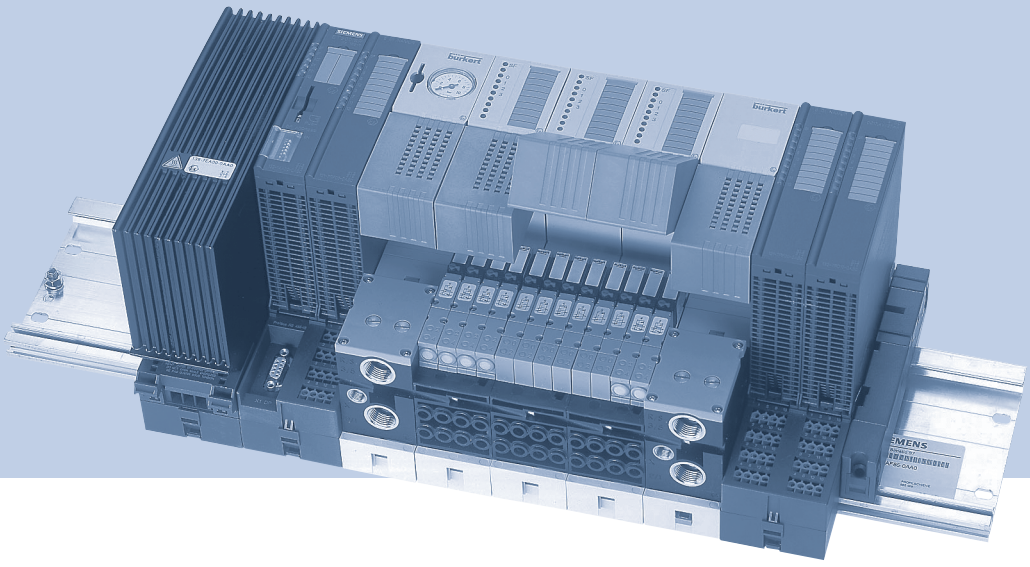
bürkert
FLUID CONTROL SYSTEMS

Type 8650
AirLINE Ex

Electrical and Pneumatic Automation System



Operating Instructions

Bedienungsanleitung
Instructions de Service

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Operating Instructions 1805/06_EU-EN_00804032 / Original DE

Electrical and Pneumatic Automation System Type 8650

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General Information and Safety Instructions

Contents

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1. OPERATING INSTRUCTIONS

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

WARNING!

The operating instructions contain important safety information!

Failure to observe these instructions may result in hazardous situations.

- The operating instructions must be read and understood.

1.1. Symbols

DANGER!

Warns of an immediate danger!

- Failure to observe the warning may result in a fatal or serious injury.

WARNING!

Warns of a potentially dangerous situation!

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

CAUTION!

Warns of a possible danger!

- Failure to observe this warning may result in a moderately severe or minor injury.

NOTE!

Warns of damage to property!

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

designates additional significant information, tips and recommendations.

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

→ designates a procedure which you must carry out.

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2. INTENDED USE

Incorrect use of the Type 8650 AirLINE Ex can be dangerous to people, nearby equipment and the environment.

- The device is designed for use in explosive environments (precise classification see EC-Type Examination Certificates in the Appendix). It may be used to control pneumatically operated devices.
- Ensure that the device is protected before using outdoors.
- Use according to the authorized data, operating conditions and conditions of use specified in the contract documents and operating instructions. These are described in the chapter entitled “System Description AirLINE Ex” and “Technical Data”.
- The device may be used only in conjunction with third-party devices and components recommended and authorised by Bürkert.
- Correct transportation, correct storage and installation and careful use and maintenance are essential for reliable and faultless operation.
- Use the Type 8650 AirLINE Ex 8793 only as intended.

2.1. Restrictions

If exporting the system/device, observe any existing restrictions.

2.1.1. Ex-Approval

The Ex approval is only valid if the modules and components approved by Bürkert are used in the manner described in this operating manual.

The electronic modules may only be employed in combination with the pneumatic valve types approved by Bürkert. Use in any other way will invalidate the Ex approval!

Unauthorized modifications to the system, the modules or components will also void the Ex approval.

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3. BASIC SAFETY INSTRUCTIONS

These safety instructions do not make allowance for any

- contingencies and events which may arise during the installation, operation and maintenance of the devices.
- local safety regulations; the operator is responsible for observing these regulations, also with reference to the installation personnel.

Danger – high pressure!

- Before loosening the lines and valves, turn off the pressure and vent the lines.

Risk of electric shock!

- Before reaching into the device or the equipment, switch off the power supply and secure to prevent reactivation!
- Observe applicable accident prevention and safety regulations for electrical equipment!
  (It is permitted to replace electronic modules and valves even while the power is on.)

Verbrennungsgefahr/Brandgefahr bei Dauerbetrieb durch heiße Geräteoberfläche!

- Das Gerät von leicht brennbaren Stoffen und Medien fernhalten und nicht mit bloßen Händen berühren.

General hazardous situations.

To prevent injury, ensure that:

- Do not supply aggressive or inflammable media to the media connections of the system.
- Do not supply fluids to the media connections of the system.
- In low-pressure applications ensure that no flammable or explosive media are drawn into the AirLINE-Ex system.
- Do not subject the housing to mechanical loads (e. g. by placing objects on the housing or using the housing as a step).
- Do not cover the ventilation slots in the housing.
- The system cannot be activated unintentionally.
- Installation and repair work may be carried out by authorised technicians only and with the appropriate tools.
- After an interruption in the power supply or pneumatic supply, ensure that the process is restarted in a defined or controlled manner.
- The device may be operated only when in perfect condition and in consideration of the operating instructions.
- The general rules of technology apply to application planning and operation of the device.

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NOTE!

Operate the system with direct current only!
To avoid damaging the system, use only direct current as the power supply for the system.

Avoid pressure drop!
To avoid a pressure drop, the compressed air supply to the system must be as large as possible.

Electrostatic sensitive components / modules!

- The device contains electronic components which react sensitively to electrostatic discharge (ESD). Contact with electrostatically charged persons or objects is hazardous to these components. In the worst case scenario, they will be destroyed immediately or will fail after start-up.
- Observe the requirements in accordance with EN 61340-5-1 to minimise or avoid the possibility of damage caused by sudden electrostatic discharge!
- Also ensure that you do not touch electronic components when the power supply voltage is present!

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4. GENERAL INFORMATION

4.1. Contact address

Germany

Bürkert Fluid Control System
Sales Centre
Chr.-Bürkert-Str. 13-17
D-74653 Ingelfingen
Tel. + 49 (0) 7940 - 10-91 111
Fax + 49 (0) 7940 - 10-91 448
E-mail: info@de.buerkert.com

International

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

And also on the internet at:

www.buerkert.com

4.2. Warranty

The warranty is only valid if the AirLINE Ex Type 8650 is used as authorized in accordance with the specified application conditions.

4.3. Approvals

The approval rating on the Bürkert labels refers to Bürkert products.

You can find more detailed information on the approvals in the Appendix of these operating instructions.

4.4. Information on the Internet

The operating instructions and data sheets for Type 8650 can be found on the Internet at:

www.buerkert.com → Type 8650

4.5. Trademarks

The listed designations are trademarks of the respective companies / associations / organizations.

ET 200iSP	Siemens AG
PROFIBUS	PROFIBUS Nutzerorganisation e. V.

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System Description

Contents

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1. GENERAL DESCRIPTION

1.1. Product Description

AirLINE Ex Type 8650 (hereafter referred to as AirLINE Ex) is an electrical and pneumatic automation system in protection class IP30 that has been developed for use in explosive environments.

In combination with modules from the Siemens SIMATIC ET 200iSP System, a full range of electronic and pneumatic components are available. As long as simple rules are observed, it permits pneumatic, electric and electronic modules with different functions can be combined with one another. The components are connected to each other using screws or latches. In this way both the electrical and the pneumatic connections are made. The pilot valves integrated on the pneumatic modules allow a wide range of different pneumatic actuators to be controlled on site (e. g. process valves or pneumatic cylinders).

Fig. 1: View of the overall system (Siemens SIMATIC ET 200iSP and Bürkert AirLINE Ex)

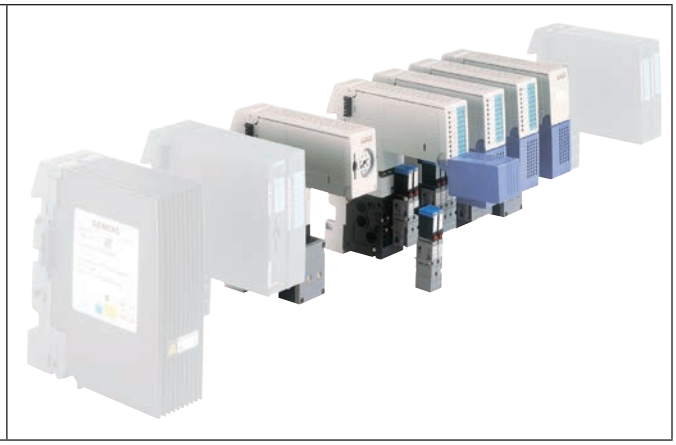

Fig. 2: View of the Bürkert AirLINE Ex system

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1.2. Characteristic Features and Benefits

1.2.1. Characteristic features of AirLINE Ex

- Simple operation
- Automatic set-up of supply and data circuits
- Open, flexible and modular structure
- Combination of different valve segments and different electrical I/O functions for space and application-optimized station configurations.
- Seamless integration into Siemens SIMATIC ET 200iSP
- Operation is possible with oiled or unoiled compressed air, as well as with neutral and non-combustible gases.

1.2.2. The benefits of AirLINE Ex

- Flow-optimized valve design.
  Pressure range of vacuum up to 10 bar (depending on the valve models used).
  Flow of approx. 300 l/min and 700 l/min for a valve width of 10 mm and 16 mm respectively.
- Long service life with oiled and unoiled compressed air thanks to low-wear valve function.
- Central exhaust air exhaust.
- Replacement of valves and electronic modules during operation possible thanks to „intrinsically safe“ explosion-proof construction.
- Optional operation with auxiliary control air in extended pressure ranges (also see the chapter *Configuration and Function of the Modules / Integratable Valves*)
- Simple combination of various functions, configurations and add-ons thanks to high modularity
- Numerous valve functions: 3/2-, 2 x 3/2- and 5/2-way combined with various circuit functions
- Wide range of connection possibilities
- Integration of pneumatic options possible (e. g. check valves)
- Optional emergency manual override of the valves
- Different pressure levels possible in one system
- Integration of pressure gauges for operating pressure display
- Central compressed air supply

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1.3. Field of Application

The AirLINE Ex System is designed for decentralized operation in industrial environments.
Thanks to the modular configuration, electronics and fluidics can be combined particularly simply and efficiently.
It complies with protection class IP30.

DANGER!

Risk of electric shock!

The terminal modules (with upright system wiring) are designed for the Ex-protection class “Ex-e” (increased safety).

- Before working on the terminal modules, always switch off the operating voltage to the system.
  Further information can be found in the handbook for the Siemens ET200iSP.

Danger of explosion!

If a system is installed in a control cabinet in the explosion-proof area, observe the following:

- The control cabinet must be authorized for use in the explosion-protected area.
- The control cabinet must be dimensioned large enough to ensure that the generated lost heat can be dissipated to the exterior in a suitable manner.
- The internal temperature of the control cabinet must not exceed the max. permitted ambient temperature for the device.

1.4. Marking

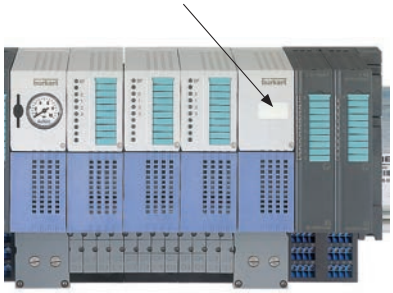

Fig. 3: Location of the type label

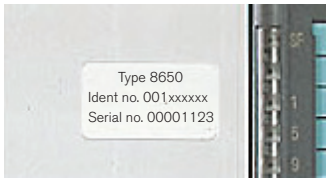

Fig. 4: Type label

Information about the labeling of the electronic and terminal modules can be found in the chapters Configuration and Function of the Modules / Terminal Module / Labeling and Configuration and Function of the Modules / Electronic Module / Labeling.

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2. TECHNICAL DATA

2.1. General Technical Data

Medium	Clean, dry air (oiled or unoiled), neutral gases (particle size max. 5 µm)
Max. power consumption	see table below "*Power consumption of the active modules".*
Ambient temperature during operation	0 °C to +55 °C
Storage temperature	-20 °C to +60 °C
Relative humidity	5 to 95 %, non-condensing
Acceleration during operation	5 m/s^2
Rated operating mode	100 % CDF (continuous operation)
Operating voltage	24 V DC in EEx-e (Details: see Siemens Power Supply Module)
Degree of protection	IP30
Protection class	3 (VDE0580)
Housing materials	Pneumatic modules and valves: PA (polyamide electronic modules: PBT (polybutylene terephthalate)
Seal materials	Pneumatic modules and valves: NBR electronic modules: PC (polycarbonate)
Approvals	A prerequisite for the authorized use of the total AirLINE-Ex system is the installation in a suitable certified housing: - Ex-e- or Ex-d-housing for Zone 1 respectively - Ex-d-housing for Zone 21 FA prerequisite for FM-Ex in Zone 21 or Class II, III Div. 1,2 with the substance classes E, F & G is the operation in a suitable Ex-D housing.
▪ Electronic modules	ATEX: ATEX II 2 G Ex ib IIC T4 (Zone 1 / 21) IEC-Ex: IECEx KEM 07.0032 FM-Ex: Class II, III, Div. 1, 2, GP E, F, G IS Class I, Div. 1 GP A, B, C, D T4 Class I, Div. 2 GP A, B, C, D T4 Class I, Zone 1, AEx ib IIC T4
▪ Terminal modules	ATEX: ATEX II 2 G Ex e [ia/ib] IIC T4 (Zone 1 / 21) IEC-Ex: IECEx KEM 07.0033 FM-Ex: Class II, III, Div. 1, 2, GP E, F, G IS Class I, Div. 1, GP A, B, C, D T4 Class I, Div 2, GP A, B, C, D T4 Class I, Zone 1 e [ia/ib] IIC T4

The AirLINE Ex satisfies the requirements of the EMC Act.

Interference resistance EN 50082-2
Emitted interference EN 50081-2

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2.1.1. Power consumption of the active modules, including the mounted valves

Modul type	max. power consumption	Ident-no.
4 channels 11 mm	max. 2.9 W	171 941
8 channels 11 mm	max. 3.6 W	171 942
4 channels 16,5 mm	max. 2.9 W	171 943
8 channels 16,5 mm	max. 3.6 W	171 944

2.2. Dimensions

2.2.1. The Complete System

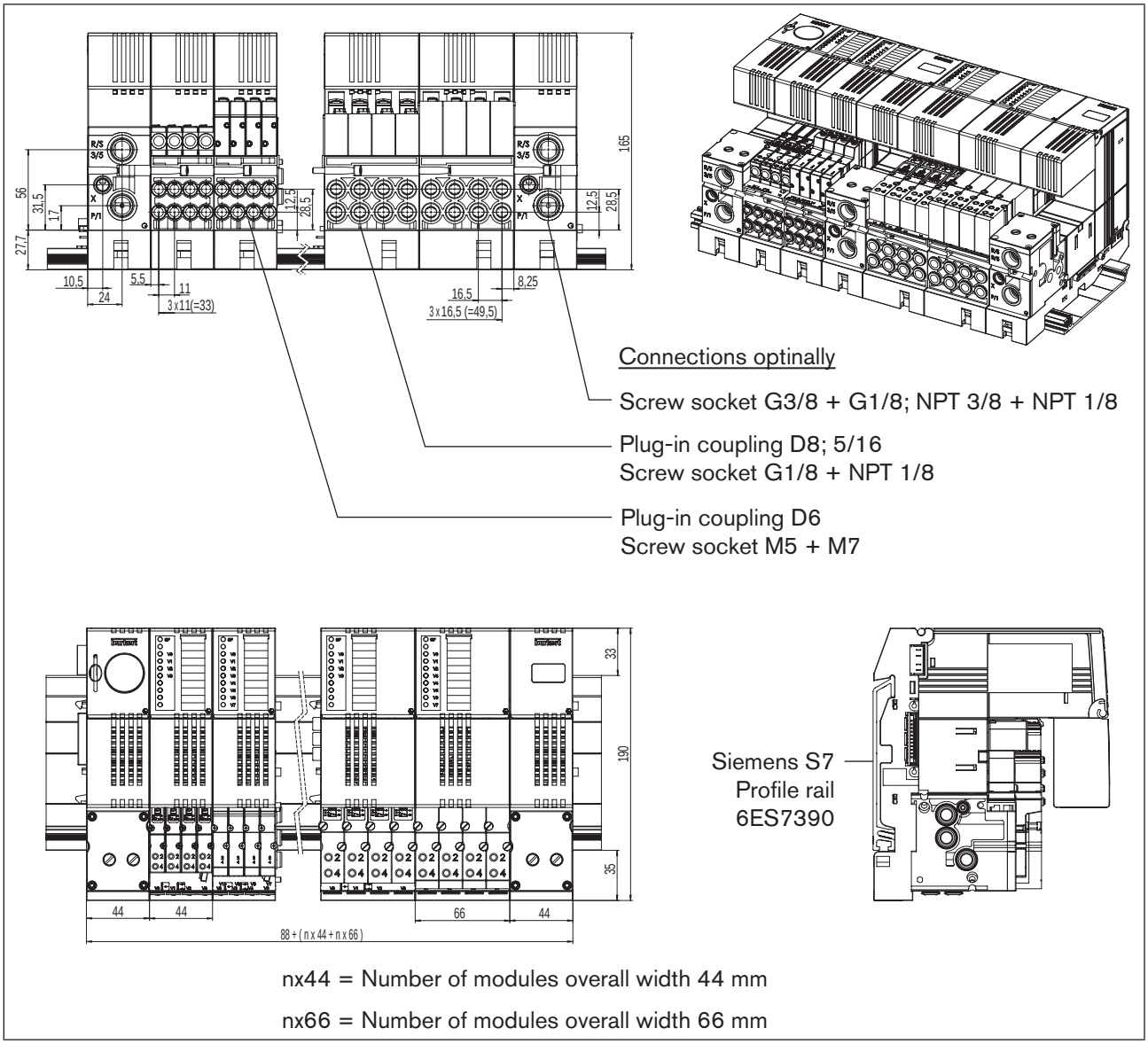

Fig. 5: Dimensions [mm] - The Complete System

3. SYSTEM ACCESSORIES

System accessories		Ident-no.
Function plates for flange pattern 6524 / 6525 (Installation instead of a simple 3/2-way or 5/2-way valve / 11 mm)		
Blind plate complete for 3/2-way and 5/2-way valves (for sealing an unused valve position)		650 373
Supply plate complete) (for additional medium supply for high-consumption applications or for supplying separate media circuits or pressure stages)		649 637
Breather plate complete) (for additional exhaust for high-consumption applications or for exhaust of separate media circuits or pressure stages)		655 166

Function plates for flange pattern 6524 (installation instead of a 2x 3/2-way valve / 11 mm)		
Blind plate complete for 2x 3/2-way valves (for sealing an unused valve position)		661 092
Supply plate complete 1) (for additional medium supply for high-consumption applications or for feeding separate media circuits or pressure stages)		667 945
Breather plate complete 1) (for additional exhaust for high-consumption applications or for exhaust of separate media circuits or pressure stages)		667 947

Function plates for flange pattern 6526 / 6527 (Installation instead of a 3/2-way or 5/2-way valve / 16.5 mm)		
Blind plate complete for 3/2-way and 5/2-way valve		653 765
Supply plate complete (for additional medium supply for high-consumption applications or for feeding separate media circuits or pressure stages)		655 156
Breather plate complete (for additional exhaust for high-consumption applications or for exhaust of separate media circuits or pressure stages)		653 697

Further accessories		
Set with various spare parts for valve and module installation (seals, screws, etc.)		186 877
Cap for plug-in valve contact		653 670
Plug for P channel shut-off (for configuration of several pressure stages or media circuits in a system, Type 8650)		655 068
S7-Profile rail, lenght 482 mm	6ES7390-1AE80-0AA0 (Siemens)	655 982
S7-Profile rail, lenght 530 mm	6ES7390-1AF30-0AA0 (Siemens)	655 983
S7-Profile rail, lenght 585 mm	6ES7390-1AF85-0AA0 (Siemens)	671 701
S7-Profile rail, lenght 830 mm	6ES7390-1AJ30-0AA0 (Siemens)	671 702
S7-Profile rail, lenght 885 mm	6ES7390-1AJ85-0AA0 (Siemens)	671 703
S7-Profile rail, lenght 2000 mm	6ES7390-1BC00-0AA0 (Siemens)	--
Suitable Ex bus connector for Siemens IM152	e. g. 6ES7-972-0DA60-0XA0 (Siemens)	655 981

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1) These plates are installed instead of a valve and use the working ports of the respective valve position. As these have smaller cross-sections than the ports on the supply segments, the possible flow rates are correspondingly lower!

For competent advice, please contact your local Bürkert sales partner.

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Configuration and Function

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1. CONFIGURATION

1.1. Maximum System Configuration

No. of modules	up to 32 I/O modules / pneumatic modules in the complete system Siemens SIMATIC ET 200iSP / Bürkert AirLINE Ex At least 1 field bus interface module (IM152) and 1 power supply module each; if required, these can be installed redundantly.
Valve positions	up to 48 with 11 mm valves Types 6524/6525 (with a middle supply segment) up to 32 with 16.5 mm valves Types 6526/6527 (with a middle supply segment) Mixing 44 mm / 66 mm valve segments is possible.
Maximum width	1095 mm including all Siemens modules (one power supply and one interface) 1185 mm including all Siemens modules (two power supply and two interfaces)
Other limitations are possible due to the installation position and power considerations (see the Simatic ET 200iSP manual).	

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1.2. Siemens SIMATIC ET 200iSP System Components

Further information on the SIMATIC ET 200iSP system can be found in the manual ET 200iSP (Siemens order No. 6ES7152-1AA00-8AA0) or on the Internet at www.automation.siemens.com/simatic.

1.3. Bürkert AirLINE Ex - System Components

1.3.1. Module Terminology

In order to simplify the overview of the system structure, designations have been defined for the modules and assemblies. The relationships are explained in the following illustrations.

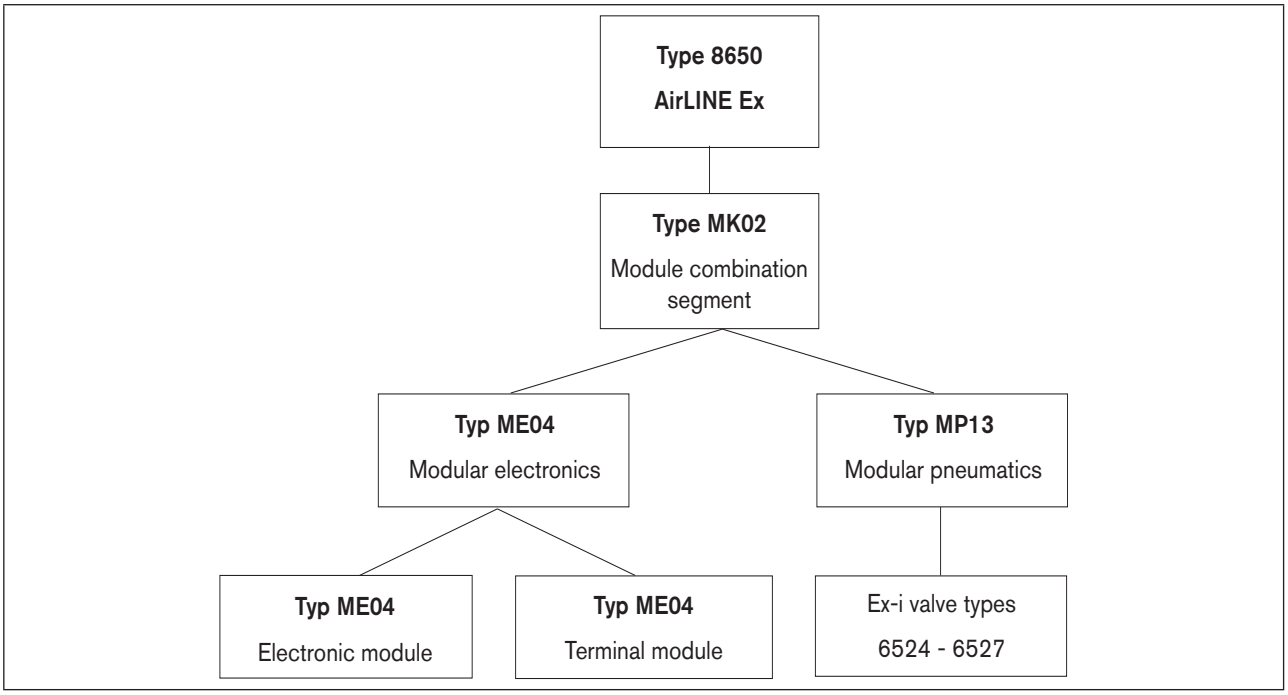

Fig. 1: Module Terminology

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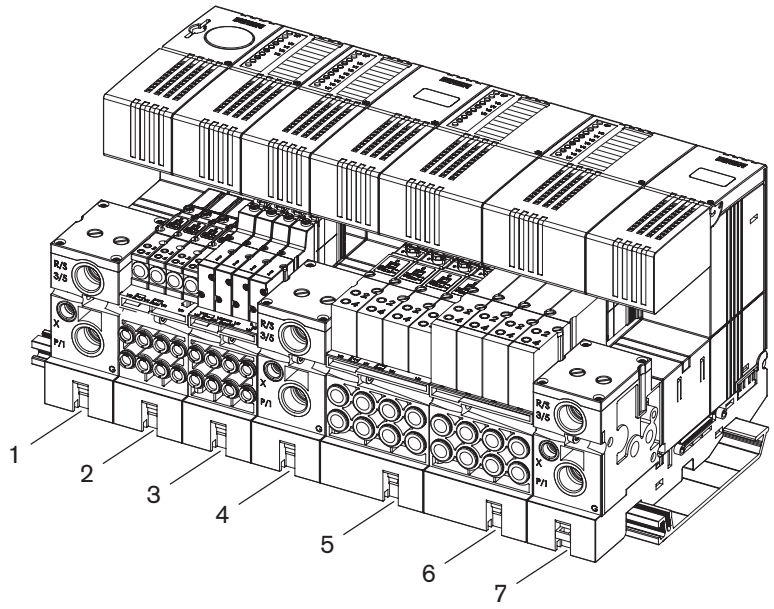
1.3.2. Configuration of a complete AirLINE Ex system (example)

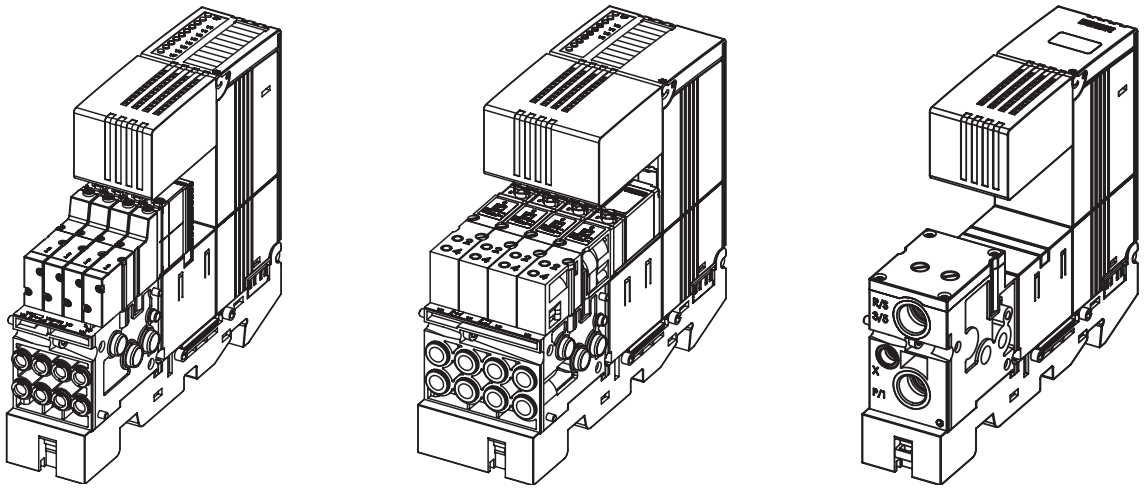


Legend

1 Supply segment, left
2 Valve segment 44 mm, 4 valve functions
3 Valve segment 44 mm, 8 valve functions
4 Supply segment, middle (Intermediate supply)
5 Valve segment 66 mm, 4 valve functions
6 Valve segment 66 mm, 8 valve functions (not yet available)
7 Supply segment, right

Fig. 2: Configuration of a complete AirLINE Ex system (example)

1.3.3. Valve and Supply Segments - Type MK02 (module combination)



Valve segment (44 mm) Ventilscheibe (66 mm) Supply segment (44 mm)

Fig. 3: Valve and Supply Segments - Type MK02 (module combination)

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1.3.4. Electronics - Typ ME04 (modular electronics)

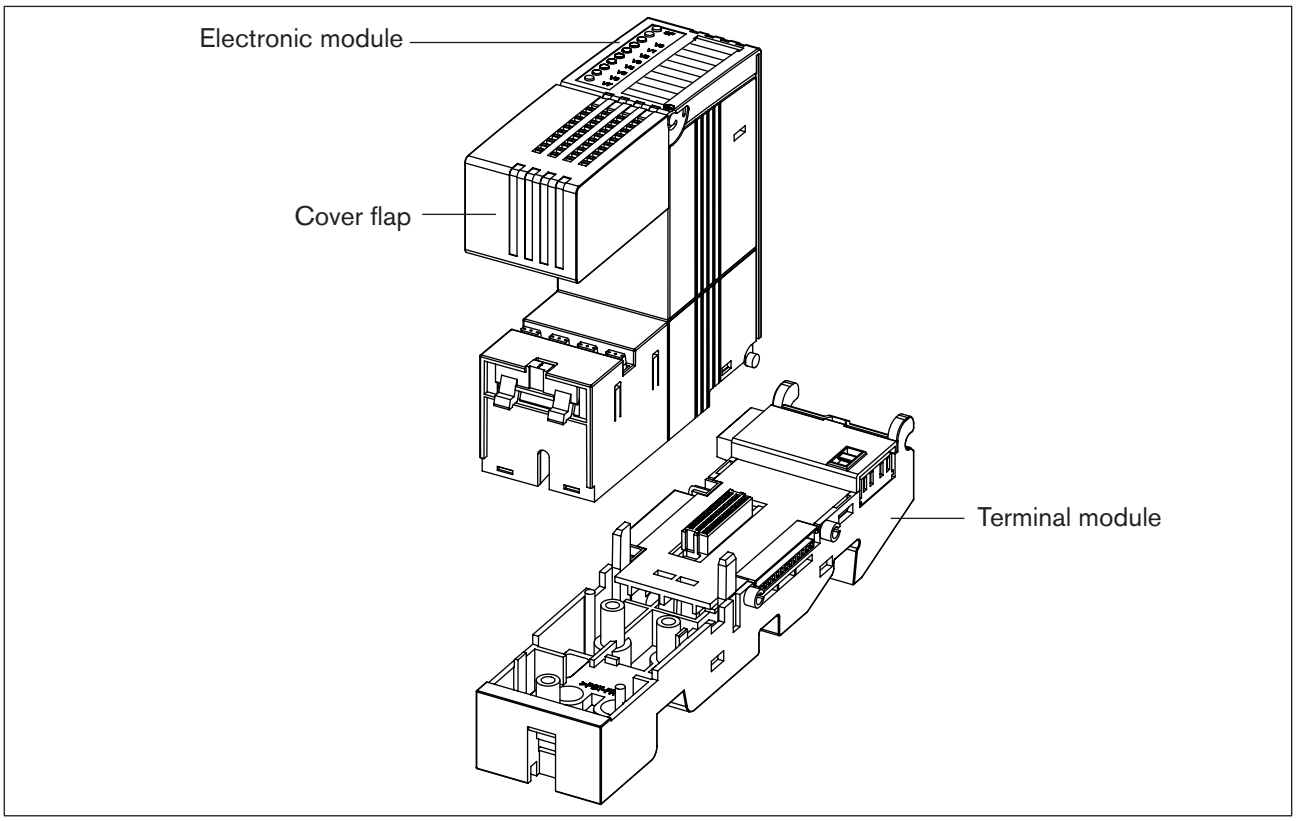

Fig. 4: Electronics - Typ ME04 (modular electronics)

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1.3.5. Pneumatics - Type MP13 (modular pneumatics)

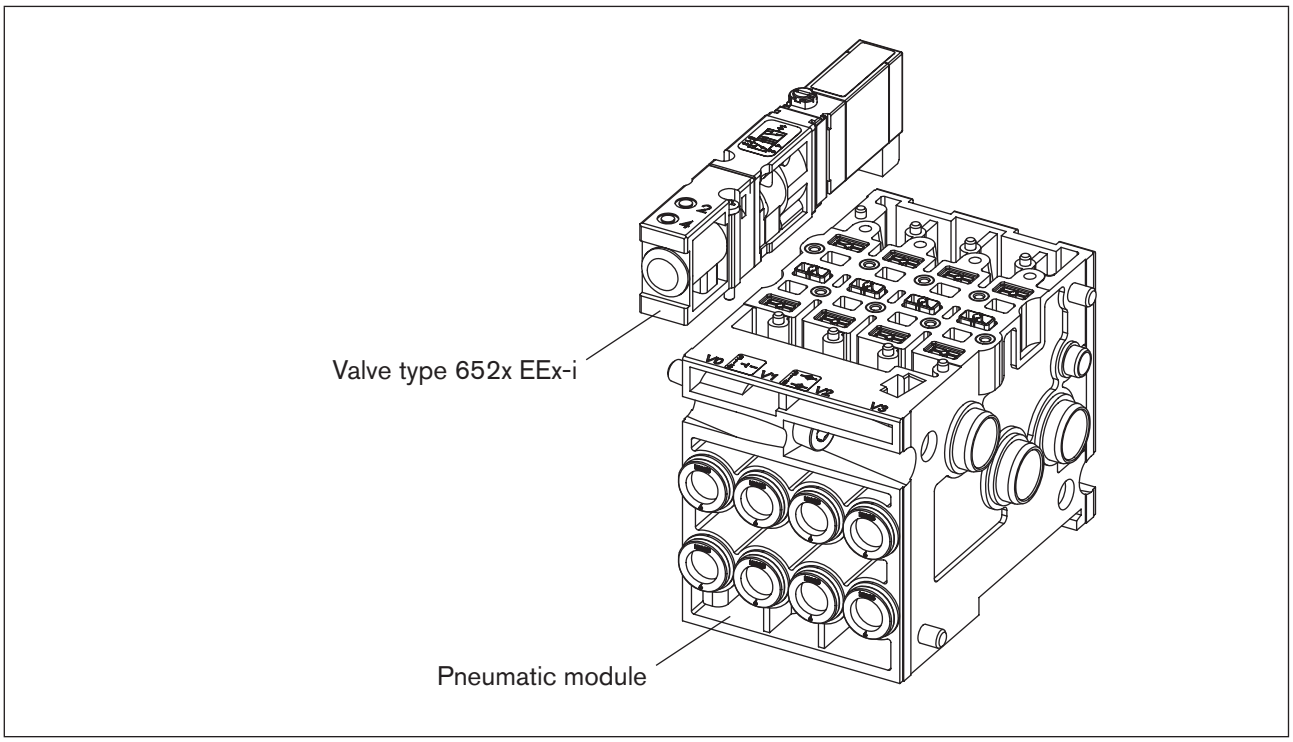

Fig. 5: Bild: Pneumatics - Type MP13 (modular pneumatics)

The detailed descriptions of the individual modules can be found in chapter *Configuration and Function of the Modules.*

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2. FUNCTION

AirLINE Ex is an electric and pneumatic automation system with a modular structure. It has been developed in cooperation with Siemens.

