

Type 8653 AIRLINE FIELD

Field module for pneumatics



Operating Instructions for all variants

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Technical documentation 2505/07_GBen_00810656_898139787_27021598662399883 / Original DE

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1 About this document

The document is an important part of the product and guides the user to safe installation and operation. The information and instructions in this document are binding for the use of the product.

- ▶ Before using the product for the first time, read and observe the whole safety chapter.
- ▶ Before starting any work on the product, read and observe the respective sections of the document.
- ▶ Keep the document available for reference and give it to the next user.
- ▶ Contact the Bürkert sales office for any questions.



Further information concerning the product at [Products](#).

- ▶ Enter the article number from the type label in the search bar.

The illustrations in these instructions may vary depending on the product variant.

1.1 Symbols



DANGER!

Warns of a danger that leads to death or serious injuries.



WARNING!

Warns of a danger that can lead to death or serious injuries.



CAUTION!

Warns of a danger that can lead to minor injuries.

NOTICE!

Warns of property damage on the product or the installation.



Indicates important additional information, tips and recommendations.



Refers to information in this document or in other documents.

- ▶ Indicates a step to be carried out.

✓ Indicates a result.

Menu Indicates a software user-interface text.

1.2 Terms and abbreviations

The terms and abbreviations are used in this document to refer to following definitions.

büS	Bürkert system bus, a communication bus developed by Bürkert and based on the CANopen protocol
EVS	External valve voltage shut-off Valves can be de-energised irrespective of the control signals from the bus master. This safety shut-off can be applied to individual valves, valve units or the entire valve block.
SIA	Safety-related shut-off variant (see "EVS")
Device	Field module AirLINE Field Type 8653

1.3 Manufacturer

Bürkert Fluid Control Systems
Christian-Bürkert-Str. 13-17
74653 Ingelfingen
GERMANY

The contact addresses are available at [Contact](#).



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2 Safety

2.1 Intended use

The AirLINE Field module Type 8653 is designed for the pneumatic control unit and detection of the switching states of pneumatically actuated process valves, pneumatic cylinders and other pneumatically controlled actuators directly in the process environment.

Prerequisites for safe and trouble-free operation are proper transport, storage, installation, commissioning, operation and maintenance.

The instructions are part of the device. The device is intended exclusively for use within the scope of these instructions. Uses of the device that are not described in these instructions, the contractual documents or the type label can lead to severe personal injury or death, damage to the device or property and dangers for the surrounding area or the environment.

- ▶ Only trained and qualified personnel may install, operate and maintain the device. See qualification of persons in [Safety instructions](#) [▶ 7]
- ▶ Use the device only in conjunction with third-party devices and components recommended and authorized by Bürkert.
- ▶ Use the device only when it is in perfect condition.
- ▶ Do not use the device in potentially explosive atmosphere.
- ▶ Do not open the device.

The device is intended solely for industrial use.

The device is not suitable for use in applications where there is danger to life and limb.

2.2 Safety instructions



The AirLINE Field module Type 8653 is supplied as a fully assembled device. If the device is defective, it must be replaced.

Qualification of personnel working with the device

Improper use of the device can lead to serious personal injury or death. To avoid accidents when working with the device, the following minimum requirements must be met:

- ▶ Carry out work on the device within the scope of these instructions in a safety-compliant manner.
- ▶ Detect and avoid dangers when working on the device.
- ▶ Understand the instructions and implement the information contained therein accordingly.

Responsibility of the operator

The operator is responsible for observing the location-specific safety regulations, also in relation to personnel.

- ▶ Observe the general rules of technology.
- ▶ Install the device according to the regulations applicable in the respective country.
- ▶ The operator must make hazards arising from the location of the device avoidable by providing appropriate operating instructions.

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 will be 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 a sudden electrostatic discharge.
- ▶ Do not touch electronic components when the supply voltage is connected.

Changes and other modifications, spare parts and accessories

Changes to the device, incorrect installation or use of non-approved devices or components create hazards that can lead to accidents and injuries.

- ▶ Do not make any changes to the device.
- ▶ Do not mechanically load the device.
- ▶ Observe the operating instructions of the device or component used.
- ▶ Only use the devices in conjunction with devices and components recommended or approved by Bürkert.

Spare parts and accessories that do not meet Bürkert's requirements may impair the operational safety of the device and cause accidents.

- ▶ To ensure operational safety, only use original parts from Bürkert.

Operation only after proper transport, storage, installation, start-up or maintenance.

Improper transport, storage, installation, start-up or maintenance endanger the operational safety of the device and can cause accidents. This can lead to serious personal injury or death.

- ▶ Only carry out works which are described in these instructions.
- ▶ Only carry out works using suitable tools.
- ▶ Have all other works carried out by Bürkert only.

Working on the device

Working on the device before it has been powered down, unauthorised switching-on or unmonitored start-up of the system can cause accidents. This can lead to serious personal injury or death.

- ▶ Only work on the device when it is not in use.
- ▶ Ensure that the device or system cannot be switched on unintentionally.
- ▶ Following an interruption, restart the process in a controlled manner. Observe the following sequence:
 1. Turn on electrical supply.
 2. Turn on pneumatic supply (in case of external pressure supply, first the external auxiliary pilot air [X/12/14], then the operating medium pressure [P/1]).

Media under pressure

Pressurised media can cause serious injuries. In the event of overpressure or pressure surges, the device or lines can burst. Pneumatic lines that are defective or not securely fastened can come loose and swing around. Switching off the pressure can trigger uncontrolled movement of the actuators.

- ▶ Secure the actuators against movement before working on the device or system.

- ▶ Switch off the pressure before working on the device or system. Vent or drain the lines.

Electric shock due to electrical components

Touching live parts can result in severe electric shock.

- ▶ Switch off voltage before working on the device or system. Secure against reactivation.
- ▶ Adhere to any applicable accident prevention and safety regulations for electrical devices.

Hot surfaces and fire hazard

If the device is left on for an extended period of time, its surface can become hot.

- ▶ Wear suitable protective gloves.
- ▶ Keep highly flammable substances and media away from the device.
- ▶ Do not obstruct heat dissipation required for operation.

3 Product description

The AirLINE Field Type 8653 field module is designed for decentralised use in the process environment. It is easy to install and increases process reliability thanks to its integrated monitoring and diagnostic functions.

The housing with IP65/67 degree of protection eliminates the need for further protective housing such as a control cabinet.

3.1 Product overview

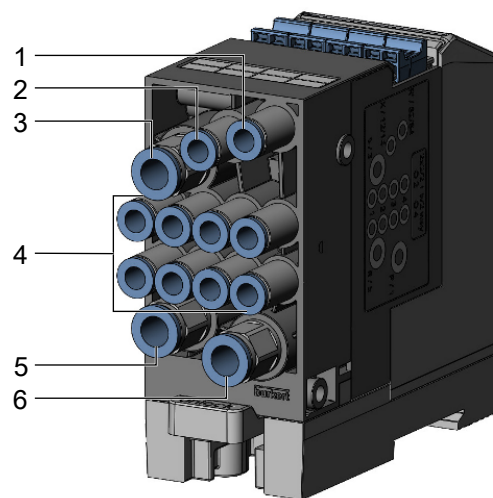


Fig. 1: Structure of AirLINE Field Type 8653, view from below

1 Exhaust port for auxiliary pilot air (R'/82/84)	2 Pressure port for auxiliary pilot air (X/12/14)
3 Exhaust port (S/3)	4 Working ports (2: top, 4: bottom)
5 Exhaust port (R/5)	6 Pressure port (P/1)

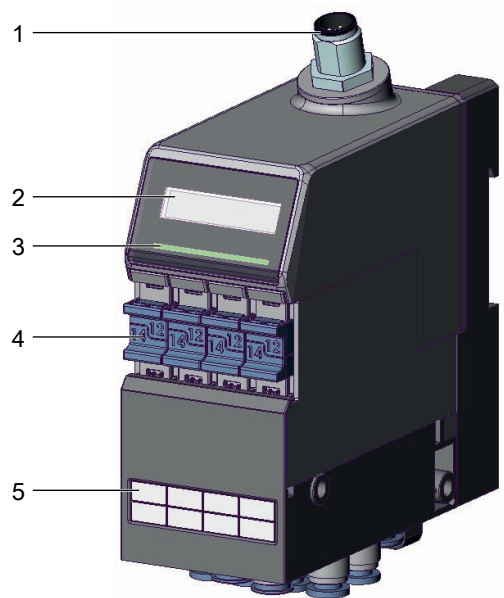


Fig. 2: Structure of AirLINE Field Type 8653, view from the front

1 M12 5-pin circular plug Operating voltage, input and output signals	2 Display for messages
3 Device status LED	4 Manual override options
5 Identification plates for labelling the valve positions	

