![burkert FLUID CONTROL SYSTEMS]

Type ME44
I/O module

4AI module
4AO module
8DI module
8DO module

Operating Instructions

bürkert
FLUID CONTROL SYSTEMS

I/O module Type ME44

CONTENTS

English

1 OPERATING INSTRUCTIONS

The operating instructions describe the entire life cycle of the device. Keep these instructions ready to hand at the operation site.

Important safety information!

▸ Carefully read these instructions.

▸ Observe in particular the safety instructions, intended use and operating conditions.

▸ Persons who work on the device must read and understand these instructions.

1.1 Symbols

⚠ CAUTION!

Warns of a potential danger.

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

NOTE!

Warns of damage.

▸ Failure to observe may result in damage to the device or the system.

Indicates important additional information, tips and recommendations.

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

▶ Designates instructions to avoid danger.

→ Designates a procedure which you must carry out.

☑ Designates a result.

MENU Symbol for software interface texts.

1.2 Definition of terms

Term	in these instructions stands for
Device, I/O module	I/O module Type ME44
büS	Bürkert system bus; a communication bus developed by Bürkert, based on the CANopen protocol

2 INTENDED USE

The I/O module Type ME44 collects, converts and compares physical measurement data from external sensors or receives switching commands from büS participants via the büS interface. These measurement data or these switching commands are relayed to external actuators or to büS participants via the büS interface.

▸ Install the device in a suitable control cabinet or housing. The control cabinet or the housing must at least have IP54 degree of protection.

▸ Use the device only as intended. Non-intended use of the device may be dangerous to people, nearby equipment and the environment.

▸ Use the device only in conjunction with third-party devices and components recommended or approved by Bürkert.

▸ Only operate the device when it is in perfect condition.

▸ Prerequisites for safe and trouble-free operation are correct transportation, correct storage, installation, start-up, operation and maintenance.

▸ To use the device, observe the permitted data, operating conditions and application conditions. These specifications can be found in the contract documents, the operating instructions and on the type label.

3 BASIC SAFETY INSTRUCTIONS

These safety instructions do not take into account any unforeseen circumstances and events which occur during installation, operation and maintenance. The operator is responsible for observing the location-specific safety regulations, also with reference to personnel.

⚠️

General hazardous situations.

To prevent injuries, observe the following:

▸ Do not modify the device.

▸ Do not mechanically load the device.

▸ Secure the device or system to prevent unintentional activation.

▸ Only trained technicians may perform installation and maintenance work.

▸ Install the device according to the regulations applicable in the respective country.

▸ After an interruption in the power supply, ensure that the process is restarted in a controlled manner.

▸ Observe the general rules of technology.

NOTE!

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, these components are destroyed immediately or fail after start-up.

▸ Meet the requirements specified by EN 61340-5-1 to minimise or avoid the possibility of damage caused by sudden electrostatic discharge.

▸ Do not touch electronic components when the supply voltage is connected.

▸ Cap all unused electrical interfaces with covers.

8

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

Online at: www.burkert.com

4.2 Warranty

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

4.3 Information on the Internet

Operating instructions and data sheets for the Bürkert products can be found on the Internet at:

www.burkert.com

5 PRODUCT DESCRIPTION

The I/O module Type ME44 receives measurement data from external sensors and inputs, converts them, and forwards them to external actuators or büS participants and gateways to controllers, and is also capable of issuing data from controllers or büS participants.

The I/O module Type ME44 is available in the following variants:

• 4AI module with 4 analogue inputs

• 4AO module with 4 analogue outputs

• 8DI module with 8 digital inputs

• 8DO module with 8 digital outputs

5.1 Possible combinations

The I/O module Type ME44 can be used as part of a system in combination with other modules. To assemble a system consisting of multiple modules, contact your Bürkert sales department.

Example of a system at the minimum configuration level:
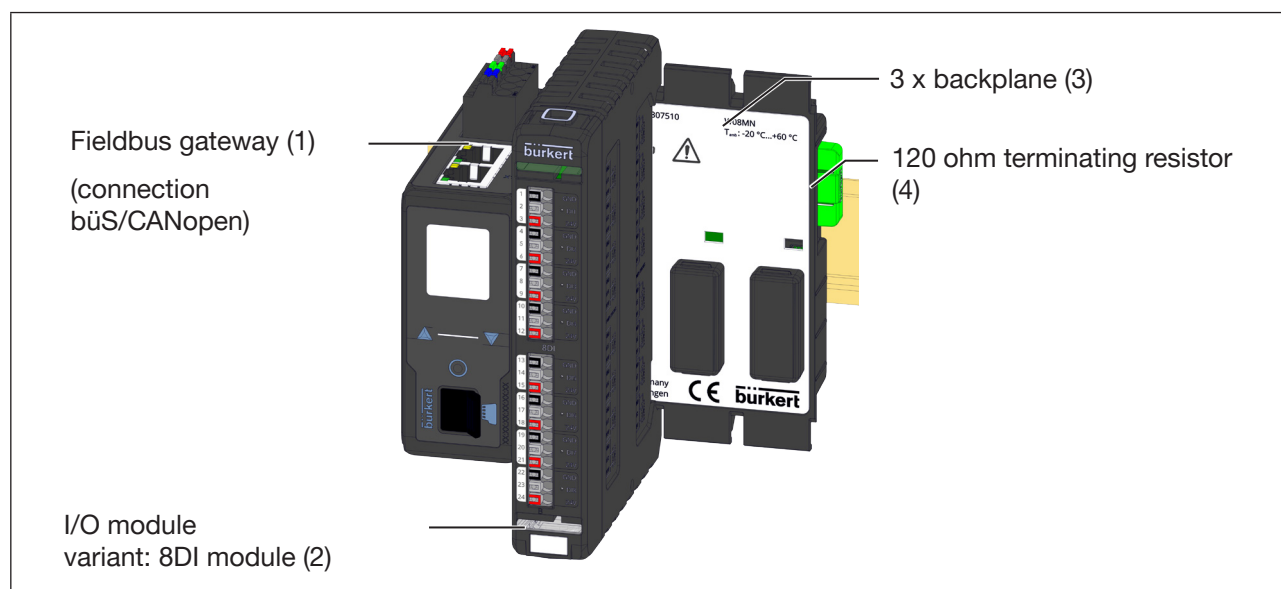
Figure 1:   Example: System with I/O module Type ME44 at minimal configuration level

Module	Designation	Types
1	Fieldbus gateway (connection büS/CANopen)	ME43
2	I/O module: 8DI module (or 4AI, 4AO, 8DO module)	ME44
3	3 x backplane	BPX3
4	120 ohm terminating resistor	ME43

Table 1:   Example: minimum configuration level for a system with I/O module Type ME44

Maximum configuration level for I/O modules Type ME44

Quantity	Modules
3	3 x backplane BPX3, each for 3 I/O modules Type ME44
9	I/O modules Type ME44

Table 2:   Maximum configuration level for a system with I/O module Type ME44

6 TECHNICAL DATA

> The following values are indicated on the type label:
>
> ▸ Supply voltage
>
> ▸ Permitted ambient temperature range

6.1 Conformity

The device conforms to the EU directives as per the EU Declaration of Conformity (if applicable).

6.2 Standards

The applied standards, which are used to demonstrate conformity with the directives, are listed in the EU type examination certificate and/or the EU Declaration of Conformity (if applicable).

6.3 Operating conditions

NOTE!

Malfunction due to heat and heavy frost

▸ Do not use the device outside the permitted temperature range.

Permitted ambient temperature: –20…+60 °C
Huminity: 90% up to 60 °C (non condensing)
Altitude: Up to 2000 m above sea level

6.4 Mechanical data

Dimensions
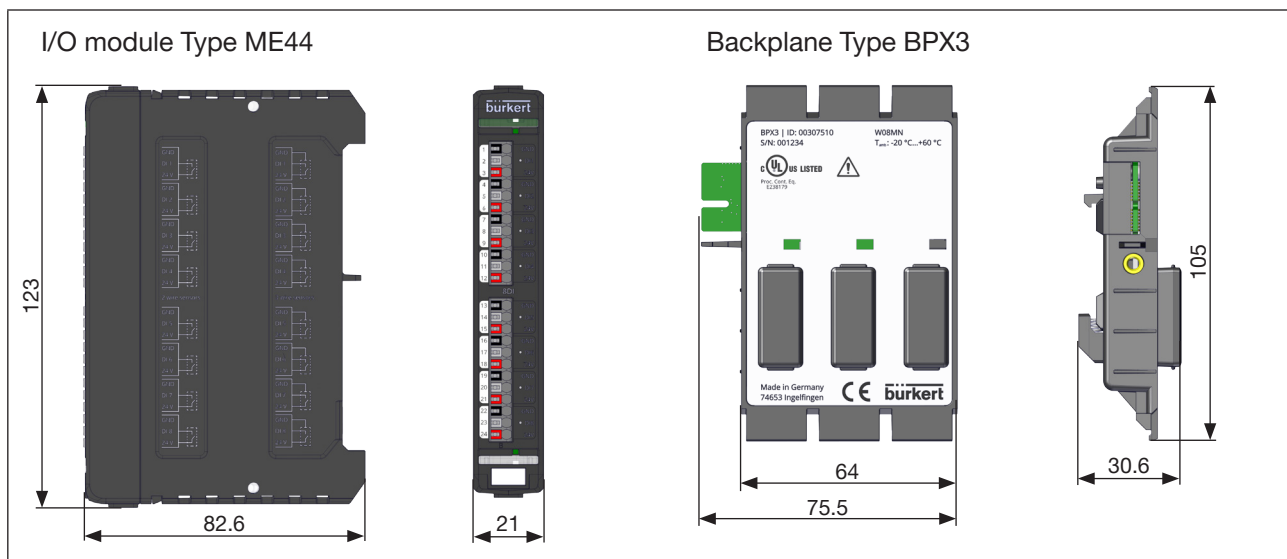
Figure 2:   Dimensions of I/O module Type ME44 and backplane Type BPX3

Housing material Type ME44:   Polycarbonate

6.5 Description of type label and device labelling
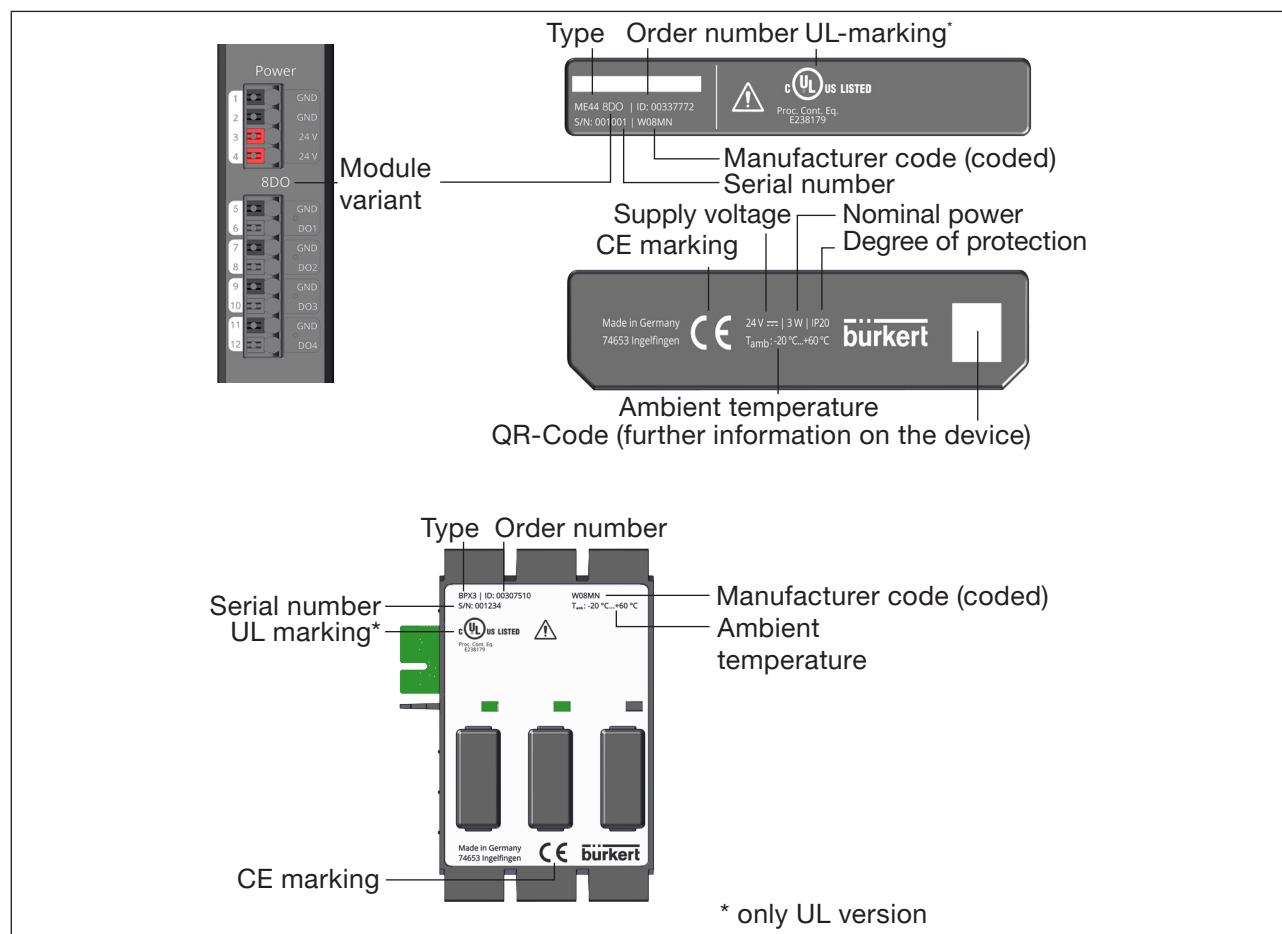
Figure 3: Description of type label and device labelling (example)

6.6 Electrical data

Operating voltage:	24 V ⎓ + 20%/– 15% via backplane BPX3
Wire connection cross-section	0.2…1.5 mm^2
Power consumption	4AI: 3.5 W 4AO: 3.5 W 8DI: 10 W 8DO: 3 W
Degree of protection:	IP20 according to EN 60529/IEC 60529
UL devices:	Limited Energy Circuit (LEC) according to UL/IEC 61010-1
	Limited Power Source (LPS) according to UL/IEC 60950
	SELV/PELV with UL Recognized Overcurrent Protection, design according to UL/IEC 61010-1 Table 18
	NEC Class 2 power source

12

Coverage | The I/O modules' inputs are protected against voltage pulses and excess currents as per IEC 61131-2, Zone B. Voltages over +/– 30 V can destroy the module.

Standards | EMC   EN 61000

IEC 61131-2

6.6.1 Electrical characteristics of inputs and outputs

4AI module	
Electrical variant	Current input or voltage input Configurable input (AI as DI) AI also usable as DI (configuration via software Bürkert Communicator)
Operating mode	• 0…20 mA • 4…20 mA • 0…10 V • 0…5 V • 0…2 V
Accuracy	0.1% FSR Temperature coefficient: • Current input: ± 35 ppm/K • Voltage input: ± 40 ppm/K
Input impedance	• Current measurement at 25 °C ≤ 110 ohms • Voltage measurement at 25 °C ≥ 115 kohms
Electrical isolation	Yes, on backplane for system bus, no separation among the inputs
Max. aux. current consumption	4 x 50 mA (sensor supply)
Max. module current consumption	25 mA

Table 3:   Electrical characteristics 4AI module

4AO module	
Electrical variant	Current output or voltage output
Operating mode	• 0…20 mA • 4…20 mA • 0…10 V • 0…5 V • 0…2 V
Accuracy	0.1% FSR
Loop impedance	≤ 900 ohms for current output ≥ 750 ohms for voltage output
Zero-scale error	+ 0.22% FSR

4AO module	
Electrical isolation	Yes, on backplane for system bus, no separation among the outputs
Max. module current consumption	30 mA
Max. Current in the output path	4 x 50 mA @ 900 ohm load during current output (current consumption decreases with less resistance)

Table 4:   Electrical characteristics 4AO module

8DI module	
Electrical variant	2-wire sensor, 3-wire sensor, mechanical limit switch (all inputs can be configured as frequency inputs)
Switching threshold	VOFF = 0…5 V VON = 10…30 V
Input current for VON, typ. 24 V $=$	Max. 5.7 mA
Input type	Type 1 and Type 3 as per IEC 61131-2
Number of fre-quency inputs	8
Frequency input	Max. up to 2.5 kHz
Input impedance	> 4 kohms
Sampling time/sam-pling frequency	1 ms…4 s/0.25 Hz…1 kHz
Electrical isolation	No
Sensor supply max.	8 x 30 mA
Max. module current consumption	30 mA (+ 8 x 30 mA sensor supply)

Table 5:   Electrical characteristics 8DI module

8DO module	
Operating mode	• On-Off • PWM (pulse width modulation) • PFM (pulse frequency modulation)
Output current	Max. 750 mA per channel (parallel switching possible)
Clock frequency	20 kHz
Electrical isolation	Yes, on backplane for system bus, no separation among the outputs
Max. module current consumption	30 mA
Max. aux. current consumption	8 x 750 mA

Table 6:   Electrical characteristics 8DO module

14

6.6.2   Diagnostic characteristics of inputs and outputs

8DI module	
Wire break detection (by channel) for 2-wire sensors	for internal and external supply
Short circuit detection (by channel) for 3-wire sensors	for internal and external supply

Table 7:   Diagnostic characteristics 8DI module, digital input

8DO module: Digital output	
Short circuit detection / Overload detection as per IEC 61131-2_2880-04 (by channel)	for external supply of a channel

Table 8:   Diagnostic characteristics 8DO module, digital output

Factory setting for lower and upper electrical limits for 4AI module

Type of input signal	Lower electrical limit	Upper electrical limit
0…20 mA	–0.25 mA	21 mA
4…20 mA	3.6 mA	21 mA
0…10 V	–0.25 V	10.25 V
0…5 V	–0.25 V	5.25 V
0…2 V	–0.25 V	2.25 V

Table 9:   Factory setting for lower and upper electrical limits for 4AI module

> The lower and upper electrical limits can be customised to the user.

6.6.3   Connectable wires

	minimum	maximum
Clamping area	0.13 mm^2	1.5 mm^2
Wire connection cross-section AWG	AWG 28	AWG 14
Solid-core H05(07) V-U	0.2 mm^2	1.5 mm^2
Fine-wired H05(07) V-K	0.2 mm^2	1.5 mm^2
With end splice with collar as per DIN 46 228/4	0.25 mm^2	0.75 mm^2
With end splice as per DIN 46 228/1	0.25 mm^2	1.5 mm^2
Minimum Temperature rating 105 °C		

Table 10:   Connectable wires

7 INSTALLATION

NOTE!

‣ Installation may only be performed with trained technical personnel with suitable tools.

7.1 Mounting the fieldbus gateway on the backplane

Fieldbus gateway | Backplane BPX3 | Backplane BPX3 with mounted fieldbus gateway

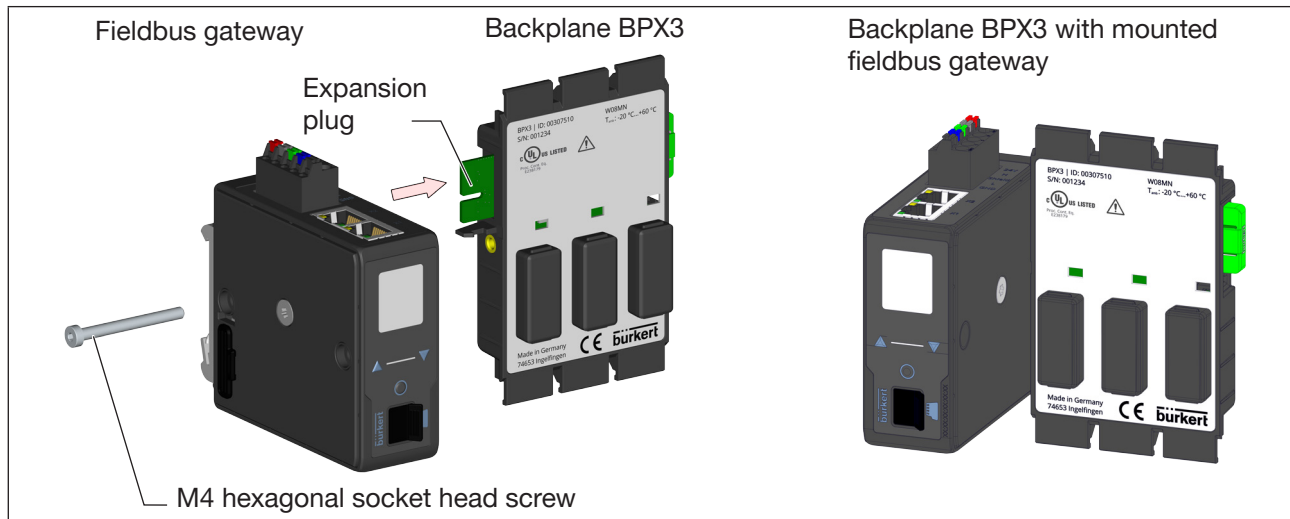Expansion plug

M4 hexagonal socket head screw

Figure 4: *Mounting the fieldbus gateway on the backplane*

→ Remove any covers from the expansion socket of the fieldbus gateway.

