bürkert
FLUID CONTROL SYSTEMS

Type 3363, 3364, 3365
AE3363, AE33

Electromotive diaphragm control valve

Operating instructions

MAN 1000302829 EN Version: G Status: RL (released | freigegeben) printed: 19.07.2024

Electromotive diaphragm control valve

Contents

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1 OPERATING INSTRUCTIONS

The operating instructions describe the entire life cycle of the device. Keep these instructions in an easily accessible location for every user. The instructions must be available to each new owner of the device.

Important safety information.

Carefully read through the operating instructions. 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 against an imminent danger.

▸ Failure to observe these instructions will result in death or serious injuries.

WARNING!

Warns of a potentially hazardous situation!

▸ Failure to observe these instructions may result in serious injuries or death.

CAUTION!

Warns against a possible risk.

▸ Failure to observe these instructions may result in moderate or minor injuries.

ATTENTION!

Warns of damage to property.

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

Indicates important additional information, advice and recommendations.

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

▸ Indicates an instruction to be carried out to avoid a danger, a warning or a possible risk.

→ Indicates a procedure to be carried out.

Indicates a result.

MENU Symbol for software interface texts.

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1.2 Definition of terms

- **The term “device” as used in these instructions relates to the electromotive diaphragm control valve Type 3363, 3364, 3365 and AE3363. Device:**
- AG2: Actuator size 2 with a nominal force of 2500 N for diaphragm size 8...40
  AG3: Actuator size 3 with a nominal force of 11500 N for diaphragm size 40...100
- **Ex:** The abbreviation “Ex” used in these instructions stands for “potentially explosive”.
- The term “büS” (Bürkert system bus) used in this instruction stands for the communication bus developed by Bürkert and based on the CANopen protocol.
- In these instructions, the unit bar stands for relative pressure. The absolute pressure is stated separately in bar(abs).

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2 INTENDED USE

Improper use of the electromotive Type 3363, 3364 and 3365 diaphragm control valve may be dangerous for people, nearby equipment and the environment.

The electromotive diaphragm control valve is designed to control the flow of liquid and gaseous media.

- Standard devices must not be used in the potentially explosive atmosphere. They do not possess the separate Ex type label denoting the approval for use in potentially explosive environments.
- The use of alkaline cleaning agents is not permitted for cleaning the surface of the device.
- If the position of the valve has a bearing on safety concerns in the event of a power failure: Only use devices that have the SAFEPOS energy-pack (optional energy storage system).
- When using the device, observe the authorised data, and the operating and usage conditions specified in the contract documents and in the operating instructions.
- Protect device from harmful environmental influences (e.g. radiation, air humidity, fumes, etc.)! For any matters requiring clarification, contact the relevant sales department.

Only use the device

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

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3 BASIC SAFETY INSTRUCTIONS

This safety information does not take into account any contingencies or occurrences that may arise during installation, use and maintenance of the device. The operating company is responsible for the respect of the local safety regulations, including staff safety.

Risk of injury from high pressure.

- Before working on the system or device, switch off the pressure and ventilate or empty the lines.

Danger of burns and risk of fire.

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

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

Risk of crushing by mechanically powered parts.

- Installation work on the compressor, diaphragm and valve body must only be performed while electrically isolated.
  For devices with SAFEPOS energy-pack: completely remove the SAFEPOS energy-pack. Wait until the LED light ring is no longer lit and ensure that the LED status is not in "LED off" mode.
- Do not reach into the openings of the valve body.

Risk of uncontrolled process in the event of a power failure.

For devices without the optional SAFEPOS energy-pack, the valve will not stop in a defined position in the event of a power failure.

- Only use devices that have a SAFEPOS energy-pack (optional energy storage system).
- Select a valve position that is safe in respect of the process in the SAFEPOS menu.

Danger due to loud noises.

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

Medium may leak out if the diaphragm is worn.

- Relief bore must be regularly inspected for any medium leakages.
- If medium is leaking from the relief bore, the diaphragm must be replaced.
- If the medium is hazardous, secure the area around the leakage to prevent risks.

General hazardous situations.

To prevent injury, ensure that:

- In potentially explosive atmosphere the device must only be used in accordance with the specifications on the separate type label.
- The additional information and safety instructions relating to potentially explosive atmospheres enclosed with the device or the separate operating instructions relating to potentially explosive atmospheres must be adhered to when deploying the device.

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- In potentially explosive atmospheres, only use devices with a separate Ex type label.
- Only the media listed in chapter "8 Technical data" should be fed into the medium ports.
- Do not make any internal or external changes to the device and do not subject it to mechanical stress.
- Secure to prevent unintentional operation.
- Note the system-specific safety regulations.
- Make sure only trained technicians carry out installation and maintenance work.
- Transport, install and dismantle a heavy device only with the aid of a second person and using suitable equipment.
- Following an interruption in the power supply, ensure that the process is restarted in a controlled manner. Observe the sequence.
  1. Connect supply voltage.
  2. Pressurise the device with medium.
- Observe the general rules of technology.
- The valves must be installed according to the regulations applicable in the country of use.

ATTENTION!

Electrostatically sensitive components and assemblies.

The device contains electronic components that are susceptible to the effects of electrostatic discharging (ESD). Components that come into contact with electrostatically charged persons or objects are at risk. In the worst-case scenario, they will be destroyed immediately or will fail after start-up.

- Observe the requirements for minimizing or avoiding the possibility of damage caused by sudden electrostatic discharge in accordance with EN 61340-5-1.
- Do not touch electronic components when the supply voltage is connected.

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4 GENERAL NOTES

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
E-mail: info@burkert.com

International

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

Also on the Internet at:

country.burkert.com

4.2 Warranty

A precondition for the warranty is that the device is used as intended in consideration of the specified usage conditions.

4.3 Information on the Internet

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

country.burkert.com

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5 PRODUCT DESCRIPTION

5.1 General description

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

The diaphragm control valve has an electromotive linear actuator with actuation electronics assembly. The actuation electronics assembly for position control or process control is actuated either via standard signals (analogue) or via a fieldbus (digital). The electromotive linear actuator is set up such that it is optimally effective. At the same time, when idling without power, it also keeps the valve sealed and in position even under the maximum specified medium pressure.

The device can also be equipped with the energy storage system (SAFEPOS energy-pack). In the event of a supply voltage failure, the energy storage system supplies the actuator with the energy required to move the valve to the position defined in the SAFEPOS menu.

The valve position can be manually changed in two ways.
1. Electrical manual override: used if supply voltage is present.
2. Mechanical manual override: Must only be used if there is no supply voltage present.

The device can be set and operated either via 2 capacitive buttons and 4 DIP switches, or on a display with a touchscreen. It is also always possible to set the device with the büS service interface and by using PC software Bürkert Communicator. The USB büS interface set, available as an accessory, is required for configuration with Bürkert Communicator.

5.2 Properties

- Hermetic separation of the medium from the actuator by a diaphragm.
- Any flow direction.
- Self-drainage with appropriate installation. The ends of the connections used must be cylindrical.
- Minimum dead space.
- High flow rate values and low turbulence flow due to the valve body that aids in flow.
- External, directly accessible display with touchscreen.
- 360° LED light ring for displaying device states, valve end positions and operating state.
- No electrical energy is required to hold the valve position even under maximum operating medium pressure, except for basic consumption for the control unit.
- Valve actuator can rotate 360°.
- Integrated control unit for position control or process control.
- Contact-free, high-resolution and wear-free position sensor.
- The actuator housing consists of a robust and heat-dissipating aluminium body. The coating is resistant to common detergents. The plastics used for the actuator housing are also detergent-resistant.
- Easy and quick replacement of the diaphragm. PTFE/EDPM diaphragms can be replaced by EPDM diaphragms.

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5.3 Variants

The following variants are described in these instructions:

Controller versions

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

Body variants

- Type 3363: 2-way valve body
- Type 3364: T-valve body
- Type 3365: Tank bottom body

5.4 Options

- Energy storage system (SAFEPOS energy-pack) for reaching safety position.
  The safety position that the valve is supposed to take in the event of a supply voltage failure is specified via the SAFEPOS menu.
- Various fieldbus systems for transmitting the control parameters.
- Display module, operated via touchscreen.
- SIM card for saving and transmitting device-specific values and settings.

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6 STRUCTURE AND FUNCTION

The electromotive diaphragm control valve consists of a linear actuator powered by an electric motor and a diaphragm valve body.

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

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

The actuation electronics assembly for position control or process control is actuated either via standard signals (analogue) or via a fieldbus (digital).

The electromotive diaphragm control valve is designed with the three-wire technique. Standard devices are operated with 2 buttons and 4 DIP switches, while devices with a display module can be display-operated.

The electromotive linear actuator consists of a brushless direct current motor, a gear and a threaded spindle. The valve spindle connected to the threaded spindle transfers the force to the diaphragm compressor.

The linear actuator does not use any electrical energy when holding the valve position. This means that, when idling, only the control electronics require energy.

Port connections:
Welded connection, threaded socket connection, flange connection, clamp connection or bond connection (Connection sizes on request).

6.1 Representation – Structure of the electromotive diaphragm control valve

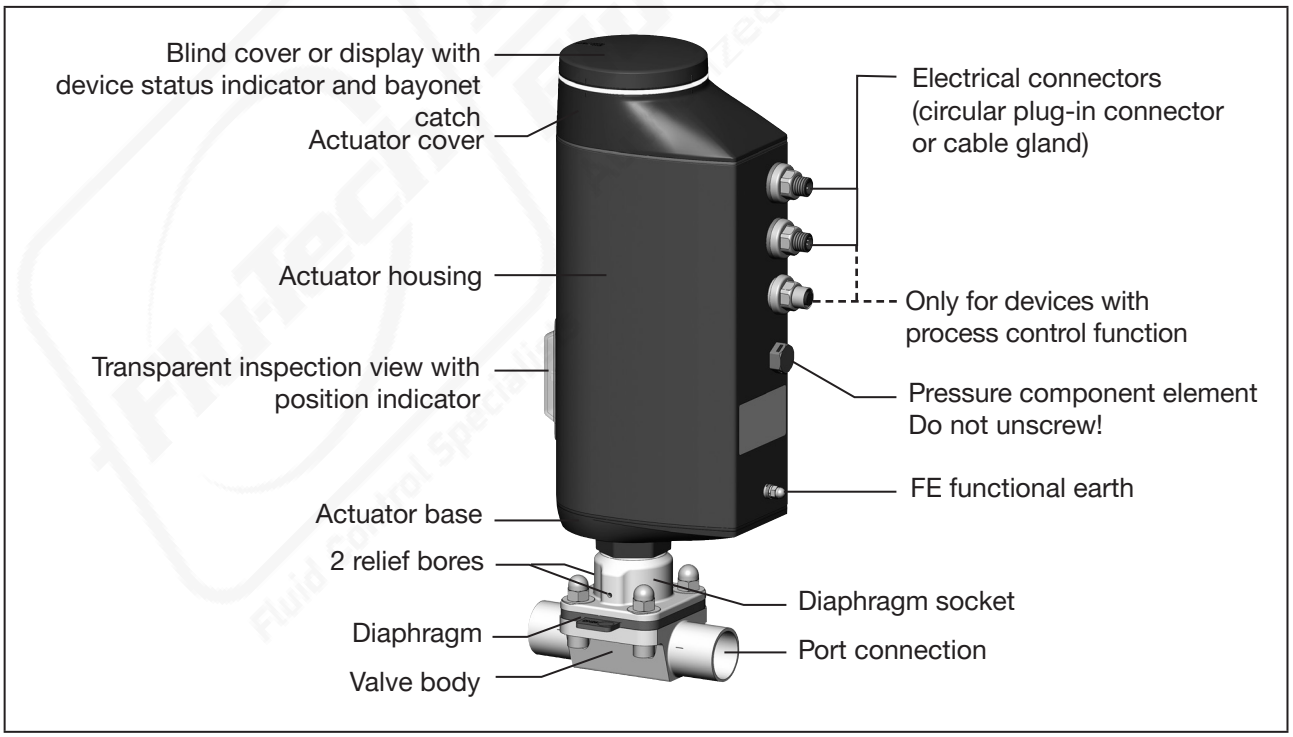

Fig. 1: Structure, electromotive diaphragm control valve with 2-way body

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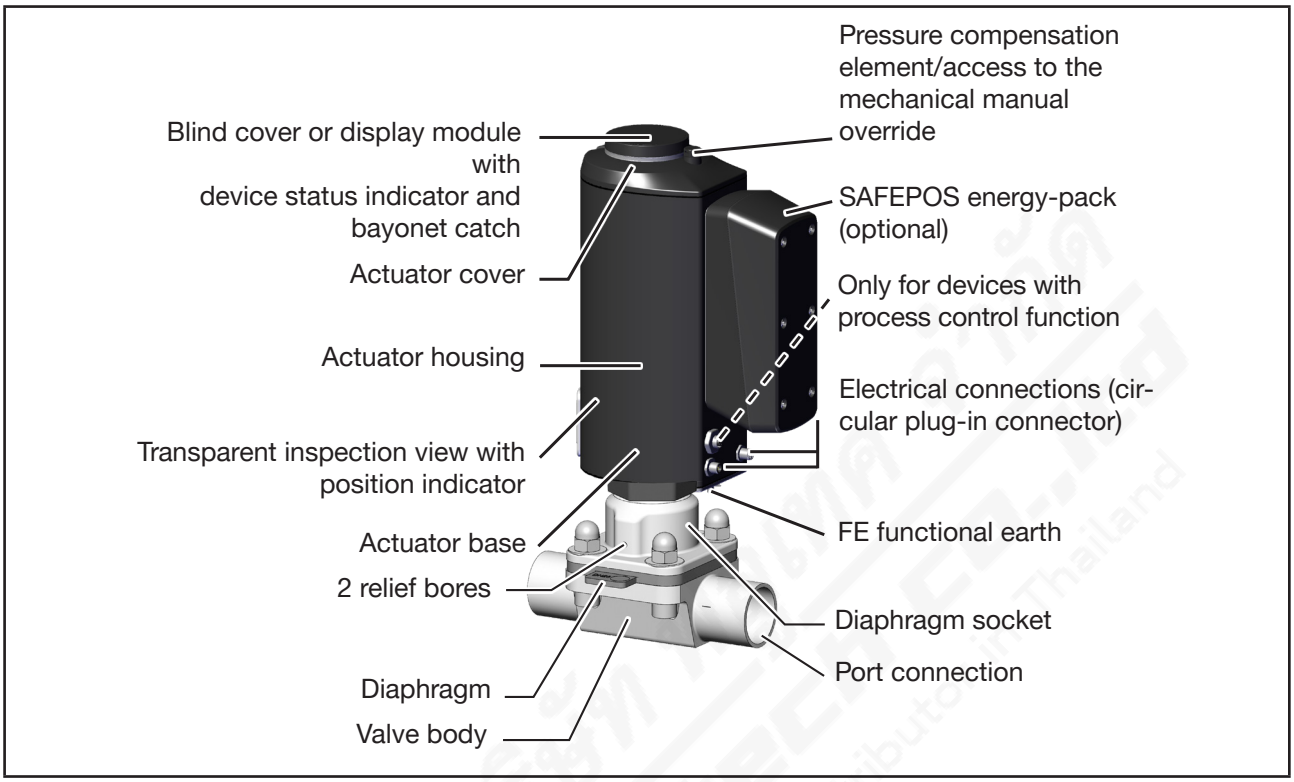

Fig. 2: Structure, electromotive diaphragm control valve AG3

6.2 Valve position after supply voltage failure

Valve position for devices without the SAFEPOS energy-pack:

If the electromotive actuator idles upon a supply voltage failure, the valve remains in the last position that it was in.

If the supply voltage fails while the actuator is changing the valve position, the valve remains in an undefined position. The flywheel mass of the actuator and the operating medium pressure continue to influence the valve spindle until it finally idles.

Valve position for devices with the SAFEPOS energy-pack:

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

For a description of the SAFEPOS energy-pack, see chapter “7.3 Energy storage SAFEPOS energy-pack (option)” on page 27

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6.3 Safety position

The safety position that the valve assumes in the following scenarios is defined in the SAFEPOS menu:

- Internal error
- Cable break if parameterised accordingly
- Digital input if parameterised accordingly
- Supply voltage failure (optional)
  This function is only available for devices that have the optional SAFEPOS energy-pack accessory.

The following safety positions are available to choose from in the SAFEPOS menu:

- Close = valve closed
- Open = Valve opened
- User-Defined = freely defined safety position input by a per cent value (0% = closed, 100% = open).
- Inactive = valve remains in an undefined position in the event of a supply voltage failure.

6.4 Display of the device status

The device status is displayed on the LED light ring. Various LED modes may be configured to display the device's status and valve position:

- Valve mode
- Valve mode + warnings (factory pre-set)
- NAMUR operation mode

The description for setting the LED mode can be found in chapter "12.2.2 Set LED operation mode" on page 91.

6.4.1 Valve mode

The valve position and device status "Failure" are displayed in the valve mode.

Notifications on device statuses "Out of specification", "Maintenance required" and "Function check" are not displayed in the valve mode.

The factory-set colours for displaying the valve positions "open" and "closed" can be switched. The description can be found in the software description for Type 3363 on our homepage www.burkert.de

Displays in valve mode:

For device status "Normal": Continuously lit in the colour of the valve position.
For device status "Failure": Alternating flashing between red and the valve position colour.

Valve position	Colour for valve position	Colour for device status "Failure"
open	yellow	red
in between	white	
closed	green	

Tab. 1: Display of device status in valve mode

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6.4.2 Valve mode + warnings

In this operation mode, the valve position and device statuses “Failure”, “Out of specification”, “Maintenance required” and “Function check” are displayed.

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

Displays in valve mode + warnings:
For device status “Normal”: Continuously lit in the colour of the valve position.
For device statuses that deviate from “Normal”: flashes alternately with the colours for the valve position and the device status.

Valve position	Colour for valve position	Colour for device status			
		Failure, error or fault	Function check	Out of specification	Maintenance required
open	yellow	red	orange	yellow	blue
in between	white				
closed	green				

Tab. 2: Display of device status in valve mode + warnings

6.4.3 NAMUR operation mode

In NAMUR mode the LED light ring lights up in the colour specified for the device status as per NAMUR NE 107.

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

Indicators in NAMUR operation mode:

Status indicator in line with NE 107, issue 2006-06-12			
Colour	Colour code	Description	Meaning
red	5	Failure, error or fault	Due to a malfunction in the device or its peripherals, closed-loop control mode is not possible.
orange	4	Function check	Work is being carried out on the device, which means that closed-loop control mode is temporarily not possible.
yellow	3	Out of specification	The environment conditions or process conditions for the device are not within the specified range. Internal device diagnostics indicate problems within the device or with the process properties.
blue	2	Maintenance required	The device is in closed-loop control mode, but function will soon be restricted. → Do the required maintenance operation.
green	1	Diagnostics active	Device is in error-free operation. Status changes are highlighted in colour. Messages are sent via any fieldbus that may be connected.

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Status indicator in line with NE 107, issue 2006-06-12			
Colour	**Colour code**	**Description**	**Meaning**
white	0	Diagnostics inactive	Device is switched on. Status changes are not displayed. Messages are not transferred via a fieldbus that may be connected.

Tab. 3: Indication of the device status in NAMUR operation mode

*A detailed fault description can be found in chapter “22 Troubleshooting and messages” on page 165

6.4.4 Flashing of the LED light ring

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

6.4.5 Notifications on device status

Notifications on device status are recorded in the logbook. Chapter “21 Maintenance” contains the most common notifications and the measures that they require.

Notifications on device status “Function check”
The notifications are presented when closed-loop control mode is interrupted by work on the device.

Notifications on device status “Function check”
Manual operation active
M.SERVICE active
M.Q0.TUNE active
M.CLEAN active
P.LIN active
Process Simulation active
Signal generator active

Tab. 4: Notifications on device status “Function check”

6.5 Factory settings

Operating state:
Devices in their factory default state have their operating state preset to MANUAL.

The pre-set factory settings for the individual menu options can be found in chapter “17 Operating structure and factory setting”.

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

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7 CONTROL ELECTRONICS

- **Variants**
  Type 3363, 3364 or 3365 with position control function
  Type 3363, 3364 or 3365 with process control function

- **Position sensor**
  contact-free, high-resolution and wear-free.

- **Microprocessor-controlled electronics assembly**
  for signal processing, control and motor control.

- **Electrical interfaces**
  Circular plug-in connector or cable gland

7.5.1 Interfaces

AG2 variant

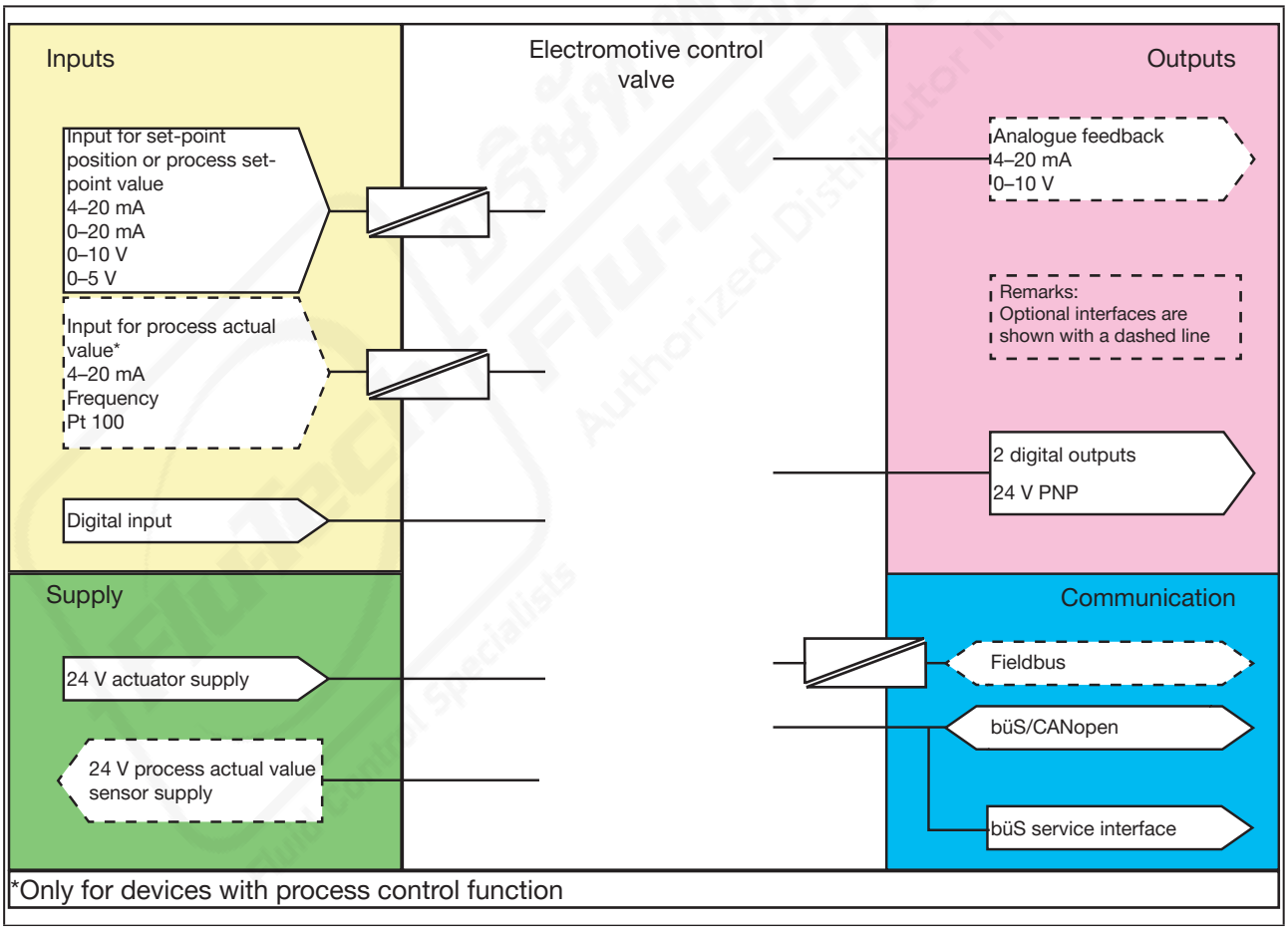

Fig. 3: Overview of galvanic isolations AG2

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AG3 Variant

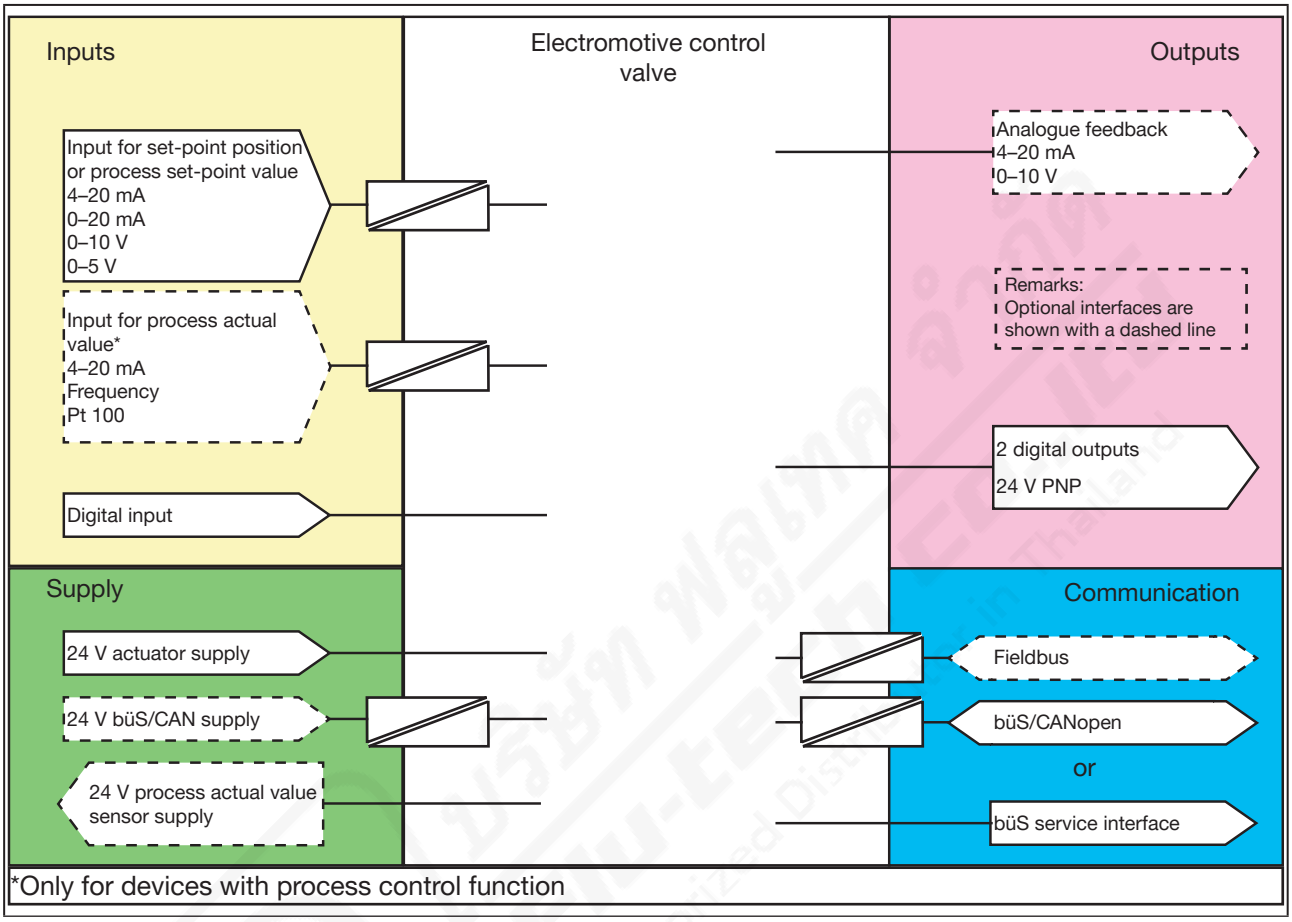

Fig. 4: Overview of galvanic isolations AG3

The electromotive diaphragm control valve is designed with the three-wire technique, i.e. the electrical supply (24 V ⎓) is separate from the set-point signal.

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7.1 Functional diagram of the electromotive diaphragm control valve

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

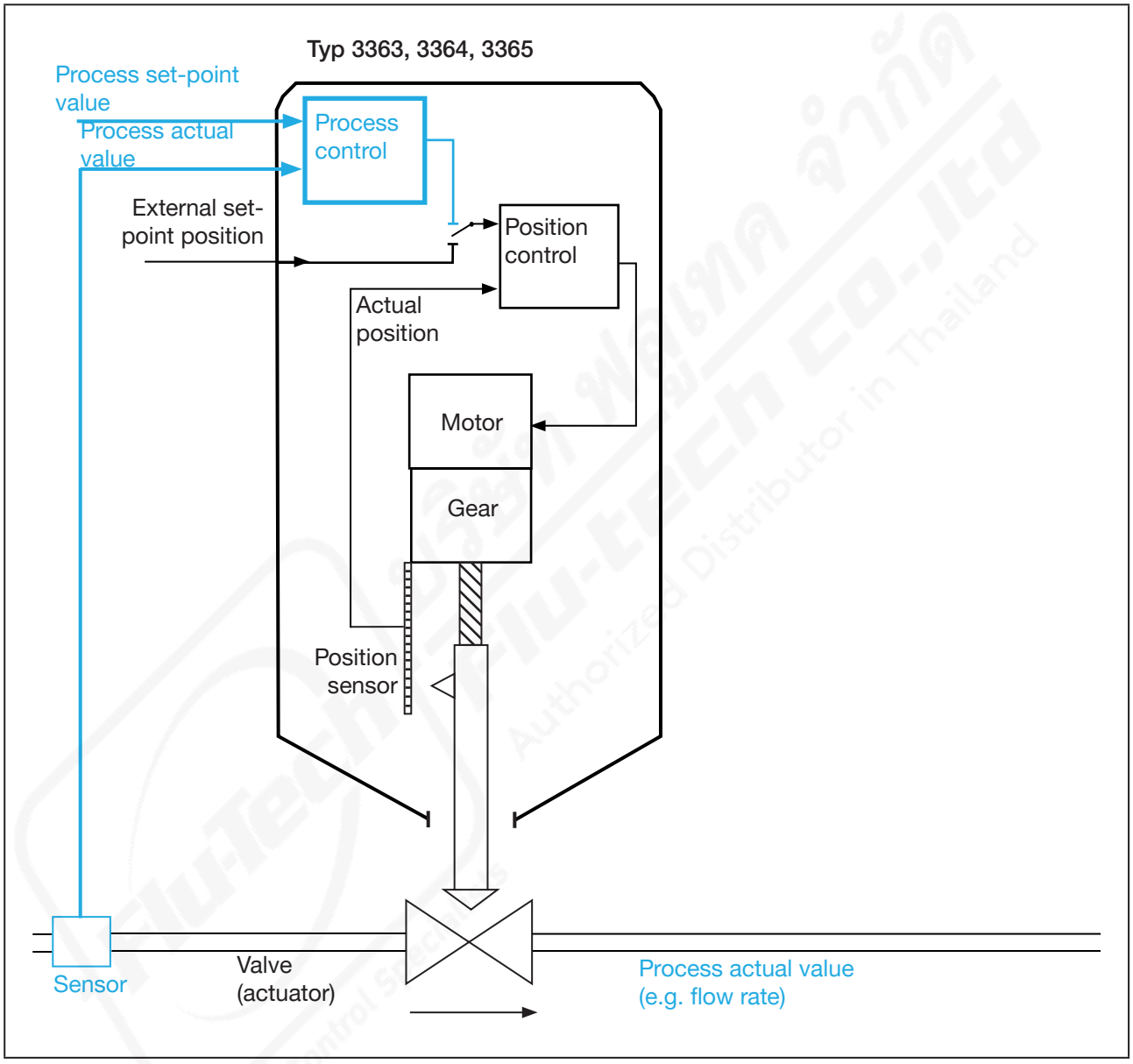

Fig. 5: Functional diagram, electromotive diaphragm control valve

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7.2 Functionality of the control electronics

The additionally implemented PID controller can, except for the position control, also be used to conduct a process control (e.g. level, pressure, flow rate, temperature) for purposes of cascade control.Signal flow diagram.

The process control function is integrated in a control loop. The set-point position of the valve is derived from the process set-point value and the process actual value, with the control parameters (PID controller). The process set-point value can be specified by an external signal.

For process control, the position control becomes an auxiliary control loop, which in turn creates a cascade control. The process controller in the main control loop of the control valve has a PID function. The process set-point value (SP) is specified as the set-point value and compared with the actual value (PV) of the measured quantity being controlled. The position sensor records the actual position (POS) of the electromotive linear actuator. The position control compares this actual position with the set-point value (CMD) of the process control. If there is a control difference (Xd1), the actuating variable (CTRL) is used to change the actual position (POS) and thus the valve opening.

Signal flow diagram

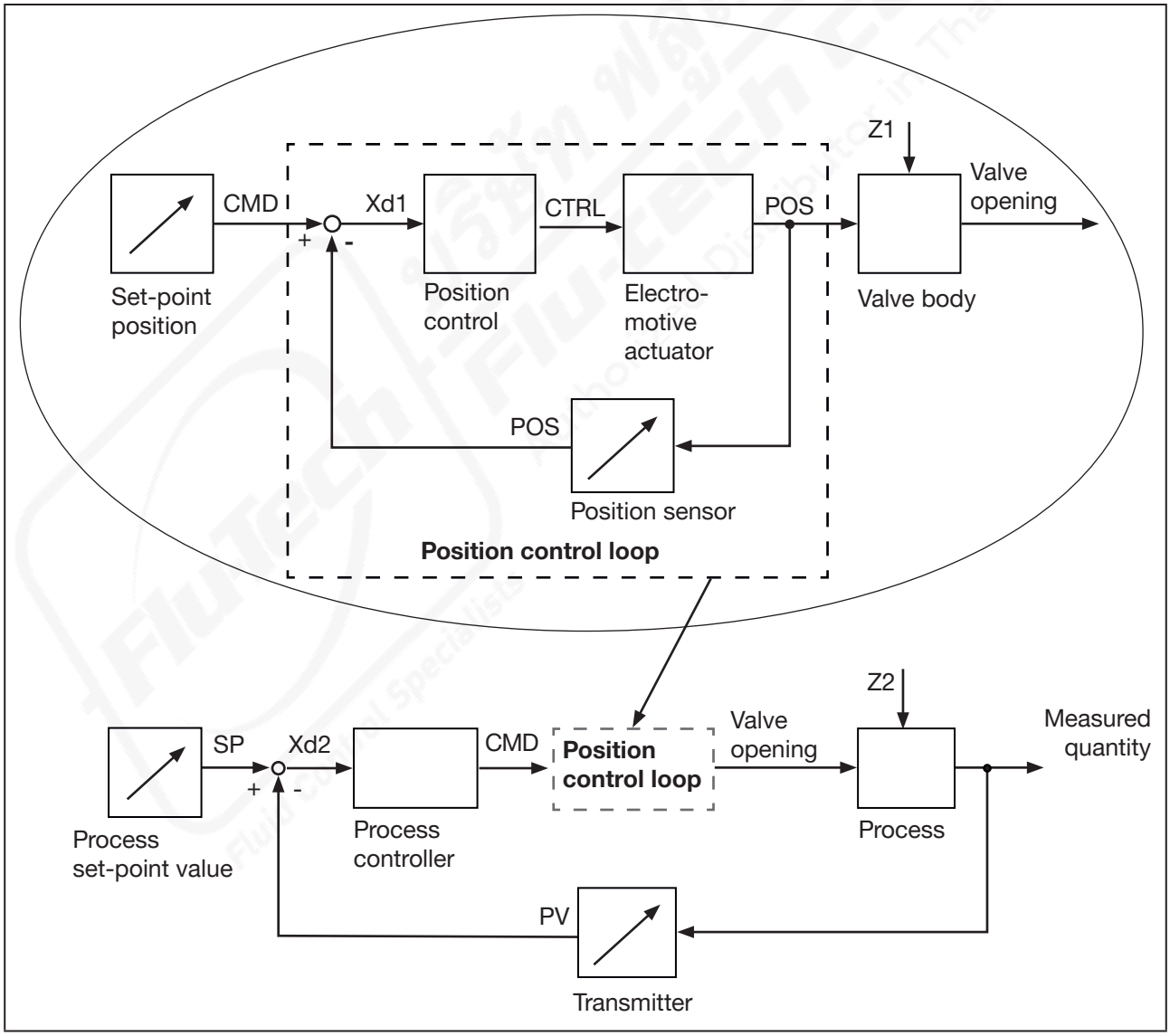

Fig. 6: Signal flow diagram

7.2.1 Schematic presentation of the position control

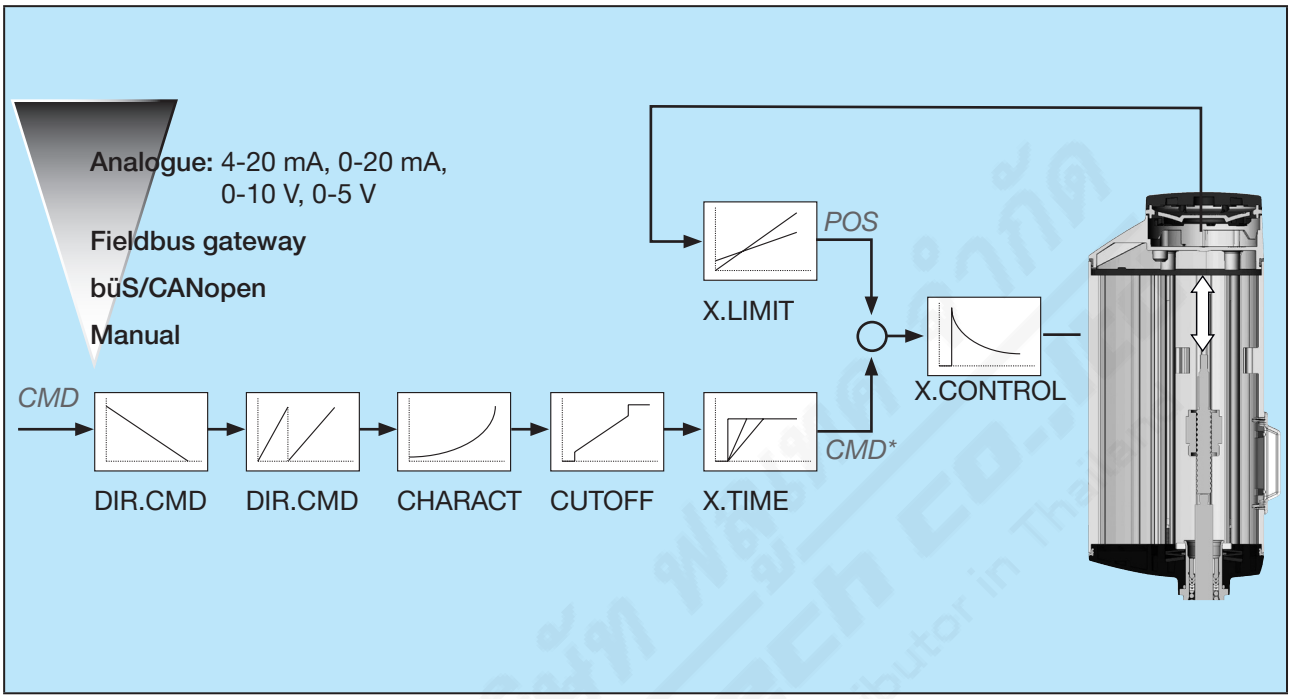

Fig. 7: Schematic presentation of the position control

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

Menu	Description
X.LIMIT	Mechanical stroke range limit
DIR.CMD	Set-point position direction
SPLTRNG	Signal split range
CHARACT	Transfer characteristic
CUTOFF (type X.CO) (type P.CO)	Sealing function (based on set-point position) (based on process set-point value)
X.TIME	Position control setting speed limit
X.CONTROL	Position control parameterisation
SP.scale	Scaling process set-point value
SP.SLOPE	Increase rate per unit of time
SP.FILTER	Process set-point value filter
PV.scale	Scaling process actual value
PV.FILTER	Process actual value filter
PID.PARAMETER	Process control parameterisation
P.CO. scale	Scaling process control

Tab. 5: Legend, position control and process control menu

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

Tab. 6: Legend, position control and process control measured variables

7.2.2 Schematic presentation of the process control

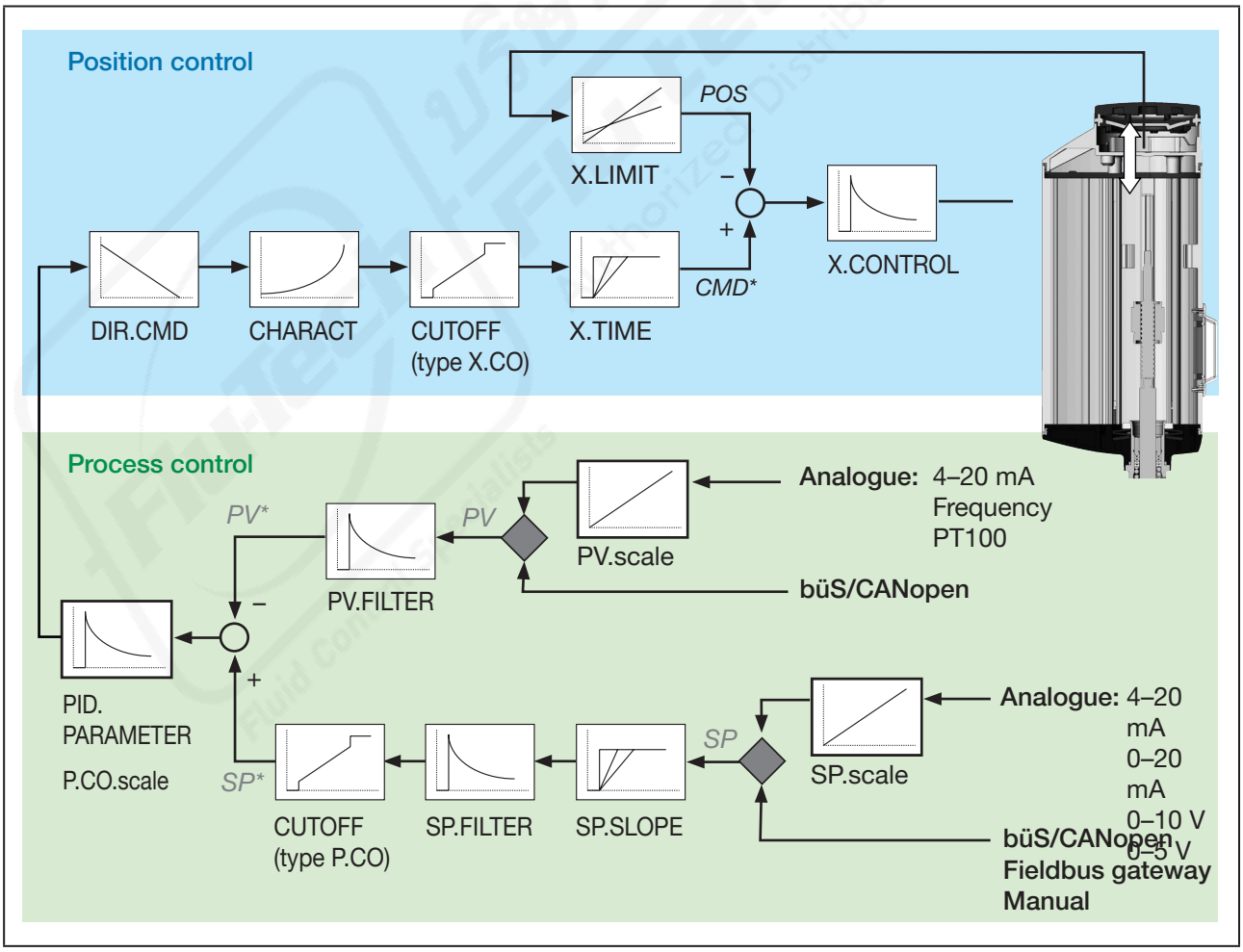

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Fig. 8: Schematic presentation of the process control

7.3 Energy storage SAFEPOS energy-pack (option)

The device can also be equipped with the energy storage system (SAFEPOS energy-pack). In the event of a supply voltage failure, the energy storage system supplies the actuator with the energy required to move the valve to the safety position.

The safety position is set using the DIP switch.

After a maximum of 120 seconds (depending on operating conditions), the energy storage is fully charged and ready for operation.

7.3.1 Service life

Service life: up to 15 years (depending on operating conditions).

The service life of 5 years was calculated based on the following conditions:

Ambient temperature	30 °C (AG2) / 65 °C (AG3)
Medium temperature	165 °C
Duty cycle	100%
Medium pressure	5 bar
Nominal diameter	DN32 (AG2) / DN65 (AG3)

ATTENTION!

The energy storage system SAFEPOS energy-pack is a wearing part. The service life figures are approximate values that cannot be guaranteed.

7.3.2 Notifications on the state of the SAFEPOS energy-pack

The device issues a warning:
the energy storage system capacity is greatly reduced. The energy storage system must be replaced soon.

▸ ⚠ The SAFEPOS energy-pack must be promptly replaced before the end of its service life.

The device issues an error alert and assumes the safety position:
The SAFEPOS energy-pack was not promptly replaced before issuance of the warning. The storage capacity is so low that assumption of the safety position can no longer be guaranteed.

7.3.3 Replace SAFEPOS energy-pack (AG2)

CAUTION!

Risk of injury from electrical voltage.

- ▸ Turn off the supply voltage before removing the SAFEPOS energy-pack.
- ▸ Ensure that the SAFEPOS energy-pack is fully discharged. Wait until the LED light ring is no longer lit and ensure that the LED status is not in “LED off” mode (see chapter “12.2.1 LED illuminated ring”).

The SAFEPOS energy-pack is located in the actuator housing. Remove the following parts from the actuator for replacement:

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

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

1. Blind cover
2. LED and storage module
3. Actuator cover

The process for removing these parts is described in detail in chapter "10.5.2 Access to connection terminals" on page 65.

Removing SAFEPOS energy-pack:

→ Loosen the safety screw (hexalobular-internal screw T10).

→ Completely pull the SAFEPOS energy-pack out from the clamp.

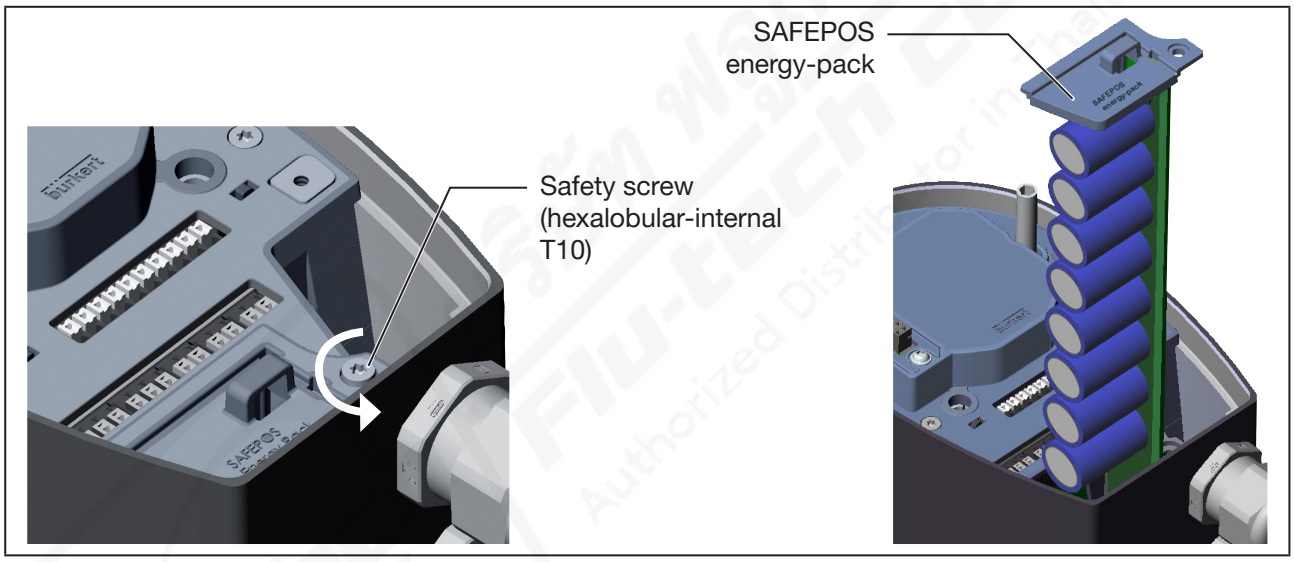

Fig. 9: Removing SAFEPOS energy-pack

Inserting new SAFEPOS energy-pack:

→ Remove the SAFEPOS energy-pack from the transport packaging.