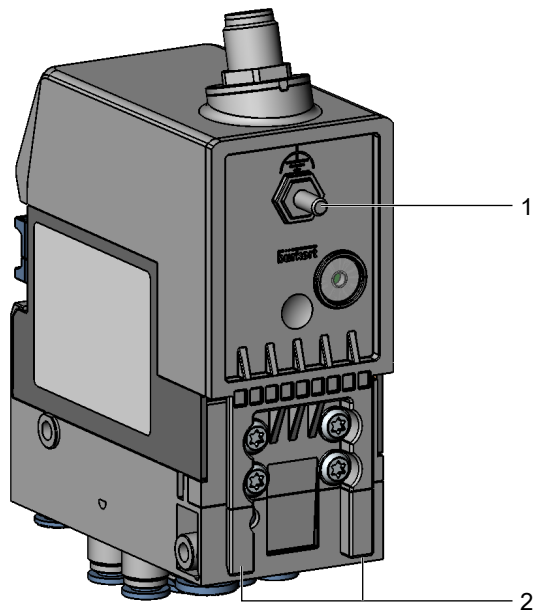


Fig. 3: Structure of AirLINE Field Type 8653, view from behind (without bracket)

1 M4 earthing bolt	2 Guide bars (for attaching the bracket)
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3.2 Display elements



1 Display for messages

2 Device status LED



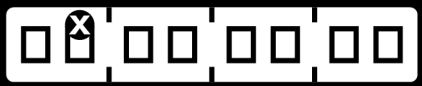

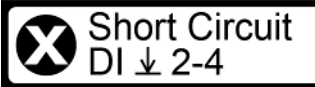
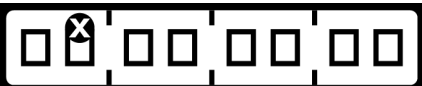
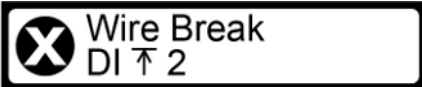
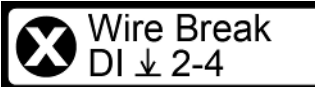
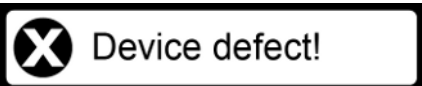
3.2.1 Display

The display shows the switching position of the valves and the error states of the outputs in graphic form.

Depending on the configuration of the device, additional information can be displayed, e.g. the position of the actuator assigned to the output.

Messages are indicated as text on the display. The text message display alternates cyclically with the graphical display of the channel status.

Indicator	Description
	Display indicator with 4 valve positions (e.g.: 5/2-way valves)
	Display indicator with 4 valve positions (double valves, e.g. 2x 3/2-way valves)
	Mixed display view (double and single valves)
	Valve 1 actuated
	Valve 1 actuated Feedback: "Upper end position reached"
	Valve 1 actuated Feedback: "Lower end position reached"
	EVS has been implemented for this valve unit (alternating mes- sages).
	Logic, display and diagnostics continue to operate unaffected and remain available.

Indicator	Description	
	Maintenance limit for pilot valve 1 reached (alternating messages)	Example of further possible messages: Act. SCC limit Ch. 1
		Maintenance limit for actuator 1 reached
	Short circuit on input 2 of the upper position feedback indicator unit (alternating messages)	Example of further possible messages:
		
		Short circuit on inputs 2–4 of the lower position feedback indicator unit
	Wire break on input 2 of the upper position feedback indicator unit (alternating messages)	Example of further possible messages:
		
		Wire break on inputs 2–4 of the lower position feedback indicator unit
	Device defective. The device is irreparably damaged. Please replace with a spare device.	

Tab. 1: Description of display indicators

3.2.2 Status indicator

The status indicator shows the status of the device and its peripherals, based on NAMUR recommendation 107 (NR 107).

If various alerts are present, the status indicator always shines in the colour of the highest prioritised alert (red = outage = highest priority).

Colour	Colour code	Status	Description
red	5	Failure, error or fault	Due to a malfunction in the device or its periphery, normal operation is not possible.
orange	4	Function check	Work is being carried out on the device, which means that normal operation is temporarily not possible.
yellow	3	Out of specification	The environment conditions or process conditions for the device are not within the specified range. Internal device diagnostics indicate problems within the device or with the process properties.
blue	2	Maintenance required	The device is in normal operation, although a function is briefly restricted. ► Service device
green	1	Diagnostics active	Device is running faultlessly, diagnostics are active.
white	0	Diagnostics inactive	Device is switched on, diagnostics are inactive.

Tab. 2: Status indicator according to NE 107

3.3 Type label and device labelling

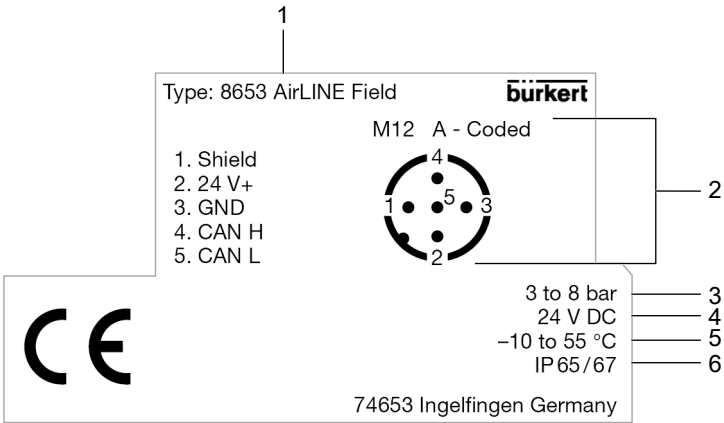


Fig. 4: Example of device labelling on the side of the device housing (bÜS/CANopen variant)

1 Type	2 Pin assignment of M12 5-pin circular plug
3 Pilot pressure	4 Operating voltage
5 Ambient temperature	6 Degree of protection

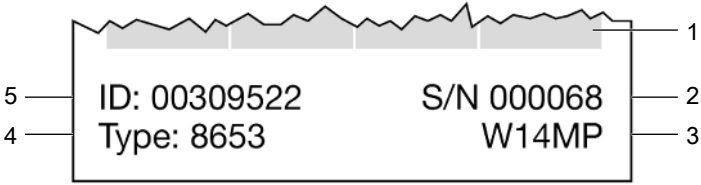


Fig. 5: Example of device labelling on the front of the device housing

1 Device marker set	2 Serial number
3 Manufacture code	4 Type
5 Article number	

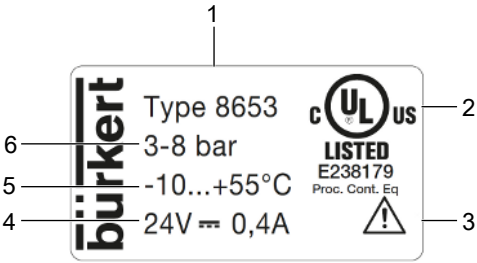


Fig. 6: UL type label example

1 Type	2 Certification labelling
3 Note: Observe the operating instructions	4 Operating voltage
5 Ambient temperature	6 Pilot pressure

3.4 Circuit functions of pneumatic slide valves

Icon	Description
	Circuit function C (CF C), NC 2 x 3/2-way solenoid valve, pilot-operated, with manual override Normally closed
	Circuit function D (CF D), NO 2 x 3/2-way solenoid valve, pilot-operated, with manual override Normally open
	Circuit function H (CF H) 5/2-way solenoid valve, pilot-operated, with manual override Pressurisation via working port (1), therefore one of the two ports (2) or (4) is under pressure.
	Circuit function Z (CF Z) 5/2-way solenoid valve Impulse variant with 2 coils and manual override Pressurisation via working port (1), i.e. one of the two ports (2) or (4) is under pressure.
	Circuit function L (CF L) 5/3-way solenoid valve, with manual override All connections blocked in the central position
	Circuit function M (CF M) 5/3-way solenoid valve, with manual override In central position, ports 2 and 4 aerated
	Circuit function N (CF N) 5/3-way solenoid valve, with manual override In central position, ports 2 and 4 vented

Tab. 3: Circuit function

4 Technical data

4.1 Standards and directives

The device complies with the valid EU harmonisation legislation.