→ Align the expansion socket of the fieldbus gateway with the expansion plug of the backplane.

→ Connect fieldbus gateway to the backplane.

→ Using the M4 hexagonal socket head screw, screw the fieldbus gateway to the backplane.
⚠ Observe tightening torque of 0.75 Nm.

7.1.1 180°-rotated installation of the fieldbus gateway

There are 2 expansion sleeves for connecting the fieldbus gateway with the backplane. As a result, the fieldbus gateway can be installed turned by 180° with the electrical connection upwards or downwards.

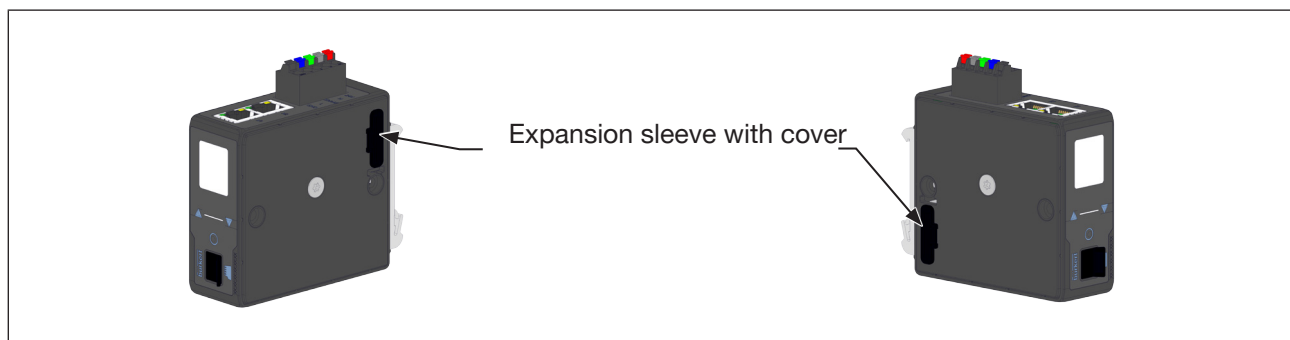The interfaces are sealed with a cover during delivery.

Expansion sleeve with cover

Figure 5: *Expansion sleeves of the fieldbus gateway*

→ Remove the cover with a screwdriver before installation.

NOTE!

Seal the unused expansion sleeve with the cover to prevent damage.

	→ Loosen the screw. → Turn the standard rail clip by 180°. → Tighten locking screw with 2 Nm.

Figure 6:   Turning standard rail clip

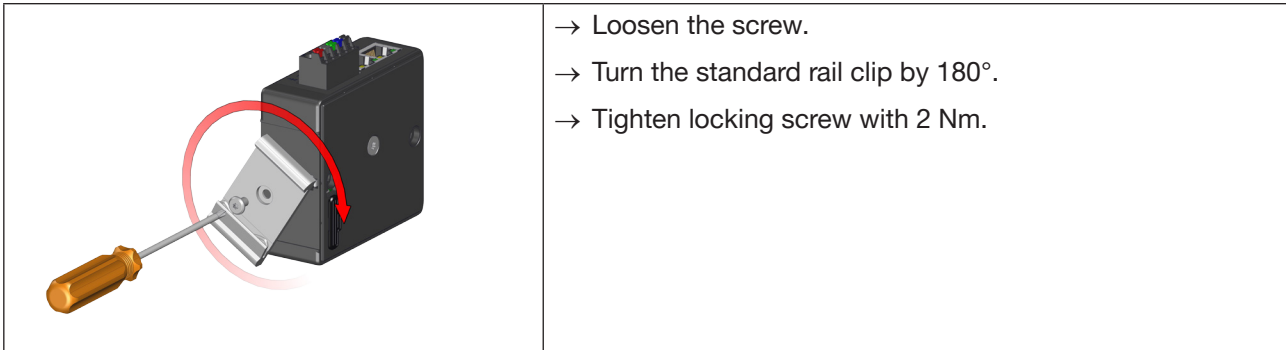## 7.2   Mounting the I/O module Type ME44 on the backplane
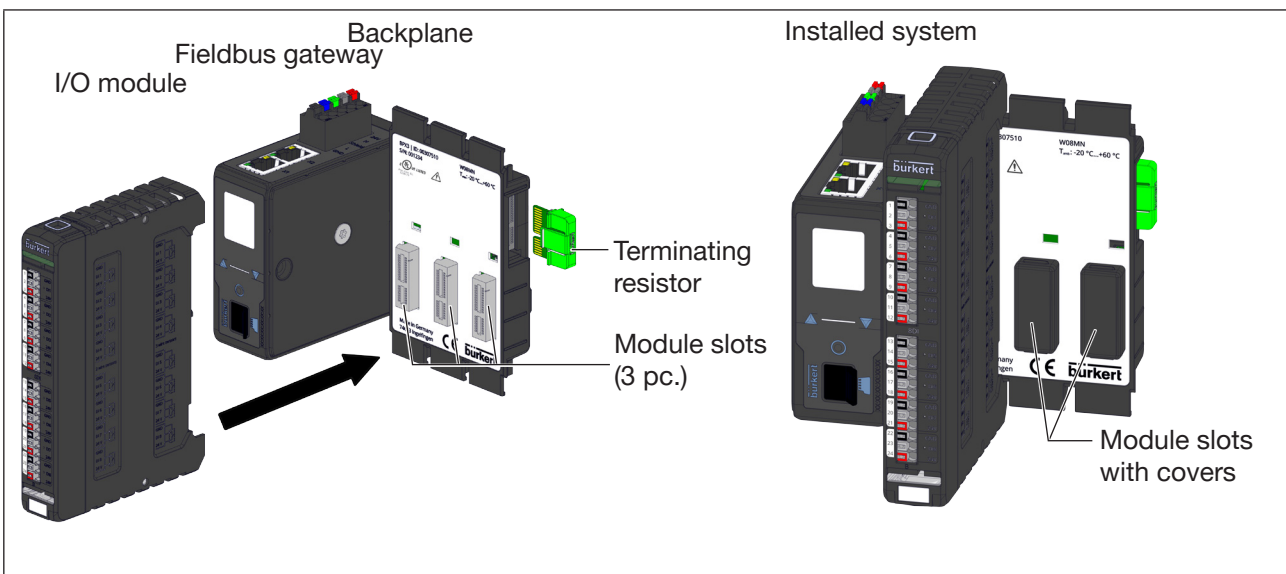

Figure 7:   Mounting the I/O module Type ME44 on the backplane

→ Remove any covers from the backplane.

→ Align the I/O module with the module slot of the backplane.

→ Press I/O module onto the backplane until it engages.

The I/O module is not connected to the supply voltage.

Use supply voltage unit with adequate power.

7.3 Electrical installation

NOTE!

Prerequisite for the fault-free functioning of the device and to avoid interference issues:

▸ Use only shielded cables with a braided or foil shield.

7.3.1 Electrical configuration and circuit diagram 4AI module
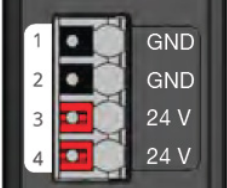
Electrical configuration:
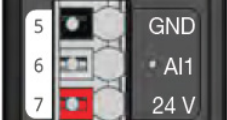
	Plug configuration AUX Power		External circuit
		GND	Ground
		GND	Ground
		24 V	Aux Power supply voltage 24 V $\mathrm{=}$ + 20%/– 15%
		24 V	Aux Power supply voltage 24 V $\mathrm{=}$ + 20%/– 15%
	Plug configuration analogue inputs		**External circuit**
		GND	Ground
		AI1…AI4	Analogue input +
		24 V	Supply voltage 24 V $\mathrm{=}$ + 20%/– 15%

Table 11:   Configuration 4AI module

Circuit diagram:

The circuit diagram is pressed onto the outside of the I/O module.

Figure 8:   Circuit diagram 4AI module, internally supplied

Figure 9:   Circuit diagram 4AI module, externally supplied

English

7.3.2 Electrical configuration and circuit diagram 4AO module

Electrical configuration:
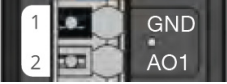
	Plug configuration analogue outputs		External circuit
		GND	Ground
		AO1…AO4	Analogue output +

Table 12:   Configuration 4AO module

7.3.3 Electrical configuration and circuit diagram for 8DI module

Electrical configuration:
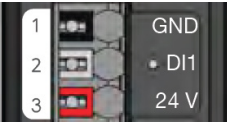
	Plug configuration		External circuit
		GND	Ground
		DI1…DI8	Digital input Frequency inputs: DI1…DI8
		24 V	Supply voltage 24 V $=\!=\!=$ + 20%/– 15%

Table 13:   Electrical configuration 8DI module

Circuit diagram:

> ⊗ The circuit diagram is pressed onto the outside of the I/O module.
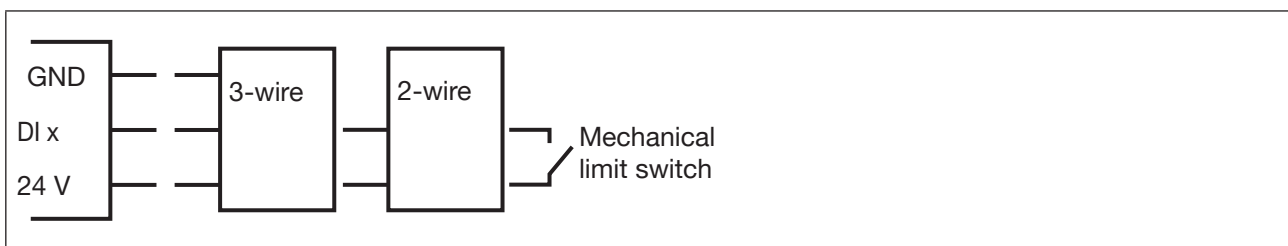
Figure 10:   Circuit diagram 8DI module

7.3.4 Electrical configuration and circuit diagram for 8DO module

Electrical configuration:

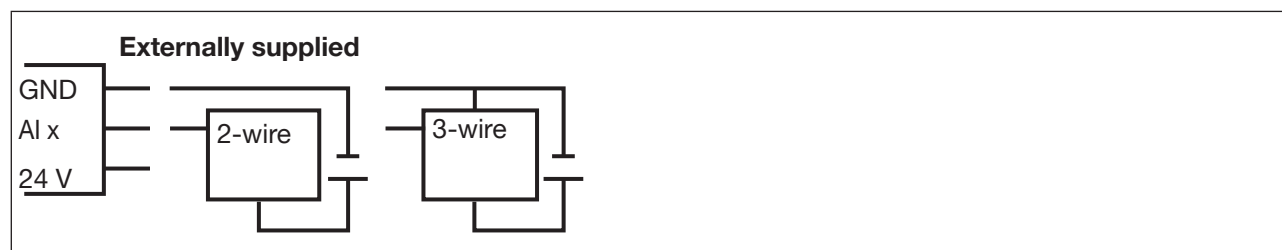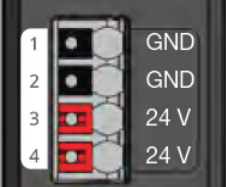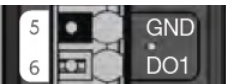|	Plug configuration AUX Power	External circuit
⬛	GND	Ground
⬛	GND	Ground
🟧	24 V	Aux Power supply voltage 24 V ⎓ + 20%/– 15%
🟧	24 V	Aux Power supply voltage 24 V ⎓ + 20%/– 15%
	Plug configuration digital outputs	**External circuit**
⬛	GND	Ground
⬜	DO1…DO8	Digital output +

Table 14:   Configuration 8DO module

7.3.5 Connecting external sensors and actuators to the power supply

→ Connect the wires of the external sensors and actuators to the respective terminals.

→ Connect cable shielding (see chapter "7.3.6 Connecting the cable shielding").

If the I/O module is difficult to reach, the connection panel for the electrical connection can be removed.

Remove the connection panel — upper lock — press — lower lock — press

Remove the I/O module — upper unlocking device — press toward the centre — lower unlocking device
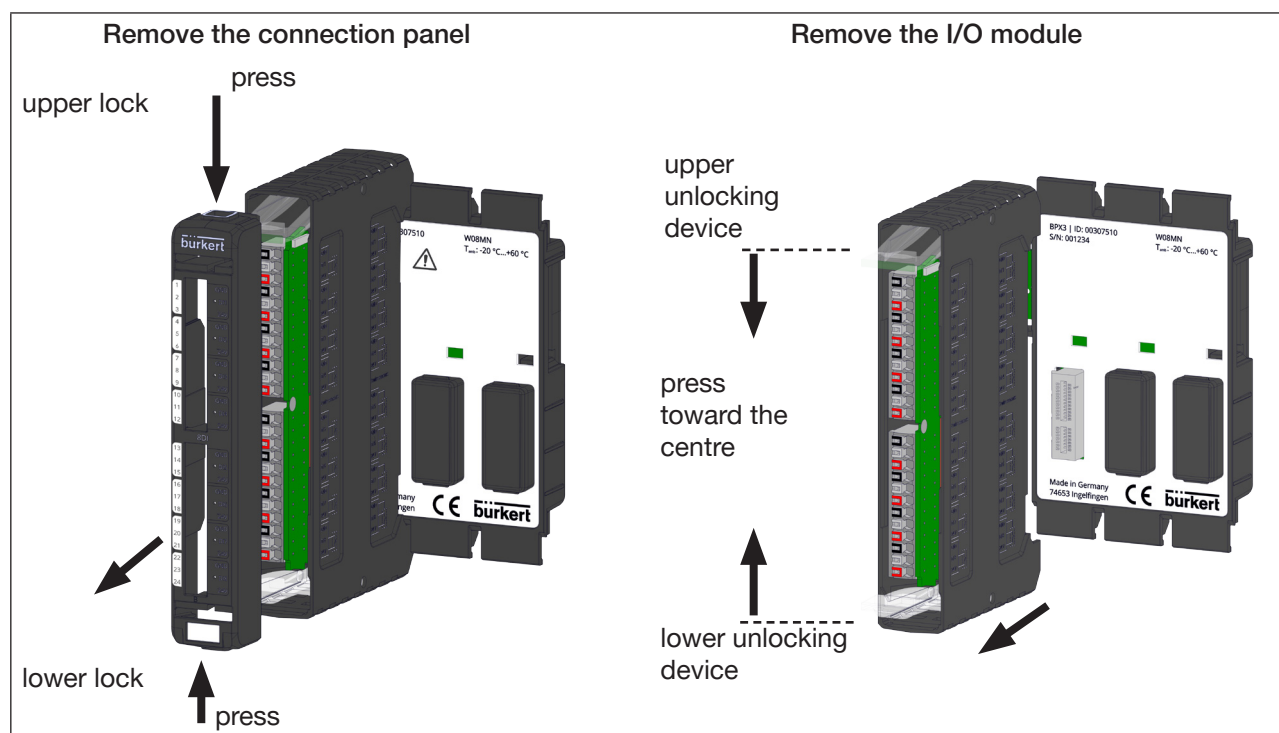
Figure 11:   Uninstalling backplane from fieldbus gateway

→ Press on the blue squares until the lock is released and remove the connection panel.

→ Press the upper and lower unlocking device toward the centre of the device and remove the I/O module from the backplane.

→ Align the connection panel with the I/O module and let it lock into place.

→ Connect the wires of the external sensors and actuators to the respective terminals.

→ Connect cable shielding (see chapter "7.3.6 Connecting the cable shielding").

→ Press on the connection panel until it clicks into position.

7.3.6   Connecting the cable shielding

NOTE!

Required for impeccable function of the device.

The cable shielding must be placed on the functional earth on both wire ends.

1. On the I/O module
   • directly at the control cabinet input or
   • on a separate bus bar directly on the module.

2. On the external sensor or actuator.

7.4   Mounting the system on the standard rail

1.	→ Tilt the system and align it with the standard rail.
2.	→ Hook system into the lower guide of the standard rail.
3.	→ Press the system upwards, tilting it towards the standard rail and lock it into place in the upper track of the standard rail.
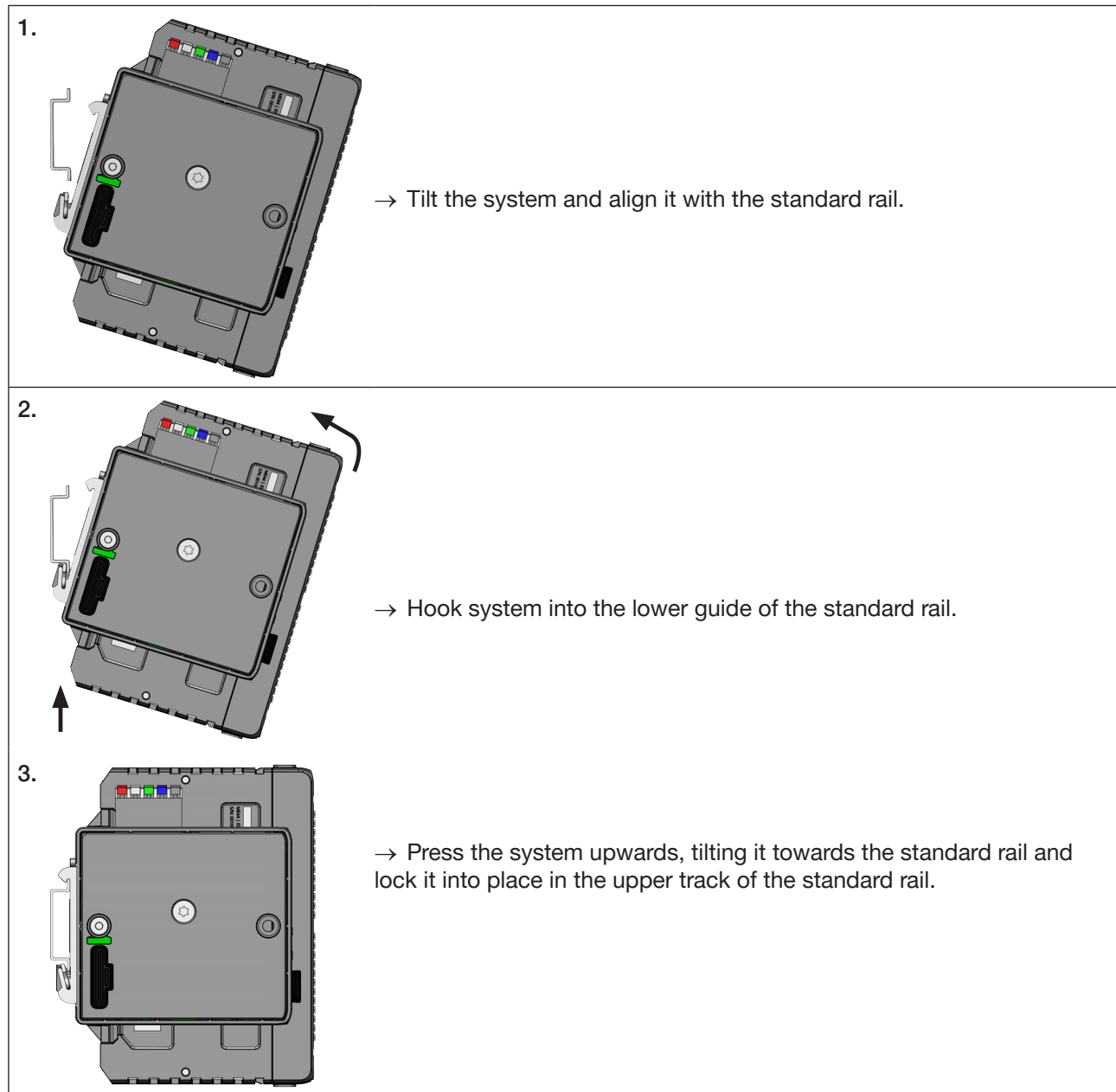
Figure 12:   Mounting the device on the standard rail

Assembly recommendation for configuration levels with several backplanes.