→ Insert the SAFEPOS energy-pack into the two guide grooves on the side and push it in until it stops.

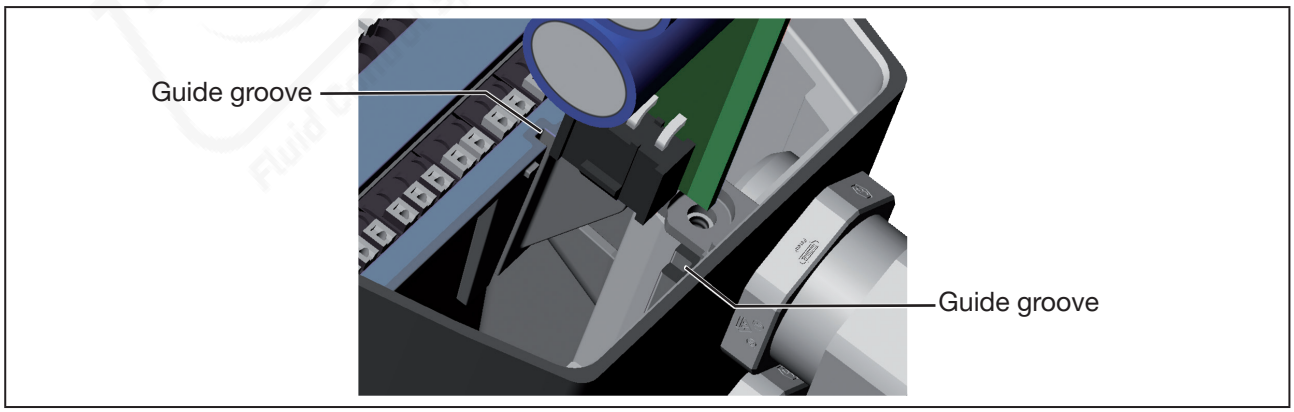

Fig. 10: Inserting SAFEPOS energy-pack

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→ Apply the safety screw (hexalobular-internal screw T10).

→ Connect supply voltage.

7.3.4 Replace SAFEPOS energy-pack (AG3)

CAUTION!

Risk of injury from electrical voltage.

- ▸ Turn off the supply voltage before removing the SAFEPOS energy-pack.
- ▸ Ensure that the SAFEPOS energy-pack is fully discharged. Wait until the LED light ring is no longer lit and ensure that the LED status is not in “LED off” mode (see chapter “12.2.1 LED illuminated ring”).

The SAFEPOS energy-pack is located on the actuator housing. Remove the following parts from the actuator for replacement:

Remove SAFEPOS energy-pack cover:

→ Remove 6 fastening screws (hexalobular-internal screws T25).

→ Remove the cover.

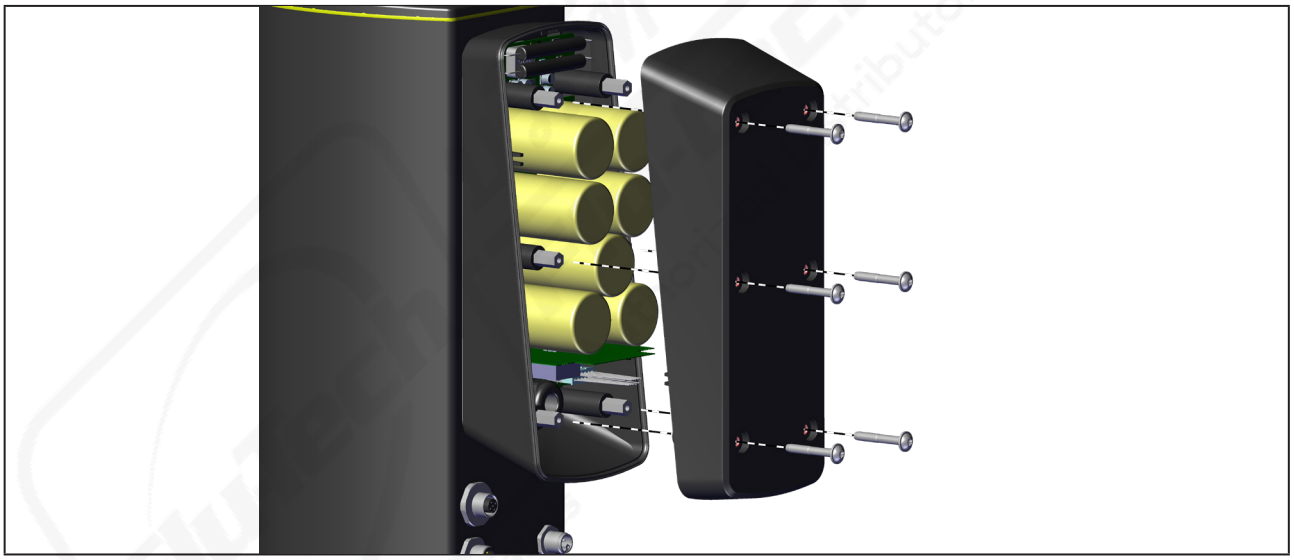

Fig. 11: Take off SAFEPOS energy-pack cover

Removing SAFEPOS energy-pack:

CAUTION!

Risk of injury from electrical voltage.

- ▸ Ensure that the red LED to display the residual voltage has gone out before the components are touched.

→ Remove printed circuit board

→ Remove adapter cable.

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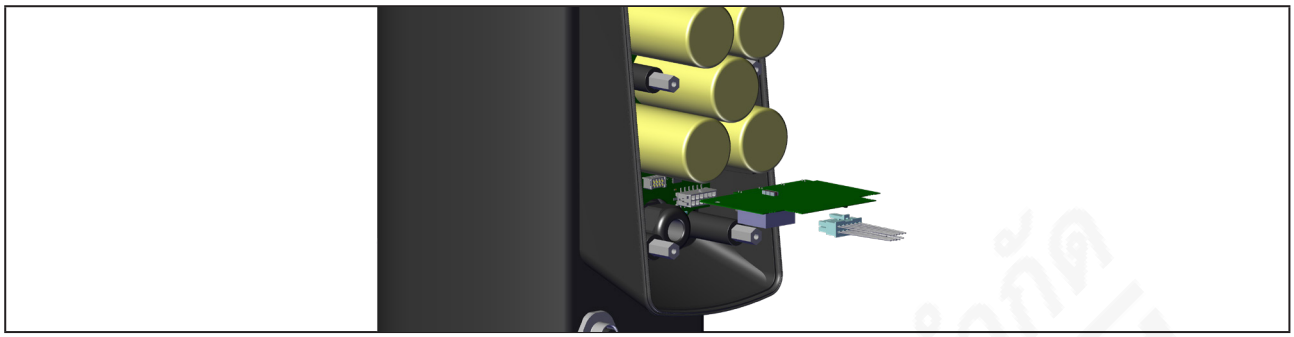

Fig. 12: Remove printed circuit board and adapter cable

→ Loosen 4 cheese head screws (socket head screw AF3).

→ Remove the SAFEPOS energy-pack.

Fig. 13: Loosen screws on the printed circuit board/remove SAFEPOS energy-pack

Inserting new SAFEPOS energy-pack:

→ Remove the SAFEPOS energy-pack from the transport packaging.

→ Installation in reverse order.

Tighten 4 cheese head screws (socket head screw AF3) to 1.1 Nm tightening torque.
Tighten 6 fastening screws (T25 hexalobular-internal screws) to 3 Nm tightening torque.

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8 TECHNICAL DATA

The following product-specific information is provided on the type label:

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

8.1 Standards and directives

The device complies with the valid EU harmonisation legislation. In addition, the device also complies with the requirements of the laws of the United Kingdom.Approvals

The harmonised standards that have been applied for the conformity assessment procedure are listed in the current version of the EU Declaration of Conformity/UK Declaration of Conformity.

8.2 Approvals

The product is cULus approved. Refer to chapter "8.8 Electrical data" for information on use in UL environments.

8.3 Type label

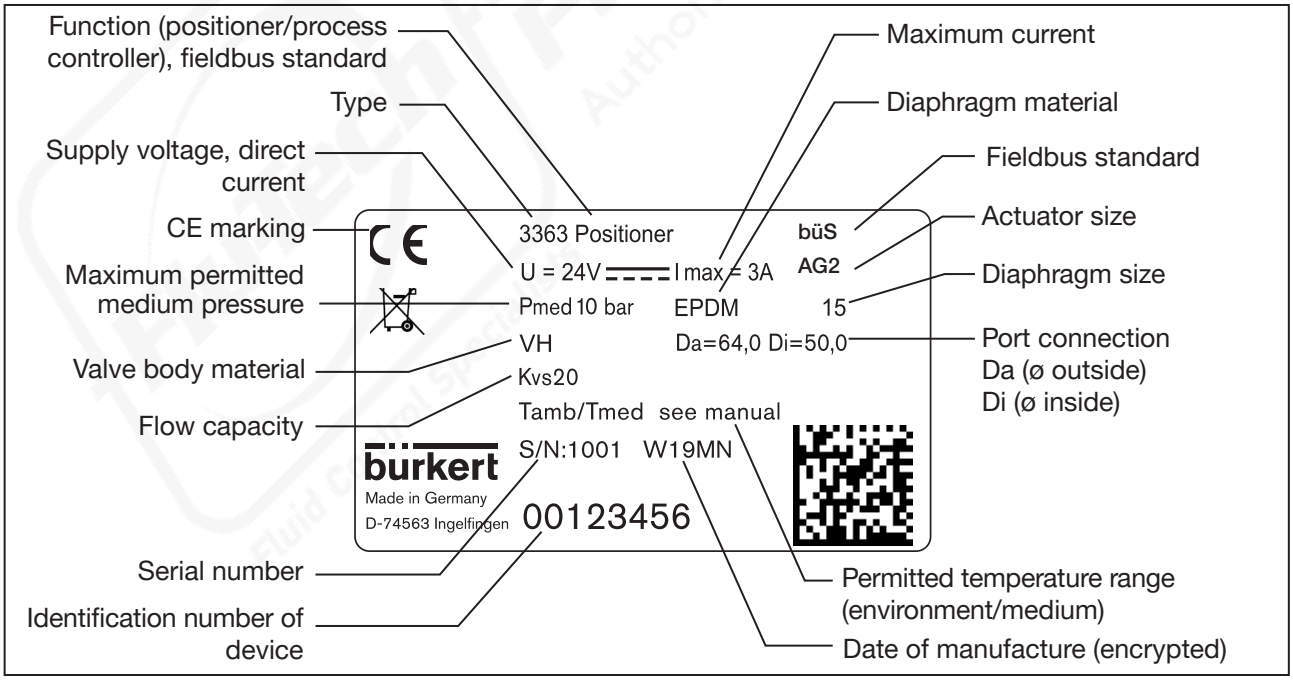

Fig. 14: Description of the type label (example)

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8.3.1 UL additional label (example)

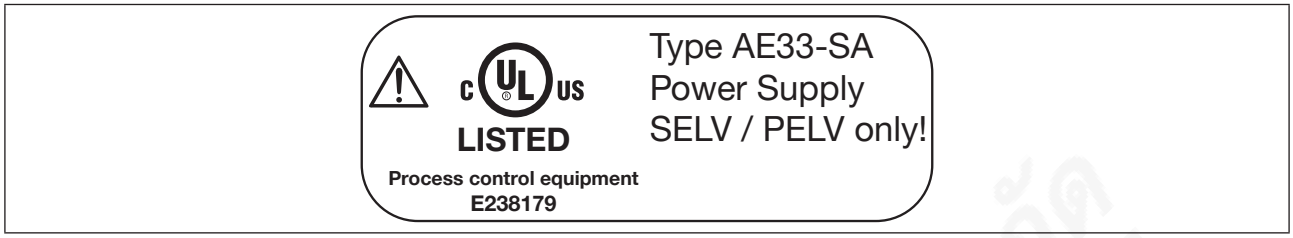

Fig. 15: UL additional label (example)

8.4 Labelling of forged steel valve body

Labelling may vary depending on variant.

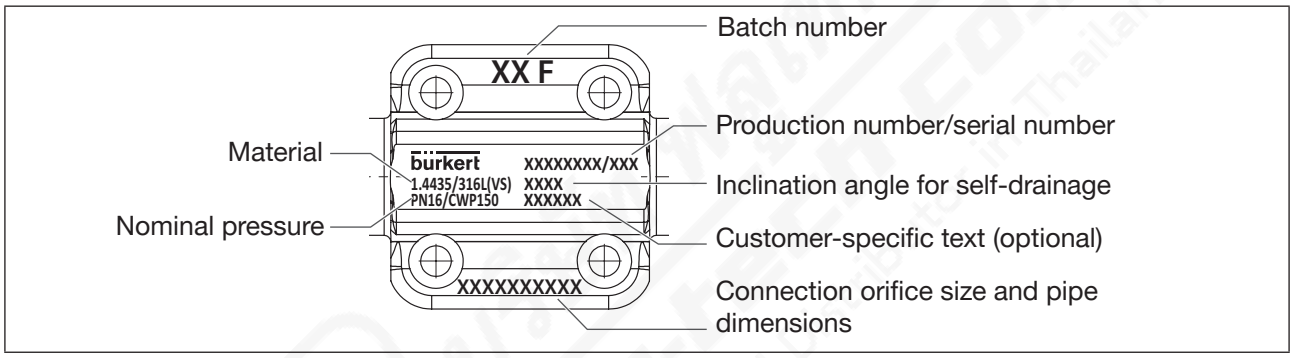

Fig. 16: Labelling of valve body from forged steel (example)

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8.5 Labelling of tube valve body (VP)

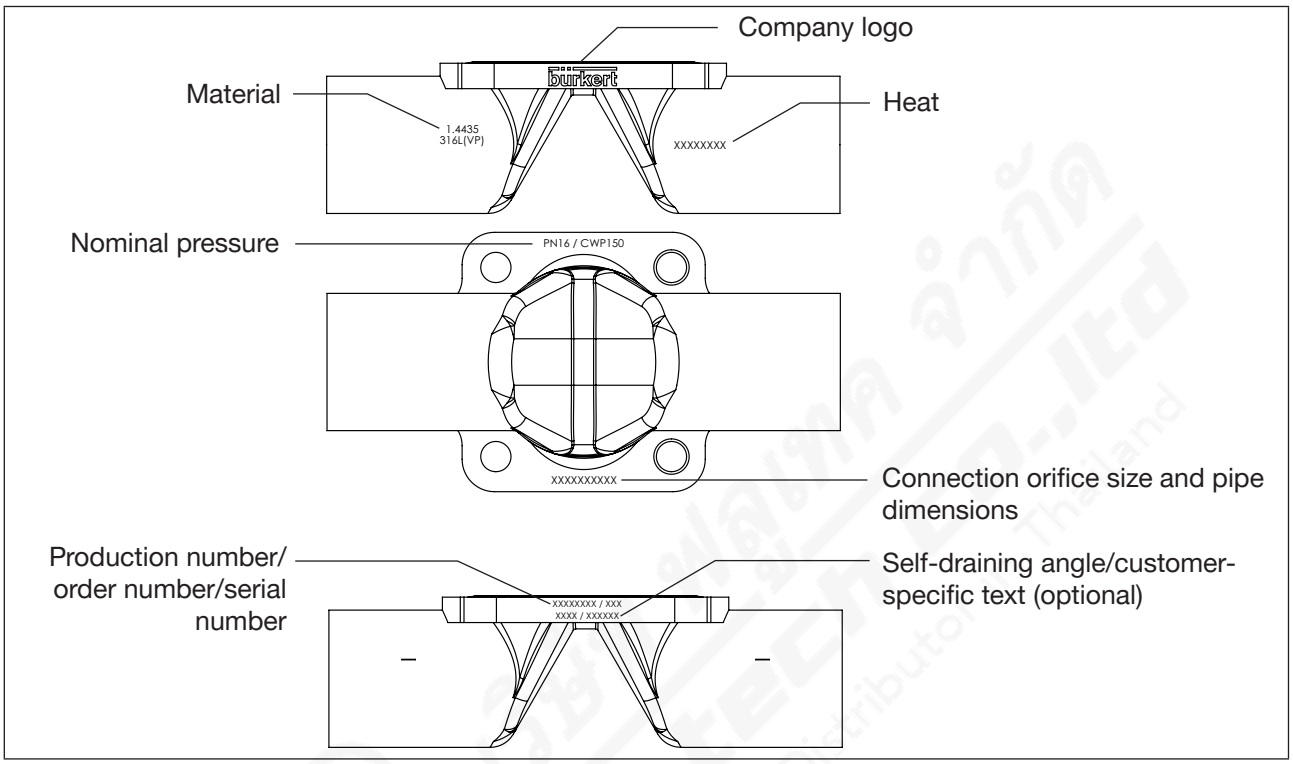

Fig. 17: Labelling of tube valve body (VP)

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8.6 Operating conditions

The product-specific information on the type label must be heeded when operating the device.

WARNING!

Loss of function if operated below or above permitted temperature range.

- Never expose the device to direct sunlight in outdoor areas.
- Do not operate above or below the permitted ambient temperature range.

WARNING!

Reduced sealing function if medium pressure too high.

Because the diaphragm control valve is closed against the medium flow, an excessive medium pressure may cause the valve to not close tightly.

- The medium pressure must not exceed the maximum value specified on the type label.

WARNING!

Danger from leakage of hot medium

The diaphragm does not provide permanent protection against hot medium.

- The diaphragm control valves must not be used for steam containment.

Maximum permitted medium pressure: see type label,

Media: neutral, high-purity, sterile, contaminated, aggressive or abrasive media of high to very high viscosity.

Degree of protection: (checked by Bürkert/not assessed by UL)
IP65 and 67 according to IEC 529, EN 60529
NEMA 250 4x (not guaranteed if installation position: actuator at bottom)

Operating altitude: up to 2000 m above seal level

8.6.1 Permitted temperature ranges

The permitted temperature ranges for the medium and surrounding environment are dependent on various factors:

- **Medium temperature:** Dependent on valve body material and diaphragm material.
  See tables in chapter "8.6.2 Permitted medium temperature"
- **Ambient temperature:** Dependent on medium temperature.
  See "Fig. 19: Temperature diagram AG2" and "Fig. 20: Temperature diagram AG3".

All factors must be taken into consideration when calculating permitted temperatures.

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Minimum temperatures	Environment: –10 °C Medium: Heed dependencies on ambient temperature and medium temperature. See chapter “8.6.2 Permitted medium temperature”
Maximum temperatures	Heed dependencies on ambient temperature and medium temperature. See chapter“8.6.3 Temperature diagram for medium and environment”

8.6.2 Permitted medium temperature

ATTENTION!

Depending on the medium temperature the behaviour of the medium temperature in relation to the diaphragm material may change.

- The specified medium temperatures only apply to medium that do not attack the diaphragm materials or cause it to swell up.
- The functional properties and service life of the diaphragm may be diminished if the medium temperature is too high or too low.

Permitted medium temperature for diaphragm material

Diaphragm material	Permitted temperature range for medium		
	Minimum	Maximum	Steam sterilisation
EPDM (AD)	–10 °C	+143 °C	+150 °C/60 min.
PTFE/EPDM (EA)	–10 °C	+130 °C	+140 °C/60 min.
Advanced PTFE/EPDM (EU)	–5 °C	+143 °C	+150 °C/60 min.
GYLON/EPDM laminated (ER)	–5 °C	+130 °C	+140 °C/60 min.
FKM (FF)	0 °C	+130 °C	Not suitable for steam/dry heat up to +150 °C/60 min.

Tab. 7: Permitted medium temperature dependent on diaphragm material

Permitted medium temperature for metal valve body

Valve body material	Permitted temperature range
Stainless steel	–10...+150 °C

Tab. 8: Medium temperature for metal valve body

Permitted medium temperature for plastic valve body

The permitted medium temperature for plastic valve bodies is dependent on the medium pressure.
See pressure diagram “Fig. 18”.

Valve body material	Permitted temperature range (depending on medium pressure, see pressure diagram “Fig. 18”)
PP, see pressure diagram	+10...+90 °C
PVC-C, see pressure diagram	+10...+80 °C
PVC-U, see pressure diagram	+10...+60 °C
PVDF, see pressure diagram	–20...+120 °C

Tab. 9: Medium temperature for plastic valve body

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Diagram for nominal diameter values (DN) 15 to 40:

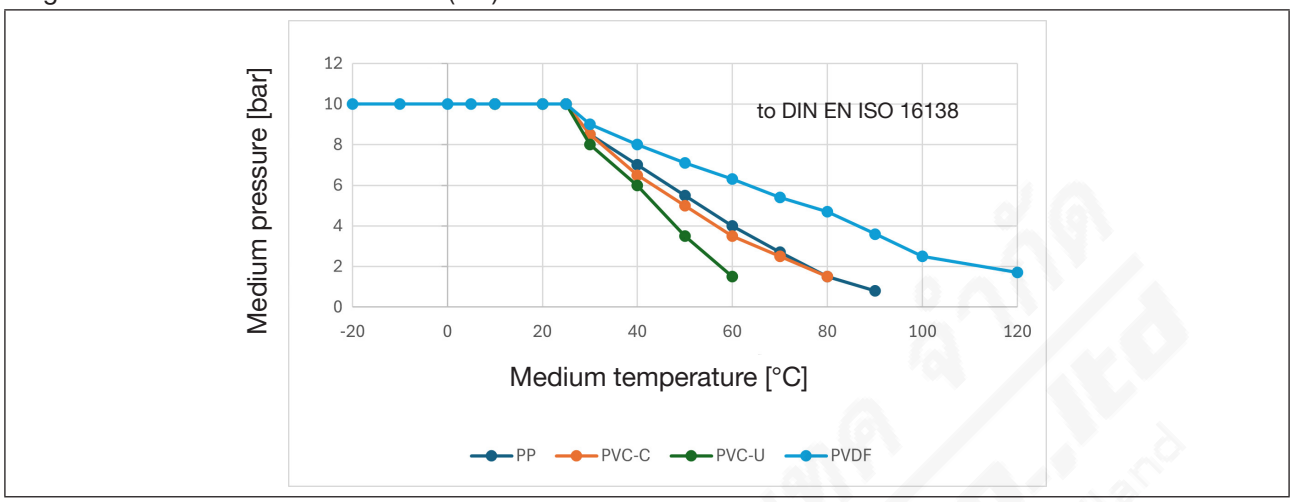

Fig. 18: Diagram: dependent on medium temperature and medium pressure for plastic valve body

8.6.3 Temperature diagram for medium and environment

The maximum permitted temperature for the environment and medium are dependent on one another. The permitted maximum temperatures must be determined using the temperature diagram.

The values have been calculated under the following maximum operating conditions:
AG2: diaphragm size 25 EPDM
AG3: diaphragm size 65 EPDM
Each at 100% duty cycle with 10 bar operating pressure.

Individual reviews may be performed under different operating conditions. For this, please contact your Bürkert branch office.

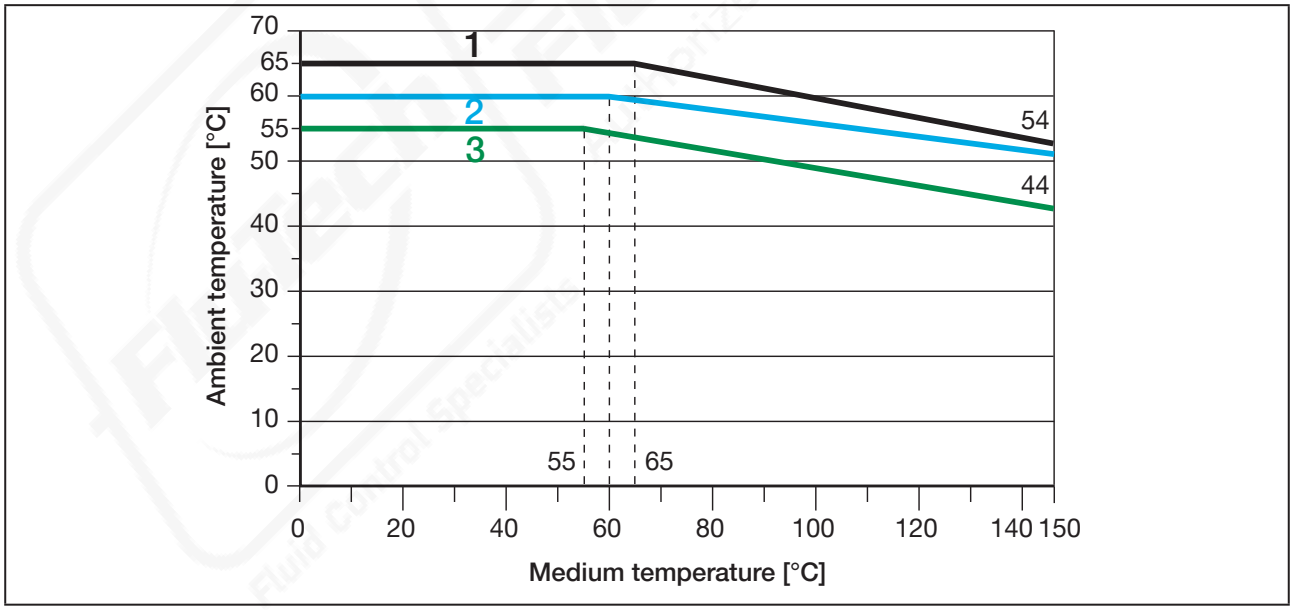

Fig. 19: Temperature diagram AG2

No.	Description
1	Device without module
2	Devices with display module
3	Devices with SAFEPOS energy-pack* or fieldbus gateway, with or without display module

* The service life of the SAFEPOS energy-pack is dependent on the medium temperature and ambient temperature (see chapter “Electrical data”).

Tab. 10: Description of temperature diagram AG2

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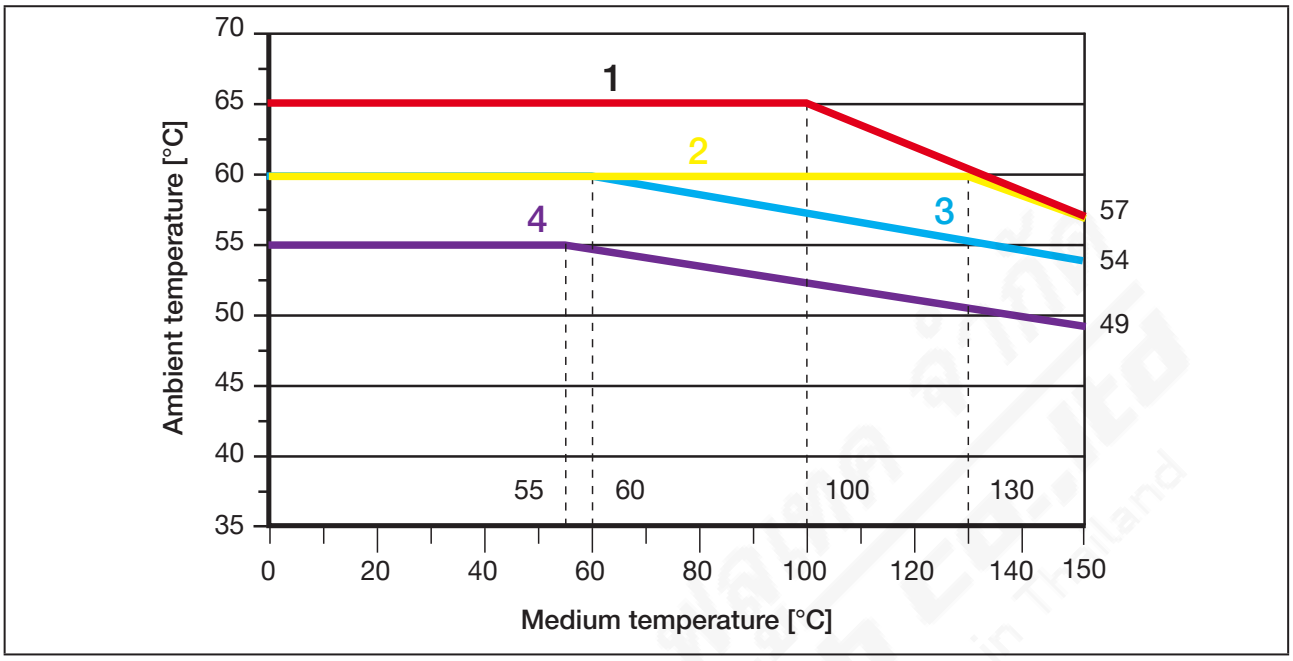

Fig. 20: Temperature diagram AG3

Item	Description
1	Device without module
2	Devices with SAFEPOS energy-pack*
3	Devices with display module with/without SAFEPOS energy-pack*
4	Devices with fieldbus gateway with/without display module with/without SAFEPOS energy-pack*
* The service life of the SAFEPOS energy-pack is dependent on the medium temperature and ambient temperature (see chapter "Electrical data").	

Tab. 11: Description of temperature diagram AG3

* The service life of the SAFEPOS energy-pack is dependent on the medium temperature and ambient temperature. For a description see "7.3 Energy storage SAFEPOS energy-pack (option)"

8.7 General technical data

Dimensions:	see data sheet
Weight:	see data sheet
Materials	Actuator base: PPS (AG2)/1.4308 (AG3) Actuator housing: Aluminium EN AW 6063 powder-coated Viewing window: PC Actuator cover: PPS (AG2)/PC (AG3) Valve body Metal: investment cast (VG), forged steel (VS), tube valve body (VP) Plastic: PP, PVC-C, PVC-U and PVDF Body connection: CF-8/1.4308/1.4470 Spindle seal: FKM
Sealing material	Actuator housing sealing element: EPDM Valve seat seal: See type label
Diaphragm	EPDM, PTFE or FKM (see type label)

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Fluidic connection

Connection types:	Threaded socket connection G ½-G 4 (NPT, RC on request) Welded connection as per EN ISO 1127 (ISO 4200), DIN 11850 Series 2 Clamp connection as per ISO 2852, DIN 32676, ASME BPE, BS 4825 Glued connection Other fluidic connections on request
Installation position:	depends on body variant. See chapter “9.2 Installation position of the diaphragm control valves”
Electrical connection:	with terminal connectors (only AG2) or circular plugs
Sound pressure level:	< 70 dB (A), may be higher depending on the usage conditions.
Cvs value:	see type label or operating instructions

8.8 Electrical data

WARNING!

Electrical shock.

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

Protection class	3 in accordance with DIN EN 61140
Electrical connections	Devices with position controller function: Terminal strip with cable gland, 2 x M20 (only AG2) or 2 circular plug-in connectors M12, 5-pin and 8-pin Devices with process control function: Terminal strip with cable gland, 3 x M20 (only AG2) or circular plug-in connectors 2 x M12, 5-pin and 1 x M12, 8-pin

ATTENTION!

Consider voltage drop on power supply cable.
Example: with a cable cross-section of 0.34 mm², a copper cable may be a maximum of 8 metres long.

Operating voltage +24 V ⎓ ±10 %, max. residual ripple 10 %

Operating current [A]*:

	Typical (without charging current SAFEPOS energy-pack)	Maximum (for layout of power supply unit)
AG2	2 A	3 A
AG3	3.5A	5 A

The operating current can be reduced if necessary:
1. Reduce the control speed X.TIME.
2. Devices with SAFEPOS energy-pack: Set “Control if ready” function. Also refer to operating instructions.

Standby consumption (Electronics assemblies without actuator) [W]**: 1...5 (depending on the level of disassembly)**

Transmitter supply voltage: 24 V ± 10%, only for devices with process control function.

Transmitter supply current: max. 150 mA, only for devices with process control function.

* All values relate to a supply voltage of 24 V at + 25 °C.

Attention: At minimum ambient and medium temperature, the operating current can be up to 5 A (AG2) or 11 A (AG3) (incl. 1 A charging current of the optional SAFEPOS energy-pack).

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

1. For devices with the SAFEPOS energy-pack: Setting the "Control if ready" function reduces the max. operating current by 1 A. Setting in the configuration area **Position controller** → **Parameter** → **SAFEPOS** → **ENERGY-PACK** → **FUNCTION** → **Control if ready**.
2. Reducing the control speed X.TIME.
   Setting: Setting in the configuration area **Position controller** → **Parameter** → **ADD.FUNCTION** → **Activate X.TIME** → **X.TIME** → **Opening time** → **Closing time**.

Service life of SAFEPOS energy-pack: Charging time: maximum 120 seconds (dependent on usage conditions)
Service life: up to 15 years (depending on usage conditions).
The service life of 5 years was calculated based on the following conditions:

ambient temperature	30 °C (AG2)/65 °C (AG3)
Medium temperature	165 °C
duty cycle	100 %
medium pressure	5 bar
diaphragm size	DN32 (AG2) / DN65 (AG3)

Analogue inputs: **(electrically isolated from the supply voltage and analogue output)**

Input data for set-point value signal

0/4-20 mA:	Input resistance	< 70 Ω
	Resolution	12 bit
0-5/10 V:	Input resistance	22 kΩ
	Resolution	12-bit, resolution relates to 0...10 V

Input data for actual value signal (optional)

4-20 mA:	Input resistance	< 70 Ω
	Resolution	12 bit
Frequency:	Measurement range	up to 1,000 Hz
	Input resistance	> 30 kΩ
	Resolution	0.1% of measured value
	Input signal	> 300 mVss
	Signal form	Sine wave, square wave, triangle wave
Pt 100:	Measurement range	–20...+220 °C
	Resolution	0.01 °C
	Measuring current	1 mA

Analogue output (optional)

Max. current:	10 mA (for voltage output 0–5/10 V)
Load:	0–800 Ω (for current output 0/4–20 mA)

Digital outputs (optional)

24 V PNP, current limit:	100 mA
Digital inputs:	NPN, 0-5 V = log “0”, 10–30 V = log “1” inverted input correspondingly inverted (input current < 6 mA)
Communication interface:	Connection to PC with USB-büS interface set
Communications software:	Bürkert Communicator

The digital input, digital outputs and analogue output are not electrically isolated from the operating voltage. They relate to the GND potential of the operating voltage.

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

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9 INSTALLATION

9.1 Safety instructions for installation

WARNING!

Risk of injury due to improper assembly.

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

CAUTION!

Risk of injury due to a heavy device.

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

- Secure heavy equipment to keep it from tipping or falling over.
- Transport, install and remove heavy device with the aid of a second person only.
- Use suitable tools.

9.2 Installation position of the diaphragm control valves

Depending on the valve body the installation position for the diaphragm control valve will vary.

One of the relief bores in the diaphragm socket for monitoring leakages must be at the lowest position.

9.2.1 Installation position for 2-way valve body

Installation position: Arbitrary, ideally with actuator facing upwards.

Ensuring self-drainage:

The installer and the operator are responsible for ensuring self-drainage.

Self-draining must be considered during the installation:

- Inclination angle of the pipeline To ensure that the pipeline is self-draining, we recommend the inclination angles according to the valid ASME BPE.
- **Self-draining angle for valve body:**

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

  The self-draining angle is specified as a value on forged steel valve bodies (VS) and tube valve bodies (VP) (see “Fig. 16” on page 32 and “Fig. 17” on page 33).

  The marking on the port connection of valve bodies serves as an orientation aid (see “Fig. 21”). The marking must point upwards.

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

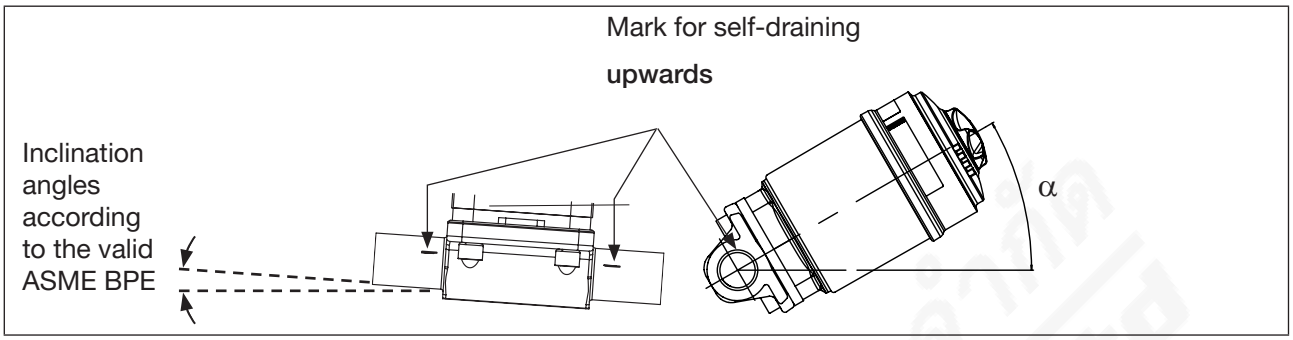

Fig. 21: Installation position for self-draining of body

Information about self-drainage on the Internet.

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

The installer and the operator are responsible for ensuring self-drainage.

www.Buerkert.de. Type / Manuals / Additional manual “Angle information for self-drainage”.

If you require clarification, contact your Bürkert sales department.

9.2.2 Installation position for T-valve body

Recommended installation position:

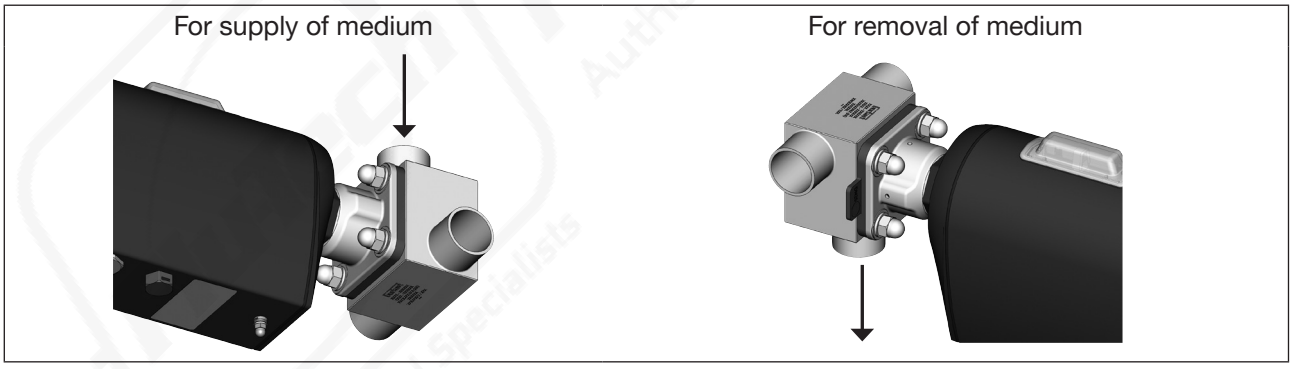

Fig. 22: Installation position for T-valve body, Type 3364

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9.2.3 Installation position for tank bottom body

Recommended installation position: Preferably with actuator facing downwards.

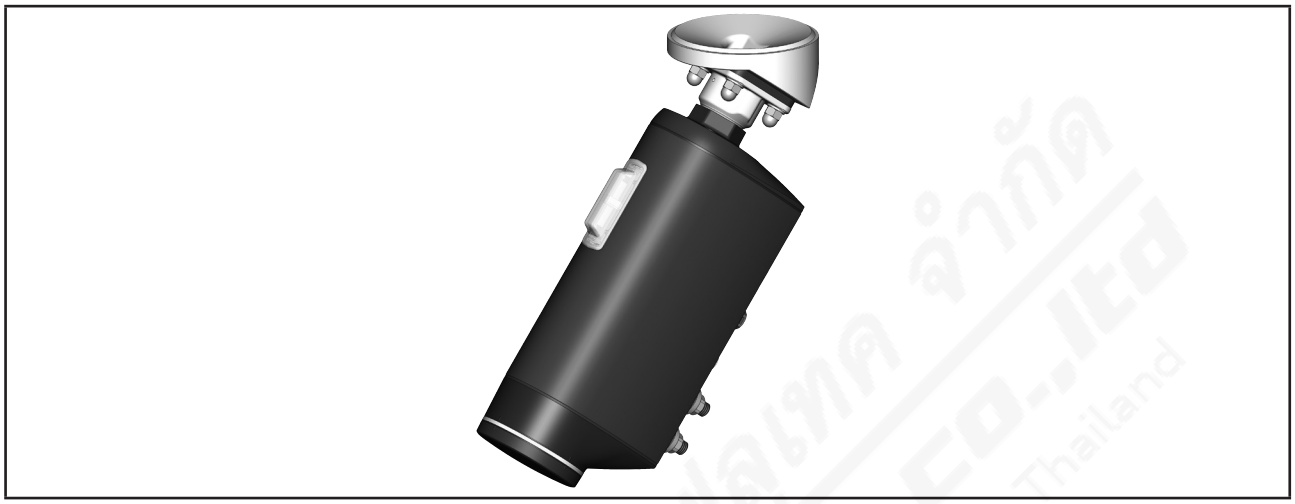

Fig. 23: Installation position for tank bottom body, Type 3365

9.3 Installation of devices with threaded connection, flange connection, clamp connection or bonded connection

ATTENTION!

Damage to the diaphragm.

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

Devices in their factory default state already have their operating state set to MANUAL.

9.3.1 Required work steps

1. If not already preset, set MANUAL operating state, chapter “14.1” on page 105.
2. If device is already electrically connected, shut off power supply. Wait until LED illuminated ring goes out.
3. Install device in pipeline, chapter “9.3.3” on page 43.
4. Electrical installation, chapter “10” on page 57.
5. Connect supply voltage.
6. Execute TUNE function for adjustment of position control, chapter “11.5” on page 75 (AG2) and “11.6” on page 78 (AG3).
7. Set AUTOMATIC operating state, chapter “14.1” on page 105

9.3.2 Installation conditions

Pipelines: Ensure that pipelines are in alignment.

Preparation: Clear impurities from pipelines (seal material, metal chips, etc.).
Support and align pipelines.
To ensure that the pipeline is self-draining, we recommend the inclination angles according to the valid ASME BPE.

9.3.3 Install device in the pipeline

Prerequisite: MANUAL operating state.

ATTENTION!

The following must be heeded when installing the device in the system.

The device and relief bore must be accessible for inspections and maintenance work.

DANGER!

Risk of injury from high pressure.

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

WARNING!

Risk of crushing by mechanically powered parts.

▸ Do not reach into the openings of the valve body.

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→ Connect valve body to pipeline.
⚠ Ensure that there is no voltage present and minimal vibration during installation.

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

Next steps:

- Electrical installation, chapter “10” on page 57.
- Connect supply voltage.
- Execute TUNE function for adjustment of position control, chapter “11.5” on page 75 (AG2) and “11.6” on page 78 (AG3)
- Set AUTOMATIC mode, chapter “14.1” on page 105.

ATTENTION!

Damage to the diaphragm.

▸ To prevent damage, execute TUNE function first after establishing the electrical connection. Only then should the operating mode be set to AUTOMATIC.

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9.4 Installation of devices with welded connections

ATTENTION!

National regulations regarding welder qualifications and the performance of welding work must be observed.

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

The following must be heeded when installing the device in the system.

The device and relief bore must be accessible for inspections and maintenance work.

ATTENTION!

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

- Remove the actuator before welding in the valve body.

Damage to the diaphragm

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

Delivery condition for units with welding connection The units are delivered disassembled.
Operating state: MANUAL.
Actuator position: valve open.

9.4.1 Required work steps

The device must not be welded into the pipeline while the actuator is still installed. Installation is broken down into the following steps:

1. If not already preset, set MANUAL operating state, chapter “14.1” on page 105.
2. If the valve is in the closed position, switch it to the position “valve 100% open”, chapter “15” on page 116.
3. If the device is already electrically connected, shut off supply voltage. Wait until LED illuminated ring goes out.
4. If the device is not removed, remove the actuator and diaphragm from the valve body, chapter “9.7” on page 54.
5. Weld the valve body into the pipeline,
   - 2-way valve body or T-valve body, chapter “9.4.3” on page 46.
   - Tank bottom body, chapter “9.4.4” on page 47.
6. Install the actuator on the valve body, chapter “9.5” on page 48.
7. Execute TUNE function for adjustment of position control, chapter “11.5” on page 75 (AG2) and “11.6” on page 78 (AG3).
8. Set AUTOMATIC mode, chapter “14.1” on page 105.

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9.4.2 Required tool

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

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

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

DANGER!

Risk of injury from high pressure.

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

Installation conditions:

Installation position: 2-way valves, see chapter "9.2.1" on page 40.
T-valves, see chapter "9.2.2" on page 41.

Pipelines: Ensure the pipelines are aligned.

Preparation: Clear impurities from pipelines (seal material, metal chips, etc.).
Support and align pipelines. To ensure that the pipeline is self-draining, we recommend the inclination angles according to the valid ASME BPE.

Welding valve body:

ATTENTION!

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

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

Observe the laws in force in the country regarding the qualification of welders and the execution of welding work.

→ Weld the valve body into the pipeline.
⚠ Ensure that there is no voltage present and minimal vibration during installation!

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9.4.4 Welding tank bottom body

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

DANGER!

Risk of injury from high pressure.

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

Recommendations:

Observe sequence:

1. **Note:** Weld the tank bottom body to the container base before the container is assembled. It is possible to weld onto a ready-assembled container but it is more difficult. The tank bottom body must be welded into the middle of the container base so that the container can be drained optimally.
2. Assemble the container.
3. Weld the tank bottom body into the pipeline.

Installation conditions:

Installation position: **See chapter "9.2.3" on page 42.**

Prepare container: **Clear impurities from container (sealants, metal chips, etc.).**

Prepare pipeline: **Clear impurities from pipelines (seal material, metal chips, etc.). Support and align pipelines. To ensure that the pipeline is self-draining, we recommend the inclination angles according to the valid ASME BPE.**

Welding valve body:

ATTENTION!

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

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

For information on containers and instructions for welding, refer to the ASME VIII Division I standard. Check the batch number indicated on the manufacturer's certificate 3.1.B supplied before starting welding.

Observe the laws in force in the country regarding the qualification of welders and the execution of welding work.

ATTENTION!

Note when welding:

- Only use welding materials that are suitable for the tank bottom body.
- The tank bottom valve must not collide with any other part of the equipment, and it must be possible to assemble and dismantle the actuator without any problems.

→ Welding the tank bottom body to the container.

→ Assemble the container.

→ Weld the tank bottom body into the pipeline

⚠ Ensure that there is no voltage present and minimal vibration during installation!

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Next steps:

- If the diaphragm is not mounted, mount it on the actuator, chapter “9.5.3” on page 48.
- Install the actuator onto the valve body and establish electrical connection, chapter “9.5.4” on page 50.
- Execute TUNE function for adjustment of position control, chapter “11.5” on page 75 (AG2) and “11.6” on page 78 (AG3)

ATTENTION!

Damage to the diaphragm.

▸ To prevent damage, execute TUNE function first after establishing the electrical connection. Only then should the operating mode be set to AUTOMATIC.