Supply, communication and electrical I/O functions are available via the Siemens SIMATIC ET 200iSP system. The AirLINE Ex system can be seamlessly integrated into the Siemens system, with the modules of the AirLINE Ex system functioning as digital outputs with integrated valves.

2.1. View of the Overall System

Fig. 6: View of the overall system (Siemens SIMATIC ET 200iSP and Bürkert AirLINE Ex Type 8650)

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2.2. Functional representation of the AirLINE Ex-system

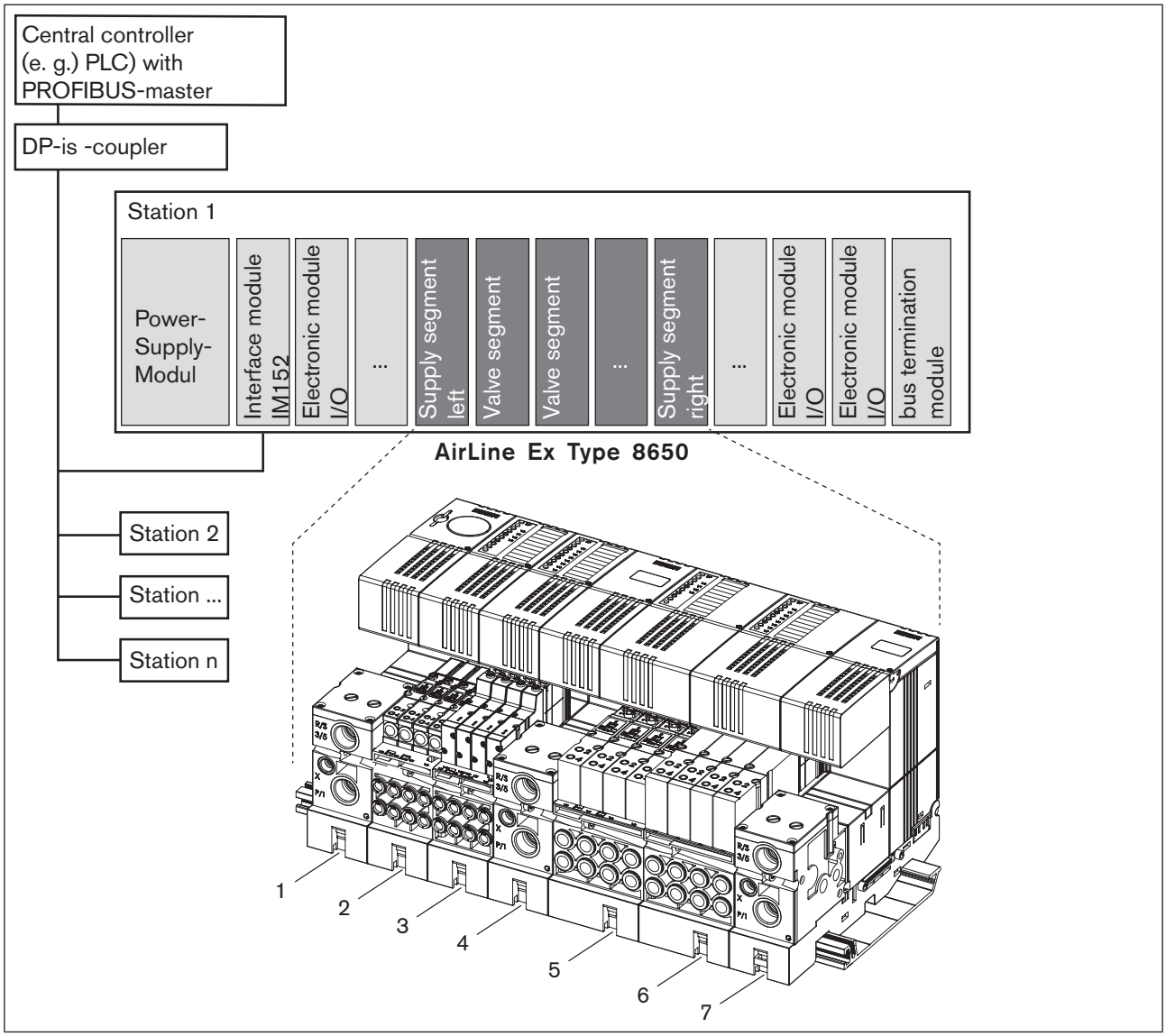

Fig. 7: Functional representation of an AirLINE Ex *system (example)*

Legend

1 Supply segment, left
2 Valve segment 44 mm, 4 valve functions
3 Valve segment 44 mm, 8 valve functions
4 Supply segment, middle (Intermediate supply)
5 Valve segment 66 mm, 4 valve functions
6 Valve segment 66 mm, 8 valve functions (not yet available)
7 Supply segment, right

Bürkert components
AirLINE Ex

Siemens components
SIMATIC ET200iSP

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Configuration and Function of the Modules

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1. SUPPLY SEGMENTS

1.1. Configuration and function

An assembly consisting of a terminal module, function module and pneumatic module is referred to as a stackable segment.
Supply segments are used for mounting the system on the profile rail and for connection of the fluidic supply and exhaust lines. They are electrically passive (all lines are looped through 1:1) and are ***not*** planned in the programs for hardware configuration (e. g. Siemens Step7).

As an option, versions with an integrated mechanical pressure gauge to display operating pressure are available.

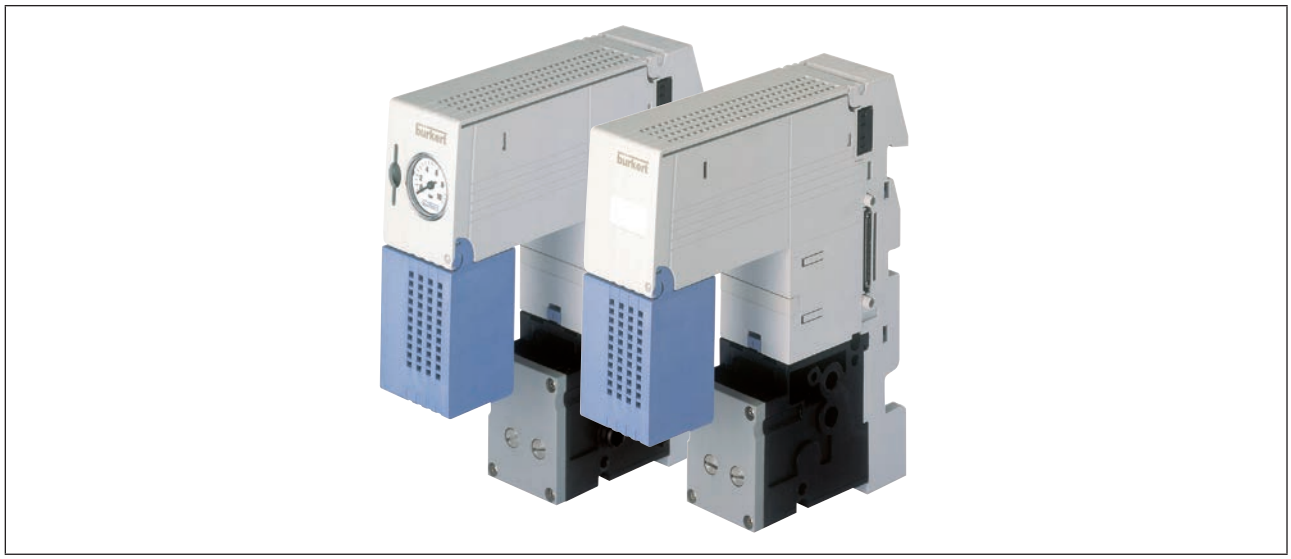

Fig. 1: Supply segment, left / middle / right (with / without pressure gauge)

1.2. Technical Data

Power consumption	0 W (Module is electrically passive)
Pneumatic connections	G 3/8“, G 1/8“ oder NPT 3/8“, NPT 1/8“
Dimensions	ca. 50 (station width 44) x 190 x 120 mm
Material (Housing pneumatic)	PA, PBT, PC
Weight (without / with pressure gauge)	480 g / 520 g

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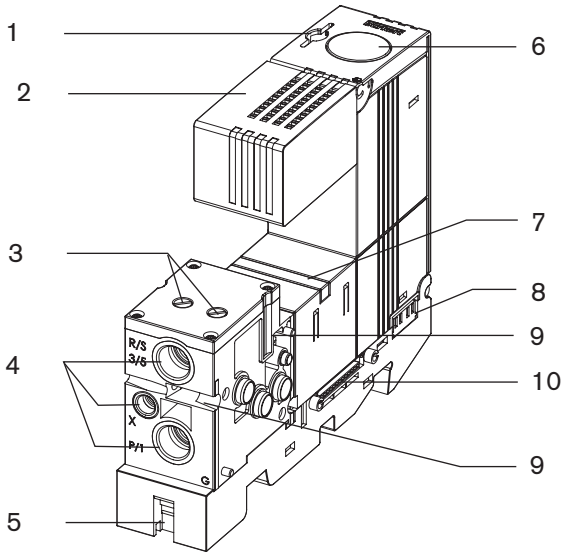
1.2.1. Overview



Legend

1 Storage compartment for SD card

2 Hinged cover flap

3 Clamping bolt (2x) for system mounting

4 Pneumatic ports

5 Unlocking slide, only installed on right-hand supply segments;

6 Pressure gauge (optional) for displaying operating pressure

7 Shut-off slide

8 Power-Bus plug

9 Inclined tie rods (2x);
not installed on left-hand supply segments

10 Plug for communication bus

Fig. 2: Overview - Supply segments

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1.2.2. Dimensions

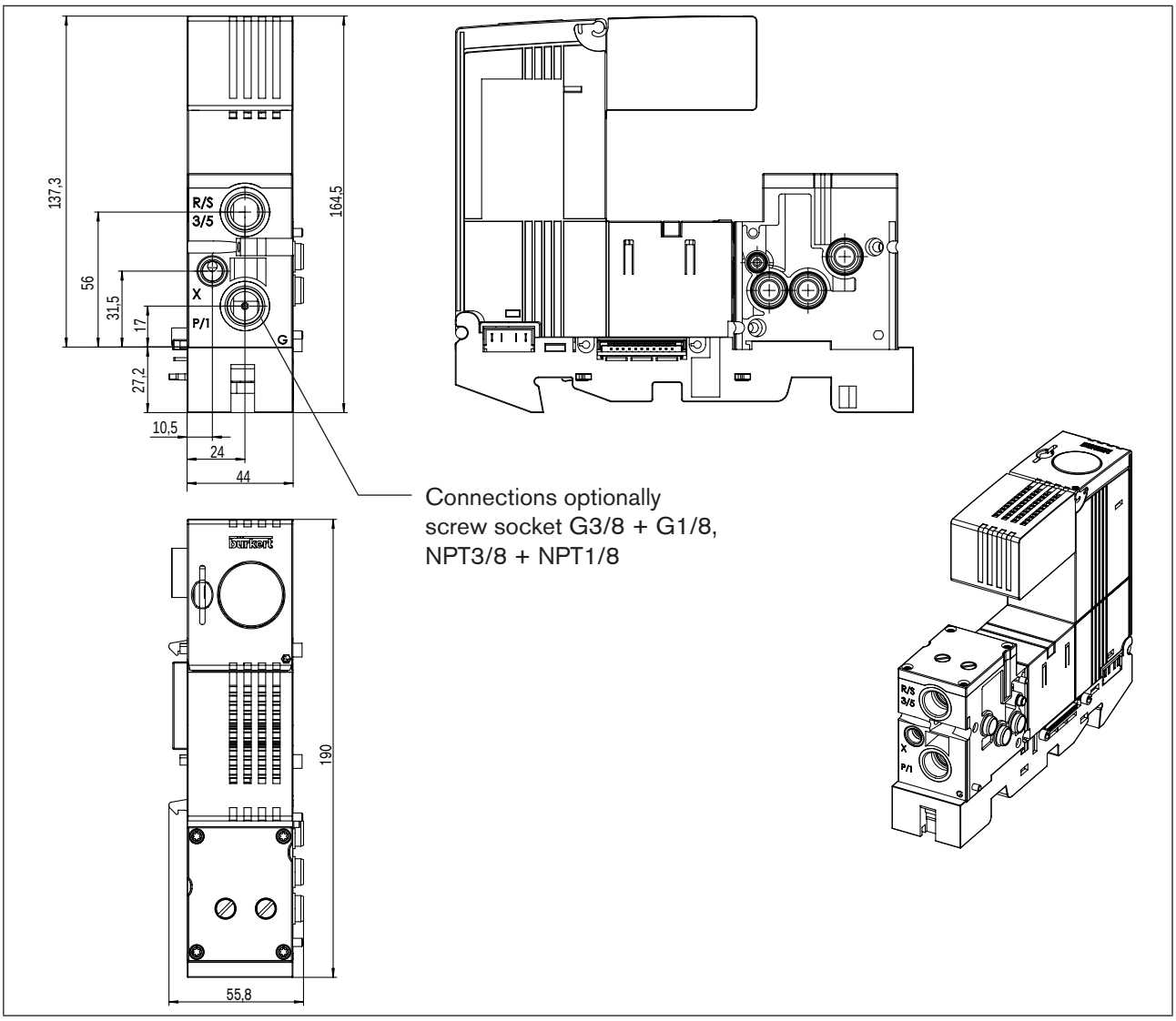

Fig. 3: Dimensions [mm] - Supply segments

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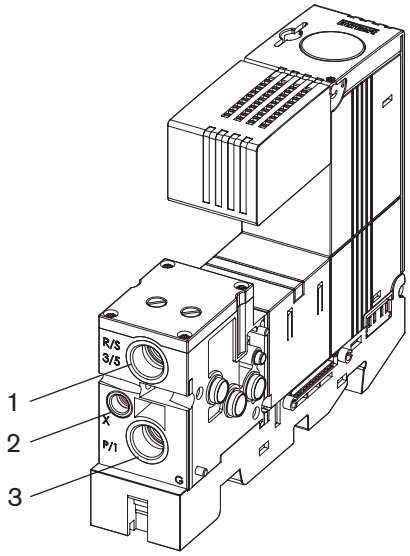
1.3. Pneumatic Connections



Position	Marking	Function	Version	
			G	NPT
1	R/S-3/5	Exhaust air	3/8“	3/8“
2	X	Control ▪ EXT: Auxiliary control air ▪ INT: Pilot exhaust air	1/8“	1/8“
3	P/1	Compressed air supply	3/8“	3/8“

Fig. 4: Pneumatic connections - Supply segment

1.4. Displays

Pressure gauge for displaying operating pressure

Fig. 5: Operating pressure displayed on a pressure gauge of a supply segment

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1.5. Spare parts

Supply segment - Spare parts	Ident no.
Cover flap for 44 mm wide modules	667 898
Pressure gauge module	174 010
Blank module (without pressure gauge)	174 009
Terminal module, 44 mm, passive, without locking slide (for supply segment left and center)	173 368
Terminal module 44 mm, passive, with locking slide (for supply segment right)	173 369
Set with various spare parts for valve and module installation (seals, screws, etc.)	186 877

Pneumatic module	Preassembled groups of pneumatic module and corresponding terminal module
Ask your Bürkert representative which versions or which options are suitable for your requirements.	

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2. VALVE SEGMENTS

2.1. Configuration and Function

An assembly consisting of a terminal module, function module and pneumatic module is referred to as a stackable segment.
Valve segments function as digital output modules. They convert the electrical control signals of the interface module into pneumatic output signals that control the fluid flow.
Two different versions (44/66 mm wide) for valves of different air capacity are available. The different valve functions can be freely combined.

Additional pneumatic functions can be integrated as options.

Valve segments are planned with the hardware configuration programs (e. g. Siemens Step7).

Fig. 6: Valve segment

Further information can be found in the chapter *Configuration and Function of the Modules / Electronic Module and Configuration and Function of the Modules / Basic Pneumatic Module.*

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2.2. Technical Data

	11 mm Valves		16,5 mm Valves	
Number of valve output ports	4	8	4	8
Dimensions [mm]	44 x 120 x 135		66 x 120 x 135	
Weight with valves [g]	580	690	1080	n / a
Material Housing Pneumatic module	 PBT, PC PA			
Current consumption [mA]	250	310	250	310
Power loss of the module [W]	max. 2.9	max. 3.6	max. 2.9	max. 3.6
Status display	1 LED (red) for the module status 1 LED (green) per channel (valve function)			

Pneumatic power data					
Valve type	6524 3/2-way	6525 5/2-way	6524 2x 3/2-way	6526 3/2-way	6527 5/2-way
Circuit functions[1)]	C/D	H	2x C	C/D	H
Stacking sizes [mm]	11			16.5	
Pneumatic connections Plug-and-socket connections Threaded connections	 D4[5)], D6, D1/4“ [5)] M5, M7			 D8 = (5/16“) G 1/8“, NPT 1/8“	
Orifice [mm]	4			6	
QNn[2)] [l/min]	300			700	
Opening time[3)] 10 % [ms]	35			80	
Closing time[3)] 10 % [ms]	45			90	
Pressure range[4)] [bar] with auxiliary control air[6)]	2.5 ... 7 1 ... 7			2 ... 8 1 ... 8	
Power [W]	0.3				

[1)] C=NC (normally closed), D=NO (normally open)

[2)] Flow rate QNn value air [l/min]: Measured at +20 °C, pressure 6 bar at the valve inlet and 1 bar pressure difference

[3)] Switching times [ms]: measured in accordance with ISO 12238
These values may differ, depending on the valve type and function (see operating manual, chapter *Configuration and Function of the Modules / Integrable Valves).*

[4)] Pressure data [bar]: Overpressure with respect to atmospheric pressure

[5)] Connections variants on request

[6)] Versions for vacuum on request

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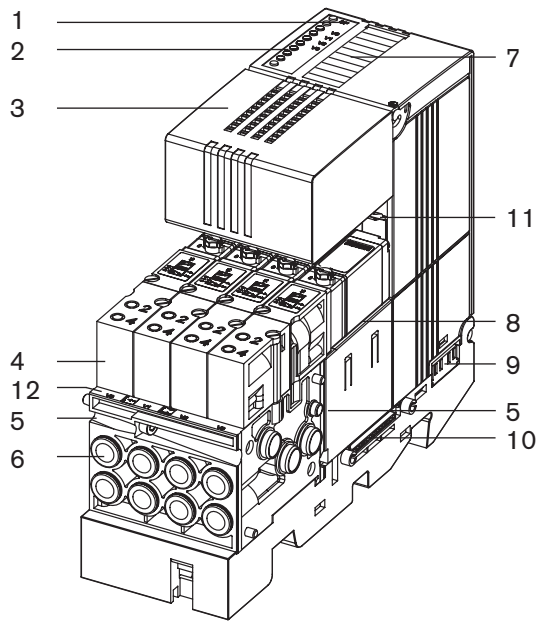
2.2.1. Overview Valve segments / Station width 44 mm and 66 mm



Legend

1 LED (red) for module status display
2 LEDs (green) for channel status display
3 Hinged cover flap
4 Valves
5 Inclined tie rods (2x)
6 Pneumatic service ports
7 Slip-in label strip
8 Shut-off slide (under the valves)
9 Power-Bus plug
10 Plug for communication bus
11 Valve ejector (only with station width 66 mm)
12 Valve number identification

Fig. 7: Overview - Valve segments (example: station width 66 mm)

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2.2.2. Dimensions

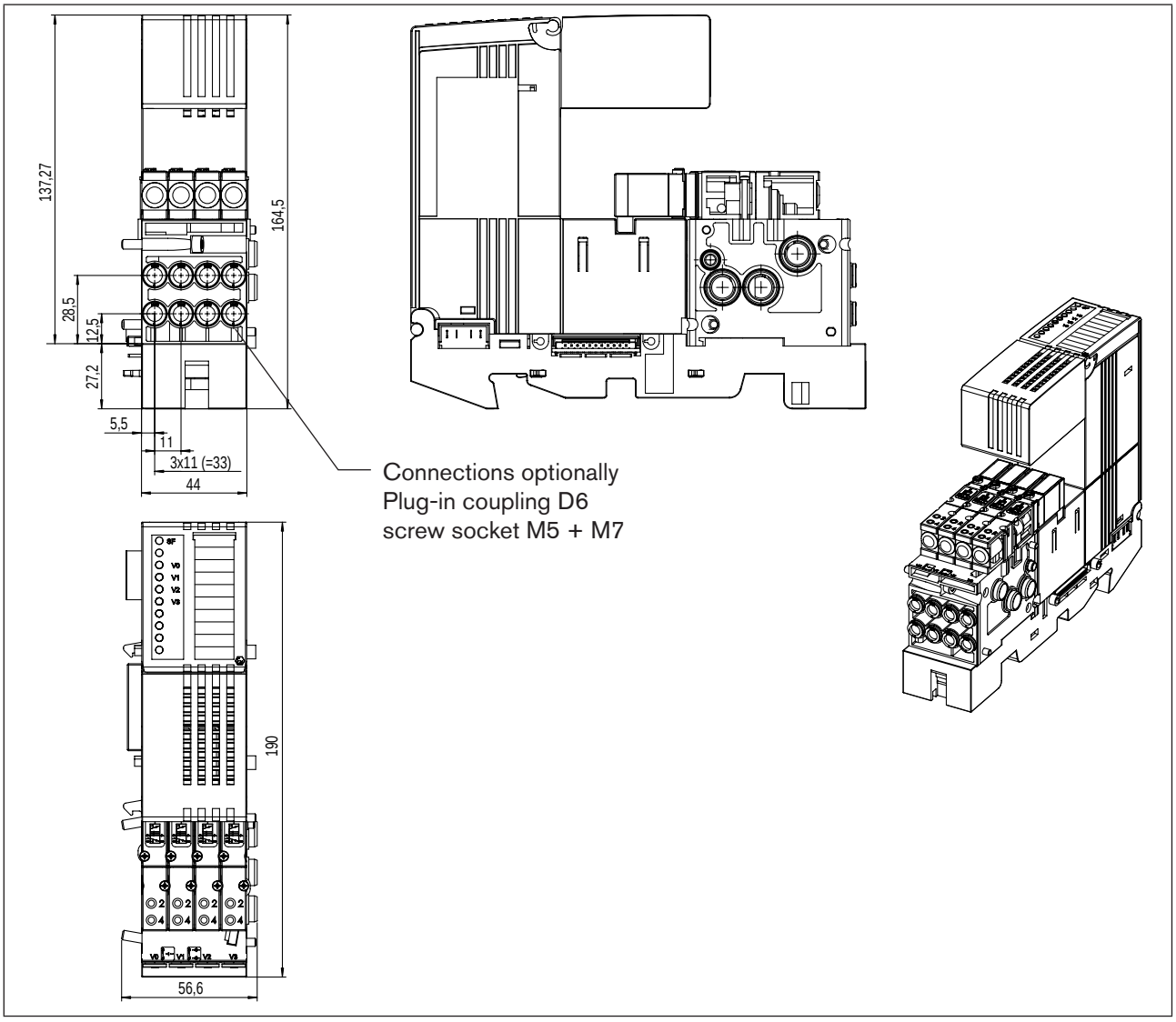

Fig. 8: Dimensions [mm] - Valve segment (example: station width 44 mm)

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2.3. Pneumatic Connections

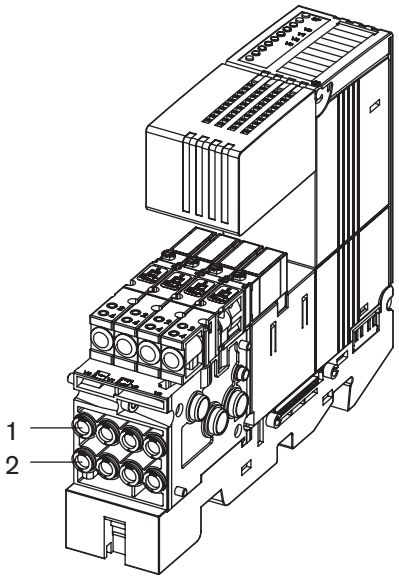
WARNING!

Danger – high pressure!

A sudden escape of pressure medium may rapidly accelerate parts (hoses, small parts, …) and cause damage or injuries.

If pressure changes occur, actuators may change their position and cause damage or injuries.

- Before working on pressure-operated devices, always depressurize and vent them.
- Mechanically secure actuators beforehand to prevent them from shifting.



Possible configuration of the service ports

Position	Valves		Double valves
	3/2-way	5/2-way	2x 3/2-way
	6524/6526	6525/6527	6524/6526
1	not used	2	2 (valve 12)
2	2	4	4 (valve 14)

Fig. 9: Possible configurations of the service ports (example: station width 44 mm)

2.4. Displays

LED for module status display (function like Siemens modules)

LEDs to display the channel status (also see the chapter *Configuration and Function of the Module / Valve Segments / Channel Assignment)*

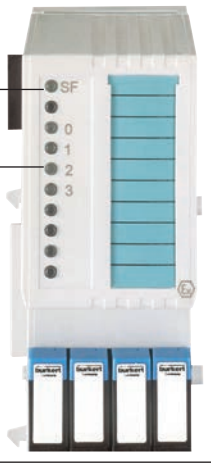


Fig. 10: Display elements of the valve segment

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2.5. Channel Assignment

2 bytes must be planned per valve segment / electronic module. These are allocated to the channels as shown here:

Byte	High-Byte			Low-Byte							
Bit	7	...	0	7	6	5	4	3	2	1	0
Channel number with 4-channel modules	X	X	X	X	X	X	X	3	2	1	0
Channel number with 8-channel modules	X	X	X	7	6	5	4	3	2	1	0

The channel status LEDs on the electronic module are assigned to the channel / valve numbers.

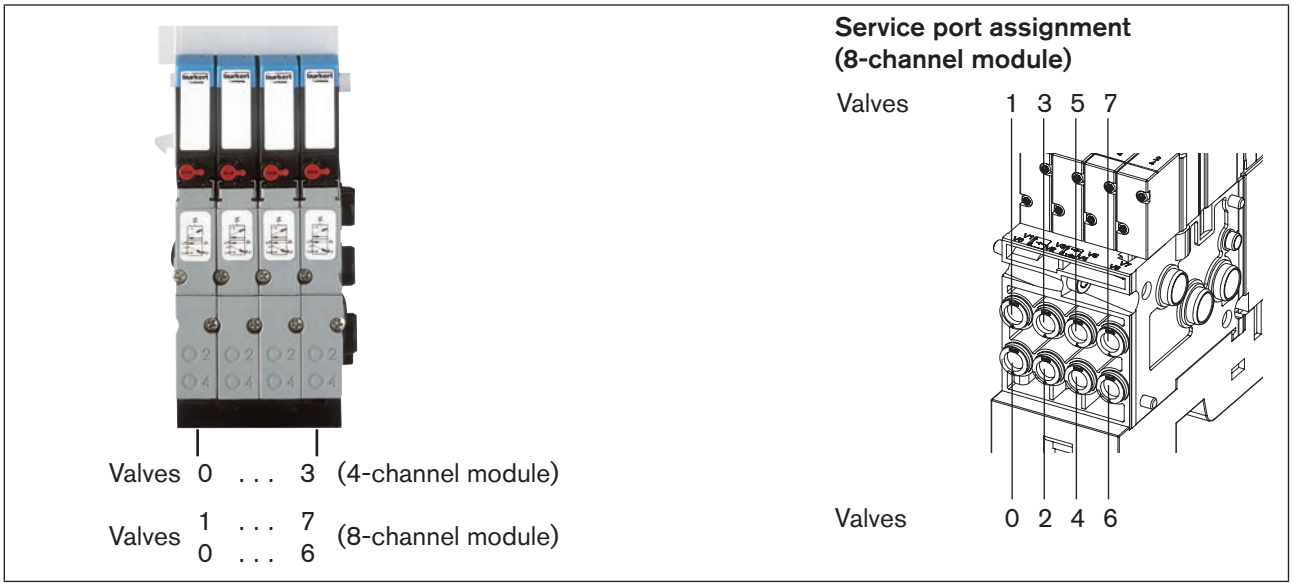

Fig. 11: Valve assignment

2.6. Diagnosis (Electronic Module)

Group fault display: Yes, locally at the electronic module (red LED)

Diagnostic functions (can be read out using Profibus):

- Channel status diagnosis (channel open, channel short circuited)
- Individual switching cycle counter for each channel with warning limits for pilot valve and connected actuator

2.7. Accessory

Valve segment - Accessory	Ident no.
Plug to block P-channel (to build up several pressure levels or medium groups in an AirLINE Ex system type 8650)	655 068

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2.8. Spare parts

Valve segment - Spare parts	Ident no.
Set with various spare parts for valve and module installation (seals, screws, etc.)	186 877
Cover flap for 44 mm wide modules	667 898
Cover flap for 66 mm wide modules	667 899
Label strip for electronic modules	667 917
Electronic module 4 channels 11mm (for valve segments 44 mm station width)	171 941
Electronic module 8 channels 11mm (for valve segments 44 mm station width)	171 942
Electronic module 4 channels 16.5 mm (for valve segments 66 mm station width)	171 943
Electronic module 8 channels 16.5 mm (for valve segments 66 mm station width)	171 944
Terminal module 44 mm, active (for valve segments 44 mm station width)	173 370
Terminal module 66 mm, active (for valve segments 66 mm station width)	173 371
Pneumatic modules	Preassembled groups of pneumatic module and corresponding terminal module
Ask your Bürkert representative which versions or which options are suitable for your requirements.	

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3. PNEUMATIC CONNECTOR MODULE

3.1. Configuration and Function

The pneumatic supply module forms part of the supply segment. It provides for the external connections to the fluidic supply and exhaust of the system and passes this on to the valves.

