bürkert
FLUID CONTROL SYSTEMS

Type 3360, 3361

Electromotive control valve

Operating Instructions

MAN 1000274112 EN Version: - Status: RL (released | freigegeben) printed: 23.11.2015

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Operating Instructions 1511/00_EUen_00810490 / Original DE

Electromotive 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.

1.2 Definitions of terms

- The term "device" used in these instructions applies to all valve types described in these instructions:
  Type 3360, electromotive angle seat control valve
  Type 3361, electromotive straight seat control valve
- In these instructions, the abbreviation "Ex" stands for "explosion-proof".

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2 INTENDED USE

Non-authorized use of the electromotive control valve Type 3360 and 3361 may be a hazard to people, nearby equipment and the environment.

The electromotive control valve Type 3360 and 3361 is designed to control the flow of liquid and gaseous media.

- Standard model 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.

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.

2.1 Restrictions

If exporting the device, observe any existing restrictions.

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3 BASIC SAFETY INSTRUCTIONS

These safety instructions do not make allowance for any

- contingencies and events which may arise during the assembly, operation, and maintenance.
- local safety regulations – the operator is responsible for observing these regulations, also in relation to the installation personnel.

Risk of injury from high pressure!

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

If switched on for a prolonged time, risk of burns or fire due to hot device surface.

- ▸ Keep the device away from highly flammable substances and media and do not touch with bare hands.

Risk of crushing due to mechanically moving parts.

- ▸ Perform installation work on control cone, diaphragm and valve body in the isolated state only.
  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.

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 rating plate.
- ▸ 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.
- ▸ 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.
- ▸ Only trained technicians may perform installation and maintenance work.
- ▸ 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.

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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@de.buerkert.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 3360 and 3361 can be found on the Internet at:

www.burkert.com.

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5 PRODUCT DESCRIPTION

5.1 General description

The electromotive control valve Type 3360 and 3361 is suitable for controlling the flow of liquid and gaseous media.

This may be neutral gas, water, alcohol, oil, propellant, hydraulic fluid, saline solution, alkali, organic solvent and vapor.

The control valve has an electromotive linear actuator with the electronic control system of a position controller which is actuated either via standard signals (analog) or via a field bus (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 control: 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 interfache 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.

A particular feature of the straight seat control valve of Type 3361 is the screw-in valve seat which can be changed to reduce the orifice.

5.2 Properties

- High leak-tightness by self-adjusting packing gland.
- Devices with PTFE seal material are kept tight without the power supply.
- High flow values by the streamlined valve body made of stainless steel.
- External, directly accessible display with touch-screen.
- Mechanical position indicator which shows the valve position even if the supply voltage fails.
- 360° LED illuminated ring for displaying the device statuses, 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.
- Simple and fast replacement of the control cone.
- Valve actuator can be rotated through 360 °.
- Integrated control as position controller.
- Non-contact, high-resolution and wear-free travel 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.

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5.2.1 Particular features of the 2/2-way straight seat control valve (Type 3361):

- Simple and fast replacement of the screw-in valve seat.
- Generously dimensioned expansion space above the valve seat to prevent erosion on the valve body caused by cavitation.
- Optimum valve selection to match the application.
  3 designs of different Kv values are available as standard for each line size
  (5 designs of different Kv values for line size ½").

5.3 Technical features

- Characteristic: modified equal percentage flow characteristics.
- Theoretical setting ratio (Kv_S / Kv_0) 50:1, alternatively other setting ratios can be realized.
- Kv_Rvalue, i.e. the smallest Kv value at which the angularity tolerance according to DIN IEC 534-2-4 is still maintained:

  Angle seat control valve, Type 3360: ≤ DN 20, Kv_R at 10 % of the stroke
  > DN 20, Kv_R at 5 % of the stroke

  Straight seat control valve, Type 3361: ≤ DN 10, Kv_R at 10 % of the stroke
  > DN 10, Kv_R at 5 % of the stroke
- In the case of the straight seat control valve of Type 3361, the screw-in valve seat can be changed to reduce the orifice.

Definition DN
DN designates the orifice of the valve seat, not the diameter of the line connection.

Definition of connection size
The connection size denotes the diameter of the line connection.

5.4 Designs

The following designs are described in these instructions:

- Type 3360, electromotive angle seat control valve
- Type 3361, electromotive straight seat control valve

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5.4.1 Versions (valve sizes and actuator sizes)

Angle seat control valve Type 3360:

Available actuator size in nominal force [N]							
Connection size (valve body)		Orifice DN (valve seat)					
[mm]	[inch]	15	20	25	32	40	50
15	1/2"	1300	-	-	-	-	-
20	3/4"	-	1300	-	-	-	-
25	1"	-	-	1300	-	-	-
32	1 1/4"	-	-	-	1300	-	-
40	1 1/2"	-	-	-	-	1300	-
50	2"	-	-	-	-	-	1300

Table 1: Versions angle seat control valve, Type 3360

Straight seat control valve Type 3361:

Available actuator size in nominal force [N]											
Connection size (valve body)		Orifice DN (valve seat)									
[mm]	[inch]	4	6	8	10	15	20	25	32	40	50
10	3/8"	1300	1300	1300	1300	-	-	-	-	-	-
15	1/2"	1300	1300	1300	1300	1300	-	-	-	-	-
20	3/4"	-	-	-	1300	1300	1300	-	-	-	-
25	1"	-	-	-	-	1300	1300	1300	-	-	-
32	1 1/4"	-	-	-	-	-	1300	1300	1300	-	-
40	1 1/2"	-	-	-	-	-	-	1300	1300	1300	-
50	2"	-	-	-	-	-	-	-	1300	1300	1300

Table 2: Versions straight seat control valve, Type 3361

5.4.2 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 field bus 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 control valve consists of an electromotively driven linear actuator, a control cone and a 2/2-way straight seat valve body or a 2/2-way angle seat 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 travel sensor.

Control is via standard signals (analog) or via field bus (digital).

The electromotive control valve is designed using three-wire technology. It is operated on the standard model 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 control cone.

- 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.
- The flow-enhancing valve body made of stainless steel enables high flow values.
- The self-adjusting packing gland ensures high leak-tightness.
- The control cone is coupled to the actuator spindle via a dowel pin and can therefore be quickly replaced.
- The actuator housing consists of a robust and heat-dissipating aluminum body which has a coating resistant to cleaning agents. The plastic materials used are also resistant to cleaning agents.
- The incoming flow is always under the seat.

Valve seat:

- In the case of the straight seat control valve, the valve seat is screwed in.
  The orifice can easily be reduced by replacing the screwed-in valve seat.
- In the case of the angle seat control valve, the valve seat is incorporated in the valve body. It is therefore not possible to reduce the orifice.

As the valve seat is always closed against the medium flow, the direction of flow must be specified so that the incoming flow is under the valve seat.

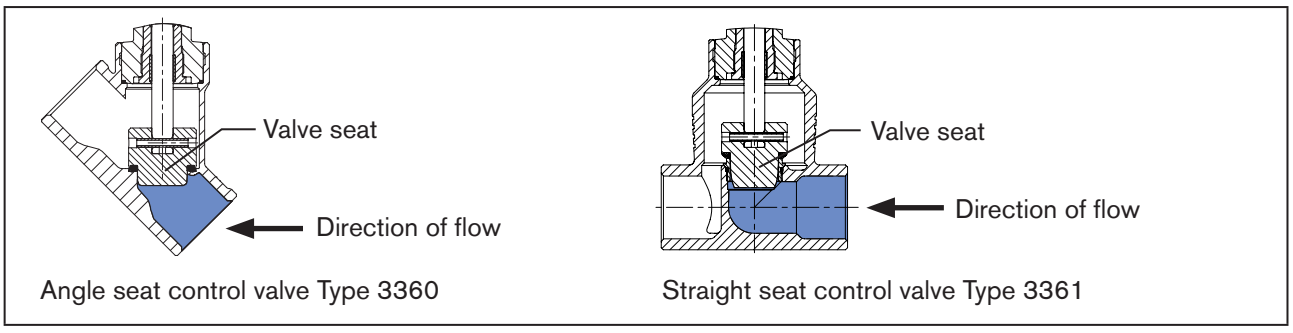

Figure 1: Incoming flow under the seat, direction of flow

Fluid connections:

- The socket connection or welded connection is the standard model for all valve bodys.
- For the straight seat control valve Type 3361 there is also the valve body with a flanged connection.

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6.1 Diagram – structure of the electromotive control valve

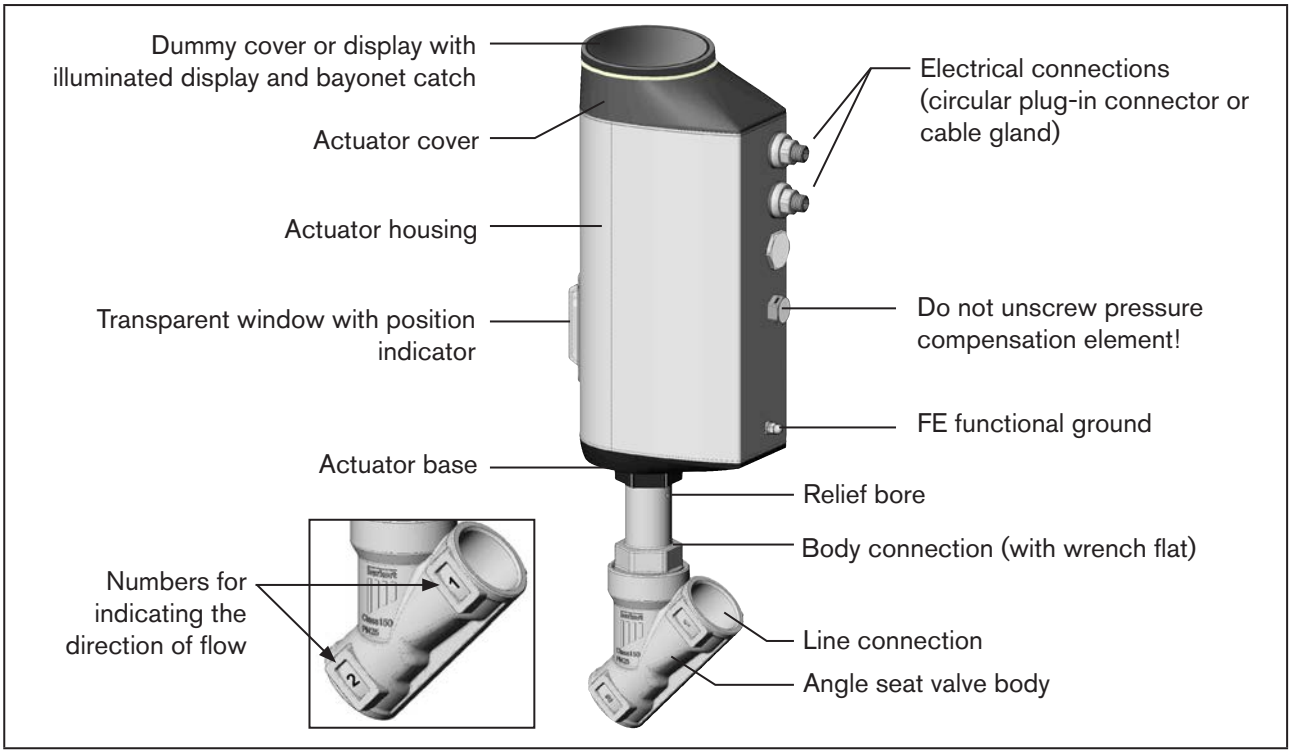

Figure 2: Structure, electromotive angle seat control valve Type 3360

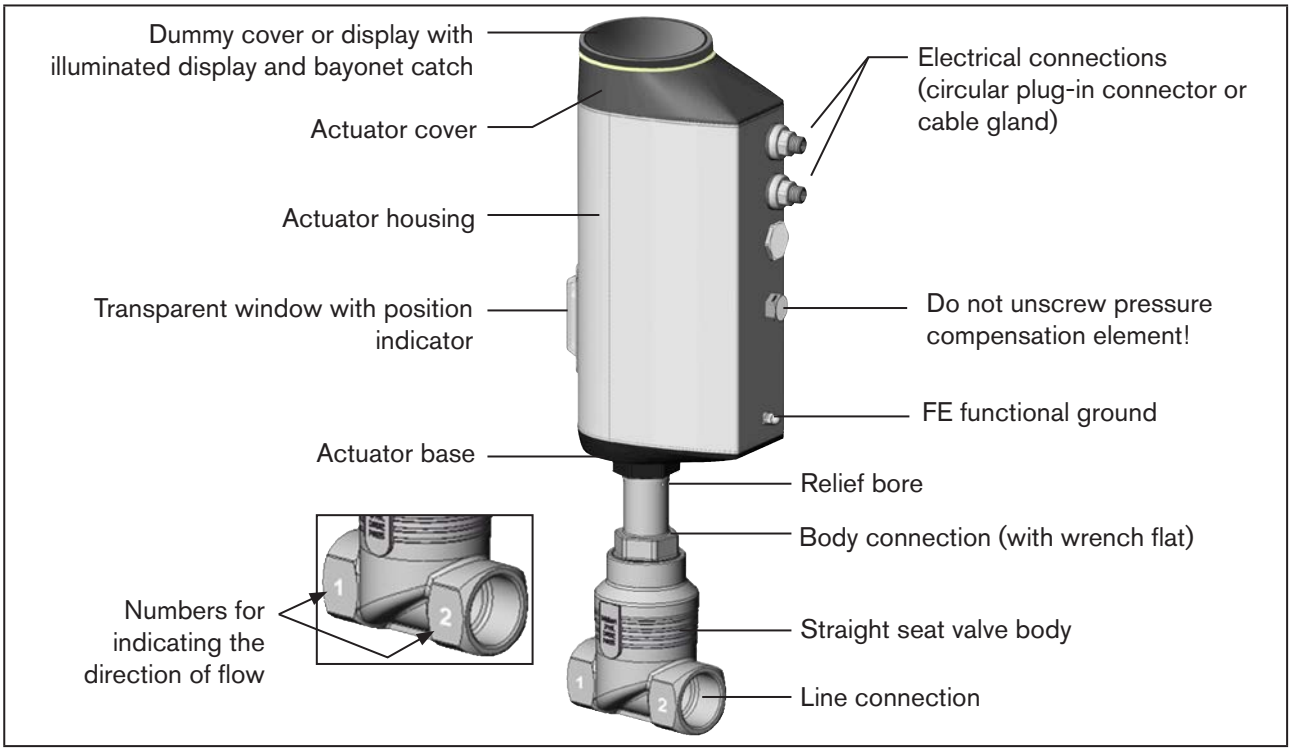

Figure 3: Structure, electromotive straight seat control valve Type 3361

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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 "7.2 SAFEPOS energy-pack (option)", page 24

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
- Binary 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 status

The device status 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 59.

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.

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 3: Display of device status 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	Function check	Out of specification	Maintenance required
open	yellow	red	orange	yellow	blue
between	white				
closed	green				

Table 4: Display of device status 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:

Display in accordance with NE 107		Description	Meaning
Color	red	Failure	Control mode is not possible due to malfunctioning in the device or at its peripheral equipment.
	orange	Function check	Work is being carried out at the device; control mode is therefore not currently possible.
	yellow	Out of specification	Ambient conditions or process conditions for the device are outside the specified area. The set-point value deviation is greater than expected under operating conditions.
	blue	Maintenance required	The device is still in control mode. However, the stock of consumables will soon be depleted or a function will soon be restricted due to the operating conditions.
	green	Normal	Device is working in normal operation.

Table 5: Display of device status in NAMUR mode

***** A detailed fault description can be found in Chapter "19.2 Maintenance", page 104.

6.4.4 Flashing of the LED illuminated ring

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

6.4.5 Device status messages

Device status messages are displayed in the logbook. Chapter "19 Maintenance, troubleshooting" 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	P.Lin active
X.Tune active	Process simulation active
P.Tune active	Signal generator active

Table 6: Messages for device status "Function check"

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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", page 82.

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

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7 ELECTRICAL CONTROL

7.1 Function

The position of the actuator (stroke) is regulated according to the set-point position value. The set-point position value is specified either by an external standard signal (analog) or via a field bus (digital).

The travel sensor records the actual position (POS) of the electric linear actuator. The position controller compares this actual position value with the set-point position value (CMD) which is defined as standard signal. If there is a control difference (Xd1), the electromotive actuator is controlled via the CTRL variable and the actual position value is changed accordingly.

Technical properties:

- **Travel 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

7.1.1 Interfaces

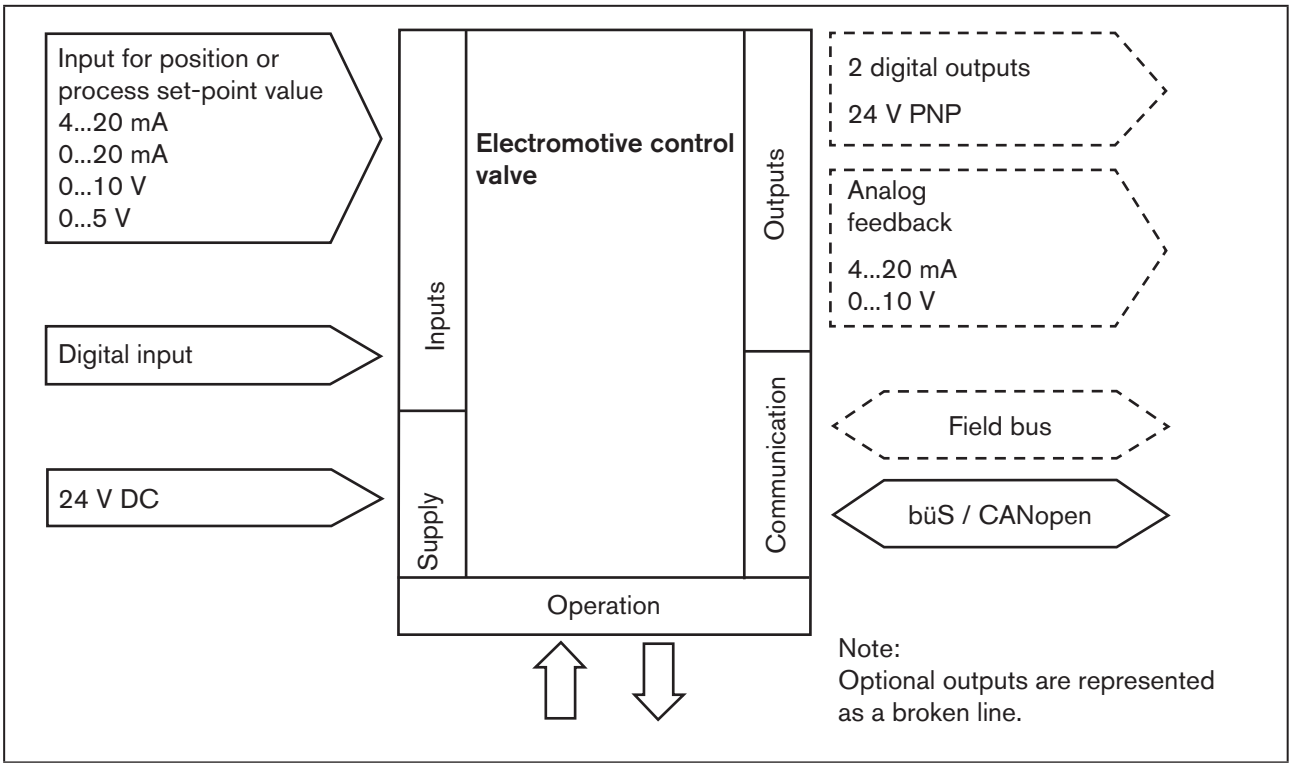

Figure 4: Interfaces of the position controller

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

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7.1.2 Signal flow plan

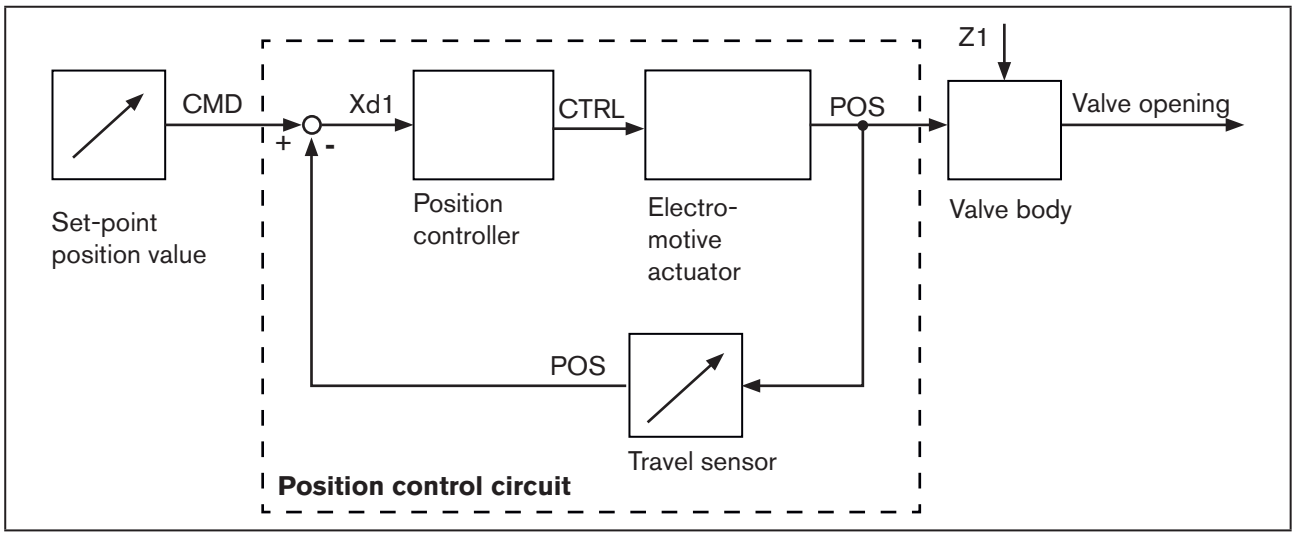

Figure 5: Signal flow plan

7.1.3 Function diagram

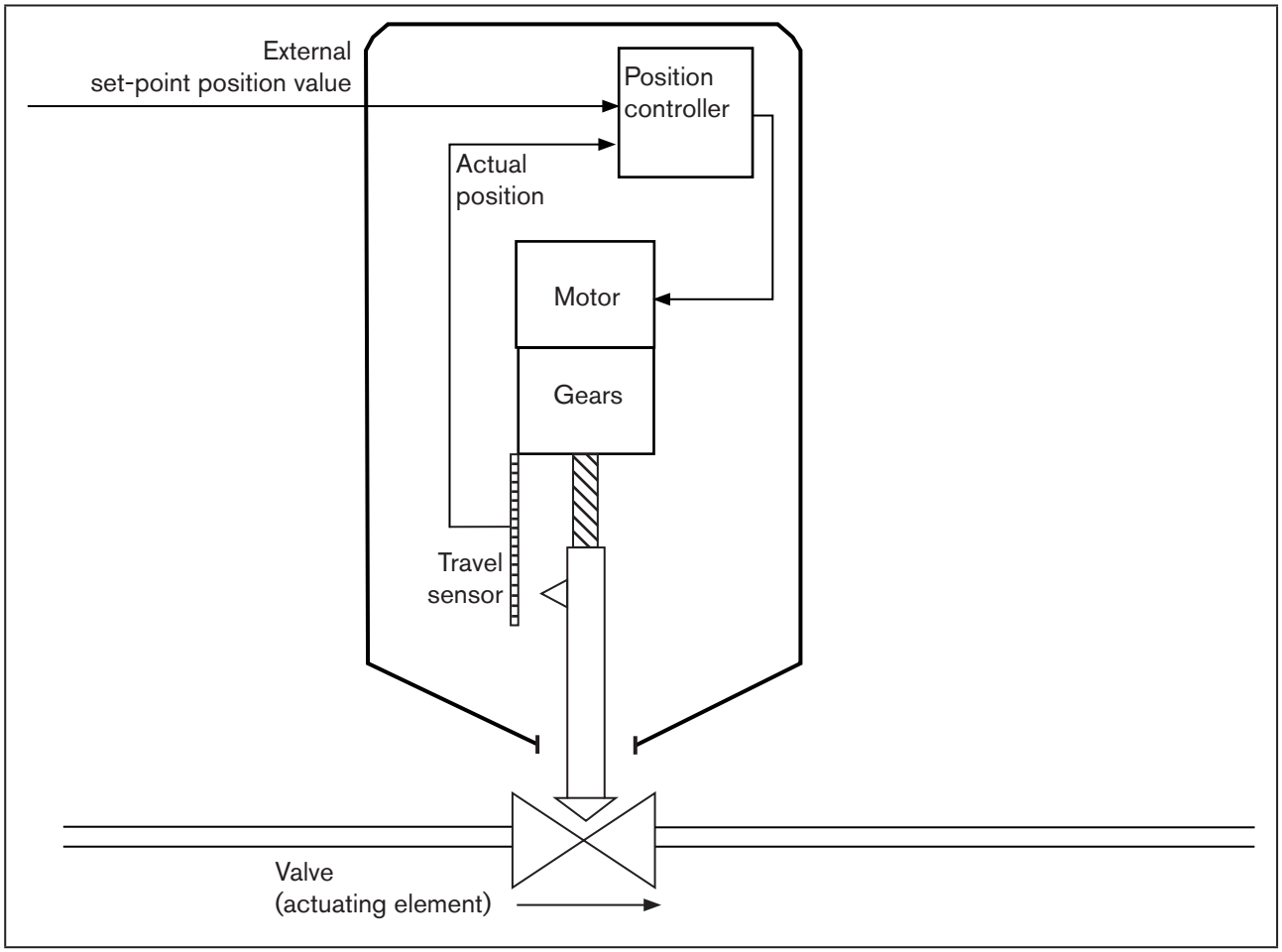

Figure 6: Function diagram

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7.1.4 Schematic representation of the position control

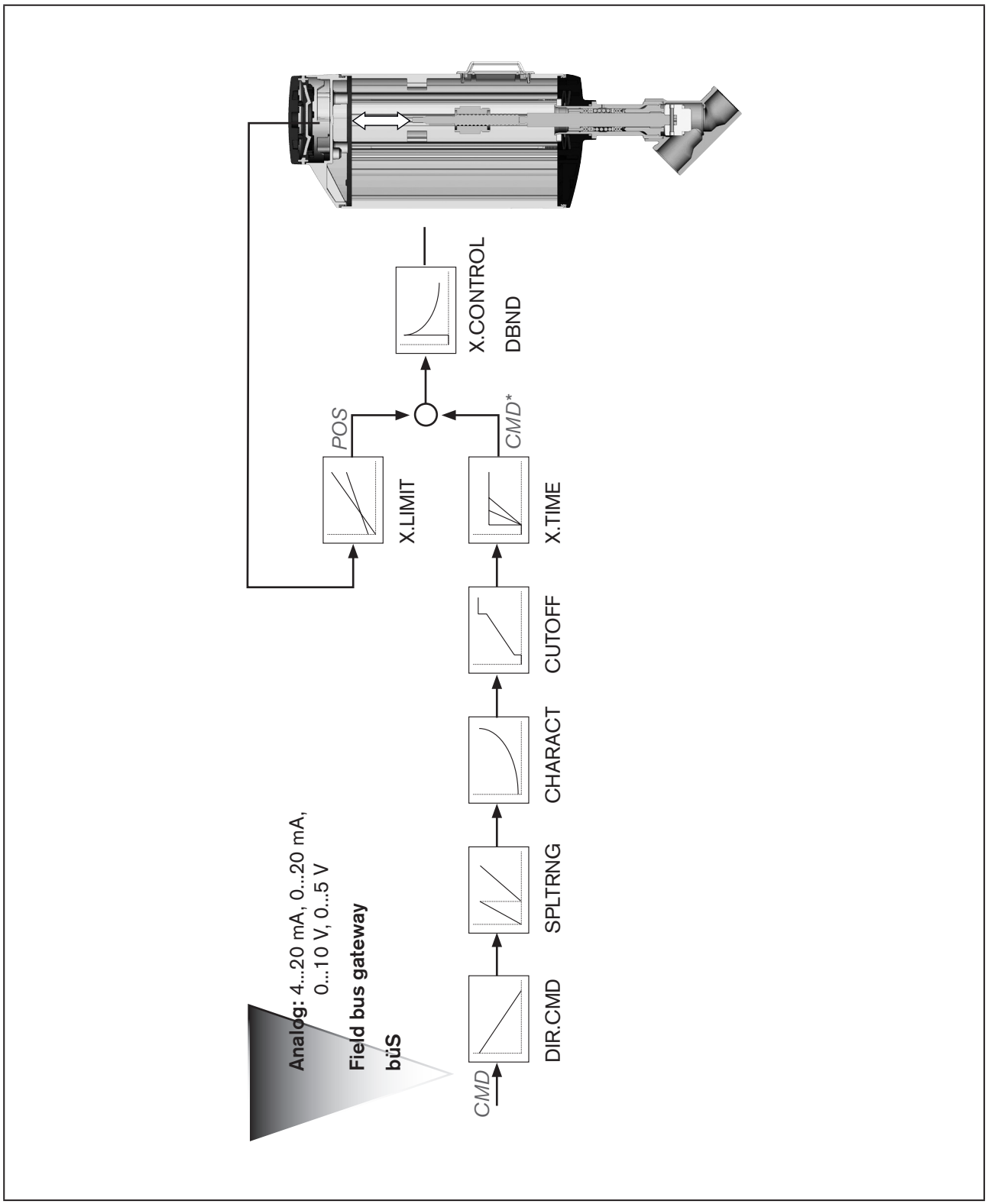

Figure 7: Schematic representation of the position control

7.2 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.

7.2.1 Service life

The service life is between 2.5 and 10 years depending on the operating conditions.

The service life of 2.5 years was determined under the following conditions:

Ambient temperature	40 °C
Medium temperature	180 °C
Duty cycle	100 %
Medium pressure	5 bar
Orifice	DN32

ATTENTION!

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

7.2.2 Messages on the state of the SAFEPOS energy-pack

The device issues a maintenance message:
Due to aging, the SAFEPOS energy-pack has a remaining storage capacity of 30 %.

▸ ⚠ 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.

7.2.3 Replacing SAFEPOS energy-pack

⚠ **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 LED illuminated ring goes out; the LED status must not be in **LED off** mode, see Chapter "12.2.2 Setting LED mode".

The SAFEPOS energy-pack is housed in the actuator housing. To replace it, remove the following parts from the actuator:

1. Dummy cover or display module
2. LED and storage module
3. Actuator cover.

The removal of these parts is described in detail in Chapter "10.2.2 Access to the connection terminals", page 47.

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Removing SAFEPOS energy-pack:

→ Loosen the locking screw (hexagonal socket round screw T10).

→ Completely pull out the SAFEPOS energy-pack on the bracket.

