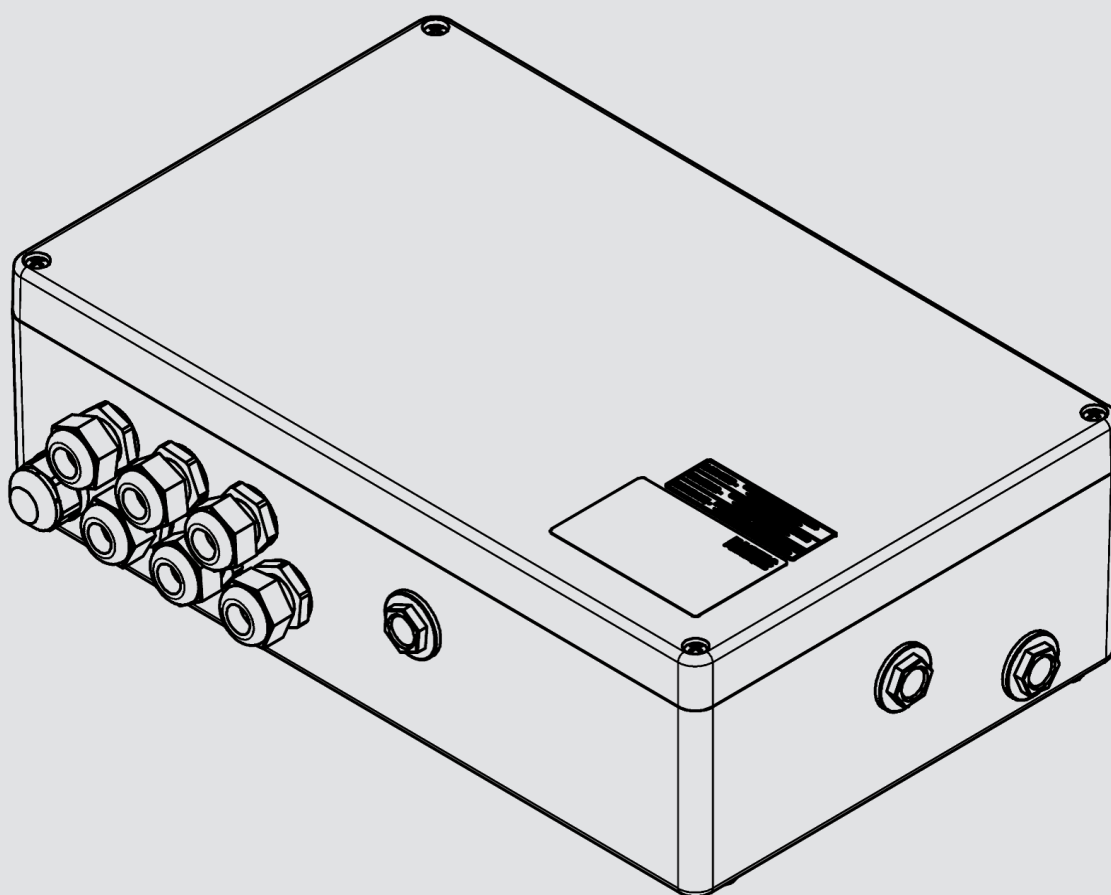


## Manual Ex p Control Unit APEX

Set SIEMENS



## **Operating Instructions Safety Manual**

**SIEMENS Version**  
ATEX / IECEx Zone 1

**Ex px Purge Unit  
Type 05-0089-0076**

Consisting of:  
Ex px Control Unit APEX, type 07-37A2-3211/2726  
Ex e Control Station, type 07-3103-2512/0639

**Ex p Purge Unit  
Type 05-0089-0077**

Consisting of:  
Ex px Control Unit APEX, type 07-37A2-3211/2726  
Ex e Control Station, type 07-3103-2512/0639  
p-Operator Panel, type 17-51P5-1111

Document number: 01-37A2-7D0004  
Revision: 0

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# 1 About these operating instructions



Please read carefully before putting the device into operation.  
Please observe the corresponding user manual.

This manual contains the information required for using the control unit in accordance with its intended purpose. It is addressed to technically qualified personnel.

Familiarity with and the technically perfect implementation of the safety instructions and warnings described in this manual are preconditions for safe installation and commissioning. The safety notes and warnings in these operating instructions are given in a general manner and only qualified personnel will have the necessary know how to interpret and implement them correctly in specific individual cases.

These operating instructions are an integral part of the scope of delivery even if, for logistical reasons, they can be ordered and delivered separately.

- ▶ Should you require further information, please request the required information from your local or responsible BARTEC branch. Read the operating instructions and in particular the safety instructions carefully before using the device.
- ▶ Keep the operating instructions during the entire service life of the device.
- ▶ Make the brief instructions accessible to all persons entrusted with handling the device.

## 1.1 Highlighting in the document

### 1.1.1 Warnings

Warnings are used in this user manual to warn of property damage and personal injury.

- Always read and follow these warnings.

Warnings are specially highlighted in this user manual and identified by symbols:

#### **DANGER**

**DANGER** indicates a hazardous situation which, if safety measures are not observed, may result in death or serious injuries with permanent damage.

#### **WARNING**

**WARNING** indicates a hazardous situation which, if safety measures are not observed, may result in serious injuries without permanent damage.

#### **CAUTION**

**CAUTION** indicates a hazardous situation which, if safety measures are not observed, can result in minor injuries.

#### **ATTENTION**

**ATTENTION** indicates a hazardous situation which, if the safety measures are not observed, may result in damage to property.

Explanation of the structure of a warning notice

#### **WARNING WORD**

**Identifies the source of danger, cause of danger or type of danger**

**Consequence of non-compliance with the described safety measure.**

- **Safety measure**

Example of a warning notice

#### **DANGER**

**Operation of the control unit in the case of damage!**

**Death or serious injury.**

- **Put the control unit out of operation and secure it against restart.**

### 1.1.2 Symbols and icons

| Symbol                                                                            | Explanation                                                                                                     |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
|  | Important notices and information for the effective, efficient and environmentally friendly use of the product. |
|  | Ex application; this symbol indicates special information for Ex applications                                   |
|  | Safety function, this symbolism indicates special notes for safe functions according to IEC 61508.              |

## 1.2 Technical changes

The current versions of the datasheets, operating instructions, certificates and EC declarations of conformity as well as information on new accessories can be downloaded from [www.bartec.de](http://www.bartec.de) under “Products” in the product area “Control and Connection Equipment”, or requested directly from BARTEC GmbH.