→ First hook the minimum configuration level, consisting of fieldbus gateway and 1 backplane, into the standard rail.

→ Hook other backplanes individually in succession into the standard rail and push onto the previous backplane.

→ Install I/O modules and connection panels.

22

MAN 1000436558 EN Version: E Status: RL (released | freigegeben) printed: 28.04.2021

8 DISPLAY ELEMENTS OF I/O MODULES

The I/O modules of Type ME44 have the following LEDs for indicating the status.

• LED for indicating the device status.
The LED shows the colour based on NAMUR NE 107.

• LEDs for indicating the channel status.
The number of LEDs depends on the available channels (1 LED per channel).

LED for indicating the device status

LED for indicating the channel status
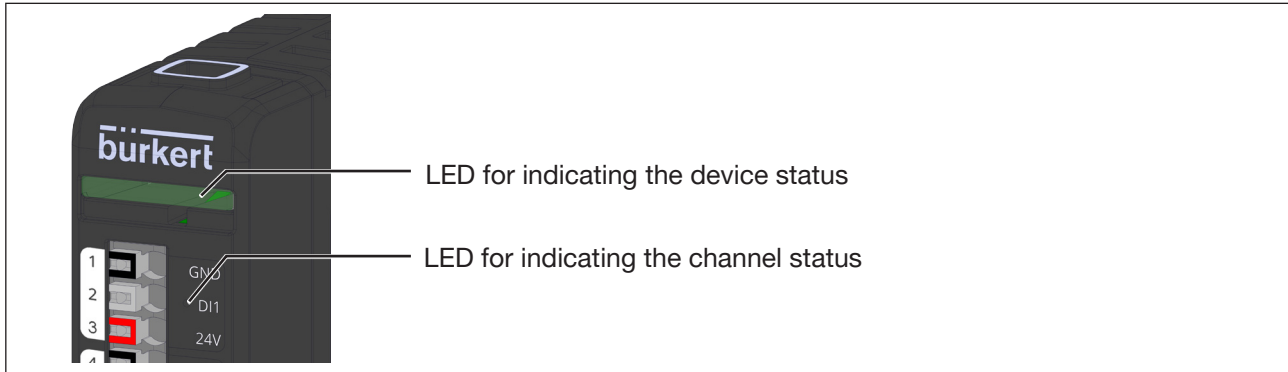
Figure 13: LEDs for indicating the status

8.1 LED for indicating the channel status

The LED for displaying the channel status alternates between the colours green, red and orange.

Description of the status indicator:

Colour	Meaning
Green	Channel active
Red	Error present, channel is inactive
Orange	Error present, channel is active

Table 15: LED for indicating the channel status

8.2   LED for indicating the device status

The LED shows the colour based on NAMUR NE 107.

There are 2 other modes in which a solid colour can be selected or the LED is switched off.

The LED flashes to identify the device if it is selected in Bürkert Communicator.

If several messages exist simultaneously, the message 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:

Indication in line with NE 107		Description	Meaning
Colour code	Colour		
5	Red	Failure, error or fault	Functional fault. Device functionality is not guaranteed.
4	Orange	Function check	The device is searching for a büS participant. This status ends after a few seconds.
3	Yellow	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. Data sheet values cannot be complied with.
2	Blue	Maintenance required	The device has detected a deviation during ongoing diagnostics. Device functionality limited. The device is in closed-loop control mode, but function will soon be restricted. → Perform device maintenance.
			Device configuration cannot be managed: • Updated device configuration cannot be saved. • Not possible to transfer the configuration when swapping devices.
1	Green	Diagnostics active	Device is in error-free operation. Status changes are highlighted in colour. Messages are sent via any fieldbus that may be connected.
0	White	Diagnostics inactive	Device is switched on. Status conditions are not displayed. Messages are not listed in the message list or transmitted via any connected fieldbus. Device is running within its specifications.

Table 16:   Indication of the device status in NAMUR operation mode

8.3 Diagnostics of the device status

The various I/O module states can be diagnosed from the LED displays for the device status and channel status.

Diagnostics 4AI module:

Colour of device status LED	Colour of channel status LED	Meaning
Green	Off	Device is in error-free operation. Channel is inactive.
Green	Green	Device is in error-free operation. Channel is active and has a valid value.
Red	Red	Device faulty. Channel is active. The following errors may occur: • Input signal outside of the permissible range

Table 17: Diagnostics, device state 4AI module

Diagnostics 4AO module:

Colour of device status LED	Colour of channel status LED	Meaning
Green	Off	Device is in error-free operation. Channel is inactive.
Green	Green	Device is in error-free operation. Channel is active and has a valid value.
Green	Red	Device is in error-free operation. The channel is active and the mapped value from the producer is invalid (NAMUR stays green if consumer emergency setting (0x2003sub9) = 0 (none))
Red	Red	Device faulty. Channel is active. The following errors may occur: • Short circuit (in voltage operation mode, detection only when output > 50 mV) • Open loop (in power operation mode, detection only when output > 40 μA) • Mapped producers not found • Mapped value from the producer is invalid (NAMUR also red when consumer emergency setting (0x2003sub9) ! = 0 (none))

Table 18: Diagnostics, device state 4AO module

Diagnostics 8DI module:

Colour of device status LED	Colour of channel status LED	Meaning
Green	Off	Device is in error-free operation. Channel is inactive or input voltage is < 5 V.
Green	Green	Device is in error-free operation. Channel is active with input voltage > 10 V.
Red	Red	Device faulty. Channel is active, but the following errors may occur: • Wire break, • short circuit.

Table 19: Diagnostics, device state 8DI module

Diagnostics 8DO module:

Colour of device status LED	Colour of channel status LED	Meaning
Green	Off	Device is in error-free operation. Two states may be present: • Channel is inactive. • Channel is active in state = low
Green	Green	Device is in error-free operation. Channel is active in state: High. In operating mode PWM and PFM: Channel is processing signals according to the configuration.
Green	Red	Device is in error-free operation. The channel is active and the mapped value from the producer is invalid (NAMUR stays green if consumer emergency setting (0x2003sub9) = 0 (none))
Red	Red in ON/OFF operation mode Red/orange flashing in PWM/PFM operation mode	Device faulty. Channel is active, but the following errors may occur: • short circuit / Overload (no short circuit detection in low power operation mode) • Mapped producers not found • Mapped value from the producer is invalid (NAMUR also red when consumer emergency setting (0x2003sub9) ! = 0 (none))

Table 20: Diagnostics, device state 8DO module

9 START-UP WITH BÜRKERT COMMUNICATOR

⚠ The Bürkert Communicator software can be downloaded free of charge from the Bürkert website. In addition to the software, the USB-büS interface kit, available as an accessory, is required.

The USB büS interface kit can be ordered from Bürkert as an accessory (see "19 Replacement parts and accessories").

ℹ This chapter only describes basic use of the Bürkert Communicator. The detailed description of the operation and setting of the Bürkert Communicator software can be found on the homepage: www.burkert.com → Type 8920

9.1 Bürkert Communicator user interface
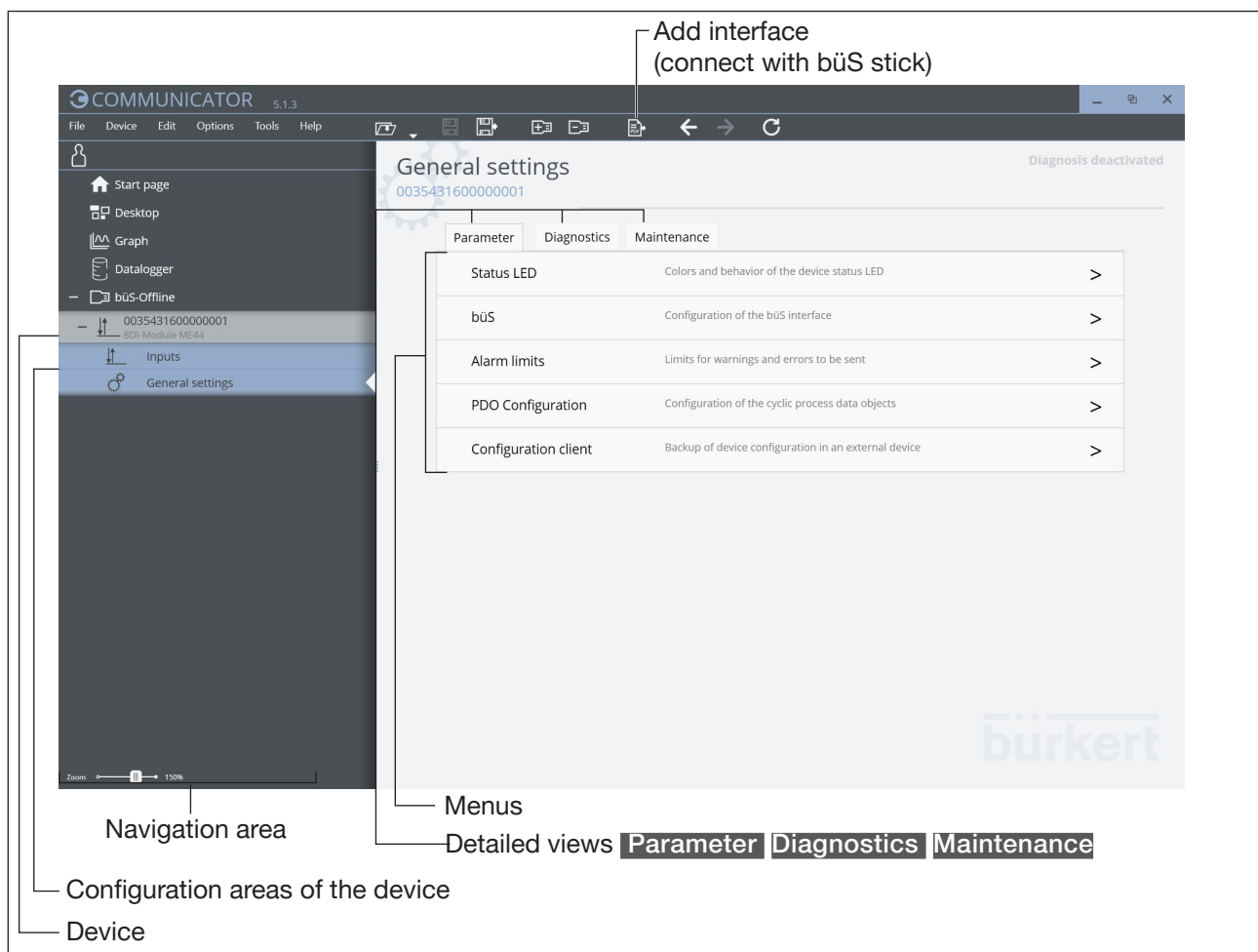
Figure 14:   Example of a Bürkert Communicator user interface

9.2 Connect device with Bürkert Communicator

The Bürkert Communicator can be connected to the device via a büs network or with the büS stick.

→ Install Bürkert Communicator on the PC.

→ Use the USB-büS-interface to establish the connection between the device and the PC.
Not required for the devices in a büS network.

→ Start the Bürkert Communicator.

→ In the menu bar, click the icon ⊞ for Add interface.

→ Select büS stick or büS via the network.

→ Finish.

☑ The device is connected to the Bürkert Communicator and is displayed in the navigation area.

10   4AI MODULE START-UP

10.1   Base setting of analogue inputs

> ⊘ The Bürkert Communicator software is required for the base setting.
>
> The Bürkert Communicator software can be downloaded for free from the Bürkert homepage. www. buerkert.de → Type ME44.
> In addition to the software, the USB büS interface kit, available as an accessory, is required.

Base setting of analogue inputs AI1 to AI4 (pay attention to order)		Factory default setting	Requirement
1.	Select input signal.	not configured	mandatory
2.	Select physical size for the process values.	–	mandatory
3.	Calibrate process value of the analogue input:		mandatory
	• Lower value	0	
	• Upper value	100	
4.	Set filter response time.	3.00 s	optional
5.	Enable and parameterise warning alerts for deviations in the process set-point value:	not enabled	optional
	• Lower limit	–	
	• Upper limit	–	
6.	Enable and parameterise error alerts for deviations in the process set-point value:	not enabled	optional
	• Lower limit	–	
	• Upper limit	–	
7.	Enable and parameterise error alert for input errors (supply voltage or current strength):	For defined upper and lower limits see chapter "10.1.7 Enable and parameterise error alerts for input errors".	optional
	• Lower electrical limit	enabled	
	• Upper electrical limit	enabled	
8.	Use analogue input as digital input.	not enabled	optional
9.	Enter name for the output value.	no name provided	
10.	Set sample time.	100 ms	

Table 21:   Overview: Base settings of the analogue inputs of the 4AI module

10.1.1 Open menu for setting the analogue inputs in Bürkert Communicator

Required access rights: Installer

Open menu:

→ ↧ Select `4AI` in the navigation area.
Click `+` to open the configuration areas.

→ Select `AI1`, `AI2`, `AI3` or `AI4` in the configuration area.

The detailed view `Parameter` is displayed with the menus for setting the analogue input.

> ⊕ The complete menu tree for setting the analogue input is displayed after the input signal is selected.

10.1.2 Select input signal for analogue input

Required access rights: Installer

→ Select `AI1`, `AI2`, `AI3` or `AI4` in the configuration area.

The detailed view `Parameter` is displayed with the menus for setting the analogue input.

→ Select `operating mode`.

→ Select input signal.

✅ You have selected the input signal for the analogue input.

10.1.3 Select physical size for the process values of the analogue input

Required access rights: Installer

→ Select `AI1`, `AI2`, `AI3` or `AI4` in the configuration area.

The detailed view `Parameter` is displayed with the menus for setting the analogue input.

→ Select `Configure unit`.

→ Select physical size.

→ `Finish`.

✅ You have selected the physical size for the analogue input.

10.1.4 Adjust the process value of the analogue input

The process value of the analogue input can be adjusted in various ways:

• In the "Maintenance" detailed view: 2-point hardware adjustment with help from a wizard, for which the lower and upper process values are calculated with an equation.

• In the "Parameter" detailed view: Adjustment by entering the lower and upper process values.

30

> ⊘ **Recommendation for initial start-up:**
> 2-point adjustment with the wizard is recommended for proper scaling of the process values. Detailed view Maintenance → Menu Hardware adjustment → Menu 2-point hardware adjustment.

Required access rights: Installer

Adjustment in the "Maintenance" detailed view: 2-point hardware calibration of the process value with the wizard:

2-point hardware calibration is performed via a linear equation calculated with the specified values for points 1 and 2.

Procedure:

→ Select AI1, AI2, AI3 or AI4 in the configuration area.

The detailed view Parameter is displayed with the menus for setting the analogue input.

→ Switch to detailed view Maintenance.

→ Select Hardware adjustment.

→ Select 2-point hardware ajustment.

A wizard guides users through the menu.

The following values are displayed during adjustment.

– The raw values of the analogue input for adjustment point 1.

– Offset and slope of the linear equation.

→ Finish.

✅ You have adjusted the process value of the analogue input.

Adjustment of the "Parameter" detailed view: Adjustment by entering the lower and upper process values

→ Select AI1, AI2, AI3 or AI4 in the configuration area.

The detailed view Parameter is displayed with the menus for setting the analogue input.

Adjust the lower process value of the analogue input:

→ Select Value at xxx. The display (0 mA, 4 mA or 0 V) depends on the selected input signal.

→ Enter value.

Adjust the upper process value of the analogue input:

→ Select Value at xxx. The display (20 mA, 2 V, 5 V or 10 V) depends on the selected input signal.

→ Enter value.

✅ You have adjusted the process value of the analogue input.

10.1.5   Set filter response time for the analogue input

The filter response time determines the damping ratio for current or voltage fluctuations in the analogue input.

Required access rights: Installer

→ Select AI1, AI2, AI3 or AI4 in the configuration area.

The detailed view Parameter is displayed with the menus for setting the analogue input.

→ Select Filter response time.

→ Enter value.

☑ You have set the filter response time for the analogue input.

10.1.6 Enable and parameterise warning alerts and error alerts

Warning and error alerts for deviations from the process set-point value can be enabled. Define the lower and upper limits that will trigger an alert when entered.

Required access rights: Installer

→ Select AI1, AI2, AI3 or AI4 in the configuration area.

The detailed view Parameter is displayed with the menus for setting the analogue input.

Enable warning alerts and/or error alerts:

→ Select Process warnings or Process errors.

→ Select Activation flag.

→ Enable Lower limit and/or Upper limit.

Set the limits for warning or error alerts based on the selected activation flag:

→ Select Lower limit.

→ Enter value.

→ Select Upper limit.

→ Enter value.

☑ You have enabled the warning alerts and error alerts for deviations from the process set-point value.

10.1.7 Enable and parameterise error alerts for input errors

An error alert for deviations in the input signal can be enabled. Define the lower and upper electrical limits that trigger an error alert when entered.

Factory setting:
The error alerts are enabled by the manufacturer. The following table shows the upper and lower electrical limits set for the issuance of error alerts.

Type of input signal	Lower electrical limit	Upper electrical limit
0–20 mA	–0.25 mA	21 mA
4–20 mA	3.6 mA	21 mA
0–10 V	–0.25 V	10.25 V
0–5 V	–0.25 V	5.25 V
0–2 V	–0.25 V	2.25 V

Table 22:   Factory setting: Error alerts for input errors

Required access rights: Installer

→ Select AI1, AI2, AI3 or AI4 in the configuration area.

The detailed view Parameter is displayed with the menus for setting the analogue input.

Enable error alerts:

→ Select Input error.

→ Select Activation flag.

→ Select parameters for the error alert. Multiple selections are possible.

• Lower electrical limit

• Upper electrical limit

Set the limits for error alerts according to the selected activation flag:

→ Select Lower electrical limit.

→ Enter value.

→ Select Upper electrical limit.

→ Enter value.

☑ You have enabled the error alerts for deviations from the input signal.

10.1.8   Use analogue input as digital input

Each analogue input of the 4AI module can also be used as a digital input.

Enabling use as digital input

Required access rights: Installer

→ Select `AI1`, `AI2,` `AI3` or `AI4` in the configuration area.

The detailed view `Parameter` is displayed with the menus for setting the analogue input.

→ Select `AI as DI`.

→ Set `On`.

The analogue input is enabled for use as digital input and the configuration area `AI as DI` is integrated for parametrisation.

Parametrisation for use as digital input:

→ Select `AI as DI` in the configuration area.

The detailed view `Parameter` is displayed with the menus for setting the analogue input.

→ Select `AI1`, `AI2,` `AI3` or `AI4`.

→ Select `Lower threshold value` and enter the limit.

→ Select `Upper threshold value` and enter the limit.

✔ You have enabled and parameterised analogue input for use as digital input.

10.1.9   Enter name for the output value of the analogue input

If required, a name can be entered for the output value of each analogue input.

Required access rights: Installer

→ Select `AI1`, `AI2,` `AI3` or `AI4` in the configuration area.

The detailed view `Parameter` is displayed with the menus for setting the analogue input.

→ Enter `Output value name`.

→ Enter name.

✔ You have given the output value of the analogue input a name.

10.1.10   Set sampling time for the analogue input

The sampling time sets the time frame in which the data from the input are read.

Factory setting: 100 ms

> ❗ With a shorter sampling time, the bus load on the CAN bus increases.

Setting sampling time:

Required access rights: Installer

→ In the configuration area select AI1 (or corresponding output).

The detailed view Parameter is displayed with the menus for setting the analogue input.

→ Select Sampling time.

→ Choose value.

☑ You have set the sampling time.

11 ADDITIONAL 4AI MODULE SETTINGS

11.1 Menus in the configuration area AI1 to AI4

The following overview and brief description of the menus contains the device-specific settings for the I/O module and not the description of the PC software Bürkert Communicator.

11.1.1 Detailed view "Parameter"

> The "Parameter" detailed view menu for the analogue inputs AI1 to AI4 is extensively described in the chapter 4AI module start-up.

11.1.2 Detailed view "Diagnostics"

Open menu:

→ ↕ Select 4AI in the navigation area.
Click ➕ to open the configuration areas.