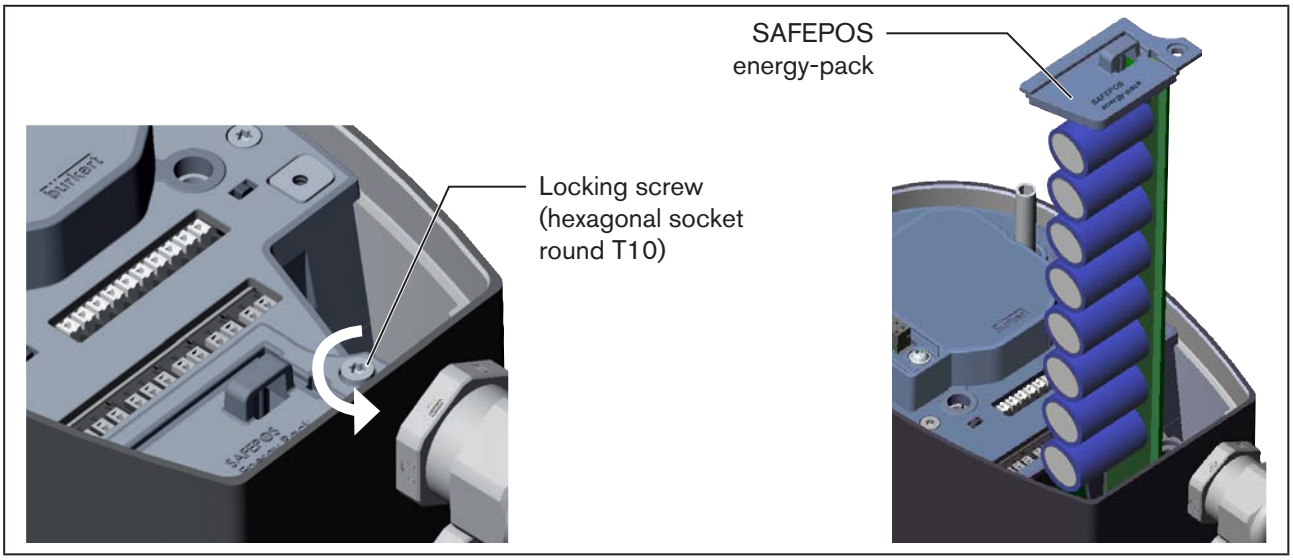

Figure 8: Removing SAFEPOS energy-pack

Inserting new SAFEPOS energy-pack:

→ Take the SAFEPOS energy-pack out of the transport packaging.

→ Insert the SAFEPOS energy-pack into the two lateral guiding grooves and push in all the way.

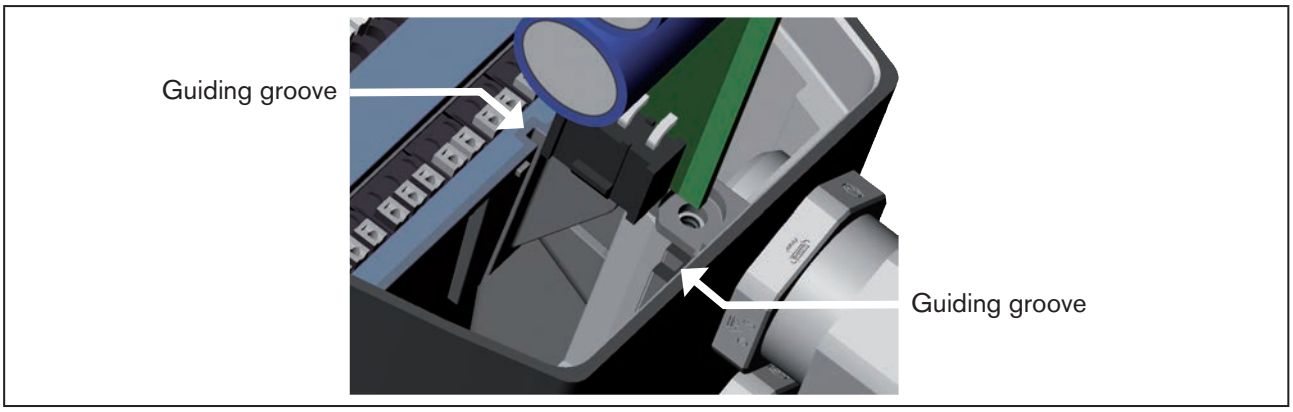

Figure 9: Inserting SAFEPOS energy-pack

→ Tighten the locking screw (hexagonal socket round screw T10).

→ Apply supply voltage.

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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
- Seal material and material of the valve body
- Field bus standard
- Orifice of the valve seat
- Flow capacity
- Actuator size
- Line connection
- Maximum permitted medium pressure
- Direction of flow

8.1 Conformity

The electromotive control valves Type 3360 and 3361 are compliant with EC directives as stated in the EC Declaration of Conformity.

8.2 Standards

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

8.3 Rating plate

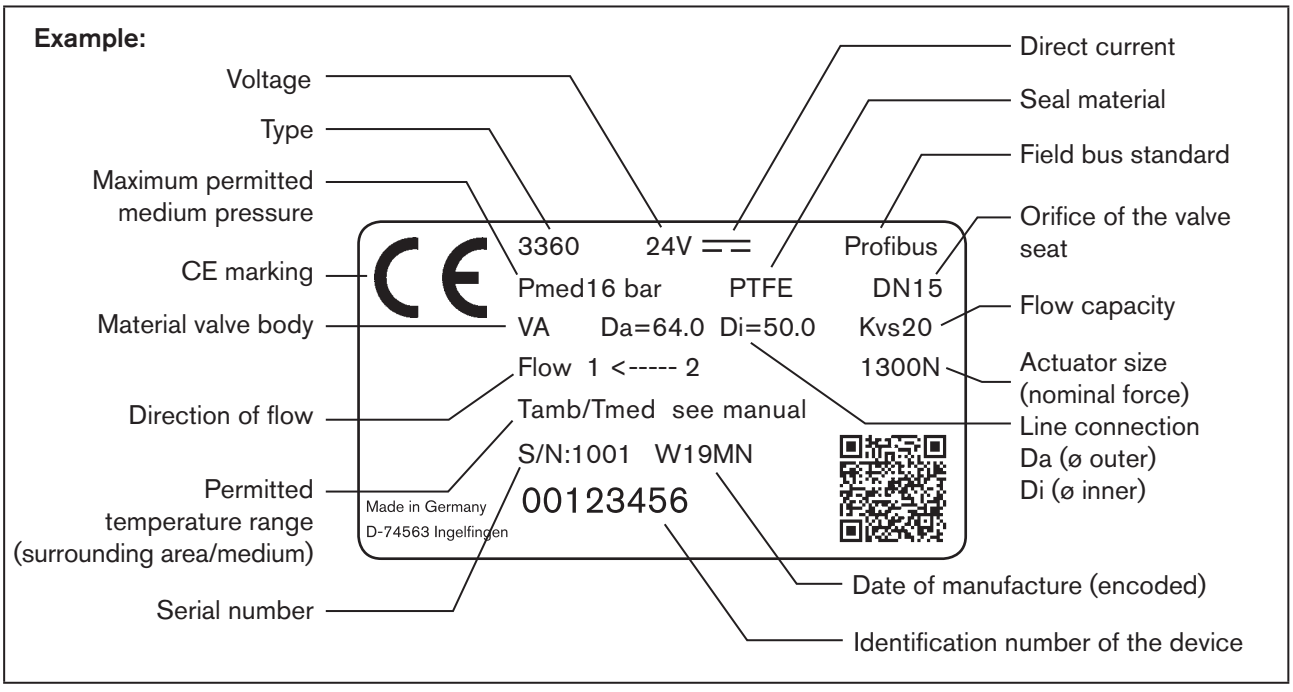

Figure 10: Description of the rating plate (example)

8.4 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 valve seat is closed against the medium flow, the medium pressure may become too high and prevent the valve seat from closing tightly.

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

Maximum permitted medium pressure:	see rating plate
Media:	Neutral gases and vapor. Liquid media: Water, alcohol, oil, propellant, hydraulic fluid, saline solution, alkali, organic solvent.
Degree of protection:	IP65 (IP67 on request) in accordance with IEC 529, EN 60529.
Direction of flow:	is specified on the rating plate by an arrow and the numbers 1 and 2. The 1 and the 2 stand for identification also on the valve body. The incoming flow is under the seat.

8.4.1 Permitted temperature ranges

Minimum temperatures	Surrounding area:	-25 °C
	Medium:	-10 °C
Maximum temperatures	Surrounding area:	depending on the medium temperature; see temperature graph below. On devices with display module max. +50 °C absolute.
	Medium:	depending on the ambient temperature; see temperature graph below. On devices with seat seal PTFE/steel, max. +130 °C absolute.

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Temperature graph

The maximum permitted temperature for the surrounding area and the medium depend on each other. The permitted maximum temperatures of the device versions can be determined from the characteristics of the temperature graph.

The values were determined under the following maximum operating conditions: Orifice DN32 when 100% duty cycle at 16 bar medium pressure.

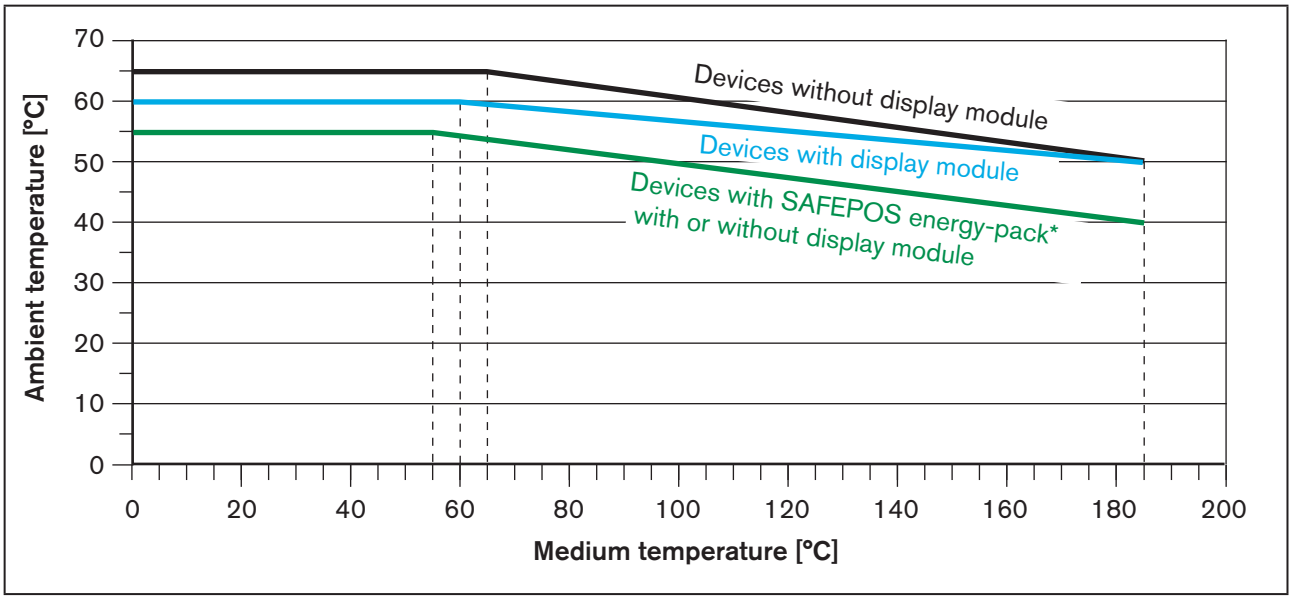

Figure 11: Temperature graph

* The service life of the SAFEPOS energy-pack depends on the medium temperature and the ambient temperature. For description see "7.2 SAFEPOS energy-pack (option)"

8.5 General technical data

Dimensions:	See data sheet	
Weight:	See data sheet	
Materials	Actuator:	PPS and aluminum powder-coated
	Valve body:	316 L
	Body connection:	316L / 1.4401
	Spindle:	1.4401 / 1.4404
	Spindle guide:	1.4401 / 1.4404 / 316L with carbon-filled PTFE
	packing gland	PTFE V-rings with spring compensation (carbon-filled PTFE)
Seal material	Sealing element actuator housing:	EPDM
	Valve seat seal:	See rating plate
Fluid connection		
Possible connection types:	Socket connection G ½...G 2 (NPT, RC on request) Welded connection according to EN ISO 1127 (ISO 4200), DIN 11850 Series 2 Also for straight seat control valves of Type 3361: Flanged connection in accordance with DIN 2634, ANSI B16.5 class 150, JIS 10K Other connections on request	

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Electrical connection:	by connection terminals or circular plugs
Installation position:	any position, preferably with actuator face up

8.6 Electrical data

Protection class	3 in accordance with VDE 0580
Electrical connections	Cable gland, 2x M20 or 2 circular plug-in connectors M12, 5-pin and 8-pin
Operating voltage	24 V DC ± 10 % max. residual ripple 10 %
Operating current [A]*	max. 3 A 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
Life time energy pack SAFEPOS energy-pack	depending on the operating conditions 2.5 to 10 years. The service life of 2.5 years was determined under the following conditions: Ambient temperature 40 °C Medium temperature 180 °C Duty cycle 100 % Medium pressure 5 bar Orifice DN32
Standby consumption [W]*	min. 2 W, max. 5 W
Average consumption Electronics without actuator [W]*	Basic consumption typically 3 W Option analog and binary outputs 0.5 W SAFEPOS energy-pack 0.5 W Field bus gateway 1 W
Energy consumption actuator for 1 cycle [Ws]*	(see following graphs)

* All values refer to a supply voltage of 24 V DC at 25 °C.

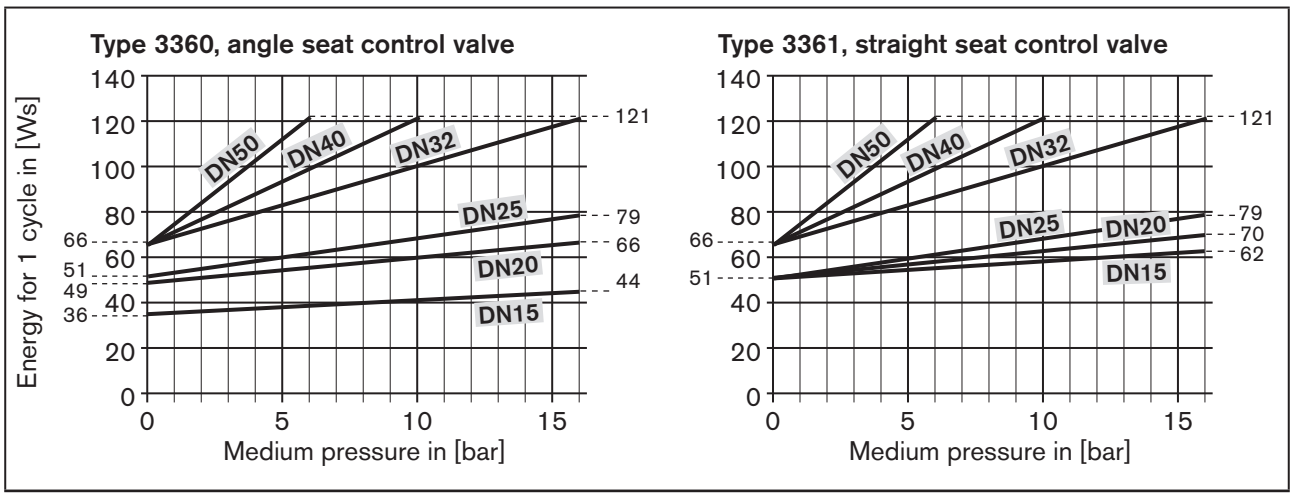

Figure 12: Energy consumption of actuator

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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.

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 (optimum)

4...20 mA:	Input resistance	60 Ω
	Resolution	12 bits
Frequency:	Measurement range	0...1000 Hz
	Input resistance	> 30 kΩ
	Resolution	1‰ of measurement value
	Input signal	> 300 mVss
	Waveform	Sine wave, rectangle wave, triangle wave
Pt 100:	Measurement range	–20 to +220 °C
	Resolution	< 0.1 °C
	Measurement current	1 mA

Analog output (optional):

max. current	10 mA (for voltage output 0...5/10 V)
Load	0...560 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: Connection to PC via USB büS interface set

Communications software: Communicator

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

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

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8.7 Flow values and flow characteristics for angle seat control valve (Type 3360)

The flow values and the resulting characteristic depend on the orifice of the valve seat (abbreviated designation DN).

Definition DN
DN designates the orifice of the valve seat, not the diameter of the line connection.

8.7.1 Flow values and flow characteristics for DN 15

Flow values	
Stroke [%]	**Kv value [m³/h]**
5	0.16
10	0.17
20	0.22
30	0.4
40	1.2
50	2.7
60	3.5
70	4.0
80	4.5
90	4.8
100	5.0

Flow characteristic

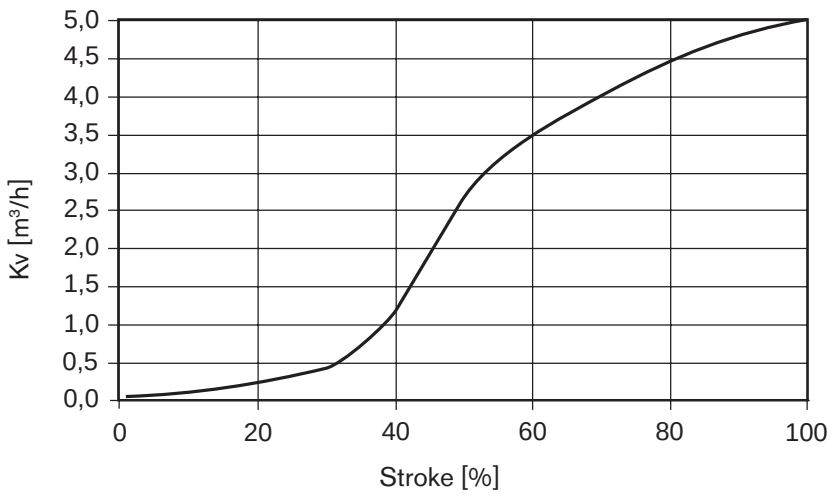

Table 7: Angle seat control valve, flow values and flow characteristic for DN 15

8.7.2 Flow values and flow characteristics for DN 20

Flow values	
Stroke [%]	**Kv value [m³/h]**
5	0.26
10	0.27
20	0.4
30	1.1
40	4.0
50	5.9
60	7.2
70	8.3
80	9.1
90	9.6
100	10.0

Flow characteristic

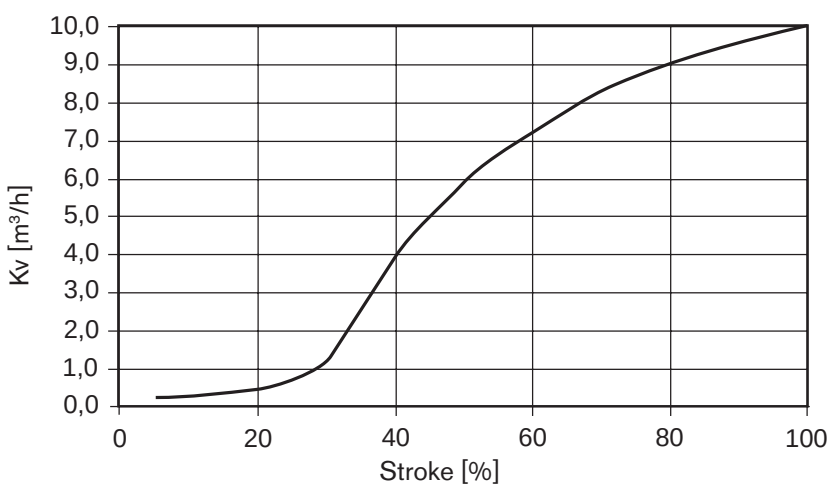

Table 8: Angle seat control valve, flow values and flow characteristic for DN 20

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8.7.3 Flow values and flow characteristics for DN 25

Flow values	
Stroke [%]	**Kv value [m³/h]**
5	0.34
10	0.36
20	0.62
30	1.5
40	5.2
50	8.9
60	11.5
70	13.0
80	14.2
90	15.4
100	16.0

Flow characteristic

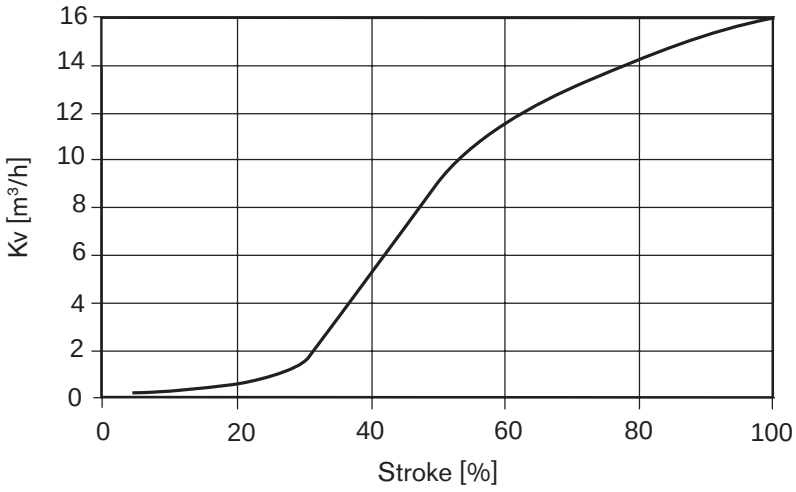

Table 9: Angle seat control valve, flow values and flow characteristic for DN 25

8.7.4 Flow values and flow characteristics for DN 32

Flow values	
Stroke [%]	**Kv value [m³/h]**
5	0.40
10	0.46
20	0.92
30	2.5
40	9.1
50	13.9
60	17.1
70	19.5
80	22.1
90	23.4
100	25.0

Flow characteristic

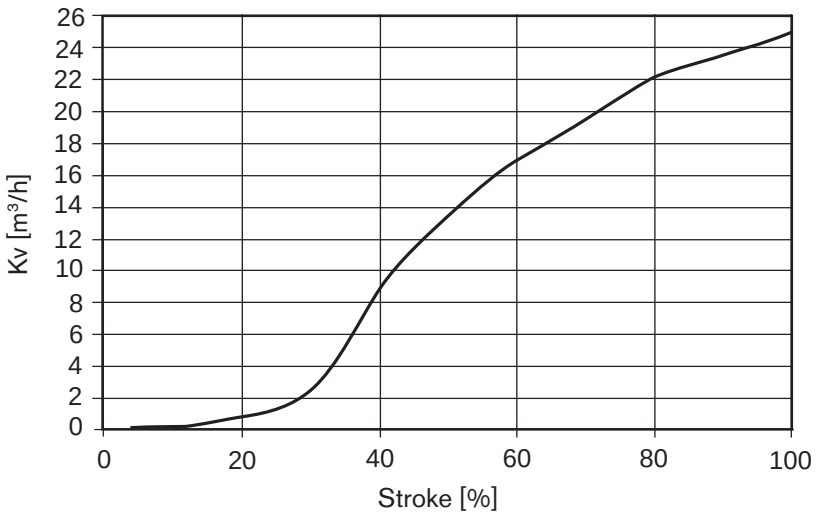

Table 10: Angle seat control valve, flow values and flow characteristic for DN 32

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8.7.5 Flow values and flow characteristics for DN 40

Flow values	
Stroke [%]	**Kv value [m³/h]**
5	0.48
10	0.66
20	1.4
30	5.1
40	14.0
50	20.0
60	24.3
70	28.3
80	31.7
90	34.5
100	36.0

Flow characteristic

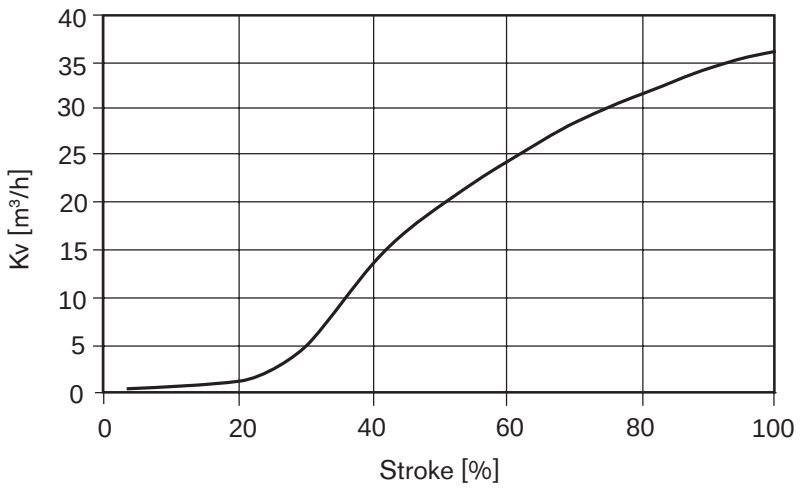

Table 11: Angle seat control valve, flow values and flow characteristic for DN 40

8.7.6 Flow values and flow characteristics for DN 50

Flow values	
Stroke [%]	**Kv value [m³/h]**
5	0.87
10	1.2
20	1.8
30	4.0
40	15.2
50	26.0
60	35.0
70	40.3
80	45.0
90	48.0
100	53.0

Flow characteristic

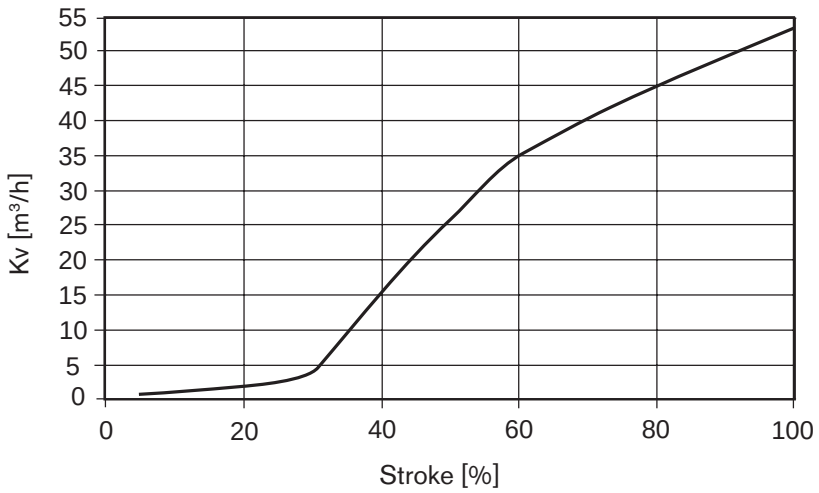

Table 12: Angle seat control valve, flow values and flow characteristic for DN 50

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8.8 Flow values and flow characteristics for straight seat control valve (Type 3361)

The flow values and the resulting characteristic depend on the orifice of the valve seat (abbreviated designation DN).

Definition DN
DN designates the orifice of the valve seat, not the diameter of the line connection.

8.8.1 Flow-rate characteristics

The straight seat control valve shows different characteristics depending on the orifice.

- Equal percentage of parabolic cone for valve seats with orifice DN 8...DN 50
- Linear cone for valve seats of the orifice DN 4 and DN 6,
  flow characteristic according to DIN / IEC 534-2-4
- Theoretical setting ratio (Kv_S: Kv_0)
  Orifice DN 8...DN 50: 50: 1
  Orifice DN 6: 25: 1
  Orifice DN 4: 10: 1
- Kv_R value[9] at 5 % of the stroke for DN > 10 mm
  Kv_R value at 10 % of the stroke for DN ≤ 10 mm

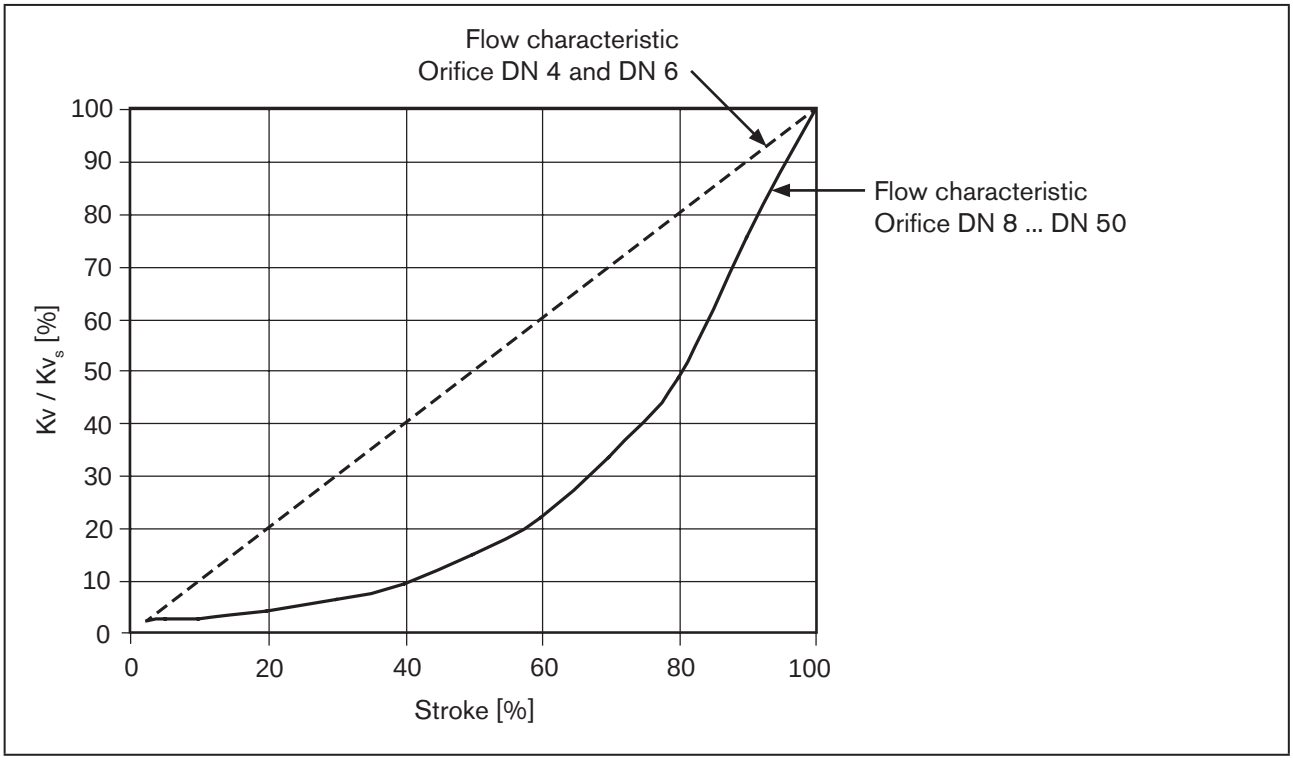

Figure 13: Flow characteristic, straight seat control valves

[9] Kv_R value= the smallest KV value at which the angularity tolerance according to DIN / IEC 534-2-4 can still be maintained.

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8.8.2 Flow values

Definition DN
DN designates the orifice of the valve seat, not the diameter of the line connection.

Definition of connection size
The connection size denotes the diameter of the line connection.