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

4.2 Operating conditions

Altitude	Up to 2000 m above sea level
Ambient temperature	-10...+55 °C
Storage temperature	-10...+60 °C
Nominal operating mode	Continuous operation (100% duty cycle)
Maximum switching frequency	2.5 Hz
Degree of protection according to EN 60529/IEC 60529	IP65, IP67 (not rated by UL)

4.3 Electrical data

Operating voltage	24 V $\pm 10\%$ Max. 1 V _{p-p} ¹⁾ residual ripple with fieldbus interface
Current consumption	≤ 400 mA
Protection class according to DIN EN 61140 (VDE 0140-1)	III

¹⁾ UL-approved variants must be supplied in one of the following ways:
a. "Limited Energy Circuit" (LEC), according to UL/IEC61010-1
b. "Limited Power Source" (LPS), according to UL/IEC60950
c. SELV/PELV with UL-approved overcurrent protection, designed according to UL/IEC61010-1, Table 18
d. NEC Class 2 power supply unit

4.4 Pneumatic data

Medium	Dry compressed air, oiled or oil-free
	Neutral gases
Compressed air quality	ISO 8573-1:2010, Class 7.4.4 ²⁾
Medium pressure	0 to 8 bar (observe Pilot pressure diagram [► 19])
Pilot pressure	3 to 8 bar (observe Pilot pressure diagram [► 19])

4.5 Mechanical data

Valve slots	4
-------------	---

4.6 Pneumatic slide valve Type 6534

Circuit function 2x C and circuit function 2x D	
2x CF-C	2x 3/2-way, normally closed
2x CF-D	2x 3/2-way, normally open
Flow rate Q_{Nn}	up to 310 l _N /min (for exact flow values for the different circuit functions, see data sheet for Type 8652 under country.burkert.com)
Electrical power	
Before power reduction	2x 0.7 W
After power reduction	2x 0.175 W
Current	
Before power reduction	2x 29 mA
After power reduction	2x ≤10 mA

²⁾ To prevent the expanded compressed air from freezing, its pressure dew point must be at least 10 K less than the medium temperature.

Circuit function H and circuit function Z

CF H	(5/2-way monostable)
CF Z	(5/2-way bistable)
Flow rate Q_{Nn}	up to 310 l_N/min (for exact flow values for the different circuit functions, see data sheet for Type 8652 under country.burkert.com)
Electrical power	
Before power reduction	0.7 W
After power reduction	0.175 W
Current	
Before power reduction	29 mA
After power reduction	≤10 mA

Circuit function L, circuit function M and circuit function N

CF L	(5/3-way blocked)
CF M	(5/3-way pressurised)
CF N	(5/3-way vented)
Flow rate Q_{Nn}	up to 310 l_N/min (for exact flow values for the different circuit functions, see data sheet for Type 8652 under country.burkert.com)
Electrical power	
Before power reduction	0.7 W
After power reduction	0.175 W

4.6.1 Pilot pressure diagram

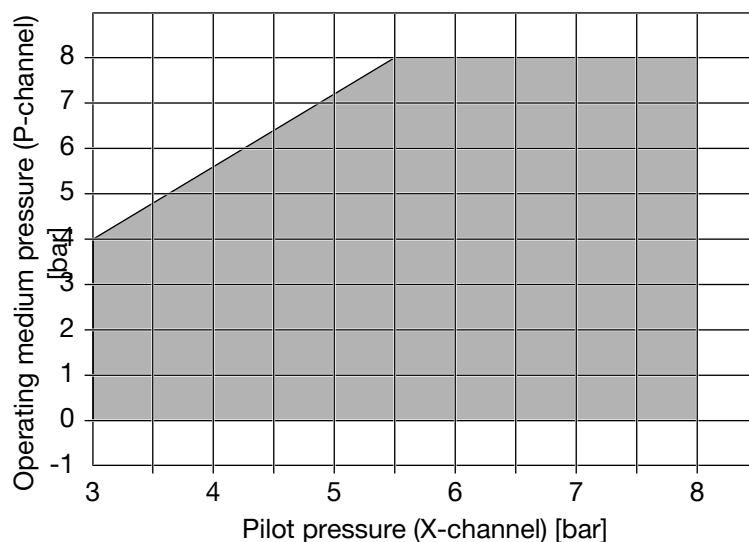


Fig. 7: Pilot pressure diagram for pneumatic slide valve Type 6534

5 Installation



Risk of injury or material damage when working on the device or system.

- ▶ Read and observe the chapter **Safety** [▶ 7] before working on the device or system.

5.1 Mounting options

The housing has an IP65/67 degree of protection. Therefore, no additional protective housing (e.g. control cabinet) is required.

The device can be mounted on the following types directly in the process environment:

- Mounting via side mounting holes
- Standard rail installation
- Mounting with wall mount

5.2 Mounting via side mounting holes

NOTICE!

Ensuring the degree of protection

If the device is mounted with the pneumatic ports facing upwards, the degree of protection cannot be guaranteed.

For installation with upward-facing pneumatic ports:

- ▶ Seal the ventilation ducts with a suitable silencer or
- ▶ exhaust air via a hose.



Fig. 8: Lateral mounting holes

- ▶ Connect the functional earth (see **Connecting the functional earth in the case of wall mounting** [▶ 29]).
- ▶ Securely fasten the device to a suitable surface using 2 suitable screws (e.g. M5 screw) (max. tightening torque 1.5 Nm for M5 screw).

5.3 Standard rail installation

NOTICE!

Ensuring the degree of protection

If the device is mounted with the pneumatic ports facing upwards, the degree of protection cannot be guaranteed.

For installation with upward-facing pneumatic ports:

- ▶ Seal the ventilation ducts with a suitable silencer or
- ▶ exhaust air via a hose.

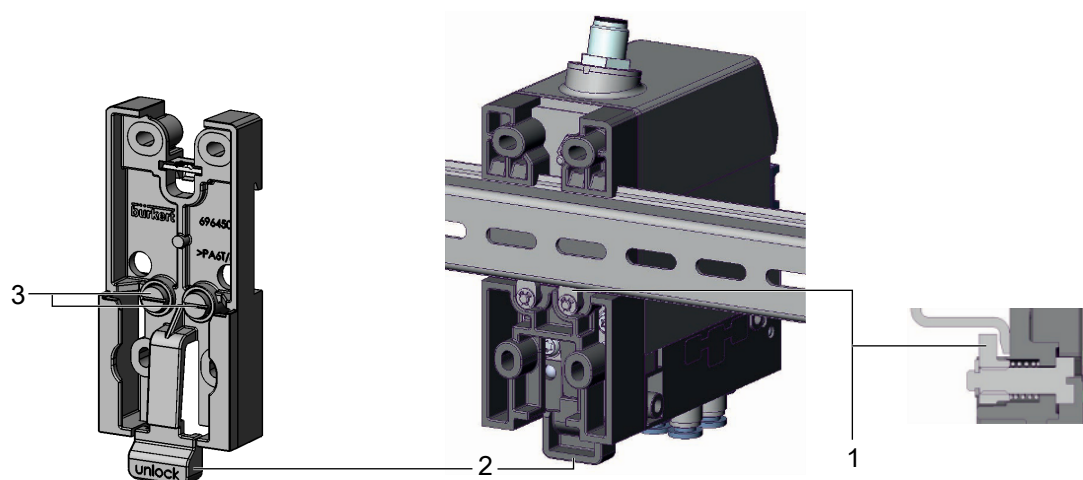


Fig. 9: Standard rail installation

1 Clamping piece

2 Latching lever

3 Fastening screws

- ▶ Remove the wall mount from the device (see [Separating and reattaching the device and wall mount \[► 23\]](#))
- ▶ Fastening screws with a flat-blade screwdriver **counterclockwise** Turn carefully as far as it will go.
- ▶ Tilt the bracket slightly upwards, place it on the DIN rail and swivel it open.
- ▶ Screw in bracket screws with a flat-blade screwdriver **clockwise** Turn carefully as far as it will go.
- ✓ The bracket is now fixed to the DIN rail with the clamping pieces.
- ▶ Slide the guide bars of the field module from top to bottom into the guide grooves of the bracket until you hear the locking mechanism engage.