- Set AUTOMATIC mode, chapter “14.1” on page 105.

9.5 Installing actuator on valve body

9.5.1 Required work steps

1. If the diaphragm is not mounted, mount it on the actuator. Chapter “9.5.3” on page 48.
2. Mount the actuator onto the valve body and establish electrical connection. Chapter “9.5.4” on page 50.
3. Execute TUNE function for adjustment of position control, chapter “11.5” on page 75 (AG2) and “11.6” on page 78 (AG3)
4. Set AUTOMATIC mode, chapter “14.1” on page 105.

9.5.2 Required tool

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

9.5.3 Mounting the diaphragm on the actuator

There are different fixture types for the diaphragm depending on the size of the diaphragm.

Diaphragm size	Fixture types for diaphragms	
	PTFE	EPDM / FKM / laminated PTFE
08	Buttoned diaphragm	Buttoned diaphragm
15, 20	Diaphragm with bayonet catch	Diaphragm with bayonet catch
25-100	Diaphragm with bayonet catch	Diaphragm screwed in

Tab. 12: Fixture types for diaphragms

Fixture of diaphragms with bayonet catch:

→ Place diaphragm in compressor and turn 90° to lock into place.

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Fixture of screw-in diaphragm:

→ If there is no insert in the compressor, place the insert into the compressor as shown in the image.

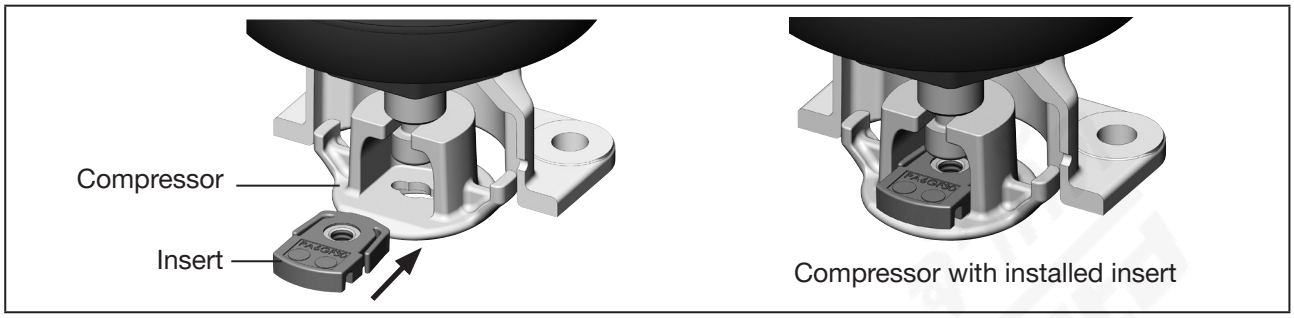

Fig. 24: Place insert into compressor

→ Screw diaphragm handtight in compressor.

→ Loosen by half a rotation.

→ Align diaphragm. The mark tab of the diaphragm must protrude from the valve body at a right angle to the longitudinal axis of the pipeline (see "Fig. 25").

Fixture of buttoned diaphragm:

→ Attach buttons of diaphragm in compressor.

→ Align diaphragm. The mark tab of the diaphragm must protrude from the valve body at a right angle to the longitudinal axis of the pipeline (see "Fig. 25").

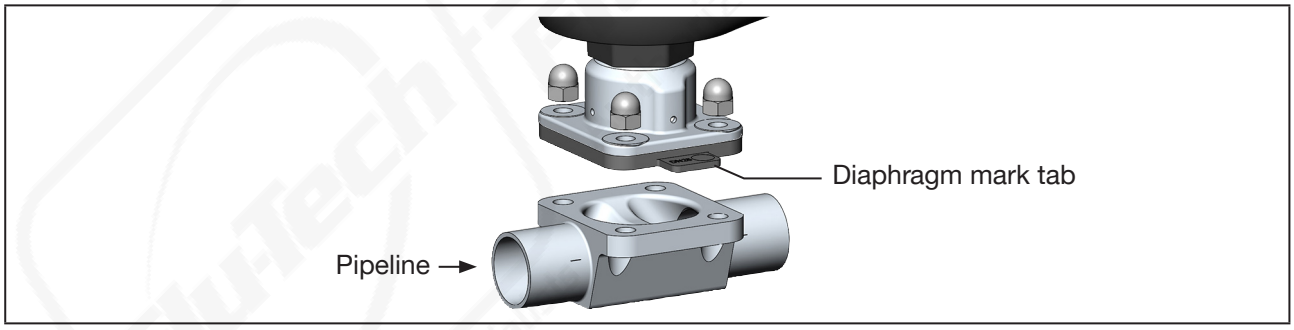

Fig. 25: Aligning the diaphragm (example 2-way body)

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9.5.4 Mount the actuator onto the valve body and establish electrical connection

WARNING!

Risk of injury from electric shock.
Risk of crushing by mechanically powered parts.

▸ Switch off the supply voltage.

ATTENTION!

Damage to the diaphragm.

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

▸ The actuator must be in the position “valve 100% open“.

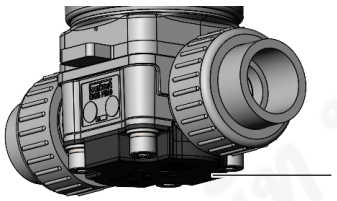

Fig. 26: Body reinforcement for PP variants (DN15, DN20, DN25)

→ ⚠ Before installing the actuator, check whether the diaphragm is free of damage and correctly aligned. The mark tab of the diaphragm must protrude from the valve body at a right angle to the longitudinal axis of the pipeline (see “Fig. 25”).

→ Replace the damaged diaphragm.

→ Place actuator on the valve body.
In the case of T-valve bodies and tank button bodies, stud bolts are pre-fitted.
With 2-way bodies, insert screws into the valve body.
For PP variants (DN15, DN20, DN25) the intended body reinforcement is mandatory.

→ Tighten the nuts in a diagonal pattern lightly until the diaphragm is seated between the valve body and actuator.
⚠ Do not tighten the nuts yet.

→ Electrically connect the device.
The position of the ports can be changed by turning the actuator through 360°. For a description see chapter “9.6 Rotating the actuator”.

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

→ Execute M.SERVICE as described below.

Perform M.SERVICE for devices without a display module:

ATTENTION!

Malfunction is valve position is not fully open.

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

The two buttons for triggering M.SERVICE are located beneath the blind cover.
For devices equipped with a display module, the buttons have no function. The M.SERVICE is triggered on the display.

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

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

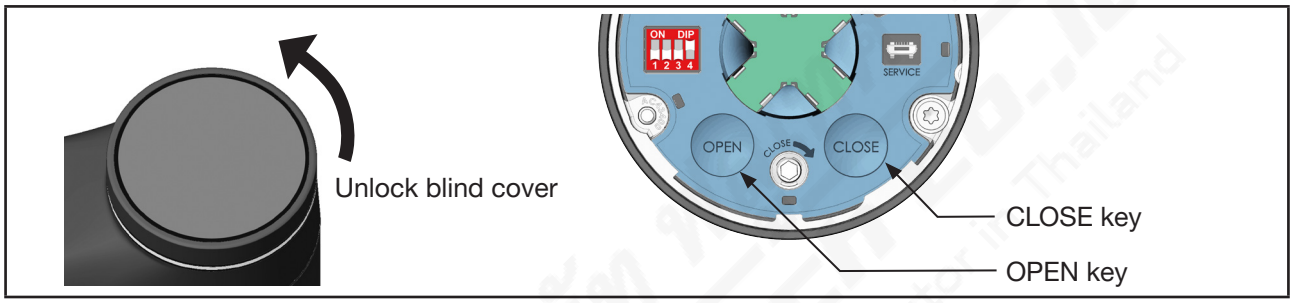

Fig. 27: Execute M.SERVICE

→ To unlock the blind cover, turn it anticlockwise and remove.

→ Hold down the OPEN and CLOSE keys together at the same time for 5 seconds.

✔ This will execute the M.SERVICE function.

→ Wait until M.SERVICE is finished and the actuator stops.

Execute M.SERVICE from the device’s display:

Display operation: button functions

Select, activate	Confirm	Back

To trigger the M.SERVICE function, you must switch to the “Maintenance” detailed view for position controllers.

How to switch from the home screen to the detailed view:

→ Switch to CONFIGURATION on the home screen, select the position controller and switch to MAINTENANCE.

✔ You are now in the “Maintenance” detailed view.

How to trigger the M.SERVICE function:

→ **Select CALIBRATION.**

→ **Select M.SERVICE.**

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

→ Start M.SERVICE.

The following text appears:

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“Processing. Please wait.” “Complete.”

The function M.SERVICE has now been executed.

Tighten nuts gradually:

WARNING!

Risk of injury when failing to observe tightening torque value.

Failure to observe the tightening torque value is dangerous due to the risk of damage to the device.

▸ Observe the tightening torque value.

→ Follow a crosswise pattern in tightening the nuts to 1/3 of the tightening torque value.

→ Then follow a crosswise pattern again in tightening the nuts to 2/3 of the tightening torque value.

→ Finally, follow a diagonal pattern in tightening the nuts to their permitted tightening torque value.

Tightening torque value for installation of the actuator

Diaphragm size	Tightening torques for diaphragms [Nm]*			
	VS, VG, PP, PVC-C, PVC-U, PVDF		VA, VP	
	EPDM/FKM	PTFE	EPDM/FKM	PTFE
08	2	2,5	2	2,5
15	3,5	4	3,5	4
20	4	4,5	4	4,5
25	5	6	7	8
32	6	8	8	10
40	8	10	12	15
50	12	15	15	20
65	20	30	20	30
80	30	40	30	40
100	40	50	40	50
* A tolerance of +10% of the respective tightening torque applies to all values				

Tab. 13: Tightening torques for diaphragms

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

Next steps:

- Execute TUNE function for adjustment of position control, chapter “11.5” on page 75 (AG2) and „11.6“ auf Seite (AG3)

ATTENTION!

Damage to the diaphragm.

▸ To prevent damage, execute TUNE function first after establishing the electrical connection. Only then should the operating mode be set to AUTOMATIC.

- Set AUTOMATIC mode, chapter “11.6” on page 78.

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9.6 Rotating the actuator

ATTENTION!

Damage to the diaphragm.

▸ When turning the actuator, the valve must be open to prevent damage to the diaphragm.

The position of the ports can be changed by turning the actuator through 360°.

→ For devices that have not been installed, clamp the valve body in a holding device.

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

→ Turn the actuator into the required position.

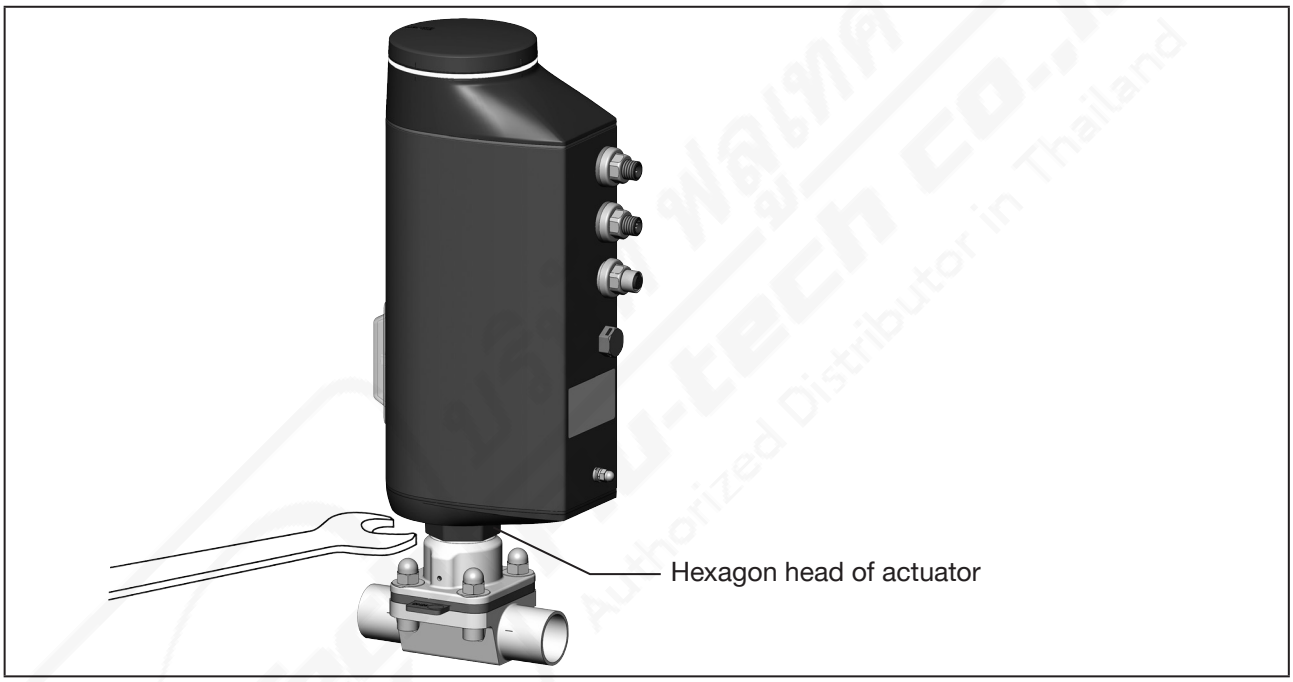

Fig. 28: Turn actuator

The actuator cannot be rotated on devices that have a holding device fitted.

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9.7 Disassembling the actuator

DANGER!

Risk of injury from high pressure.

- Before working on the system or device, switch off the pressure and ventilate or empty the lines.

WARNING!

Risk of injury due to improper installation work.

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

9.7.1 Required work steps

1. Set MANUAL operating state, chapter “14.1” on page 105.
2. Switch the valve to the position “valve 100% open“, chapter “15” on page 116.
3. Switch off the supply voltage. Wait until LED illuminated ring goes out.
4. Remove actuator from the valve body, chapter “9.7.2” on page 54.

9.7.2 Removing actuator from the valve body

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

WARNING!

Risk of injury from electric shock.
Risk of crushing by mechanically powered parts.

- Switch off the supply voltage.
- For devices with SAFEPOS energy-pack: completely remove the SAFEPOS energy-pack. Wait until the LED ring is no longer lit and ensure that the LED light ring is not in “LED off” mode.

ATTENTION!

Damage to the diaphragm.

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

→ Loosen the 4 nuts on the diaphragm socket crosswise.

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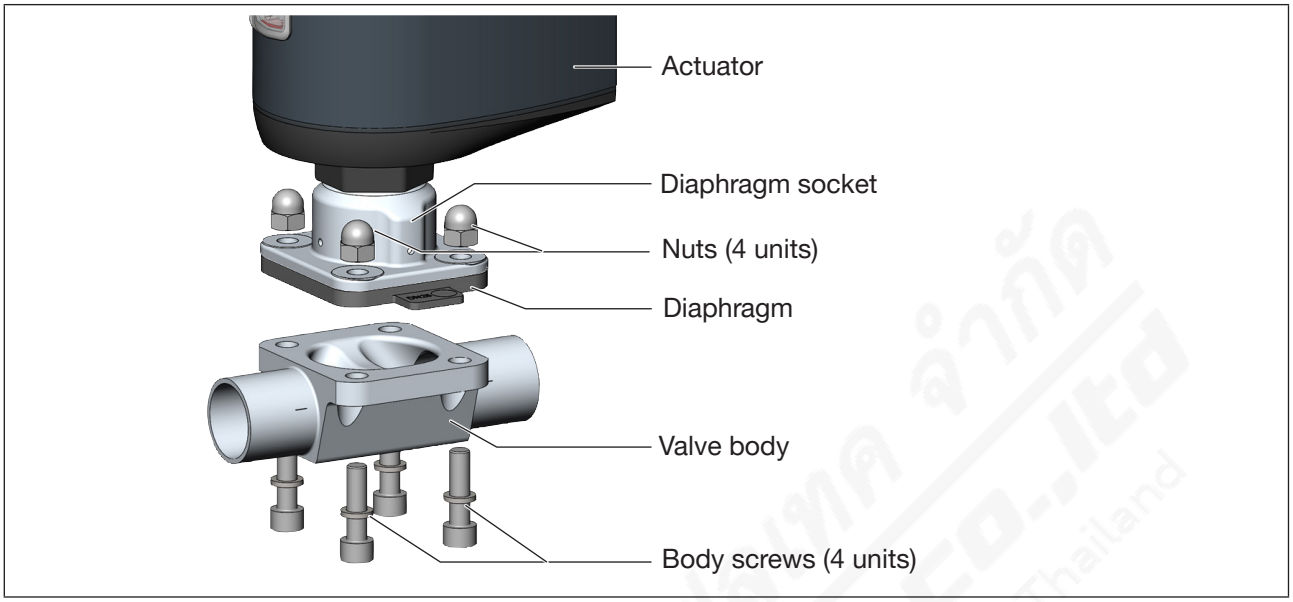

Fig. 29: Disassembly of the diaphragm using the 2-way body as an example

→ Remove the body screws.

→ Remove valve body.

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9.8 Holding device

The holding device protects the valve actuator from damage resulting from forces and vibrations. The holding device is available as an accessory. See chapter “24 Accessories, replacement parts” on page 170.

9.8.1 Install the holding device

→ Install holding device as shown in the image on the hexagon head of the actuator.

ATTENTION!

Ensure that theactuator is rotated to the correct position beforehand.

→ Fix the holding device in place by suitable means.

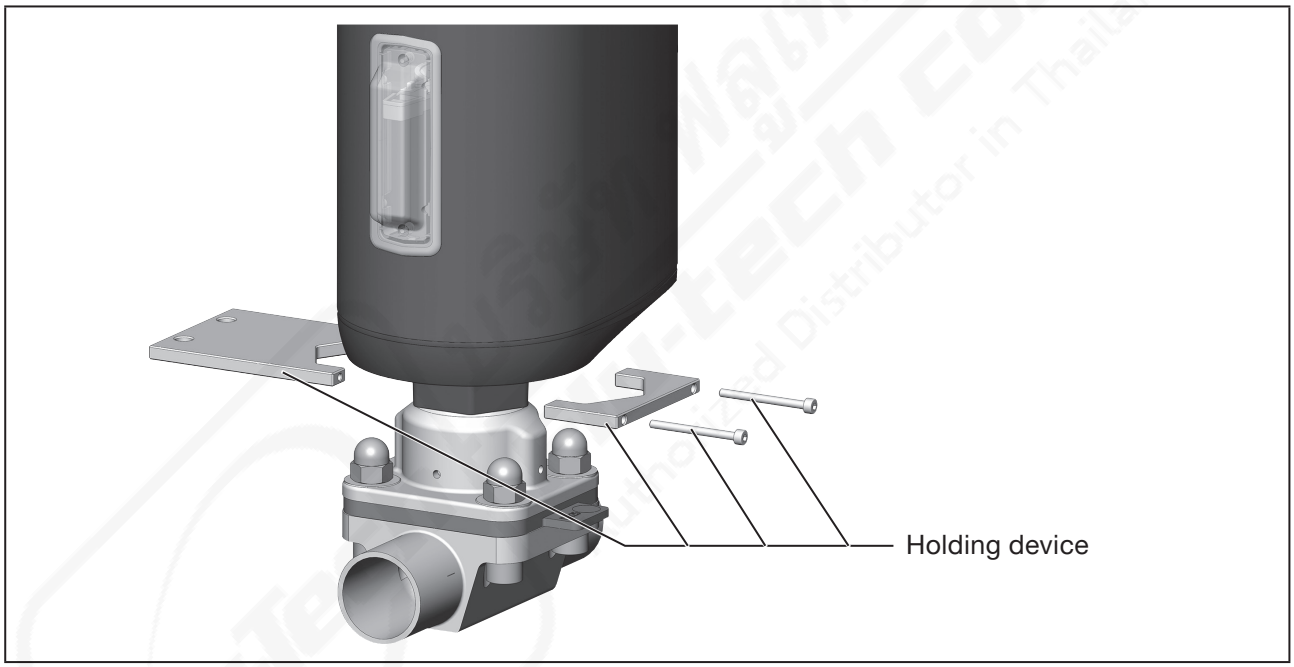

Fig. 30: Install the holding device

The actuator cannot be rotated on devices that have a holding device fitted.

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10 ELECTRICAL INSTALLATION

The electromotive diaphragm control valve is available in 2 connection variants:

- With a circular plug-in connector (multi-pin variant)
- Cable gland with connection terminals (only AG2)

Signal values

Operating voltage:	24 V ⎓
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 authorised technicians only and with the appropriate tools.
- ▸ Observe general engineering standards & rules during installation.

Risk of injury due to unintentional activation of the system and uncontrolled restart.

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

ATTENTION!

To ensure electromagnetic compatibility (EMC) the functional earth must be connected to earth with a short line (max. 1 m). The functional earth must have a cross-section of at least 1.5 mm².

Use of set-point input 4–20 mA

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

Choice of connection line:
When choosing the length and cross-section of the individual wires, take into account the voltage drop in relation to the maximum supply current.

→ Connect the device in accordance with the tables.

→ Perform the necessary basic configuration and adjustments for the electromotive diaphragm control valve after the operating voltage has been established. For a description, see chapter “11 Start-up”.

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10.1.2 Description of circular plug-in connectors

AG2 variant

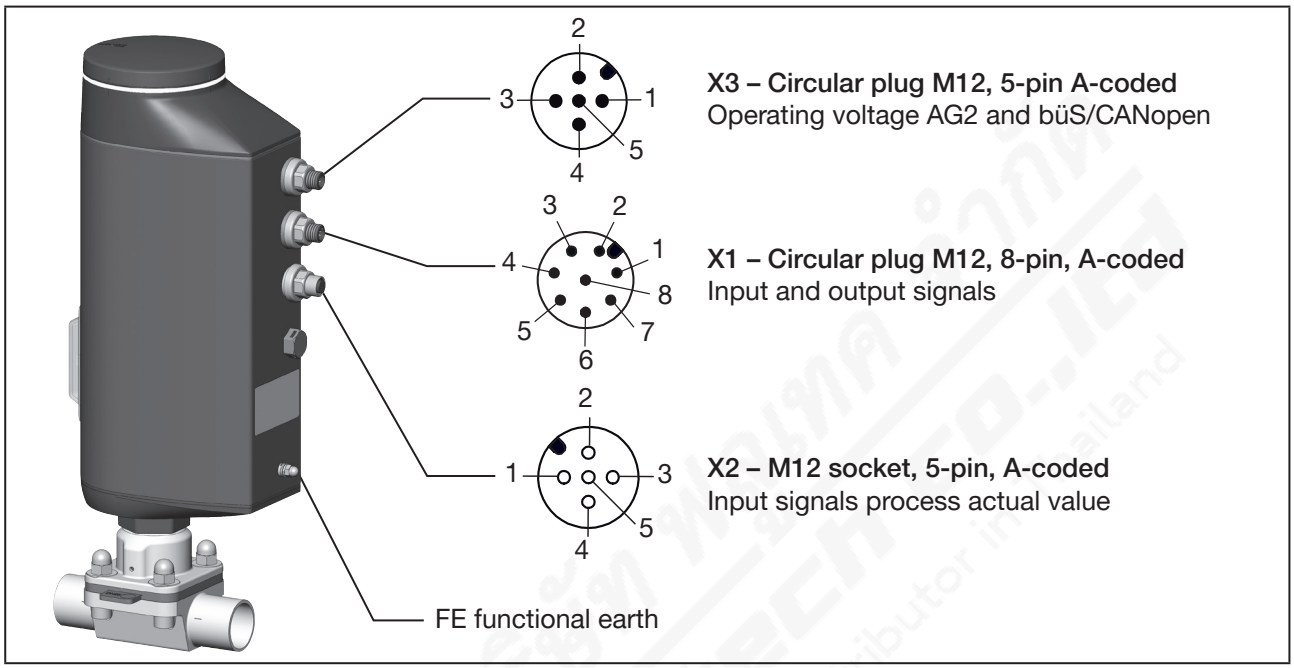

Fig. 31: Circular plug-in connector AG2

AG3 variant

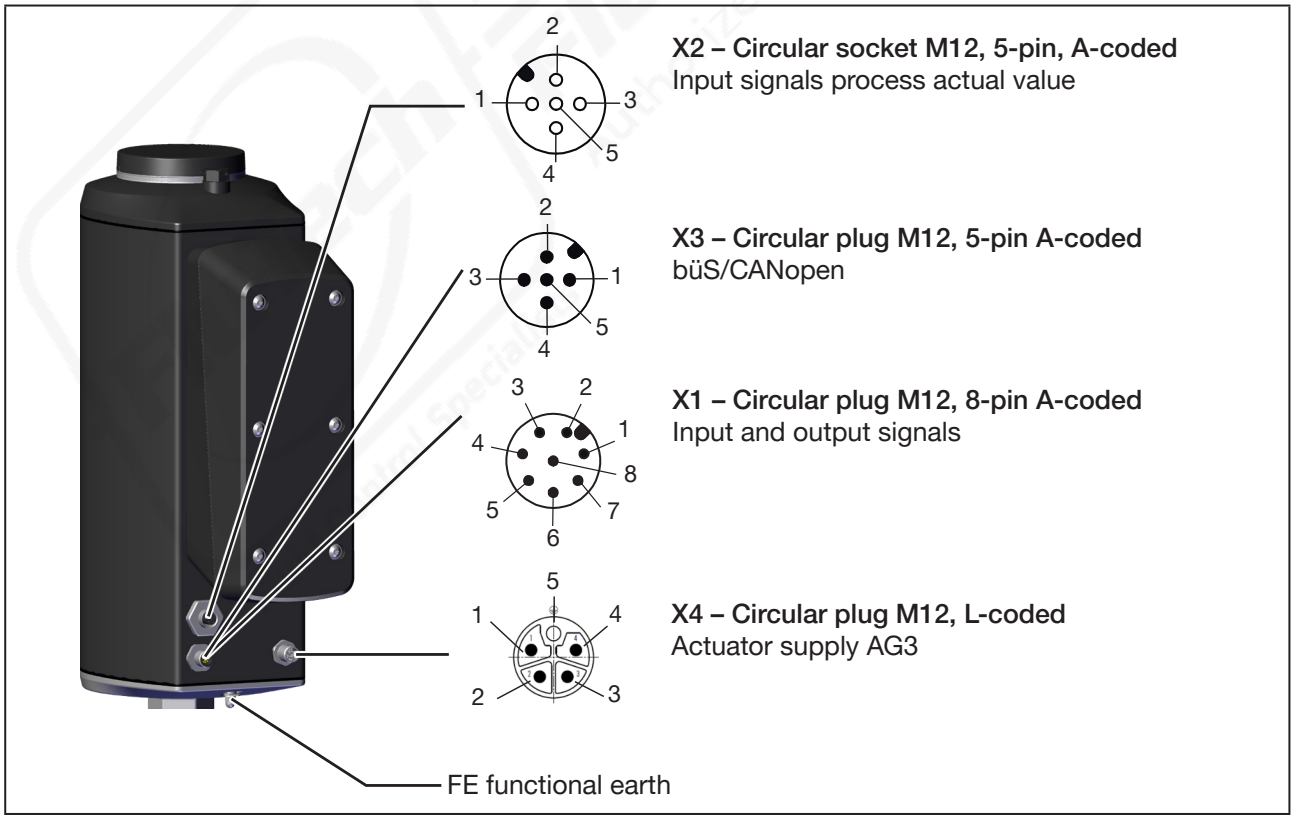

Fig. 32: Circular plug-in connector AG3

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Circular plug-in connector	AG2			AG3		
	Analogue	with fieldbus gateway	büS/ CANopen	Analogue	with fieldbus gateway	büS/ CANopen
X1	X	-	-	X	-	-
X2	optional for devices with process control function					
X3	X	X	X	-	X	X
X4	-	-	-	X	X	X

Tab. 14: Use of circular plug-in connector AG2/AG3

→ Connect the device in accordance with the tables.

→ Perform the necessary basic configuration and adjustments for the electromotive diaphragm control valve after the operating voltage has been established. See Chapter "11 Start-up"

10.1.3 X1 – Circular plug M12, 8-pin, A-coded

Pin	Wire colour*	Assignment
Input signals from control centre (e.g. PLC)		
8	red	Set-point value + (0/4-20 mA or 0-5/10 V) for operating voltage electrically isolated
7	blue	Set-point value –
1	white	Digital input + 0-5 V (log. 0) 10-30 V (log. 1)
Output signals to control centre (e.g. PLC) – (only required with analogue output and/or digital output option)		
6	pink	Analogue output+ (0/4–20 mA or 0–5/10 V)
5	grey	Analogue output –
4	yellow	Digital output 1 (24 V/0 V)
3	green	Digital output 2 (24 V/0 V)
2	brown	Digital inputs and digital outputs GND
* The specified wire colours refer to the connection cable, which is available as an accessory with ID no. 919061.		

Tab. 15: X1 – Circular plug M12, 8-pin, A-coded

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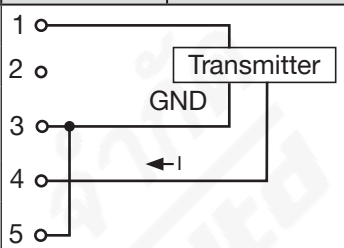
10.1.4 X2 – M12 socket, 5-pin, A-coded, input signals process actual value (only with process control function)

Signal type*	Pin	Wire colour	Assignment	Device end	External circuit
4–20 mA – internally supplied	1	brown	+24 V supply transmitter		
	2	white	PV1: not assigned		
	3	blue	GND (identical to GND operating voltage)		
	4	black	PV2: output from transmitter		
	5	grey	PV3: Bridge to GND (GND from 3-wire transmitter)		
4-20 mA - externally supplied	1	brown	Not assigned		
	2	white	Not assigned		
	3	blue	Not assigned		
	4	black	PV2: process actual +	4	4-20 mA
	5	grey	PV3: process actual –	5	GND 4-20 mA
Frequency – internally supplied	1	brown	+24 V supply sensor	1	+24 V
	2	white	PV1: Cycle input +	2	Cycle +
	3	blue	GND	3	GND (identical to GND operating voltage)
	4	black	PV2: not assigned		
	5	grey	PV3: Bridge to GND (GND from 3-wire transmitter)	5	Cycle –
Frequency - externally supplied	1	brown	Not assigned		
	2	white	PV1: Cycle input +	2	Cycle +
	3	blue	Not assigned		
	4	black	PV2: not assigned		
	5	grey	PV3: Cycle input –	5	Cycle –
Pt 100 (see note below)	1	brown	Not assigned		
	2	white	PV1: Process actual 1 (power supply)	2	Pt 100
	3	blue	Not assigned		
	4	black	PV2: Process actual 2 (compensation)	4	
	5	grey	PV3: Process actual 3 GND	5	

* Configurable via software:
Inputs/outputs → PV → ANALOG.type
(signal source: PV.source→ Analogue).

Tab. 16: X2 – M12 socket, 5-pin, A-coded input signals process actual value (only on devices with process control function)

NOTE!

The Pt 100 sensor must be connected via three lines to compensate for line resistance.
Pin 4 and Pin 5 must be bridged at the sensor.

Connection cables must not exceed 20 m in length.

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10.1.5 X3 – Circular plug M12, 5-pin A-coded, operating voltage AG2 and büS/CANopen network

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

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

Pin	Wire colour		Assignment (from device perspective)
	without büS network 4-pin connection*	with büS network**	
1	-	CAN shield	
2	white	red	+24 V ⎓ ±10%, max. residual ripple 10%
3	blue	black	GND/CAN_GND
4	-	white	CAN_H
5	-	blue	CAN_L

* The specified wire colours relate to the 4-pin M12 connection cable, which is available as an accessory with ID No. 918038.

*** The specified wire colours relate to the büS cable, which is available as an accessory. See* cabling guideline on our website country.burkert.com.

Tab. 17: X6 – Circular plug M12, 5-pin, A-coded, operating voltage AG2 and büS/CANopen network

10.1.6 X3 – Circular plug M12, 5-pin, büS/CANopen network AG3

For variants with fieldbus gateway, using this connection is optional for service büS or a büS-capable externally supplied sensor.

Pin	Wire colour with büS network*	Assignment (from device perspective)
1	CAN shield	
2**	red	24 V ⎓ ± 10% max. residual ripple 10%
3**	black	GND/CAN_GND
4	white	CAN_H
5	blue	CAN_L

**The specified wire colours relate to the büS cable, which is available as an accessory. See* cabling guideline on our website country.burkert.com.

*** This system supply must be galvanically isolated from the actuator supply.*

Tab. 18: X3 – Circular plug M12, 5-pin, büS/CANopen network AG3

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10.1.7 X4 – Circular plug M12, L-coded, 5-pin, actuator supply AG3

Pin	Wire colour*	Assignment
1	brown	+24 V ⎓ ±10%, max. residual ripple 10%
2	white	Do not connect
3	blue	GND
4	black	Do not connect
5	grey	FE connected to housing

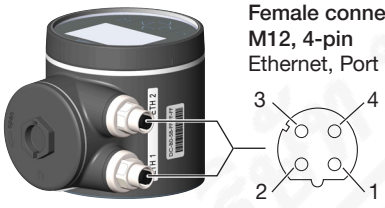
* The specified wire colours relate to the 4-pin M12 connection cable, which is available as an accessory with ID no. 20010840.

Tab. 19: X4 – Circular plug M12, L-coded, actuator supply AG3

→ Perform the necessary basic setting and adjustments for the electromotive control valve after the operating voltage has been established. For a description, see chapter "11.3 Base settings".

10.2 Electrical connection fieldbus gateway

The fieldbus gateway for Industrial Ethernet is connected using 4-pin M12 circular plug-in connectors.



Pin	Assignment
1	Transmit +
2	Receive +
3	Transmit –
4	Receive –

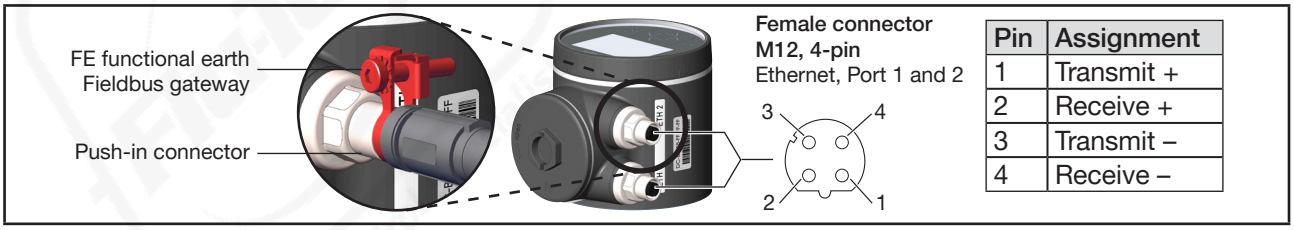
Fig. 33: Electrical connection and pin assignment, fieldbus gateway

ATTENTION!

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

Use a short line (max. 1 m) with a cross-section of at least 1.5 mm² for connecting to earth.

For versions with Fieldbus gateway, the Fieldbus gateway must also be connected to earth along with the actuator. This connection to earth is made with the ground terminal supplied, to the circular plug-in connector of the connected Ethernet cable.



Pin	Assignment
1	Transmit +
2	Receive +
3	Transmit –
4	Receive –

Fig. 34: Electrical connection, pin assignment and FE functional earth at fieldbus gateway

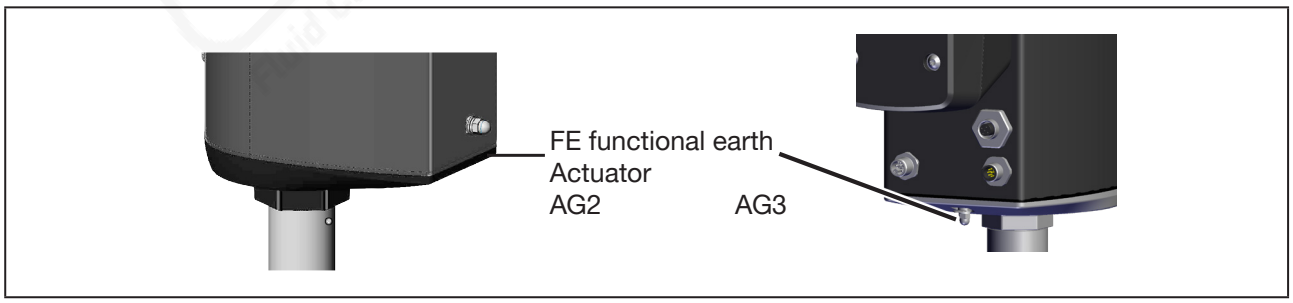


Fig. 35: FE functional earth at actuator

10.3 Electrical connection büS/CANopen

10.3.1 X3 – M12 circular plug, 5-pin, büS/CANopen network and operating voltage

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

Tab. 20: X3 – M12 circular plug, 5-pin, büS/CANopen network and operating voltage

ATTENTION!

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

Additional information about cabling for büS networks is available at the following link:
Guideline for cabling of büS networks

→ Perform the necessary basic setting and adjustments for the electromotive control valve after the operating voltage has been established. For a description, see chapter "11.3 Base settings".

10.4 Electrical connection fieldbus gateway

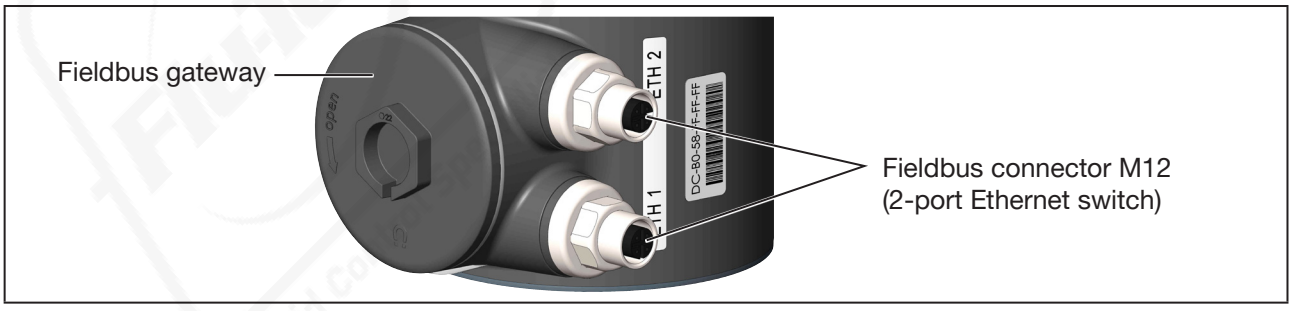


Fig. 36: Electrical connection fieldbus gateway

The fieldbus connection is made with a circular plug-in connector M12, 4-pin.

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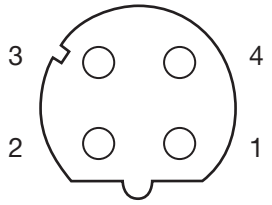
Connection diagram	Pin	Assignment
	1	Transmit +
	2	Receive +
	3	Transmit –
	4	Receive –

Tab. 21: Electrical assignment of fieldbus gateway

ATTENTION!

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

The metal housing of the M12 circular plug-in connector is connected to the actuator housing, which is why the functional earth must be connected to earth on the actuator housing. Use a short line (max. 1 m) with a cross-section of at least 1.5 mm² for connecting to earth.

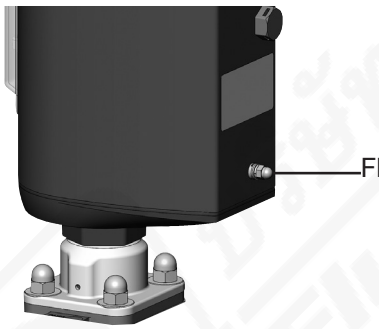


Fig. 37: Functional earth

10.5 Electrical installation with cable gland

10.5.1 Safety instructions

WARNING!

Risk of injury from improper installation.

- Installation may be carried out by authorised technicians only and with the appropriate tools.
- Observe general engineering standards & rules during installation.

Risk of injury due to unintentional activation of the system and uncontrolled restart.

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

Use of set-point input 4–20 mA

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

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ATTENTION!

To ensure electromagnetic compatibility (EMC) the functional earth must be connected to earth with a short line (max. 1 m). The functional earth must have a cross-section of at least 1.5 mm².

10.5.2 Access to connection terminals

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

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

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

1. Remove display module or blind cover:

ATTENTION!

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

Fig. 38: Remove blind cover or display module

→ To unlock, turn the display module or the blind cover counterclockwise and remove.
ATTENTION! For devices with display module, take note of the connection cable to the HMI interface.

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

2. Remove the LED and storage module:

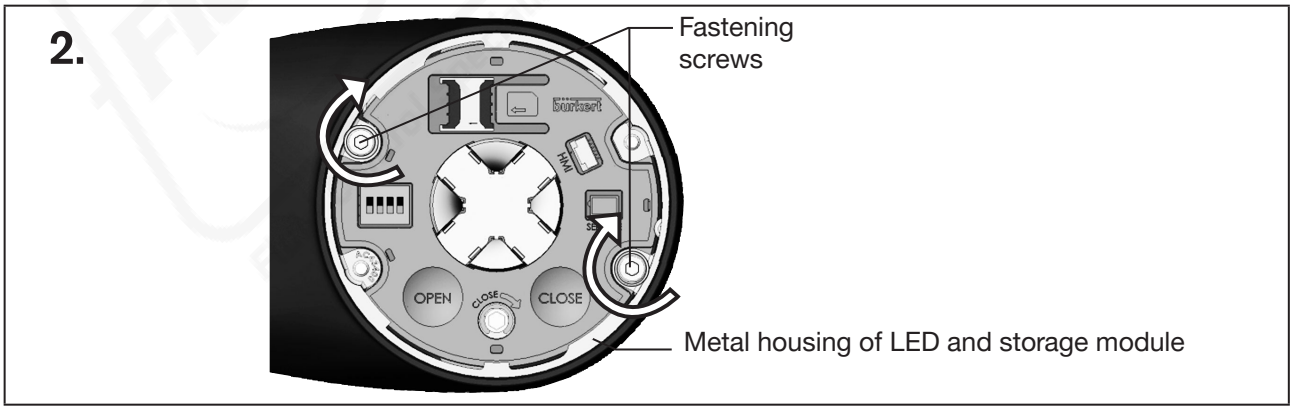

Fig. 39: Remove the LED and storage module

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

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→ Grab the LED and storage module by both sides of the metal housing and lift it out.

3. Remove the actuator cover:

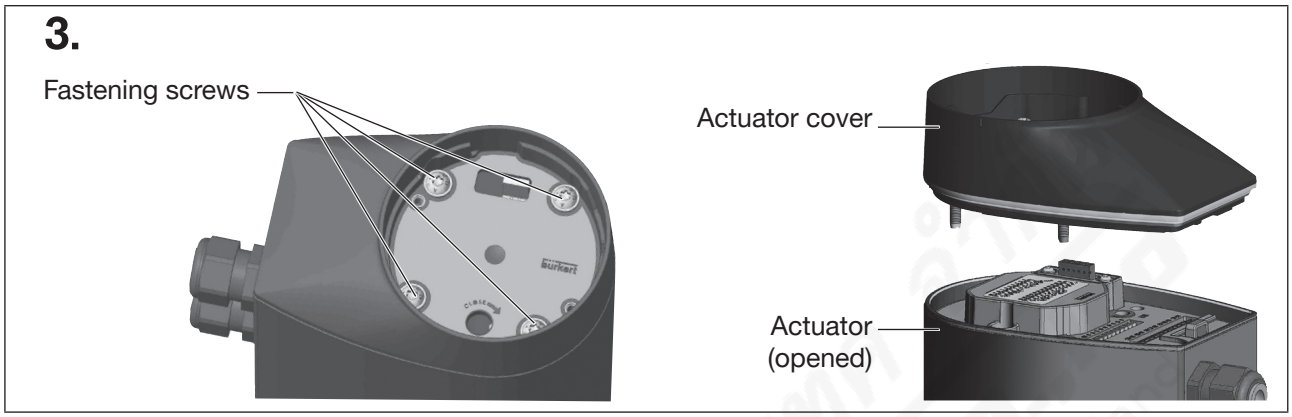

Fig. 40: Remove the actuator cover

→ Remove 4 fastening screws (hexalobular-internal screws T25).
The screws are integrated securely in the actuator cover.

→ Remove the actuator cover.

The connection terminals are now accessible.

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10.5.3 Connecting the cable

→ Push the cable through the cable gland.

ATTENTION!

Take note for connection to spring-loaded terminals.

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

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

→ Attach the wires to the terminals. The terminal layout is provided in the tables below from Page 68.

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

ATTENTION!

The ingress of dirt or moisture may cause damage or malfunction.

To preserve IP65 and IP67 protection, ensure the following:

- Unused cable glands must be sealed using dummy plugs.
- The union nuts of cable glands must be tightened. Tightening torque, dependent on the cable size or dummy plugs, approx. 1.5 Nm.

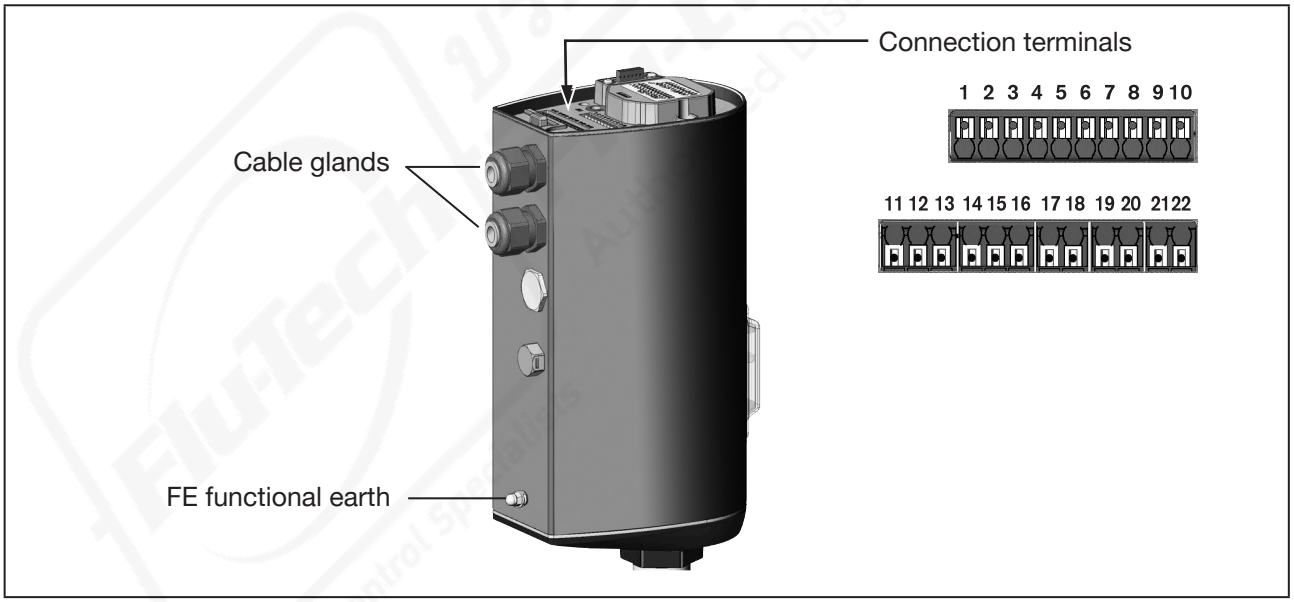

Fig. 41: Connecting the cable

→ Connect the device in accordance with the tables.