KV_S values

Connection size (valve body)		Kv_S values									
		Orifice DN (seat) [mm]									
[mm]	[inch]	4	6	8	10	15	20	25	32	40	50
10	3/8"	0.5	1.2	2.0	2.7	-	-	-	-	-	-
15	1/2"	0.5	1.2	2.1	3.1	4.3	-	-	-	-	-
20	3/4"	-	-	-	3.2	5.2	7.1	-	-	-	-
25	1"	-	-	-	-	5.3	7.2	12.0	-	-	-
32	1 1/4"	-	-	-	-	-	8.0	13.0	17.8	-	-
40	1 1/2"	-	-	-	-	-	-	13.6	20.2	23.8	-
50	2"	-	-	-	-	-	-	-	21.0	24.6	37.0

Table 13: Kv_S values, straight seat control valves

Kv values

Connection size (valve body)		Orifice DN (valve seat)		Kv values [m^3/h]										
				Stroke [%]										
[mm]	[inch]	[mm]	[inch]	5	10	20	30	40	50	60	70	80	90	100
10	3/8"	4	1/8"	0.04	0.05	0.10	0.16	0.22	0.27	0.32	0.36	0.40	0.44	0.50
		6	3/16"	0.05	0.12	0.32	0.48	0.62	0.76	0.88	0.98	1.07	1.13	1.20
		8	1/4"	0.06	0.07	0.09	0.12	0.18	0.26	0.42	0.61	0.92	1.50	2.00
		10	3/8"	0.09	0.11	0.13	0.19	0.30	0.48	0.73	1.00	1.60	2.30	2.70
15	1/2"	4	1/8"	0.04	0.05	0.10	0.16	0.22	0.27	0.32	0.36	0.40	0.44	0.50
		6	3/16"	0.05	0.12	0.32	0.48	0.62	0.76	0.88	0.98	1.07	1.13	1.20
		8	1/4"	0.07	0.08	0.11	0.13	0.19	0.27	0.43	0.63	0.95	1.60	2.10
		10	3/8"	0.09	0.11	0.15	0.19	0.31	0.49	0.75	1.10	1.70	2.50	3.10
		15	1/2"	0.14	0.17	0.22	0.35	0.52	0.80	1.20	1.80	2.70	3.70	4.30
20	3/4"	10	3/8"	0.11	0.12	0.16	0.20	0.33	0.52	0.77	1.20	1.80	2.60	3.20
		15	1/2"	0.14	0.17	0.22	0.35	0.52	0.80	1.20	1.80	2.90	4.00	5.20
		20	3/4"	0.20	0.25	0.30	0.45	0.70	1.10	1.60	2.40	3.50	5.20	7.10
25	1"	15	1/2"	0.14	0.17	0.22	0.35	0.52	0.80	1.20	1.80	2.90	4.10	5.30
		20	3/4"	0.20	0.25	0.31	0.47	0.70	1.10	1.60	2.50	3.80	5.40	7.20
		25	1"	0.35	0.38	0.65	1.00	1.50	2.20	3.40	5.10	7.00	9.40	12.00
32	1 1/4"	20	3/4"	0.22	0.25	0.35	0.50	0.75	1.10	1.60	2.50	3.80	5.80	8.00
		25	1"	0.40	0.47	0.73	1.10	1.60	2.50	3.70	5.40	7.50	10.30	13.00
		32	1 1/4"	0.48	0.60	0.85	1.30	2.10	3.10	4.50	6.80	10.20	14.00	17.80

Table 14: Kv values, connection size 10 mm to 32 mm, straight seat control valves

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Connection size (valve body)		Orifice (valve seat)		Kv values [m³/h]										
				Stroke [%]										
[mm]	[inch]	[mm]	[inch]	5	10	20	30	40	50	60	70	80	90	100
40	1 1/2"	25	1"	0.40	0.50	0.75	1.10	1.70	2.60	3.80	5.60	8.00	10.70	13.60
		32	1 1/4"	0.48	0.60	0.85	1.30	2.10	3.20	4.60	6.90	11.00	15.00	20.20
		40	1 1/2"	0.60	0.70	1.10	1.70	2.70	4.00	6.00	9.20	13.80	18.20	23.80
50	2"	32	1 1/4"	0.48	0.60	0.90	1.30	2.10	3.20	4.60	6.90	11.60	16.00	21.00
		40	1 1/2"	0.60	0.70	1.00	1.70	2.60	4.00	5.90	9.20	14.00	18.90	24.60
		50	2"	0.90	1.10	1.90	2.90	4.50	6.80	10.50	15.50	22.00	29.30	37.00

Table 15: Kv values, connection size 40 mm and 50 mm, straight seat control valves

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9 INSTALLATION OF THE VALVE

9.1 Safety instructions

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.

NOTE!

Damage to valve body, seat seal or diaphragm.

- To prevent damage, the device must be in the MANUAL operating state during installation.

Devices are delivered with the MANUAL operating state preset.

9.2 Devices with socket or flanged connection

9.2.1 Installation requirements

Installation position: any position; preferably with actuator facing up.

Direction of flow: is specified on the rating plate by an arrow and the numbers 1 and 2.
The 1 and the 2 stand for identification also on the valve body.
The incoming flow is under the seat.

Pipelines: Ensure that the pipelines are aligned.

Filter: Required for devices with approval in accordance with EN 161.
In accordance with DIN EN 161 "Automatic Shut-off Valves for Gas Burners and Gas Appliances", a strainer must be installed upstream of the valve in the pipeline to prevent a 1 mm test pin from penetrating.

Preparation: Clean pipelines (sealing material, swarf, etc.).

9.2.2 Installation

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 "21 Accessories, spare parts".

9.3 Devices with welded body

The electromotive control valves must not be welded with mounted actuator into the pipeline. Installation in the pipeline is therefore divided into the following steps:

1. Prepare removal of the actuator.
2. Remove the actuator.
3. Weld valve body into the pipeline.
4. Mount actuator on the valve body.

9.3.1 Preparing removal of the actuator

ATTENTION!

Damage to valve body, seat seal or diaphragm.

To prevent damage, the valve must be open when removing the actuator.

→ If the valve is closed: Open the valve using the mechanical manual control. See Chapter "15.2 Actuating valve mechanically", page 80.

⚠ **WARNING!**

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.
- Keep clear of the openings in the valve body.

9.3.2 Removing the actuator

→ Clamp the valve body into a holding fixture.

→ Place a suitable open-end wrench on the body connection.
⚠ Do not unscrew the body connection with a tool which could damage the body connection (e.g. pipe wrench).

→ Unscrew the actuator off the valve body.

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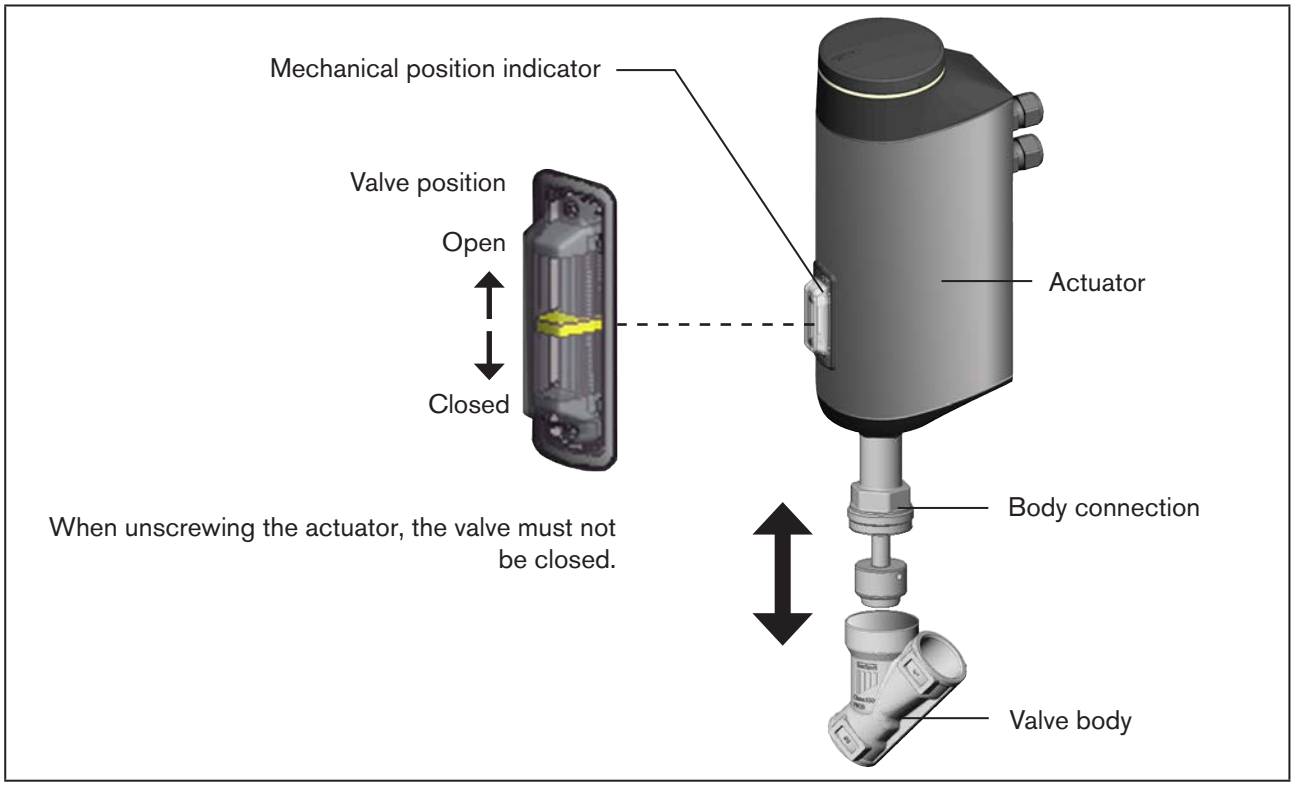

Figure 14: Installation of electromotive actuator (angle seat control valve shown in the example)

9.3.3 Installation requirements

Installation position:	Any position
Direction of flow:	is specified on the rating plate by an arrow and the numbers 1 and 2. The 1 and the 2 stand for identification also on the valve body. The incoming flow is under the seat.
Pipelines:	Ensure that the pipelines are aligned.
Filter:	Required for devices with approval in accordance with EN 161. In accordance with DIN EN 161 "Automatic Shut-off Valves for Gas Burners and Gas Appliances", a strainer must be installed upstream of the valve in the pipeline to prevent a 1 mm test pin from penetrating.
Preparation:	Clean pipelines (sealing material, swarf, etc.).

9.3.4 Welding valve body into the pipeline

DANGER!

Risk of injury from high pressure!

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

ATTENTION!

Damage to the electronics of the actuator by the effect of heat.

▪ Before welding in the valve body, remove the actuator.

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

9.3.5 Mounting actuator on the valve body

→ ⚠ Before mounting the actuator, check whether the graphite seal of the valve body is available and undamaged.

→ Replace damaged or missing graphite seal.

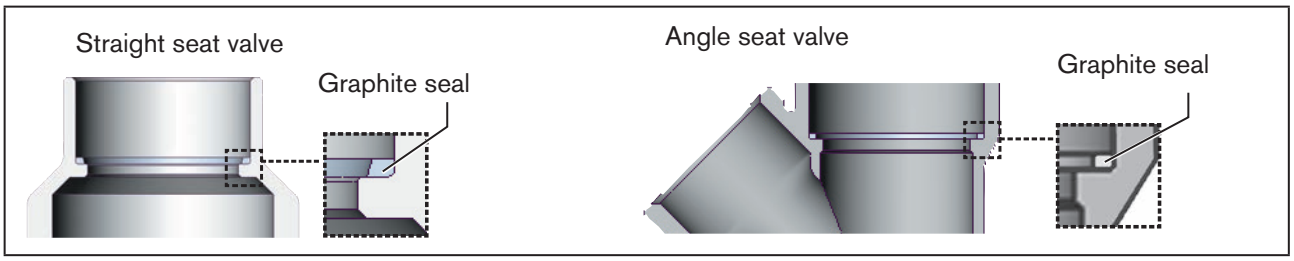

Figure 15: Graphite seal of the valve body

DANGER!

Danger if incorrect lubricants used.

Unsuitable lubricant may contaminate the medium. In oxygen applications there is a risk of an explosion!

▸ Only use approved lubricants for specific applications, such as oxygen or analytical applications.

→ If required, grease the external thread of the body connection (e.g. with Klüber paste UH1 96-402 from Klüber).

→ Place the external thread on the internal thread of the body connection. See "Figure 14: Installation of electromotive actuator (angle seat control valve shown in the example)".

→ Place a suitable open-end wrench on the body connection.
⚠ Do not screw on the body connection with a tool which could damage the body connection (e.g. pipe wrench).

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.

→ Screw actuator onto the valve body.

Connection size	Tightening torque for body connection [Nm]
10/15	45 ±3
20	50 ±3
25	60 ±3

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32	65 ±3
40	
50	70 ±3
65	100 ±3
80	120 ±5
100	150 ±5

Table 16: Tightening torques for body connection

Definition of connection size
The connection size denotes the diameter of the line connection.

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 "21 Accessories, spare parts".

9.3.6 After installation

→ Connect the device electrically.

The position of the connections can be aligned by rotating the actuator through 360°. For description see chapter "9.4 Rotating the actuator".

A description of the electrical connection can be found in chapter "10 Electrical installation".

ATTENTION!

Damage to valve body, seat seal or diaphragm.

- To prevent damage, first run the X.TUNE function after making the electrical connection. Only then reset the operating state to AUTOMATIC.

→ Run X.TUNE function to adjust the position controller. See Chapter "11.6 Adjusting the position controller – running X.TUNE", page 55.

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9.4 Rotating the actuator

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

ATTENTION!

Damage to the seat seal and seat contour when valve is closed.

If the valve is closed when the actuator is rotated, the seat seal and the seat contour may be damaged.

- If the valve is closed: Before rotating the actuator, open the valve using the mechanical manual control. For description see "15.2 Actuating valve mechanically".

→ 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.

WARNING!

If incorrect direction of rotation, risk of injury due to discharge of medium and pressure release.

If the direction of rotation is wrong, the body connection may become detached.

▸ Rotate actuator in the indicated direction only (see "Figure 16: Rotating the actuator").

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

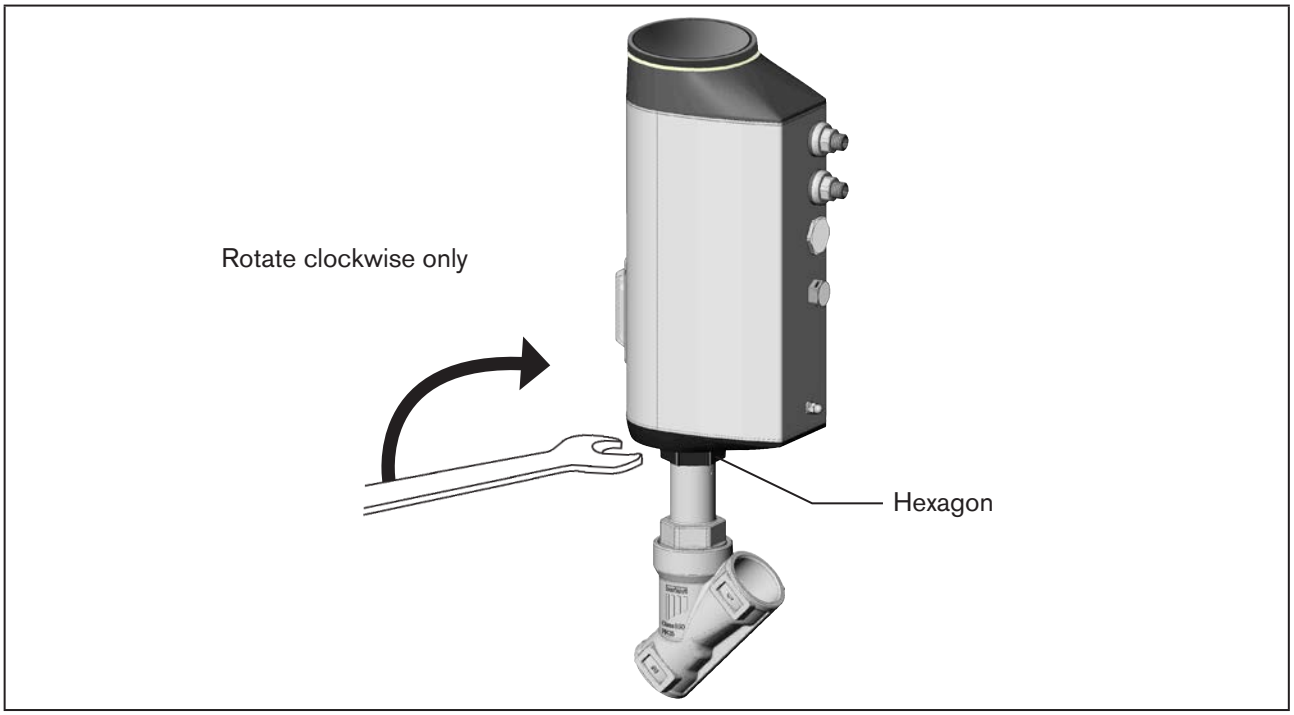

Figure 16: Rotating the actuator

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9.5 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 in 2 sizes. See Chapter "21 Accessories, spare parts", page 109.

9.5.1 Attaching the holding device

→ Attach holding device to the pipe between valve body and actuator as shown in the diagram.

If there is a relief bore:

ATTENTION!

Ensure that the relief bore, which is used to detect leakages, is not covered.

→ Fix the holding device in place using suitable means.

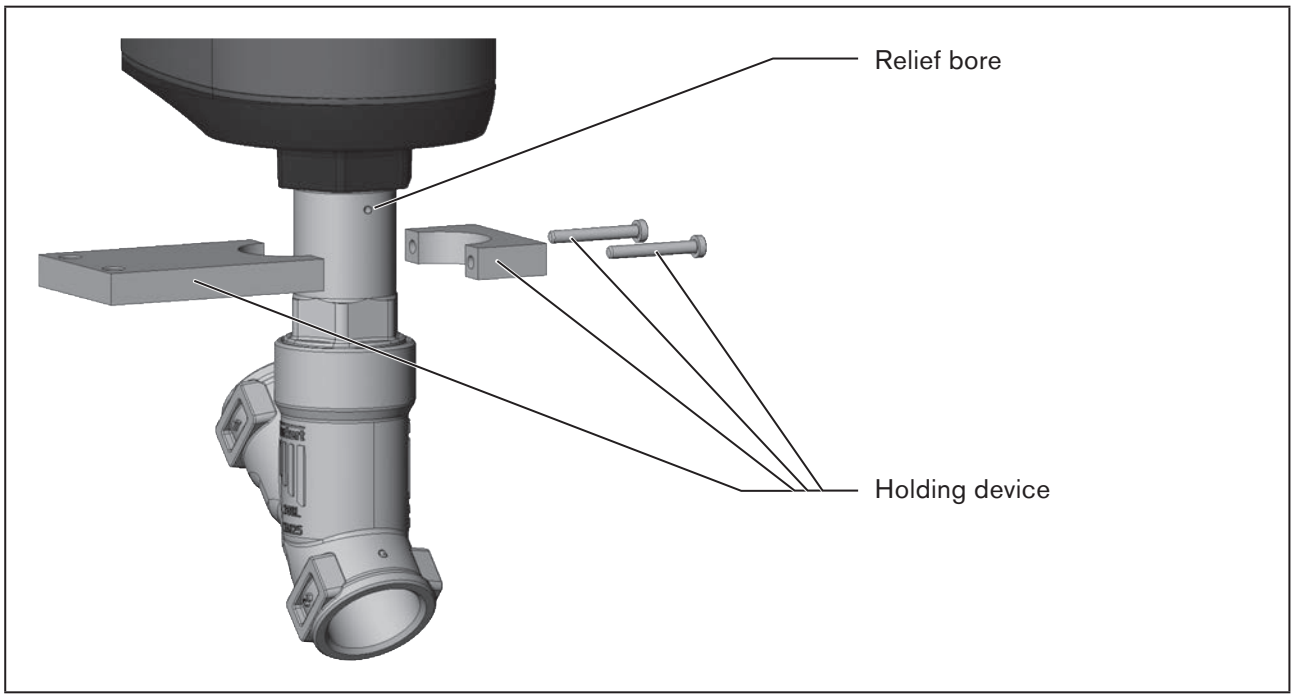

Figure 17: Attaching the holding device

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10 ELECTRICAL INSTALLATION

The electromotive 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 DC
Set-point value:	0...20 mA; 4...20 mA 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 of Type 3360 or 3361 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.

EtherNet/IP:
The designation of the circular plug-in connectors and contacts can be found in chapter "18 Field bus gateway".

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 basic settings and adjustments for the electromotive control valve. For a description see chapter "11 Start-up".

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10.1.2 Description of the circular plug-in connectors

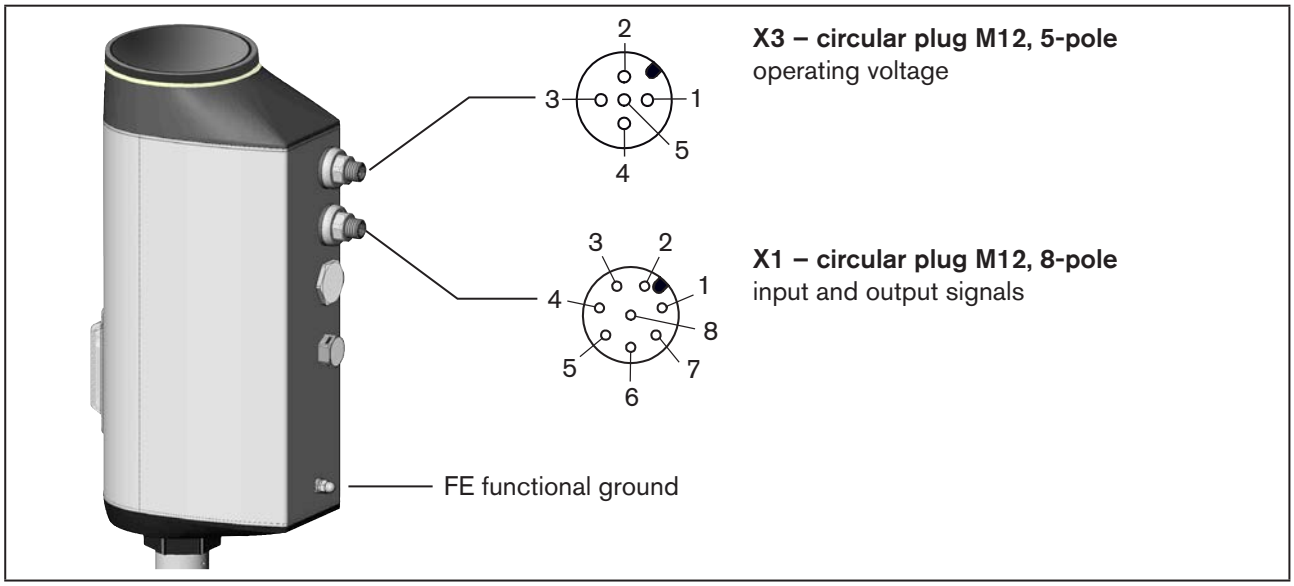

Figure 18: Description of the circular plug-in connectors

10.1.3 X1 – M12 circular plug, 8-pole

Pin	Wire color*	Assignment	On the device side	External circuit / signal level
Input signals from the control centre (e.g. PLC)				
8	red	Set-point value + (0/4...20 mA or 0...5/10 V)	8 ○———	+ (0/4...20 mA or 0...5/10 V) galvanically isolated for the operating voltage
7	blue	Set-point value –	7 ○———	Set-point value –
1	white	Digital input +	1 ○———	+ 0...5 V (log. 0) / 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+	6 ○——→	+ (0/4...20 mA or 0...5/10 V)
5	gray	Analog output –	5 ○——→	Analog output –
4	yellow	Digital output 1	4 ○——→	24 V / 0 V
3	green	Digital output 2	3 ○——→	24 V / 0 V
2	brown	Digital inputs and digital outputs GND	2 ○——→	GND

* *The indicated wire colors refer to the connection cable, part no. 919061, available as an accessory.*

Table 17: X1 – M12 circular plug, 8-pole

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10.1.4 X3 – M12 circular plug, 4-pole or 5-pole, operating voltage

Pin	Wire color		Assignment	On the device side	External circuit / signal level
	without büS network 4-pole connection*	with büS network			
1	-	-	CAN shield	1 (FE functional ground)	
2	brown	red	+24 V DC	2 	24 V DC ± 10 % max. residual ripple 10 %
3	blue	black	GND / CAN_GND	3	
4	-	white	CAN_H		
5	-	blue	CAN_L		

* *The indicated wire colors refer to the M12 connection cable, 4-pole, part no. 918038, available as an accessory.*

Table 18: X6 – M12 circular plug, 4-pole or 5-pole, operating voltage

Electrical installation with or without büS network:
To be able to use the büS network (CAN interface), a 5-pole circular plug and a shielded 5-wire cable must be used.

If the büS network is not used, a 4-pole circular plug can be used as a counterpart.

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10.2 Electrical installation with cable gland

10.2.1 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 of Type 3360 or 3361 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 mm².

10.2.2 Access to the connection terminals

To access the terminals, open the device 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.

→ To release the display module or the dummy cover, rotate counter-clockwise by 90° and remove from the actuator housing.
⚠ On the display module pay attention to the connection cable leading to the HMI interface!

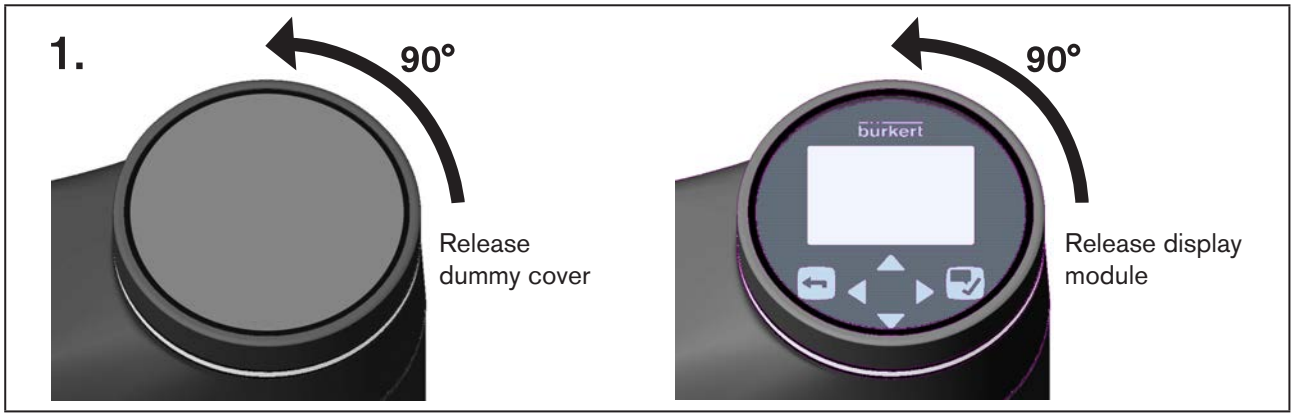

Figure 19: Removing dummy cover or display module from the actuator housing

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Device version with display module:

→ Release the HMI interface and disconnect connection cable.

2. Removing LED and storage module:

→ Remove the 2 fastening screws (hexagon head key, width across flats 3 mm).

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

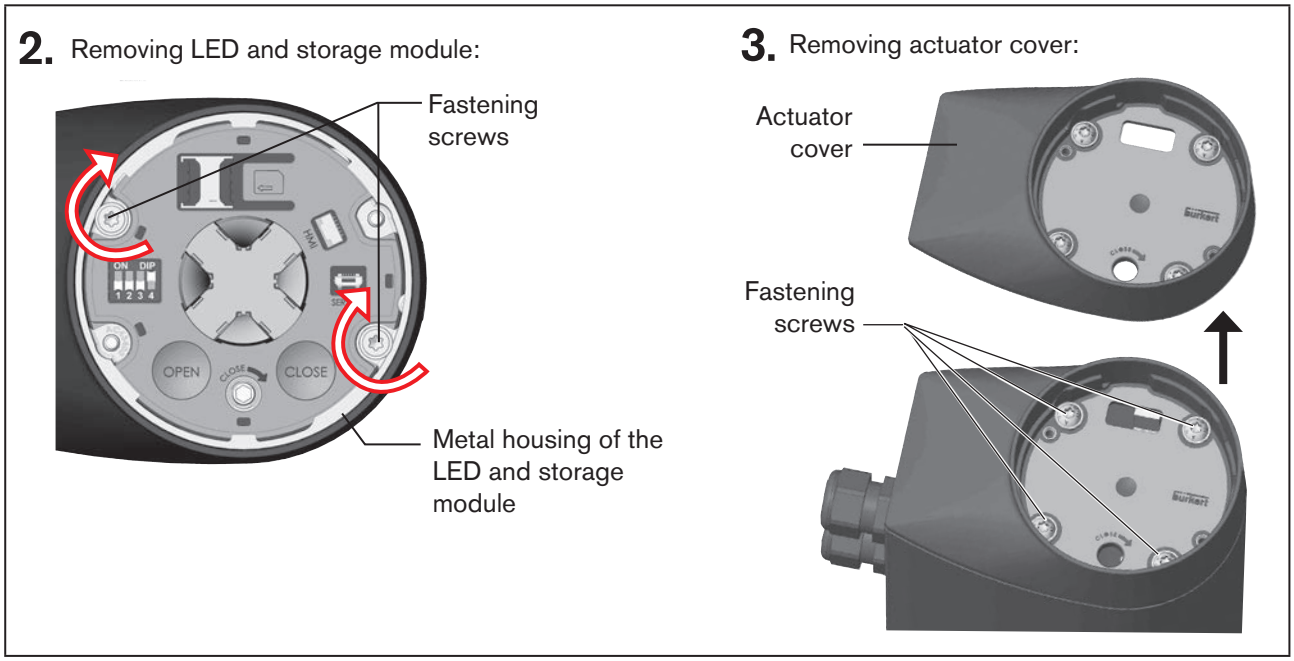

Figure 20: Remove LED and storage module and remove actuator cover

3. Removing actuator cover:

→ Loosen the 4 fastening screws (T25 hexagonal socket round screws).
The screws are integrated in the actuator cover to prevent them from falling out.

→ Remove the actuator cover.

The connection terminals are now accessible.

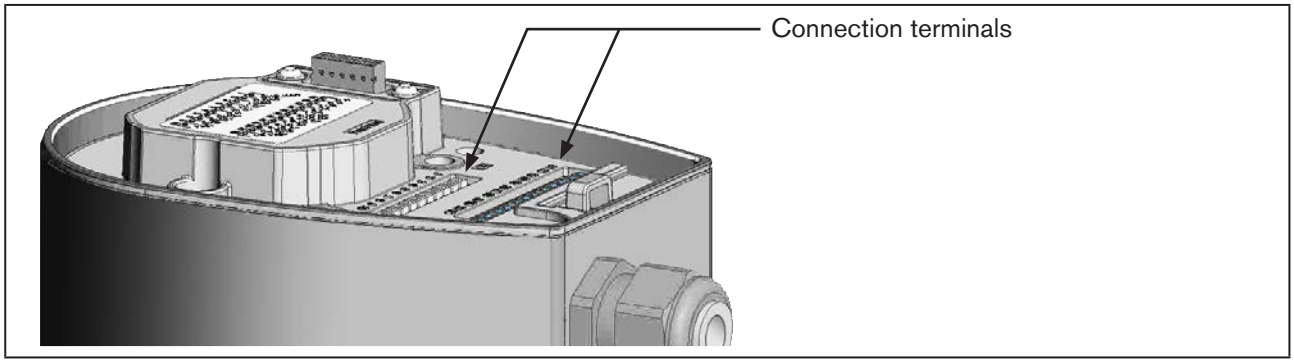

Figure 21: Location of the connection terminals

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10.2.3 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 50.

→ 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:

- 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.

