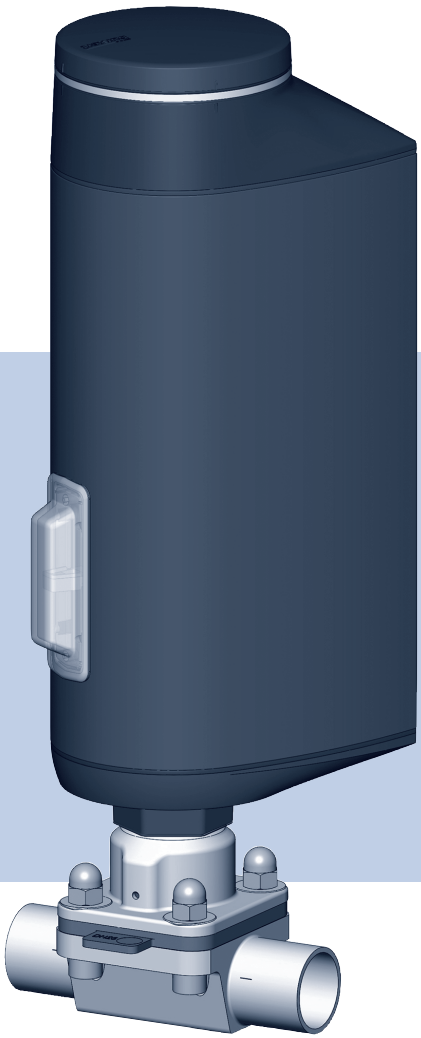
bürkert
FLUID CONTROL SYSTEMS

# Type 3363, 3364, 3365
# AE3363

Electromotive diaphragm control valve



## Operating Instructions

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Operating Instructions 1910/03_EUen_00810537 / Original DE

# Electromotive diaphragm control valve

## Contents



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# 1 THE OPERATING INSTRUCTIONS

The operating instructions describe the entire life cycle of the device. Keep these instructions in a location which is easily accessible to every user and make these instructions available to every new owner of the device.

**Important safety information.**

Read the operating instructions carefully and thoroughly. Study in particular the chapters entitled *Basic safety instructions* and *Intended use*.

▸ The operating instructions must be read and understood.

## 1.1 Symbols

**DANGER!**

**Warns of an immediate danger!**

▸ Failure to observe the warning will result in fatal or serious injuries.

**WARNING!**

**Warns of a potentially dangerous situation!**

▸ Failure to observe the warning may result in serious injuries or death.

**CAUTION!**

**Warns of a possible danger!**

▸ Failure to observe this warning may result in a moderate or minor injury.

**ATTENTION!**

**Warns of damage to property!**

▪ Failure to observe the warning may result in damage to the device or other equipment.

Indicates important additional information, tips and recommendations.

Refers to information in these operating instructions or in other documentation.

▸ Designates an instruction which you must follow to prevent a hazard.

→ Designates a procedure which you must carry out.

Indicates a result.

MENUE Representation of software interface text.

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## 1.2 Definition of the term “device”

- **Device:** The term “device” used in these instructions applies to the electromotive diaphragm control valve of Types 3363, 3364, 3365 and AE3363.
- **Ex:** In these instructions, the abbreviation “Ex” stands for “explosion-risk”.
- The term “büS” (Bürkert system bus) used in this manual stands for the communication bus developed by Bürkert, based on the CANopen protocol.

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# 2 INTENDED USE

**Non-authorized use of the electromotive diaphragm control valve Type 3363, 3364 and 3365 may be a hazard to people, nearby equipment and the environment.**

**The electromotive diaphragm control valve Type 3363, 3364 and 3365 is designed to control the flow of liquid and gaseous media.**

- Standard devices must not be used in the potentially explosive area. They do not have a separate Ex rating plate which indicates approval for the explosion-proof area.
- The surfaces of the device must not be cleaned with alkaline cleaning agents.
- If the valve position is relevant as regards safety in the event of a power failure: Use only those devices which have the SAFEPOS energy-pack (optional energy pack).
- Use according to the authorized data, operating conditions, and conditions of use specified in the contract documents and operating instructions.
- Protect the device against harmful environmental influences (e.g. radiation, air humidity, vapors, etc.)! If in doubt, consult the relevant sales company.

**Use the device**

- only in conjunction with third-party devices and components recommended and authorized by Bürkert.
- only when in perfect condition and always ensure proper storage, transportation, installation and operation.
- only as intended.

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# 3 BASIC SAFETY INSTRUCTIONS

These safety instructions do not consider any contingencies or incidents which occur during installation, operation and maintenance. The operator is responsible for observing the location-specific safety regulations, also with reference to the personnel.

**Risk of injury from high pressure!**

- Before working on the system or device, switch off the pressure and vent or drain lines.

**Danger of burns and risk of fire.**

Following an extended duty cycle or as a result of a hot medium, the surface of the device may become hot.

- Only touch the device when wearing protective gloves.
- Keep the device away from highly flammable substances and media.

**Risk of crushing due to mechanically moving parts.**

- Perform installation work on the pressure piece, diaphragm and valve body only when they have been isolated from the power supply.
  Devices with SAFEPOS energy-pack: Completely drain SAFEPOS energy-pack. Wait until LED illuminated ring goes out; the LED status must not be in **LED off** mode.
- Keep clear of the openings in the valve body.

**Danger due to an uncontrolled process in the event of a power failure.**

If devices do not have the optional SAFEPOS energy-pack, the valve remains in an undefined position in the event of a power failure.

- If the valve position is relevant as regards safety in the event of a power failure: Use only those devices which have the SAFEPOS energy-pack (optional energy pack).
- In the SAFEPOS select a valve position which is safe for the process.

**Danger due to loud noises.**

- Depending on the operating conditions, the device may generate loud noises. More detailed information on the likelihood of loud noises is available from the relevant sales office.
- Wear hearing protection when in the vicinity of the device.

**Leaking medium when the diaphragm is worn.**

- Regularly check relief bore for leaking medium.
- If medium is leaking out of the relief bore, change the diaphragm.
- If the media is hazardous, protect the area surrounding the discharge point against dangers.

**General hazardous situations.**

To prevent injuries:

- In a hazardous area, the device may be used only in accordance with the specification on the separate Ex type label.
- To use the device in an explosion-risk area, observe the additional information with safety instructions for the explosion-risk area enclosed with the device or the separate explosion-risk operating instructions.

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- ▸ Devices without a separate Ex rating plate may not be used in a potentially explosive area.
- ▸ Only feed in the media types specified in chapter "8 Technical data" to the media connections.
- ▸ Do not make any internal or external changes on the device and do not subject it to mechanical stress.
- ▸ Secure the system from unintentional actuation.
- ▸ Note the system-specific safety regulations.
- ▸ Only trained technicians may perform installation and maintenance work.
- ▸ Transport, install and dismantle a heavy device with the help of another person and with appropriate tools.
- ▸ After an interruption, ensure that the process is restarted in a controlled manner. Observe sequence!
  1. Apply supply voltage.
  2. Charge the device with medium.
- ▸ Observe the general rules of technology.
- ▸ The valves must be installed in accordance with the regulations applicable in the country.

**ATTENTION!**

**Electrostatic sensitive components and modules.**

The device contains electronic components which react sensitively to electrostatic discharge (ESD). Contact with electrostatically charged persons or objects are hazardous to these components. In the worst case scenario, they will be destroyed immediately or will fail after start-up.

- Observe the requirements in accordance with EN 61340-5-1 to minimize or avoid the possibility of damage caused by sudden electrostatic discharge!
- Do not touch electronic components while the supply voltage is switched on!

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# 4 GENERAL INFORMATION

## 4.1 Contact address

**Germany**

Bürkert Fluid Control Systems
Sales Center
Christian-Bürkert-Str. 13-17
D-74653 Ingelfingen
Tel. + 49 (0) 7940 - 10 91 111
Fax + 49 (0) 7940 - 10 91 448
Email: info@burkert.com

**International**

Contact addresses can be found on the final pages of the printed operating instructions.

And also on the Internet at:

www.burkert.com

## 4.2 Warranty

The warranty is only valid if the device is used as intended in accordance with the specified application conditions.

## 4.3 Information on the Internet

Operating instructions and data sheets for Types 3363, 3364 and 3365 can be found on the Internet at:

www.burkert.com.

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# 5 PRODUCT DESCRIPTION

## 5.1 General description

The electromotive diaphragm control valve Type 3363, 3364 and 3365 is suitable for controlling the flow rate of liquid and gaseous media. These can be neutral, ultra-pure, sterile as well as contaminated, aggressive or abrasive media of high to low viscosity.

The diaphragm control valve has an electromotive linear actuator with electronic control system. The electronic control system for position control or process control are controlled either via standard signals (analog) or via a fieldbus (digital).The electromotive linear actuator has been designed in such a way that it has an optimum degree of efficiency. At the same time the actuator keeps the valve tight and in position in a de-energized state even at the maximum specified medium pressure.

Optionally there is the energy pack (SAFEPOS energy-pack) for the device. If the supply voltage fails, the energy pack supplies the actuator with the required energy to move the valves into the required position which can be adjusted via a menu.

The valve position can be manually changed in 2 ways.
1. Electrical manual control: is used when supply voltage applied.
2. Mechanical manual override: may only be used if no supply voltage applied.

The device can be set and operated either via 2 capacitive buttons and 4 DIP switches or optionally on a display with touch-screen. There is also the option of setting the device via the büs Service interface and by using the PC software “Bürkert Communicator”. To make the setting using the “Bürkert Communicator”, the USB-büS-interface set, available as an accessory, is required.

## 5.2 Properties

- Medium hermetically separated from the actuator by the diaphragm.
- Any flow direction.
- Self-draining in appropriate installation. The ends of the utilized connections must be cylindrical.
- Minimum dead space.
- High flow values and low-turbulence flow through the stream-lined valve body.
- External, directly accessible display with touch-screen.
- 360° LED illuminated ring for displaying the device states, valve end positions and operating state.
- To keep the valve position, no electrical energy is required even at maximum medium pressure, except for the basic consumption for actuation.
- Valve actuator can be rotated through 360°.
- Integrated control for position control or process control.
- Non-contact, high-resolution and wear-free position sensor.
- The actuator housing consists of a robust and heat-dissipating aluminum body. The coating is resistant to the usual cleaning agents. The plastic materials used for the actuator housing are also resistant to cleaning agents.
- Simple and fast replacement of the diaphragm. PTFE/EPDM diaphragms can be replaced with EPDM diaphragms.

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## 5.3 Variants

The following variants are described in these instructions:

**Controller variants**

- Electromotive diaphragm control valve with position controller function
- Electromotive diaphragm control valve with process controller function

**Body variants**

- Type 3363: 2-way body
- Type 3364: T-body
- Type 3365: tank bottom body

## 5.4 Options

- Energy pack (SAFEPOS energy-pack) for approaching the safety position.
  The safety position, which the valve is to occupy if the supply voltage fails, is specified via the SAFEPOS menu.
- Different fieldbus systems for transferring the control parameters.
- Display module, can be operated via touch-screen.
- SIM card for saving and transferring device-specific values and settings.

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# 6 STRUCTURE AND FUNCTION

The electromotive diaphragm control valve consists of an electromotively driven linear actuator and a diaphragm valve body.

The electronic control and the “SAFEPOS energy-pack” are housed in the side of the linear actuator.

The electronic control consists of the microprocessor-controlled electronics and the position sensor.

The electronic control system for position control or process control are controlled either via standard signals (analog) or via a fieldbus (digital).

The electromotive diaphragm control valve is designed using three-wire technology. Operation is on standard devices with 2 buttons and 4 DIP switches or optionally on devices with a display module on the display.

The electromotive linear actuator consists of a brushless direct current motor, gears and a threaded spindle. The valve spindle, which is connected to the threaded spindle, transfers the force to the pressure piece of the diaphragm..

The linear actuator is designed in such a way that it does not require electrical energy to keep the valve position, i.e. when it is at a standstill, only the electronic control consumes energy.

**Port connections:**
Welded connection, threated socket connection, flange connection, clamp connection, bonded connection. (Connection sizes on request).

## 6.1 Diagram – structure of the electromotive diaphragm control valve

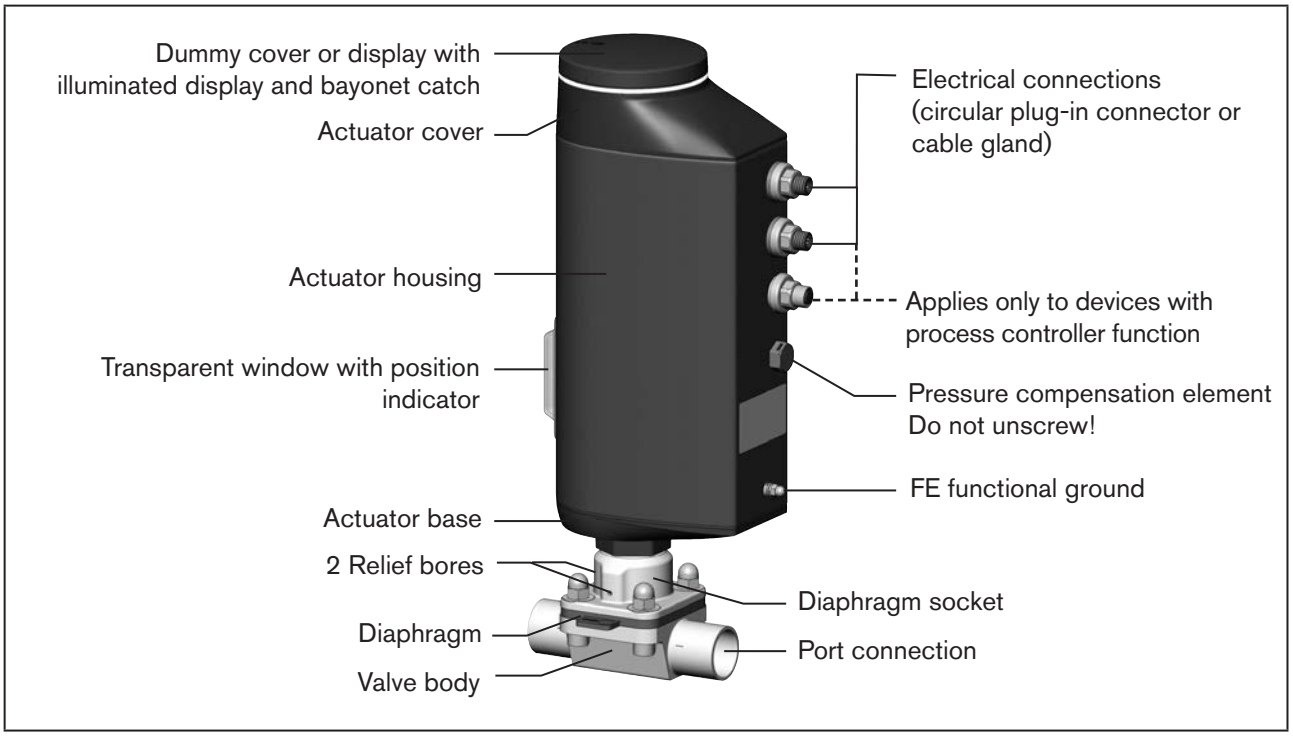


*Figure 1: Structure, electromotive diaphragm control valve with 2-way body*

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## 6.2 Valve position after failure of the supply voltage

**Valve position when using devices without the SAFEPOS energy-pack:**

If the electromotive actuator is at a standstill due to failure of the supply voltage, the valve remains in the last occupied position.

If the supply voltage fails while the actuator is changing the valve position, the valve stops in an undefined position. The actuator flywheel mass and the medium pressure continue to affect the valve spindle until it finally comes to a standstill.

**Valve position when using devices with the SAFEPOS energy-pack:**

The valve occupies the safety position defined in the SAFEPOS menu.

Description of the SAFEPOS energy-pack see Chapter “7.4 SAFEPOS energy-pack (option)”, page 26

## 6.3 Safety position

The safety position defined in the SAFEPOS menu is the position which the valve occupies in the following cases:

- Internal error
- Sensor break if parameterized accordingly
- Digital input if parameterized accordingly
- Failure of the supply voltage (optional)
  This function is available only on devices which have the optionally available SAFEPOS energy-pack.

**The following safety positions are selected in the SAFEPOS menu:**

- Close = Valve closed
- Open = Valve open
- User-Defined = Freely defined, safety position input by a percentage value (0 % = closed, 100 % = open).
- Inactive = Valve stops in an undefined position if the supply voltage fails.

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## 6.4 Display of the device state

The device state is indicated at the LED illuminated ring. To indicate the device status and the valve position, different LED modes can be set:

- Valve mode
- Valve mode w/ warnings (mode set in the factory)
- NAMUR mode

The description for setting the LED mode can be found in Chapter “12.2.2 Setting LED mode”, page 89.

### 6.4.1 Valve mode

The valve position and the device status “Failure” are indicated in the valve mode.

Messages for device status "Out of specification", "Maintenance required", and "Function check" are not displayed in valve mode.

The factory default colors for indicating the open and closed valve positions can be changed.
A description can be found in the software description for Type 3363 on our homepage.
www.burkert.com

**Displays in valve mode:**

When device status “Normal”: Permanently lit in the color of the valve position.
When device status “Failure”: Flashes alternately red and in the color of the valve position.

| Valve position | Color of valve position | Color of device status "Failure" |
|---|---|---|
| **open** | yellow | rot |
| **between** | white | |
| **closed** | green | |

*Table 1: Display of device state in valve mode*

### 6.4.2 Valve mode w/ warnings

The valve position as well as the device status “Failure”, “Out of specification”, “Maintenance required”, and “Function check” are displayed in this mode.

If several device statuses exist simultaneously, the device status with the highest priority is displayed. The priority is determined by the severity of the deviation from standard operation (red = failure = highest priority).

**Displays in valve mode w/ warnings:**
When device status “Normal”: Permanently lit in the color of the valve position.
If device status deviates from “Normal”: The colors of the valve position and device status flash alternately.

| Valve position | Color of valve position | Color of device status | | | |
|---|---|---|---|---|---|
| | | Failure, error or fault | Function check | Out of specification | Maintenance required |
| **open** | yellow | red | orange | yellow | blue |
| **between** | white | | | | |
| **closed** | green | | | | |

*Table 2: Display of device state in valve mode w/ warnings*

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### 6.4.3 NAMUR mode

In NAMUR mode, the LED illuminated ring lights up according to NAMUR NE 107, in the color specified for the device status.

If several device statuses exist simultaneously, the device status with the highest priority is displayed. The priority is determined by the severity of the deviation from standard operation (red = failure = highest priority).

Displays in NAMUR mode:

| Status display in accordance with NE 107, edition 2006-06-12 | | | |
|---|---|---|---|
| **Color** | **Color code** | **Description** | **Meaning** |
| Red | 5 | Failure, error or fault | Due to a malfunction in the device or on its periphery, controlled operation is not possible |
| Orange | 4 | Function check | The device is being worked on; controlled operation is therefore temporarily not possible. |
| Yellow | 3 | Out of specification | The ambient conditions or process conditions for the device are outside the specified area.<br>Device internal diagnostics point to problems in the device or with the process properties. |
| Blue | 2 | Maintenance required | The device is in controlled operation, however function is briefly restricted.<br>→ Maintain device. |
| Green | 1 | Diagnostics active | Device is operating faultlessly. Status changes are shown in color.<br>Messages are transmitted via any connected fieldbus. |
| White | 0 | Diagnostics inactive | Device is switched on.<br>Status changes are not shown.<br>Messages are not transmitted via any connected field bus. |

*Table 3: Display of device status in NAMUR mode*

* A detailed fault description can be found in Chapter “22 TROUBLESHOOTING AND MESSAGES”, page 174.

### 6.4.4 Flashing of the LED illuminated ring

Flashing indicates that a connection to the PC software “Bürkert Communicator” has been established.

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### 6.4.5 Device status messages

Device status messages are displayed in the logbook. Chapter "21 Maintenance" describes the most common messages and the required action.

**Messages for device status "Function check"**
The messages are output when control mode is interrupted by work at the device.

| Messages for device status "Function check" |
|---|
| Manual control active |
| M.SERVICE active |
| M.Q0.TUNE active |
| M.CLEAN active |
| P.LIN active |
| Process simulation active |
| Signal generator active |

*Table 4: Messages for device status "Function check"*

## 6.5 Factory settings

Operating state:
Devices are delivered with the MANUAL operating state preset.

Find the factory presets for the individual menu points in Chapter "17 Operating structure / Factory settings".

The factory settings are highlighted in blue to the right of the menu in the operating structure.

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# 7 ELECTRICAL CONTROL

- **Variants**
  Type 3363, 3364 oder 3365 with position controller function
  Type 3363, 3364 oder 3365 with process controller function
- **Position sensor**
  non-contact, high resolution and wear-free.
- **Microprocessor-controlled electronics**
  for signal processing, control and motor control.
- **Electrical interfaces**
  Circular plug-in connector or cable gland

## 7.1 Interfaces

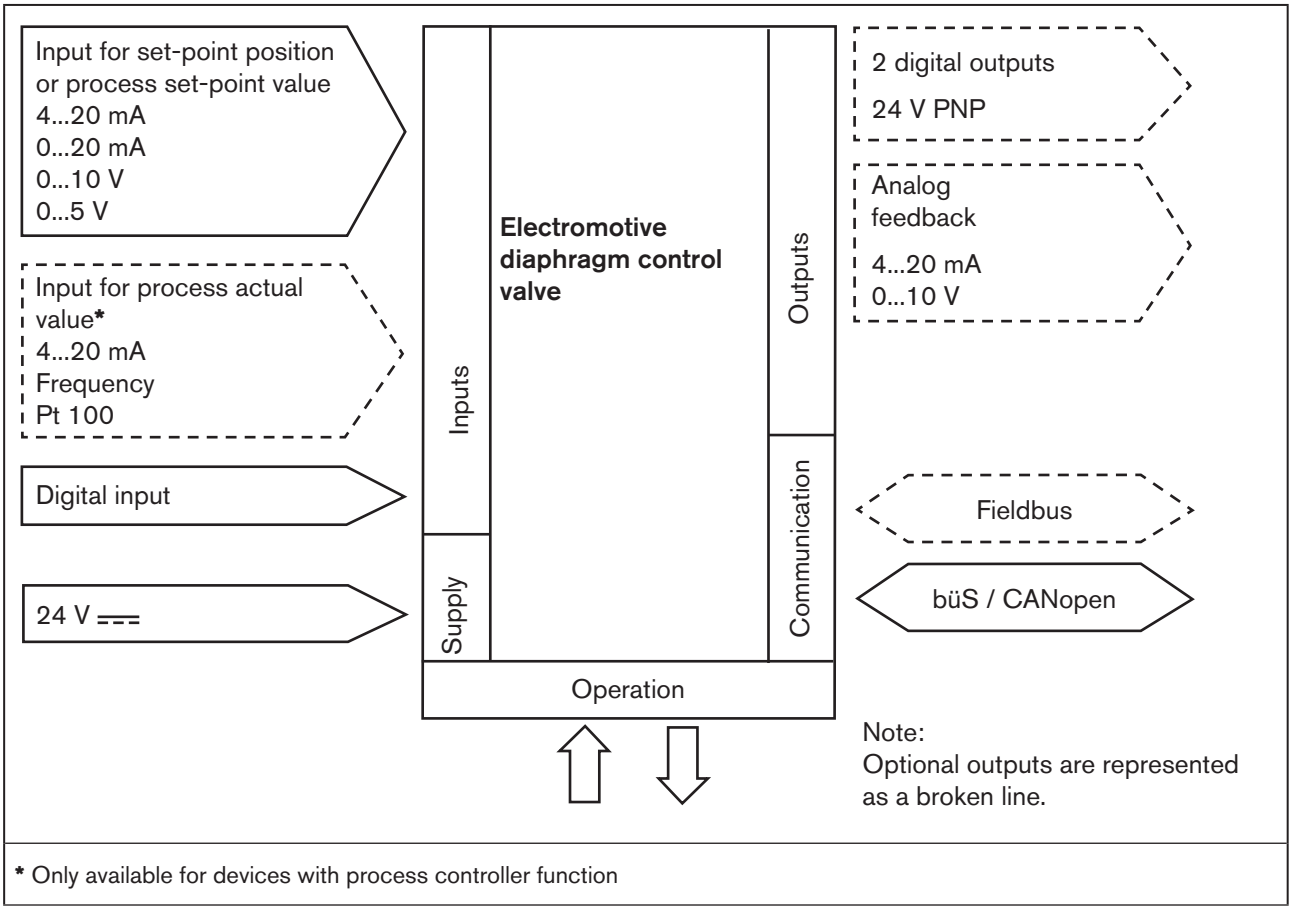


*Figure 2: Interfaces of the electromotive diaphragm control valve*

The electromotive diaphragm control valve is designed using three-wire technology, i.e. the power (24 V ⎓)is supplied separately from the set-point value signal.

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## 7.2 Function diagram of the electromotive diaphragm control valve

The black parts of the image describe the position controller function. The additional elements for the process controller function (optional) are shown in blue.

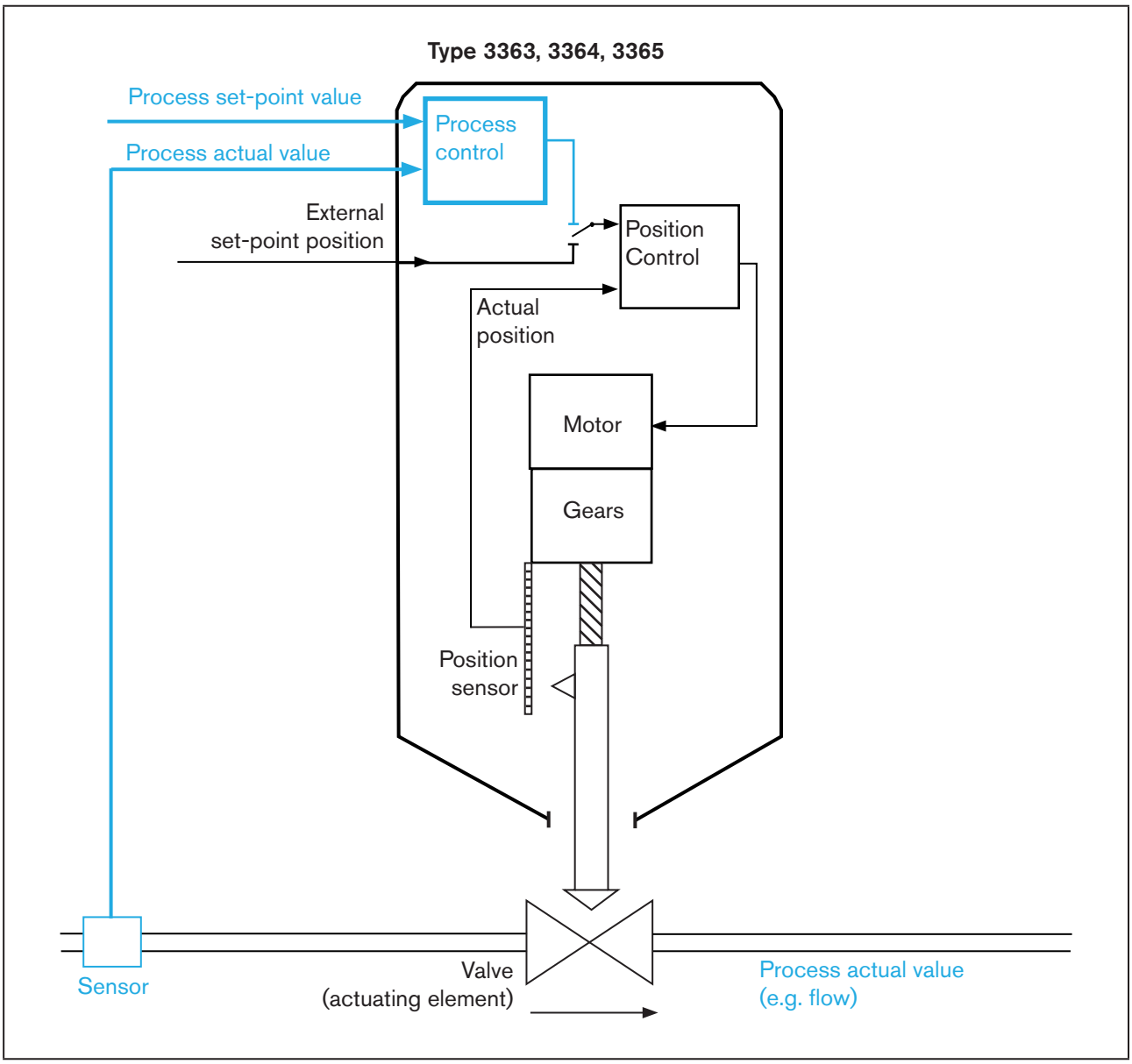


*Figure 3: Function diagram of the electromotive diaphragm control valve*

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## 7.3 Operating mode of the electrical control

Apart from actual position control, the additionally implemented PID controller can also be used to perform process control (e.g. level, pressure, flow, temperature) in the sense of a cascade control.

The process controller function is linked to a control circuit. The set-point position of the valve is calculated from the process set-point value and the process actual value via the control parameters (PID controller). The process set-point value can be specified by an external signal.

In process control the position control becomes the lower-level auxiliary control circuit, resulting in a cascade control. The process controller in the main control circuit of the diaphragm control valve has a PID function. The process set-point value (SP) is specified as set-point value and compared with the actual value (PV) of the process variable to be controlled. The position sensor records the actual position (POS) of the electromotive linear actuator. This position actual value is compared by the position control with the set-point value (CMD) of the process control. If there is a control difference (Xd1), the actuating variable (CTRL) changes the actual position (POS) and therefore the valve opening.

**Signal flow plan**

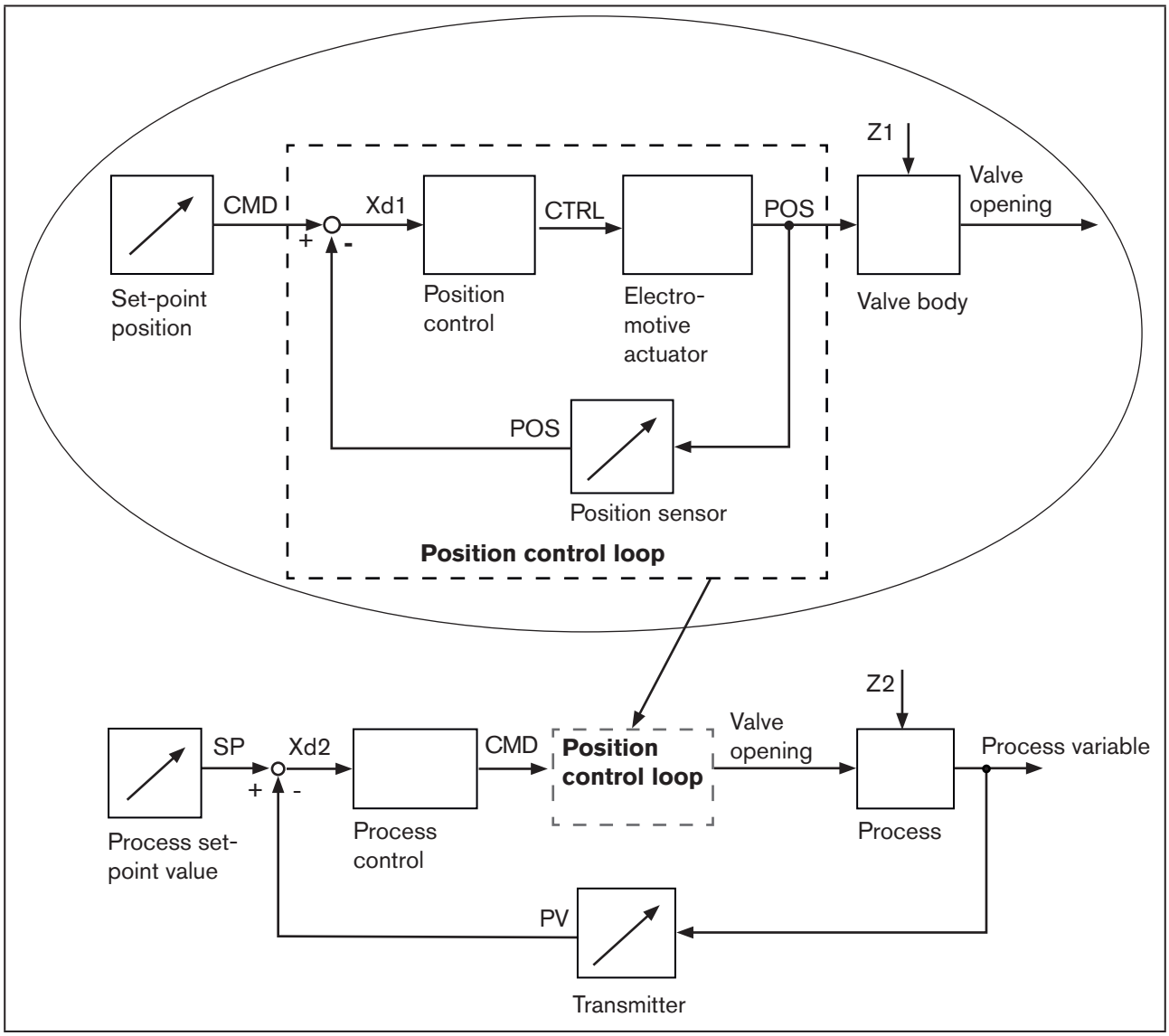


*Figure 4: Signal flow plan*

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### 7.3.1 Schematic representation of the position control

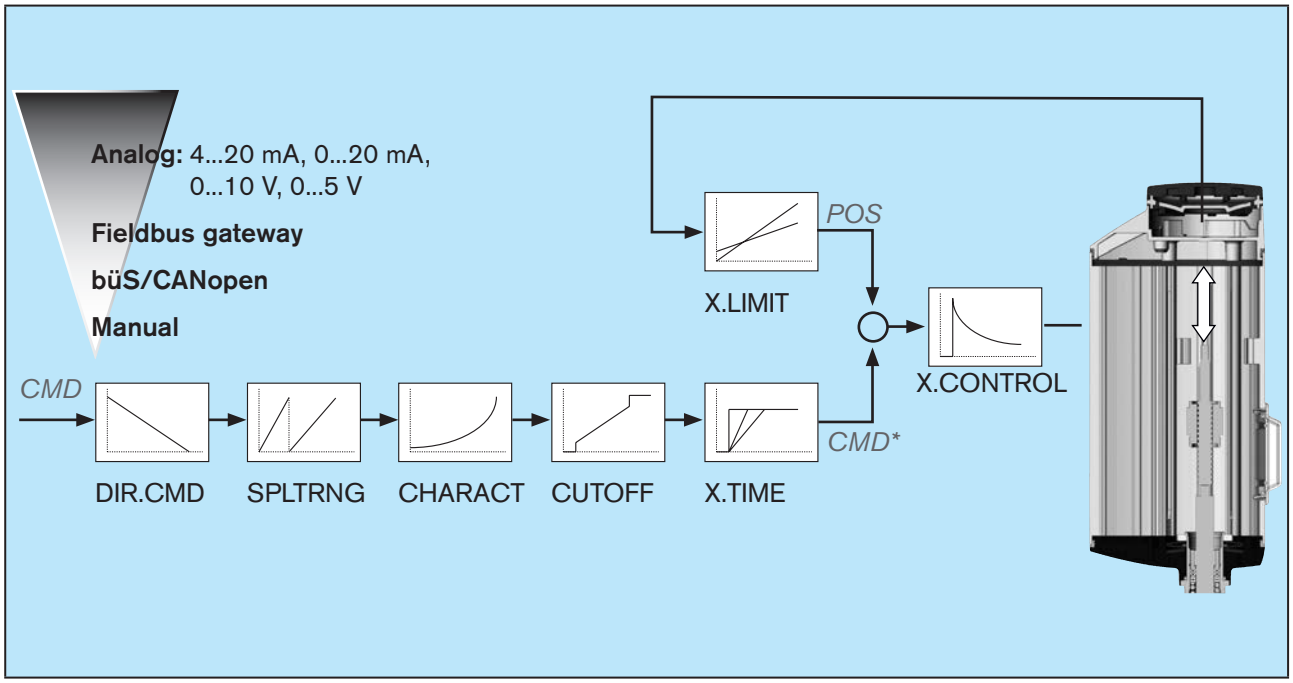


*Figure 5: Schematic representation of the position control*

**Legend for schematic representation of position control and process control:**

| Menu | Description |
|---|---|
| X.LIMIT | Limit of the mechanical stroke range |
| DIR.CMD | Effective direction (set-point position) |
| SPLTRNG | Signal split range |
| CHARACT | Transfer characteristic |
| CUTOFF<br>(type X.CO)<br>(type P.CO) | Sealing function<br>(with regard to set-point position)<br>(with regard to process set-point value) point |
| X.TIME | Limit of the control speed position control |
| X.CONTROL | Parameterization position control |
| SP.scale | Scaling process set-point value |
| SP.SLOPE | Growth rate per time unit |
| SP.FILTER | Filter for process set-point value |
| PV.scale | Scaling process actual value |
| PV.FILTER | Filter for process actual value |
| PID.PARAMETER | Parameterization process control |
| P.CO. scale | Scaling process control |

*Table 5: Legend, menu position control and process control*

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| Process variables | Description | |
|---|---|---|
| *POS* | Position actual value | |
| *CMD* | Set-point position | Position controller function: Selection of the source for the input signal of the set-point position in the menu → Inputs/Outputs → CMD → CMD.source. |
| | | Process controller function: The set-point position is specified by the process controller. |
| *CMD** | Set-point position processed by the controller | |
| *PV* | Process actual value: Selection of the source for the input signal of the process actual value in the menu → Inputs/Outputs → PV → PV.source. | |
| *PV** | Process actual value processed by the controller | |
| *SP* | Process set-point value: Selection of the source for the input signal of the process set-point value in the menu → Inputs/Outputs → SP I CMD → SP.source. | |
| *SP** | Process set-point value processed by the controller | |

*Table 6: Legend, process variables position control and process control*

## 7.3.2 Schematic representation of the process control

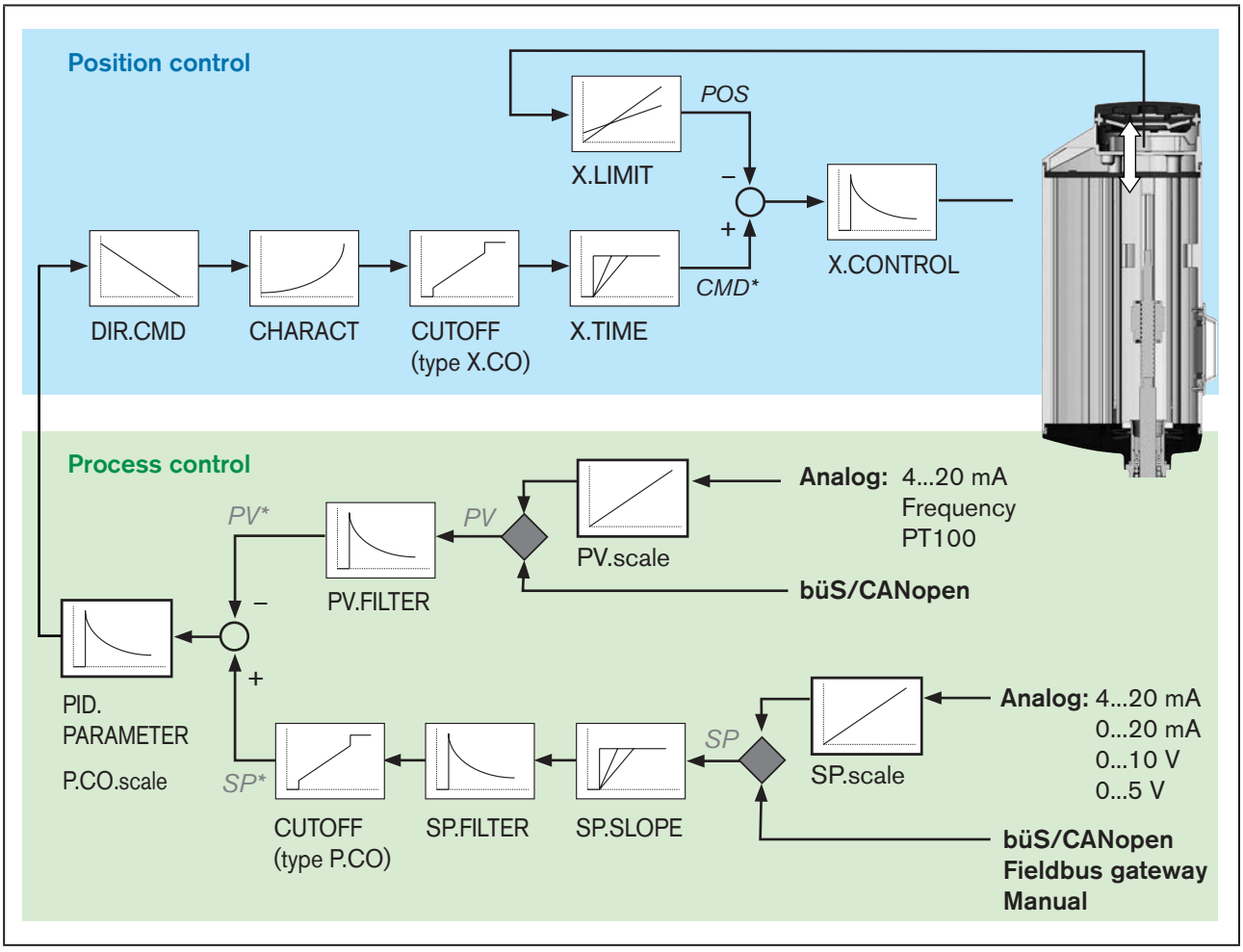


*Figure 6: Schematic representation of the process control*

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## 7.4 SAFEPOS energy-pack (option)

Optionally there is the energy pack (SAFEPOS energy-pack) for the device. If the supply voltage fails, the energy pack supplies the actuator with the required energy to move the valve into the required position which can be adjusted via a menu. The energy pack is fully charged and ready for use after a maximum of 100 seconds (depending on the conditions of use).

### 7.4.1 Service life

Service life: up to 10 years (depending on the conditions of use).

The determined service life of 7.5 years was determined under the following conditions:

| | |
|---|---|
| Ambient temperature | 30 °C (86 °F) |
| Medium temperature | 80 °C (176 °F) |
| Duty cycle | 100 % |
| Medium pressure | 6 bar (87,02 psi) |
| Diaphragm size | 32 |

**ATTENTION!**

The SAFEPOS energy-pack is a wearing part. Information on the service life are guide values which are not guaranteed.

### 7.4.2 Messages on the state of the SAFEPOS energy-pack

**The device issues a maintenance message:**
The remaining service life of the energy storage is approx. 25 %! The energy storage must be changed soon.

▸ ⚠ Replace SAFEPOS energy-pack in good time before the service life ends.

**The device issues an error message and moves to the safety position:**
The SAFEPOS energy-pack was not replaced in good time after the warning was issued. The storage capacity is so low that there is no guarantee that the safety position can be approached.

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# 8 TECHNICAL DATA

**The following product-specific information is indicated on the rating plate:**

- Voltage [V] (tolerance ±10 %) and current type
- Diaphragm material and material of the valve body
- Fieldbus standard
- Diaphragm size
- Flow capacity
- Actuator size
- Port connection
- Maximum permitted medium pressure

## 8.1 Conformity

The electromotive diaphragm control valves Type 3363, 3364, 3365 and AE3363 are compliant with EU directives as stated in the EU Declaration of Conformity.

## 8.2 Standards

The applied standards, which are used to demonstrate compliance with the EU Directives, are listed in the EU type test certificate and/or the EU Declaration of Conformity.

## 8.3 Licenses

The product is cULus approved. Instructions for use in the UL area see chapter “8.9 Electrical data”.

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## 8.4 Type label

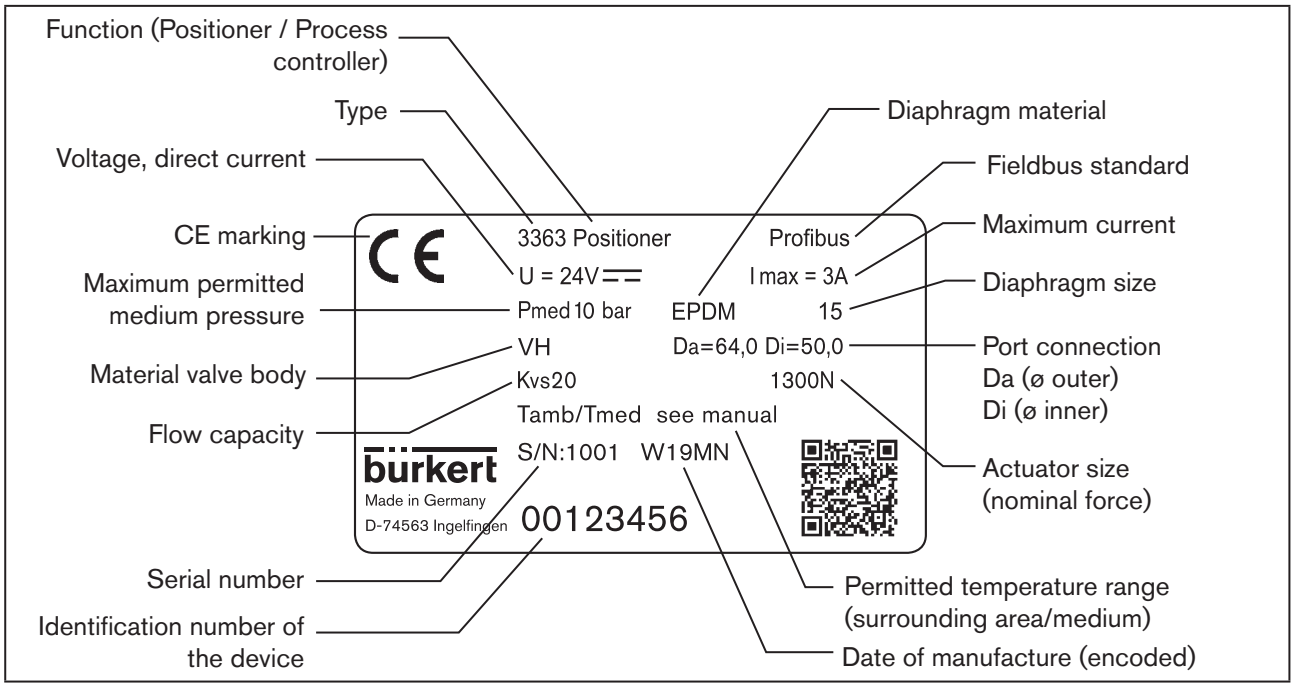


*Figure 7: Description of the type label (example)*

### 8.4.1 UL additional label (Example)

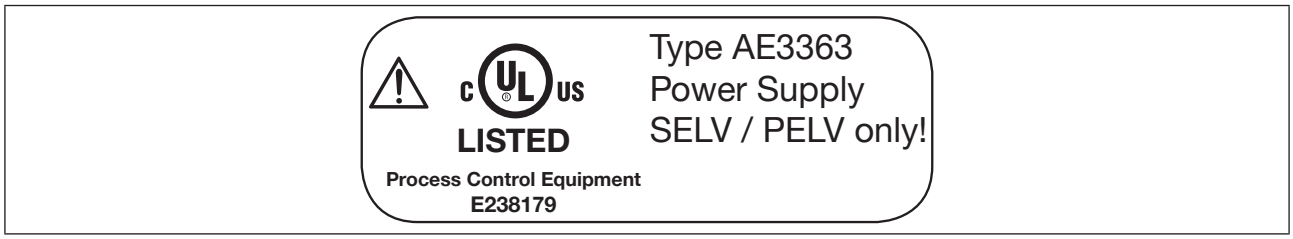


*Figure 8: UL additional label (example)*

## 8.5 Labeling of the forged steel valve bodies

Depending on the variant, the labeling may vary.

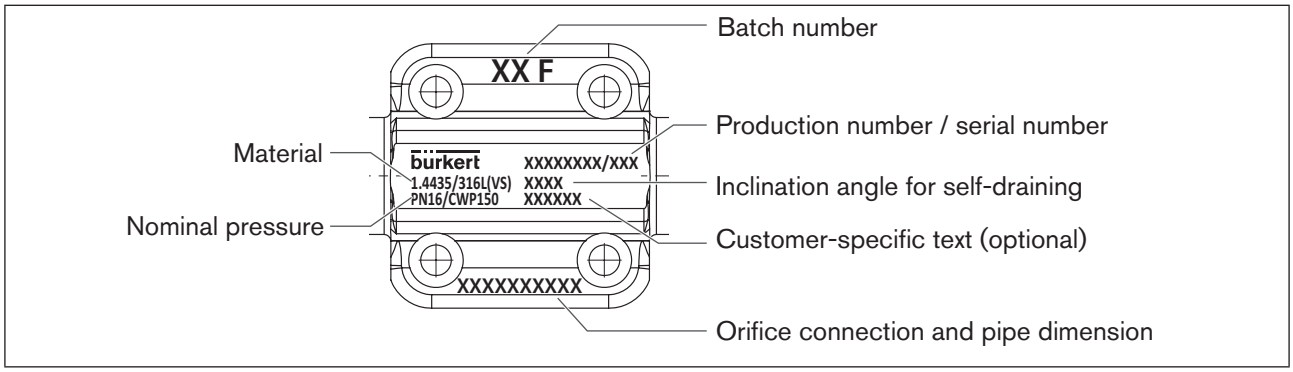


*Figure 9: Labeling of the forged steel valve bodies (example)*

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## 8.6 Labeling of the tube valve bodies (VP)

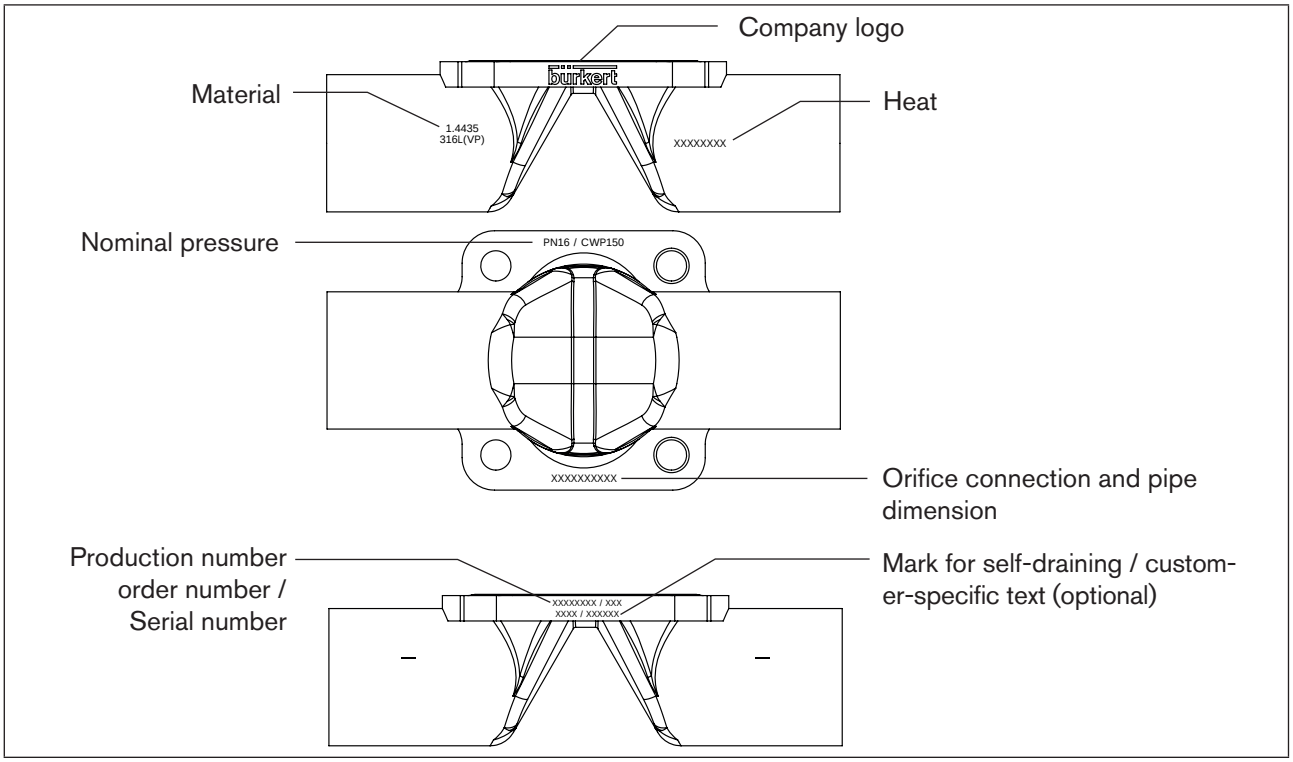


*Figure 10: Labeling of the tube valve bodies (VP)*

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## 8.7 Operating conditions

**For operation of the device observe the product-specific information on the rating plate.**

**WARNING!**

**Malfunction if the temperature exceeds or drops below the permitted temperature range.**

- Never expose the device outdoors to direct sunlight.
- The temperature must not exceed or drop below the permitted ambient temperature range.

**WARNING!**

**Reduced sealing function if medium pressure too high.**

As the diaphragm control valve is closed against the medium flow, the medium pressure may become too high and prevent the valve from closing tightly.

- The medium pressure must not be greater than the maximum value specified on the rating plate.

**WARNING!**

**Danger due to escape of hot medium.**

The diaphragm is not permanently temperature-resistant to hot medium.

- Do not use the diaphragm control valve for steam shut-off.

Maximum permitted medium pressure: see rating plate

| | |
|---|---|
| Media: | neutral, high-purity, sterile, contaminated, aggressive or abrasive media with high to semi-fluid viscosity. |
| Degree of protection: | (verified by Bürkert / not evaluated by UL)<br>IP65/67 according to IEC 529, EN 60529, (IP67 on request).<br>NEMA 250 4x (not guaranteed for installation location: actuator facing downward). |
| Altitude: | up to 2000 m above sea level. |

### 8.7.1 Permitted temperature ranges

The permitted medium and ambient temperature ranges depend on various factors:

- **Medium temperature:** depends on the material of the valve body and diaphragm materials. See chapter “8.7.2 Permitted medium temperature”
- **Ambient temperature:** depends on the medium temperature. See “Figure 12: Temperature graph”.

To determine the permitted temperatures, all factors must be taken into account.