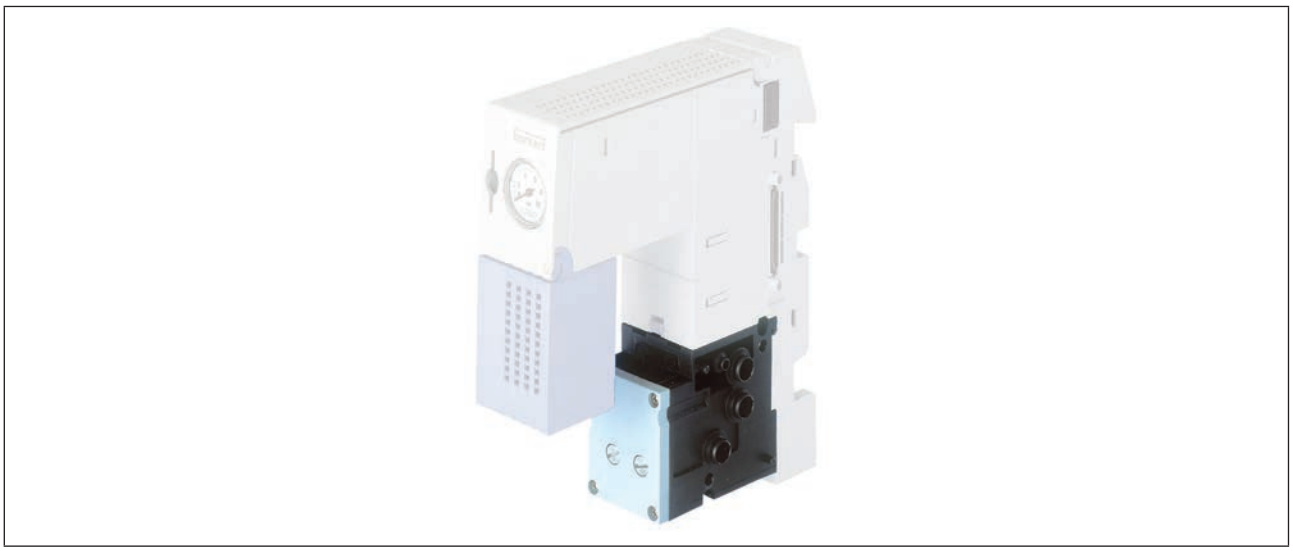

Fig. 12: Pneumatic supply module (part of the supply segment)

3.2. Technical Data

Pneumatic connections	G 3/8“, G 1/8“ or NPT 3/8“, NPT 1/8“
Dimensions	ca. 50 (station width 44) x 70 x 75 mm
Material	PA
Weight	150 g

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3.2.1. Overview

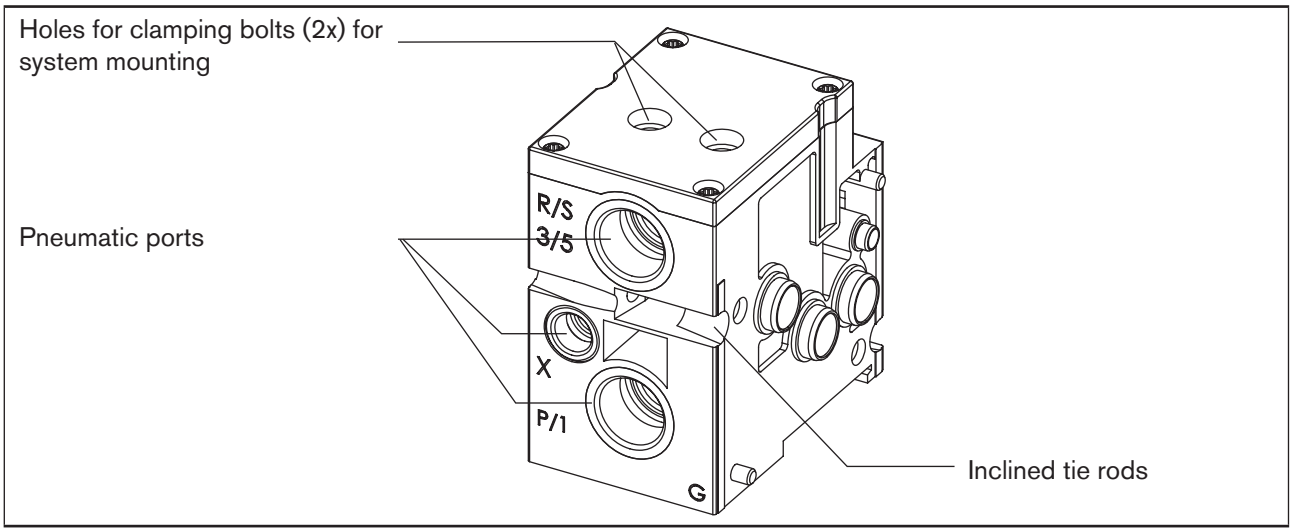
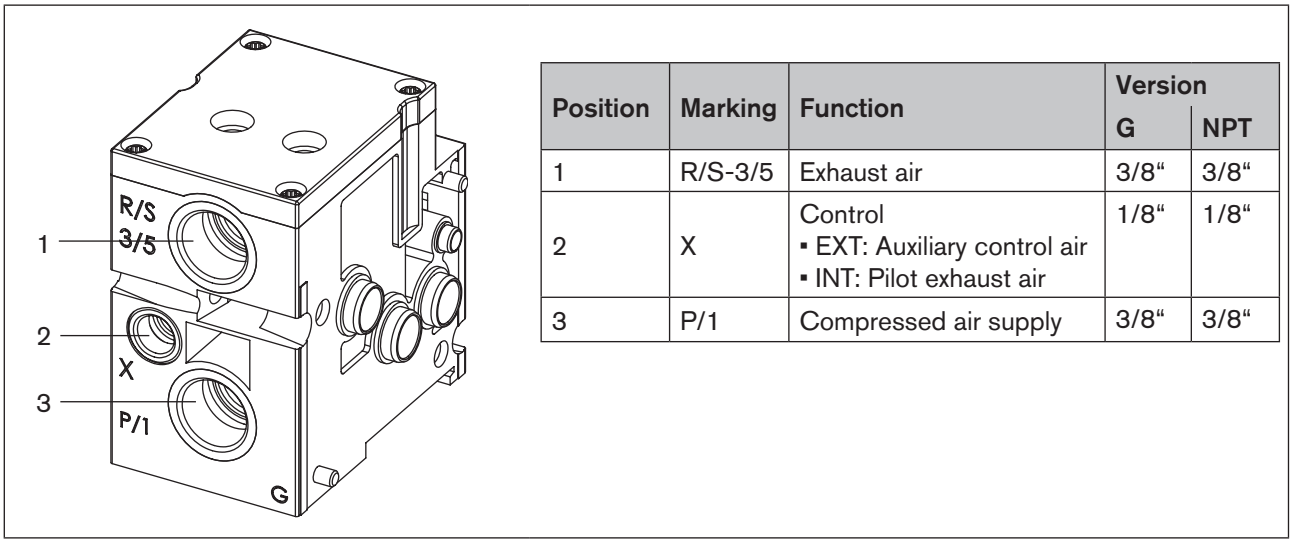


Fig. 13: Overview - Pneumatic supply module

3.3. Pneumatic Connections



Position	Marking	Function	Version	
			G	NPT
1	R/S-3/5	Exhaust air	3/8“	3/8“
2	X	Control ▪ EXT: Auxiliary control air ▪ INT: Pilot exhaust air	1/8“	1/8“
3	P/1	Compressed air supply	3/8“	3/8“

Fig. 14: Pneumatic Connections - Pneumatic supply modules

Supplementary information can be found in chapter *Configuration and Function of the Modules / Supply segments*“.

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4. BASIC PNEUMATIC MODULE

4.1. Configuration and Function

The basic pneumatic module is a part of the valve segment.
It holds the valves, provides their fluidic supply and exhaust and sets up the flow outlets.

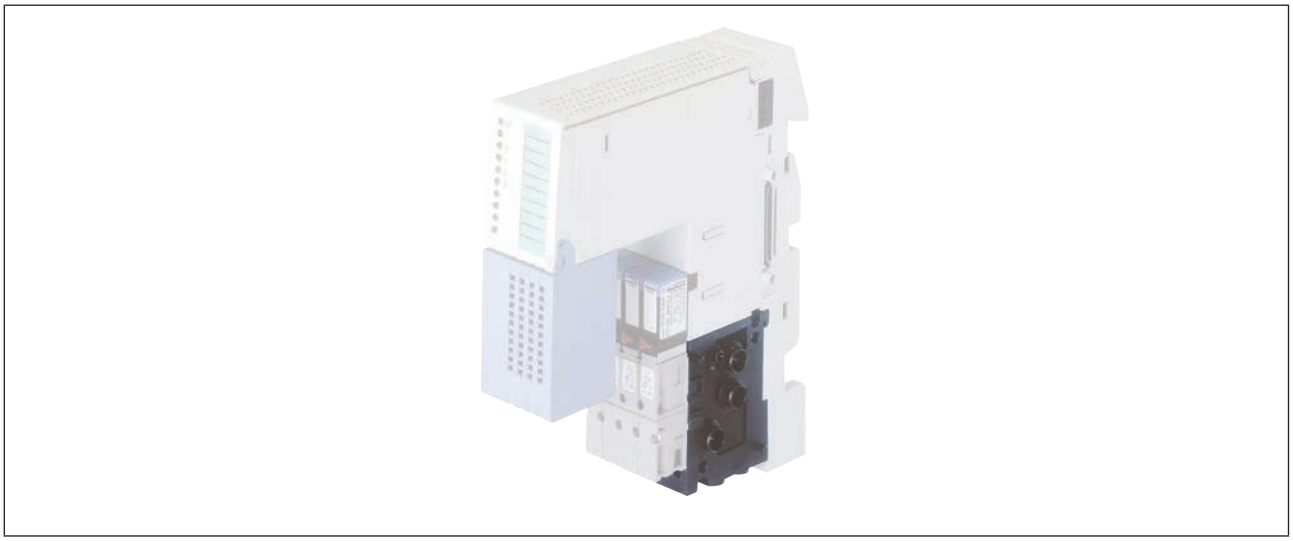

Fig. 15: Basic Pneumatic Module (part of the valve segment)

4.2. Technical Data

Pneumatic connections of the valve segment for Valves with station width 11 mm	Plug-and-socket connection Ø 6 mm (4 mm, ¼“ on request); Thread M5, M7
Valves with station width 16.5 mm	Plug-and-socket connection Ø 8 mm; Thread G 1/8“, NPT 1/8“
Dimensions	ca. 50 (station width 44 mm) x 70 x 55 mm ca. 72 (station width 66 mm) x 70 x 55 mm
Material	PA, PBT, PC
Weight	140 g (station width 44 mm) 180 g (station width 66 mm)

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4.2.1. Versions

The variants differ according to station width, number of valve positions, connection pattern of the valves, configuration of the service ports and optional use of check valves and / or P shut-offs.

Types Pneumatic	MP13	
Station width	11 mm	16 mm
Valve types	6524 - Ex-i 6525 - Ex-i	6526 - Ex-i 6527 - Ex-i
Port configuration (basic pneumatic module)	Plug-and-socket connection Ø 4 mm Plug-and-socket connection Ø 6 mm Plug-and-socket connection Ø ¼“ Thread M5 Thread M7	Plug-and-socket connection Ø 8mm (= 5/16“) Thread G1/8“ Thread NPT 1/8“
check valves (optional)	without check valve check valve in R channel check valve in R+S channel	
P shut-off (optional)	with P shut-off[1)]	not available

[1)] Only available for certain valve types and with functional limitations (see chapter *Basic pneumatic modules with integrated P shut-off*)

4.2.2. Check Valve for Venting Ports

Because some applications require the use of a check valve, different versions are available:

- without a check valve
- check valve in R channel
- check valve in R+S channel

4.2.3. Basic Pneumatic Modules with Integrated P Shut-off

General description

For the basic pneumatic modules MP 13 in the version for valve types 6524 and 6525, a P shut-off integrated into the module is available as an option. With this option, a valve to be replaced can be exchanged under pressure without having to depressurize the complete valve island or system. During valve exchange the open cross-section is reduced mechanically so much, that there is only slight residual leakage.

Features and limitations

The use of the P shut-off results in certain limitations with respect to the operating data of the complete system:

- The flow rate of the valves, Type 6524/6525, is reduced to approx. 60 %.
- For proper operation avoid back-pressures in the exhaust lines R and S (see chapter Installation / “10.2. Connection of the Exhaust Air”, page 73).
- The possible operating pressure range is between 5 and 7 bar.
- Since the pressure supply for the pilot valves is not shut off when using valves with external auxiliary control air, the use of the P shut-off is possible only in conjunction with the valves internal control air in the limited pressure range.
- The P shut-off can be combined with the integrated check valves.

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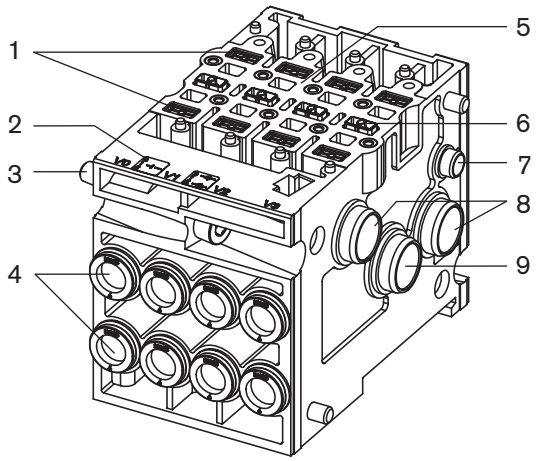
NOTE!

Pressure supply!

When using the P shut-off basic modules, ensure that the pressure supply to the valve islands is configured with a sufficiently large volume. (Minimum hose diameter 8/6 mm)

4.2.4. Overview

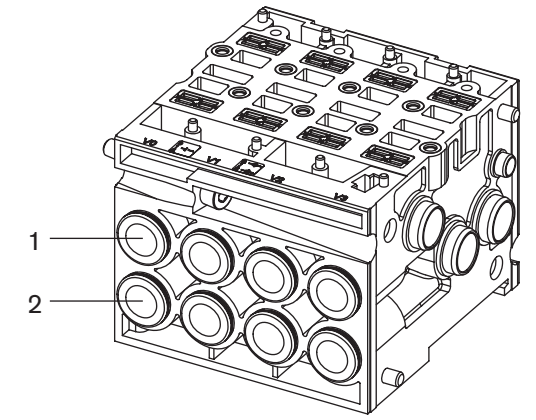


Legend

1 check valve (optional)
2 Labeling of valve positions and installed options
3 Inclined tie rods
4 Service ports (assignment dependant on valve type)
5 Flange for valve
6 P shut-off (optional, only for certain versions)
7 X channel
8 R- & S channel
9 P channel

Fig. 16: Overview - Basic pneumatic module (Station width: 44 mm, with the options check valves and P shut-off)

4.3. Pneumatic Connections



Possible configuration of the service ports

Position	Valves		Double valves
	3/2-way 6524/6526	5/2-way 6525/6527	2x 3/2-way 6524/6526
1	not used	2	2 (valve 12)
2	2	4	4 (valve 14)

Fig. 17: Possible configuration of the service ports - basic pneumatic module

4.4. Accessory

Basic pneumatic module - Accessory	Ident nr.
Plug to block P-channel (to build up several pressure levels or medium groups in a AirLINE Ex system type 8650)	655 068

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5. TERMINAL MODULE

5.1. Configuration and Function

All segments start out on a terminal module.
It anchors all attached components to the profile rail and contains the electric backplane (energy and data bus).

They can **not** be planned in the hardware configuration programs (e. g. Siemens Step7).

Fig. 18: Terminal module

The EC type-examination certificate can be found in the Annex to this operating manual.

5.2. Marking

Fig. 19: General labelling

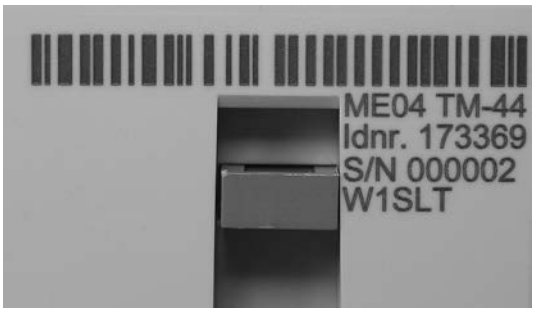


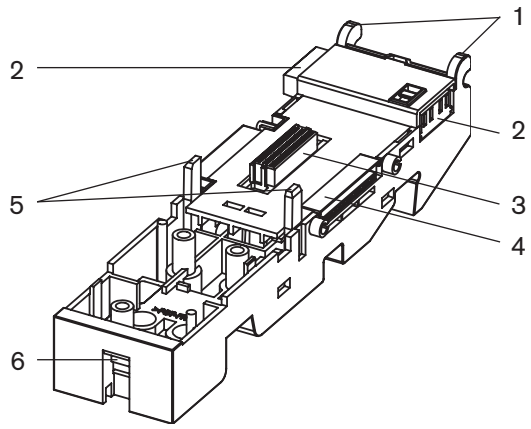
Fig. 20: Identification and serial number

Fig. 21: Location of the marking

5.3. Technical Data

Ident no. of the module	173 368	173 369	173 370	173 371
Application	Supply segment		Valve segment	
	left and middle	right	44 mm	66 mm
Dimensions [mm]	55 (station width 44 mm) x 190 x 45			66 x 190 x 45
Weight [g]	150			210
Housing material	PBT, PC			
Power loss of the module [W]	0 (The module contains no electrically active components)			
Type of protection	II 2 G Ex e [ia/ib] IIC T4			

5.3.1. Overview



Legend

1 Hinge contour for the electronic module
2 Plug connector for the power bus
3 Plug for the electronic module (not with Identification No. 173 678 and 173 369)
4 Plug connector for the data bus
5 Abutment for the electronic module
6 Unlocking slide (only with Identification No. 173 369)

Fig. 22: Overview - Terminal module (Version: station width 44 / 66 mm)

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6. ELECTRONIC MODULE

6.1. Configuration and Function

The electronic module forms part of the valve segment.

It contains the plug-and-socket connections for the valves and the electronics necessary to control the valves.

It is electrically active (function: Digital output module) and **must be planned** accordingly in the programs for the hardware configuration (e. g. Siemens Step7).

During operations, the electronic modules can be exchanged individually (not more than one at a time).

Fig. 23: Electronic module

- For 8-channel modules, have a look at the chapter, Commissioning / *Non-cyclical Parameters of AirLINE Ex-Module / The Number of Simultaneously Switchable Pilot Valves*.
- The type examination certificate can be found in the Annex to this operating manual.

6.2. Marking

Fig. 24: General labelling

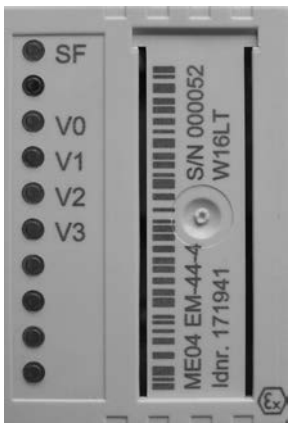


Fig. 25: Identification and serial number

Fig. 26: Location of the marking

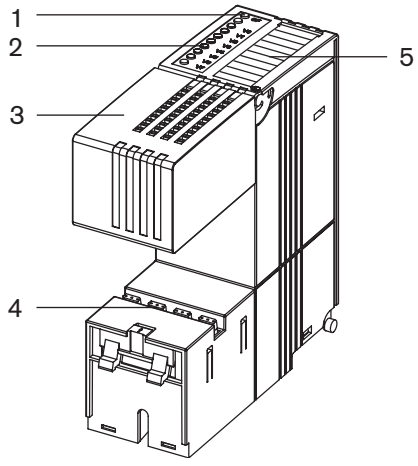
6.3. Technical Data

Ident no. of the module	171 941	171 942	171 943	171 944
Number of valve output ports	4	8	4	8
Dimensions [mm]	44 x 120 x 135 (for 11 mm valve)		66 x 120 x 135 (for 16.5 mm valve)	
Weight [g]	230	250	270	290
Material (Housing)	PBT, PC			
Current consumption[1)] [mA]	250	310	250	310
Power loss of the module [W]	max. 2.9	max. 3.6	max. 2.9	max. 3.6
Power loss in the event of a system error [W]	max. 4.2			
Status displays	LED (red) for the module status LED (green) per channel (valve function)			
Type of protection	II 2 G Ex ib IIC T4			

[1)] These values must be taken into account when calculating the max. total power consumption of the station (see also Table 3-4 in the Siemens handbook ET 200 iSP).

6.3.1. Overview

Electronic module / station width 44 mm



Legend

1 LED (red) for module status display
2 LEDs (green) for channel status display
3 Hinged cover flap
4 Plug for connection of the valves
5 Slip-in label strip

Fig. 27: Overview - Electronic module (Version station width 44 mm)

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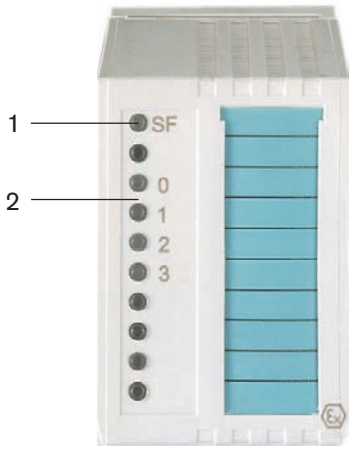
6.4. Displays



Legend

1 LED for module status display
(function as for Siemens modules)

2 LEDs showing channel status
(also see the chapter Configuration and Function of the Module / Valve Segments / Channel Assignment)

Fig. 28: Operating / display elements of the electronic module

6.5. Diagnosis

Group fault display: Yes, locally at the electronic module (red LED)

Diagnostic functions (can be read out using Profibus):

- Channel status diagnosis (channel open, channel short circuited)
- Individual switching cycle counter for each channel with warning limits for pilot valve and connected actuator

6.6. Spare Parts

Electronic module - Spare parts	Ident no.
Cover flap for 44 mm wide modules	667 898
Cover flap for 66 mm wide modules	667 899
Label strip for electronic modules	667 917

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7. VALVE THAT CAN BE INTEGRATED

Pilot Control

The pilot valves employed in the AirLINE Ex system essentially consist of two components:

- Component 1: the pilot control in protection class Ex-i.
  The pilot control converts the supplied electrical energy into a pneumatic switching signal.

The EC-Type Examination Certificates for the pilot controls can be found in the Appendix of these operating instructions.

- Component 2: the amplifier.
  The amplifier is a purely pneumatic element that increases the relatively low flow rate of the pilot control system to the level necessary for the application.

Because, from an electrical point of view, only the pilot control is important, much information is based upon this, e. g. boost time or approval-related facts.

The pilot control system is an independent module (e. g. Type 6104). In complete valves (e. g. Type 6525), it may already be integrated.

Valves with auxiliary control air

When using valves in the auxiliary control air version, the exhaust air of the pilot control valve escapes into the environment.

Valves with auxiliary control air cannot be combined with standard valves (internal auxiliary control air) on the valve island, as the X port then has a different function.

Further information on the valves can also be found on the Internet under the respective type number.
www.burkert.com

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7.1. Pneumatic Valves Type 6524/6525 (station width 11 mm)

7.1.1. Configuration and function

The pneumatic valves of Type 6524 and 6525 consist of an Ex-i pilot solenoid valve (Type 6104 or Type 6144) and a pneumatic seat valve as an amplifier.

This operating principle enables high pressures to be controlled with low power consumption and short switching times. Normally, the valves are equipped with an emergency manual override (versions without this feature are available).

Fig. 29: Pneumatic valves type 6524 and type 6525

7.1.2. Technical Data

Housing material	PA (polyamide)
Gasket material	NBR
Media	dry compressed air, oiled or oil-free neutral gases (5 µm filter recommended)
Line connection	Flange for MP13
Pneumatic module	Type MP13 with thread M5, M7 or Type MP13 with plug connector Ø 6 mm, (Ø 4 mm, Ø ¼“ on request)
Manual override	yes (alternative versions without)
Rated power	0.3 W
Rated operating mode	100 % continuous operation
Electrical connection at the valve	rectangular plug RM 5.08 mm
Installation	with 2 screws M2 x 20

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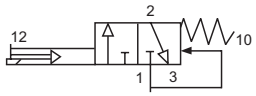
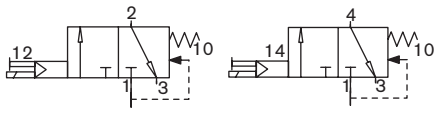
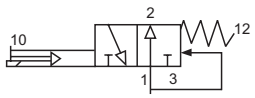
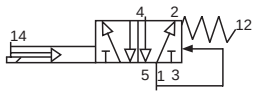
7.1.3. Ordering Chart

Description	Orifice	QNn-value air [l/min]	Rated power [W]	Pressure range [bar]	Switching times Opening [ms]	Switching times Closing [ms]	Ident no.
C = NC (normally closed)  3/2-way valve, pilot controlled, current-free, outlet port 2 relieved	4	300	0.3	2.5 ... 7	35	45	184 766
							186 832[2)]
			0.3	1... 8[1)]	35	45	186 831[1)]
							186 833[1, 2)]
			0.3	1 ... 7	35	45	186 835[1)]
2 x C = NC (normally closed)  3/2-way valve, pilot controlled, current-free, outlet port 2 relieved	4	300	2 x 0.3	2.5 ... 7	20[3)]	25	182 086
			2 x 0.3	1 ... 8[1)]	20[3)]	25	182 088[1)]
D = NO (normally open)  2 x 3/2-way valve, pilot controlled, current-free, outlet port 2 and 4 relieved	4	300	0.3	2.5 ... 7	35	45	184 767
							184 768[2)]
H  5/2-way valve, pilot controlled, current-free, outlet port 1 with outlet port 2, outlet port 4 vented	4	300	0.3	2.5 ... 7	35	45	184 769
							184 773[2)]
			0.3	1 ... 7	35	45	186 834[1)]

[1)] Version with auxiliary control air

[2)] Without manual override

[3)] Please observe the information for the characteristics of the 8-channel modules in the chapter “Start-up”, section “Acyclic parameters of the AirLINE Ex modules”!

5/3-way function with locked mid-position:

This function can be implemented with the delockable double check valve, Type 0498 (control is by 2x 3/2-way function).

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7.2. Pneumatic Valves Types 6526/6527 (station width 16.5 mm)

7.2.1. Configuration and Function

The valves of Type 6526 and 6527 consist of an Ex-i pilot solenoid valve (Type 6106) and a pneumatic seat valve as an amplifier.

The operating principle enables high pressures to be controlled with low power consumption and short switching times.
Normally, the pilot control valves are equipped with an emergency manual override (versions without this feature are available)

Fig. 30: Pneumatic valves type 6526 and type 6527

7.2.2. Technical Data

Housing material	PA (polyamide)
Gasket material	NBR
Media	dry compressed air, oiled or oil-free neutral gases (10 µm filter recommended)
Line connection	Flange for MP13
Pneumatic module	Type MP13 with G 1/8“, NPT 1/8“ or Type MP13 with plug-and-socket connection Ø 8 mm
Manual override	yes (alternative versions without)
Rated power	0.3 W
Rated operating mode	100 % continuous operation
Electrical connection at the valve	rectangular plug RM 5.08 mm
Installation	with 2 screws M3 x 30

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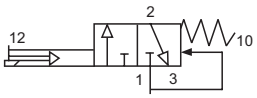
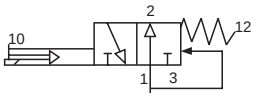
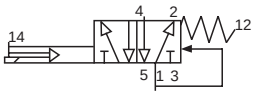
7.2.3. Ordering Chart

Description	Orifice	QNn-value air [l/min]	Rated power [W]	Pressure range [bar]	Switching times Opening [ms]	Switching times Closing [ms]	Ident no.
C = NC (normally closed)  3/2-way valve, pilot controlled, current-free, outlet port 2 relieved	6	700	0.3	2 ... 10	80	90	175 634
							175 674[2]
			0.3	-0,9 ... 8	80	90	175 673[1]
							175 723[1,2]
			0.3	1 ... 8	80	90	175 731[1]
D = NO (normally open)  3/2-way valve, pilot controlled, current-free, outlet port 2 pressurized	6	700	0.3	2 ... 8	80	90	175 725
							175 726[2]
H  5/2-way valve, pilot controlled, current-free, outlet port 1 with outlet port 2, outlet port 4 vented	6	700	0.3	2 ... 8	80	90	175 727
							175 728[2]
			0.3	1 ... 8	80	90	175 729[1]

[1] Version with auxiliary control air

[2] Without manual override

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Installation

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1. SAFETY INSTRUCTIONS

DANGER!

Risk of injury from high pressure!

- Before loosening the lines and valves, turn off the pressure and vent the lines.

Risk of electric shock!

- Before reaching into the device or the equipment, switch off the power supply and secure to prevent reactivation!
- Observe applicable accident prevention and safety regulations for electrical equipment!

WARNING!

Risk of injury from improper installation!

- Installation may be carried out by authorised technicians only and with the appropriate tools!

Risk of injury from unintentional activation of the system and an uncontrolled restart!

- Secure system from unintentional activation.
- Following assembly, ensure a controlled restart.

CAUTION!

Escape of medium and malfunction!

If the seals are seated incorrectly, leaks and malfunctions may occur due to pressure losses.

- Ensure that the seals are seated correctly in the area of the electronics and pneumatics.

Short circuit, malfunction

The electrical connection requires exact contacting.

- Do not bend contacts.
- If connections are damaged or bent, replace the affected components.
- Do not switch on the system unless the components are in perfect working order.

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NOTE!

Operate the system with direct current only!
To avoid damaging the system, use only direct current as the power supply for the system.

Avoid pressure drop!
To avoid a pressure drop, the compressed air supply to the system must be as large as possible.

Electrostatic sensitive components / modules!

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

- Observe the requirements in accordance with EN 61340-5-1 and 5-2 to minimise or avoid the possibility of damage caused by sudden electrostatic discharge!
- Also ensure that you do not touch electronic components when the power supply voltage is present!

Restrictions!
Observe the applicable restrictions for the conversion / expansion of systems.

- **Read about this in the chapter “Structure and function of the AirLINE Ex system”, section “Maximum system expansion”).**

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2. INSTALLATION INSTRUCTIONS

NOTE!

Incorrectly installed systems (e.g. inclined tie rods not tightened properly) may leak.

- Prior to start-up, always firmly seal all open attachments and locking devices.
- The blue cover flaps of the individual segments can be removed if required.
- If moving from a cold to a warm environment, do not install the system until it has adjusted itself to the ambient temperature in order to prevent condensation!

2.1. Unpacking pre-assembled systems

NOTE!

Important – take module correctly out of the packaging!

To prevent damage to the pre-assembled system when taking it out of the packaging, observe the following:

→ Take hold of the system by the pneumatic connection modules and take it out of the packaging (see figure “Holding points”).

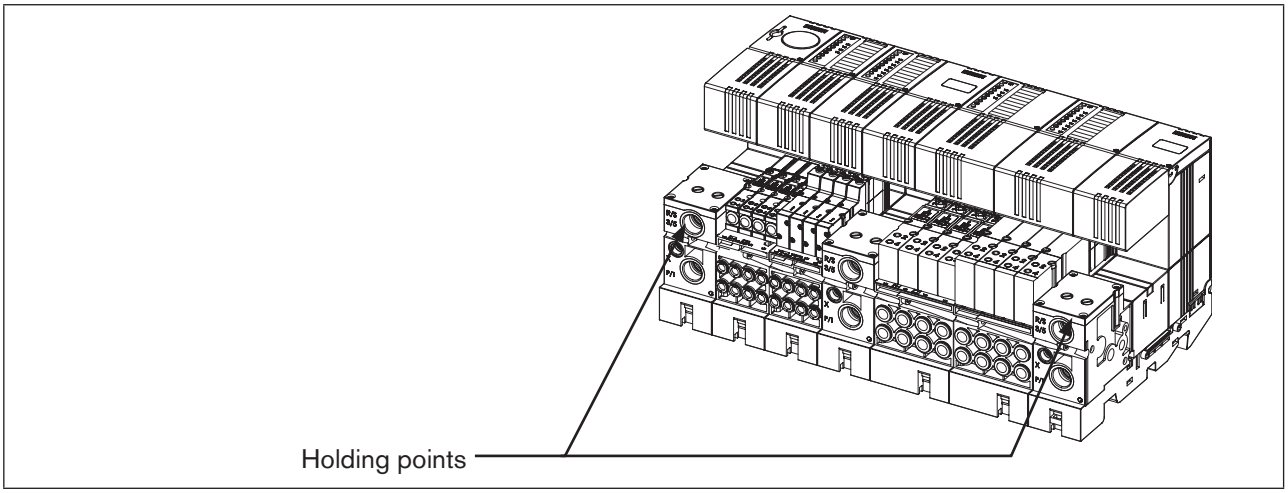

Fig. 1: Holding points for removal of pre-assembled systems

2.2. Installation Tools and Torques

Application	Type and size of the tool	Torque
Actuation of the locking elements	Plain screwdriver, size 5	-
Screw the clamping bolts onto the supply modules, screw fitting of terminal module - pneumatic module	Plain screwdriver, size 7	1.3 ... 1.5 Nm
Installation / removal of the valves with 11 mm station width	Cross-head screwdriver Size 0	0.2 Nm
Installation / removal of the valves with 16.5 mm station width	Cross-head screwdriver Size 1	0.3 Nm
Tightening of the inclined tie rods	Allen key (3 mm)	0.6 Nm

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2.3. Position of the Assemblies

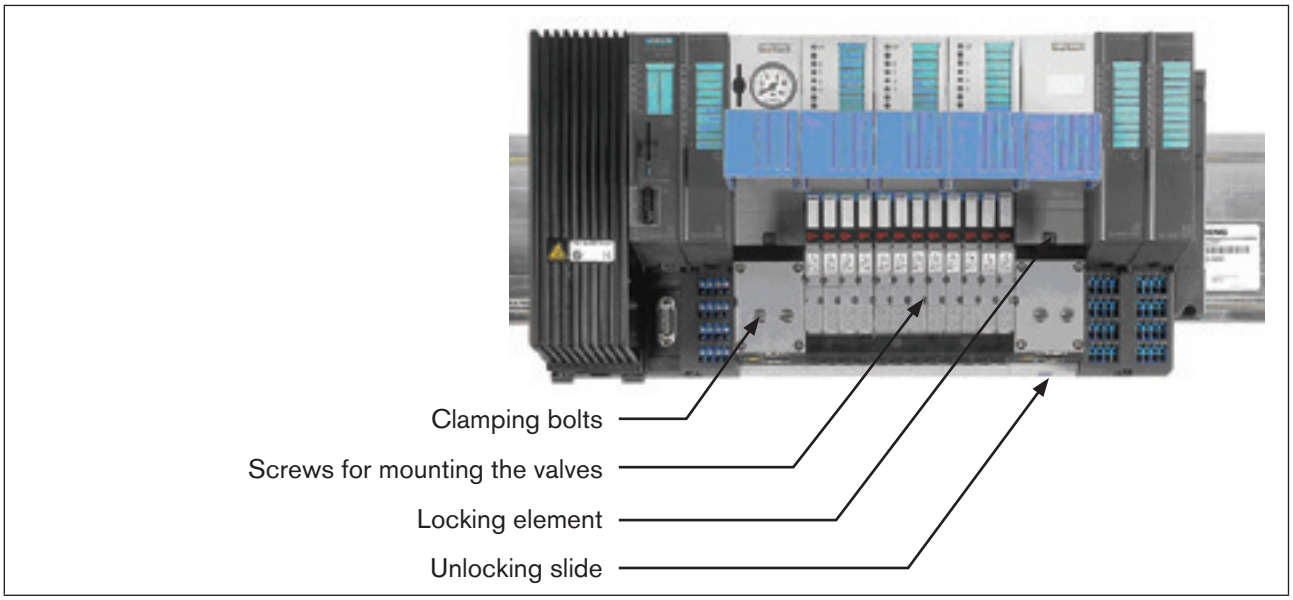

Fig. 2: Position of the modules to be screwed on

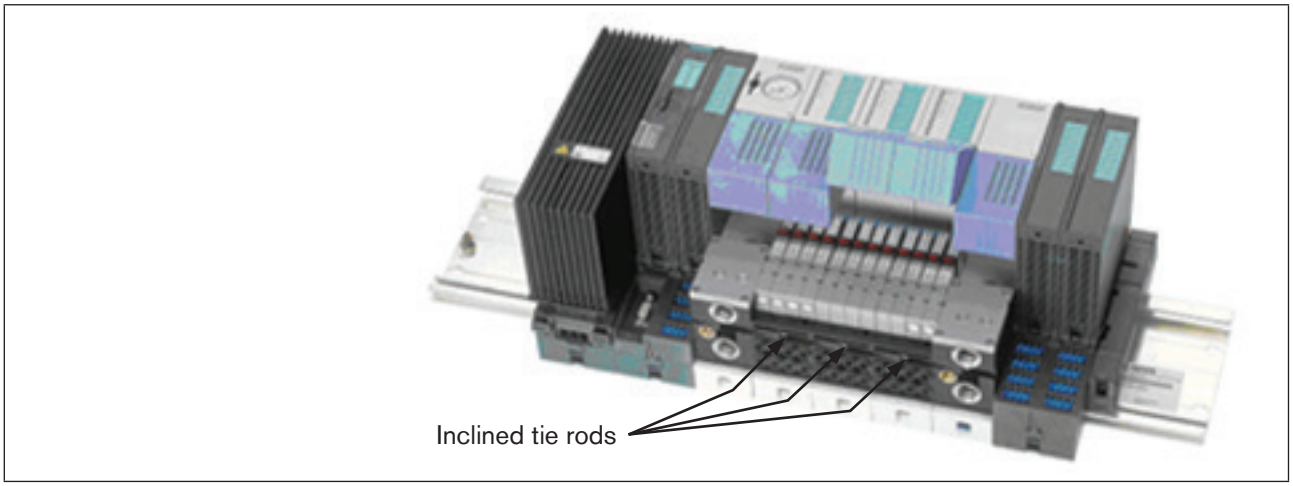

Fig. 3: Position of the tie rods on the installed system

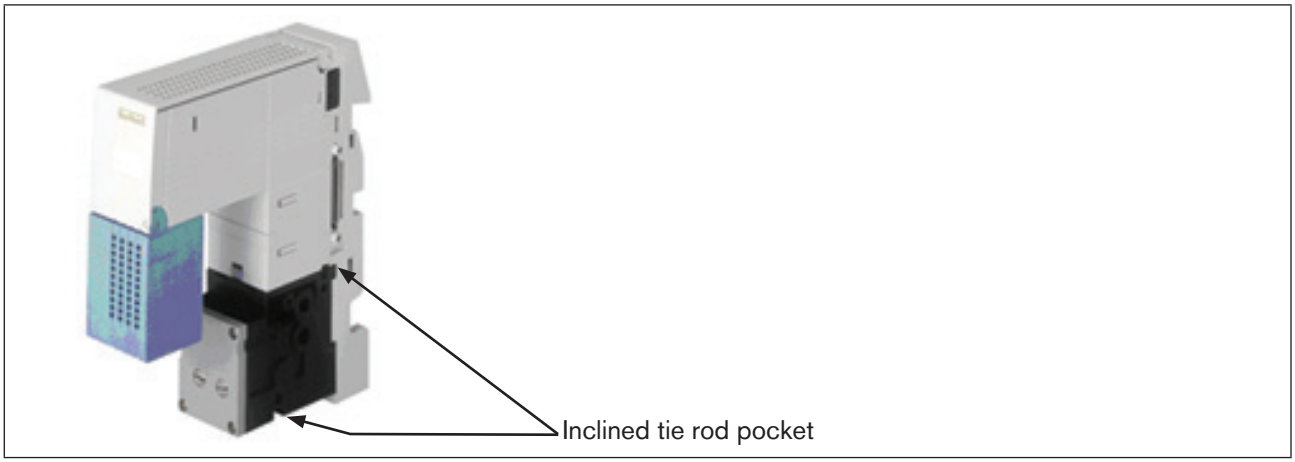

Fig. 4: Two inclined tie rod pockets of one segment

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3. INSTALLATION ON S7 PROFILE RAIL (PRE-ASSEMBLED SYSTEM)

3.1. Removing a System from a Profile Rail

→ Loosen all clamping bolts (1) on the connection modules (turn counter-clockwise)

→ Swivel system out of the profile rail.