→ Select AI1 (or corresponding output) in the configuration area.

→ Select detailed view Diagnostics.

Overview of the menus:

Diagnostics for AI1 to AI4 (analogue inputs 1…4)	
Levels 1	**Description**
Type	Indicates type of analogue input.
Operating mode	Indicates the operating mode set for the analogue input.
Input value	Indicates the voltage or current strength applied to the analogue input. The displayed electrical size depends on the selected input signal. ⓵ The modules are generally correctly calibrated by the manufacturer. If it is determined that the displayed input value deviates from the actual value, recalibration is required. The recalibration is performed in the detailed view Maintenance → Hardware calibration.
Output value	Indicates the process value issued on the fieldbus.

Table 23: Menus of the 4AI module, configuration area AI1 to AI4, detailed view "Diagnostics"

11.1.3 "Maintenance" detailed view

Open menu:

→ ⌷ Select `4AI` in the navigation area. Click `+` to open the configuration areas.

→ Select `AI1` (or corresponding output) in the configuration area.

→ Select detailed view `Maintenance`.

Overview of the menus:

`Maintenance` for `AI1` to `AI4` (analogue inputs 1…4)	
Levels 1 and 2	**Description**
`Hardware adjustment`	Scaling the input signal
`2-point hardware adjustment`	Wizard for adjust the input signal
	The 2-point hardware adjustment is performed via a linear equation calculated with the specified values for points 1 and 2.
	Menu points:
	• Input value for point 1
	• Raw value: Indicates the raw value (value of the unscaled input signal).
	• Input value for point 2
	• Raw value: Indicates the raw value (value of the unscaled input signal).
	• Recalculated offset: Indicates the offset recalculated for the input signal via the linear equation.
	• Recalculated slope: Indicates the slope recalculated for the input signal via the linear equation.
`Offset`	Setting the offset for the input signal
`Gradient`	Setting the slope for the input signal
`Reset to factory calibration`	Reset hardware adjustment of the corresponding channel to factory setting.
`Process value scaling`	Scaling using real process values.
`Factory reset`	Reset all settings of the corresponding channel to factory setting, except for hardware adjustment.

Table 24: Menus of the 4AI module, configuration area AI1 to AI4, detailed view "Maintenance"

11.2 Menus in the configuration area "General settings"

The following overview and brief description of the menus contains the device-specific settings for the I/O module and not the description of the PC software Bürkert Communicator.

11.2.1 Detailed view "Parameter"

Open menu:

→ ⬍ Select `4AI` in the navigation area.
Click `+` to open the configuration areas.

→ In configuration area select `General settings`.

→ Select detailed view `Parameter`.

Overview of the menus:

`Parameters` **for** `General settings`	
Levels 1, 2 and 3	**Description**
`Status LED`	Setting the LED to display the device status.
`Operating mode`	Set LED operation mode for displaying device states. The following LED modes can be selected: • NAMUR operation mode, for description see <u>"8.2 LED for indicating the device status" on page 24</u>. • LED off.
`büS`	Parameterisation of the device as a büS participant.
`Displayed name`	Issue name under which the device is displayed. 🛈 No entry required.
`Location`	Indicates location of device
`Description`	The input window can be used to describe the device or for additional information on the device. 🛈 No entry required.
`Advanced`	Further settings for the device as participant of a network.
`Unique device name`	Assign communication ID for communication in the network. 🛈 If the communication ID is changed, the assigned partnership with another participant is lost.
`Baud rate`	Set transmission speed for the device as a büS participant or CANopen participant.
`büS address`	Assign address under which the device is operated as a büS participant or CANopen participant.

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Parameters for General settings	
Levels 1, 2 and 3	**Description**
Bus operating mode	Select communication: • Protocol CANopen • Protocol büS • Single device
CANopen status	Set communication state for the device: Pre-operational: The participant can be communicated with via SDOs. PDO communication is not possible. Operational: The participant can independently send and receive process data. ❗ The menu is only available when selecting the protocol CANopen.
Deallocation delay	Time from the loss of a partner to deletion of its configuration.
Alarm limits	Display and setting of the limits that, when exceeded or not reached, cause the device to trigger an error alert or warning.
Supply voltage	Display the limits for supply voltage.
Error low	Indicates the limit for supply voltage, the exceedance of which triggers an error alert from the device. Note hysteresis!
Error high	Indicates the limit for supply voltage, the failure to meet which triggers a warning from the device. Note hysteresis!
Hysteresis	Indicates the hysteresis for the supply voltage limits. ❗ The hysteresis is centrally assigned to the limit. Example: Error high 26.4 V Hysteresis 0.5 V The error is issued for a supply voltage > 26.9 V and is resolved with a supply voltage < 25.9 V.
Device temperature	Display and setting of the limits for device temperature.
Error low	Indicates the limit for device temperature, the exceedance of which triggers an error alert from the device. Note hysteresis!
Error high	Indicates the limit for device temperature, the failure to meet which triggers a warning from the device. Note hysteresis!
Warning low	Setting the limit for device temperature, the exceedance of which triggers a warning from the device. Note hysteresis!
Warning high	Setting the limit for device temperature, the failure to meet which triggers a warning from the device. Note hysteresis!

Parameters for General settings	
Levels 1, 2 and 3	**Description**
Hysteresis	Indicates the hysteresis for the device temperature limits. ❗ The hysteresis is centrally assigned to the limit. Example: Warning above 80 °C Hysteresis 4 °C The warning is issued for a device temperature > 82 °C and is resolved with a device temperature < 78 °C.
Diagnostics	Menu for enabling and deactivating the diagnostics function.
Active	Diagnostics function enabled: • The LED for the device status display shows the device status depending on the operation mode that has been set. • Alerts are entered in the logbook.
Inactive	Diagnostics function deactivated: • The LED for the device status display does not show the device status. • There is no entry of errors in the logbook.
PDO configuration	Configuration of the cyclic process data objects:
PDO 1 PDO 2 PDO 3 Multiplexed PDO	❗ The cyclical process data objects are configured with a wizard that guides the user through the necessary operating steps.
Reset to default values	Reset the PDO configuration to the default values
Output module PDOs	For a description see "11.1 Menus in the configuration area AI1 to AI4" on page 36.

Table 25:   Menus of the 4AI module, configuration area "General settings", detailed view "Parameter".

11.2.2   Detailed view "Diagnostics"

Open menu:

→ 〤 Select ▨4AI▨ in the navigation area.
Click ➕ to open the configuration areas.

→ In configuration area select ▨General settings▨.

→ Select detailed view ▨Diagnostics▨.

Overview of the menus:

Diagnostics for General settings	
Levels 1 and 2	**Description**
Device status	Information on the device status.
Operating duration	Indicates the operating duration over the entire life cycle of the device.
Device temperature	Device temperature display
Voltage drops	Display: Number of voltage drops since last reboot.
Min./max. values	Indicates minimum and maximum measured device temperature.
Device boot counter	Indicates device reboot throughout the entire device life cycle.
Transferable memory status	Storage and management of configuration settings possible. For settings see instructions "Central configuration management – transferring configuration data when replacing device". The instructions can be found on the Bürkert homepage → Type ME43.
Current system time	Indicates date and time.
büS status	Information on büS network.
Receive errors	Indicates current receive errors.
Receive errors max.	Indicates all receive errors since last reboot.
Transmit errors	Indicates current transmit errors.
Transmit errors max.	Indicates all transmit errors since last reboot.
Reset error counter.	Reset the error counter for receive and transmit errors to 0.
CANopen status	Information on device's state of communication as büS network participant. Pre-operational or operational.
Logbook	Menu for displaying and managing logbook entries.

Table 26:   Menus of the 4AI module, configuration area "General settings", detailed view "Diagnostics"

11.2.3 "Maintenance" detailed view

Open menu:

→ 〡 Select 4AI in the navigation area.
Click + to open the configuration areas.

→ In configuration area select General settings.

→ Select detailed view Maintenance.

Overview of the menus:

Maintenance for General settings	
Levels 1 and 2	**Description**
Device information	Indicates device-specific data.
Displayed name	Indicates the name entered for the device. ⚠ The name is entered in the configuration area General settings → Parameter in the menu büS → Displayed name.
Identification number	Indicates the identification number of the device.
Serial number	Indicates the serial number of the device.
Software ident. number	Indicates the identification number of the software used in the device.
Software version	Indicates the version of the software used in the device.
büS version	Indicates the büS version of the device.
Hardware version	Indicates the hardware version of the device.
Product type	Indicates the type designation of the device.
Manufacture date	Indicates the date on which the device was manufactured.
eds version	Indicates the eds version.
Device driver	Information on the driver of the device. This menu is only available in the PC software Bürkert Communicator.
Reset device	Menu for resetting and restarting the device.
Restart	Restart the device. A software reset is performed during the device reboot. The configuration and parameterisation settings for the device remain after the reboot.
Factory reset	Reset the device to factory setting. When performing a factory reset, the corresponding settings defined for the device are overwritten by the factory settings.

Table 27: Menu of the 4AI module, configuration area "General settings", detailed view "Maintenance"

12 4AO MODULE START-UP

12.1 Base setting of analogue outputs

> ⚠ The Bürkert Communicator software is required for the base setting.
>
> The Bürkert Communicator software can be downloaded for free from the Bürkert homepage. www.buerkert.de → Type ME44.
> In addition to the software, the USB büS interface kit, available as an accessory, is required.

Base setting of analogue outputs AO1 to AO4 (pay attention to order)		Factory default setting	Requirement
1.	Select operating mode.	not configured	mandatory
2.	Calibrate process value of the analogue output:		mandatory
	• Lower value	0	
	• Upper value	100	
3.	Set filter response time.	3.00 s	optional
4.	Configure error handling	Last valid value	optional
5.	Enter name for the input value.	no name provided	
6.	Set diagnostics.	Short circuit detection, Open loop detection	

Table 28:   Overview: Base settings of the analogue outputs of the 4AO module

12.1.1 Open menu for setting analogue outputs in Bürkert Communicator

Required access rights: Installer

Open menu:

→ ⥮ Select 4AO in the navigation area.
Click + to open the configuration areas.

→ In the configuration area select AO1, AO2, AO3 or AO4.

The detailed view Parameter is displayed with the menus for setting the analogue input.

> ⚠ The complete menu tree for setting the analogue input is displayed after the output signal has been selected.

12.1.2 Select operating mode for analogue output

Required access rights: Installer

→ In the configuration area select AO1, AO2, AO3 or AO4.

The detailed view Parameter is displayed with the menus for setting the analogue output.

→ Select operating mode.

→ Select output signal.

☑ You have selected the output signal for the analogue output.

12.1.3   Calibrate the process value of the analogue output

Calibration of the "Parameter" detailed view: Calibration by entering the lower and upper process values

→ In the configuration area select `AO1`, `AO2,` `AO3` or `AO4`.

The detailed view `Parameter` is displayed with the menus for setting the analogue output.

Calibrate the lower process value of the analogue output:

→ Select `Value for xxx`. The display (0 mA, 4 mA or 0 V) depends on the selected output signal.

→ Enter value.

Calibrate the upper process value of the analogue input:

→ Select `Value for xxx`. The display (20 mA, 2 V, 5 V or 10 V) depends on the selected output signal.

→ Enter value.

✅ You have calibrated the process value of the analogue output.

12.1.4   Set filter response time for the analogue input

The filter response time determines the damping ratio for current or voltage fluctuations in the analogue input.

Required access rights: Installer

→ In the configuration area select `AO1`, `AO2,` `AO3` or `AO4`.

The detailed view `Parameter` is displayed with the menus for setting the analogue input.

→ Select `Filter response time`.

→ Enter value.

✅ You have set the filter response time for the analogue input.

12.1.5   Set filter error handling for the analogue input

Configuration of which value is output in the error state.

Required access rights: Installer

→ In the configuration area select `AO1`, `AO2,` `AO3` or `AO4`.

The detailed view `Parameter` is displayed with the menus for setting the analogue input.

→ Select `Error handling`.

→ Select `Last valid value` or `Error value`.

✅ You have set the error handling for the analogue input.

12.1.6 Enter name for the output value of the analogue input

If required, a name can be entered for the output value of each analogue input.

Required access rights: Installer

→ Select AO1, AO2, AO3 or AO4 in the configuration area.

The detailed view Parameter is displayed with the menus for setting the analogue input.

→ Enter Input value name.

→ Enter name.

✅ You have given the output value of the analogue input a name.

12.1.7 Set diagnostics for analogue output

The diagnostics can be used to configure the error detection.

Factory setting: Short circuit detection

Required access rights: Installer

→ Select AO1 (or corresponding output) in the configuration area.

The detailed view Parameter is displayed with the menus for setting the analogue output.

→ Select Diagnostics.

→ Select Open loop and/or Short circuit detection.

✅ You have set the diagnostics.

13 ADDITIONAL 4AO MODULE SETTINGS

13.1 Menus in the configuration area AO1 to AO4

The following overview and brief description of the menus contains the device-specific settings for the I/O module and not the description of the software Bürkert Communicator.

13.1.1 Detailed view "Parameter"

The "Parameter" detailed view menu for the analogue outputs AO1 to AO4 is extensively described in the chapter 4AO module start-up.

13.1.2 Detailed view "Diagnostics"

Open menu:

→ ⇕ Select 4AO in the navigation area.
Click ＋ to open the configuration areas.

→ Select AO1 (or corresponding output) in the configuration area.

→ Select detailed view Diagnostics.

Overview of the menus:

Diagnostics for AO1 to AO4 (analogue outputs 1…4)	
Levels 1	**Description**
Type	Indicates type of analogue input.
Operating mode	Indicates the operating mode set for the analogue input.
Input value	Indicates the voltage or current strength applied to the analogue output. The displayed electrical size depends on the selected output signal. ⚠ The modules are generally correctly calibrated by the manufacturer. If it is determined that the displayed output value deviates from the actual value, recalibration is required.
Output value	Indicates the process value issued on the fieldbus.

Table 29:   Menus of the 4AO module, configuration area AO1 to AO4, detailed view "Diagnostics"

13.2 Menus and possible settings in the configuration area "General settings"

13.2.1 Detailed view "Parameter"

Open menu:

→ ⥮ Select 4AO in the navigation area.
Click + to open the configuration areas.

→ In configuration area select General settings.

→ Select detailed view Parameter.

Overview of the menus:

Parameters for General settings	
Levels 1, 2 and 3	**Description**
Status LED	Colours and behaviour of the device status LED
Operating mode	Setting the various operating modes: NAMUR, fixed colour and LED off.
büS	Parameterisation of the device as a büS participant.
Displayed name	Issue name under which the device is displayed.
Location	Specify location to be shown for the device.
Description	The input window can be used to describe the device or for additional information on the device. ❗ No entry required.
Advanced	Further settings for the device as participant of a network.
Unique device name	Assign communication ID for communication in the network. ❗ If the communication ID is changed, the assigned partnership with another participant is lost.
Baud rate	Set transmission speed for the device as a büS participant or CANopen participant.
Fixed CANopen address	Assign address under which the device is operated as a büS participant or CANopen participant.
CANopen address	Address that is actually used.
CANopen status	Set communication state for the device: Pre-operational: The participant can be communicated with via SDOs. PDO communication is not possible. Operational: The participant can independently send and receive process data. ❗ The menu is only available when selecting the protocol CANopen.
Bus operation mode	Select communication: • Protocol CANopen • Protocol büS • Single device

Parameters for General settings	
Levels 1, 2 and 3	**Description**
Show errors from büS partners	The device will also show an error if one of its partners has an error.
Deallocation delay	Time from the loss of a partner to deletion of its configuration.
Alarm limits	Display and setting of the limits that, when exceeded or not reached, cause the device to trigger an error alert or warning.
Device temperature	Display the limits for device temperature.
Error low	
Error high	
PDO configuration	Configuration of the cyclic process data objects:
PDO 1	(!) The cyclical process data objects are configured with a wizard that guides the user through the necessary operating steps. Inhibit time: Minimal time between two transfers before being resent. Event timer: Longest time between two transfers. Does not depend on whether the value has changed.
Reset to default values	Reset the PDO configuration to the default values
Configuration client	Serves to store a device configuration on another device.
Operation mode	Active: Inactive: Automatically switch on: Another provider is awaited and then set to "Active".
Change operation mode	Startup wizard launches.

Table 30:   4AO module menus, configuration area "General settings", detailed view "Parameter"

48

13.2.2   Detailed view "Diagnostics"

Open menu:

→ ⬍ Select `4AO` in the navigation area.
Click `+` to open the configuration areas.

→ In configuration area select `General settings`.

→ Select detailed view `Diagnostics`.

Overview of the menus:

`Diagnostics` **for** `General settings`	
Levels 1 and 2	**Description**
`Device status`	Information on the device status.
`Operating duration`	Indicates the operating duration over the entire life cycle of the device.
`Operating duration since last boot`	Indicates operating duration since the device's last start-up
`Device temperature`	Indicates the device temperature applied to the device.
`Min./Max. values`	Minimum and maximum temperature values
`Min. temperature`	Minimal temperature
`Max. temperature`	Maximum temperature
`Device boot counter`	Indicates the number of all reboots that the device has performed.
`Transferable memory status`	Storage and management of configuration settings possible. For settings see instructions "Central configuration management – transferring device configuration when replacing device". These instructions can be found on the Bürkert homepage → Type ME43
`büS status`	Information on the büS network.
`Receive errors`	Indicates present receive errors.
`Receive errors max.`	Indicates all past and current receive errors.
`Transmit errors`	Indicates present transmit errors.
`Transmit errors max.`	Indicates all past and current transmit errors.
`Reset error counter`	Resets the two maximum values of the error counters.
`CANopen status`	Information on device's state of communication as büS network participant. Pre-operational or operational.
`Logbook`	Indicates system notifications
`Configuration client`	
`Transferable memory status`	
`Status`	Current device status
`Number of reconfigurations`	Number of device reconfigurations

Table 31:   4AO module menus, configuration area "General settings", detailed view "Diagnostics"

13.2.3 "Maintenance" detailed view

Open menu:

→ ⊥ Select 4AO in the navigation area.
Click ➕ to open the configuration areas.

→ In configuration area select General settings.

→ Select detailed view Maintenance.

Overview of the menus:

Maintenance for General settings	
Levels 1 and 2	**Description**
Device information	Indicates device-specific data.
Displayed name	Indicates the name entered for the device. ⚠ The name is entered in the configuration area General settings → Parameter in the menu büS → Displayed name.
Identification number	Indicates the identification number of the device.
Serial number	Indicates the serial number of the device.
Software ident. number	Indicates the identification number of the software used in the device.
Software version	Indicates the version of the software used in the device.
büS version	Indicates the büS version of the device.
Hardware version	Indicates the hardware version of the device.
Product type	Indicates the type designation of the device.
Manufacture date	Indicates the date on which the device was manufactured.
eds version	Indicates the eds version.
Device driver	Information on the driver of the device. This menu is only available in the PC software Bürkert Communicator.
Reset device	Menu for resetting and restarting the device.
Restart	Restart the device. A voltage reset is performed during the device reboot. The configuration and parameterisation settings for the device remain after the reboot.
Factory reset	Reset the device to factory setting. When performing a factory reset, the corresponding settings defined for the device are overwritten by the default values.

Table 32:   Menus of the 4AO module, configuration area "General settings", detailed view "Maintenance"

14 8DI MODULE START-UP

14.1 Base setting of digital inputs

> ⚠ The Bürkert Communicator software is required for the base setting.
>
> The Bürkert Communicator software can be downloaded for free from the Bürkert homepage. www.buerkert.de → Type ME44.
> In addition to the software, the USB büS interface kit, available as an accessory, is required.

A wizard, which guides you through the menu and the required operating steps, is available for the base setting of the 8DI module.

→ ↕ Select 8DI in the navigation area.
Click + to open the configuration areas.

→ Select General settings > Parameter > Setup.