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| | | |
|---|---|---|
| Minimum temperatures | Environment: | –10 °C (14 °F) |
| | Medium: | Observe dependence on material of the valve body and diaphragm materials. See chapter "8.7.2 Permitted medium temperature" |
| Maximum temperatures | Observe dependencies on ambient temperature and medium temperature. See chapter "8.7.3 Temperature graph for medium and ambient temperature" | |

## 8.7.2 Permitted medium temperature

**ATTENTION!**

The behavior of the medium with respect to the diaphragm materials may change depending on the medium temperature.

- The indicated medium temperatures apply only to media which do not corrode or swell the diaphragm materials.
- The functional properties, and the service life of the diaphragm, may be impaired if the temperature rises or drops below the indicated medium temperature.

**Permitted medium temperature for diaphragm materials**

| Diaphragm material | Permitted medium temperature range | | |
|---|---|---|---|
| | minimal | maximal | Steam sterilisation |
| EPDM (AD) | -10 °C (14 °F) | +143 °C (289.4 °F) | +150 °C/60 min. (302 °F/60 min.) |
| PTFE/EPDM (EA) | -10 °C (14 °F) | +130 °C (266 °F) | +140 °C/60 min. (284 °F/60 min.) |
| Advanced PTFE/EPDM (EU) | -5 °C (23 °F) | +143 °C (289.4 °F) | +150 °C/60 min. (302 °F/60 min.) |
| GYLON / EPDM laminated (ER) | -5 °C (23 °F) | +130 °C (266 °F) | +140 °C/60 min. (284 °F/60 min.) |
| FKM (FF) | 0 °C (32 °F) | +130 °C (266 °F) | No steam / dry heat up to +150 °C/60 min. (302 °F/60 min.) |

*Table 7: Permitted medium temperature depending on the diaphragm materials*

**Permitted medium temperature for valve bodies made of metal**

| Valve body material | Permitted temperature range |
|---|---|
| Stainless steel | -10...+150 °C (14...302 °F) |

*Table 8: Medium temperature for valve bodies of metal*

**Permitted medium temperature for plastic valve bodies**

The permitted medium temperature for plastic valve bodies depends on the medium pressure.
See graph of pressure "Figure 11".

| Valve body material | Permitted temperature range (depends on the medium pressure, see graph of pressure "Figure 11") |
|---|---|
| PVC, see graph of pressure | -10...+60 °C (14 °F...140 °F) |
| PVDF, see graph of pressure | -10...+120 °C (14 °F...248 °F) |
| PP, see graph of pressure | -10...+80 °C (14 °F...176 °F) |

*Table 9: Medium temperature for plastic valve bodies*

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Graph of pressure for orifices (DN) 15 to 40:

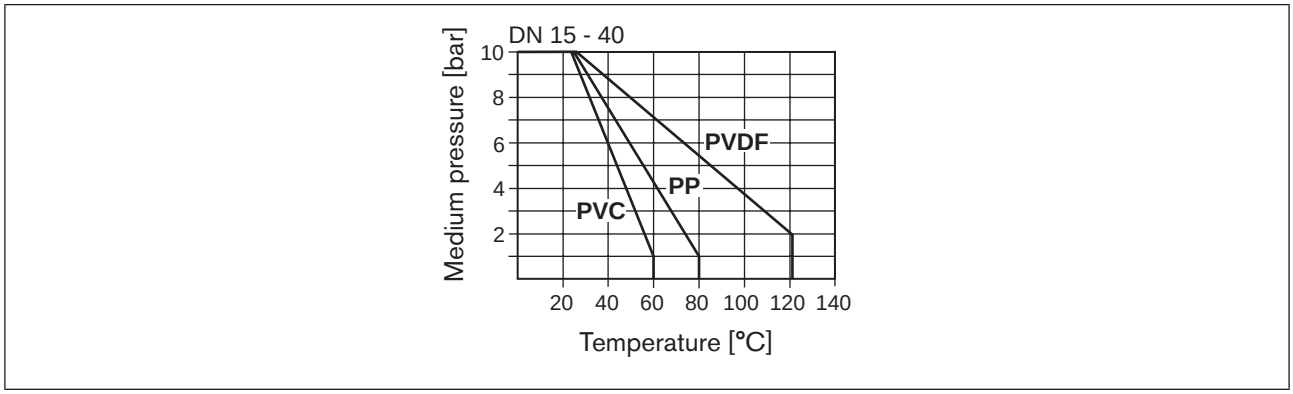


*Figure 11: Graph: Dependence on medium temperature and medium pressure for valve bodies made of plastic*

## 8.7.3 Temperature graph for medium and ambient temperature

The maximum permitted temperature for the ambient and the medium depend on each other. The permitted maximum temperatures must be determined using the temperature graph.

The values were determined under the following maximum operating conditions: Diaphragm size 25 when 100% duty cycle at 10 bar medium pressure.

For deviating operating conditions an individual verification can be performed. Please contact your Bürkert office for more information.

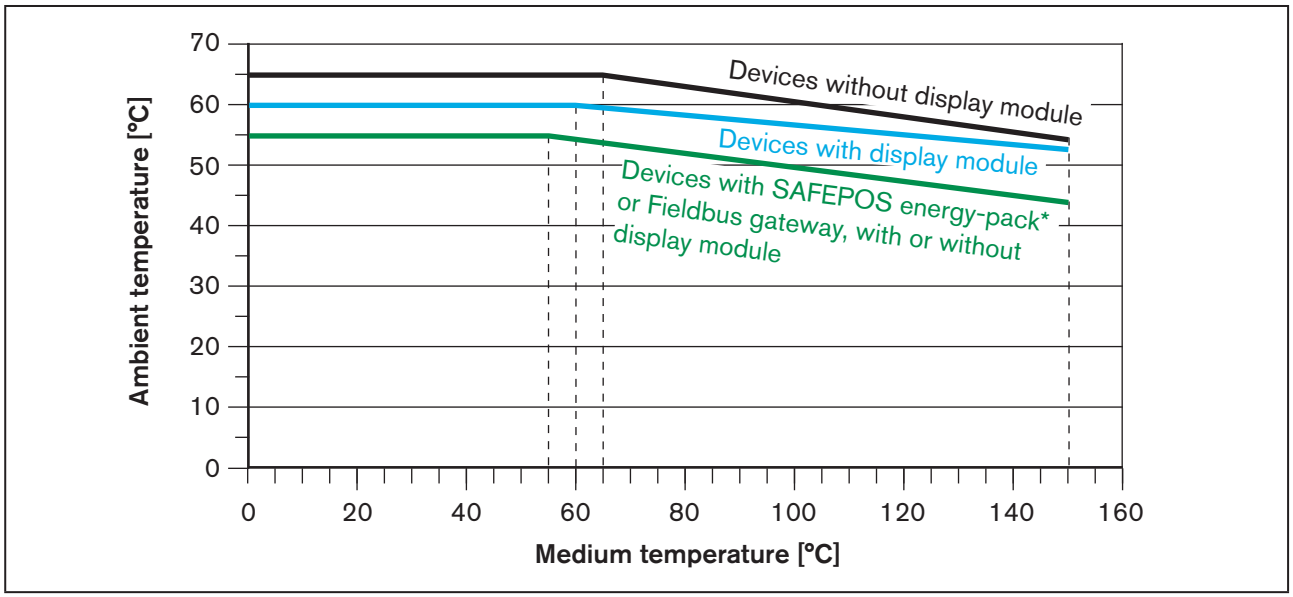


*Figure 12: Temperature graph*

* The service life of the SAFEPOS energy-pack depends on the medium temperature and the ambient temperature. For description see "7.4 SAFEPOS energy-pack (option)"

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## 8.8 General technical data

| | | |
|---|---|---|
| Dimensions: | See data sheet | |
| Weight: | See data sheet | |
| Materials | Actuator: | PPS and aluminum powder-coated |
| | Valve body: | Metal: stainless steel board material (types 3324 and 3325), Investment casting (VG), forged steel (VS), tubular-formed body (VP), Plastic: PP, PVC and PVDF |
| | Body connection: | CF-8 / 1.4308 |
| | Spindle seal: | FKM |
| | Seal material: | sealing element actuator housing: EPDM |
| | Diaphragm: | EPDM, PTFE or FKM (see type label) |
| Fluid connection<br>Connection types: | Welded connection according to: | DIN EN ISO 1127 / ISO 4200 / DIN11866 B<br>DIN 11850 2 / DIN11866 A<br>ASME BPE / DIN 11866 C<br>BS4825<br>SMS 3008 |
| | Clamp connection according to: | DIN 32676 B (ISO 4200)<br>DIN 32676 A (DIN 11850 2)<br>ASME BPE |
| | Threated socket connection, langed connection and bonded connection. (Connection sizes on request). | |
| Electrical connection: | by connection terminals or circular plugs | |
| Installation position: | depends on the body model. See chapter “9.2 Installation position of the diaphragm control valves”. | |
| Sound pressure level: | <70 dB (A), may be higher depending on the usage conditions. | |

## 8.9 Electrical data

**WARNING!**

**Electric shock.**

Protection class III is only guaranteed when using a SELV power supply unit or PELV power supply unit.

| | |
|---|---|
| Protection class | 3 in accordance with DIN EN 61140 |
| Electrical connections | Devices with position controller function:<br>Cable gland, 2x M20 or<br>2 circular plug-in connectors M12, 5-pin and 8-pin<br><br>Devices with process controller function:<br>Cable gland, 3x M20 or<br>circular plug-in connectors 2x M12, 5-pin and 1x M12, 8-pin |

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**ATTENTION!**

Consider voltage drop in supply line.
Example: with a cable cross-section of 0.34 mm² a copper cable may have a maximum length of 8 meters.

| | | |
|---|---|---|
| Operating voltage | 24 V ⎓ ±10 %,<br>max. residual ripple 10 % | |
| Operating current [A]* | max. 3 A (at 25 °C / 77 °F), including actuator at max. load and charging current of the optional SAFEPOS energy-pack (charging current approx. 1 A) for the design of the power supply unit | |
| Supply voltage transmitter: | 24 V ±10 %, available only for devices with process controller function. | |
| Supply current transmitter: | Max. 150 mA, available only for devices with process controller function. | |
| Standby consumption [W]* | Min. 2 W, max. 5 W | |
| Average consumption Electronics without actuator [W]* | Basic consumption | typically 3 W |
| | Option analog and digital outputs | 0.5 W |
| | SAFEPOS energy-pack | 0.5 W |
| | Fieldbus gateway | 1 W |
| Energy consumption actuator for 1 cycle [Ws]* | (See following graphs) | |

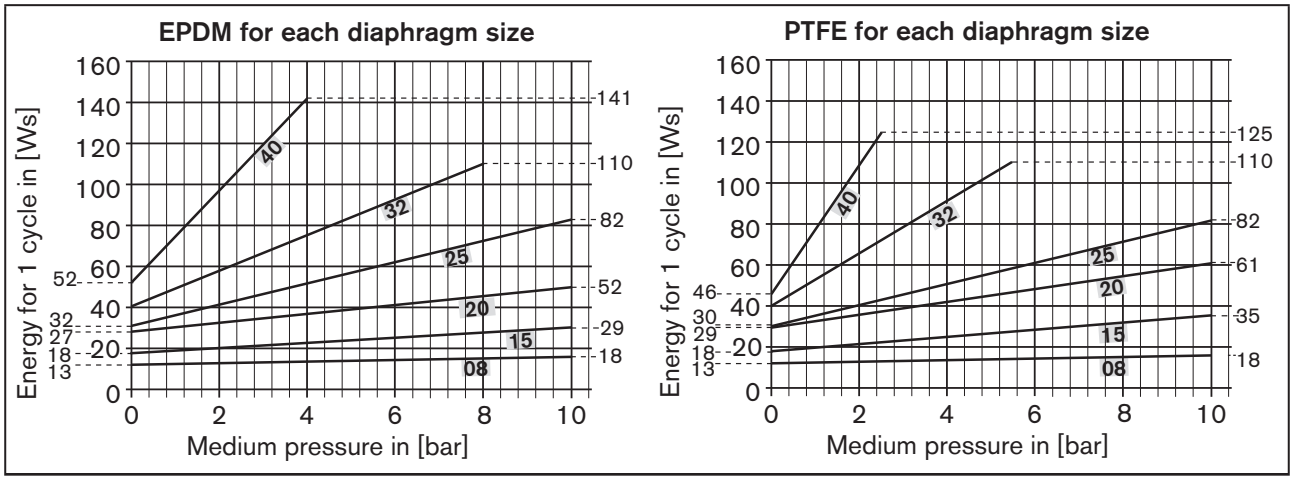


*Figure 13: Energy consumption of actuator for each diaphragm size*

The operating current can be reduced by the following measures, if necessary

1. For devices with the SAFEPOS energy-pack energy storage:
   Setting the function “Control if ready” reduces the max. operating current by 1 A.
   Setting in the configuration area **Position controller** → **Parameter** → **SAFEPOS** → **ENERGY-PACK** → **FUNCTION** → **Control if ready**.

2. Reducing the control speed X.TIME.
   Setting: Setting in the configuration area **Position controller** → **Parameter** → **ADD.FUNCTION** → activate **X.TIME** → **X.TIME** → **Opening time** → **Closing time**..

* All values refer to a supply voltage of 24 V ⎓ at 25 °C (77 °F) ambient temperature and medium temperature.

**Note:** At minimum ambient and medium temperatures, the operating current can be up to 5 A (incl. 1 A charging current for the optional SAFEPOS energy-pack).

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| | | |
|---|---|---|
| Service life of the SAFEPOS energy-pack | Charging time: maximum 100 seconds (depending on the conditions of use) | |
| | Service life: up to 10 years (depending on the conditions of use).<br>The determined service life of 7.5 years was determined under the following conditions: | |
| | Ambient temperature | 30 °C (86 °F) |
| | Medium temperature | 80 °C (176 °F) |
| | Duty cycle | 100 % |
| | Medium pressure | 6 bar (87.2 psi) |
| | Diaphragm size | 32 |

**Analog inputs:** (galvanically isolated from the supply voltage and analog output)

Input data for set-point value signal

| | | |
|---|---|---|
| 0/4...20 mA: | Input resistance | 60 Ω |
| | Resolution | 12 bits |
| 0...5/10 V: | Input resistance | 22 kΩ |
| | Resolution | 12 bits, resolution specific to 0...10 V |

Input data for actual value signal (optional)

| | | |
|---|---|---|
| 4...20 mA: | Input resistance | 60 Ω |
| | Resolution | 12 bits |
| Frequency: | Measurement range | 0.2...6500 Hz |
| | Input resistance | > 30 kΩ |
| | Precision | 0.1 % of measurement value |
| | Input signal | > 300 mVss |
| | Waveform | Sine wave, rectangle wave, triangle wave |
| Pt 100: | Measurement range | −20 to +220 °C (-4 to 428 °F) |
| | Precision | 0.01 °C |
| | Measurement current | 1 mA |

**Analog output (optional):**

| | |
|---|---|
| max. current | 10 mA (for voltage output 0...5/10 V) |
| Load | 0...800 Ω (for current output 0/4...20 mA) |

**Digital outputs (optional):**

| | |
|---|---|
| Current limit | 100 mA |

**Digital inputs:** 0...5 V = log “0”, 10...30 V = log “1”
inverted input reversed accordingly (input current < 6 mA)

**Communications interface to the PC:** büS service interface, connection is established using the USB-büS-Interface

**Communications software for PC:** “Bürkert Communicator”

The digital input, the digital outputs and the analog output are not galvanically isolated from the operating voltage. They refer to the potential GND of the operating voltage.

Current limit: in the event of an overload the output voltage is reduced.

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## 8.10 Flow characteristic

Example of flow characteristics: Connection size DN 25, according to ASME
seal material EPDM

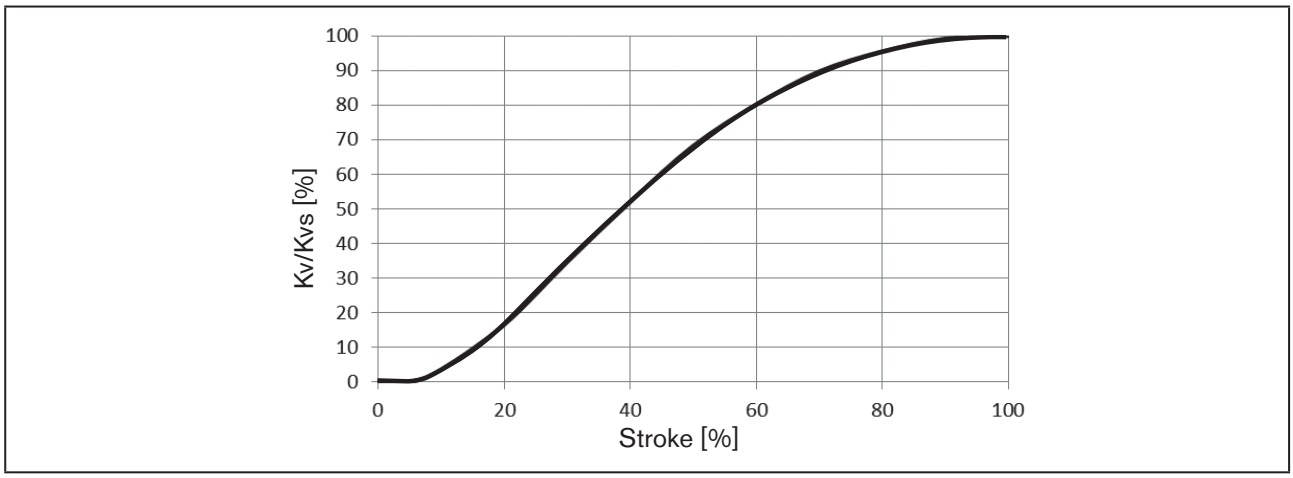


*Table 10: Example of flow characteristics for diaphragm control valve*

## 8.11 Flow values for forged steel valve bodies

### 8.11.1 Kv values for forged steel valve bodies VS

| Kv values for forged steel valve bodies VS - DIN (DIN 11850 series 2 / DIN 11866 series A) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diaphragm size | Orifice connection (DN) | Seal material | Kv value [m3/h] | | | | | | | | | | |
| | | | Stroke [%] | | | | | | | | | | |
| | | | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| 8 | 8 | EPDM | 0 | 0 | 0 | 0.09 | 0.3 | 0.53 | 0.8 | 1.1 | 1.4 | 1.6 | 1.7 |
| | | PTFE | 0 | 0 | 0.19 | 0.45 | 0.79 | 1.1 | 1.4 | 1.6 | 1.8 | 1.9 | 1.9 |
| | 10 | EPDM | 0 | 0 | 0 | 0.06 | 0.24 | 0.48 | 0.7 | 0.96 | 1.2 | 1.4 | 1.5 |
| | | PTFE | 0 | 0 | 0.15 | 0.37 | 0.66 | 0.92 | 1.2 | 1.5 | 1.7 | 1.8 | 1.9 |
| 15 | 15 | EPDM | 0 | 0 | 0.63 | 1.5 | 2.7 | 3.7 | 4.6 | 5.5 | 6.0 | 6.2 | 6.5 |
| | | PTFE | 0 | 0 | 0.32 | 1.1 | 1.9 | 2.7 | 3.6 | 4.4 | 5.1 | 5.6 | 6.0 |
| 20 | 20 | EPDM | 0 | 0.58 | 2.1 | 4.4 | 6.3 | 8.0 | 9.5 | 10.6 | 11.5 | 12 | 12.4 |
| | | PTFE | 0 | 0.3 | 1.8 | 3.1 | 5.3 | 7.0 | 8.4 | 9.7 | 10.7 | 11.5 | 12.0 |
| 25 | 25 | EPDM | 0 | 0.1 | 2.6 | 4.8 | 8 | 10.8 | 13.4 | 15.8 | 17.4 | 18.9 | 20 |
| | | PTFE | 0 | 0.6 | 2.4 | 4.1 | 6.5 | 9 | 11 | 12.9 | 14.6 | 16 | 17 |
| 40 | 32 | EPDM | 0 | 2.9 | 8.9 | 15.6 | 21.6 | 26.8 | 30.5 | 32.5 | 33.2 | 33.9 | 34 |
| | | PTFE | 2.3 | 4.5 | 10.2 | 16.7 | 21.9 | 26.5 | 29.8 | 32.1 | 33.4 | 33.8 | 34 |
| | 40 | EPDM | 1.3 | 3.7 | 9.4 | 16.6 | 22.6 | 28 | 31.9 | 35.1 | 37.4 | 39.1 | 40 |
| | | PTFE | 1.6 | 3.9 | 9.3 | 16.2 | 22.1 | 27.3 | 31.5 | 34.6 | 37.2 | 39.1 | 40 |

*Table 11: Kv values for forged steel valve bodies VS - DIN*

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| Kv values for forged steel valve bodies VS - ISO (EN ISO 1127/ISO 4200 / DIN 11866 series B) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diaphragm size | Orifice connection (DN) | Seal material | Kv value [m3/h] | | | | | | | | | |
| | | | Stroke [%] | | | | | | | | | |
| | | | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| 8 | 10 | EPDM | 0 | 0 | 0 | 0.05 | 0.18 | 0.33 | 0.48 | 0.66 | 0.84 | 1.01 | 1.1 |
| | | PTFE | 0 | 0 | 0.06 | 0.2 | 0.33 | 0.5 | 0.66 | 0.82 | 0.97 | 1.05 | 1.1 |
| 15 | 10 | EPDM | 0 | 0.05 | 1.01 | 2.3 | 3.4 | 4.3 | 4.8 | 5.1 | 5.2 | 5.4 | 5.5 |
| | | PTFE | 0 | 0.22 | 0.86 | 1.5 | 2.4 | 3.3 | 4.0 | 4.5 | 4.9 | 5.1 | 5.2 |
| | 15 | EPDM | 0 | 0 | 0.63 | 1.5 | 2.7 | 3.7 | 4.6 | 5.5 | 6.0 | 6.2 | 6.5 |
| | | PTFE | 0 | 0 | 0.32 | 1.1 | 1.9 | 2.7 | 3.6 | 4.4 | 5.1 | 5.6 | 6.0 |
| 20 | 20 | EPDM | 0 | 0.58 | 2.1 | 4.4 | 6.3 | 8.0 | 9.5 | 10.6 | 11.5 | 12.1 | 12.5 |
| | | PTFE | 0 | 0.3 | 1.8 | 3.1 | 5.3 | 7.0 | 8.4 | 9.7 | 10.7 | 11.5 | 12.0 |
| 25 | 25 | EPDM | 0 | 0.06 | 2.4 | 4.3 | 7.2 | 9.7 | 12.1 | 14.2 | 15.7 | 17.0 | 18.0 |
| | | PTFE | 0 | 0.56 | 2.2 | 3.9 | 6.1 | 8.5 | 10.4 | 12.2 | 13.7 | 15.1 | 16.0 |
| 40 | 40 | EPDM | 1.3 | 3.8 | 9.6 | 17.0 | 23.2 | 28.7 | 32.7 | 36.0 | 38.3 | 40.1 | 41.0 |
| | | PTFE | 1.6 | 3.9 | 9.3 | 16.2 | 22.1 | 27.3 | 31.5 | 34.6 | 37.2 | 39.1 | 40.0 |

*Table 12: Kv values for forged steel valve bodies VS - ISO*

| Kv values for forged steel valve bodies VS - ASME (ASME BPE / DIN 11866 series C) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diaphragm size | Orifice connection (DN) | Seal material | Kv value [m3/h] | | | | | | | | | |
| | | | Stroke [%] | | | | | | | | | |
| | | | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| 8 | 1/2“ | EPDM | 0 | 0 | 0 | 0.06 | 0.24 | 0.48 | 0.7 | 0.96 | 1.2 | 1.4 | 1.5 |
| | | PTFE | 0 | 0 | 0.15 | 0.37 | 0.66 | 0.92 | 1.2 | 1.5 | 1.7 | 1.8 | 1.9 |
| 15 | 1/2“ | EPDM | 0 | 0.1 | 1.2 | 2.3 | 2.9 | 3.1 | 3.1 | 3.1 | 3.1 | 3.1 | 3.1 |
| | | PTFE | 0 | 0.24 | 0.98 | 1.8 | 2.4 | 2.8 | 3.0 | 3.1 | 3.1 | 3.1 | 3.1 |
| 20 | 3/4“ | EPDM | 0 | 1.0 | 2.7 | 4.9 | 6.6 | 7.7 | 8.2 | 8.4 | 8.4 | 8.4 | 8.4 |
| | | PTFE | 0 | 0.3 | 1.8 | 3.5 | 5.3 | 6.7 | 7.6 | 8.1 | 8.4 | 8.5 | 8.5 |
| 25 | 1" | EPDM | 0 | 0.55 | 2.6 | 5.4 | 8.1 | 10.6 | 12.4 | 13.9 | 14.8 | 15.4 | 15.5 |
| | | PTFE | 0.1 | 0.67 | 2.3 | 4.3 | 6.7 | 8.9 | 10.7 | 12.2 | 13.4 | 14.0 | 14.5 |
| 40 | 1 ½" | EPDM | 0 | 3.1 | 9.6 | 17.0 | 23.5 | 29.1 | 33.2 | 35.4 | 36.1 | 36.9 | 37.0 |
| | | PTFE | 2.5 | 4.9 | 11.2 | 18.4 | 24.2 | 29.2 | 32.9 | 35.4 | 36.8 | 37.3 | 37.5 |

*Table 13: Kv values for forged steel valve bodies VS - ASME*

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| Kv values for forged steel valve bodies VS - BS 4825 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diaphragm size | Orifice connection (DN) | Seal material | Kv value [m3/h] | | | | | | | | | |
| | | | Stroke [%] | | | | | | | | | |
| | | | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| 8 | 1/4“ | EPDM | 0 | 0 | 0 | 0.08 | 0.29 | 0.45 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| | | PTFE | 0 | 0 | 0.18 | 0.36 | 0.47 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| 15 | 1/2“ | EPDM | 0 | 0.18 | 1.2 | 2.3 | 3.1 | 3.5 | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 |
| | | PTFE | 0 | 0.35 | 1.1 | 2.0 | 2.8 | 3.3 | 3.5 | 3.6 | 3.6 | 3.6 | 3.6 |

*Table 14: Kv values for forged steel valve bodies VS - BS 4825*

## 8.11.2 Kvs values for forged steel valve bodies VS

| Kvs values for forged steel valve bodies VS | | | | | | | |
|---|---|---|---|---|---|---|---|
| Diaphragm size | Orifice connection (DN) | Seal material | Kvs value [m3/h] | | | | |
| | | | DIN | ISO | ASME | BS | SMS |
| 8 | 6 | EPDM | 1.1 | - | - | - | - |
| | | PTFE | 1.1 | - | - | - | - |
| | 8 / 1/4" | EPDM | 1.7 | 1.5 | 0.7 | 0.5 | - |
| | | PTFE | 1.9 | 2.0 | 0.7 | 0.5 | - |
| | 10 / 3/8" | EPDM | 1.5 | 1.5 | 1.6 | 1.4 | - |
| | | PTFE | 1.9 | 2.0 | 1.8 | 1.6 | - |
| | 15 / 1/2“ | EPDM | - | - | 1.5 | - | - |
| | | PTFE | - | - | 1.9 | - | - |
| 15 | 10 / 3/8" | EPDM | 3.5 | 5.5 | - | - | - |
| | | PTFE | 3.4 | 5.2 | - | - | - |
| | 15 / 1/2“ | EPDM | 6.5 | 6.5 | 3.1 | 3.7 | - |
| | | PTFE | 6.0 | 6.0 | 3.1 | 3.6 | - |
| | 20 / 3/4“ | EPDM | - | - | 6.5 | - | - |
| | | PTFE | - | - | 6.0 | - | - |
| 20 | 20 / 3/4“ | EPDM | 12.4 | 12.5 | 8.4 | 8.9 | - |
| | | PTFE | 12.0 | 12.0 | 8.5 | 8.8 | - |
| 25 | 25 / 1" | EPDM | 20.0 | 18.0 | 15.5 | - | 16.0 |
| | | PTFE | 17.0 | 16.0 | 14.5 | - | 14.8 |
| 40 | 32 | EPDM | 34.0 | - | - | - | - |
| | | PTFE | 34.0 | - | - | - | - |
| | 40 / 1 ½" | EPDM | 40.0 | 41.0 | 37.0 | - | 38.0 |
| | | PTFE | 40.0 | 40.0 | 37.5 | - | 38.0 |

*Table 15: Kvs values for forged steel valve bodies VS*

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# 8.12 Flow values for cast valve bodies and plastic valve bodies

## 8.12.1 Kv values for cast valve bodies VG

| Kv values for cast valve bodies VG - all standards | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Diaphragm size | Orifice connection (DN) | Seal material | Kv value [m3/h] | | | | | | | | | |
| | | | Stroke [%] | | | | | | | | | |
| | | | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| 8 | 8 | EPDM | 0 | 0 | 0 | 0.14 | 0.29 | 0.45 | 0.58 | 0.71 | 0.84 | 0.95 |
| | | PTFE | 0 | 0.26 | 0.5 | 0.73 | 0.88 | 1.1 | 1.3 | 1.4 | 1.4 | 1.5 |
| 15 | 15 | EPDM | 0.1 | 0.24 | 1 | 2 | 3 | 3.7 | 4.4 | 5.1 | 5.3 | 5.6 |
| | | PTFE | 0.5 | 1.2 | 1.9 | 2.6 | 3.5 | 4 | 4.5 | 4.8 | 5 | 5.3 |
| 20 | 20 | EPDM | 0.1 | 0.3 | 2.2 | 4.2 | 6.1 | 7.6 | 8.8 | 9.8 | 10.5 | 10.7 |
| | | PTFE | 0.6 | 1.1 | 2.5 | 3.9 | 6.3 | 7.9 | 8.6 | 9.5 | 10.3 | 10.5 |
| 25 | 25 | EPDM | 0.7 | 1.5 | 3.7 | 6.3 | 8.6 | 10.5 | 12.2 | 13 | 14.1 | 14.6 |
| | | PTFE | 0.4 | 0.7 | 2.3 | 4.2 | 6.2 | 8.2 | 9.9 | 11.9 | 13 | 13.6 |
| 40 | 40 | EPDM | 1.9 | 8.1 | 15.3 | 21.6 | 23.6 | 26.2 | 29.1 | 32.2 | 33.8 | 35 |
| | | PTFE | 2.2 | 8.2 | 15.4 | 21.4 | 24.4 | 26.1 | 29 | 31.6 | 33.7 | 35 |

*Table 16: Kv values for cast valve bodies VG*

## 8.12.2 Kv values for plastic valve bodies (PD, PP, PV)

| Kv values for plastic valve bodies (PD, PP, PV) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Diaphragm size | Orifice connection (DN) | Seal material | Kv value [m3/h] | | | | | | | | | |
| | | | Stroke [%] | | | | | | | | | |
| | | | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| 15 | 15 | EPDM | 0.15 | 0.38 | 0.88 | 1.3 | 1.7 | 2.1 | 2.5 | 2.7 | 2.9 | 3 |
| | | PTFE | 0.07 | 0.16 | 0.58 | 1.1 | 1.3 | 1.8 | 2.1 | 2.4 | 2.6 | 2.8 |
| 20 | 20 | EPDM | 0.4 | 0.9 | 2.1 | 3.5 | 5.1 | 6 | 6.6 | 6.8 | 6.9 | 7 |
| | | PTFE | 0.3 | 0.8 | 1.8 | 3.3 | 4.5 | 5.6 | 6.3 | 6.6 | 6.7 | 6.8 |
| 25 | 25 | EPDM | 0.32 | 1.9 | 3.7 | 5.8 | 7.9 | 9.5 | 10.9 | 11.4 | 11.6 | 11.7 |
| | | PTFE | 0.18 | 0.75 | 2.4 | 4.2 | 6 | 7.6 | 8.9 | 9.8 | 10.4 | 10.6 |
| 32 | 32 | EPDM | 1.5 | 3.6 | 6.7 | 9.9 | 12.5 | 15 | 16.1 | 16.5 | 16.7 | 16.9 |
| | | PTFE | 1 | 2.2 | 5.3 | 8.5 | 11.2 | 14 | 15.6 | 16.3 | 16.5 | 16.7 |
| 40 | 40 | EPDM | 1 | 4.3 | 8.5 | 13.4 | 18.2 | 21.8 | 24.7 | 26.4 | 26.6 | 26.6 |
| | | PTFE | 0.61 | 3.6 | 7.6 | 12.9 | 17.3 | 20.1 | 23.5 | 25.5 | 25.9 | 26.1 |

*Table 17: Kv values for plastic valve bodies (PD, PP, PV)*

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### 8.12.3 Kvs values for cast valve bodies VG and plastic valve bodies (PD, PP, PV)

| Kvs values for cast valve bodies VG and plasticvalve bodies (PD, PP, PV) | | | | |
|---|---|---|---|---|
| Diaphragm size | Orifice connection (DN) | Seal material | Kvs value [m3/h] | |
| | | | Cast valve body VG (all standards) | Plastic valve body (all materials) |
| 8 | 8 | EPDM | 0.95 | - |
| | | PTFE | 1.5 | - |
| 15 | 15 | EPDM | 5.6 | 3 |
| | | PTFE | 5.3 | 3 |
| 20 | 20 | EPDM | 10.7 | 7 |
| | | PTFE | 10.5 | 6.7 |
| 25 | 25 | EPDM | 14.6 | 11.4 |
| | | PTFE | 13.6 | 10 |
| 32 | 32 | EPDM | - | 17.5 |
| | | PTFE | - | 17.1 |
| 40 | 40 | EPDM | 35.0 | 24.5 |
| | | PTFE | 35.0 | 24.0 |

*Table 18: Kvs values for cast valve bodies VG and plastic valve bodies (PD, PP, PV)*

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## 8.13 Flow values for tube valve bodies

### 8.13.1 Kv values for 3G tube valve bodies (VP)

| Kv values for 3G tube valve bodies (VP) - DIN (DIN 11850 series 2 / DIN 11866 series A) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diaphragm size | Orifice connection (DN) | Seal material | Kv value [m3/h] | | | | | | | | | | |
| | | | Stroke [%] | | | | | | | | | | |
| | | | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| 15 | 15 | EPDM | 0 | 0 | 0.4 | 1.3 | 2.5 | 3.7 | 4.7 | 5.6 | 6.3 | 6.9 | 7.2 |
| | | PTFE | 0 | 0 | 0.1 | 0.6 | 1.3 | 2.1 | 3.1 | 3.8 | 4.4 | 5.3 | 6.7 |
| | 20 | EPDM | 0 | 0.1 | 1 | 2 | 3.1 | 4.5 | 5.4 | 6.2 | 6.6 | 7.1 | 7.4 |
| | | PTFE | 0 | 0.1 | 0.5 | 1.1 | 1.7 | 2.3 | 3 | 3.6 | 4.3 | 4.7 | 5.1 |
| 20 | 25 | EPDM | 0 | 0.3 | 2 | 4 | 6.7 | 9.2 | 11.2 | 12.6 | 13.8 | 14.5 | 14.9 |
| | | PTFE | 0 | 0.2 | 1.4 | 2.7 | 4.3 | 6.4 | 9.1 | 11 | 12.3 | 13.2 | 13.7 |
| 25 | 32 | EPDM | 0 | 0 | 1.6 | 4 | 7.2 | 11 | 14.2 | 16.8 | 19 | 21.1 | 22.5 |
| | | PTFE | 0 | 0.3 | 1.8 | 3.8 | 6 | 8.7 | 11.4 | 13.6 | 15.9 | 17.6 | 18.8 |
| 32 | 40 | EPDM | 0 | 0.1 | 3.4 | 8.2 | 13.8 | 20.3 | 24.9 | 28.8 | 32 | 34 | 35 |
| | | PTFE | 0.2 | 1.9 | 5.4 | 9.5 | 15.7 | 20.5 | 24.6 | 28.5 | 31.4 | 33.7 | 34.5 |
| 40 | 50 | EPDM | 0 | 2.3 | 8.3 | 17.5 | 25.1 | 31.5 | 36.5 | 39.6 | 43.6 | 43.8 | 46 |
| | | PTFE | 1 | 3.2 | 8.8 | 16.4 | 24 | 30.4 | 34.6 | 39.5 | 42.5 | 44.4 | 44.5 |

*Table 19: Kv- values for 3G tube valve bodies (VP) - DIN*

| Kv values for 3G tube valve bodies (VP) - ISO (EN ISO 1127/ISO 4200 / DIN 11866 series B) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diaphragm size | Orifice connection (DN) | Seal material | Kv value [m3/h] | | | | | | | | | | |
| | | | Stroke [%] | | | | | | | | | | |
| | | | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| 8 | 8 | EPDM | 0 | 0 | 0 | 0.1 | 0.4 | 0.6 | 0.9 | 1.2 | 1.5 | 1.7 | 1.9 |
| | | PTFE | 0 | 0 | 0.3 | 0.5 | 0.8 | 1.1 | 1.4 | 1.8 | 2 | 2.2 | 2.4 |
| 15 | 15 | EPDM | 0 | 0 | 0.4 | 1.1 | 2 | 3.3 | 4.4 | 5.3 | 6 | 6.6 | 7 |
| | | PTFE | 0 | 0 | 0.2 | 1 | 1.9 | 3 | 4 | 4.9 | 5.6 | 6.2 | 6.6 |
| 20 | 20 | EPDM | 0 | 0.5 | 2.2 | 4.2 | 7.1 | 9 | 10.5 | 11.6 | 12.5 | 13.2 | 13.5 |
| | | PTFE | 0 | 0 | 0.8 | 2.2 | 3.8 | 6.1 | 7.9 | 9.5 | 10.6 | 11.5 | 12.1 |
| 25 | 25 | EPDM | 0 | 0 | 1.6 | 4.1 | 7.3 | 11.3 | 14.1 | 16.1 | 18.5 | 19.6 | 21 |
| | | PTFE | 0 | 0.5 | 2.4 | 4.4 | 6.7 | 10 | 12.3 | 14.1 | 16.1 | 17.3 | 18.4 |
| 32 | 32 | EPDM | 0 | 0 | 3.6 | 8.1 | 15 | 20.4 | 25.1 | 28.7 | 32.2 | 34.6 | 36 |
| | | PTFE | 0 | 1.7 | 5.3 | 9.4 | 16 | 20.9 | 25.6 | 29.2 | 32.5 | 35.2 | 36 |
| 40 | 40 | EPDM | 0 | 1.7 | 7.9 | 17.2 | 25.4 | 32 | 38.2 | 42.4 | 45.3 | 46.6 | 48 |
| | | PTFE | 0.9 | 3.4 | 9.4 | 17.5 | 25.4 | 31.9 | 36.7 | 41.4 | 43.7 | 46 | 47 |

*Table 20: Kv- values for 3G tube valve bodies (VP) - ISO*

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| Kv values for 3G tube valve bodies (VP) - ASME (ASME BPE / DIN 11866 series C) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Diaphragm size | Orifice connection (DN) | Seal material | Kv value [m3/h] | | | | | | | | | |
| | | | Stroke [%] | | | | | | | | | |
| | | | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| 8 | ½" | PTFE | 0 | 0 | 0.1 | 0.4 | 0.8 | 1.1 | 1.4 | 1.6 | 1.9 | 2.1 | 2.2 |
| 15 | ¾“ | PTFE | 0 | 0 | 0.4 | 1.3 | 2.2 | 3.2 | 4.3 | 5.1 | 5.7 | 6.2 | 6.5 |
| 20 | 1" | PTFE | 0 | 0.1 | 0.8 | 2.5 | 4.4 | 7 | 9 | 10.5 | 11.6 | 12.3 | 12.7 |
| 32 | 1 ½" | PTFE | 0 | 0.4 | 4.9 | 9.3 | 15.8 | 20.7 | 24.9 | 28.1 | 31 | 31.5 | 32 |
| 40 | 2” | PTFE | 0 | 1.8 | 7.2 | 14.6 | 22.5 | 29.9 | 35.3 | 39.9 | 44.4 | 45.7 | 46 |

*Table 21: Kv- values for 3G tube valve bodies (VP) - ASME*

## 8.13.2 Kvs values for 3G tube valve bodies (VP)

| Kvs- values for 3G tube valve bodies (VP) (IHU2) | | | | | |
|---|---|---|---|---|---|
| Diaphragm size | Orifice connection (DN) | Seal material | Kvs value [m3/h] | | |
| | | | DIN | ISO | ASME |
| 8 | 8 / 1/4" | EPDM | - | 1.9 | - |
| | | PTFE | - | 2.4 | - |
| | 10 / 3/8“ | EPDM | 1.9 | - | - |
| | | PTFE | 2.4 | - | - |
| | 15 / 1/2“ | EPDM | - | - | - |
| | | PTFE | - | - | 2.2 |
| 15 | 15 / 1/2“ | EPDM | 7.2 | 7 | - |
| | | PTFE | 6.7 | 6.6 | - |
| | 20 / 3/4“ | EPDM | 6.9 | - | - |
| | | PTFE | 5.5 | - | 6.5 |
| 20 | 20 / 3/4“ | EPDM | - | 13.5 | - |
| | | PTFE | - | 12.1 | - |
| | 25 / 1" | EPDM | 14.9 | - | - |
| | | PTFE | 13.7 | - | 12.7 |
| 25 | 25 / 1" | EPDM | - | 19.1 | - |
| | | PTFE | - | 15.6 | - |
| | 32 | EPDM | 20.0 | - | - |
| | | PTFE | 15.8 | - | - |
| 32 | 32 | EPDM | - | 36.0 | - |
| | | PTFE | - | 36.0 | - |
| | 40 / 1 ½" | EPDM | 35.0 | - | - |
| | | PTFE | 34.5 | - | 32.0 |
| 40 | 40 / 1 ½" | EPDM | - | 48.0 | - |
| | | PTFE | - | 47.0 | - |
| | 50 / 2" | EPDM | 46.0 | - | - |
| | | PTFE | 43.5 | - | 45.0 |

*Table 22: Kvs values for 3G tube valve bodies (VP)*

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# 9 INSTALLATION OF THE VALVE

## 9.1 Safety instructions for installation

**WARNING!**

**Risk of injury from improper assembly.**

- The assembly may be carried out only by trained technicians and with the appropriate tools.
- Secure system against unintentional activation.
- After installation, ensure that the process is restarted in a controlled manner. Observe sequence!
  1. Apply supply voltage.
  2. Charge the device with medium.

**CAUTION!**

**Risk of injury due to a heavy device.**

The device can fall down during transport or during installation and cause injuries.

- Transport, install and dismantle a heavy device with the help of another person.
- Use appropriate tools.

## 9.2 Installation position of the diaphragm control valves

The installation position of the diaphragm control valve varies depending on the valve body.

One of the relief bores in the diaphragm socket, for monitoring leakage, must be at the lowest point.

### 9.2.1 Installation position of 2-way body

**Installation position:** any position, preferably with the actuator facing up.

**Ensuring self-drainage:**

It is the responsibility of the installer and operator to ensure self-drainage.

Self-draining must be considered during the installation:

- **Inclination angle of the pipeline.**
  Observe an inclination angle of 1°...5° for the pipeline.
- **Self-drainage-angle for valve body:**

  The self-drainage-angle (α) depends on the valve body size (diaphragm size) and the inner diameter of the port connection (DN).

  The self-drainage angle is specified as a value on forged steel valve bodies (VS) and tube valve bodies (VP). (See “Figure 9”, page 28 and “Figure 10”, page 29).

  The marking on the port connection of valve bodies serves as an orientation aid (see “Figure 14”). The marking must point upwards.

  The actual self-drainage-angle must be set with a suitable measuring tool.

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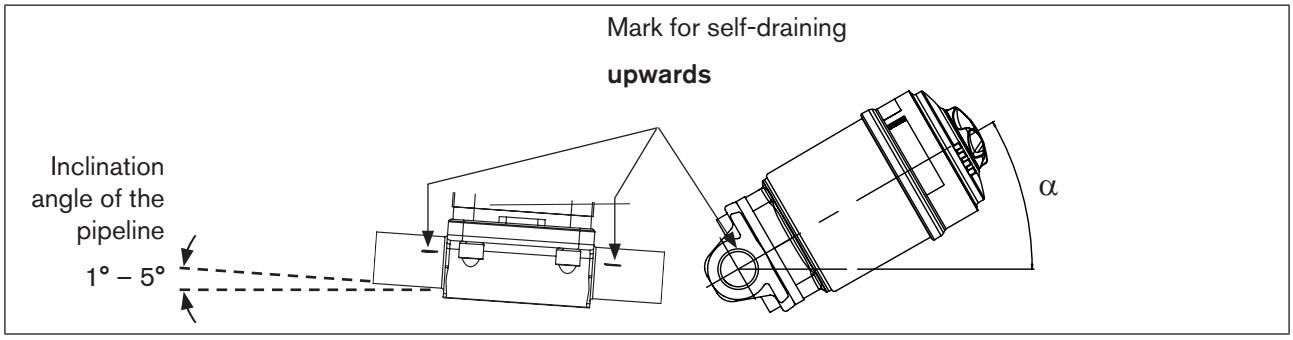


*Figure 14: Installation position for self-drainage of the body*

**Information about self-draining on the Internet.**

If the self-drainage angle is not specified on the valve body, please refer to the additional manual “Angle specifications for self-draining“ on our website.

It is the responsibility of the installer and operator to ensure self-draining.

www.Buerkert.com. Type / User Manuals / Additional manual „Angles for self-draining of diaphragm valves“.

If you require clarification, contact your Bürkert sales department.

## 9.2.2 Installation position of T-valve body

**Installation position:**

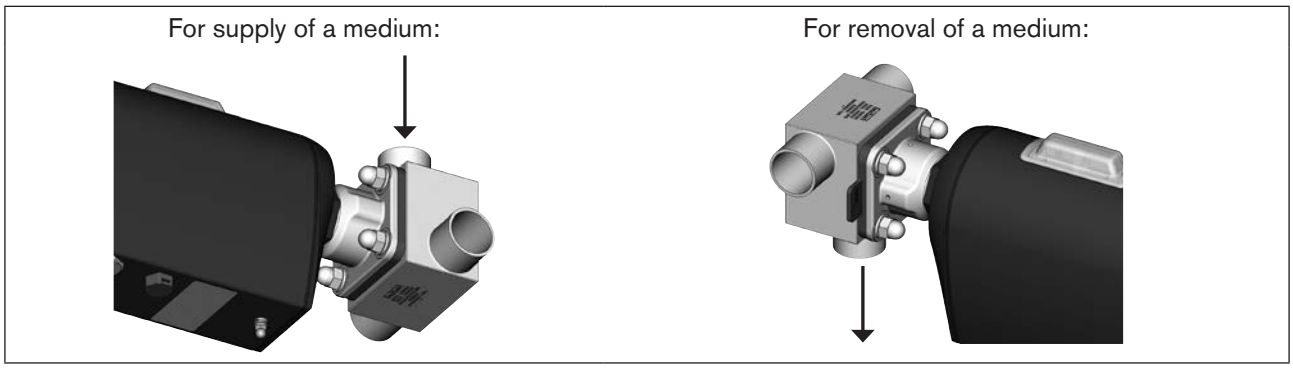


*Figure 15: Installation position of T-valve body*

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### 9.2.3 Installation position of tank bottom body

**Recommended installation position:** any, preferably with actuator face down.

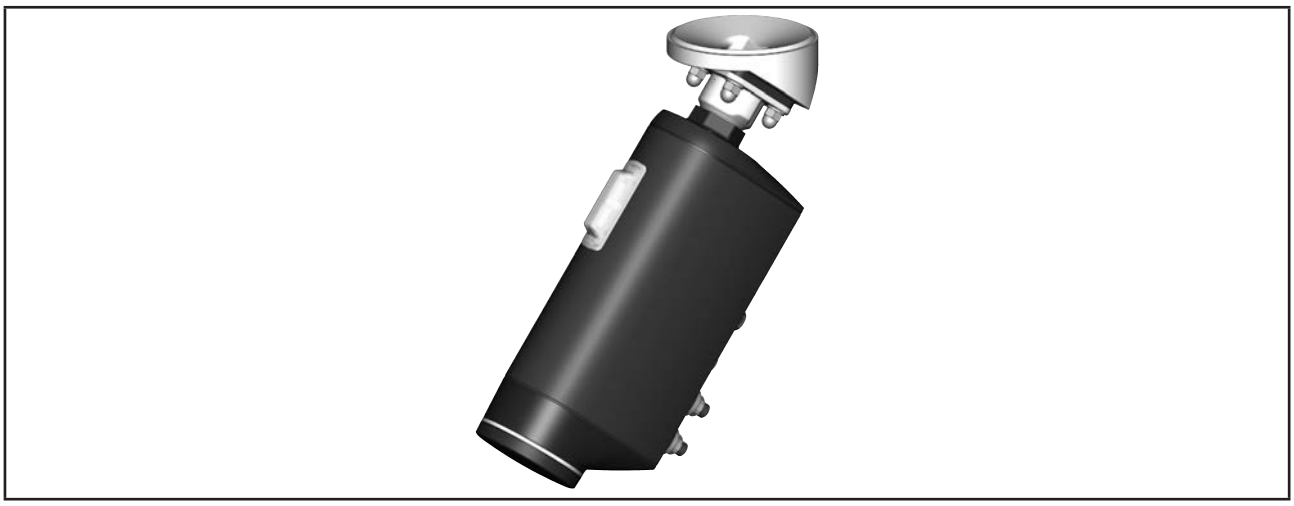

*Figure 16: Installation position of tank bottom body, Type 3325*

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## 9.3 Installation of devices with threated socket connection, flange connection, clamp connection or bond connection

**ATTENTION!**

**Damage to the diaphragm.**

▸ To prevent damage, the valve must be in MANUAL operating state during installation.

Devices are delivered with the MANUAL operating state preset.

### 9.3.1 Required work steps

1. If not preset, set operating state MANUAL, chapter “14.1”, page 103.
2. If the device is already electrically connected, switch off the supply voltage. Wait until LED illuminated ring goes out.
3. Mount the device in the pipeline, chapter “9.3.3”, page 46.
4. Electrical installation, chapter “10”, page 60.
5. Apply supply voltage.
6. Execute function M.Q0.TUNE, chapter “11.5”, page 75.
7. Set operating state AUTOMATIK, chapter “14.1”, page 103.

### 9.3.2 Installation requirements

**Pipelines:** Ensure that the pipelines are aligned.

**Preparation:** Clean pipelines (sealing material, swarf, etc.).
Support and align pipelines. To ensure that the pipeline is self-draining, observe an inclination angle of 1° – 5°.

### 9.3.3 Mounting the device in the pipeline

**Precondition: MANUAL operating state.**

**ATTENTION!**

**Note the following when installing the device in the plant.**

The device and the relief bore must be accessible to allow inspection and maintenance work.

**DANGER!**

**Risk of injury from high pressure.**

▸ Before working on the system, switch off the pressure and vent or drain lines.

**WARNING!**

**Risk of crushing due to mechanically moving parts.**

▸ Keep clear of the openings in the valve body.

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→ Connect valve body to pipeline.
⚠ Ensure installation is de-energized and low-vibration.

**Holding device**
To protect the valve actuator from damage due to forces and vibrations, a holding device is recommended. This is available as an accessory. See chapter “24 Accessories, spare parts”.

**Next steps:**

- Electrical installation, chapter “10”, page 60.
- Apply supply voltage.
- To adjust the position control, running the M.Q0.TUNE function, chapter “11.5”, page 75.

**ATTENTION!**

**Damage to the diaphragm.**

▸ To prevent damage, first run the M.Q0.TUNE function after making the electrical connection. Only then set the operating state to AUTOMATIC.

- Set operating state AUTOMATIK, chapter “14.1”, page 103.

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## 9.4 Installation of devices with welded connection

**ATTENTION!**

Observe the national regulations for the qualification of welders and for performing welding work.

⚠ For devices with a tank bottom body, special measures must be observed when they are welded in.

**Note the following when installing the device in the plant.**

The device and the relief bore must be accessible to allow inspection and maintenance work.

**ATTENTION!**

**The diaphragm and the electronics in the actuator will be damaged by the effects of heat.**

- Remove the actuator before welding in the valve body.

**Damage to the diaphragm.**

- To prevent damage, the device must be in the MANUAL operating state during installation and removal of the actuator and diaphragm.
- The actuator must be in the position “valve 100% open“.

**Delivery condition for devices with welded connection**
The devices are delivered in a disassembled state.
Operating state: MANUAL.
Position of the actuator: Valve open.

### 9.4.1 Required work steps

The device must not be welded with mounted actuator into the pipeline. Installation is divided into the following steps:

1. If not preset, set operating state MANUAL, chapter “14.1”, page 103.
2. If the valve is in the closed position, switch it to the position “valve 100% open”, chapter “15”, page 114.
3. If the device is already electrically connected, switch off the supply voltage. Wait until LED illuminated ring goes out.
4. If the device is not removed, remove the actuator and diaphragm from the valve body, chapter .“9.7”, page 57.
5. Weld valve body into the pipeline.
   - 2-way body or T-body, chapter “9.4.3”, page 49.
   - Tank bottom body, chapter “9.4.4”, page 50.
6. Mount actuator on the valve body, chapter “9.5”, page 51.
7. Execute function M.Q0.TUNE, chapter “11.5”, page 75.
8. Set operating state AUTOMATIK, chapter “14.1”, page 103.

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### 9.4.2 Required tools and equipment

- Allen key, width across flats 3 mm
  Only required when no supply voltage is applied to the device in order to move the valve into the open position.
- Open-end wrench

### 9.4.3 Welding 2-way body or T-valve body into the pipeline

**Precondition: The actuator and diaphragm must be removed from the valve body.**

**DANGER!**

**Risk of injury from high pressure!**

▸ Before working on the system, switch off the pressure and vent or drain lines.

**Installation requirements:**

| | |
|---|---|
| Installation position: | 2-way valve, see chapter “9.2.1”, page 43.<br>T-valve, see chapter “9.2.2”, page 44. |
| Pipelines: | Ensure that the pipelines are aligned. |
| Preparation: | Clean pipelines (sealing material, swarf, etc.).<br>Support and align pipelines. To ensure that the pipeline is self-draining, observe an inclination angle of 1° – 5°. |

**Welding valve body:**

**ATTENTION!**

**The diaphragm and the electronics in the actuator will be damaged by the effects of heat.**

▸ Remove the actuator before welding in the valve body.

Observe the applicable laws and regulations of the respective country with regard to the qualification of welders and the execution of welding work.

→ Weld valve body into the pipeline.
⚠ Ensure installation is de-energized and low-vibration.

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### 9.4.4 Welding tank bottom body

**Precondition: The actuator and diaphragm must be removed from the valve body.**

**DANGER!**

**Risk of injury from high pressure!**

- Before working on the system, switch off the pressure and vent or drain lines.