→ Bring all clamping bolts (1) on the connection modules to the home position (by turning them counter-clockwise all the way).

→ Hook the system in the required position on the upper edge of the profile rail and swivel open.

→ Tighten all clamping bolts (1) by turning them clockwise (stipulated torque 1.5 Nm).

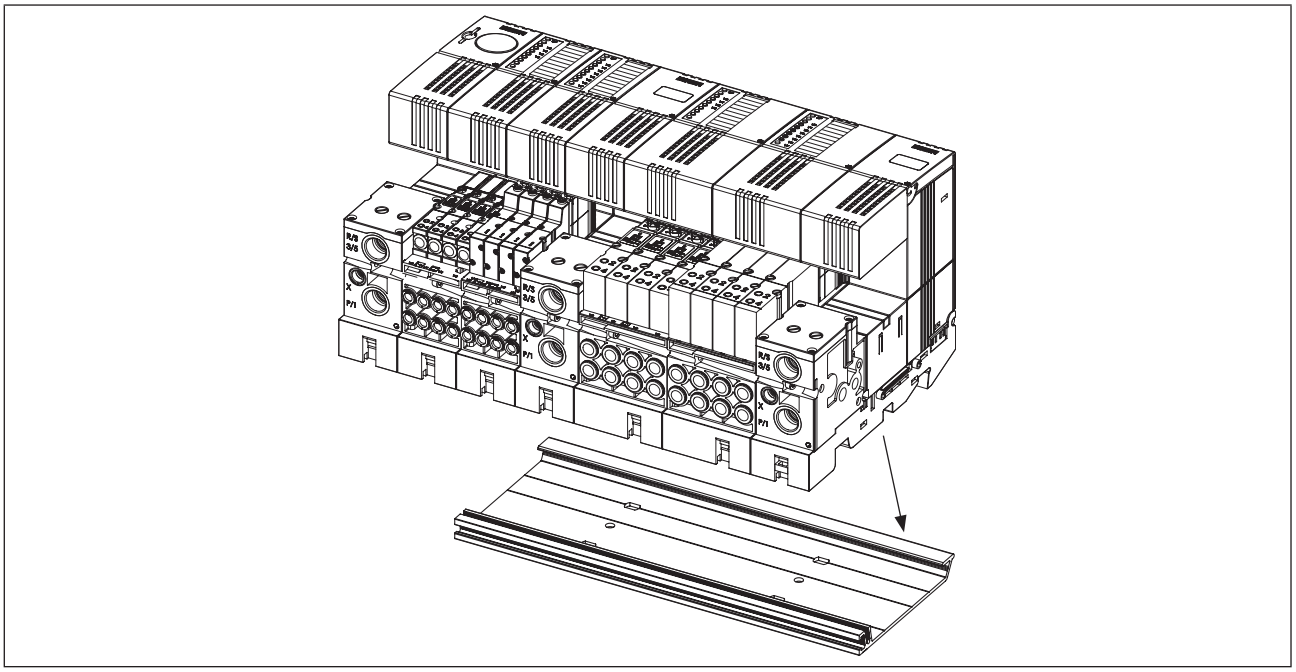

Fig. 5: Mounting on to the profile rail

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3.2. Installation/Removal of the ET 200iSP-Modules

Installation

→ The ET 200iSP™ modules (terminal modules and bus termination modules) can be placed onto the profile rail and latched to the AirLINE Ex System.

→ Modules, which are attached to the right supply segment, interlock with the supply segment.

Removal

→ Using a cross-head screwdriver, remove the unlocking slide (2) from the supply segment. This will release the engaged module.

→ Push module to the right.

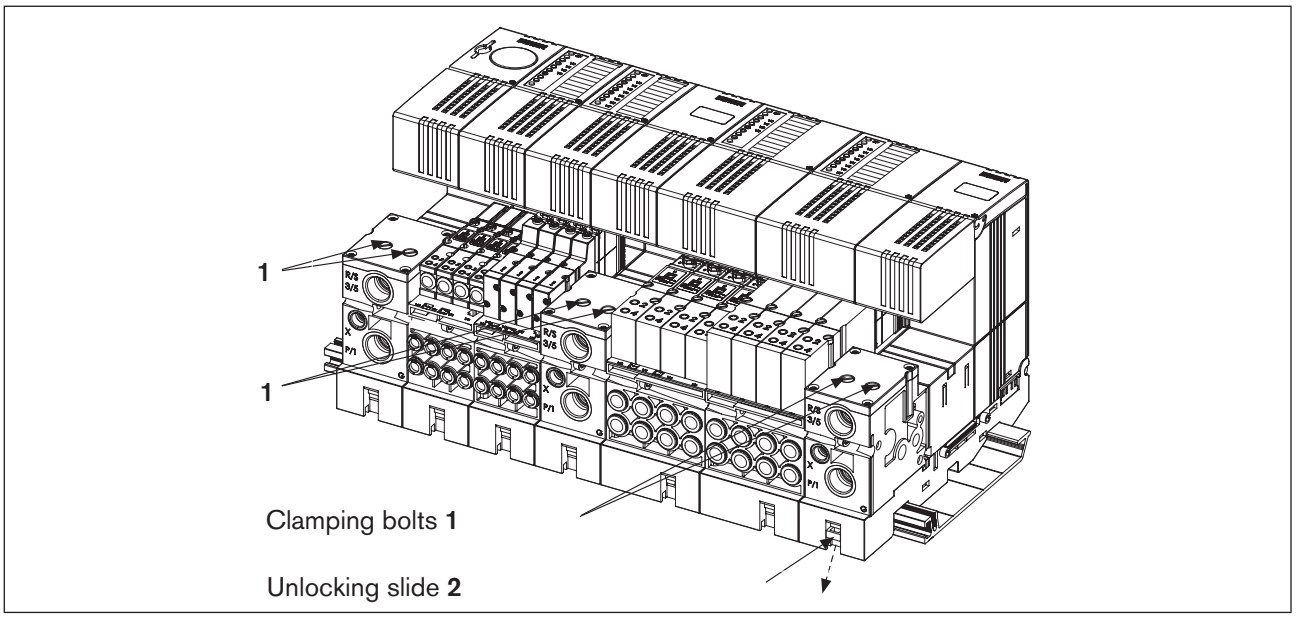

Fig. 6: Clamping bolts / Unlocking slide

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4. INSTALLATION IN THE CONTROL CABINET

The distances to be observed for installation in the control cabinet can be found in the handbook for the SIMATIC ET200iSP.

To facilitate replacement of an electronic module, the minimum distance indicated in the picture below is recommended.

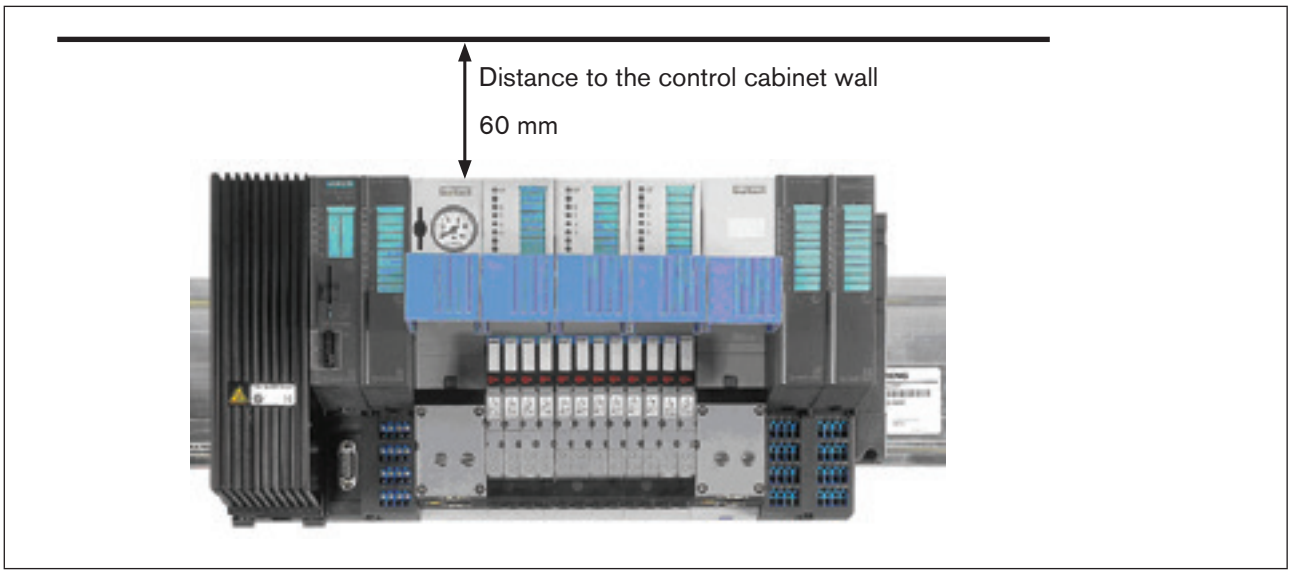

Fig. 7: Distance to top of the control cabinet wall

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5. CONFIGURATION, CONVERSION AND EXPANSION OF AN EXISTING SYSTEM WITH INDIVIDUAL SEGMENTS

5.1. System Configuration

Two inclined tie rods (3) connect the modules to each other.

→ To assemble modules, place two modules on the profile rail and push together.

→ Now screw the right module to the left one with two inclined tie rods.
(Hexagon-socket wrench 3 mm, torque 0.6 Nm)

→ Other modules can be installed on the right in the same way.

→ Finally, tighten all clamping bolts (1) by turning them clockwise (stipulated torque 1.5 Nm).

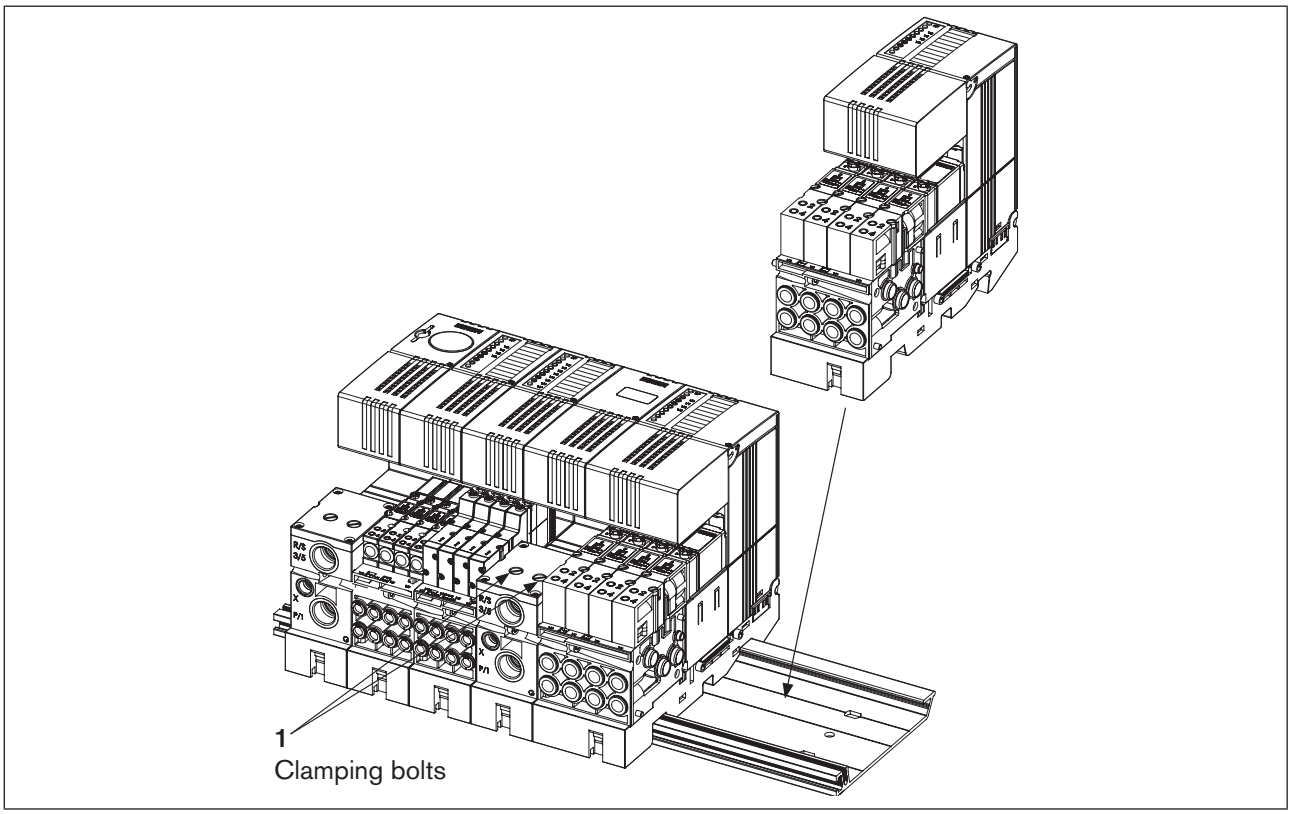

Fig. 8: Adding segments

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5.2. Conversion and Expansion

→ Loosen the clamping bolts (1) on the right supply segment.

→ Loosen the two inclined tie rods (3)

→ Push the supply segment to the right.

→ In the same way more segments can be moved until the position is reached in which the system is to be changed.

→ When a segment is added, first hook it into the upper edge of the profile rail.

→ Swivel in the segment and push it to the left up to the existing subsystem.

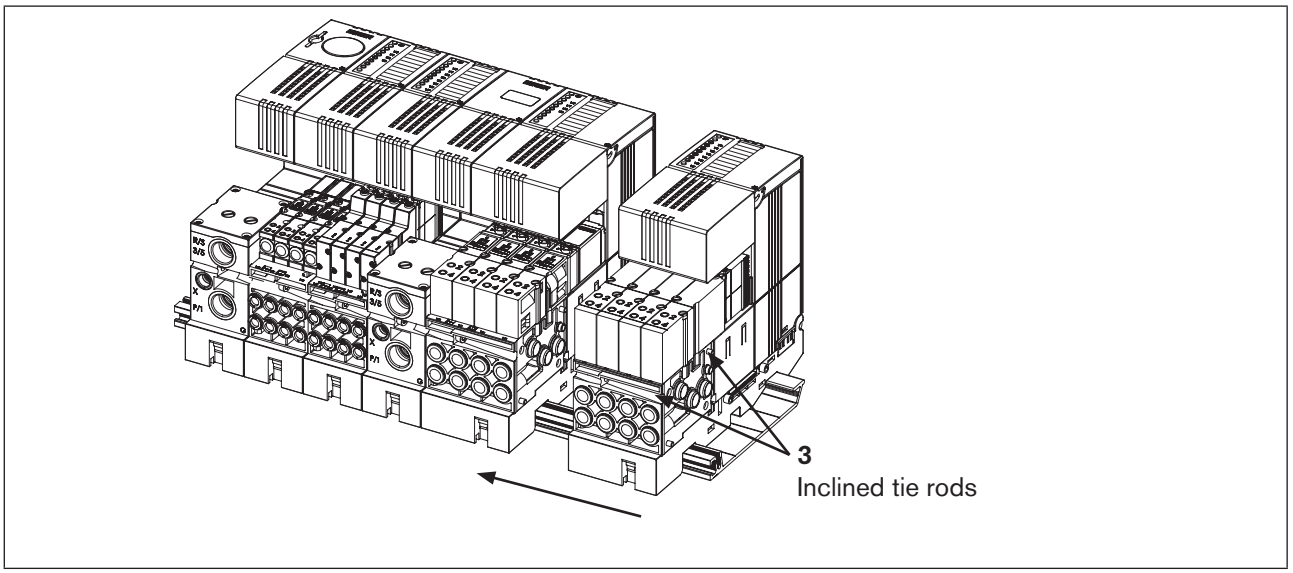

Fig. 9: Dock the segment to the system

5.3. Assembly

→ Reassemble the system in reverse order.

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6. REMOVAL / INSTALLATION OF INDIVIDUAL SEGMENTS

6.1. Removal

Supply segments

→ Release required module by actuating the locking element and swivel out.

→ In the case of the pressure gauge module ensure that the hose is disconnected from the pneumatic module (see figure: Hose connection of the pressure gauge module).

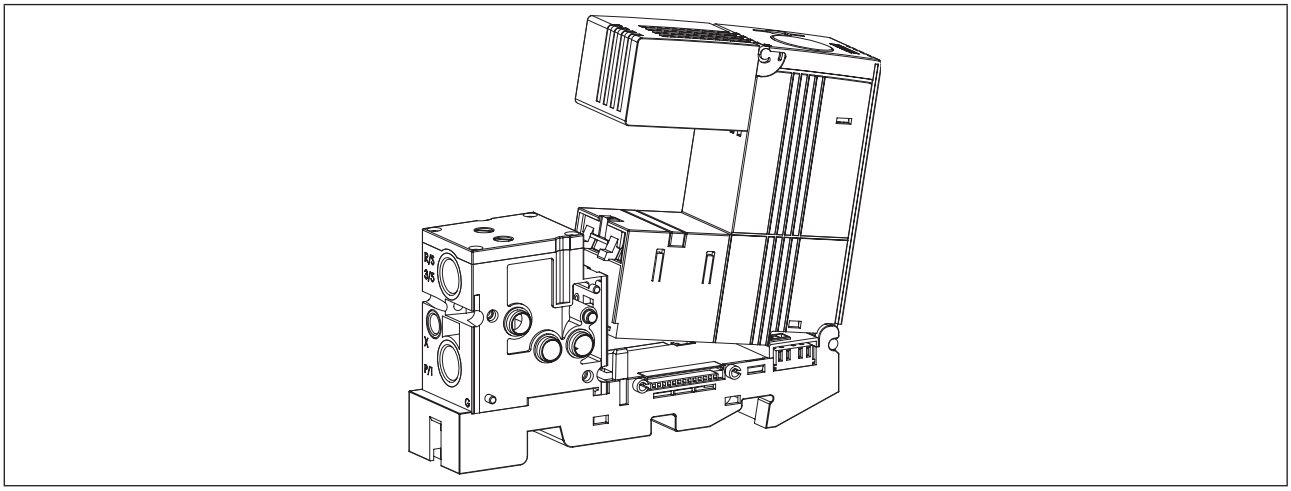

Fig. 10: Removal / installation of a supply segment

Valve segments

→ Remove valves and any protective caps from the plug-in contacts (either depressurized or all affected locations with P-shutoff).

→ Release the electronic module by actuating the locking element in the direction of the arrow and swivel out the module (see figure: Removal / installation of the valve segment).

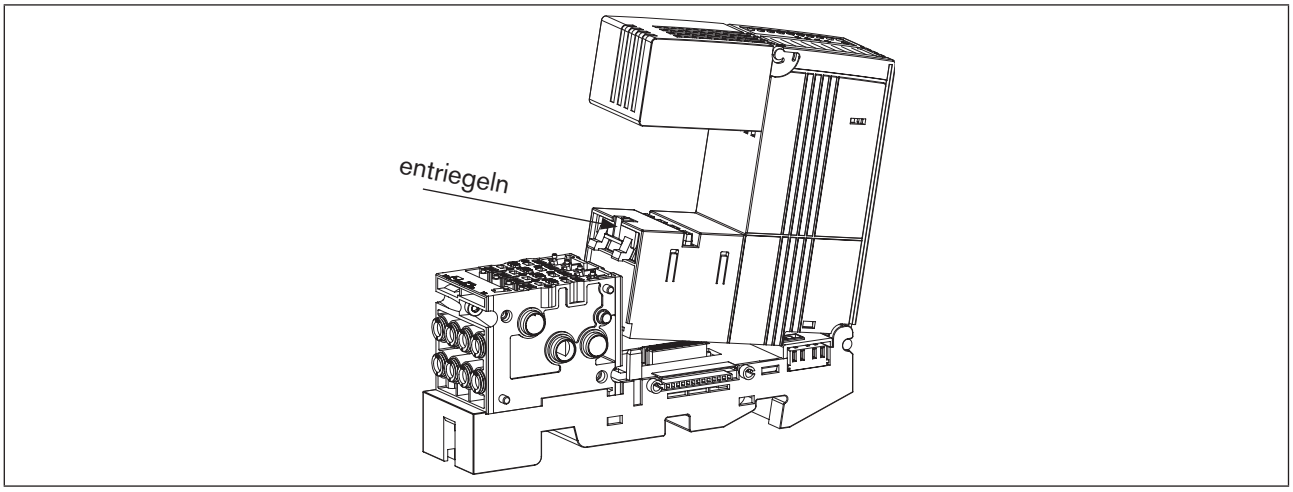

Fig. 11: Removal / installation of a valve segment

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6.2. Installation

Supply segment

Pressure gauge module:

→ In the case of the pressure gauge module connect the hose to the pneumatic module before hooking in the module (see figure: Hose connection of the pressure gauge module).

→ Hook module into the terminal module and swivel in until it engages.

→ **Valve segment**

→ Hook electronic module into the terminal module.

→ Actuate locking element in the direction of the arrow and swivel in the module all the way.

→ Screw on valves (either depressurized or all affected locations with P-shutoff).

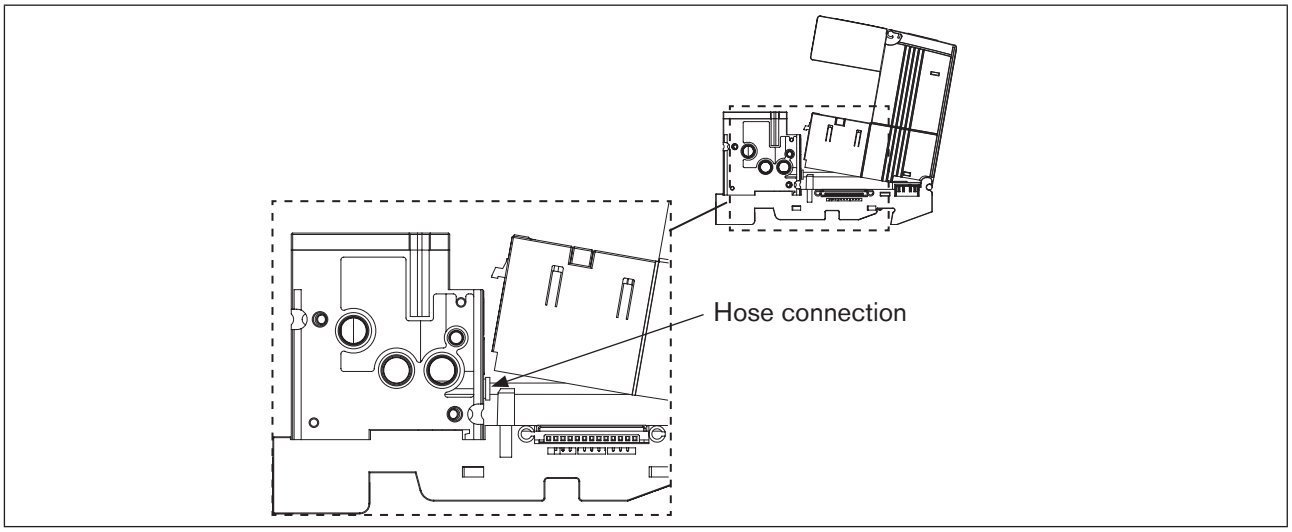

Fig. 12: Hose connection of the pressure gauge module

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7. REMOVAL / INSTALLATION OF THE COVER FLAPS

7.1. Installation

→ To install the cover flap, attach it in the half swiveled open position and then push it into the hinge contour until it engages.

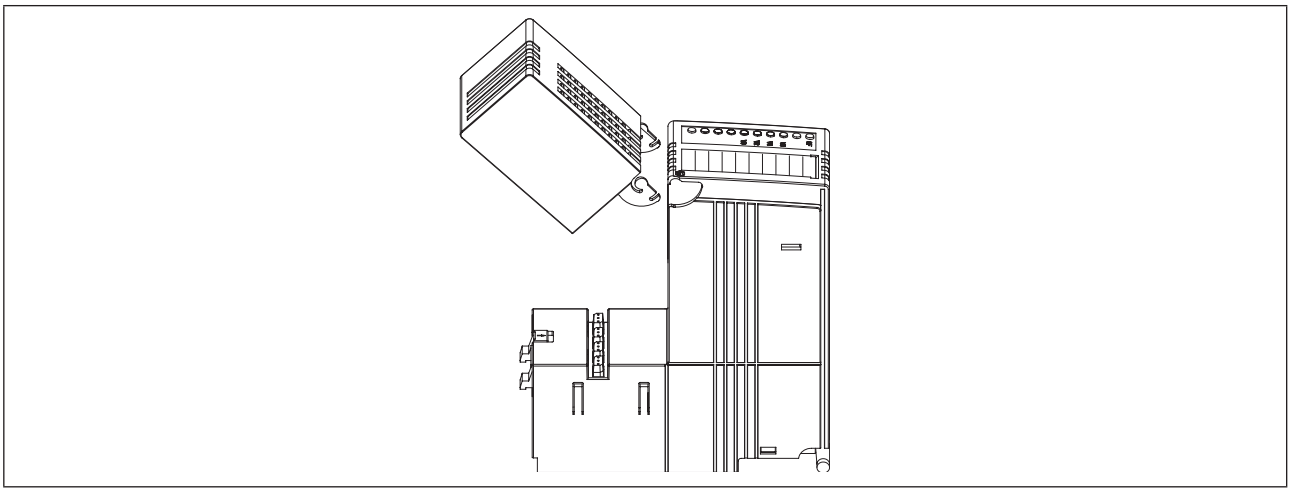

Fig. 13: Attaching the cover flap

7.2. Removal

→ Swivel open the cover flap and carefully lift the hinge plate over the hinge contour (e.g. using a small cross-head screwdriver).

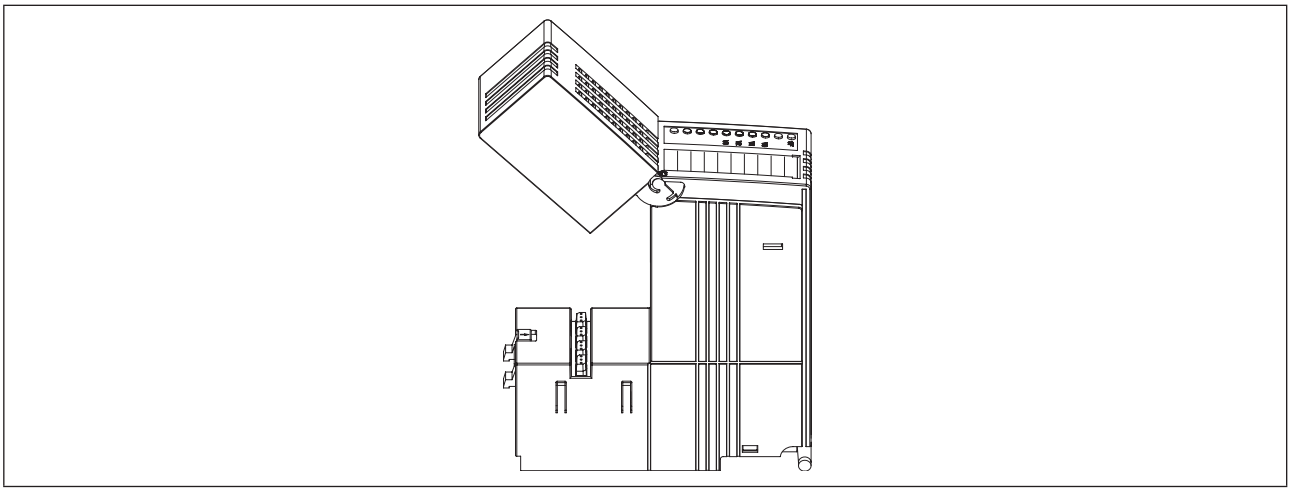

Fig. 14: Engaging the cover flap

The cover flaps have no effect on the function of the system and can be omitted or removed if required.

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8. REPLACING A TERMINAL OR PNEUMATIC MODULE

For installation of the terminal-pneumatic module subassembly, the modules are aligned to each other during production. The alignment ensures compliance with all tolerances on the interfaces (profile holder - plug – fluidic ducts).

Mount the pneumatic module itself on a terminal module and, when integrating it into the system, ensure that all interfaces (profile holder - plug – fluidic ducts) interlock without difficulty. Otherwise, proceed as follows:

→ Take the subassembly out of the system again.

→ Slacken the three screws on the back of the terminal module.

→ Re-align the pneumatic module on the terminal module.

→ Tighten the three screws again.

Instructions for conversion or expansion of the system.

Grease sealing rings!

To facilitate installation and to prevent damage, the sealing rings of the pneumatic modules should be greased during the installation work (e.g. with Centoplex 2 from Klüber Lubrication).

Serial numbers and identification number of the system lose their validity!

During conversion or expansion work the serial and identification numbers of the pre-assembled systems lose their validity.

In this case we recommend removing the identification plate and affixing a suitable note to the device.

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9. REPLACING A VALVE

DANGER!

Risk of injury due to pressure change!

When the valve is removed, only the P-channel is shut off. As a result, the pressure at the service outputs A or B is reduced. A connected actuator is therefore also depressurized and may move as a result.

- If there is a fairly large volume on the actuator side, provide a shut-off option for the service ports to prevent the actuator from moving.

9.1. Installation instructions

Before replacing the valve, ensure that the relevant equipment is in an electrically safe state.

If the respective valve position does not feature a P-shutoff, first depressurize the system.

If the valves mounted on modules with P-shutoff are changed under pressure, only a maximum of four valves may be removed at the same time.

When the valve is being removed, a relatively large amount of air is initially released, as the P-shutoff cannot close until the required pressure difference is reached. However, as the automatic shut-off considerably reduces the exhaust air, only a low residual leakage remains when the P-shutoff is closed.

9.2. Installation

→ When installing the valve, ensure that the seal has been inserted correctly.

→ Tighten the valve to the tightening torques indicated in the operating instructions.

→ When installing the valve, ensure that the service ports are also pressurized in the corresponding rest position of the valve until it switches over. As a result, a connected actuator can perform a movement according to the pressurization.

→ Ensure that these actuator movements cannot cause any damage or unwanted operations in the equipment.

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10. CONNECTION OF THE AIR INLET AND EXHAUST LINES

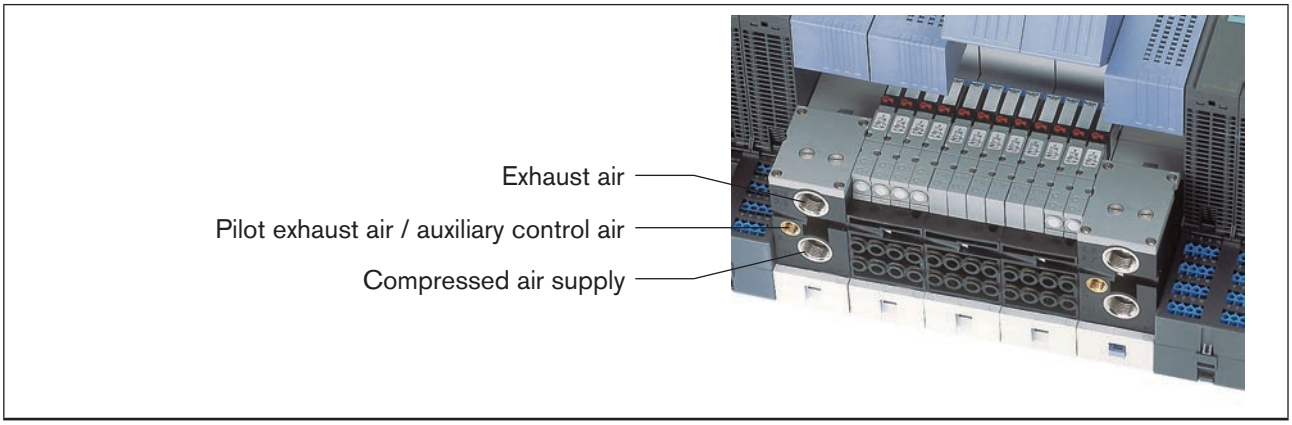

Fig. 15: Connections of the air inlet and exhaust lines

10.1. Connection of the Pressure Supply

→ Connect the compressed air supply to the P/1 connections on the connection modules.