**Disclaimer:** We reserve the right to make technical changes. Changes, errors and printing errors do not justify claims for damages.

## 1.3 Languages

The original user manual is written in German. All other available languages are translations of the original user manual.

The user manual is available in German and English. If further languages are required, these must be requested from BARTEC or stated when placing the order.

## 2 Safety

### 2.1 Intended use

#### 2.1.1 Exclusive purpose

The Ex p control unit APEX serves exclusively as a controlling and monitoring device for pressurized enclosures and is intended for use in explosion group II, category 2G (EPL Gb) and temperature class T4.

Furthermore, the safety function of the Ex p control unit APEX satisfies the requirements on SIL 2 according to IEC 61508 and performance level “d” according to EN ISO 13849-1. The permissible operating data of the device used must be observed.

#### 2.1.2 Improper use

Any other use is not in accordance with the intended purpose and may lead to damage and accidents. The manufacturer will not be liable for any use beyond that of its intended purpose.

### 2.2 Qualification of staff

| Target group                    | Skills                                                                                                                                                                                                                                                                                                        |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Design / engineering            | <ul style="list-style-type: none"> <li>• Technical training</li> <li>• Knowledge and experience to identify and avoid hazards that may be caused by electricity</li> <li>• Understanding of the overall system</li> <li>• Configuration / programming</li> <li>• Special induction for the Ex area</li> </ul> |
| Electrician / installer         | <ul style="list-style-type: none"> <li>• Technical training</li> <li>• Knowledge and experience to identify and avoid hazards that may be caused by electricity</li> <li>• Understanding of the overall system</li> <li>• Special induction for the Ex area</li> </ul>                                        |
| Operator                        | <ul style="list-style-type: none"> <li>• Induction in operation by the owner</li> <li>• Special induction for the Ex area</li> </ul>                                                                                                                                                                          |
| Storage and transport companies | <ul style="list-style-type: none"> <li>• Loading and transport activities</li> <li>• Professional storage</li> </ul>                                                                                                                                                                                          |

## 2.3 Warranty

### WARNING

#### UNAUTHORISED MODIFICATIONS AND/OR ALTERATIONS TO THE CONTROL SYSTEM.

Explosion protection as well as design and manufacture in line with strain and safety requirements are no longer guaranteed.

- ▶ Before making any modifications or alterations, contact the manufacturer to obtain written approval.
- ▶ Use only original spare parts and original wearing parts.



#### Assumption of warranty

The manufacturer assumes the complete warranty only and exclusively for the spare parts ordered from the manufacturer.

As a basic rule, our “General Terms, Conditions of Sale and Delivery” apply. They are available to the managing operator on conclusion of contract at the latest. Warranty and liability claims for personal injury and damage to property are excluded if they are due to one or several of the following reasons:

- ➔ Improper use of the Exp control unit.
- ➔ Incorrect installation, commissioning, operation and maintenance of the Exp control unit.
- ➔ Non-compliance with the instructions in the manual with respect to transport, storage, assembly, commissioning, operation and maintenance.
- ➔ Unauthorized structural changes to the Exp control unit.
- ➔ Inadequate monitoring of parts that are subject to wear.
- ➔ Improperly performed repairs.
- ➔ Disasters caused by foreign bodies and force majeure.

We guarantee the Exp control unit and its accessories for a period of one year starting on the date of delivery from the Bad Mergentheim plant. This warranty covers all parts of the delivery and is restricted to the replacement free of charge or the repair of the defective parts in our Bad Mergentheim plant. Any packaging delivered here should be kept where possible. If necessary, the goods should be sent to us after written agreement. There is no entitlement to rectification at the site of installation.

## 2.4 Safety instructions

### 2.4.1 General

- ➔ Do not dry wipe or clean devices in hazardous areas!
- ➔ Do not open devices in hazardous areas.
- ➔ The general statutory regulations or guidelines relating to safety at work, accident prevention and environmental protection legislation must be observed, e.g. the German Industrial Health and Safety Ordinance (BetrSichV) or the applicable national ordinances.
- ➔ Wear suitable clothing and footwear in view of the risk of dangerous electrostatic charges.
- ➔ Avoid exposure to heat outside the specified temperature range (see Chapter “General technical data”).
- ➔ Avoid exposure to moisture.

### 2.4.2 Safety instructions for operation

#### Commissioning

- ➔ Before commissioning, check that all components and documents are available.

#### Inspection

- ➔ Under EN/IEC 60079-17, the owner of electrical systems in hazardous areas is obliged to have them checked by a qualified electrician to ensure that they are in a proper condition.

#### Maintenance

- ➔ For electrical systems, the relevant installation and operating regulations must be observed (e.g. Directive 99/92/EC, Directive 2014/34/EUEC, BetrSichV or the nationally applicable ordinances EN/IEC 60079-14 and the DIN VDE 0100 series)!
- ➔ Please observe the national waste disposal regulations for disposal.

#### Servicing

- ➔ Regular servicing is not necessary if the device is operated correctly in accordance with the installation instructions and ambient conditions.
- ➔ BARTEC recommends annual servicing and inspection.
- ➔ See Chapter “Maintenance and care”.

## Repairs

- ➔ Repairs on explosion-protected equipment may be done only by authorized persons working in accordance with the latest development in technology and using original spare parts. The applicable provisions must be observed.
- ➔ Repairs must be carried out in accordance with EN / IEC 60079-19.
- ➔ For SIL-qualified devices, only a corresponding electronics module with SIL qualification may be used.

All application settings must be re-entered. Therefore, you must conduct a restart after a repair. If you have saved the data of parameter assignment the first time you commissioned the Ex p control unit, you can transfer them back to the replacement control unit. Detailed information on the replacement of spare parts can be found in these operating instructions. After restart or transfer of the parameter assignment data, you must verify the parameters. Only then will the device be ready for operation again.