**Recommendations**

Observe sequence:

1. Weld the tank bottom body onto the base of the tank before installing the tank.
   Welding onto a tank which has already been installed is possible but more difficult.
   **Note:** Weld the tank bottom body in the middle of the tank base so that the tank can be optimally drained.
2. Construction of the tank.
3. Weld the tank bottom body into the pipeline.

**Installation requirements:**

| | |
|---|---|
| Installation position: | See chapter "9.2.3", page 45. |
| Tank preparation: | Clean the tank (sealing material, swarf, etc.). |
| Pipeline preparation: | Clean pipelines (sealing material, swarf, etc.).<br>Support and align pipelines. To ensure that the pipeline is self-draining, observe an inclination angle of 1° – 5°. |

**Welding valve body:**

**ATTENTION!**

**The diaphragm and the electronics in the actuator will be damaged by the effects of heat.**

- The actuator must be removed before the valve body is welded in.

For information on tanks and instructions on welding observe the standard ASME VIII Division I.

Before you start welding, check the batch number indicated on the supplied manufacturer's certificate 3.1.B.

Observe the applicable laws and regulations of the respective country with regard to the qualification of welders and the execution of welding work.

**ATTENTION!**

**Note for welding:**

- Use only welding material which is suitable for the tank bottom body.
- The tank bottom valve must not collide with any other installation part; the actuator must be easy to install and remove.

→ Weld the tank bottom body to the container.

→ Construct the tank.

→ Weld the tank bottom body into the pipeline.
⚠ Ensure installation is de-energized and low-vibration.

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**Next steps:**

- If the diaphragm is not mounted, mount it on the actuator, chapter “9.5.3”, page 51.
- Mount the actuator onto the valve body and connect the power, chapter “9.5.4”, page 53.
- To adjust the position control, running the M.Q0.TUNE function, chapter “11.5”, page 75.

**ATTENTION!**

**Damage to the diaphragm.**

▸ To prevent damage, first run the M.Q0.TUNE function after making the electrical connection. Only then set the operating state to AUTOMATIC.

- Set operating state AUTOMATIK, chapter “14.1”, page 103.

# 9.5 Mounting actuator on valve body

## 9.5.1 Required work steps

1. If the diaphragm is not mounted, mount it on the actuator, chapter “9.5.3”, page 51.
2. Mounting actuator on the valve body and making the electrical connections, chapter “9.5.4”, page 53.
3. Execute function M.Q0.TUNE, chapter “11.5”, page 75.
4. Set operating state AUTOMATIK, chapter “14.1”, page 103.

## 9.5.2 Required tools

- Allen key, width across flats 3 mm
  Only required when no supply voltage is applied to the device in order to move the valve into the open position.
- Open-end wrench

## 9.5.3 Mounting the diaphragm on the actuator

Depending on the size of the diaphragm, there are different fastening types for the diaphragm.

| Diaphragm size | Fastening types for diaphragms | |
|---|---|---|
| | PTFE | EPDM / FKM / laminated PTFE |
| 08 | Diaphragm pressed in | Diaphragm pressed in |
| 15, 20 | Diaphragm with bayonet catch | Diaphragm with bayonet catch |
| 25, 32, 40 | Diaphragm with bayonet catch | Diaphragm screwed in |

*Table 23: Fastening types for diaphragms*

**Fastening the diaphragm with a bayonet catch:**

→ Hook diaphragm into the pressure piece and secure by turning it 90°.

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**Fastening the diaphragm by screwing it in:**

→ If there is no insert in the pressure piece, fit the insert into the pressure piece as shown in the figure.

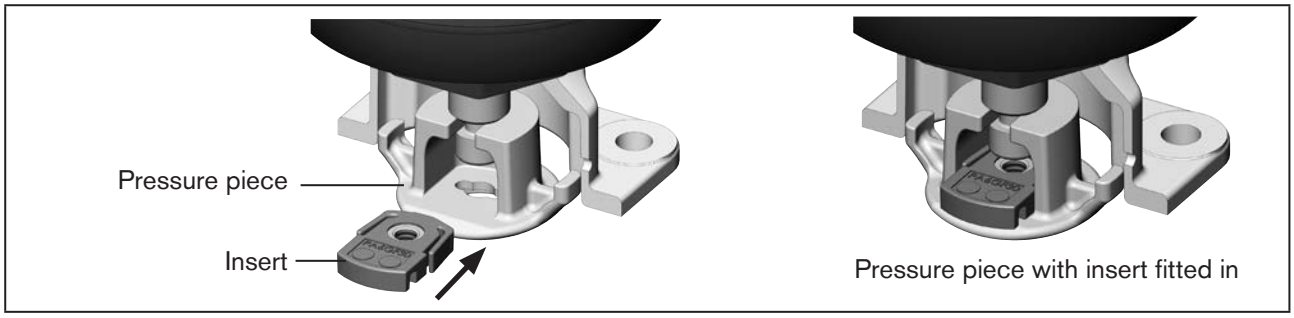


*Figure 17: Fitting the insert into the pressure piece*

→ Hand-tighten the diaphragm into the pressure piece.

→ Loosen by half a rotation.

→ Align diaphragm.
The identification tab on the diaphragm must protrude out of the valve body at right angles to the longitudinal axis of the pipeline (see “Figure 18”).

**Fastening the diaphragm by pressing it in:**

→ Press diaphragm into the pressure piece.

→ Align diaphragm. The identification tab on the diaphragm must protrude out of the valve body at right angles to the longitudinal axis of the pipeline (see “Figure 18”).

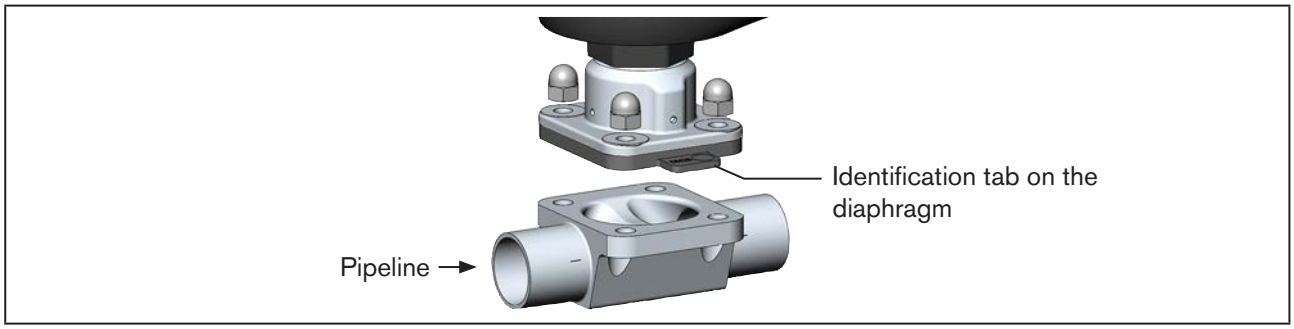


*Figure 18: Aligning the diaphragm (example 2-way body)*

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### 9.5.4 Mounting actuator on the valve body and making the electrical connections

**WARNING!**

**Risk of injury due to electric shock.**
**Risk of crushing due to mechanically moving parts.**

- Switch off supply voltage.

**ATTENTION!**

**Damage to the diaphragm.**

- To prevent damage, the device must be in MANUAL operating state during installation.
- The actuator must be in the position “valve 100% open“.

→ ⚠ Before installing the actuator, check whether the diaphragm is free of damage and correctly aligned.
The mark tab of the diaphragm must protrude from the valve body at a right angle to the longitudinal axis of the pipeline (see “Figure 18”).

→ Replace a damaged diaphragm.

→ Place actuator on the valve body.
Stud bolts have been pre-installed for T-body and tank bottom body.
Insert screws into the valve body for 2-way bodies.

→ Lightly tighten the nuts in a crosswise sequence until the diaphragm is positioned between the housing and actuator.
⚠ Do not fully tighten nuts yet.

→ Connect the device electrically.
The position of the connections can be aligned by rotating the actuator through 360°. See chapter “9.6 Rotating the actuator”.

A description of the electrical connection can be found in chapter “10 Electrical installation”

→ Run M.SERVICE as described below.

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**Perform M.SERVICE for devices without a display module:**

**NOTE!**

**Malfunction is valve position is not fully open.**

▸ The valve must be in the position “valve 100% open” before the M.SERVICE is triggered.

The 2 buttons for running the M.SERVICE are located under the dummy cover.

For devices equipped with a display module, the buttons have no function. The M.SERVICE is triggered on the display.

**Devices with ATEX approval or IECEx approval are secured with a magnetic lock.**

The removal of the cover is described in the additional manual for electromotive control valves with ATEX approval and IECEx approval.

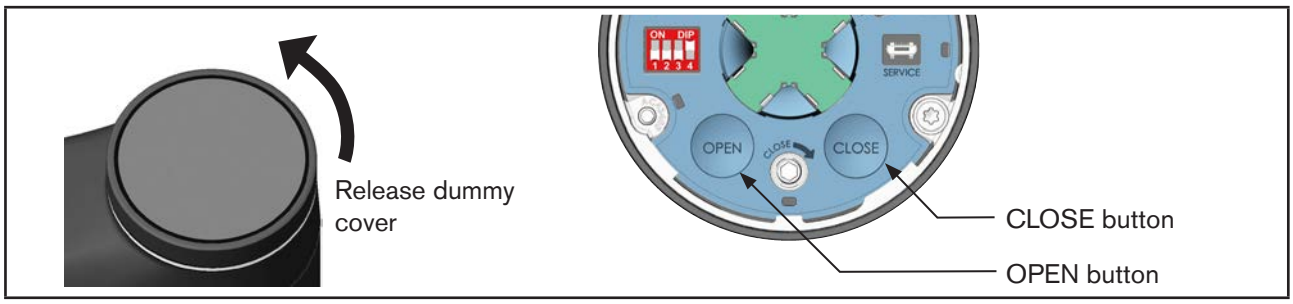


*Figure 19: Running M.SERVICE*

→ To release, rotate the dummy cover counter-clockwise and remove it.

→ Simultaneously hold down the OPEN and CLOSE buttons for 5 s.

✔ The M.SERVICE function is running.

→ Wait until the M.SERVICE function has ended and the actuator stops.

**Running M.SERVICE on the device display:**

Display operation: Key functions

| | | |
|---|---|---|
| select, activate | confirm | back |

To run the M.SERVICE function, you must change to the detailed view maintenance for position controller.

**Changing from home screen to the detailed view:**

→ Switch from home screen to **CONFIGURATION**, select **Position controller** and switch to **MAINTENANCE**.

✔ You are in the detailed view maintenance.

**Running the M.Q0.TUNE function:**

→ Select **CALIBRATION**.

→ Select **SERVICE**.

The following question appears: “Do you really want to start the M.SERVICE?

→ Start M.SERVICE.

The following text appears:

“--Operation--. Please wait...”

“Finished.”

✔ The M.SERVICE function has run.

**Tighten nuts gradually:**

**WARNING!**

**Risk of injury due to non-observance of the tightening torque.**

Non-observance of the tightening torque is hazardous as the device may be damaged.

▸ Observe tightening torque.

→ Tighten the nuts crosswise to 1/3 of the tightening torque.

→ Then tighten the nuts crosswise to 2/3 of the tightening torque.

→ Tighten crosswise up to the permitted tightening torque.

**Tightening torque for installation of the actuator**

| Diaphragm size | Tightening torques for diaphragm [Nm]* | |
|---|---|---|
| | EPDM/FKM | PTFE / advanced PTFE / laminated PTFE |
| 08 | 2.5 +10 % | 2.5 +10 % |
| 15 | 3.5 +10 % | 4 +10 % |
| 20 | 4 +10 % | 4.5 +10 % |
| 25 | 5 +10 % | 6 +10 % |
| 32 | 8 +10 % | 10 +10 % |
| 40 | 8 +10 % | 10 +10 % |
| * For all values, there is a tolerance of +10 % of the respective tightening torque. | | |

*Table 24: Tightening torques for installation of the actuator*

**Holding device**
To protect the valve actuator from damage due to forces and oscillations, a holding device is recommended. This is available as an accessory. See chapter “24 Accessories, spare parts”.

**Next steps:**

- To adjust the position control, running the M.Q0.TUNE function, chapter “11.5”, page 75.

**ATTENTION!**

**Damage to the diaphragm.**

▸ To prevent damage, first run the M.Q0.TUNE function after making the electrical connection. Only then set the operating state to AUTOMATIC.

- Set operating state AUTOMATIK, chapter “14.1”, page 103.

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## 9.6 Rotating the actuator

**ATTENTION!**

**Damage to the diaphragm.**

▸ To prevent damage to the diaphragm, the valve must be open when the actuator is rotated.

The position of the connections can be aligned by rotating the actuator through 360°.

→ In the case of devices which are not installed, clamp the valve body in a holding device.

→ Place an open-end wrench (width across flats M41) on the hexagon of the actuator.

→ Rotate the actuator and move it into the required position.

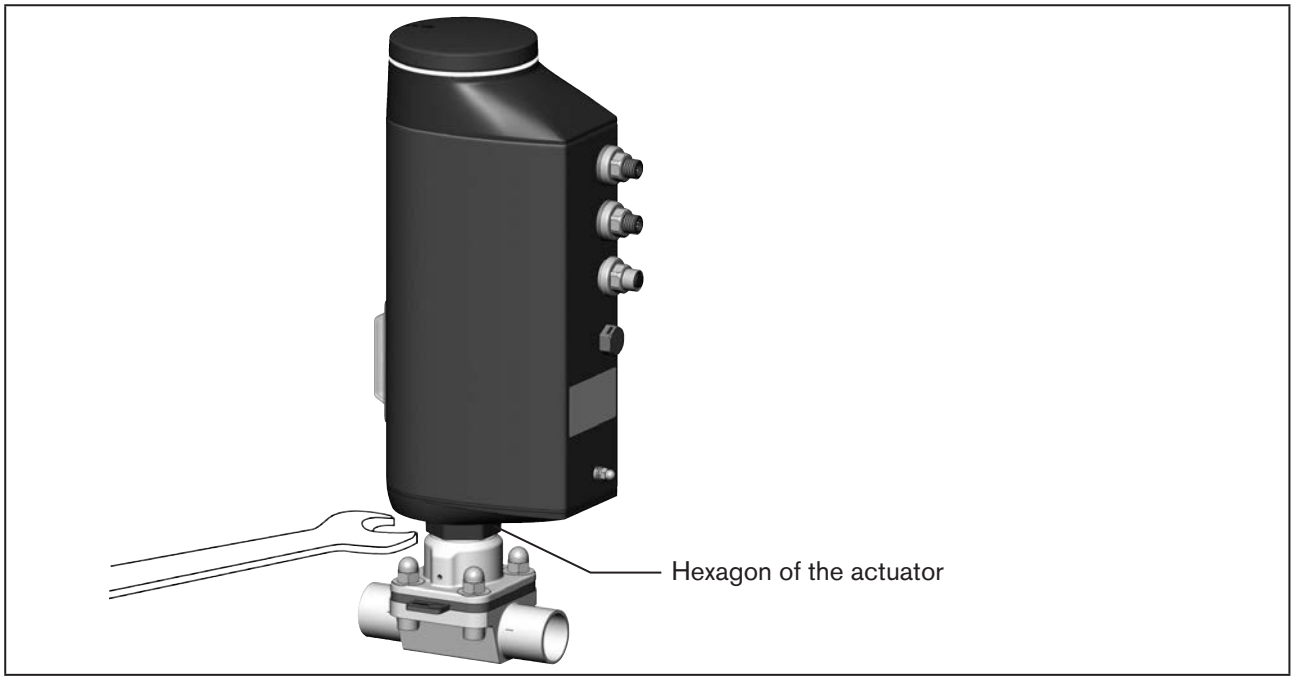


*Figure 20: Rotating the actuator*

**The actuator cannot be rotated if devices are fitted with a holding device.**

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## 9.7 Removing the actuator

**DANGER!**

**Risk of injury from high pressure.**

- Before working on the system or device, switch off the pressure and vent or drain lines.

**WARNING!**

**Risk of injury due to improper installation work.**

- The actuator may be removed only by trained technicians and with the appropriate tools.

### 9.7.1 Required work steps

1. Set operating state MANUAL, chapter “14.1”, page 103.
2. Switch the valve to the position “valve 100% open“, chapter “15”, page 114.
3. Switch off the supply voltage. Wait until LED illuminated ring goes out.
4. Remove actuator from valve body, chapter “9.7.2”, page 57.

### 9.7.2 Remove actuator from valve body

**Preconditions: MANUAL operating state, valve position 100% open, supply voltage switched off.**

**WARNING!**

**Risk of injury due to electric shock.**
**Risk of crushing due to mechanically moving parts.**

- Switch off supply voltage.
- Devices with SAFEPOS energy-pack: Completely drain SAFEPOS energy-pack. Wait until LED illuminated ring goes out; the LED status must not be in **LED off** mode.

**ATTENTION!**

**Damage to the diaphragm.**

- To prevent damage, the device must be in the MANUAL operating state during installation and removal of the actuator and diaphragm.
- The actuator must be in the position “valve 100% open“.

→ Loosen the 4 nuts on the diaphragm socket cross-wise.

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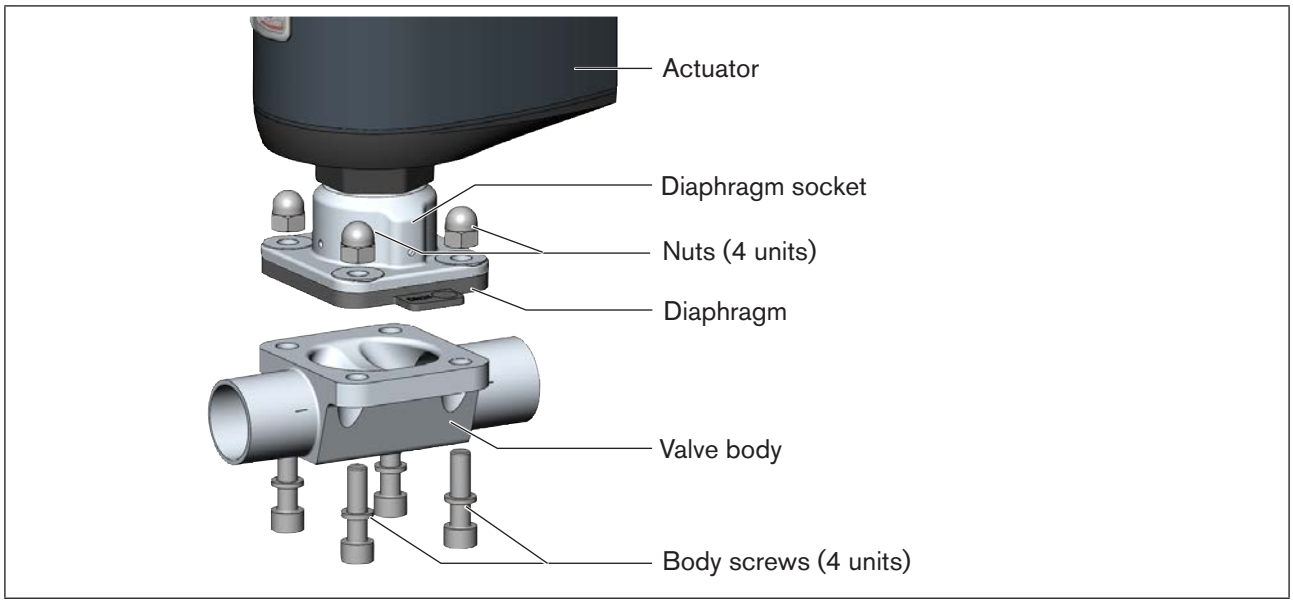


*Figure 21: Disassembly of the diaphragm using the 2-way body as an example*

→ Remove the body screws.

→ Remove valve body.

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## 9.8 Holding device

The holding device is used to protect the valve actuator from damage due to forces and vibrations. The holding device is available as an accessory. See Chapter “24 Accessories, spare parts”, page 179.

### 9.8.1 Attaching holding device

→ Attach holding device to the hexagon of the actuator as shown in the diagram.

**ATTENTION!**

**Ensure that the actuator is rotated into the correct position beforehand.**

→ Fix the holding device in place using suitable means.

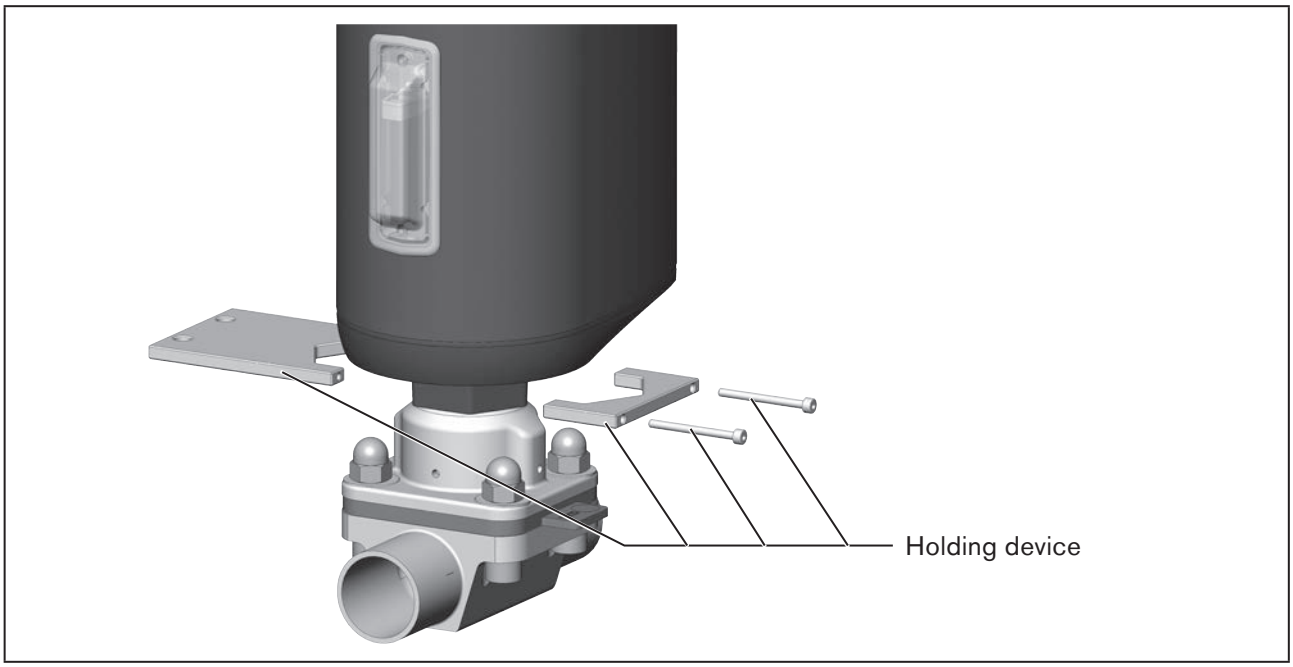


*Figure 22: Attaching the holding device*

**The actuator cannot be rotated if devices are fitted with a holding device.**

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# 10 ELECTRICAL INSTALLATION

The electromotive diaphragm control valve is available with one of 2 different connection variants:

- With circular plug-in connector (multipole version)
- Cable gland with connection terminals

**Signal values**

| | |
|---|---|
| Operating voltage: | 24 V ⎓ |
| Set-point value: | 0...20 mA; 4...20 mA<br>0...5 V; 0...10 V |

## 10.1 Electrical installation with circular plug-in connector

### 10.1.1 Safety instructions

**WARNING!**

**Risk of injury from improper installation.**

- ▸ Installation may be carried out by authorized technicians only and with the appropriate tools.
- ▸ Observe the general rules of technology during installation.

**Risk of injury from unintentional activation of the system and uncontrolled restart.**

- ▸ Secure system against unintentional activation.
- ▸ Following installation, ensure a controlled restart.

**ATTENTION!**

To ensure electromagnetic compatibility (EMC), the functional ground must be grounded with a short cable (max. 1m). The functional ground must have a cross-section of at least 1.5 mm².

**Using the set-point value input 4...20 mA**

If several devices are connected in series and the power supply to a device in this series connection fails, the input of the failed device becomes highly resistive. As a result, the 4...20 mA standard signal fails.

**Selection of the connection line:**
When selecting the length and cross-section of the individual wires, consider the voltage drop with reference to the maximum supply current.

→ Connect the device according to the tables.

→ When the operating voltage is applied make the required base settings and adjustments for the electromotive diaphragm control valve. For a description see chapter “11 Start-up”.

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## 10.1.2 Description of the circular plug-in connectors

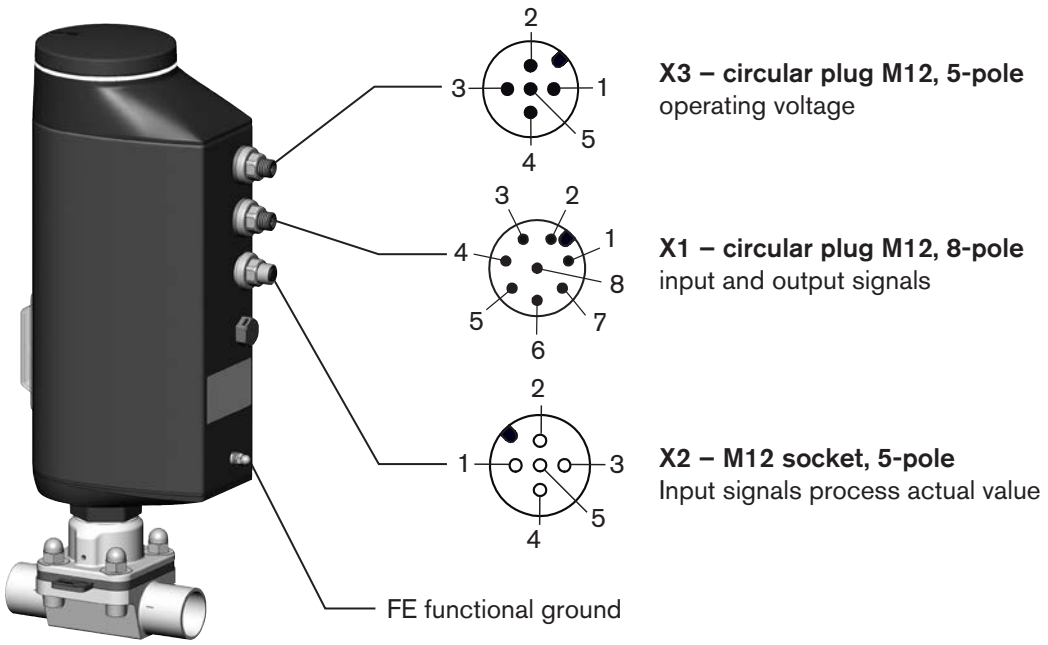


*Figure 23: Description of the circular plug-in connectors*

## 10.1.3 X1 – M12 circular plug, 8-pole

| Pin | Wire color* | Assignment | |
|---|---|---|---|
| **Input signals from the control centre (e.g. PLC)** | | | |
| 8 | red | Set-point value +<br>(0/4...20 mA or 0...5/10 V) galvanically isolated for the operating voltage | |
| 7 | blue | Set-point value – | |
| 1 | white | Digital input + | 0...5 V (log. 0)<br>10...30 V (log. 1) |
| **Output signals to the control center (e.g. PLC) – (required for analog output and/or digital output option only)** | | | |
| 6 | pink | Analog output+ (0/4...20 mA or 0...5/10 V) | |
| 5 | gray | Analog output – | |
| 4 | yellow | Digital output 1 (24 V / 0 V) | |
| 3 | green | Digital output 2 (24 V / 0 V) | |
| 2 | brown | Digital inputs and digital outputs GND | |
| * The indicated wire colors refer to the connection cable, part no. 919061, available as an accessory. | | | |

*Table 25: X1 – M12 circular plug, 8-pole*

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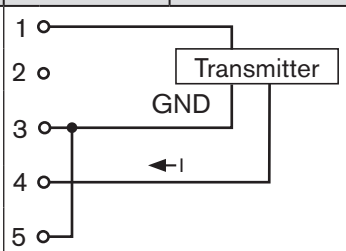
### 10.1.4 X2 – M12 socket, 5-pole, input signals process actual value (for process controller function only)

| Signal type* | Pin | Wire color | Assignment | On the device side | External circuit |
|---|---|---|---|---|---|
| 4...20 mA - internally supplied | 1 | brown | +24 V supply transmitter |  | |
| | 2 | white | PV1: not used | | |
| | 3 | blue | GND (identical with GND operating voltage) | | |
| | 4 | black | PV2: output of transmitter | | |
| | 5 | gray | PV3: bridge to GND (GND from 3-wire transmitter) | | |
| 4...20 mA - externally supplied | 1 | brown | not used | | |
| | 2 | white | not used | | |
| | 3 | blue | not used | | |
| | 4 | black | PV2: prozess actual + | 4 | 4...20 mA |
| | 5 | gray | PV3: prozess actual – | 5 | GND 4...20 mA |
| Frequency - internally supplied | 1 | brown | +24 V sensor supply | 1 | +24 V |
| | 2 | white | PV1: clock input + | 2 | Clock + |
| | 3 | blue | GND | 3 | GND (identical with GND operating voltage) |
| | 4 | black | PV2: not used | | |
| | 5 | gray | PV3: bridge to GND (GND from 3-wire transmitter) | 5 | Clock – |
| Frequency - externally supplied | 1 | brown | not used | | |
| | 2 | white | PV1: clock input + | 2 | Clock + |
| | 3 | blue | not used | | |
| | 4 | black | PV2: not used | | |
| | 5 | gray | PV3: clock input – | 5 | Clock – |
| Pt 100 (see note below) | 1 | brown | not used | | |
| | 2 | white | PV1: process actual 1 (current feed) | 2 | Pt 100 |
| | 3 | blue | not used | | |
| | 4 | black | PV2: process actual 2 (compensation) | 4 | |
| | 5 | gray | PV3: process actual 3 GND | 5 | |

* Can be adjusted by software:
Inputs / Outputs → PV → ANALOG.type (signal source: PV.source → Analog).

*Table 26: X2 – M12 socket, 5-pole, input signals process actual value (only available for devices with process controller function)*

**ATTENTION!**

For reasons of wire resistance compensation, connect the Pt 100 sensor via 3 wires. Always bridge Pin 4 and Pin 5 on the sensor.

Connection lines may be a maximum of 20 m long.

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### 10.1.5 X3 – M12 circular plug, 5-pole, operating voltage (Devices without büS/CANopen network)

A 4-pole female connector can be used as a counterpart.

| Pin | Wire color* | Assignment |
|---|---|---|
| 1 | - | do not connect |
| 2 | white | +24 V ⎓ ± 10 %, max. residual ripple 10 % |
| 3 | blue | GND |
| 4 | - | do not connect |
| 5 | - | do not connect (not available on the 4-pole female connector) |
| * *The indicated wire colors refer to the M12 connection cable, 4-pole, part no. 918038, available as an accessory.* | | |

*Table 27: X3 – M12 circular plug, 5-pole, operating voltage*

→ When the operating voltage is applied make the required base settings and adjustments for the electromotive diaphragm control valve. For a description see chapter "11.3 Base settings".

## 10.2 Electrical connection büS/CANopen

### 10.2.1 X3 – M12 circular plug, 5-pole, büS/CANopen network and operating voltage

| Pin | Wire color* | Assignment |
|---|---|---|
| 1 | CAN shield | |
| 2 | red | +24 V ⎓ ± 10 %, max. residual ripple 10 % |
| 3 | black | GND / CAN_GND |
| 4 | white | CAN_H |
| 5 | blue | CAN_L |
| * *The specified wire colours refer to the büS cable, which is available as an accessory. See the cabling guideline,* **link:** Guide for planning of büS networks | | |

*Table 28: X3 – M12 circular plug, 5-pole, büS/CANopen network and operating voltage*

**NOTE!**

A shielded 5-wire cable must be used for the electrical connection of the büS/CANopen network.

**Further information on cabling büS networks can be found under the following link:**
Guide for planning of büS networks

→ When the operating voltage is applied make the required base settings and adjustments for the electromotive diaphragm control valve. For a description see chapter "11.3 Base settings".

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## 10.3 Electrical connection fieldbus gateway


*Figure 24: Electrical connection fieldbus gateway*

The fieldbus gateway is connected with a circular plug-in connector M12, 4-pole.

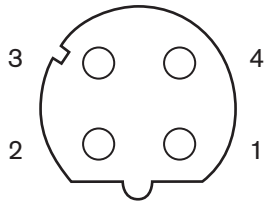
| Circuit diagram | Pin | Assignment |
|---|---|---|
|  | 1 | Transmit + |
| | 2 | Receive + |
| | 3 | Transmit – |
| | 4 | Receive – |



*Table 29: Electrical assignment fieldbus gateway*

**NOTE!**

To ensure electromagnetic compatibility (EMC), a shielded Ethernet cable must be used. Ground the cable shield on both sides, i.e. on each of the connected devices.

As the metal housing of the M12 circular plug-in connector is connected to the actuator housing, the functional ground must be grounded on the actuator housing. For the grounding use a short line (max. 1m) with a cross-section of at least 1.5 mm².

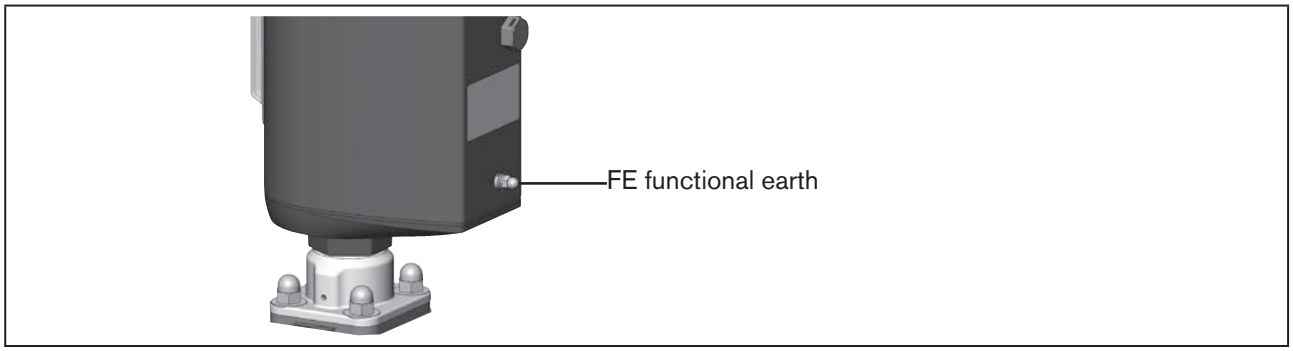



*Figure 25: Functional earth*

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## 10.4 Electrical installation with cable gland

### 10.4.1 Safety instructions

**WARNING!**

**Risk of injury from improper installation.**

- Installation may be carried out by authorized technicians only and with the appropriate tools.
- Observe the general rules of technology during installation.

**Risk of injury from unintentional activation of the system and uncontrolled restart.**

- Secure system against unintentional activation.
- Following installation, ensure a controlled restart.

**Using the set-point value input 4...20 mA**

If several devices are connected in series and the power supply to a device in this series connection fails, the input of the failed device becomes highly resistive.
As a result, the 4...20 mA standard signal fails.

**ATTENTION!**

To ensure electromagnetic compatibility (EMC), the functional ground must be grounded with a short cable (max. 1m). The functional ground must have a cross-section of at least 1.5 mm$^2$.

### 10.4.2 Access to the connection terminals

**Devices with ATEX approval or IECEx approval are secured with a magnetic lock.**

The removal of the cover is described in the additional manual for electromotive control valves with ATEX approval and IECEx approval.

To access the terminals, open the actuator housing as described below.

**1. Remove display module or dummy cover:**

**ATTENTION!**

**Carefully remove display module ensuring that the connection cable and the HMI interface are not damaged.**


*Figure 26: Removing dummy cover or display module*

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→ To release the display module or the dummy cover, rotate counter-clockwise and remove it.
**ATTENTION!** On the display module pay attention to the connection cable leading to the HMI interface!

→ For devices with display module disconnect the connection cable from the HMI interface.

**2. Removing LED and storage module:**

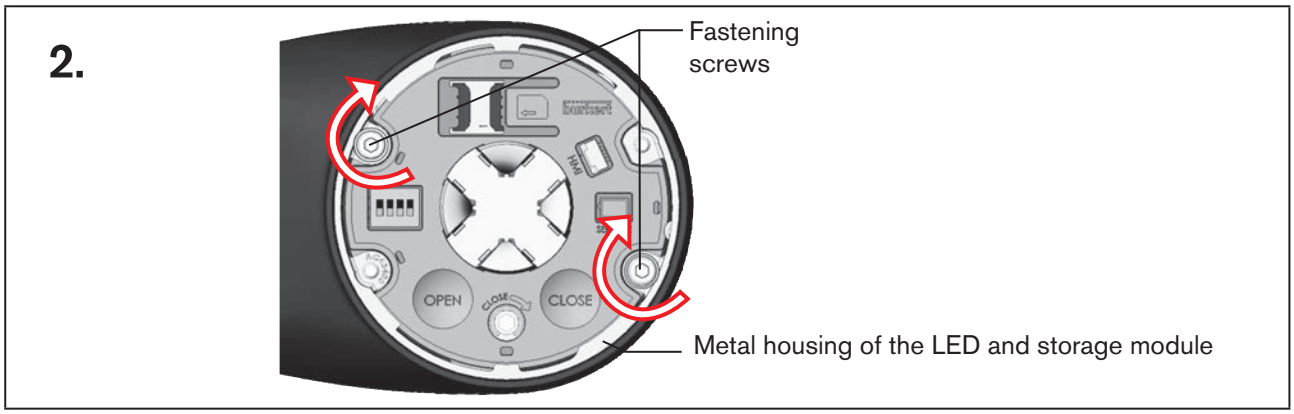


*Figure 27: Removing LED and storage module*

→ Remove the 2 fastening screws (hexalobular-internal screws T20).

→ Take hold of the LED and storage module on both sides of the metal housing and lift out.

**3. Removing actuator cover:**

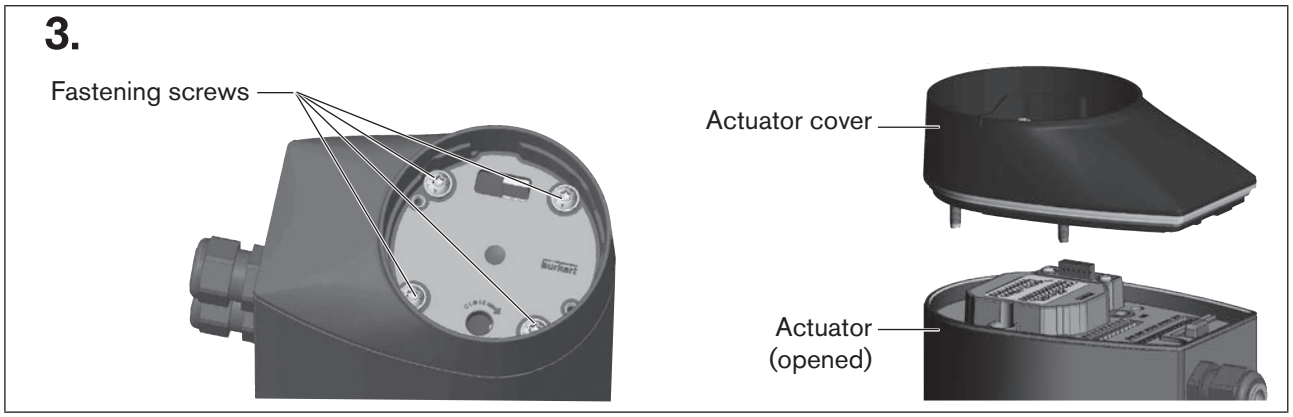


*Figure 28: Removing actuator cover*

→ Loosen the 4 fastening screws (hexalobular-internal screws T25).
The screws are integrated in the actuator cover to prevent them from falling out.

→ Remove actuator cover.

The connection terminals are now accessible.

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### 10.4.3 Connecting the cables

→ Push the cables through the cable gland.

**ATTENTION!**

**Allow for connection to spring-type terminals.**

- Minimum length of the wire end ferrule: 8 mm
- Maximum cross-section of the wire end ferrule: 1.5 mm² (without collar), 0.75 mm² (with collar)

→ Strip at least 8 mm insulation from the wires and crimp on wire end ferrules.

→ Connect the wires. The terminal assignment can be found in the tables below, starting on page 68.

→ Tighten the union nut of the cable gland (tightening torque approx. 1.5 Nm).

**ATTENTION!**

**Damage or malfunction due to ingress of dirt and moisture.**

To comply with the degree of protection IP65 and IP67:

- Close all unused cable glands with dummy plugs.
- Tighten the union nuts on the cable glands. Tightening torque depends on cable size or dummy plug approx. 1.5 Nm.

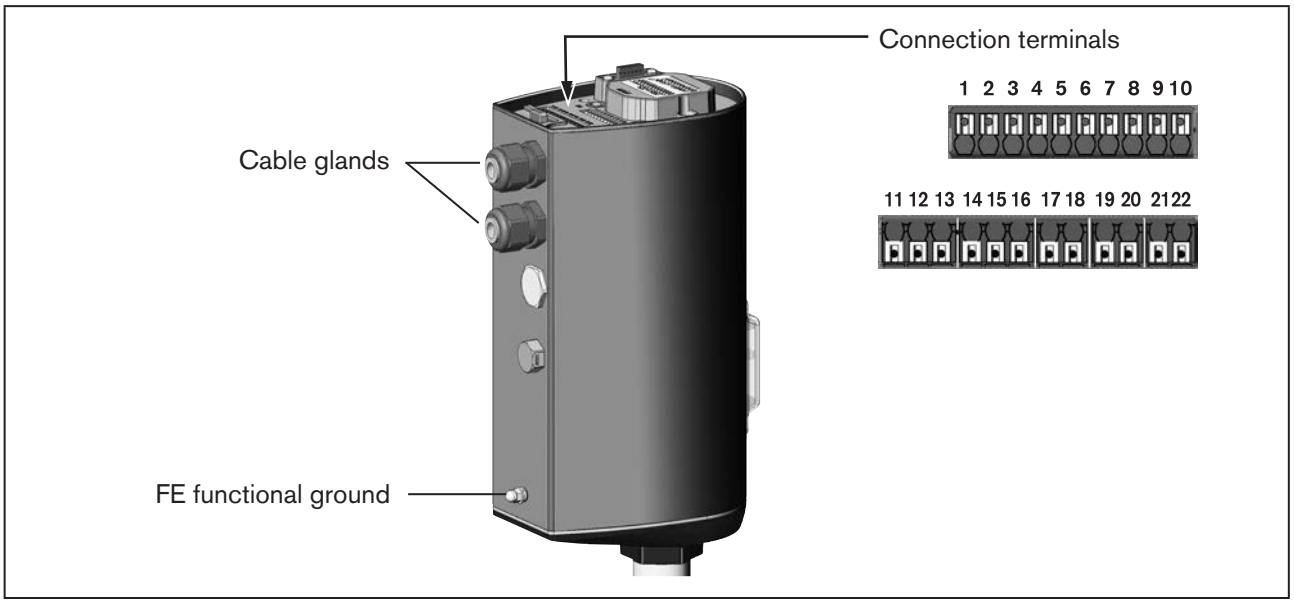


*Figure 29: Connecting the cables*

→ Connect the device according to the tables.

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### 10.4.4 Terminal assignment – input signal from the control center (e.g. PLC)

| Terminal | Assignment |
|---|---|
| 8 | Set-point value + (0/4...20 mA or 0...5/10 V) galvanically isolated for the operating voltage |
| 7 | Set-point value – |
| 5 | Digital input + 0...5 V (log. 0) / 10...30 V (log. 1) |
| 4 | Digital input GND<br>specific to operating voltage GND (terminal GND) |

*Table 30: Terminal assignment – input signal from the control center (e.g. PLC)*

### 10.4.5 Terminal assignment – Output signals to the control center (e.g. PLC) – (required for analog output and/or digital output option only)

| Terminal | Assignment |
|---|---|
| 19 | Analog output + (0/4...20 mA or 0...5/10 V) |
| 20 | Analog output – |
| 18 | Digital output 1 (24 V / 0 V) |
| 17 | Digital output 2 (24 V / 0 V) |
| 16 | Digital output GND |

*Table 31: Terminal assignment – output signal to the control center (e.g. PLC)*

### 10.4.6 Terminal assignment – operating voltage

| Terminal | Assignment |
|---|---|
| 10 | +24 V ⎓ ±10 %<br>max. residual ripple 10 % |
| 9 | GND |

*Table 32: Terminal assignment – operating voltage*

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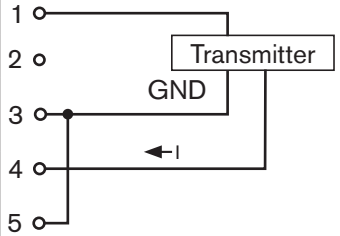
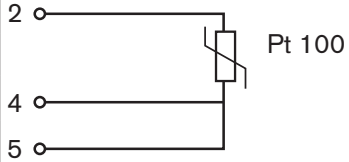
## 10.4.7 Terminal assignment – process actual value input (for process controller function only)

| Signal type* | Terminal | Assignment | On the device side / External circuit |
|---|---|---|---|
| 4...20 mA - internally supplied | 22<br>15<br>21<br><br>14<br>13 | +24 V supply transmitter<br>PV1: not used<br>GND (identical with GND operating voltage)<br>PV2: output of transmitter<br>PV3: bridge to GND (GND from 3-wire transmitter) |  |
| 4...20 mA - externally supplied | 22<br>15<br>21<br>14<br>13 | not used<br>not used<br>not used<br>PV2: prozess actual +<br>PV3: prozess actual – | 4 — 4...20 mA<br>5 — GND 4...20 mA |
| Frequency - internally supplied | 22<br>15<br>21<br>14<br><br>13 | +24 V sensor supply<br>PV1: clock input +<br>GND<br>PV2: not used<br><br>PV3: bridge to GND (GND from 3-wire transmitter) | 1 — +24 V<br>2 — Clock +<br>3 — GND (identical with GND operating voltage)<br>5 — Clock – |
| Frequency - externally supplied | 22<br>15<br>21<br>14<br>13 | not used<br>PV1: clock input +<br>not used<br>PV2: not used<br>PV3: clock input – | 2 — Clock +<br>5 — Clock – |
| Pt 100 (see note below) | 22<br>15<br>21<br>14<br>13 | not used<br>PV1: process actual 1 (current feed)<br>not used<br>PV2: process actual 2 (compensation)<br>PV3: process actual 3 GND |  |

* Can be adjusted via software:
Inputs / Outputs → PV → ANALOG.type (signal source: PV.source → Analog).

*Table 33: Terminal assignment – process actual value input (only available for devices with process controller function)*

**ATTENTION!**

For reasons of wire resistance compensation, connect the Pt 100 sensor via 3 wires.
Always bridge terminal 14 and terminal 13 on the sensor.

Connection lines may be a maximum of 20 m long.

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## 10.4.8 Closing the actuator housing

**ATTENTION!**

**Damage or malfunction due to ingress of dirt and moisture.**

Before closing the device, comply with the degree of protection IP65 and IP67 by ensuring that:

- The seal in the actuator housing/actuator cover must be inserted and undamaged.
- The sealing surfaces must be clean and dry.

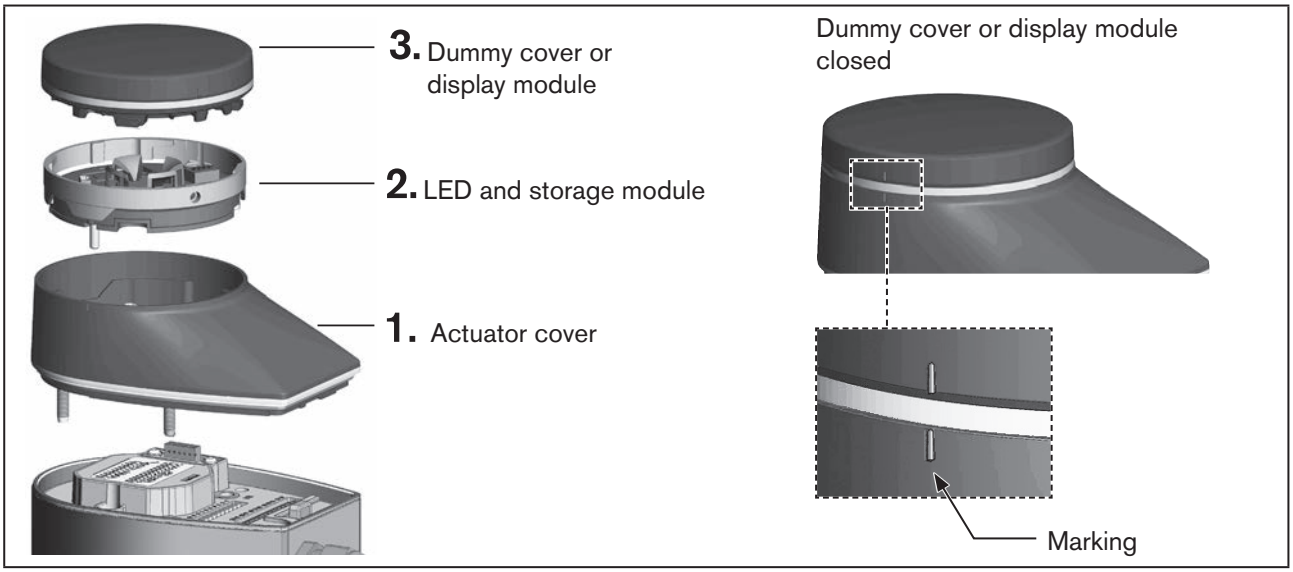


*Figure 30: Closing the actuator housing*

**1. Mounting the actuator cover**

→ Place actuator cover on the actuator housing.

→ Slightly screw in the 4 fastening screws (T25 hexagonal socket round screws) crosswise, firstly by hand and then tighten (tightening torque: 5.0 Nm).

**2. Mount LED and storage module:**

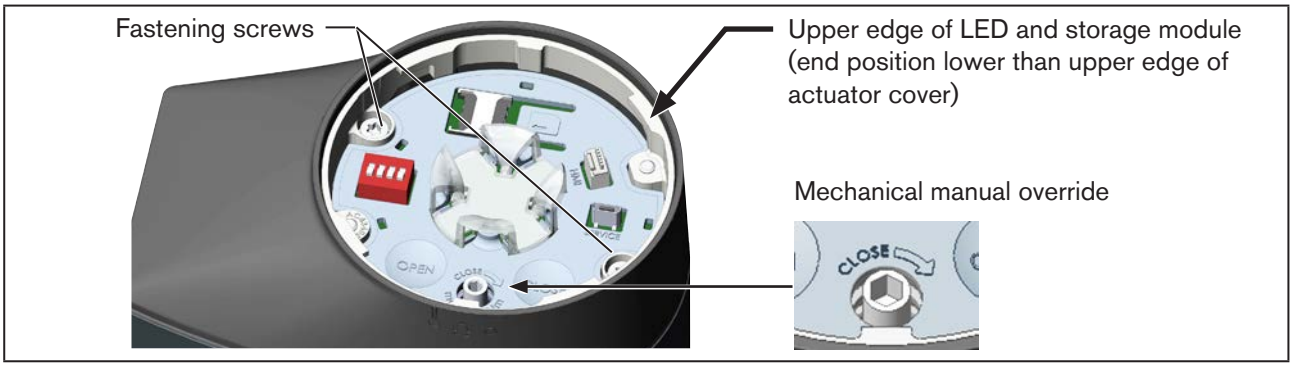


*Figure 31: Mount LED and storage module:*

→ Place the LED and storage module onto the actuator cover.
Align the recess for the manual override in the centre, paying attention to the correct alignment of the electrical plug connection.

→ Carefully press down the LED and storage module by hand.
The end position is reached if the upper edge of the module is fully and evenly recessed in the actuator cover.

**NOTE!**

**The plug connection will be damaged if the LED and storage module is not correctly inserted.**

- Before the fastening screws are tightened, the LED and storage module must be fully recessed in the actuator cover.

→ Tighten 2 fastening screws (hexalobular-internal screws T20).
Observe the tightening torque of 1.1 Nm!

**3. Close device with dummy cover or display module**

Device version with display module:

→ Insert the connection cable into the HMI interface.

→ Fit the display module and turn clockwise until the marking at the edge is directly over the marking for the drive cover.

Device version with dummy cover:

→ Mount dummy cover and turn clockwise until the 2 marks (one vertical line on the dummy cover and on the actuator) are vertically aligned.

When the operating voltage is applied make the required base settings and adjustments for the electromotive diaphragm control valve. For a description see chapter “11.3 Base settings”.

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# 11 START-UP

## 11.1 Safety instructions

**WARNING!**

**Risk of injury from improper operation!**

Improper operation may result in injuries as well as damage to the device and the surrounding area.

- The operating personnel must know and have understood the contents of the operating instructions.
- Observe the safety instructions and intended use.
- Only adequately trained personnel may start up the equipment/the device.

## 11.2 Setting options for start-up

- **Setting with the PC software Bürkert Communicator on the PC**
  This type of setting is possible for all device types and device variants.

The PC software Bürkert Communicator can be downloaded free of charge from the Bürkert homepage.

To do this, the USB-büS-Interface set, available as an accessory, is required.
Communication is established by the büS service interface of the device.

- **Setting on the display of the device (optional)**
  Possible only for devices with display module.

- **Adjust the position control using 2 capacitive buttons in the device (M.Q0.TUNE function)**
  Possible only for devices without display module.