DThe supply should be fed via the largest possible lines to prevent pressure drops.
In larger AirLINE Ex systems and high-consumption applications the supply should be connected for the right and left supply segment, optionally also via additional supply segments in the middle

→ Seal the unused P/1 connections with a plug.

10.2. Connection of the Exhaust Air

→ Connect the exhaust air to the R/S 3/5 connections on the connection modules.

The exhaust air should be conveyed along the largest possible lines and, if required, via silencers at high flow rates in order to prevent back pressures.
The exhaust air should be connected for the right and left supply segment, optionally also via additional supply segments in the middle.

10.3. Pilot Exhaust Air / Auxiliary Control Air

Depending on which valves you operate on the AirLINE Ex system, port X is used as follows:

10.3.1. Standard Valves

In this case the exhaust air from the pilot control valves is exhaust separately from the R/S 3/5 port to port X. This avoids problems in the event that higher back-pressures occur in the R/S 3/5 channel.
This should be done using the largest possible lines if necessary with mufflers for high flow rates in order to avoid back-pressure.

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10.3.2. Valves with Auxiliary Control Air

In the case of valves that are to be employed for a wider range of pressures, the pilot control valve is supplied with air via a separate pressure port. This should be connected to port X.

10.4. Plug to Block P-channel

Optionally, the pressure supply of the system can be segmented using a partition in the central P-channel between two pneumatic modules. This allows different pressure levels or different media to be used in the same system.
With pre-assembled systems, the position for the partition is indicated on the appropriate pneumatic module.

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Commissioning

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1. SAFETY INSTRUCTIONS

DANGER!

Risk of injury from high pressure!

- Before loosening the lines and valves, turn off the pressure and vent the lines.

Risk of electric shock!

- Before reaching into the device or the equipment, switch off the power supply and secure to prevent reactivation!
- Observe applicable accident prevention and safety regulations for electrical equipment!

WARNING!

Risk of injury from improper operation!

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

- Before start-up, ensure that the operating personnel are familiar with and completely understand the contents of the operating instructions.
- Observe the safety instructions and intended use.
- Only adequately trained personnel may operate the equipment/the device.

Risk of injury from unintentional activation of the system and an uncontrolled restart!

- Secure system from unintentional activation.
- Following assembly, ensure a controlled restart.

NOTE!

Operate the system with direct current only!
To avoid damaging the system, use only direct current as the power supply for the system.

Avoid pressure drop!
To avoid a pressure drop, the compressed air supply to the system must be as large as possible.

Electrostatic sensitive components / modules!

- The device contains electronic components which react sensitively to electrostatic discharge (ESD). Contact with electrostatically charged persons or objects is hazardous to these components. In the worst case scenario, they will be destroyed immediately or will fail after start-up.
- Observe the requirements in accordance with EN 61340-5-1 and 5-2 to minimise or avoid the possibility of damage caused by sudden electrostatic discharge!
- Also ensure that you do not touch electronic components when the power supply voltage is present!

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2. INITIALIZATION

2.1. Communication Connection

The valve segment communicate with the interface module IM152 via the backplane bus system of the ET 200iSP. This exchanges not only input / output data but also parameter, configuration and diagnostic data with a central master (controller) via PROFIBUS-DP-is.

Many PROFIBUS masters (controllers) require a program that describes the hardware configuration (e. g. Siemens Step7 for the S7 controllers). These programs require the equipment master data file (GSD file) that contains the equipment-specific information.

For the use of acyclic services, an EDD file is also required. Programs such as the Siemens PDM permit access to extensive additional information (I&M data, switching cycle counters, etc.).

A current version of both of these files is available on CD or on the internet.

Because these files for communicability are taken care of by Siemens, when you look on the Bürkert homepage you will not find the information directly. Instead, you will find a link leading you to the appropriate current versions.

Siemens Step7 & Siemens PCS7:

If Siemens Step7 is used, an alternative to the method stated above is the option of linking AirLINE Ex by means of a Hardware Support Package (“HSP”) or, analogously, by means of a Software Update Package (“SUP”) in Siemens PCS7.

This method has the following advantages:

The acyclic functions of AirLINE Ex can be parameterized directly in HW config.

Extended functions of the ET200iSP can be used (e.g. redundancy).

Hardware-specific diagnoses can be displayed in PCS7.

You can download “HSP” and “SUP” from the Bürkert homepage (under Type 8650 software) or receive them directly from Bürkert.

Supply segments are electrically passive (logically transparent) and are not taken into consideration in the configuration tools.

2.2. Configuration of the Hardware Using Siemens Step7

A software program such as Step 7 from Siemens is necessary for the configuration of the bus master.

Use the program Step7 from Siemens in version 5.3 or higher to ensure hardware compatibility.

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Configuration:

→ Before the AirLINE Ex system can be accessed, the corresponding GSD (file package) must be imported into the hardware catalog of the tool.

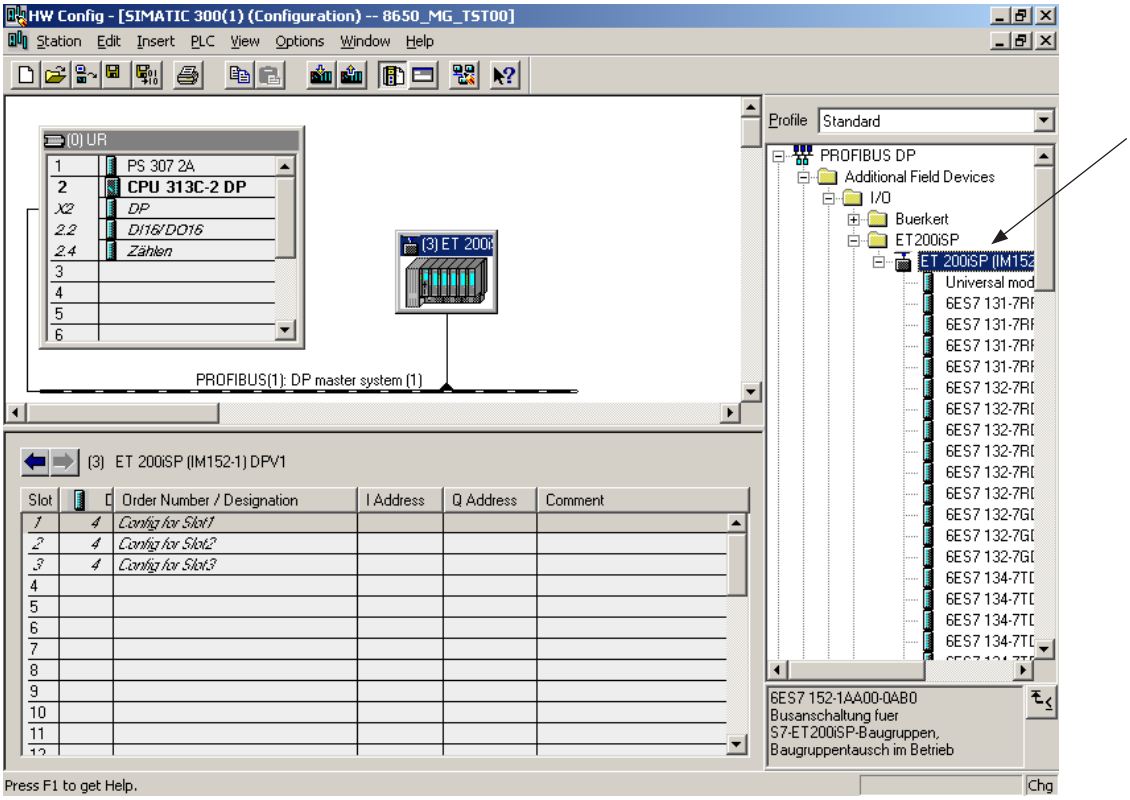

Fig. 1: Select ET 200iSP

→ Select ET 200iSP in the hardware catalogue and drag it onto the Profibus.

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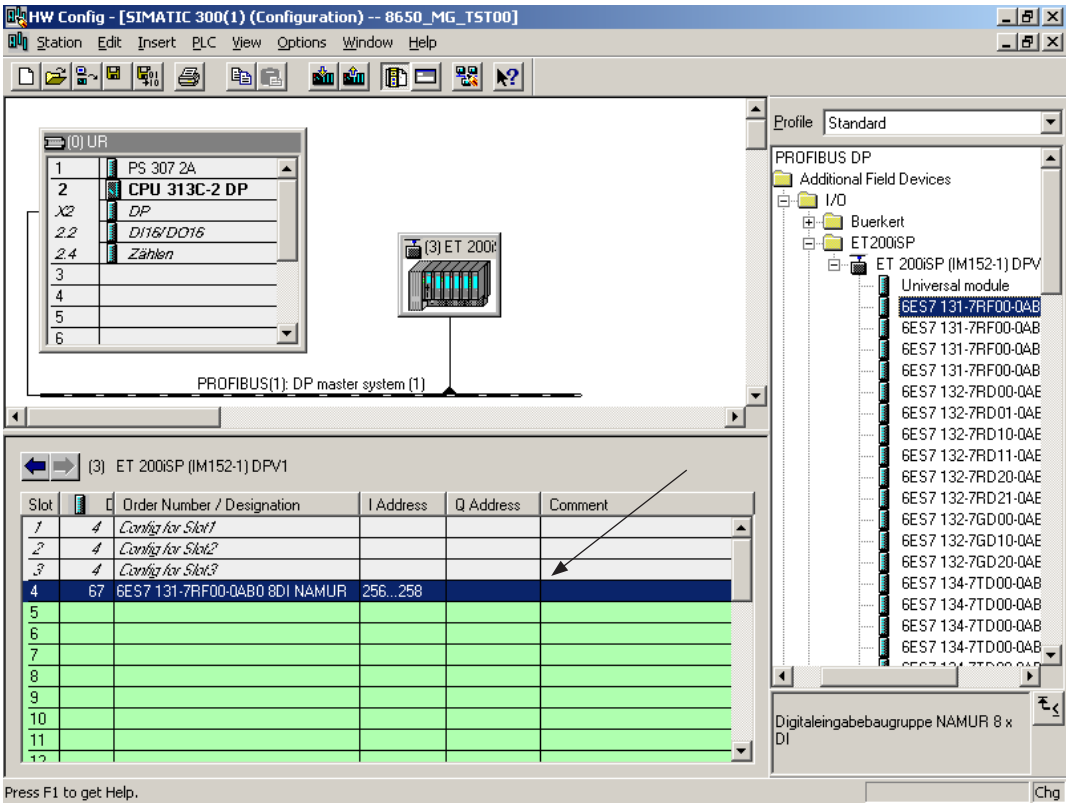

Fig. 2: ET 200iSP on the Profibus

→ Select the desired modules from the catalogue listings of the ET200iSP and drag the selection onto the respective slot of the ET 200iSP station.

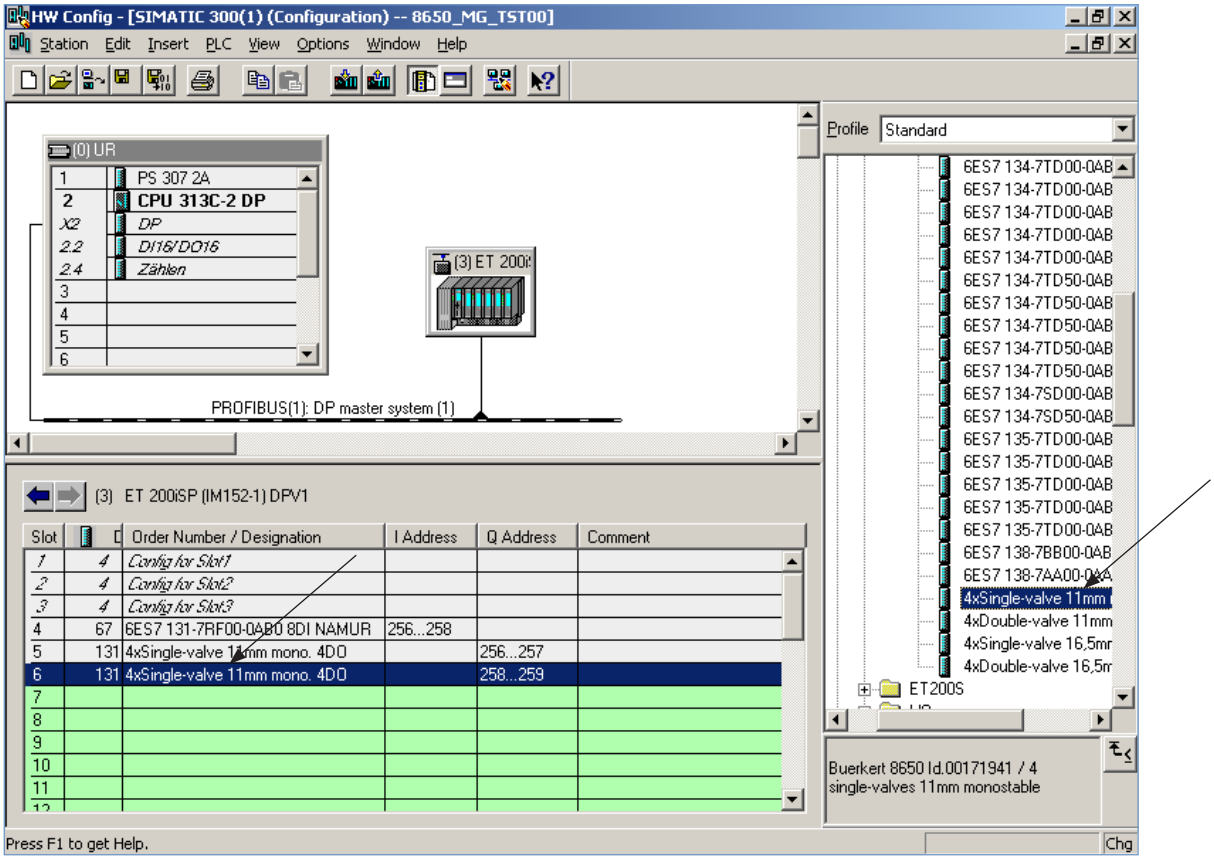

Fig. 3: Determine module and slot

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The active AirLINE Ex pneumatic modules **can be found in the same part** of the hardware catalogue. They are handled in the same way as a digital electric output module

Supply segments are passive and are **not** planned (see also chapter *Configuration and Function of the Modules / Supply segments*!

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2.3. Access to the Acyclic Parameters with the Siemens PDM

A software program such as e. g. Siemens Process Device Manager (PDM) is required for accessing the acyclic parameters of the modules.

Use the PDM program from Siemens (version 6.0 or higher) to ensure compatibility with the hardware.

The corresponding EDDL (file package) must be imported into the device catalogue of the tool before the AirLINE Ex modules can be accessed.

→ When the S7 Manager has started, select *"Extras / SIMATIC PDM / Manage device catalog"* via the menu bar.

→ Using *"Search"*, indicate the source directory in which the EDDL file is stored. Then select the device type ET 200iSP and acknowledge with OK.

The data of the ET 200iSP system is now included in the device catalog.

The following screenshots indicate how a new station is structured in the PDM.

→ To insert a new object, select the object type

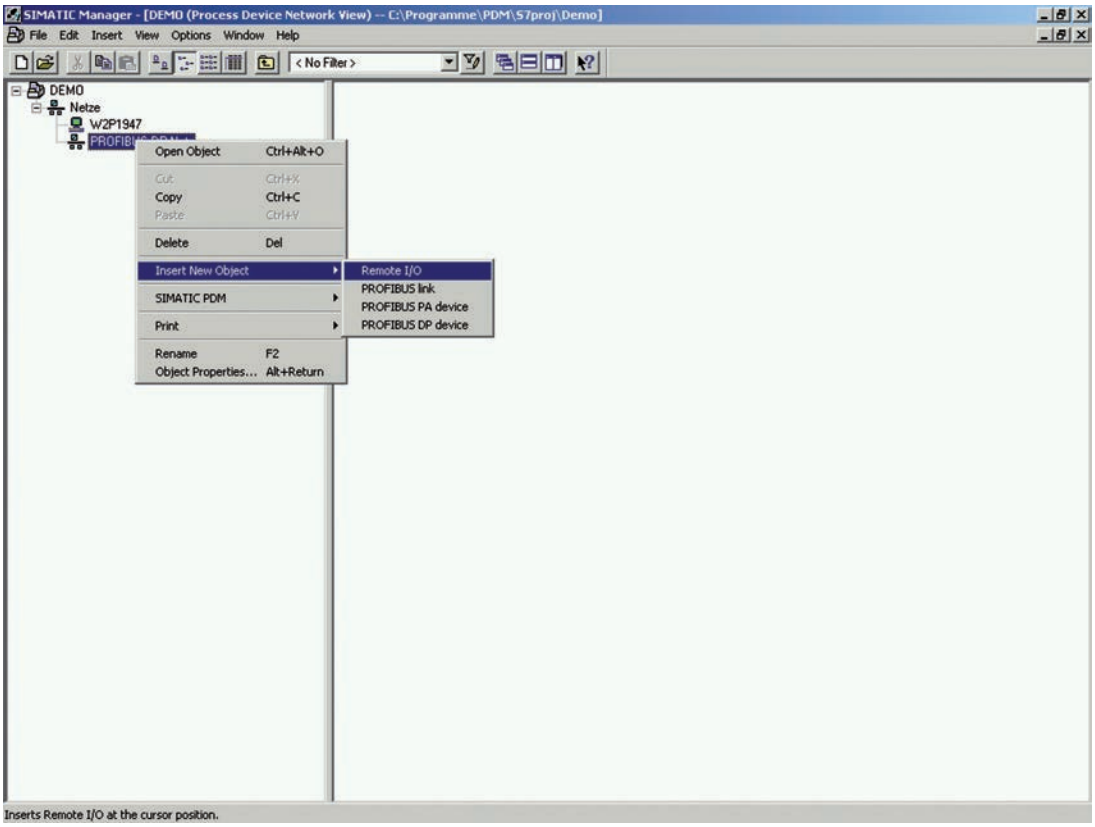

Fig. 4: Selecting a new object

→ Insert the new object.

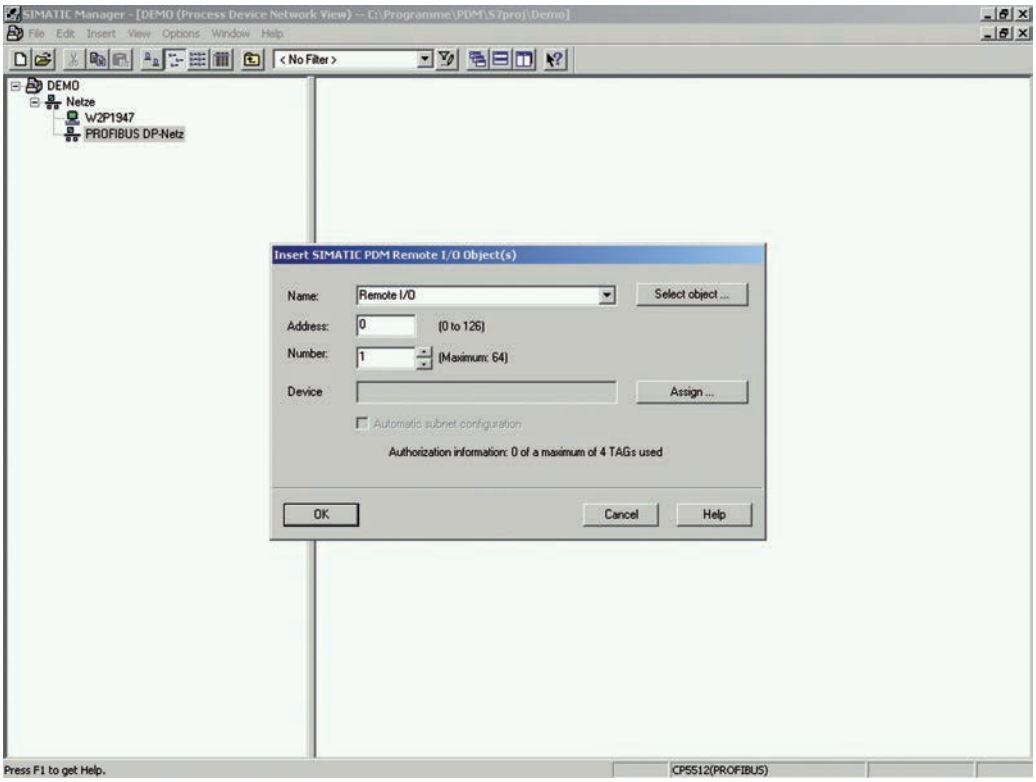

Fig. 5: Inserting a new object

→ To insert a new device, first select the device type.

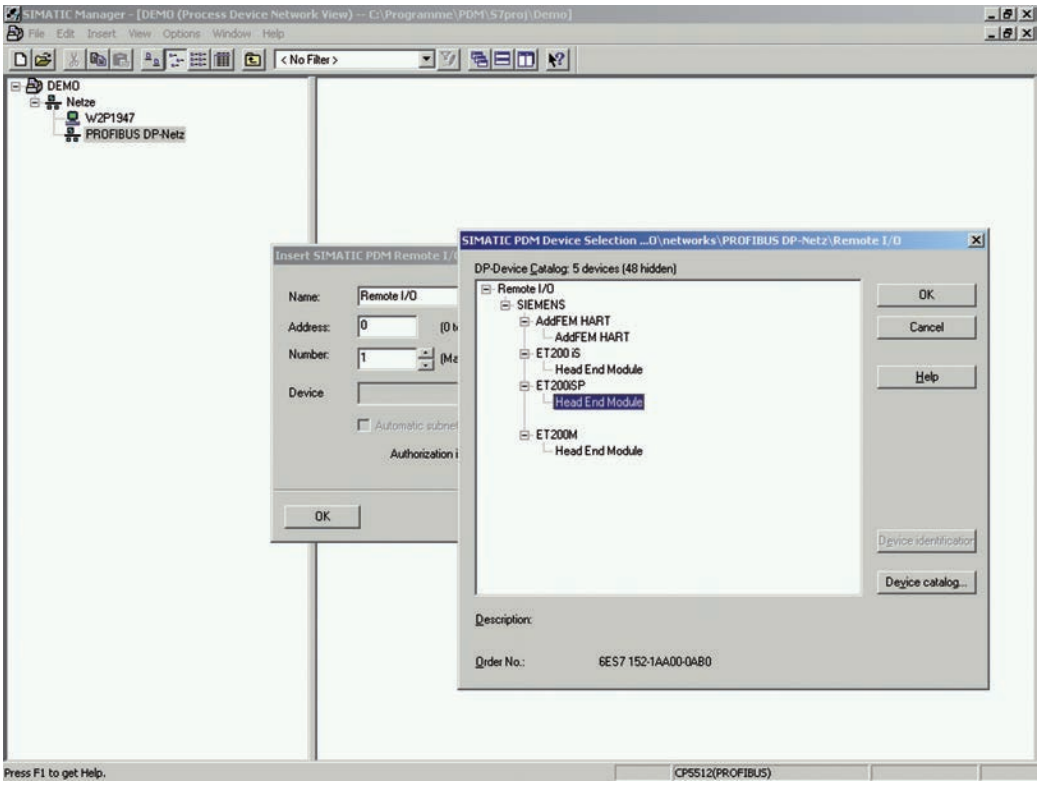

Fig. 6: Selection of a new device

→ Define the station designation and address.

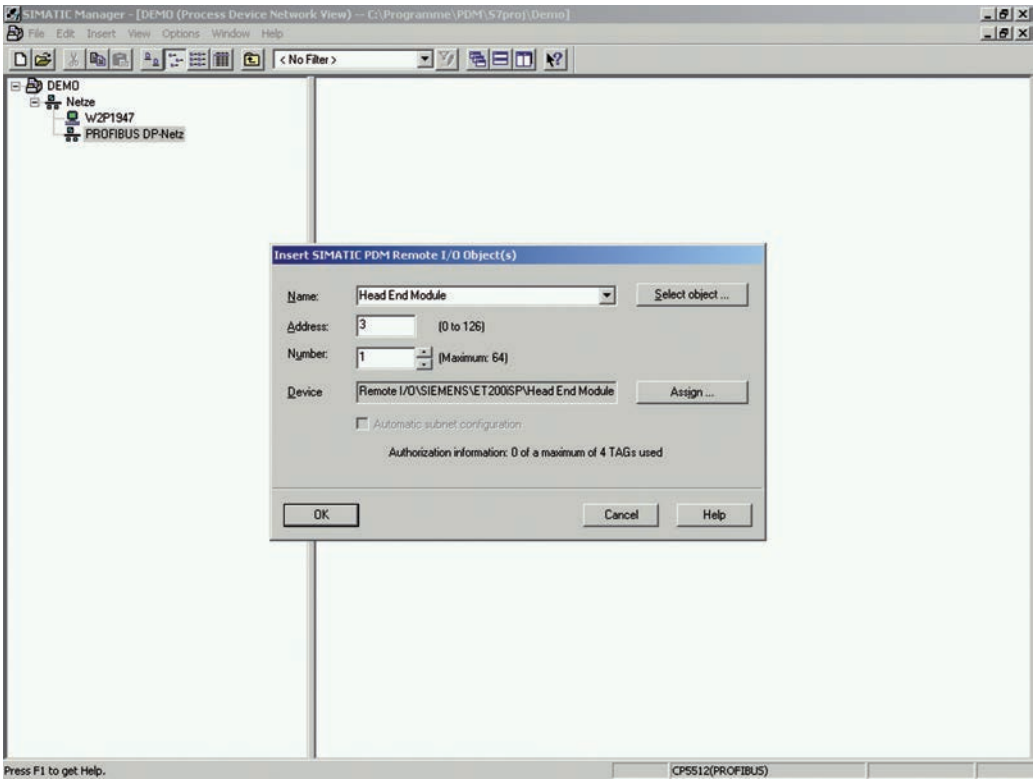

Fig. 7: Defining the station designation and address.

→ Add the function modules.

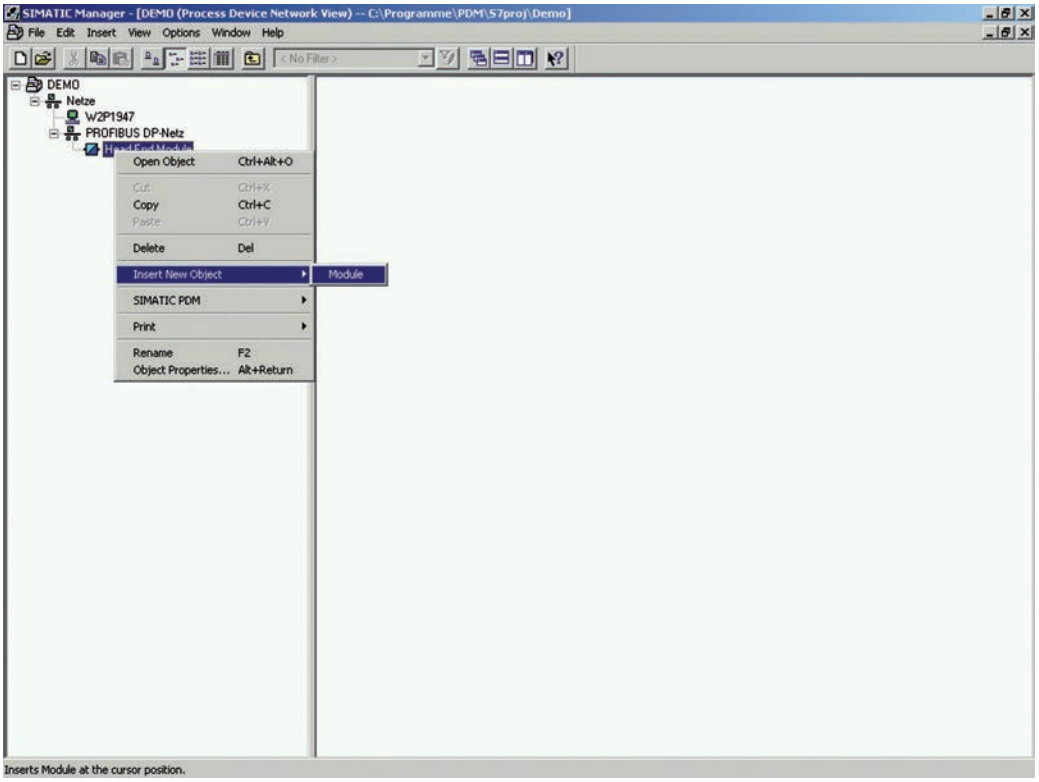

Fig. 8: Addition of the function modules

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→ Define the desired number of identical modules.

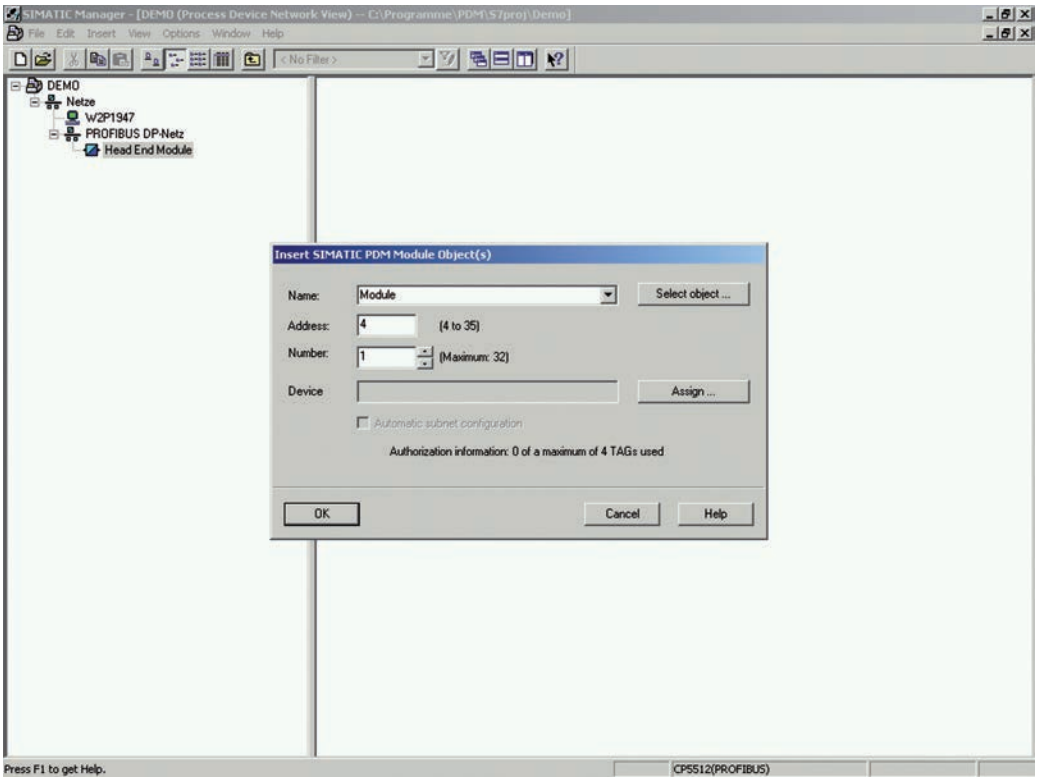

Fig. 9: Defining the number of identical modules

→ Select the module type via the menu *"Allocate"*.

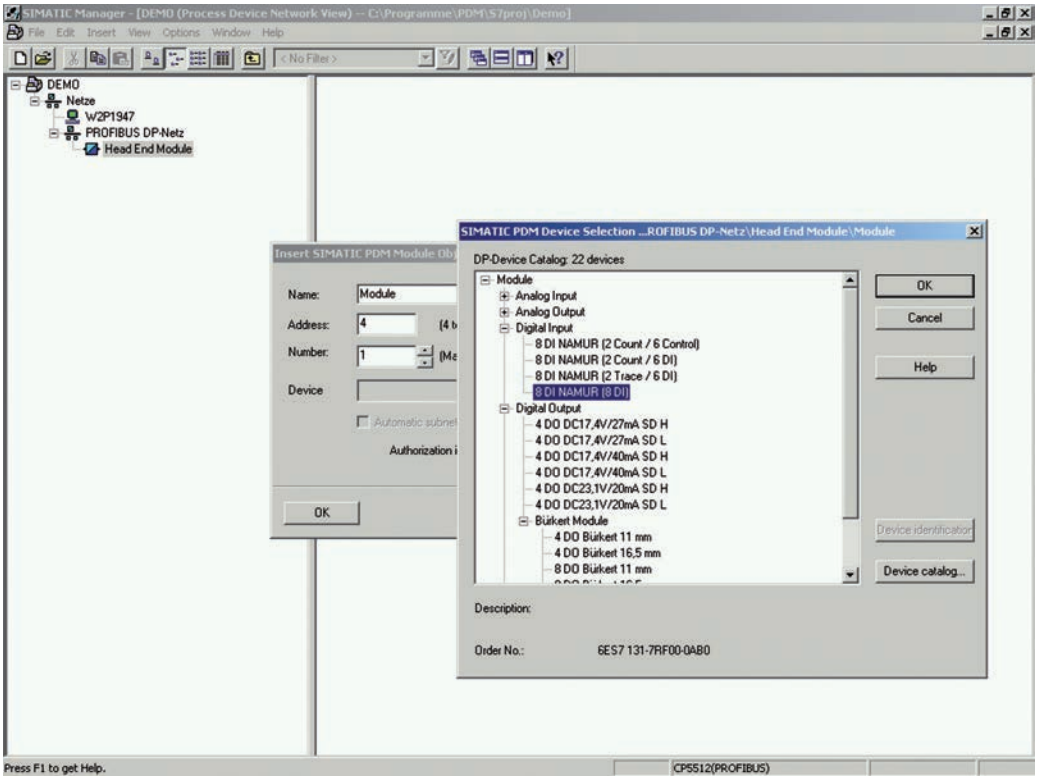

Fig. 10: Selecting the module type

→ Terminate the module selection with OK.