5.4 Mounting with wall mount

NOTICE!

Ensuring the degree of protection

If the device is mounted with the pneumatic ports facing upwards, the degree of protection cannot be guaranteed.

For installation with upward-facing pneumatic ports:

- ▶ Seal the ventilation ducts with a suitable silencer or
- ▶ exhaust air via a hose.

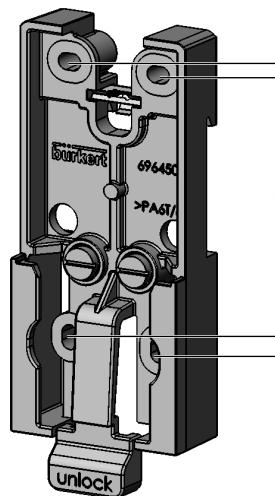


Fig. 10: Holes for fastening screws for wall mount

1 Holes for fastening screws

- ▶ Remove the wall mount from the device (see [Separating and reattaching the device and wall mount \[► 23\]](#)).
- ▶ Securely fasten the wall mount to a suitable surface using 4 suitable screws (e.g. M5 screw) (max. tightening torque 1.5 Nm for M5 screw).
- ▶ Connect the functional earth (see [Connecting the functional earth in the case of wall mounting \[► 29\]](#)).
- ▶ Slide the guide bars of the field module from top to bottom into the guide grooves of the bracket until you hear the locking mechanism engage.

5.5 Separating and reattaching the device and wall mount

In the delivery state, the device is engaged with the wall mount.

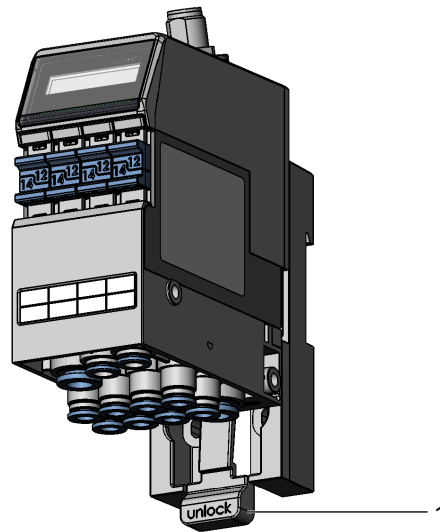
CAUTION!

Risk of injury from sharp edges.

The earthing plate of the wall mount has sharp edges that can cause cuts.

- Use suitable protective gloves when working with the wall mount.

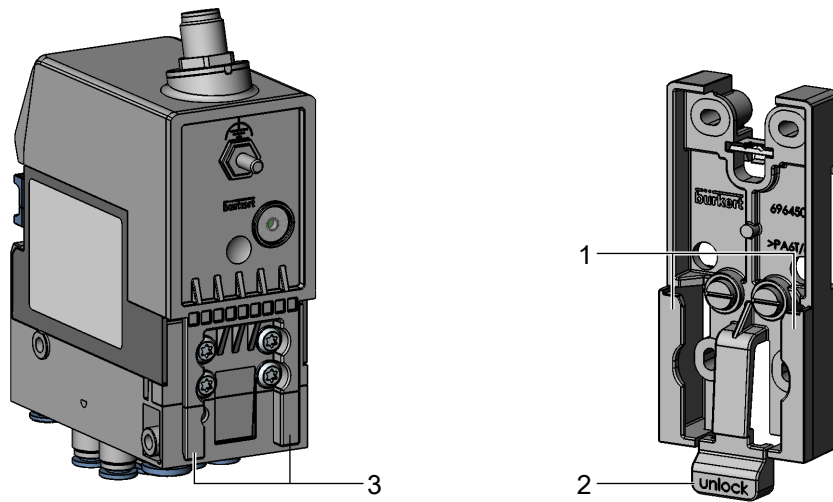
Separating the device from the wall mount



1 Latching lever

- Push the locking lever backwards.
- Pull the device upwards.

Engaging the device and wall mount



1 Guide grooves

2 Latching lever

3 Guide bars

- Slide the guide bars from top to bottom into the guide grooves of the wall mount until you hear the locking mechanism engage.

6 Pneumatic connection



Risk of injury or material damage when working on the device or system.

- Read and observe the chapter **Safety** [► 7] before working on the device or system.

6.1 Description of the connections



The pressure port for auxiliary pilot air (X/12/14) must always be connected.

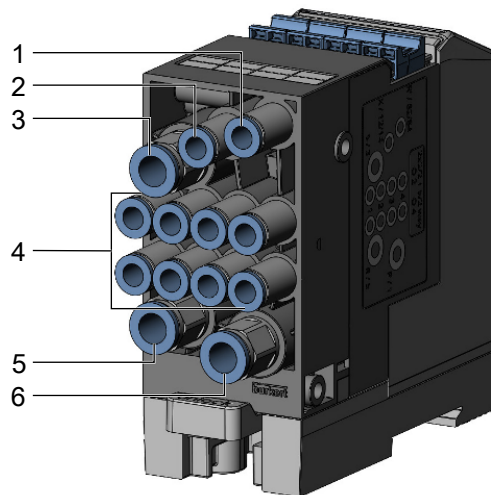


Fig. 11: Pin assignment of the pneumatic ports

1 Exhaust port for auxiliary pilot air (R/82/84)	2 Pressure port for auxiliary pilot air (X/12/14)
3 Exhaust port (S/3)	4 Working ports (2: top, 4: bottom)
5 Exhaust port (R/5)	6 Pressure port (P/1)

6.2 Recommended action for push-in connectors

Our push-in connectors meet the requirements specified in the ISO 14743:2020 standard. However, if you encounter leakage or retention problems when installing pneumatic hoses in the push-in connectors, you can take the following measures:

Use suitable materials

- Ensure that the appropriate combination of hose material (polyamide or polyurethane) and push-in connector is used, as different materials require different holding forces.

Check the hose size

- Ensure that the outer diameter of the hose matches the specification of the push-in connector. Hoses that are too small or too large may not sit correctly in the push-in connector. According to ISO 14743:2020, depending on the outer diameter (OD) of the hose, the tolerances must not exceed the following values:

Material	Hose OD [mm]	Permitted deviation OD [mm]
Polyamide (PA)	3...10	±0.08
	12...16	±0.1
Polyurethane (PU)	3...8	±0.1
	10...16	±0.15

Check the hose for damage

- Check the hose for visible damage such as cracks, kinks or wear. Such defects can prevent the hose from seating properly in the push-in connector.

Cut the hose correctly

- Cut the hose straight. Cutting it diagonally adversely affects the holding force. If the hose is not seated evenly in the push-in connector, the holding force is reduced and the seal between the push-in connector and hose is no longer sufficient. Furthermore, the pressure will be distributed unevenly in the system, which can cause the hose to slip or be pulled out of the push-in connector under pressure.

Insert the hose correctly

- Press the hose into the push-in connector with sufficient force. The hose must be inserted deep enough into the push-in connector so that it is held correctly by the claws.

Check the push-in connector system

- Ensure that the push-in connector system is designed for the corresponding operating conditions. The push-in connectors must function reliably at pressures from –0.09 MPa (–0.9 bar) to 1.6 MPa (16 bar) and be designed for temperatures from –20 °C to +80 °C. Even if the operating conditions for push-in connectors are specified in accordance with ISO 14743:2020, the specific operating conditions of the product used (e.g. those of a valve island) must be taken into account.

Check the holding capacity of the push-in connector

- When installing the hose, make sure that it is firmly seated in the push-in connector and can reliably withstand the specified minimum tensile forces to ensure a secure connection. It is recommended not to increase the load beyond what is necessary, as excessive tensile force can

Type 8653

Pneumatic connection

impair the function and safety of the connection.

For orientation: depending on body weight and fitness, an average person can apply forces of around 300 to 500 N when pulling.

Hose OD, D, mm	3	4	6	8	10	12	14	16
Hose OD, D, in (mm)	1/8 (3.17)	5/32 (4)	1/4 (6.35)	5/16 (8)	3/8. (9.52)	1/2 (12.7)	–	5/8 (16)
Minimum tensile force for polyamide hose (PA), N	60	70	120	170	250	300	300	350
Minimum tensile force for polyurethane hose (PU), N	25	50	100	150	200	200	250	300

Tab. 4: Minimum tensile force for the tensile test (DIN ISO 14743:2020)

If the problem persists despite the measures taken, it is possible to use support sleeves (ID 20099400). These sleeves help to increase the stability and tightness of hoses in push-in connectors. This is particularly important when softer or more flexible hoses such as polyurethane (PU) ones are used.