- ➔ For Ex applications, only one device and one electronic module may be used with corresponding Ex approval. Order the spare parts from your local representative. The serial number can be found on the type plate of the device, inside the enclosure.

## 2.5 Avoidance of damage to property

### 2.5.1 Short circuit due to improper connection

An incorrect connection of the power supply will destroy the electronics and void the warranty.

### 2.5.2 Triggering the safety function

Switching on again too quickly after switching off can cause internal voltage peaks in the power supply unit and thus trigger a safety function. After switching off the voltage path, wait at least 30 seconds before switching on again.

### 2.5.3 EMC-compliant connection

For the safe function of the Ex p control unit it is important to carry out the wiring in accordance with EMC. This includes observing the chapter Electrical connections with regard to EMC-compliant wiring and inductive loads.

### 2.5.4 Storage at an excessively high temperature

Store the Ex p control unit at the intended storage temperature since otherwise damage to the electronics or seals may occur. Ensure adequate air conditioning at high storage temperatures.

### 2.5.5 Aggressive cleaning agents

When selecting the correct cleaning agent, it is essential that it is suitable for use since otherwise damage may occur to seals and connections. Combustible products are generally not permitted.

### 2.5.6 Danger to health due to improper disposal

According to the European WEEE Directive, electrical and electronic equipment may not be disposed of with household waste. Their components must be sent separately for recycling or disposal because toxic and hazardous components can cause long-term damage to health and the environment if not disposed of properly.

As consumers, you are obliged under the Electrical and Electronic Equipment Act (ElektroG) to return electrical and electronic equipment at the end of its serviceable life free of charge to the manufacturer, the point of sale or to public collection points set up for this purpose. Details of this are regulated by the respective national law. The symbol on the product, the operating instructions or/and the packaging refers to these regulations. With this type of material separation, recycling and disposal of old devices, you make an important contribution to the protection of our environment.

## 2.6 Obligations of the owner

The owner undertakes to restrict permission to work with and on the APEX control unit to people who:

- ➔ are familiar with the basic regulations on safety and accident prevention and have been instructed in the use of the APEX control unit;
- ➔ have read and understood the documentation, the chapter on safety and the warnings.
- ➔ The owner must check that the safety regulations and accident prevention rules valid for the respective application are observed.

## 2.7 Instructions for use

- ➔ The overvoltage category II of the non-intrinsically safe circuits according to IEC 60664-1 must be observed.
- ➔ The warning “WARNING – DO NOT OPEN UNDER VOLTAGE” must be part of the external marking of the entire electrical device or the enclosure must have a locking system to prevent the fuses from being energized during replacement.

## 2.8 Marking and test certificate

### 2.8.1 Ex p control unit APEX, type 07-37A2-3211/2726

| ATEX (Europe)                   |                                                   |
|---------------------------------|---------------------------------------------------|
| Marking                         | Ⓔ II 2(1)G Ex eb mb ib [ib pxb] [ia Ga] IIC T4 Gb |
| EU-Type Examination Certificate | BVS 19 ATEX E 015 X                               |
| IECEx (International)           |                                                   |
| Marking                         | Ex eb mb ib [ib pxb] [ia Ga] IIC T4 Gb            |
| IECEx Certificate of Conformity | IECEx BVS 19.0038X                                |

### 2.8.1 Ex e control station, type 07-3107-2512/0639

| ATEX (Europe)                   |                               |
|---------------------------------|-------------------------------|
| Marking                         | Ⓔ II 2G Ex db eb ib IIC T4 Gb |
| EU-Type Examination Certificate | IBExU 12 ATEX 1099 X          |
| IECEx (International)           |                               |
| Marking                         | Ex db eb ib IIC T4 Gb         |
| IECEx Certificate of Conformity | IECEx IBE 12.0031 X           |

## 2.9 Standards complied with

### 2.9.1 Ex p control unit APEX, type 07-37A2-3211/2726

| Standard                                                      | Designation                                                                                                             |
|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| EN IEC 60079-0:2018/AC:2020<br>IEC 60079-0:2011 Edition: 6.0  | Explosive atmospheres – Part 0: General requirements                                                                    |
| EN 60079-2:2014<br>IEC 60079-2:2007 Edition: 5.0              | Explosive atmospheres - Part 2: Equipment protection by pressurized enclosure “p”                                       |
| EN 60079-7:2015/A1:2018<br>IEC 60079-7:2006 Edition: 4.0      | Explosive atmospheres - Part 7: Equipment protection by increased safety “e”                                            |
| EN 60079-11:2012<br>IEC 60079-11:2011 Edition: 6.0            | Explosive atmospheres - Part 11: Equipment protection by intrinsic safety “i”                                           |
| EN 60079-18:2015/A1:2017<br>IEC 60079-18:2014 Edition: 4.0    | Explosive atmospheres - Part 18: Equipment protection by cast encapsulation “m”                                         |
| EN 60079-31:2014<br>IEC 60079-31:2013 Edition: 2.0            | Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure “t”                                    |
| EN 61010-1:2010<br>IEC 61010-1:2010 Edition 3.0               | Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements |
| EN 61000-6-4:2007 + A1:2011<br>IEC 61000-6-4:2018 Edition 3.0 | Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments       |

| Standard                                                          | Designation                                                                                                                                                                                                                                                      |
|-------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EN 61000-3-2:2014<br>IEC 61000-3-2:2018 Edition 5.0               | Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current $\leq 16$ A per phase)                                                                                                                   |
| EN 61000-3-3:2013<br>EN 61000-3-3:2013 +<br>AMD1:2017 Edition 3.1 | Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitations of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems for equipment with rated current $\leq 16$ A per phase, and not subject to conditional connection |
| EN 61326-1:2013<br>IEC 61326-1:2012                               | Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements                                                                                                                                               |
| EN ISO 13849-1:2015                                               | Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design                                                                                                                                                            |
| EN ISO 13849-2:2012                                               | Safety of machinery - Safety-related parts of control systems - Part 2: Validation                                                                                                                                                                               |
| DIN EN 62061:2016<br>IEC 62061:2015                               | Safety of machinery - Functional safety of safety-related of electrical, electronic and programmable electronic control systems                                                                                                                                  |