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10.5.4 Terminal layout – input signal from control centre (e.g. PLC)

Terminal	Assignment
8	Set-point value + (0/4-20 mA or 0-5/10 V) for operating voltage electrically isolated
7	Set-point value –
5	Digital input + 0-5 V (log. 0) 10-30 V (log. 1)
4	Digital input GND relates to GND operating voltage (GND terminal)

Tab. 22: Terminal layout – input signal from control centre (e.g. PLC)

10.5.5 Terminal layout – output signals to control centre (e.g. PLC) – only required with analogue output and/or digital output option

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

Tab. 23: Terminal layout – output signal to control centre (e.g. PLC)

10.5.6 Terminal layout – operating voltage

Terminal	Assignment
10	+24 V ⎓ ±10%, max. residual ripple 10%
9	GND

Tab. 24: Terminal layout – operating voltage

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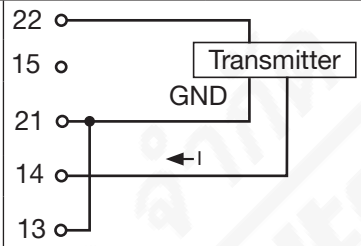
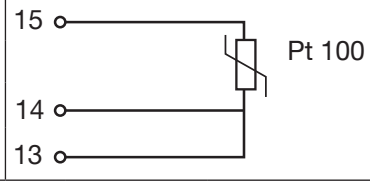
10.5.7 Terminal layout – process actual value input (only with process control function)

Signal type*	Terminal	Assignment	Device end	External circuit
4–20 mA – internally supplied	22	+24 V supply transmitter		
	15	PV1: not assigned		
	21	GND (identical to GND operating voltage)		
	14	PV2: output from transmitter		
	13	PV3: Bridge to GND (GND from 3-wire transmitter)		
4-20 mA - externally supplied	22	Not assigned		
	15	Not assigned		
	21	Not assigned		
	14	PV2: process actual +	14	4-20 mA
	13	PV3: process actual –	13	GND 4-20 mA
Frequency – internally supplied	22	+24 V supply sensor	22	+24 V
	15	PV1: Cycle input +	15	Cycle +
	21	GND	21	GND (identical to GND operating voltage)
	14	PV2: not assigned		
	13	PV3: Bridge to GND (GND from 3-wire transmitter)	13	Cycle –
Frequency - externally supplied	22	Not assigned		
	15	PV1: Cycle input +	15	Cycle +
	21	Not assigned		
	14	PV2: not assigned		
	13	PV3: Cycle input –	13	Cycle –
Pt 100 (see note below)	22	Not assigned		
	15	PV1: Process actual 1 (power supply)		
	21	Not assigned		
	14	PV2: Process actual 2 (compensation)		
	13	PV3: Process actual 3 GND		
*Configurable via software: Inputs/outputs → PV → ANALOG.type (signal source: PV.source → Analogue).				

Tab. 25: Terminal layout – process actual value input (only on devices with process control function)

NOTE!

The Pt 100 sensor must be connected via three lines to compensate for line resistance.
Clip 14 and clip 13 must be bridged at the sensor.

Connection cables must not exceed 20 m in length.

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10.5.8 Closing the actuator housing

ATTENTION!

The ingress of dirt or moisture may cause damage or malfunction.

To preserve IP65 and IP67 degree of protection, ensure the following before closing the device:

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

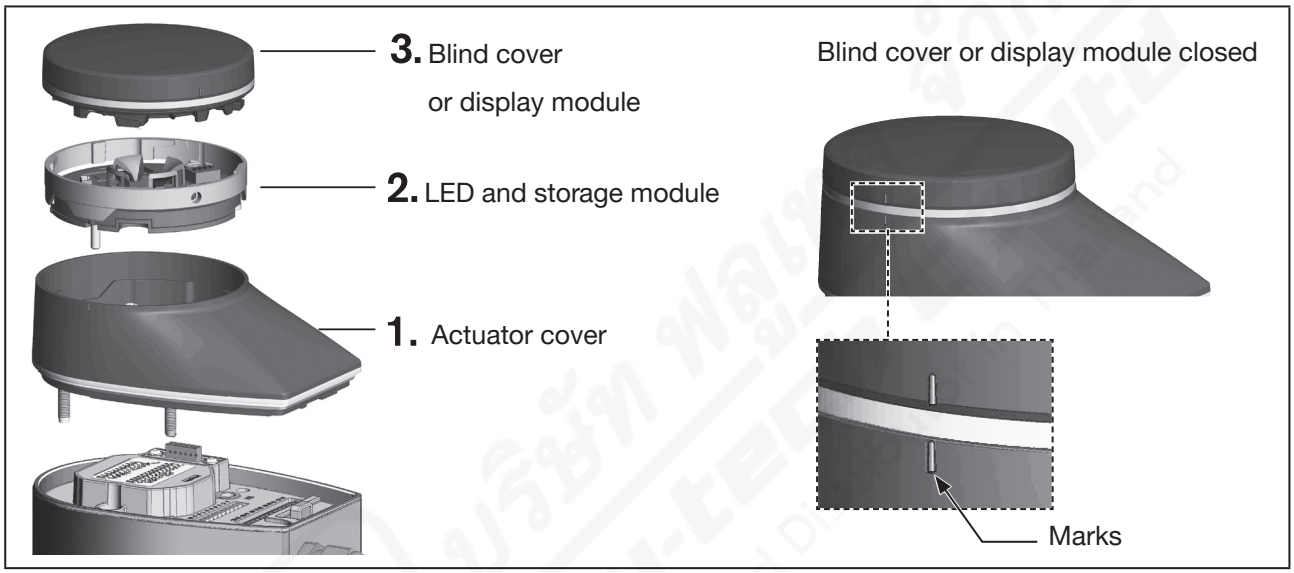

Fig. 42: Closing the actuator housing

1. Install actuator cover

→ Place actuator cover on the actuator housing.

→ First screw in the four fastening screws (hexalobular-internal screws T25) by hand lightly, then tighten them (tightening torque: 5.0 Nm).

2. Mount LED and storage module:

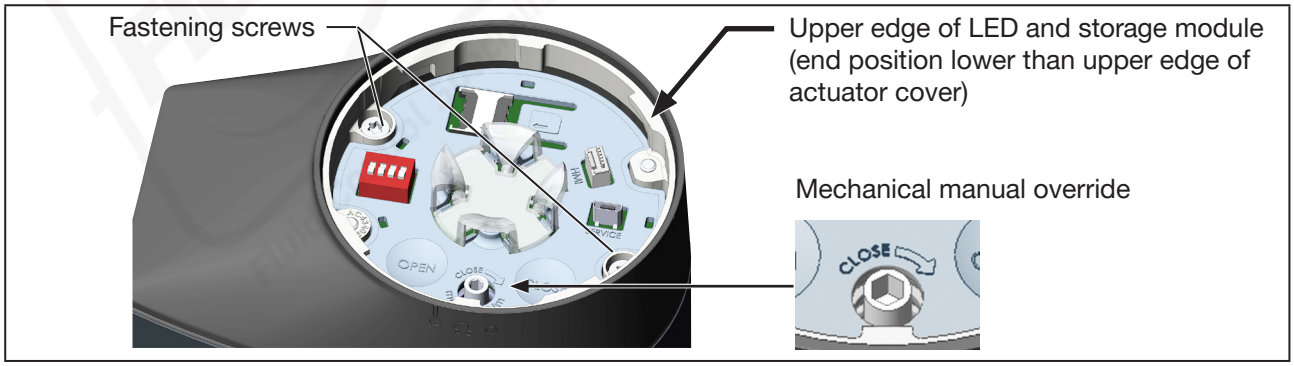

Fig. 43: Mount LED and storage module:

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

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

ATTENTION!

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

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

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

3. Close device with blind cover or display module

For devices with display module:

→ Connect the connection cable to the HMI interface.

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

For devices with blind covers:

→ Fit the blind cover and turn clockwise until the marking at the edge is directly over the marking for the actuator cover.

Perform the necessary basic configuration and adjustments for the electromotive diaphragm control valve after the operating voltage has been established. For a description, see chapter “11.3 Base settings”.

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11 START-UP

11.1 Safety instructions

WARNING!

Risk of injury due to 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 understand the contents of the operating instructions.
- The safety instructions must be followed and the device used only as intended.
- Only adequately trained personnel may start up the system/device.

11.2 Configuration options for start-up

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

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

It requires the USB-büS-Interface available as an accessory.
Communication is performed via the device's büS service interface.

- **Configuration on display of device (optional)**
  Only possible on devices with display module.

- **Use two capacitive buttons in device to adjust position control (function M.Q0-TUNE)**
  Only possible on devices without display module.

11.3 Base settings

A start-up wizard that provides step-by-step guidance through the base settings is available for Bürkert Communicator and the display.
(Configuration area → Positioner or Process controller → START-UP)

11.3.1 Base settings for position control

Type of base setting (observe sequence)		Factory default setting
1.	Set the safety position	Close/open (dependent on device variant)
2.	Adjustment of position control (Function M.Q0.TUNE)	–
3.	Set standard signal for set-point position	Signal type analogue: 4...20 mA
		Gateway: Specified by fieldbus
4.	Set AUTOMATIC operating state	MANUAL

Tab. 26: Overview: base settings for position control

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11.3.2 Base settings for process control

Type of base setting (observe sequence)			Factory default setting
1.	Set the safety position		Close/open (dependent on device variant)
2.	Select physical unit for process control		Per cent
3.	Configure process values		
	a)	Select standard signal for process set-point value	Signal type analogue: 4...20 mA
			Gateway: Specified by fieldbus
	b)	Scale process set-point value	Minimum 0%, maximum 100%
	c)	Select standard signal for process actual value	4-20 mA
	d)	Scale process actual value	Minimum 0%, maximum 100%
4.	Scale process control		Minimum 0%, maximum 100%
5.	Set dead band for process control		1 %
6.	Adjustment of position control (Function M.Q0. TUNE)		-
7.	Set up process control		
	a)	Linearising process characteristic[1] (function P.LIN) Additionally for devices without display module: set DIP switch 2 to ON to activate the correction characteristic.	-
	b)	Adjust process control [2] (P.TUNE function)	-
8.	Set AUTOMATIC operating state		MANUAL

1) Only necessary if process characteristic varies substantially from linearity. Linearisation using the function P.LIN can take a lot of time with slow processes.

2) The P.TUNE function supports process control set-up by independently optimising process parameters. The process of fine-tuning process parameters is described in the Type 3363 software description.

Tab. 27: Overview: base settings for process control

Set AUTOMATIC mode, see chapter “14.1 Changing the operating state, AUTOMATIC, MANUAL” on page 105.

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11.4 Set the safety position

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

Settings are created on the PC using the büS service interface and the “Bürkert Communicator” PC software. It requires the USB büS interface set available as an accessory.

Display operation: button functions

Select, activate	Confirm	Back

To adjust the safety position, switch to the Parameters detailed view for position controllers.

How to switch to detailed view:

→ When using Bürkert Communicator for the configuration, select Position Controller in the navigation area.

→ When using the display for the configuration, switch to CONFIGURATION on the home screen and select Position Controller.

✔ You are now in the “Parameter” detailed view.

How to configure the safety position:

→ Select SAFEPOS.

→ Select FUNCTION.

The following safety positions are available for selection:

Close	Valve tightly closed.
Open	Valve open.
User-defined	User-defined safety position. The entry of the position in this menu is described below.
Inactive	Valve remains in an undefined position.

→ Select safety position.

Entry of user-defined safety position (only if user-defined safety position is selected).

→ Select position.

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

✔ The safety position is now configured.

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11.5 Adjustment of position control on AG2

The position control is preset and executed at the factory for devices with a fitted valve body when delivered.

When executing the function M.Q0.TUNE the position control is adjusted at the actual stroke of the proportional valve in use and the required closing force is determined.

To this end, the seal closure point must be approached manually. It is important that the valve is not closed entirely here.

To this end, the seal closure point must be approached manually. Based on this position, the device uses an algorithm to calculate the force required for tight closing. In order to achieve optimum membrane protection, the valve must not be closed further than the sealing closing point (see “Fig. 44”).

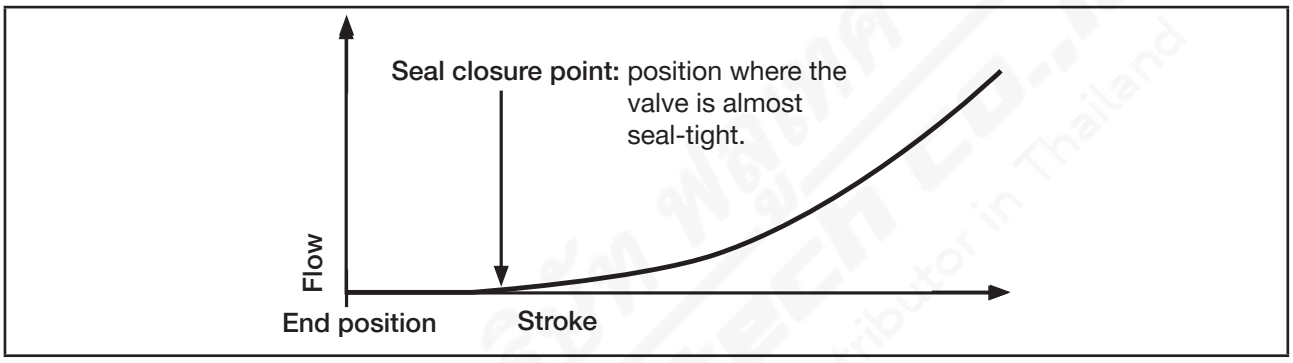

Fig. 44: Seal closure point

11.5.1 Adjustment of the position control – M.Q0.TUNE for AG2

Devices with process control function:

The customer can adapt the parameters for the algorithm. For description see software description for Type 3363 on our website country.burkert.com.

The seal closure point to adjust the position control can be determined automatically with the M.Q0.TUNE-AUTO function. To ensure the seal closure point can be determined, the measured values and process control must be scaled before executing M.Q0.TUNE-AUTO.

ATTENTION!

Execute **M.Q0.TUNE**.

- Execute M.Q0.TUNE to ensure that the diaphragm closes seal-tight under the specified conditions and that the service life of the diaphragm is optimised.
- When replacing the diaphragm, actuator or valve body or when operating conditions change, M.Q0.TUNE must be executed anew.
- The function M.Q0.TUNE must be executed in MANUAL operating state.

WARNING!

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

Executing M.Q0.TUNE without pressurising the medium will cause the actuator to be incorrectly adjusted. This will result in an uncontrolled process caused by non-leak-tight actuator or damage to the diaphragm.

- Only execute M.Q0.TUNE with pressurised medium.

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11.5.2 Adjust with buttons in the device

If the device has a display module, the OPEN and CLOSE buttons will have no function. The position control adjustment can be performed on the display.

The two buttons for approaching the seal closure point and for triggering M.Q0.TUNE are located under the blind cover.

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

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

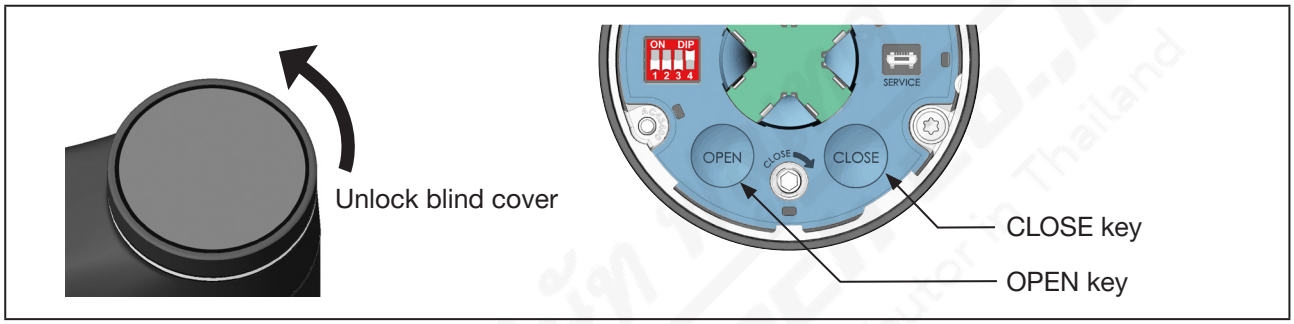

Fig. 45: Adjustment of position controller with keys in device

→ To unlock the blind cover, turn it anticlockwise and remove.

How to trigger the M.Q0.TUNE function:

⚠ Ensure that the medium is pressurised and that MANUAL mode is set!

→ Establish operating conditions (medium pressure and temperature).

→ Use the CLOSE button to approach the seal closure point.

→ Hold down the OPEN and CLOSE buttons together at the same time for 5 seconds.

✔ This will execute the M.Q0.TUNE function.
The device will now calculate the optimum force for closing the valve so that it is seal-tight.

The LED light ring will light up orange while the M.Q0.TUNE is executed.
When M.Q0.TUNE is finished, the LED light ring returns to its previous status.

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11.5.3 Adjustment of position control on PC or device display

Settings are created on the PC using the büS service interface and the “Bürkert Communicator” PC software. It requires the USB-büS-Interface available as an accessory.

Display operation: button functions

Select, activate	Confirm	Back

To trigger the M.Q0.TUNE function, you must switch to the “Maintenance” detailed view for position controllers.

How to switch to detailed view:

→ When using Bürkert Communicator for the configuration, select Position Controller in the navigation area and switch to MAINTENANCE.

→ When using the display for the configuration, switch to CONFIGURATION on the home screen, select Position Controller and switch to MAINTENANCE.

You are now in the “Maintenance” detailed view.

Devices with process control function:
The seal closure point to adjust the position control can be determined automatically with the M.Q0.TUNE-AUTO function.
To ensure the seal closure point can be determined, the measured values and process control must be scaled before executing M.Q0.TUNE-AUTO.

⚠Ensure that the medium is pressurised and that MANUAL mode is set!

How to trigger the M.Q0.TUNE-MANU function:

→ Start M.Q0.TUNE.

→ Select M.Q0.TUNE-MANU.

The following text appears:

”1. Establish operating conditions!
2. Manually approach the seal closure point (position at which the valve is almost seal-tight).
3. Start TUNE!”

→ Confirm.

The following text appears:

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

→ Confirm.

→ Use the arrow button to approach the seal closure point.

→ Confirm.

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

→ Start M.Q0.TUNE.

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✔ This will execute the M.Q0.TUNE function.
The device will now calculate the optimum force for the valve seal closure point.

The LED light ring will light up orange while the M.Q0.TUNE is executed.
When M.Q0.TUNE is finished, the LED light ring returns to its previous status.

How to trigger the M.Q0.TUNE-AUTO function:

⚠ Ensure that the medium is pressurised and that MANUAL mode is set!

→ **Select** CALIBRATION.

→ Select M.Q0.TUNE-AUTO.

The following text appears:

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

→ Confirm.

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

→ Start M.Q0.TUNE.

✔ This will execute the M.Q0.TUNE function.
The device will now calculate the optimum force for closing the valve so that it is seal-tight.

If M.Q0.TUNE is aborted due to an error, a message will appear (see subsequent table).

Possible messages when M.Q0.TUNE is aborted	Description
Device error present.	There is an error present that makes it impossible to execute M.Q0.TUNE.
Timeout.	M.Q0.TUNE could not be executed within the time limit due to an error.
It was not possible to determine the seal closure point.	M.Q0.TUNE was unable to determine the seal closure point due to an error.

Tab. 28: Possible error messages after abort of the function M.Q0.TUNE

11.6 Adjustment of position control on AG3

The position control is preset and executed at the factory for devices with a fitted valve body when delivered.

Check the diaphragm material settings and maximum operating pressure in the menu Position controller > DIAPHRAGM > Force Level before adjusting the position controller.

⚠ An incorrectly set diaphragm material, incorrectly set operating pressure or deviating force adjustment may impact the service life of the diaphragm and/or the tightness of the valve. The valves are delivered with the maximum adjustable operating pressure. If the operating pressure in the system is significantly lower, it is recommended to adjust the operating pressure settings. The TUNE must then be run again.

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ATTENTION!

Only run TUNE if necessary.

It is only necessary to adjust the position control again if the actuator has been dismantled and/or the diaphragm or the valve body has been replaced, or if the valve is loose.

With the M.Q0.TUNE function, the tight closing point and the tight closing force can be adapted to the current operating conditions. Due to the adapted sealing force, the service life of the diaphragm can be increased, especially at low operating pressures.

With the X.TUNE function, the tight closing point is determined via the presettings for the maximum operating pressure.

When executing the X.TUNE or M.Q0.TUNE function, the position control is adapted to the physical stroke of the proportional valve used and the required sealing force is determined.

M.Q0.TUNE

With the M.Q0.TUNE function, the tight closing point must be approached manually. It is important that the valve is not completely closed (see "Fig. 44"), only to the necessary seal closure point. Based on this position the device uses an algorithm to calculate the optimum force for sealing

If necessary, adjust the position control using the M.Q0.TUNE function, see chapter "11.5.1" on page 75.

X.TUNE

Adjust the position control using the X.TUNE function, see chapter "11.6.1" on page 79.
When executing the X.TUNE function, the position control is adapted to the physical stroke of the proportional valve used and the required sealing force is determined using the default settings.

Applying the operating pressure is not required, but does optimise the result of the X.TUNE.

The LED illuminated ring will light up orange while the X.TUNE is executed.

When X.TUNE is finished, the LED illuminated ring returns to its previous status.

11.6.1 Adjustment of X.TUNE position controller with keys in device

The 2 keys for triggering X.TUNE are located beneath the blind cover.

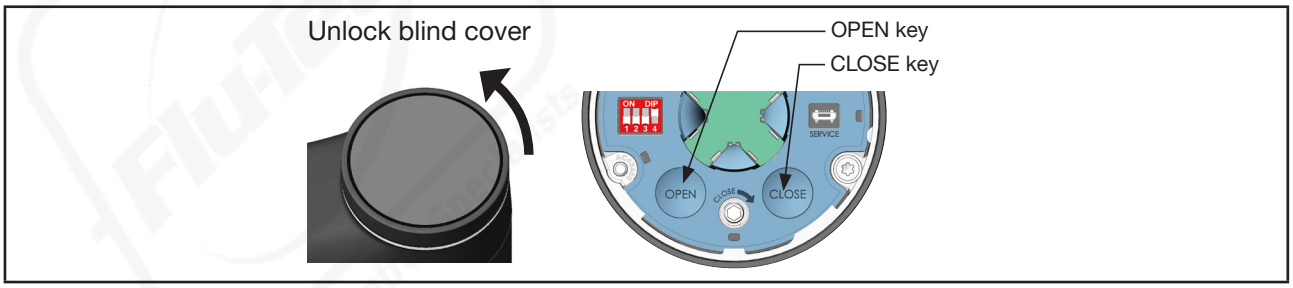

Fig. 46: Adjustment of position controller with keys in device

→ To unlock the blind cover, turn it anticlockwise and remove.

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

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

How to trigger the X.TUNE function:

→ Hold down the OPEN and CLOSE keys together at the same time for 5 seconds.

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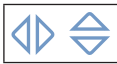
11.6.2 Adjustment of X.TUNE position controller on PC or device display

Adjustments are performed on a PC via the büS service interface using the “Bürkert Communicator” PC software. It requires the USB-büS-Interface available as an accessory.

Display operation: button functions

	Select, activate		Confirm		Back

To trigger the X.TUNE function, you must switch to the “Maintenance” detailed view for position controllers.

How to trigger the X.TUNE function:

Check diaphragm material settings and maximum operating pressure in the menu Position controller > DIAPHRAGM > Force Level.

→ When using Bürkert Communicator for the configuration, select Position Controller in the navigation area and switch to MAINTENANCE.

→ When using the display for the configuration, switch to CONFIGURATION on the home screen, select Position Controller and switch to MAINTENANCE.

✓ You are now in the “Maintenance” detailed view.

→ Select CALIBRATION.

→ Select X.TUNE.

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

→ Start X.TUNE.
✓ This will execute the X.TUNE function.

If X.TUNE is aborted due to an error, a message will appear (see subsequent table).

Possible messages when X.TUNE is aborted	Description
Device error present.	There is an error present that makes it impossible to execute X.TUNE.
Timeout.	X.TUNE could not be executed within the time limit due to an error.
The motor current is too great.	The motor current is too great to perform the X.TUNE function.
The lower end position of the valve is not recognised.	The lower end position of the valve cannot be recognised by the position sensor.

Tab. 29: Possible error messages after abort of the X.TUNE function

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11.7 Set standard signal for set-point position

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

Settings are created on the PC using the büS service interface and the “Bürkert Communicator” PC software. It requires the USB büS interface set available as an accessory.

Display operation: button functions

Select, activate	Confirm	Back

How to switch to detailed view:

How to switch to detailed view:

→ When using Bürkert Communicator for the configuration, select Inputs/Outputs in the navigation area.

→ When using the display for the configuration, switch to CONFIGURATION on the home screen and select Inputs/Outputs.

✓ You are now in the “Parameter” detailed view.

How to configure the standard signal:

→ **Select** CMD.

→ Select ANALOG.type.

→ Select standard signal.

✓ You have set the standard signal.

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11.8 Select physical unit for process control

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

Settings are created on the PC using the büS service interface and the “Bürkert Communicator” PC software. It requires the USB büS interface set available as an accessory.

Display operation: button functions

Select, activate	Confirm	Back

To select the physical unit, switch to the “Parameters” detailed view for process controllers.

How to switch to detailed view:

→ When using Bürkert Communicator for the configuration, select Process Controller in the navigation area.

→ When using the display for the configuration, switch to CONFIGURATION on the home screen and select Process Controller.

✓ You are now in the “Parameter” detailed view.

How to select the physical unit for process control:

→ **Select UNIT.**

→ Select physical unit.

✓ The physical unit is now selected.

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11.9 Configure process values

Setting option:
Using the Bürkert Communicator PC software or the display of the device (optional).
Settings are created on the PC using the büS service interface and the “Bürkert Communicator” PC software. It requires the USB büS interface set available as an accessory.

Display operation: button functions

Select, activate	Confirm	Back

To configure process values, you to the “Parameters” detailed view for inputs/outputs.

How to switch to detailed view:

→ When using Bürkert Communicator for the configuration, select Inputs/Outputs in the navigation area.

→ When using the display for the configuration, switch to CONFIGURATION on the home screen and select Inputs/Outputs.

✓ You are now in the “Parameter” detailed view.

11.9.1 Selecting and scaling standard signal for process set-point value

How to select the standard signal for the process set-point value:

→ **Select** SP/CMD.

→ Select ANALOG.type.

→ Select standard signal.

→ ✓ The standard signal for the process set-point value is now selected.

How to scale the process set-point value:

→ **Select** SP.scale.

→ Enter the minimum and maximum values.

✓ The process set-point value is now configured.

11.9.2 Selecting and scaling standard signal for process actual value

How to select the standard signal for the process actual value:

→ **Select** PV.

→ Select ANALOG.type.

→ Select standard signal.

✓ The standard signal for the process actual value is now selected.

How to scale the process actual value:

→ **Select** PV.scale.

→ Enter the minimum and maximum values.

✓ The process actual value is now configured.

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11.10 Scale process control

Scaling process control affects the following functions:

- Dead band for process control
- Sealing function (CUTOFF), if process control (P.CO) is selected in menu CUTOFF → CUTOFF.type.

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

Settings are created on the PC using the büS service interface and the “Bürkert Communicator” PC software. It requires the USB büS interface set available as an accessory.

Display operation: button functions

Select, activate	Confirm	Back

To scale process control, switch to the “Parameters” detailed view for process controllers.

How to switch to detailed view:

→ When using Bürkert Communicator for the configuration, select Process Controller in the navigation area.

→ When using the display for the configuration, switch to CONFIGURATION on the home screen, select Process Controller.

✓ You are now in the “Parameter” detailed view.

How to scale process control:

→ **Select P.CO.scale.**

→ Enter the minimum and maximum values.

✓ The process control is now scaled.

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11.11 Set dead band for process control

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

Settings are created on the PC using the büS service interface and the “Bürkert Communicator” PC software. It requires the USB büS interface set available as an accessory.

Display operation: button functions

Select, activate	Confirm	Back

To set the dead band, switch to the “Parameters” detailed view for process controllers.

How to switch to detailed view:

→ When using Bürkert Communicator for the configuration, select Process Controller in the navigation area.

→ When using the display for the configuration, switch to CONFIGURATION on the home screen, select Process Controller.

✓ You are now in the “Parameter” detailed view.

How to configure the dead band:

→ **Select** PID.PARAMETER.

→ Select DBND.

→ Enter percentage value.

✓ The dead band is now configured.

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11.12 Setting up process control and executing P.LIN, P.TUNE

Setting option:
Using the Bürkert Communicator PC software or the display of the device (optional).
Settings are created on the PC using the büS service interface and the “Bürkert Communicator” PC software. It requires the USB büS interface set available as an accessory.

Display operation: button functions

Select, activate	Confirm	Back

To set up process control, switch to the “Maintenance” detailed view for process controllers.

How to switch to detailed view:

→ When using Bürkert Communicator for the configuration, select Process Controller in the navigation area and switch to MAINTENANCE.

→ When using the display for the configuration, switch to CONFIGURATION on the home screen, select Process Controller and switch to MAINTENANCE.

✓ You are now in the “Maintenance” detailed view.

11.12.1 Linearising process characteristic (P.LIN)

How to linearise the process characteristic:

→ **Select CALIBRATION.**

→ Select P.LIN.

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

→ Start P.LIN.

✓ This will execute the P.LIN function.

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11.12.2 For devices without a display module – activate the correction characteristic

DIP switch 2, which is located under the blind cover, is used to activate the correction characteristic.

→ To unlock the blind cover, turn it anticlockwise and remove.

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

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

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

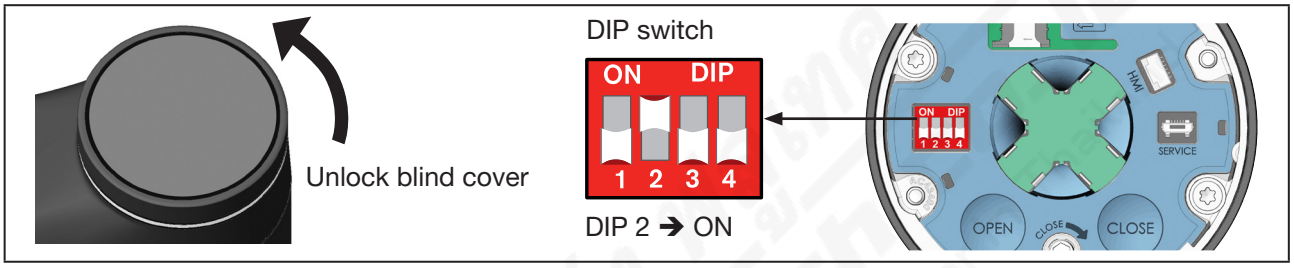

Fig. 47: Activate the correction characteristic

→ Close the blind cover.

11.12.3 Adjusting process control (P.TUNE)

How to trigger the P.TUNE function:

→ **Select** CALIBRATION.

→ Select P.TUNE.

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

→ Start P.TUNE.

✓ This will execute the P.TUNE function.

Set AUTOMATIC operating state after start-up. See chapter “14.1 Changing the operating state, AUTOMATIC, MANUAL” on page 105.

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11.13 Set AUTOMATIC operating state

Factory setting: Devices in their factory default state have their operating state preset to MANUAL.

11.13.1 Setting AUTOMATIC operating state for devices without a display module

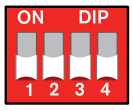
DIP switch 4, which is located under the blind cover, is used to set the operating state.

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

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

→ To unlock the blind cover, turn it counterclockwise and remove.

→ Set AUTOMATIC operating state with DIP switch 4.

	Operating state	
	AUTOMATIC: DIP 4 ➔ down	MANUAL: DIP 4 ➔ up (ON)

→ Close the blind cover.

11.13.2 Setting AUTOMATIC operating state for devices with a display module

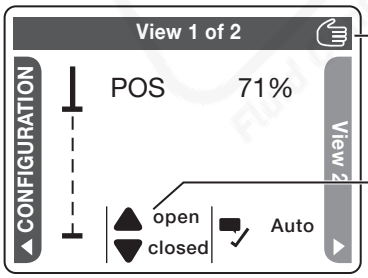
This setting is changed in the ProcessControl layout.

The ProcessControl layout is pre-defined in factory settings for the home screen (factory designation: View 1...).
To access the home screen, hold down the ← Back key.
See also chapter "13.3.1 Home screen and user-specific views" on page 97).

→ To change the operating mode, briefly press the Menu button.

AUTOMATIC operating state: The MANUAL icon and the two arrow icons labelled "open" and "close" are hidden.

Home screen (factory designation: View 1...)
Layout: ProcessControl
Display: in MANUAL operating state.



Icon for
MANUAL operating state: MANUAL icon is displayed
AUTOMATIC: MANUAL icon is hidden

Arrow icons labelled "open" and "closed"
MANUAL: Arrow icons are displayed
AUTOMATIC: Arrow icons are hidden

Fig. 48: Icons for operating state

→ Set AUTOMATIC operating state.

12 OPERATION

WARNING!

Risk of injury from improper operation.

Improper operation may result in injuries as well as damage to the device and its surroundings.

- ▸ The operating personnel must know and understand the contents of the operating instructions.
- ▸ The safety instructions must be followed and the device used only as intended.
- ▸ Only adequately trained personnel may operate the equipment/the device.

Different operating elements are available for operating the device, depending on the variant.

- **Standard devices without display module**
  Operation is performed with 2 capacitative buttons and 4 DIP switches.
- **Option – devices with display module**
  Operation and configuration of the diaphragm control valve are performed on the display with touchscreen.
- **Additional operating options**
  Alternatively, the device can be configured using a PC. Settings are created using the büS service interface and the “Bürkert Communicator” PC software.
  It requires the USB-büS-Interface available as an accessory.

12.1 Overview: availability of the operating elements

Operating element	Function	Availability	
		Devices without display module	Devices with display module
4 DIP switches	Set effective direction	yes	no (available, but without function. Configuration via display)
	Enabling, disabling correction characteristic		
	Enable, disable sealing function		
	Switch to AUTOMATIC, MANUAL operating state		
OPEN key	Opening the valve	yes	
CLOSE key	Closing the valve:		
OPEN key and CLOSE key	Adjustment of position control, execute M.Q0.TUNE function	yes	
	Execute M.SERVICE	yes	
Mechanical manual override	Mechanically opening or closing the valve	yes	yes
SIM card holder	Holder for using the SIM card available as an accessory	yes	yes
büS service interface	For connecting a CAN adapter or the USB büS interface set available as an accessory	yes	yes
Bürkert Communicator PC software	Software for configuration and setting the device on a PC	yes	yes
Display with touchscreen	Configuring, setting and operating the device	no	yes

Tab. 30: Operating possibilities

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12.2 Display elements

Description of the display elements:

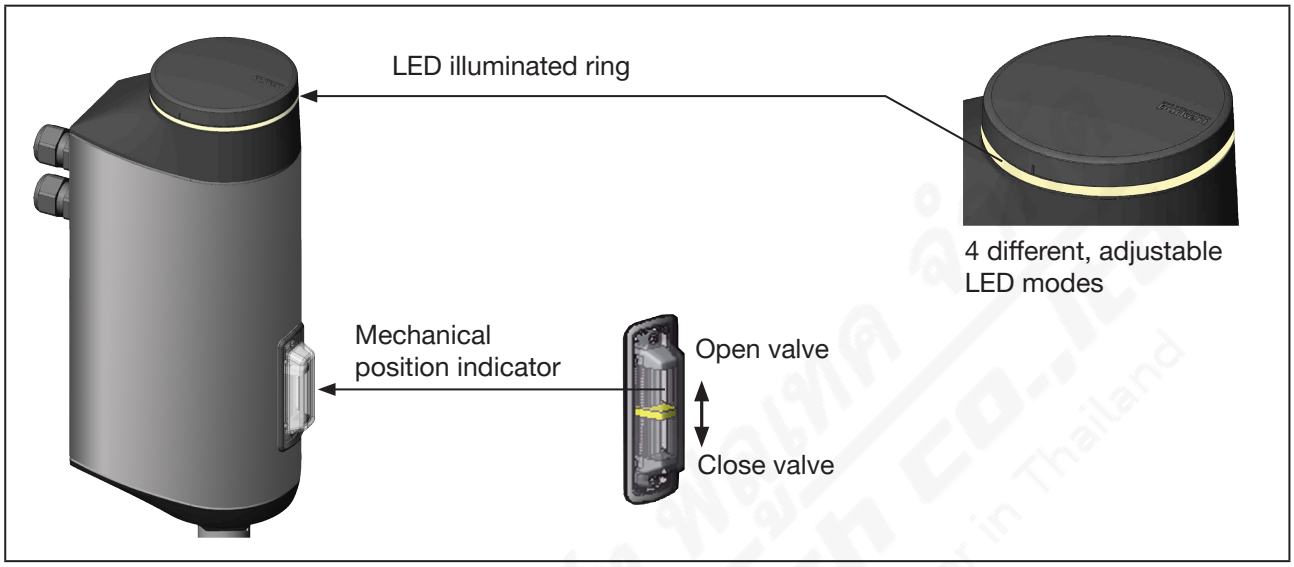

Fig. 49: Display elements

12.2.1 LED illuminated ring

The transparent LED light ring that transmits the light of the LEDs to the outside is fitted to the blind cover or display module.

The LED illuminated ring lights up or flashes slowly or quickly in one or several alternating colours to indicate the device's state.

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

- NAMUR operation mode*
- Valve mode*
- Valve mode + warnings* – factory pre-set operation mode
- LED off

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

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12.2.2 Set LED operation mode

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

Settings are created on the PC using the büS service interface and the “Bürkert Communicator” PC software. It requires the USB büS interface set available as an accessory.

Display operation: button functions

Select, activate	Confirm	Back

To configure, you must switch to the detailed view “Parameter for general settings”.

How to switch to detailed view:

→ When using Bürkert Communicator for the configuration, select General settings in the navigation area.

→ When using the display for the configuration, switch to CONFIGURATION on the home screen and select General settings.

✔ You are now in the “Parameter” detailed view.

How to set LED operation mode:

→ **Select** Status LED.

→ Select Mode.

The following LED modes are available:

NAMUR operation mode

Valve mode

Valve mode + warnings

LED off

→ Select LED operation mode.

✔ You have set the LED operation mode.

12.2.3 Mechanical position indicator

The mechanical position indicator shows the valve position independently of the supply voltage (see “Fig. 49: Display elements”).

12.2.4 Display elements of the display module (optional)

For a description, see “13 Display operation (option)”.

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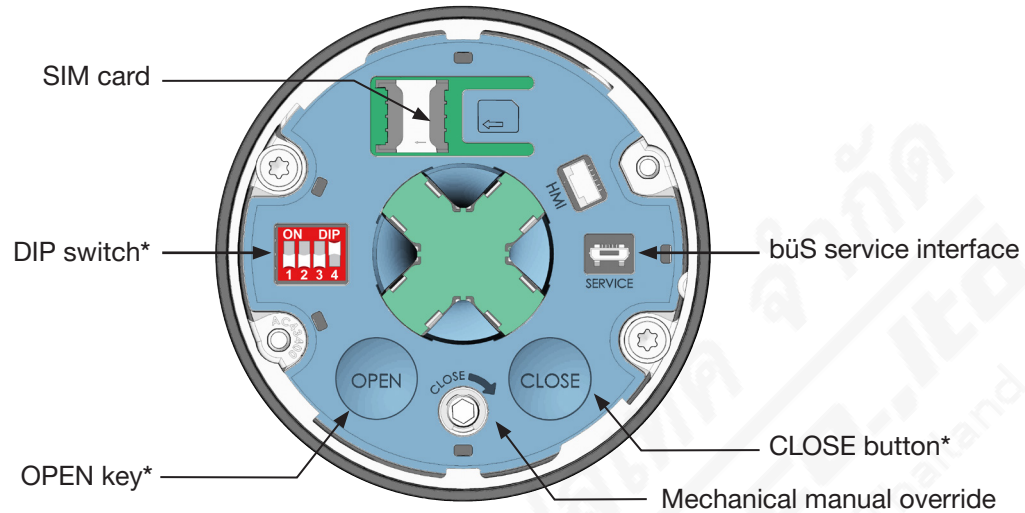
12.3 Operating elements



* *Non-functional in devices with display module. The display must be used for operation.*

Fig. 50: Operating elements

12.3.1 DIP switch

Settings

Switch 1: Sets the effective direction between input signal and set-point position.
See chapter “14.4” on page 113.

Switch 2: Enables or disables the correction characteristic (for adjusting the operating characteristic) (see chapter “14.3” on page 110).

Switch 3: Enables or disables sealing function. See chapter “14.2” on page 108.

Switch 4: Switches between AUTOMATIC and MANUAL mode.
See chapter “14.1” on page 105.

The DIP switches are non-functional in devices with a display module. The configuration can be performed on the display.

12.3.2 OPEN key and CLOSE key

Electrical manual override: Opening valve: Press OPEN button.
Closing valve: Press CLOSE button. See chapter “15.1”.
⚠ When closing the valve:
Carefully close the valve with minimal force to prevent damage to the diaphragm. Do not press the button again when the valve is closed!

Trigger M.Q0.TUNE (Autotune): For a description, see chapter “11.5 Adjustment of position control on AG2”.

Trigger M.SERVICE See chapter “9.5.4 Mount the actuator onto the valve body and establish electrical connection”.

If the device has a display module, the OPEN and CLOSE buttons will have no function. The configuration can be performed on the display.

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12.3.3 Mechanical manual override

If there is no supply voltage, e.g. during installation or in the event of a power failure, the valve can be opened or closed using the mechanical manual override.

For description, see chapter “15.4 Actuating the valve mechanically”.

12.4 büS service interface

The büS service interface can be used for quick service.

- Configuration of the device, e.g. the base setting for start-up with the PC software Bürkert Communicator. It requires the USB-büS-Interface set available as an accessory.
- Configuration of the büS network.
- Parameterising of operation parameters
- Error diagnostics
- Software update

Only connect the matching CAN adapter to the büS service interface. This CAN adapter is part of the USB büS interface set available as an accessory (see “Tab. 45: Accessories” on page 170).

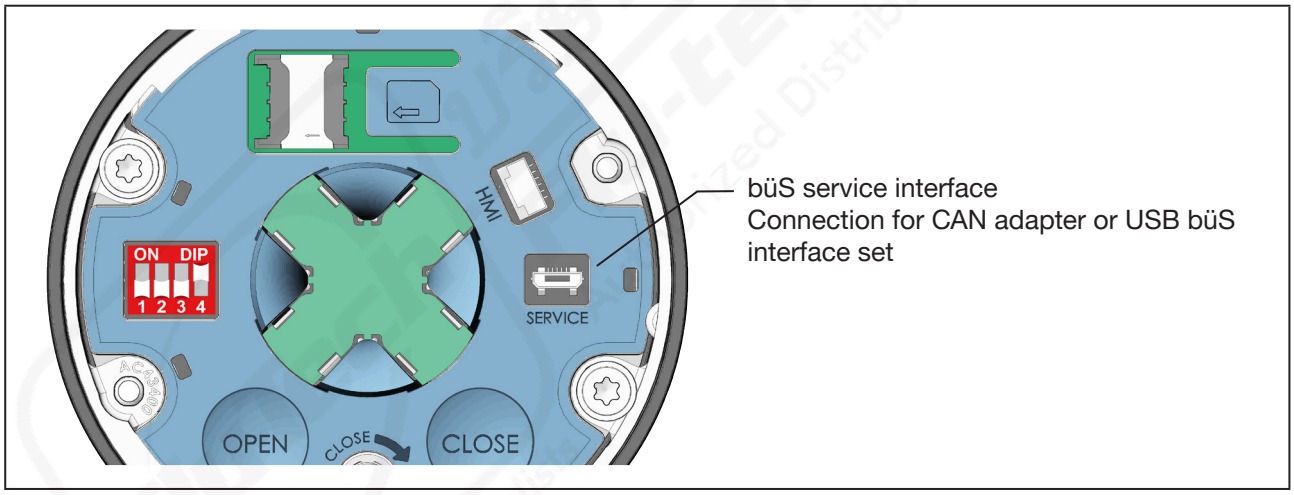

Fig. 51: büS service interface

For devices with a fieldbus gateway, the büS service interface is inside the fieldbus gateway (see chapter “18.1.1 Access to büS service interface” on page 147).

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12.5 SIM card – acquire and save data (option)

The optional SIM card can be used to store device-specific values and user settings and transfer them to another device.

The configuration client (for BüS devices) is disabled when the SIM card is inserted.
Further information can be found by searching for “central configuration management” on our website country.burkert.com

The SIM card is detected when the device starts and is checked for available data. This data will be transferred or overwritten accordingly:

- The SIM card does not contain any data.
  The existing device-specific values and user settings are saved to the SIM card.
- The SIM card contains data compatible with the device.
  The data on the SIM card are transferred by the device. The existing device-specific values and user settings are overwritten.
- The SIM card contains data that are 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 a standard SIM card for the device.
The SIM card used is a special industrial version that offers additional durability and temperature-resistance.
Only purchase the SIM card for the electromotive diaphragm control valves from your Bürkert sales department. See chapter “24 Accessories, replacement parts”.

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

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

Inserting the SIM card:

→ Place the SIM card on the surface with the SIM card symbol. The position must correspond to that shown on the symbol.

→ Gently push the SIM card to the left into the holder until it stops.

→ Restart the device. The new data are transmitted.

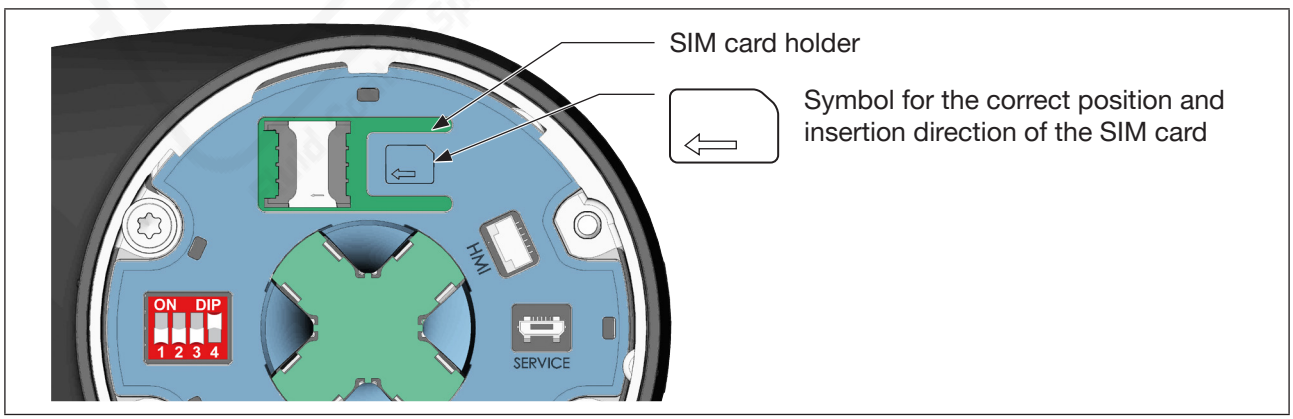

Fig. 52: Using the SIM card

13 DISPLAY OPERATION (OPTION)

The device is operated and configured on a touchscreen display.