7 Electrical connection



Risk of injury or material damage when working on the device or system.

- Read and observe the chapter **Safety** [► 7] before working on the device or system.

7.1 Connect functional earth when mounting on DIN rail

The earthing bolt of the device touches an earthing plate that is integrated into the bracket. With DIN rail mounting, the earthing plate is in contact with the DIN rail. This means that the device is connected to earth potential when it is clamped onto the earthed DIN rail.



WARNING!

Malfunction due to electrostatic discharge

Electrostatic discharge on the device may cause malfunctions.

- Connect the DIN rail to the functional earth according to the installation situation using a short cable with a large cross-section.



WARNING!

Danger due to electromagnetic fields

If the functional earth (FE) is not connected, the requirements of the EMC directive are not met.

- Connect the DIN rail to the functional earth according to the installation situation using a short cable with a large cross-section.

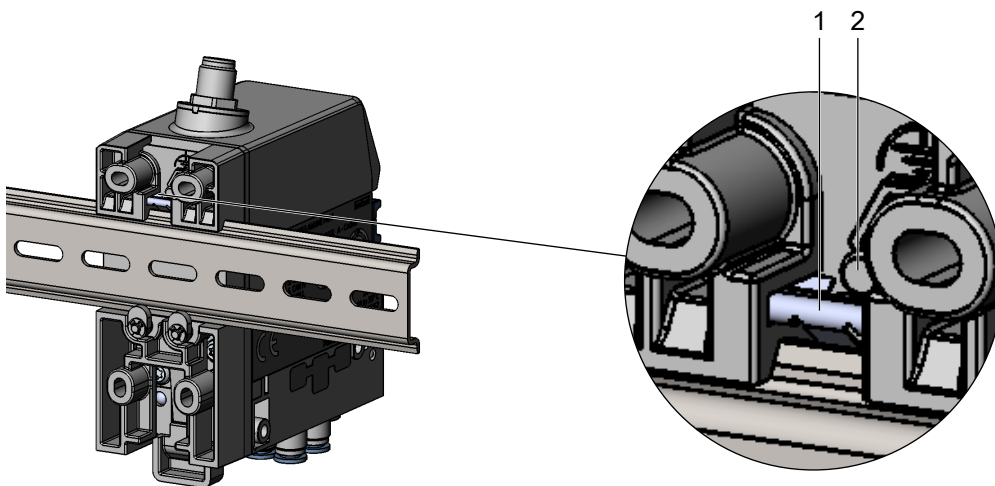


Fig. 12: Earthing via DIN rail

1 Earthing plate

2 Earthing bolt

- Connect the DIN rail to the functional earth.

7.2 Connecting the functional earth in the case of wall mounting

WARNING!

Malfunction due to electrostatic discharge

Electrostatic discharge on the device may cause malfunctions.

- ▶ Connect the device to the functional earth according to the installation situation using a short cable with a large cross-section.

WARNING!

Danger due to electromagnetic fields

If the functional earth (FE) is not connected, the requirements of the EMC directive are not met.

- ▶ Connect the device to the functional earth according to the installation situation using a short cable with a large cross-section.

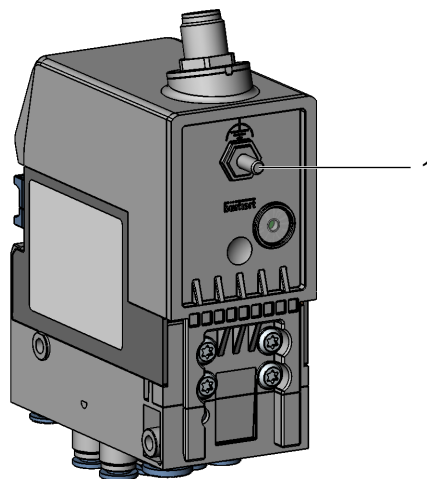


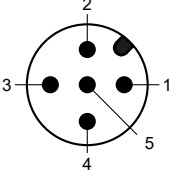
Fig. 13: Earthing bolt on the back of the appliance (shown without bracket)

1 M4 earthing bolt

- ▶ Connect the earthing bolt to the functional earth.

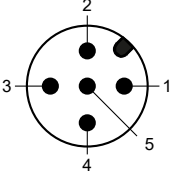
7.3 Pin assignment of M12 5-pin circular plug

büS/CANopen

Plug view	Pin	assignment
	1	Shielding
	2	Supply voltage 24 V \equiv
	3	GND
	4	CAN_H (büS connection)
	5	CAN_L (büS connection)

Tab. 5: Pin assignment of circular plug M12, 5-pin, A-coded, büS/CANopen

IO-Link, Port Class B

Plug view	Pin	assignment
	1	L+ (24 V \equiv Processor)
	2	P24 (24 V \equiv valve unit)
	3	L- (0 V GND processor)
	4	C/Q (IO-Link)
	5	N24 (0 V GND valve unit)

Tab. 6: Pin assignment of circular plug M12, 5-pin, A-coded, IO-Link, port class B

8 Commissioning



Risk of injury or material damage when working on the device or system.

- Read and observe the chapter **Safety** [► 7] before working on the device or system.

8.1 Identification of the valve positions

The device is supplied with MultiCard format device markers
Inscription label ESG 5/10 MC NE WS

The device markers are fixed to a sprue and can be printed in this form using standardised industrial printers (e.g. from Weidmüller). After printing, the device markers can be removed from the sprue and clipped onto the valve.

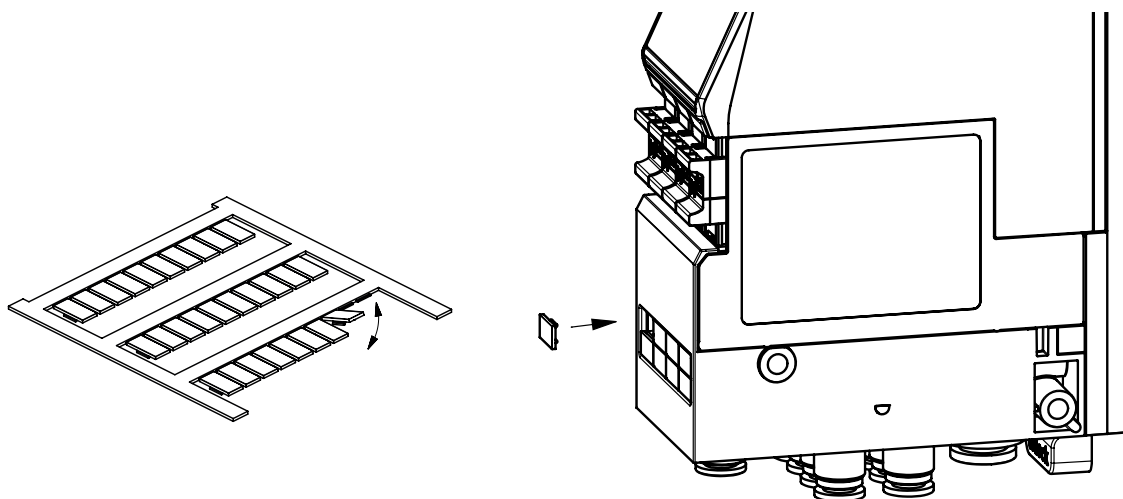


Fig. 14: Labelling of the valve positions with device markers in MultiCard format

8.2 Commissioning with manual override

Manual override is ideal for starting up the device and system. The manual override works without voltage being applied to the valve island and allows manual valve switching.

Depending on the circuit function (CF) of the valves, the manual overrides are labelled in a number of ways:

Circuit functions C, Z and H (with CF-H only 1 manual override option):

Labelling	Effect of the switched manual override
12	Supply channel 1 connected to working port 2
14	Supply channel 1 connected to working port 4

Circuit function D:

Labelling	Effect of the switched manual override
10 (12)	Connection between supply channel 1 and working port 2 interrupted
10 (14)	Connection between supply channel 1 and working port 4 interrupted



Fig. 15: Manual override of the valves

1 Manual override unactuated	2 Manual override switched
------------------------------	----------------------------

The standard manual override is spring return and latching.