### 2.9.2 Ex e control station, type 07-3103-2512/0639

| Standard                                                     | Designation                                                                       |
|--------------------------------------------------------------|-----------------------------------------------------------------------------------|
| EN IEC 60079-0:2018/AC:2020<br>IEC 60079-0:2011 Edition: 6.0 | Explosive atmospheres – Part 0: General requirements                              |
| EN 60079-1:2014<br>IEC 60079-1:2014 Edition: 7.0             | Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures “d” |
| EN 60079-7:2015/A1:2018<br>IEC 60079-7:2006 Edition: 4.0     | Explosive atmospheres - Part 7: Equipment protection by increased safety “e”      |
| EN 60079-11:2012<br>IEC 60079-11:2011 Edition: 6.0           | Explosive atmospheres - Part 11: Equipment protection by intrinsic safety “i”     |

## 2.10 SIL qualification / Safety according to IEC 61508



The SIL qualification is only valid for the version of type 07-37A2-\*\*\*1/\*\*\*\* (APEX).



Important notes and information on the safe handling of the product.

### 2.10.1 SIL qualification

During the development of the Ex p control unit, special attention is paid to the avoidance of systematic errors and the detection and control of random errors. The most important characteristics and requirements from the point of view of functional safety according to IEC 61508 are as follows:

- ➔ Internal monitoring of safety-relevant circuitry parts
- ➔ In the event of an error, transition of the safety-relevant outputs to a defined safe state
- ➔ Determination of the failure probability of the defined safety function
- ➔ Safe parameter assignment with non-safe operating environment
- ➔ Re-test

The SIL qualification of components is documented in this manual. All safety-relevant characteristic data required by the user and the planner for project planning and operation of the safety-instrumented system are summarized in this chapter. Further SIL-relevant information is integrated in this manual.

### 2.10.2 Safety function

The safety function of the Ex p control unit is the purge with a defined quantity of purge gas, the safe monitoring of the internal overpressure of the protected equipment and the release for operation. The safe state means that in the event of a drop in pressure or malfunction, the Ex p control unit switches to the safe state = deactivation of the protected equipment.

The “safe state” is triggered by:

- ➔ Falling below the minimum pressures within the Ex p equipment
- ➔ Illogical pressure values within the Ex p equipment
- ➔ Failure of the supply voltage

If the Ex p control unit does not deactivate or does not change to the safe state on request or in the case of an error, a hazardous failure exists.

### 2.10.3 Safety parameters

**THE FOLLOWING SAFETY PARAMETERS ARE WITHOUT OPTIONAL SENSORS.**



The optional sensors must be considered to determine the total failure rate!

- The safety parameters may be derived from the documentation on the optional sensors used.

Safety parameters according to IEC/EN 61508 / DIN EN ISO 13849-:

SIL = 2

Performance Level: = d

$PFH_{sys} = (PFH_{S+} + PFH_L + PFH_{FE} + PFH_C) = 1.70E-08$

HFT = 1

$SFF_{sys} = 92.85 \%$

MTTFd = 76 Yr

DC = 88.78 %

Device type B (complex equipment)

Interval of retests = 1 year

Category 3

### 2.10.4 Reaction time

The reaction time of the Exp control unit to safety-relevant functions without specific user delay times is smaller than 2 seconds.

With the Exp control unit it is possible to set a delay time for pressure fluctuations below the minimum pressure.

This results in a delay time of

$$T_{\text{Reaction}} = T_{\text{Control}} + T_{\text{Delay}}$$

$T_{\text{Reaction}}$  = Time required by the Exp control unit APEX to react to a safety-relevant function

$T_{\text{Control}}$  = Internal time required by the Exp control unit to recognize the safety-relevant triggering. < 2 seconds

$T_{\text{Delay}}$  = Adjustable delay time for safety-relevant triggering which is added to the reaction time  $T_{\text{Control}}$ .

### 2.10.5 Residual risk

Residual risks may arise from:

- ➔ Errors in project planning
- ➔ Errors in operating
- ➔ Errors in wiring

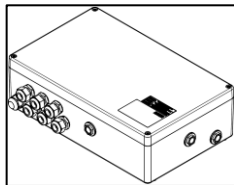
## 3 Product description

### 3.1 General information

The Ex p control set described here is intended for use in pressurized equipment in the "containment system" version.

The set described here is preset for the SIEMENS analyses of the 6 series and can be used without further parameter settings.

### 3.2 Ex p control unit APEX, type 07-37A2-3211/2726



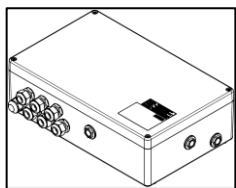
The APEX control unit of type 07-37A2-3211/2726 is specially designed for Ex p systems with the concept of a "containment system with continuous operating flow".

For this purpose, the APEX control unit operates according to the procedure described in EN 60079-2, chapter 13.3. In this process, the Ex p control unit purges the protected volume and then safely prevents the occurrence of a dangerous concentration of explosive gas mixtures by means of a continuous operating flow.

Due to the higher pressure inside the protected volume compared to the atmosphere, explosive gases cannot enter the pressurized enclosure from the outside at any time.

After mounting the APEX control unit and connecting the purge gas connections to the volume to be protected, and after connecting the mains voltage and purge gas, the Ex p system starts automatically. The Ex p control with the APEX control unit regulates the purge gas flow and the nominal enclosure pressure during the pre-purge phase, as well as the nominal enclosure pressure and the operating flow during the operating phase.