1. Setting sample time

> ⚠ The sample time affects the accuracy of the frequency measurement. The longer the sample time, the greater the accuracy of the frequency measurement. This dependency is illustrated in the following diagram.
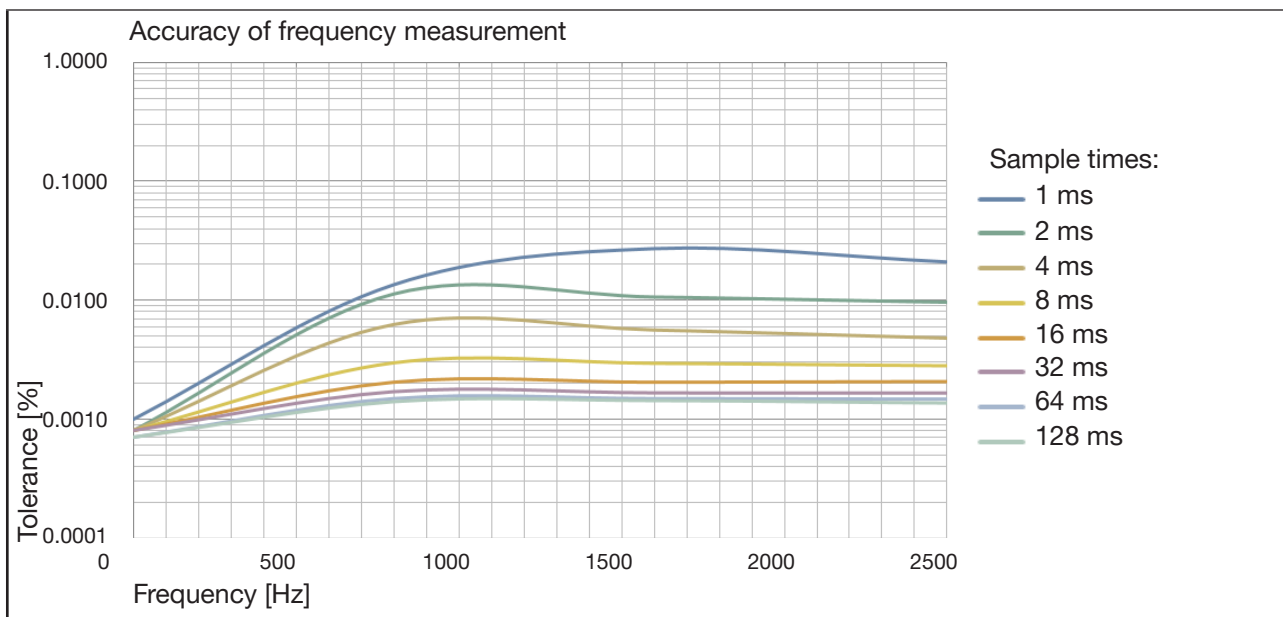

Figure 15:   Diagram: Accuracy of the frequency measurement according to the sample time

→ Enter the sample time. Press Next.

2. Configuring multi-function inputs

The type of input can be specified for channels 1 to 8.

The following types are available to choose from:

Input designation	Function
Digital input	digital input.

Input designation	Function
Pulse counter	Counting of the incoming pulses over the entire operating period. ⚠ The counter can be reset to 0. Configuration area: Inputs → Maintenance → Reset totalizers → Pulse counter.
Frequency input	Frequency measurement at input
Flow input	Flow rate per unit of time.
Flow totalizer input	Counting of the flow rate over the entire operating period. ⚠ The counter can be reset to 0. Configuration area: Inputs → Maintenance → Reset totalizers → Flow totalizer.

Table 33:   Description: Multi-function input types

→ Select the type of multi-function input.

→ Press Next.

When selecting a flow input:

→ Enter the K-factor for the flow inputs.

⚠ 2-point calibration is possible.
Configuration area: Inputs → Maintenance → Flow input calibration.

→ Press Next.

3. Enable wire break detection for the inputs

→ To enable wire break detection, click on the icon behind the corresponding channel.

→ Press Next.

☑ You have performed the base setting for the 8DI module.

15 ADDITIONAL 8DI MODULE SETTINGS

15.1 Menus and possible settings in the configuration area "Inputs"

The following overview and brief description of the menus contains the device-specific settings for the I/O module and not the description of the software Bürkert Communicator.

15.1.1 Detailed view "Parameter"

Open menu:

→ 🖳 Select 8DI in the navigation area.
Click ➕ to open the configuration areas.

→ Select Inputs in the configuration area.

→ Select detailed view Parameter.

Overview of the menus:

Parameters for inputs.	
Levels 1 and 2	**Description**
Sample time	Setting the sample time. ❗ The setting is made with the base setting for start-up in the configuration area Inputs → Parameter → Setup.
Input inversion	Inverting inputs by channel. Only for digital inputs.
Wire break detection active	Enable or deactivate wire break detection for digital inputs 1 to 8. • Wire break detection active: In the case of a wire break, the device status "Error" is displayed depending on the LED operation mode that has been set. An error message is entered in the logbook. • Wire break detection inactive: A wire break is not displayed on the LED for displaying the device status. No error message is entered in the logbook.
Mark bus-outputs as invalid	If the event of an error, the affected bus-output values can be marked as invalid. All other bus-outputs of the device are not affected.
Multi-function input channel 1…8	Indicates the settings for the respective multi-function input. ❗ The setting is made with the base setting for start-up in the configuration area Inputs → Parameter → Setup.
Type	Input type display
Setup	Basic settings of input module

Table 34: 8DI module menus, configuration area "Inputs", detailed view "Parameter"

15.1.2   Detailed view "Diagnostics"

Open menu:

→ ⌶ Select 8DI in the navigation area.
Click ➕ to open the configuration areas.

→ Select Inputs in the configuration area.

→ Select detailed view Diagnostics.

Overview of the menus:

Diagnostics **for** inputs	
Levels 1 and 2	**Description**
Short circuit	Indicates whether a short circuit is present.
Wire break	Indicates whether a wire break is present.
Multi function input status	Show the current status of the multi function inputs.
Out of specification	Indicates whether the input frequency is outside the specified range.
Error	Indicates whether the input frequency is too high. To avoid device instability, the input has been disabled. Restart the device to reset the input.

Table 35:   8DI module menus, configuration area "Inputs", detailed view "Diagnostics"

15.1.3   Detailed view „Maintenance"

Open menu:

→ ⌶ Select 8DI in the navigation area.
Click ➕ to open the configuration areas.

→ In configuration area select Inputs.

→ Select detailed view Maintenance.

Overview of the menus:

Maintenance **for** Inputs	
Levels 1	**Description**
Flow input calibration	2-Point-Calibration of flow inputs
Reset pulse counter	Reset the cyclic pulse counter
Reset totalizer	Reset pulse counter totalizer and flow totalizer

Table 36:   8DI module menus, configuration area "Inputs", detailed view "Maintenance"

15.2 Menus and possible settings in the configuration area "General settings"

15.2.1 Detailed view "Parameter"

Open menu:

→ ⬍ Select 8DI in the navigation area.
Click + to open the configuration areas.

→ In configuration area select General settings.

→ Select detailed view Parameter.

Overview of the menus:

Parameters for General settings	
Levels 1, 2 and 3	**Description**
Status LED	Colours and behaviour of the device status LED
Operating mode	Setting the various operating modes: NAMUR, fixed colour and LED off.
büS	Parameterisation of the device as a büS participant.
Displayed name	Issue name under which the device is displayed.
Location	Specify location to be shown for the device.
Description	The input window can be used to describe the device or for additional information on the device. 🛑 No entry required.
Advanced	Further settings for the device as participant of a network.
Unique device name	Assign communication ID for communication in the network. 🛑 If the communication ID is changed, the assigned partnership with another participant is lost.
Baud rate	Set transmission speed for the device as a büS participant or CANopen participant.
Fixed CANopen address	Assign address under which the device is operated as a büS participant or CANopen participant.
CANopen address	Address that is actually used.

Parameters for General settings	
Levels 1, 2 and 3	**Description**
CANopen status	Set communication state for the device: Pre-operational: The participant can be communicated with via SDOs. PDO communication is not possible. Operational: The participant can independently send and receive process data. ![!] The menu is only available when selecting the protocol CANopen.
Bus operation mode	Select communication: • Protocol CANopen • Protocol büS • Single device
Deallocation delay	Time from the loss of a partner to deletion of its configuration.
Alarm limits	Display and setting of the limits that, when exceeded or not reached, cause the device to trigger an error alert or warning.
Supply voltage	Display and setting of the limits for supply voltage.
Error above	Indicates the limit for supply voltage, the exceedance of which triggers an error alert from the device. Note hysteresis!
Error below	Indicates the limit for supply voltage, the failure to meet which triggers an error alert from the device. Note hysteresis!
Supply voltage	Display and setting of the limits for device temperature.
Error above	Indicates the limit for device temperature, the exceedance of which triggers an error alert from the device. Note hysteresis!
Error below	Indicates the limit for device temperature, the failure to meet which triggers a warning from the device. Note hysteresis!
PDO configuration	Configuration of the cyclic process data objects:
PDO 1 PDO 2 PDO 3	![!] The cyclical process data objects are configured with a wizard that guides the user through the necessary operating steps. Inhibit time: Minimal time between two transfers before being resent. Event timer: Longest time between two transfers. Does not depend on whether the value has changed.
Multiplexed PDO	Combination of PDO (cyclical data) and SDO (acyclical data) Inhibit time: Minimal time between two transfers before being resent.
Reset to default values	Reset the PDO configuration to the default values
Configuration client	Serves to store a device configuration on another device.

56

Parameters **for** General settings	
Levels 1, 2 and 3	**Description**
Operation mode	Active: Inactive: Automatically switch on: Another provider is awaited and then set to "Active".
Change operation mode	Startup wizard launches.

15.2.2 Detailed view "Diagnostics"

Open menu:

→ ↧ Select `8DI` in the navigation area.
Click `+` to open the configuration areas.

→ In configuration area select `General settings`.

→ Select detailed view `Diagnostics`.

Overview of the menus:

`Diagnostics` **for** `General settings`	
Levels 1 and 2	**Description**
`Device status`	Information on the device status.
`Operating duration`	Indicates the operating duration over the entire life cycle of the device.
`Operating duration since last boot`	Indicates operating duration since the device's last start-up
`Device temperature`	Indicates the device temperature applied to the device.
`Min./Max. values`	Minimum and maximum temperature values
`Min. temperature`	Minimal temperature
`Max. temperature`	Maximum temperature
`Device boot counter`	Indicates the number of all reboots that the device has performed.
`Transferable memory status`	Storage and management of configuration settings possible.
	For settings see instructions "Central configuration management – transferring device configuration when replacing device". These instructions can be found on the Bürkert homepage → Type ME43
`büS status`	Information on the büS network.
`Receive errors`	Indicates present receive errors.
`Receive errors max.`	Indicates all past and current receive errors.
`Transmit errors`	Indicates present transmit errors.
`Transmit errors max.`	Indicates all past and current transmit errors.
`Reset error counter`	Resets the two maximum values of the error counters.
`CANopen status`	Information on device's state of communication as büS network participant. Pre-operational or operational.
`Logbook`	Indicates system notifications
`Configuration client`	
`Transferable memory status`	
`Status`	Current device status
`Number of reconfigurations`	Number of device reconfigurations

Table 37:   8DI module menus, configuration area "General settings", detailed view "Diagnostics"

15.2.3 "Maintenance" detailed view

Open menu:

→ 〽 Select 8DI in the navigation area.
Click ➕ to open the configuration areas.

→ In configuration area select General settings.

→ Select detailed view Maintenance.

Overview of the menus:

Maintenance for General settings	
Levels 1 and 2	**Description**
Device information	Indicates device-specific data.
Displayed name	Indicates the name entered for the device. 🛈 The name is entered in the configuration area General settings → Parameter in the menu büS → Displayed name.
Identification number	Indicates the identification number of the device.
Serial number	Indicates the serial number of the device.
Software ident. number	Indicates the identification number of the software used in the device.
Software version	Indicates the version of the software used in the device.
büS version	Indicates the büS version of the device.
Hardware version	Indicates the hardware version of the device.
Product type	Indicates the type designation of the device.
Manufacture date	Indicates the date on which the device was manufactured.
eds version	Indicates the eds version.
Device driver	Information on the driver of the device. This menu is only available in the PC software Bürkert Communicator.
Reset device	Menu for resetting and restarting the device.
Restart	Restart the device. A voltage reset is performed during the device reboot. The configuration and parameterisation settings for the device remain after the reboot.
Factory reset	Reset the device to factory setting. When performing a factory reset, the corresponding settings defined for the device are overwritten by the default values.

Table 38: Menus of the 8DI module, configuration area "General settings", detailed view "Maintenance"

16 8DO MODULE START-UP

16.1 Base settings of the digital outputs

> The Bürkert Communicator software is required for the base setting.
>
> The Bürkert Communicator software can be downloaded for free from the Bürkert homepage. www.burkert.com → Type ME44.
> In addition to the software, the USB büS interface kit, available as an accessory, is required.

Base settings for the digital outputs DO1 to DO8	Factory default setting	Requirement
Select operating mode. • On-Off • Threshold value • PWM • PFM	not configured	mandatory
Parameterising the digital output according to the selected operating mode.	–	mandatory
Inversion of digital output.	Off	optional
Enter name for the input value of the digital output.	no name provided	optional
Set short circuit detection.	enabled	optional

Table 39:   Overview: Base settings of the digital outputs of the 8DO module

16.1.1 Open menu for setting the digital outputs in Bürkert Communicator

Required access rights: Installer

Open menu:

→ ↧ Select `8DO` in the navigation area.
Click `+` to open the configuration areas.

→ Select `DO1` (or corresponding output) in the configuration area.

The detailed view `Parameter` is displayed with the menus for setting the digital output.

> The complete menu tree for setting the digital output is displayed after the operating mode has been selected.

16.1.2 Select operating mode for digital output

Required access rights: Installer

→ Select `DO1` (or corresponding output) in the configuration area.

The detailed view `Parameter` is displayed with the menus for setting the digital output.

→ Select operating mode.

Possible selection:

- On-Off: Operating mode for 2 states, on or off.

- Threshold value: Threshold values are defined for the state switch of the output.

- PWM: Output with pulse-width modulation.
  Fast: for actuating a proportional solenoid valve.
  Slow: for actuating an on-off effector.

- PFM: Output with frequency modulation, e.g. for actuating a pump.

→ Select operating mode.

✅ You have selected the operating mode for the digital output.

> **Parameterisation of the digital output according to the selected operating mode is described in the following chapters "16.2" to "16.5".**

16.1.3   Inverting the digital output

The inversion reverses the circuit function of the digital output.

Required access rights: Installer

→ Select DO1 (or corresponding output) in the configuration area.

The detailed view Parameter is displayed with the menus for setting the digital output.

→ Select Inversion.

→ Set On.

✅ You have inverted the digital output.

16.1.4   Enter name for the input value of the digital output.

Required access rights: Installer

→ Select DO1 (or corresponding output) in the configuration area.

The detailed view Parameter is displayed with the menus for setting the digital output.

→ Enter Input value name.

→ Enter name.

✅ You have given the input value of the digital output a name.

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16.1.5 Enable short circuit detection

Required access rights: Installer

→ Select DO1 (or corresponding output) in the configuration area.

The detailed view Parameter is displayed with the menus for setting the digital output.

→ Select Short circuit detection.

→ Set On.

☑ You have enabled short circuit detection.

English

16.2 Parameterising the digital output for operating mode "On-Off"

There are only 2 states for the digital output in "On-Off" operating mode, namely on or off.

16.2.1 Overview: Parameterising the digital output for operating mode "On-Off"

Parameterising the digital outputs DO1 to DO8 in "On-Off" operating mode	Factory default setting	Requirement
Setting delay for the digital output.	0 s (no delay)	optional
Set error handling.	Off	optional
Set power reduction.	Off	optional

Table 40: Overview: Parameterising the digital output for operating mode "On-Off"

16.2.2 Setting operating mode "On-Off – delay for the digital output"

The delay sets the time between receiving a signal and switching the output.

> If the delay lasts longer than the applied signal, the output is unchanged.

Required access rights: Installer

→ Select DO1 (or corresponding output) in the configuration area.

The detailed view Parameter is displayed with the menus for setting the digital output.

→ Select Delay.

→ Enter value.

✔ You have set the delay for the digital output.

16.2.3 Setting operating mode "On-Off – error handling"

The error handling determines which state the digital output will take on in the event of an error.

Required access rights: Installer

→ Select DO1 (or corresponding output) in the configuration area.

The detailed view Parameter is displayed with the menus for setting the digital output.

→ Select Error handling.

Possible selection:

• Last valid value: Output of the last valid value.

• Off: The digital output remains off or is deactivated.

• On: The digital output remains on or is enabled.

→ Select state for error handling.

✔ You have set error handling for the digital output.

16.2.4 Setting operating mode "On-Off – power reduction"

The power reduction saves energy, because a parameterisable PWM signal is activated instead of a permanent "on" signal.

2 parameters are set for the power reduction:

• The time frame until the power reduction becomes active [T_d].

• The duty cycle of the PWM signal.
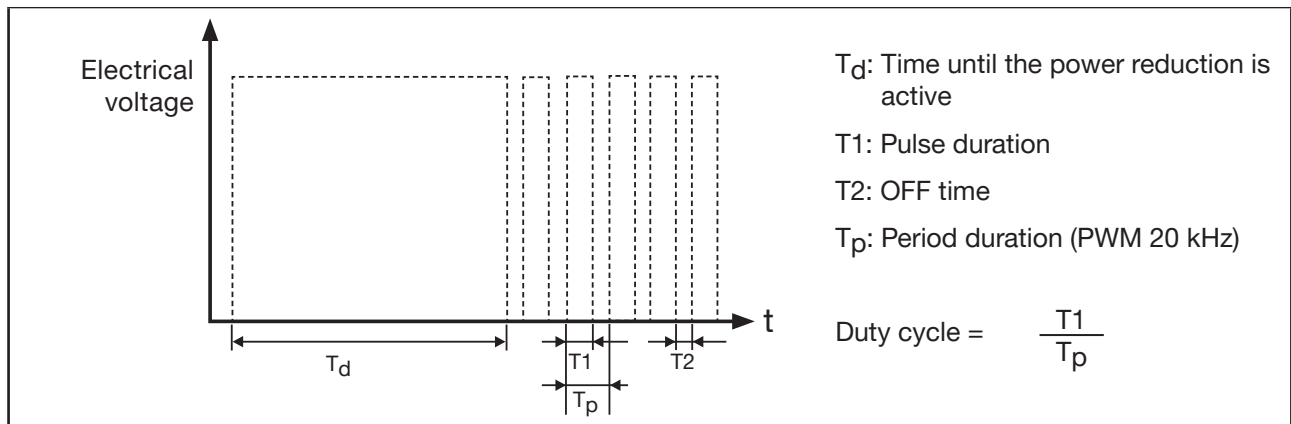
Principle of the power reduction:

Figure 16:   Principle of the power reduction

Set power reduction:

Required access rights: Installer

→ Select DO1 (or corresponding output) in the configuration area.

The detailed view Parameter is displayed with the menus for setting the digital output.

→ Select Power reduction.

→ Select Status.

→ Set ON to enable the power reduction.

→ Select Power reduction after in order to set the time frame [T_d] until the power reduction becomes active.

→ Enter value.

→ Select Duty cycle to enter the duty cycle.

→ Enter the per cent value for the reduced output power.

✅ You have set the power reduction for the digital output.

16.3 Parameterising the digital output for operating mode "Threshold value"

In "Threshold value" operating mode, threshold values are selected for the state change of the output.

16.3.1 Overview: Parameterisation of the digital output for operating mode "Threshold value"

Parameterisation for the analogue outputs DO1 to DO8 in operating mode "Threshold value"	Factory default setting	Requirement
Set threshold mode. Setting operation mode for toggling the output. • Hysteresis • Window	Hysteresis	mandatory
Set lower and upper threshold value.	lower threshold value 0 upper threshold value 100	mandatory
Set delay.	0 s (no delay)	optional
Set error handling.	Off	optional
Set power reduction.	Off	optional

Table 41: Overview: Parameterisation of the digital output for operating mode "Threshold value"

16.3.2 Operating mode "Threshold value" – setting threshold mode

The threshold mode is used to define how the output reacts to pulses/signals that exceed the threshold values.

Selection:

• Hysteresis: The toggle function monitors whether a threshold value is not reached or is exceeded.

• Window: The toggle function monitors whether the monitored process is within the defined set-point range, or is outside of the defined upper and lower limits.

Effect of the threshold mode on the toggling behaviour of the digital output:

Threshold mode	Not inverted	Inverted
Hysteresis		

Threshold mode	Not inverted	Inverted
Window	Contact ON OFF Lower Upper Process value Threshold value	Contact ON OFF Lower Upper Process value Threshold value

Table 42:   Effect of the threshold mode on the toggling behaviour of the digital output

Set threshold mode:

Required access rights: Installer

→ Select DO1 (or corresponding output) in the configuration area.