Spring return:

If the sliding mechanism is moved to a first resistor, the manual override returns to the unactuated state after release.

Latching:

If the resistor is exceeded, the manual override stops in the switched state after release. Slide mechanism must be pushed back manually over the locking point to reset the manual override to the unactuated state

8.2.1 Additional element “MO locking”

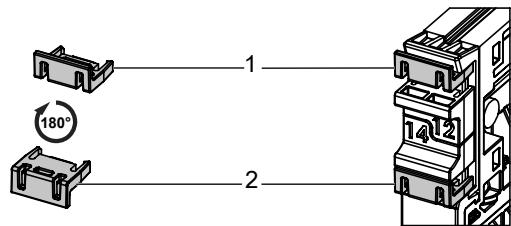


Fig. 16: Additional element “MO locking”

1 Locking manual override only by spring return	2 Locking manual override blocked
---	-----------------------------------

The additional element “MO Locking” enables manual override to be restricted.

Depending on the rotational position (rotated 0° or 180°) of the clipped-in additional element, manual override is either by spring return or locked.

9 Configuration with Bürkert Communicator

The Bürkert Communicator software for communication with Bürkert devices enables convenient setting and monitoring of application-specific parameters.

Required components:

- Bürkert Communicator software
The software can be downloaded free of charge at country.burkert.com.
- USB-büS-interface set 1
or USB-büS-interface set 2
Information on the USB-büS-Interface set can be found at country.burkert.com

Installation of the Communicator

- Install Communicator on a PC.
Note: Do not connect the büS stick to the PC during installation.



This chapter describes the basic operating of the Communicator.

Detailed information on operating the Communicator can be found in the software operating instructions at country.burkert.com.

9.1 Connect Communicator to büS/CANopen device

- Set the terminating resistor (on the büS stick or external terminating resistor).
- Use the USB-büS-Interface set to establish the connection between the device and the PC.

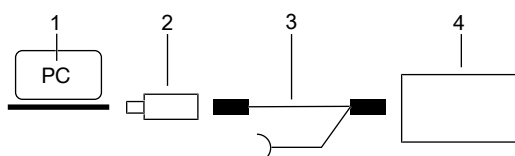


Fig. 17: Connecting the device to the PC

1 PC	2 büS stick
3 büS cable with connection socket for power supply unit	4 Device

9.2 Connecting the Communicator to the büS/CANopen network

- ▶ Do not set an additional terminating resistor (check büS stick!).
- ▶ Use the USB-büS-Interface set to establish the connection between the network and the PC.

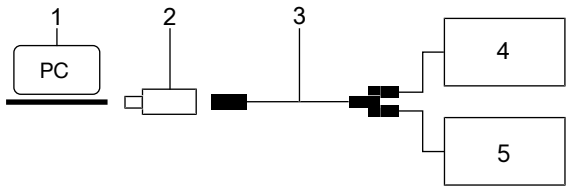



Fig. 18: Connection of PC to network

1 PC	2 büS stick
3 büS cable	4 Device 1
5 Device n	

9.3 Add interface

- ▶ Click on the icon  in the menu bar of the Communicator.
- ▶ Select the appropriate interface in the **Connection manager** viewlet.
- ▶ To adjust the properties of the connection, click on the pencil icon.
 - Ensure that the set baud rate corresponds to the network.
 - When connecting to a CANopen network, select **Don't send heartbeats (more PLC-friendly)** if necessary. This means that the Communicator is not recognised by the programmable logic controller.

9.4 Adjusting settings

Menu or function	Values or description
Device	
> General settings	
> Parameter	
> Setup	A wizard will take you through the base settings for the device.

Tab. 7: Menu tree

10 Configuration via fieldbus

The device can be used in bÜS networks or CANopen networks.

The device can be used with other fieldbuses in combination with the Type ME43 Fieldbus Gateway or the Type 8652 AirLINE valve island.

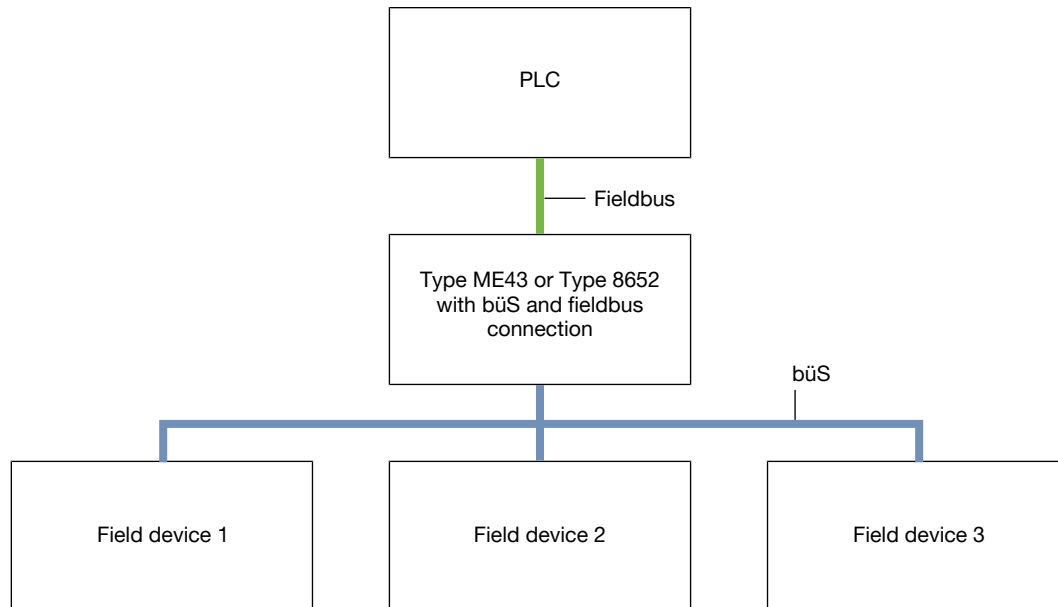


Fig. 19: Schematic structure of a bus system with various expansion devices



Operating instructions for fieldbus gateway Type ME43:

country.burkert.com → Type ME43, chapter entitled "SETTING UP THE BÜS NETWORK"

Operating instructions for valve island AirLINE Type 8652:

country.burkert.com → Type 8652, chapter entitled "Using extension modules"

10.1 Cabling for bÜS/CANopen networks



Information on planning bÜS (CANopen) networks is available at country.burkert.com. Enter "Cabling guide" in the search bar to find the document.

10.2 Start-up file

The commissioning file (eds file) and the description of the device-specific objects are available in the device description files.

Please refer to the documentation of your project design software for instructions regarding the installation of the start-up file.



Download the device description files at country.burkert.com.

- ▶ Enter the article number from the type label in the search bar.
- ▶ Download the device description files from "Downloads" > "Software".

Fieldbus

CANopen

EDS file

IO-Link

IODD file



The CANopen standard objects are described in the “CANopen network configuration” software instructions.

Download the software instructions at country.burkert.com.

- ▶ Enter the article number from the type label in the search bar.
- ▶ Download the software manual from “Downloads” > “Operating instructions”.

10.3 Bit-wise composition of the inputs and outputs

The field device consists of 1 valve unit with a maximum of 8 valves (= 4 double valves).

Each valve unit has

- 1 byte cyclical output for current upper end position feedback status
- 1 byte cyclical output for current feedback status of the lower end position
- 1 byte cyclical input for valves
- 1 byte cyclical input for external upper end position feedback indicator
- 1 byte cyclical input for external lower end position feedback indicator

Example showing the assignment of the bits in the BM1-Valves object for double valves (Example of object BM1_Valves)

BM1_Valves							
Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
Valve 1	Valve 2	Valve 3	Valve 4	Valve 5	Valve 6	Valve 7	Valve 8
Pneumatic connection							
2	4	2	4	2	4	2	4

Tab. 8: Valve unit with 4 double valves

If there are single valves in a valve unit, the next bit is skipped after a single valve (see example below).

Example showing the assignment of the bits in the BM1-valves object for 2 single valves and 2 double valves (Example of object BM1_Valves)


BM1_Valves					
2 single valves			2 double valves		
Bit 0	Bit 2	Bit 4	Bit 5	Bit 6	Bit 7
Valve 1	Valve 3	Valve 5	Valve 6	Valve 7	Valve 8
Pneumatic connection					
4	4	2	4	2	4

Tab. 9: Valve unit with 2 single valves and 2 double valves

11 Device functions

11.1 Actuator switching time measurement

This function can be used to detect wear or possible faults in process valves (actuators) at an early stage by monitoring the switching time. This helps to optimise maintenance intervals.