## 3.2.1 Variant APEX, type 07-37A2-3211/2726

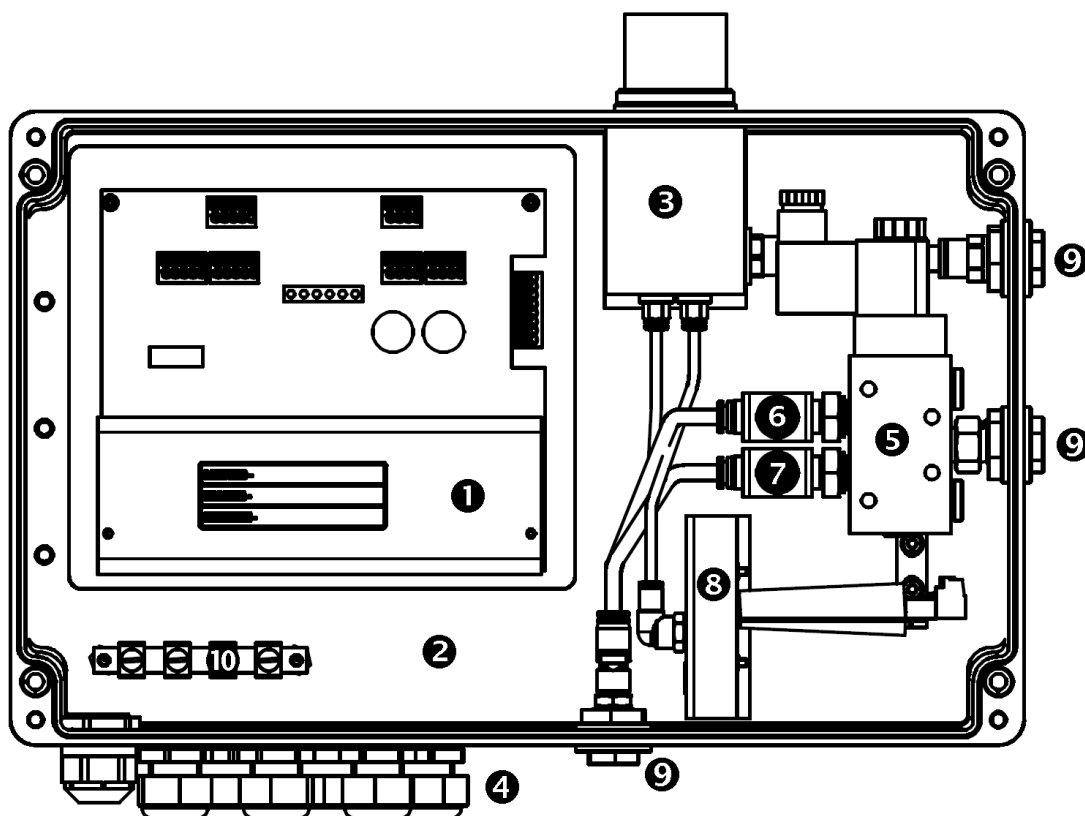


The enclosure of the Ex p control unit APEX is made of glass fibre reinforced polyester.

In this enclosure variant, the associated pressure measuring card as well as purge gas control and purge gas outlet are integrated.

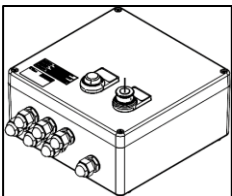
Ex p control units of this enclosure variant are mounted separately from the pressurized enclosure.

In terms of explosion protection, the enclosure provides Ex protection for gas.



| Item | Designation               |
|------|---------------------------|
| ①    | Control electronics APEX  |
| ②    | Protection enclosure      |
| ③    | Pressure sensor module    |
| ④    | Ex cable entry            |
| ⑤    | Changeover valve          |
| ⑥    | Purge gas flow adjustment |
| ⑦    | Operating flow adjustment |
| ⑧    | Pressure measurement      |
| ⑨    | Pneumatic connections     |
| ⑩    | PE busbar                 |

3.3 Ex e control station, type 07-3103-2512/0639

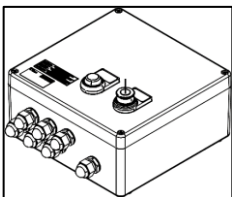


The Ex e control station is used for voltage and signal distribution as well as activation of the bypass operation.

The Ex e control station has a bypass key switch and an indicator light that shows when bypass operation is activated.

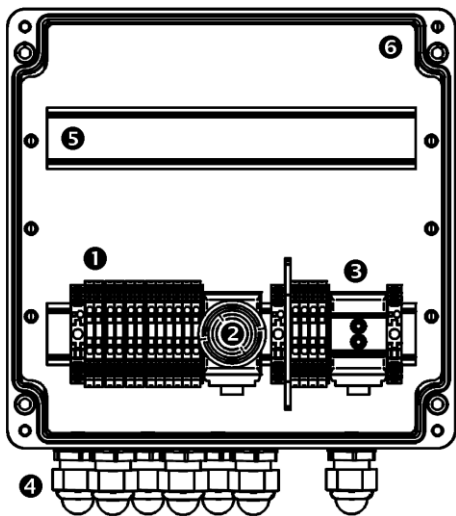
Internally, a MODEX cradle relay can be integrated if required.

3.3.1 Variant Ex control station, type 07-3103-2512/0639



The enclosure of the Ex e control unit is made of glass fibre reinforced polyester.

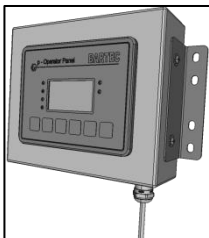
In terms of explosion protection, the enclosure provides Ex e protection for gas.



| Item | Designation                                        |
|------|----------------------------------------------------|
| 1    | Connection terminal row                            |
| 2    | Illuminated indicator                              |
| 3    | Bypass key switch                                  |
| 4    | Ex cable entry                                     |
| 5    | Free installation space, e.g., optional comb relay |
| 6    | Protection enclosure                               |

## 3.4 Accessories

### 3.4.1 p-operator panel



The p-operator panel is a visualization unit for the APEX control unit. It can be optionally connected and is used to display the system states and to parameterize the control units.

By means of mounting brackets, it can be used both as an add-on or installation.

It can be connected or disconnected during operation and it is therefore not necessary for it to be permanently connected to the control unit.

Use of the p-operator panel is described in separate operating instructions.

### 3.4.2 Programming enable



The programming bridge must be connected to the control unit in order to change parameters and switching values.

Values which are changed without a connected programming bridge are not accepted by the APEX control unit.

### 3.4.3 Programming cable



The programming cable is used to connect the Exp control unit to the PC. This must be connected to the control unit and PC in order to change parameters and switching values.

## 4 Transport and storage

### 4.1 Scope of delivery



Missing parts or damage must be reported immediately in writing to the forwarding agent, the insurance company or BARTEC GmbH.