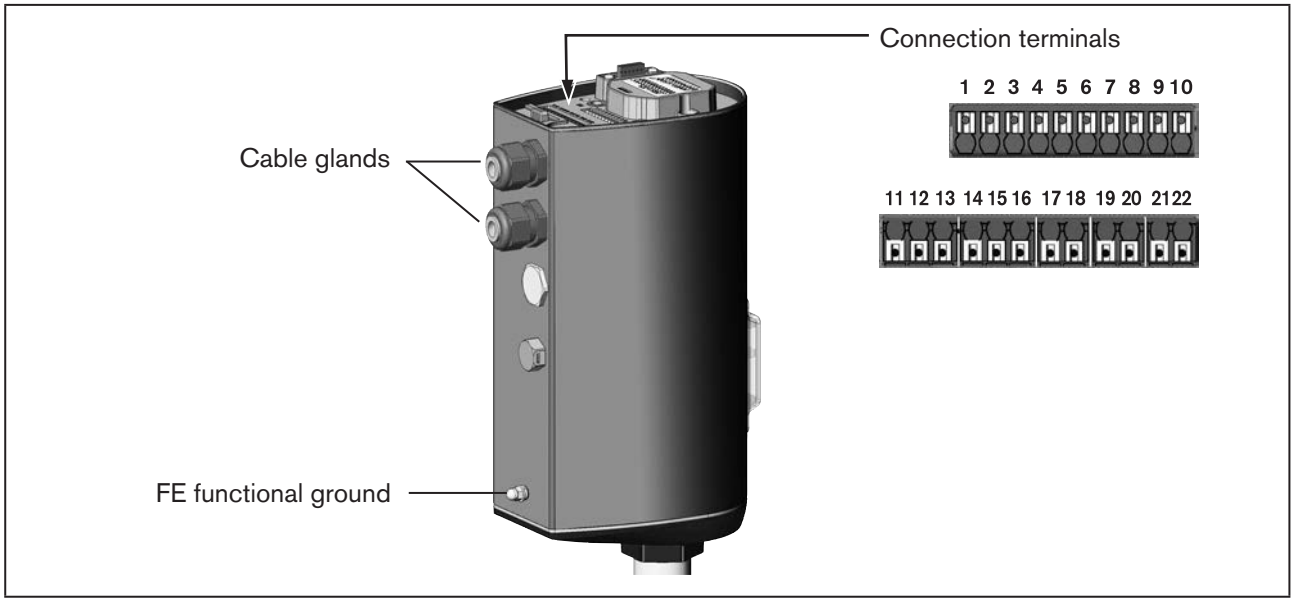

Figure 22: Connecting the cables

→ Connect the device according to the tables.

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

Terminal	Assignment	On the device side	External circuit / signal level
8	Set-point value + (0/4...20 mA or 0...5/10 V)	8	+ (0/4...20 mA or 0...5/10 V) galvanically isolated for the operating voltage
7	Set-point value –	7	Set-point value –
5	Digital input +	5	+ 0...5 V (log. 0) / 10...30 V (log. 1)
4	Digital input GND	4	GND specific to operating voltage GND (terminal GND)

Table 19: Terminal assignment – input signal from the control center (e.g. PLC)

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

Terminal	Assignment	On the device side	External circuit / signal level
19	Analog output+	19	+ (0/4...20 mA or 0...5/10 V)
20	Analog output –	20	Analog output –
18	Digital output 1	18	24 V / 0 V
17	Digital output 2	17	24 V / 0 V
16	Digital output GND	16	GND

Table 20: Terminal assignment – output signal to the control center (e.g. PLC)

10.2.6 Terminal assignment – operating voltage and büS network

Terminal	Assignment	On the device side	External circuit / signal level
	CAN shield		
10	+24 V DC	10	24 V DC ± 10 %
9	GND	9 / 1	max. residual ripple 10 %
1*	CAN_GND	⚠ Do not connect unless a separate line is used for CAN.	
2*	CAN_H		
3*	CAN_L		

Table 21: Terminal assignment – operating voltage and büS network

*** Electrical installation of büS network:**
The terminals 1, 2 and 3 (CAN interface) are for the connection of the büS network.
Terminal 1 is bridged internally with terminal 9, however is not designed for the operating voltage.

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10.2.7 Closing the device

ATTENTION!

Damage or malfunction due to ingress of dirt and moisture.

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

- The seal is inserted in the actuator housing/actuator cover and is not damaged.
- The sealing surfaces must be clean and dry.

1. Attaching 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. Inserting LED and storage module

→ Insert LED and storage module and fix with the 2 fastening screws (tightening torque: 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.

→ Put on display module and rotate clockwise by 90° until it engages.

Device version with dummy cover:

→ Put on dummy cover and rotate clockwise by 90° until it engages.

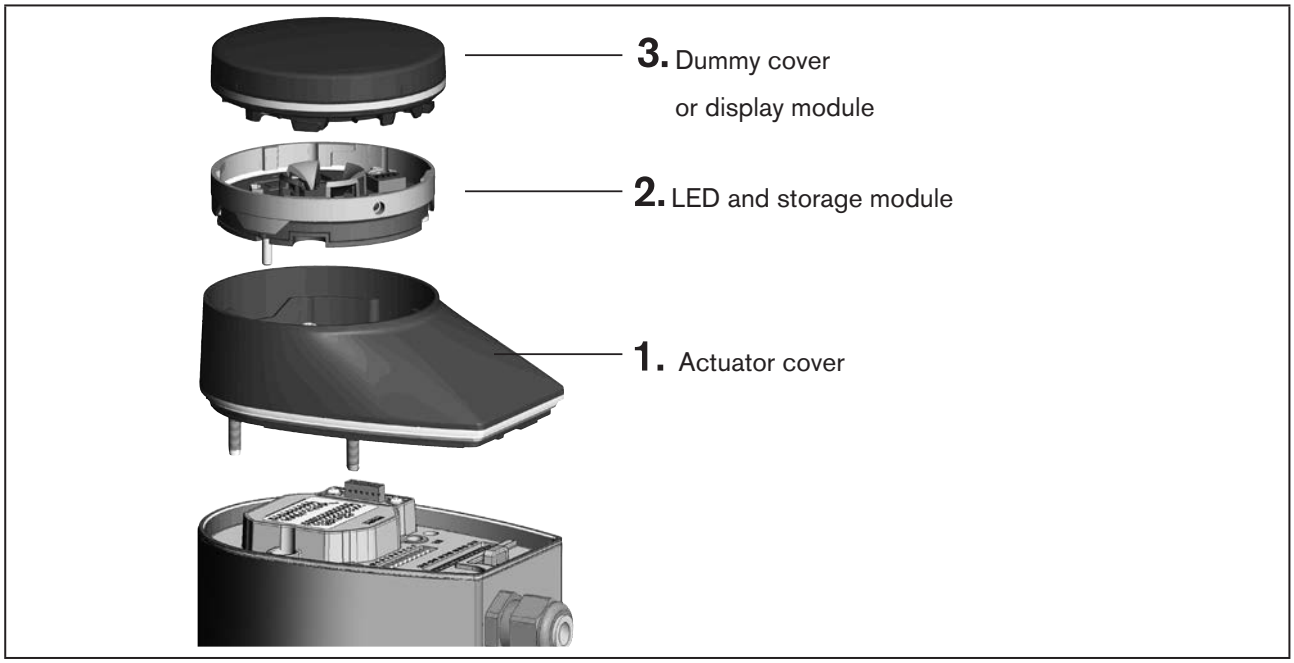

Figure 23: Closing the device

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

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.

NOTE!

Observe for devices which were removed for installation.

If the actuator was removed, the X.TUNE function must be run again before commissioning. Chapter "11.6 Adjusting the position controller – running X.TUNE".

- The device must be in the MANUAL operating state.

11.2 Setting the operating state

Devices are delivered with the MANUAL operating state preset. Set the operating state to AUTOMATIC for start-up. For a description see Chapter "14.1 Switching operating state, AUTOMATIC – MANUAL".

11.3 Basic settings

In the case of devices in the as-delivered state, all basic settings required for start-up have already been made at the factory.

Overview of basic factory settings:

Device version	Basic factory settings			
	Type of signal	Standard signal	Safety position	Adjustment of position controller
Standard	analog	4...20 mA (for analog signal type)	close	The X.TUNE function is run at the factory.
Option gateway	gateway	is specified by the field bus		Follow the instructions in Chapter"11.1 Safety instructions".
Description	Separate software description	Chapter "11.4"	Chapter "11.5"	Chapter "11.6"

Table 22: Basic factory settings

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There are different ways of making basic settings on the device.

- **Basic setting on the PC or tablet**
  Possible on all device types and device versions.
  The setting is made in the "Communicator" PC software which can be downloaded free of charge from the Bürkert homepage.
  In addition to the PC software, the USB büS interface set, available as an accessory, is required. Communication is established by the büS Service interface of the device (see "12.4 büS Service interface"e").
- **Adjusting the position controller (X.TUNE function) using 2 capacitive buttons on the device**
  Only possible on devices which do not feature the optionally available display module.
- **Basic setting on the display of the device (optional)**
  Only possible on devices which feature the optionally available display module.

11.4 Setting standard signal

Setting options

- On the PC or tablet.
  The setting 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.
- On the device display (option) change

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

Changing from View 1 to the detailed view:

→ to CONFIGURATION.

→ Select **Inputs / Outputs** and confirm selection.

You are in the detailed view parameter.

Setting the standard signal:

→ Select CMD and confirm.

→ Select ANALOG.type and confirm.

→ Select standard signal and save.

You have set the standard signal.

→ Back with.

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11.5 Setting safety position

Setting options

- On the PC or tablet.
  The setting on the PC 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.
- On the device display (option) change

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

Changing from View 1 to the detailed view:

→ to CONFIGURATION.

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

✓ You are in the detailed view parameter.

Setting the safety position:

→ Select SAFEPOS and confirm.

→ Select FUNCTION and confirm.

The following safety positions can be selected:

Close	Valve tightly closed.
Open	Valve open.
User-Defined	Freely defined safety position. The input of the position in this menu is described below.
Inactive	Valve stops in an undefined position if the supply voltage fails.

→ Select safety position and save.

Input of the freely defined safety position in the menu User-Defined.

→ Select Position and confirm.

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

✓ You have set the safety position.

→ Back with.

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11.6 Adjusting the position controller – running X.TUNE

When the X.TUNE function is run, the position controller is adjusted to the physical stroke of the actuating element used.

Devices are delivered with the X.TUNE function run at the factory.

ATTENTION!

Do not run X.TUNE without requirement!

The X.TUNE function is necessary when changing the valve body or removing the actuator for installation.

WARNING!

Danger due to uncontrolled process after running the X.TUNE function.

If the X.TUNE is run under medium pressure, the controller will be incorrectly adjusted. This will result in an uncontrolled process.

- Never run the X.TUNE under medium pressure.
- Secure system against unintentional activation!

11.6.1 Adjustment using the buttons in the device

The 2 buttons for running the X.TUNE are located under the dummy cover.

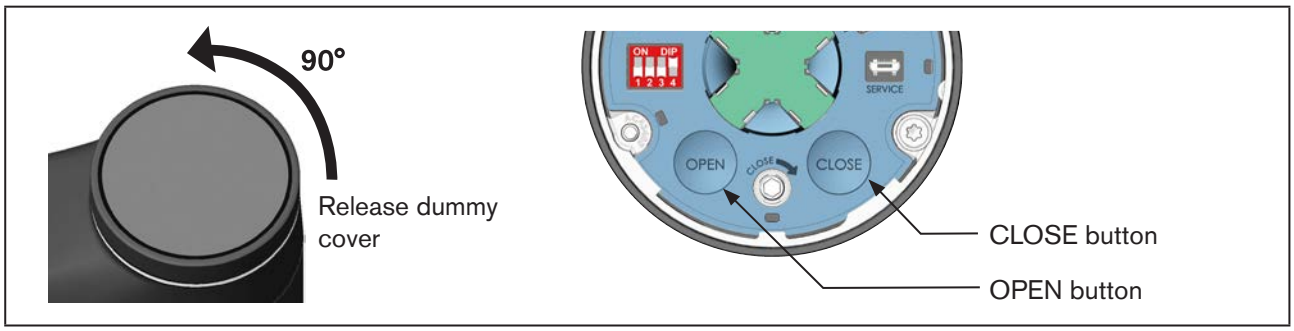

Figure 24: Adjustment of the position controller using the buttons in the device

→ To release, rotate the dummy cover counter-clockwise by 90° and remove from the actuator housing.

Running the X.TUNE function:

⚠ Ensure that no medium pressure is applied!
Do not run the X.TUNE unless it is absolutely essential.

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

When the X.TUNE is running, the LED illuminated ring is lit orange.

When the X.TUNE ends, the LED illuminated ring is reset to its previous status.

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11.6.2 Adjustment 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.

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

Changing from View 1 to the detailed view:

→ to CONFIGURATION.

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

→ Change to MAINTENANCE.

✓ You are in the detailed view maintenance.

Running the X.TUNE function:

⚠ Ensure that no medium pressure is applied!

→ Select CALIBRATION and confirm.

→ Select X.TUNE and confirm:

The following question appears: "Do you really want to start the X.TUNE?"
⚠ Do not confirm the question unless it is absolutely essential to run the X.TUNE.

→ Confirm question with.

✓ The X.TUNE function is run.

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

Possible messages when X.TUNE is canceled	Description
There are device errors.	There is an error which is preventing X.TUNE from running.
Time limit exceeded	The X.TUNE could not be run within the time limit due to an error.
Motor current is too high.	The motor current is too large for running the X.TUNE function.
Lower end position of the valve is not detected.	The lower end position of the valve cannot be detected by the travel sensor.

Table 23: Possible error message following cancellation of the X.TUNE function

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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 version, there are different control elements available for operation of the device.

- **Standard model – devices without display module**
  The device is operated via 2 capacitive buttons and 4 DIP switches.
- **Option – devices with display module**
  The 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		
Mechanical Manual Control	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 24: Operating options

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12.2 Display elements

Representation of the display elements:

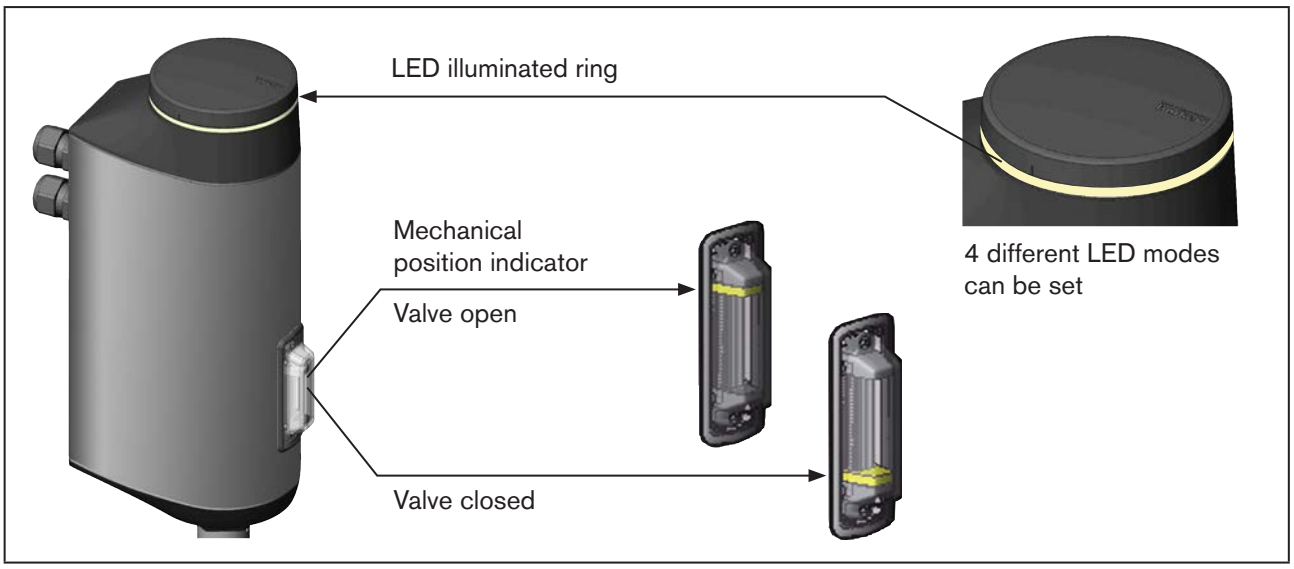

Figure 25: Display elements

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

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

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

* A complete description of the device statuses, errors and warnings, which are displayed in LED mode, can be found in chapter "6.4 Display of the device status".

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12.2.2 Setting LED mode

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

Changing from View 1 to the detailed view:

→ to **CONFIGURATION**.

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

✓ You are in the detailed view parameter.

Setting the LED mode:

→ Select **Status LED** and confirm.

→ Select **Mode** and confirm.

The following LED modes can be selected:

NAMUR mode

Valve mode

Valve mode w/warnings

Fixed color

LED off

→ Select LED mode and save.

✓ You have set LED mode.

→ Back with .

12.2.3 Mechanical position indicator

The valve position can be read off on the mechanical position indicator even if the supply voltage fails (see "Figure 25: Display elements")

12.2.4 Display elements of the display module (option)

For description see "13 Display operation (option)"

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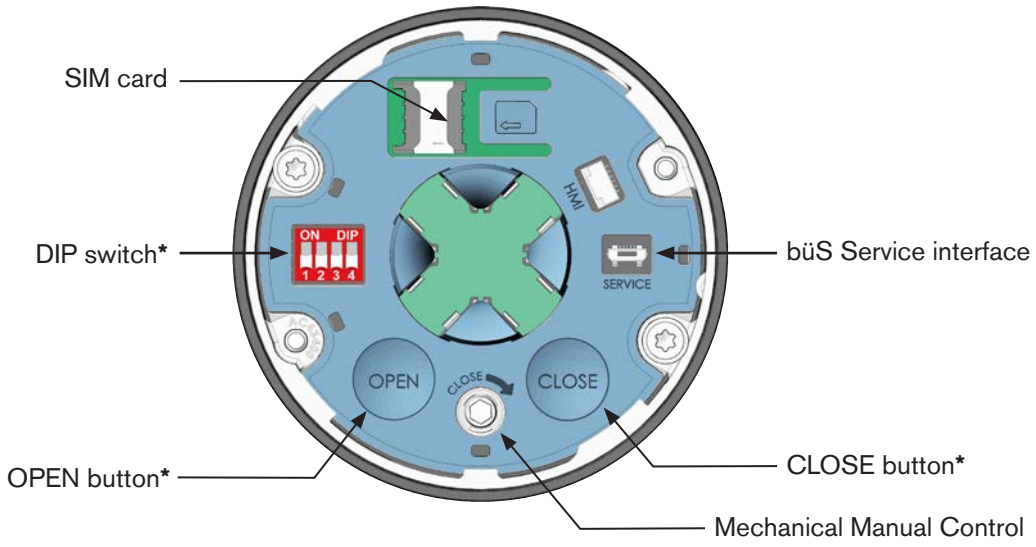
12.3 Control elements

Representation of the control elements:



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

Figure 26: 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 76.

Switch 2: For activating or deactivating the correction characteristic (for adjusting the operating characteristic) (see Chapter "14.3", page 73).

Switch 3: For activating or deactivating the sealing function. See Chapter "14.2", page 71.

Switch 4: For switching between AUTOMATIC mode and MANUAL mode.
See Chapter "14.1", page 70.

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

12.3.2 OPEN button and CLOSE button

Electrical manual control: Open valve: Press OPEN button
Close valve: Press CLOSE button

Running X.TUNE (Autotune): For description see chapter "11.6 Adjusting the position controller – running X.TUNE".

The OPEN and CLOSE buttons have no function for devices which have a display module. The electrical manual control can be implemented on the display only.

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12.3.3 Mechanical Manual Control

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 control.

For description see Chapter "15.2 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 basic setting 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.
  The büS Service interface is internally connected directly to 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 43: Accessories", page 109).

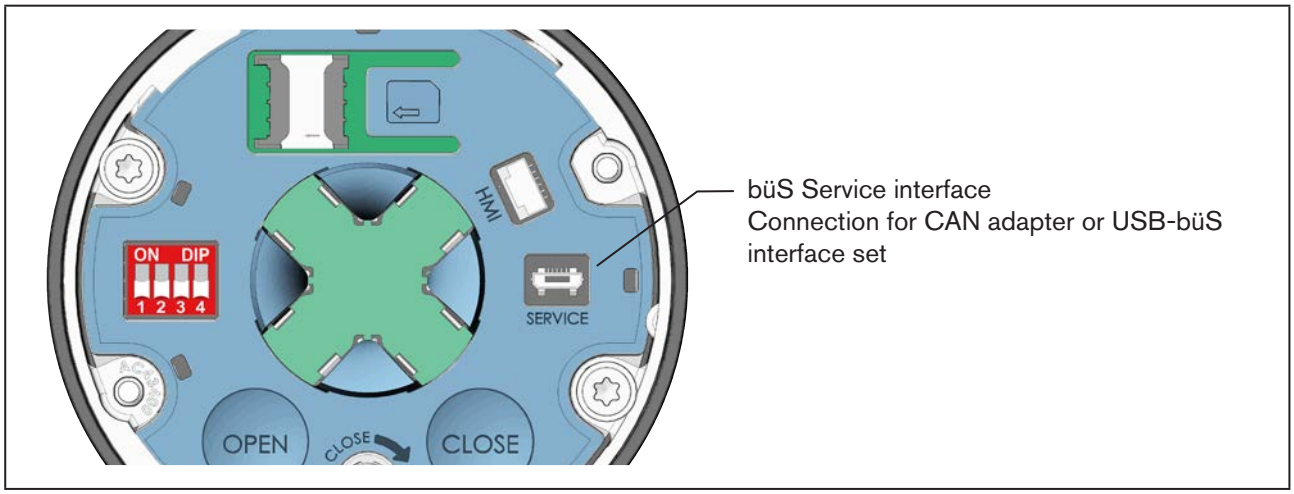

Figure 27: büS Service interface

For devices with EtherNet/IP the büS Service interface is inside of the field bus gateway (see Chapter "Table 33: LED status displays of the interfaces X1 and X2 (field bus connection)", page 96).

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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.

A SIM card which has just been inserted is checked for existing data during device restart. 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 control valves via your Bürkert sales department only.
See Chapter "21 Accessories, spare parts".

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.

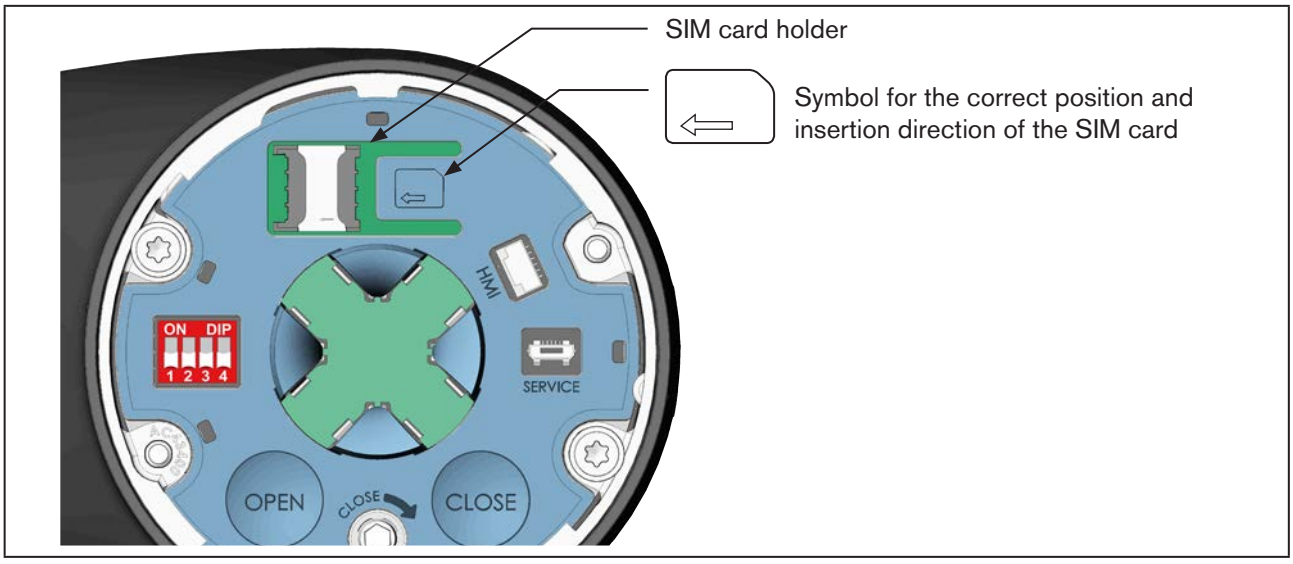

Figure 28: Inserting the SIM card

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13 DISPLAY OPERATION (OPTION)

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

13.1 User interface

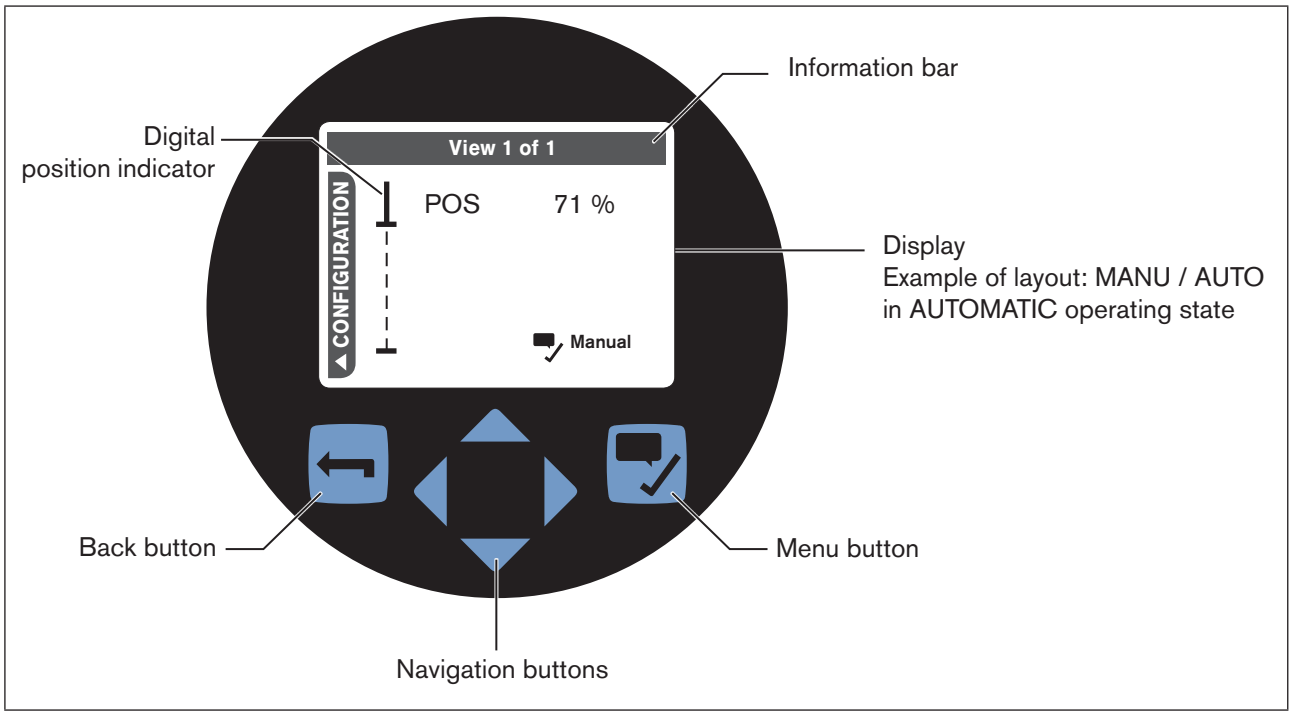

Figure 29: User interface

13.2 Description of the buttons

Key	Functions	
Back button 	Press briefly:	Back
	Hold down:	Jump back to View 1 (start screen)
Navigation buttons 	Change view	
	Accept selection (e.g. for option fields)	
	When entering values: Change decimal place	
Navigation buttons 	Select menu	
	Select configuration, setting	
	When entering values: Change value (number)	

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Key	Functions	
Navigation button ▲	Open valve (in MANUAL operating state)	
Navigation button ▼	Close valve (in MANUAL operating state)	
Menu button	Press briefly:	Confirm selection
		Save selection
		Next (in the Wizard)
	Hold down:	Open context menu

Figure 30: Description of the button functions

13.3 Display views

You go from the start screen to the following views:

- **Configuration view,** using the left navigation button
- **Views 2...4** created by the user using the right navigation button
  See also "13.3.1 User-specific views", page 65.

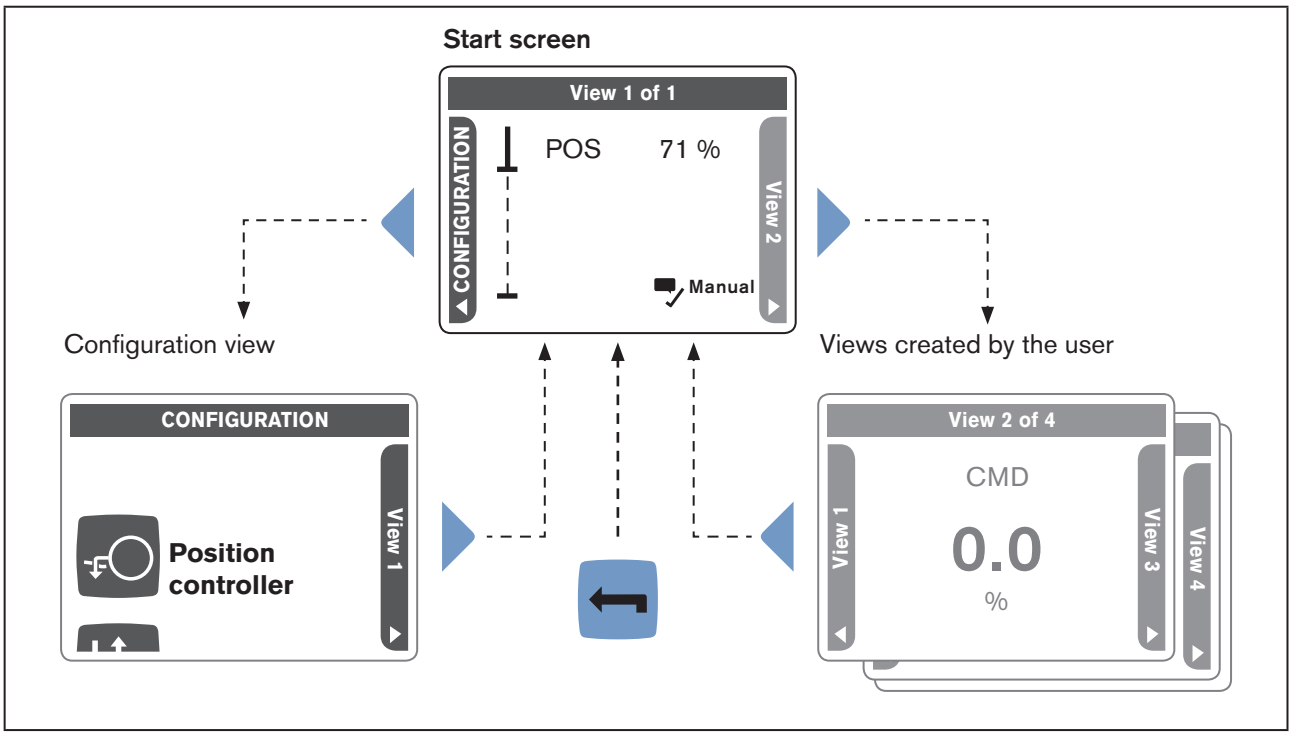

Figure 31: Start screen, configuration view, user-specific views

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The configuration view is divided into different areas.