13.1 User interface

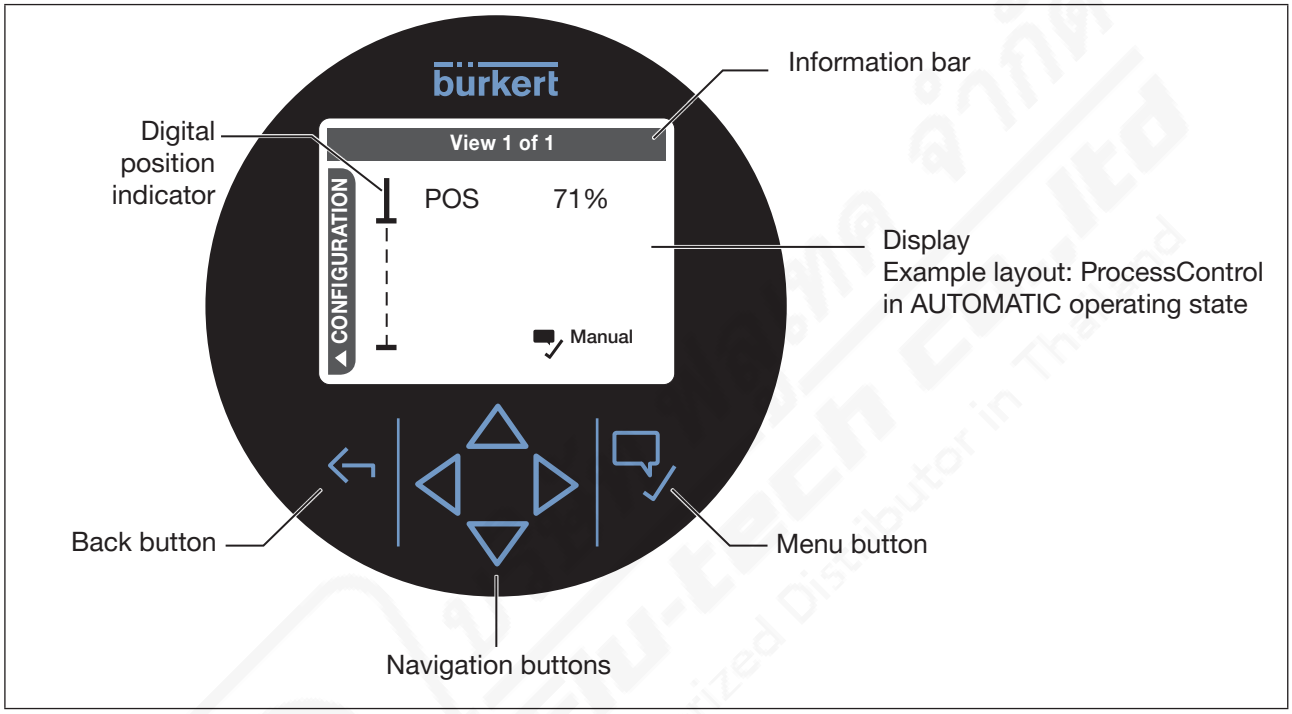

Fig. 53: Display user interface

13.2 Description of buttons

Button		Functions	
Back button		Press briefly:	Back
		Hold down:	Return to home screen (View 1...)
Navigation buttons		Change view	
		Accept selection (e.g. with option fields)	
		When entering values: change decimal place	
		Select menu	
		Configuration, select setting	
		When entering values: change value (figure)	
		Open valve (in MANUAL operating state)	
		Close valve (in MANUAL operating state)	

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Button		Functions	
Menu button		Press briefly:	Confirm selection
			Save selection
			Next (in wizard)
		Hold down:	Open context menu

Fig. 54: Description of button function

13.3 Display views

The following views can be accessed from the home screen:

- **Configuration view,** using the left navigation button  .
- **From user-created view 2...4,** using the right navigation button  .
  See also "13.3.1 Home screen and user-specific views" on page 97.

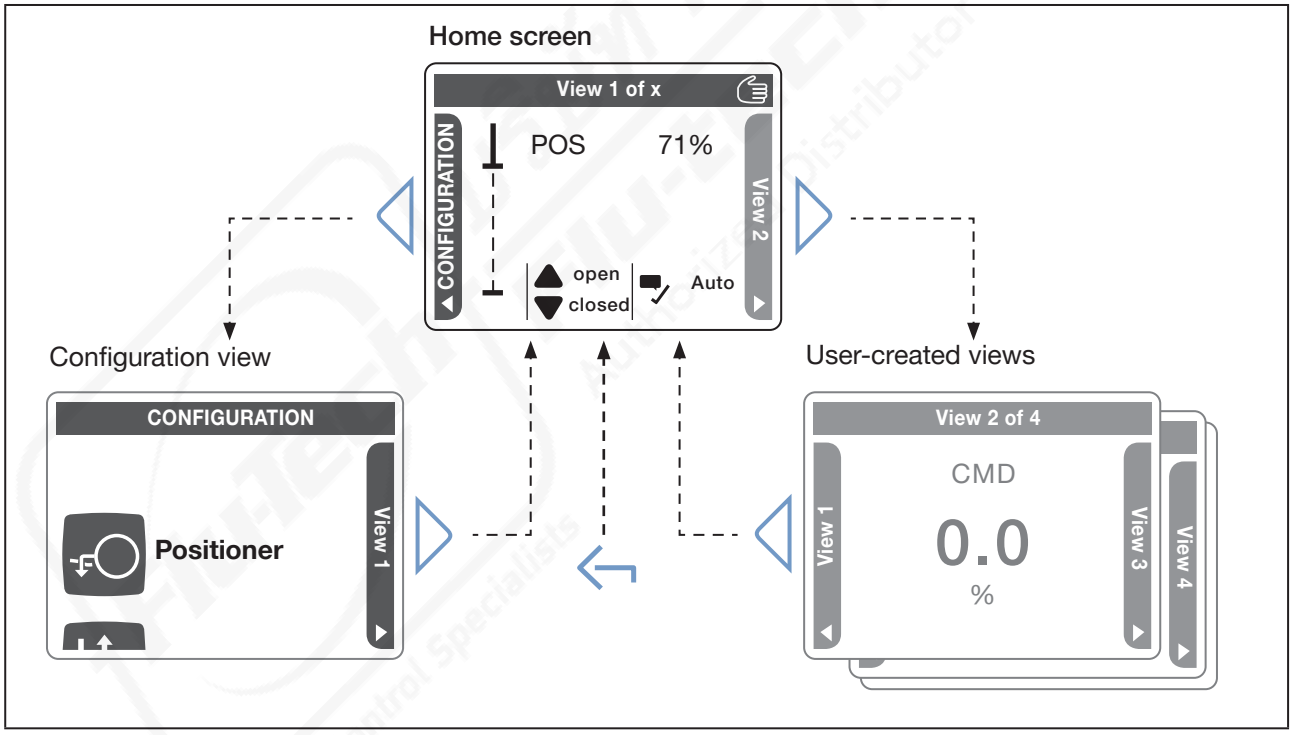

Fig. 55: Home screen, configuration view, user-specific views

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13.3.1 Home screen and user-specific views

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

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

Five different layouts are 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 depicted as a curve in the view.
Trend with 2 values	The process sequence is depicted as a curve and with 2 process values in the view.
ProcessControl	Preset at the factory for the home screen (see “Fig. 55” on page 96). The position of the valve is depicted as a value and in a position indicator in the view. The icons for AUTOMATIC and MANUAL operating state, and for closing and opening the valve, are displayed.
Setting:	You can create views, change their title and assign the layout either in the context menu on the home screen or from a user-specific view. To open the context menu, hold down the menu key .

The comprehensive, detailed description for the display module can be found on our homepage https://country.burkert.com/ under: Type ME31 → Software ME31.

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13.3.2 Configuration view

The configuration view is divided in various areas.

Symbol	Configuration area
	Positioner
	Inputs/outputs
	Process controller
	Industrial communication
	Displays
	General settings

Tab. 31: Configuration areas

You can switch between the areas with the navigation buttons ▽ and △.

13.3.3 Detailed views

From the configuration view you can access the following detailed views:

Detailed view	How to access the detailed view from the configuration view
Parameters	Select **Configuration area** * and confirm selection.
Maintenance	Select Configuration area* and confirm selection. Switch to detailed view MAINTENANCE.
* See „Tabelle 44: Konfigurationsbereiche“ auf Seite .“Tab. 31: Configuration areas” on page 98	

Tab. 32: Detailed views

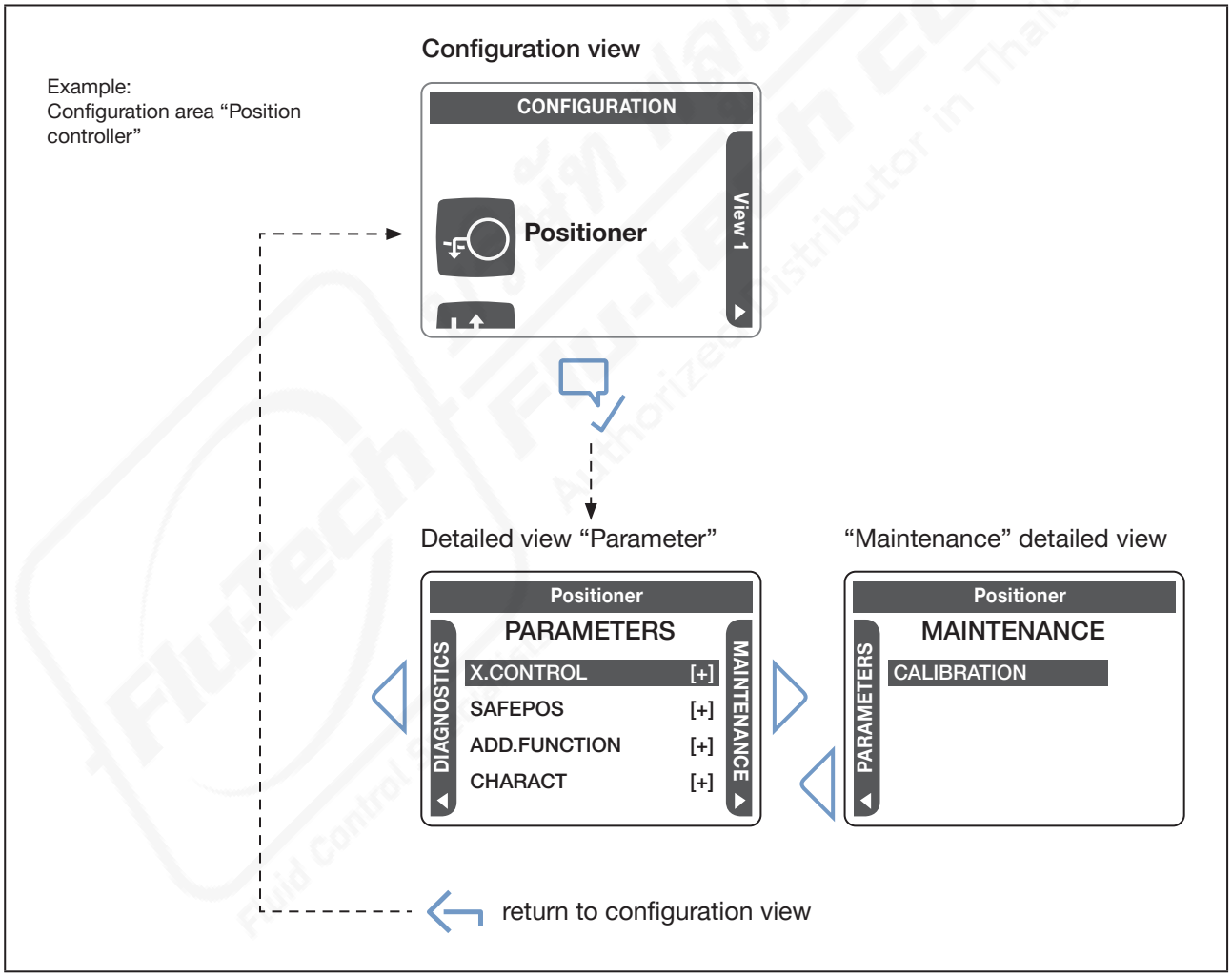

Fig. 56: Detailed views; Parameter, Maintenance, Diagnostics

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13.4 Description of symbols

Symbols for access rights

Symbol	Description
	This setting is write-protected and can only be modified with the appropriate access rights/ user code.
	User.
	Advanced user is logged on to the device.
	Installer is logged on to the device.
	Bürkert service employee is logged on to the device.

Tab. 33: Symbols for access rights

The rights to read, configure or alter data depend on the set access right and password protection.
See chapter “13.5 Access rights and password protection” on page 102.

Icons for indicating device status in accordance with NAMUR NE 107

If several device states exist simultaneously, the device state with the highest priority is displayed.

Priority	Symbol	Description
1		Failure, error or fault! Due to a malfunction in the device or its peripherals, closed-loop control mode is not possible. → Review the messages in the message list.
2		Function check! Work is being carried out on the device, which means that closed-loop control mode is temporarily not possible.
3		Outside of specification! The environment conditions or process conditions for the device are not within the specified range. Internal device diagnostics indicate problems within the device or with the process properties.
4		Maintenance required! The device is in closed-loop control mode, but function will soon be restricted. → Do the required maintenance operation.

Tab. 34: Symbols in accordance with NAMUR NE 107

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Symbols for displaying operating states

Priority	Symbol	Description
1		Device is no longer in closed-loop control mode due to a severe error. The valve is stuck in its position.
2		Energy-pack active: The supply voltage has been interrupted. The device is supplied with power via the energy-pack. In AUTOMATIC operating state the actuator moves to the safety position (see symbol “safety position”) In MANUAL operating state the actuator is stuck in the last assumed position.
3		Device is in MANUAL operating state.
4		Device is in SIMULATION operating state. The signal for the set-point value setting default is simulated.
5		Process control active.
6		Position control active.

Tab. 35: Symbols for displaying operating states

Symbols for displaying specific valve positions

Priority	Symbol	Description
1		Valve is in the safety position.
2		Valve is in the sealed position.

Tab. 36: Symbols for displaying specific valve positions

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13.5 Access rights and password protection

There are three user levels for assigning access rights.

If password protection is enabled, the information bar of the display displays the enabled user level with the corresponding icon.

User level	Symbol	Description
Advanced user		PIN required: Manufacturer-set code 005678. Rights: reading values, limited right to change values.
Installer		PIN required. Manufacturer-set code 001946. Rights: reading values, expanded right to change values.
Bürkert		PIN required. Only for Bürkert employees.

Tab. 37: User levels

13.5.1 factory setting

Password protection is not enabled on delivery. Settings in the software can be made at any time and without entering a password.

A password is only required for settings that only Bürkert employees are permitted to make.

13.5.2 Enabling password protection

You must switch to the detailed view “Parameters for general settings” to enable or disable password protection.

How to switch from the home screen to the detailed view:

→ switch to CONFIGURATION.

→ Select General settings and confirm selection.

✓ You are now in the “Parameter” detailed view.

How to enable password protection and change passwords:

→ select Passwords and confirm.

→ Select Password protection and confirm.

→ Select On and confirm.

✓ You have enabled password protection.
Effect: Software settings that require a specific user level can only be made upon entering the corresponding user level code.

→ Return with ↩.

After password protection is enabled, you can change the passwords for the user levels.

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→ Select Change passwords and confirm.

→ Select user level and confirm.

→ Enter code: Add with decimal place; change to Value with decimal place.

→ Confirm the code set.

✓ You have changed the user level password.

→ Return with ↩.

Attention! Document passwords such that they are always accessible to authorised persons.

Once the screen saver is active, settings that require a certain user level are only possible with input of a password.

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

13.5.3 Disabling password protection

The user level Installer is required to disable password protection.

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

→ Select Off and confirm.

→ Select Password protection and confirm.

✓ You have disabled password protection.

→ Return with ↩.

13.5.4 Changing user level

To change the user level you must switch to the context menu. Hold down the menu button.

How to switch user levels:

→ Select Switch user levels.

→ Select user level.

→ Set password (PIN).

✓ You have switched the user level.

Logging out of the user level:

→ Select Log out and confirm.

✓ You have disabled the user level.

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13.6 Screen saver

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

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

Factory setting: The waiting time between operation and enabling of the screen saver is one minute.

ATTENTION!

Faulty operation as a result of EMC disruptions, cleaning work or unintended physical contact.

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

13.6.1 Set screen saver

The setting is made in the detailed view “Parameter for displays”.

How to switch from the home screen to the detailed view:

→ switch to CONFIGURATION.

→ Select Displays and confirm selection.

✔ You are now in the “Parameter” detailed view.

How to set the screen saver:

→ select Screen saver and confirm.

→ Select Wait time and confirm.

→ Select desired wait time in minutes and enable.

→ Select Brightness and confirm.

→ Set desired brightness in % and confirm.

✔ You have set the screen saver.

→ Return with ↩.

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14 BASIC FUNCTIONS

14.1 Changing the operating state, AUTOMATIC, MANUAL

Factory setting: Devices in their factory default state have their operating state preset to MANUAL.

14.1.1 Changing operating state in devices without a display module

DIP switch 4, which is located under the blind cover, is used to change operating state.

→ To unlock the blind cover, turn it anticlockwise and remove.

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

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

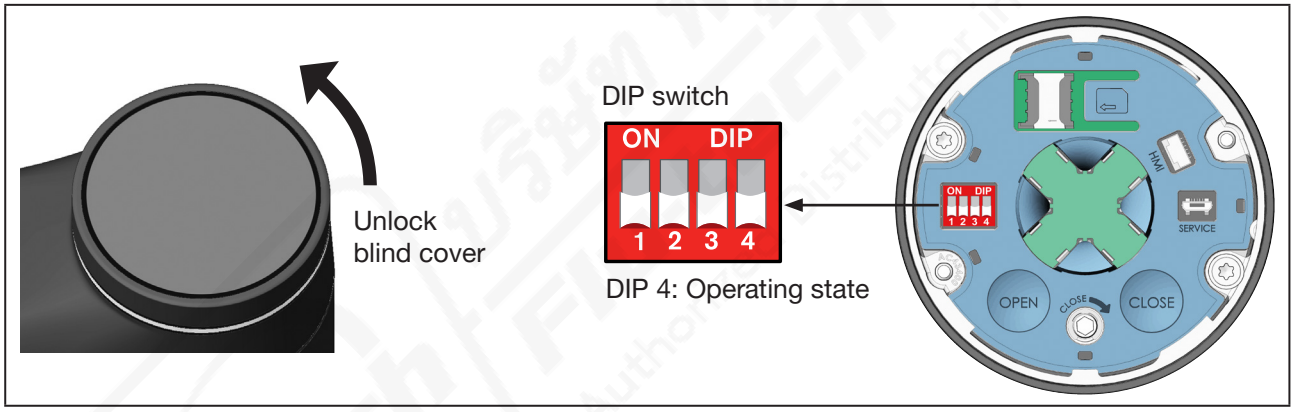
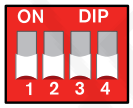


Fig. 57: Setting the operating state

→ Set the operating state with DIP switch 4.

	Operating state	
	AUTOMATIC: DIP 4 ➔ down	MANUAL: DIP 4 ➔ up (ON)

→ Close the blind cover.

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14.1.2 Changing operating state in devices with a display module

The operating state can be set in 2 ways:

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

Setting using the menu button

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

If you want to change the operating state using the menu key, the view of the display must be in the ProcessControl layout. See “Fig. 58”.

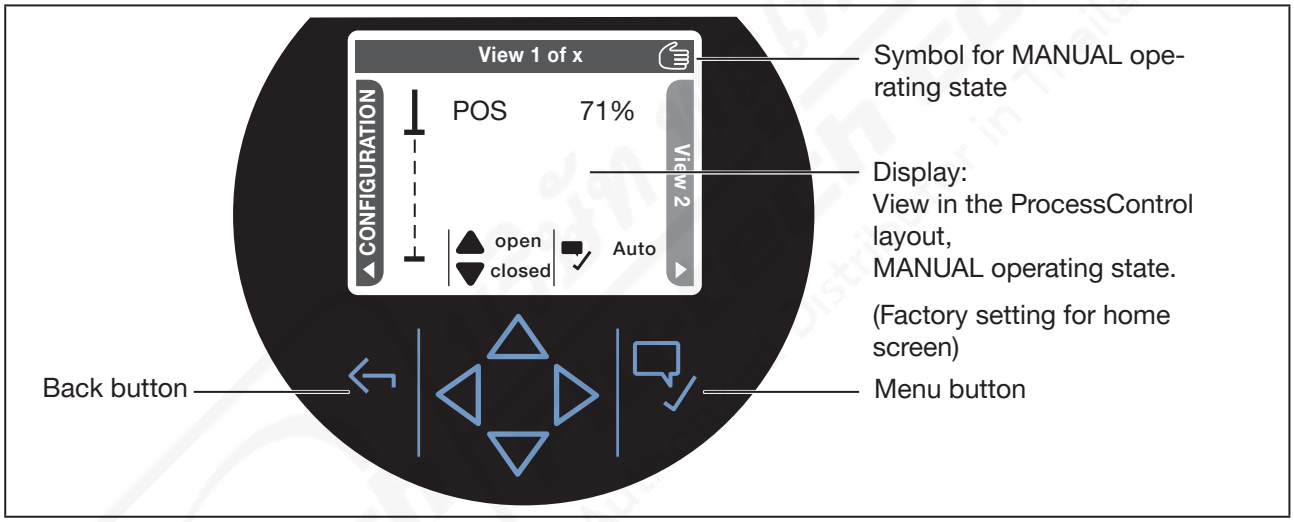

Fig. 58: Changing the operating state, MANUAL – AUTOMATIC

→ To change the operating mode, briefly press the Menu button.

MANUAL: The MANUAL symbol appears in the information bar at the top. The two arrow symbols labelled “open” and “close” are displayed.

AUTOMATIC: The MANUAL icon and the two arrow icons labelled “open” and “close” are hidden.

Setting the layout:

The layout is set in the context menu: To open the context menu, hold down the menu button .

View 1...).

To access the home screen, hold down the back key.

See also chapter “13.3 Display views” on page 96.

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Setting in the menu AUTO I MANU

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

Settings are created on the PC using the büS service interface and the “Bürkert Communicator” PC software. It requires the USB büS interface set available as an accessory.

Display operation: button functions

Select, activate	Confirm	Back

To configure, you must switch to the detailed view “Maintenance for general settings”.

How to switch to detailed view:

→ When using Bürkert Communicator for the configuration, select General settings in the navigation area and switch to MAINTENANCE.

→ When using the display for the configuration, switch to CONFIGURATION on the home screen, select General settings and switch to MAINTENANCE.

✓ You are now in the “Maintenance” detailed view.

How to set the operating state:

→ Select AUTO I MANU.

→ Select Automatic mode or Manual mode.

✓ You have set the operating state.

The MANUAL operating state includes the menuAUTO | MANU and the menuManual mode for manual override of the valve.

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14.2 Enable – disable sealing function

Factory setting: The sealing function is disabled in devices upon delivery.

This function causes the valve to seal or open completely within the set range.

The parameters for the sealing or opening of the valve (CMD) is stated in per cent. The transfer from sealing or opening to closed-loop control mode occurs with a hysteresis of 1%.

If the process valve is in the sealing range, an icon appears on the display.

14.2.1 Enabling or disabling sealing function in devices without a display module

The sealing function must be configured for enabling.
Configuration is performed on a PC via the büS service interface and with the Bürkert Communicator PC software. It requires the USB-büS-Interface available as an accessory.

The process for configuration on a PC is the same as on the device display. Configuration is described in chapter "14.2.3 Configuring the sealing function".

DIP switch 3, which is located under the blind cover, is used to enable the sealing function.

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

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

→ To unlock the blind cover, turn it anticlockwise and remove.

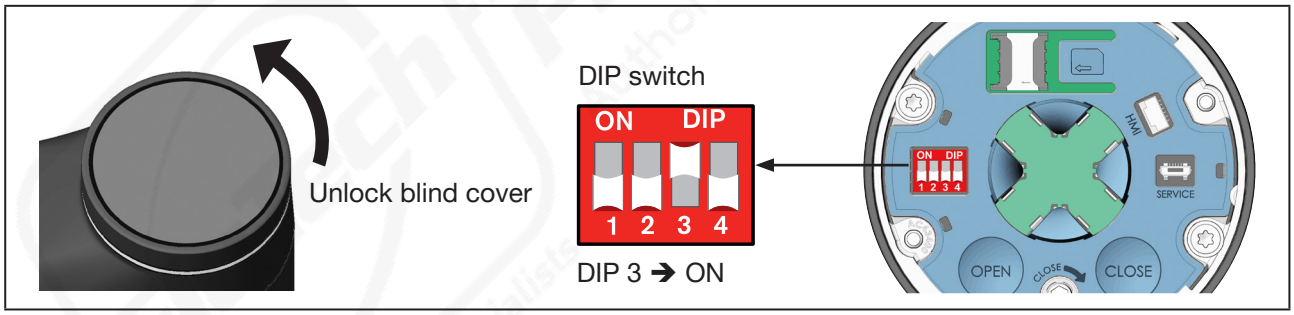

Fig. 59: Enable sealing function

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

→ Close the blind cover.

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14.2.2 Enable or disable sealing function in devices with a display module

To enable or disable the sealing function, you must switch to the detailed view “Parameter for position controller”.

How to switch from the home screen to the detailed view:

→ switch to CONFIGURATION.

→ Select Position controller and confirm selection.

✓ You are now in the “Parameter” detailed view.

How to enable the sealing function:

→ select ADD.FUNCTION and confirm.

→ Select CUTOFF, enable with the navigation buttons on the side and confirm.

The device returns to the “Parameter” detailed view.

The sealing function is enabled and the menu CUTOFF for configuration is now available in the “Parameter” detailed view.

→ Return with .

14.2.3 Configuring the sealing function

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

Settings are created on the PC using the büS service interface and the “Bürkert Communicator” PC software. It requires the USB büS interface set available as an accessory.

Display operation: button functions

Select, activate	Confirm	Back

To configure the sealing function, you must switch to the detailed view “Parameter for position controller”.

How to switch to detailed view:

→ When using Bürkert Communicator for the configuration, select Position Controller in the navigation area.

→ When using the display for the configuration, switch to CONFIGURATION on the home screen, select Position Controller.

How to configure the sealing function:

→ Select CUTOFF in the detailed view “Parameter for position controller”.

→ Select Lower Limit.

→ Enter lower limit.

→ Select Upper Limit.

→ Enter upper limit.

✓ You have configured the sealing function.

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14.3 Enabling – disabling correction characteristic

Factory setting: The correction characteristic is disabled in devices on delivery.

When the correction characteristic is enabled, the flow characteristic or operating characteristic is corrected depending on the set-point position (CMD) and valve stroke (POS).

Flow characteristic:
The flow characteristic $k_V = f(s)$ indicates the flow rate of a valve, expressed by the k_V value, as a function of the stroke s of the actuator spindle. The flow characteristic is determined by the shape of the valve body and the diaphragm. Two types of flow characteristics are generally realised: the linear and the equal percentage.

With linear characteristics, equal stroke changes are apportioned the same k_V value changes dk_V.

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

With equal percentage characteristics, a change in stroke ds corresponds to an equal percentage change in the k_V value.

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

Operating characteristic:
The operating characteristic Q = f(s) shows the relationship between the volume flow Q in the installed valve and the stroke s. The properties of the pipes, pumps and consumers are included in this characteristic. The operating characteristic therefore has a different shape than the flow characteristic.

For positioning applications of controllers, special requirements are often placed on the operating characteristic, e.g. linearity. For this reason, it is occasionally necessary to correct the operating characteristic in an appropriate manner. The diaphragm control valve therefore has a transmission element that performs various 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. In addition, it is possible to programme a user-defined characteristic by entering supporting points.

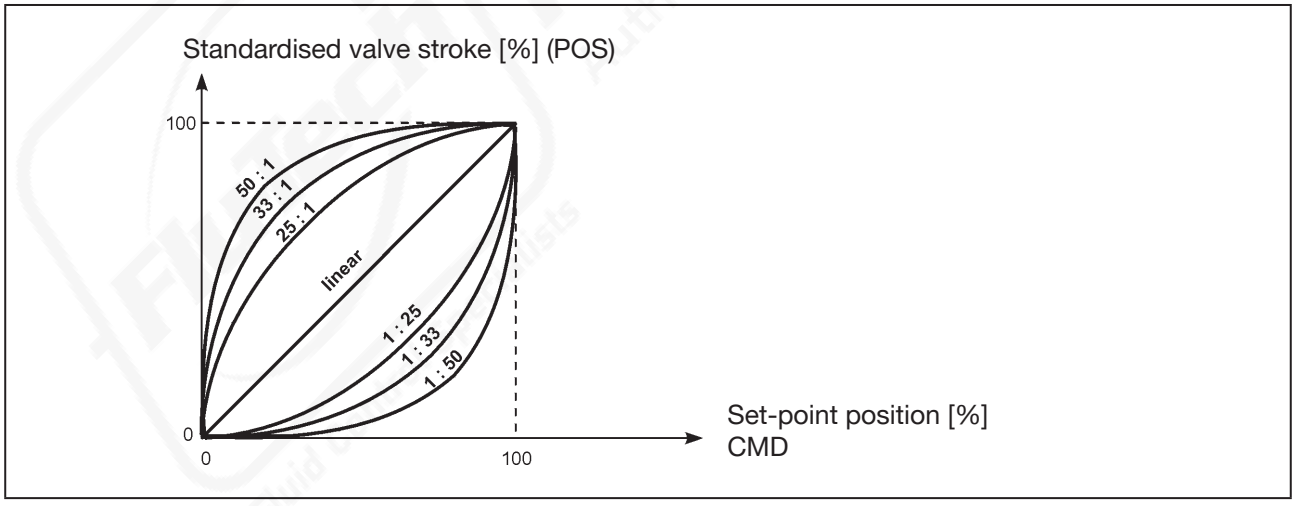

Fig. 60: Characteristics

14.3.1 Enabling or disabling correction characteristic in devices

without a display module

The correction characteristic must be selected for enabling. For a description, see chapter “14.3.3 Select correction characteristic or program to be user-specific”.

DIP switch 2, which is located under the blind cover, is used to activate the correction characteristic.

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

→ To unlock the blind cover, turn it counterclockwise and remove.

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

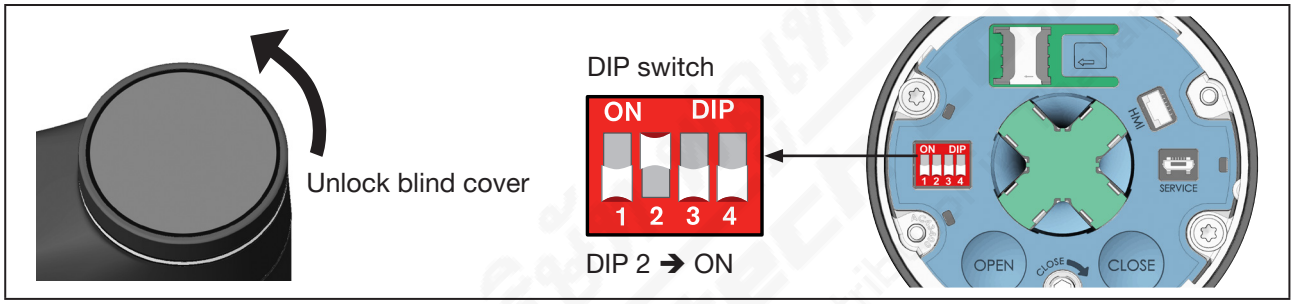

Fig. 61: Activate the correction characteristic

→ Close the blind cover.

14.3.2 Enabling or disabling correction characteristic in devices with a display module

To enable or disable the correction characteristic, you must switch to the detailed view “Parameter for position controller”.

How to switch from the home screen to the detailed view:

→ select Position controller and confirm selection.

→ switch to CONFIGURATION.

✔ You are now in the “Parameter” detailed view.

How to enable the correction characteristic:

→ **select** ADD.FUNCTION and confirm.

→ Select CHARACT, enable with the side navigation buttons and confirm.

The device returns to the “Parameter” detailed view.

The correction characteristic is enabled and the menu CHARACT for configuration is now available in the “Parameter” detailed view.

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14.3.3 Select correction characteristic or program to be user-specific

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

Settings are created on the PC using the büS service interface and the “Bürkert Communicator” PC software. It requires the USB büS interface set available as an accessory.

Display operation: button functions

Select, activate	Confirm	Back

To program the correction characteristic you must switch to the “Parameter for position controller” detailed view.

How to switch to detailed view:

→ When using Bürkert Communicator for the configuration, select Position Controller in the navigation area.

→ When using the display for the configuration, switch to CONFIGURATION on the home screen, select Position Controller.

How to select the correction characteristic:

→ Select CHARACT in the “Parameter for position controller” detailed view.

→ Confirm TYPE.

→ Select correction characteristic.

✓ You have selected the correction characteristic.

How to configure the user-defined correction characteristic:

if the correction characteristic User-defined was selected in the TYPE menu, the TABLE DATA menu appears. The correction characteristic can be programmed therein as described below:

→ Select TABLE DATA.

→ Select desired reference point y 0 – y 100.

→ Enter desired per cent value.

→ Enter the per cent in succession for all reference points.

→ Leave the TABLE DATA menu.

✓ You have programmed the correction characteristic.

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14.4 Change effective direction

Factory setting: The effective direction “Rise” is set in devices on delivery.

Meaning:

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

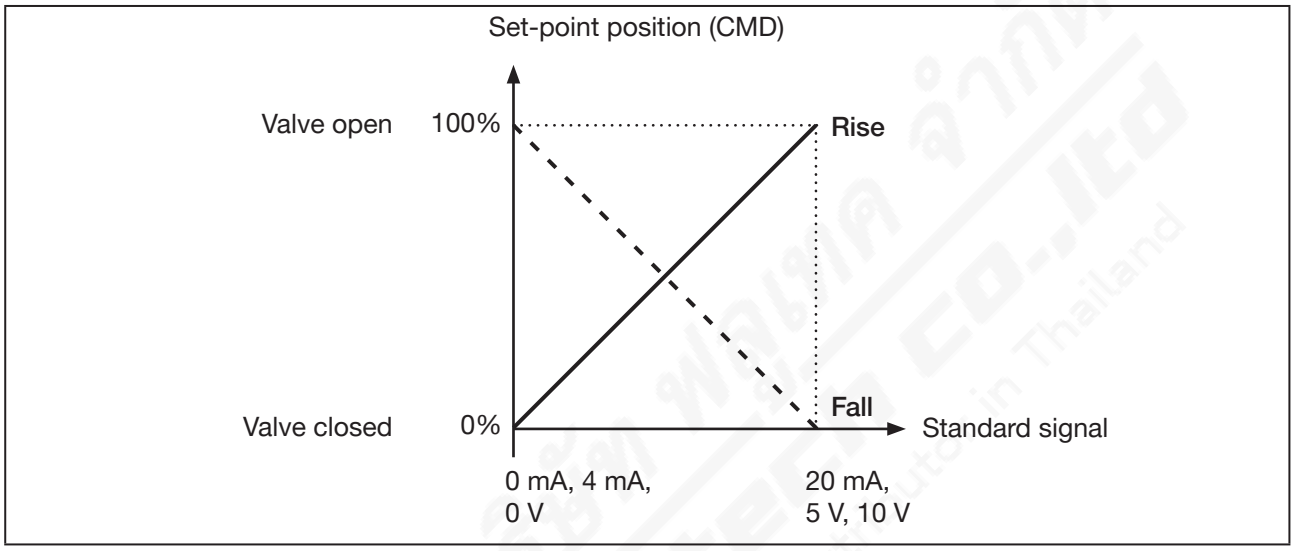

Fig. 62: Effective direction diagram

14.4.1 Changing effective direction in devices without a display module

The effective direction is changed with DIP switch 1, located below the blind cover.

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

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

→ To unlock the blind cover, turn it counterclockwise and remove.

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

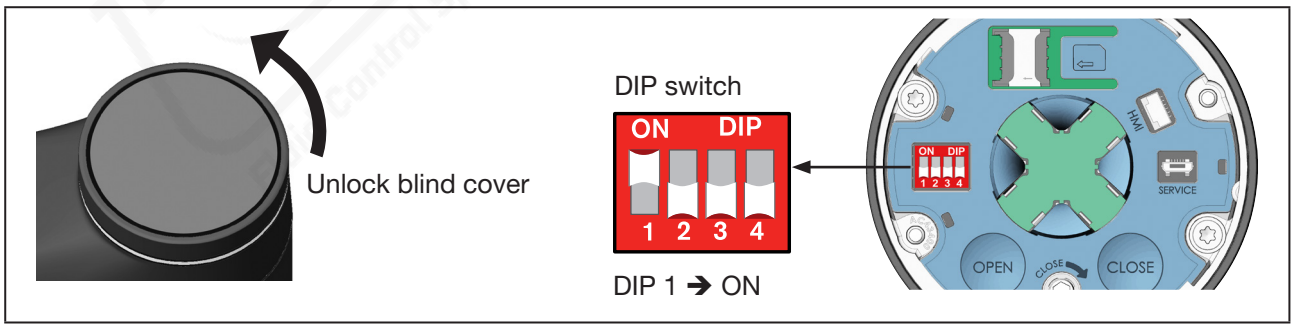

Fig. 63: Change effective direction

→ Close the blind cover.

14.4.2 Changing effective direction in devices with a display module

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

How to switch from the home screen to the detailed view:

→ switch to CONFIGURATION.

→ Select Position controller and confirm selection.

✓ You are now in the “Parameter” detailed view.

How to change the effective direction:

→ Select ADD.FUNCTION and confirm.

→ Select DIR.DMD, enable with the side navigation buttons and confirm.

The device returns to the “Parameter” detailed view.

The menu for changing effective direction DIR.DMD is now enabled and available in the “Parameter” detailed view.

→ In the detailed view select the parameter DIR.CMD and confirm.

→ Select Effective direction Rise or Fall and confirm.

→ Go back with .

✓ You have changed the effective direction.

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14.5 Disabling process control

For devices with a process control function, the process control can be disabled in order to operate the device with the position controller function. The menus that are solely relevant to process control remain visible after disabling, but cannot be used.

Required configuration after disabling process control.
The source for the set-point position must be configured for the positioner function.
Configuration in menu → Inputs/outputs → SP I CMD → CMD.source.

14.5.1 Disabling process control in the device operating menu

The process control is generally disabled in the device operating menu, or via the digital input, büS/ CANopen or fieldbus.

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

Settings are created on the PC using the büS service interface and the “Bürkert Communicator” PC software. It requires the USB büS interface set available as an accessory.

Display operation: button functions

Select, activate	Confirm	Back

To scale process control, switch to the “Parameters” detailed view for process controllers.

How to switch to detailed view:

→ When using Bürkert Communicator for the configuration, select Process Controller in the navigation area.

→ When using the display for the configuration, switch to CONFIGURATION on the home screen and select Process Controller.

✓ You are now in the “Parameter” detailed view.

How to disable process control:

→ Select P.CO.inactive.

→ Select P.CONTROL inactive.

✓ The process control is now disabled. The device is now working with position controller function.

14.5.2 Alternative disabling of process control

Alternatively, the process control can be disabled via the digital input, büS/CANopen or fieldbus. The source must be configured accordingly.

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

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

Selection:

→ Digital (digital input)

→ büS

→ Fieldbus (fieldbus)

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15 MANUAL OVERRIDE OF VALVE

The valve can be manually actuated in various ways:

- Electrically with the OPEN and CLOSE buttons which are located under the blind cover (only on devices without display module), see chapter “15.1” on page 116.
- Electrically using the display on the home screen (only on devices with a display module), see chapter “15.2.1” on page 118.
- Electrically in the AUTO | MANU menu.
  Setting on the display or using the Bürkert Communicator PC software, see chapter “15.3” on page 119.
- Mechanically with the manual override, see chapter “15.4” on page 120.

15.1 Electrical override of valve on devices without a display module

The valve can be electrically actuated in various ways:

- with buttons in the device, see chapter “15.1.1” on page 116.
- Using the Bürkert Communicator PC software in the AUTO I MANU menu.
  For a description, see chapter “15.3” on page 119.

15.1.1 Electrically actuating the valve using keys in the device

ATTENTION!

Diaphragm may be damaged as a result of electrical manual override.

▸ Do not press the CLOSE key while the valve is closed or else the diaphragm may be damaged.

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

The 2 buttons for actuating the valve and for setting the mode are located under the blind cover.

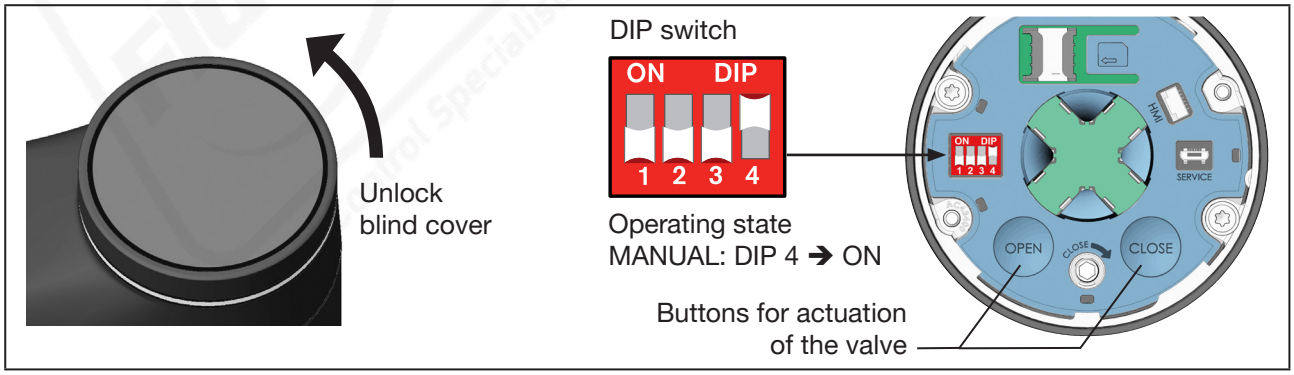

Fig. 64: Set MANUAL operating state and actuate valve

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Remove the blind cover:

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

→ To unlock the blind cover, turn it anticlockwise and remove.

Switch to MANUAL operating state:

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

Change valve position:

→ To open, press the OPEN button

→ To close, press the CLOSE button.
ATTENTION!
Do not press the CLOSE button again while the valve is closed or else the diaphragm may be damaged.

Switch to AUTOMATIC operating state:

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

Close blind cover:

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

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15.2 Electrical override of valve on devices with a display module

The valve can be electrically actuated in various ways:

- using the navigation keys on the display, see chapter “15.2.1” on page 118.
- on the display or with the Bürkert Communicator PC software in the AUTO I MANU menu.
  For a description, see chapter “15.3” on page 119.

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

ATTENTION!

Diaphragm may be damaged as a result of electrical manual override.

- If the valve is closed, do not press the CLOSE navigation button again, or else the diaphragm may be damaged.

The navigation keys for actuating the valve are available in the home screen or in a view. Requirements for actuation of the valve: (see “Fig. 65”):

- View of the display in the ProcessControl layout,
- MANUAL operating state.

Setting the layout:

The layout is set in the context menu: To open the context menu, hold down the menu button.

View 1...).

To access the home screen, hold down the back key.

See also chapter “13.3 Display views” on page 96.

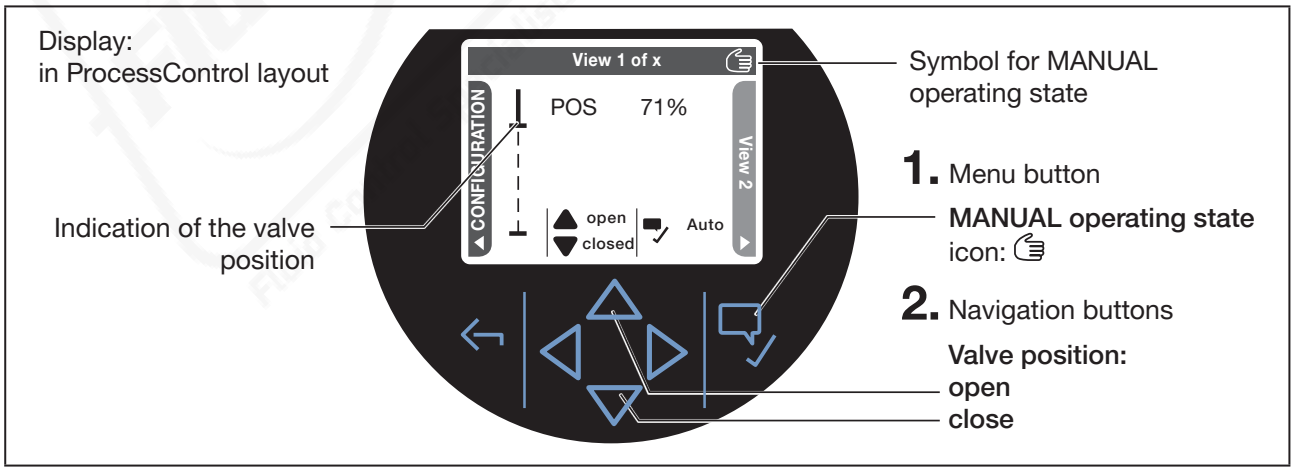

Fig. 65: On the display set the mode and actuate the valve

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Switch to MANUAL operating state:

→ Press the menu button.
In MANUAL operating state the MANUAL icon is visible in the info bar.
The two arrow icons labelled “open” and “close” are displayed. The device’s LED light ring flashes.

Change valve position:

→ To open the valve, press the top navigation key.

→ To close the valve, press the bottom navigation key.
NOTE! If the valve is closed, do not press the CLOSE navigation button again, or else the diaphragm may be damaged.

The valve position is shown on the display (see “Fig. 65”).

Switch to AUTOMATIC operating state:

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

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

ATTENTION!

Diaphragm may be damaged as a result of electrical manual override.

▸ If the valve is closed, do not press the CLOSE arrow again, or else the diaphragm may be damaged.

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

For the setting using the Bürkert Communicator software, the device must be connected to the PC using the büS service interface. It requires the USB-büS-Interface available as an accessory.

Display operation: button functions

Select, activate	Confirm	Back

Actuate the valve with the AUTO | MANU menu:

To configure, you must switch to the detailed view “Maintenance for general settings”.

How to switch to detailed view:

→ When using Bürkert Communicator for the configuration, select General Settings in the navigation area and switch to MAINTENANCE.

→ When using the display for the configuration, switch to CONFIGURATION on the home screen, select General Settings and switch to MAINTENANCE.

✓ You are now in the “Maintenance” detailed view.

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How to open or close the valve:

→ Select AUTO | MANU.

If the device is in AUTOMATIC operating state:

→ Select Manual mode to set MANUAL operating state.
The Manual mode menu for manual actuation of the valve is now available.

→ In the Manual Mode menu, open and close the valve with the arrow keys.
⚠ If the valve is closed, do not press the CLOSE arrow again, or else the diaphragm may be damaged.

15.4 Actuating the valve mechanically

If the supply voltage is not applied, e.g. during installation or in the event of a power failure, the valve position can be changed using the mechanical manual override.

ATTENTION!

Damage to device or diaphragm caused by mechanical manual override.

- ▸ Only use mechanical manual override while in a de-energised state.
- ▸ Carefully close the valve with minimal force to prevent damage to the diaphragm (max. 2 Nm).

15.4.1 Required work steps

Devices without fieldbus gateway:

1. Switch off the supply voltage. Wait until the LED light ring goes out.
2. Remove blind cover or display module, chapter “15.4.3” on page 121.
3. Actuate the valve mechanically, chapter “15.4.5” on page 123.
4. Close blind cover or display module, chapter “15.4.7” on page 124.
5. Connect supply voltage.

Devices with fieldbus gateway:

1. Switch off the supply voltage. Wait until LED illuminated ring goes out.
2. Remove blind cover or display module, chapter “15.4.3” on page 121.
3. Remove fieldbus gateway from actuator, chapter “15.4.4” on page 122.
4. Actuate the valve mechanically, chapter “15.4.5” on page 123.
5. Mount fieldbus gateway on actuator, chapter “15.4.6” on page 124.
6. Close blind cover or display module, chapter “15.4.7” on page 124.
7. Connect supply voltage.

15.4.2 Required tool

- Allen key, width across flats 3 mm

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15.4.3 Remove blind cover or display module

ATTENTION!