## 11.3 Base settings

A start-up wizard, which runs gradually through the base setting, is available for the Bürkert Communicator and the display.
(Configuration area → **Position controller** or **Process controller** → **START-UP**)

### 11.3.1 Base settings position control

| Type of base setting (observe sequence) | | Factory presetting |
|---|---|---|
| 1. | Setting safety position | Close / Open (depending on the device variant) |
| 2. | Adjustment of position control (MQ.0.TUNE function) | - |
| 3. | Set standard signal for set-point position | Signal type analog: 4...20 mA |
| | | Gateway: is specified by the fieldbus |
| 4. | Set operating state to AUTOMATIC | MANUAL |

*Table 34: Overview: Base settings for position control*

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## 11.3.2 Base settings process control

| Type of base setting (observe sequence) | | | Factory presetting |
|---|---|---|---|
| 1. | Setting safety position | | Close / Open (depending on the device variant) |
| 2. | Select physical unit for process control | | Percentage |
| 3. | Parameterize process values | | |
| | a) | Select standard signal for process set-point value | Signal type analog: 4...20 mA |
| | | | Gateway: is specified by the fieldbus |
| | b) | Scale process set-point value | Minimum 0 %, maximum 100 % |
| | c) | Select standard signal for process actual value | 4...20 mA |
| | d) | Scale process actual value | Minimum 0 %, maximum 100 % |
| 4. | Scale process control | | Minimum 0 %, maximum 100 % |
| 5. | Set dead band of the process control | | 1 % |
| 6. | Adjustment of position control (MQ.0.TUNE function) | | - |
| 7. | Set up process control | | |
| | a) | Linearize process characteristic[1] (P.LIN function)<br>In addition for devices without a display module: To activate the correction characteristic, set the DIP switch 2 to ON. | - |
| | b) | Adjust process control[2] (P.TUNE function) | - |
| 8. | Set operating state to AUTOMATIC | | MANUAL |

*1) Only required if the process characteristic deviates greatly from the linearity. Linearization with the P.LIN function takes a longer time for slow processes.*

*2) The P.TUNE function supports the setting up of the process control by automatic optimization of the process parameters. The fine adjustment of the process parameters is described in the software description with reference to Type 3363.*

*Table 35: Overview: Base settings for position control*

Set operating state to AUTOMATIC: see chapter “14.1 Switching operating state, AUTOMATIC – MANUAL”, page 103.

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## 11.4 Setting safety position

**Setting option:**
Using the PC software Bürkert Communicator or on the display of the device (option).

The setting on the PC is made by the büS service interface and by using the PC software "Bürkert Communicator". To do this, the USB-büS-Interface set, available as an accessory, is required.

Display operation: Key functions

| | | |
|---|---|---|
| select, activate | confirm | back |

To set the safety position, you must change to the detailed view parameters for position controller.

**Changing to the detailed view:**

→ When setting with Bürkert Communicator in the navigation area, select **Position controller**.

→ When setting on the display switch from home screen to **CONFIGURATION** and select **Position controller**.

✓ You are in the detailed view parameter.

**Setting the safety position:**

→ Select **SAFEPOS**.

→ Select **FUNCTION**.

The following safety positions can be selected:

| | |
|---|---|
| **Close** | Valve tightly closed. |
| **Open** | Valve open. |
| **User-Defined** | Freely defined safety position.<br>The input of the position in this menu is described below. |
| **Inactive** | Valve stops in an undefined position. |

→ Select safety position.

**Input of the freely defined safety position (applicable only when selecting safety position User-Defined).**

→ Select **Position** .

→ Input safety position
(0% = closed, 100% = open).

✓ You have set the safety position.

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## 11.5 Adjust the position control – running M.Q0.TUNE

When the M.Q0.TUNE function is running, the position control is adjusted to the actual stroke of the actuator used and the required sealing force is determined.

In doing so, the sealing point must be manually approached. It is important that the valve is not completely closed.

Based on this position, the device uses an algorithm to calculate the optimum sealing force. This ensures that the diaphragm is sealed under the given conditions and that the service life of the diaphragm is optimized.

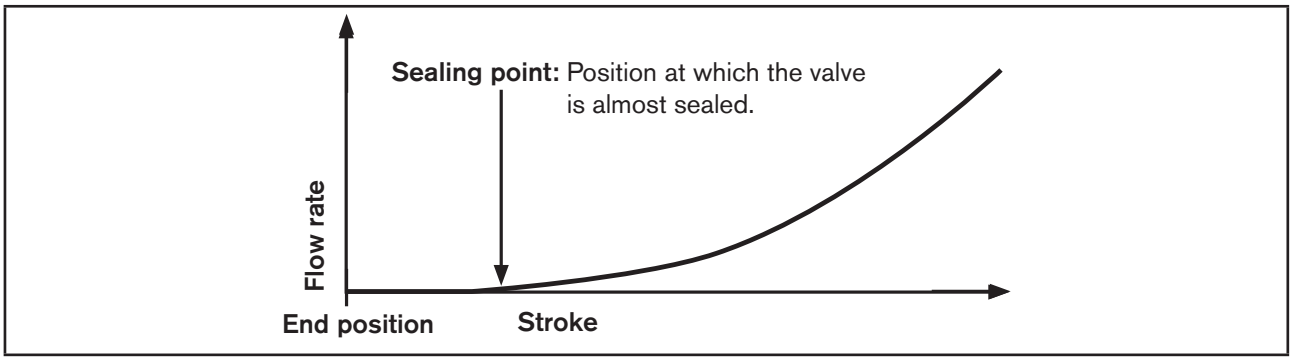


*Table 36: Sealing point*

**Devices with process controller function:**

The parameters for the algorithm can be adjusted by the customer. Description see software description of Type 3363 on our Homepage www.burkert.com.

The sealing point for adjusting the position control can be automatically determined with the function M.Q0.TUNE-AUTO. To ensure that the sealing point can be correctly determined, the process values and the process control must be scaled before the M.Q0.TUNE-AUTO is run.

**ATTENTION!**

Run **M.Q0.TUNE.**

- Run M.Q0.TUNE to ensure that the diaphragm is sealed under the given conditions and that the service life of the diaphragm is optimized.
- After changing the diaphragma, actuator or valve body, or if the operating conditions are changed, the M.Q0. TUNE must be run again.
- Run the M.Q0.TUNE function in the MANUAL operating state.

**WARNING!**

**Danger due to uncontrolled process after running the M.Q0.TUNE function.**

If the M.Q0.TUNE is running without medium pressure, the actuator will be incorrectly adjusted.
This will cause an uncontrolled process due to a leaking actuator or damage to the diaphragm.

- Run M.Q0.TUNE under medium pressure only.

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### 11.5.1 Adjustment of the position control using the buttons in the device

The OPEN and CLOSE buttons have no function for devices which have a display module. The adjustment of the position control can be made on the display.

The 2 buttons for approaching the sealing point and for running the M.Q0.TUNE are under the dummy cover.

**Devices with ATEX approval or IECEx approval are secured with a magnetic lock.**

The removal of the cover is described in the additional manual for electromotive control valves with ATEX approval and IECEx approval.

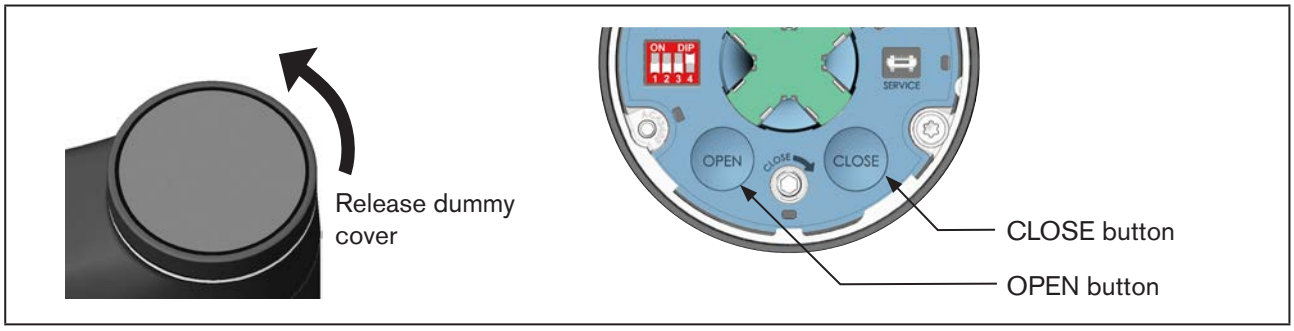


*Figure 32: Adjustment of the position controll using the buttons in the device*

→ To release, rotate the dummy cover counter-clockwise and remove it.

Running the M.Q0.TUNE function:

⚠ Ensure that medium pressure is applied and that the MANUAL operating state has been set.

→ Establish operating conditions (medium pressure and temperature)

→ Using the CLOSE button, approach the sealing point.

→ Simultaneously hold down the OPEN button and CLOSE button for 5 seconds.

✔ The M.Q0.TUNE function is running.
The device now calculates the optimum force for sealing the valve.

When the M.Q0.TUNE is running, the LED illuminated ring is lit orange.
When the M.Q0.TUNE ends, the LED illuminated ring is reset to its previous status.

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### 11.5.2 Adjustment of the position control on the PC or display of the device

The setting is made on the PC via the büS Service interface and by using the "Bürkert Communicator" PC software. To do this, the USB-büS-Interface set, available as an accessory, is required.

Display operation: Key functions

| | | |
|---|---|---|
| select, activate | confirm | back |

To run the M.Q0.TUNE function, you must change to the detailed view maintenance for position controller.

**Changing to the detailed view:**

→ When setting with Bürkert Communicator in the navigation area, select **Position controller** and switch to **MAINTENANCE**.

→ When setting on the display switch from home screen to **CONFIGURATION**, select **Position controller** and switch to **MAINTENANCE**.

✓ You are in the detailed view maintenance.

**Devices with process controller function:**
The sealing point for adjusting the position control can be automatically determined with the function M.Q0.TUNE-AUTO. To ensure that the sealing point can be correctly determined, the process values and the process control must be scaled before the M.Q0.TUNE-AUTO is run.

**Running the M.Q0.TUNE function:**

⚠ Ensure that medium pressure is applied and that the MANUAL operating state has been set!

→ Select **CALIBRATION** .

→ Select **M.Q0.TUNE-MANU** .

The following text appears:

“1. Establish operating conditions!
2. Manually approach the sealing point (Position at which the valve is almost sealed).
3. Start M.Q0.TUNE!”

→ Confirm.

The following text appears:

“Establish operating conditions:
1. Medium pressure!
2. Temperature!”

→ Confirm.

→ Using the arrow key, approach the sealing point.

→ Confirm.

The following question appears: “Do you really want to start the M.Q0.TUNE?”

→ Start M.Q0.TUNE.

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✓ The M.Q0.TUNE function is running.
The device now calculates the optimum force for sealing the valve.

When the M.Q0.TUNE is running, the LED illuminated ring is lit orange.
When the M.Q0.TUNE ends, the LED illuminated ring is reset to its previous status.

**Running the M.Q0.TUNE-AUTO function:**

⚠ Ensure that medium pressure is applied and that the MANUAL operating state has been set!

→ Select **CALIBRATION** .

→ Select **M.Q0.TUNE-MANU** .

The following text appears:

“Establish operating conditions:
1. Medium pressure!
2. Temperature!”

→ Confirm.

The following question appears: “Do you really want to start the M.Q0.TUNE?”

→ Start M.Q0.TUNE.

✓ The M.Q0.TUNE function is running.
The device now calculates the optimum force for sealing the valve.

If the M.Q0.TUNE is canceled due to an error, a message appears (see table below).

| Possible messages when M.Q0.TUNE is canceled | Description |
|---|---|
| There are device errors. | There is an error which is preventing M.Q0.TUNE from running. |
| Time limit exceeded. | The M.Q0.TUNE could not be run within the time limit due to an error. |
| Sealing point cannot be determined. | The M.Q0.TUNE could not determine the sealing point due to an error. |

*Table 37: Possible error message following cancellation of the M.Q0.TUNE-MANU function*

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## 11.6 Set standard signal for set-point position

**Setting option:**
Using the PC software Bürkert Communicator or on the display of the device (option).

The setting on the PC is made by the büS service interface and by using the PC software "Bürkert Communicator". To do this, the USB-büS-Interface set, available as an accessory, is required.

Display operation: Key functions

| | | |
|---|---|---|
| select, activate | confirm | back |

To set the standard signal, you must change to the detailed view parameters for inputs / outputs.

**Changing to the detailed view:**

→ When setting with Bürkert Communicator in the navigation area, select **Inputs / Outputs**.

→ When setting on the display switch from home screen to **CONFIGURATION** and select **Inputs / Outputs**.

✓ You are in the detailed view parameter.

**Setting the standard signal:**

→ Select **CMD**.

→ Select **ANALOG.type**.

→ Select standard signal.

✓ You have set the standard signal.

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## 11.7 Select physical unit for process control

**Setting option:**
Using the PC software Bürkert Communicator or on the display of the device (option).

The setting on the PC is made by the büS service interface and by using the PC software "Bürkert Communicator". To do this, the USB-büS-Interface set, available as an accessory, is required.

Display operation: Key functions

| | | |
|---|---|---|
| select, activate | confirm | back |

To select the physical unit, you must switch to the detailed view parameters for process controller.

**Changing to the detailed view:**

→ When setting with Bürkert Communicator in the navigation area, select **Process controller**.

→ When setting on the display switch from home screen to **CONFIGURATION** and select **Process controller**.

✓ You are in the detailed view parameter.

**Selecting the physical unit for the process control:**

→ Select **UNIT**.

→ Select physical unit.

✓ You have selected the physical unit.

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## 11.8 Parameterize process values

**Setting option:**
Using the PC software Bürkert Communicator or on the display of the device (option).

The setting on the PC is made by the büS service interface and by using the PC software "Bürkert Communicator". To do this, the USB-büS-Interface set, available as an accessory, is required.

Display operation: Key functions

| | | |
|---|---|---|
| select, activate | confirm | back |

To parameterize the process values, you must switch to the detailed view parameters for inputs / outputs.

**Changing to the detailed view:**

→ When setting with Bürkert Communicator in the navigation area, select **Inputs / Outputs**.

→ When setting on the display switch from home screen to **CONFIGURATION** and select **Inputs / Outputs**.

✓ You are in the detailed view parameter.

### 11.8.1 Select and scale standard signal for process set-point value

**Selecting the standard signal for the process set-point value:**

→ Select **SP / CMD**.

→ Select **ANALOG.type**.

→ Select standard signal.

✓ You have selected the standard signal for the process set-point value.

**Scaling the process set-point value:**

→ Select **SP .scale**.

→ Input minimum and maximum.

✓ You have parameterized the process set-point value.

### 11.8.2 Select and scale standard signal for process actual value

**Selecting the standard signal for the process actual value:**

→ Select **PV**.

→ Select **ANALOG.type**.

→ Select standard signal.

✓ You have selected the standard signal for the process actual value.

**Scaling the process actual value:**

→ Select **PV.scale**.

→ Input minimum and maximum.

✓ You have parameterized the process actual value.

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## 11.9 Scaling process control

The scaling of the process control affects the following functions:

- Dead band of the process control
- Sealing function (CUTOFF), if the process control (P.CO) has been selected in the menu CUTOFF → CUTOFF. type.

**Setting option:**
Using the PC software Bürkert Communicator or on the display of the device (option).

The setting on the PC is made by the büS service interface and by using the PC software "Bürkert Communicator". To do this, the USB-büS-Interface set, available as an accessory, is required.

Display operation: Key functions

| | | |
|---|---|---|
| select, activate | confirm | back |

To scaling the process control, you must switch to the detailed view of parameters for process controller.

**Changing to the detailed view:**

→ When setting with Bürkert Communicator in the navigation area, select **Process controller**.

→ When setting on the display switch from home screen to **CONFIGURATION**, select **Process controller**.

✓ You are in the detailed view parameter.

**Scaling the process control:**

→ Select **P.CO.scale**.

→ Input minimum and maximum.

✓ You have scaled the process control.

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## 11.10 Setting dead band of the process control

**Setting option:**
Using the PC software Bürkert Communicator or on the display of the device (option).

The setting on the PC is made by the büS service interface and by using the PC software "Bürkert Communicator". To do this, the USB-büS-Interface set, available as an accessory, is required.

Display operation: Key functions

| | | |
|---|---|---|
| select, activate | confirm | back |

To set the dead band, you must switch to the detailed view of parameters for position controller.

**Changing to the detailed view:**

→ When setting with Bürkert Communicator in the navigation area, select **Process controller**.

→ When setting on the display switch from home screen to **CONFIGURATION** and select **Process controller**.

✓ You are in the detailed view parameter.

**Setting the dead band:**

→ Select **PID.PARAMETER**.

→ Select **DBND**.

→ Enter percentage value.

✓ You have set the dead band.

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## 11.11 Set up process control – run P.LIN, P.TUNE

**Setting option:**
Using the PC software Bürkert Communicator or on the display of the device (option).

The setting on the PC is made by the büS service interface and by using the PC software "Bürkert Communicator". To do this, the USB-büS-Interface set, available as an accessory, is required.

Display operation: Key functions

| | | |
|---|---|---|
| select, activate | confirm | back |

To set up the process control, you must switch to the detailed view maintenance for process controller.

**Changing to the detailed view:**

→ When setting with Bürkert Communicator in the navigation area, select **Process controller** and switch to **MAINTENANCE**.

→ When setting on the display switch from home screen to **CONFIGURATION**, select **Process controller** and switch to **MAINTENANCE**.

✓ You are in the detailed view maintenance.

### 11.11.1 Linearize process characteristic (P.LIN)

**Linearizing the process characteristic:**

→ Select **CALIBRATION**.

→ Select **P.LIN**.

→ The following text appears: “Do you really want to start the P.Lin?”

→ Start P.LIN.

✓ The P.LIN function is running.

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### 11.11.2 For devices without a display module - activate the correction characteristic

The correction characteristic is activated with DIP switch 2 which is located under the dummy cover.

→ To release, rotate the dummy cover counter-clockwise and remove it.

**Devices with ATEX approval or IECEx approval are secured with a magnetic lock.**

The removal of the cover is described in the additional manual for electromotive control valves with ATEX approval and IECEx approval.

→ Set DIP switch 2 to ON. The correction characteristic is now activated.

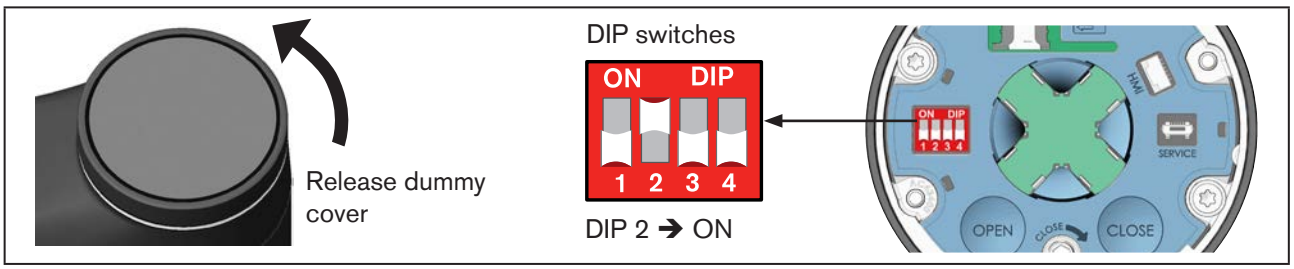


*Figure 33: Activating the correction characteristic*

→ Close the dummy cover.

### 11.11.3 Adjustment to process control (P.TUNE)

**Running the P.TUNE function:**

→ Select P.TUNE.

The following text appears: “Do you really want to start the P.Tune?”

→ Start P.TUNE.

✔ The P.TUNE function is running.

Following start-up, set the AUTOMATIC operating state. See chapter“14.1 Switching operating state, AUTOMATIC – MANUAL”, page 103.

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## 11.12 Set operating state AUTOMATIC

**Factory settings:** Devices are delivered with the MANUAL operating state preset.

### 11.12.1 Set operating state AUTOMATIC for devices without display module

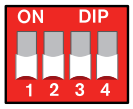
The operating state is switched with DIP switch 4 which is located under the dummy cover.

**Devices with ATEX approval or IECEx approval are secured with a magnetic lock.**

The removal of the cover is described in the additional manual for electromotive control valves with ATEX approval and IECEx approval.

→ To release, rotate the dummy cover counter-clockwise and remove it.

→ Set operating state AUTOMATIC on DIP switch 4.




| Operating state | |
|---|---|
| AUTOMATIC:<br>DIP 4 ➔ downwards | MANUAL:<br>DIP 4 ➔ upwards (ON) |

→ Close the dummy cover.

### 11.12.2 Set operating state AUTOMATIC for devices with display module

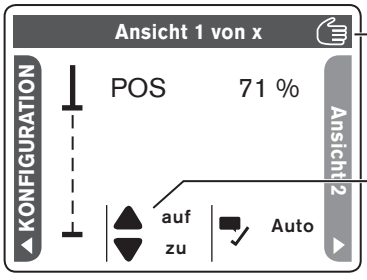
The setting is made in the MANU / AUTO layout.

The MANU / AUTO layout is preset at the factory for the home screen (factory designation: View 1...).
To access the home screen, hold down the ↩ back key.
See also Chapter “13.3.1 Home screen and user-specific views”, page 95.

→ To switch to the operating state, briefly press the menu key.

Operating state AUTOMATIC: The HAND symbol and the 2 arrow symbols labeled „open“ and „closed“ are hidden.

**Home screen** (factory designation: View 1...)
Layout: MANU / AUTO
Display: in MANUAL operating state.




Symbol for MANUAL operating state
MANUAL: HAND symbol is shown
AUTOMATIC: HAND symbol is hidden

Arrow symbols labeled „open“ and „closed“.
MANUAL: Arrow symbols are shown
AUTOMATIC: Arrow symbols are hidden

*Figure 34: Symbols for opering state*

→ Set operating state AUTOMATIC.

# 12 OPERATION

**WARNING!**

**Danger due to improper operation!**

Improper operation may result in injuries as well as damage to the device and the area around it.

- The operating personnel must know and have understood the contents of the operating instructions.
- Observe the safety instructions and intended use.
- Only adequately trained personnel may operate the equipment/the device.

Depending on the device variant, there are different control elements available for operation of the device.

- **Standard devices without display module**
  The device is operated via 2 capacitive buttons and 4 DIP switches.
- **Option – devices with display module**
  The diaphragm control valve is operated and set on the display with touch-screen.
- **Additional operating option**
  The device can be set alternatively also on a PC or tablet. It is made by the büS Service interface and by using the “Bürkert Communicator” PC software.
  To do this, the USB-büS-Interface set, available as an accessory, is required.

## 12.1 Overview: Availability of the control elements

| Control element | Function | Availability | |
|---|---|---|---|
| | | Devices without display module | Devices with display module |
| 4 DIP switches | Setting effective direction | Yes | No (available, however without function. Setting is made on the display) |
| | Activating, deactivating correction characteristic | | |
| | Activating, deactivating sealing function | | |
| | Switching MANUAL, AUTOMATIC operating state | | |
| OPEN button | Opening the valve | Yes | |
| CLOSE button | Closing the valve | | |
| OPEN button and CLOSE button | Adjust the position control, running the function M.Q0.TUNE | Yes | |
| | Running the function M:SERVICE | Yes | |
| Mechanical manual override | Opening or closing valve mechanically | Yes | Yes |
| SIM card holder | Holder for insertion of the SIM card available as an accessory | Yes | Yes |
| büS Service interface | For connection of a CAN adapter or the USB-büS-Interface set available as an accessory | Yes | Yes |
| "Bürkert Communicator" PC software | Software for configuring and setting the device on the PC or tablet | Yes | Yes |
| Display with touch-screen | Configuring, setting and operating the device | No | Yes |

*Table 38: Operating options*

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## 12.2 Display elements

**Representation of the display elements:**

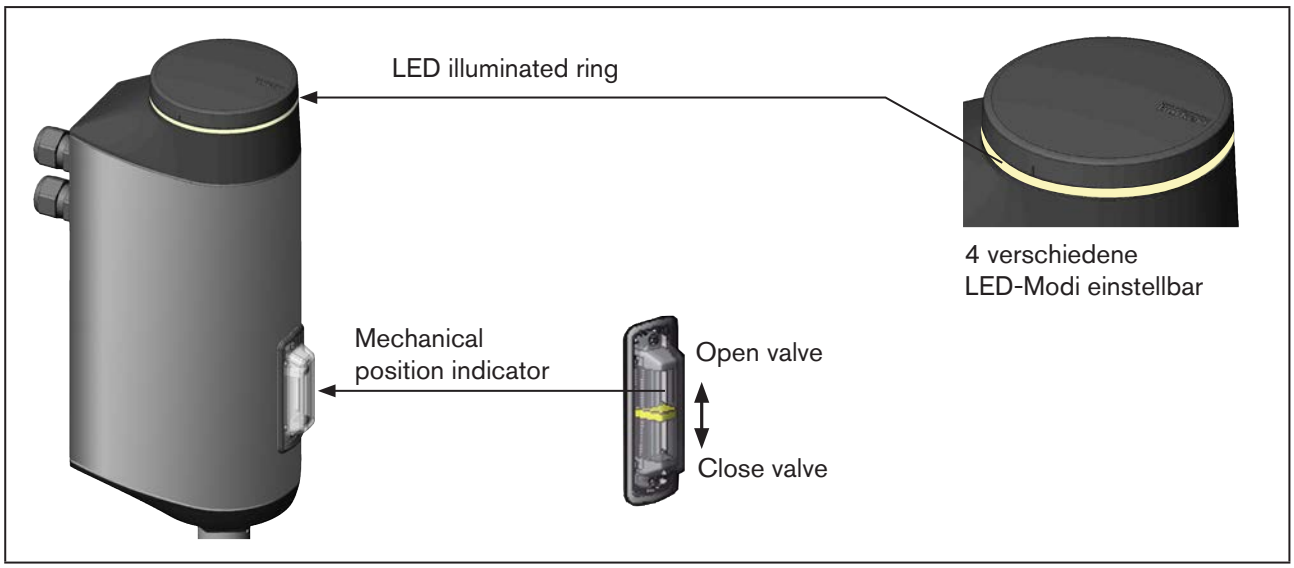


*Figure 35: Display elements*

### 12.2.1 LED illuminated ring

The transparent LED illuminated ring, which transmits the light of the LEDs outwards, is attached to the dummy cover or display module.

The device state is indicated by a lit, flashing or rapidly flashing LED illuminated ring in one color or in alternating colors.

4 different LED modes can be set for the LED illuminated ring:

- NAMUR mode*
- Valve mode*
- Valve mode w/ warnings* – mode set in the factory
- LED off

* A complete description of the device states, errors and warnings, which are displayed in LED mode, can be found in chapter “6.4 Display of the device state”.

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## 12.2.2 Setting LED mode

**Setting option:**
Using the PC software Bürkert Communicator or on the display of the device (option).

The setting on the PC is made by the büS service interface and by using the PC software "Bürkert Communicator". To do this, the USB-büS-Interface set, available as an accessory, is required.

Display operation: Key functions

| | | |
|---|---|---|
| select, activate | confirm | back |

To set LED mode, you must change to the detailed view parameters for general settings.

**Changing to the detailed view:**

→ When setting with Bürkert Communicator in the navigation area, select **General settings**.

→ When setting on the display switch from home screen to **CONFIGURATION** and select **General settings**.

✓ You are in the detailed view parameter.

**Setting the LED mode:**

→ Select **Status LED**.

→ Select **Mode**.

The following LED modes can be selected:

**NAMUR mode**

**Valve mode**

**Valve mode w/warnings**

**LED off**

→ Select LED mode.

✓ You have set LED mode.

## 12.2.3 Mechanical position indicator

The mechanical position indicator shows the valve position independently of the supply voltage (see “Figure 35: Display elements”).

## 12.2.4 Display elements of the display module (option)

For description see “13 Display operation (option)”

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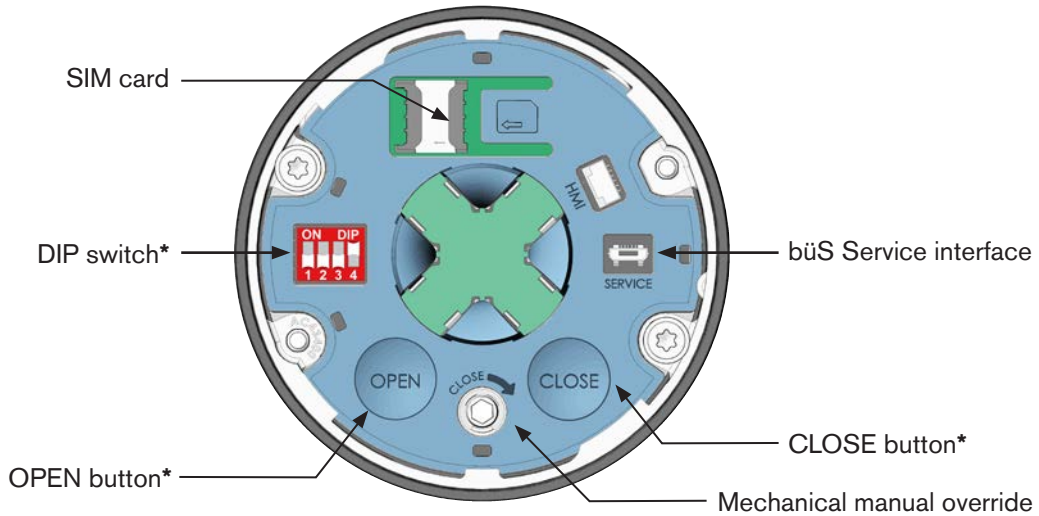
## 12.3 Control elements




* *No function on devices with display module. Operation must be on the display!*

*Figure 36: Control elements*

### 12.3.1 DIP switches

**Settings**

Switch 1: For setting the effective direction between input signal and set-point position.
See Chapter "14.4", page 111.

Switch 2: For activating or deactivating the correction characteristic (for adjusting the operating characteristic) (see Chapter "14.3", page 108.

Switch 3: For activating or deactivating the sealing function. See Chapter"14.2", page 106.

Switch 4: For switching between AUTOMATIC mode and MANUAL mode.
See Chapter "14.1", page 103.

The DIP switches have no function for devices which have a display module. The settings can be made on the display.

### 12.3.2 OPEN button and CLOSE button

Electrical manual control:
Open valve: Press OPEN button
Close valve: Press CLOSE button. See chapter "15.1".
⚠ When closing the valve:
Carefully close the valve at low force to prevent damaging the diaphragm.
Do not press the CLOSE button again when the valve is closed.

Running M.Q0.TUNE (Autotune): For description see chapter"11.5 Adjust the position control – running M.Q0. TUNE".

Running M.SERVICE: See chapter "9.5.4 Mounting actuator on the valve body and making the electrical connections"

The OPEN and CLOSE buttons have no function for devices which have a display module. The settings can be made on the display.

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### 12.3.3 Mechanical manual override

When the supply voltage is not applied, e.g. during installation or in the event of a power failure, the valve can be opened or closed with the mechanical manual override.

For description see Chapter “15.4 Actuating valve mechanically”

## 12.4 büS Service interface

The büS Service interface can be used for a short-term service.

- Configuration of the device, e.g. the base settings for setup using the “Bürkert Communicator” PC software. To do this, the USB-büS-Interface set, available as an accessory, is required.
- Configuration of the büS network.
- Parameterizing the operating parameters
- Fault diagnostics
- Software update

Connect only the applicable CAN adapter to the büS Service interface. This CAN adapter is a component of the USB-büS-Interface set available as an accessory (see“Table 53: Accessories”, page 179).

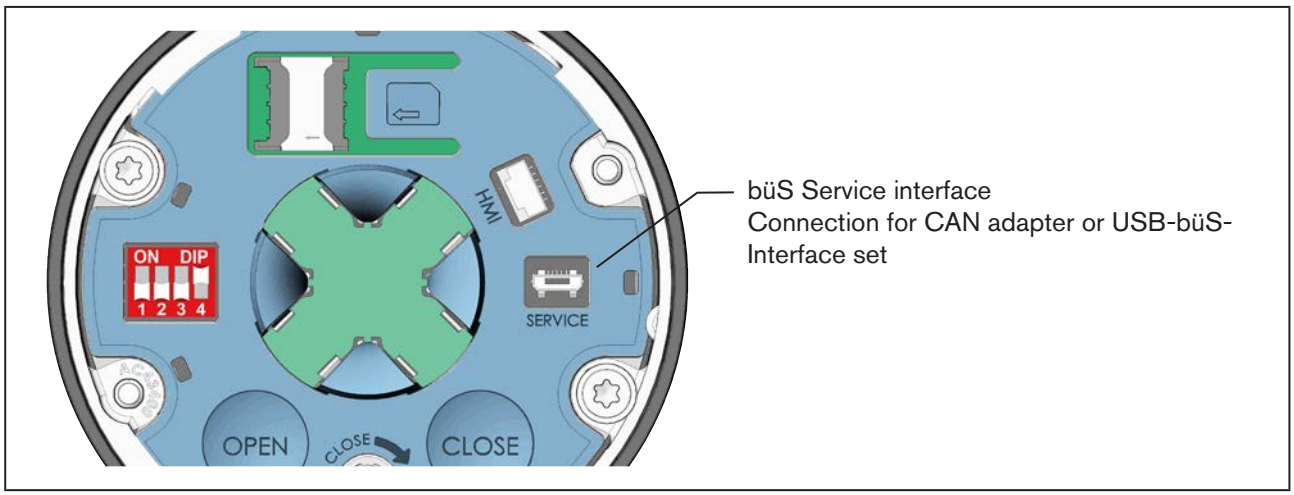


*Figure 37: büS Service interface*

On devices with a fieldbus gateway, the büS service interface is inside the fieldbus gateway (see Chapter “18.1.1 Access to the büS service interface”, page 145).

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## 12.5 Accepting and saving SIM card data (option)

The optionally available SIM card can be used to save and transfer device-specific values and user settings to a different device.

The SIM card is detected when the device starts and is checked for available data. Where applicable, this data is accepted or overwritten:

- The SIM card does not contain any data.
  The existing device-specific values and user settings are saved on the SIM card.
- The SIM card contains data which is compatible with the device.
  The SIM card data is accepted by the device. The existing device-specific values and user settings are overwritten.
- The SIM card contains data which is not compatible with the device.
  The device overwrites the data on the SIM card with its own, device-specific values and user settings.

**ATTENTION!**

**Do not use any commercially available SIM cards for the device.**
The inserted SIM card is a special industrial version which is particularly durable and temperature-resistant.
Order the SIM card for the electromotive diaphragm control valves via your Bürkert sales department only.
See Chapter "24 Accessories, spare parts".

**Do not remove the SIM card during operation.**
During operation parameter changes are immediately saved to the SIM card.
If the SIM card is removed during operation, data may be lost and the SIM card damaged.

The SIM card can be inserted during operation.
A restart is required to ensure that the device detects the SIM card.

**Inserting the SIM card:**

→ Place SIM card in the area with the SIM card symbol. The position must correspond with the symbol.

→ Applying gentle pressure, push the SIM card all the way to the left into the holder.

→ Restart the device.
The new data are transferred.

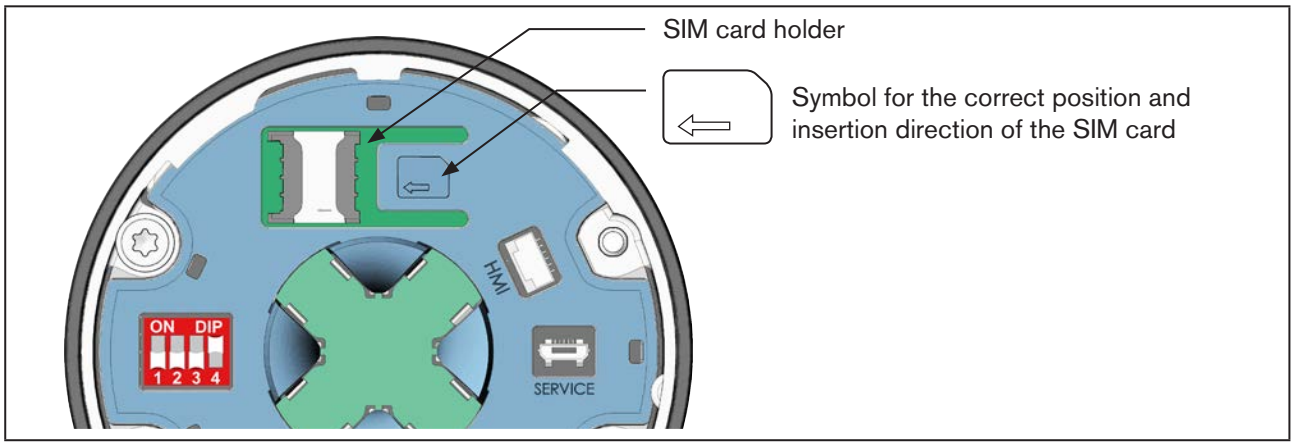


*Figure 38: Inserting the SIM card*

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# 13 DISPLAY OPERATION (OPTION)

The device is operated and set on a display with touch-screen.

## 13.1 User interface

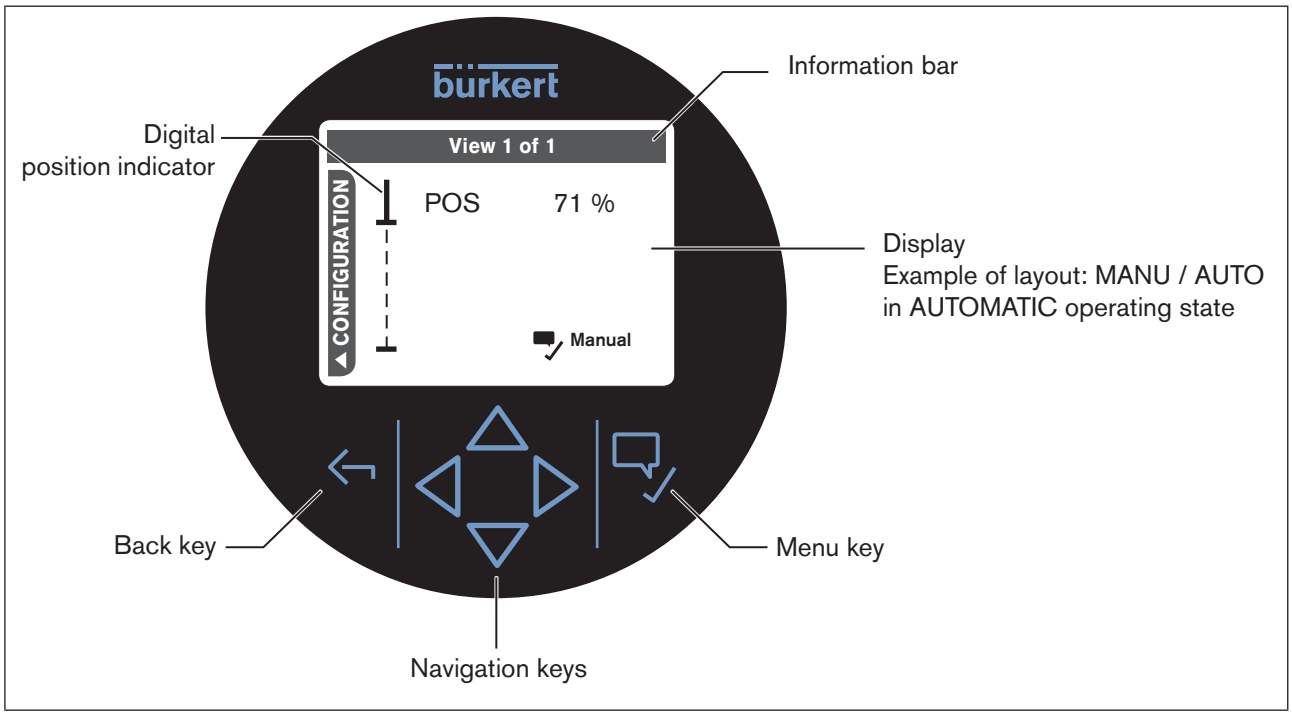


*Figure 39: User interface*

## 13.2 Description of the keys

| Key | | Functions | |
|---|---|---|---|
| Back key |  | Press briefly: | Back |
| | | Hold down: | Jump back to home screen (view 1...) |
| Navigation keys |  | Change view | |
| | | Accept selection (e.g. for option fields) | |
| | | When entering values: Change decimal place | |
| |  | Select menu | |
| | | Select configuration, setting | |
| | | When entering values: Change value (number) | |
| |  | Open valve (in MANUAL operating state) | |
| |  | Close valve (in MANUAL operating state) | |

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| Key | | Functions | |
|---|---|---|---|
| Menu key | | Press briefly: | Confirm selection |
| | | | Save selection |
| | | | Next (in the Wizard) |
| | | Hold down: | Open context menu |

*Figure 40: Description of the key functions*

## 13.3 Display views

You go from the home screen to the following views:

- **Configuration view,** using the left navigation key .
- **Views 2...4** created by the user using the right navigation key .
  See also "13.3.1 Home screen and user-specific views", page 95.

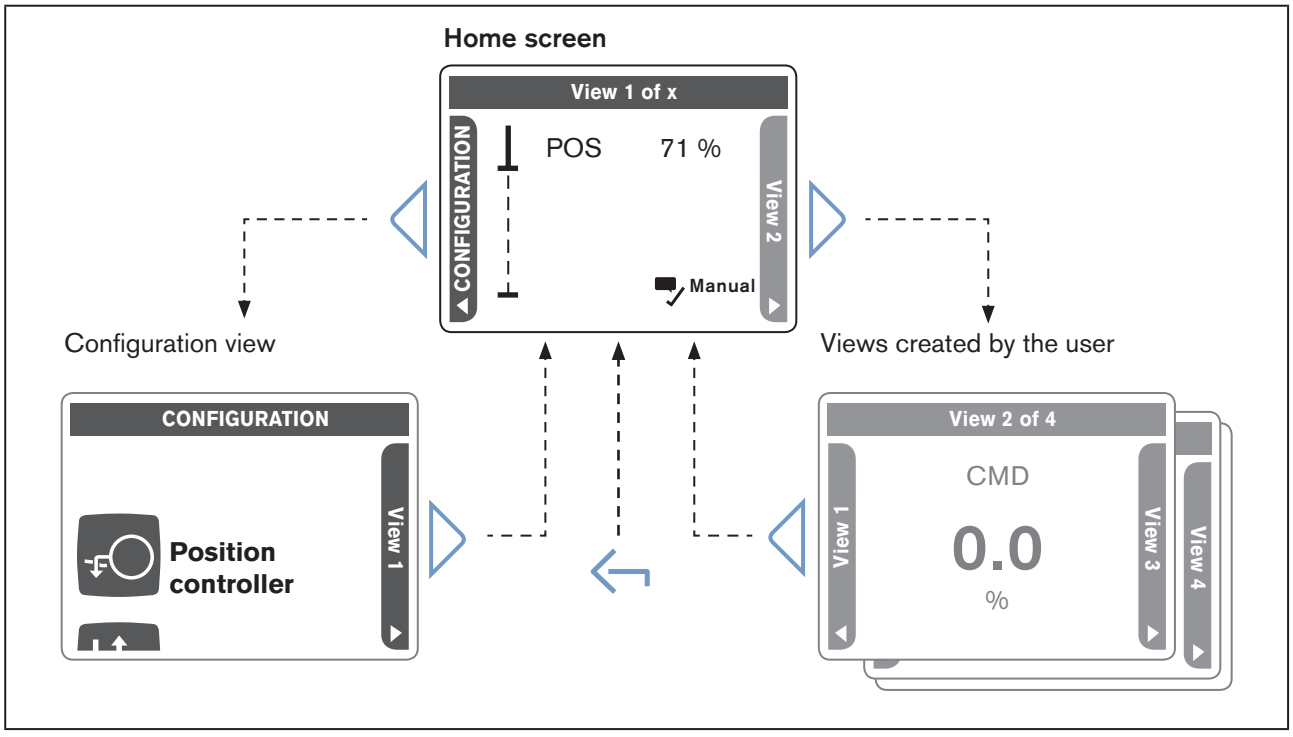


*Figure 41: Home screen, configuration view, user-specific views*

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### 13.3.1 Home screen and user-specific views

In addition to the home screen, other user-specific views can be created. The title of the view is displayed in the information bar.

The home screen title preset at the factory (View 1...) and the other views can be changed in the context menu.

There are 5 different layouts available for each view:

| | |
|---|---|
| **1 value** | 1 process value is displayed in the view |
| **2 values** | 2 process values are displayed in the view |
| **4 values** | 4 process values are displayed in the view |
| **Trend** | The process sequence is represented graphically as a curve in the view |
| **Trend with 2 values** | The process sequence is represented graphically as a curve and with 2 process values in the view |
| **MANU / AUTO** | Preset at the factory for the home screen (see “Figure 41”, page 94).<br>The position of the valve is represented as a value and on a position indicator in the view. In addition, the symbols for the AUTOMATIC and MANUAL operating state as well as for closing and opening the valve are shown. |
| **Setting:** | You can create views, change their title and assign the layout either in the context menu on the home screen or from a user-specific view.<br>To open the Context menu, hold down the menu key . |

The comprehensive, detailed description for the display module can be found on our homepage www.burkert.com unter: Type ME31 → Software ME31.

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### 13.3.2 Configuration view

The configuration view is divided into different areas.

| Symbol | Configuration area |
|---|---|
|  | Position controller |
|  | Inputs / Outputs |
|  | Process controller |
|  | Industrial communication |
|  | Display |
|  | General settings |

*Table 39: Configuration areas*

Using the navigation keys ▽ and △, you can switch between the areas.

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### 13.3.3 Detailed views

You access the following detailed views from the configuration view:

| Detailed view | This is how you access the detailed view from the configuration view |
|---|---|
| Parameter | Select configuration area* and confirm selection. |
| Maintenance | Select configuration area* and confirm selection.<br>Switch to detailed view MAINTENANCE. |
| * See "Table 39: Configuration areas", page 96. | |

*Table 40: Detailed views*

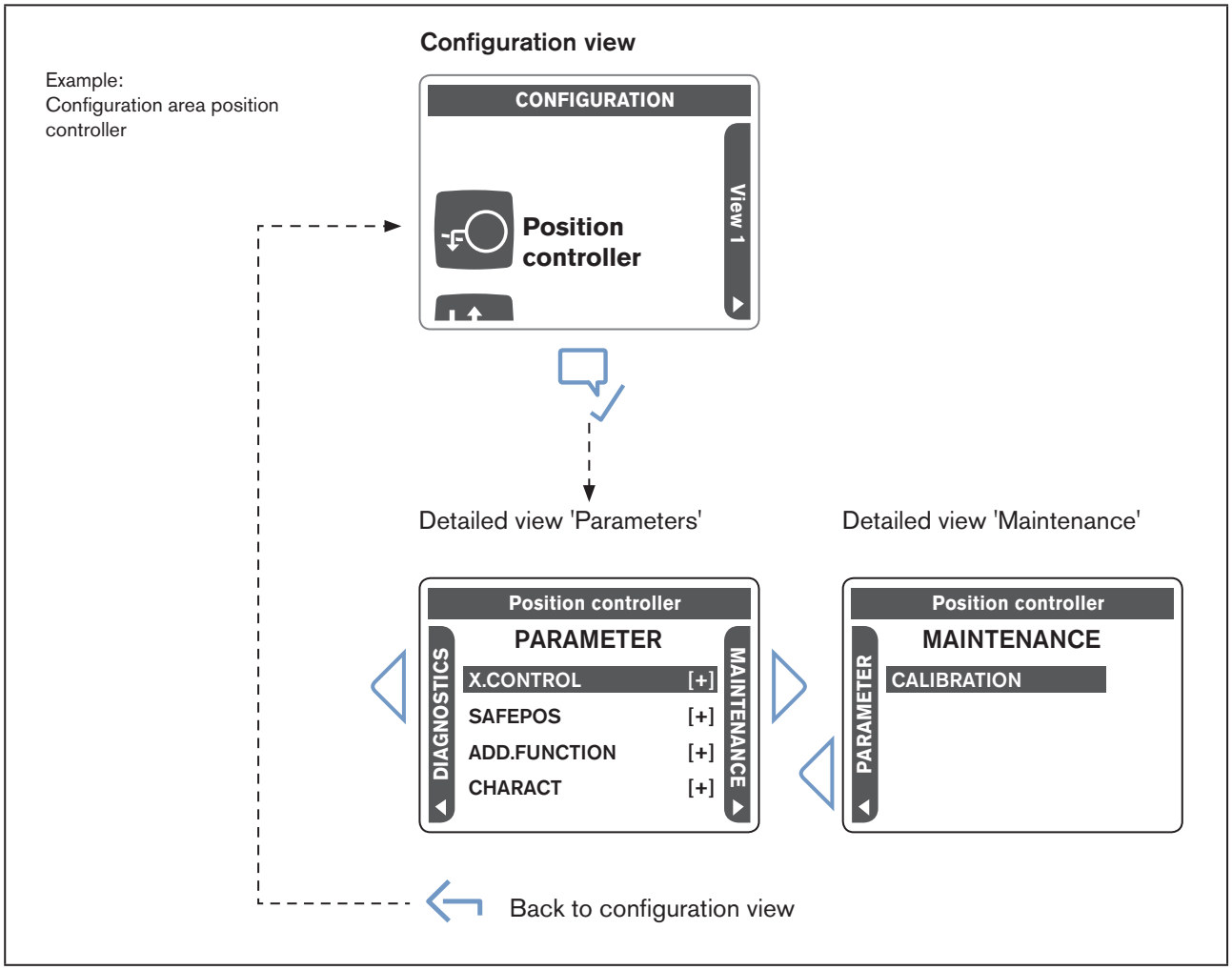


*Figure 42: Detailed views; Parameters, Maintenance, Diagnostics*

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## 13.4 Description of the symbols

### Symbols for user rights

| Symbol | Description |
|---|---|
|  | The setting is write-protected and can be changed with the appropriate user right/user code only. |
| | User |
|  | Advanced user is logged onto the device. |
|  | Installer is logged onto the device. |
|  | Bürkert Service employee is logged onto the device. |

*Table 41: Symbols for user rights*

The rights to read, set or change data depend on the set user right and the password protection.
See chapter “13.5 User rights and password protection”, page 100.

### Symbols for indicating the device status according to NAMUR NE 107

If several device statuses exist simultaneously, the device status with the highest priority is displayed.

| Priority | Symbol | Description |
|---|---|---|
| 1 |  | Failure, error or fault!<br>Due to a malfunction in the device or on its periphery, controlled operation is not possible.<br>→ Check messages in the messages list. |
| 2 |  | Function check!<br>The device is being worked on; controlled operation is therefore temporarily not possible. |
| 3 |  | Out of specification!<br>The ambient conditions or process conditions for the device are outside the specified area. Device internal diagnostics point to problems in the device or with the process properties |
| 4 |  | Maintenance required!<br>The device is in controlled operation, however function is briefly restricted.<br>→ Maintain device. |

*Table 42: Symbols according to NAMUR NE 107*

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### Symbols for indicating the operating states

| Priority | Symbol | Description |
|---|---|---|
| 1 |  | Device has stopped control mode due to a serious error. The valve remains in its position. |
| 2 |  | Energy pack active:<br>The supply voltage is interrupted. The device is supplied with voltage via the energy pack.<br>In the AUTOMATIC operating state, the actuator moves to the safety position (see "Safety position" symbol).<br>In the MANUAL operating state, the actuator remains in the last occupied position. |
| 3 |  | Device is in the MANUAL operating state. |
| 4 |  | Device is in the SIMULATION operating state.<br>The signal for the set-point value default is simulated. |
| 5 |  | Process control active |
| 6 |  | Position control active |

*Table 43: Symbols for indicating the operating states*

### Symbols for indicating the specific valve positions

| Priority | Symbol | Description |
|---|---|---|
| 1 |  | Valve is in the safety position. |
| 2 |  | Valve is in the sealing position. |

*Table 44: Symbols for indicating the specific valve positions*

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## 13.5 User rights and password protection

There are 3 user levels for assignment of user rights.

When password protection is activated, the information bar of the display shows the active user level by the corresponding symbol.

| User level | Symbol | Description |
|---|---|---|
| Advanced user |  | PIN required: Code 005678 assigned at the factory<br>Rights: Read values, limited right to change values. |
| Installer |  | PIN required. Code 001946 assigned at the factory<br>Rights: Read values, extended right to change values. |
| Bürkert |  | PIN required.<br>Only for Bürkert employees |

*Table 45: User levels*

### 13.5.1 Factory settings

Password protection is not activated in as-delivered state. Settings in the software can be made at any time and without entering a password.

A password only has to be entered for settings which Bürkert employees are allowed to make.

### 13.5.2 Activating password protection

To activate or deactivate password protection, you must switch to the detailed view Parameters for general settings.

**Changing from home screen to the detailed view:**

→  to **CONFIGURATION**.

→  Select **General settings** and  confirm selection.

✔ You are in the detailed view parameter.

Activating password protection and changing passwords:

→ Select  **Passwords** and  confirm.

→ Select  **Password protection** and  confirm.

→ Select  **On** and  confirm.

✔ You have activated password protection.
Consequence: Software settings, which require a specific user level, are possible only by entering the corresponding code of the user level.

→ Back with  .

When password protection has been activated, you can change the passwords for the user levels.

→ Select Change passwords and confirm.

→ Select user level and confirm.

→ Enter code: Add decimal point with ; change value of the decimal point with .

→ Confirm the set code.

✓ You have changed the password of the user level.

→ Back with .

**Caution!** Document passwords so that they are always accessible for authorized persons.

As soon as the screen saver is active, settings, which require a specific user level, are possible only by entering the password.

When password protection is activated, the Installer user level is required to change the password protection.

### 13.5.3 Deactivating password protection

To deactivate password protection, the Installer user level is required.

→ In the detailed view General settings select Passwords and confirm.

→ Select Password protection and confirm.

→ Select Off and confirm.

✓ You have deactivated password protection.

→ Back with .

### 13.5.4 Changing user level

To change the user level, you must switch to the context menu. To do this, hold down the menu key .

**Changing the user level:**

→ Select Change user level.

→ Select user level.

→ Set password (PIN).

✓ You have changed the user level.

**Logging out of the user level:**

→ Select Logout and confirm.

✓ You have deactivated the user level.

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## 13.6 Screen saver

The user interface of the display is protected by a screen saver. Canceling the screen saver:

→ Press any key and follow the instructions on the display.

Factory default setting: The waiting time between operation and activation of the screen saver is 1 minute.

**ATTENTION!**

**Faulty operations due to EMC interference, cleaning work or unintentional contact.**

▸ To prevent faulty operations, set the shortest possible waiting time for the screen saver, e.g. 1 minute.

### 13.6.1 Setting screen saver

The setting is made in the detailed view parameters for display.

**Changing from home screen to the detailed view:**

→ Switch to **CONFIGURATION**.

→ Select **Display** and confirm selection.

✓ You are in the detailed view parameter.

**Setting the screen saver:**

→ Select **Screen saver** and confirm.

→ Select **Delay** and confirm.

→ Select required waiting time in **minutes** and activate.

→ Select **Brightness** and confirm.

→ Set required brightness as % and confirm.

✓ You have set the screen saver.

→ Back with ↩.

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# 14 BASIC FUNCTIONS

## 14.1 Switching operating state, AUTOMATIC – MANUAL

**Factory settings:** Devices are delivered with the MANUAL operating state preset.

### 14.1.1 Changing operating state for devices without display module

The operating state is switched with DIP switch 4 which is located under the dummy cover.