Using the navigation buttons ▼ and ▲, you can switch between the areas.

Representation in the configuration view	
Symbol	**Configuration area**
	Position controller
	Inputs / Outputs
	Field bus
	Display
	General settings

Table 25: Configuration areas

13.3.1 User-specific views

The user can create additional views to display the process values. The view which is to be seen is displayed on the Information bar.

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 in the factory (see "Figure 29"). 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:	The creation of other views and the allocation of the layout occur in the Context menu. To open the Context menu, hold down the menu button  .

A detailed description on making settings can be found in the operating instructions for the display module ME31 on our homepage www.burkert.com.

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13.3.2 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. Switch to detailed view **MAINTENANCE**.
* See "Table 25: Configuration areas", page 65.	

Table 26: Detailed views

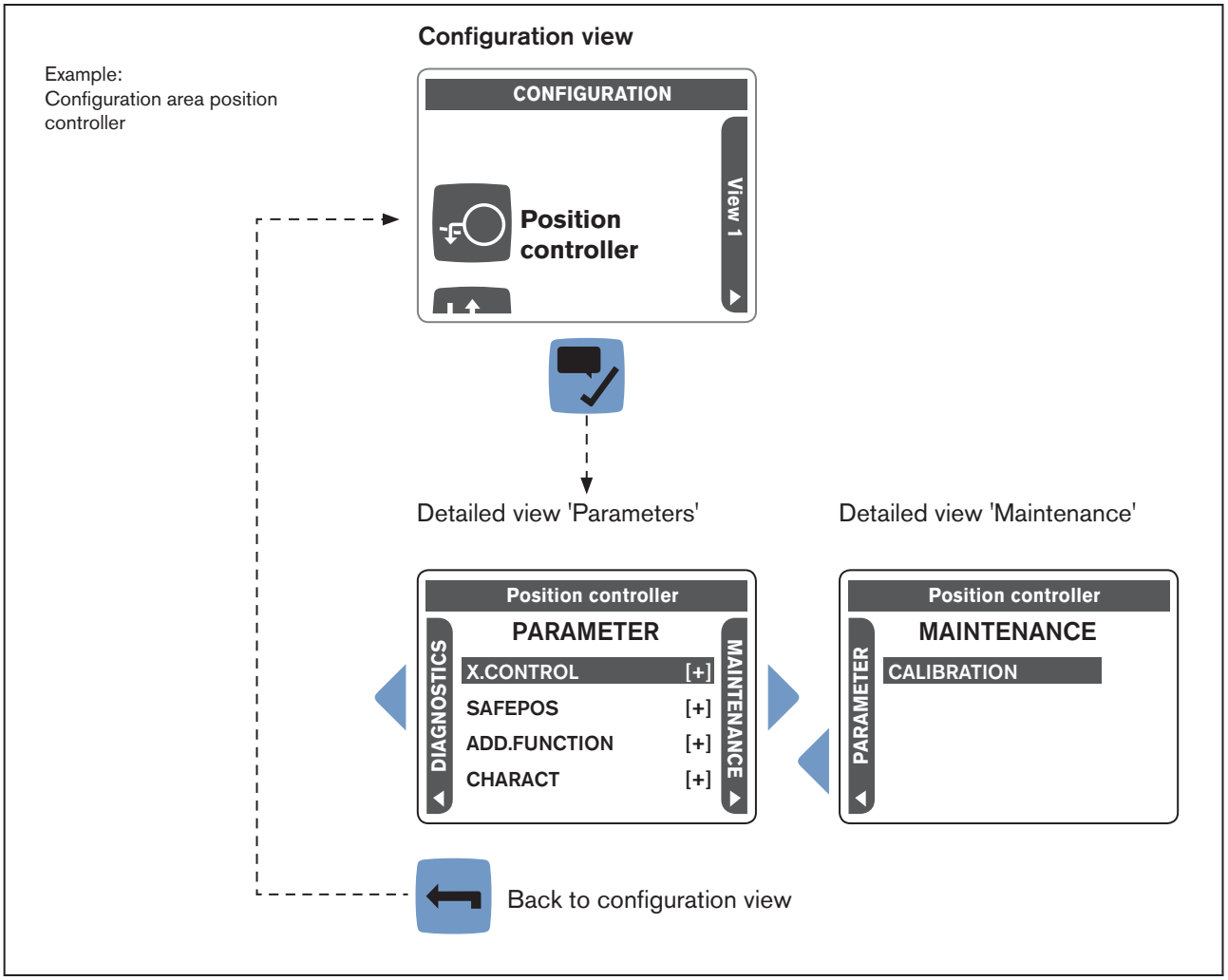

Figure 32: Detailed views; Parameters, Maintenance, Diagnostics

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13.4 Description of the symbols

Symbols for operating software

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

Table 27: Symbols for operating software

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! Control mode is not possible due to malfunctioning in the device or at its peripheral equipment. → Check messages in the messages list.
2		Function check! Work is being carried out at the device; control mode is therefore not currently possible.
3		Out of specification! Ambient conditions or process conditions for the device are outside the specified area. The set-point value deviation is greater than expected under operating conditions.
4		Maintenance required! The device is still in control mode. However, the stock of consumables will soon be depleted or a function will soon be restricted due to the operating conditions.

Table 28: 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: The supply voltage is interrupted. The device is supplied with voltage via the energy pack. In the AUTOMATIC operating state, the actuator moves to the safety position (see "Safety position" symbol). 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. The signal for the set-point value default is simulated.
5		Process control active
6		Position control active

Table 29: 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 30: Symbols for indicating the specific valve positions

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13.5 Screen saver

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

→ Press any button 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.

13.5.1 Setting screen saver

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

Changing from View 1 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 **Waiting time** 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 setting: Devices are delivered with the MANUAL operating state preset.

14.1.1 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 by 90° and remove from the actuator housing.

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

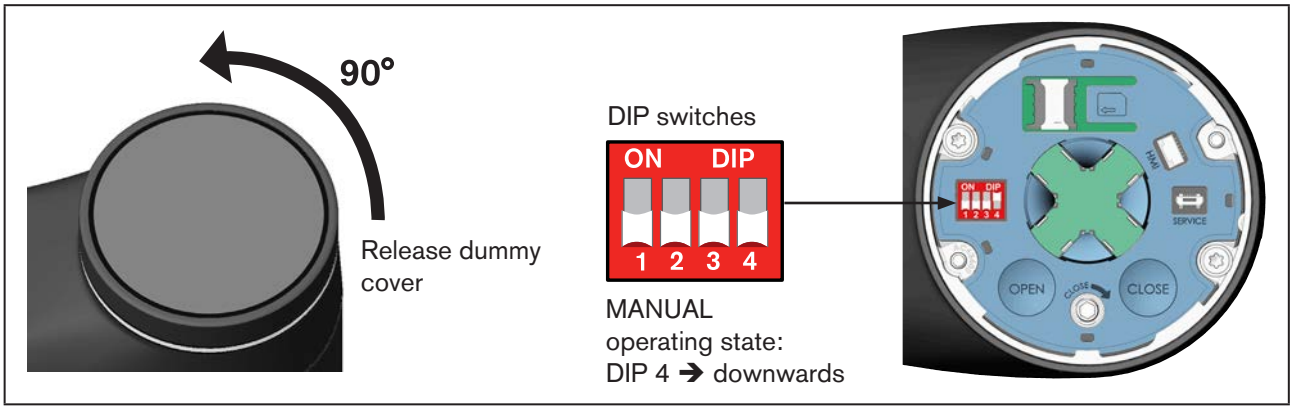

Figure 33: Setting MANUAL operating state

→ Close the dummy cover.

14.1.2 Devices with display module

The setting is made in View 1 (start screen).

You can access View 1 by holding down the Back button.

To change the operating state, the MANU / AUTO layout must be selected for View 1 (preset in the factory). See also Chapter "13.3.1 User-specific views", page 65.

→ To switch to the operating state, briefly press the Menu button.

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.

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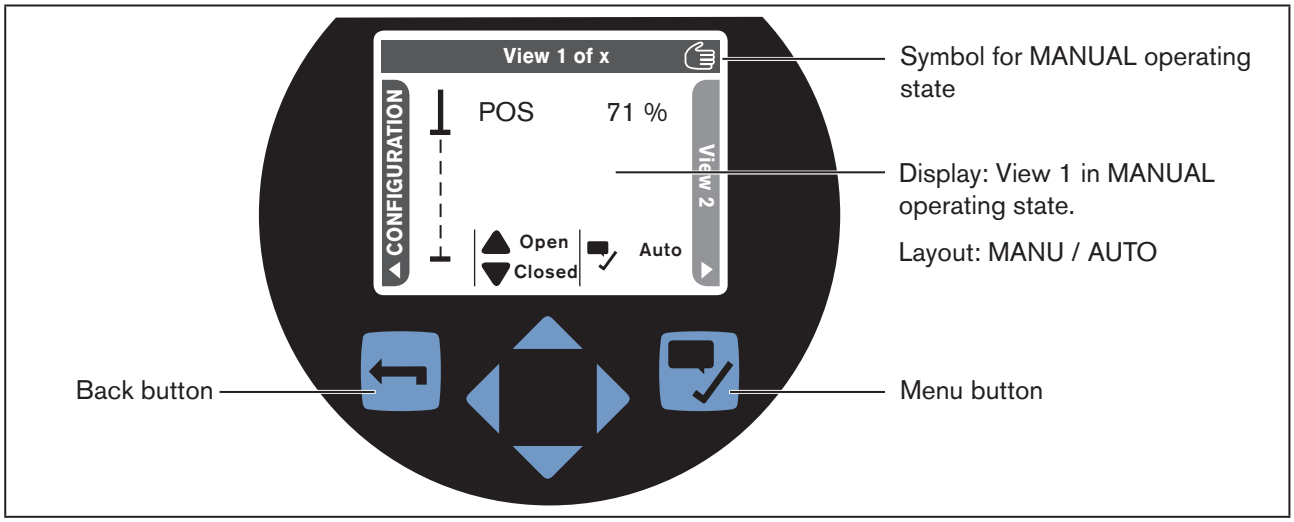

Figure 34: Switching operating state, MANUAL – AUTOMATIC

14.2 Activating – deactivating the sealing function

Factory setting: 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 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 the next "14.2.2".

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

→ To release, rotate the dummy cover counter-clockwise by 90° and remove from the actuator housing.

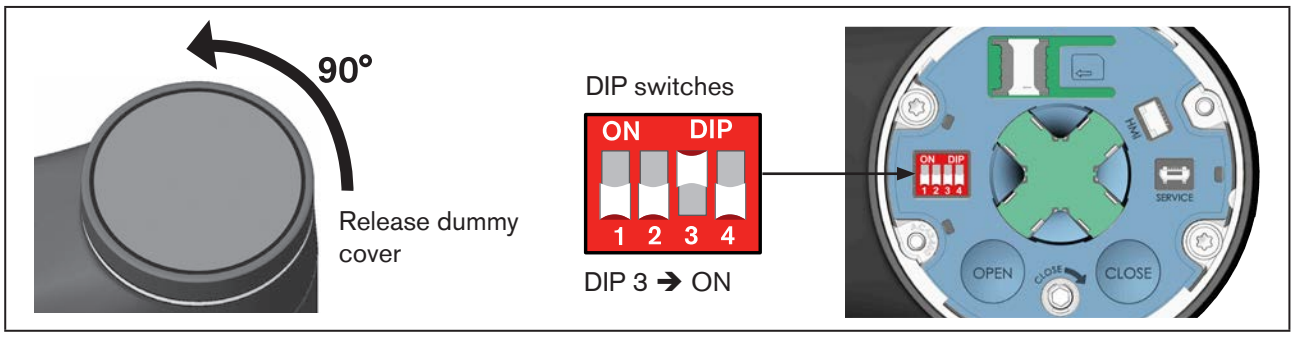

Figure 35: Activating the sealing function

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

→ Close the dummy cover.

14.2.2 Devices with display module

The setting is made in the detailed view parameters for position controller.

Changing from View 1 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 buttons 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.

Configuring the sealing function:

→ In the detailed view parameters select **CUTOFF** and confirm.

→ Confirm **Lower Limit**.

→ Input lower limit value and confirm.

→ Select **Upper Limit** and confirm.

→ Input upper limit value and confirm.

You have activated and configured the sealing function.

→ Back with .

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14.3 Activating – deactivating correction characteristic

Factory setting: 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 seat and the seat seal. 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 control valve of Type 3360 and 3361 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.

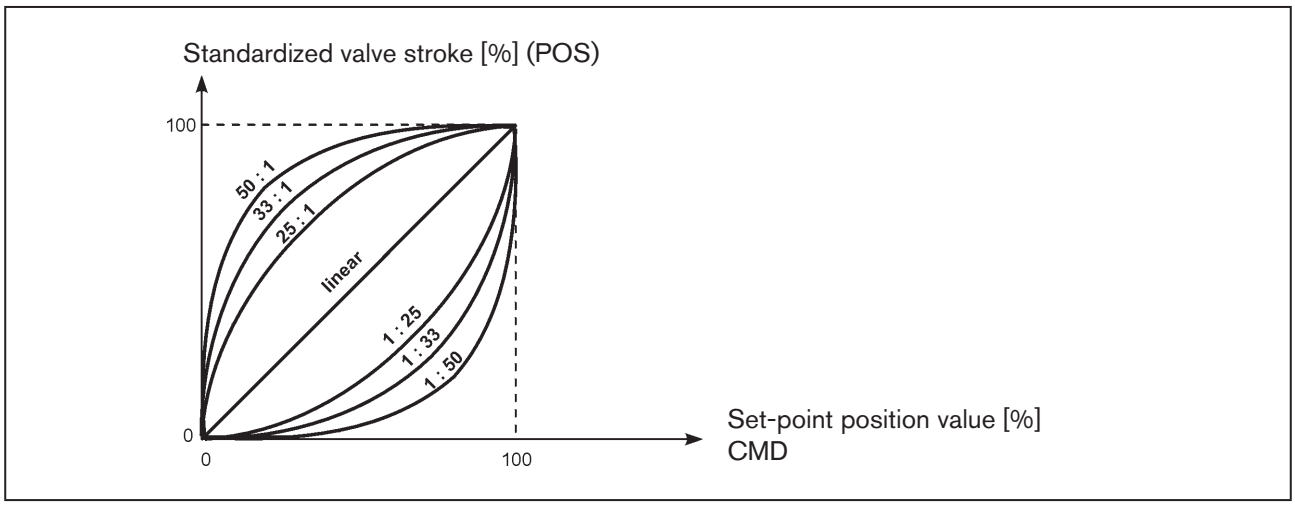

Figure 36: Characteristics

14.3.1 Devices without display module

The correction characteristic 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. This is described in the next chapter "14.3.2".

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

→ To release, rotate the dummy cover counter-clockwise by 90° and remove from the actuator housing.

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

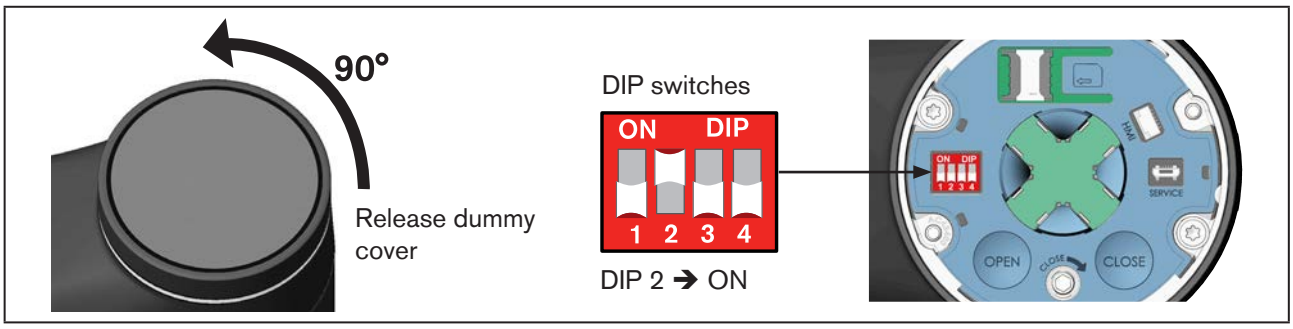

Figure 37: Activating the correction characteristic

→ Close the dummy cover.

14.3.2 Devices with display module

The setting is made in the detailed view parameters for position controller.

Changing from View 1 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 buttons 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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Selecting the correction characteristic:

→ In the detailed view parameters select CHARACT and confirm.

→ Confirm TYPE.

→ Select correction characteristic and confirm.

→ Back with.

✓ 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 and confirm.

→ Select required node y 0 ... y 100 and confirm.

→ Input required percentage and confirm.

→ After inputting all nodes, back with.

✓ You have programmed the correction characteristic.

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14.4 Changing effective direction

Factory setting: 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.

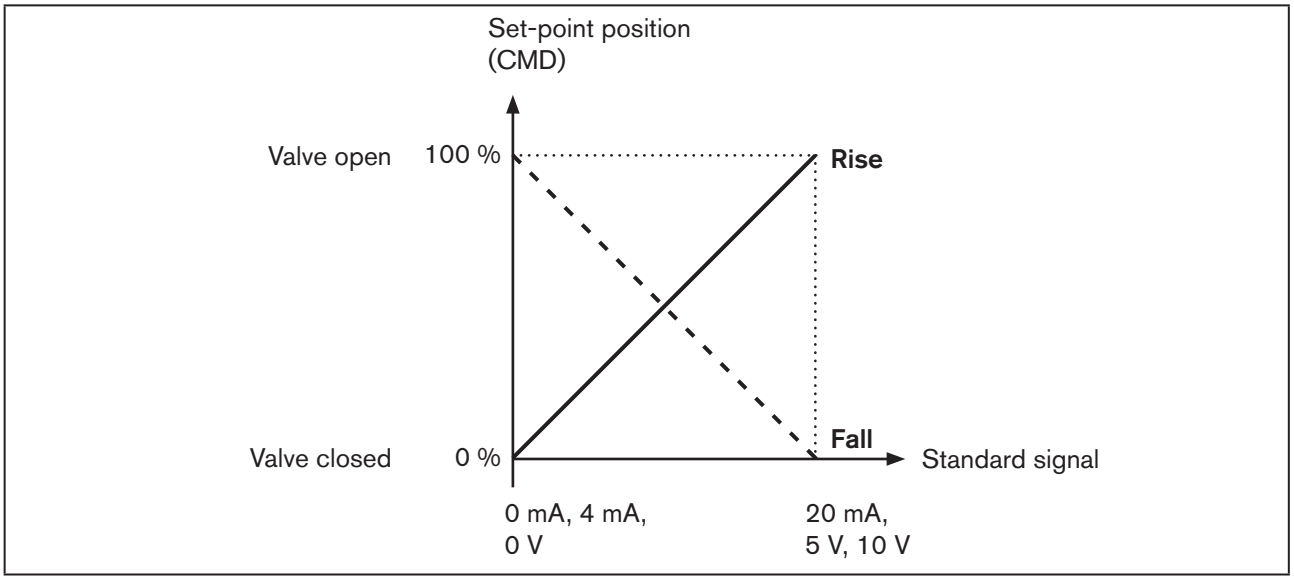

Figure 38: Diagram of effective direction

14.4.1 Devices without display module

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

→ To release, rotate the dummy cover counter-clockwise by 90° and remove from the actuator housing.

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

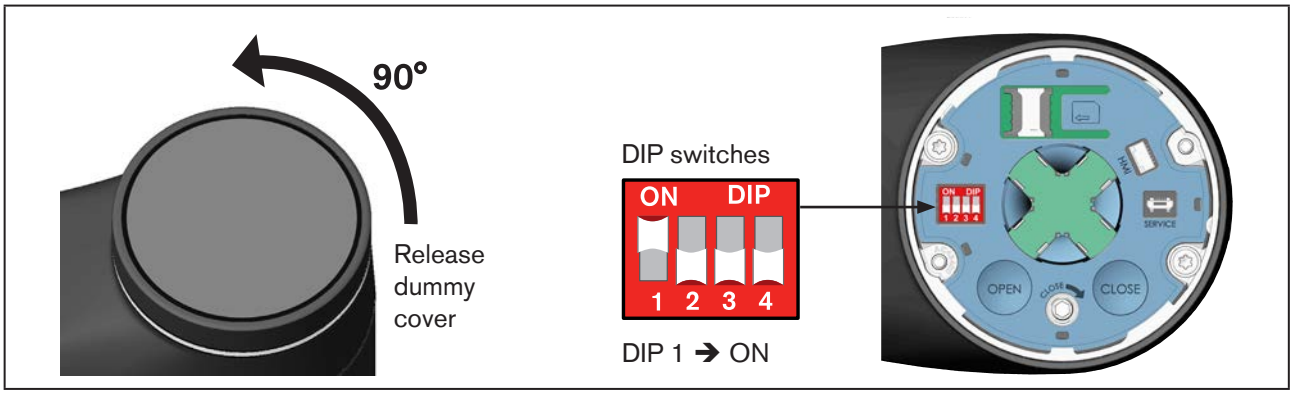

Figure 39: Changing effective direction

→ Close the dummy cover.

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14.4.2 Devices with display module

The setting is made in the detailed view parameters for position controller.

Changing from View 1 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 buttons 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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15 MANUAL ACTUATION OF THE VALVE

The control valve can be manually actuated in 2 ways: electrically or mechanically.

Electrical manual control is usually used to open and close the valve manually.

Mechanical manual control is used to open and close the valve in the event of a power failure. Mechanical manual control may be used in a de-energized state only.

15.1 Actuating valve electrically

Depending on the device version, the valve is manually and electrically actuated on the display or by pressing 2 buttons which are located on the LED and storage module under the dummy cover.

15.1.1 Devices with display module

The valve is actuated on the display in View 1 (start screen) and in MANUAL operating state.

You can access View 1 by holding down the Back button.

To open and close the valve, the MANU / AUTO layout must be selected for View 1 (preset in the factory). See also Chapter "13.3.1 User-specific views", page 65.

Opening or closing the valve:

→ To switch to MANUAL operating state, briefly press the Menu button.
The HAND symbol can be seen at the top on the information bar. The 2 arrow symbols labeled "open" and "closed" are shown.

→ To open the valve press the upper navigation button.

→ To close the valve press the lower navigation button.

→ To switch to AUTOMATIC operating state, briefly press the Menu button.

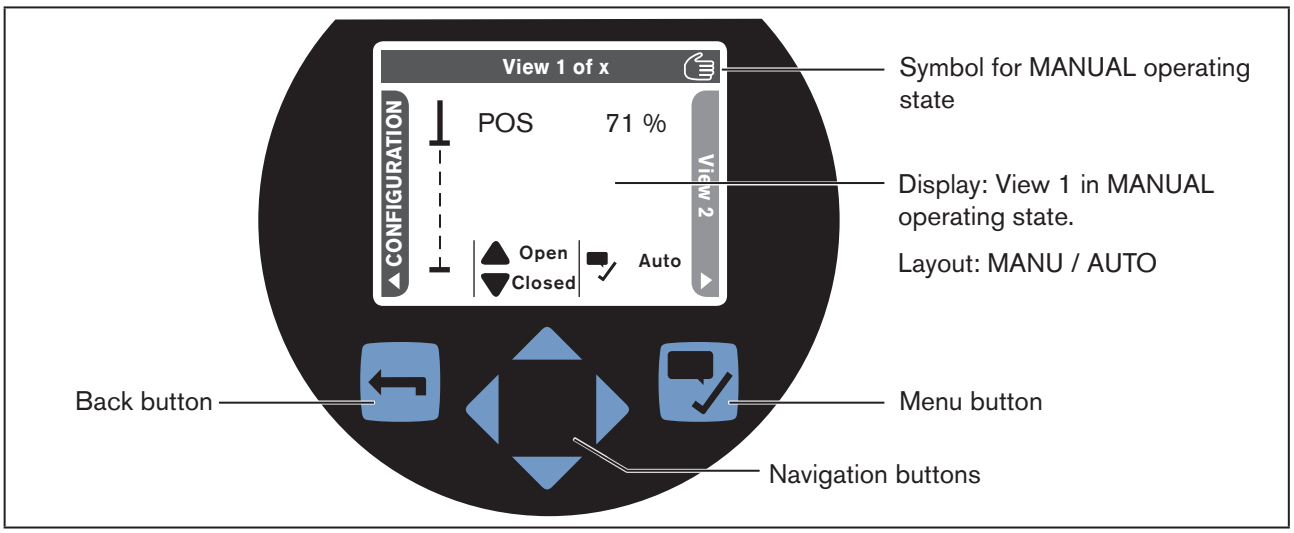

Figure 40: Electrical manual control on the display

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15.1.2 Devices without display module

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

The 2 buttons for opening and closing the valve are located under the dummy cover.

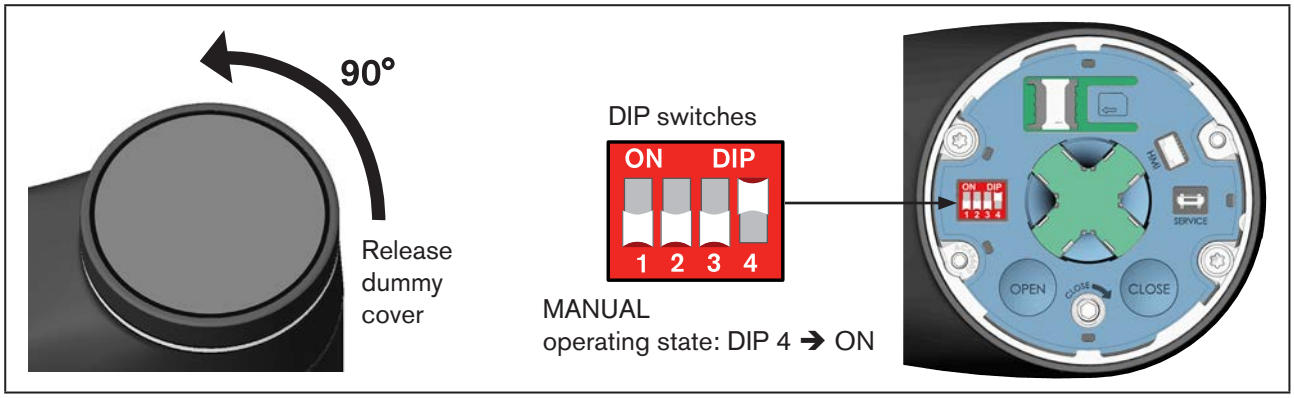

Figure 41: Setting MANUAL operating state

→ To release, rotate the dummy cover counter-clockwise by 90° and remove from the actuator housing.

→ Set DIP switch 4 to ON. The device is now in MANUAL operating state (see "Figure 41").

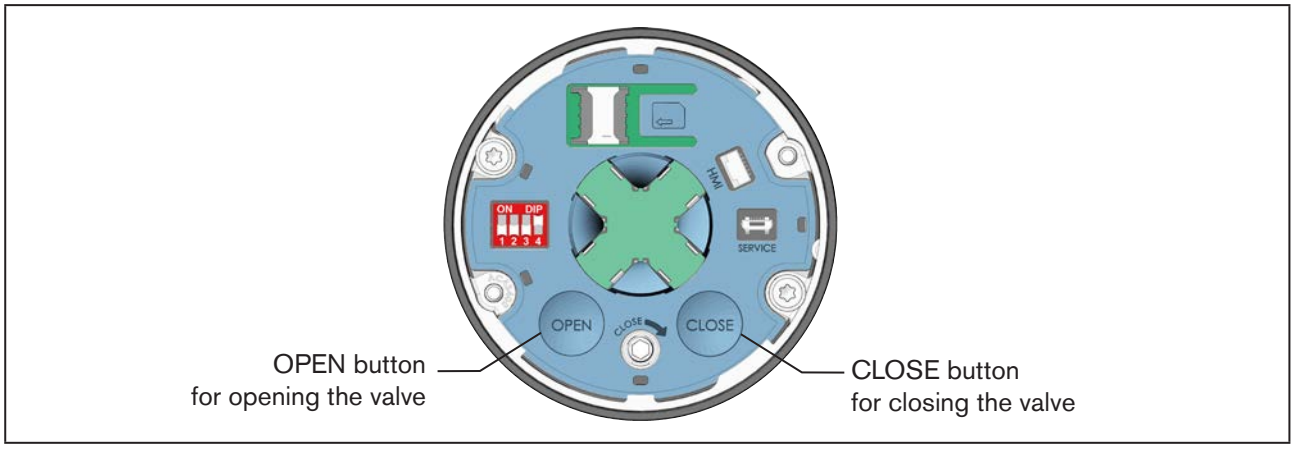

Figure 42: Electrical manual control for devices without display module

→ Using the OPEN button and CLOSE button, open or close the valve (see "Figure 42").

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

→ Close the dummy cover.

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15.2 Actuating valve mechanically

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 control.

ATTENTION!

The mechanical manual control may be used in a de-energized state only, otherwise the device may be damaged.

ATTENTION!

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

→ To release the display module or the dummy cover, rotate counter-clockwise by 90° and remove from the actuator housing.
⚠ On the display module pay attention to the connection cable leading to the HMI interface!

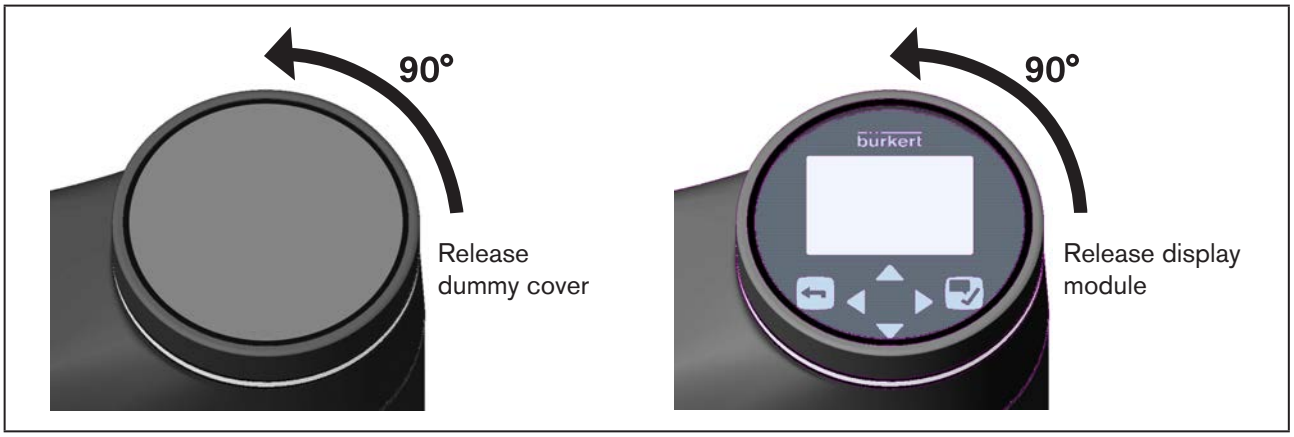

Figure 43: Removing dummy cover or display module from the actuator housing

→ To adjust the valve, use an Allen key with 4 mm width across flats.

ATTENTION!