The detailed view Parameter is displayed with the menus for setting the digital output.

→ Select Threshold mode.

→ Select Window or Hysteresis.

☑ You have set threshold mode.

16.3.3   Setting operating mode "Threshold value – lower and upper threshold value"

The lower and upper threshold values define the limits for the state change of the digital output.

Required access rights: Installer

→ Select DO1 (or corresponding output) in the configuration area.

The detailed view Parameter is displayed with the menus for setting the digital output.

→ Select Lower threshold value.

→ Enter value.

→ Select Upper threshold value.

→ Enter value.

☑ You have set the threshold values for the state change of the digital output.

16.3.4 Setting operating mode "Threshold value – delay for the digital output"

The delay sets the time between receiving a signal and switching the output.

> ! If the delay lasts longer than the applied signal, the output is unchanged.

Required access rights: Installer

→ Select DO1 (or corresponding output) in the configuration area.

The detailed view Parameter is displayed with the menus for setting the digital output.

→ Select Delay.

→ Enter value.

✅ You have set the delay for the digital output.

16.3.5 Setting operating mode "Threshold value – error handling"

The error handling determines which state the digital output will take on in the event of an error.

Required access rights: Installer

→ Select DO1 (or corresponding output) in the configuration area.

The detailed view Parameter is displayed with the menus for setting the digital output.

→ Select Error handling.

Possible selection:

• Last valid value: Output of the last valid value.

• Off: The digital output remains off or is deactivated.

• On: The digital output remains on or is enabled.

→ Select state for error handling.

✅ You have set error handling for the digital output.

16.3.6   Setting operating mode "Threshold value – power reduction"

The power reduction saves energy, because a parameterisable PWM signal is activated instead of a permanent "on" signal.

2 parameters are set for the power reduction:

• The time frame until the power reduction becomes active $[T_d]$.

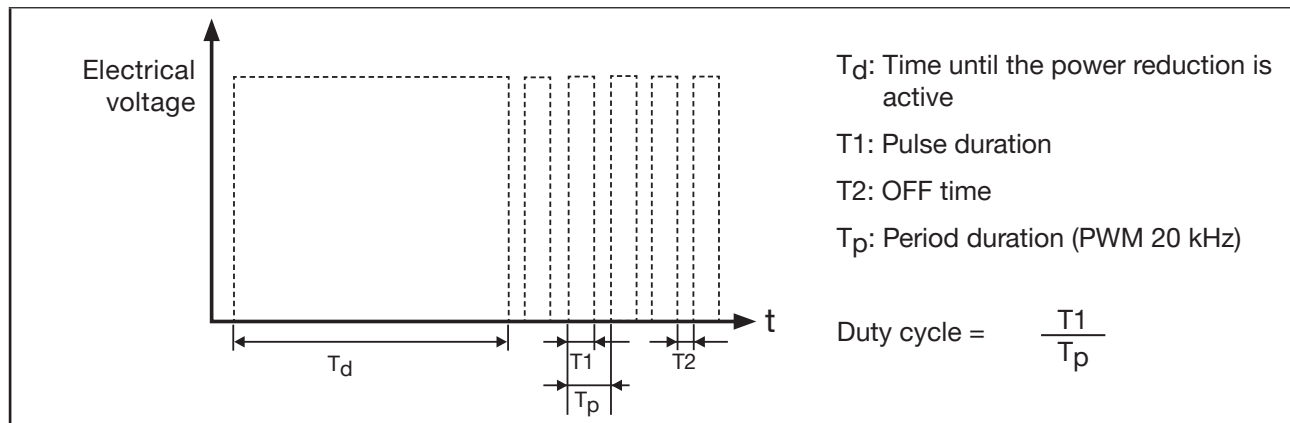• The duty cycle of the PWM signal.

Principle of the power reduction:

T_d: Time until the power reduction is active

T1: Pulse duration

T2: OFF time

T_p: Period duration (PWM 20 kHz)

Duty cycle = $\dfrac{T1}{T_p}$

Figure 17:   Principle of the power reduction

Set power reduction:

Required access rights: Installer

→ Select DO1 (or corresponding output) in the configuration area.

The detailed view Parameter is displayed with the menus for setting the digital output.

→ Select Power reduction.

→ Select Status.

→ Set Active to enable the power reduction.

→ Select Power reduction after in order to set the time frame $[T_d]$ until the power reduction becomes active.

→ Enter value.

→ Select Duty cycle to enter the duty cycle.

→ Enter the per cent value for the reduced output power.

✅ You have set the power reduction for the digital output.

16.4 Parameterising the digital output for operating mode "PWM"

In operating mode "PWM", toggling of the digital output is controlled by a pulse-width-modulated signal. The ON time is based on the frequency (period duration) and the duty cycle.

16.4.1 Overview: Parameterising the digital output for operating mode "PWM"

Parameterisation for the analogue outputs DO1 to DO8 in operating mode "PWM" (note the order)		Factory default setting	Requirement
1.	Setting operation mode for pulse-width modulation: • Fast PWM • Slow PWM	Fast PWM	mandatory
2.	If Fast PWM is selected: Set frequency (number of toggle processes per period).	2 kHz	mandatory
	If Slow PWM is selected: • Set period duration. • Set minimum ON time.	1.00000 min 125 ms	mandatory
3.	Set scaling: • Set value for the process input that equates to a duty cycle of 0%. • Set value for the process input that equates to a duty cycle of 100%.	0 100	mandatory
	Set error handling.	Error value	optional

Table 43:   Overview: Parameterisation of the digital output for operating mode "Threshold value"

Principle of operating mode "PWM":

$T1 = \text{ON time}$

$T_p = \text{period duration} = \dfrac{1}{\text{Frequency}}$

$\text{Duty cycle} = \dfrac{T1}{T_p}$

ON time T1 varies
Period duration T_p is constant

If the inversion is set for the digital output, T1 corresponds to the OFF time.
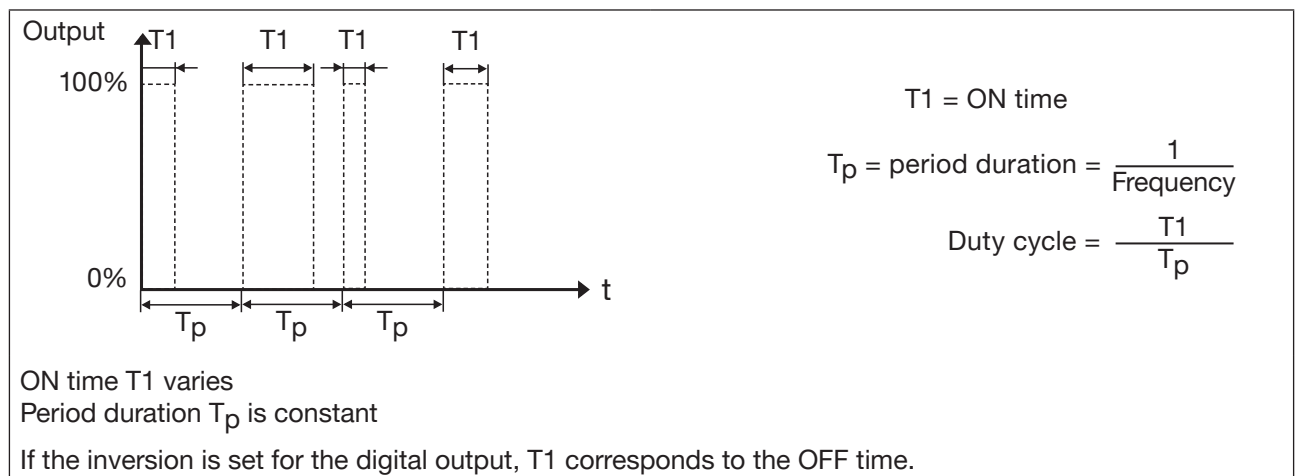
Figure 18:   Principle of operating mode "PWM"

16.4.2 Setting operating mode "PWM – operation mode for pulse-width modulation"

With regard to pulse-width modulation of the digital output, there are 2 operation modes to choose from for the following criteria:

- Slow PWM

  Suitable for: Period duration: 0.5 s…1 day

- Fast PWM,

  Suitable for: Frequency: 1 Hz…20 kHz

Required access rights: Installer

→ Select DO1 (or corresponding output) in the configuration area.

The detailed view Parameter is displayed with the menus for setting the digital output.

→ Select operating mode.

→ Select Slow PWM or Fast PWM.

✅ You have set the operation mode for pulse-width modulation of the digital output.

16.4.3 Setting operating mode "PWM – frequency for fast PWM"

⚠ This setting is only possible in operation mode Fast PWM.

Required access rights: Installer

→ Select DO1 (or corresponding output) in the configuration area.

The detailed view Parameter is displayed with the menus for setting the digital output.

→ Select Frequency.

→ Enter value.

✅ You have set the pulse-width modulation frequency of the digital output.

16.4.4 Setting operating mode "PWM – period duration and minimum ON time for slow PWM"

> ⓘ These settings are only possible in operation mode Slow PWM.

Required access rights: Installer

→ Select DO1 (or corresponding output) in the configuration area.

The detailed view Parameter is displayed with the menus for setting the digital output.

Setting period duration [T_p]:

→ Select Period duration.

→ Enter value.

✓ You have set the period duration for the pulse-width modulation of the digital output.

Setting the minimum ON time [T1]:

→ Select Minimum ON time.

→ Enter value.

✓ You have set the minimum switch.on time for the pulse-width modulation of the digital output.

16.4.5 Setting operating mode "PWM – scaling"

Required access rights: Installer

→ Select DO1 (or corresponding output) in the configuration area.

The detailed view Parameter is displayed with the menus for setting the digital output.

Set the value for the process input that equates to a duty cycle of 0%:

→ Select value at 0%.

→ Enter value.

Set the value for the process input that equates to a duty cycle of 100%:

→ Select value at 100%.

→ Enter value.

✓ You have set the scaling for the pulse-width modulation of the digital output.

16.4.6   Setting operating mode "PWM – error handling"

The error handling determines which value the digital output will issue in the event of an error.

Required access rights: Installer

→ Select `DO1` (or corresponding output) in the configuration area.

The detailed view `Parameter` is displayed with the menus for setting the digital output.

→ Select `Error handling`.

Possible selection:

• `Last valid value`: Output of the last valid value.

• `Error value`: Issuance of a user-defined value.

→ Choose value.

Only when selecting error value:

→ Select `Error value`.

→ Enter the value that is issued in the event of an error.

☑ You have set error handling for the digital output.

16.5 Parameterising the digital output for operating mode "PFM"

In operating mode "PFM", the toggling of the digital output is controlled by a pulse frequency-modulated signal. The number of switch pulses (frequency) varies depending on the input value and the maximum frequency. The ON time corresponds to pulse width.

16.5.1 Overview: Parameterisation of the digital output for operating mode "PFM"

Parameterisation of the analogue outputs DO1 to DO8 in operating mode "PFM"	Factory default setting	Requirement
Set maximum frequency (maximum number of pulses per unit of time).	180 1/min (180 pro Minute)	mandatory
Set pulse width (ON time).	200 ms	mandatory
Set scaling: • Set the value for the process input for which no pulse is issued (0% of maximum frequency). • Set the value for the process input for which the maximum number of pulses is issued (100% of maximum frequency).	0 100	mandatory
Set error handling.	Error value	optional

Table 44:   Overview: Parameterisation of the digital output for operating mode "Threshold value"

Principle of operating mode "PFM":

T1 = ON time

T2 = OFF time

T_p = period duration = $\dfrac{1}{\text{Frequency}}$

ON time T1 is constant
Period duration T_p varies

If the inversion is set for the digital output, T1 corresponds to the OFF time.
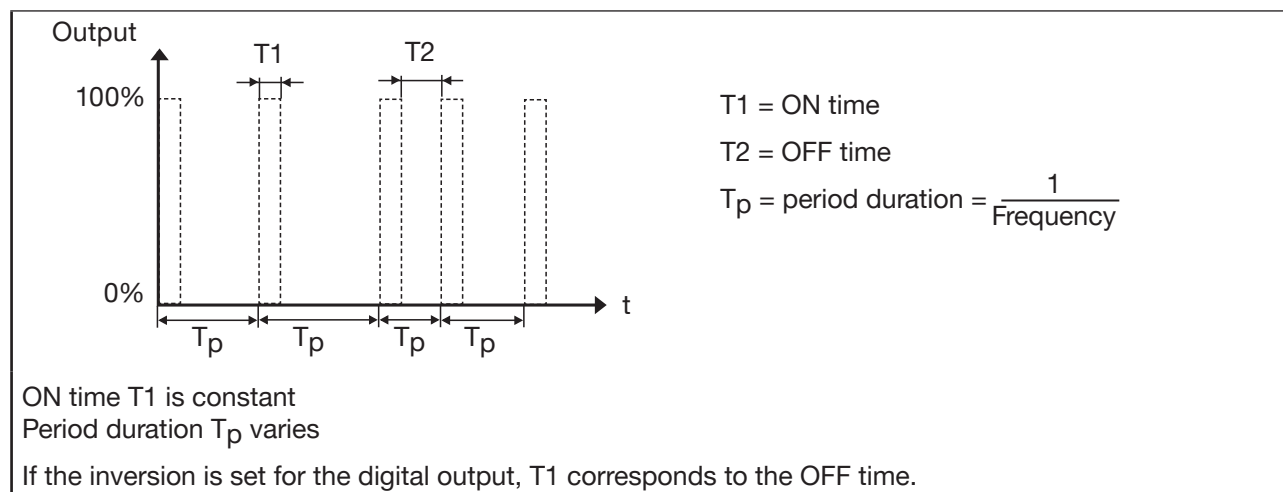
Figure 19:   Principle of operating mode "PWM"

16.5.2 Setting maximum frequency for the digital output

The maximum frequency defines the maximum number of pulses per unit of time for the digital output.

Required access rights: Installer

→ Select DO1 (or corresponding output) in the configuration area.

The detailed view Parameter is displayed with the menus for setting the digital output.

→ Select Maximum frequency.

→ Enter the value for the maximum frequency.

✔ You have set the maximum frequency for the digital output.

16.5.3 Setting pulse width

The pulse width is used to set the ON time per pulse for the digital output.

Required access rights: Installer

→ Select DO1 (or corresponding output) in the configuration area.

The detailed view Parameter is displayed with the menus for setting the digital output.

→ Select Pulse width.

→ Enter the value for the pulse width (ON time per pulse).

✔ You have set the pulse width for the digital output.

16.5.4 Setting operating mode "PFM – scaling"

Required access rights: Installer

→ Select DO1 (or corresponding output) in the configuration area.

The detailed view Parameter is displayed with the menus for setting the digital output.

Set the value for the process input for which no pulse is issued (0% of maximum frequency):

→ Select value at 0%.

→ Enter value.

Set the value for the process input for which the maximum number of pulses is issued (100% of maximum frequency).

→ Select value at 100%.

→ Enter value.

✔ You have set the scaling for the pulse-frequency modulation of the digital output.

16.5.5 Setting operating mode "PFM – error handling"

The error treatment is used to define the value that is issued in the "Error" state.

74

Required access rights: Installer

→ Select DO1 (or corresponding output) in the configuration area.

The detailed view Parameter is displayed with the menus for setting the digital output.

→ Select Error handling.

Possible selection:

• Last valid value: Output of the last valid value.

• Error value: Issuance of a user-defined value.

→ Choose value.

Only when selecting error value:

→ Select Error value.

→ Enter the value that is issued in the event of an error.

☑ You have set the value that is issued for error handling.

17 ADDITIONAL 8DO MODULE SETTINGS

17.1 Menus in the configuration area "General settings"

The following overview and brief description of the menus contains the device-specific settings for the I/O module and not the description of the PC software Bürkert Communicator.

17.1.1 Detailed view "Parameter"

Open menu:

→ ⫩ Select 8DO in the navigation area.
Click + to open the configuration areas.

→ In configuration area select General settings.

→ Select detailed view Parameter.

Overview of the menus:

Parameters for General settings	
Levels 1, 2 and 3	**Description**
Status LED	Setting the LED to display the device status.
Operating mode	Set LED operation mode for displaying device states. The following LED modes can be selected: • NAMUR operation mode, for description see "8.2 LED for indicating the device status" on page 24. • LED off.
büS	Parameterisation of the device as a büS participant.
Displayed name	Issue name under which the device is displayed. ⚠ No entry required.
Location	Indicates location of device
Description	The input window can be used to describe the device or for additional information on the device. ⚠ No entry required.
Advanced	Further settings for the device as participant of a network.
Unique device name	Assign communication ID for communication in the network. ⚠ If the communication ID is changed, the assigned partnership with another participant is lost.
Baud rate	Set transmission speed for the device as a büS participant or CANopen participant.
büS address	Assign address under which the device is operated as a büS participant or CANopen participant.

Parameters for General settings	
Levels 1, 2 and 3	**Description**
Bus operating mode	Select communication: • Protocol CANopen • Protocol büS • Single device
CANopen status	Set communication state for the device: Pre-operational: The participant can be communicated with via SDOs. PDO communication is not possible. Operational: The participant can independently send and receive process data. ❗ The menu is only available when selecting the protocol CANopen.
Show errors from büS partners	The device will also show an error if one of its partners has an error.
Deallocation delay	Time from the loss of a partner to deletion of its configuration.
Alarm limits	Display and setting of the limits that, when exceeded or not reached, cause the device to trigger an error alert or warning.
Supply voltage	Display the limits for supply voltage.
Error low	Indicates the limit for supply voltage, the exceedance of which triggers an error alert from the device. Note hysteresis!
Error high	Indicates the limit for supply voltage, the failure to meet which triggers a warning from the device. Note hysteresis!
Hysteresis	Indicates the hysteresis for the supply voltage limits. ❗ The hysteresis is centrally assigned to the limit. Example: Error high 26.4 V Hysteresis 0.5 V The error is issued for a supply voltage > 26.9 V and is resolved with a supply voltage < 25.9 V.
Device temperature	Display and setting of the limits for device temperature.
Error low	Indicates the limit for device temperature, the exceedance of which triggers an error alert from the device. Note hysteresis!
Error high	Indicates the limit for device temperature, the failure to meet which triggers a warning from the device. Note hysteresis!
Warning low	Setting the limit for device temperature, the exceedance of which triggers a warning from the device. Note hysteresis!
Warning high	Setting the limit for device temperature, the failure to meet which triggers a warning from the device. Note hysteresis!

Parameters for General settings	
Levels 1, 2 and 3	**Description**
Hysteresis	Indicates the hysteresis for the device temperature limits. 🛈 The hysteresis is centrally assigned to the limit. Example: Warning above 80 °C Hysteresis 4 °C The warning is issued for a device temperature > 82 °C and is resolved with a device temperature < 78 °C.
Diagnostics	Menu for enabling and deactivating the diagnostics function.
Active	Diagnostics function enabled: • The LED for the device status display shows the device status depending on the operation mode that has been set. • Alerts are entered in the logbook.
Inactive	Diagnostics function deactivated: • The LED for the device status display does not show the device status. • There is no entry of errors in the logbook.
PDO configuration	Configuration of the cyclic process data objects:
PDO 1	🛈 The cyclical process data objects are configured with a wizard that guides the user through the necessary operating steps.
Reset to default values	Reset the PDO configuration to the default values
Configuration client	Serves to store a device configuration on another device.
Operation mode	Active: Inactive: Automatically switch on: Another provider is awaited and then set to "Active".
Change operation mode	Startup wizard launches.

Table 45:   Menus of the 8DO module, configuration area "General settings", detailed view "Parameter".

17.1.2   Detailed view "Diagnostics"

Open menu:

→ ⛁ Select 8DO in the navigation area.
Click + to open the configuration areas.

→ In configuration area select General settings.

→ Select detailed view Diagnostics.