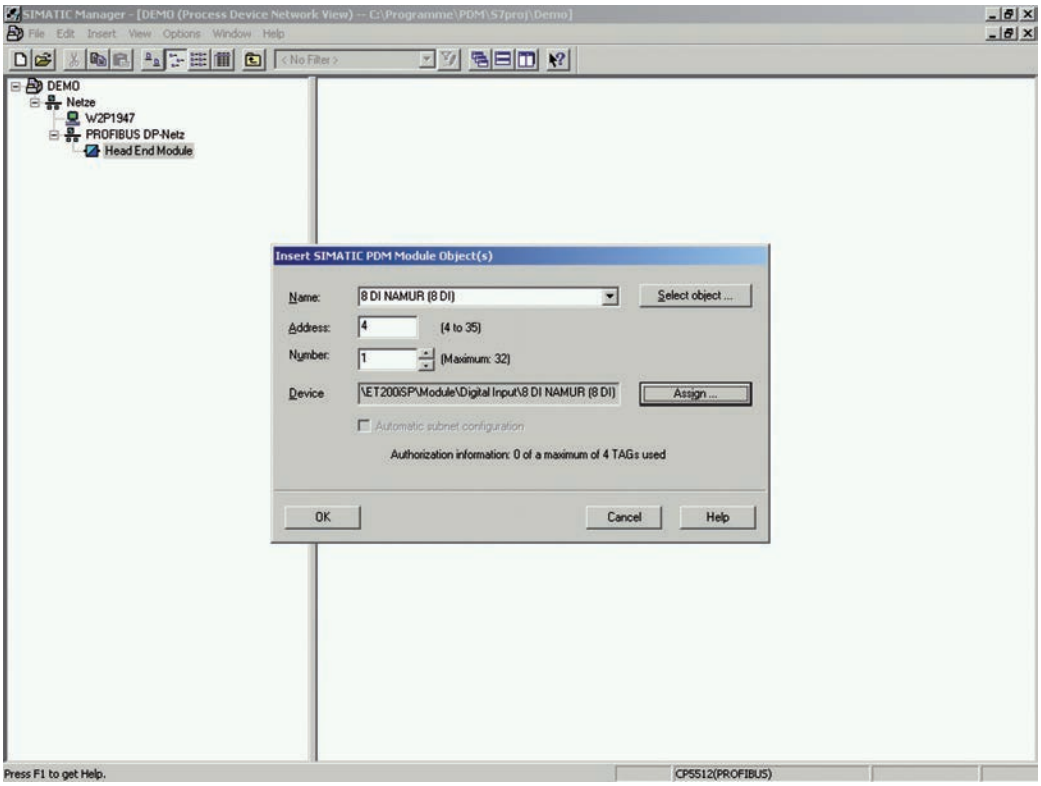

Fig. 11: Terminating the module selection

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2.4. Example with Two Different Function Modules

→ Select the head station.

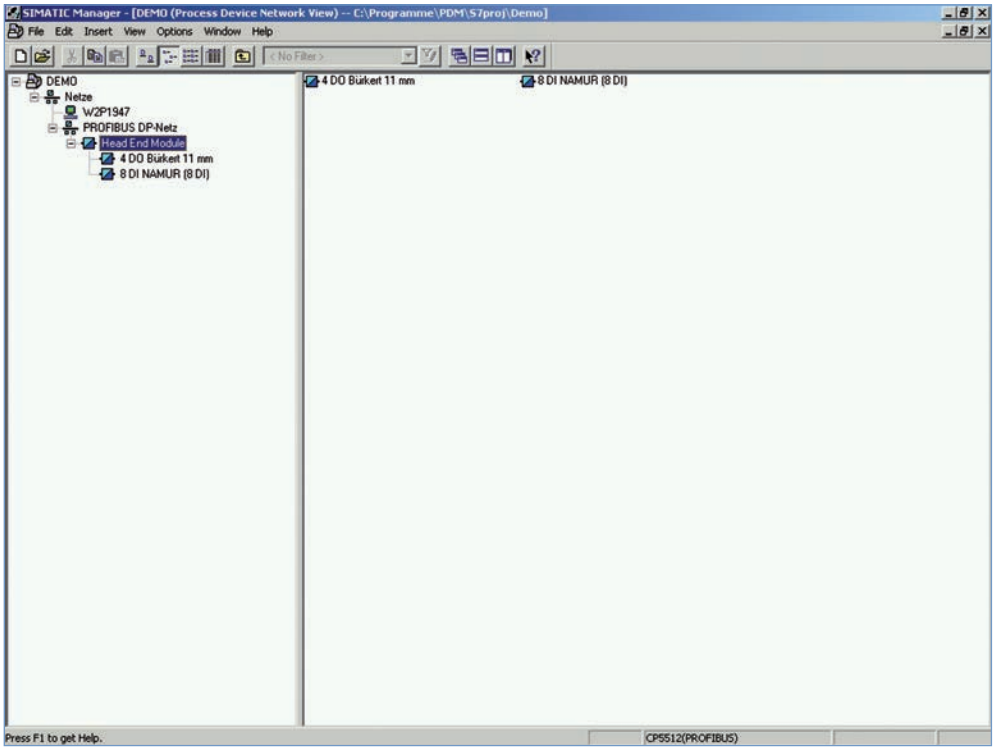

Fig. 12: Selection of the head station

→ Open the station for access to the acyclic functions.

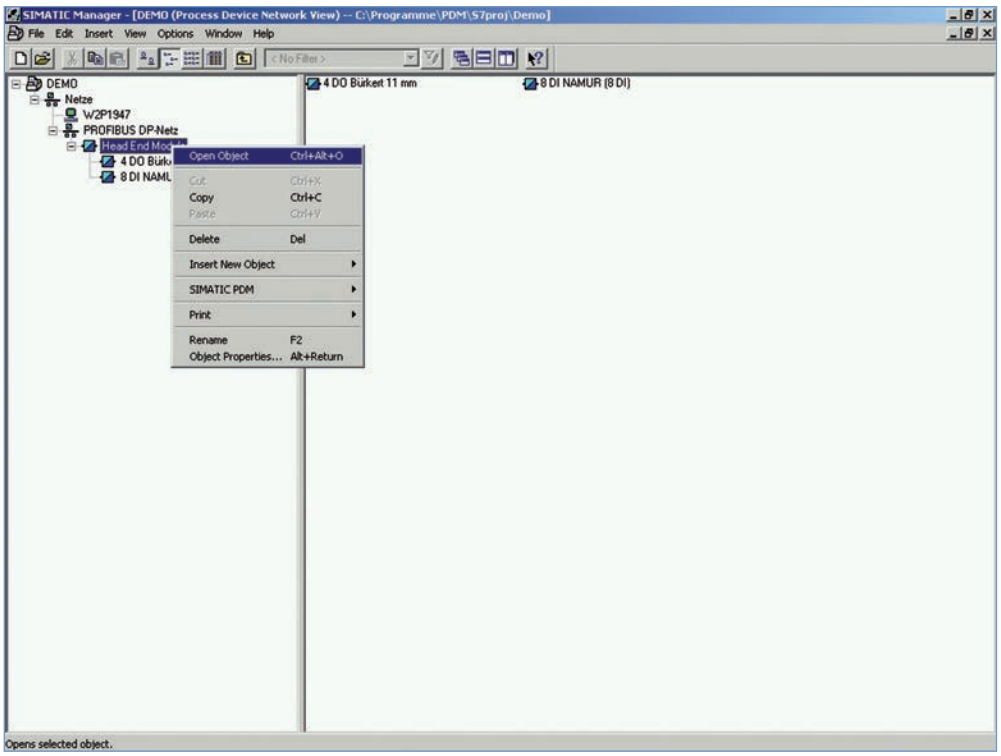

Fig. 13: Opening the station

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→ Select the access mode (specialist: full access; maintenance staff: limited access).

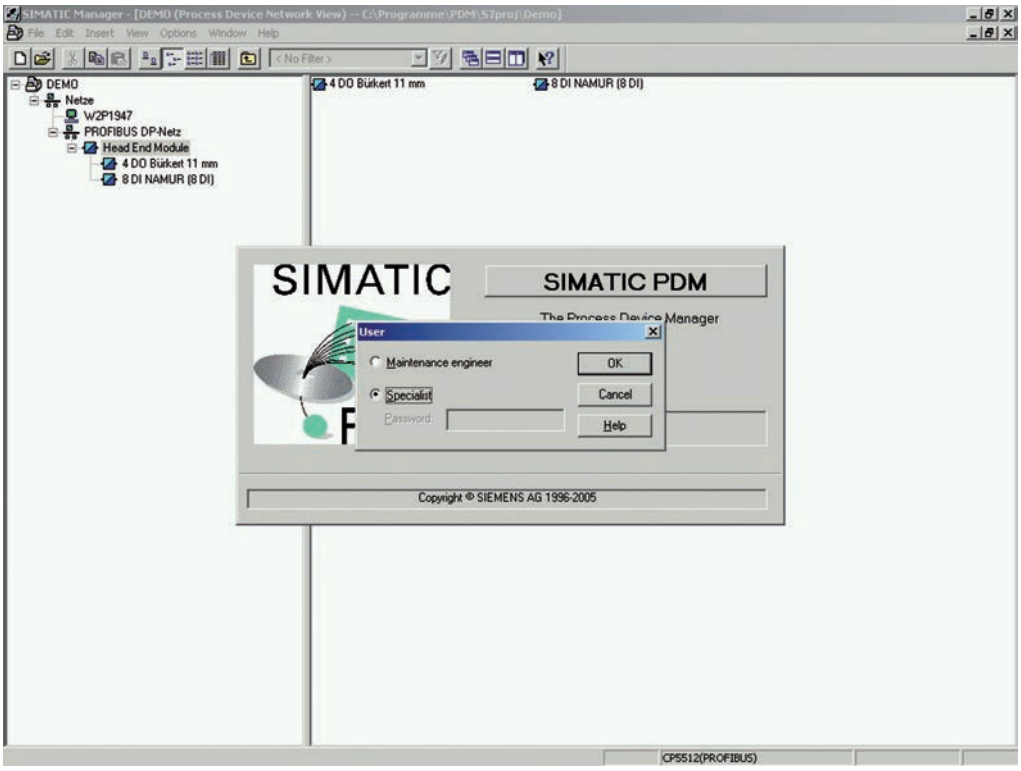
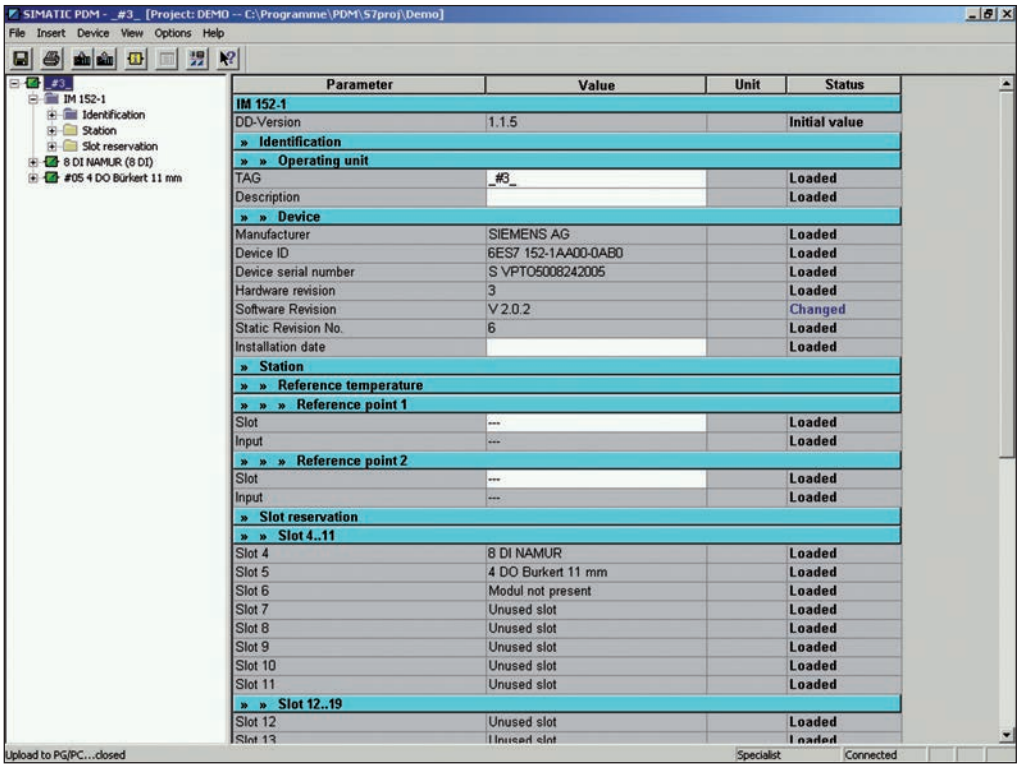


Fig. 14: Selection of the access mode

→ Select the head station to obtain the interface module parameters and to get an overview of the station configuration



Parameter	Value	Unit	Status
IM 152-1			
DD-Version	1.1.5		Initial value
» Identification			
» » Operating unit			
TAG	_#3_		Loaded
Description			Loaded
» » Device			
Manufacturer	SIEMENS AG		Loaded
Device ID	6ES7 152-1AA00-0AB0		Loaded
Device serial number	S VPTO5008242005		Loaded
Hardware revision	3		Loaded
Software Revision	V 2.0.2		Changed
Static Revision No.	6		Loaded
Installation date			Loaded
» Station			
» » Reference temperature			
» » » Reference point 1			
Slot	---		Loaded
Input	---		Loaded
» » » Reference point 2			
Slot	---		Loaded
Input	---		Loaded
» Slot reservation			
» » Slot 4..11			
Slot 4	8 DI NAMUR		Loaded
Slot 5	4 DO Burkert 11 mm		Loaded
Slot 6	Modul not present		Loaded
Slot 7	Unused slot		Loaded
Slot 8	Unused slot		Loaded
Slot 9	Unused slot		Loaded
Slot 10	Unused slot		Loaded
Slot 11	Unused slot		Loaded
» » Slot 12..19			
Slot 12	Unused slot		Loaded
Slot 13	Unused slot		Loaded

Fig. 15: Parameters of the interface module and overview of the station configuration

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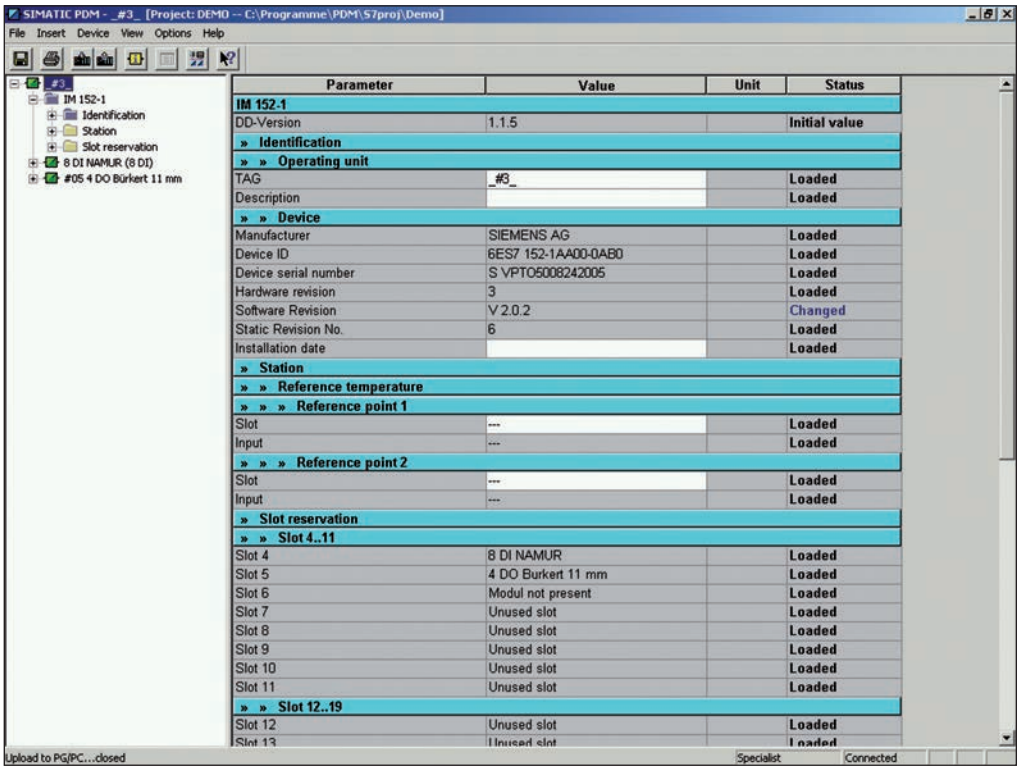

Parameter	Value	Unit	Status
IM 152-1			
DD-Version	1.1.5		**Initial value**
» Identification			
» » Operating unit			
TAG	_#3_		**Loaded**
Description			**Loaded**
» » Device			
Manufacturer	SIEMENS AG		**Loaded**
Device ID	6ES7 152-1AA00-0AB0		**Loaded**
Device serial number	S VPTO5008242005		**Loaded**
Hardware revision	3		**Loaded**
Software Revision	V 2.0.2		**Changed**
Static Revision No.	6		**Loaded**
Installation date			**Loaded**
» Station			
» » Reference temperature			
» » » Reference point 1			
Slot	---		**Loaded**
Input	---		**Loaded**
» » » Reference point 2			
Slot	---		**Loaded**
Input	---		**Loaded**
» Slot reservation			
» » Slot 4..11			
Slot 4	8 DI NAMUR		**Loaded**
Slot 5	4 DO Burkert 11 mm		**Loaded**
Slot 6	Modul not present		**Loaded**
Slot 7	Unused slot		**Loaded**
Slot 8	Unused slot		**Loaded**
Slot 9	Unused slot		**Loaded**
Slot 10	Unused slot		**Loaded**
Slot 11	Unused slot		**Loaded**
» » Slot 12..19			
Slot 12	Unused slot		**Loaded**
Slot 13	Unused slot		**Loaded**

Fig. 16: Parameters of an AirLINE Ex pneumatic module

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2.5. Acyclic Parameters of the AirLINE Ex Modules

2.5.1. Parameters that can be displayed or modified by modules

Name	Value	Unit	Status
4 DO Bürkert 11 mm			
PDM_ConfigurationTool	1: PDM	-	Initial value
# Identification			
# # Operating unit			
TAG	4 DO Bürkert 11 mm	-	-
Description			Initial value
# # Device			
Manufacturer	BUERKERT	-	-
Device designation	BUERKERT-ID00171941		
Device serial number	00001234		
Hardware revision	0		
Software revision	A 0.0.4		
Static revisions no.	3		
Installation date	-		Initial value
# Module			
Slot number	14	-	-
Module type	4 DO Bürkert 11 mm		
# 4 DO Bürkert 11 mm			
Data format	S7	-	Initial value
Module type	4 DO Bürkert 11 mm (BUERKERT-ID00171941)		-
Enable switching cycle counter diagnosis	enable		Initial value
Switching cycle counter warning limit	1000000		-
Number of simultaneously switchable pilot valves	4		
Boost time for the pilot valves	300		

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2.5.2. Access rights maintenance staff / specialist

Some of the parameters described below can only be modified when access is made in the PDM as a SPECIALIST.
Further information on read and write rights can be found in the online Help for the Siemens PDM program.

2.5.3. Functions of the parameters

- **Enable switching cycle counter diagnosis (read / write)**
  Defines whether a diagnosis message is to be generated when the warning limit for a pilot valve switching cycle counter is exceeded.
- **Switching cycle counter warning limit(read / write)**
  Defines the value of the pilot valve switching cycle counter at which a diagnosis message is to be generated as a warning.
- **Number of simultaneously switchable pilot valves – only relevant for the 8-channel module – (read).** Indicates how many pilot valves can be simultaneously activated (also see boost time) (depending on the type and amount of pilot valves, the total amount of current at actuation might be higher than the maximum the electronic module can provide).

With the 8-channel module, valves 0 to 3 and/or 4 to 7 each make up a group.
If more than 4 valves are activated at once (including the previously activated valve), the following might occur:

- Situation 1: No valves are activated in group 0 to 3. Then, the co-activated valves of group 4 to 7 are immediately activated.
- Situation 2: Additional valves of group 0 to 3 are activated. Then the co-activated valves of group 4 to 7 are only activated after the boost time has elapsed.

- **Boost time for the pilot valves (read / write)**
  When switching on, the pilot valves receive a higher current. At the end of the boost time, the current is reduced in order to minimize the power loss and to optimize the current balance in the electronic module.

Module	Value „Boost time“
00171941 (4 channels 11mm)	500
00171942 (8 channels 11mm)	300
00171943 (4 channels 16.5mm)	800
00171944 (8 channels 16.5mm)	300

- **Date of the last switching cycle counter reset (read only)**
  Indicates the last reset of the actuator switching cycle counter.
- **Enable switching cycle counter diagnosis (read / write)**
  Defines whether a diagnosis message is to be generated when the warning limit for the switching cycle counter is exceeded.

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2.5.4. Parameters that can be displayed or modified by channels

Name	Value	Unit	Status
# # Channel 0			
Channel enable	enable	-	Initial value
Behavior at CPU/Master-STOP	switching alternative value		
Alternative value	0		
# # # Pilot valve			
Switching cycle counter reset	inactive	-	Initial value
ID number of the pilot valve	0		Initial value
Current number of the switching cycles	74766		-
# # # Actuator			
Enable switching cycle counter diagnosis	enable	-	Initial value
Switching cycle counter warning limit	0		
Switching cycle counter reset	inactive		
Date of the last switching cycle counter reset	-		
Current number of switching cycles	74766		-
# # # Diagnosis			
Group diagnosis	barred	-	-
Broken wire			
Short circuit			

2.5.5. Functions of the channel parameter (general)

- **Enable channel (read / write)**
  Defines whether or not the channel is enabled for use.
- **Behavior at CPU/Master STOP (read / write)**
  Defines which value the channel assumes when the master is set to STOP.
- **Alternative values (read / write)**
  Defines the alternative value for the case „Switch alternative value at master STOP“.

2.5.6. Functions of the parameter actuator (that are connected to the pilot valve (of this channel)

- **Switching cycle counter reset**
  Initiates a reset of the actuator switching cycle counter.
- **ID number of the pilot valve (read / write)**
  You can enter the ID number of the pilot valve used here. This makes it quickly available if replacement or preventive maintenance are forthcoming.
- **Current number of switching cycles (read only)**
  Indicates how many switching cycles the pilot valve has performed since the last counter reset.

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2.5.7. Functions of the actuator (connected to the pilot valve of this channel)

- **Enable switching cycle counter diagnosis (read / write)**
  Defines whether a diagnosis message is generated when the warning limit for the switching cycle counter is exceeded.
- **Switching cycle counter warning limit (read / write)**
  Defines the value of the switching cycle counter at which a diagnosis message is generated as a warning.
- **Switching cycle counter reset**
  Triggers a reset of the corresponding switching cycle counter.
- **Date of the last switching cycle counter reset (read only)**
  Indicates when the switching cycle counter of the actuator was reset the last time.
- **Current number of switching cycles (read only)**
  Indicates how many switching cycles the actuator has performed since the last reset of the counter.

2.5.8. Functions of the diagnosis parameter

- **Group diagnosis (read / write)**
  Indicates whether group diagnostic messages should be generated.
- **Broken wire (read / write)**
  Indicates whether a diagnosis message is generated when an output port is open.
- **Short circuit (read / write)**
  Indicates whether a diagnosis message is generated in the event of a short circuit of the output port.

2.5.9. Why separate switching cycle counters for pilot valve and actuator?

Each electronic module provides two independent switching cycle counters (1x for pilot valve, 1x for actuator) for each channel, as the two devices (pilot valve on the island, actuator in the field) can also be serviced or replaced independently of each other.

Example:

On a process valve in the field the diaphragm and stuffing box packing are replaced in line with preventive maintenance.

- Actuator switching cycle counter can be reset;
- However, the pilot valve and its current number of switching cycles remain unaffected.

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2.6. Use of “HSP” and “SUP” under Siemens Step7 / PCS7

2.6.1. Hardware Support Package (HSP) for STEP7

From STEP7 V5.3 SP2 the HSP2033 can be re-installed for the hardware catalog.
The HSP2033 supplements the Decentralized Peripheral ET 200iSP with the 4 and 8-channel valve modules from AirLINE Ex.

2.6.2. Installation of the HSP2033:

→ The “hsp2033.zip” file is saved and extracted in a directory of your choice.

→ Open “HW config” in STEP 7.

→ Select the “Install extras / HW updates” menu command

→ In the subsequent dialog select and execute “Copy data carrier” (see screenshots “Installing HW updates” step 1-2).

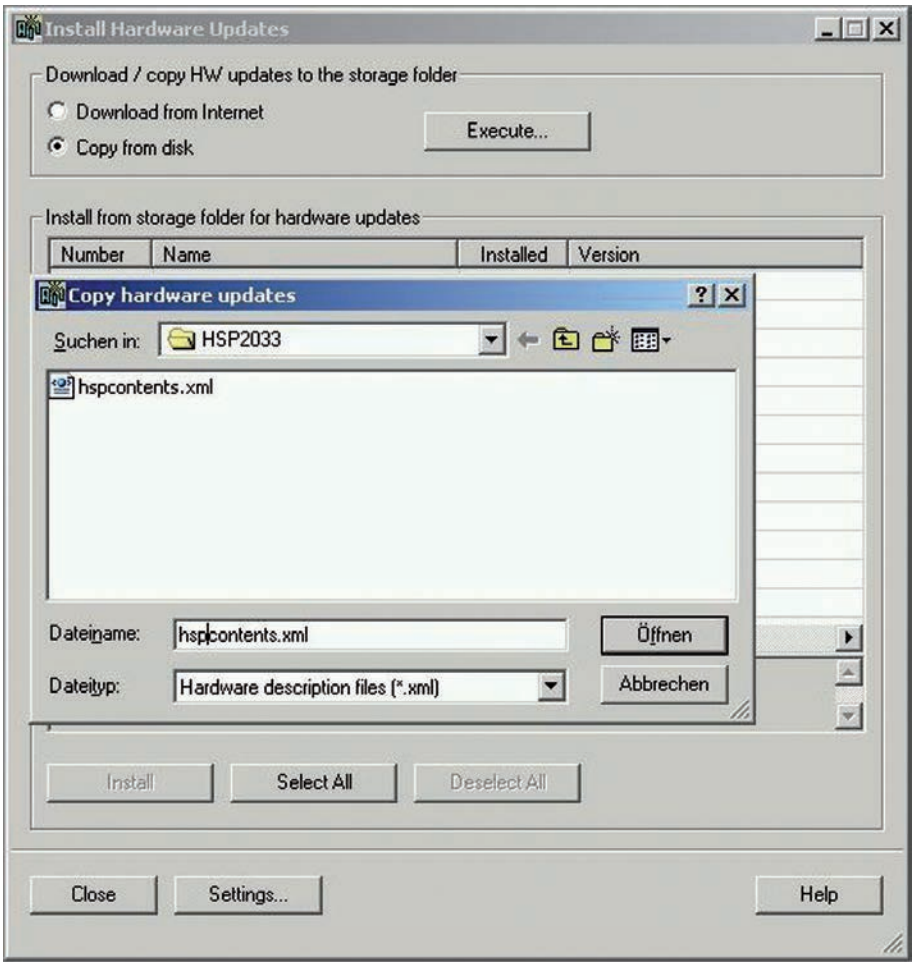

Fig. 17: Installing HW updates, step 1

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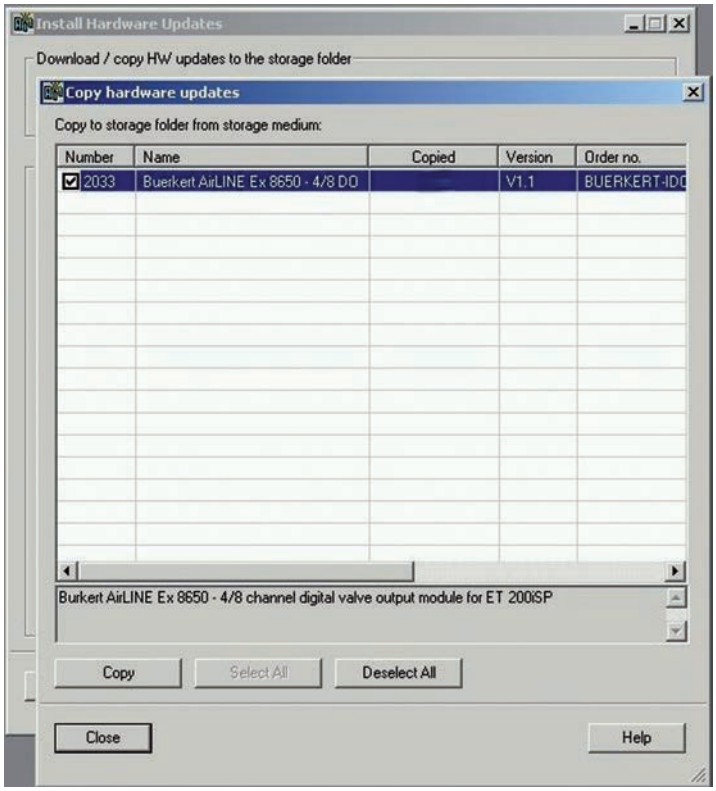

Fig. 18: Installing HW updates, step 2

→ When the copying process is complete, close the dialog field.

→ Now select the HSP with the number 2033 and acknowledge with install.

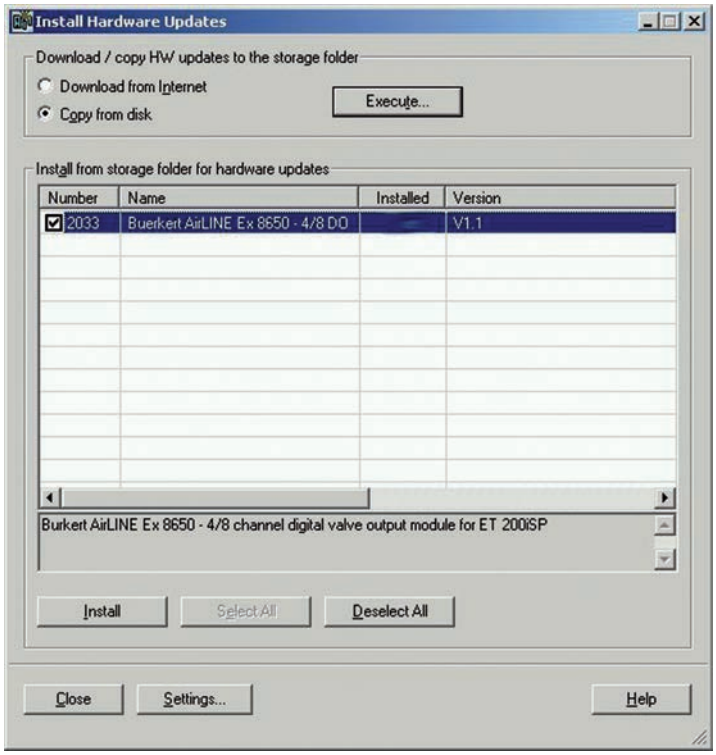

Fig. 19: Installing HW updates, step 3

When the installation is complete, the AirLINE Ex 8650 valve modules are included in the hardware catalog.

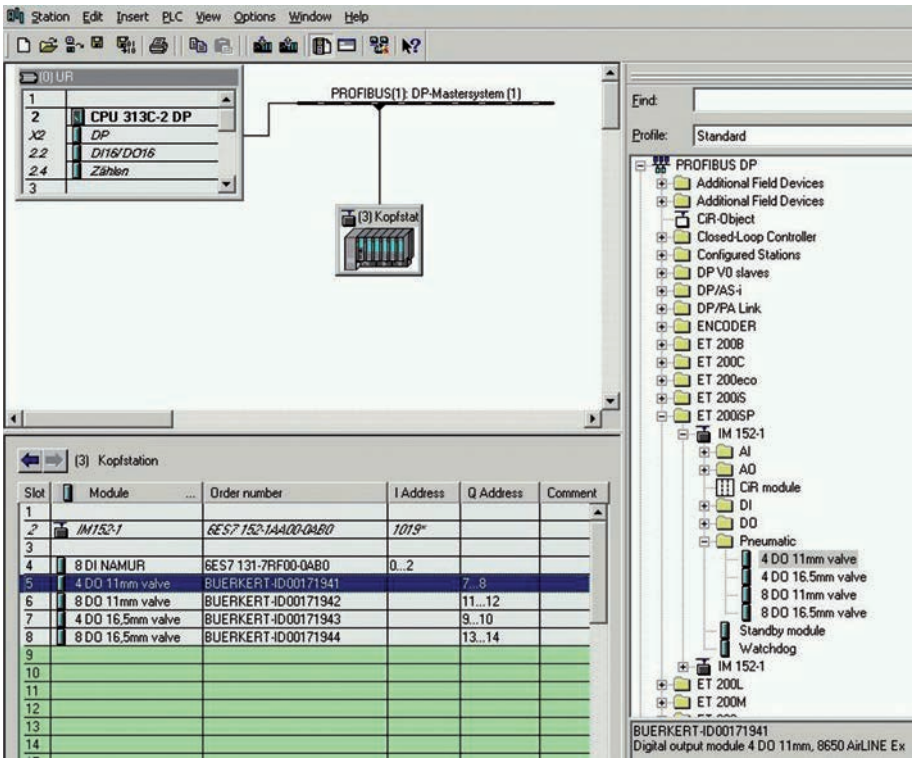

Fig. 20: HW updates, completely installed

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Changing the parameters

→ The parameters of a module can be changed via its “Object properties”.