→ To release, rotate the dummy cover counter-clockwise and remove it.

**Devices with ATEX approval or IECEx approval are secured with a magnetic lock.**

The removal of the cover is described in the additional manual for electromotive control valves with ATEX approval and IECEx approval.

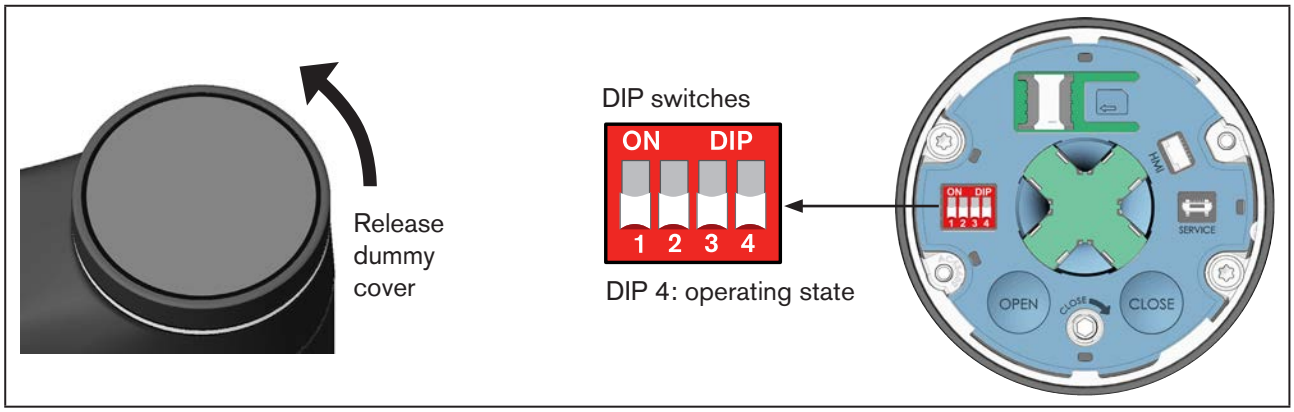


*Figure 43: Setting operating state*

→ Set operating state on DIP switch 4.

| ON DIP 1 2 3 4 | Operating state | |
|---|---|---|
| | AUTOMATIC:<br>DIP 4 ➔ downwards | MANUAL:<br>DIP 4 ➔ upwards (ON) |

→ Close the dummy cover.

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## 14.1.2 Changing operating state for devices with display module

The operating state can be set in 2 ways:

- **using the menu key in the MANU / AUTO** layout on the home screen or in a user-specific view.
- **in the AUTO I MANU menu,** which is in the configuration area **General settings**.

### Setting using the menu key

You can change the operating state in the home screen or in a view.

If you want to change the operating state using the menu key, the view of the display must be in the MANU / AUTO layout. See "Figure 44".

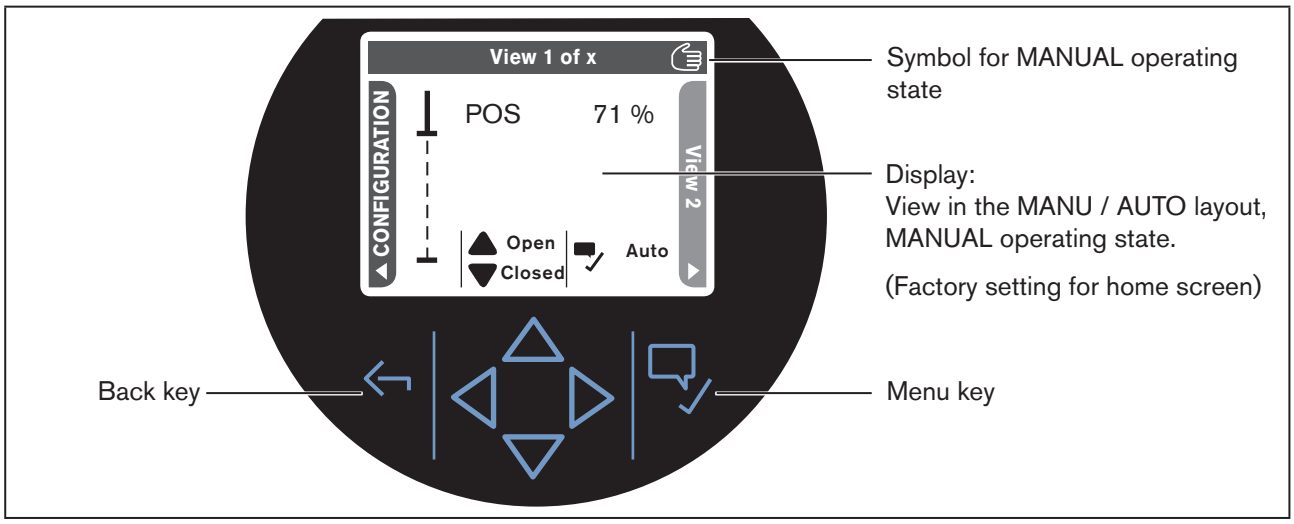


*Figure 44: Switching operating state, MANUAL – AUTOMATIC*

→ To switch to the operating state, briefly press the menu key.

MANUAL: The HAND symbol can be seen at the top on the information bar. The 2 arrow symbols labeled "open" and "closed" are shown.

AUTOMATIC: The LED illuminated ring on the device is lit. The HAND symbol and the 2 arrow symbols labeled "open" and "closed" are hidden.

**Setting the layout:**
The layout settings are created in the context menu: To open the context menu, hold down the menu key.

**MANU / AUTO layout factory setting:**
The MANU / AUTO layout is preset at the factory for the home screen (factory designation: View 1...).
To access the home screen, hold down the back key.

See also chapter "13.3 Display views", page 94.

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### Setting in the AUTO I MANU menu

**Setting option:**
Using the PC software Bürkert Communicator or on the display of the device (option).

The setting on the PC is made by the büS service interface and by using the PC software "Bürkert Communicator". To do this, the USB-büS-Interface set, available as an accessory, is required.

Display operation: Key functions

| | | |
|---|---|---|
| select, activate | confirm | back |

To make the setting, you must change to the detailed view maintenance for general settings.

**Changing to the detailed view:**

→ When setting with Bürkert Communicator in the navigation area, select **General settings** and switch to **MAINTENANCE**.

→ When setting on the display switch from home screen to **CONFIGURATION**, select **General settings** and switch to **MAINTENANCE**.

✓ You are in the detailed view maintenance.

Setting the operating state:

→ Select **General settings**

→ Select **Automatic mode** or **Manual mode**.

✓ You have set the operating state.

In MANUAL operating state not only the **AUTO I HAND** menu but also the **Manual mode** menu is available to manually actuate the valve.

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## 14.2 Activating – deactivating the sealing function

**Factory settings:** Devices are delivered with the sealing function deactivated.

This function causes the valve to be sealed or completely opened in the set area.

To do this, the limit values for sealing or opening the valve (CMD) are input as a percentage. The transition from sealing or opening to control mode occurs at a hysteresis of 1 %.

If the process valve is in the sealing area, a symbol appears on the display.

### 14.2.1 Activating or deactivating the sealing function for devices without display module

The sealing function must be configured before it can be activated.
The configuration is run on the PC via the büS Service interface and by using the "Bürkert Communicator" PC software. To do this, the USB-büS-Interface set, available as an accessory, is required.

The configuration procedure on the PC is the same as on the display of the device. The configuration is described in chapter "14.2.3 Configuring sealing function".

The sealing function is activated with DIP switch 3 which is located under the dummy cover.

**Devices with ATEX approval or IECEx approval are secured with a magnetic lock.**

The removal of the cover is described in the additional manual for electromotive control valves with ATEX approval and IECEx approval.

To release, rotate the dummy cover counter-clockwise and remove it.

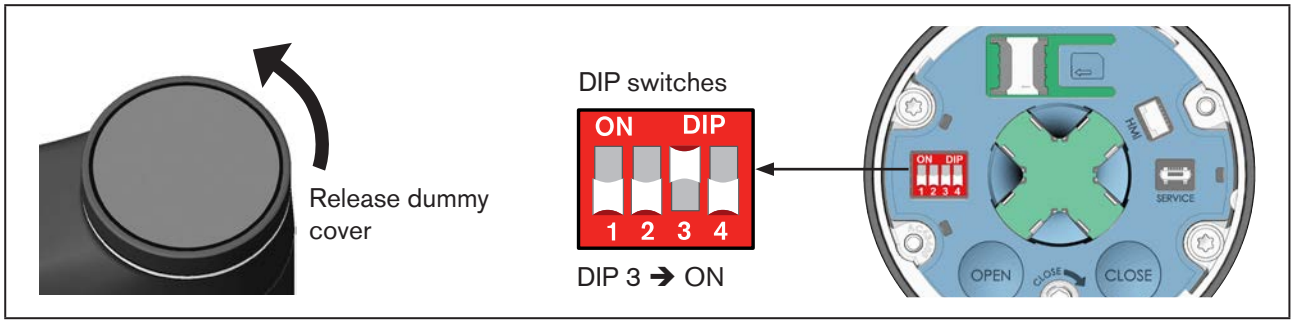


*Figure 45: Activating the sealing function*

→ Set DIP switch 3 to ON. The sealing function is activated.

→ Close the dummy cover.

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### 14.2.2 Activating or deactivating the sealing function for devices with display module

To activate or deactivate the sealing function, you must switch to the detailed view parameters for position controller.

**Changing from home screen to the detailed view:**

→ Switch to **CONFIGURATION**.

→ Select **Position controller** and confirm selection.

✓ You are in the detailed view parameter.

**Activating the sealing function:**

→ Select **ADD.FUNCTION** and confirm.

→ Select **CUTOFF**, activate wit the side navigation keys and confirm.

The device returns to detailed view parameters.

The sealing function is activated and the menu **CUTOFF** for configuration is now available in the detailed view parameters.

→ Back with .

### 14.2.3 Configuring sealing function

**Setting option:** Using the PC software Bürkert Communicator or on the display of the device (option).

The setting on the PC is made by the büS service interface and by using the PC software "Bürkert Communicator". To do this, the USB-büS-Interface set, available as an accessory, is required.

Display operation: Key functions

| | | |
|---|---|---|
| select, activate | confirm | back |

To configure the sealing function, you have to switch to the detailed view Parameters for position controller.

**Changing to the detailed view:**

→ When setting with Bürkert Communicator in the navigation area, select **Position controller**.

→ When setting on the display switch from home screen to **CONFIGURATION** and select **Position controller**.

**Configuring the sealing function:**

→ In the detailed view parameters for position controler select **CUTOFF**.

→ Select **Lower Limit**.

→ Input lower limit value.

→ Select **Upper Limit**.

→ Input upper limit value.

✓ You have activated and configured the sealing function.

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## 14.3 Activating – deactivating correction characteristic

**Factory settings:** Devices are delivered with the correction characteristic deactivated.

When the correction characteristic is activated, the flow characteristic or operating characteristic specific to the set-point position value (CMD) and the valve stroke (POS) is corrected.

**Flow characteristic:**
The flow characteristic $k_V = f(s)$ indicates the flow of a valve, expressed by the $k_V$ value depending on the stroke s of the actuator spindle. The flow characteristic is determined by the design of the valve body and the diaphragm. In general 2 types of flow characteristics are implemented, the linear and the equal percentage.

In the case of linear characteristics, equal $k_V$ value changes $dk_V$ are assigned to equal stroke changes ds.

$$(dk_V = n_{lin} \cdot ds).$$

In the case of equal percentage characteristics, an equal percentage change to the $k_V$ value corresponds to a stroke change ds.

$$(dk_V/k_V = n_{eqlprct} \cdot ds).$$

**Operating characteristic:**
The operating characteristic Q = f(s) specifies the correlation between the volumetric flow Q in the installed valve and the stroke s. This characteristic has the properties of the pipelines, pumps and consumers. The operating characteristic therefore exhibits a form which differs from the flow characteristic.

In the case of control tasks for closed-loop control systems it is usually particular demands which are placed on the course of the operating characteristic, e.g. linearity. For this reason it is occasionally necessary to correct the course of the operating characteristic in a suitable way. The diaphragm control valve therefore has a transfer element which implements different characteristics. These characteristics are used to correct the operating characteristic.

Equal percentage characteristics 1:25, 1:33, 1:50, 25:1, 33:1, and 50:1 as well as a linear characteristic can be set. Moreover, it is possible to program a user-defined characteristic by inputting nodes.

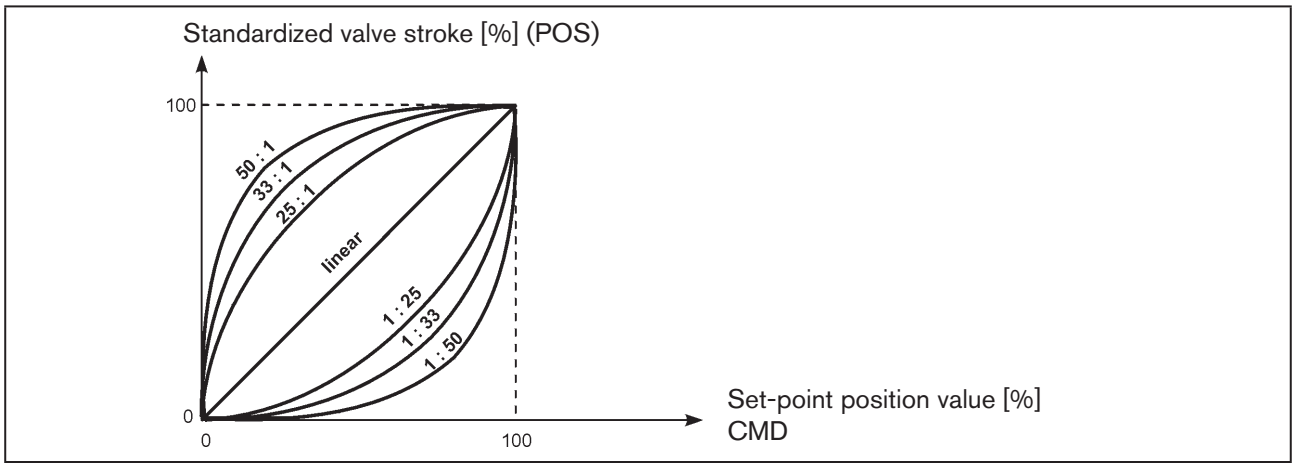


*Figure 46: Characteristics*

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### 14.3.1 Activating or deactivating correction characteristic for devices without display module

The correction characteristic must be selected before it can be activated. For a description see chapter “14.3.3 Selecting correction characteristic or programming it specific to the user”.

The correction characteristic is activated with DIP switch 2 which is located under the dummy cover.

**Devices with ATEX approval or IECEx approval are secured with a magnetic lock.**
The removal of the cover is described in the additional manual for electromotive control valves with ATEX approval and IECEx approval.

→ To release, rotate the dummy cover counter-clockwise and remove it.

→ Set DIP switch 2 to ON. The correction characteristic is now activated.

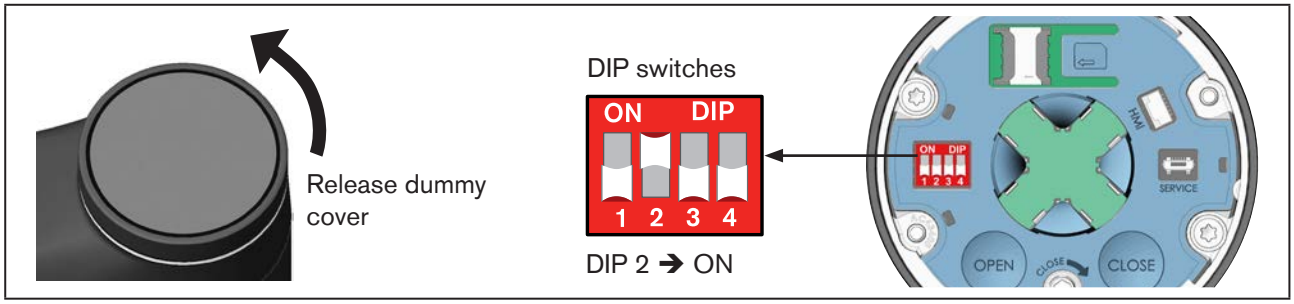


*Figure 47: Activating the correction characteristic*

→ Close the dummy cover.

### 14.3.2 Activating or deactivating correction characteristic for devices with display module

To activate or deactivate the correction characteristic, you must switch to the detailed view Parameters for position controller.

**Changing from home screen to the detailed view:**

→ Switch to **CONFIGURATION**.

→ Select **Position controller** and confirm selection.

You are in the detailed view parameter.

**Activating the correction characteristic:**

→ Select **ADD.FUNCTION** and confirm.

→ Select **CHARACT**, activate wit the side navigation keys and confirm.

The device returns to detailed view parameters.

The correction characteristic is activated and the menu **CHARACT** for configuration is now available in the detailed view parameters.

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### 14.3.3 Selecting correction characteristic or programming it specific to the user

**Setting option:**
Using the PC software Bürkert Communicator or on the display of the device (option).

The setting on the PC is made by the büS service interface and by using the PC software "Bürkert Communicator". To do this, the USB-büS-Interface set, available as an accessory, is required.

Display operation: Key functions

| | | |
|---|---|---|
| select, activate | confirm | back |

To program the correction characteristic, you have to switch to the detailed view Parameters for position controller.

**Changing to the detailed view:**

→ When setting with Bürkert Communicator in the navigation area, select **Position controller**.

→ When setting on the display switch from home screen to **CONFIGURATION** and select **Position controller**.

**Selecting the correction characteristic:**

→ In the detailed view parameters for position controller select **CHARACT**.

→ Confirm **TYPE**.

→ Select correction characteristic.

✓ You have selected the correction characteristic.

**Programming the user-defined correction characteristic:**

If the correction characteristic **User-Defined** was selected in the menu **TYPE**, the menu **TABLE DATA** appears. The correction characteristic can be programmed as described below:

→ Select **TABLE DATA**.

→ Select required node **y 0** ... **y 100**.

→ Input required percentage.

→ Input percentage one after the other for each node.

→ Leave the menu **TABLE DATA**.

✓ You have programmed the correction characteristic.

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## 14.4 Changing effective direction

**Factory settings:** Devices are delivered with the “Rise” effective direction set.

Meaning:

- Rise: The position 0 % (valve closed) is controlled with the standard signal 0 V, 0 mA or 4 mA.
- Fall: The position 0 % (valve closed) is controlled with the standard signal 5 V, 10 V or 20 mA.

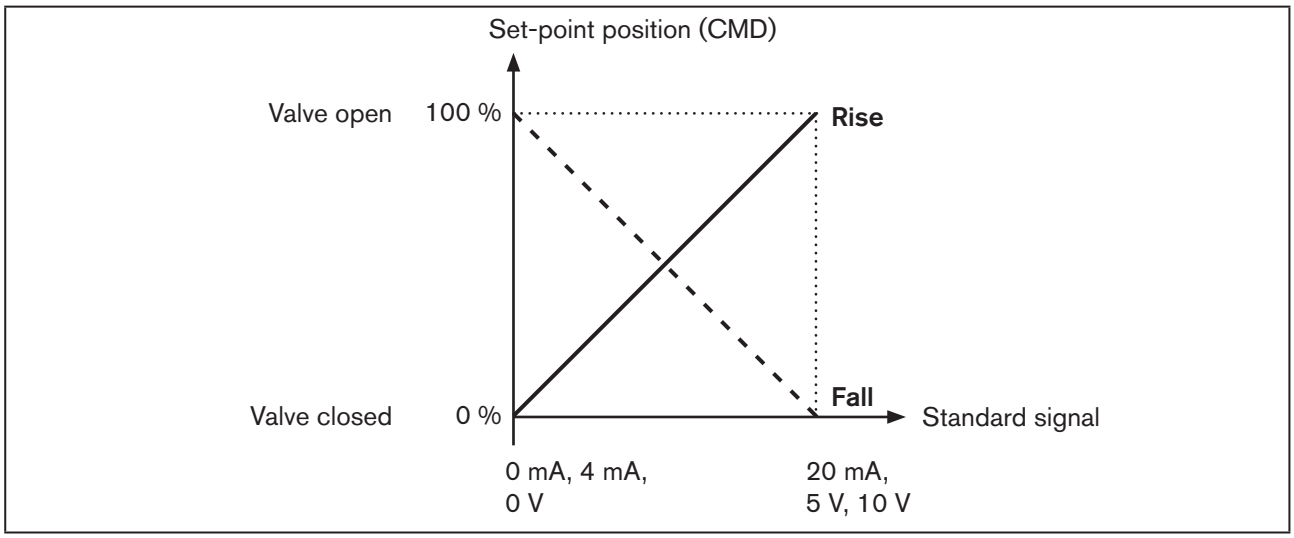


*Figure 48: Diagram of effective direction*

### 14.4.1 Changing effective direction for devices without display module

The effective direction is changed with DIP switch 1 which is located under the dummy cover.

**Devices with ATEX approval or IECEx approval are secured with a magnetic lock.**

The removal of the cover is described in the additional manual for electromotive control valves with ATEX approval and IECEx approval.

→ To release, rotate the dummy cover counter-clockwise and remove it.

→ Set DIP switch 1 to ON. The effective direction is changed to “Fall”.

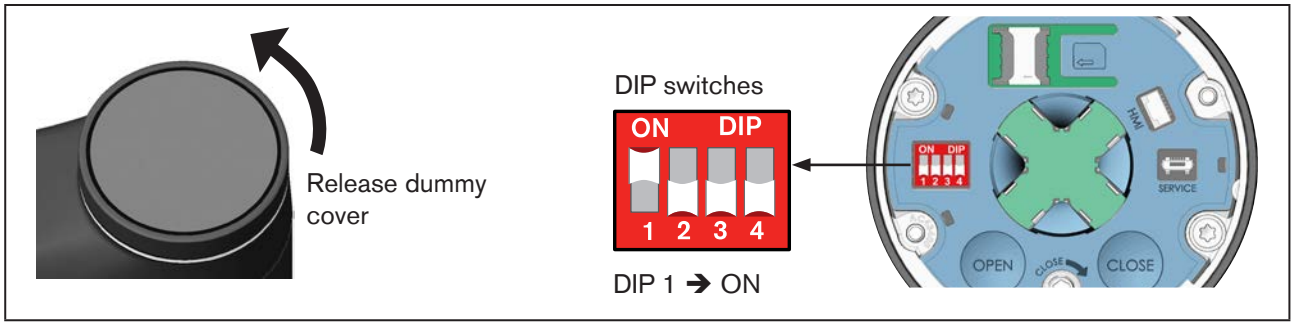


*Figure 49: Changing effective direction*

→ Close the dummy cover.



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### 14.4.2 Changing effective direction for devices with display module

To change the effective direction, you must switch to the detailed view Parameters for position controller.

**Changing from home screen to the detailed view:**

→ Switch to **CONFIGURATION**.

→ Select **Position controller** and confirm selection.

✓ You are in the detailed view parameter.

**Changing the effective direction:**

→ Select **ADD.FUNCTION** and confirm.

→ Select **DIR.DMD**, activate wit the side navigation keys and confirm.

The device returns to detailed view parameters.

The menu for changing the effective direction **DIR.DMD** is now activated and is available in the detailed view parameters.

→ In the detailed view parameters select **DIR.CMD** and confirm.

→ Select effective direction **Rise** or **Fall** and confirm.

→ Back with .

✓ You have changed the effective direction.

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## 14.5 Deactivating process control

If devices feature the process controller function, the process control can be deactivated to operate the device with position controller function. The menus which are relevant just to process control remain visible even after deactivation, although they have no effect.

**Required setting after deactivation of the process control.**
The source for the set-point position must be configured for the position controller function.
Setting in the menu → Inputs/Outputs → SP I CMD → CMD.source.

### 14.5.1 Deactivating the process control in the control menu of the device

The process control is usually deactivated in the control menu of the device or alternatively via the digital input, büS/CANopen or fieldbus.

**Setting option:** Using the PC software Bürkert Communicator or on the display of the device (option).

The setting on the PC is made by the büS service interface and by using the PC software "Bürkert Communicator". To do this, the USB-büS-Interface set, available as an accessory, is required.

Display operation: Key functions

| | | |
|---|---|---|
| select, activate | confirm | back |

To deactivate the process control, you must switch to the detailed view Parameters for process controller.

**Switch to the detailed view as follows:**

→ When setting with Bürkert Communicator in the navigation area, select Process controller.

→ When setting on the display switch from home screen to CONFIGURATION and select Process controller.

✓ You are in the detailed view Parameter.

**Deactivating the process control:**

→ Select P.CO.inactive.

→ Select P.CONTROL inactive.

✓ You have deactivated the process control. The device now operates with position controller function.

### 14.5.2 Alternative deactivation of the process control

The process control can be deactivated either via the digital input, büS/CANopen or fieldbus. To do this, the source must be configured accordingly.

To configure the source, you must switch to the detailed view Parameters for inputs/outputs.

Setting in the menu → ADDITIONAL IOs → DIGITAL IN → X.CO I P.CO.source.

Selection:

→ Digital (digital input)

→ büS

→ Fieldbus (Fieldbus)

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# 15 MANUAL ACTUATION OF THE VALVE

The valve can be manually actuated in different ways:

- Electrically with the OPEN and CLOSE buttons which are located under the dummy cover (only on devices without display module), see chapter “15.1”, page 114.
- Electrically using the display on the home screen (only on devices with display module), see chapter “15.2.1”, page 116.
- Electrically in the AUTO | MANU menu.
  Setting on the display or using the “Bürkert Communicator” PC software, see chapter “15.3”, page 117.
- Mechanically with the manual override, see chapter “15.4”, page 118.

## 15.1 Actuate valve electrically for devices without display module

The valve can be electrically actuated in different ways:

- Using keys on the device, see chapter “15.1.1”, page 114.
- Using the “Bürkert Communicator” PC software in the AUTO I MANU menu.
  Description see chapter “15.3”, page 117.

### 15.1.1 Electrically actuating the valve using keys in the device

**NOTE!**

**Damage to the diaphragm by electrical manual control.**

▸ Do not press the CLOSE button when the valve is closed, otherwise the diaphragm may be damaged.

To actuate the valve, the device must be in MANUAL operating state.

The 2 buttons for actuating the valve and set the operating state are located under the dummy cover.

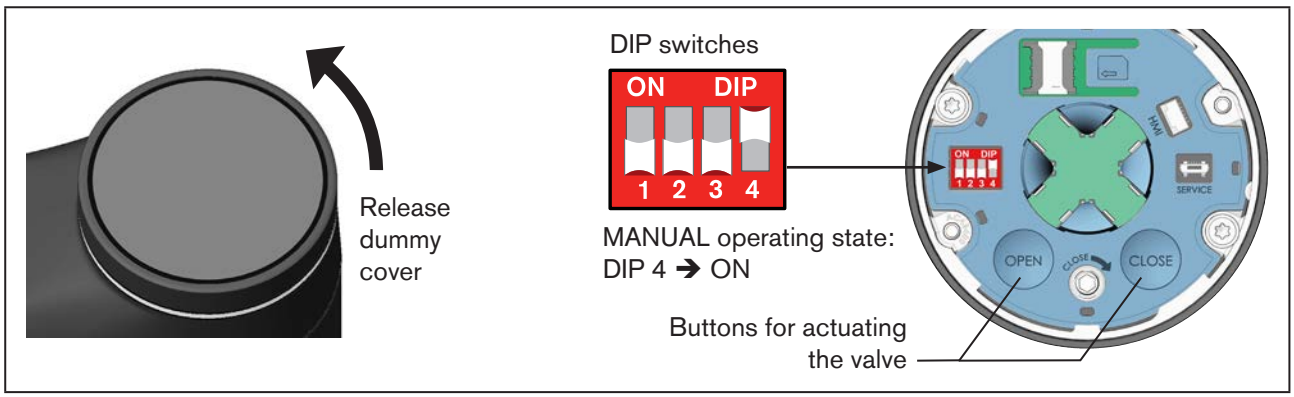


*Figure 50: Setting MANUAL operating state and actuating the valve*

**Remove dummy cover:**

**Devices with ATEX approval or IECEx approval are secured with a magnetic lock.**
The removal of the cover is described in the additional manual for electromotive control valves with ATEX approval and IECEx approval.

→ To release, rotate the dummy cover counter-clockwise and remove.

**Changing to the operating state MANUAL**:

→ Set DIP switch 4 to ON.
The device is the MANUAL operating state.

**Change valve position:**

→ To open press the OPEN button.

→ To close press the CLOSE button.
**NOTE!**
Do not press the CLOSE button when the valve is closed, otherwise the diaphragm may be damaged.

**Changing to the operating state AUTOMATIC**:

→ Push DIP switch 4 downwards.
The device is back in the AUTOMATIC operating state.

**Close dummy cover:**

→ Mount dummy cover and turn clockwise until the 2 marks (one vertical line on the dummy cover and on the actuator) are vertically aligned.

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## 15.2 Actuate valve electrically for devices with display module

The valve can be electrically actuated in different ways:

- Using the navigation keys on the display, see chapter "15.2.1", page 116.
- On the display or using the "Bürkert Communicator" PC software in the AUTO I MANU menu. Description see chapter "15.2", page 116.

### 15.2.1 Actuating the valve using the navigation keys on the display module

**NOTE!**

**Damage to the diaphragm by electrical manual control.**

- When the valve is closed, do not press the navigation key for closing again, otherwise the diaphragm may be damaged.

The navigation keys for actuating the valve are available in the home screen or in a view. Requirements for actuating the valve: (see "Figure 51"):

- View of the display in the MANU / AUTO layout,
- MANUAL operating state.

**Setting the layout:**
The layout settings are created in the context menu: To open the context menu, hold down the menu key.

**MANU / AUTO layout factory setting:**
The MANU / AUTO layout is preset at the factory for the home screen (factory designation: View 1...).
To access the home screen, hold down the back key.

See also chapter "13.3 Display views", page 94).

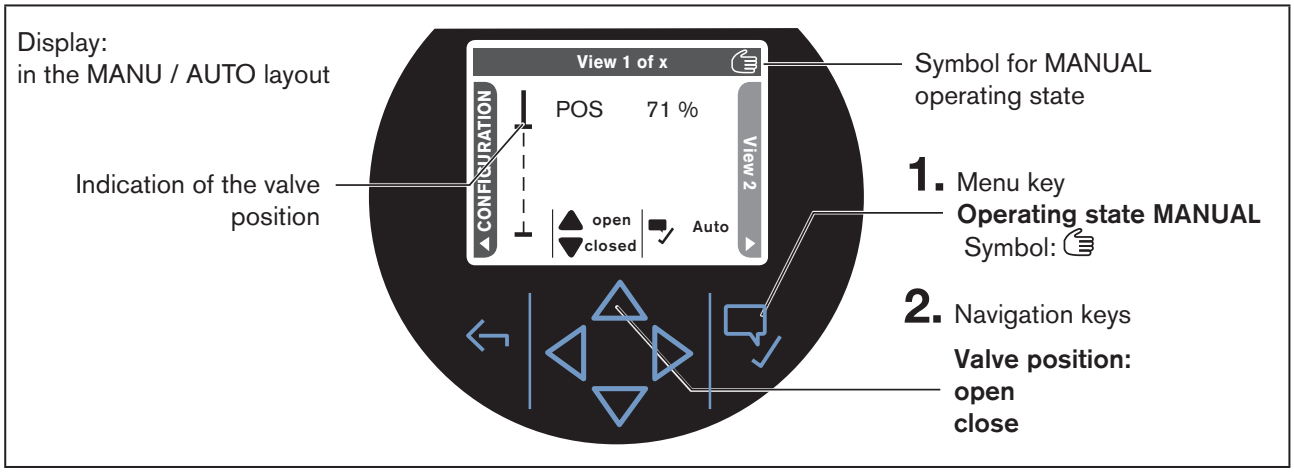


*Figure 51: On the display set the operating state and actuate the valve*

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**Changing to the operating state MANUAL**:

→ Press the menu key.
The HAND symbol can be seen at the top on the information bar.
The 2 arrow symbols labeled “open” and “closed” are shown. The LED illuminated ring on the device flashes.

**Change valve position:**

→ To open the valve press the upper navigation key.

→ To close the valve press the lower navigation key.
**NOTE!** When the valve is closed, do not press the navigation key for closing again, otherwise the diaphragm may be damaged.

→ The valve position is indicated on the display (see “Figure 51”).

**Changing to the operating state AUTOMATIC**:

→ To switch to AUTOMATIC operating state, briefly press the menu key.

## 15.3 Electrically actuating the valve using the Bürkert Communicator or display module

**NOTE!**

**Damage to the valve seat seal by electrical manual control.**

- When the valve is closed, do not press the arrow for closing again, otherwise the diaphragm may be damaged.

Both the “Bürkert Communicator” PC software as well as the device software provide the additional option to actuate the valve using the AUTO | MANU menu.

For the setting using the “Bürkert Communicator” PC software, the device must be connected to the PC using the büS service interface. To do this, the USB-büS-interface set, available as an accessory, is required.

Display operation: Key functions

| | | |
|---|---|---|
| select, activate | confirm | back |

**Actuating the valve using the AUTO | MANU menu:**

To make the setting, you must change to the detailed view maintenance for general settings.

Changing to the detailed view:

→ When setting with „Bürkert Communicator“ in the navigation area, select General settings and switch to MAINTENANCE.

→ When setting on the display switch from home screen to CONFIGURATION, select General settings and switch to MAINTENANCE.

✓ You are in the detailed view maintenance.

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Opening or closing the valve:

→ Select **AUTO I MANU**.

If the valve is in AUTOMATIC operating state:

→ To set the MANUAL operating state, select **Manual mode**.
The **Manual mode** menu for manual actuation of the valve is now available.

→ In the **Manual mode** menu open and close the valve using the arrow keys.
**NOTE!**
When the valve is closed, do not press the arrow for closing again, otherwise the diaphragm may be damaged.

## 15.4 Actuating valve mechanically

When the supply voltage is not applied, e.g. during installation or in the event of a power failure, the valve position can be changed using the mechanical manual control.

**NOTE!**

The mechanical manual control may be used in a de-energized state only, otherwise the device may be damaged.

### 15.4.1 Required work steps

**Devices without fieldbus gateway:**

1. Switch off the supply voltage. Wait until LED illuminated ring goes out.
2. Removing dummy cover or display module, see chapter “15.4.3”, page 119.
3. Actuating valve mechanically, see chapter “15.4.5”, page 121 .
4. Closing the dummy cover or display module, see chapter “15.4.7”, page 122.
5. Apply supply voltage.

**Devices with fieldbus gateway:**

1. Switch off the supply voltage. Wait until LED illuminated ring goes out.
2. Removing dummy cover or display module, see chapter “15.4.3”, page 119.
3. Removing the fieldbus gateway from the actuator, see chapter “15.4.4”, page 120.
4. Actuating valve mechanically, see chapter “15.4.5”, page 121 .
5. Mounting the fieldbus gateway on the actuator, see chapter “15.4.6”, page 122.
6. Closing the dummy cover or display module, see chapter “15.4.7”, page 122.
7. Apply supply voltage.

### 15.4.2 Required tool

- Allen key, width across flats 3 mm

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### 15.4.3 Removing dummy cover or display module

**NOTE!**

Carefully remove display module ensuring that the connection cable and the HMI interface are not damaged.

**Devices with ATEX approval or IECEx approval are secured with a magnetic lock.**

The removal of the cover is described in the additional manual for electromotive control valves with ATEX approval and IECEx approval.


*Figure 52: Removing dummy cover or display module*

→ To release the display module or the dummy cover, rotate counter-clockwise and remove.
⚠ On the display module pay attention to the connection cable leading to the HMI interface!

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### 15.4.4 Removing the fieldbus gateway from the actuator

**Preconditions:**
**Supply voltage switched off, dummy cover or display module removed.**

**NOTE!**

The fieldbus gateway may be removed only when it is deenergised, otherwise the device may be damaged.

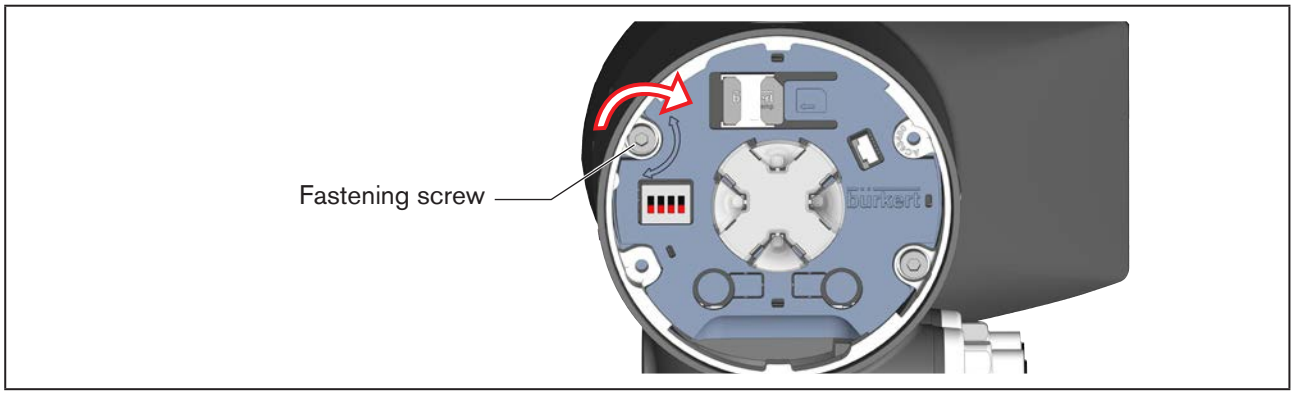


*Figure 53: Remove fieldbus gateway*

→ Remove fastening screw (socket head screw, width across flats 3 mm).

**NOTE!**

Caution when removing the fieldbus gateway. Fieldbus gateway and actuator are connected to each other by a cable.

→ To release the fieldbus gateway, turn it counterclockwise and carefully remove it.

→ Disconnect connection cable from the fieldbus gateway.

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### 15.4.5 Actuating valve mechanically

**Preconditions:**
**Supply voltage switched off, dummy cover or display module removed. Also for device variant with fieldbus gateway: Fieldbus gateway removed.**

**NOTE!**

The mechanical manual override may be used only when it is deenergised, otherwise the device may be damaged.

→ To mechanically actuate the valve, use an Allen key with width across flats 3 mm.

**NOTE!**

**Maximum torque 2 Nm.**
If the torque is exceeded on reaching the valve end position, the mechanical manual control will be damaged.

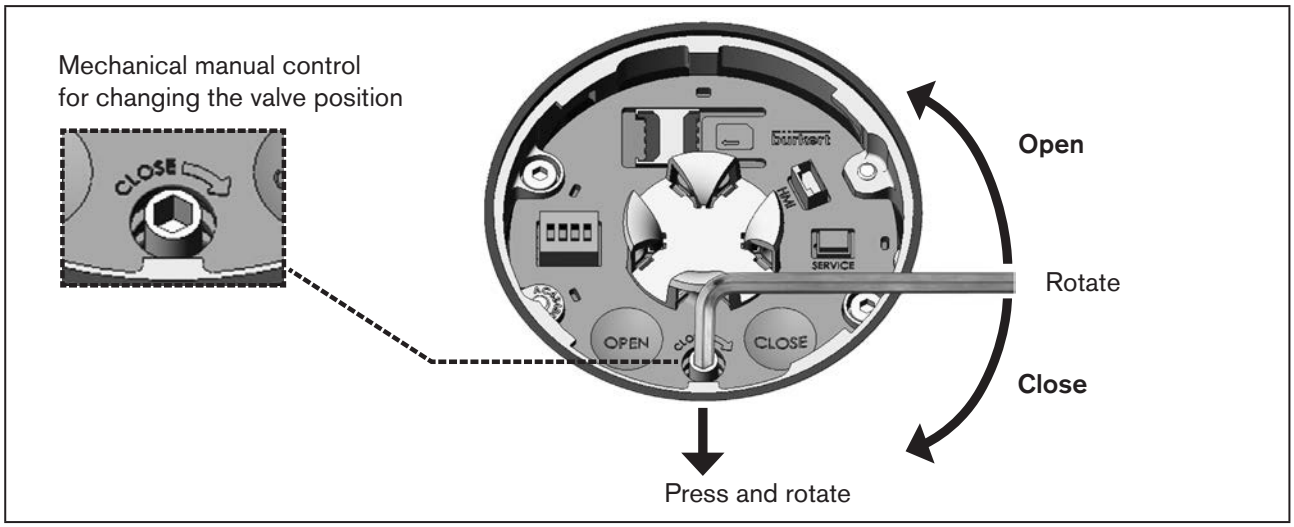


*Figure 54: Mechanical manual control*

→ Applying a gentle pressure, couple the mechanical manual control and simultaneously turn the Allen key counter-clockwise (see "Figure 54").
⚠ When closing the valve:
Carefully close the valve at low force to prevent damaging the diaphragm.

→ Move valve to the required position.
⚠ Maximum torque 2 Nm (1.5 lbf ft).
- To open, turn it counterclockwise.
- To close, turn it clockwise

→ After reaching the required valve position, remove the Allen key.
The mechanical manual control automatically decouples.

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## 15.4.6 Mounting the fieldbus gateway on the actuator

**Preconditions: Supply voltage switched off.**

**NOTE!**

The fieldbus gateway may be mounted only when it is deenergised, otherwise the device may be damaged.

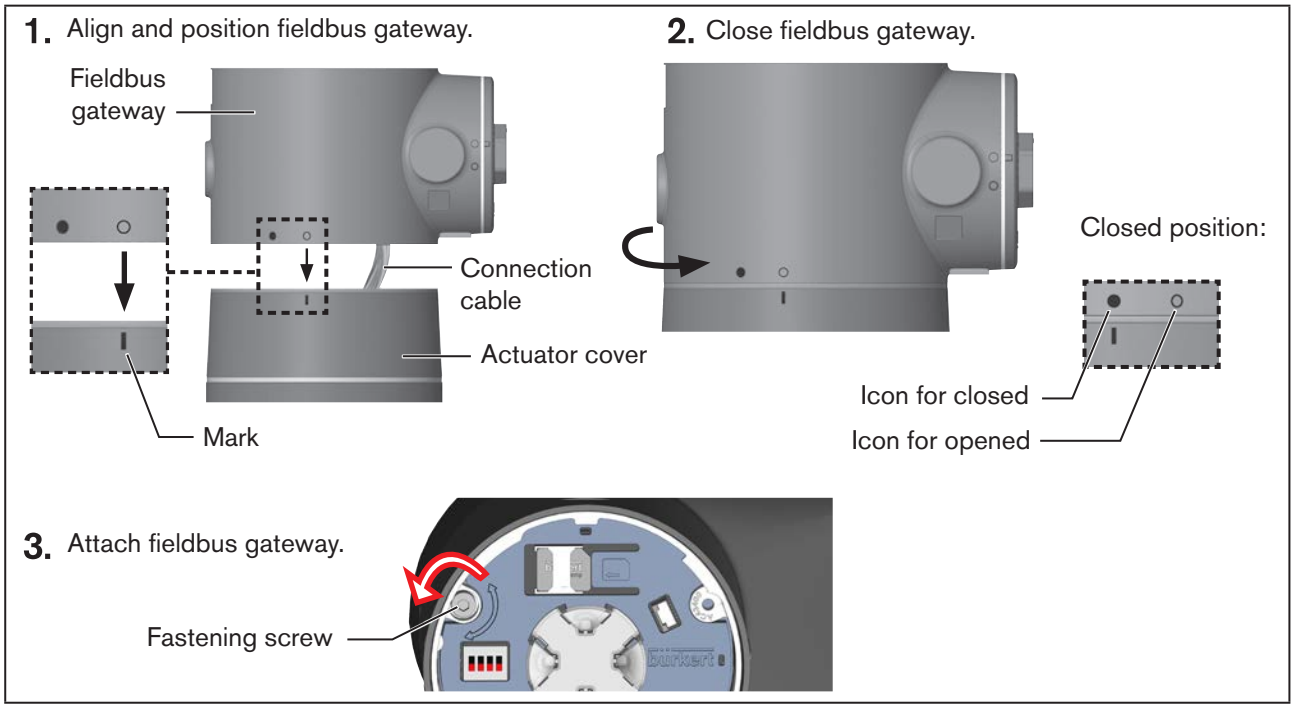


*Figure 55: Mount fieldbus gateway.*

→ Insert connection cable into the actuator on the fieldbus gateway.

→ Align and position fieldbus gateway on the actuator cover.
Centre the icon for opened over the mark on the actuator.

→ Manually turn fieldbus gateway clockwise until the icon for closed is positioned over the mark.

→ Tighten fastening screw (socket head screw, width across flats 3 mm).
Observe tightening torque 1.1 Nm!

## 15.4.7 Closing the dummy cover or display module

**Devices with ATEX approval or IECEx approval are secured with a magnetic lock.**

The removal of the cover is described in the additional manual for electromotive control valves with ATEX approval and IECEx approval.

**NOTE!**

**For devices with display module**
Before mounting the display, check whether the cable is correctly connected to the HMI interface.

→ Mount display module or the dummy cover and turn it clockwise until the 2 marks are vertically aligned. Vertical lines are affixed as marks to the display module, dummy cover and actuator.

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# 16 EXTENDED FUNCTIONS

Functions for special control tasks and the corresponding settings are described in separate software instructions.
Use the type of device search to find these documents on our homepage at: www.Burkert.com

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# 17 OPERATING STRUCTURE / FACTORY SETTINGS

The factory presets are highlighted in blue to the right of the menu in the operating structure.

Examples: ◉ / ☒ Menu options activated or selected at the factory

○ / ☐ Menu options not activated or selected at the factory

*2 %*, *10 sec*, ... Values set at the factory

## 17.1 Operating structure of the configuration area

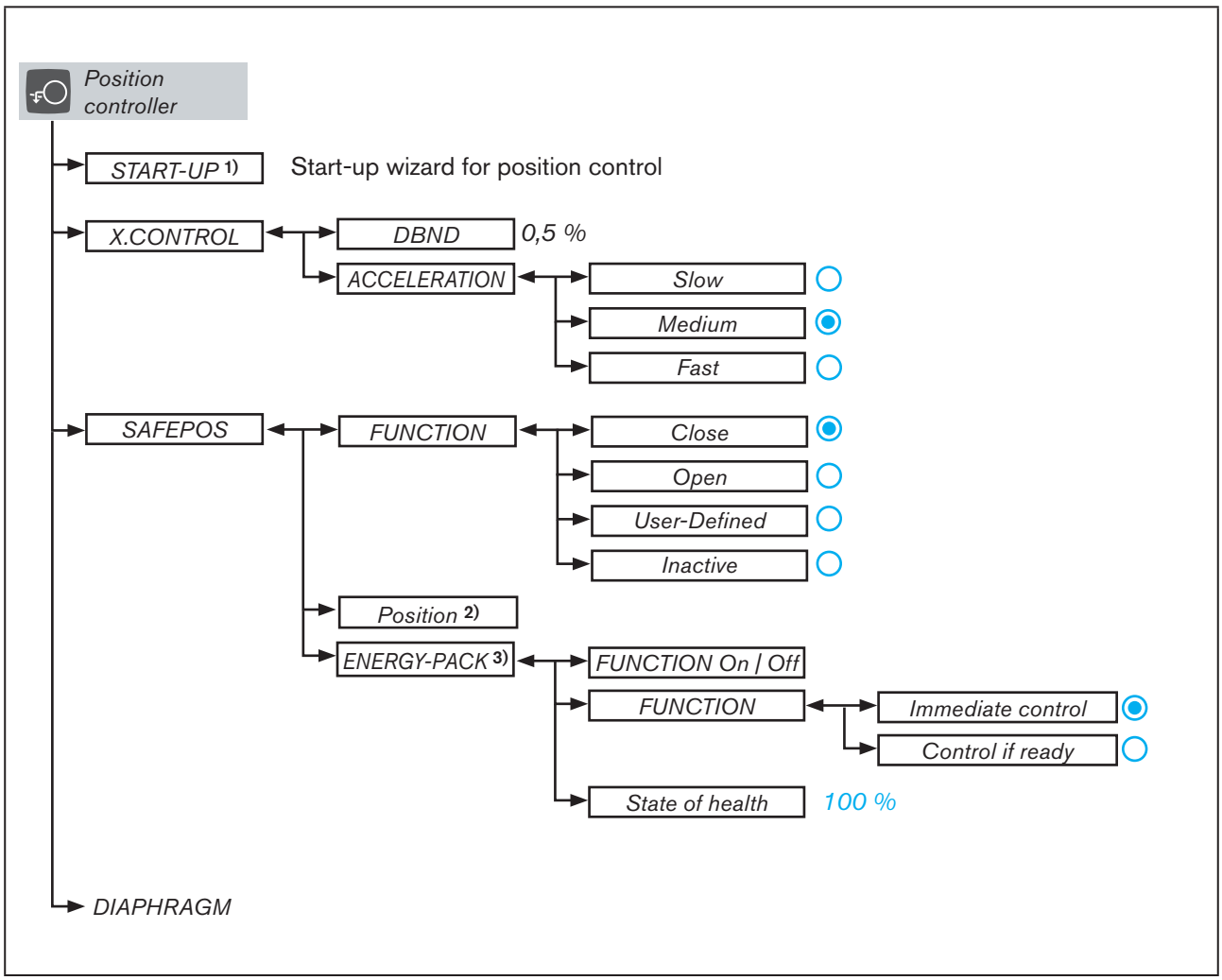


*Figure 56: Operating structure - 1-a, Configuration area position controller*

**1) Only available for devices without process controller function.**

**2)** Only available if in the menu **SAFEPOS** → **FUNCTION** → **User Defined** has been selected.

**3)** Only available for devices with SAFEPOS energy pack (optional).

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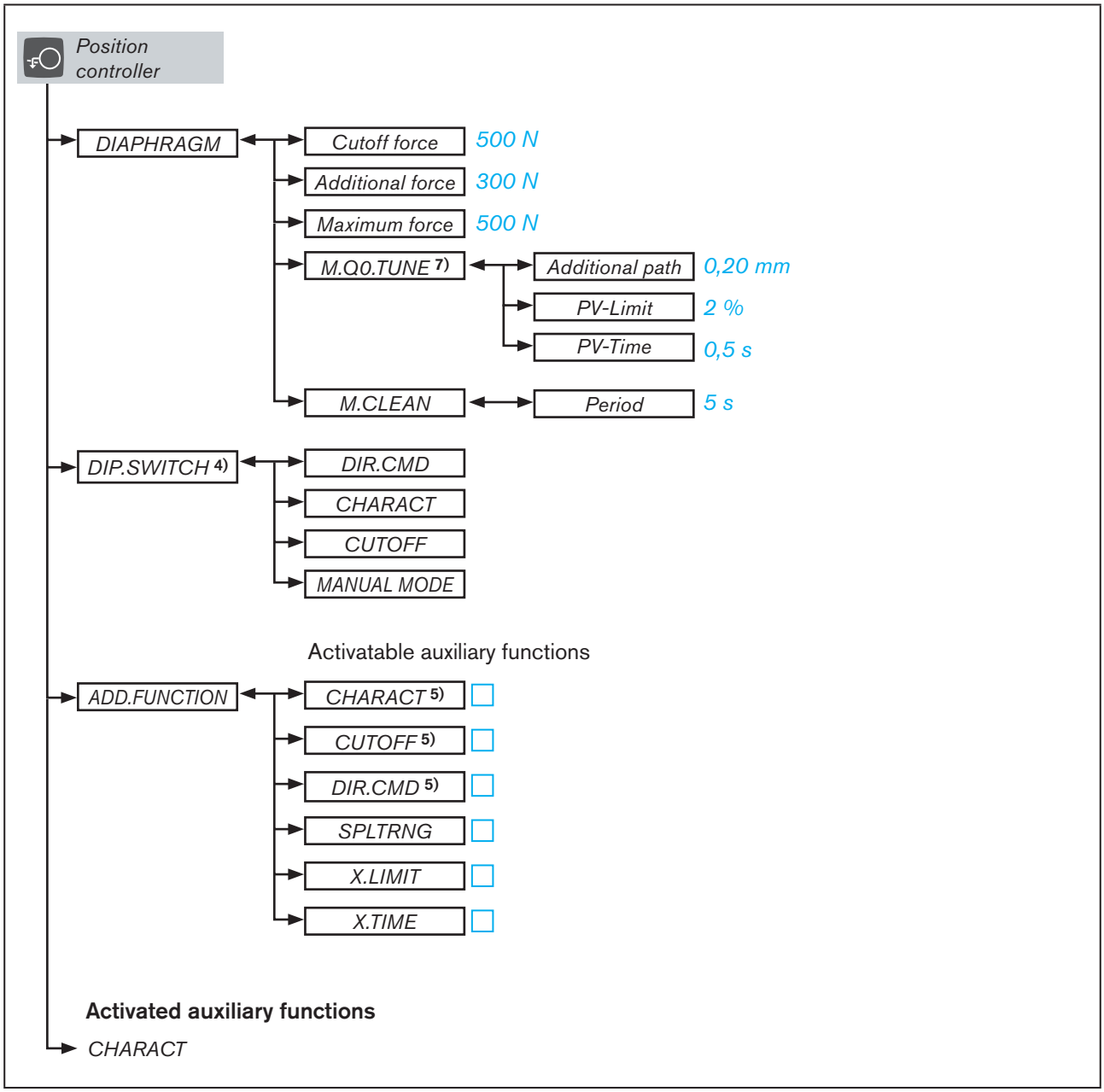


*Figure 57: Operating structure - 1-b, Configuration area position controller*

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4) Only available in the PC software Bürkert Communicator for devices without a display module.

5) For devices without display module the menu is not activated with **ADD.FUNCTION** but on the DIP switch of the device.

7) Only available for devices with process controller function.