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

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

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

Fig. 66: Remove blind cover or display module

→ To unlock, turn the display module or the blind cover counterclockwise and remove.
⚠For devices with display module, take note of the connection cable to the HMI interface.

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15.4.4 Removing the fieldbus gateway from the actuator

Prerequisites:
Supply voltage switched off, blind cover or display module removed.

ATTENTION!

The fieldbus gateway may be removed only when it is deenergised, otherwise the device may be damaged.

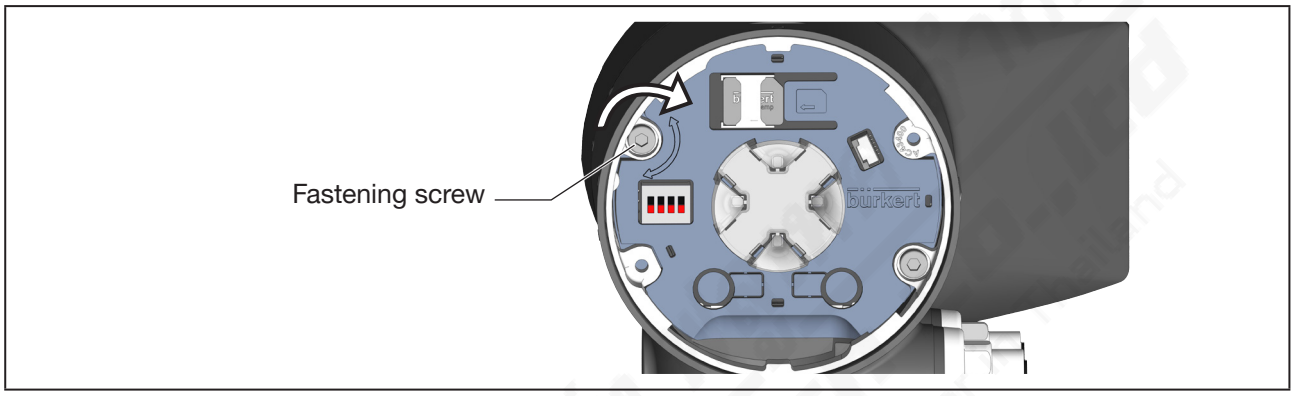

Fig. 67: Remove fieldbus gateway

→ Remove fastening screw (socket head screw, width across flats 3 mm).

ATTENTION!

Caution when removing the fieldbus gateway. Fieldbus gateway and actuator are connected to each other by a cable.

→ To release the fieldbus gateway, turn it counterclockwise and carefully remove it.

→ Disconnect connection cable from the fieldbus gateway.

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15.4.5 Actuating the valve mechanically

Prerequisites:
Supply voltage switched off, blind cover or display module removed. Also for device variant with fieldbus gateway: Fieldbus gateway removed.

ATTENTION!

The mechanical manual override may be used only when it is de-energised, otherwise the device may be damaged.

→ To mechanically override the valve, use an Allen key with 3 mm AF.

ATTENTION!

Maximum torque 2 Nm.
Exceeding this torque value upon reaching the end position of the valve may damage the manual override mechanism.

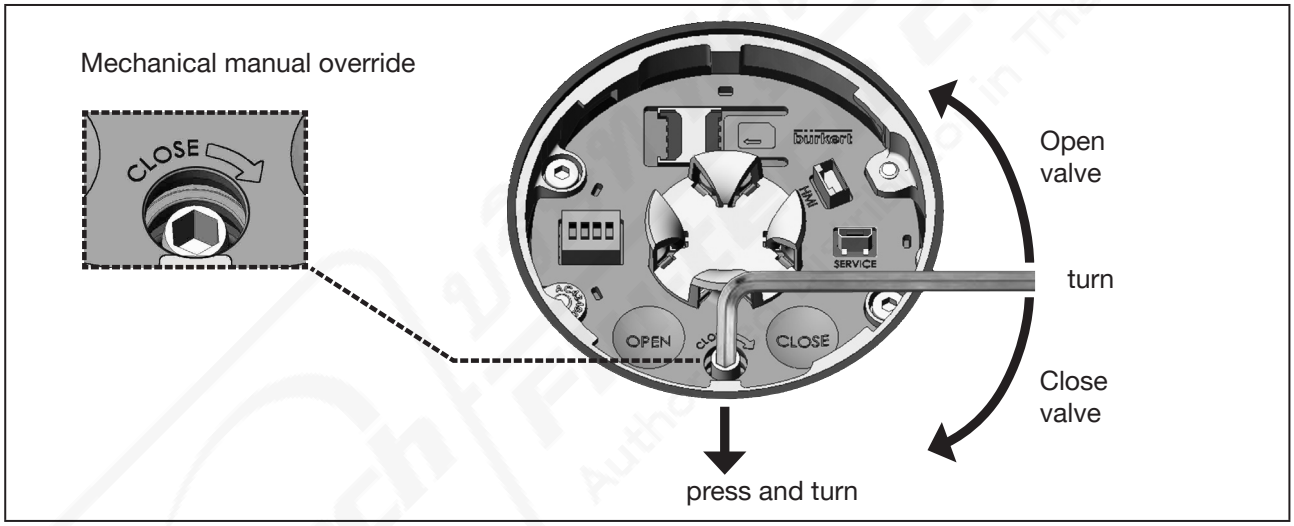

Fig. 68: Mechanical manual override

→ Apply light pressure to lock the mechanical manual override mechanism into place while turning the Allen key at the same time (see „Bild 67“).
⚠ When closing the valve:
Carefully close the valve with minimal force to prevent damage to the diaphragm.

→ Move the valve to the desired position.
“Fig. 68”⚠ Maximum torque 2 Nm.
- ⚠Turn counterclockwise to open.
- Turn clockwise to close.

→ Once the desired valve position is achieved, remove the Allen key.
The mechanical manual override mechanism will disengage automatically.

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15.4.6 Mounting the fieldbus gateway on the actuator

Prerequisites: supply voltage switched off.

ATTENTION!

The fieldbus gateway may be mounted only when it is deenergised, otherwise the device may be damaged.

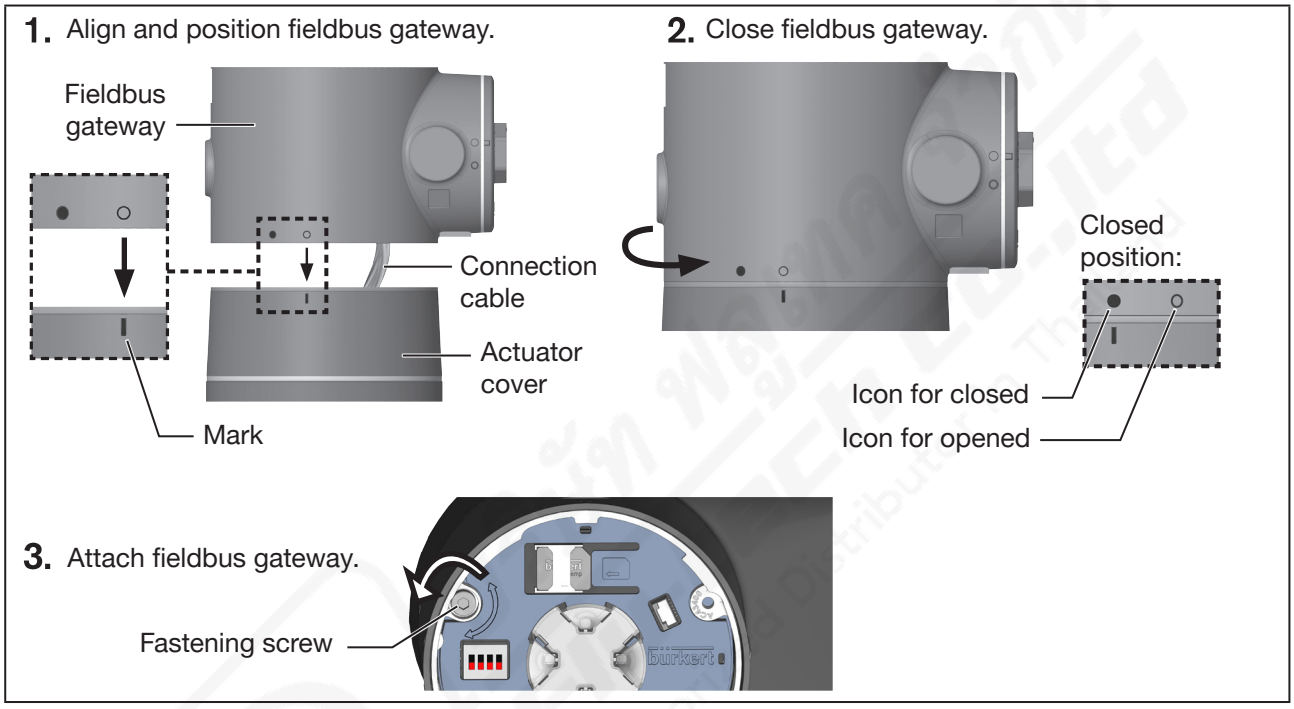

Fig. 69: Mounting fieldbus gateway:

→ Insert connection cable into the actuator on the fieldbus gateway.

→ Align and position fieldbus gateway on the actuator cover.
Centre the icon for opened over the mark on the actuator.

→ Manually turn fieldbus gateway clockwise until the icon for closed is positioned over the mark.

→ Tighten fastening screw (socket head screw, width across flats 3 mm).
Observe the tightening torque of 1.1 Nm!

15.4.7 Close the blind cover or display module

Devices with ATEX approval or IECEx approval are secured with a magnetic lock.
Closing the cover is described in the supplementary instructions for the electromotive control valves with ATEX approval and IECEx approval.

ATTENTION!

For devices with display module
Before mounting the display, check whether the cable is correctly connected to the HMI interface.

→ Mount display module or the blind cover and turn it clockwise until the 2 marks are vertically aligned.
Vertical lines are affixed as marks to the display module, blind cover and actuator.

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16 ADVANCED FUNCTIONS

The functions for special control tasks and their configuration are described in a separate software description. These can be found, with specification on our homepage: www.Buerkert.de

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17 OPERATING STRUCTURE AND FACTORY SETTING

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

Examples: ◉ / ☒ Factory-enabled or selected menu options
○ / ☐ Factory-disabled or unselected menu options
2%, *10 sec*, ... Factory-set values

17.1 Operating structure of the configuration area

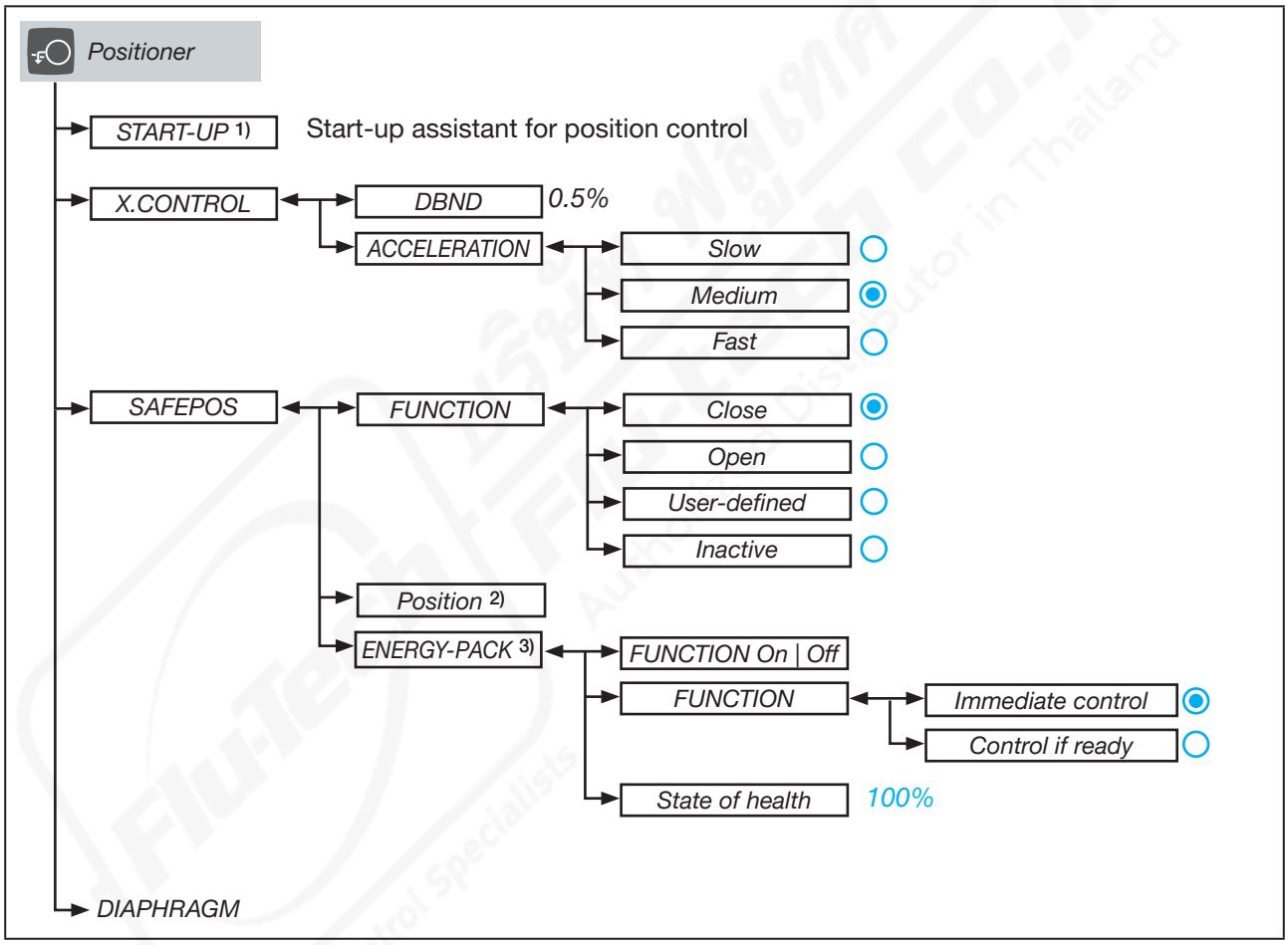

Fig. 70: Operating structure – 1-a, "Positioner" configuration area

1) Only available in devices without process controller function

2) Only available if selected in the menu SAFEPOS → FUNCTION → User-Defined.

3) Only available in devices with energy storage system SAFEPOS energy-pack (option).

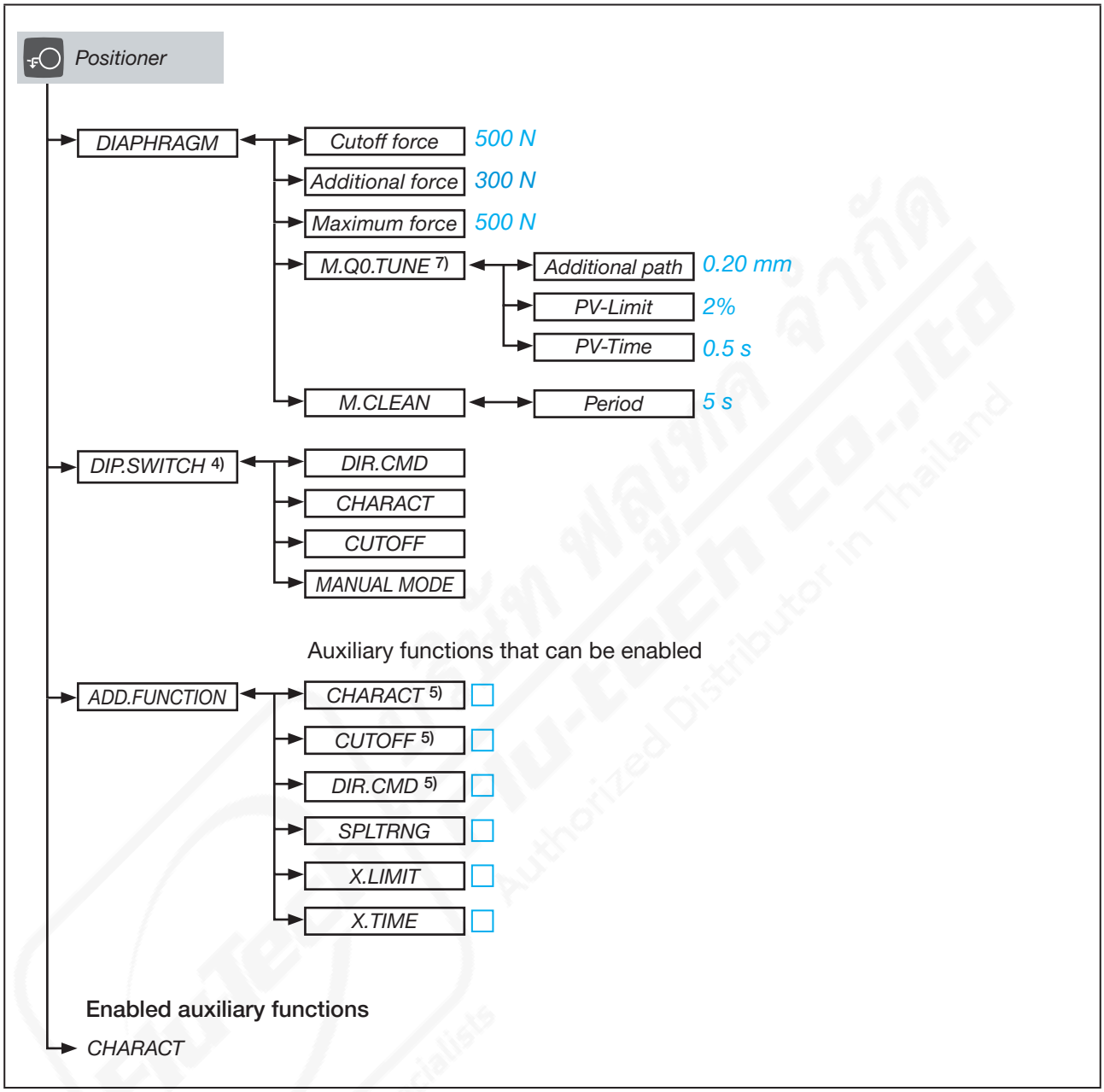

Fig. 71: Operating structure – 1-b, "Position controller" configuration area

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4) Only available in the Bürkert Communicator software for devices without a display module.

5) For devices without a display module, the menu is not enabled with ADD.FUNCTION but rather on the DIP switch of the device

7) Only available in devices with process control function.

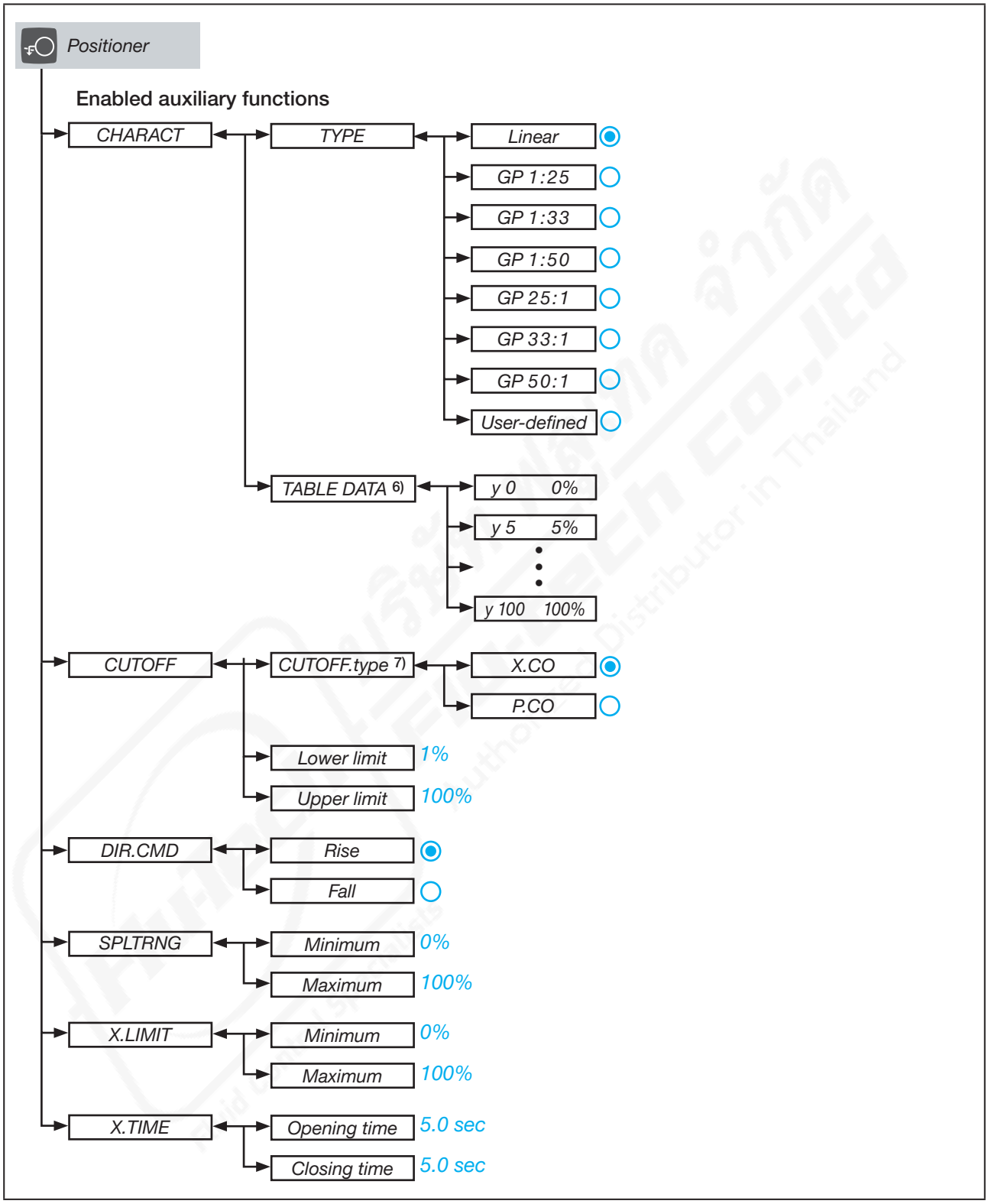

Fig. 72: Operating structure – 1-c, "Position controller" configuration area

6) Only available if selected in the menu CHARACT → TYPE → User-Defined.

7) Only available in devices with process control function.

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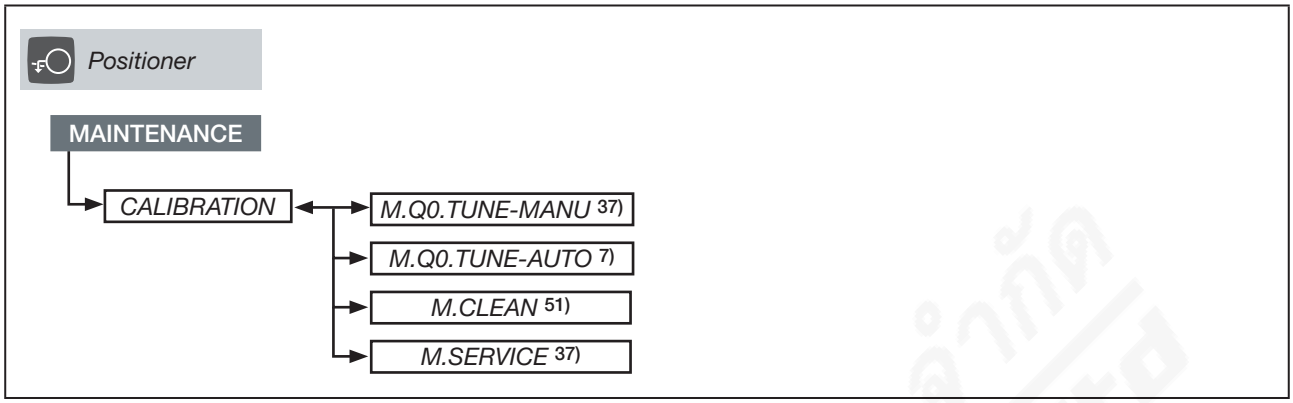

Fig. 73: Operating structure – 1-d, position controller maintenance

7) Only available in devices with process control function.

37) Only available on display.

51) Not available if the setting is made via the digital input. Setting: Inputs/outputs → DIGITAL IN → M.CLEAN.source.

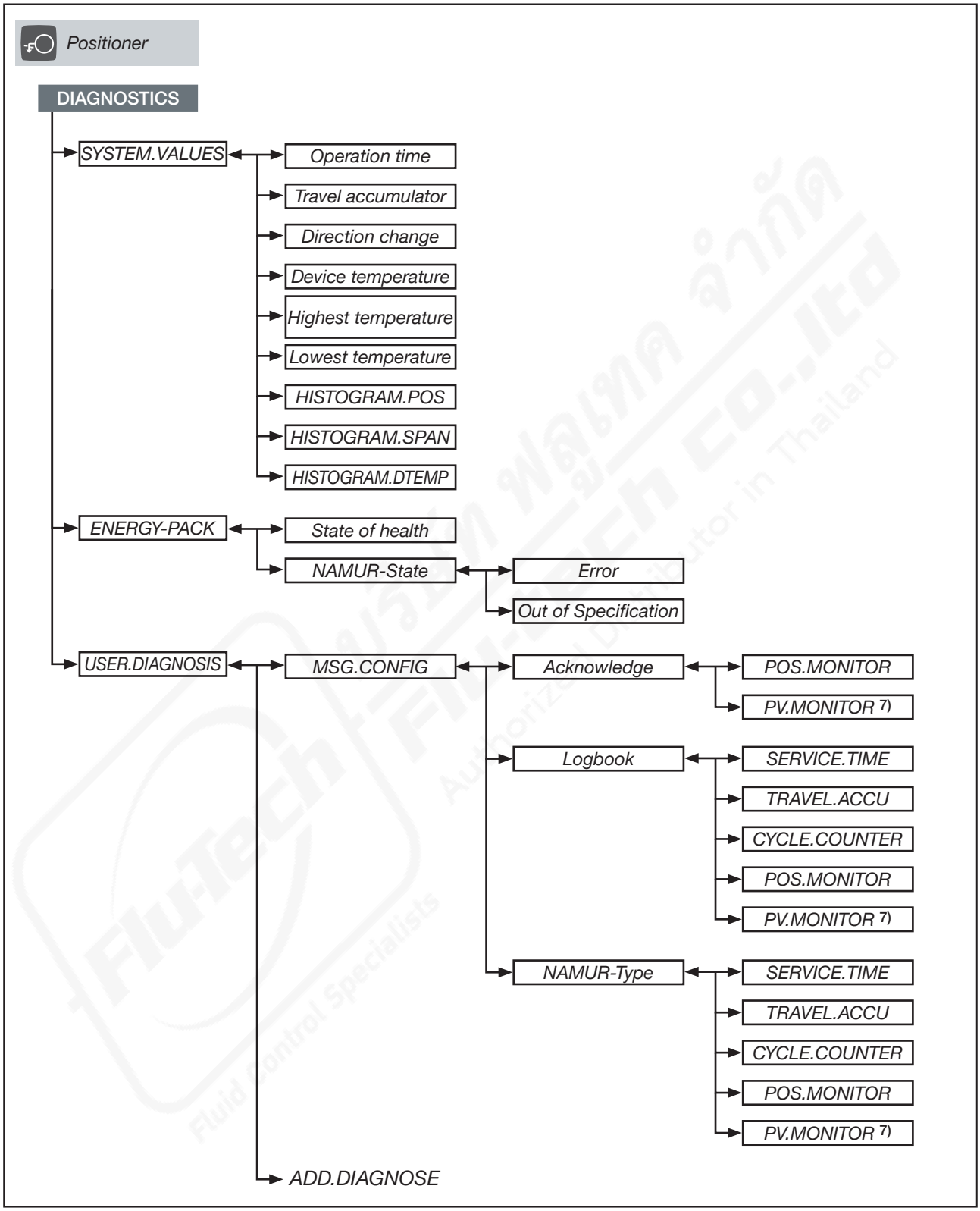

Fig. 74: Operating structure – 1-e, position controller diagnostics

7) Only available in devices with process control function.

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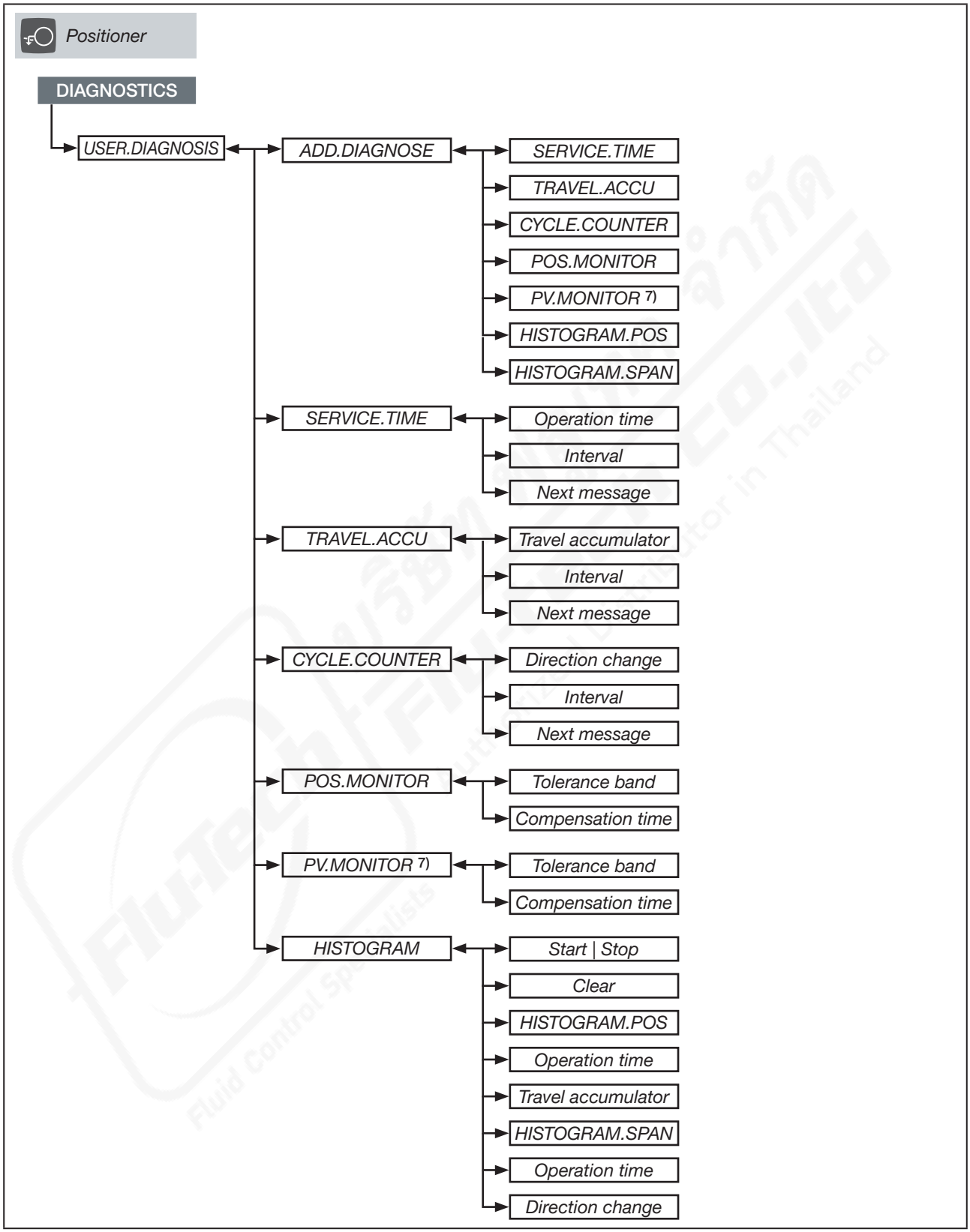

Fig. 75: Operating structure – 1-f, position controller diagnostics

7) Only available in devices with process control function.

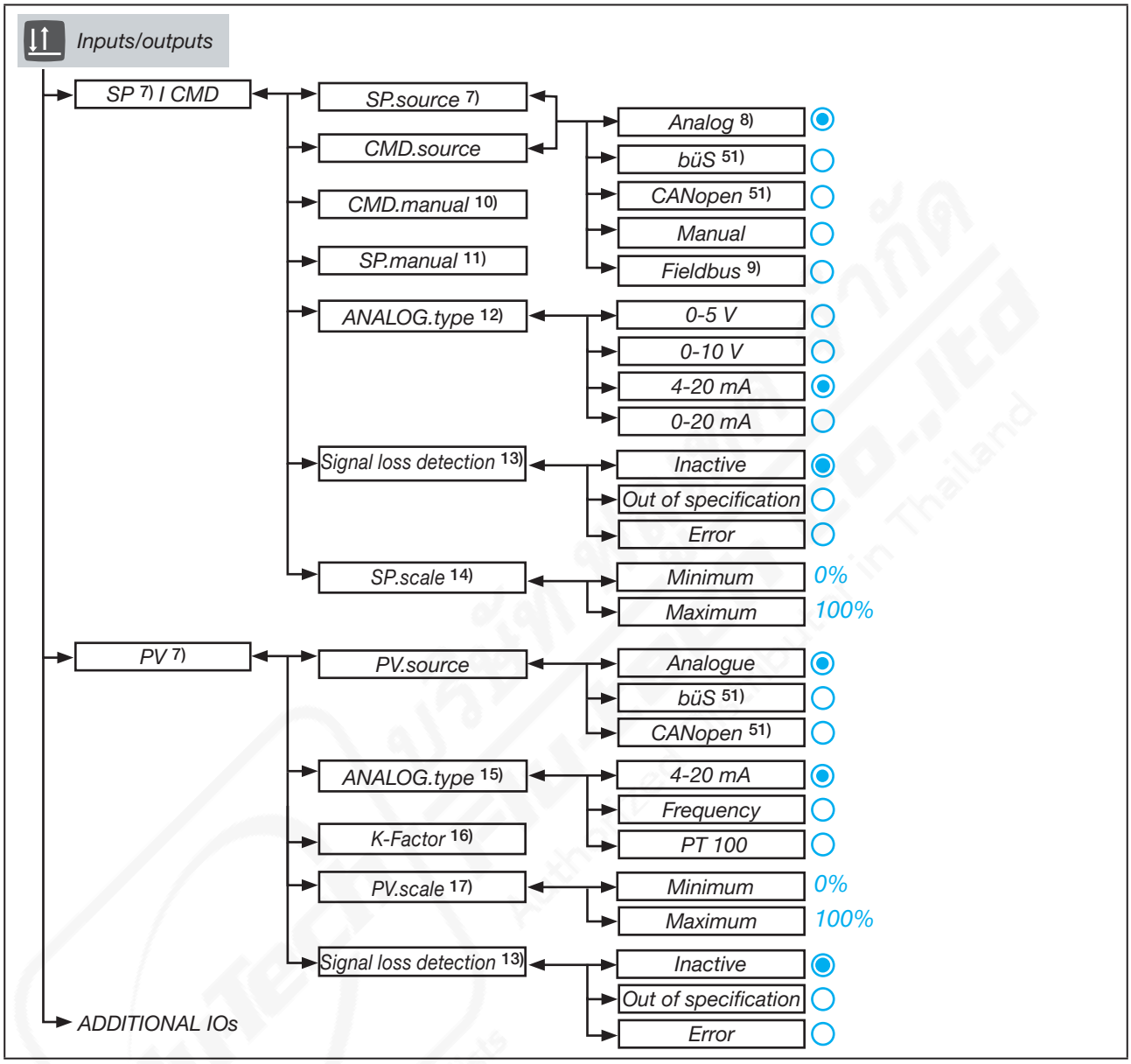

Fig. 76: Operating structure – 2-a, "Inputs/outputs" configuration area

7) Only available in devices with process control function.

8)Not available in devices with gateway option.

9) Only available in devices with gateway option.

10) Only available if selected in the menu CMD.source → Manual.

11) Only available in devices with process control function if selected in menu SP I CMD → SP.source → Manual.

12) Only available if selected in the menu CMD.source or in menu SP.source → Analog.

13) Only available if selected in submenu → ANALOG.type → 4–20 mA.

14) Only available in devices with process control function if selected in menu SP I CMD → SP.source → Analog.

15) Only available if selected in the menu PV.source → Analog.

16) Only available if selected in the menu PV → Analog.type → Frequency.

17) Only available if selected in the menu PV → Analog.type → 4–20 mA.

51) Only available in devices with corresponding protocol.

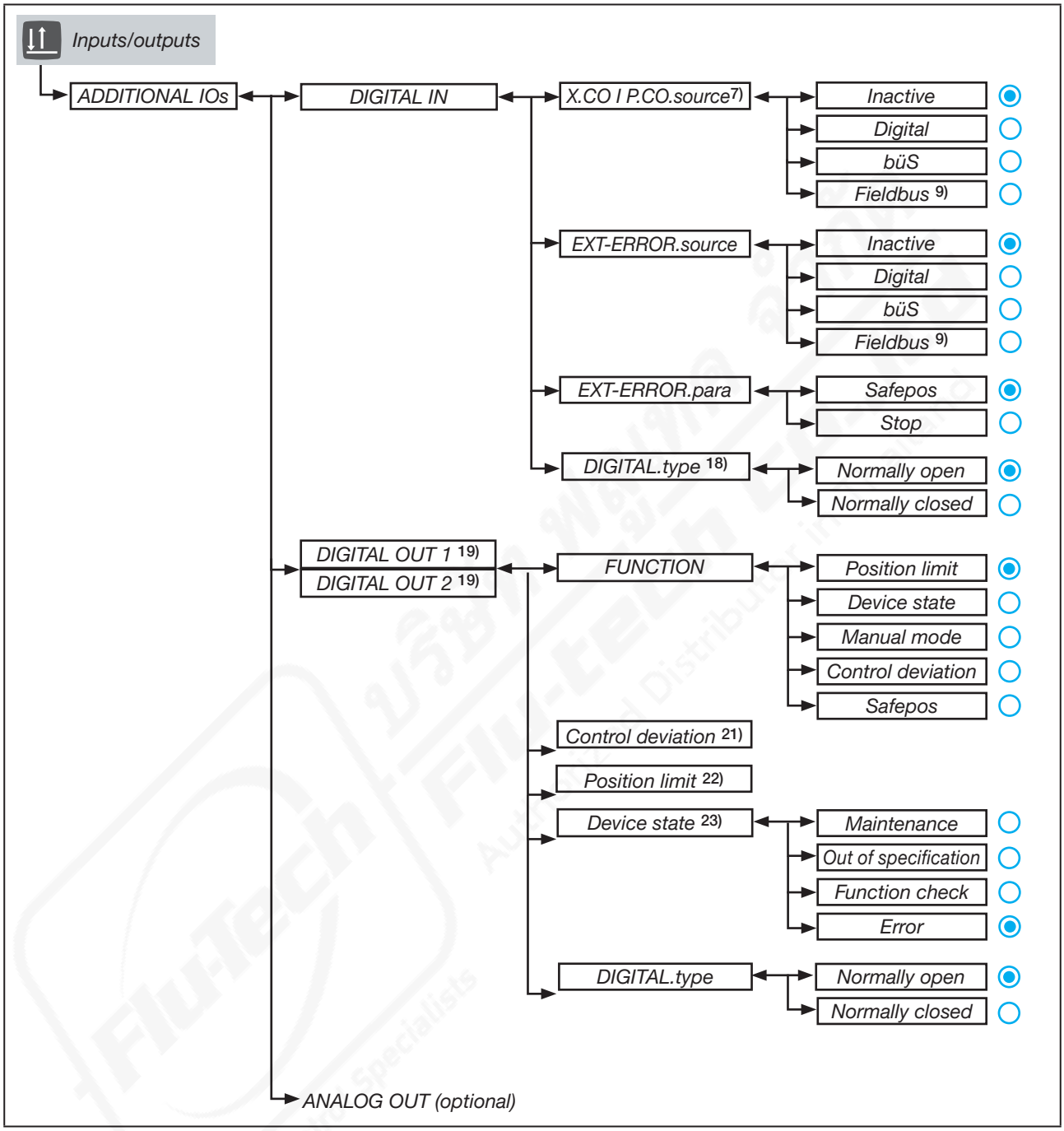

Fig. 77: Operating structure – 2-b, "Inputs/outputs" configuration area

7) Only available in devices with process control function

9) Only available in devices with gateway option.

18) Only available if selected in the menu ADDITIONAL IO's → DIGITAL IN → X.CO I P.CO.source or EXT-ERROR.source → Digital .

19) Only available in devices with digital output option.

21) Only available if selected in submenu FUNCTION → Control Deviation.

22) Only available if selected in submenu FUNCTION → Position Limit.

23) Only available if selected in submenu FUNCTION → Device State.

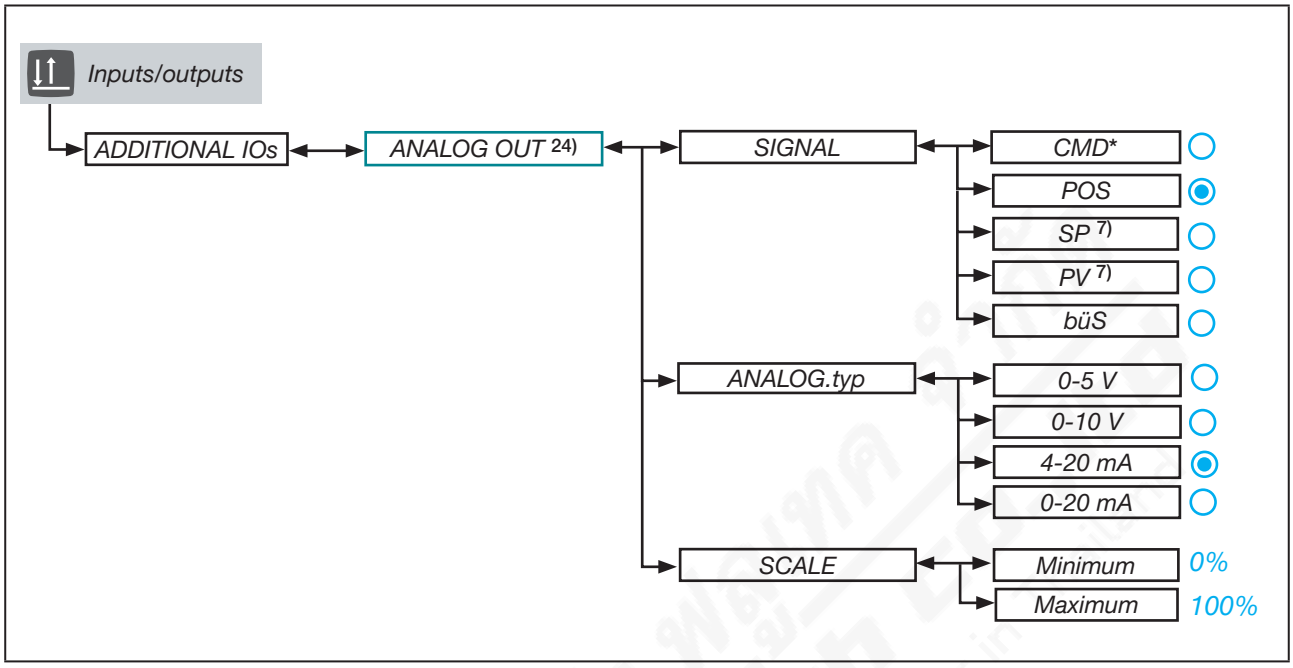

Fig. 78: Operating structure – 2-c, "Inputs/outputs" configuration area

7) Only available in devices with process control function.

24) Only available in devices with analogue output option.

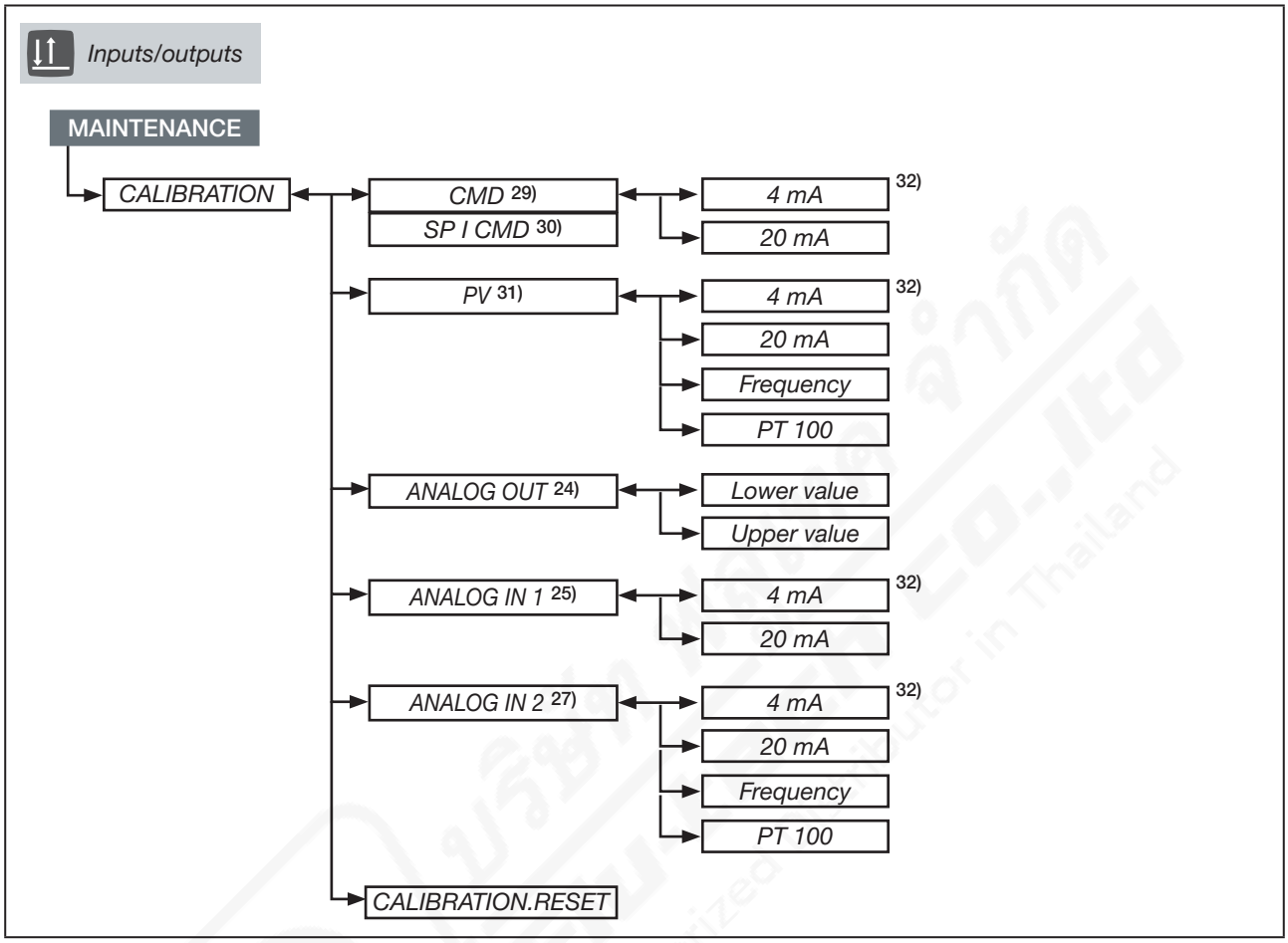

Fig. 79: Operating structure – 2-d, inputs/outputs maintenance

Industrial communication

The “Industrial Communication” configuration area is only available in devices equipped with a fieldbus gateway.
The Industrial Communication menu is described in the separate software manual.

Download at: www.burkert.com / Type 3363 / Downloads “Operating instructions” / Software manual Type 3360, 3361, 3363....

Fig. 80: Operating structure – 3, Industrial communication

24) Only available in devices with analogue output option.

25) Only available in devices with position controller function if selected in menu CMD → CMD.source → büS or Manual.

in devices with position controller function if selected in menu SP I CMD → CMD.source and SP.source → büS or Manual. Not available in devices with gateway option.