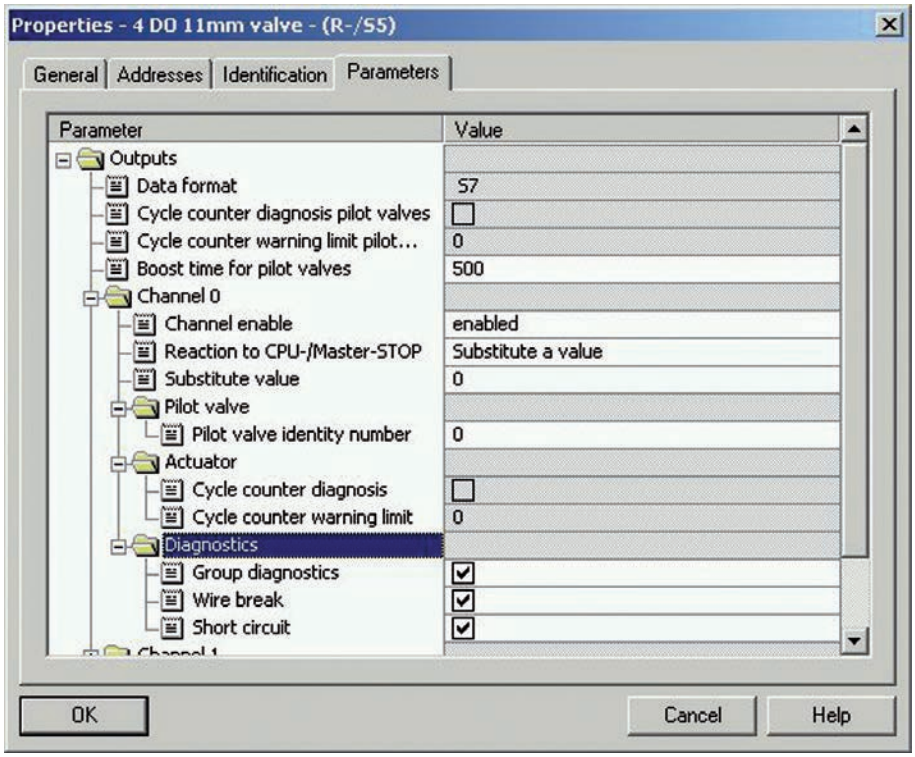

Fig. 21: Changing the parameters of a module

Currently the settings of the switching cycle counters can be changed via SIMATIC PDM only.

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2.7. Software Update Package (SUP) for PCS7

By installing the Software Update Package for AirLINE EX 8560, the full functional range of the Decentralized Peripheral ET 200iSP can also be used in PCS7 (from V6.1 SP1).

2.7.1. Installation of the HSP2033:

→ The “Buerkert_Pack.zip” file is saved and extracted in a directory of your choice.

→ Prior to setup, end all SIMATIC applications.

→ Start the “Buerkert_ET200iSP_SM.exe” file by double clicking and follow the instructions for setup.

The installation program checks whether the required STEP 7 programs or whether PCS 7 V6.1 + SP1 are available.

When the installation is complete, the AirLINE Ex 8650 valve modules are included in the hardware catalog of HW config.

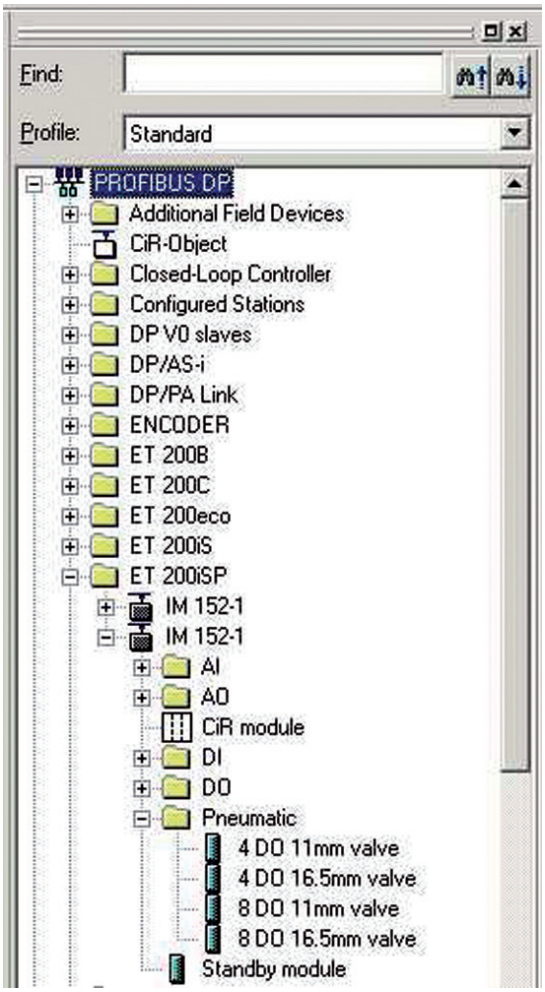

Fig. 22: Software Update Package

Currently the settings of the switching cycle counters can be changed via SIMATIC PDM only.

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The installation of the Software Update Package is recorded and can be checked under Start > SIMATIC > Information >"- Installed software".

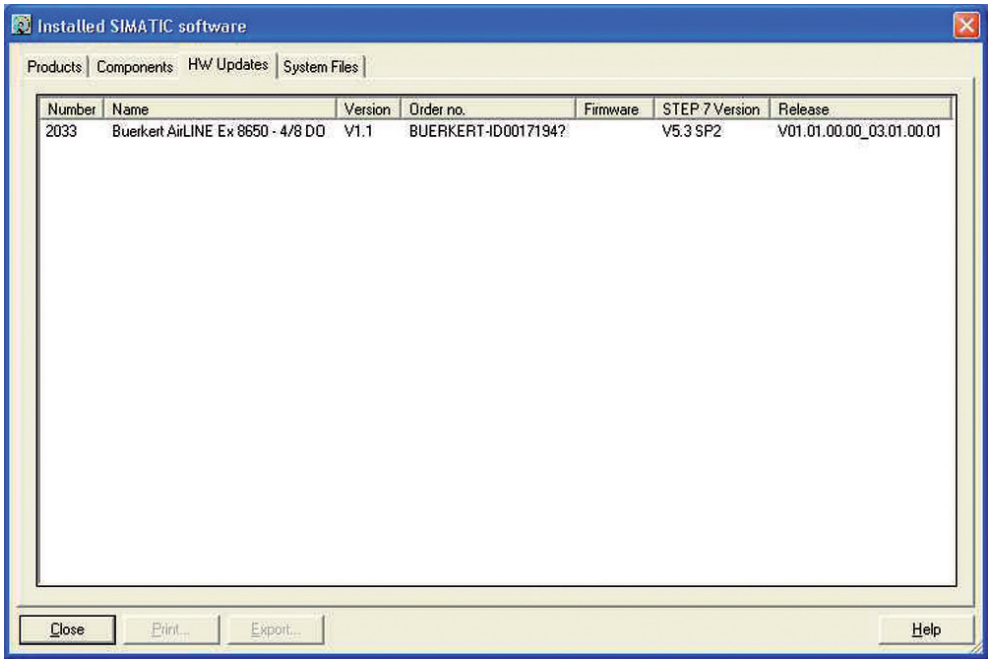

Fig. 23: SIMATIC Software

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3. SD CARD / SYSTEM SERIALIZATION DATA

The serialization data of completely installed systems of type 8650 can be provided as a data record.
The record includes the serial numbers of the valves, the electronic modules and the terminal module. The order always refers to the system configuration from left to right (serial number of the valve island – serial number of all electronic modules – serial number of all valves – serial number of all terminal modules)

The structure of a serialization data record is provided as an example in the chapter; Commissioning / SD-card / System Serialization Data / Serialization Data Record

The data record is on an sd-card, which is located in the storage compartment of the pressure gauge module.

The data is in common .xml format and can be easily worked on (i.e. for your facilities records) using a variety of tools (e.g. a simple text editor, browsers or a spreadsheet program).

3.1. Serialization Data Record

The following is an example of the structure of a serialization data record.