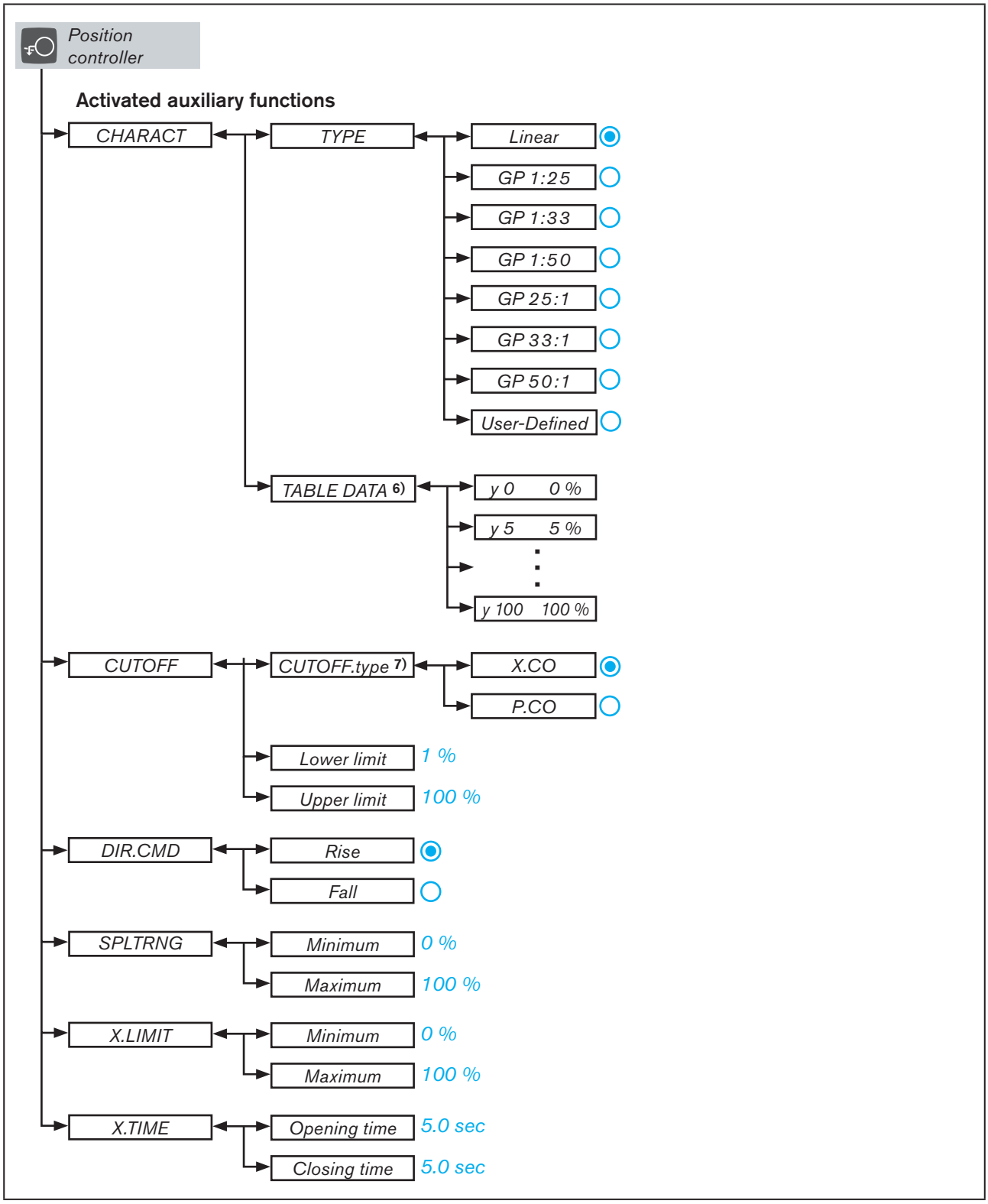


*Figure 58: Operating structure - 1-c, Configuration area position controller*

6) Only available if in the menu **CHARACT** → **TYPE** → **User Defined** has been selected.

7) Only available for devices with process controller function.

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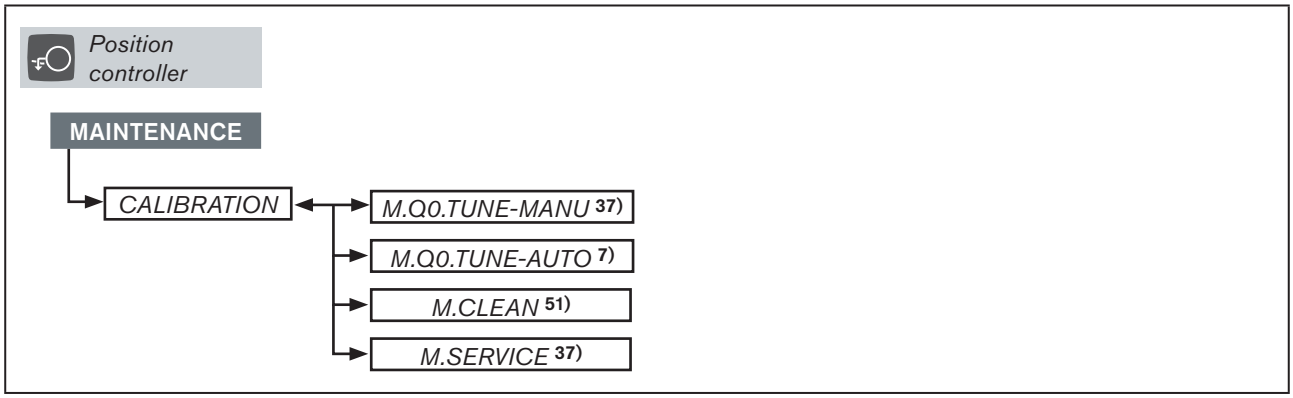


*Figure 59: Operating structure - 1-d, Maintenance position controller*

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7) Only available for devices with process controller function.

37) Available on the display only.

51) Not available if the setting is made via the digital input. Setting: **Inputs/Outputs** → **DIGITAL IN** → **M.CLEAN.source.**

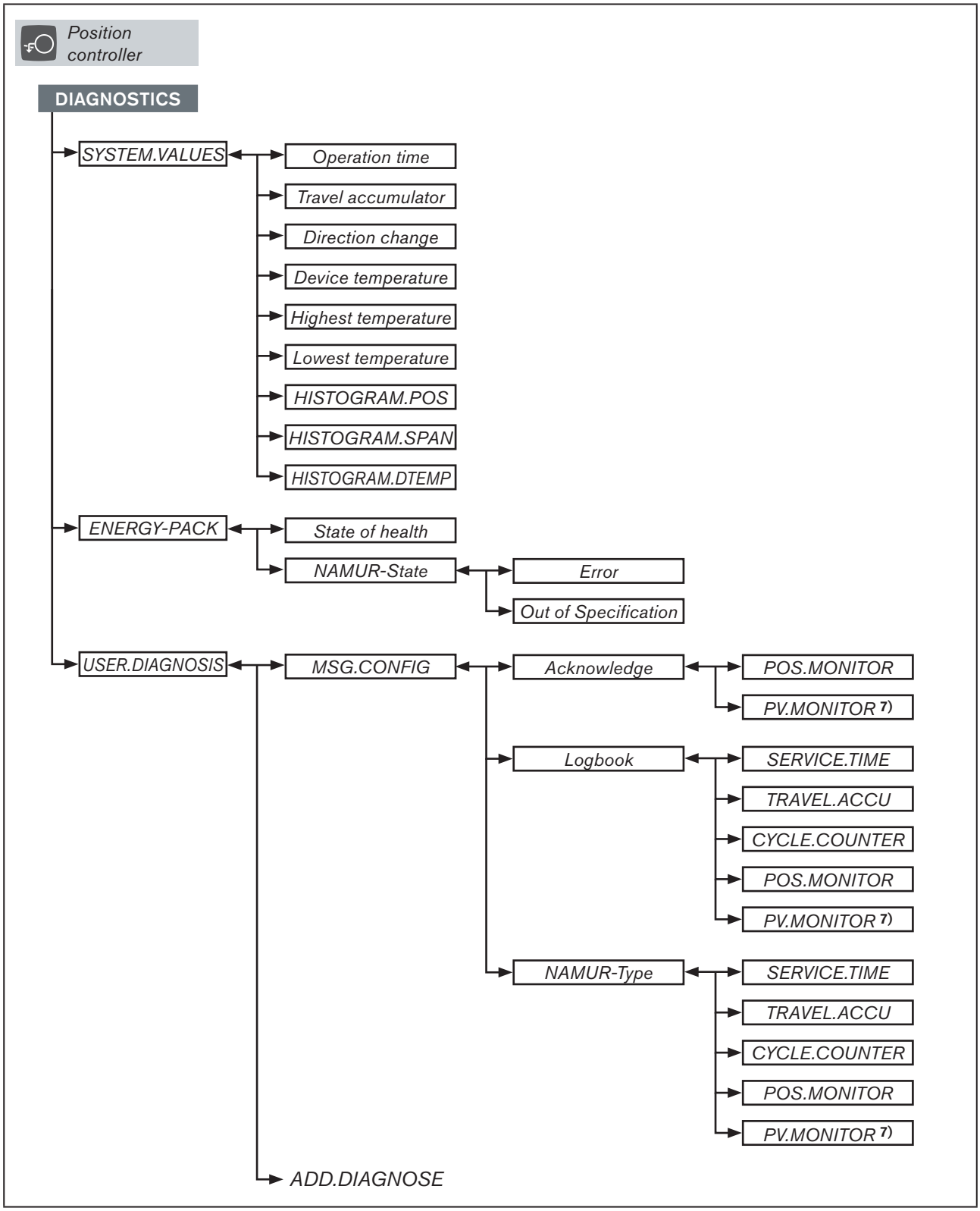


*Figure 60: Operating structure - 1-e, Diagnostics position controller*

**7)** Only available for devices with process controller function.

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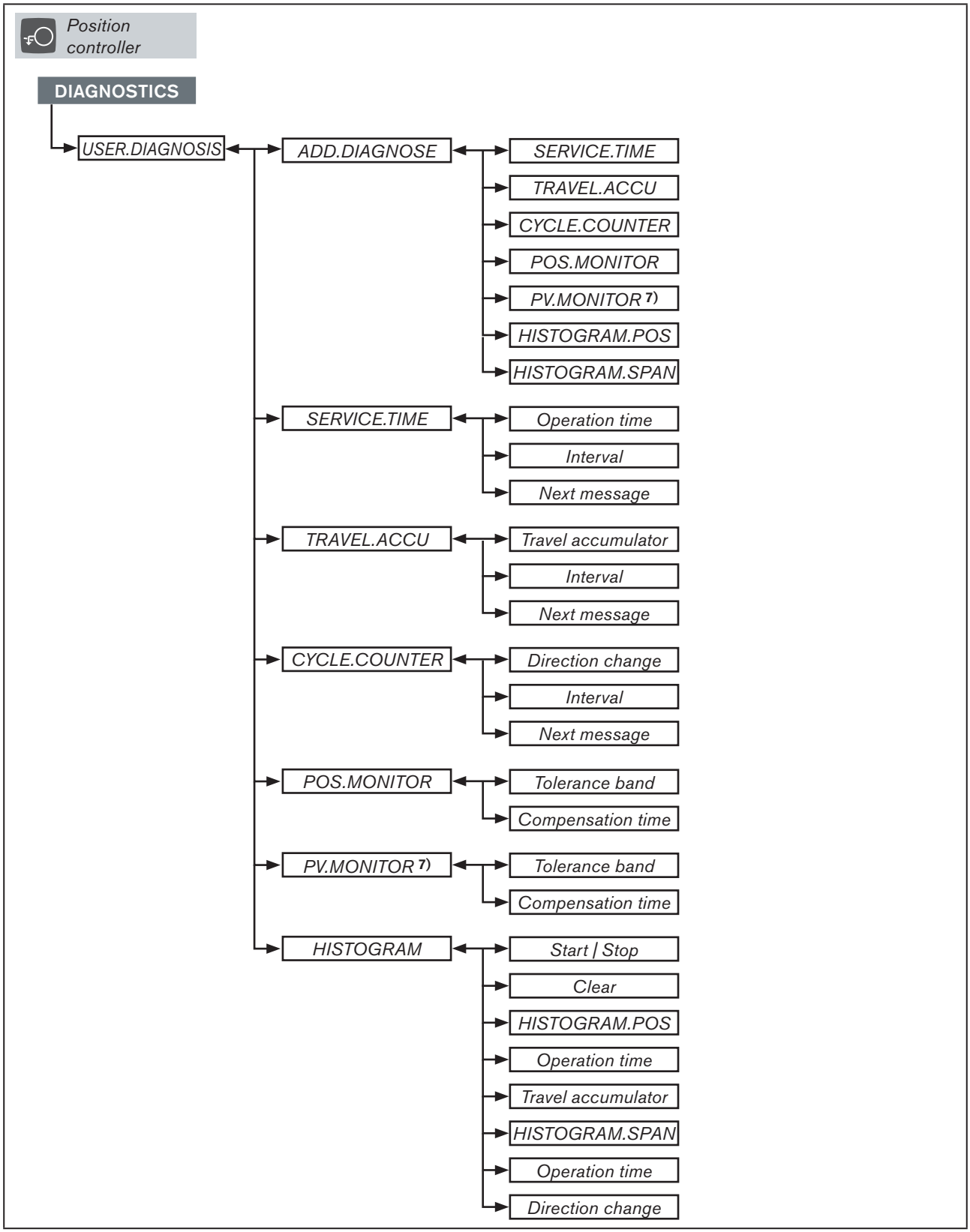


*Figure 61: Operating structure - 1-f, Diagnostics position controller*

**7)** Only available for devices with process controller function.

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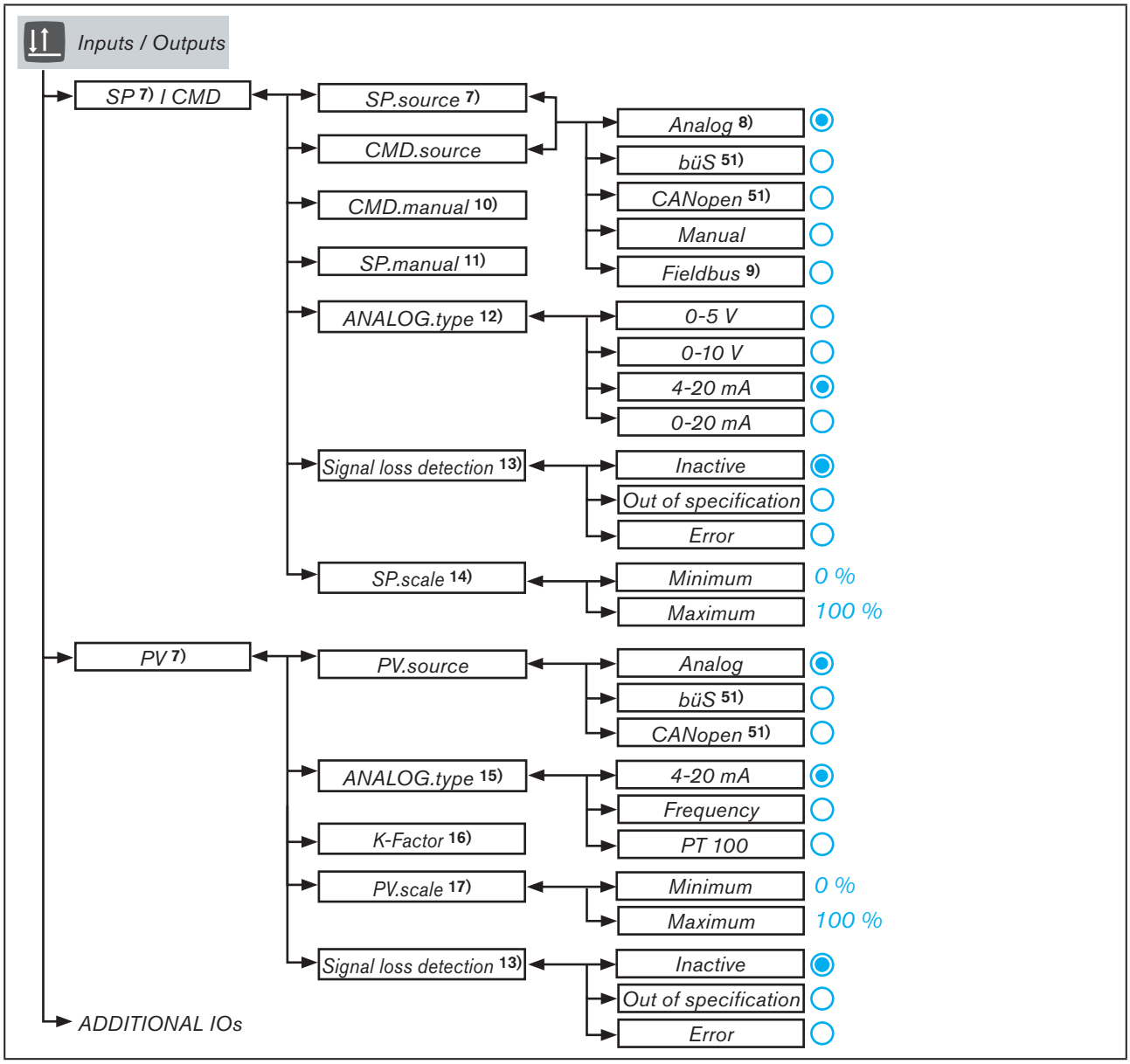


*Figure 62: Operating structure - 2-a, Configuration area inputs / outputs*

**7)** Only available for devices with process controller function.

**8)** Not available for devices with Gateway option.

**9)** Only available for devices with Gateway option.

**10)** Only available if in the menu **CMD.source** → **Manual** has been selected.

**11)** Only available for devices with process controller function if in the menu **SP I CMD** → **SP.source** → **Manual** has been selected.

**12)** Only available if in the menu **CMD.source** and/or in the menu **SP.source** → **Analog** has been selected.

**13)** Only available if in the submenu → **ANALOG.type** → **4-20 mA** has been selected.

**14)** Only available for devices with process controller function if in the menu **SP I CMD** → **SP.source** → **Analog** has been selected.

**15)** Only available if in the submenu **PV.source** → **Analog** has been selected.

**16)** Only available if in the menu **PV** → **Analog.type** → **Frequency** has been selected.

**17)** Only available if in the menu **PV** → **Analog.type** → **4-20 mA** has been selected.

**51)** Only available for devices with the according communication protocol.

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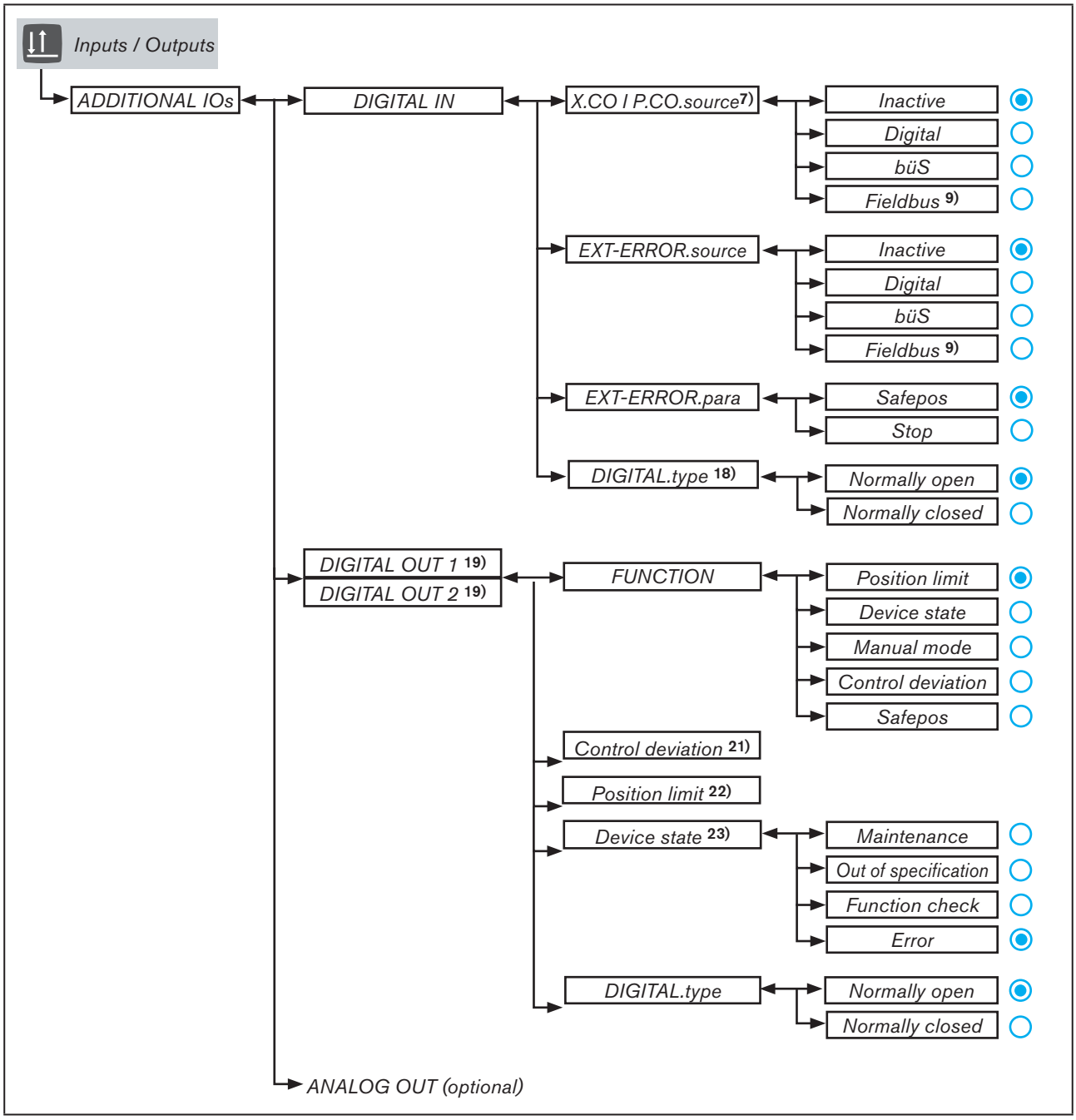


*Figure 63: Operating structure - 2-b, Configuration area inputs / outputs*

**7)** Only available for devices with process controller function.

**9)** Only available for devices with Gateway option.

**18)** Only available if in the menu **ADDITIONAL IO's** → **DIGITAL IN** → **X.CO I P.CO.source** or **EXT-ERROR.source** → **Digital** has been selected.

**19)** Only available for devices with the digital output option.

**21)** Only available if in the submenu **FUNCTION** → **Control Deviation** has been selected.

**22)** Only available if in the submenu **FUNCTION** → **Position Limit** has been selected.

**23)** Only available if in the submenu **FUNCTION** → **Device State** has been selected.

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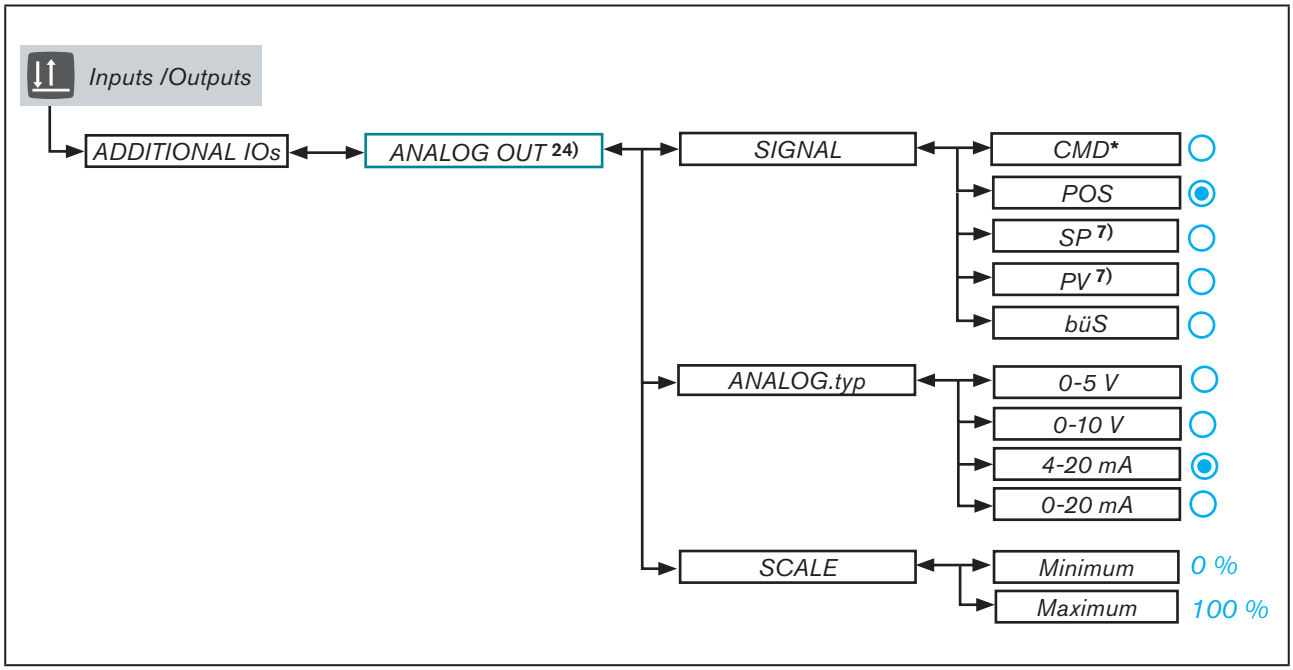


*Figure 64: Operating structure- 2-c, Configuration area inputs / outputs*

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**7)** Only available for devices with process controller function.

**24)** Only available for devices with the analog output option.

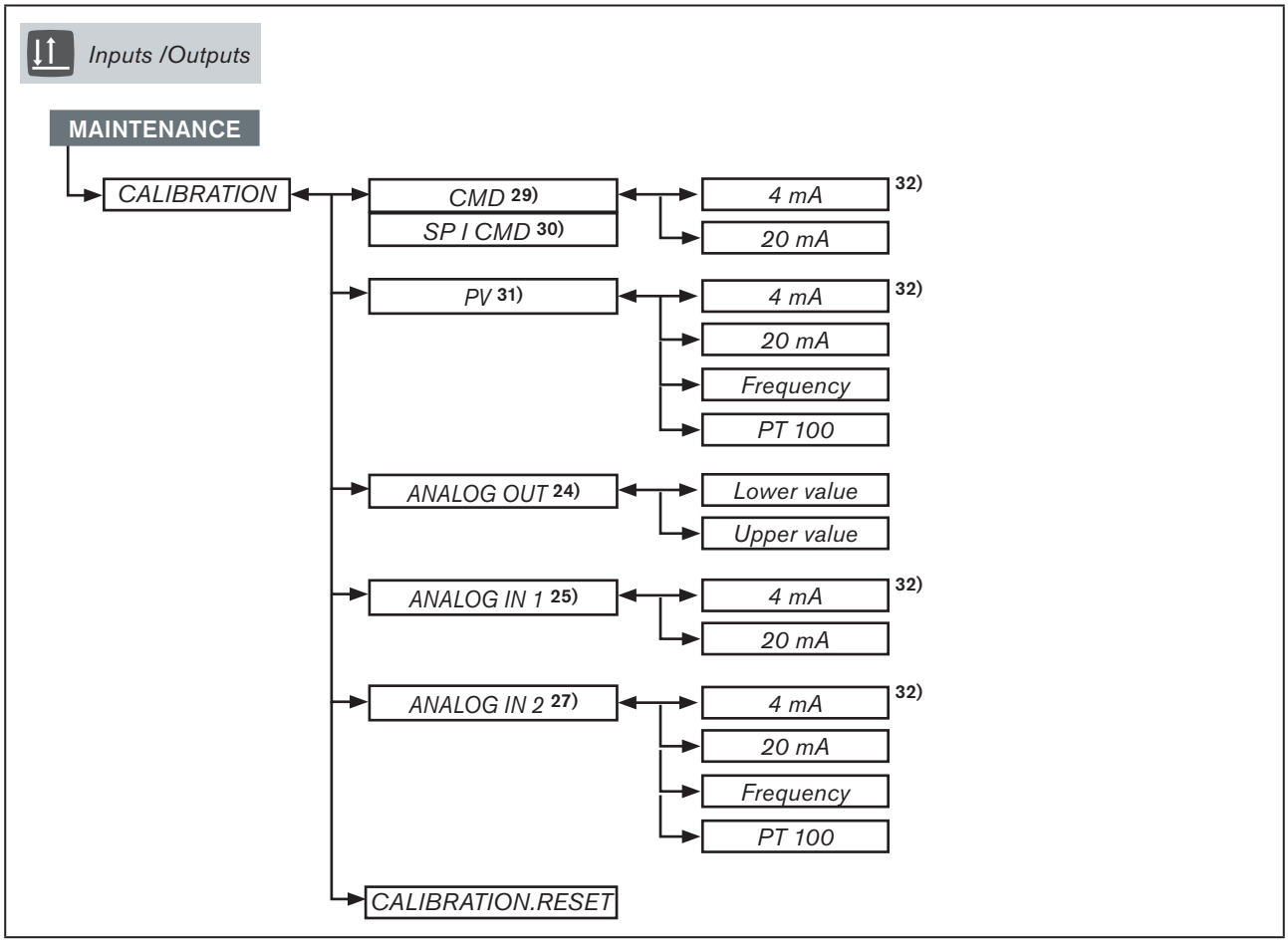


*Figure 65: Operating structure - 2-d, Maintenance inputs / outputs*

*Industrial communication*

The Industrial Communication configuration area is only available for devices equipped with a fieldbus gateway.
The Industrial Communication menu is described in the separate software manual.

**Download at:** www.burkert.com / Type 3363 / Downloads “Operating instructions” / Software manual Type 3360 3361 3363....

*Figure 66: Operating structure - 3, Industrial communication*

24) Only available for devices with the analog output option.

25) Only available - for devices with position controller function if in the menu **CMD** → **CMD.source** → **büS** or **Manual** has been selected.
for devices with process controller function if in the menu **SP I CMD** → **CMD.source** and **SP.source** → **büS** or **Manual** has been selected. Not available for devices with Gateway option.

27) Only available for devices with process controller function if in the menu **PV** → **PV.source** → **büS** has been selected.

29) Only available for devices with position controller function if in the menu **CMD** → **CMD.source** → **Analog** has been selected.

30) Only available for devices with process controller function if in the menu **SP I CMD** → **CMD.source** or **SP.source** → **Analog** has been selected.

31) Only available for devices with process controller function if in the menu **PV** → **PV.source** → **Analog** has been selected.

32) The display depends on the set input signal → **Inputs/Outputs** → menu **ANALOG.type** or **TYPE**.

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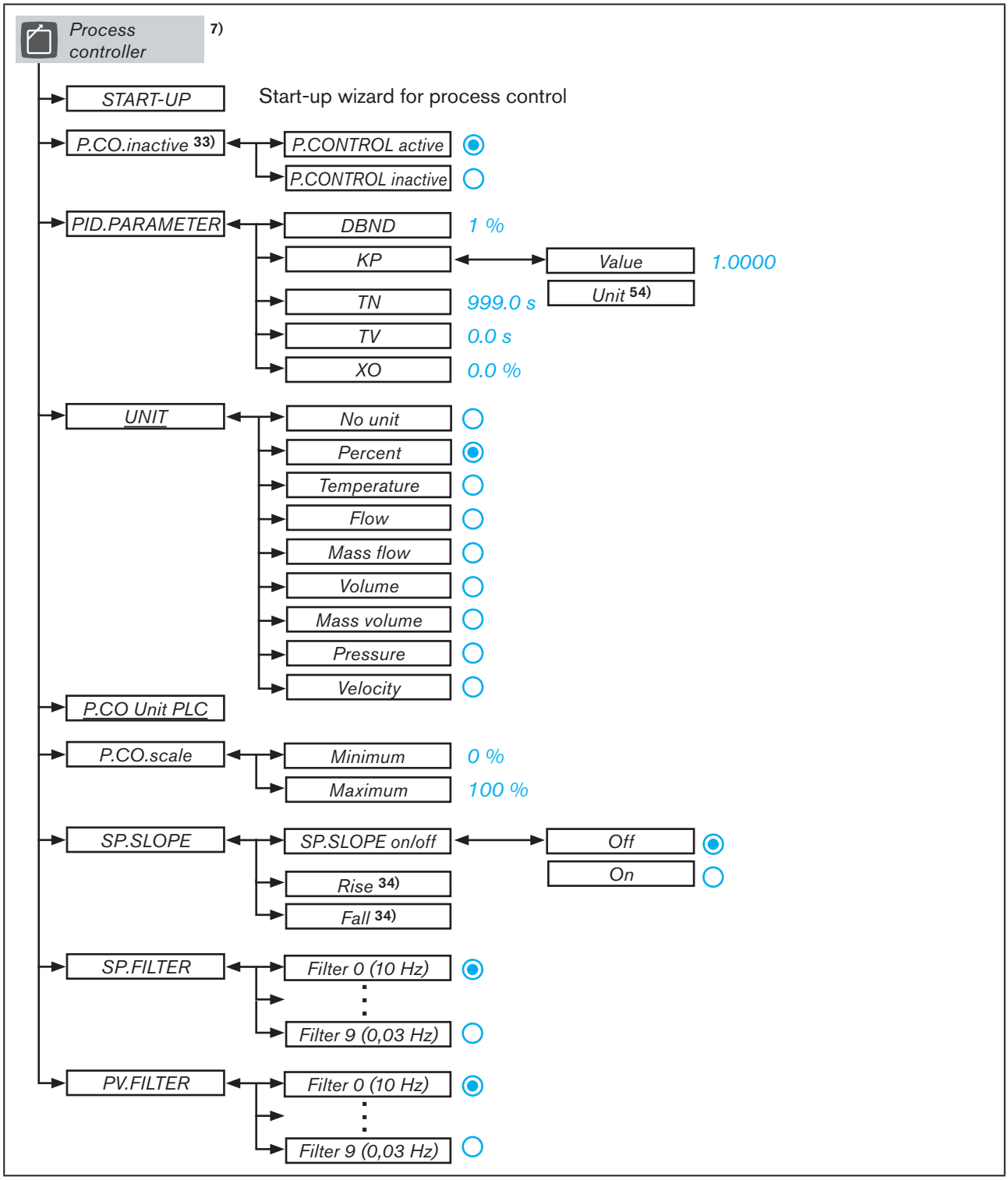


*Figure 67: Operating structure- 3-a, Configuration area process controller*

**7)** Only available for devices with process controller function.

**33)** Not available if the setting is made via the digital input, büS/CANopen or the fieldbus. Setting: **Inputs / Outputs** → **DIGITAL IN** → **X.CO I P.CO.source**.

**34)** Only available if in the menu **SP.SLOPE** → **SP.SLOPE on/off** → **On** has been selected.

**54)** Not available if in the menu **UNIT** → **No unit** or **Percent** has been selected.

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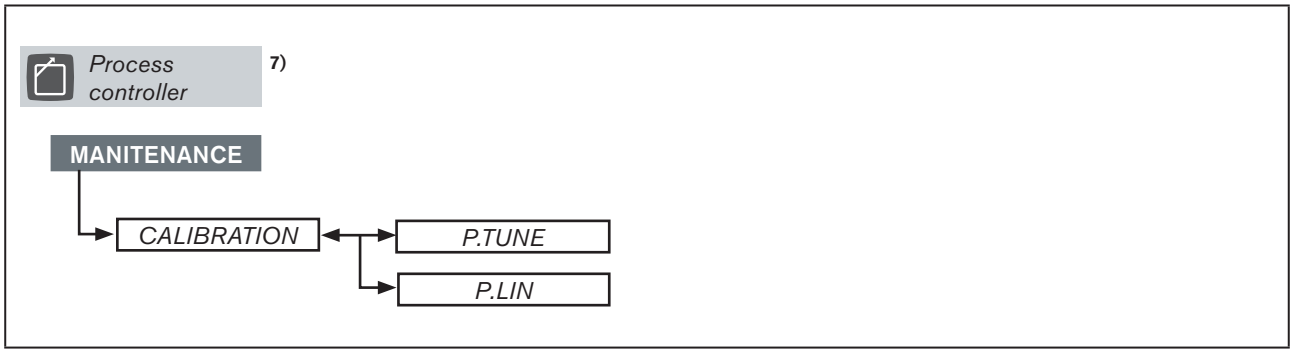


*Figure 68: Operating structure - 3-b, Maintenance process controller*

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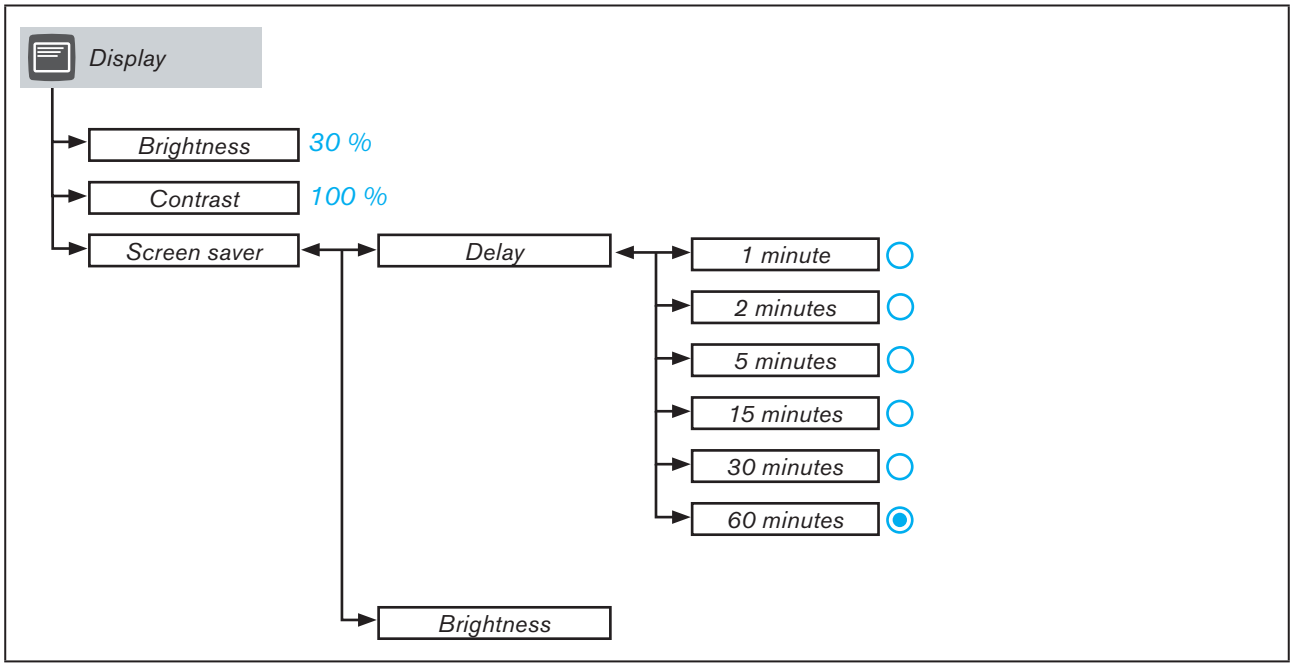


*Figure 69: Operating structure - 4-a, Configuration area display*

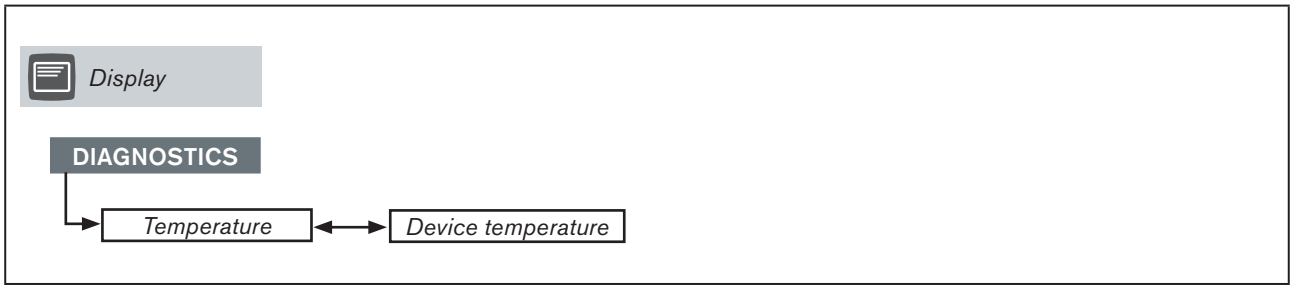


*Figure 70: Operating structure - 4-b, Diagnostics display*

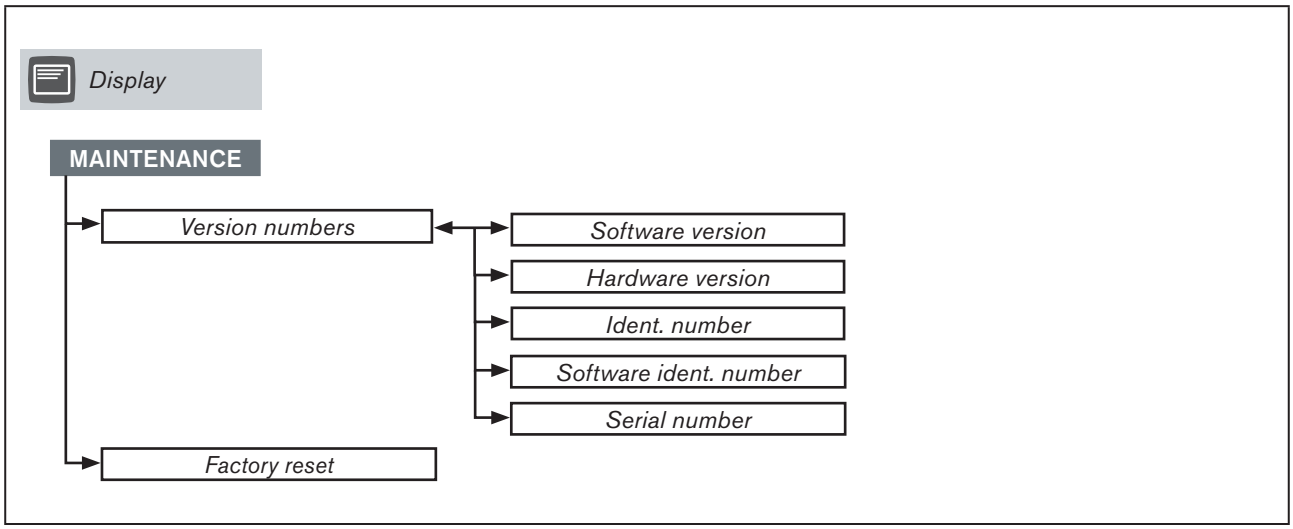


*Figure 71: Operating structure - 4-c, Maintenance display*

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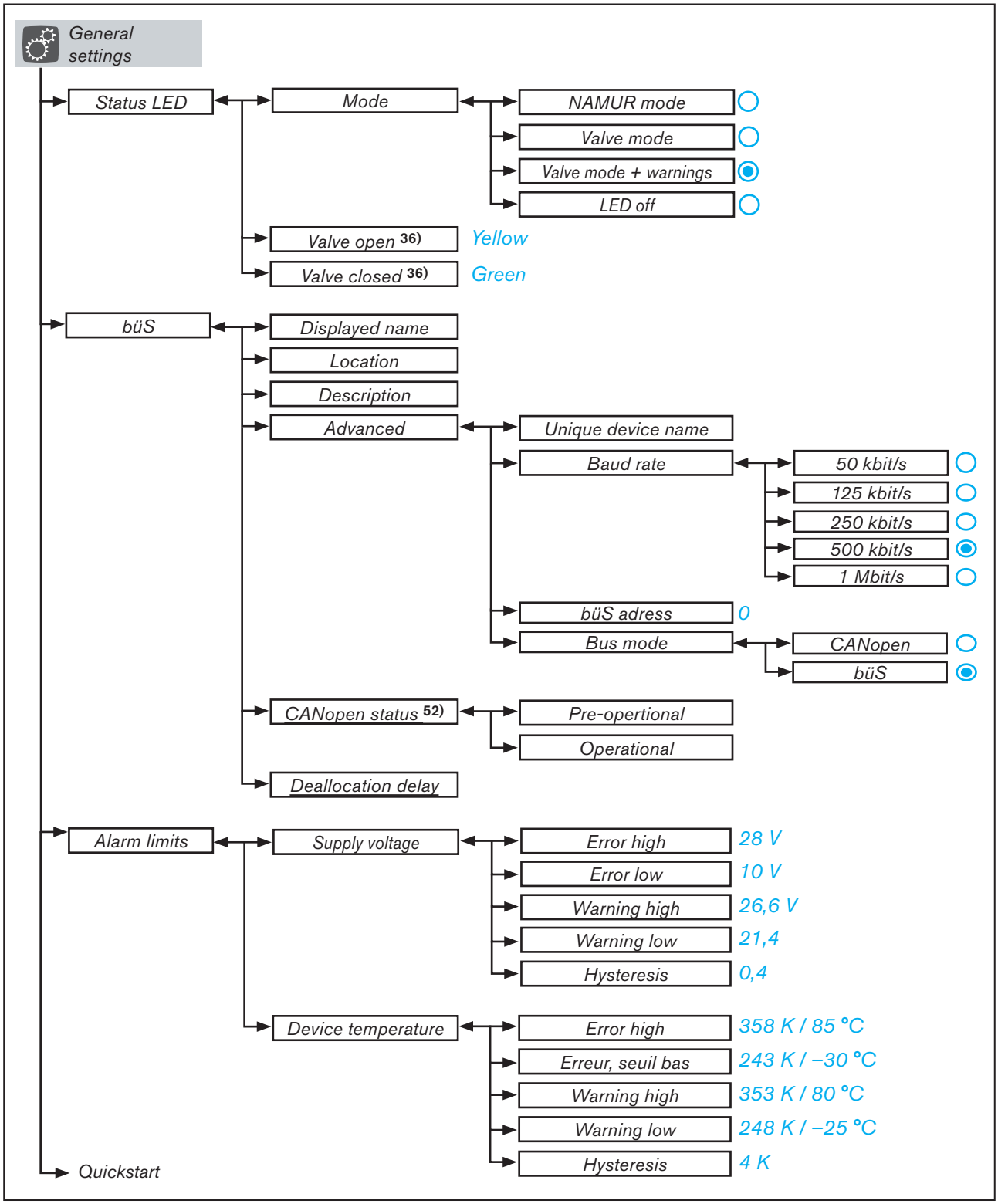


*Figure 72: Operating structure - 5-a, Configuration area general settings*

**36)** Only available if in the menu **Mode** → **Valve mode** or **Valve mode w/ Warnings** has been selected.

**52)** Only available if in the menu **Bus mode** → **CANopen** has been selected.

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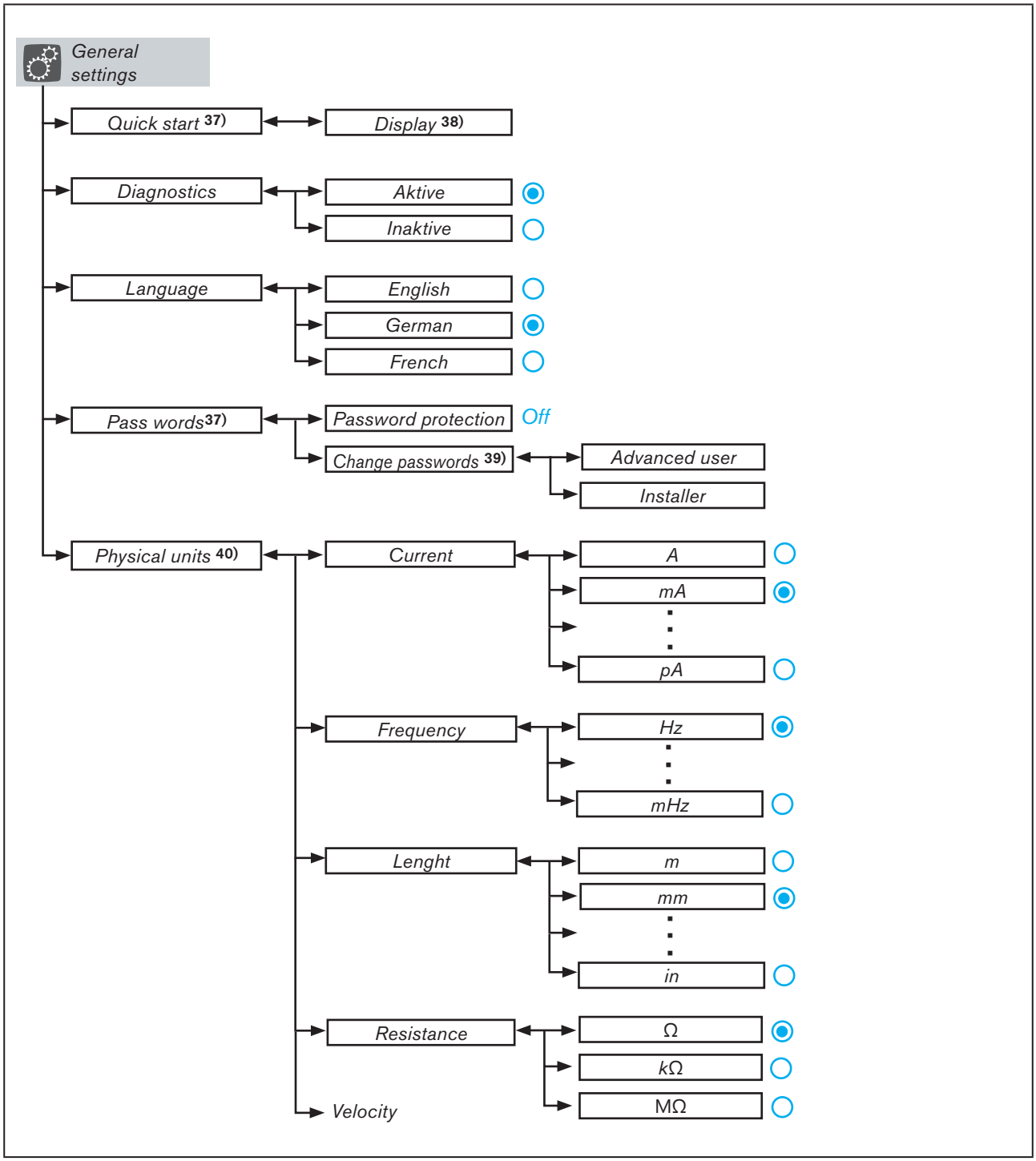


*Figure 73: Operating structure- 5-b,Configuration area general settings*

37) Available on the display only.

38) The menu designation depends on the selected language.

39) Only available if in the menu **Password protection** → **On** has been selected.

40) Available on the display only.
With the PC software Communicator the setting is made on the menu bar **View** → **System of units**.

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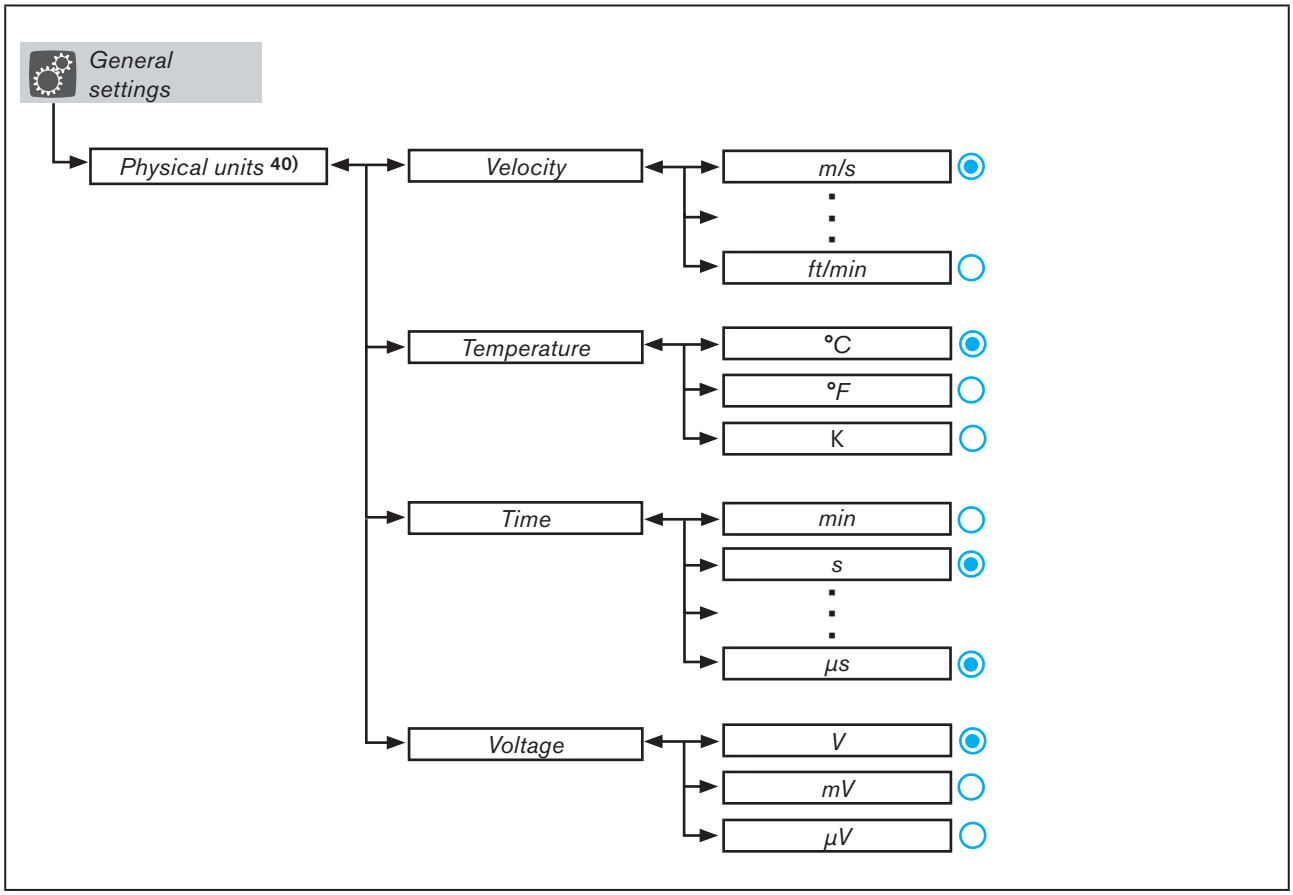


*Figure 74: Operating structure - 5-c, Configuration area general settings*

40) Available on the display only.
With the PC software Communicator the setting is made on the menu bar **View** → **System of units**.