Overview of the menus:

MAN 1000436558 EN Version: E Status: RL (released | freigegeben) printed: 28.04.2021

Diagnostics for General settings	
Levels 1 and 2	**Description**
Device status	Information on the device status.
Operating duration	Indicates the operating duration over the entire life cycle of the device.
Device temperature	Device temperature display
Voltage drops	Display: Number of voltage drops since last reboot.
Min./max. values	Indicates minimum and maximum measured device temperature.
Device boot counter	Indicates device reboot throughout the entire device life cycle.
Transferable memory status	Storage and management of configuration settings possible. For settings see instructions "Central configuration management – transferring configuration data when replacing device". The instructions can be found on the Bürkert homepage → Type ME43.
Current system time	Indicates date and time.
büS status	Information on büS network.
Receive errors	Indicates current receive errors.
Receive errors max.	Indicates all receive errors since last reboot.
Transmit errors	Indicates current transmit errors.
Transmit errors max.	Indicates all transmit errors since last reboot.
Reset error counter.	Reset the error counter for receive and transmit errors to 0.
CANopen status	Information on device's state of communication as büS network participant. Pre-operational or operational.
Logbook	Menu for displaying and managing logbook entries.
Configuration client	
Transferable memory status	
Status	Current device status
Number of reconfigurations	Number of device reconfigurations

Table 46:   Menus of the 8DO module, configuration area "General settings", detailed view "Diagnostics"

17.1.3   "Maintenance" detailed view

Open menu:

→ ⇕ Select 8DO in the navigation area.
Click ➕ to open the configuration areas.

→ In configuration area select General settings.

→ Select detailed view Maintenance.

Overview of the menus:

Maintenance for General settings	
Levels 1 and 2	**Description**
Device information	Indicates device-specific data.
Displayed name	Indicates the name entered for the device. 🛈 The name is entered in the configuration area General settings → Parameter in the menu büS → Displayed name.
Identification number	Indicates the identification number of the device.
Serial number	Indicates the serial number of the device.
Software ident. number	Indicates the identification number of the software used in the device.
Software version	Indicates the version of the software used in the device.
büS version	Indicates the büS version of the device.
Hardware version	Indicates the hardware version of the device.
Product type	Indicates the type designation of the device.
Manufacture date	Indicates the date on which the device was manufactured.
eds version	Indicates the eds version.
Device driver	Information on the driver of the device. This menu is only available in the PC software Bürkert Communicator.
Reset device	Menu for resetting and restarting the device.
Restart	Restart the device. A software reset is performed during the device reboot. The configuration and parameterisation settings for the device remain after the reboot.
Factory reset	Reset the device to factory setting. When performing a factory reset, the corresponding settings defined for the device are overwritten by the factory settings.

Table 47:   Menu of the 8DO module, configuration area "General settings", detailed view "Maintenance"

18 MAINTENANCE

18.1 Replacing the I/O module Type ME44

🛈 I/O modules can be replaced during operation (hot plug).

🛈 Follow the software instructions for central configuration management when replacing the I/O modules.

Available online at www.burkert.com > ME44 > User manuals.

NOTE!

▸ Maintenance may be carried out only by trained specialist technicians and with the appropriate tools.

1. Remove sensor and actuator cables.

→ Press push-in contacts of the connection terminal and pull out the wires.
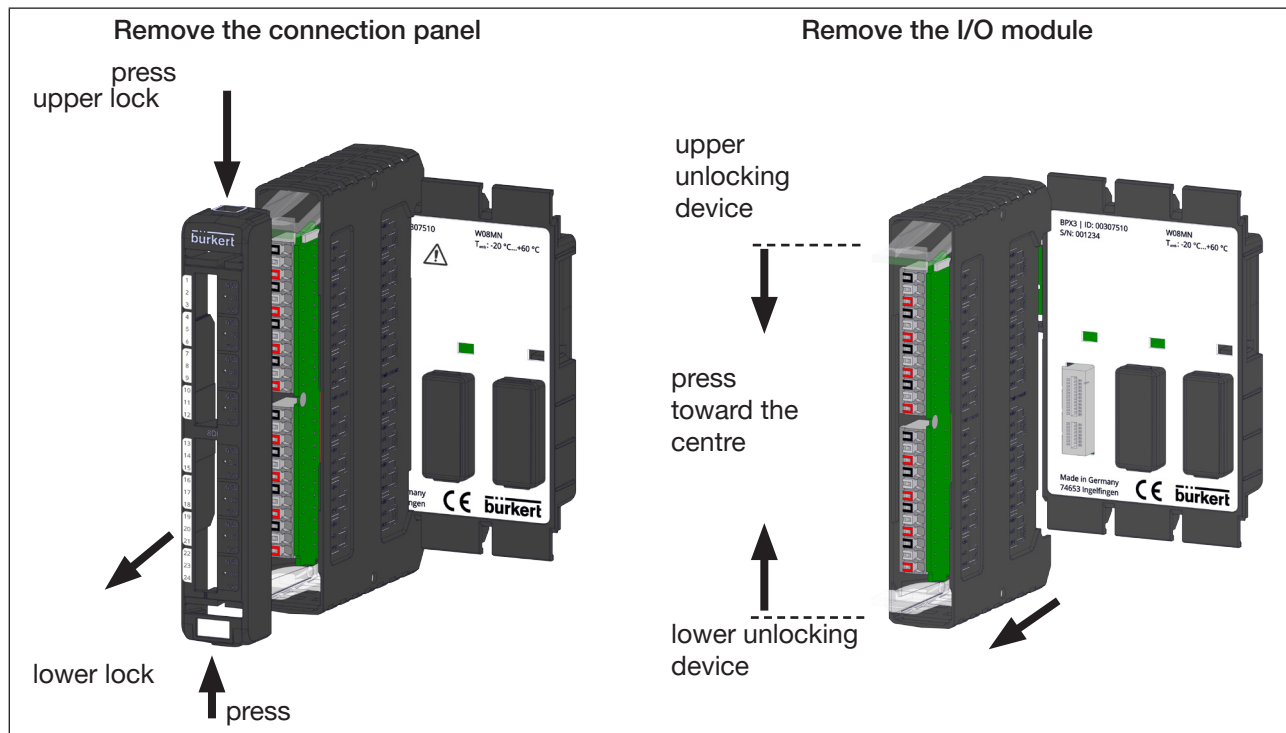
Figure 20:   Replacing the I/O module Type ME44

2. Remove I/O module from the backplane.

→ Press on the blue squares until the lock is released and remove the connection panel.

→ Press the upper and lower unlocking device toward the centre of the device and remove the I/O module from the backplane.

3. Installing the replacement device.
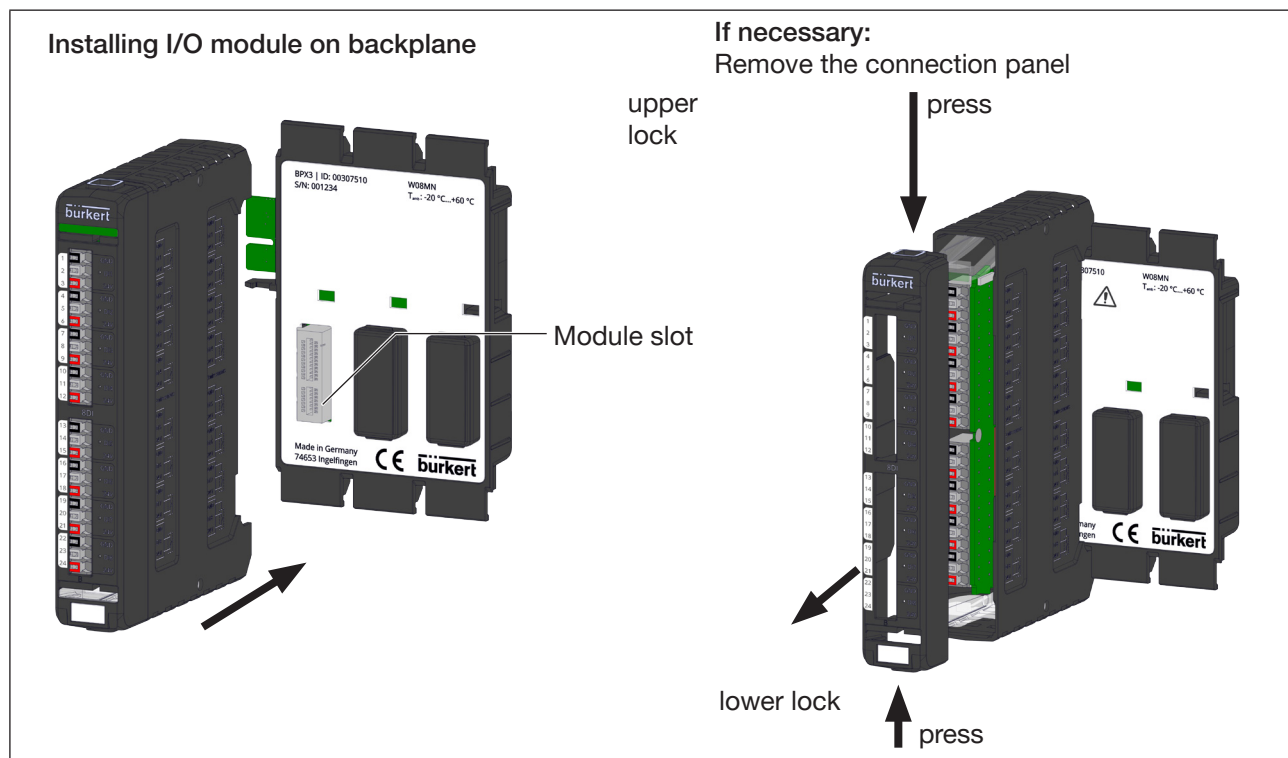
Figure 21:   Mounting the I/O module Type ME44 on the backplane

→ Align the I/O module with the module slot of the backplane.

→ Press I/O module onto the backplane until it engages.

The I/O module is now connected to the supply voltage.

> **Use supply voltage unit with adequate power.**

Connecting external sensors and actuators to the power supply:

Electrical configuration 4AI module:

	Plug configuration AUX Power		External circuit
		GND	Ground
		GND	Ground
		24 V	Aux power supply voltage 24 V $=$ + 20%/– 15%
		24 V	Aux power supply voltage 24 V $=$ + 20%/– 15%
	Plug configuration analogue inputs		**External circuit**
		GND	Ground
		AI1…AI4	Analogue input +
		24 V	Supply voltage 24 V $=$ + 20%/– 15%

Table 48:   Configuration 4AI module

Electrical configuration 4AO module:
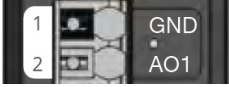
Plug configuration analogue outputs		External circuit
⬛	GND	Ground
⬜	AO1…AO4	Analogue output +

Table 49: Configuration 4AO module

Electrical configuration 8DI module:

Plug configuration		External circuit
⬛	GND	Ground
⬜	DI1…DI8	Digital input Frequency inputs: DI1…DI8
🟧	24 V	Supply voltage 24 V ⎓ + 20%/– 15%

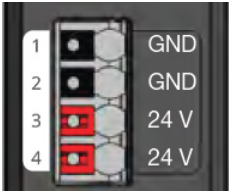*Table 50: Electrical configuration 8DI module*

Electrical configuration 8DO module:
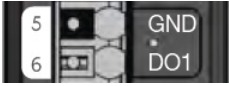
Plug configuration AUX Power		External circuit
⬛	GND	Ground
⬛	GND	Ground
🟧	24 V	Aux power supply voltage 24 V ⎓ + 20%/– 15%
🟧	24 V	Aux power supply voltage 24 V ⎓ + 20%/– 15%
Plug configuration digital outputs		**External circuit**
⬛	GND	Ground
⬜	DO1…DO8	Digital output +

Table 51: Configuration 8DO module

→ Connect wires of the external sensors and actuators to the terminals on the respective connection panels.

If the connection panel has been removed:

→ Align connection panel with the I/O module.

→ Press on the connection panel until it clicks into position.

18.2 Replacing the backplane

⚠️ **CAUTION!**

Electrical voltage.

▸ Before working on the device or system, switch off the power supply. Secure against reactivation.

NOTE!

▸ Maintenance may be carried out only by trained specialist technicians and with the appropriate tools.

18.2.1 Disassembly of successively adjacent backplanes

1. → ⚠️ Switch off the supply voltage.

2. Remove all I/O modules from the backplane in the same way.

Remove the connection panel   **Remove the I/O module**

upper lock   press

upper unlocking device

press toward the centre

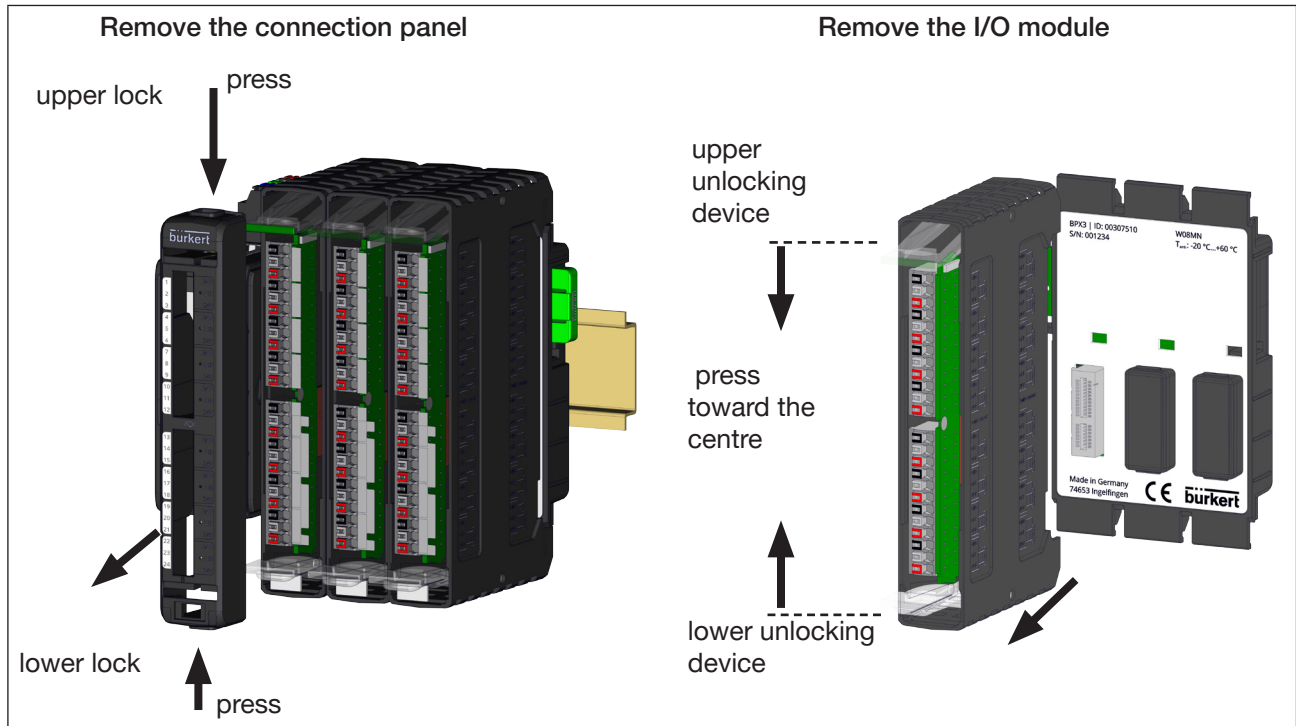lower lock   press

lower unlocking device

Figure 22:   Remove I/O modules from the backplane.

→ Press on the blue squares until the lock is released and remove the connection panel.

→ Press the upper and lower unlocking device toward the centre of the device and remove the I/O module from the backplane.

3. Remove backplane.

🛇 Contiguous backplanes are unlocked by removing the outer, right I/O module of the left adjacent backplane.
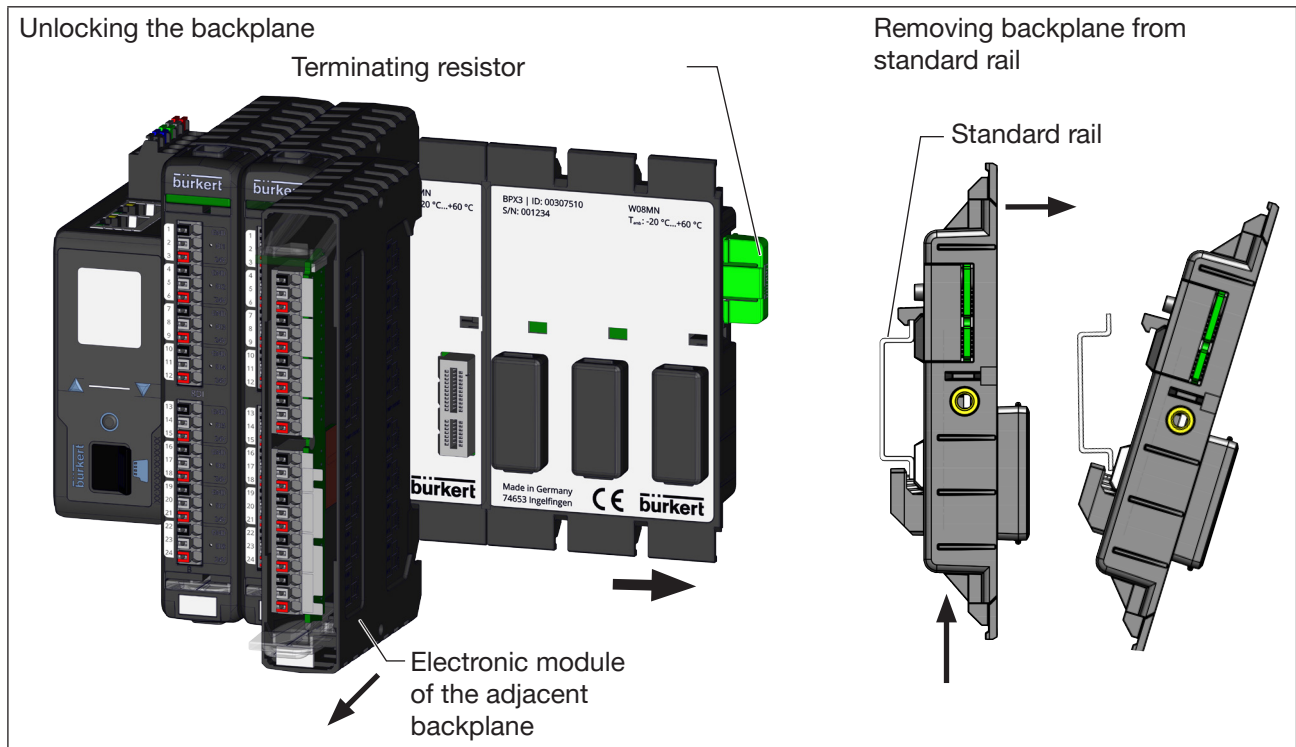

Figure 23:   Disassembly of successively adjacent backplanes

→ Remove the outer, right I/O module from the left adjacent backplane.
The backplane is unlocked.

→ Disconnect from the adjacent backplane by pulling to the right, and remove the backplane from the standard rail.

Removing the backplane from the standard rail:

→ Press the backplane upwards and detach it from the upper guide of the standard rail.

→ If the terminating resistor is on the backplane, remove the terminating resistor from the backplane.

🛇 **Keep the removed terminating resistor at hand, as it must be plugged into the outermost backplane of the system after replacement.**

18.2.2 Uninstalling the backplane from the fieldbus gateway

1. → ⚠ **Switch off the supply voltage.**

2. **Remove sensor and actuator cables.**

→ Press push-in contacts of the connection terminal and pull out the wires.