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```
<?xml version="1.0" encoding="ISO-8859-1" ?>
- <VALFILE>
  + <Auftragsdaten>
  - <VALLISTE>
    - <LNR0000>
        <BEZ>Ventilinsel</BEZ>
        <IDNRK>00180032</IDNRK>          ← Valve island ID number
        <SNR>001001</SNR>                ← Valve island serial number
      </LNR0000>
    - <LNR0001>
        <BEZ>Elektronikmodul</BEZ>
        <IDNRK>00171941</IDNRK>          ← ID number of the first electronic module
        <SNR>000042</SNR>                ← Serial number of the first electronic module
      </LNR0001>
    - <LNR0002>
        <BEZ>Elektronikmodul</BEZ>
        <IDNRK>00171941</IDNRK>          ← ID number of the second electronic module
        <SNR>000041</SNR>                ← Serial number of the second electronic module
      </LNR0002>
    - <LNR0003>
        <BEZ>Ventil</BEZ>
        <IDNRK>00173563</IDNRK>          ← ID number of the first valve
        <SNR>002290</SNR>                ← Serial number of the first valve
      </LNR0003>
    + <LNR0004>                          ┐
    + <LNR0005>                          │
    + <LNR0006>                          │
    + <LNR0007>                          ├ Data of the valves 2 - 7 hidden
    + <LNR0008>                          │
    + <LNR0009>                          │
    - <LNR0010>                          ┘
        <BEZ>Ventil</BEZ>
        <IDNRK>00173563</IDNRK>          ← ID number of the last valve
        <SNR>002277</SNR>                ← Serial number of the last valve
      </LNR0010>
    - <LNR0011>
        <BEZ>Terminalmodul</BEZ>
        <IDNRK>00173368</IDNRK>          ← ID number of the first terminal module
        <SNR>000044</SNR>                ← Serial number of the first terminal module
      </LNR0011>                         ┐
    + <LNR0012>                          ├ Data of the valves 2 and 3 hidden
    + <LNR0013>                          ┘
    - <LNR0014>
        <BEZ>Terminalmodul</BEZ>
        <IDNRK>00173369</IDNRK>          ← ID number of the last terminal module
        <SNR>000045</SNR>                ← Serial number of the last terminal module
      </LNR0014>
    </VALLISTE>
  </VALFILE>
```

Example of a serialization data record

Maintenance and Repair

Contents

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1. SAFETY INSTRUCTIONS

DANGER!

Risk of injury from high pressure in the equipment!

- Before loosening the lines and valves, turn off the pressure and vent the lines.

Risk of injury due to electrical shock!

- Before reaching into the system, switch off the power supply and secure to prevent reactivation!
- Observe applicable accident prevention and safety regulations for electrical equipment!
  (It is permitted to replace electronic modules and valves even while the power is on.)

WARNING!

Risk of injury from improper repair work!

- Maintenance may be carried out by authorized technicians only and with the appropriate tools!

Risk of injury from unintentional activation of the system and an uncontrolled restart!

- Secure system from unintentional activation.
- Following maintenance, ensure a controlled restart.

NOTE!

Operate the system with direct current only!
To avoid damaging the system, use only direct current as the power supply for the system.

Avoid pressure drop!
To avoid a pressure drop, the compressed air supply to the system must be as large as possible.

Electrostatic sensitive components / modules!

- The device contains electronic components which react sensitively to electrostatic discharge (ESD). Contact with electrostatically charged persons or objects is hazardous to these components. In the worst case scenario, they will be destroyed immediately or will fail after start-up.
- Observe the requirements in accordance with EN 61340-5-1 and 5-2 to minimise or avoid the possibility of damage caused by sudden electrostatic discharge!
- Also ensure that you do not touch electronic components when the power supply voltage is present!

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2. MAINTENANCE

2.1. Module Maintenance

The modules of the AirLINE Ex system are maintenance-free when operated in accordance with the instructions in this operating manual.

2.2. Cleaning

DANGER!

Danger of explosion caused by electrostatic charge!

If there is a sudden discharge from electrostatically charged devices or persons, there is a danger of explosion in the EX area.

- Clean the device surface of the solenoid valve by gently wiping it with a damp cloth only.

Clean the system with a damp, lint-free cloth only.

Solvents or alcohol are not suitable for cleaning. They may attack the plastic parts.

2.3. Diagnosis Function

2.3.1. Switching Cycle Counter

The current counter readings are stored in the modules at regular intervals where they are safe even in the event of a power failure.

If the operating voltage is frequently switched off, it is possible that individual switching cycles are not recorded in the remanent memory so that the stored number of switching cycles is slightly lower than the actual number of switching cycles performed.

Details of this can be found in the chapter *Configuration and Function of the Modules / Electronic Modules and Commissioning / Initial Start-up.*

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3. MAINTENANCE

DANGER!

Risk of injury from high pressure in the equipment!

- Before loosening the lines and valves, turn off the pressure and vent the lines.

3.1. Changing Valves During Operation

3.1.1. Installation instructions

Before replacing the valve, ensure that the relevant equipment is in an electrically safe state.

If the respective valve position does not feature a P-shutoff, first depressurize the system.

If the valves mounted on modules with P-shutoff are changed under pressure, only a maximum of four valves may be removed at the same time.

When the valve is being removed, a relatively large amount of air is initially released, as the P-shutoff cannot close until the required pressure difference is reached. However, as the automatic shut-off considerably reduces the exhaust air, only a low residual leakage remains when the P-shutoff is closed.

3.1.2. Replacement

→ Loosen the two screws on the valve and remove the valve.

→ When installing the new valve, ensure that the seal has been inserted correctly.

→ Tighten the valve to the tightening torques indicated in the operating instructions.

→ When installing the valve, ensure that the service ports are also pressurized in the corresponding rest position of the valve until it switches over. As a result, a connected actuator can perform a movement according to the pressurization.

→ Ensure that these actuator movements cannot cause any damage or unwanted operations in the equipment.

3.2. Changing Electronic Modules During Operation

Corresponding with the Siemens electric I/O modules, the electronic modules of the AirLINE EX system can be changed during operation.

The interface module only permits the removal of **one** electronic module. If several electronic modules are removed at the same time, the station signals a malfunction.

If changing the electronic modules during operation, proceed as follows:

→ To replace an electronic module, first remove all valves connected to it (as described above). In the case of unused valve positions, remove the cover flaps from the electric contacts if required.

→ Remove electronic module. The procedure is described in the chapter “Installation / Removal of Individual Segments”.

→ The replaced module is installed in reverse sequence.

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3.3. Troubleshooting

Fault	Possible cause	Remedy
Valves do not switch	No or insufficient operating voltage.	→ Check the electrical connection. → Ensure the correct operating voltage.
	Manual override not in neutral position.	→ Move the manual override to the neutral position.
	No or insufficient pressure supply.	→ Design the pressure supply system with as large a volume as possible (also with upline devices such as pressure regulators, air conditioners, shut-off valves, etc.) Minimum operating pressure ≥ 2.5 bar
	Incorrect configuration.	→ Use the corresponding module from the hardware catalogue.
	Channel not enabled for use.	→ Change setting of the parameters (compare section “Acyclic parameters of the AirLINE Ex modules” in the chapter “Start-up”)
	Too low value set for “Boost time”.	
	Fuse in the module tripped due to a short circuit (can only occur in extreme cases).	→ Replace the electronic module. Check whether related valves are faulty or damaged.
Valves switch with a delay or blow off at the exhaust ports.	No or insufficient pressure supply.	→ Design the pressure supply system with as large a volume as possible (also with upline devices such as pressure regulators, air conditioners, shut-off valves, etc.) Minimum operating pressure ≥ 2.5 bar
	Valves are not in their normal position (current-free) during the pressure build-up.	→ Pressurize the valve block before switching the valves!
	Inadequate venting of the exhaust air ducts due to too small or soiled silencers (back pressures).	→ Use adequately dimensioned silencers or expansion vessels. → Clean any soiled silencers.
	Contamination or foreign matter in the pilot control or main valve.	→ Replace the valve.
Valve blocks leaking.	Missing or pinched O-rings between the modules. Missing or wrongly positioned profile seals between valves and basic pneumatic module.	→ Determine the location or the leaks or missing seals. → Install missing seals or replace damaged seals.

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Fault	Possible cause	Remedy
SF LED lights up.	Wrong configuration.	→ Use the corresponding module from the hardware catalogue.
	Valve diagnosis trips (short circuit, open outlet port).	→ Check the proper installation of the valve. → Replace defective valves. → Deactivate the diagnosis for valve positions not in use.
	Module does not start due to internal current limit (short circuits at the outlet ports).	→ Remedy the short circuits (defective valves at the outlet ports) → Carry out a voltage reset of the module / system.

If an ET200iSP station has started once with Profibus address X, the address can be changed as follows:

→ Switch off the station.

→ Set the address 0 (all DIP switches in position OFF).

→ Switch on the station and wait approx. 10 seconds.

→ Switch off the station and wait approx. 10 seconds again.

→ Set the desired new address Y.

→ Switch on the station.

The new address is stored.

3.4. Repair

If a repair is necessary, send the module to your local Bürkert subsidiary or contact our After-Sales Service.

Address and telephone number can be found in the chapter „General Information / Scope of Supply“.

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Storage, Packaging, Transport, Disposal

Contents

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1. STORAGE

NOTE!

Incorrect storage may damage the device.

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

1.1. Storage Conditions for Modules in Original Packaging

The following information applies to modules transported in their original packaging.

Requirement	Admissible range
Free fall	≤1 m
Temperature	-40 to +70 °C
Temperature change	20 K/h
Atmospheric pressure	1080 to 660 hPa (corresponding to an altitude of -1000 m to +3500 m)
Relative humidity	5 to 95 %, non-condensing

AirLINE Ex surpasses the requirements of IEC 61131-2 regarding transport conditions.

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1.2. Shutdown

1.2.1. Safety Instructions

DANGER!

Risk of injury from high pressure in the equipment!

- Before loosening the lines and valves, turn off the pressure and vent the lines.

Risk of injury due to electrical shock!

- Before reaching into the system, switch off the power supply and secure to prevent reactivation!
- Observe applicable accident prevention and safety regulations for electrical equipment!
  (It is permitted to replace electronic modules and valves even while the power is on.)

WARNING!

Risk of injury from improper installation!

- Removal may be carried out by authorized technicians only and with the appropriate tools!

Risk of injury from unintentional activation of the equipment and an uncontrolled restart!

- Secure equipment to prevent unintentional activation.

1.2.2. Shutting down the system

→ Vent the system.

→ Switch off the power supply.

→ Remove the modules. The procedure is described in the chapter “Installation / Removal of Individual Segments”.

→ Keep the modules in their original packaging or in similar protective packaging.

1.2.3. Restarting the system

→ Unpack and acclimatize the modules before restarting the system.

→ Start-up is described in the chapter “Commissioning / Initialization”.

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2. PACKAGING, TRANSPORT

NOTE!

Transport damages!

Inadequately protected equipment may be damaged during transport.

- During transportation protect the device against wet and dirt in shock-resistant packaging.
- Avoid the action of heat and cold which can lead to temperatures above or below the admissible storage temperature.
- Protect the electrical interfaces and pneumatic connections from damage by placing protective caps on them.

2.1. Transport Conditions for Modules in Original Packaging

The following information applies to modules transported in their original packaging.

Requirement	Admissible range
Free fall	≤1 m
Temperature	-40 to +70 °C
Temperature change	20 K/h
Atmospheric pressure	1080 to 660 hPa (corresponding to an altitude of -1000 m to +3500 m)
Relative humidity	5 to 95 %, non-condensing

AirLINE Ex surpasses the requirements of IEC 61131-2 regarding transport conditions.

3. DISPOSAL

→ Dispose of the device and packaging in an environmentally friendly manner.

NOTE!

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

- Observe the relevant disposal and environmental protection regulations.

Note:

Observe national waste disposal regulations.

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Annex

Contents

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1. EC DECLARATION OF CONFORMITY

We hereby declare that the products with the designation:

Electrical and Pneumatic Automation System AirLINE Ex Type 8650

satisfy the requirements which are specified in the Council Directives to approximate the laws of the member states:

- **Low Voltage Directive (LVD) (2006/95/EC)**
- **Electromagnetic compatibility Directive (2004/108/EC)**
- **Pressure Equipment Directive (97/23/EC)**
- **ATEX-Directive (94/9/EC)**

One or several of the following standards were used to assess the products concerning compliance with the **Low Voltage Directive (2006/95/EG):**

EN 50178	Electronic equipment for use in power installations
EN 60730-1	Automatic electrical controls for household and similar use - Part 1: General requirements
EN 60664-1	Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests
EN 60204-1	Safety of machinery – Electrical equipment of machines - Part 1: General requirements
EN 60529	Degrees of protection provided by enclosures (IP code)
EN 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements

Additional requirements for solenoid valves:

DIN VDE 0580	Electromagnetic devices and components - General specifications

One or several of the following standards were used to assess the products concerning the **Directive on Electromagnetic Compatibility (2004/108/EC):**

EN 61000-3-2	Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current <= 16 A per phase)
EN 61000-3-3	Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current <=16 A per phase and not subject to conditional connection.
EN 61000-6-2	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
EN 61000-6-4	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

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One or several of the following standards have been used to assess the products with respect to **Pressure Equipment Directive (97/23/EG)**:

EN 60730-1	Automatic electrical controls for household and similar use - Part 1: General requirements
EN 60730-2-8	Automatic electrical controls for household and similar use - Part 2-8: Particular requirements for electrically operated water valves, including mechanical requirements

The products have been subjected to the following conformity assessment procedure:

Module A	**Internal production control**

The Pressure Equipment Directive for products with a nominal voltage < 50V is applied to the CE mark only for equipment which has a nominal width > 25 mm and controls gases belonging to Group 1 or vapour or equipment which has a nominal width > 32 mm and controls gases belonging to Group 2 and the product is within the range > 1,000 and < 3,500 for the calculation nominal pressure x nominal width.

The products with a nominal voltage >= 50V with respect to Pressure Equipment Directive (97/23/EC) are assessed in Article 1 Paragraph 3.6 of this directive, according to which the equipment is measured by the Low Voltage Directive and therefore does not drop below the scope of the Pressure Equipment Directive.

For the assessment of the products according to the **ATEX directive (94/9/EC)** one or several of the following standards were used. The used standards are listed in the EC Type Examination Certificate.

EN 60079-0 (replaced EN 50014)	Electrical apparatus for explosive gas atmospheres - Part 0: General requirements
EN 60079-1 (replaced EN 50018)	Electrical apparatus for explosive gas atmospheres - Part 1: Flameproof enclosures „d“
EN 60079-7 (replaced EN 50019)	Explosive atmospheres - Part 7: Equipment protection by increased safety „e“
EN 60079-11 (replaced EN 50020)	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety „i“
EN 60079-15 (replaced EN 50021)	Electrical apparatus for explosive gas atmospheres - Part 15: Construction, test and marking of type of protection „n“ electrical apparatus
EN 60079-18 (replaced EN 50028)	Electrical apparatus for explosive gas atmospheres - Part 18: Construction, test and marking of type of protection encapsulation „m“ electrical apparatus
EN 61241-0 (replaced partially EN 50281-1-1)	Electrical apparatus for use in the presence of combustible dust - Part 0: General requirements
EN 61241-1 (replaced partially EN 50281-1-1)	Electrical apparatus for use in the presence of combustible dust - Part 1: Protection by enclosures „tD“

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The following standards were also used to assess non-electrical equipment and equipment in the filling station area:

EN 13463-1	Non-electrical equipment for potentially explosive atmospheres - Part 1: Basic method and requirements
EN 13617-1	Petrol filling stations - Part 1: Safety requirements for construction and performance of metering pumps, dispensers and remote pumping units

The production of electrical equipment, for which an EC-type examination certificate is available, is monitored by;

Physikalisch Technische Bundesanstalt

Bundesallee 100

38116 Braunschweig

Such units are labeled with CE0102.

The EC-type examination certificate comes with the operations manual, where the number can also be found. As a general

rule, the standards found in the EC-type examination certificate are valid.

Corporate Quality, Uwe Schlauch

Bürkert Werke GmbH & Co. KG

Christian-Bürkert-Straße 13-17

74653 Ingelfingen | Germany

Ingelfingen, 02. 02. 2007

(This document was issued electronically and is therefore valid without signature)

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1.1. Standards used for CSA-, FM-Ex and IEC-Ex-certification

For the CSA-certification, the following standards have been applied:

CAN/CSA 22.2 No. 157-92

CAN/CSA 22.2 No. 213-M1987

CAN/CSA 22.2 E-60079-0 -07

CAN/CSA 22.2 E-60079-7 -03

CAN/CSA 22.2 E-60079-11 -02

ANSI/ISA-60079-0 (12.00.01)-2005

ANSI/ISA-60079-7 (12.16.01)-2002

ANSI/ISA-60079-11 (12.02.01)-2002

For the FM-Ex-certification, the following standards have been applied:

FM Class 3600-1998

FM Class 3610-2007

FM Class 3611-2004

FM 3810 - (ANSI/ISA-82.02.01-2004)

For the IEC-Ex-certification, the following standards have been applied:

IEC 60079-0 : 2004

IEC 60079-7 : 2006

IEC 60079-11 :1999

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1.2. Set-Up of the Type 8650 System for Certification Conformity

Observe the following regulations to ensure that the configuration of the system is authorized:

When converting or expanding a system, check whether the satisfied approvals are affected.

A type 8650 system can be placed at any chosen location between IM152 and the bus termination module of a SIMATIC ET200iSP station.

Set-up conformity for the type 8650 system is based on a left to right assembly order:

1. The left side of the system is to be capped with a terminal segment. This is based on the certified terminal module (Id.-Nr. 00173368).
2. After this, there are one or more valve segments – the 44 or 66 mm wide versions can be freely combined – based on the terminal modules (44 mm wide: id.-no. 00173370 or. 66 mm wide id.-no. 00173371).
   Details about the valve segments is found in the section *Valve Segments*.
3. The right side of the system is to be capped with a terminal segment.
   This is based on the certified terminal module (Id.-Nr. 00173369).
4. For larger systems or systems with larger flow volumes, additional terminal segments can be used between the valve segments.
   These are based on the certified terminal module (Id.-Nr. 00173368).

Valve segments

Valve segments 44 mm wide / 4-channel version:

The above mentioned terminal module is to be equipped with an electronic module (Id.-Nr. 00171941). This is to control the ex-i certified type 6104 or 6144 pilot valve.

If a valve slot is not in use, it must be equipped with a covering cap (Id.-Nr. 653670).

Valve segments 44 mm wide / 8-channel version:

The above mentioned terminal module is to be equipped with an electronic module (Id.-Nr. 00171942). This is to control the ex-i certified type 6144 pilot valve.

If a valve slot is not in use, it must be equipped with a covering cap (Id.-Nr. 653670).

Valve Segments 66 mm wide / 4-channel version:

The above mentioned terminal module is to be equipped with an electronic module (Id.-Nr. 00171943). This is to control the ex-i certified type 6106 pilot valve.
If a valve slot is not in use, it must be equipped with a covering cap (Id.-Nr. 653670).

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1.3. Certificates

- Terminal module (permit designation: KEMA 06ATEX0092)
- Electronic module (permit designation: KEMA 06ATEX0093)
- Valve type 6144 Ex-i (permit designation: PTB 07ATEX2048)
- Valve type 6104 Ex-i with solenoid"G1 642 735" (permit designation: PTB 01 ATEX2173)
- Valve type 6106 Ex-i with solenoid "AC21" (permit designation: PTB 01 ATEX2175).

1.3.1. Overview of the valves which can be used depending on the required approval and the electronic modules used

Electronic module	Max. zulässige Umgebungstemp. °C[1)]	Approval		
		ATEX	IEC-Ex	FM-Ex
171941 (4 channel 11mm)	55	6104, 6144	6104, 6144	In preparation
171942 (8 channel 11mm)	50	6144 (double valve model)	-	-
171943 (4 channel 16.5 mm)	55	6106	6106	In preparation
171944 (8 channel 16.5 mm)	Module not yet available			

[1)] Depending on the installation position, the limit may be lower – for details see EC-Type Examination Certificates

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2. EC-TYPE EXAMINATION CERTIFICATE TERMINAL MODULES

(Certificate number: KEMA 06ATEX0092, Issue Number: 2)

KEMA

Translation, original language: German

(1) **EC-TYPE EXAMINATION CERTIFICATE**

(2) **Equipment and protective systems intended for use in potentially explosive atmospheres - Directive 94/9/EC**

(3) EC-Type Examination Certificate Number: **KEMA 06ATEX0092** Issue Number: **2**

(4) Equipment: **Terminal modules for System Type 8650**

(5) Manufacturer: **Bürkert Werke GmbH & Co. KG**

(6) Address: **Christian Bürkert Straße 13 - 17, D74653 Ingelfingen, Germany**

(7) This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) KEMA Quality B.V., notified body number 0344 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the directive.

The examination and test results are recorded in confidential test report no. 2100816.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0 : 2006 **EN 50020 : 2002** **EN 60079-7 : 2003**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment according to the Directive 94/9/EC. Further requirements of the directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

II 2 G Ex e [ia/ib] IIC T4

This certificate is issued on 14 February 2007 and, as far as applicable, shall be revised before the date of cessation of presumption of conformity of (one of) the standards mentioned above as communicated in the Official Journal of the European Union.

KEMA Quality B.V.

C.G. van Es
Certification Manager

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PRODUCTS RvA C 001

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T +31 26 3 56 20 00 F +31 26 3 52 58 00 customer@kema.com www.kema.com Registered Arnhem 09085396

Experience you can trust.

(13) **SCHEDULE**

(14) **to EC-Type Examination Certificate KEMA 06ATEX0092** Issue No. **2**

(15) **Description**

The terminal modules TM-ES type 173368 and type 173369 and the terminal modules TM-VA type 173370 and type 173371 for system type 8650 serve for the electrical and mechanical connection of different modules. The complete system 8650 is intended to be integrated with the I/O-System of Siemens ET200iSP.

The terminal modules TM-ES type 173368 and type 173369 take the pneumatic supply module and also a EM-module with an optional mechanical manometer.
Terminal module type 173368 is connected to the left side and terminal module type 173369 is connected to the right side of System 8650.

Optionally, terminal module type 173368 can be connected between the left and the right side.

The terminal modules TM-VA type 173370 and type 173371 take the pneumatic ground module and also the electronic module for the control of the valves and are connected between the terminal modules TM-ES type 173368 and type 173369.

The terminal modules are equipped with an interface for the transfer of the supply (Power-Bus) and the data (ES-bus).

Ambient temperature range -20 °C … +70 °C.

Installation instructions

The complete system shall be installed according to the instruction manual for the "Distributed I/O System ET 200iSP" of Siemens.

(16) **Test Report**

KEMA No. 2100816.

(17) **Special conditions for safe use**

None.

(18) **Essential Health and Safety Requirements**

Assured by compliance with the standards listed at (9).

(19) **Test documentation**

As listed in Test Report No. 2100816.

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3. IEC-EX CERTIFICATE OF CONFORMITY TERMINAL MODULES

(Certificate Number: KEMA IECExKEM07.0033 , Issue Number: 0)

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	IECEx KEM 07.0033	issue No.:0	Certificate history:
Status:	**Current**		
Date of Issue:	**2007-11-07**	Page 1 of 3	
Applicant:	**Bürkert Werke GmbH & Co. KG** Christian Bürkert Straße 13 - 17, D74653 Ingelfingen, **Germany**		
Electrical Apparatus: *Optional accessory:*	**Terminal modules for System Typ 8650**		
Type of Protection:	**increased and intrinsic safety**		
Marking:	**Ex e [ia/ib] IIC T4**		
Approved for issue on behalf of the IECEx Certification Body:	C.G. van Es		
Position:	Certification Manager		
Signature: *(for printed version)*			
Date:	2007-11-07		

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:

KEMA Quality B.V.
Utrechtseweg 310
6812 AR Arnhem
The Netherlands

KEMA

IECEx Certificate of Conformity

Certificate No.: IECEx KEM 07.0033

Date of Issue: **2007-11-07** Issue No.: **0**

Manufacturer: **Bürkert Werke GmbH & Co. KG**
Christian Bürkert Straße 13 - 17,
D74653 Ingelfingen
Germany

Manufacturing location(s):

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacture'rs quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:
The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

IEC 60079-0 : 2004 Edition: 4.0	Electrical apparatus for explosive gas atmospheres - Part 0: General requirements
IEC 60079-7 : 2006-07 Edition: 4	Explosive atmospheres - Part 7: Equipment protection by increased safety "e"

*This Certificate **does not** indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

Test Report:

NL/KEM/ExTR07.0024/00

Quality Assessment Report:
DE/PTB/QAR07.0002/00

MAN 1000089724 EN Version: I Status: RL (released | freigegeben) printed: 22.05.2018

IECEx Certificate of Conformity

Certificate No.: IECEx KEM 07.0033

Date of Issue: **2007-11-07** Issue No.: **0**

Schedule

EQUIPMENT:
Equipment and systems covered by this certificate are as follows:

General product information:
The terminal modules TM-ES type 173368 and type 173369 and the terminal modules TM-VA type 173370 and type 173371 for system type 8650 serve for the electrical and mechanical connection of different modules. The complete system 8650 is intended to be integrated with the I/O-System of Siemens ET200iSP.

The terminal modules TM-ES type 173368 and type 173369 take the pneumatic supply module and also a EM-module with an optional mechanical manometer.Terminal module type 173368 is connected to the left side and terminal module type 173369 is connected to the right side of System 8650.

Optionally, terminal module type 173368 can be connected between the left and the right side.

The terminal modules TM-VA type 173370 and type 173371 take the pneumatic ground module and also the electronic module for the control of the valves and are connected between the terminal modules TM-ES type 173368 and type 173369.

The terminal modules are equipped with an interface for the transfer of the supply (Power-Bus) and the data (ES-bus).

Ambient temperature range -20 °C ... +70 °C.

Installation instructions
The complete system shall be installed according to the instruction manual for the "Distributed I/O System ET 200iSP" of Siemens.

CONDITIONS OF CERTIFICATION: NO

4. EC-TYPE EXAMINATION CERTIFICATE ELECTRONIC MODULES

(Bescheinigungs-Nummer: KEMA 06ATEX0093, Ausgabe Nummer: 3)

KEMA

Translation, original language: German

(1) **EC-TYPE EXAMINATION CERTIFICATE**

(2) Equipment and protective systems intended for use in potentially explosive atmospheres - Directive 94/9/EC

(3) EC-Type Examination Certificate Number: **KEMA 06ATEX0093** Issue Number: **3**

(4) Equipment: **Electronic modules id. no. 171941, no. 171942 and no. 171943 for System Type 8650**

(5) Manufacturer: **Bürkert Werke GmbH & Co. KG**

(6) Address: **Christian Bürkert Straße 13 - 17, D74653 Ingelfingen, Germany**

(7) This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) KEMA Quality B.V., notified body number 0344 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the directive.

The examination and test results are recorded in confidential test report no. 2108128.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0 : 2006 **EN 50020 : 2002**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment according to the Directive 94/9/EC. Further requirements of the directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

Ex **II 2 G Ex ib IIC T4**

This certificate is issued on 7 December 2007 and, as far as applicable, shall be revised before the date of cessation of presumption of conformity of (one of) the standards mentioned above as communicated in the Official Journal of the European Union.

KEMA Quality B.V.

C.G. van Es
Certification Manager

Page 1/3

PRODUCTS RvA C 001

KEMA Quality B.V. Utrechtseweg 310, 6812 AR Arnhem P.O. Box 5185, 6802 ED Arnhem The Netherlands
T +31 26 3 56 20 00 F +31 26 3 52 58 00 customer@kema.com www.kema.com Registered Arnhem 09085396

Experience you can trust.

MAN 1000089724 EN Version: I Status: RL (released | freigegeben) printed: 22.05.2018

KEMA

(13) **SCHEDULE**

(14) **to EC-Type Examination Certificate KEMA 06ATEX0093** Issue No. **3**

(15) **Description**

Electronic modules Valve output (EM-VA) id. no. 171941, id. no.171942 and id. no 171943 are modules for placement on a Terminal module (TM), used for the control of valves in a System Type 8650. The complete system 8650 is intended to be integrated with the Siemens I/O-System ET200iSP.

Module no. 171941 has to be used with valves type 6104-Ex-i with coil type G1 642 735 or valve type 6144-Ex-i
Module no. 171942 has to be used with valves type 6144-Ex-i.
Module no. 171943 has to be used with valves type 6106-Ex-i with coil type AC21

Ambient temperature -20 °C ... +55 °C

The relation between the ambient temperature and the mounting position for the different modules and valve types is given in the following table:

Module no.	Valve type	Ambient temperature horizontal position	Ambient temperature all other positions
171941	6104 or 6144- Ex-i	≤ 55 °C	≤ 50 °C
171942	6144- Ex-i	≤ 50 °C	≤ 50 °C
171943	6106-Ex-i	≤ 55 °C	≤ 50 °C

Electrical data

Electronic module - Valve module (EM-VA) id. no.171941, 171942 or 171943:

Power Bus circuit..... (connected through TM-EM) — in type of protection intrinsic safety Ex ib IIC, only for connection to the Power Bus circuit of the aforementioned I/O System.

From the safety point of view the module draws a current of 330 mA.

Data circuit..... (connected through TM-EM) — in type of protection intrinsic safety Ex ib IIC, only for connection to the Data circuit of the aforementioned I/O System.

Installation instructions

The complete system shall be installed according to the instruction manual for the "Distributed I/O System ET 200iSP" of Siemens.

(16) **Test Report**

KEMA No. 2108128.

MEAN-P-Ex55 v2.1

Page 2/3

(13) **SCHEDULE**

(14) **to EC-Type Examination Certificate KEMA 06ATEX0093** Issue No. **3**

(17) **Special conditions for safe use**

None.

(18) **Essential Health and Safety Requirements**

Assured by compliance with the standards listed at (9).

(19) **Test documentation**

As listed in Test Report No. 2108128.

5. IEC-EX CERTIFICATE OF CONFORMITY ELECTRONIC MODULES

(Certification Number: KEMA IECExKEM07.0032 , Issue Number: 0)

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	IECEx KEM 07.0032	issue No.:0	Certificate history:
Status:	**Current**		
Date of Issue:	**2007-11-07**	Page 1 of 3	

Applicant: **Bürkert Werke GmbH & Co. KG**
Christian Bürkert Straße 13 - 17,
D74653 Ingelfingen,
Germany

Electrical Apparatus: **Electronic modules for System Type 8650**
Optional accessory:

Type of Protection: **intrinsic safety**

Marking: **Ex ib IIC T4**

Approved for issue on behalf of the IECEx Certification Body: C.G. van Es

Position: Certification Manager

Signature:
(for printed version)

Date: 2007-11-07

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:

KEMA Quality B.V.
Utrechtseweg 310
6812 AR Arnhem
The Netherlands

KEMA

MAN 1000089724 EN Version: I Status: RL (released | freigegeben) printed: 22.05.2018

IECEx Certificate of Conformity

Certificate No.: IECEx KEM 07.0032

Date of Issue: **2007-11-07** Issue No.: **0**

Manufacturer: **Bürkert Werke GmbH & Co. KG**
Christian Bürkert Straße 13 - 17,
D74653 Ingelfingen,
Germany

Manufacturing location(s):

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacture'rs quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:
The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

IEC 60079-0 : 2004 Edition: 4.0	Electrical apparatus for explosive gas atmospheres - Part 0: General requirements
IEC 60079-11 : 1999 Edition: 4	Electrical apparatus for explosive gas atmospheres - Part 11: Intrinsic safety 'i'

*This Certificate **does not** indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

Test Report:

NL/KEM/ExTR07.0020/00

Quality Assessment Report:
DE/PTB/QAR07.0002/00

MAN 1000089724 EN Version: I Status: RL (released | freigegeben) printed: 22.05.2018

IECEx Certificate of Conformity

Certificate No.: IECEx KEM 07.0032

Date of Issue: **2007-11-07** Issue No.: **0**

Page 3 of 3

Schedule

EQUIPMENT:
Equipment and systems covered by this certificate are as follows:

Description
Electronic modules Valve output (EM-VA) id.no. 171941 and id.no. 171943 are modules for placement on a Terminal module (TM), used for the control of valves in a System Type 8650.
The complete system 8650 is intended to be integrated with the Siemens I/O-System ET200iSP.

Module no. 171941 has to be used with valves types 6104-Ex-i with coil type G1 642 735 or valve type 6144-Ex-i.

Module no. 171943 has to be used with valves types 6106-Ex-i with coil type AC21.

Ambient temperature: -20 °C ... +55 °C (horizontal mounting position);
-20 °C ... +50 °C (all other mounting positions).

Electrical data
Electronic module - Valve module (EM-VA) id. no. 171941 or id. no. 171943: Power Bus circuit (connected through TM-EM); in type of protection intrinsic safety Ex ib IIC, only for connection to the Power Bus circuit of the aforementioned I/O System. From the safety point of view the module draws a current of 330 mA.
Data circuit (connected through TM-EM); in type of protection intrinsic safety Ex ib IIC, only for connection to the Data circuit of the aforementioned I/O System.

Installation instructions
The complete system shall be installed according to the instruction manual for the "Distributed I/O System ET 200iSP" of Siemens.

CONDITIONS OF CERTIFICATION: NO

MAN 1000089724 EN Version: I Status: RL (released | freigegeben) printed: 22.05.2018

6. EC-TYPE-EXAMINATION CERTIFICATE 11 MM-VALVES TYPE 6104

(Certification Number: PTB 01ATEX2173)

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

EC-TYPE-EXAMINATION CERTIFICATE

(Translation)

(1) EC-TYPE-EXAMINATION CERTIFICATE

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 94/9/EC**

(3) EC-type-examination Certificate Number:

PTB 01 ATEX 2173

(4) Equipment: Magnet coil, type G1 642 735 -....-....

(5) Manufacturer: Bürkert Werke GmbH & Co

(6) Address: 74653 Ingelfingen; Germany

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report PTB Ex 01-20163.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50014:1997 + A1 + A2 **EN 50020:1994**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type-examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

Ex II 2 G EEx ia IIC T6 or EEx ia IIC T5

Zertifizierungsstelle Explosionsschutz Braunschweig, November 13, 2001
By order:

(signature) *L.S.*

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

sheet 1/2

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt.
In case of dispute, the German text shall prevail.

Physikalisch-Technische Bundesanstalt • Bundesallee 100 • D-38116 Braunschweig

MAN 1000089724 EN Version: I Status: RL (released | freigegeben) printed: 22.05.2018

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

(13) **S C H E D U L E**

(14) **EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2173**

(15) Description of equipment

The magnet coil, type G1 642 735 -....-.... is used to actuate valves which control non-flammable gaseous or liquid media. It is designed as rocker solenoid. The magnet coil is permanetly connected with the valve housing by ultrasonic welding and, therefore, can be used only in combination with a valve body. The equipment is suitable for single mounting or block mounting depending on the supplied power, the temperature class and the ambient temperature. For limitation of the breaking overvoltage diodes are connected in parallel to the coil. The effective internal inductance is negligibly low.

Electrical data

Supply	only for connection to certified intrinsically safe circuits with the following maximum values: U_i = 35 V I_i = 0.9 A P_i = see table in the operating instructions

(16) Test report PTB Ex 01-20163

(17) Special conditions for safe use

none

(18) Essential health and safety requirements

met by compliance with the standards mentioned above

Zertifizierungsstelle Explosionsschutz — Braunschweig, November 13, 2001
By order:

(signature) *L.S.*

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

2 pages, correct and complete as regards content.
By order:

Dr.-Ing. Johannsmeyer — Braunschweig, February 2, 2004
Regierungsdirektor

sheet 2/2

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt.
In case of dispute, the German text shall prevail.

Physikalisch-Technische Bundesanstalt • Bundesallee 100 • D-38116 Braunschweig

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

1st SUPPLEMENT

according to Directive 94/9/EC Annex III.6

to EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2173

(Translation)

Equipment: Solenoid, type G1 642 735 -....-....

Marking: Ⓔx **II 2 G EEx ia IIC T6/T5/T4**

Manufacturer: Bürkert Werke GmbH & Co.

Address: Christian-Bürkert-Straße 13-17
74653 Ingelfingen, Germany

Description of supplements and modifications

The solenoid, type G1 642 735 -....-.... , may in future also be manufactured in compliance with the test documents shown in the Test Report.

For identification of the solenoids, an in-company code will be used. Under this code, the intrinsically safe solenoids have the identification Nos. EXI/01, EXI/02 and EXI/03.

The solenoid type series are complemented to include type EXI/03 with a coil resistance of 125 Ω. The geometry of the coil will not be changed.

For the relationship between type of protection, temperature class, acceptable ambient temperature range, and type of installation for type EXI/03, reference is made to the table below:

Type of protection	Temperature class	$T_{U\,max}$	Installation
EEx ia IIC	T4	-40 ... +70 °C	Block-type

The electrical data will be complemented.

Electrical data (for all types of coils)

Supply ..... Only for connection to certified intrinsically safe circuits

Maximum values

U_i = 35 V
I_i = 0.9 A
P_i see table in the instructions for operation

L_i negligibly low
C_i negligibly low

Sheet 1/2

MAN 1000089724 EN Version: I Status: RL (released | freigegeben) printed: 22.05.2018

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

1st SUPPLEMENT TO EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2173

For the relationship between type name and coil data, reference is made to the table below:

Type	$U_{i\,min}$	$I_{i\,min}$	Coil resistance
EXI/01	9.3 V	29 mA	320 Ω
EXI/02	11.7 V	23 mA	510 Ω
EXI/03	6.1 V	49 mA	125 Ω

All other data shall also apply to this 1st supplement without any alterations.

Test report: PTB Ex 06-26066

Zertifizierungsstelle Explosionsschutz
By order:

Braunschweig, June 13, 2006

Dr.-Ing. U. Johannsmeyer
Direktor und Professor

MAN 1000089724 EN Version: I Status: RL (released | freigegeben) printed: 22.05.2018

7. IEC-EX CERTIFICATE OF CONFORMITY 11 MM-VALVES TYPE 6104

Certification Number: PTB06.0101)

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	**IECEx PTB 06.0101**	Issue No.: **0**
Status:	**Current**	
Date of Issue:	**2007-04-18**	Page **1** of **3**
Applicant:	**Bürkert Werke GmbH & Co. KG** Christian-Bürkert-Str. 13-17 D-74653 Ingelfingen **Germany**	
Electrical Apparatus: *Optional accessory:*	**Magnet coil type G1 642 735-....-...**	
Type of Protection:	**Intrinsic safety**	
Marking:	**Ex ia IIC T6 resp. Ex ia IIC T5**	

Approved for issue on behalf of the IECEx Certification Body: Dr.-Ing. Ulrich Johannsmeyer

Position: Department Head "Intrinsic Safety and Safety of Systems"

Signature: (for printed version)

Date: 2007-05-10

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:

Physikalisch-Technische Bundesanstalt (PTB)
Bundesallee 100
38116 Braunschweig
Germany

MAN 1000089724 EN Version: I Status: RL (released | freigegeben) printed: 22.05.2018

IECEx Certificate of Conformity

Certificate No.: **IECEx PTB 06.0101**

Date of Issue: **2007-04-18** Issue No.: **0**

Page **2** of **3**

Manufacturer: **Bürkert Werke GmbH & Co. KG**
Christian-Bürkert-Str. 13-17
D-74653 Ingelfingen
Germany

Manufacturing location(s):

Bürkert Werke GmbH & Co. KG
Landauerstr. 24
D-74582 Gerabronn
Germany

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacture'rs quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:
The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

IEC 60079-0 : 2004 Edition: 4.0	Electrical apparatus for explosive gas atmospheres - Part 0: General requirements
IEC 60079-11 : 2006 Edition: 5	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"

*This Certificate **does not** indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

Test Report:

DE/PTB/ExTR07.0004/00

Quality Assessment Report:

DE/PTB/QAR07.0002/00

IECEx Certificate of Conformity

Certificate No.: **IECEx PTB 06.0101**

Date of Issue: **2007-04-18** Issue No.: **0**

Page **3** of **3**

Schedule

EQUIPMENT:
Equipment and systems covered by this certificate are as follows:

The magnet coil, type G1 642 735 -....-.... is used to actuate valves which control non-flammable gaseous or liquid media. It is designed as rocker solenoid. The magnet coil is permanently connected with the valve housing by ultrasonic welding and, therefore, can be used only in combination with a valve body. The equipment is suitable for single mounting or block mounting depending on the supplied power, the temperature class and the ambient temperature. For limitation of the breaking overvoltage diodes are connected in parallel to the coil. The effective internal inductance is negligibly low.

For further information see annex.

CONDITIONS OF CERTIFICATION: NO

MAN 1000089724 EN Version: I Status: RL (released | freigegeben) printed: 22.05.2018

8. EC-TYPE-EXAMINATION CERTIFCATE 16,5 MM-VALVES TYPE 6106

Certification Number: PTB 01ATEX2175)

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

(1) EC-TYPE-EXAMINATION CERTIFICATE

(Translation)

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 94/9/EC**

(3) EC-type-examination Certificate Number:

PTB 01 ATEX 2175

(4) Equipment: Magnet coil, type AC 21

(5) Manufacturer: Bürkert Werke GmbH & Co

(6) Address: Christian-Bürkert-Straße 13-17, 74653 Ingelfingen; Germany

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report PTB Ex 01-20162 .

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50014:1997 + A1 + A2 **EN 50020:1994**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type-examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

Ex II 2 G EEx ia IIC T6 and EEx ia IIC T5

Zertifizierungsstelle Explosionsschutz Braunschweig, November 19, 2001
By order:

(signature) *L.S.*

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

sheet 1/2

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt.
In case of dispute, the German text shall prevail.

Physikalisch-Technische Bundesanstalt • Bundesallee 100 • D-38116 Braunschweig

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

(13) **S C H E D U L E**

(14) **EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2175**

(15) Description of equipment

The magnet coil, type AC 21 is used to actuate valves which control non-flammable gaseous or liquid media. It is designed as rocker solenoid. The magnet coil is srewed onto the valve housing. Free-wheeling diodes are connected in parallel to the coil. The positive terminal is marked with (+). The internal inductance is negligibly low. For electrical connection one of the plug types, the upward cable head connector or the press-fitted strands shall be used. The equipment is suitable for single mounting or block mounting depending on the supplied power, the temperature class and the ambient temperature. It is supplied only from certified intrinsically safe circuits.

Electrical data

Supply	only for connection to certified intrinsically safe circuits with the following maximum values: U_i = 35 V I_i = 0.9 A P_i = see table in the operating instructions

(16) Test report PTB Ex 01-20162

(17) Special conditions for safe use

none

(18) Essential health and safety requirements

met by compliance with the standards mentioned above

Zertifizierungsstelle Explosionsschutz
By order:

(signature) *L.S.*

Dr.-Ing. U. Johannsmeyer
Regierungsdirektor

Braunschweig, November 19, 2001

2 pages, correct and complete as regards content
By order:

Dr.-Ing. Johannsmeyer
Regierungsdirektor

Braunschweig, February 11, 2004

sheet 2/2

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

1. SUPPLEMENT

according to Directive 94/9/EC Annex III.6

to EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2175

(Translation)

Equipment: Solenoid, type AC 21

Marking: Ⓔx **II 2 G EEx ia IIC T6/T5/T4**

Manufacturer: Bürkert Werke GmbH & Co.

Address: Christian-Bürkert-Straße 13-17, 74653 Ingelfingen, Germany

Description of supplements and modifications

The solenoid, type AC 21, may in future also be manufactured in compliance with the test documents shown in the Test Report.

For identification of the solenoids, an in-company code will be used. Under this code, the intrinsically safe solenoids have the identification Nos. EXI/21, EXI/22 and EXI/23.

The solenoid type series are complemented to include type EXI/23 with a coil resistance of 125 Ω. The geometry of the coil will not be changed.

For the relationship between type of protection, temperature class, acceptable ambient temperature range, and type of installation for type EXI/03, reference is made to the table below:

Type of protection	Temperature class	$T_{U\,max}$	Installation
EEx ia IIC	T4	-40 ... +100 °C	Block-type

The electrical data will be complemented.

Electrical data (for all types of coils)

Supply ..... Only for connection to certified intrinsically safe circuits

Maximum values

U_i = 35 V
I_i = 0.9 A
P_i see table in the instructions for operation

L_i negligibly low
C_i negligibly low

Sheet 1/2

MAN 1000089724 EN Version: I Status: RL (released | freigegeben) printed: 22.05.2018

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

1. SUPPLEMENT TO EC-TYPE-EXAMINATION CERTIFICATE PTB 01 ATEX 2175

For the relationship between type name and coil data, reference is made to the table below:

Type	$U_{i\,min}$	$I_{i\,min}$	Coil resistance
EXI/01	9.3 V	29 mA	320 Ω
EXI/02	11.7 V	23 mA	475 Ω
EXI/03	6.1 V	49 mA	125 Ω

All other data shall also apply to this 1st supplement without any alterations.

Test report: PTB Ex 06-26250

Zertifizierungsstelle Explosionsschutz
By order:

Dr.-Ing. U. Johannsmeyer
Direktor und Professor

Braunschweig, August 30, 2006

Sheet 2/2

MAN 1000089724 EN Version: I Status: RL (released | freigegeben) printed: 22.05.2018

9. IEC-EX CERTIFICATE OF CONFORMITY 16,5 MM-VALVES TYPE 6106

(Certification Number: PTB06.0102)

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	**IECEx PTB 06.0102**	Issue No.: **0**
Status:	**Current**	
Date of Issue:	**2007-04-18**	Page **1** of **3**
Applicant:	**Bürkert Werke GmbH & Co. KG** Christian-Bürkert-Str. 13-17 D-74653 Ingelfingen **Germany**	
Electrical Apparatus: *Optional accessory:*	**Magnet coil type AC21**	
Type of Protection:	**Intrinsic safety**	
Marking:	**Ex ia IIC T6 resp. Ex ia IIC T5**	

Approved for issue on behalf of the IECEx Certification Body: Dr.-Ing. Ulrich Johannsmeyer

Position: Department Head "Intrinsic Safety and Safety of Systems"

Signature: (for printed version)

Date: 2007-05-10

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:

Physikalisch-Technische Bundesanstalt (PTB)
Bundesallee 100
38116 Braunschweig
Germany

PTB

MAN 1000089724 EN Version: I Status: RL (released | freigegeben) printed: 22.05.2018

IECEx Certificate of Conformity

Certificate No.: **IECEx PTB 06.0102**

Date of Issue: **2007-04-18** Issue No.: **0**

Page **2** of **3**

Manufacturer: **Bürkert Werke GmbH & Co. KG**
Christian-Bürkert-Str. 13-17
D-74653 Ingelfingen
Germany

Manufacturing location(s):

Bürkert Werke GmbH & Co. KG
Landauerstr. 24
D-74582 Gerabronn
Germany

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacture'rs quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:
The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

IEC 60079-0 : 2004 Edition: 4.0	Electrical apparatus for explosive gas atmospheres - Part 0: General requirements
IEC 60079-11 : 1999 Edition: 4	Electrical apparatus for explosive gas atmospheres - Part 11: Intrinsic safety 'i'

*This Certificate **does not** indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

Test Report:

DE/PTB/ExTR07.0005/00

Quality Assessment Report:

DE/PTB/QAR07.0002/00

IECEx Certificate of Conformity

Certificate No.: **IECEx PTB 06.0102**

Date of Issue: **2007-04-18** Issue No.: **0**

Page **3** of **3**

Schedule

EQUIPMENT:
Equipment and systems covered by this certificate are as follows:

The magnet coil, type AC21 is used to actuate valves which control non-flammable gaseous or liquid media. It is designed as rocker solenoid. The magnet coil is screwed onto the valve housing. Free-wheeling diodes are connected in parallel to the coil. The positive terminal is marked with (+). The effective internal inductance is negligibly low. For electrical connection one of the plug types, the upward cable head connector or the press-fitted strands shall be used. The equipment is suitable for single mounting or block mounting depending on the supplied power, the temperature class and the ambient temperature. It is supplied only from certified intrinsically safe circuits.

For additional information see annex.

CONDITIONS OF CERTIFICATION: NO

MAN 1000089724 EN Version: I Status: RL (released | freigegeben) printed: 22.05.2018

10. EC-TYPE-EXAMINTATION CERTIFICATE 11 MM-VALVES TYPE 6144

(Certification Number: PTB 07ATEX2048)

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

EC-TYPE-EXAMINATION CERTIFICATE

(Translation)

(1)

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 94/9/EC**

(3) EC-type-examination Certificate Number:

PTB 07 ATEX 2048

(4) Equipment: Solenoid, type 6144

(5) Manufacturer: Bürkert Werke GmbH & Co.

(6) Address: Christian-Bürkert-Straße 13-17, 74653 Ingelfingen, Germany

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report PTB Ex 07-27199 .

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0:2006 **EN 60079-11:2007**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type-examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

II 2 G Ex ia IIC T6

Zertifizierungsstelle Explosionsschutz
By order:

Braunschweig, October 31, 2007

Dr.-Ing. U. Johannsmeyer
Direktor und Professor

sheet 1/6

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt.
In case of dispute, the German text shall prevail.

Physikalisch-Technische Bundesanstalt • Bundesallee 100 • D-38116 Braunschweig

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Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

(13) **S C H E D U L E**

(14) **EC-TYPE-EXAMINATION CERTIFICATE PTB 07 ATEX 2048**

(15) Description of equipment

The solenoid, type 6144 is a rocker valve intended for the control of non-flammable, gaseous or liquid media. It is designed as single valve or double valve.

The double valve consists of two single valves which are arranged consecutively in a common enclosure.

Depending on the supplied power, the temperature class and the maximum permissible ambient temperature, both variants are suitable for single mounting or butt-mounting.

The equipment is intended for application inside the hazardous area.

For relationship between design, temperature class, power rating and thermal data as well as the kind of mounting, reference is made to the following tables:

A) Single valve

i) type of protection Ex ia IIC T6

maximum permissible power	kind of mounting	permissible range of the ambient temperature
0.4 W	butt-mounting	-40 ... 40 °C
0.5 W	butt-mounting	-40 ... 30 °C
0.4 W	single mounting	-40 ... 55 °C
0.5 W	single mounting	-40 ... 50 °C
0.6 W	single mounting	-40 ... 45 °C
0.7 W	single mounting	-40 ... 40 °C
0.8 W	single mounting	-40 ... 35 °C

ii) type of protection Ex ia IIC T5

maximum permissible power	kind of mounting	permissible range of the ambient temperature
0.4 W	butt-mounting	-40 ... 55 °C
0.5 W	butt-mounting	-40 ... 45 °C

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Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE PTB 07 ATEX 2048

0.6 W	butt-mounting	-40 ... 40 °C
0.7 W	butt-mounting	-40 ... 35 °C
0.8 W	butt-mounting	-40 ... 25 °C
0.4 W	single mounting	-40 ... 70 °C
0.5 W	single mounting	-40 ... 65 °C
0.6 W	single mounting	-40 ... 60 °C
0.7 W	single mounting	-40 ... 55 °C
0.8 W	single mounting	-40 ... 50 °C
0.9 W	single mounting	-40 ... 45 °C
1 W	single mounting	-40 ... 40 °C
1.1 W	single mounting	-40 ... 35 °C

iii) type of protection Ex ia IIC T4

maximum permissible power	kind of mounting	permissible range of the ambient temperature
0.4 W	butt-mounting	-40 ... 90 °C
0.5 W	butt-mounting	-40 ... 80 °C
0.6 W	butt-mounting	-40 ... 75 °C
0.7 W	butt-mounting	-40 ... 70 °C
0.8 W	butt-mounting	-40 ... 60 °C
0.4 W	single mounting	-40 ... 105 °C
0.5 W	single mounting	-40 ...100 °C
0.6 W	single mounting	-40 ... 95 °C
0.7 W	single mounting	-40 ... 90 °C
0.8 W	single mounting	-40 ... 85 °C
0.9 W	single mounting	-40 ... 80 °C
1 W	single mounting	-40 ... 75 °C
1.1 W	single mounting	-40 ... 70 °C

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Physikalisch-Technische Bundesanstalt

PTB

Braunschweig und Berlin

SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE PTB 07 ATEX 2048

B) Double valve

j) type of protection Ex ia IIC T6

maximum permissible power	kind of mounting	permissible range of the ambient temperature
0.4 W	butt-mounting	-40 ... 35 °C
0.5 W	butt-mounting	-40 ... 25 °C
0.4 W	single mounting	-40 ... 50 °C
0.5 W	single mounting	-40 ... 45 °C
0.6 W	single mounting	-40 ... 40 °C
0.7 W	single mounting	-40 ... 30 °C
0.8 W	single mounting	-40 ... 25 °C

jj) type of protection Ex ia IIC T5

maximum permissible power	kind of mounting	permissible range of the ambient temperature
0.4 W	butt-mounting	-40 ... 50 °C
0.5 W	butt-mounting	-40 ... 40 °C
0.6 W	butt-mounting	-40 ... 30 °C
0.4 W	single mounting	-40 ... 65 °C
0.5 W	single mounting	-40 ... 60 °C
0.6 W	single mounting	-40 ... 55 °C
0.7 W	single mounting	-40 ... 45 °C
0.8 W	single mounting	-40 ... 40 °C
0.9 W	single mounting	-40 ... 35 °C
1 W	single mounting	-40 ... 30 °C

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Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE PTB 07 ATEX 2048

jjj) type of protection Ex ia IIC T4

maximum permissible power	kind of mounting	permissible range of the ambient temperature
0.4 W	butt-mounting	-40 ... 85 °C
0.5 W	butt-mounting	-40 ... 75 °C
0.6 W	butt-mounting	-40 ... 65 °C
0.7 W	butt-mounting	-40 ... 55 °C
0.8 W	butt-mounting	-40 ... 50 °C
0.9 W	butt-mounting	-40 ... 40 °C
1 W	butt-mounting	-40 ... 35 °C
0.4 W	single mounting	-40 ... 100 °C
0.5 W	single mounting	-40 ... 95 °C
0.6 W	single mounting	-40 ... 90 °C
0.7 W	single mounting	-40 ... 85 °C
0.8 W	single mounting	-40 ... 75 °C
0.9 W	single mounting	-40 ... 70 °C
1 W	single mounting	-40 ... 65 °C

Electrical data for both variants

Supply circuit ..... type of protection Ex ia IIC
only for connection to a certified intrinsically safe circuit

For relationship between the permissible maximum values for different input parameters, reference is made to the following table:

U_i [V]	15	18	20	22	25	28	30	35
I_i [mA]	900	440	309	224	158	120	101	73

C_i negligibly low
L_i negligibly low

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Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE PTB 07 ATEX 2048

(16) Test report PTB Ex 07-27199

(17) Special conditions for safe use

none

(18) Essential health and safety requirements

met by compliance with the standards mentioned above

Zertifizierungsstelle Explosionsschutz
By order:

Dr.-Ing. U. Johannsmeyer
Direktor und Professor

Braunschweig, October 31, 2007

11. IEC-EX CERTIFICATE OF CONFORMITY 11 MM-VALVES TYPE 6144

(Certification Number: IECEx PTB07.0063)

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	IECEx PTB 07.0063 issue No.:0	Certificate history:
Status:	**Current**	
Date of Issue:	**2008-01-09** Page 1 of 4	
Applicant:	**Bürkert Werke GmbH & Co. KG** Christian-Bürkert-Str. 13 - 17 D-74653 Ingelfingen **Germany**	
Electrical Apparatus: *Optional accessory:*	**Solenoid, type 6144**	
Type of Protection:	**Intrinsic Safety**	
Marking:	**Ex ia IIC T6**	
Approved for issue on behalf of the IECEx Certification Body:	Dr.-Ing. Ulrich Johannsmeyer	
Position:	Department Head "Intrinsic Safety and Safety of Systems"	
Signature: *(for printed version)*		
Date:	2008-01-11	

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:

Physikalisch-Technische Bundesanstalt (PTB)
Bundesallee 100
38116 Braunschweig
Germany

PTB

MAN 1000089724 EN Version: I Status: RL (released | freigegeben) printed: 22.05.2018

IECEx Certificate of Conformity

Certificate No.: IECEx PTB 07.0063

Date of Issue: **2008-01-09** Issue No.: **0**

Page 2 of 4

Manufacturer: **Bürkert Werke GmbH & Co. KG**
Landauer Str. 24
D-74582 Gerabronn, Germany
Germany

Manufacturing location(s):

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:
The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

IEC 60079-0 : 2004 Edition: 4.0	Electrical apparatus for explosive gas atmospheres - Part 0: General requirements
IEC 60079-11 : 2006 Edition: 5	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"

*This Certificate **does not** indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

Test Report:

DE/PTB/ExTR07.0068/00

Quality Assessment Report:
DE/PTB/QAR07.0002/00

IECEx Certificate of Conformity

Certificate No.: IECEx PTB 07.0063

Date of Issue: **2008-01-09** Issue No.: **0**

Page 3 of 4

Schedule

EQUIPMENT:
Equipment and systems covered by this certificate are as follows:

The solenoid, type 6144 is a rocker valve intended for the control of non-flammable, gaseous or liquid media. It is designed as single valve or double valve.The double valve consists of two single valves which are arranged consecutively in a common enclosure.

Depending on the supplied power, the temperature class and the maximum permissible ambient temperature, both variants are suitable for single mounting or butt-mounting.

The equipment is intended for application inside the hazardous area.

For further information see Technical Data.

CONDITIONS OF CERTIFICATION: NO

MAN 1000089724 EN Version: I Status: RL (released | freigegeben) printed: 22.05.2018

IECEx Certificate of Conformity

Certificate No.: IECEx PTB 07.0063

Date of Issue: **2008-01-09** Issue No.: **0**

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Additional information:

see Technical Data

IECEx Test Report > ExTR

IECEx Technical Report: DE/PTB/ExTR07.0068/00 details

ExTR :	
ExTR Reference Number *: (automatic numbering)	DE/PTB/ExTR07.0068/00
Status*:	Issued
ExTR Free Reference Number*:	DE/PTB/ExTR07.0068/00
Date of Issue*: (yyyy-mm-dd)	2007-12-14
List of Standards Covered*:	IEC 60079-0 (Ed.4.0); IEC 60079-11 (Ed.5)
Issuing ExTL*:	PTB - Physikalisch-Technische Bundesanstalt (PTB)
Endorsing ExCB*:	PTB - Physikalisch-Technische Bundesanstalt (PTB)
Manufacturer*:	Bürkert Werke GmbH & Co. KG Christian-Bürkert-Str. 13 - 17 D-74653 Ingelfingen
Country of Manufacture*:	Germany
Ex Protection*:	Intrinsic Safety "i"
Ratings:	
Product*:	Solenoid, type 6144
Model Reference*:	PTB 07 ATEX 2048
Related IECEx Certificates:	IECEx PTB 07.0063 issue: 0 [Current]
Comment:	none
Attachment:	

Last modified: 09.01.2008 13:31:54

IECEx Quality Assessment Repport: QARs

IECEx Quality Assessment Report: DE/PTB/QAR07.0002/00 details

QAR :

QAR Reference Number *: (automatic numbering)	DE/PTB/QAR07.0002/00
Related QARs:	DE/PTB/QAR07.0002/01
Status*:	Issued
QAR Free Reference Number*:	DE/PTB/04-24165
Date of Original Issue*: (yyyy-mm-dd)	2007-01-23
Audit Date*: (yyyy-mm-dd)	2007-06-04
Site(s) audited*:	Bürkert Werke GmbH & Co. KG Christian-Bürkert-Straße 13-17 74653 Ingelfingen Germany Bürkert Werke GmbH & Co. KG Landauer Straße 24 74653 Gerabronn Germany Bürkert Werke GmbH & Co. KG Schleifbachweg 40 74613 Öhringen Germany Bürkert + Cie. S.A.S. Triembach au Val 67220 Ville France
Issuing ExCB*:	PTB - Physikalisch-Technische Bundesanstalt (PTB)
Manufacturer*:	Bürkert Werke GmbH & Co. KG Christian-Bürkert-Straße 13-17 74653 Ingelfingen Germany
Country of Manufacture*:	Germany
Product information*:	Product groups: solenoids in the decisive type of protection "Encapsulation" , resp. "Intrinsic Safety" resp. "Flameproof Enclosure"; electronic modules in the decisive type of protection "Intrinsic Safety";, mechanical/electrical components for vapour recovery systems
Validity*: (yyyy-mm-dd)	2010-07-20
Protection concept*:	Ex m, Ex i, Ex d
Related IECEx Certificates: (automatic linking)	IECEx PTB 06.0101 issue: 0 [Current] IECEx PTB 06.0102 issue: 0 [Current] IECEx PTB 07.0021X issue: 0 [Current] IECEx KEM 07.0032 issue: 0 [Current] IECEx KEM 07.0033 issue: 0 [Current] IECEx PTB 07.0063 issue: 0 [Current]
Related Certificates: (manual insertion)	IECEx PTB 04.0016 IECEx PTB 05.0026 X IECEx PTB 06.0101 IECEx PTB 06.0102 IECEx PTB 07.0021 X
Comment:	This QAR is valid until 2010-07-20
Attachment:	

Last modified: 09.01.2008 13:30:56

bürkert
FLUID CONTROL SYSTEMS

MAN 1000089724 EN Version: I Status: RL (released | freigegeben) printed: 22.05.2018

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