27) Only available in devices with process control function if selected in menu PV → PV.source → büS.

29) Only available in devices with position controller function if selected in menu CMD → CMD.source → Analog.

30) Only available in devices with process control function if selected in menu SP I CMD → CMD.source or SP.source → Analog.

31) Only available in devices with process control function if selected in menu PV → PV.source → Analog.

32) The display depends on the set input signal → Inputs/outputs → Menu ANALOG.type or TYPE.

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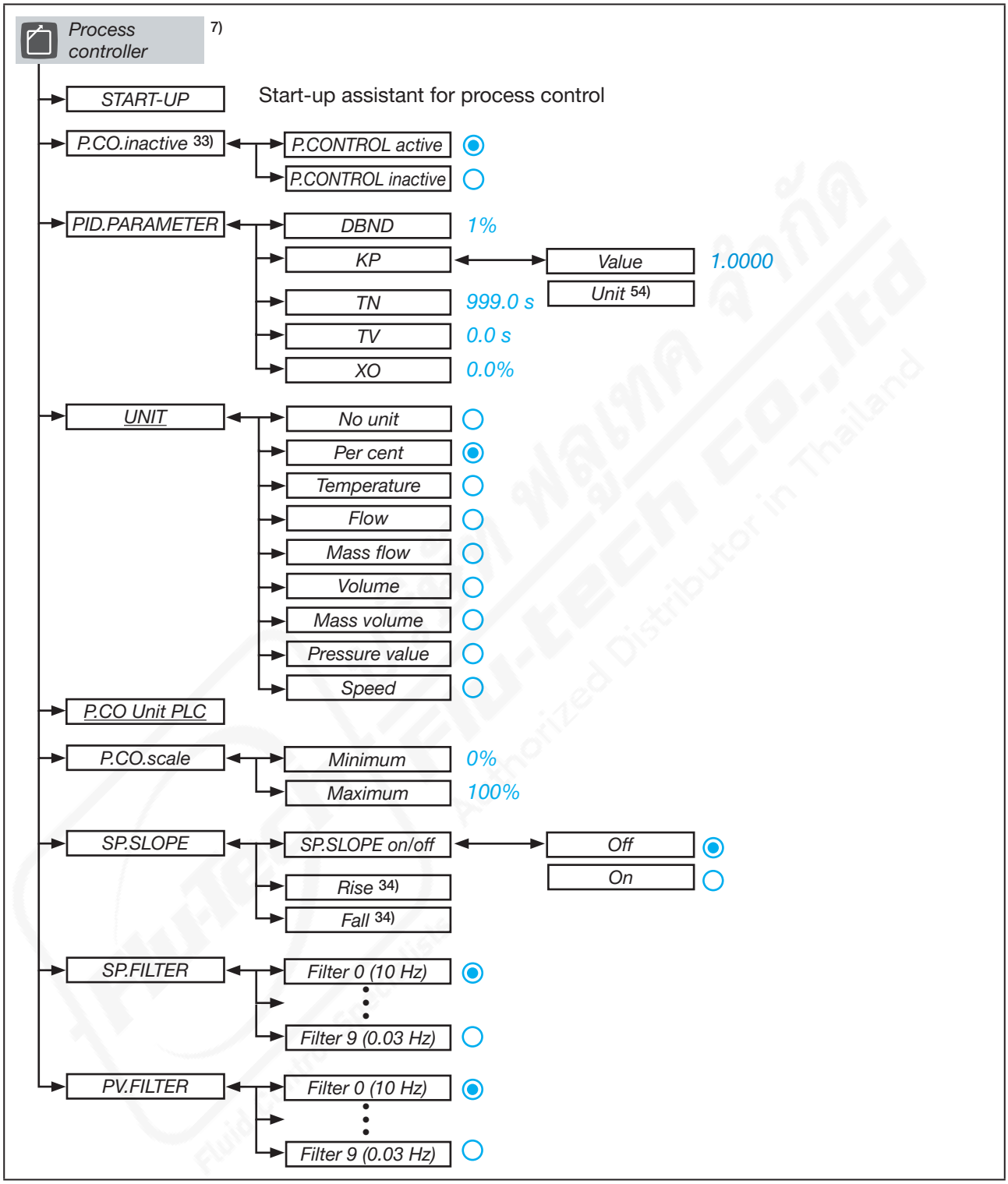

Fig. 81: Operating structure – 3-a, "Process controller" configuration area

7) Only available in devices with process control function.

33) Not available if the setting is made via the digital input, büS/CANopen or fieldbus. Setting: Inputs/outputs → DIGITAL IN → X.CO I P.CO.source.

34) Only available if selected in the menu SP.SLOPE → SP.SLOPE on/off → On.

54) Not available if selected in menu UNIT → No unit or per cent.

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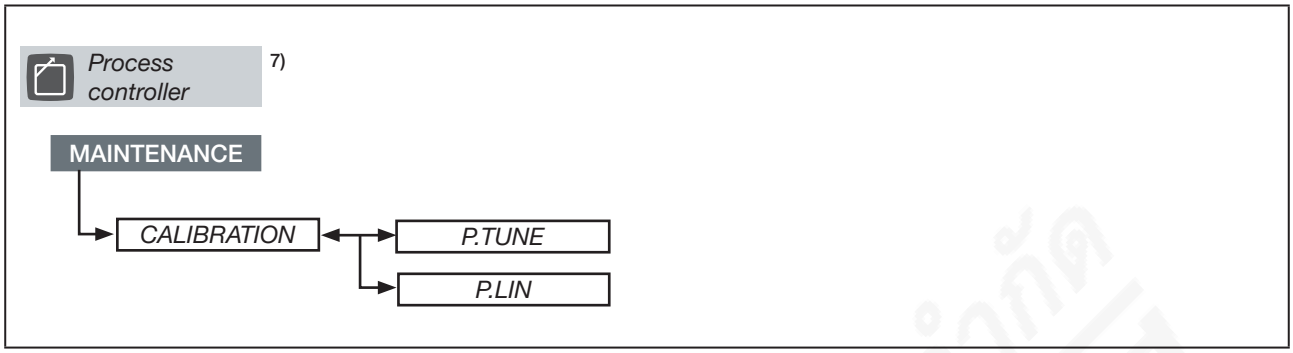

Fig. 82: Operating structure – 3-b, process controller maintenance

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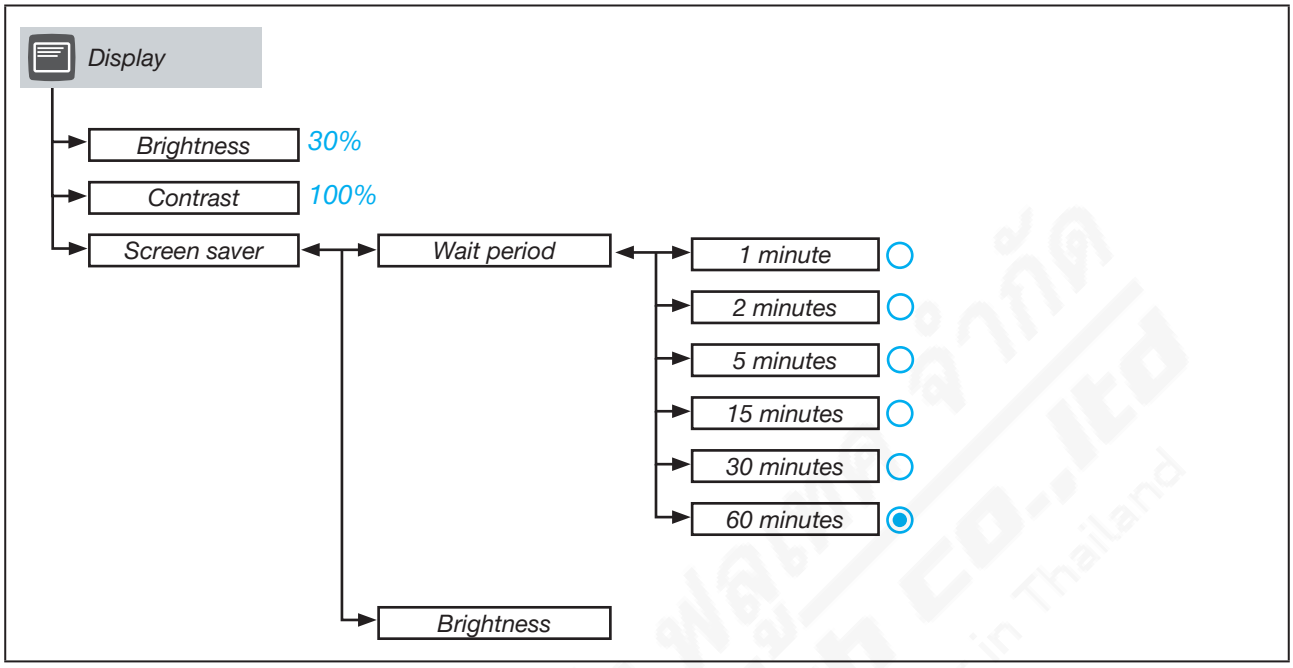

Fig. 83: Operating structure – 4-a, "Display" configuration area

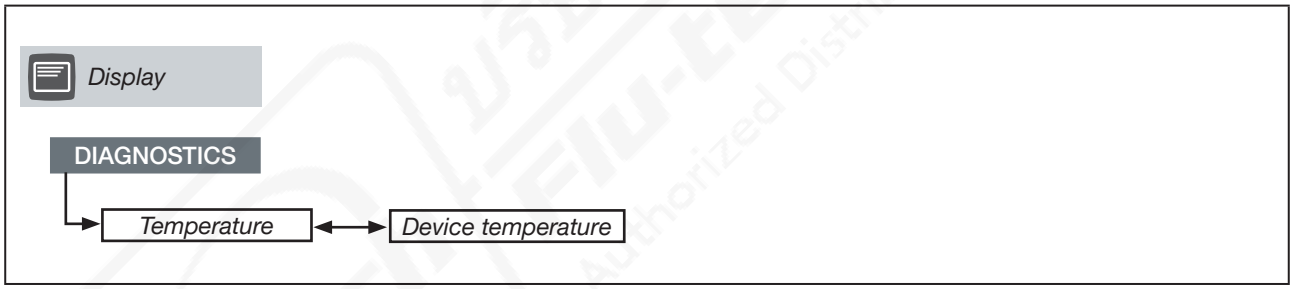

Fig. 84: Operating structure – 4-b, diagnostics display

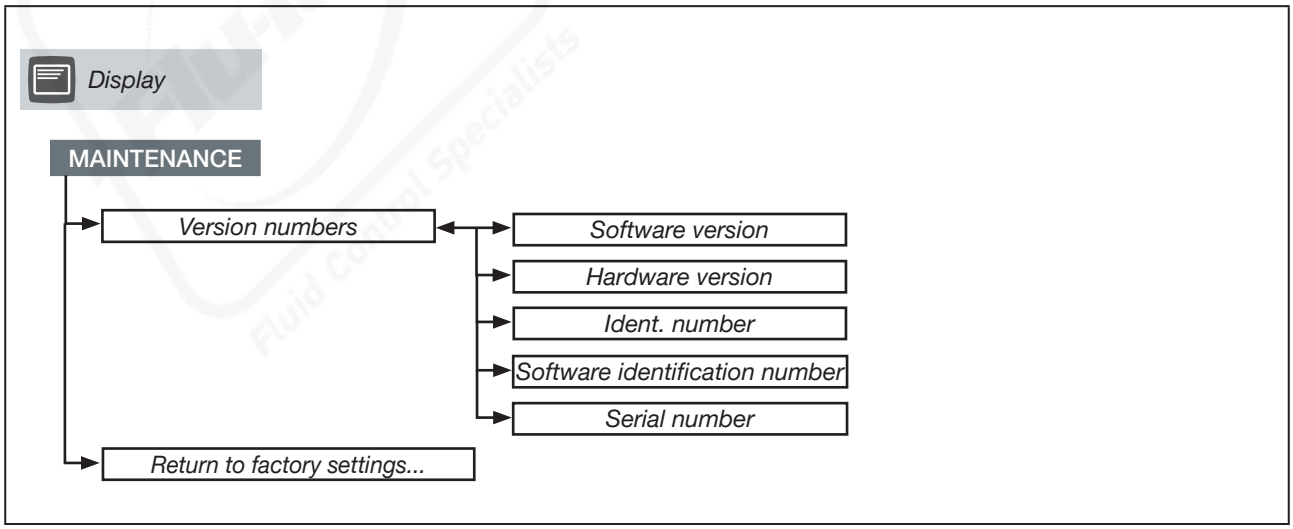

Fig. 85: Operating structure – 4-c, maintenance display

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MAN 1000302829 EN Version: G Status: RL (released | freigegeben) printed: 19.07.2024

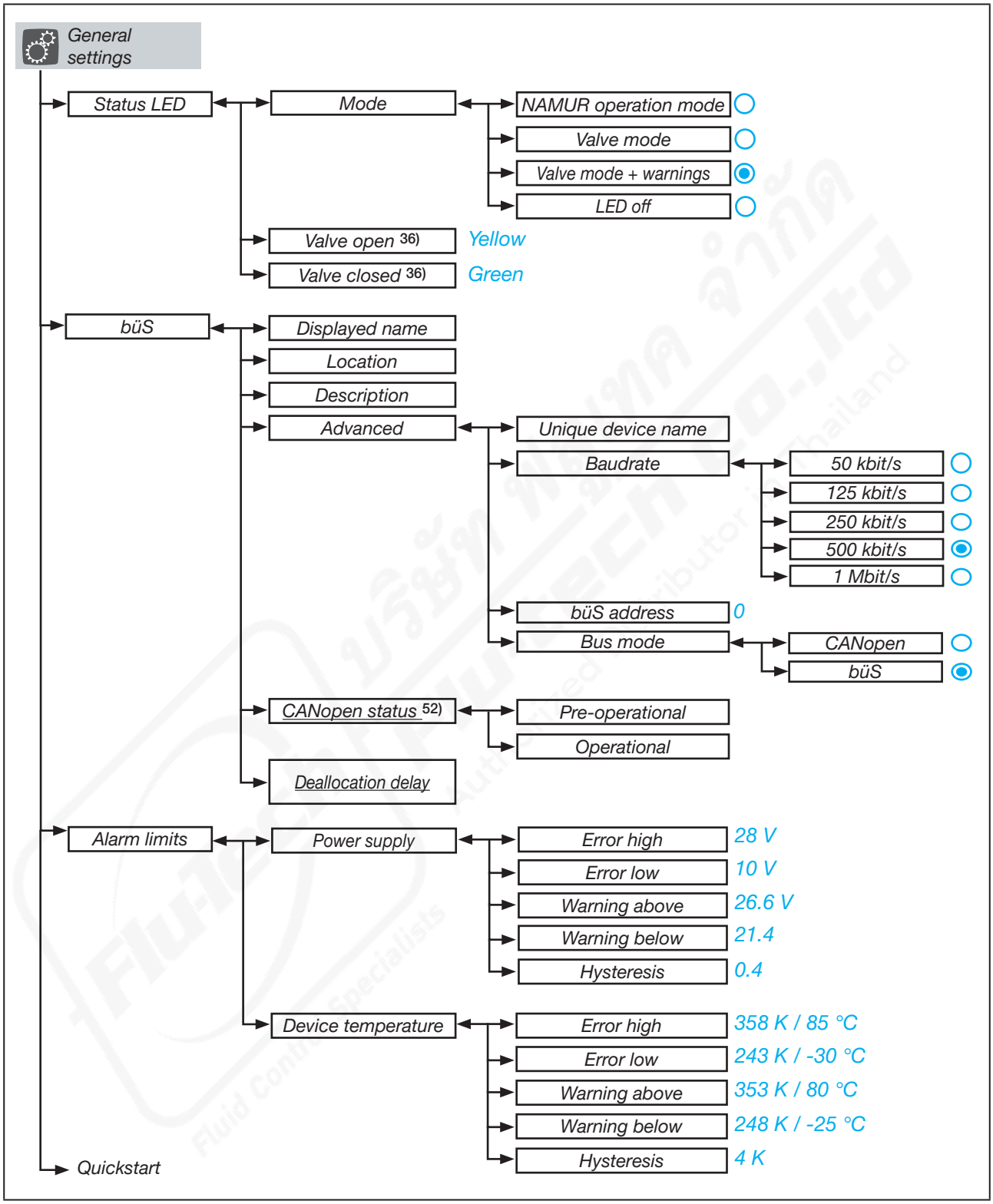

Fig. 86: Operating structure – 5-a, configuration area “General settings”

36) Only available if selected in the menu Operation mode → Valve mode or Valve mode+warnings.

52) Only available if selected in the menu Bus operation mode → CANopen.

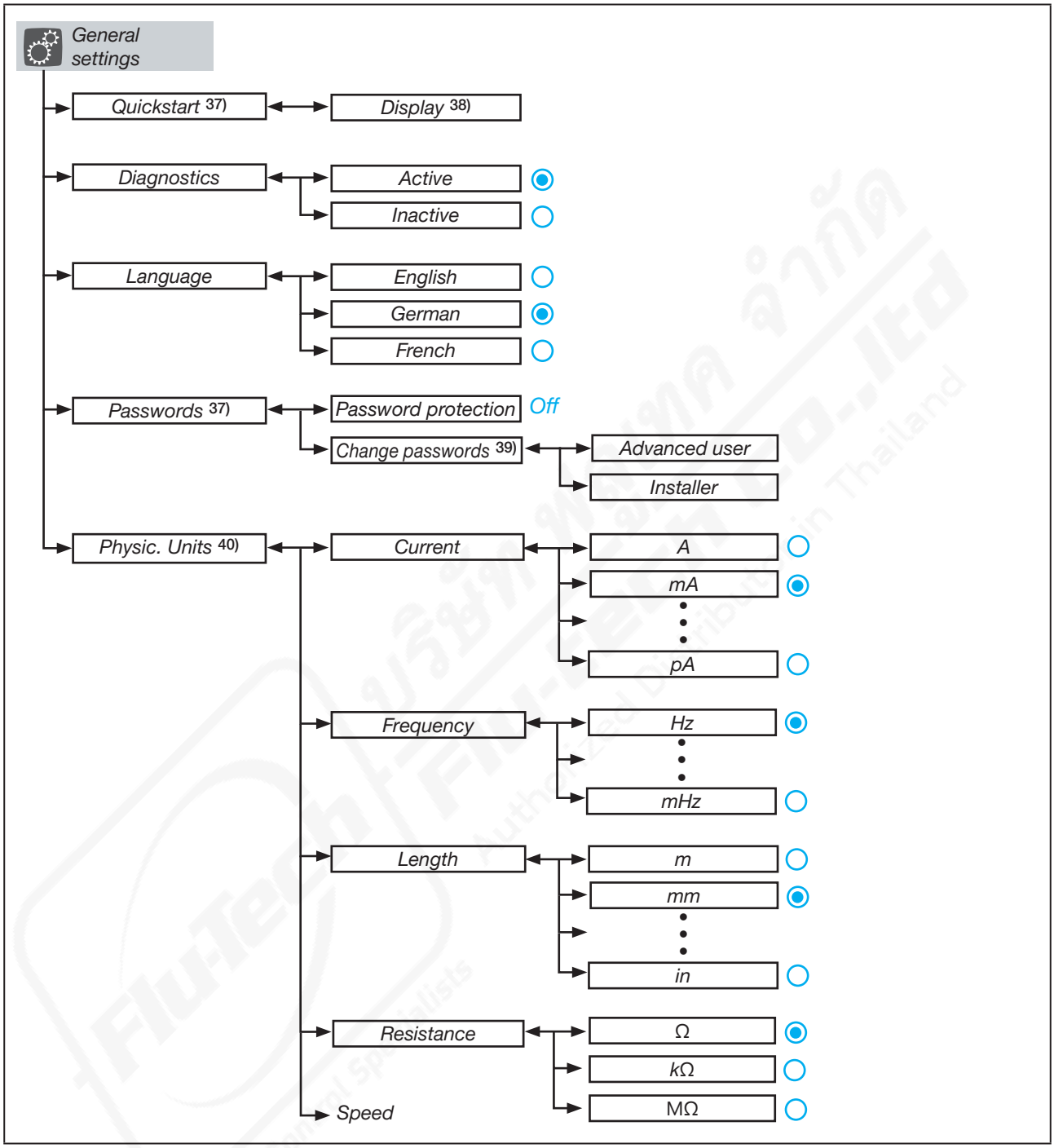

Fig. 87: Operating structure – 5-b, configuration area "General settings"

37) Only available on display.

38) The menu name depends on the selected language.

39) Only available if selected in the menu **Password protection** → **On**.

40) Only available on display.
The setting in the Communicator software is made in the menu bar **View** → **Unit system**.

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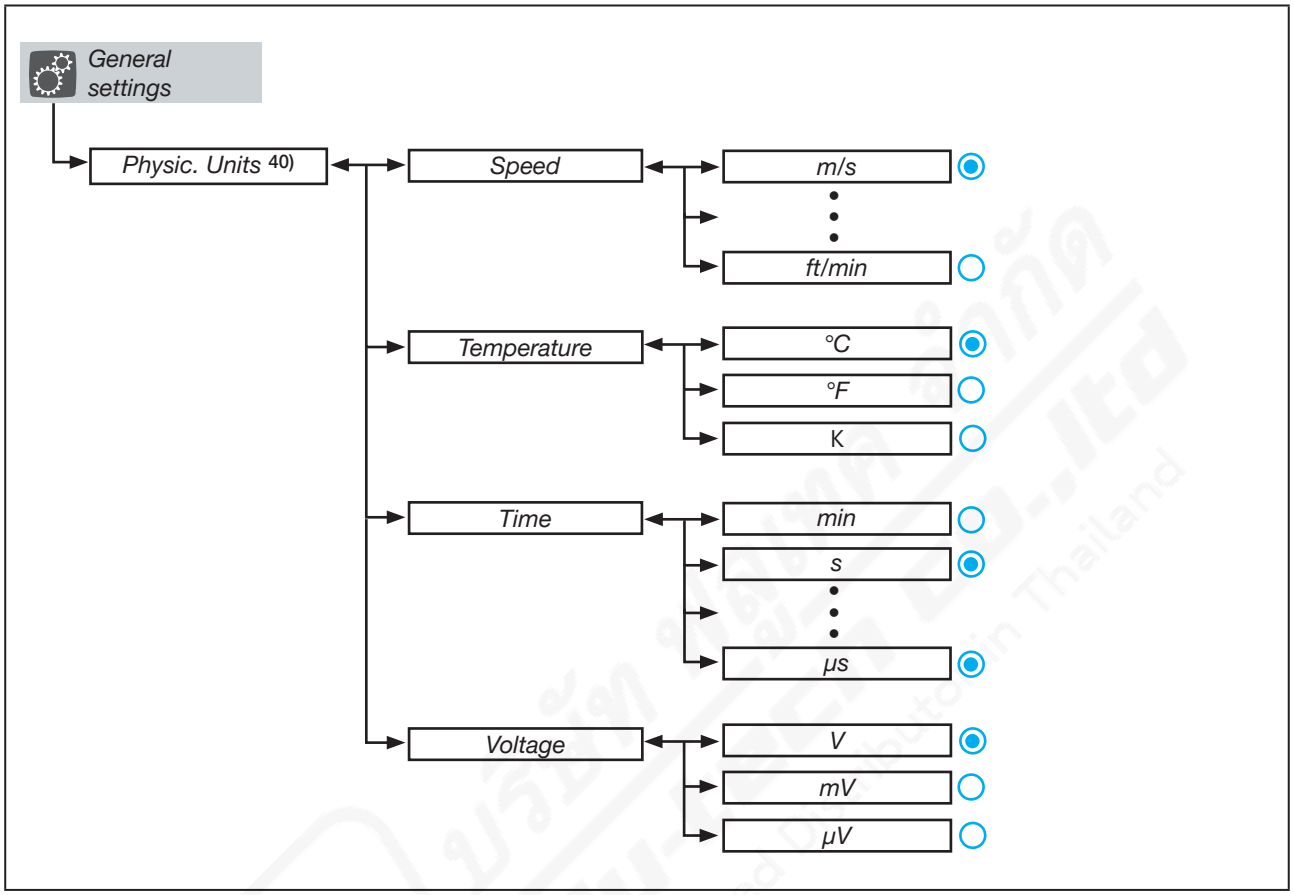

Fig. 88: Operating structure – 5-c, configuration area “General settings”

40) Only available on display.
The setting in the Communicator software is made in the menu bar **View** → **Unit system**.

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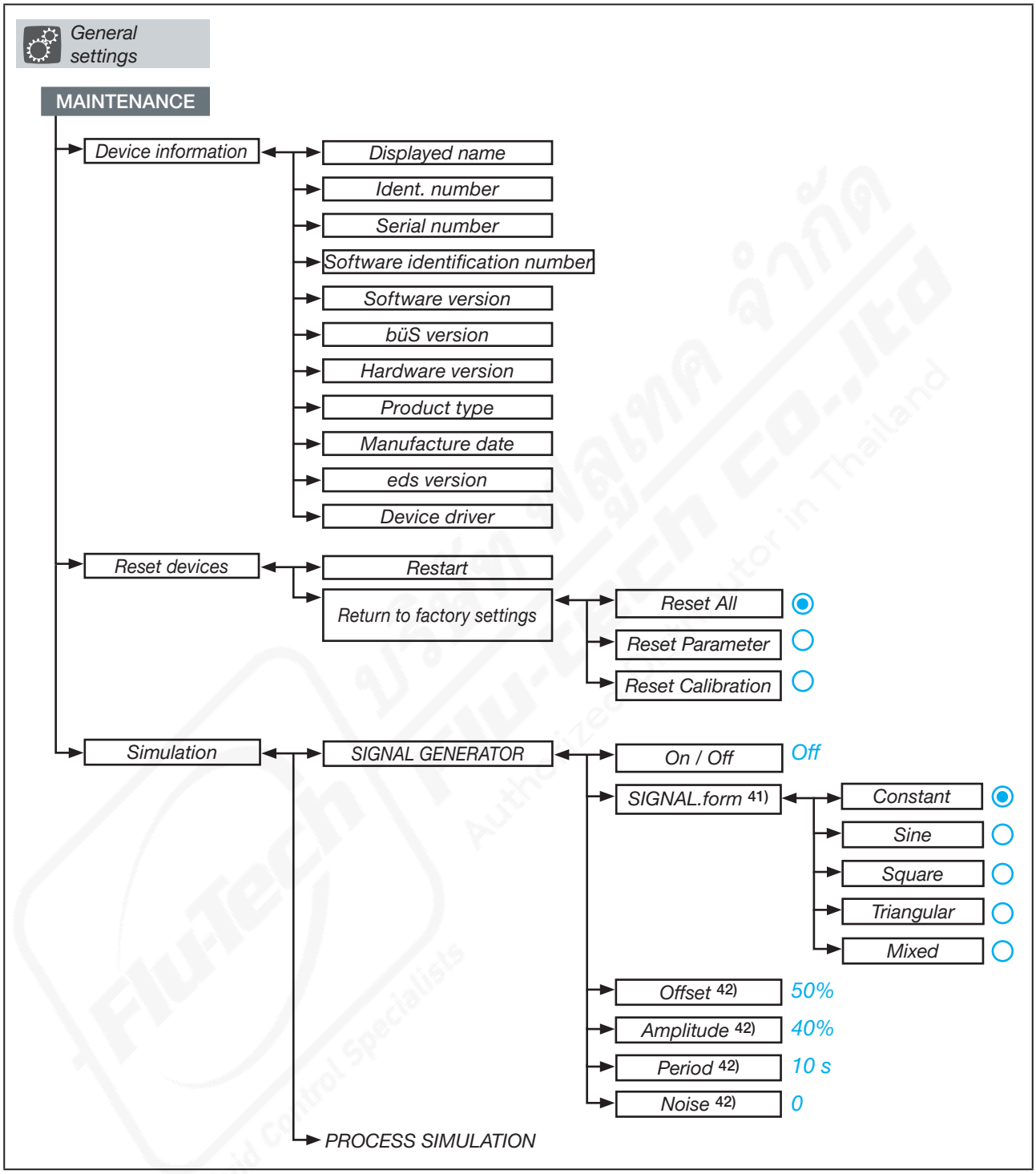

Fig. 89: Operating structure – 5-d, general settings maintenance

41) Only available if selected in the menu SIGNAL GENERATOR → on I off → On.

42) The display depends on the selection in the menu SIGNAL.form.

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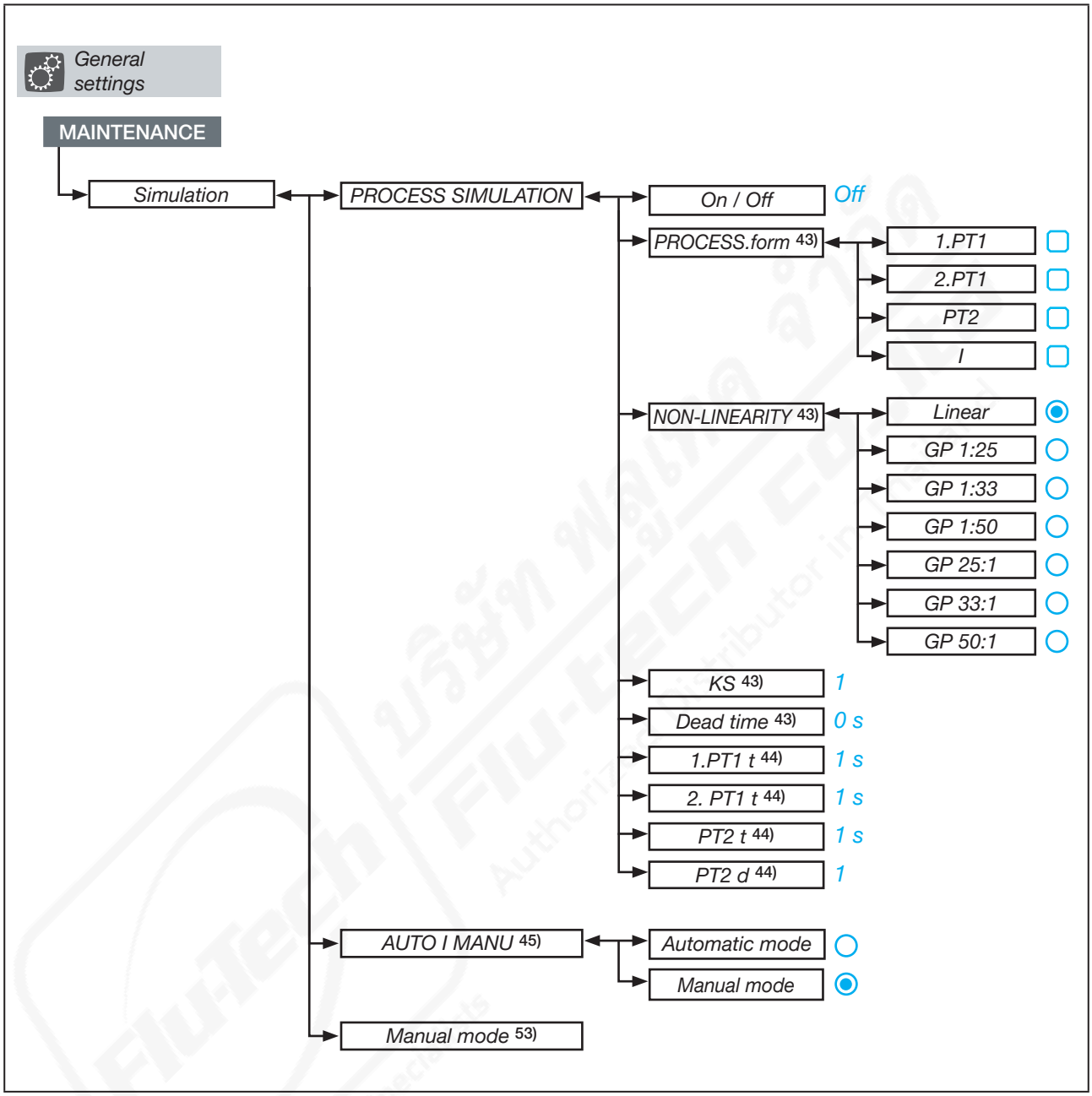

Fig. 90: Operating structure – 5-d, general settings maintenance

43) Only available if selected in the menu PROCESS SIMULATION → on I off → On.

44) Display depends on selection in menu PROCESS.form.

45) Only available in devices with display module.

53) Only available in devices with display module and if selected in menu AUTO I MANU → Manual mode.

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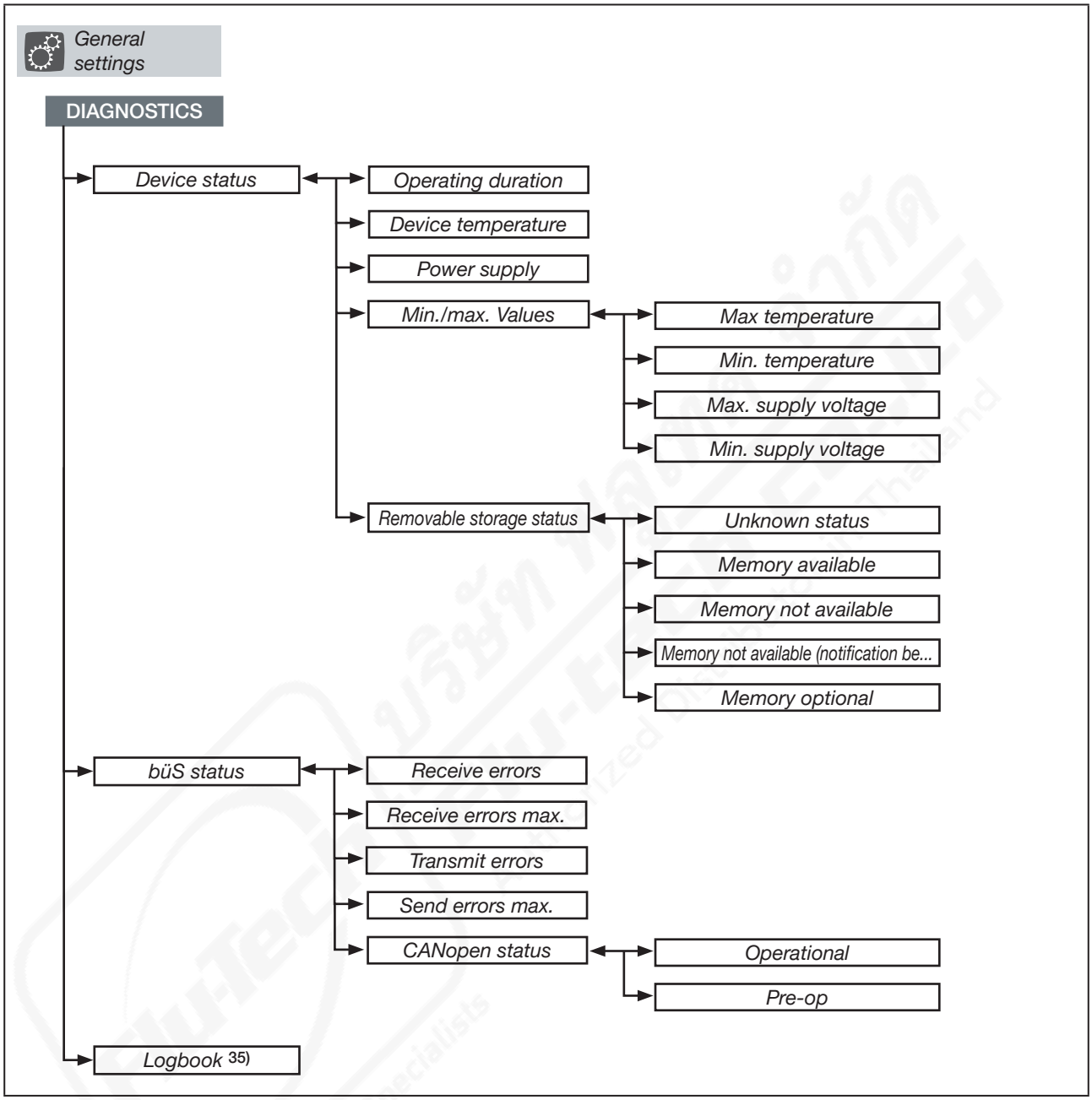

Fig. 91: Operating structure – 5-f, general settings diagnostics

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35) Only available in the Bürkert Communicator PC software.

17.2 Context menu for operation on display

The context menu is only available on the display in the operating structure shown.

In the Bürkert Communicator PC software, the partially identical menus are integrated differently into the operating structure.

A detailed description of the Bürkert Communicator PC software can be found in the respective operating instructions. **Download at:** www.burkert.com / Communicator

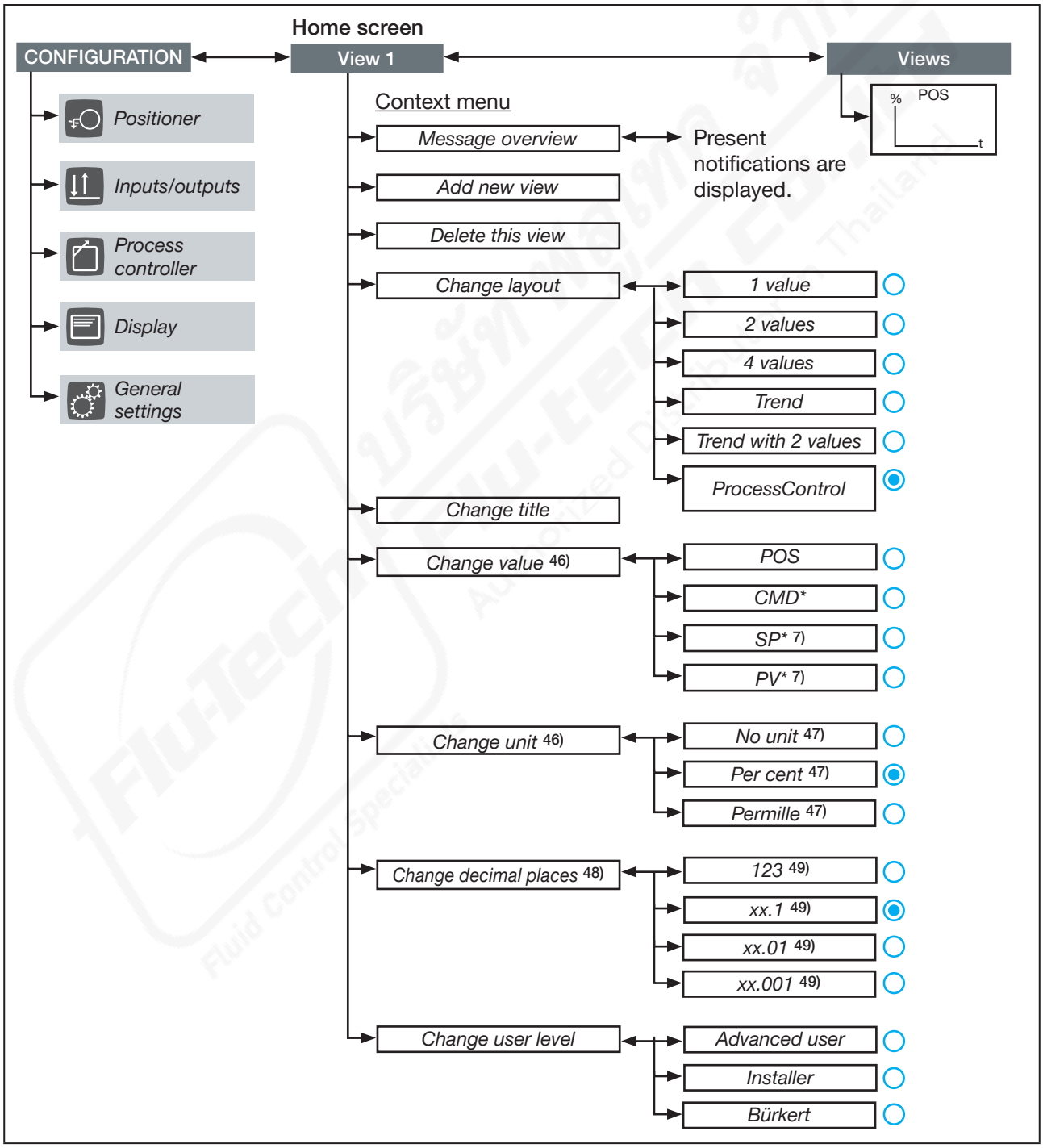

Fig. 92: Operating structure – 6, context menu for views

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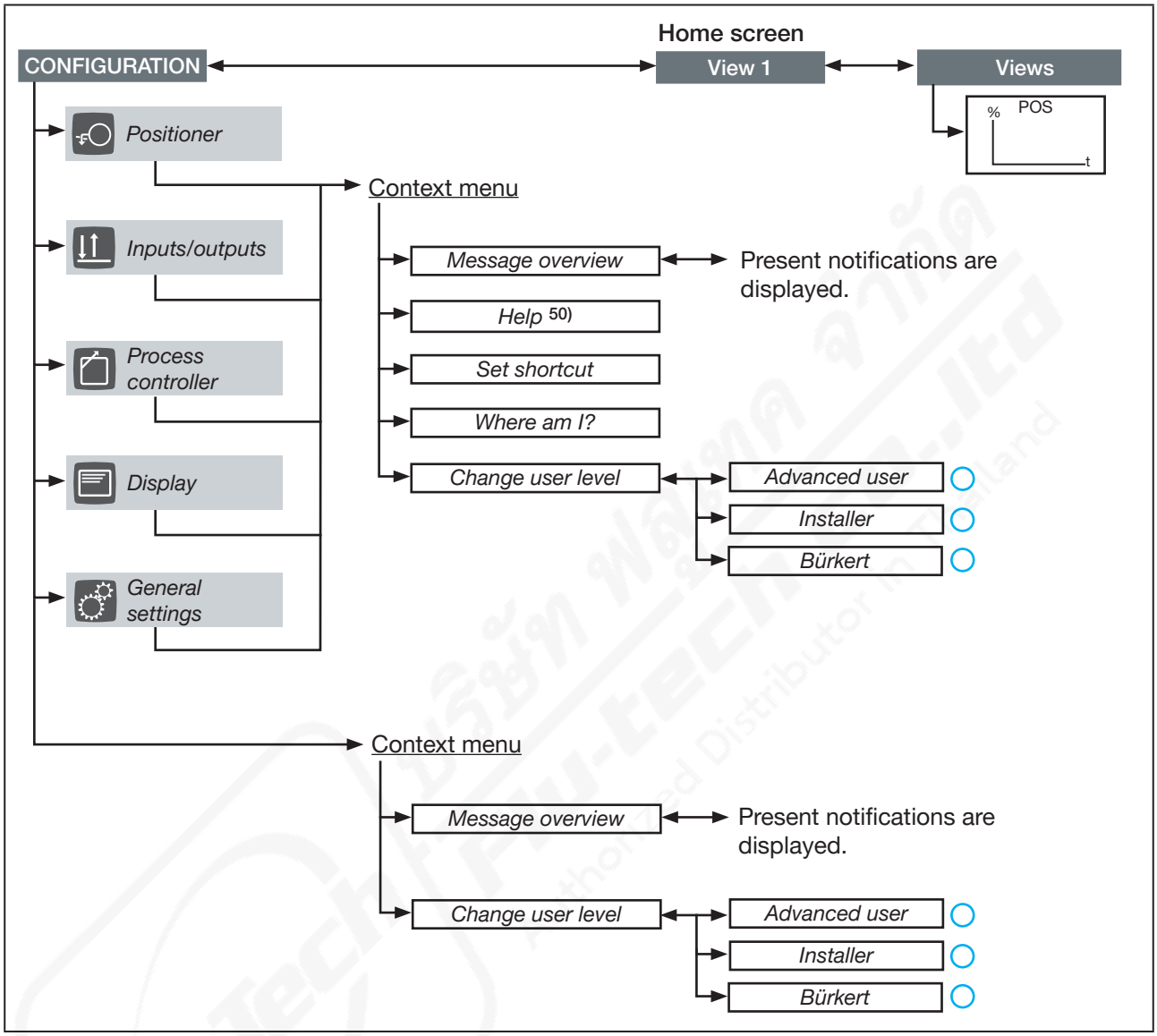

Fig. 93: Operating structure – 7, context menu in configuration area

7) Only available in devices with process control function.

46) Not available for layout ProcessControl. With set layout 2 values or 4 values, a submenu for assigning the value to be changed is displayed.

47) During process control, the selection depends on the physical unit of the process control (Process controller → UNIT) and the value selected to be shown on the display (Context menu → Change value).

48) Not available for layout Trend, Trend with 2 values or ProcessControl. With set layout 2 values or 4 values, a submenu for assigning the value to be changed is displayed.

49) Not constantly available.

50) Only available in configuration area Position controller, Inputs/outputs and Process controller.

18 INDUSTRIAL ETHERNET

To allow connection to an Ethernet network, the electromotive control valve with integrated fieldbus gateway is optionally available.

Supported fieldbus protocols: EtherNet/IP, PROFINET, Modbus TCP.

18.1 Fieldbus gateway description

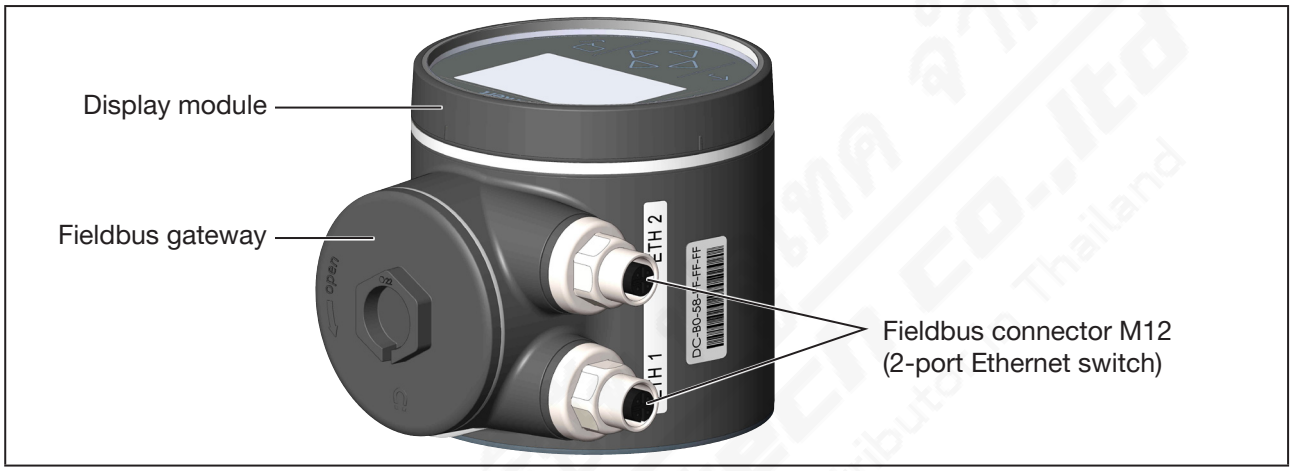

Fig. 94: Fieldbus gateway with display module

18.1.1 Access to büS service interface

The büS service interface is located inside the Fieldbus gateway.

To access it, turn the cover counterclockwise.