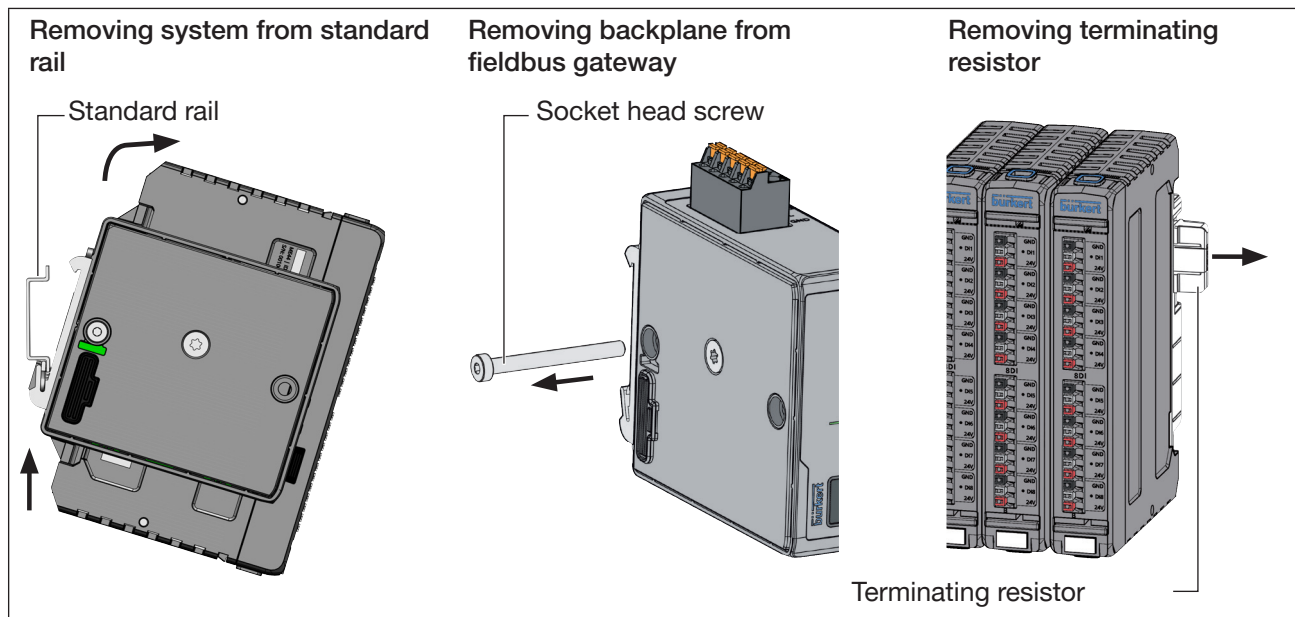| Removing system from standard rail	Removing backplane from fieldbus gateway	Removing terminating resistor

Figure 24:   Uninstalling backplane from fieldbus gateway

3. **Remove system consisting of fieldbus gateway and backplane, with mounted I/O modules, from the standard rail:**

→ Press the system upwards and detach it from the upper guide of the standard rail.

4. **Remove backplane from fieldbus gateway.**

→ Loosen socket head screw on fieldbus gateway.

→ Remove backplane.

→ If the terminating resistor is on the backplane, remove the terminating resistor from the backplane.

🛈 **Keep the removed terminating resistor at hand, as it must be plugged into the outermost back-plane of the system after replacement.**

5. Remove all I/O modules from the backplane in the same way.

Remove the connection panel   Remove the I/O module

upper lock   press

upper unlocking device

press toward the centre

lower lock

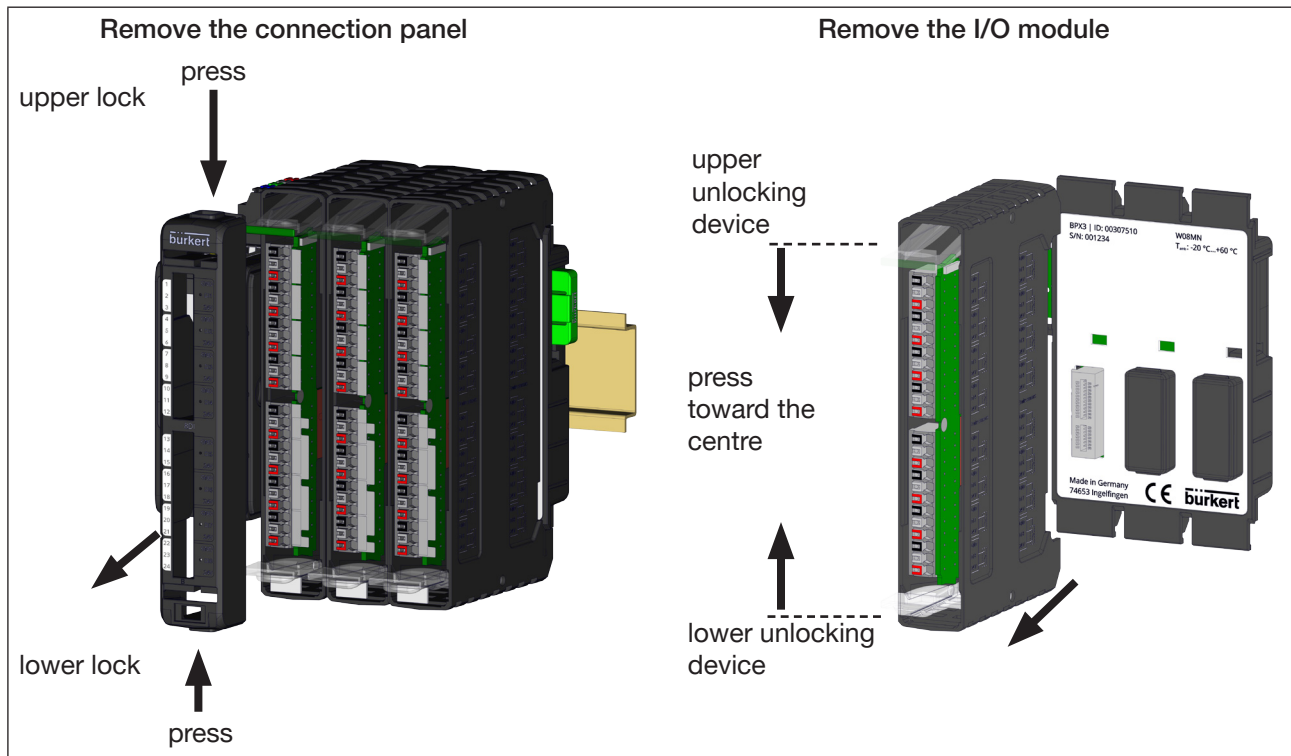lower unlocking device

press

Figure 25:   Uninstalling backplane from fieldbus gateway

→ Press on the blue squares until the lock is released and remove the connection panel.

→ Press the upper and lower unlocking device toward the centre of the device and remove the I/O module from the backplane.

MAN 1000436558 EN Version: E Status: RL (released | freigegeben) printed: 28.04.2021

87

18.2.3 Installing successively adjacent backplanes:

Installing and locking backplane

1. Install backplane

2. Install I/O module

Installing connection panels and terminating resistor
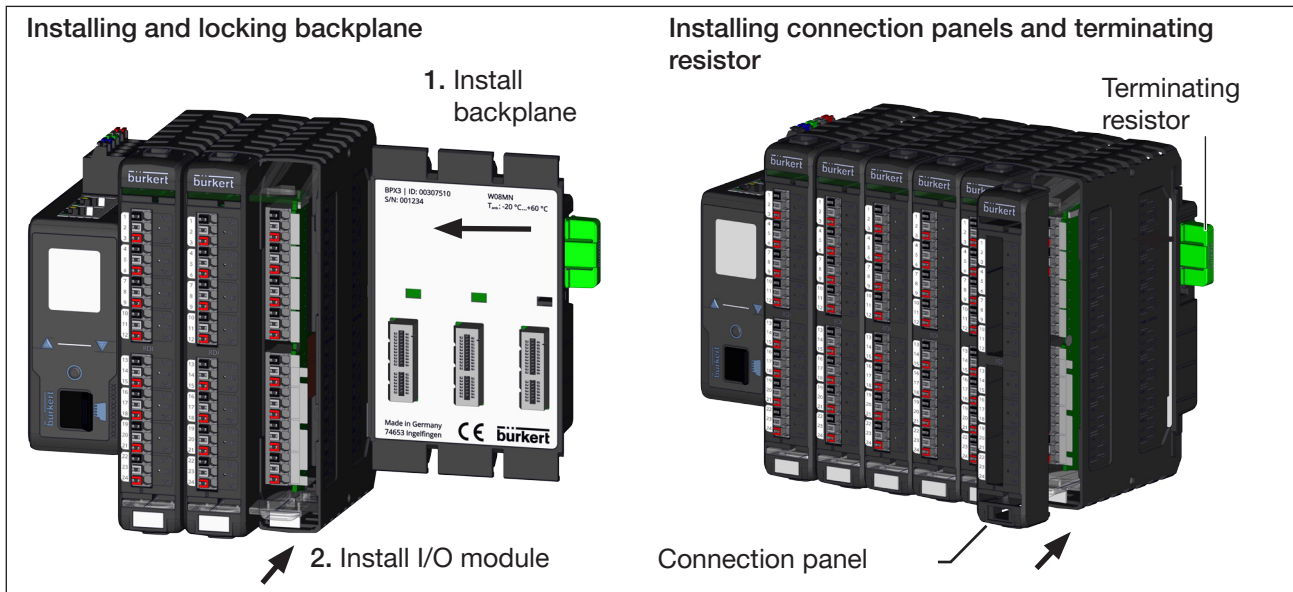
Terminating resistor

Connection panel

Figure 26: Installing successively adjacent backplanes

1. Installing the backplane on the standard rail:

→ Tilt the backplane and align it with the standard rail.

→ Hook backplane into the lower guide of the standard rail.

→ Press the backplane upwards, tilting it towards the standard rail and lock it into place in the upper guide of the standard rail.
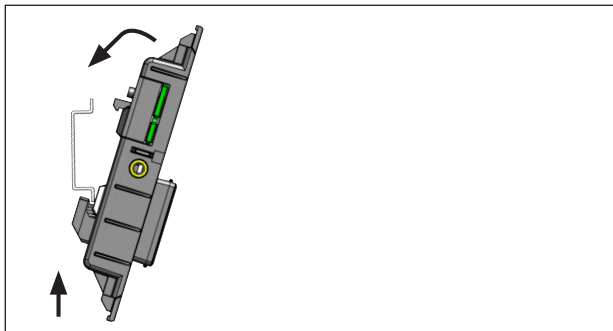
Figure 27: Installing the backplane on the standard rail

2. Lining up the backplane and installing the I/O module:

→ Slide the backplane to the left onto the adjacent backplane.

→ Reinstall the uninstalled I/O module of the left adjacent backplane that was uninstalled for unlocking.

> Installation of an additional backplane is also possible if all I/O modules of the adjacent backplane are installed.

→ Remove any covers from the backplane.

→ Reinstall the remaining I/O modules.

→ Press the respective I/O module onto the backplane until it engages.

→ Place the uninstalled connection panels back onto the I/O modules.

→ If the terminating resistor was removed, reattach it.

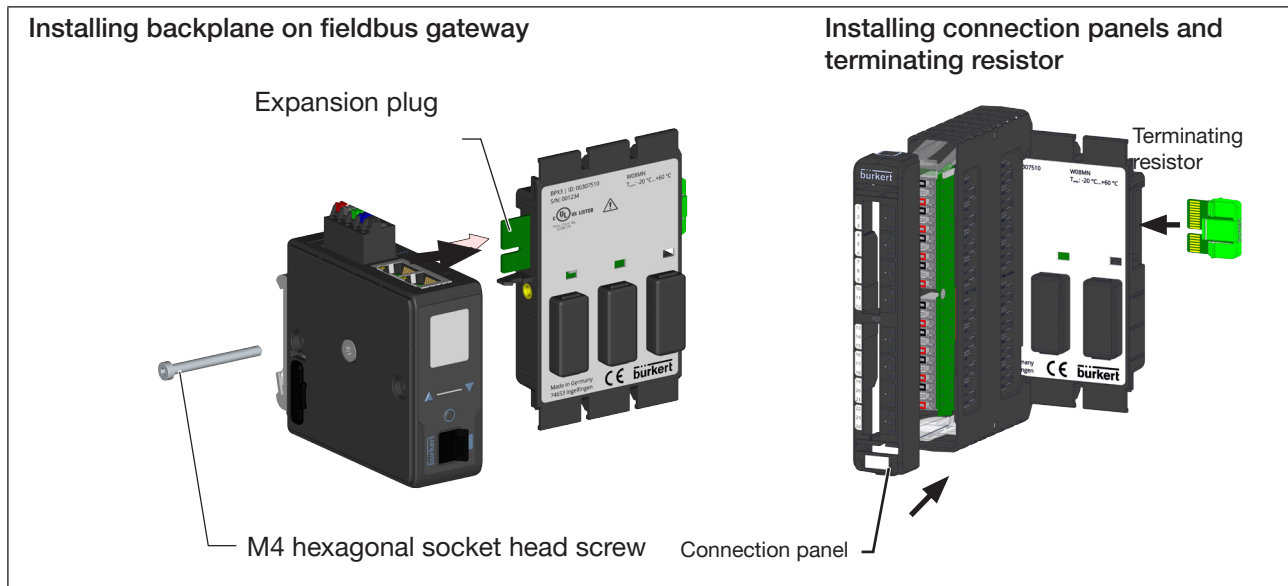### 18.2.4   Installing the backplane on a fieldbus gateway:

*Figure 28:   Install fieldbus gateway on backplane.*

1. Installing backplane on fieldbus gateway:

→ Align the expansion socket of the fieldbus gateway with the expansion plug of the backplane.

→ Connect fieldbus gateway to the backplane.

→ Using the M4 hexagonal socket head screw, screw the fieldbus gateway to the backplane.
⚠ Observe tightening torque of 0.75 Nm.

→ Remove any covers from the backplane.

2. Reinstalling uninstalled I/O modules:

→ Press the respective I/O module onto the backplane until it engages.

→ Place the uninstalled connection panels back onto the I/O modules.

→ If the terminating resistor was removed, reattach it.

3. Installing system on standard rail:
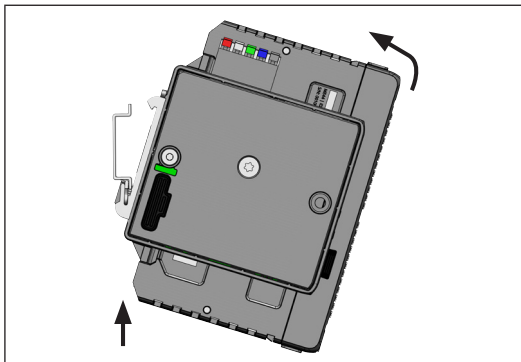
→ Tilt the system and align it with the standard rail.

→ Hook system into the lower guide of the standard rail.

→ Press the system upwards, tilting it towards the standard rail and lock it into place in the upper track of the standard rail.

Figure 29:   Mounting the system on the standard rail

18.2.5 Installation recommendation for configuration levels with multiple backplanes

→ First hook the minimum configuration level, consisting of fieldbus gateway and 1 backplane, into the standard rail.

→ Hook other backplanes individually in succession into the standard rail and push onto the previous backplane.

→ If the terminating resistor was removed, reattach it.

19 REPLACEMENT PARTS AND ACCESSORIES

NOTE!

Property damage due to incorrect parts.

Incorrect accessories and unsuitable spare parts may cause damage to the device.

▸ Use only original accessories and original spare parts from Bürkert.

Accessories	Order number
8 x digital inputs 8DI module (ME44)	354316
8 x digital outputs 8DO module (ME44)	354317
4 x analogue inputs 4AI module (ME44)	354321
4 x analogue outputs 4AO module (ME44)	354325
Module slot triple backplane (BPX3)	307510
Terminating resistor (can be connected directly)	303833
Power supply unit Type 1573 for standard rail, 100…240 V AC/24 V ⎓, 1.25 A, NEC Class 2 (UL 1310)	772438
Power supply unit Type 1573 for standard rail, 100…240 V AC/24 V ⎓, 1 A, NEC Class 2 (UL 1310)	772361
Power supply unit Type 1573 for standard rail, 100…240 V AC/24 V ⎓, 2 A, NEC Class 2 (UL 1310)	772362
Power supply unit Type 1573 for standard rail, 100…240 V AC/24 V ⎓, 4 A	772363
Micro SD card	on request
büS stick set 1 (incl. cable (M12), stick with integrated terminating resistor, power supply and software)	772426
büS stick set 2 (incl. cable (M12)), stick with integrated terminating resistor	772551
Bürkert Communicator software	http://www.burkert.com/en/type/8920

Table 52:   Accessories

20   DISASSEMBLY

⚠ **CAUTION!**

Electrical voltage.

▸ Before working on the device or system, switch off the power supply. Secure against reactivation.

NOTE!

▸ Disassembly must be performed only by trained personnel using suitable tools.

1. Switch off the supply voltage.

2. Remove 5-pole spring-loaded terminal.

3. Remove sensor and actuator cables.

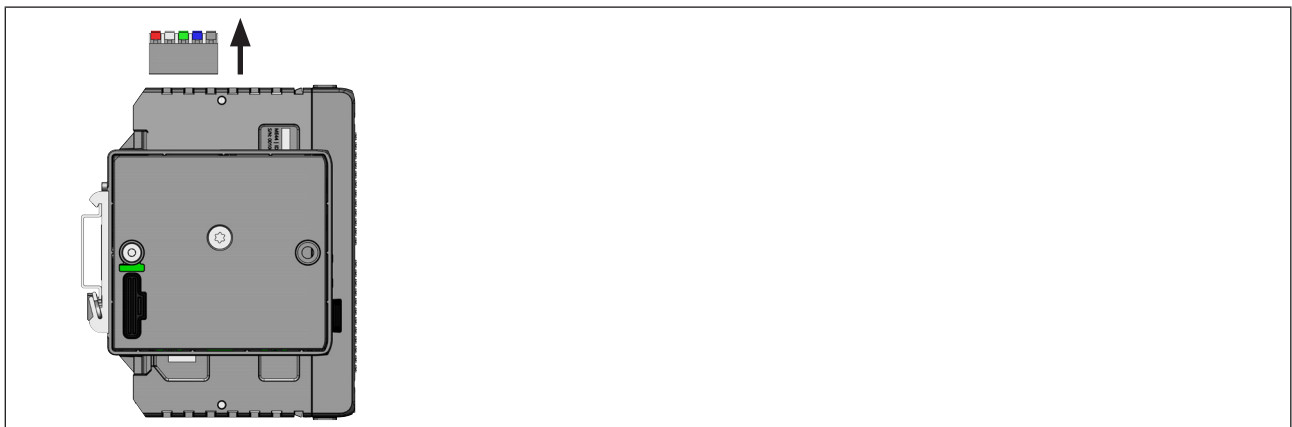→ Press push-in contacts of the connection terminal and pull out the wires.

Figure 30:   Remove 5-pole spring-loaded terminal

**4. Remove Ethernet cable from the X1 and X2 interfaces.
On PROFIBUS variant and CC-Link variant: Remove D-Sub, 9-pole push-in connector.**

5. Remove system from standard rail
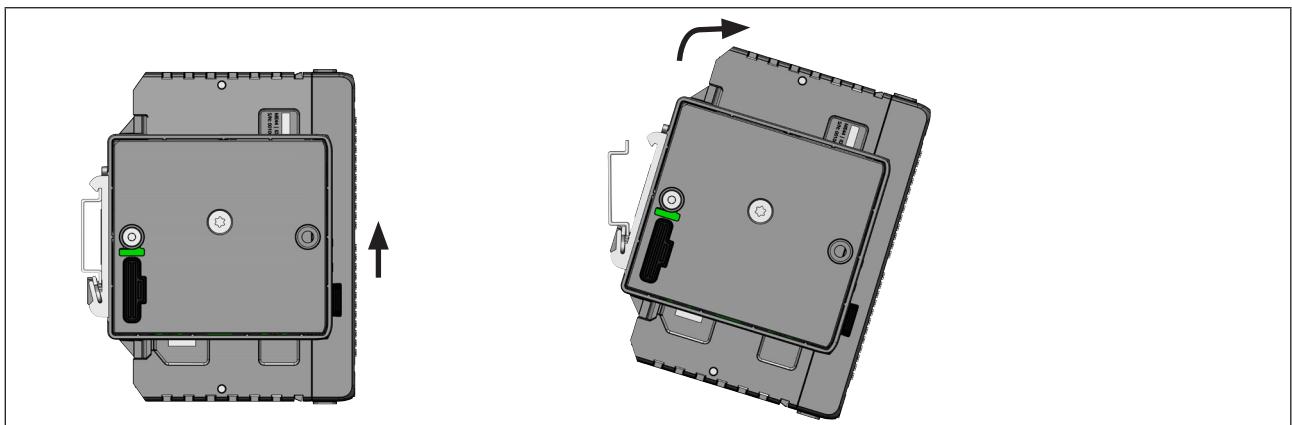

Figure 31:   Removing system from standard rail

→ Press the system upwards and detach it from the upper guide of the standard rail.

21 PACKAGING, TRANSPORT

NOTE!

Damage in transit due to inadequately protected devices.

▸ Protect the device against moisture and dirt in shock-resistant packaging during transportation.

▸ Observe permitted storage temperature.

22 STORAGE

NOTE!

Incorrect storage may damage the device.

▸ Store the device in a dry and dust-free location!

▸ Storage temperature: –30…+80 °C.

23 DISPOSAL

NOTE!

Damage to the environment caused by device parts contaminated with media.

▸ Dispose of the device and packaging in an environmentally friendly manner!

▸ Observe applicable disposal and environmental regulations.

Adhere to the national waste disposal regulations.

www.burkert.com