 The function is only possible in combination with additional DI modules (e.g. Type ME64).

The valve island can record and continuously monitor the switching times of individual or all actuators during the active process. If a process parameter changes and this affects the switching time of the actuators, this is detected and a maintenance message is sent to the programmable logic controller. The device changes the Namur Status to blue. The display indicates which channel is affected.

The set-up operation runs in the background and does not affect the process.

What is measured:

The time from switching the pneumatic slide valve to the end position feedback is measured.

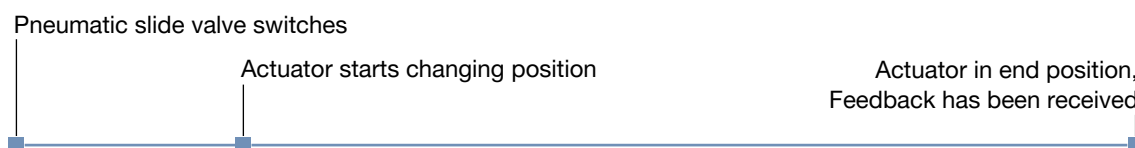


Fig. 20: Time span of the switching time measurement

Menu or function	Values or description
Device	
> Unit 1	
> Parameter	
> Actuator switching time ³⁾	
> Reference measurement	Starting/stopping the automatic actuator switching time measurement
> Settings	Manual configuration of actuator switching times, tolerance and timeout

Tab. 10: Menu tree for actuator switching time settings

11.1.1 Start reference measurement

 If actuators are expected to take more than 60 seconds to switch, refer to chapter [Timed out](#) [► 40].

³⁾ Menu only available if position feedback indicators are enabled.

During the reference measurement, 20 consecutive switching operations of each selected actuator are recorded and the average value is determined for each of the actuators. Depending on the "Tolerance" and "Timeout" settings, maintenance messages are triggered if further switching time measurements are outside the defined limits.

Requirements for correct measurement

- Position feedback indicators are connected and working
- Measurements take place under standard process conditions
- Compressed air supply is stable

Start reference measurement

- ▶ Make sure that the "Installer" user level is active.
- ▶ Select valve unit (the switching time measurement must be started/stopped separately for each valve unit).
- ▶ Select **Parameter > Actuator switching time > Reference measurement**.
- ▶ Mark the desired position feedback indicator inputs.
- ▶ Measurement type: **Yes**
- ▶ **Finish**

✓ The valve island measures the actuator switching time.

During the measurement, the indicator **Measurement of actuator run time active** is displayed in the Communicator.

The progress of the measurement can be viewed at **Parameter > Actuator switching time > Reference measurement > Next**. Inputs for which the measurement has been completed are no longer marked.

Once the measurement has been completed, the values can be read at **Diagnostics > Channel maintenance**.

11.1.2 Switching time settings

11.1.2.1 Tolerance

Factory setting: 50%

The tolerance indicates the percentage by which the current measured value may deviate from the average value. If the measured value is outside this range three times in succession, a maintenance message is triggered

Example:

The average value is 5 seconds.

With a tolerance of 50%, the permitted range is 2.5 to 7.5 seconds.

If values below 2.5 seconds or above 7.5 seconds are measured three times in succession, a maintenance message is triggered.

If the permitted tolerance is exceeded, this may indicate the following problems:

- Actuator is beginning to wear.
- Leakage in the pneumatic supply system between the valve island and actuator.
- Fluctuations in the compressed air network.

11.1.2.2 Timed out

Factory setting: 60 s

The set timeout applies as long as no average value has been determined. If an average value has been determined, the value for the timeout is 3 times the average value. If the current measured value exceeds this value, a maintenance message is triggered immediately

Example:

The average value is 5 seconds.

Therefore, the value for the timeout is 15 seconds.

If a switching time of more than 15 seconds is measured, a maintenance message is triggered.

If the permitted tolerance is exceeded, this may indicate a malfunction of the actuator, e.g. due to a hose coming loose or the actuator becoming stuck.

11.1.3 Error messages for actuator switching time

If the switching time exceeds the specified tolerance value, a maintenance message is sent to the programmable logic controller. The display of the affected valve unit indicates which channel is affected.

As soon as a correct measurement is taken, the error message disappears from the display and the programmable logic controller is informed.

12 Troubleshooting

12.1 Valves do not switch

Cause	Solution
Manual override of the valves not in neutral position.	<ul style="list-style-type: none"> ▶ Bring the manual override into the neutral position.
Pressure supply insufficient or not available.	<ul style="list-style-type: none"> ▶ Set up the largest possible volume of pressure supply (also for upstream devices such as pressure controllers, maintenance units, on/off valves, etc.). ▶ The supply connection for auxiliary pilot air (X/12/14) must always be connected. Ensure a minimum operating pressure of 3.0 bar and the ratio of pilot pressure to medium pressure in accordance with the pilot pressure diagram (see Pilot pressure diagram [► 19]).
Incorrect configuration.	<ul style="list-style-type: none"> ▶ Configure the system according to the hardware structure.
Channel not approved for use.	<ul style="list-style-type: none"> ▶ Change the parameter setting (Communicator).
No or too low operating voltage.	<ul style="list-style-type: none"> ▶ Check the electrical connection. ▶ Make sure that the operating voltage is correct.

12.2 Valves are switching with a delay or blow off at the exhaust ports

Cause	Solution
Pressure supply insufficient or not available.	<ul style="list-style-type: none"> ▶ Set up the largest possible volume of pressure supply (also for upstream devices such as pressure controllers, maintenance units, on/off valves, etc.). ▶ The supply connection for auxiliary pilot air (X/12/14) must always be connected. Ensure a minimum operating pressure of 3.0 bar and the ratio of pilot pressure to medium pressure in accordance with the pilot pressure diagram (see Pilot pressure diagram [► 19]).
Pressure build-up of pilot pressure insufficient.	<p>For 5/2-way valves (circuit function H) and 2 x 3/2-way valves (circuit function D, normally open):</p> <ul style="list-style-type: none"> ▶ Operate the valve island with external pilot pressure supply.
Valves are not in home position (de-energised) during pressure build-up.	<ul style="list-style-type: none"> ▶ Pressurise the valve block before switching the valves.

Cause	Solution
Insufficient ventilation of the exhaust air ducts due to too small or dirty silencers (back pressure).	<ul style="list-style-type: none">▶ Use appropriately large silencers or expansion vessels.▶ Clean the dirty silencers.

13 Fault messages on the display

13.1 No message, display off

Cause	Solution
No or too low operating voltage.	<ul style="list-style-type: none"> ▶ Check the electrical connection. ▶ Make sure that the operating voltage is correct.

13.2 Pilot SCC Limit Ch. X

Cause	Solution
Maintenance limit for pilot valve/ actuator channel X reached.	<ul style="list-style-type: none"> ▶ Replace the pilot valve or service the actuator and reset the switching cycle counter. or ▶ Deactivate the switching cycle counter. or ▶ Increase the switching cycle counter warning limit.

13.3 Short Circuit Ch. X

Cause	Solution
Short circuit on input x of the feedback unit.	▶ Check the position feedback indicator/plug connection.
Position feedback indicator or plug connection defective.	<ul style="list-style-type: none"> or ▶ Replace the position feedback indicator.

13.4 Wire Break Ch. X

Cause	Solution
Wire break on input x of the feedback unit.	▶ Check the position feedback indicator/plug connection.
Position feedback indicator or plug connection defective.	<ul style="list-style-type: none"> or ▶ Replace the position feedback indicator.

13.5 Device defect!

Cause	Solution
Power supply to the pneumatic slide valves not possible.	▶ Replace the device with a spare.
Device irreparably damaged.	

13.6 EVS Active

Cause	Solution
No power supply for type 8653 valves, IO-Link variant.	<ul style="list-style-type: none">▶ Check the IO-Link master, port class B. If port class A is used, please connect a separate power supply for pin 2 and pin 5. See chapter Pin assignment of M12 5-pin circular plug [▶ 30]

14 Uninstallation



Risk of injury or material damage when working on the device or system.

- Read and observe the chapter **Safety** [► 7] before working on the device or system.