Maximum tightening torque 2 Nm.
If the tightening torque is exceeded on reaching the valve end position, the mechanical manual control will be damaged.

The position indicator must detect when the valve reaches the end positions (see "Figure 44").

→ Applying a gentle pressure, couple the mechanical manual control and simultaneously turn the Allen key (see "Figure 45").

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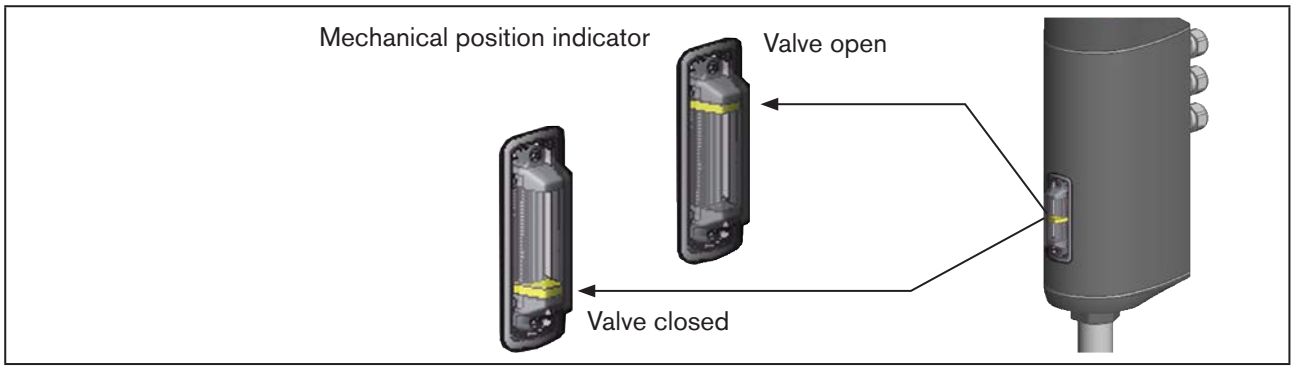

Figure 44: Mechanical position indicator

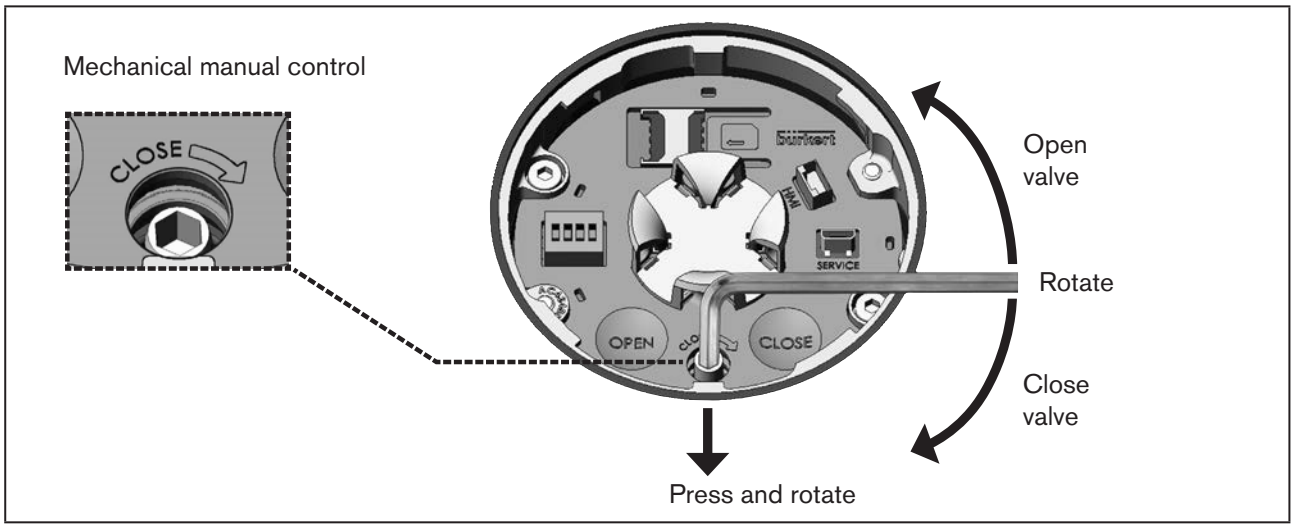

Figure 45: Mechanical manual control

→ Move valve to the required position.
⚠ Maximum tightening torque 2 Nm.
Open (rotate counter-clockwise), close (rotate clockwise).

→ After reaching the required valve position, remove the Allen key.
The mechanical manual control automatically decouples.

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

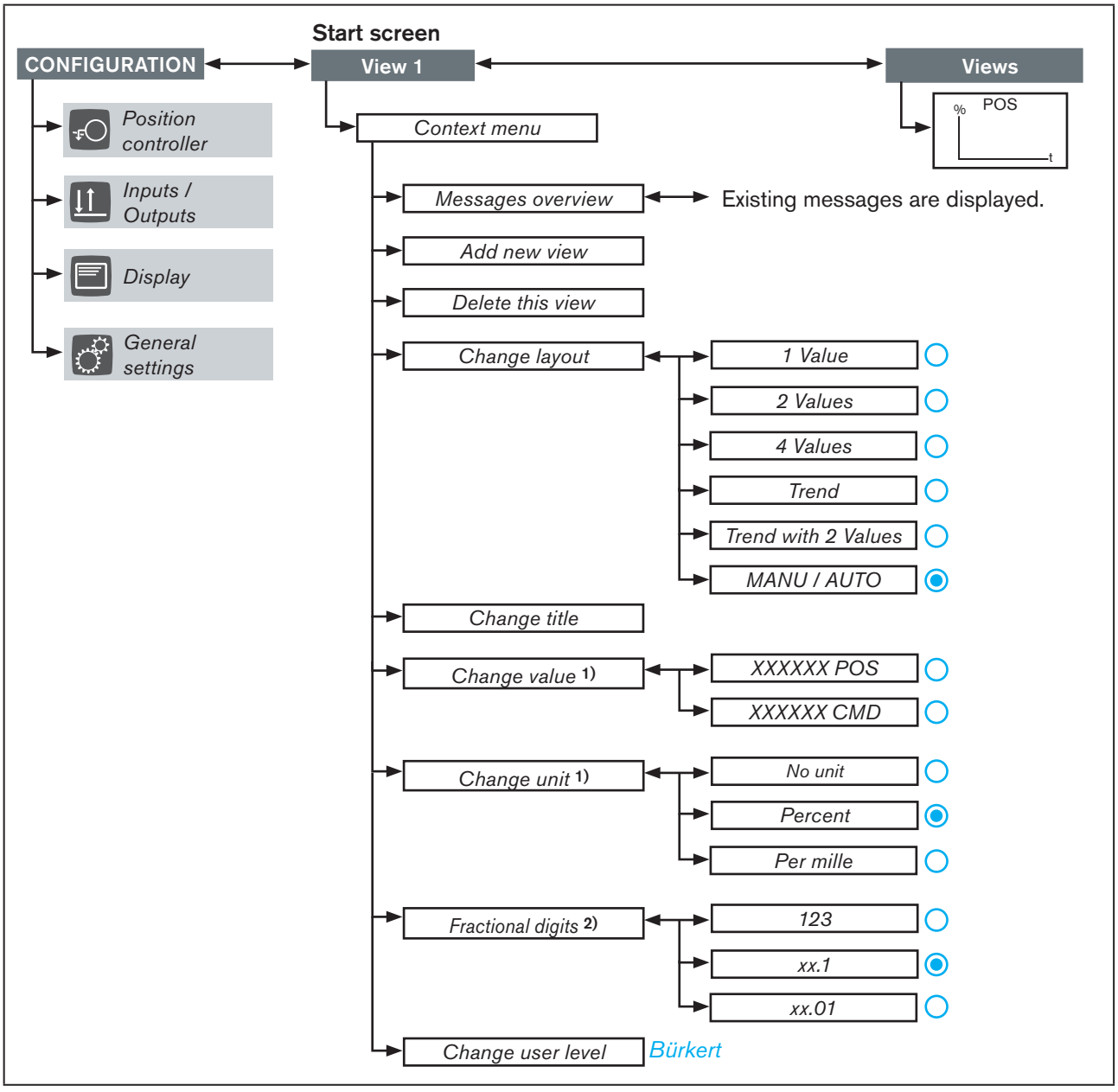

Figure 46: Operating structure - 1, Context menu for views

1) Not available for the **MANU / AUTO** layout.

2) Not available for the **Trend**, **Trend with 2 values** or the **MANU / AUTO** layout.

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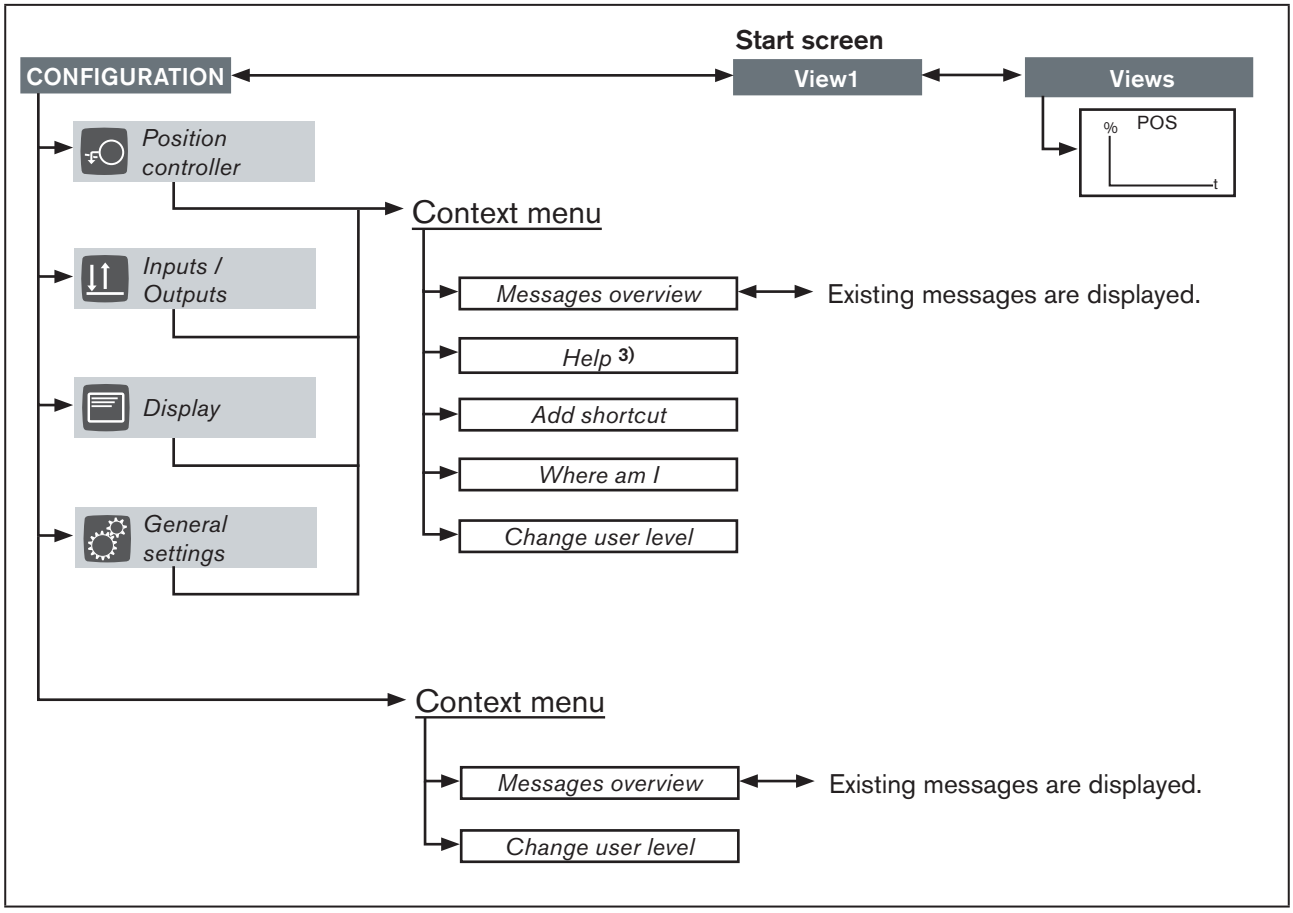

Figure 47: Operating structure - 2, Context menu in the configuration area

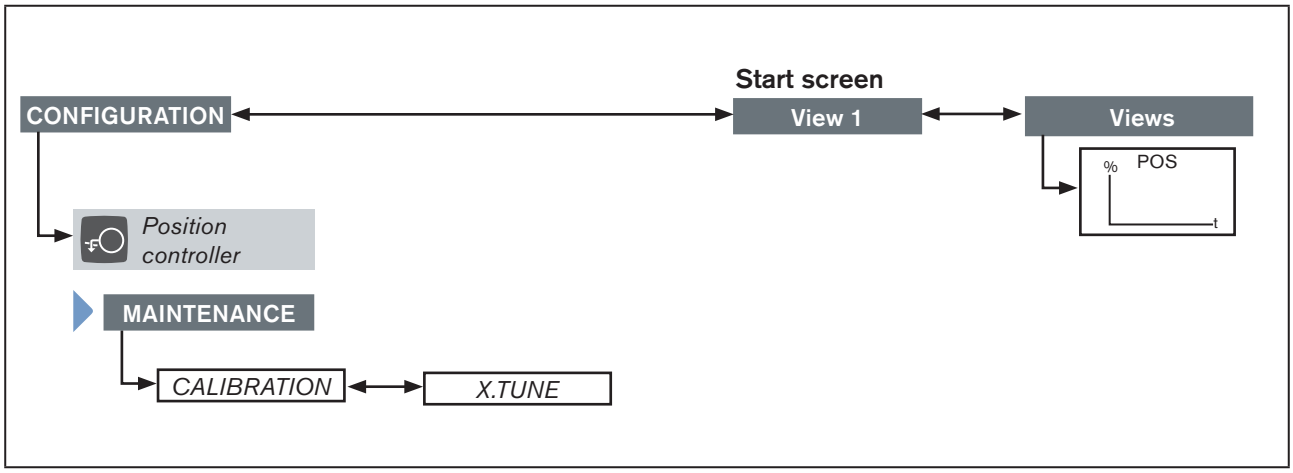

Figure 48: Operating structure - 3, Maintenance position controller

3) Only available in the configuration area **Position controller** and **Inputs / Outputs**.

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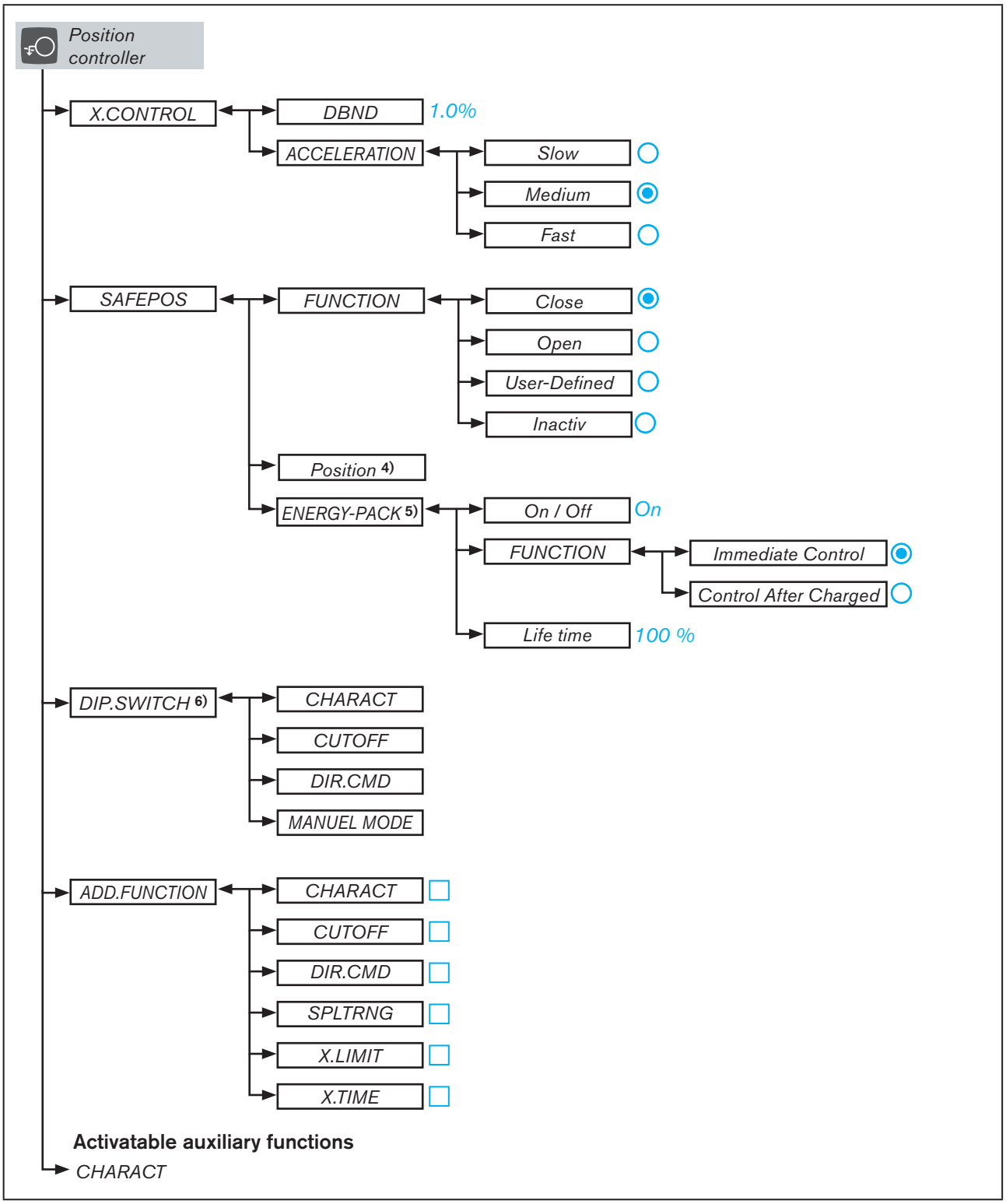

Figure 49: Operating structure - 4, Configuration area position controller

4) Only available if in the menu **SAFEPOS** → **FUNCTION** → **User-Defined** has been selected.

5) Only available for devices with SAFEPOS energy pack (optional).

6) Only available in PC software Bürkert Communicator for devices without a display module.

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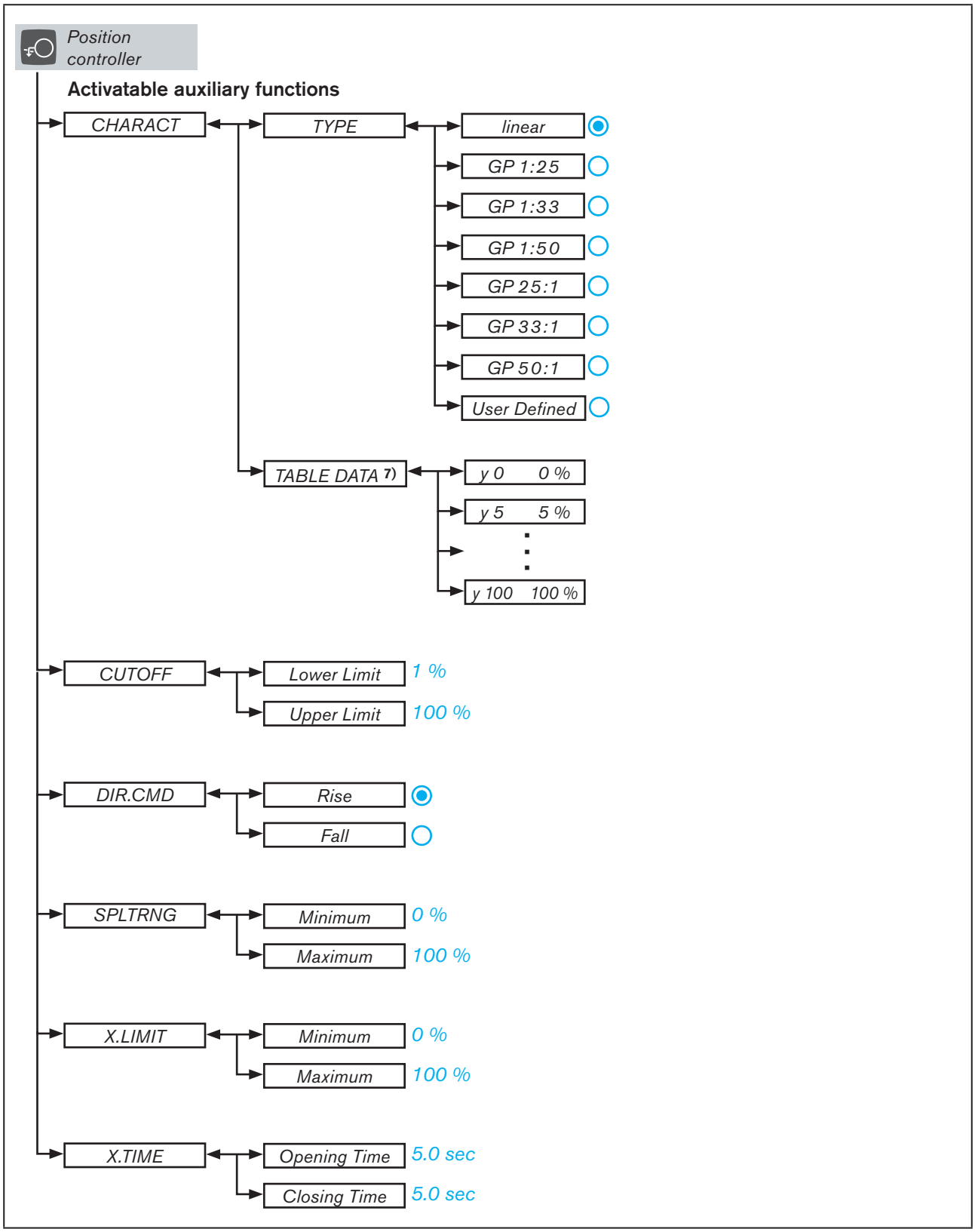

Figure 50: Operating structure - 5, Configuration area position controller

7) Only available if in the menu **CHARACT** → **TYPE** → **User Defined** has been selected.

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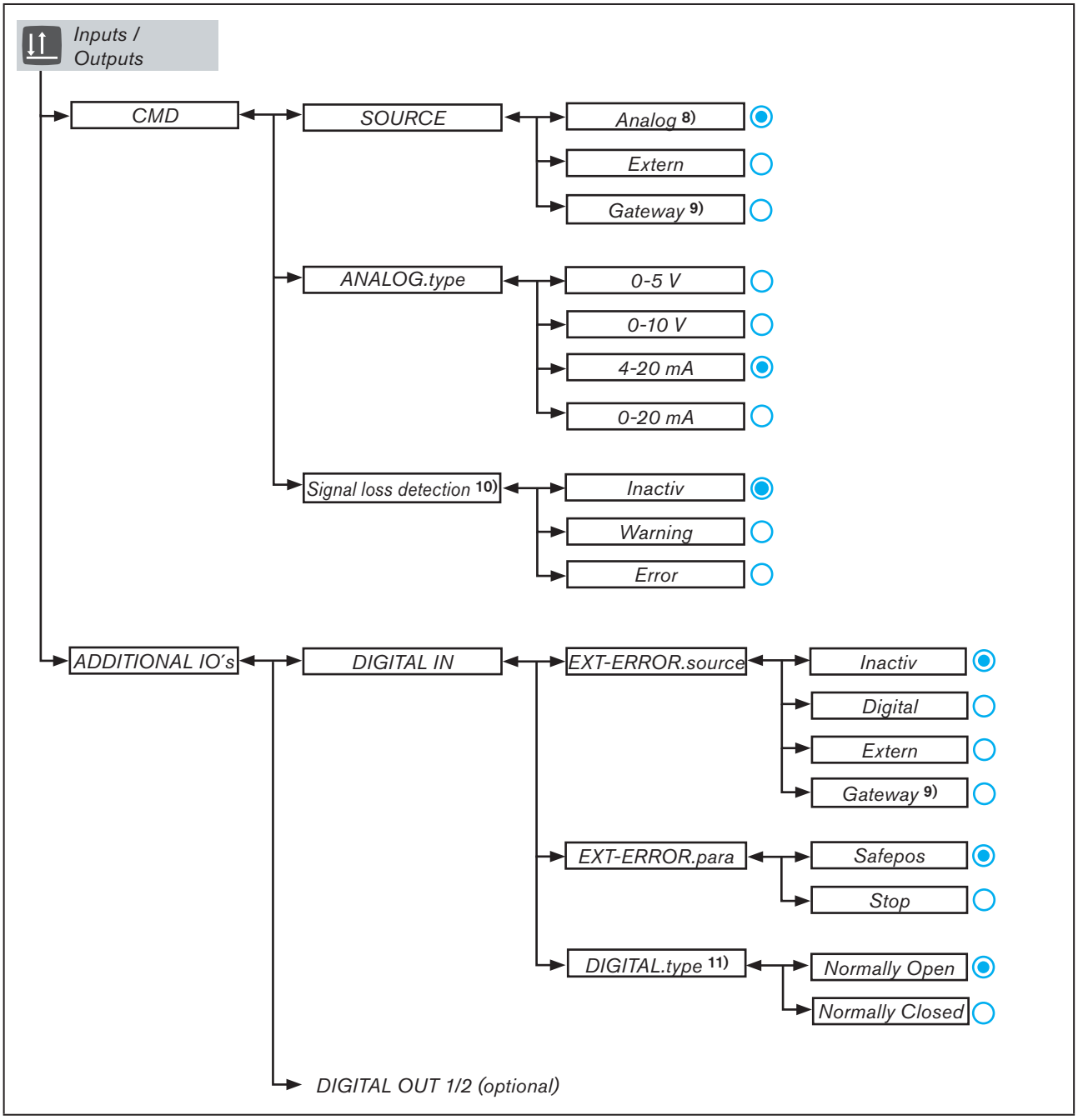

Figure 51: Operating structure - 6, Configuration area inputs / outputs

8) Not available for devices with Gateway option.

9) Only available for devices with Gateway option.

10) Only available if in the menu **CMD** → **ANALOG.type** → **4-20 mA** has been selected.

11) Only available if in the menu **ADDITIONAL IOs** → **DIGITAL IN** → **EXT-ERROR.source** → **Digital** has been selected.

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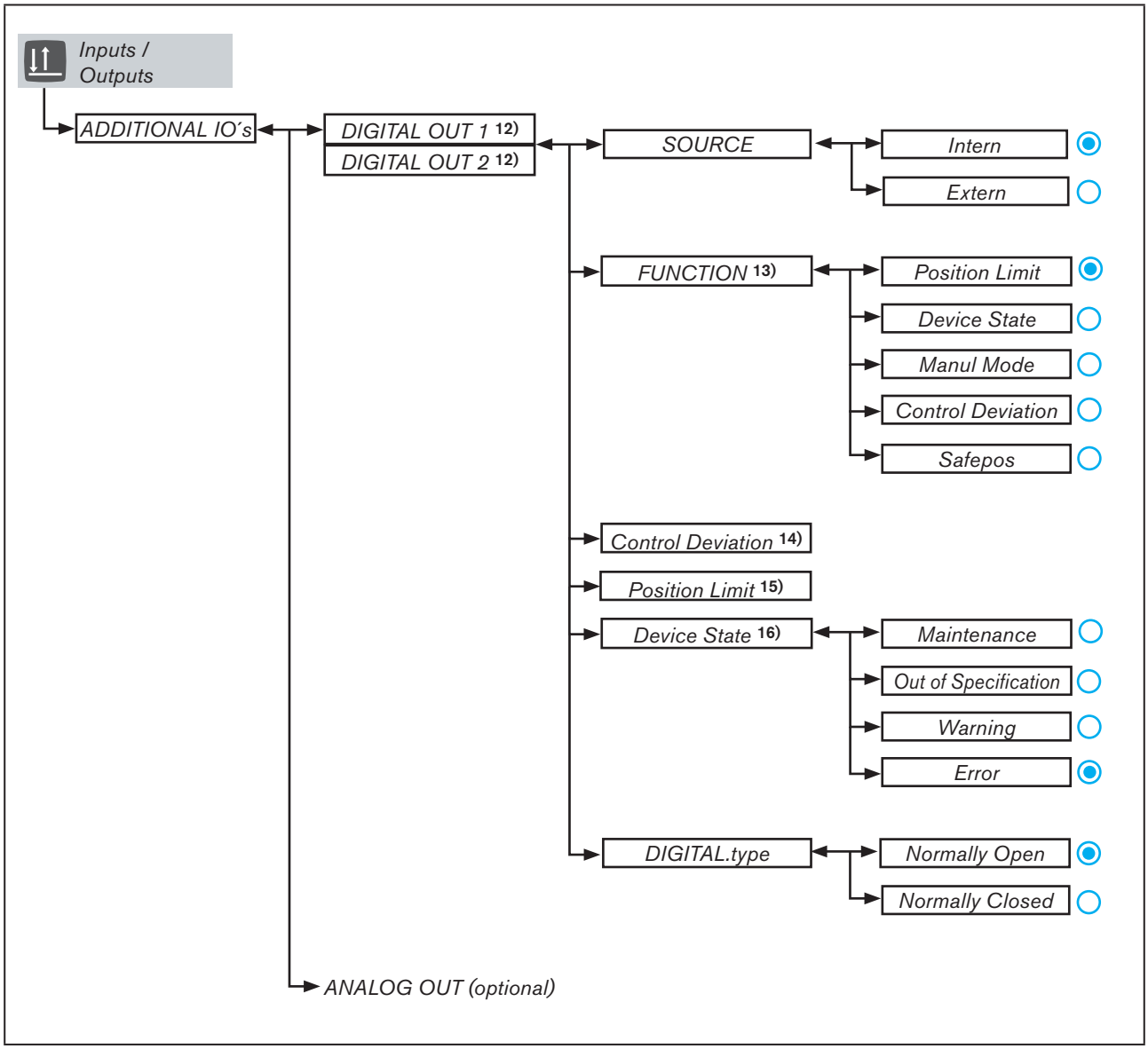

Figure 52: Operating structure - 7, Configuration area inputs / outputs

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12) Only available for devices with the digital output option.

13) Only available if in the submenu **Source** → **Internal** has been selected.

14) Only available if in the submenu **Source** → **Internal** and in **FUNCTION** → **Control Deviation** has been selected.

15) Only available if in the submenu **Source** → **Internal** and in **FUNCTION** → **Position Limit** has been selected.

16) Only available if in the submenu **Source** → **Internal** and in **FUNCTION** → **Device State** has been selected.