Check the completeness of the scope of delivery using the delivery note.

As standard, each Ex p control unit is delivered with the following scope of delivery:

| Set SIEMENS<br>7MB8000-7CA                           | Set SIEMENS<br>7MB8000-7CB                           |
|------------------------------------------------------|------------------------------------------------------|
| → Ex p Control Unit APEX,<br>Type: 07-37A2-3211/2726 | → Ex p Control Unit APEX,<br>Type: 07-37A2-3211/2726 |
| → Ex Control Station,<br>Type: 07-3103-2512/0639     | → Ex Control Station,<br>Type: 07-3103-2512/0639     |
|                                                      | → p-Operator Panel,<br>Type: 17-51P5-1111            |
| → Set connection cable                               | → Set connection cable                               |
| → LAN programming cable                              | → LAN programming cable                              |
| → Parameter switch                                   | → Parameter switch                                   |

### 4.2 Packaging

The Ex p control unit is delivered packed in film, on pallets and/or in boxes.

- Dispose of the packaging materials at the designated disposal points. Observe the applicable national regulations for disposal.

## 4.3 Transport



### WARNING

**DEATH OR RISK OF INJURY FROM FALLING HEAVY SUSPENDED LOADS.**

- ▶ Never stand under suspended loads.
- ▶ Secure the Exp control unit before transport using suitable fastening (e.g. straps)

### ATTENTION

**AVOID HARD IMPACTS, E.G. BY FALLING DOWN OR SETTING DOWN TOO VIGOROUSLY.**

The Exp control unit may be damaged.

- ▶ Only use hoists and load handling attachments with sufficient load bearing capacity.
- ▶ The permissible lifting weight of a lifting device may not be exceeded.
- ▶ Slowly set down the control unit.

Observe the weight of the goods to be transported and select an adequate transport device.

## 4.4 Storage

Store the control unit in a horizontal position and at a temperature of -20 °C to +40 °C in its original packaging. The environment must be dry, dust-free and low vibration.

Store the control unit for a maximum of 2 years.

For warehouse logistics, we recommend the “first in – first out” principle.

## 4.5 Disposal



Observe the applicable national regulations for disposal

Dispose of the control unit at the designated disposal points.

## 5 Installation



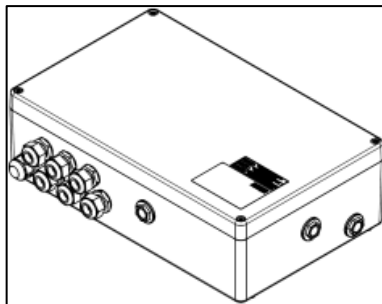
Before starting work, find out about the general safety instructions (see Chapter 2 Safety instructions).



Deviations in assembly may arise in the case of customized set-ups.

Carry out the installation according to the following sections, unless otherwise agreed for customer-specific control units.

### 5.1 Installation of the Ex p control unit, type 07-37A2-3211/2726

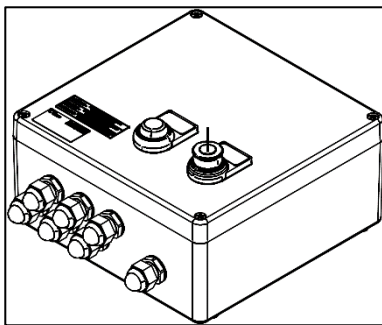


Install the Ex p control unit at the intended position using the fixing options on the enclosure.

M6 screws with corresponding locking elements can be used as fixing material.

The accompanying drilling pattern is provided in the Appendix.

### 5.2 Installation of the Ex e control station, type 07-3103-2512/0639



Install the Ex p control unit at the intended position using the fixing options on the enclosure.

M6 screws with corresponding locking elements can be used as fixing material.

The accompanying drilling pattern is provided in the Appendix.

### 5.3 Installation of the purge gas supply

#### MATERIAL DAMAGE DUE TO LACK OF PRESSURE REDUCTION.

THE EX P CONTROL UNIT IS SUPPLIED WITHOUT PRESSURE REDUCTION AS STANDARD

The maximum pressure for the Ex p control unit is 2.5 bar.

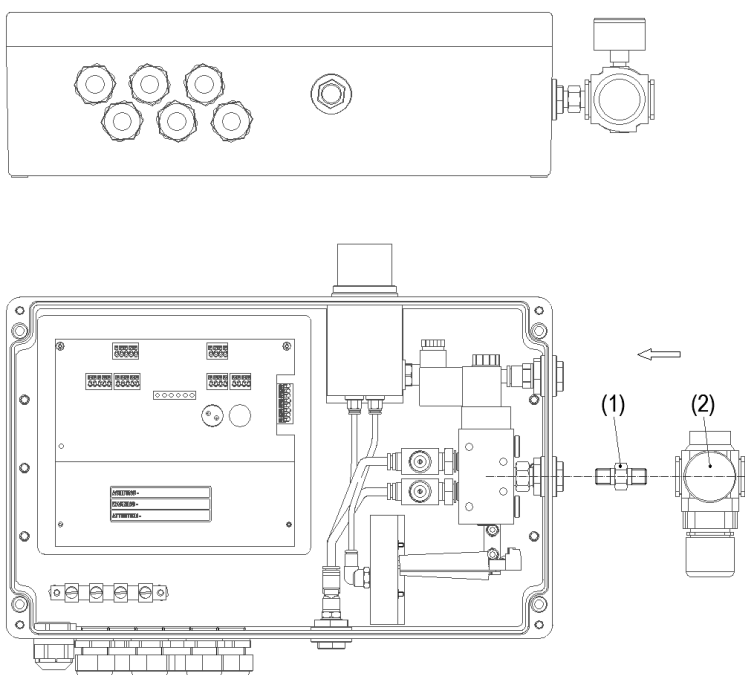
- For higher pressures of the supplied purge gas, a pressure reducer must be connected upstream.



The pressure reducer and the double nipple are not included in the scope of delivery.

The pressure reducer for reducing the supplied purge gas pressure is mounted on the outside of the Ex p control unit APEX. For this purpose, a bulkhead fitting with a G1/4" internal thread is attached to the enclosure.