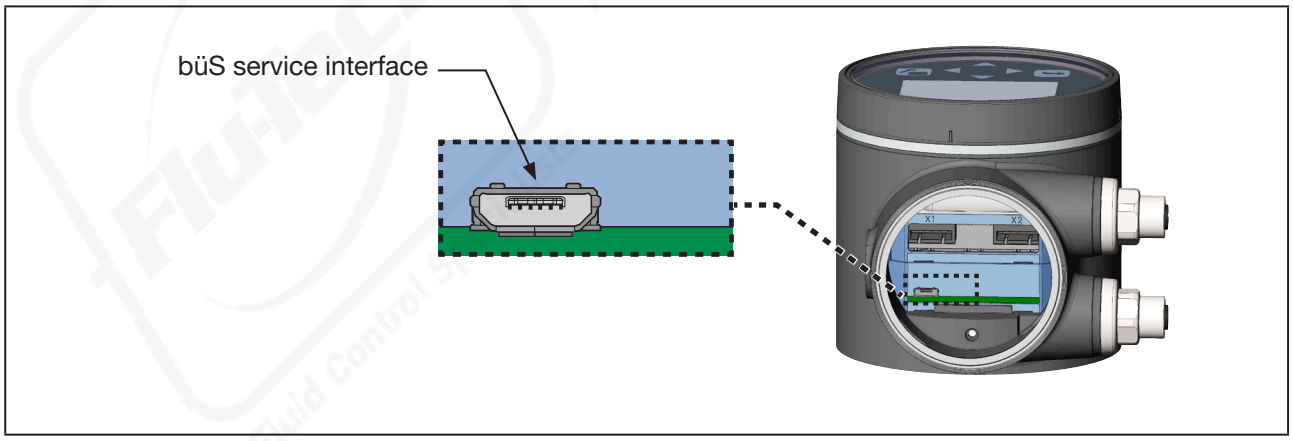

Fig. 95: büS service interface with fieldbus gateway variant

For electrical connection of Fieldbus gateway:
see chapter “10.4 Electrical connection fieldbus gateway” on page 63.

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18.1.2 LEDs for indicating network connection status

The LEDs for indicating network connection status are located inside the fieldbus gateway.

To access it, turn the cover counterclockwise.

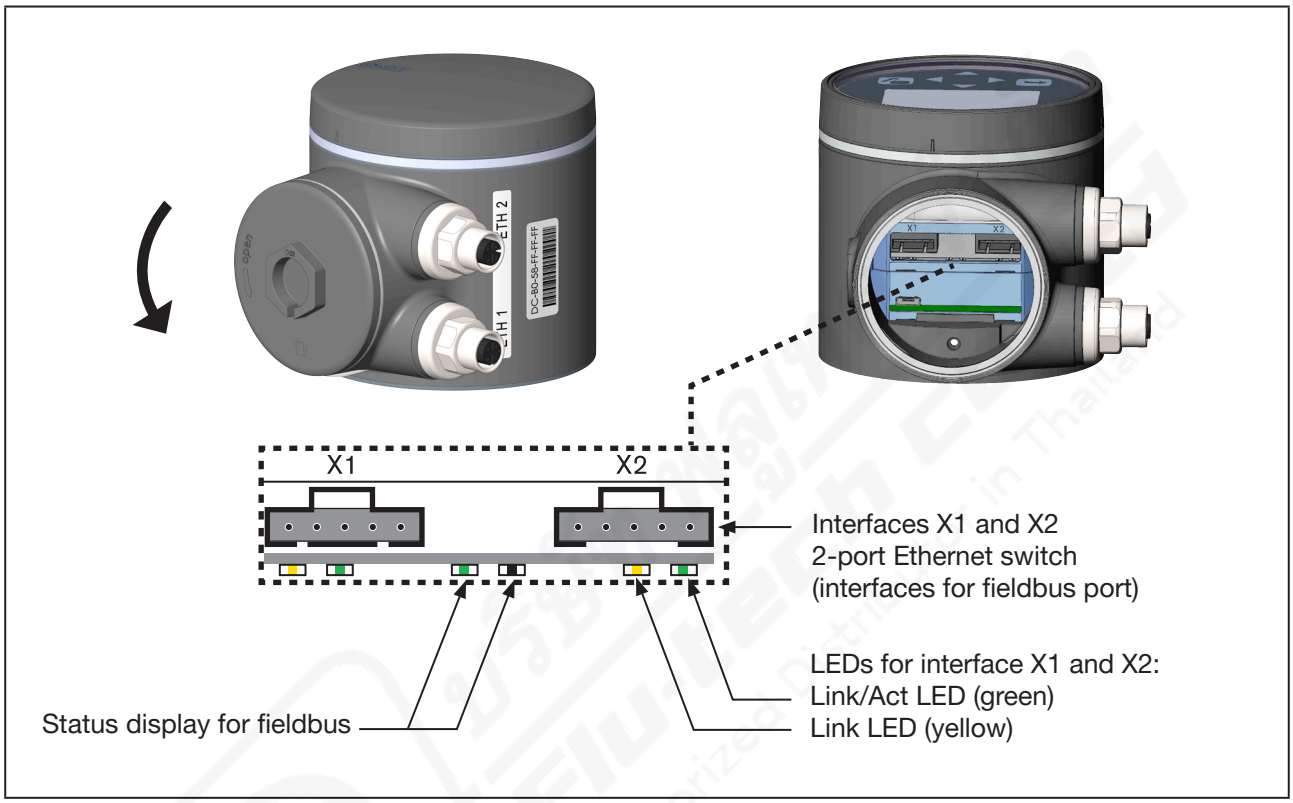

Fig. 96: LEDs for indicating network connection status

LED state		Fault description/cause	Action
Link/Act LED (green)	Active	Rapid flashing: Connection with overriding protocol layer EtherNet/IP has been established. Data are being transmitted. Slow flashing: there is no connection to the protocol layer. This is normally the case for approx. 20 seconds after restarting.	
	Not active	No connection to the network available.	Check cable.
Link LED (yellow)	Active	Connection to network active.	-
	Not active	No connection to the network available.	Check cable.

Tab. 38: LED status indicators of interfaces X1 and X2 (fieldbus port)

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18.2 Technical data Industrial Ethernet

18.2.1 PROFINET IO specifications

Topology recognition	LLDP, SNMP V1, MIB2, Physical Device
Minimum cycle time	10 ms
IRT	not supported
MRP media redundancy	MRP client is supported
Additional supported features	DCP, VLAN Priority Tagging, Shared Device
Transmission speed	100 MBit/s
Data transport layer	Ethernet II, IEEE 802.3
PROFINET IO specification	V2.3
(AR) Application Relations	The device can simultaneously process up to 2 IO ARs, 1 Supervisor AR, and 1 Supervisor DA AR.

18.2.2 EtherNet/IP specifications

Pre-defined standard objects	Identity Object (0x01)
	Message Router Object (0x02)
	Assembly Object (0x04)
	Connection Manager (0x06)
	DLR Object (0x47)
	QoS Object (0x48)
	TCP/IP Interface Object (0xF5)
	Ethernet Link Object (0xF6)
DHCP	supported
BOOTP	supported
Transmission speed	10 and 100 MBit/s
Duplex modes	Half duplex, full duplex, auto-negotiation
MDI modes	MDI, MDI-X, Auto-MDIX
Data transport layer	Ethernet II, IEEE 802.3
Address Conflict Detection (ACD)	supported
DLR (ring topology)	supported
Integrated switch	supported
CIP reset service	Identity Object Reset Service types 0 and 1

18.2.3 Modbus TCP specifications

Modbus function codes	1, 2, 3, 4, 6, 15, 16, 23
Mode	Message mode: Server
Transmission speed	10 and 100 MBit/s
Data transport layer	Ethernet II, IEEE 802.3

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18.3 Projecting via fieldbus

For project planning, you need the suitable start-up file for the respective fieldbus protocol.

Fieldbus	Start-up file
EtherNet/IP	EDS file
PROFINET	GSDML file
Modbus TCP	not required

The start-up files required for the respective project planning software and their description are available on the Internet.

Download at:
www.burkert.com / Type 3363 / Downloads “Software” / Initiation Files

Please refer to the documentation of your project design software for instructions regarding the installation of the start-up files.

18.3.1 Setting the Ethernet parameters for EtherNet/IP, PROFINET, Modbus TCP

With Modbus TCP, it is essential to set the Ethernet parameters.

Setting option:
Using the Bürkert Communicator PC software, using the web server or on the display of the device (option).

Settings are created on the PC using the büS service interface and the “Bürkert Communicator” PC software. It requires the USB büS interface set available as an accessory.

Display operation: button functions

Select, activate	Confirm	Back

To set the Ethernet parameters, you must switch to the detailed view “Parameters for Industrial Communication”.

How to switch to detailed view:

→ For setting with Bürkert Communicator, select Industrial Communication in the navigation area.

→ When using the display for the configuration, switch to CONFIGURATION on the home screen and select Industrial Communication.

You are now in the “Parameter” detailed view.

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The Ethernet parameters can only be set when the corresponding fieldbus protocol has been selected. Parameter → Protocol settings→ Protocol → Select protocol.

Setting the Ethernet parameters:

→ Select Protocol settings.

→ Select Protocol and set the desired fieldbus protocol.

Settings:

→ Select IP settings and create settings.

- DNS compatible name can only be set with PROFINET.
- Fixed IP address Factory default setting: 192.168.0.100
- Network mask Factory default setting: 255.255.255.0
- Standard Gateway Factory default setting: 192.168.0.1.

Setting for EtherNet/IP fieldbus protocol:

→ Select IP settings.

→ Select IP operation mode and set the desired operation mode. Factory default setting: Fixed IP address.

You have set the Ethernet parameters to connect the device to the PLC network.

The complete Industrial Communication menu is described in the separate software manual.

Download at: www.burkert.com / Type 3363 / Downloads “Operating instructions” / Software manual Type 3360, 3361, 3363....

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18.4 Web server

The configuration of the EtherNet participant, required to connect to the network, can be run via a web server.

18.4.1 Connecting to the web server

→ Set IP address in the PC network card.

IP address: **192.168.0.xxx**

For xxx, enter any numerical value other than 100
(100 is occupied by the IP address of the Ethernet participant by default).

→ Connect the PC via a network cable to the EtherNet participant.

18.4.2 Access to the web server

Menu

Bürkert S/N: 99

Industrial Communication

Protocol	**PROFINET**
Communication status	**Wait for establishing communication**
DNS compatible name	
MAC address	**00:50:C2:C7:E0:01**
Static IP address	**192.168.0.100**
Network mask	**255.255.255.0**
Default gateway	**192.168.0.1**
Temporary IP address	**192.168.0.100**
IP settings	**None**

Fig. 97: Access to the web server via the default IP

With EtherNet/IP, DHCP or BOOTP can also be set (NOT by default).
In this process, the IP address is acquired from a DHCP server.

→ Open an Internet browser.

→ Enter Default-IP **192.168.0.100**.
(On EtherNet/IP devices, the IP address is assigned by a DHCP server. If no address is assigned via DHCP within 1 minute, the device uses the default IP 192.168.0.100.)

The software for configuring the Ethernet participant is now available on the PC.

Configuration of multiple devices:

On delivery, all devices have the same IP address: 192.168.0.100. So that the device can be identified for configuration, only 1 unconfigured device may be on the network.

- Successively connect the devices (Ethernet participants) to the network individually and configure them.

18.4.3 Configuring Ethernet participants

Logging onto the system:

→ Enter your user name and password . Username: **admin**
Password: **admin**

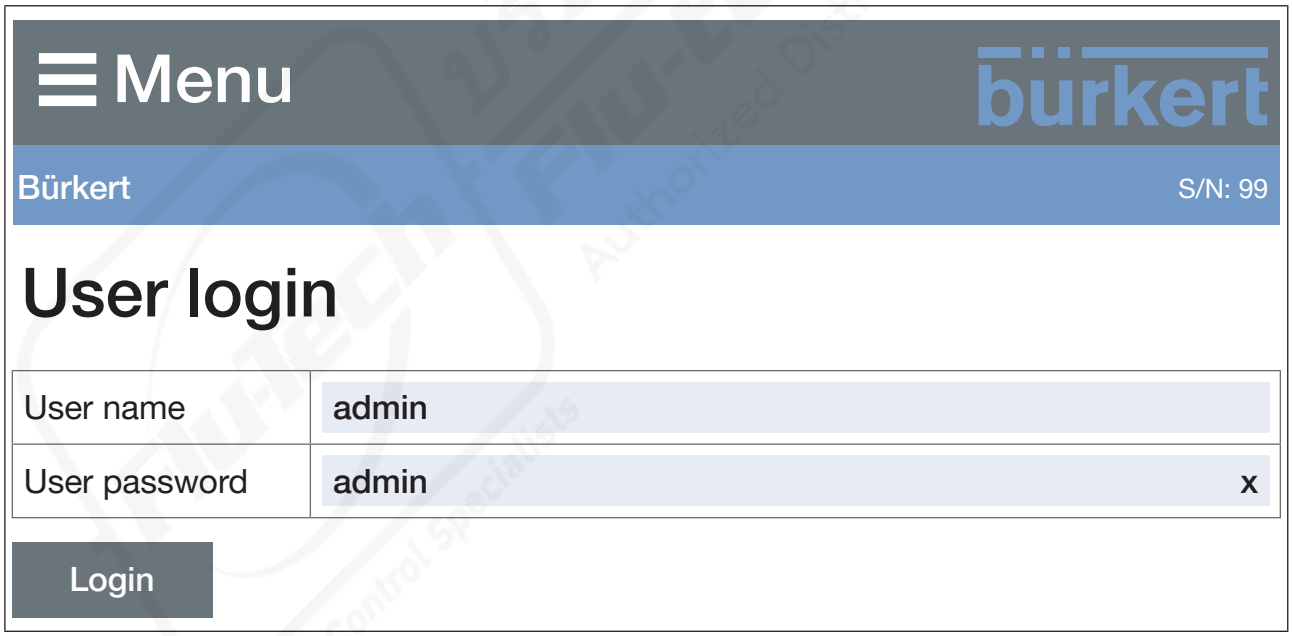

Fig. 98: Logging onto the system

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Configuration:

→ Enter the device name and IP address for the Ethernet participant.
The device name assigned here is used later during project planning (e.g. under STEP 7).

→ Confirm with **Commit changes**.

→ Conduct a power reset of the Ethernet participant to incorporate the changed parameters.

→ Restart the device with **Restart device**.

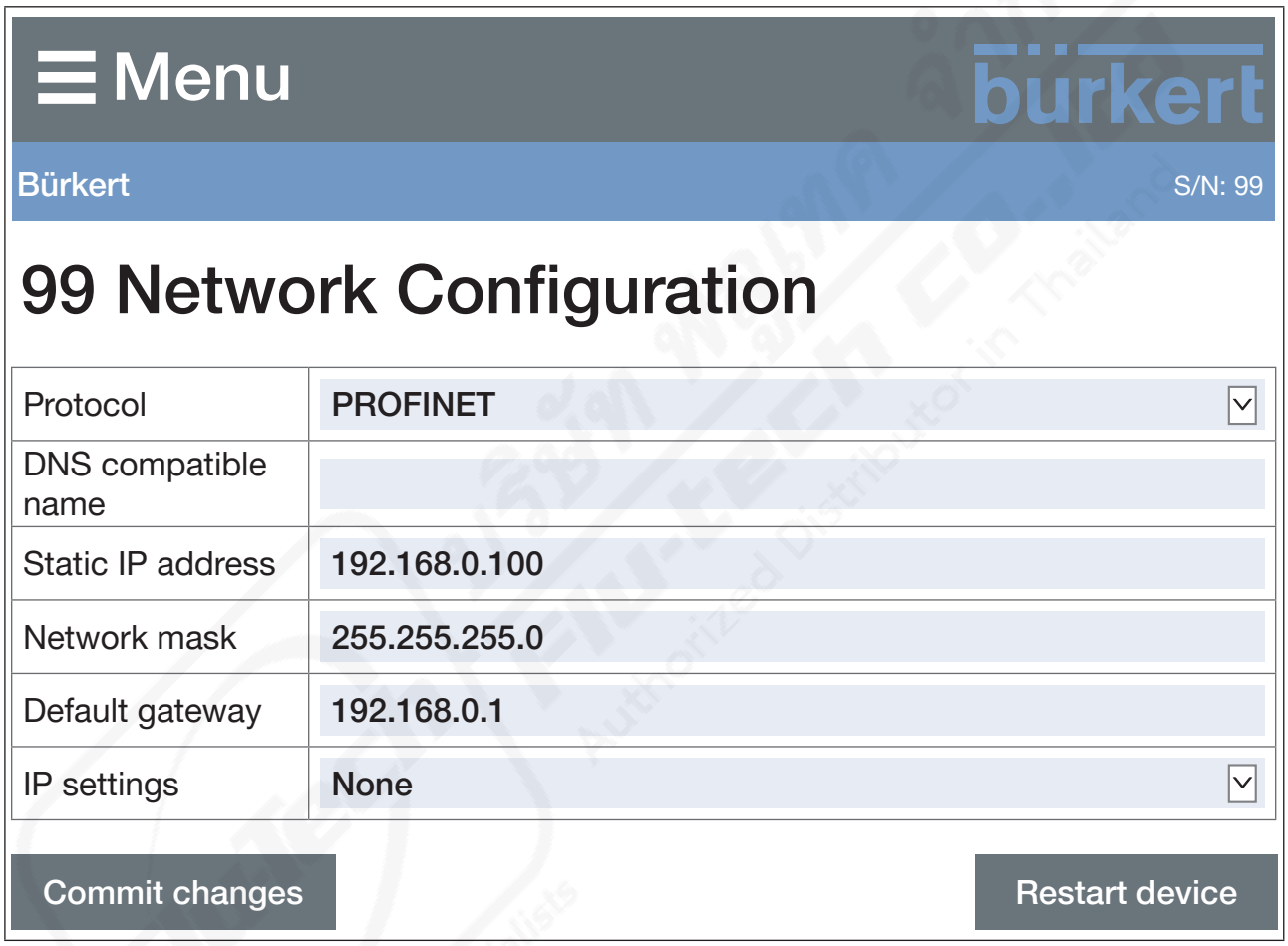

Fig. 99: Configuring Ethernet participants

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19 CANopen

Electrical installation of devices with CANopen network:
For a description, see chapter “10.3 Electrical connection büS/CANopen” on page 63.

19.1 Projecting via fieldbus

For project planning, you need an eds file as a start-up file for CANopen.

The eds file and the associated description are available on the Internet.

Download at:
www.burkert.com / Type 3363 / Downloads “Software” / Initiation Files

Please refer to the documentation of your project design software for instructions regarding the installation of the start-up files.

19.2 CANopen network configuration

Instructions for the network configuration based on the CANopen protocol are available on the Internet.

Download at:
www.burkert.com / Type 3363 / Downloads “Operating instructions” /
“Software instructions | CANopen network configuration”

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20 büS

Definition: The term “büS” (Bürkert System buS) refers to the communication buS developed by Bürkert, based on the CANopen protocol.

Electrical installation of devices with büS network:
For a description, see chapter “10.3 Electrical connection büS/CANopen” on page 63.

20.1 Cabling of büS networks

Additional information about cabling for büS networks is available at the following link:
Guideline for cabling of büS networks

20.2 Configuration of büS networks

Additional information about the configuration of büS networks can be found on the Internet.

Download at:
www.burkert.com / Type 8922 / Downloads / User Manuals / Software instructions Type 8922, MExx | Software of f(x) configuration

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21 MAINTENANCE

WARNING!

Risk of injury due to improper maintenance work.

- ▸ Maintenance may be carried out only by trained specialist technicians and with the appropriate tools.
- ▸ Secure the system against unintentional activation.
- ▸ Ensure a controlled restart after maintenance is completed.

The following maintenance must be performed on the diaphragm control valve.

- After initial steam sterilisation and whenever necessary
  → Re-tighten body screws crosswise.
- After a maximum of 10^5 switching cycles
  → Check diaphragm for wear and replace if necessary.

Muddy and abrasive media require correspondingly shorter inspection intervals.

- Replacement of SAFEPOS energy-pack
  The device issues a maintenance message as soon as the SAFEPOS energy-pack needs to be replaced.
  Message: The remaining service life of the energy-pack is approx. 25%!
  The energy-pack needs to be replaced soon.

21.1 Visual inspection

According to the usage conditions, perform regular visual inspections:

→ Check medium ports for tightness.

→ Check relief bore for leaks.

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21.2 Replacing the diaphragm

DANGER!

Risk of injury from high pressure.

▸ Before working on the system or device, switch off the pressure and ventilate or empty the lines.

WARNING!

Risk of injury due to improper installation work.

▸ The diaphragm may be replaced only by trained technicians and with the appropriate tools.

21.2.1 Required work steps

Replacement of the diaphragm is broken down into the following steps: To replace the diaphragm, ensure that the device is in the MANUAL operating state and the valve is in the position “valve 100% open”.

1. Set MANUAL operating state, chapter “14.1” on page 105
2. Switch the valve to the position “100% open“, chapter “15” on page 116.
3. Switch off the supply voltage. Wait until LED illuminated ring goes out.
4. Remove actuator from the valve body, chapter “21.2.3” on page 159.
5. Replacing the diaphragm, chapter “21.2.4” on page 160.
6. Install the actuator onto the valve body and establish electrical connection, chapter “21.2.5” on page 161.
7. Execute TUNE function for adjustment of position control, chapter “11.5” on page 75 (AG2) and “11.6” on page 78 (AG3)
8. Set AUTOMATIC mode, chapter “14.1” on page 105.

21.2.2 Required tool

- Open-end wrench

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21.2.3 Removing actuator from the valve body

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

WARNING!

Risk of injury from electric shock.
Risk of crushing by mechanically powered parts.

- Switch off the supply voltage.
- For devices with SAFEPOS energy-pack: completely remove the SAFEPOS energy-pack. Wait until the LED light ring is no longer lit and ensure that the LED light ring is not in "LED off" mode.

ATTENTION!

Damage to the diaphragm.

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

→ Loosen the 4 nuts on the diaphragm socket crosswise.

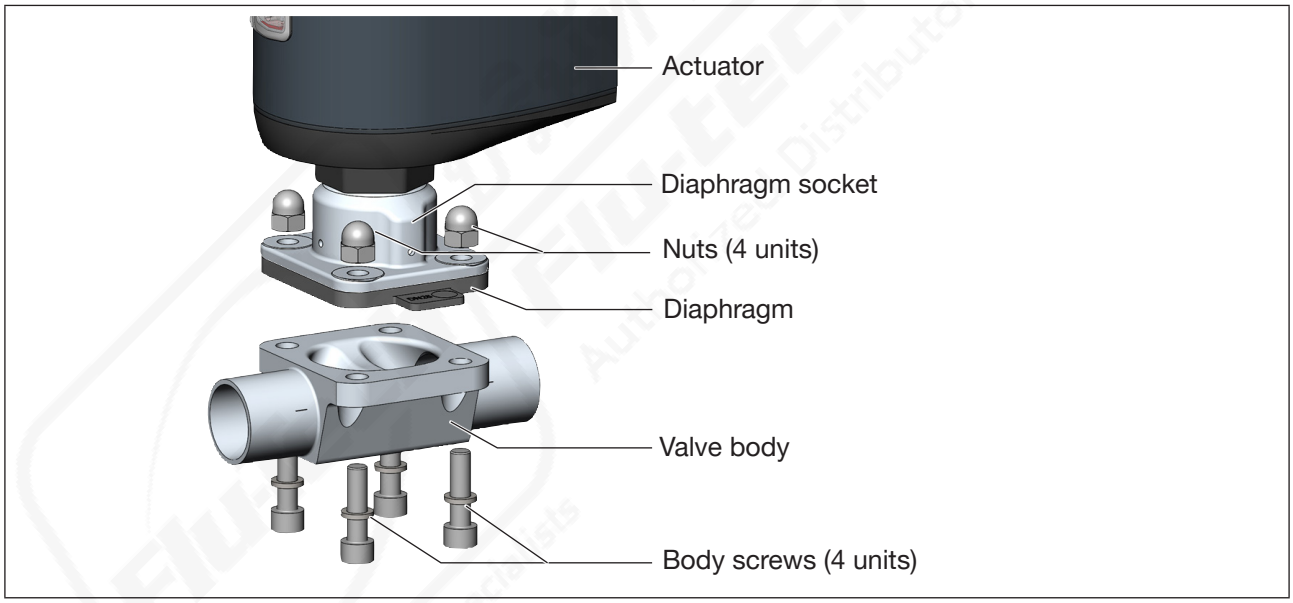

Fig. 100: Disassembly of the diaphragm using the 2-way body as an example

→ Remove the body screws.

→ Remove valve body.

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21.2.4 Replacing the diaphragm

→ Unbutton or unscrew the old diaphragm (see “Tab. 39: Fixture types for diaphragms”).
If the diaphragm has a bayonet catch: → Detach the diaphragm by turning it 90° and remove it.

Mount the new diaphragm:

There are different fixture types for the diaphragm depending on the size of the diaphragm.

Diaphragm size	Fixture types for diaphragms	
	PTFE	EPDM / FKM / laminated PTFE
08	Buttoned diaphragm	Buttoned diaphragm
15, 20	Diaphragm with bayonet catch	Diaphragm with bayonet catch
25-100	Diaphragm with bayonet catch	Diaphragm screwed in

Tab. 39: Fixture types for diaphragms

Fixture of diaphragms with bayonet catch:

→ Place diaphragm in compressor and turn 90° to lock into place.

Fixture of screw-in diaphragm:

→ If there is no insert in the compressor, place the insert into the compressor as shown in the image.

Fig. 101: Place insert into compressor

→ Screw diaphragm into compressor by hand.

→ Loosen by half a turn.

→ Align diaphragm.
The mark tab of the diaphragm must protrude from the valve body at a right angle to the longitudinal axis of the pipeline (see “Fig. 102”).

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Fixture of buttoned diaphragm:

→ Attach buttons of diaphragm in compressor.

→ Align diaphragm. The mark tab of the diaphragm must protrude from the valve body at a right angle to the longitudinal axis of the pipeline (see “Fig. 102”).

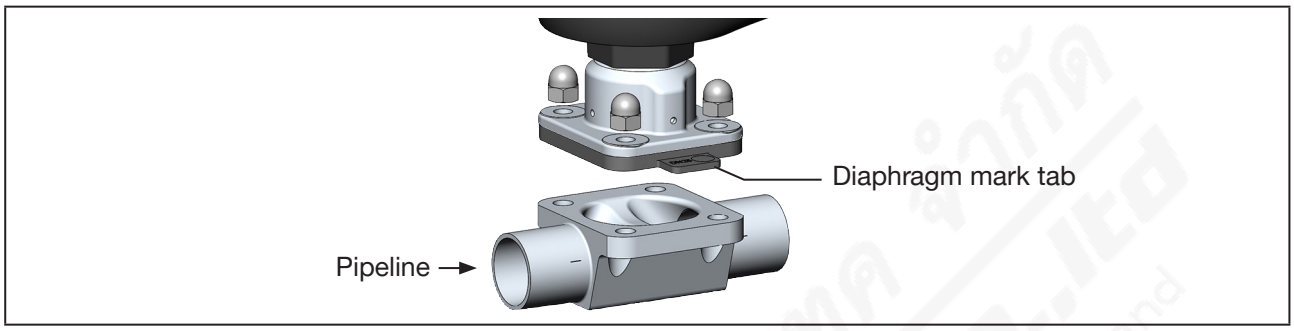

Fig. 102: Aligning the diaphragm (example 2-way body)

21.2.5 Mount the actuator onto the valve body and establish electrical connection

WARNING!

Risk of injury from electric shock.
Risk of crushing by mechanically powered parts.

- Switch off the supply voltage.

ATTENTION!

Damage to the diaphragm.

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

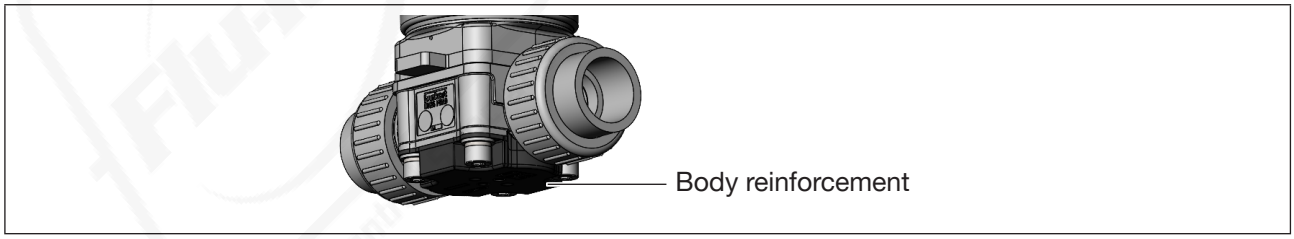

Fig. 103: Body reinforcement for PP variants (DN15, DN20, DN25)

→ ⚠ Before installing the actuator, check whether the diaphragm is free of damage and correctly aligned. The mark tab of the diaphragm must protrude from the valve body at a right angle to the longitudinal axis of the pipeline (see “Fig. 102”).

→ Replace the damaged diaphragm.

→ Place actuator on the valve body.
In the case of T-valve bodies and tank button bodies, stud bolts are pre-fitted.
With 2-way bodies, insert screws into the valve body.
For PP variants (DN15, DN20, DN25) the intended body reinforcement is mandatory.

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→ Tighten the nuts in a diagonal pattern lightly until the diaphragm is seated between the valve body and actuator.
⚠ Do not tighten the nuts yet.

→ Connect supply voltage.

→ Execute M.SERVICE as described below.

Perform M.SERVICE for devices without a display module:

ATTENTION!

Malfunction is valve position is not fully open.

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

The two buttons for triggering M.SERVICE are located beneath the blind cover.
For devices equipped with a display module, the buttons have no function. The M.SERVICE is triggered on the display.

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

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

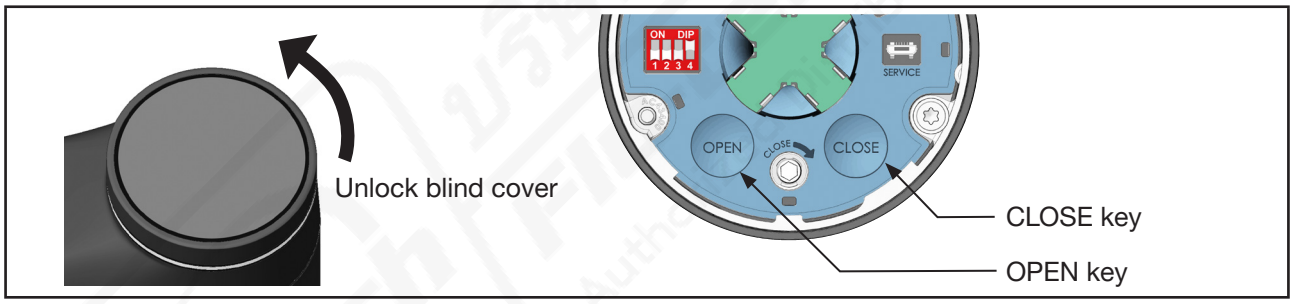

Fig. 104: Execute M.SERVICE

→ To unlock the blind cover, turn it counterclockwise and remove.

→ Hold down the OPEN and CLOSE keys together at the same time for 5 seconds.

✔ This will execute the M.SERVICE function.

→ Wait until M.SERVICE is finished and the actuator stops.

Execute M.SERVICE from the device’s display:

Display operation: button functions

Select, activate	Confirm	Back

To trigger the M.SERVICE function, you must switch to the “Maintenance” detailed view for position controllers.

How to switch from the home screen to the detailed view:

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→ Switch to CONFIGURATION on the home screen, select the position controller and switch to MAINTENANCE.

✔ You are now in the “Maintenance” detailed view.

How to trigger the M.SERVICE function:

→ Select CALIBRATION.

→ Select M.SERVICE.

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

→ Start M.SERVICE.

The following text appears:

“Processing. Please wait.”

“Finished.”

✔ The function M.SERVICE has now been executed.

Tighten nuts gradually:

WARNING!

Risk of injury when failing to observe tightening torque value.

Failure to observe the tightening torque value is dangerous due to the risk of damage to the device.

▸ Observe the tightening torque value.

→ Follow a crosswise pattern in tightening the nuts to 1/3 of the tightening torque value.

→ Then follow a crosswise pattern again in tightening the nuts to 2/3 of the tightening torque value.

→ Finally, follow a diagonal pattern in tightening the nuts to their permitted tightening torque value.

Tightening torque value for installation of the actuator

Diaphragm size	Tightening torques for diaphragms [Nm]*			
	VS, VG, PP, PVC-C, PVC-U, PVDF		VA, VP	
	EPDM/FKM	PTFE	EPDM/FKM	PTFE
08	2	2,5	2	2,5
15	3,5	4	3,5	4
20	4	4,5	4	4,5
25	5	6	7	8
32	6	8	8	10
40	8	10	12	15
50	12	15	15	20
65	20	30	20	30
80	30	40	30	40
100	40	50	40	50
* A tolerance of +10% of the respective tightening torque applies to all values				

Tab. 40: Tightening torques for diaphragms

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Next steps:

- Execute TUNE function for adjustment of position control, chapter “11.5” on page 75 (AG2) and „11.6“ auf Seite (AG3)

ATTENTION!

Damage to the diaphragm.

▸ To prevent damage, execute the function M.Q0.TUNE first after establishing the electrical connection. Only then should the operating mode be set to AUTOMATIC.

- Set AUTOMATIC mode, chapter “11.6” on page 78.

21.3 Maintenance notifications

Maintenance notifications are displayed in the following LED operation modes:

- Valve mode + warnings (factory pre-set)
  The LED light ring alternatingly flashes blue and the colour indicating the valve position.
- NAMUR operation mode. The LED light ring lights up blue.

If the LED mode is set to “valve mode”, maintenance notifications are not displayed.

Message	Device behaviour	Action
The capacity of the energy storage is strongly decreased. The energy-pack must be replaced soon.	Maintenance notification.	The SAFEPOS energy-pack must be promptly replaced before the end of its service life.

Tab. 41: Maintenance notifications

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22 TROUBLESHOOTING AND MESSAGES

22.1 Error notifications

Device error notifications are displayed as follows:

- Valve mode
  The LED light ring alternatingly flashes red and the colour indicating the valve position.
- Valve mode + warnings (factory pre-set).
  The LED light ring alternatingly flashes red and the colour indicating the valve position.
- NAMUR operation mode.
  The LED light ring glows red.

Message	Description	Device behaviour	Action
Motor temperature is too high. Motor is moving to the safety position.	Too much friction in the actuator train for operation.	Error notification. Actuator is moving to the safety position.	Contact Bürkert service.
Motor temperature is too high. Motor is idling to prevent thermal damage.	Too much friction in the actuator train for operation.	Error notification. Motor switches off. Actuator remains in place. Manual operation not possible.	Contact Bürkert service.
Excess temperature detected.	Device temperature too high for operation.	Error notification. Actuator is moving to the safety position. MANUAL operating state possible.	Reduce ambient temperature. Contact Bürkert Service if problem persists.
Low temperature detected.	Device temperature too low for operation.	Error notification. Actuator is moving to the safety position. MANUAL operating state possible.	Increase ambient temperature.
Overvoltage detected.	Supply voltage too high for device operation.	Error notification. Actuator is moving to the safety position. MANUAL operating state possible.	Check supply voltage.
Undervoltage detected.	Supply voltage failure, or supply voltage too low for device operation.	Error notification. Actuator is moving to the safety position. Manual operation not possible.	Check supply voltage. Contact Bürkert Service if problem persists.
Motor current too high.	Increased friction in the actuator train or incorrect detection of the end positions.	Error notification. Motor switches off. Actuator remains in place. Manual operation not possible.	Execute function M.Q0. TUNE. Contact Bürkert Service if problem persists.
Motor peak current too high.	Increased friction in the actuator train or incorrect detection of the end positions.		

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Message	Description	Device behaviour	Action
Internal error: reverbation sensor signal failure.	Signal failure of the position sensor.	Error notification. Actuator is moving to the safety position. Manual operation not possible.	Contact Bürkert service.
Internal error: …	Internal error in the device.	Error notification. Actuator is moving to the safety position.	Contact Bürkert service.
CMD/SP cable break.	Set-point signal cable break.	If device is configured accordingly: error notification. Actuator is moving to the safety position.	Check signal line of set-point value.
PV cable break.	Process actual signal cable break.	If device is configured accordingly: error notification. Actuator is moving to the safety position.	Check signal line of process actual value.
Persistent memory unusable: defective or not available.	Reading or writing error of internal data storage EEPROM.	Error notification. Actuator is moving to the safety position.	Restart the device. Contact Bürkert Service if problem persists.
BueS event: producer(s) not found.	Assigned external büS/CANopen producer cannot be found.	Error notification. Actuator is moving to the safety position.	Check signal to büS/CANopen partner.
BueS event: bus connection lost/not available.	büS/CANopen network cannot be found.	Error notification. Actuator is moving to the safety position.	Check büS/CANopen network.
BueS event: producer is not operational.	Producer not operational in this state.	Error notification. Actuator is moving to the safety position.	Check büS/CANopen producer.
BueS event: a device is using the same address.	Another büS/CANopen participant is using the same address.	Error notification. Actuator is moving to the safety position.	Assign a unique address to the device and büS/CANopen participant.
No correct connection to the process control system.	No connection to the process control system.	Error notification. Actuator is moving to the safety position.	Check connection to the process control system.
Energy storage must be replaced.	Storage capacity of the energy storage is too low. Assumption of the safety position cannot be guaranteed.	Error notification. Actuator is moving to the safety position.	Replace SAFEPOS energy-pack.
No energy storage available.	Energy storage SAFEPOS energy-pack not detected.	Error notification. Actuator is moving to the safety position.	Check whether the SAFEPOS energy-pack is correctly installed.

Tab. 42: Error notifications

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22.2 Notifications on device status “Out of specification”

Notifications on device status “Out of specification” are displayed in the following LED operation modes:

- Valve mode + warnings (factory pre-set).
  The LED light ring alternatingly flashes yellow and the colour indicating the valve position.
- NAMUR operation mode.
  The LED light ring glows yellow.

In LED mode “valve mode”, notifications on the device status “Out of specification” are not displayed.

Message	Description	Device behaviour	Action
Motor temperature is high.	Increased friction in the actuator train.	“Out of specification” message.	Contact Bürkert Service if problem persists.
Temperature warning limit exceeded.	Ambient temperature too high or increased friction in actuator train.	“Out of specification” message.	Reduce ambient temperature. Contact Bürkert Service if problem persists.
Temperature warning limit undershot.	Ambient temperature is too low.	“Out of specification” message.	Increase ambient temperature
Voltage warning limit exceeded.	Supply voltage is too high.	“Out of specification” message.	Check supply voltage.
Voltage warning limit undershot.	Supply voltage is too low.		
CMD/SP cable break.	Set-point signal cable break.	If device is configured accordingly: message on “Outside of specification” status. Actuator is moving to the safety position.	Check signal line of set-point value.
PV cable break.	Process actual signal cable break.	If device is configured accordingly: message on “Outside of specification” status. Actuator is moving to the safety position.	Check signal line of process actual value.

Tab. 43: Notifications on device status “Out of specification”

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22.3 Notifications on device status “Function check”

Notifications on device status “Function check” are displayed in the following LED operation modes:

- Valve mode + warnings (factory pre-set).
  The LED light ring alternatingly flashes orange and the colour indicating the valve position.
- NAMUR operation mode.
  The LED light ring glows orange.

In LED mode “valve mode”, notifications on the device status “Function check” are not displayed.

Message	Description	Device behaviour	Action
MANUAL operating state active.	Device is in the MANUAL operating state.	Notification “Function check”.	Switch to AUTOMATIC operating state.
Process simulation active	Device is in simulation mode: process values are simulated.	Notification “Function check”.	Switch off process simulation.
Signal generator active	Devices is in simulation mode: input signals are simulated.	Notification “Function check”.	Switch off signal generator.
M.Q0.TUNE active	M.Q0.TUNE function is run (adjustment of position control).	Notification “Function check”.	Wait until the M.Q0.TUNE function is exited.
P.TUNE active	P.TUNE function is run (adjustment of process control).	Notification “Function check”.	Wait until the P.TUNE function is exited.
P.LIN active	P.LIN function is run (linearisation of process characteristic).	Notification “Function check”.	Wait until the P.LIN function is exited.
External CMD not assigned.	“büS” is set as the source of the input signal. Missing assignment of the external büS/ CANopen partner.	Notification “Function check”.	Assign an external büS/ CANopen fieldbus consumer or set a different source. Setting the input signal: In the “inputs/outputs” configuration area.
External SP not assigned.			
External PV not assigned.			
External isPCOextern not assigned.			
External ExtError not assigned.			

Tab. 44: Notifications on device status “Function check”

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23 CLEANING

ATTENTION!

Do not use alkaline cleaning agents to clean the surfaces of the device.

23.1 Rinsing the valve body

The device has a M.CLEAN function for residue-cleaning of parts in contact with media.

When running the M.CLEAN function, the valve continuously changes between the 80% and 100% open positions. This means that all parts in contact with media are accessible for cleaning during the flushing process.

23.1.1 Run M.CLEAN

Run the M.CLEAN function for residue-free cleaning of parts in contact with media during the flushing process.

Setting option:
Using the Bürkert Communicator PC software or the display of the device (optional).
Settings are created on the PC using the büS service interface and the “Bürkert Communicator” PC software. It requires the USB-büS-Interface available as an accessory.

Triggering the M.CLEAN function via the digital input:
Alternatively to the menu, the M.CLEAN can be started and ended using the digital input. To do this, the M.CLEAN function must be assigned to the digital input as a source. → Inputs / Outputs → ADDITIONAL IOs → DIGITAL IN → M.CLEAN. source → Digital.

Display operation: button functions

Select, activate	Confirm	Back

To start the M.CLEAN function, you must switch to the “Maintenance” detailed view for position controllers.

How to switch to detailed view:

→ When using Bürkert Communicator for the configuration, select Position Controller in the navigation area and switch to MAINTENANCE.

→ When using the display for the configuration, switch to CONFIGURATION on the home screen, select Position Controller and switch to MAINTENANCE.

✔ You are now in the “Maintenance” detailed view.

How to run the M.CLEAN function:

→ Select CALIBRATION.

→ Select M.CLEAN.

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

→ Start M.CLEAN.

M.CLEAN is run. The valve now continuously changes its position between 80% and 100%. The following text appears: “--OPERATION-
End M.CLEAN by pressing”

→ End M.CLEAN.

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24 ACCESSORIES, REPLACEMENT PARTS

CAUTION!

Risk of injury and/or damage due to incorrect parts.

Incorrect accessories and unsuitable spare parts may cause injuries and damage to the device and the area around it.

▸ Use only original accessories and original spare parts from Bürkert.

You can find and assembly tools under the following link (device identification number required):
Wear parts and accessories

Additional information about cabling for büS networks is available at the following link:
Guideline for cabling of büS networks

Accessories	Order number
Connection cable with M12 socket, 4-pin, (length 5 m) for operating voltage	918038
Connection cable with M12 socket, 8-pin, (length 2 m) for input and output signals	919061
Connection cable with M12 socket, 5-pin, L-coded (length 5 m) for operating voltage AG3 for X4	20010840
Connection cable with M12 plug, 5-pin, (length 2 m) for input signals process actual value (only for execution with process controller) for X2	559177
USB-büS interface set:	
USB-büS interface set 1 (including power supply unit, büS stick, termination resistor, Y-distributor, 0.7m cable with M12 plug)	772426
USB-büS interface set 2 (including büS stick, termination resistor, Y-distributor, 0.7m cable with M12 plug)	772551
büS adapter for büS service interface (M12 to micro-USB büS service interface)	773254
büS cable extensions from M12 plug to M12 socket	
Connection line, length 1 m	772404
Connection line, length 3 m	772405
Connection line, length 5 m	772406
Connection line, length 10 m	772407
“Bürkert Communicator”	Info at www.buerkert.de
SIM card	291773
Holding device for diaphragm size 08* to 40	697473
Plastic display module	277869
Plastic blind cover	277881
* For diaphragm size 08 the holding device is included in delivery.	

Tab. 45: Accessories

24.1 Communication software

The PC software Bürkert Communicator is designed for communication with Bürkert devices.

A detailed description of the installation and operation of the PC software can be found in the associated operating instructions.

Download the software from: https://country.burkert.com

24.1.1 büS service interface

The device is equipped with the büS service interface for communicating with the PC. Communication takes place via a USB interface on the PC and the USB büS interface, which is available as an accessory (see "Tab. 45: Accessories").

24.2 Spare parts

24.2.1 Spare parts for valve Type 3363, 3364, 3365

Spare parts for Type 3363, 3364, 3365	Order number
SAFEPOS energy-pack	285 834

Tab. 46: Spare part for Type 3363, 3364, 3365

24.2.2 Spare part sets for replacing the diaphragm

Diaphragm size	Order numbers for diaphragms					
	EPDM (AB*)		EPDM (AD*)		FKM (FF*)	
08	677 663	E02**	688 421	E03/E04**	677 684	F01**
15 BC**	693 162	E02**	693 163	E03/E04**	693 164	F01**
20 BC**	693 165	E02**	693 166	E03/E04**	693 167	F01**
25	677 667	E01**	688 424	E03/E04**	677 687	F01**
32	677 668	E01**	688 425	E03/E04**	677 688	F01**
40	677 669	E01**	688 426	E03/E04**	677 689	F01**
	PTFE (EA*)		Advanced PTFE (EU*)		Gylon laminated (ER*)	
08	677 674	L04/L10**	679 540	L05/L09**	693 175	L06/L08**
15	677 675	E02/E04- PTFE**	679 541	E02/E04- PTFE+ Hole**	693 176	L06/L08**
20	677 676	E02/E04- PTFE**	679 542	E02/E04- PTFE+ Hole**	693 177	L06/L08**
25	677 677	E02/E04- PTFE**	679 543	E02/E04- PTFE+ Hole**	693 178	L06/L08**
32	677 678	E02/E04- PTFE**	679 544	E02/E04- PTFE+ Hole**	693 179	L06/L08**
40	584 378	E02/E04- PTFE**	584 379	E02/E04- PTFE+ Hole**	693 180	L06/L08**

Tab. 47: Spare part sets for replacing the diaphragm

* SAP code

** Marking on the diaphragm

If you have any questions, please contact your Bürkert sales department.

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25 DISASSEMBLY

DANGER!

Risk of injury due to high pressure and escaping medium.

If the device is pressurised while being disassembled, there is a risk of injury due to sudden depressurisation and medium discharge.

▸ Turn off the pressure before dismantling the device. Vent or empty the lines.

CAUTION!

Risk of injury due to a heavy device.

During transportation or installation work, the device may fall down and cause injuries.

▸ Transport, install and remove heavy device with the aid of a second person only.

▸ Use suitable tools.

ATTENTION!

Installing in the AUTOMATIC operating state will damage the device.

Devices that are installed while they are in the AUTOMATIC operating state may be irreparably damaged.

▸ If devices are to be re-used, set the MANUAL operating state before they are removed.

→ If the device is to be re-used, set the MANUAL operating state.

→ Disconnect the electrical connection.

→ Dismantle the device.

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26 PACKAGING, TRANSPORT

CAUTION!

Risk of injury due to a heavy device.

During transportation or installation work, the device may fall down and cause injuries.

- ▸ Transport, install and remove heavy device with the aid of a second person only.
- ▸ Use suitable tools.

ATTENTION!

Damage due to transport.

Inadequately protected devices may be damaged during transport.

- Use shock-resistant packaging to protect the device against moisture and dirt during transport.

27 STORAGE

ATTENTION!

Incorrect storage may damage the device.

- Store the device in a dry and dust-free location.
- Avoid storage above or below the permitted storage temperature.

Devices with diaphragms:

- Storage temperature –20-+70 °C
  (the higher the storage temperature, the faster the elastomers age).
- While in storage, the fastening screws of the diaphragm should be loosened.
- Leave the valve open while in storage.

Devices without diaphragms:

- Storage temperature: –40...+70 °C.

28 DISPOSAL

Environmentally friendly disposal

- ▸ Follow national regulations regarding disposal and the environment.
- ▸ Collect electrical and electronic devices separately and dispose of them as special waste.

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