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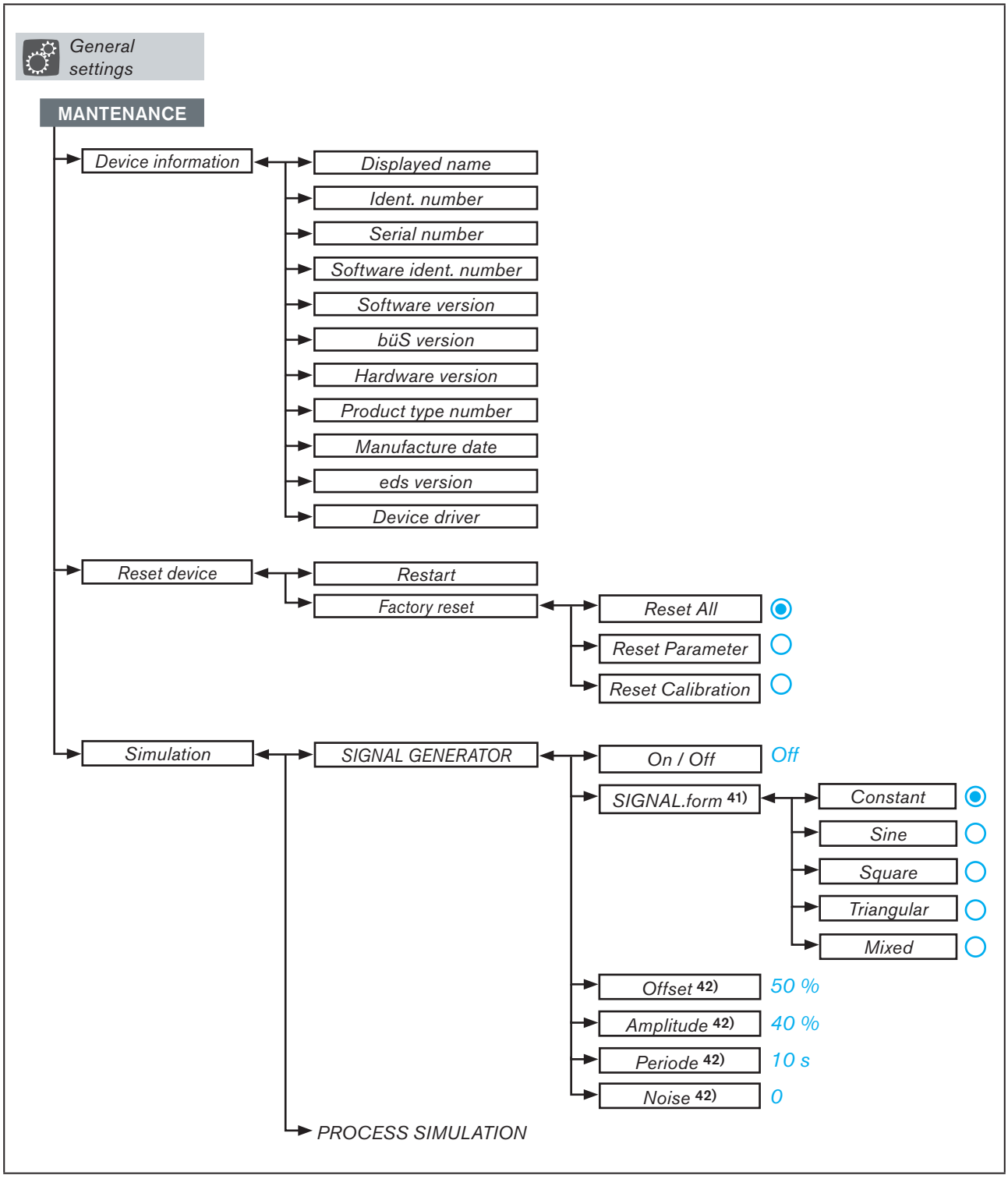


*Figure 75: Operating structure- 5-d, Maintenance general settings*

41) Only available if in the menu **SIGNAL GENERATOR** → **on I off** → **On** has been selected.

42) Display depends on the selection in the menu **SIGNAL.form**.



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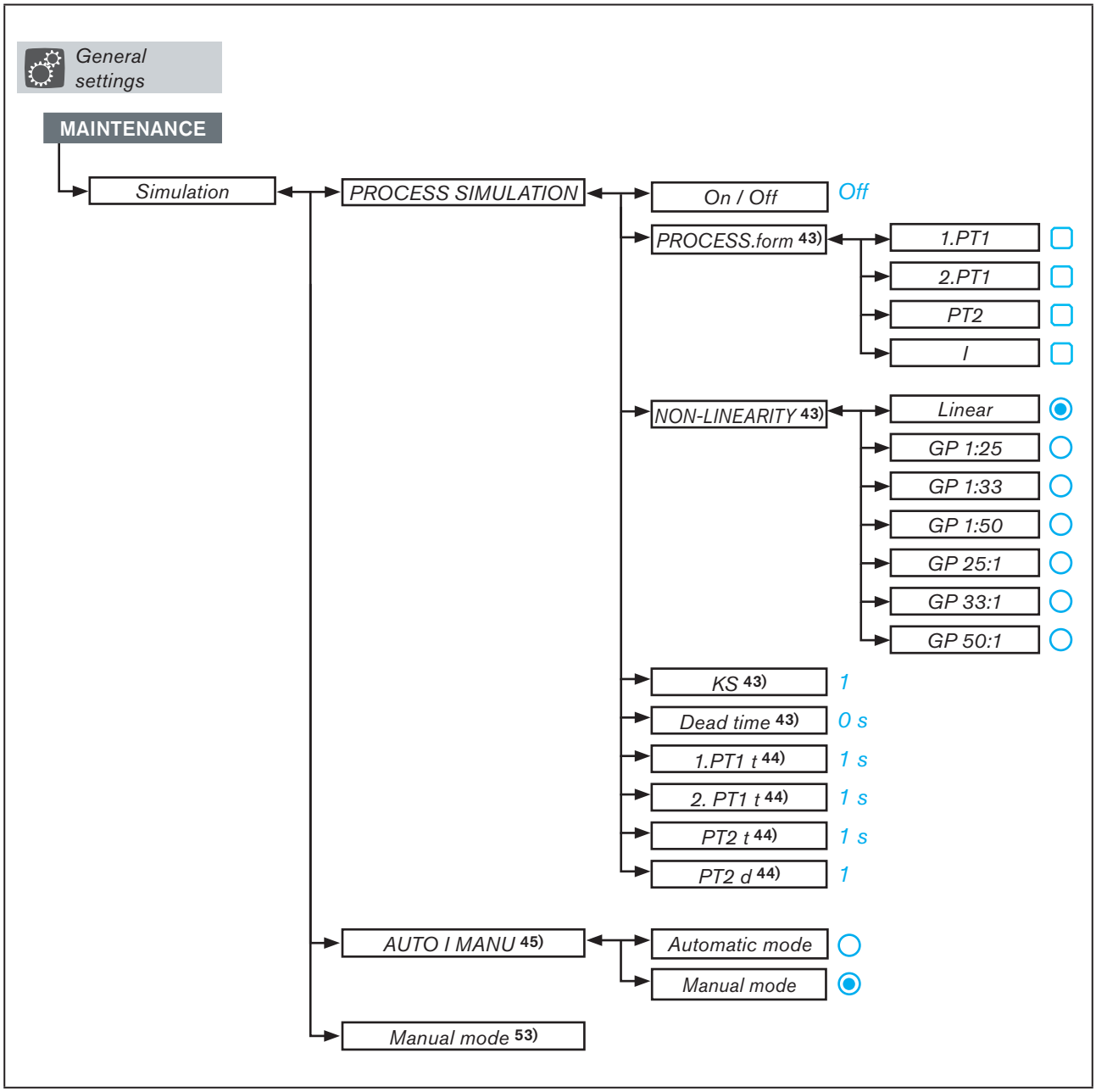


*Figure 76: Operating structure - 5-e, Maintenance general settings*

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43) Only available if in the menu **PROCESS SIMULATION** → **on I off** → **On** has been selected.

44) Display depends on the selection in the menu **PROCESS.form**.

45) Only available for devices with a display module.

53) Only available for devices with display module and, if in the **AUTO I MANU** menu, → **Manual mode** is selected.

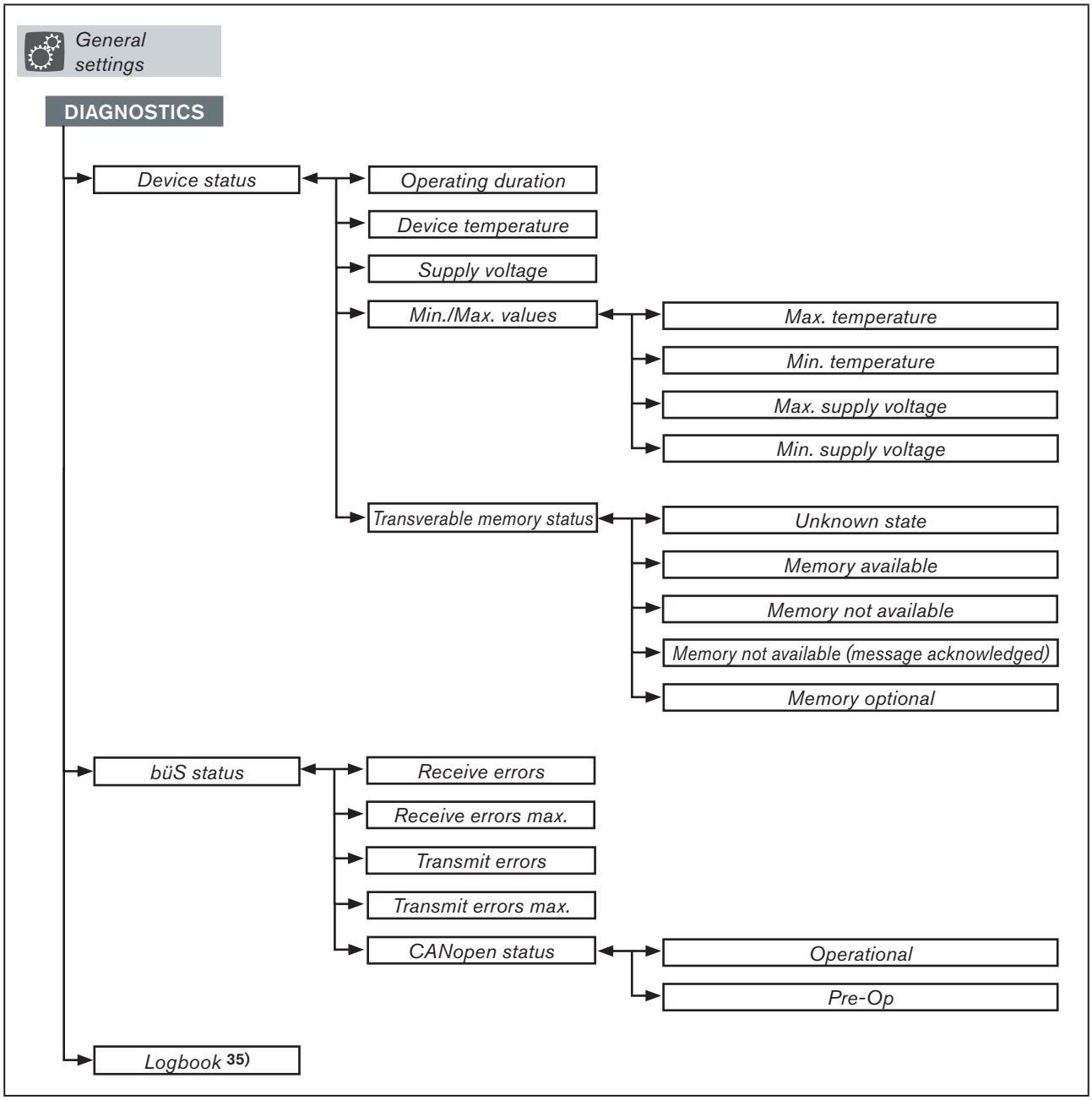


*Figure 77: Operating structure- 5-f, Diagnostics general settings*

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35) Only available in PC software Bürkert Communicator.

## 17.2 Context menu for operation on the display

The context menu is available in the shown operating structure on the display only.

In the PC software Bürkert Communicator the partially identical menus are integrated differently in the operating structure.

A detailed description of the PC software Bürkert Communicator can be found in the associated operating instructions. **Download:** www.burkert.com / Communicator

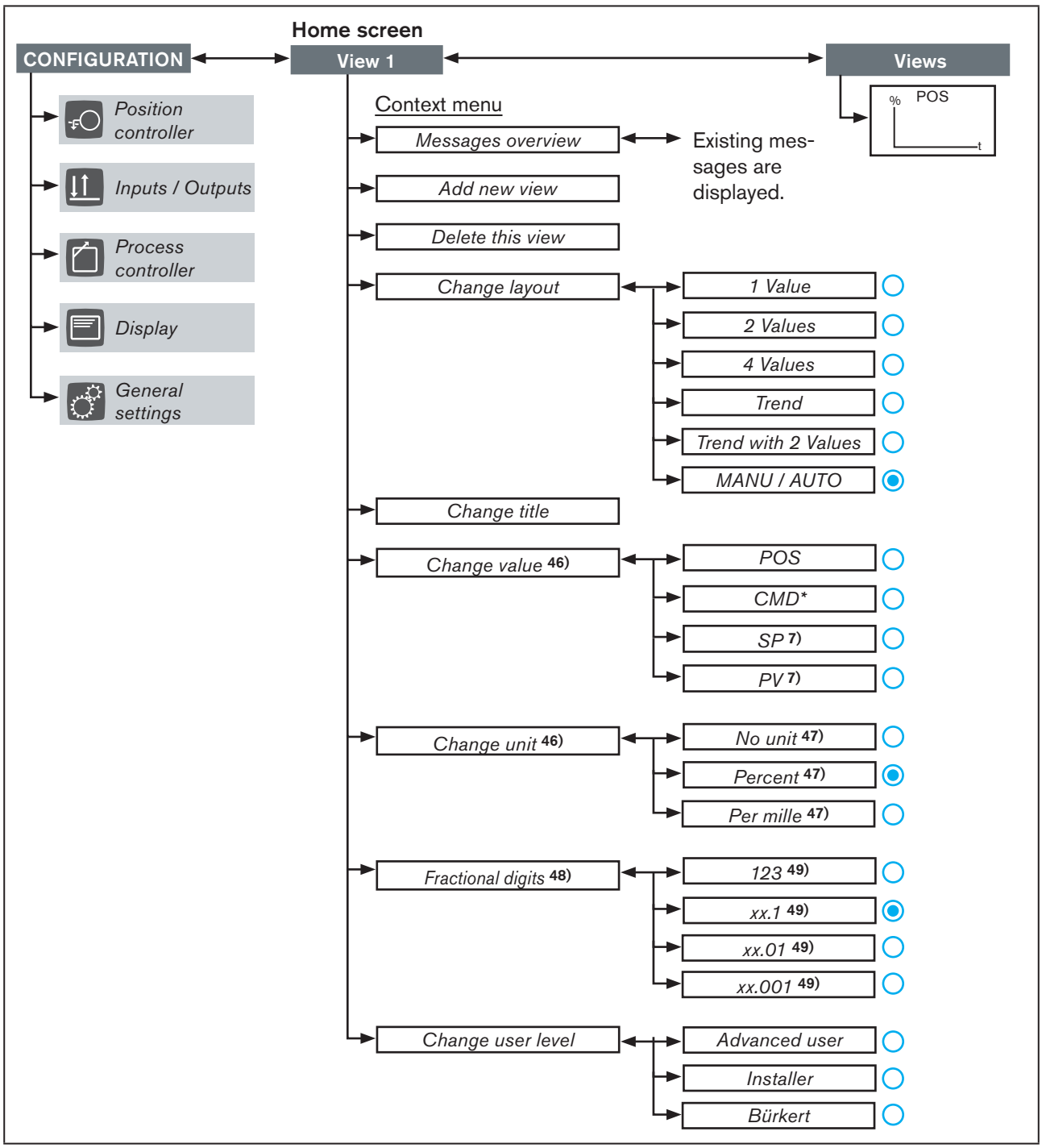


*Figure 78: Operating structure - 6, Context menu for views*

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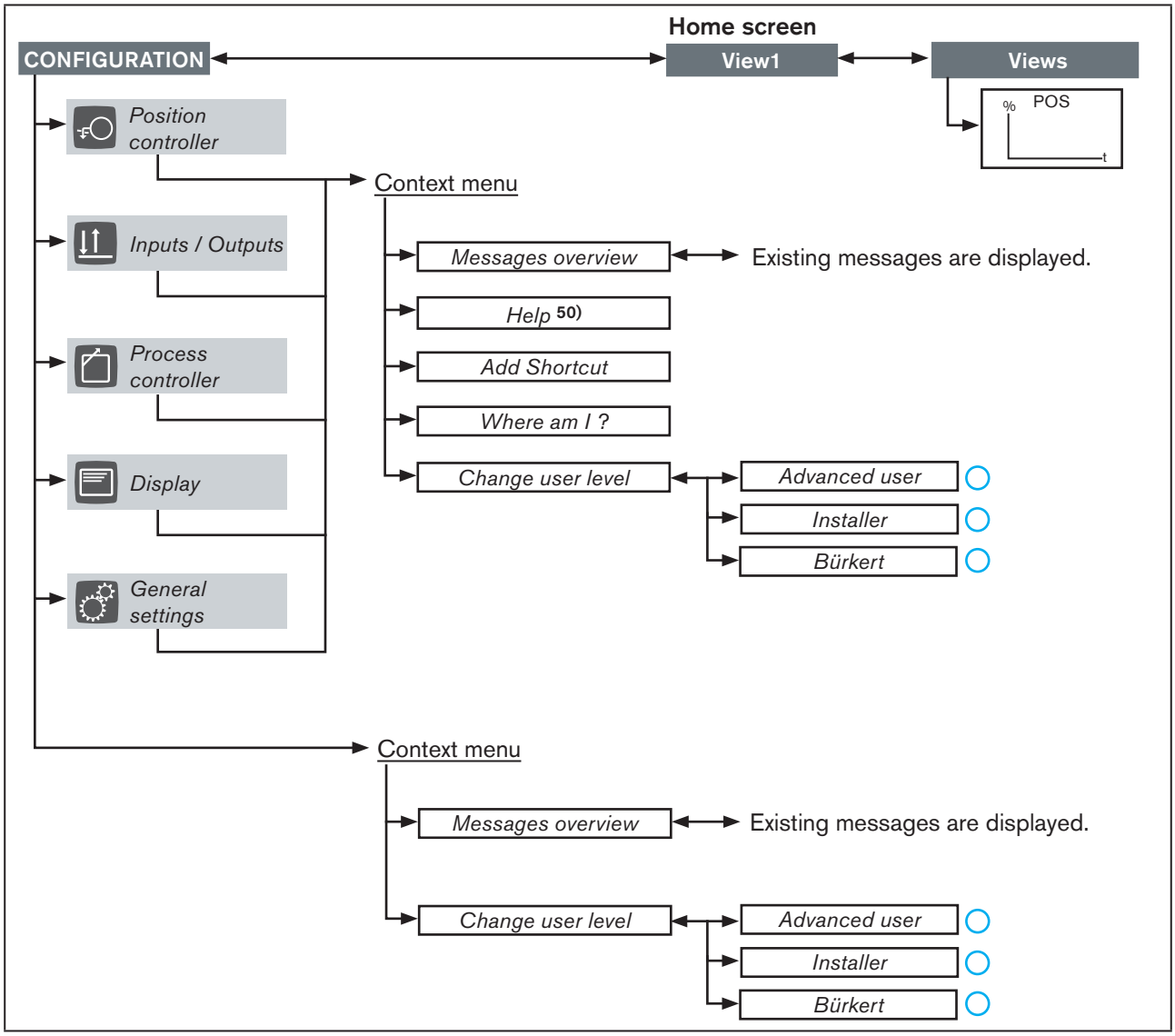


*Figure 79: Operating structure- 7, Context menu in the configuration area*

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7) Only available for devices with process controller function.

46) Not available for layout **MANU / AUTO**. For set layout **2 values** or **4 values** a submenu is shown for assigning the value to be changed.

47) For process control the selection depends on the physical unit of the process control (**Process controller** → **UNIT**) and on the value selected for the information on the display (context menu → **Change value**).

48) Not available for layout **Trend**, **Trend with 2 values** or **MANU / AUTO**. For set layout **2 values** or **4 values** a submenu is shown for assigning the value to be changed.

49) Not available universally.

50) Only available in the configuration area **Position controller**, **Inputs / Outputs** and **Process controller**.

# 18 INDUSTRIAL ETHERNET

For integration into an Ethernet network, the electromotive control valve with integrated fieldbus gateway is available as an option.

**Supported fieldbus protocols:** EtherNet/IP, PROFINET, Modbus TCP.

## 18.1 Description fieldbus gateway

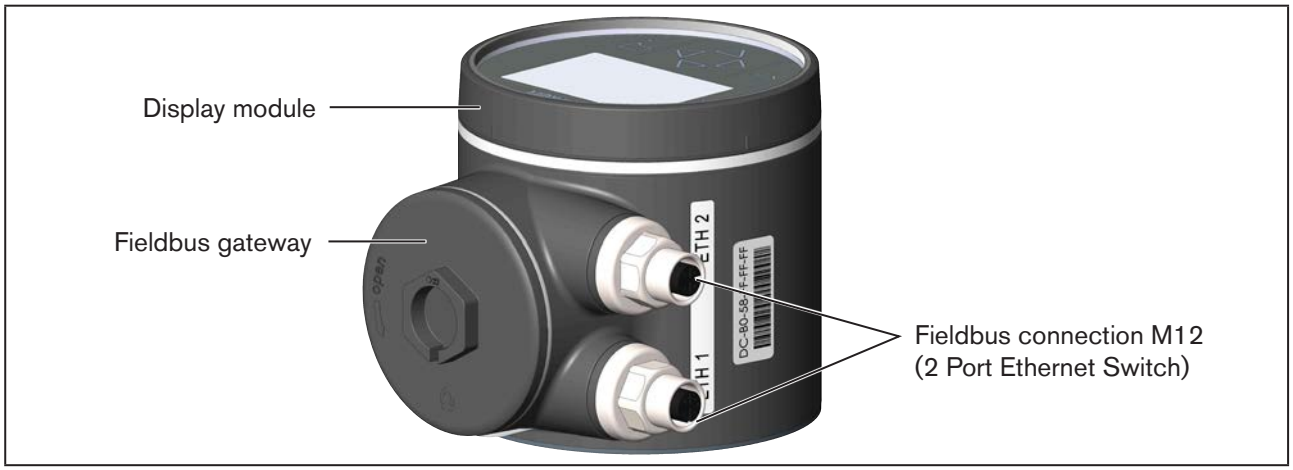


*Figure 80: Fieldbus gateway with display module*

### 18.1.1 Access to the büS service interface

The büS service interface is located inside the fieldbus gateway.

To gain access, open the cover by turning it anticlockwise.

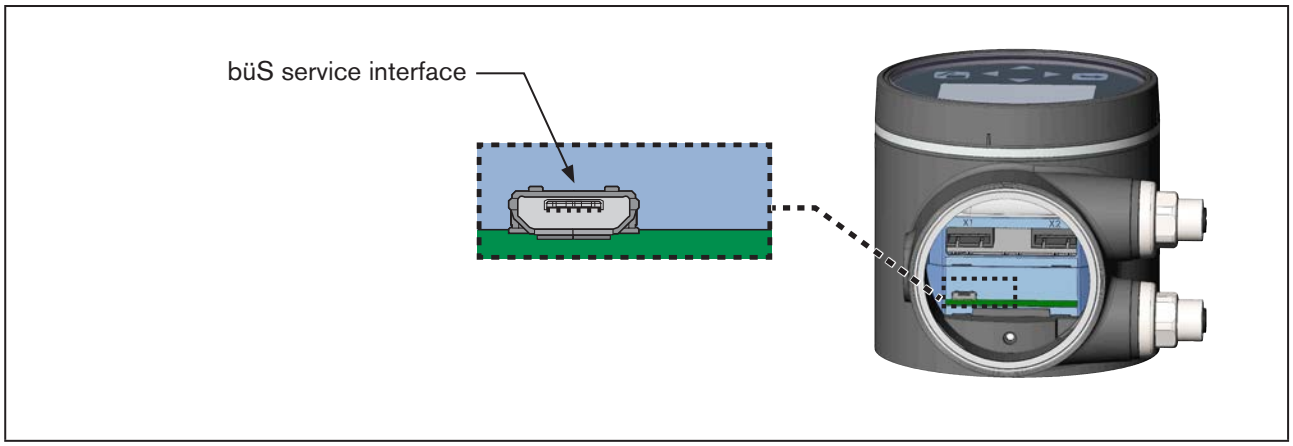


*Figure 81: büS service interface for fieldbus gateway version*

**Electrical connection of the fieldbus gateway:**
see chapter "10.3 Electrical connection fieldbus gateway", page 64.

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## 18.1.2 LEDs for status display of the network connection

The LEDs for status display of the network connection are inside the fieldbus gateway.

To gain access, open the cover by turning it anticlockwise.

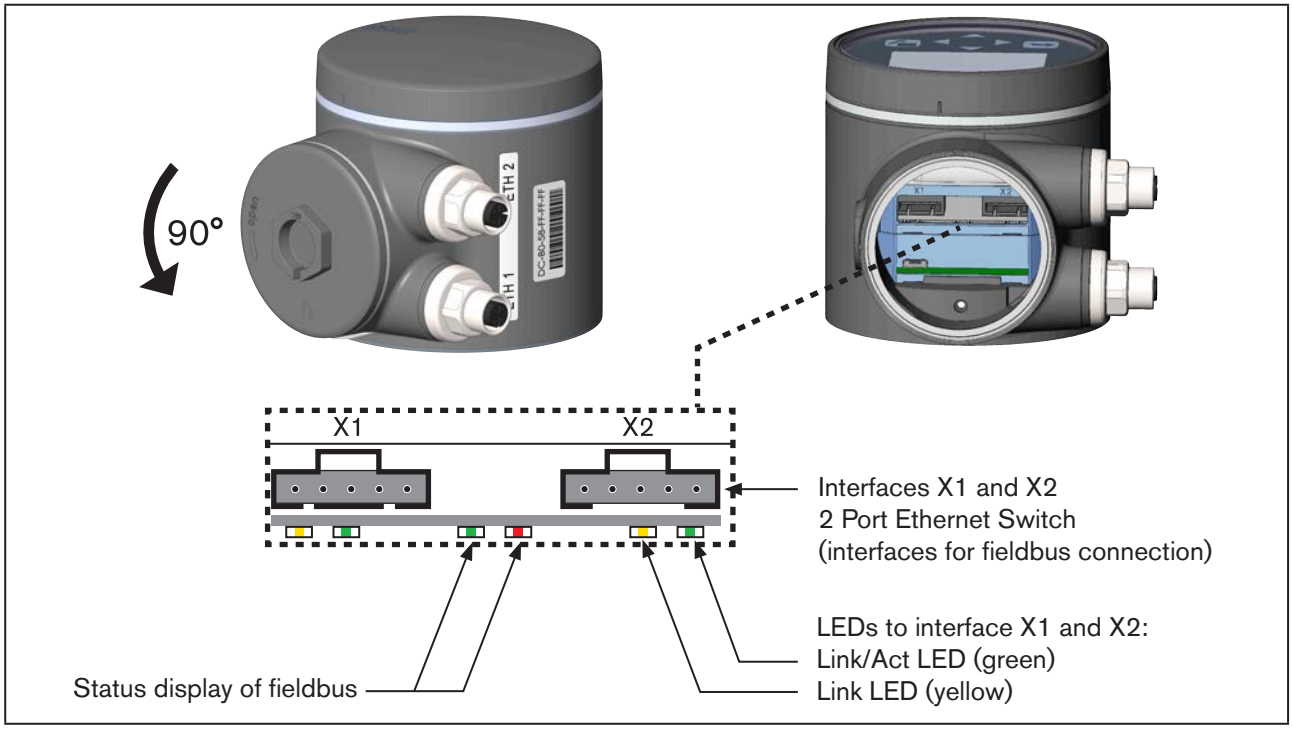


*Figure 82: LEDs for status display of the network connection*

| LED status | | Description / cause of error | Procedure |
|---|---|---|---|
| **Link/Act LED (green)** | Active | Rapid flashing: Connection to the higher-level protocol layer EtherNet/IP has been established. Data is being transmitted.<br>Slow flashing: There is no connection to the protocol layer. This is usually the case for approx. 20 seconds following a restart. | |
| | Not active | No connection to the network available. | Check cables. |
| **Link LED (yellow)** | Active | Connection to the network available. | - |
| | Not active | No connection to the network available. | Check cables. |

*Table 46: LED status displays of the interfaces X1 and X2 (fieldbus connection)*

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## 18.2 Technical data Industrial Ethernet

### 18.2.1 PROFINET IO specifications

| | |
|---|---|
| Topology recognition | LLDP, SNMP V1, MIB2, physical device |
| Minimum cycle time | 10 ms |
| IRT | not supported |
| MRP (Media Redundancy) | MRP Client is supported |
| Additional supported features | DCP, VLAN priority tagging, Shared Device |
| Transmission speed | 100 Mbit/s |
| Data transport layer | Ethernet II, IEEE 802.3 |
| PROFINET IO specification | V2.3 |
| (AR) Application Relations | The device can simultaneously process up to 2 IO-ARs, 1 Supervisor AR and 1 Supervisor DA AR. |
| Data transport layer | Ethernet II, IEEE 802.3 |

### 18.2.2 EtherNet/IP specifications

| | |
|---|---|
| Predefined standard objects | Identity Object (0x01) |
| | Message Router Object (0x02) |
| | Assembly Object (0x04) |
| | Connection Manager (0x06) |
| | DLR Object (0x47) |
| | QoS Object (0x48) |
| | TCP/IP Interface Object (0xF5) |
| | Ethernet Link Object (0xF6) |
| DHCP | supported |
| BOOTP | supported |
| Transmission speed | 10 and 100 Mbit/s |
| Duplex transmission | Half Duplex, full Duplex, autonegotiation |
| MDI modes | MDI, MDI-X, Auto-MDIX |
| Data transport layer | Ethernet II, IEEE 802.3 |
| Address Conflict Detection (ACD) | supported |
| DLR (ring topology) | supported |
| Integrated switch | supported |
| CIP Reset services | Identity Object Reset Service of Type 0 and 1 |
| Data transport layer | Ethernet II, IEEE 802.3 |

### 18.2.3 Modbus TCP specifications

| | |
|---|---|
| Modbus Function Codes | 1, 2, 3, 4, 6, 15, 16, 23 |
| Mode | Message Mode: Server |
| Transmission speed | 10 and 100 Mbit/s |
| Data transport layer | Ethernet II, IEEE 802.3 |

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## 18.3 Designing via fieldbus

For project planning, you need the suitable start-up file for the respective fieldbus protocol.

| Fieldbus | Start-up file |
|---|---|
| EtherNet/IP | eds file |
| PROFINET | GSDML file |
| Modbus TCP | not required |

The start-up files required for the respective project planning software and their description are available on the Internet.

**Download:**
www.burkert.com / Type 3363 / Downloads „Software“ / Initiation Files

For instructions on installation of the start-up files, please refer to the documentation of the design software being used.

### 18.3.1 Setting the Ethernet parameters for EtherNet/IP, PROFINET, Modbus TCP

The Ethernet parameters must be set for Modbus TCP.

**Setting option:**
Using the Bürkert Communicator PC software, using the web server or on the display of the device (option).

Settings are created on the PC using the büS service interface and the “Bürkert Communicator” PC software. To do this, you need the USB-büS-Interface, which is available as an accessory.

Display operation: Key functions

| | | |
|---|---|---|
| select, activate | confirm | back |

To set the Ethernet parameters, you must switch to the detailed view parameters for Industrial Communication.

**Switch to the detailed view as follows:**

→ When setting with “Bürkert Communicator” in the navigation area, select **Industrial communication**.

→ When setting on the display switch from home screen to **CONFIGURATION** and select **Industrial communication**.

✓ You are in the detailed view Parameter.

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The Ethernet parameters can only be set when the corresponding fieldbus protocol has been selected.
**Parameter** → **Protocol settings** →**Protocol** → Select protocol.

**Setting the Ethernet parameters:**

→ Select **Protocol settings**.

→ Select **Protocol** and set the required fieldbus protocol.

**Settings:**

→ Select **IP settings** and create settings.

- **DNS compatible name** can be set for PROFINET only.
- **Static IP address** factory default setting: 192.168.0.100
- **Network mask** factory default setting: 255.255.255.0
- **Default gateway** factory default setting: 192.168.0.1.

**Setting for EtherNet/IP fieldbus protocol:**

→ Select **IP settings**.

→ Select **IP-Mode** and set the required operation mode. Factory default setting: **Static IP address**.

You have set the Ethernet parameters to connect the device to the PLC network.

The complete Industrial Communication menu is described in the separate software manual.

**Downloads:**
www.burkert.com / Type 3363 / Downloads „User Manuals“ / Software manual Type 3360 3361 3363....

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## 18.4 Web server

The configuration of the EtherNet device required for integration in the network can be implemented via a web server.

### 18.4.1 Connection to the web server

→ Setting IP address in the network card of the PC.

IP address: **192.168.0.xxx**

For xxx enter any numerical value except 100
(EtherNet device is delivered with 100 occupied by IP address).

→ Using a network cable, connect the PC to the EtherNet device.

### 18.4.2 Access to the web server

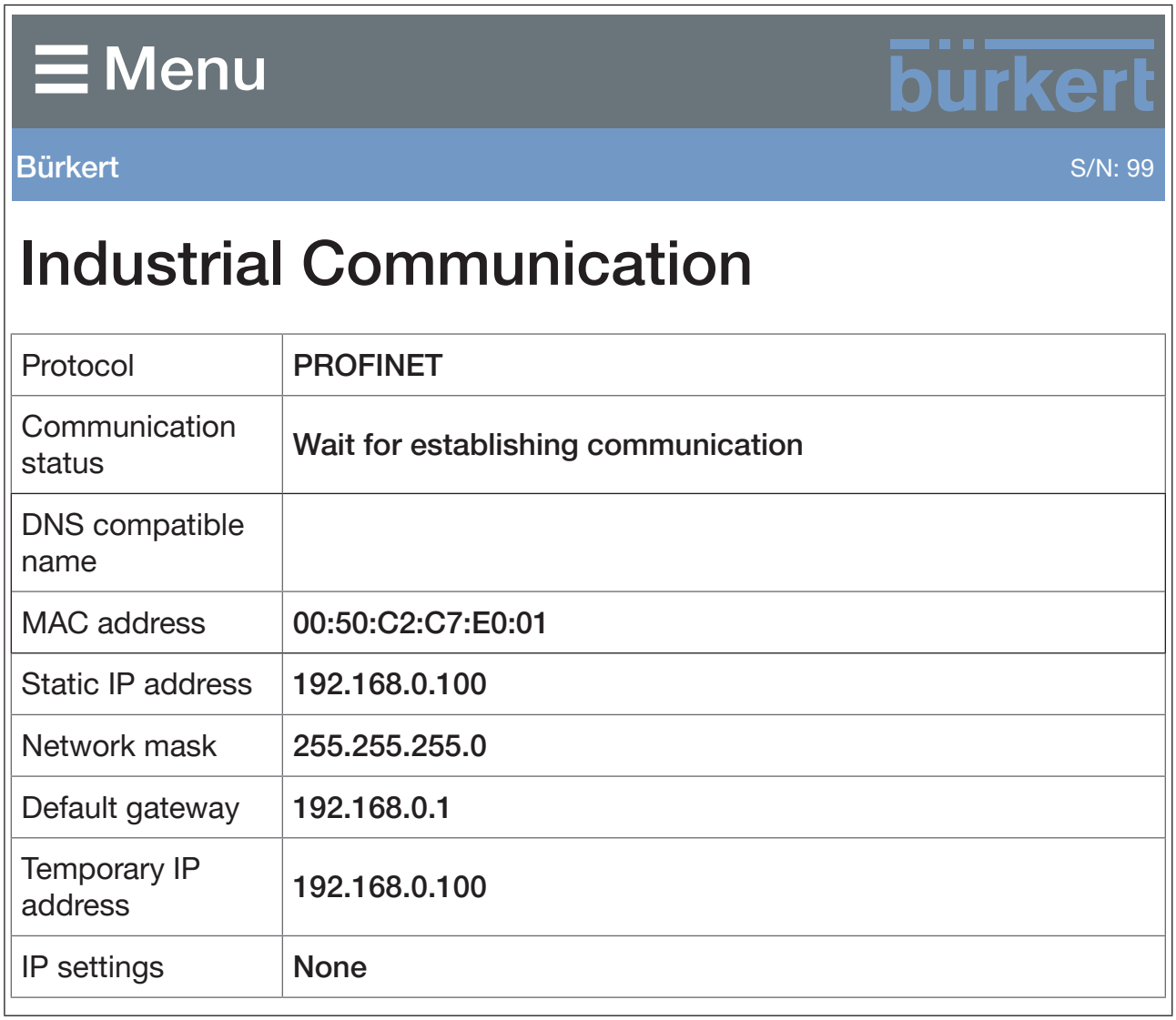


*Figure 83: Access to the web server via the Default IP*

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With EtherNet/IP, it is also possible to set DHCP or BOOTP (NOT standard).
The IP address is acquired from a DHCP server.

→ Open an Internet browser.

→ Input Default IP **192.168.0.100**.
(For Ethernet/IP devices the IP address is assigned via a DHCP server. If no assignment occurs within 1 minute via DHCP, the device uses the Default IP 192.168.0.100.)

The software for configuration of the Ethernet device is now available on the PC.

**Configuration of several devices:**

All devices are delivered with the same IP address (192.168.0.100). To ensure that the device can be identified for the configuration, the network may contain only 1 device which has not yet been configured.

▸ Connect the devices (EtherNet device) in succession, individually to the network and configure.

### 18.4.3 Configuring EtherNet device

Logging into the system:

→ Input user name and password. Username: **admin**
Password: **admin**

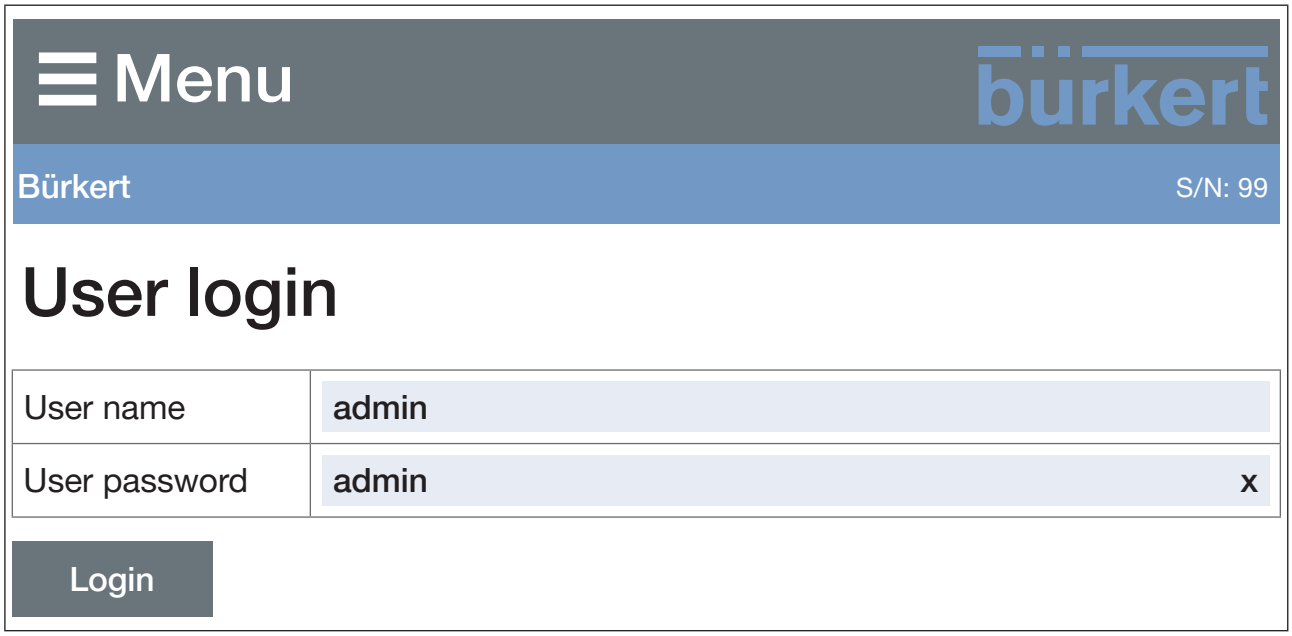


*Figure 84: Logging into the system*

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Configuration:

→ Input device name and IP address for the Ethernet device.
The device name will be used later for project planning (e.g. in STEP 7).

→ Activate with **Commit changes**.

→ To accept the changed parameters, reset the voltage in the Ethernet device.

→ Restart device with **Restart device**.

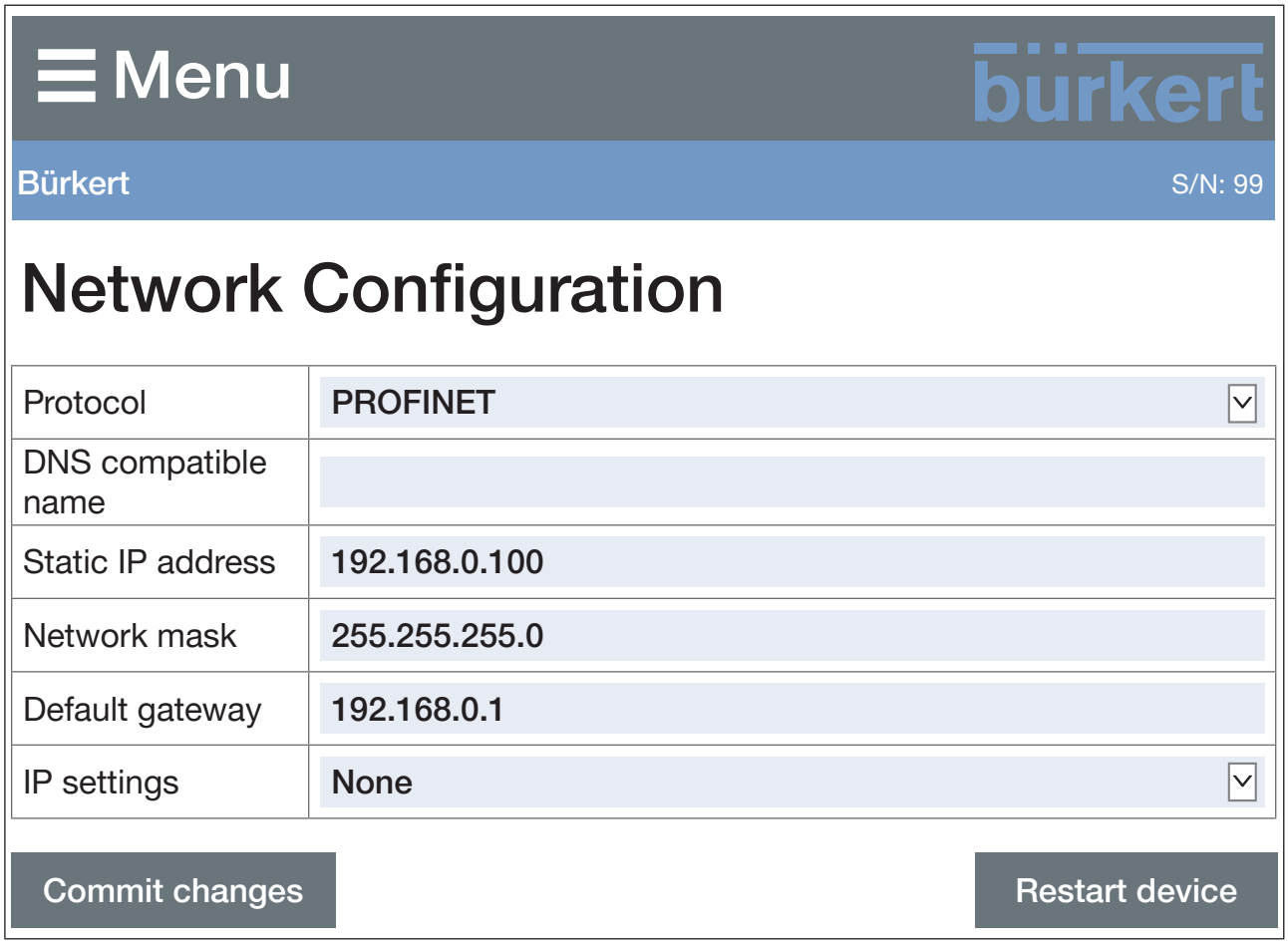


*Figure 85: Configuring Ethernet device*

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# 19 CANopen

**Electrical installation of devices with CANopen network:**
see chapter “10.2 Electrical connection büS/CANopen”, page 63.

## 19.1 Designing via fieldbus

For project planning, you need an eds file as a start-up file for CANopen.

The eds file and the associated description are available on the Internet.

**Download:**
www.burkert.com / Type 3363 / Downloads „Software“ / Initiation Files

For instructions on installation of the start-up files, please refer to the documentation of the design software being used.

## 19.2 CANopen network configuration

Instructions for the network configuration based on the CANopen protocol are available on the Internet.

**Download:**
www.burkert.com / Type 3363 / Downloads „User Manuals“ /
"Software manual | CANopen Network configuration"

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# 20 büS

The term “büS” (Bürkert system bus) used in this manual stands for the communication bus developed by Bürkert, based on the CANopen protocol.

**EElectrical installation of devices with büS network:**
see chapter “10.2 Electrical connection büS/CANopen”, page 63.

## 20.1 Cabling of büS networks

**Further information on cabling büS networks can be found under the following link:**

Guide for planning of büS networks

## 20.2 Configuration of büS networks

Additional information about the configuration of büS networks can be found on the Internet.

**Download :**
www.burkert.com / Type 8922 / Downloads / User manuals / Software manual Type 8922, MExx | Software of f(x) configuration

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# 21 MAINTENANCE

**WARNING!**

**Risk of injury from improper maintenance work.**

- ▸ Maintenance may be carried out only by trained technicians and with the appropriate tools.
- ▸ Secure system against unintentional activation.
- ▸ Following maintenance, ensure a controlled restart.

The following maintenance work is required for the diaphragm control valve.

- After the first steam sterilisation or when required
  → Retighten body screws crosswise.
- After maximum $10^5$ switching cycles
  → Check the diaphragm for wear and replace if required.

Muddy and abrasive media require correspondingly shorter inspection intervals.

- Replacing the SAFEPOS energy pack
  The device outputs a maintenance message as soon as the SAFEPOS energy pack is to be replaced.
  **Message:** The remaining service life of the energy storage is approx. 25 %!
  The energy storage must be changed soon.

## 21.1 Visual inspection

Perform regular visual inspections according to the conditions of use:

→ Check medium connections for leak-tightness.

→ Check the relief bore for leaking medium.

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## 21.2 Replacing the diaphragm

**DANGER!**

**Risk of injury from high pressure.**

▸ Before working on the system or device, switch off the pressure and vent or drain lines.

**WARNING!**

**Risk of injury due to improper installation work.**

▸ The diaphragm may be replaced only by trained technicians and with the appropriate tools.

### 21.2.1 Required work steps

To replace the diaphragm, ensure that the device is in the MANUAL operating state and the valve is in the position “valve 100% open”. Replacement of the diaphragm is broken down into the following steps:

1. Set operating state MANUAL, chapter “14.1”, page 103.
2. Switch the valve to the position “valve 100% open“, chapter “15”, page 114.
3. Switch off the supply voltage. Wait until LED illuminated ring goes out.
4. Remove actuator from valve body, chapter .“21.2.3”, page 157.
5. Replace diaphragm, chapter “21.2.4”, page 158.
6. Mounting actuator on the valve body and making the electrical connections, chapter “21.2.5”, page 159.
7 Execute function M.Q0.TUNE, chapter “11.5”, page 75.
8. Set operating state AUTOMATIK, chapter “14.1”, page 103.

### 21.2.2 Required tools

- Open-end wrench

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## 21.2.3 Remove actuator from valve body

**Preconditions: MANUAL operating state, valve position 100% open, supply voltage switched off.**

**WARNING!**

**Risk of injury due to electric shock.**
**Risk of crushing due to mechanically moving parts.**

- Switch off supply voltage.
- Devices with SAFEPOS energy-pack: Completely drain SAFEPOS energy-pack. Wait until LED illuminated ring goes out; the LED status must not be in **LED off** mode.

**ATTENTION!**

**Damage to the diaphragm.**

- To prevent damage, the device must be in the MANUAL operating state during installation and removal of the actuator and diaphragm.
- The actuator must be in the position “valve 100% open“.

→ Loosen the 4 nuts on the diaphragm socket cross-wise.

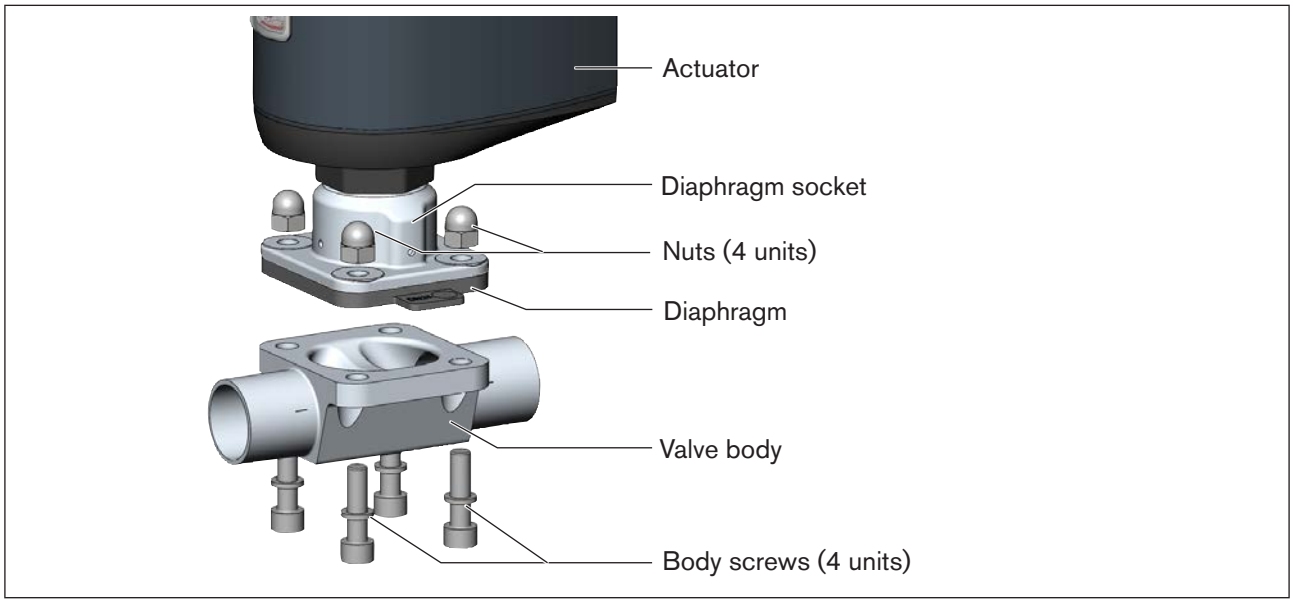


*Figure 86: Disassembly of the diaphragm using the 2-way body as an example*

→ Remove the body screws.

→ Remove valve body.

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## 21.2.4 Replacing the diaphragm

→ Unbutton or unscrew the old diaphragm (see “Table 47: Fastening types for diaphragms”).
Diaphragm with bayonet catch: → Loosen and remove diaphragm by turning it 90°.

**Mount the new diaphragm:**

Depending on the size of the diaphragm, there are different fastening types for the diaphragm.

| Diaphragm size | Fastening types for diaphragms | |
|---|---|---|
| | PTFE | EPDM / FKM / laminated PTFE |
| 08 | Diaphragm pressed in | Diaphragm pressed in |
| 15, 20 | Diaphragm with bayonet catch | Diaphragm with bayonet catch |
| 25, 32, 40 | Diaphragm with bayonet catch | Diaphragm screwed in |

*Table 47: Fastening types for diaphragms*

**Fastening the diaphragm with a bayonet catch:**

→ Hook diaphragm into the pressure piece and secure by turning it 90°.

**Fastening the diaphragm by screwing it in:**

→ If there is no insert in the pressure piece, fit the insert into the pressure piece as shown in the figure.

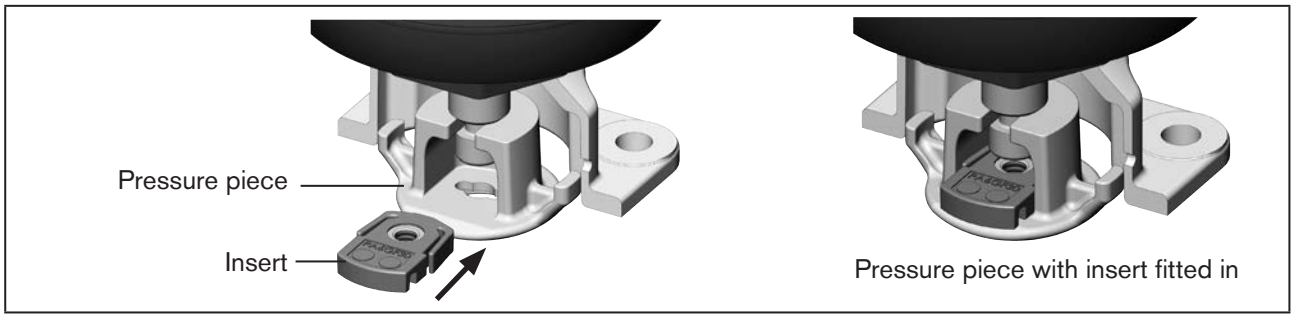


*Figure 87: Fitting the insert into the pressure piece*

→ Hand-tighten the diaphragm into the pressure piece.

→ Loosen by half a rotation.

→ Align diaphragm.
The identification tab on the diaphragm must protrude out of the valve body at right angles to the longitudinal axis of the pipeline (see “Figure 88”).

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**Fastening the diaphragm by pressing it in:**

→ Press diaphragm into the pressure piece.

→ Align diaphragm. The identification tab on the diaphragm must protrude out of the valve body at right angles to the longitudinal axis of the pipeline (see “Figure 88”).