The installation of the purge gas supply is shown below. The required installation material is included in the scope of delivery.



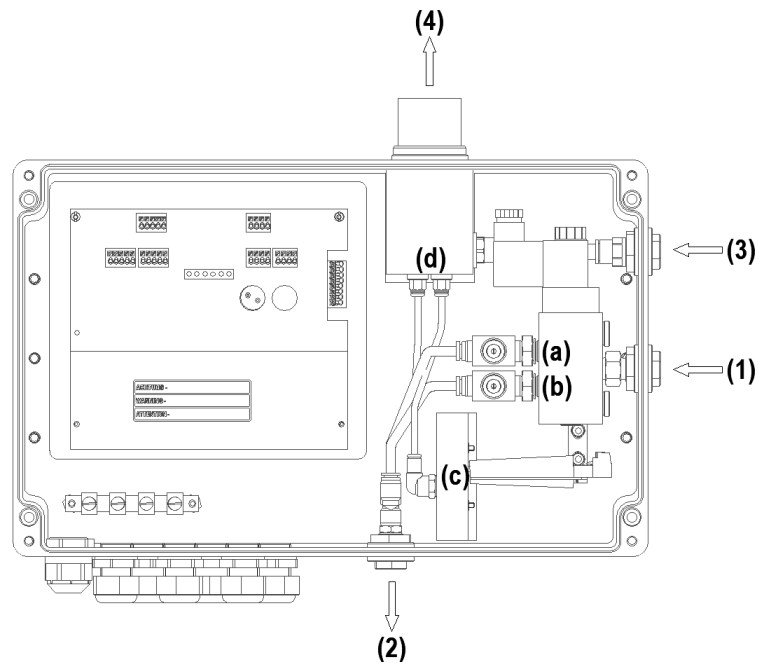
#### Procedure:

- Mount the pressure reducer by means of a double nipple G1/4" (detachable) external thread on the provided bulkhead fitting.
- If necessary, glue in the thread using a suitable pipe fitting adhesive or seal with Teflon tape®.

| Item | Designation            | Remark     |
|------|------------------------|------------|
| (1)  | Double nipple G1/4"    | detachable |
| (2)  | Pressure reducer G1/4" |            |

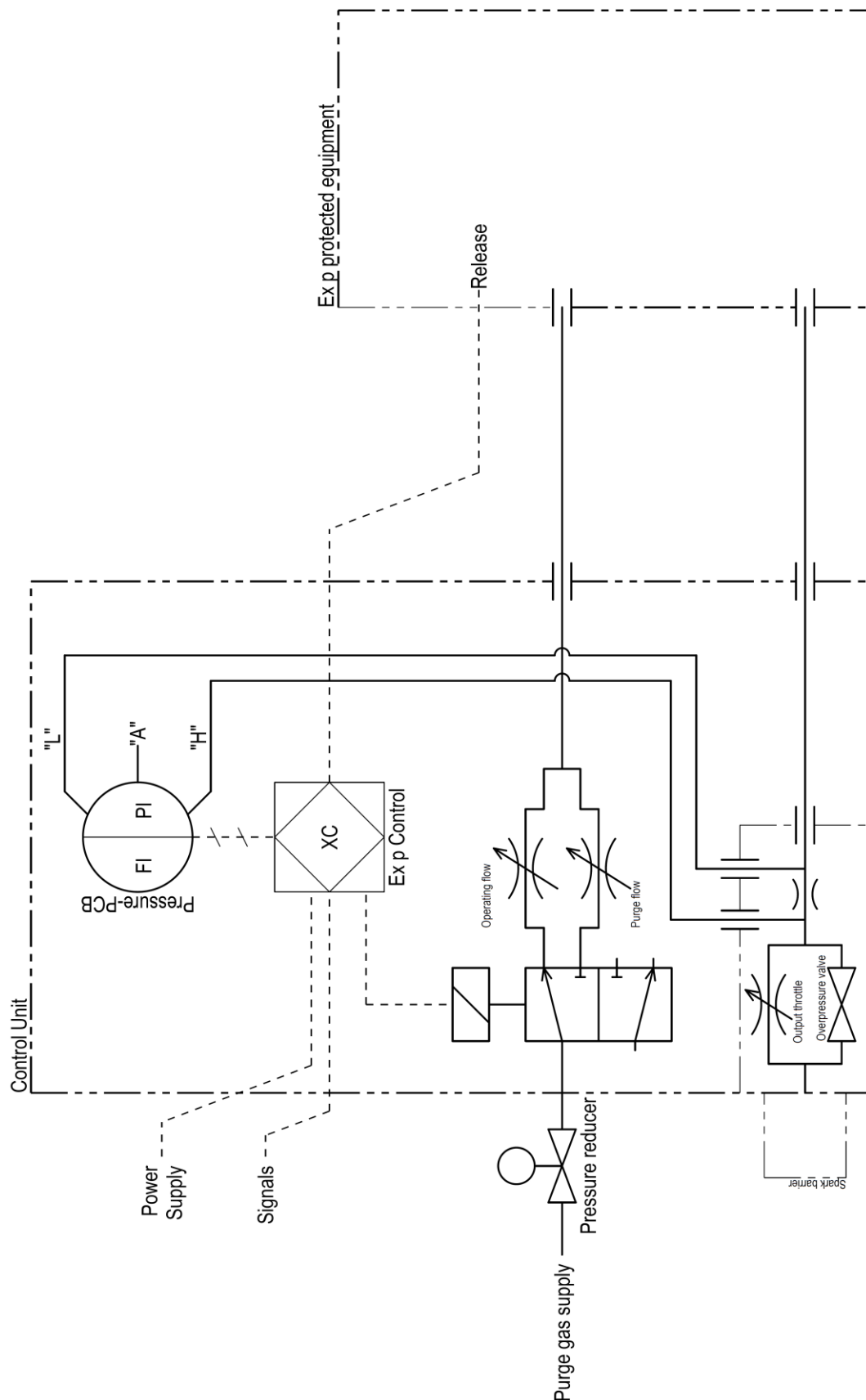
## 5.4 Pneumatic connections

The Ex p control unit type 07-37A2-3211/2726 provides the following pneumatic connections.