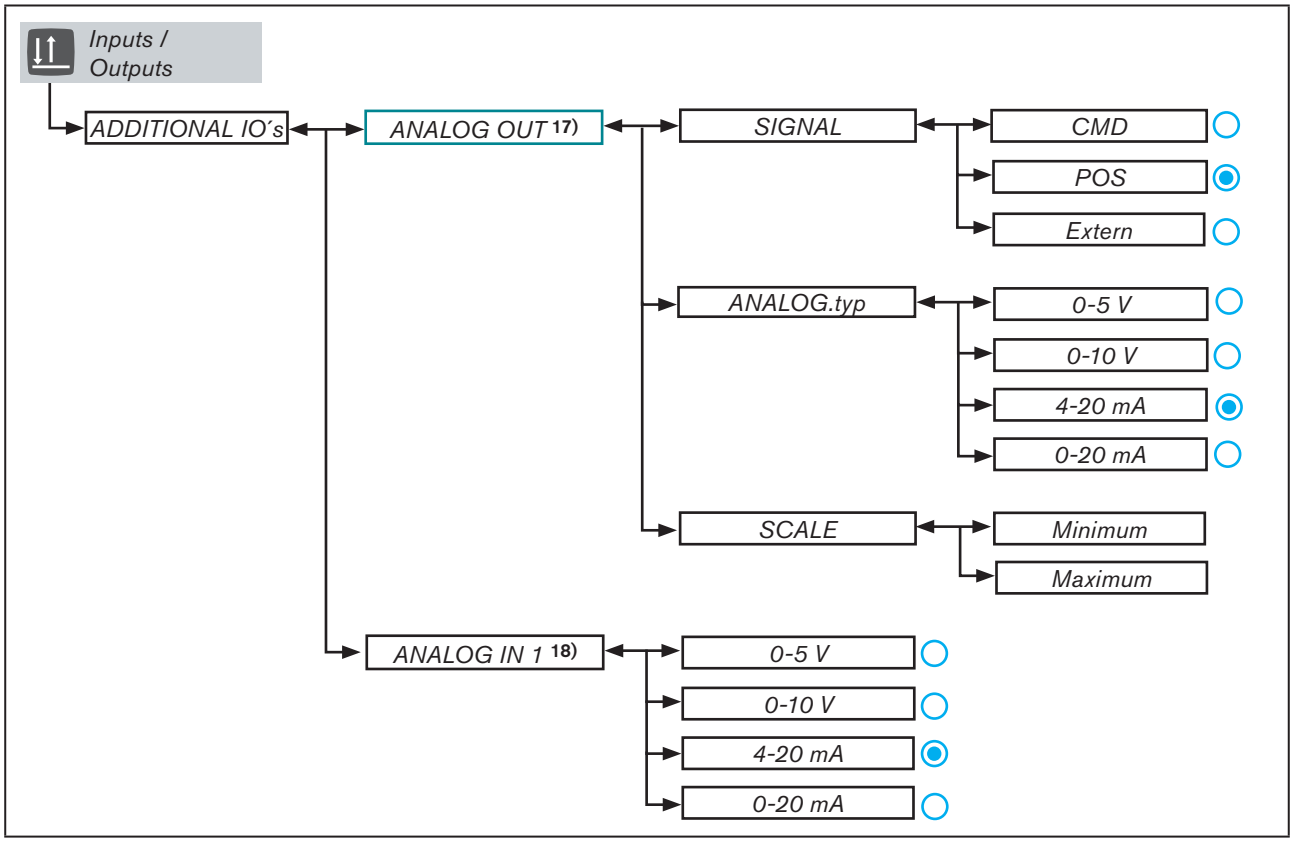

Figure 53: Operating structure - 8, Configuration area inputs / outputs

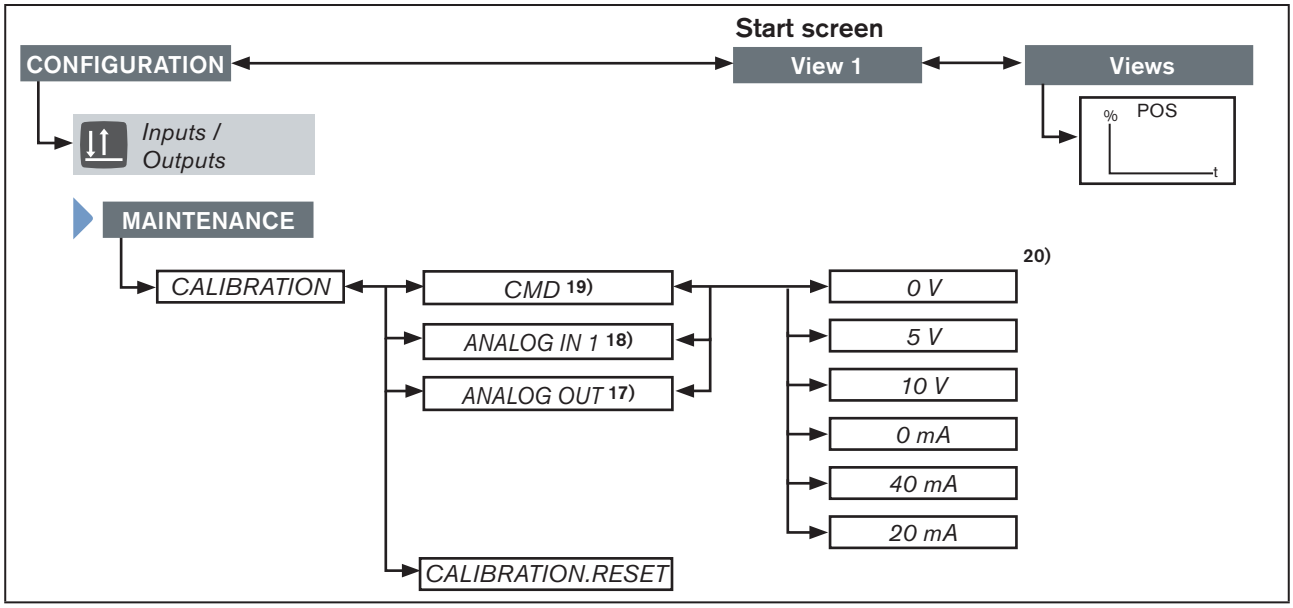

Figure 54: Operating structure - 9, Maintenance inputs / outputs

17) Only available for devices with the analog output option.

18) Only available if in the menu **CMD** → **SOURCE** → **External** or **Gateway** has been selected.

19) Only available if in the menu **CMD** → **SOURCE** → **Internal** has been selected.

20) Which units are displayed depends on the set input signal. → **Inputs / Outputs** → **ANALOG.type** menu.

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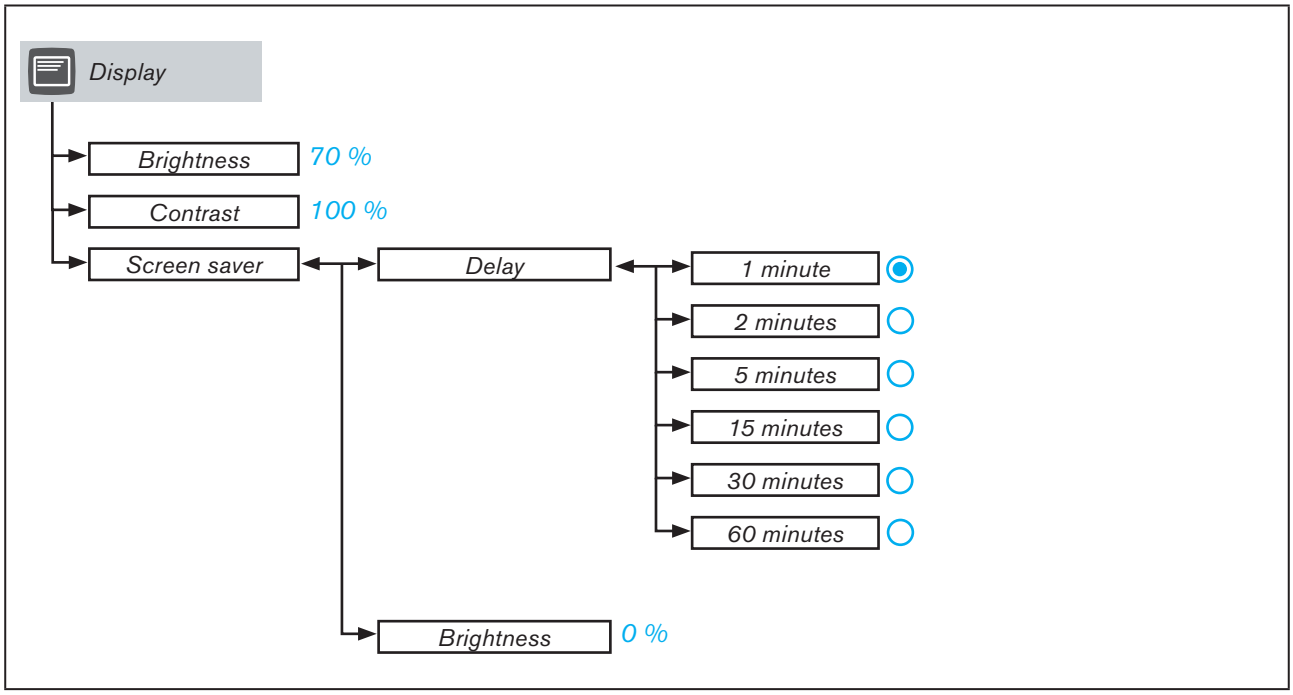

Figure 55: Operating structure - 10, Configuration area display

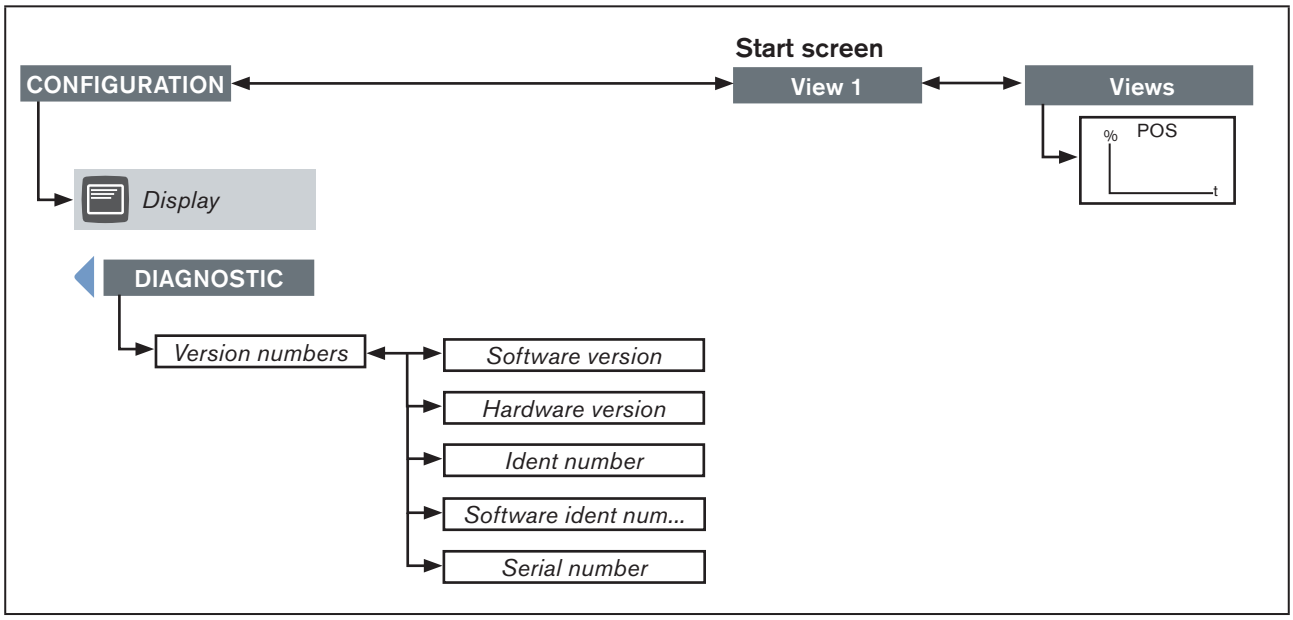

Figure 56: Operating structure - 11, Diagnostics display

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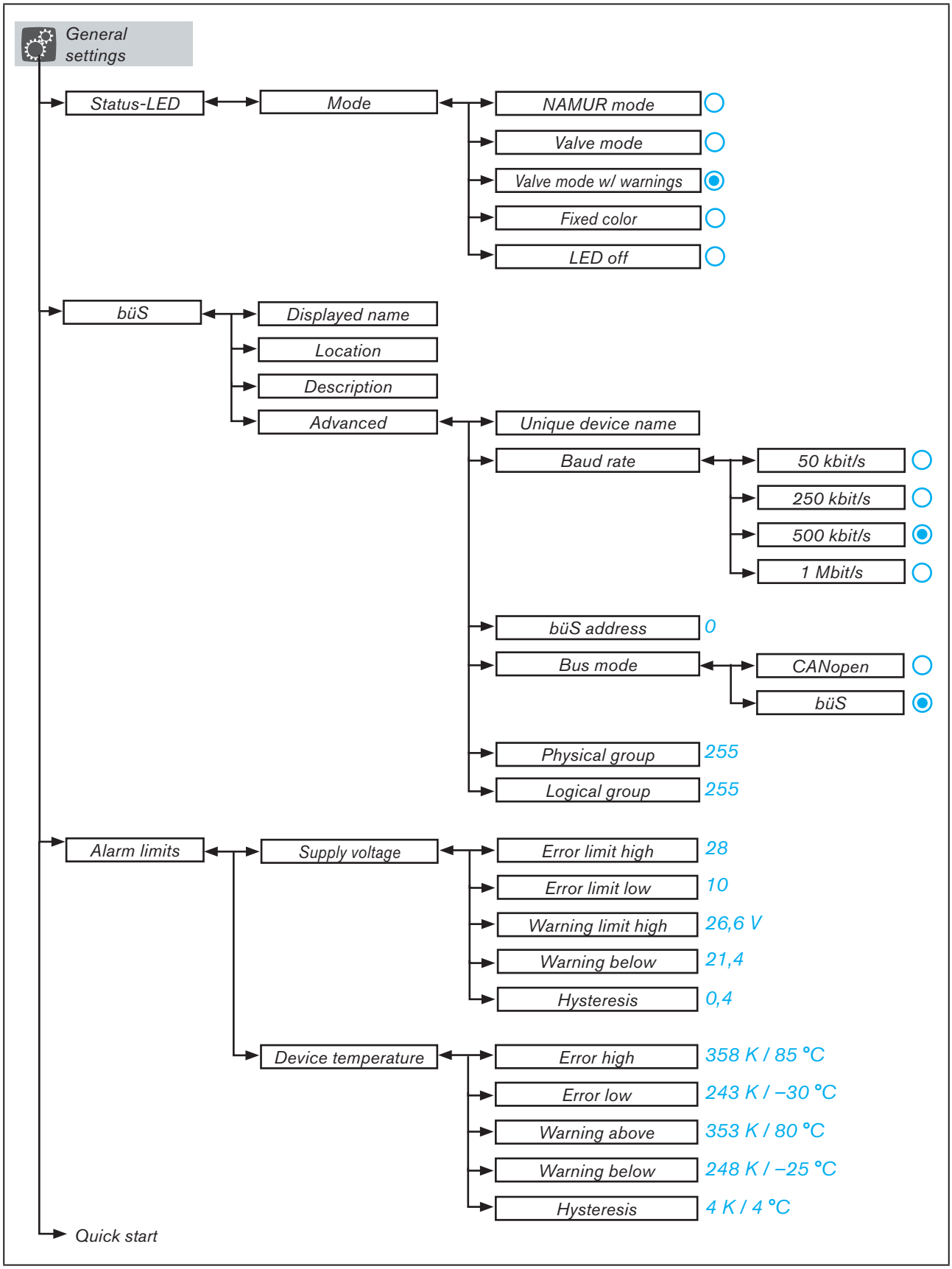

Figure 57: Operating structure - 12, Configuration area general settings

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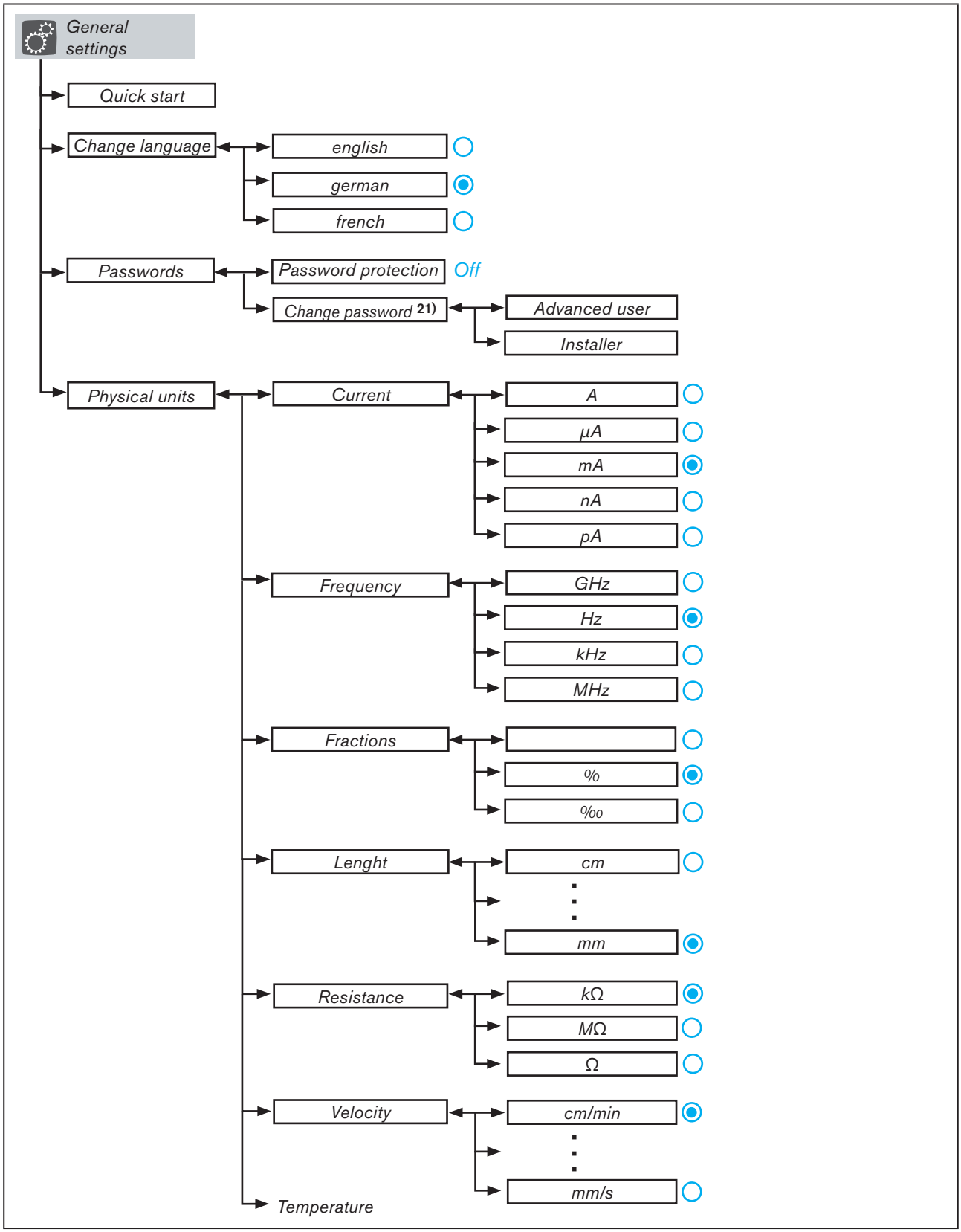

Figure 58: Operating structure - 13, Configuration area general settings

21) Only available if in the menu **Password protected** → **On** has been selected.

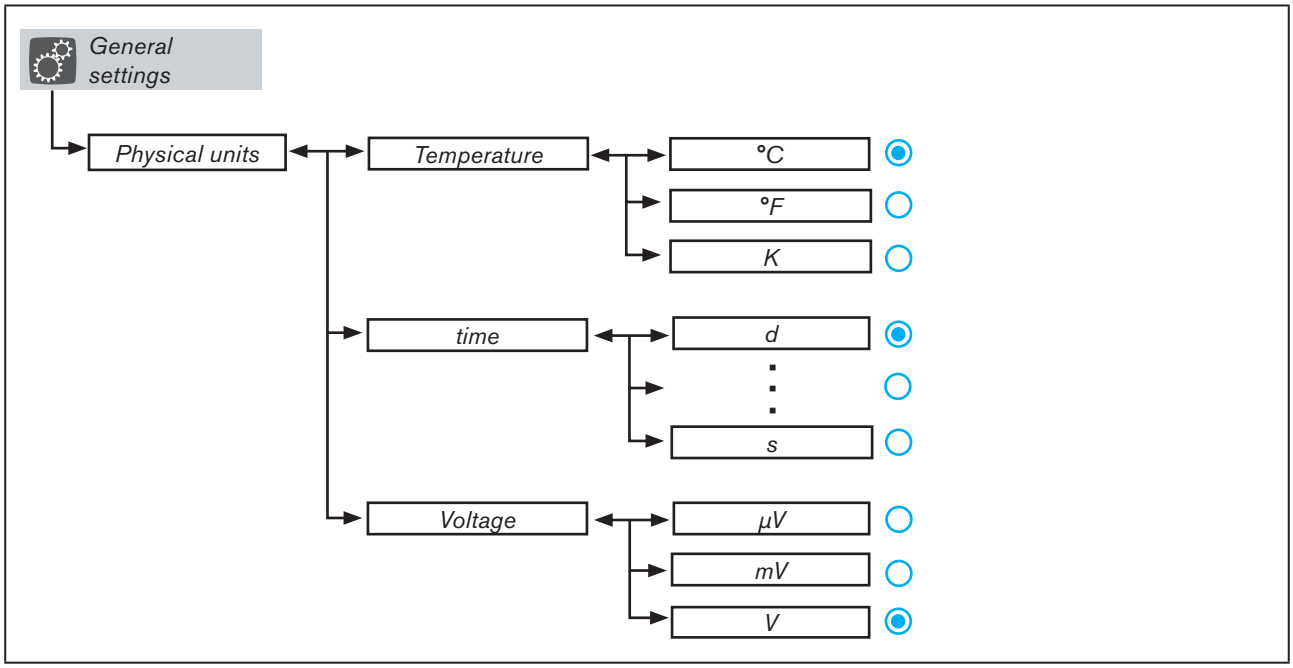

Figure 59: Bedienstruktur - 14, Configuration area general settings

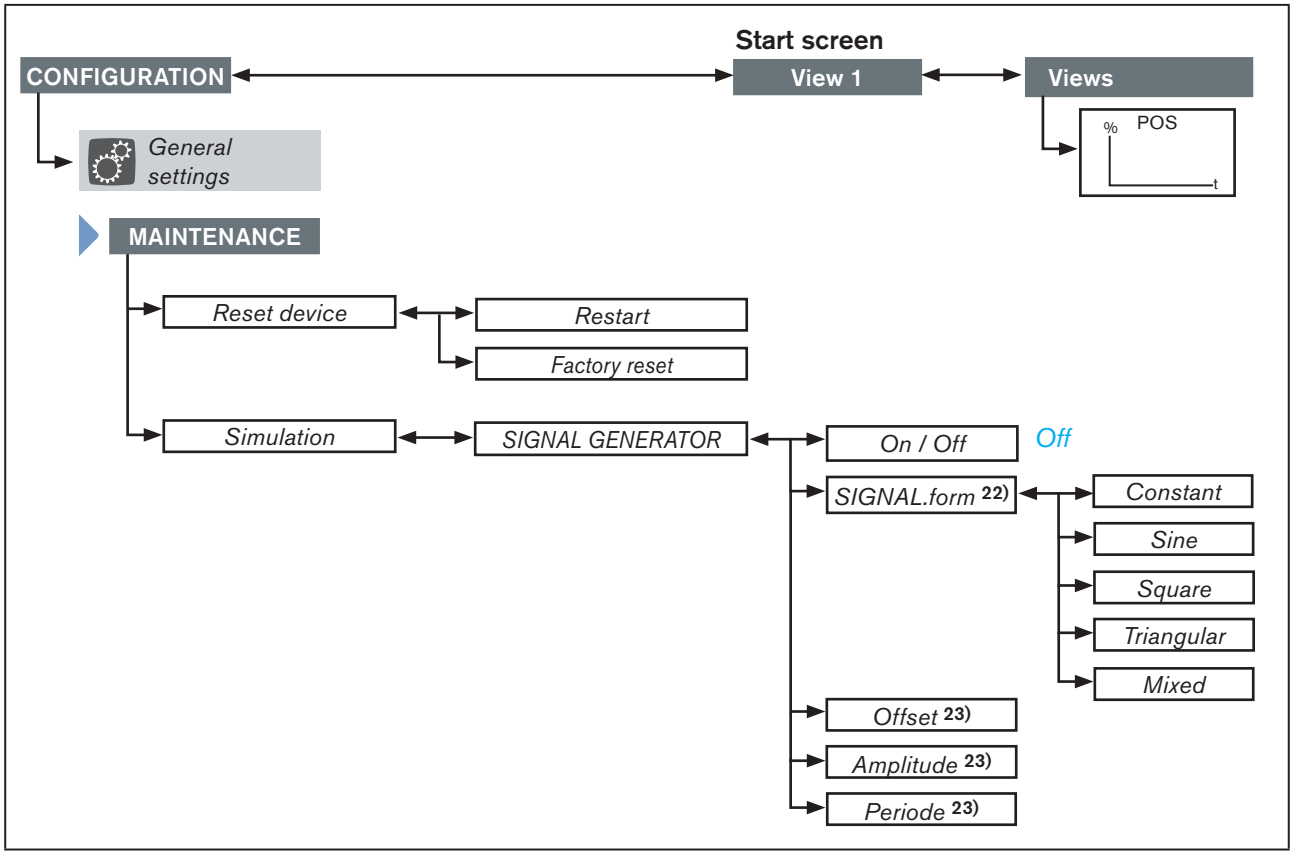

Figure 60: Operating structure - 15, Maintenance general settings

22) Only available if in the menu **Simulation** → **SOURCE** → **SIGNAL GENERATOR** → **On** has been selected.

23) Display depends on the selection in the menu **SIGNAL.form**.

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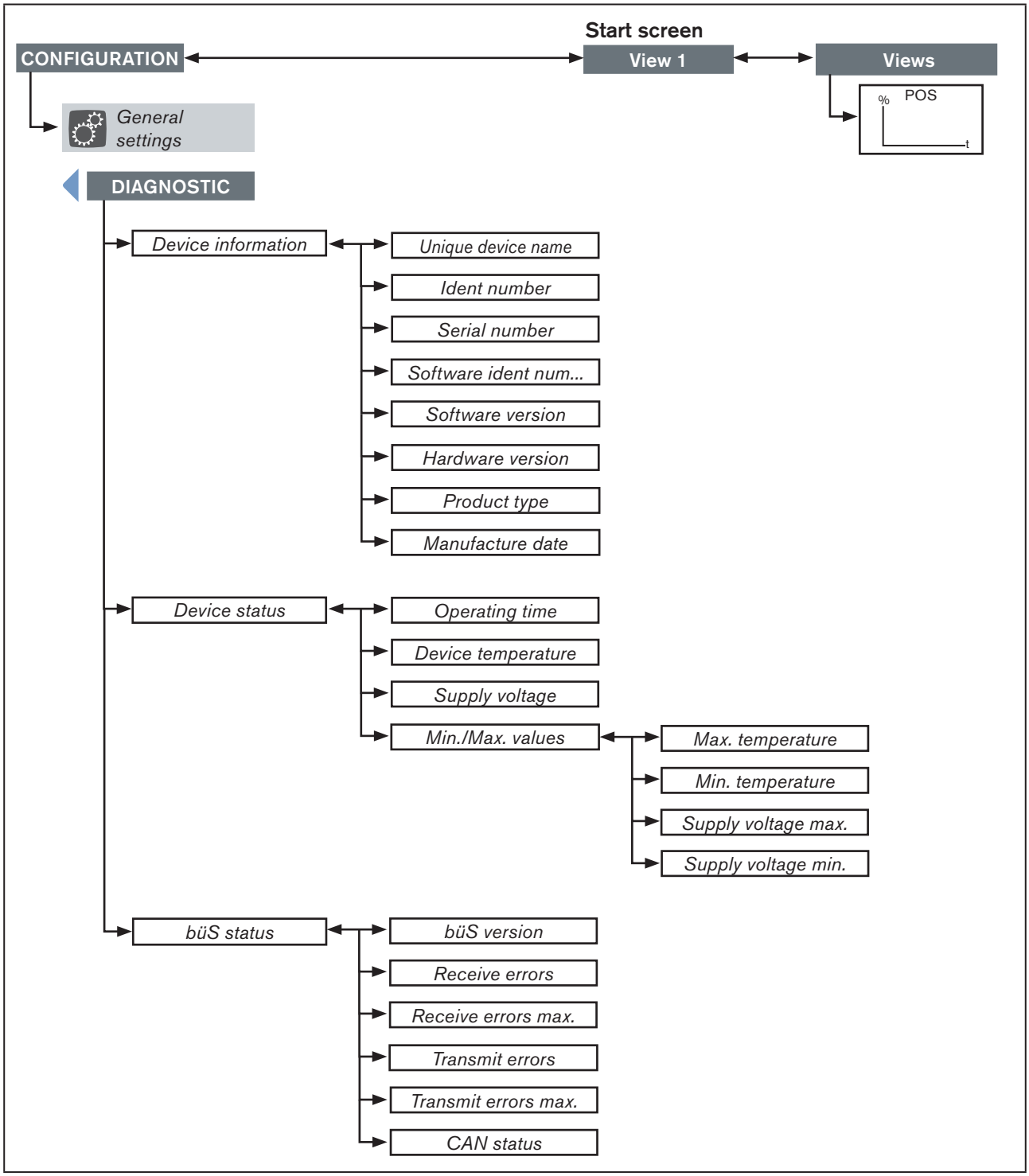

Figure 61: Operating structure - 16, Diagnostics general settings

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18 FIELD BUS GATEWAY
EtherNet/IP, PROFINET and Modbus TCP

18.1 View

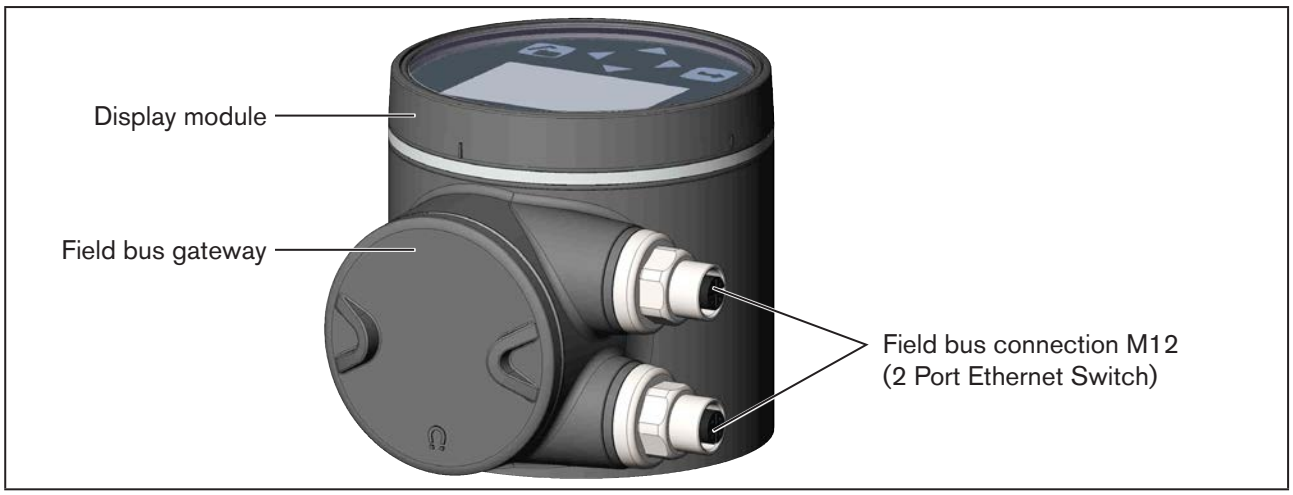


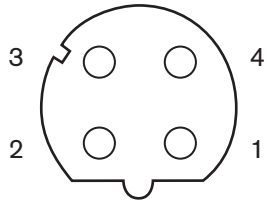
Figure 62: Field bus gateway with display module

18.2 Technical data

Network speed	10/100 mbps
Auto negotiation	Yes
Auto MDI/MDI-X	Yes
Switch function	Yes
Network diagnostics	Yes, via error telegram
MAC-ID	Individual identification number, stored in the module and on the outside of the device (see rating plate)
Device name Ethernet (factory setting)	XXX (name can be changed)
Interface for service and system update	Internal mini USB (may be used only by technicians who have been trained for this task)

18.3 Electrical connection

The EtherNet/IP is connected with a circular plug-in connector M12, 4-pole.