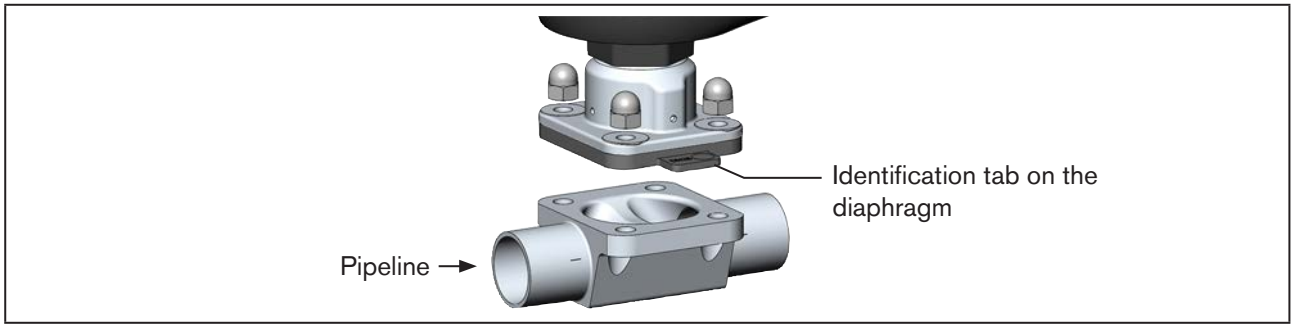


*Figure 88: Aligning the diaphragm (example 2-way body)*

## 21.2.5 Mounting actuator on the valve body and making the electrical connections

**WARNING!**

**Risk of injury due to electric shock.**
**Risk of crushing due to mechanically moving parts.**

▸ Switch off supply voltage.

**ATTENTION!**

**Damage to the diaphragm.**

▸ To prevent damage, the device must be in MANUAL operating state during installation.

▸ The actuator must be in the position “valve 100% open“.

→ ⚠ Before installing the actuator, check whether the diaphragm is free of damage and correctly aligned. The mark tab of the diaphragm must protrude from the valve body at a right angle to the longitudinal axis of the pipeline (see“Figure 88”).

→ Replace a damaged diaphragm.

→ Place actuator on the valve body.
Stud bolts have been pre-installed for T-body and tank bottom body.
Insert screws into the valve body for 2-way bodies.

→ Lightly tighten the nuts in a crosswise sequence until the diaphragm is positioned between the housing and actuator.
⚠ Do not fully tighten nuts yet.

→ Apply supply voltage.

→ Run M.SERVICE as described below.

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**Perform M.SERVICE for devices without a display module:**

**NOTE!**

**Malfunction is valve position is not fully open.**

▸ The valve must be in the position “valve 100% open” before the M.SERVICE is triggered.

The 2 buttons for running the M.SERVICE are located under the dummy cover.

For devices equipped with a display module, the buttons have no function. The M.SERVICE is triggered on the display.

**Devices with ATEX approval or IECEx approval are secured with a magnetic lock.**

The removal of the cover is described in the additional manual for electromotive control valves with ATEX approval and IECEx approval.

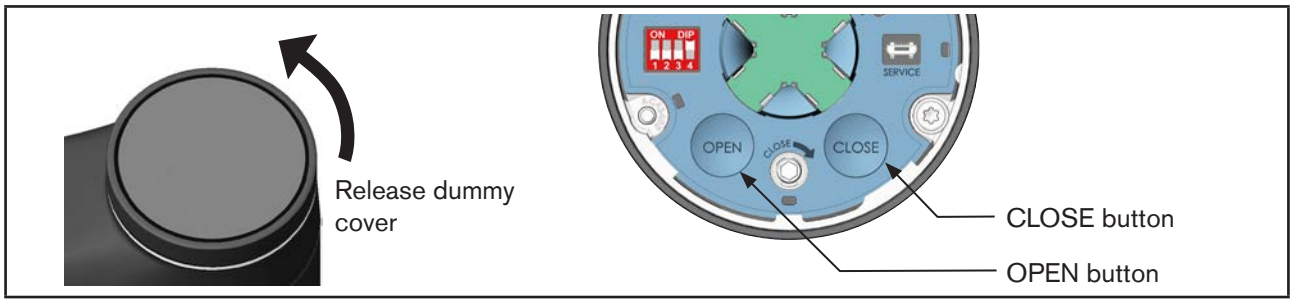


*Figure 89: Running M.SERVICE*

→ To release, rotate the dummy cover counter-clockwise and remove it.

→ Simultaneously hold down the OPEN and CLOSE buttons for 5 s.

✔ The M.SERVICE function is running.

→ Wait until the M.SERVICE function has ended and the actuator stops.

**Running M.SERVICE on the device display:**

Display operation: Key functions

| | | |
|---|---|---|
| select, activate | confirm | back |

To run the M.SERVICE function, you must change to the detailed view maintenance for position controller.

**Changing to the detailed view:**

→ Switch from home screen to **CONFIGURATION**, select **Position controller** and switch to **MAINTENANCE**.

✔ You are in the detailed view maintenance.

**Running the M.Q0.TUNE function:**

→ Select **CALIBRATION**.

→ Select **SERVICE**.

The following question appears: “Do you really want to start the M.SERVICE?

→ Start M.SERVICE.

The following text appears:

“--Operation--. Please wait...”

“Finished.”

✔ The M.SERVICE function has run.

**Tighten nuts gradually:**

**WARNING!**

**Risk of injury due to non-observance of the tightening torque.**

Non-observance of the tightening torque is hazardous as the device may be damaged.

▸ Observe tightening torque.

→ Tighten the nuts crosswise to 1/3 of the tightening torque.

→ Then tighten the nuts crosswise to 2/3 of the tightening torque.

→ Tighten crosswise up to the permitted tightening torque.

**Tightening torque for installation of the actuator**

| Diaphragm size | Tightening torques for diaphragm [Nm] | |
|---|---|---|
| | EPDM/FKM | PTFE / advanced PTFE / laminated PTFE |
| 08 | 2.5 +10 % | 2.5 +10 % |
| 15 | 3.5 +10 % | 4 +10 % |
| 20 | 4 +10 % | 4.5 +10 % |
| 25 | 5 +10 % | 6 +10 % |
| 32 | 8 +10 % | 10 +10 % |
| 40 | 8 +10 % | 10 +10 % |
| * For all values, there is a tolerance of +10 % of the respective tightening torque | | |

*Table 48: Tightening torques for installation of the actuator*

**Next steps:**

- To adjust the position control, running the M.Q0.TUNE function, chapter “11.5”, page 75.

**ATTENTION!**

**Damage to the diaphragm.**

▸ To prevent damage, first run the M.Q0.TUNE function after making the electrical connection. Only then set the operating state to AUTOMATIC.

- Set operating state AUTOMATIK, chapter “14.1”, page 103.

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## 21.3 Replacing the energy pack

**WARNING!**

**Risk of injury due to improper replacement of spare parts.**

- Spare parts may be changed only by trained technicians and with the appropriate tools.

**CAUTION!**

**Risk of injury due to electric shock.**

- Before removing the SAFEPOS energy-pack, switch off the supply voltage.
- Completely drain SAFEPOS energy-pack. Wait until the LED illuminated ring goes out; the LED status must not be in LED off mode.

Setting the LED mode, see chapter “12.2.2 Setting LED mode”, page 89.

### 21.3.1 Required work steps

The SAFEPOS energy-pack is located in the actuator housing. The following steps are required to replace the SAFEPOS energy pack:

1. Switch off the supply voltage. Wait until LED illuminated ring goes out.
2. Open the actuator housing
   Devices without fieldbus gateway, chapter “21.3.3”, page 163.
   Device with fieldbus gateway, chapter “21.3.4”, page 165.
3. Replacing the SAFEPOS energy-pack, chapter “21.3.5”, page 167:
4. Close the actuator housing
   Devices without fieldbus gateway, chapter “21.3.6”, page 169.
   Device with fieldbus gateway,, chapter “21.3.7”, page 171.
5. Apply supply voltage.

### 21.3.2 Required tools and equipment

- Key for hexalobular-internal screw T10, T20 and T25
- Allen key, width across flats 3 mm

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### 21.3.3 Opening the actuator housing for device without fieldbus gateway

**Precondition: Supply voltage switched off.**

**WARNING!**

**Risk of injury due to improper installation work.**

- The actuator may be opened only by trained technicians and with the appropriate tools.

**Removing the display module or dummy cover:**

**NOTE!**

Carefully remove display module ensuring that the connection cable and the HMI interface are not damaged.

**Devices with ATEX approval or IECEx approval are secured with a magnetic lock.**
The removal of the cover is described in the additional manual for electromotive control valves with ATEX approval and IECEx approval.


*Figure 90: Removing dummy cover or display module*

→ To release the display module or the dummy cover, rotate counter-clockwise and remove.
**NOTE!** On the display module pay attention to the connection cable leading to the HMI interface!

→ For devices with display module disconnect the connection cable from the HMI interface.

**Removing LED and storage module:**

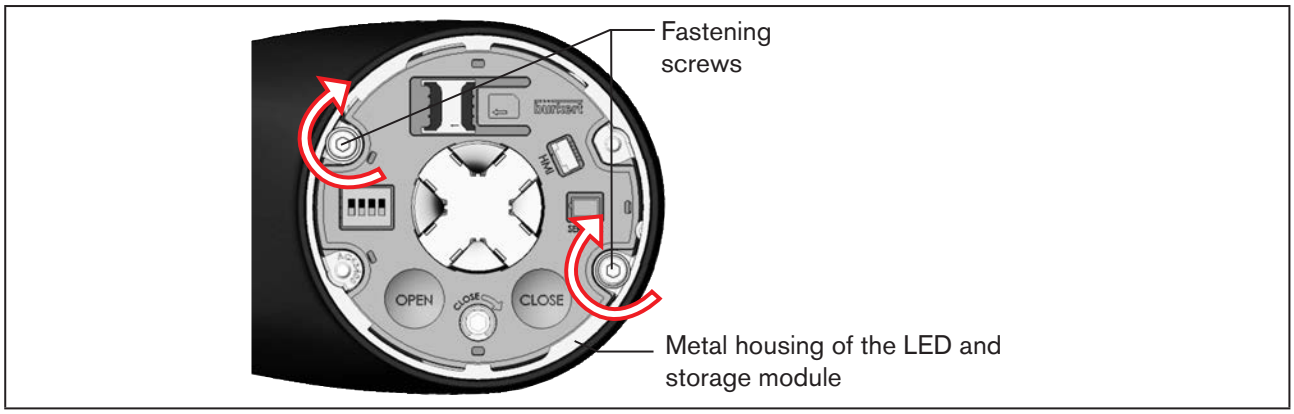


*Figure 91: Removing LED and storage module*

→ Remove the 2 fastening screws (hexalobular-internal screws T20).

→ Take hold of the LED and storage module on both sides of the metal housing and lift out.

**Removing actuator cover:**

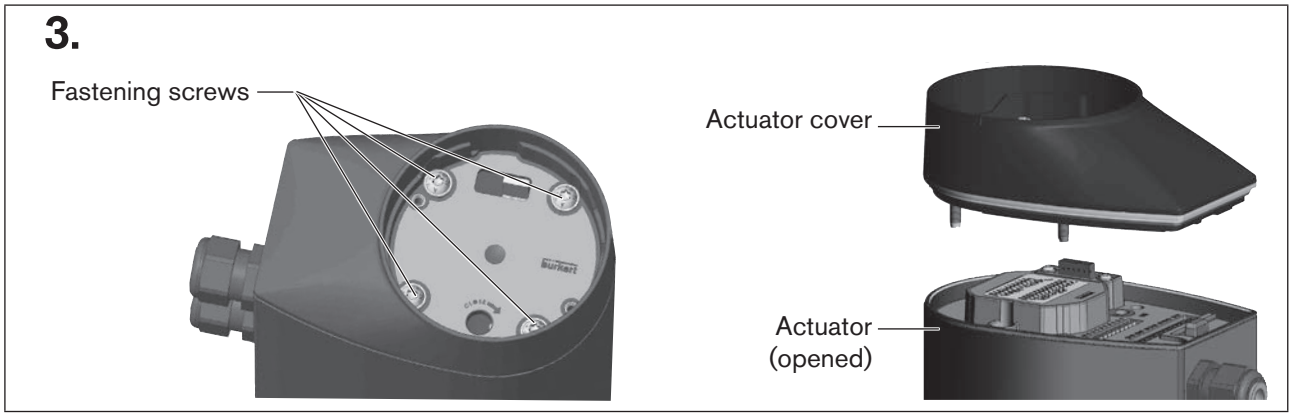


*Figure 92: Removing actuator cover*

→ Loosen the 4 fastening screws (hexalobular-internal screws T25).
The screws are integrated in the actuator cover to prevent them from falling out.

→ Remove actuator cover.

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### 21.3.4 Opening the actuator housing for device with fieldbus gateway

**Precondition: Supply voltage switched off.**

**WARNING!**

**Risk of injury due to improper installation work.**

- The actuator may be opened only by trained technicians and with the appropriate tools.

**Removing the display module or dummy cover:**

**NOTE!**

Carefully remove display module ensuring that the connection cable and the HMI interface are not damaged.

**Devices with ATEX approval or IECEx approval are secured with a magnetic lock.**
The removal of the cover is described in the additional manual for electromotive control valves with ATEX approval and IECEx approval.


*Figure 93: Removing dummy cover or display module*

→ To release the display module or the dummy cover, rotate counter-clockwise and remove.
**NOTE!** On the display module pay attention to the connection cable leading to the HMI interface!

→ For devices with display module disconnect the connection cable from the HMI interface.

**Removing fieldbus gateway:**

**NOTE!**

The fieldbus gateway may be removed only when it is deenergised, otherwise the device may be damaged.

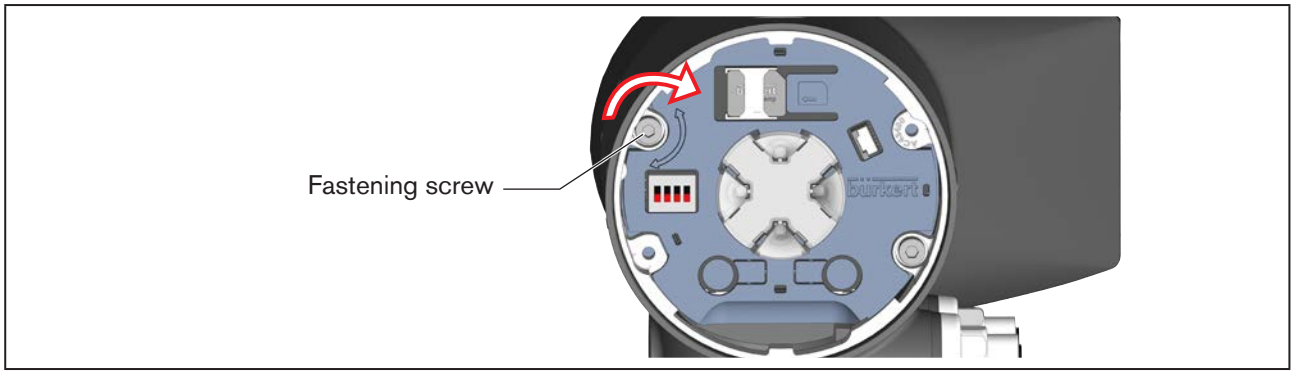


*Figure 94: Removing fieldbus gateway*

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→ Remove fastening screw (socket head screw, width across flats 3 mm).

**NOTE!**

Caution when removing the fieldbus gateway. Fieldbus gateway and actuator are connected to each other by a cable.

→ To release the fieldbus gateway, turn it counterclockwise and carefully remove it.

→ Disconnect connection cable from the fieldbus gateway.

**Removing bayonet adapter:**

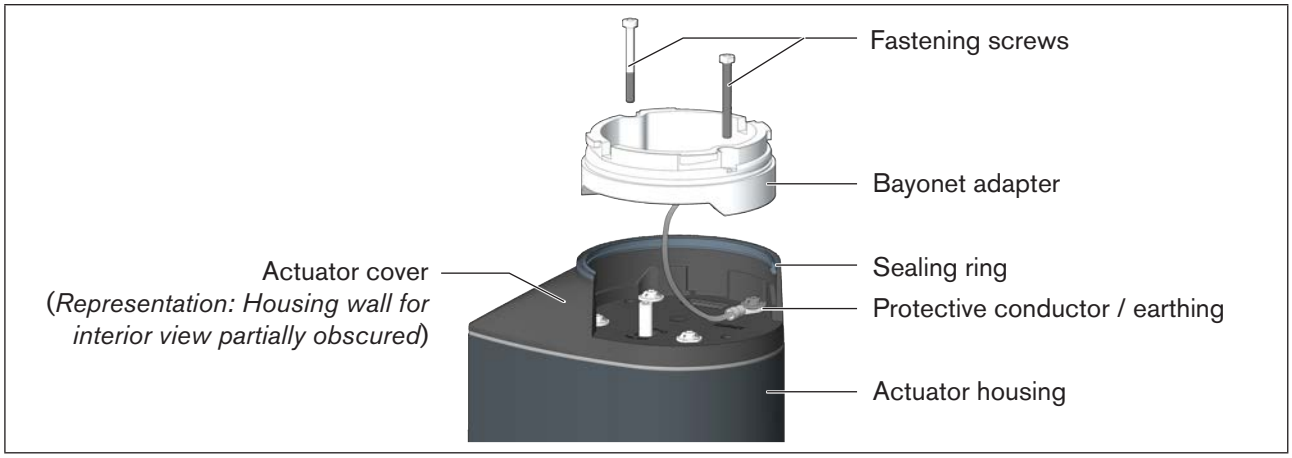


*Figure 95: Removing bayonet adapter*

→ Remove 2 fastening screws (hexalobular-internal screws T20).

→ Lift out bayonet adapter.
**NOTE!** The bayonet adapter is connected to the actuator cover by the earthing cable.
Bayonet adapter and actuator cover are removed together from the actuator.

**Removing actuator cover:**

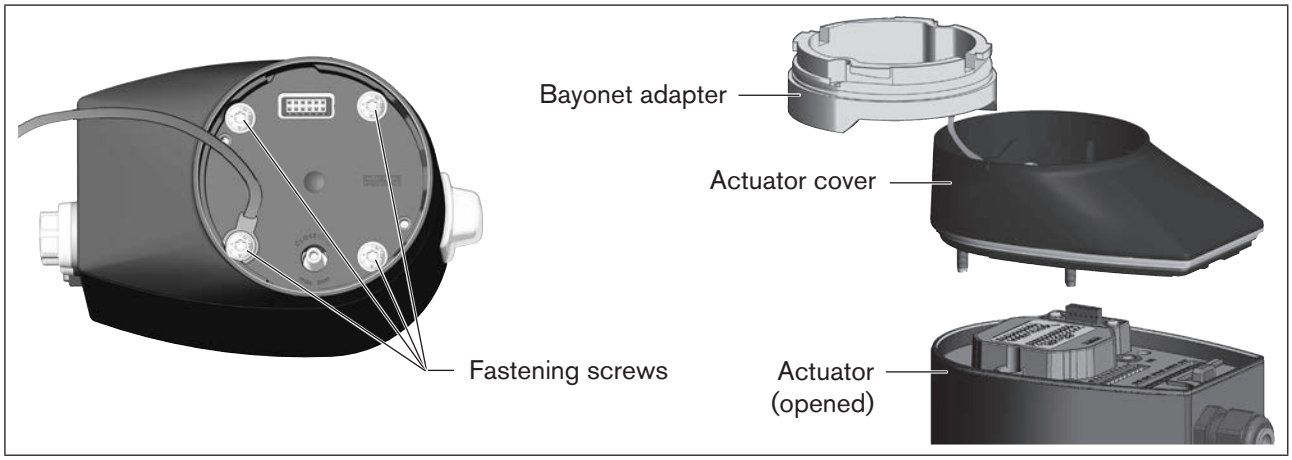


*Figure 96: Removing actuator cover*

→ Remove 4 fastening screws (hexalobular-internal screws T25).
The screws are integrated securely in the actuator cover.

→ Remove actuator cover and bayonet adapter.



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## 21.3.5 Replacing the SAFEPOS energy-pack

**Precondition: Actuator housing opened, power supply switched off.**

**Removing SAFEPOS energy pack:**

**NOTE!**

Removal while the supply voltage is applied may result in data loss.

▸ Remove SAFEPOS energy pack only when the power supply is switched off.

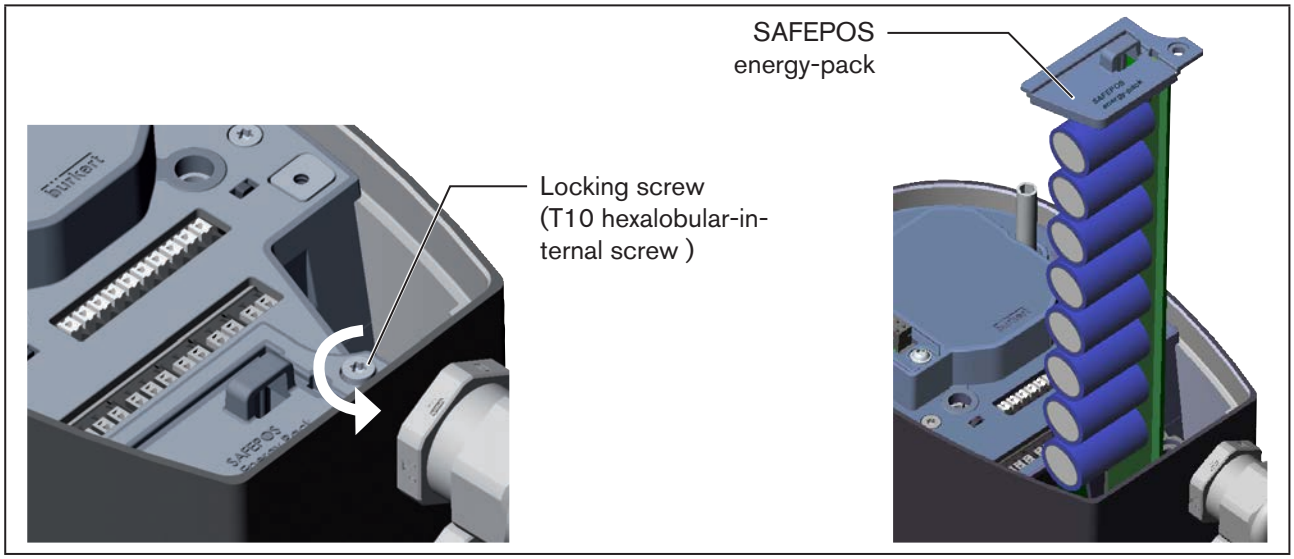


*Figure 97: Removing the SAFEPOS energy-pack*

→ Loosen locking screw (T10 hexalobular-internal screw ).

→ Completely pull out SAFEPOS energy-pack on the bracket.

**Inserting new SAFEPOS energy pack:**

→ Take SAFEPOS energy-pack out of the transport packaging.

→ Insert SAFEPOS energy-pack into the two guiding grooves and push in all the way.

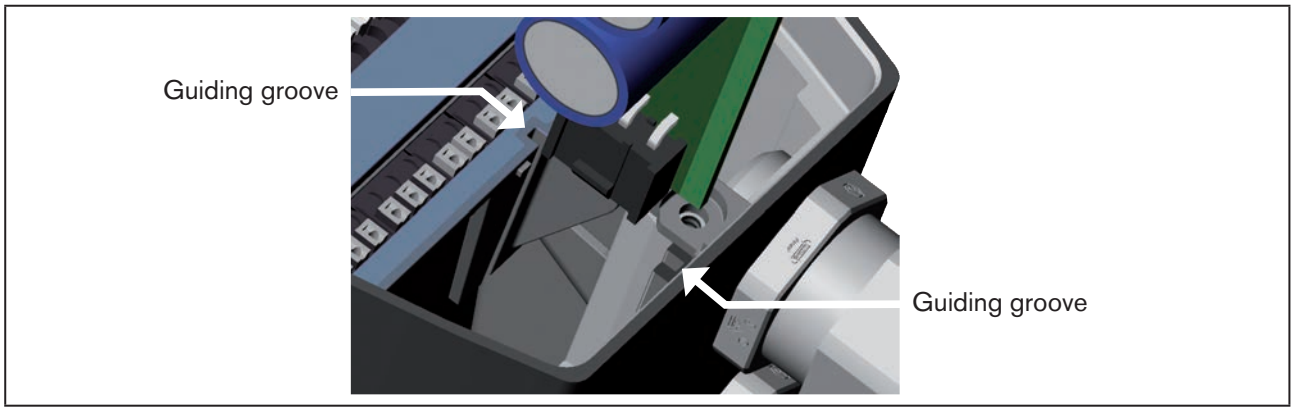


*Figure 98: Inserting the SAFEPOS energy-pack*

→ Tighten locking screw (T10 hexalobular-internal screw ).
Observe tightening torque 1.1 Nm!

**Next steps:**

- Close the actuator housing,
  Devices without fieldbus gateway, chapter “21.3.6”, page 169.
  Device with fieldbus gateway, chapter “21.3.7”, page 171.
- Apply supply voltage.

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## 21.3.6 Closing the actuator housing for device without fieldbus gateway

**ATTENTION!**

**Damage or malfunction due to ingress of dirt and moisture.**

Before closing the device, comply with the degree of protection IP65 and IP67 by ensuring that:

- The seal in the actuator housing/actuator cover must be inserted and undamaged.
- The sealing surfaces must be clean and dry.

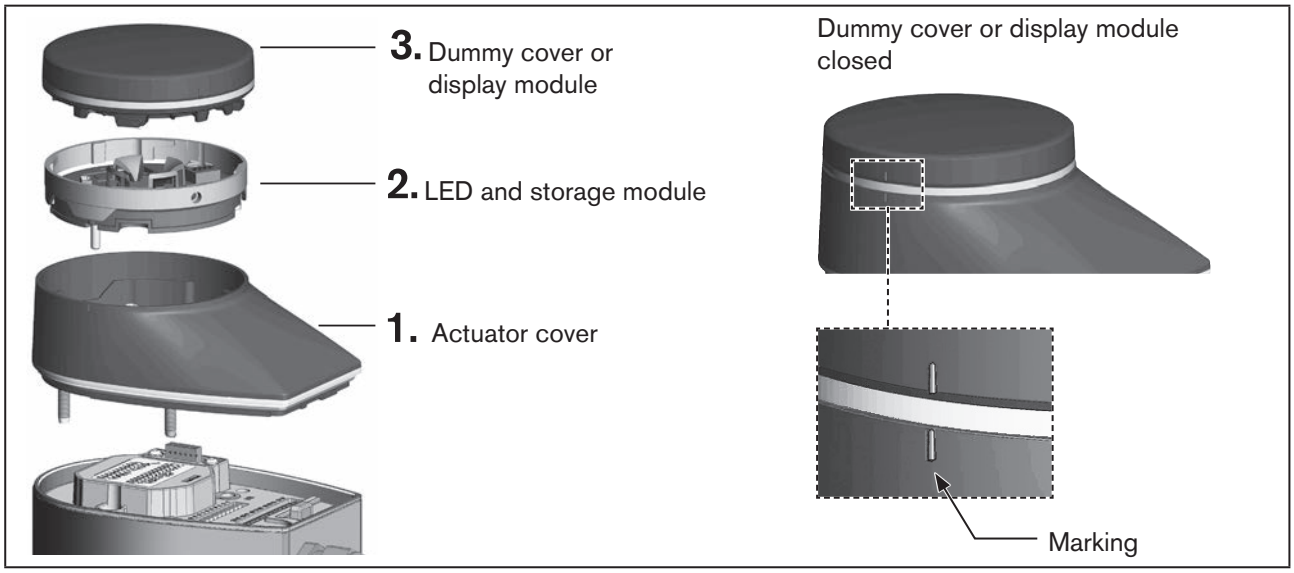


*Figure 99: Closing the actuator housing*

**1. Mounting the actuator cover**

→ Place actuator cover on the actuator housing.

→ Slightly screw in the 4 fastening screws (T25 hexagonal socket round screws) crosswise, firstly by hand and then tighten (tightening torque: 5.0 Nm).

**2. Mount LED and storage module:**

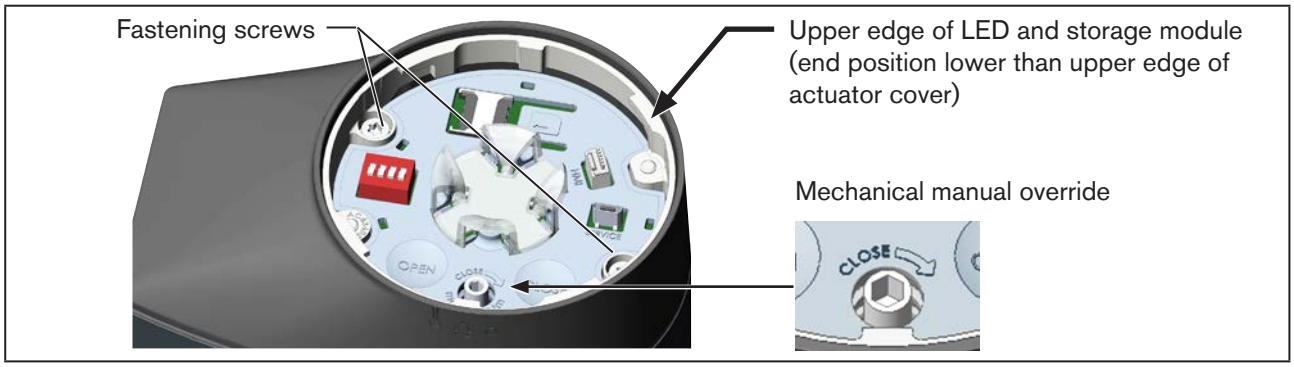


*Figure 100: Mount LED and storage module:*

→ Place the LED and storage module onto the actuator cover.
Align the recess for the manual override in the centre, paying attention to the correct alignment of the electrical plug connection.



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→ Carefully press down the LED and storage module by hand.
The end position is reached if the upper edge of the module is fully and evenly recessed in the actuator cover.

**NOTE!**

**The plug connection will be damaged if the LED and storage module is not correctly inserted.**

- Before the fastening screws are tightened, the LED and storage module must be fully recessed in the actuator cover.

→ Tighten 2 fastening screws (hexalobular-internal screws T20).
Observe the tightening torque of 1.1 Nm!

**Closing display module or dummy cover:**

**Devices with ATEX approval or IECEx approval are secured with a magnetic lock.**

Closing the cover is described in the supplementary instructions for the electromotive control valves with ATEX approval and IECEx approval.

**NOTE!**

**For devices with display module**
Before mounting the display, check whether the cable is correctly connected to the HMI interface.

→ For devices with display module, connect the connection cable to the HMI interface.

→ Mount display module or the dummy cover and turn clockwise until the 2 marks (one vertical line on the display module or dummy cover and on the actuator) are vertically aligned.

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## 21.3.7 Closing the actuator housing for device with fieldbus gateway

**Precondition: Supply voltage switched off.**

**Mounting actuator cover:**

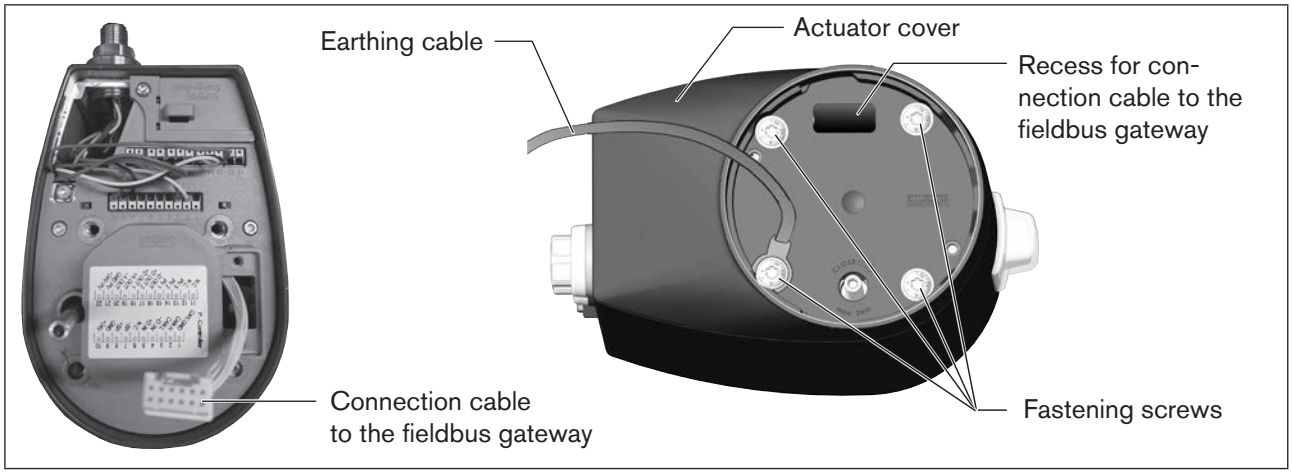


*Figure 101:* **Mounting actuator cover**

→ Feed connection cable to the fieldbus gateway through the recess in the actuator cover.

→ Position actuator cover on the actuator housing.
NOTE: The earthing cable, which is attached to the bayonet adapter, must be connected to one of the fastening screws in the actuator cover.

→ Tighten 4 fastening screws (hexalobular-internal screws T25).
Observe tightening torque 5 Nm!

**Mounting bayonet adapter:**

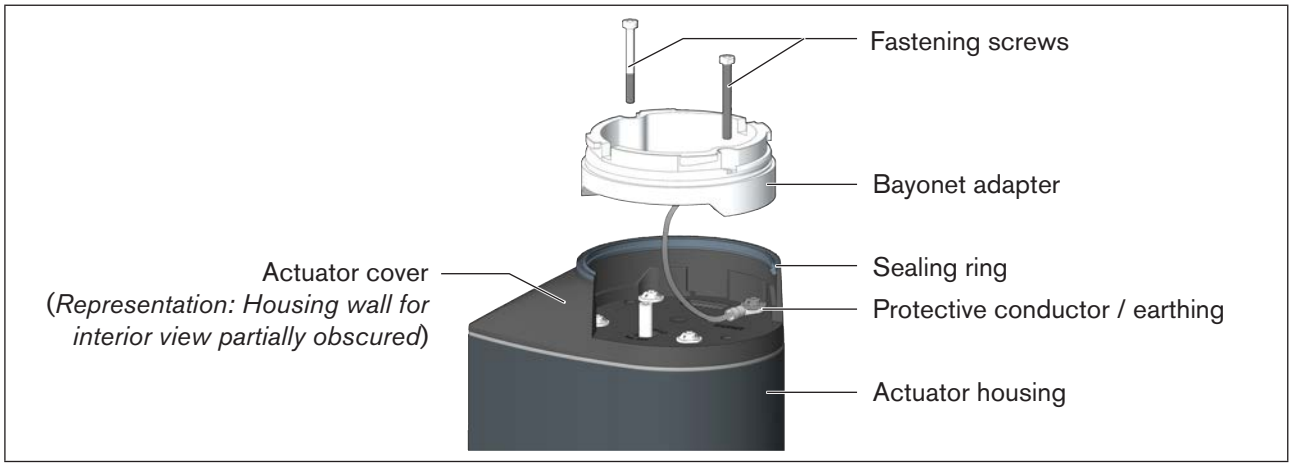


*Figure 102: Mounting bayonet adapter*

→ Position bayonet adapter on the actuator cover
**NOTE!** The sealing ring in the actuator housing must be close-fitting.

→ Tighten 2 fastening screws (hexalobular-internal screws T20)
Observe tightening torque 1.1 Nm!

**Mounting fieldbus gateway:**

**NOTE!**

The fieldbus gateway may be mounted only when it is deenergised, otherwise the device may be damaged.

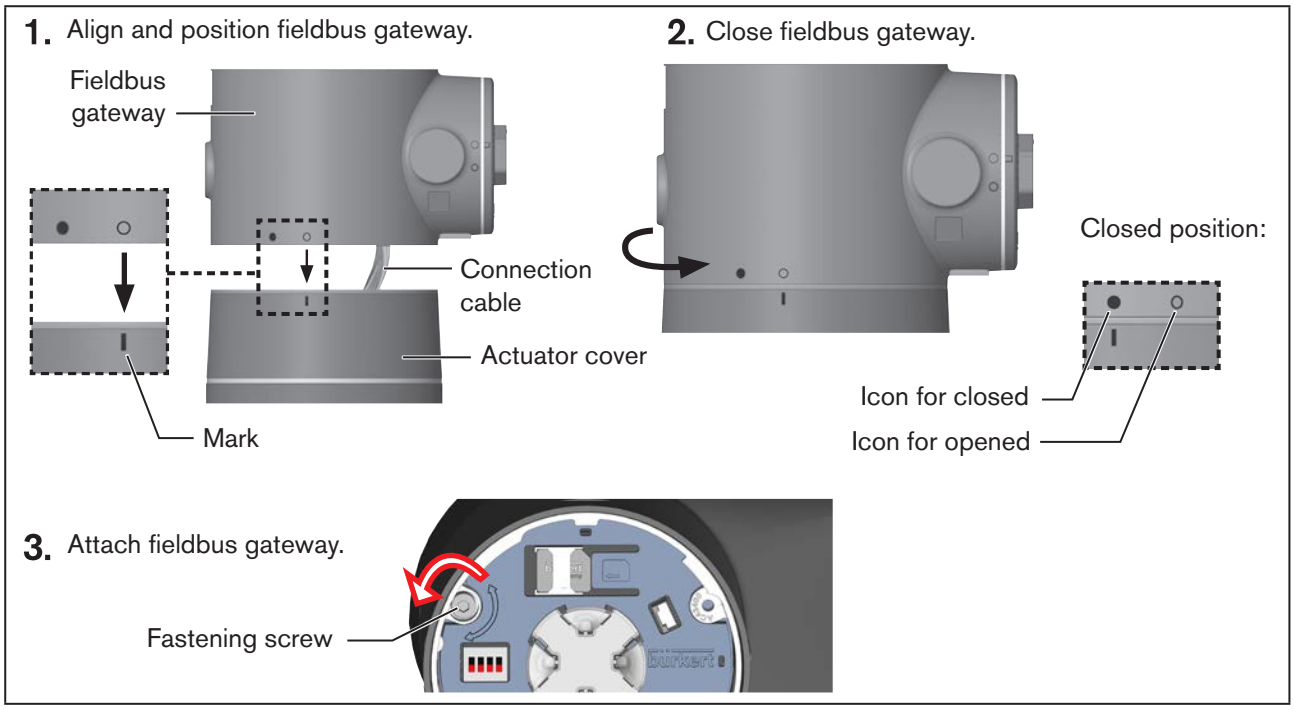


*Figure 103: Mount fieldbus gateway.*

→ Insert connection cable into the actuator on the fieldbus gateway.

→ Align and position fieldbus gateway on the actuator cover.
Centre the icon for opened over the mark on the actuator.

→ Manually turn fieldbus gateway clockwise until the icon for closed is positioned over the mark.

→ Tighten fastening screw (socket head screw, width across flats 3 mm).
Observe tightening torque 1.1 Nm!

**Closing display module or dummy cover:**

**Devices with ATEX approval or IECEx approval are secured with a magnetic lock.**

Closing the cover is described in the supplementary instructions for the electromotive control valves with ATEX approval and IECEx approval.

**NOTE!**

**For devices with display module**
Before mounting the display, check whether the cable is correctly connected to the HMI interface.

→ For devices with display module, connect the connection cable to the HMI interface.

→ Mount display module or the dummy cover and turn clockwise until the 2 marks (one vertical line on the display module or dummy cover and on the fieldbus gateway) are vertically aligned.

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## 21.4 Maintenance messanges

Maintenance messages are displayed in the following LED modes:

- Valve mode w/ warnings (mode set in the factory).
  The LED illuminated ring flashes blue alternately with the color of the valve position.
- NAMUR mode. The LED illuminated ring is lit blue.

If “Valve mode” is set as the LED mode, maintenance messages are not displayed.

| Message | Device behavior | Procedure |
|---|---|---|
| The remaining service life of the energy storage is approx. 25 %!<br>The energy storage must be changed soon. | Maintenance message. | Replace SAFEPOS energy pack soon, or in good time before the service life ends. |

*Table 49: Maintenance messages*

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# 22 TROUBLESHOOTING AND MESSAGES

## 22.1 Error messages

The error messages of the device are displayed as follows:

- Valve mode
  The LED illuminated ring flashes red alternately with the color of the valve position.
- Valve mode w/ warnings (mode set in the factory).
  The LED illuminated ring flashes red alternately with the color of the valve position.
- NAMUR mode.
  The LED illuminated ring is lit red.

| Message | Description | Device behavior | Procedure |
|---|---|---|---|
| Motor temperature is too high. Motor moves to the safety position. | Friction in the drive train is too high for operation. | Error message. Actuator moves to the safety position. | Contact your Bürkert Service Center. |
| Motor temperature is too high. Motor stops to avoid thermal damage. | Friction in the drive train is too high for operation. | Error message. Motor switches off. Actuator stops. Manual control not possible. | Contact your Bürkert Service Center. |
| Excess temperature detected. | Device temperature is too high for operation. | Error message. Actuator moves to the safety position. Manual control possible. | Reduce ambient temperature. If problems continue, contact your Bürkert Service Center. |
| Insufficient temperature detected. | Device temperature is too low for operation. | Error message. Actuator moves to the safety position. Manual control possible. | Increase ambient temperature. |
| Excess voltage detected. | Supply voltage is too high for operation. | Error message. Actuator moves to the safety position. Manual control possible. | Check supply voltage. |
| Insufficient voltage detected. | No supply voltage or supply voltage is too low for operation. | Error message. Actuator moves to the safety position. Manual control not possible. | Check supply voltage. If problems continue, contact your Bürkert Service Center. |
| Motor current is too high. | Increased friction in the drive train or end position detection incorrect. | Error message. Motor switches off. Actuator stops. Manual control not possible. | Run the M.Q0.TUNE function. If problems continue, contact your Bürkert Service Center. |
| Motor peak current is too high. | Increased friction in the drive train or end position detection incorrect. | | |

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| Message | Description | Device behavior | Procedure |
|---|---|---|---|
| Internal error: Hall sensor signal error. | Signal error of the measurement sensor. | Error message. Actuator moves to the safety position. Manual control not possible. | Contact your Bürkert Service Center. |
| Internal error: … | Internal error of the device. | Error message. Actuator moves to the safety position. | Contact your Bürkert Service Center. |
| CMD/SP sensor break. | Sensor break of the set-point value signal. | If device is configured accordingly: Error message. Actuator moves to the safety position. | Check the signal line of the set-point value. |
| PV sensor break. | Sensor break of the process actual value signal. | If device is configured accordingly: Error message. Actuator moves to the safety position. | Check the signal line of the process actual value. |
| Persistent memory cannot be used: Defective or not available. | Writing or reading error of the internal data storage EEPROM. | Error message. Actuator moves to the safety position. | Restart device. If problems continue, contact your Bürkert Service Center. |
| BueS event: Producer(s) not found. | Assigned external büS producer cannot be found. | Error message. Actuator moves to the safety position. | Check signal to büS partner. |
| BueS event: Bus connection lost / not available. | büS network cannot be found. | Error message. Actuator moves to the safety position. | Check büS network. |
| BueS event: Producer is not operational. | Producer is not operational in the status. | Error message. Actuator moves to the safety position. | Check büS producer. |
| BueS event: A device is using the same address. | Another büS participant is using the same address. | Error message. Actuator moves to the safety position. | Assign device and büS participant a unique address. |
| No correct connection to the process control system. | No connection available to the process control system. | Error message. Actuator moves to the safety position. | Check connection to the process control system. |
| Energy pack must be replaced. | Storage capacity of the energy pack is too low. Approach of the safety position cannot be guaranteed. | Error message. Actuator moves to the safety position. | Replace SAFEPOS energy pack. |
| No energy pack available. | SAFEPOS energy pack is not detected. | Error message. Actuator moves to the safety position. | Check that SAFEPOS energy pack has been installed correctly. |

*Table 50: Error messages*

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## 22.2 Messages for device status “Out of specification”

Messages for device status “Out of specification” are displayed in the following LED modes:

- Valve mode w/ warnings (mode set in the factory).
  The LED illuminated ring flashes yellow alternately with the color of the valve position.
- NAMUR mode.
  The LED illuminated ring is lit yellow.

Messages for device status "Out of specification" are not displayed in the LED mode "Valve mode".

| Message | Description | Device behavior | Procedure |
|---|---|---|---|
| Motor temperature is high. | Increased friction in the drive train. | Message "Out of specification". | If problems continue, contact your Bürkert Service Center. |
| Temperature limit exceeded. | Ambient temperature is too high or increased friction in the drive train. | Message "Out of specification". | Reduce ambient temperature. If problems continue, contact your Bürkert Service Center. |
| Temperature limit not achieved. | Ambient temperature is too low. | Message "Out of specification". | Increase ambient temperature |
| Voltage limit exceeded. | Supply voltage is too high. | Message "Out of specification". | Check supply voltage. |
| Voltage limit not achieved. | Supply voltage is too low. | | |
| CMD/SP sensor break. | Sensor break of the set-point value signal. | If device is configured accordingly: Message for status "Out of specification". Actuator moves to the safety position. | Check the signal line of the set-point value. |
| PV sensor break | Sensor break of the process actual value signal. | If device is configured accordingly: Message for status "Out of specification". Actuator moves to the safety position. | Check the signal line of the process actual value. |

*Table 51: Messages for device status “Out of specification”*

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## 22.3 Messages for device status “Function check”

Messages for device status “Function check” are displayed in the following LED modes:

- Valve mode w/ warnings (mode set in the factory).
  The LED illuminated ring flashes orange alternately with the color of the valve position.
- NAMUR mode.
  The LED illuminated ring is lit orange.

Messages for device status "Function check" are not displayed in the LED mode "Valve mode".

| Message | Description | Device behavior | Procedure |
|---|---|---|---|
| MANUAL operating state active . | Device is in the MANUAL operating state. | Message "Function check". | Switch to AUTOMATIC operating state. |
| Process simulation active | Device is in simulation mode: Process values are simulated. | Message "Function check". | Switch off process simulation. |
| Signal generator active | Device is in simulation mode: Input signals are simulated. | Message "Function check". | Switch off signal generator. |
| M.Q0.TUNE active | M.Q0.TUNE function is run (adaption of position control). | Message "Function check". | Wait until the M.Q0. TUNE function is exited. |
| P.TUNE active | P.TUNE function is run (adaption of process control). | Message "Function check". | Wait until the P.TUNE function is exited. |
| P.LIN active | P.LIN function is run (linearization of process characteristic). | Message "Function check". | Wait until the P.LIN function is exited. |
| External CMD not assigned. | "büS" has been set as the source for the input signal.<br>Assignment of the external büS/CANopen partner missing. | Message "Function check". | Assign an external büS/ CANopen fieldbus consumer or set a different source.<br>Setting the input signal: In the configuration area "Inputs / Outputs". |
| External SP not assigned. | | | |
| External PV not assigned. | | | |
| External isPCOextern not assigned. | | | |
| External ExtError not assigned. | | | |

*Table 52: Messages for device status “Out of specification””*

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# 23 CLEANING

**ATTENTION!**

The surfaces of the device must not be cleaned with alkaline cleaning agents.

## 23.1 Flushing the valve body

The device has the M.CLEAN function to remove residue from the parts which come into contact with media.

When the M.CLEAN function is running, the valve changes continuously between the 80 % and 100 % open positions. As a result, all parts which come into contact with media are accessible for cleaning during the flushing process.

### 23.1.1 Running M.CLEAN

Run the M.CLEAN function to remove residue from the parts which come into contact with media during the flushing process.

**Setting option:**
Using the PC software Bürkert Communicator or on the display of the device (option).
The setting on the PC is made by the büS service interface and by using the PC software "Bürkert Communicator". To do this, the USB-büS-Interface set, available as an accessory, is required.

**Actuating the M.CLEAN function by the digital input:**
The M.CLEAN function can be started and ended using the digital input instead of the menu.
To do this, the M.CLEAN function must be assigned as the source to the digital input: → Inputs / outputs → ADDITIONAL IOs → DIGITAL IN → M.CLEAN. source → Digital.

Display operation: Key functions

| | | |
|---|---|---|
| select, activate | confirm | back |

To start the M.CLEAN function, you must change to the detailed view maintenance for position controller.

**Changing to the detailed view:**

→ When setting with Bürkert Communicator in the navigation area, select **Position controller** and switch to **MAINTENANCE**.

→ When setting on the display switch from home screen to **CONFIGURATION**, select **Position controller** and switch to **MAINTENANCE**.

✓ You are in the detailed view maintenance.

**Running the M.CLEAN function:**

→ Select **CALIBRATION**.

→ Select **M.CLEAN**.

The following question appears: „Do you really want to start the M.CLEAN?"

→ Start M.CLEAN.

The M.CLEAN function is run. The valve now continuously changes its position between 80 % and 100 % open.
The following text appears: „--RUNNING --
End M.CLEAN by acknowledgement"

→ End M.CLEAN.

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# 24 ACCESSORIES, SPARE PARTS

**CAUTION!**

**Risk of injury and/or damage due to the use of incorrect parts.**

Incorrect accessories and unsuitable spare parts may cause injuries and damage the device and the surrounding area.

▸ Use original accessories and original spare parts from Bürkert only.

| Accessories | Order number |
|---|---|
| Connection cable with M12 socket, 4-pole, (length 5 m)<br>for operating voltage | 918038 |
| Connection cable with M12 socket, 8-pole, (length 2 m)<br>for input and output signals | 919061 |
| Connection cable with M12 circular plug, 5-pole, (length 2 m)<br>for input signals of process value (only for version with process controller) | 559177 |
| USB-büS-Interface set: | |
| USB-büS-Interface set 1<br>(including power supply unit, bus-stick, terminating resistor, Y-distributor, 0.7 m cable with M12 connector) | 772426 |
| USB-büS-Interface set 2<br>(including bus-stick, terminating resistor, Y-distributor, 0.7 m cable with M12 connector) | 772551 |
| büS adapter for büS Service interface<br>(M12 to büS Service interface micro USB) | 773254 |
| büS cable extensions from M12 plug to M12 socket | |
| Connection cable, length 1 m | 772404 |
| Connection cable, length 3 m | 772405 |
| Connection cable, length 5 m | 772406 |
| Connection cable, length 10 m | 772407 |
| Bürkert Communicator | Information at www.burkert.com. |
| SIM card | 291773 |
| Holding device for diaphragm size 8* to 40 | 697473 |
| Display module made of plastic | 277869 |
| Dummy cover made of plastic | 277881 |
| * For diaphragm size 08 the holding device is included in the scope of delivery. | |

*Table 53: Accessories*

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## 24.1 Communications software

The PC software “Communicator” is designed for communication with Bürkert devices.

A detailed description for installing and operating the PC software can be found in the associated operating instructions.

Download the software from: www.burkert.com.

### 24.1.1 büS service interface

The device is equipped with the büS service interface for communicating with the PC. Communication takes place via a USB interface on the PC and the USB-büS-Interface, which is available as an accessory (see “Table 53: Accessories”).

## 24.2 Spare parts

### 24.2.1 Spare parts for control valves of Types 3363, 3364, 3365

| Spare parts for Types 3363, 3364, 3365 | Order number |
|---|---|
| SAFEPOS energy-pack | 285 834 |

*Table 54: Spare parts of Types 3363, 3364, 3365*

### 24.2.2 Replacement part sets for replacing the diaphragm

| Diaphragm size | Order numbers of diaphragms | | | | | |
|---|---|---|---|---|---|---|
| | EPDM (AB*) | | EPDM (AD*) | | FKM (FF*) | |
| 08 | 677 663 | E02** | 688 421 | E03/E04** | 677 684 | F01** |
| 15 BC** | 693 162 | E02** | 693 163 | E03/E04** | 693 164 | F01** |
| 20 BC** | 693 165 | E02** | 693 166 | E03/E04** | 693 167 | F01** |
| 25 | 677 667 | E01** | 688 424 | E03/E04** | 677 687 | F01** |
| 32 | 677 668 | E01** | 688 425 | E03/E04** | 677 688 | F01** |
| 40 | 677 669 | E01** | 688 426 | E03/E04** | 677 689 | F01** |
| | PTFE (EA*) | | Advanced PTFE (EU*) | | Gylon laminated (ER*) | |
| 08 | 677 674 | L04/L10** | 679 540 | L05/L09** | 693 175 | L06/L08** |
| 15 | 677 675 | E02/E04- PTFE** | 679 541 | E02/E04- PTFE+ Hole** | 693 176 | L06/L08** |
| 20 | 677 676 | E02/E04- PTFE** | 679 542 | E02/E04- PTFE+ Hole** | 693 177 | L06/L08** |
| 25 | 677 677 | E02/E04- PTFE** | 679 543 | E02/E04- PTFE+ Hole** | 693 178 | L06/L08** |
| 32 | 677 678 | E02/E04- PTFE** | 679 544 | E02/E04- PTFE+ Hole** | 693 179 | L06/L08** |
| 40 | 584 378 | E02/E04- PTFE** | 584 379 | E02/E04- PTFE+ Hole** | 693 180 | L06/L08** |

*Table 55: Replacement part sets for replacing the diaphragm*

* SAP Code

** Identification on the diaphragm

If you have any queries, please contact your Bürkert sales office.

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# 25 DISASSEMBLY

**DANGER!**

**Risk of injury from high pressure and discharge of medium.**

If the device is under pressure when removed, there is a risk of injury due to sudden pressure release and discharge of medium.

▸ Before removing the device, switch off the pressure. Vent or drain the lines.

**CAUTION!**

**Risk of injury due to a heavy device.**

The device can fall down during transport or during installation and cause injuries.

▸ Transport, install and dismantle a heavy device with the help of another person.

▸ Use appropriate tools.

**NOTE!**

**Installing in the AUTOMATIC operating state will damage the device.**

Devices that are installed while they are in the AUTOMATIC operating state may be irreparably damaged.

▸ If devices are to be re-used, set the MANUAL operating state before they are removed.

→ If the device is to be re-used, set the MANUAL operating state.

→ Disconnect the electrical connection.

→ Remove device.

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# 26 PACKAGING, TRANSPORT

**CAUTION!**

**Risk of injury due to a heavy device.**

The device can fall down during transport or during installation and cause injuries.

- ▸ Transport, install and dismantle a heavy device with the help of another person.
- ▸ Use appropriate tools.

**ATTENTION!**

**Transport damage!**

Inadequately protected devices may be damaged during transportation.

- Protect the device against moisture and dirt in shock-resistant packaging during transportation.

# 27 STORAGE

**ATTENTION!**

**Incorrect storage may damage the device.**

- Store the device in a dry and dust-free location.
- Prevent the temperature from exceeding or dropping below the permitted storage temperature.

**Devices with diaphragm:**

- Storage temperature -20…+70 °C (-4...158 °F)
  (The higher the storage temperatures, the quicker the elastomers age).
- For storage, slacken the fastening screws on the diaphragm.
- Store device only with the valve open.

**Devices without diaphragm:**

- Storage temperature -40…+70 °C (-40...158 °F)

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# 28 DISPOSAL

**ATTENTION!**

**Damage to the environment caused by parts contaminated with media.**

- Dispose of the device and packaging in an environmentally friendly manner.
- Observe applicable disposal and environmental regulations.

Observe the national waste disposal regulations.

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