14.1 Disassembly of DIN rail

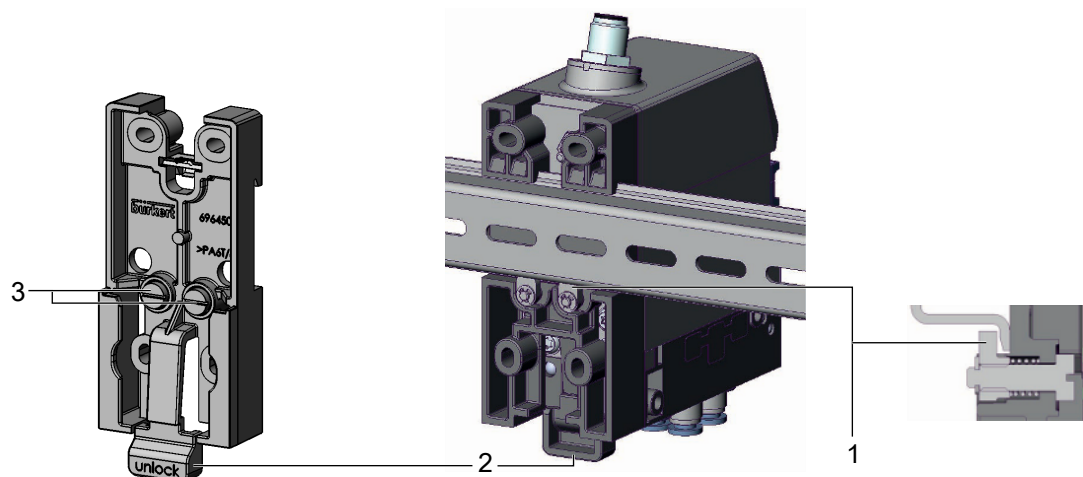


Fig. 21: Standard rail installation

1 Clamping piece

2 Latching lever

3 Fastening screws

- Press the locking lever backwards and pull the device upwards.
- Fastening screws with a flat-blade screwdriver **counterclockwise** Turn carefully as far as it will go.
- Tilt the valve block slightly upwards and lift it off the DIN rail.

14.2 Dismantling the wall mount

- Press the locking lever backwards and pull the device upwards.
- Loosen the 4 screws of the wall mount and remove the wall mount from the surface.

15 Logistics

15.1 Transport and storage

- ▶ Protect the device against moisture and dirt in the original packaging during transportation and storage.
- ▶ Avoid UV radiation and direct sunlight.
- ▶ Protect connections from damage with protective caps.
- ▶ Observe permitted storage temperature.

15.2 Return



No work or tests will be carried out on the device until a valid Contamination Declaration has been received.

- ▶ To return a used device to Bürkert, contact the Bürkert sales office. A return number is required.

15.3 Disposal

Environmentally friendly disposal



- ▶ Follow national regulations regarding disposal and the environment.
- ▶ Collect electrical and electronic devices separately and dispose of them as special waste.

Further information at country.burkert.com

16 Accessories

büS accessories

Accessories	Article number
USB-büS-interface set 1 (including power supply unit, USB-büS-interface with terminating resistor, Y-distributor, 0.7 m cable with M12 plug)	772426
USB-büS-interface set 2 (including USB-büS interface with terminating resistor, 0.7 m cable with M12 plug)	772551
büS plug M12, angled	772419
büS cable, M12 female connector angled with free cable end, 0.7 m	772626
büS cable, M12 straight female connector with free cable end, 1 m	772409
büS cable, M12 straight female connector with free cable end, 3 m	772410
büS cable, M12 straight female connector with free cable end, 5 m	772411
büS cable, M12 straight female connector with free cable end, 10 m	772412
büS cable, 50 m	772413
büS cable, 100 m	772414
büS extension cable, M12 male connector to M12 female connector, 0.1 m	772492
büS extension cable, M12 male connector to M12 female connector, 0.2 m	772402
büS extension cable, M12 male connector to M12 female connector, 0.5 m	772403
büS extension cable, M12 male connector to M12 female connector, 1 m	772404
büS extension cable, M12 male connector to M12 female connector, 3 m	772405
büS extension cable, M12 male connector to M12 female connector, 5 m	772406
büS extension cable, M12 male connector to M12 female connector, 10 m	772407
büS extension cable, M12 male connector to M12 female connector, 20 m	772408
büS service cable M12 to micro USB	773254

Electrical accessories

Accessories	Article number
5-pin M12 male connector with 120-Ohm termination resistor	772424
5-pin M12 female connector with 120-Ohm termination resistor	772425
büS adapter, M12 plug A-coded to M12 plug A-coded	772867
Y junction	772420
Y junction for connecting 2 separately energised segments of a büS network	772421

Pneumatic accessories

Accessories	Article number
Push-in connector M7, straight, nickel-plated brass, D6	773459

Accessories	Article number
Push-in connector M7, straight, VA, D6	773463
Push-in connector M7, straight, nickel-plated brass, D1/4	773460
Push-in connector M7, straight, VA, D1/4	773464
Push-in connector G1/4, straight, nickel-plated brass, D10	773461
Push-in connector G1/4, straight, nickel-plated brass, D3/8	773462
Push-in connector G1/4, straight, VA, D10	773465
Push-in connector G1/4, straight, VA, D3/8	773466
Plastic tubing for pneumatics, ø 6/4 mm, blue, polyamide (PA), 50 m	780643
Plastic tubing for pneumatics, ø 6/4 mm, black, polyamide (PA), 50 m	780644
Plastic tubing for pneumatics, ø 6/4 mm, natural, polyamide (PA), 50 m	780645
Plastic tubing for pneumatics, ø 8/6 mm, blue, polyamide (PA), 50 m	780646
Plastic tubing for pneumatics, ø 8/6 mm, black, polyamide (PA), 50 m	780647
Plastic tubing for pneumatics, ø 8/6 mm, natural, polyamide (PA), 50 m	780648
Plastic tubing for pneumatics, ø 10/8 mm, blue, polyamide (PA), 50 m	780649
Plastic tubing for pneumatics, ø 10/8 mm, blue, polyamide (PA), 50 m	780649
Plastic tubing for pneumatics, ø 10/8 mm, blue, polyamide (PA), 50 m	780649
Plastic tubing for pneumatics, ø 6/4 mm, blue, polyamide (PA), 100 m	771868
Plastic tubing for pneumatics, ø 6/4 mm, black, polyamide (PA), 100 m	771295
Plastic tubing for pneumatics, ø 6/4 mm, natural, polyamide (PA), 100 m	771296
Plastic tubing for pneumatics, ø 8/6 mm, blue, polyamide (PA), 100 m	771869
Plastic tubing for pneumatics, ø 8/6 mm, black, polyamide (PA), 100 m	771873
Plastic tubing for pneumatics, ø 8/6 mm, natural, polyamide (PA), 100 m	771297
Plastic tubing for pneumatics, ø 10/8 mm, blue, polyamide (PA), 100 m	771870
Plastic tubing for pneumatics, ø 10/8 mm, black, polyamide (PA), 100 m	771877
Plastic tubing for pneumatics, ø 10/8 mm, natural, polyamide (PA), 100 m	771874
Sintered bronze plug-in silencer, nickel-plated brass body, ø 6 mm	784306
Sintered bronze plug-in silencer, nickel-plated brass body, ø 8 mm	784304
Sintered bronze plug-in silencer, nickel-plated brass body, ø 10 mm	784305
Plug-in silencer, polyethylene (PE) ø 6 mm	772571
Plug-in silencer, polyethylene (PE) ø 8 mm	773231
Plug-in silencer, polyethylene (PE) ø 10 mm	773522
Push-in silencer, polyethylene (PE) 1/4"	773545
Push-in silencer, polyethylene (PE) 3/8"	773546
Sealing plug, nickel-plated brass, 08/06-08/06	781666

Accessories	Article number
Sealing plug, nickel-plated brass, 10/08-10/08	781667
Sealing plug, POM, 06/04-06/04	782399
Sealing plug, POM, 08/06-08/06	782400
Sealing plug, POM, 10/08-10/08, red	782401
Sealing plug, PBTP, 6 mm	771605
Sealing plug, PBTP, 8 mm	771606
Sealing plug, PBTP, 10 mm	771607

Other accessories

Accessories	Article number
Labelling labels, 1 rake (10 pieces)	368588
Manual override locks, 8 pieces	328082
Memory card	on request