Pin 1	Receive –	RJ45 Pin 6
Pin 2	Transmit –	RJ45 Pin 2
Pin 3	Receive +	RJ45 Pin 3
Pin 4	Transmit –	RJ45 Pin 1

Table 31: Electrical assignment EtherNet/IP

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ATTENTION!

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.

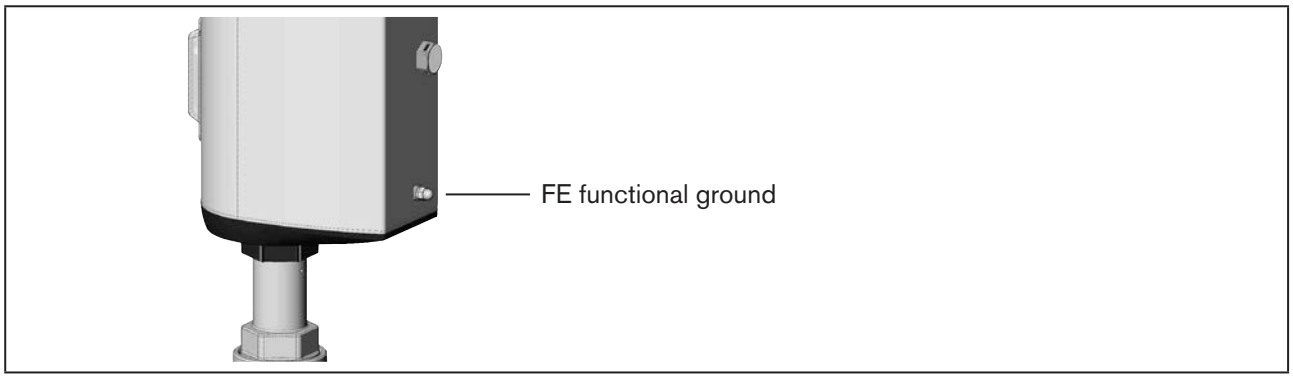

Figure 63: Functional earth

18.3.1 LEDs for status display of the network connection

The LEDs for status display of the network connection are inside the field bus gateway.

To access, open the cover using a screwdriver.

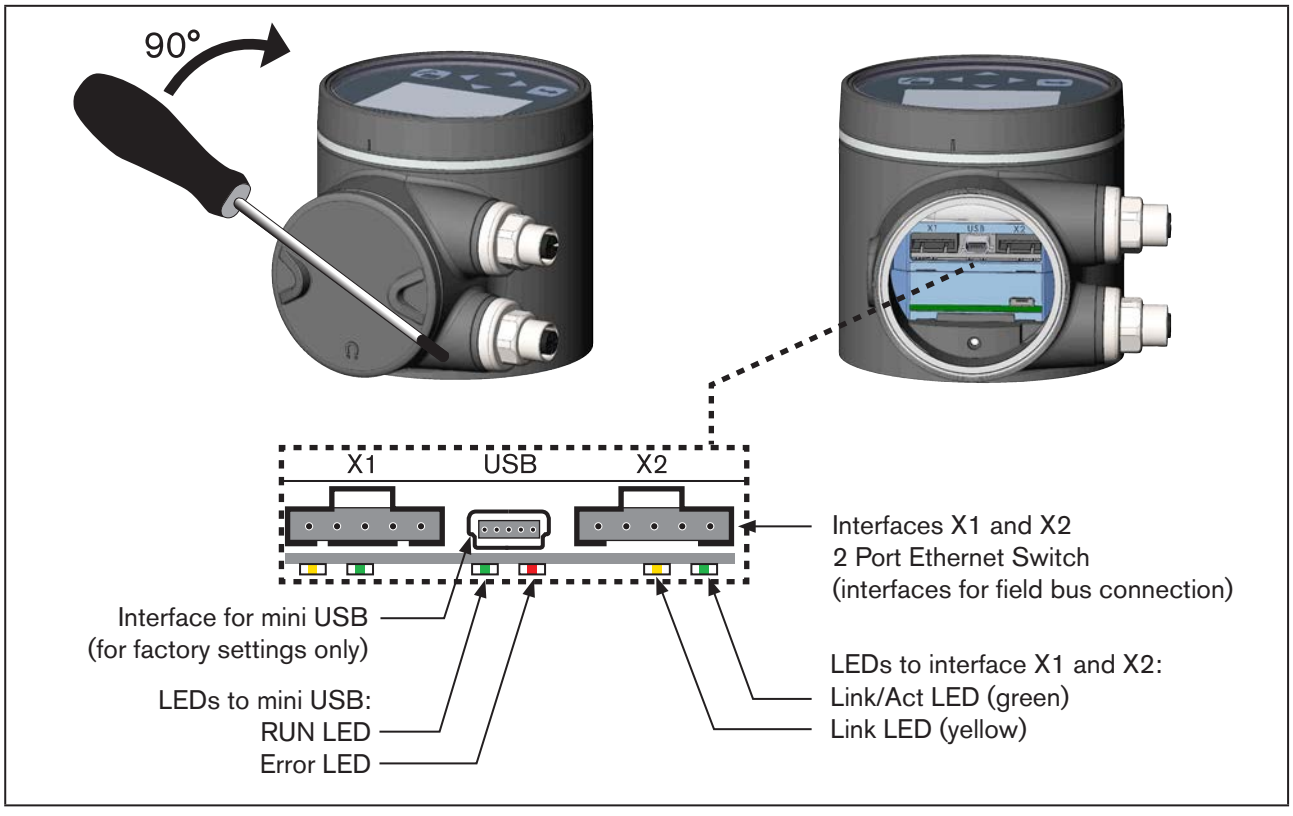

Figure 64: LEDs for status display of the network connection

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ATTENTION!

The mini USB interface is for the factory service only.

Description of the LEDs:

LED status		Description / cause of error	Procedure
RUN LED	Active	Connection to control active.	-
	Not active	Connection to control not active.	Check cables.
Error LED	Active	Connection to control not active.	Check cables.
	Not active	Connection to control active.	-

Table 32: LED status displays of the mini USB interface

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. 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	No connection to the network available.	-
	Not active	No connection to the network available.	Check cables.

Table 33: LED status displays of the interfaces X1 and X2 (field bus connection)

18.4 Access to the büS Service interface

The büS Service interface is located inside the field bus gateway.

To access, open the cover using a screwdriver. See "Figure 64".

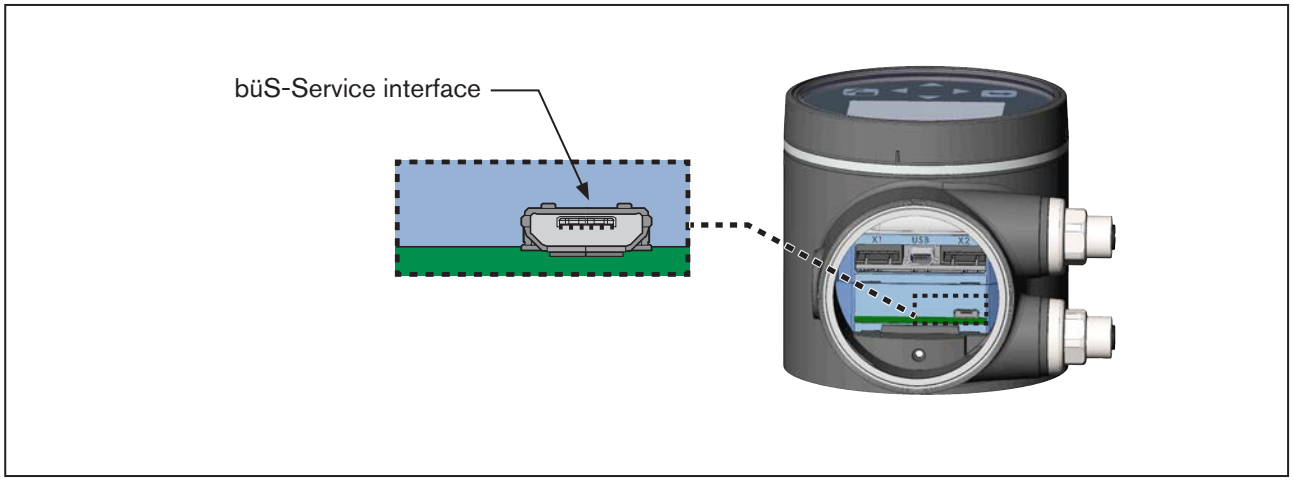

Figure 65: büS Service interface for field bus gateway version

18.5 Web server

The configuration of the EtherNet device required for integration in the network can be implemented via a web server.

18.5.1 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.

18.5.2 Access to the web server

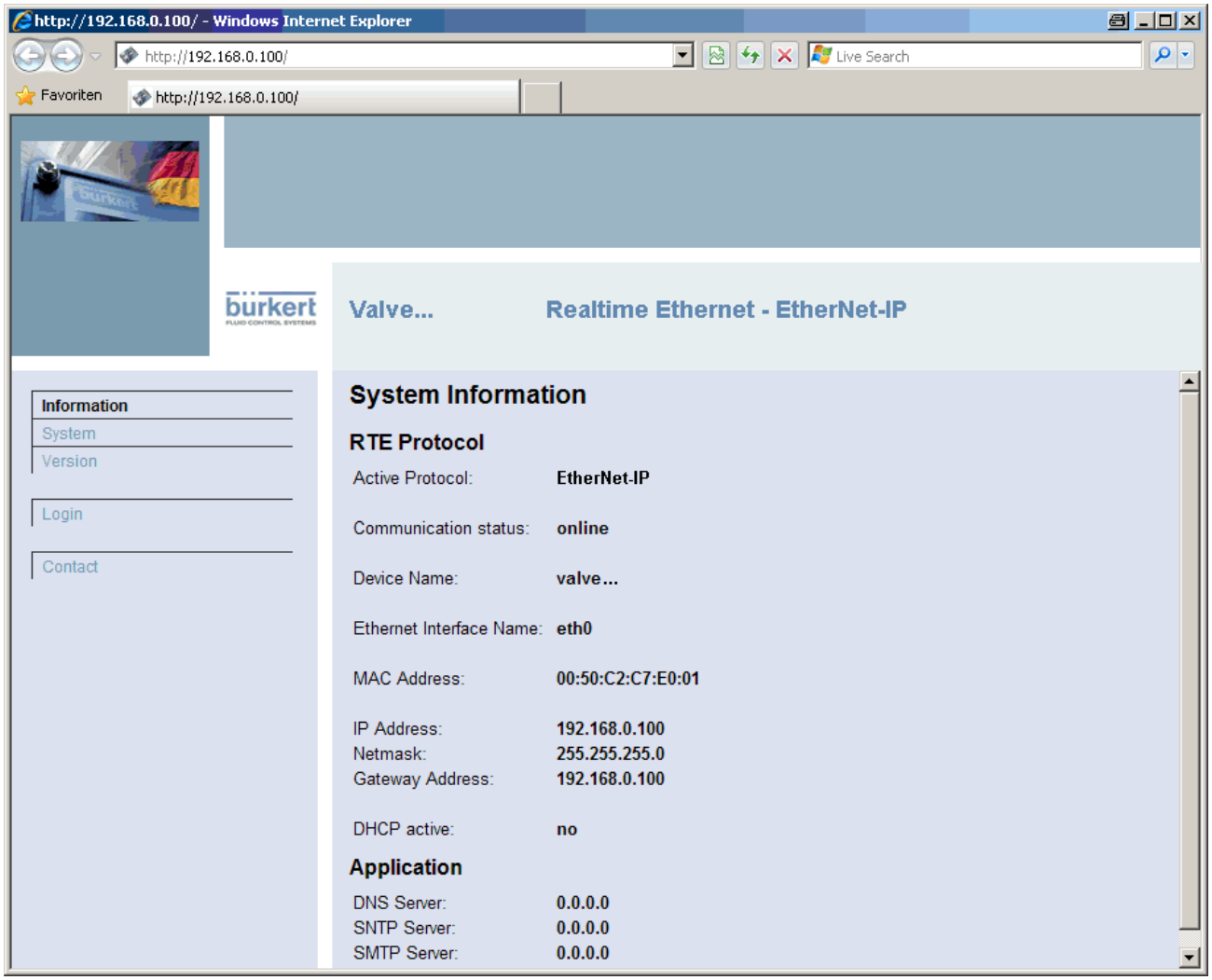

Figure 66: Access to the web server via the Default IP

→ Open an Internet browser.

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→ 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.

18.5.3 Configuring EtherNet device

Logging into the system:

→ Input user name and password. Username: **admin**
Password: **admin**

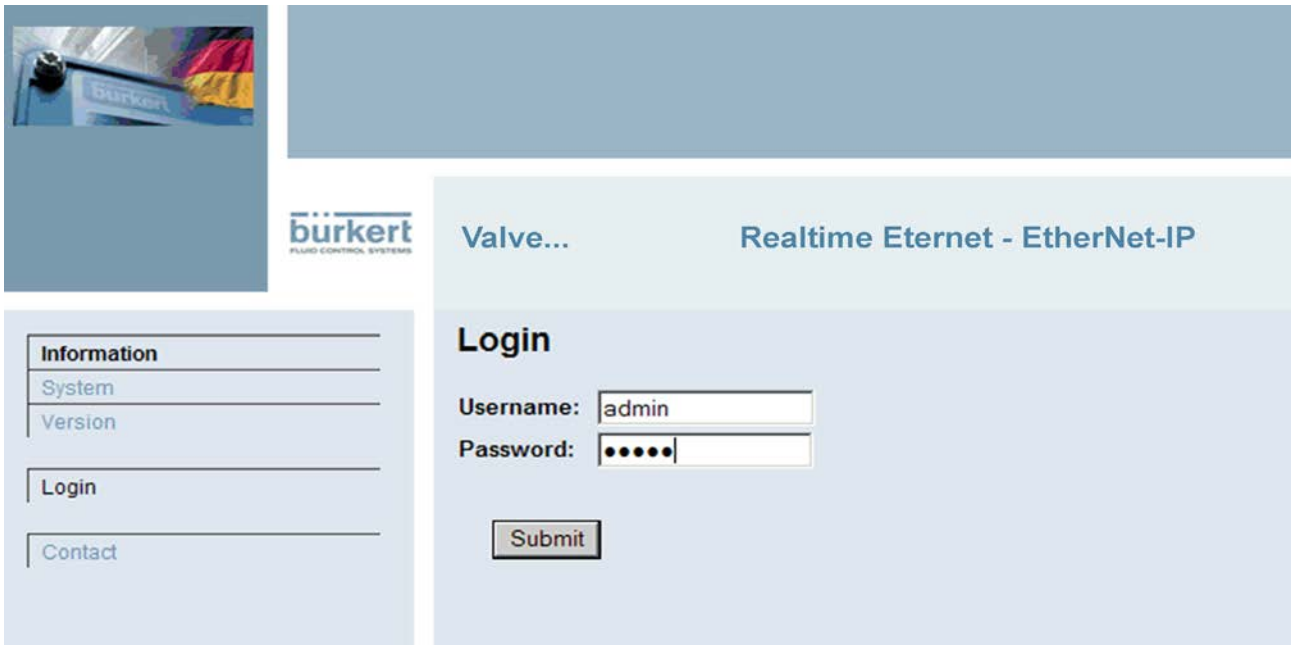

Figure 67: Logging into the system

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).

→ To accept the changed parameters, reset the voltage in the EtherNet device.

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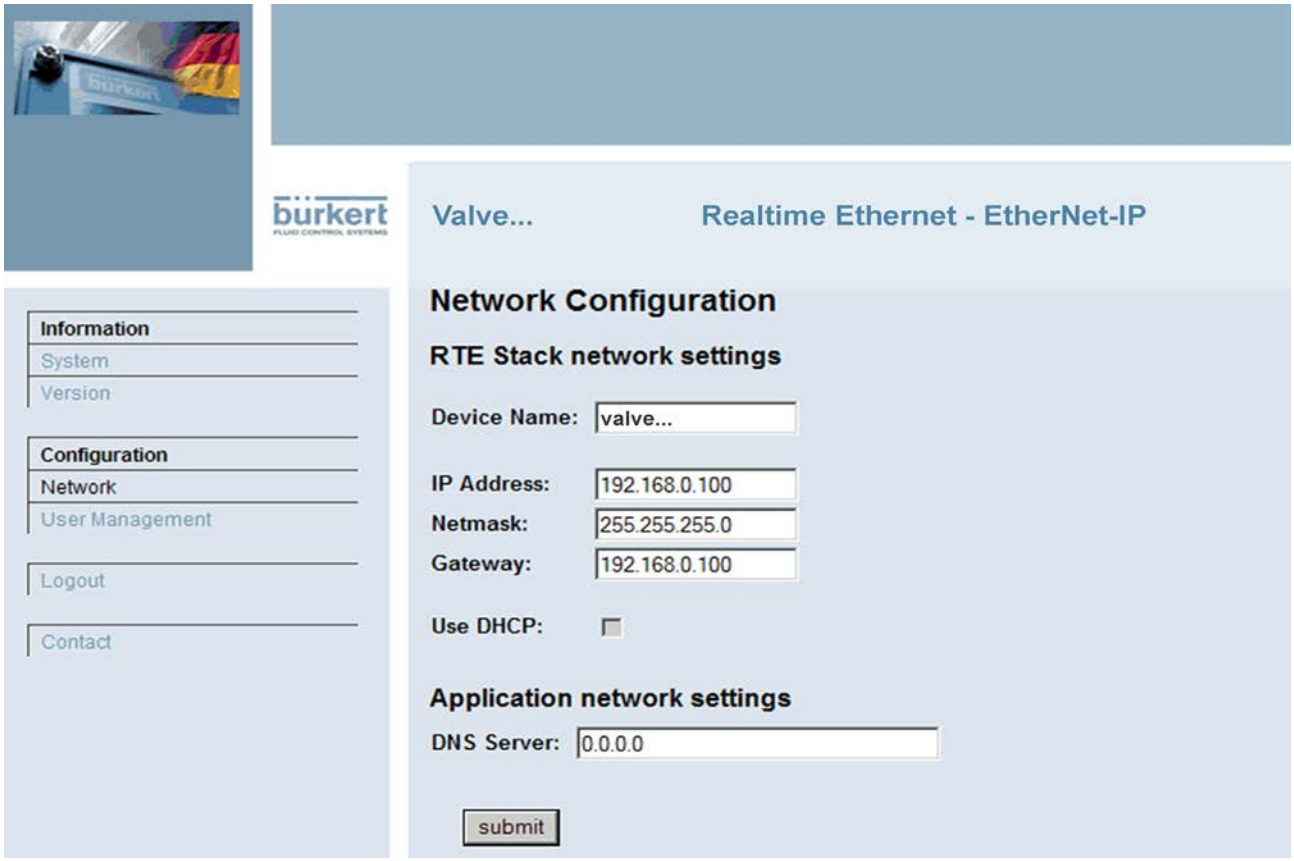

Figure 68: Configuring EtherNet device

18.6 Configuration and parameterization of EtherNet/IP

The data exchange between EtherNet/IP master and the device (EtherNet device) is object-oriented. Each node in the network is represented as a collection of objects.

The assembly object specifies the structure of the objects for data transfer. The assembly object can be used to combine (map) data (e.g. I/O data) into blocks and transmit them via a single communication link. This mapping means that fewer accesses to the network are required.

It distinguishes between input and output assemblies. An input assembly reads in data from the application via the network or produces data on the network.

An output assembly writes data to the application or consumes data from the network.

Different assembly instances have already been permanently programmed in the field bus coupler or field bus controller (static assembly). After switching on the supply voltage, data from the process map is combined by the assembly object. As soon as a connection has been established, the master can address the data with "Class", "Instance" and "Attribute" and access it or read and/or write it via I/O connections.

The mapping of the data depends on the selected assembly instance of the static assembly.

18.6.1 Addressing

The IP address is assigned – as is usual with Ethernet/IP – via a DHCP server. If no assignment occurs within 1 minute via DHCP, the device uses the Default IP 192.168.0.100.

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18.6.2 EDS file

The EDS file (Electronic Data Sheets file) includes the characteristic data of the field bus coupler or field bus controller and information on its communication abilities.

The EDS file required for EtherNet/IP operation is read in from the respective project planning software or installed.

Download the EDS file
from: www.burkert.com. → Type 3360 or 3361

Instructions on installing the EDS file can be found in the documentation of the project planning software which you are using.

18.7 Object route function

The object route function allows access to all objects in the system. The interface is described in the table. For access the object must be described with index and subindex as well as the address of the device/module. When this has been done, the value can be read back.

Name	Description	Access type	ProfiNet			EtherNet/IP			Modbus TCP		
			Slot	Subslot	Index	Class	Instance	Attributes	Function code (FC)	Start address	Number of elements
Address	(UNIT32) Specified address (node D) and object → Observe byte sequence: Little Endian! ▪ Byte 3: Device address (NODE ID) ▪ Byte 2: Sub index ▪ Byte 1: Index (low byte) ▪ Byte 0: Index (high byte)	RW	0	1	1	0xc7	1	1	FC16	1000	2
Data length	(UNIT32) Reserved	RW	0	1	2	c7	2	1	FC16	1002	2
Value in UNIT32	(UNIT32) Value of the required object	RO	0	1	3	c7	3	1	FC16	1004	2
Value as string	(C_String) Value if greater than 4 bytes	RO	0	1	4	c7	4	1	FC16	1006	10
Result	(UNIT32) 0x00000000 finished 0xFFFFFFFF running	RO	0	1	5	c7	5	1	FC4	1016	2
Start/Cancel	(UNIT8) Start or cancel the function	RW	0	1	6	c7	6	1	FC6	1018	2

Table 34: Object route function

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18.7.1 Examples of use

1. Protocol-specific access to the object route function:

ProfiNet		
Slot	Subslot	Index
0	1	0

EtherNet/IP		
Class	Instance	Attributes
0x80	0x01	0x01
Modbus TCP		
Function code (FC)	Start address	Number of elements
FC16	1000	2

Table 35: Example of use 1

Example of reading the device status object (0x2004 sub 0x01) from the device with address 0x28:

→ 0x28012004

2. Running the route function by writing 0x01 to the following index/attribute:

ProfiNet		
Slot	Subslot	Index
0	6	0

EtherNet/IP		
Class	Instance	Attributes
0x80	0x01	0x06
Modbus TCP		
Function code (FC)	Start address	Number of elements
FC6	1018	2

Table 36: Example of use 2

→ Writing 0x01

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3. Reading the queried value:

ProfiNet		
Slot	Subslot	Index
0	1	3

EtherNet/IP		
Class	Instance	Attributes
0xc7	0x03	0x03
Modbus TCP		
Function code (FC)	Start address	Number of elements
FC16	1004	2

Table 37: Example of use 3

→ Read

Example:
The device status is 0x05 (error).

18.8 Objects

The following objects allow additional control and monitoring.

18.8.1 Device status NAMUR NE 107

Name	Description	Access type
Device state NAMUR NE 107	Corresponds to the device status of type 3360 and 3361	RO

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
reserved	reserved	NAMUR mode: 0 – Automatic mode 1 – Manual mode 2 – Flashing		NAMUR status: 0 – Normal 1 – Diagnostics active 2 – Maintenance required 3 – Device out of specification 4 – Warning 5 – Error			

Table 38: Device status NAMUR NE 107

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18.8.2 büS control object

Name	Description	Access type
Control mode*	Byte 0: Defines the device behavior and communication with the connected devices. It can therefore be defined when the device starts transferring process data. Byte 1: Defines the device behavior if a device fails.	RW
Control word**	Byte 0: Address of the device to be controlled. Byte 1: Node (device) management according to CANopen specification.	RW

*

Byte 1	Byte 0
0: reserved 1: Do not cancel allocation to missing device	0: Automatic mode (büS standard) 1: Input for operation with COM 2: Input for operation with PLC
Byte 3	**Byte 2**
Reserved	Reserved

**

Byte 1	Byte 0
0x81: Reset node (device restart)	0xFF: All devices
Byte 3	**Byte 2**
Reserved	Reserved

Table 39: büS control object

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19 MAINTENANCE, TROUBLESHOOTING

19.1 Safety instructions

DANGER!

Risk of injury from high pressure in the system or device.

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

Risk of injury due to electric shock.

- Before working on the system or device, switch off the power supply and secure to prevent reactivation.
- Observe applicable accident prevention and safety regulations for electrical equipment.

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.

19.2 Maintenance

Maintenance work is described in the separate repair and maintenance instructions. These can be found on our Homepage at: www.burkert.com. → Type 3360, 3361.

19.2.1 Maintenance messages

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	Description	Device behavior	Procedure
Low capacity! Energy pack must be changed soon.	Remaining storage capacity of the SAFEPOS energy pack is 30%.	Maintenance message.	Replace SAFEPOS energy pack soon, or in good time before the service life ends.

Table 40: Maintenance messages

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19.3 Troubleshooting

19.3.1 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 41: Messages for device status "Out of specification"

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19.3.2 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 X.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.		
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.

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Message	Description	Device behavior	Procedure
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.
External CMD not assigned.	"EXTERNAL" has been set as the source for the input signal. Assignment of the external büS partner missing.	Error message. Actuator moves to the safety position.	Assign external büS partner or set "Internal" or "Gateway" as the source for the input signal. 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.			
External DigitalOut1 not assigned.			
External DigitalOut2 not assigned.			
External AnalogOutput not assigned.			
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 42: Error messages

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20 CLEANING

The surfaces of the device must not be cleaned with alkaline cleaning agents.

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21 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, 8-pole, (length 2 m)	919061
Connection cable with M12 socket, 4-pole, (length 5 m)	918038
USB büS interface set:	
büS service interface (büS stick + 0.7 m cable with M12 plug)	772551
büS adapter for büS Service interface (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
Communicator	Information at www.burkert.com.
SIM card	919902
Holding device for line connection DN15 to DN20	693770
Holding device for line connection DN25 to DN50	693771

Table 43: Accessories

21.1 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.

21.1.1 USB interface

The PC requires a USB interface for communication with the devices, also an adapter with an interface driver (see "Table 43: Accessories").

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21.2 Spare parts

21.2.1 Spare parts for control valves of Types 3360 and 3361

Spare parts for Types 3360 and 3361			Order number
SAFEPOS energy-pack			285 834
Seal set for packing gland	Spindle ø10 mm, DN15...DN20		285 685
	Spindle ø14 mm, DN25...DN50		285 722
VA spindle guide for packing gland	Spindle ø10 mm	Body DN15	246 577
		Body DN20	246 578
	Spindle ø14 mm	Body DN25	246 579
		Body DN32	246 583
		Body DN40	246 593
		Body DN50	246 594

Table 44: Spare parts for Types 3360 and 3361

21.2.2 Spare parts for angle seat control valve of Type 3360

Control cone set for Type 3360		
DN	Order number	
	Steel/steel	PTFE/steel
13/15	170 322	170 315
20	170 323	170 316
25	170 324	170 318
32	226 925	226 941
40	225 423	226 945
50	225 426	226 948

Table 45: Control cone set for Type 3360

21.2.3 Spare parts for straight seat control valve of Type 3361

Control cone set for Type 3361 contains: control cone, dowel pin, graphite seal			
Orifice DN [mm]		Order number	
fit	Body	Steel/steel	PTFE/steel
4	10/15	149 934	–
6	10/15	152 696	–
8	10/15	149 935	149 962

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Control cone set for Type 3361 contains: control cone, dowel pin, graphite seal			
Orifice DN [mm]		**Order number**	
fit	**Body**	**Steel/steel**	**PTFE/steel**
10	10/15	149 912	149 963
	20	149 914	149 965
15	15	149 915	149 943
	20	149 916	149 944
	25	149 917	149 945
20	20	149 918	149 946
	25	149 951	149 947
	32	226 951	226 963
25	25	149 953	149 949
	32	226 952	226 964
	40	226 954	226 966
32	32	226 953	226 965
	40	226 955	226 967
	50	226 957	226 969
40	40	226 956	226 968
	50	226 958	226 970
50	50	226 959	226 971

Table 46: Control cone set for Type 3361

Valve set for Type 3361 contains: valve seat, control cone, dowel pin, graphite seal			
Orifice DN [mm]		**Order number**	
fit	**Body**	**Steel/steel**	**PTFE/steel**
4	10/15	150 011	–
6	10/15	152 695	–
8	10/15	150 012	150 046
10	10/15	150 013	150 047
	20	150 014	150 048
15	15	150 015	150 049
	20	150 016	150 050
	25	150 017	150 051
20	20	150 018	150 052
	25	150 019	150 053
	32	227 025	227 037
25	25	150 021	150 055
	32	227 026	227 038
	40	227 028	227 040

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Valve set for Type 3361 contains: valve seat, control cone, dowel pin, graphite seal			
Orifice DN [mm]		**Order number**	
fit	**Body**	**Steel/steel**	**PTFE/steel**
32	32	227 027	227 039
	40	227 029	227 041
	50	227 031	227 043
40	40	227 030	227 042
	50	227 032	227 044
50	50	227 033	227 045

Table 47: Valve set for Type 3361

21.3 Installation tools

21.3.1 Installation tools for control valves of Types 3360 and 3361

Modified socket wrench for packing gland (series production status from April 2012)			
Spindle ⌀ [mm]	**Body DN**	**Wrench size**	**Order number**
10	15	SW19	683 220
10	20	SW21	683 222
14	25...50	SW21	683 223

Table 48: Installation tools for Types 3360 and 3361

21.3.2 Installation tools for control valves of Type 3361

Installation tool for replacing valve seat	
Orifice valve seat DN	**Order number**
15	652 604
20	652 605
25	652 606
32	652 607
40	652 608
50	652 609
65	655 562
80	655 563
100	655 564

Table 49: Installation tools for Type 3361

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22 DISASSEMBLY

22.1 Safety instructions

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.

→ Disconnect the electrical connection.

→ Remove device.

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23 PACKAGING, TRANSPORT

ATTENTION!

Transport damage!

Inadequately protected devices may be damaged during transportation.

- Protect the device against moisture and dirt in shock-resistant packaging during transportation.
- Prevent the temperature from exceeding or dropping below the permitted storage temperature.

24 STORAGE

ATTENTION!

Incorrect storage may damage the device.

- Store the device in a dry and dust-free location.
- Storage temperature -40 … +70 °C.

25 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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