| Connection | Designation                      | Remark              |
|------------|----------------------------------|---------------------|
| (1)        | Purge gas supply                 | G1/4"i              |
| (2)        | Purge gas feed Ex p              | G1/4"i              |
| (3)        | Purge gas return Ex p            | G1/4"i              |
| (4)        | Purge gas outlet                 | M36 inner thread    |
| (a)        | Setting of purge gas volume      | Throttle valve      |
| (b)        | Setting of continuous purge      | Throttle valve      |
| (c)        | Pressure measurement             | Changes not allowed |
| (d)        | Pressure measurement connections | Changes not allowed |

## 5.5 Pneumatic overview



## 5.6 Typical installation

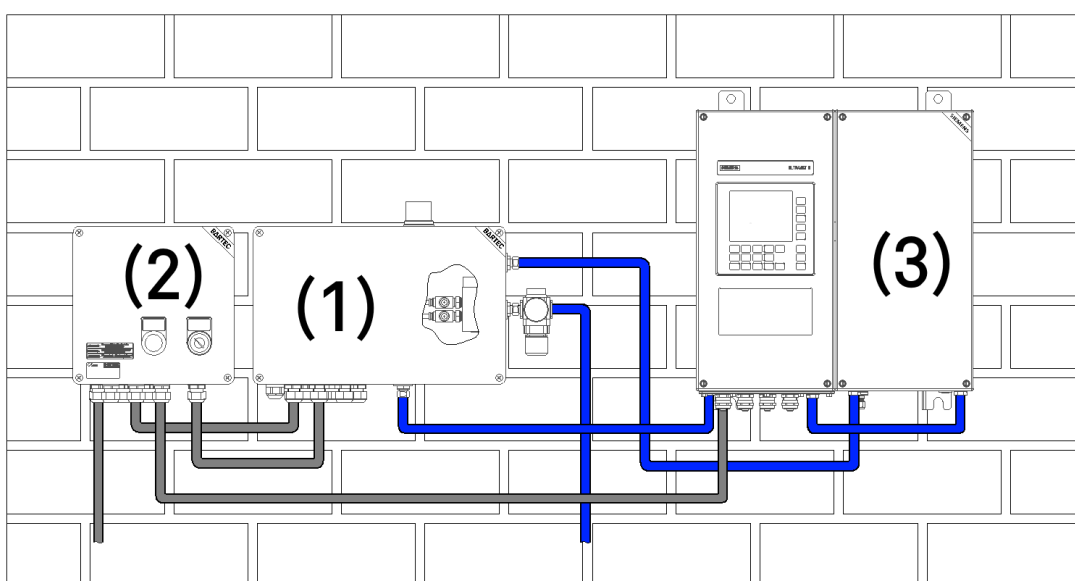
### ATTENTION

#### AVOID MALFUNCTIONS DUE TO INCORRECT INSTALLATION.

The Ex p control may have impairments in function.

- Always mount the Ex p control unit upright on a wall.

The following figure shows the typical installation of the Ex p control unit in connection with the SIEMENS analysis system. Blue lines are purge gas connections and grey lines are electrical connections.



| Item | Designation                                  |
|------|----------------------------------------------|
| (1)  | Ex p control unit, type 07-37A2-3211/2726    |
| (2)  | Ex e control station, type 07-3103-2512/0639 |
| (3)  | SIEMENS analyzer                             |

|                                                                                     |                        |
|-------------------------------------------------------------------------------------|------------------------|
|  | Purge gas piping       |
|  | Electrical connections |

## 6 Electrical connections

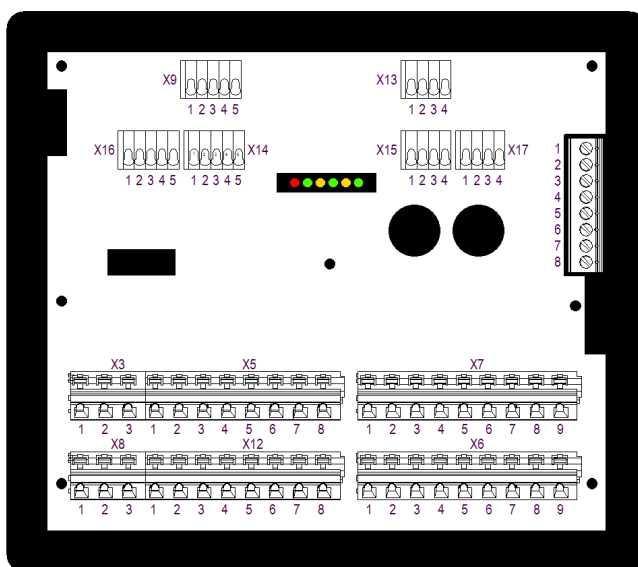
### DANGER

**DEATH OR SERIOUS PHYSICAL INJURY DUE TO WORK ON LIVE PARTS.**

Fatal injury from electrical current.

- Observe the five safety rules for work on electrical systems: Disconnect mains; protect against unintended reconnection; verify the absence of voltage; earth and short-circuit; cover or safeguard nearby live parts.

Connection terminals with the type of protection “Ex e” or “Ex i” are on the connection board of the Exp control unit.



|      | Terminal row     | Function                               |
|------|------------------|----------------------------------------|
| Ex e | X3               | Power supply                           |
|      | X5               | 2x signal relay, 1x CO each            |
|      | X8               | Enable, with voltage                   |
|      | X12              | Indicator relay, 4x NO                 |
|      | X7               | Purge gas valve, empty contacts        |
|      | X8               | Purge gas outlet, LAN                  |
|      | X9               | Bypass, temperature sensor 1           |
| Ex i | X16              | Parameter enable, temperature sensor 2 |
|      | X14              | Main switch, temperature sensor 3      |
|      | X13              | opt. sensor 1 [ia]                     |
|      | X15              | opt. sensor 2 [ib]                     |
|      | X17              | p-operator panel                       |
|      | Measurement card | Pressure measurement card              |

## 6.1 General

### 6.1.1 Connection notes

#### DANGER

**DEATH OR SERIOUS PHYSICAL INJURY WHEN THE COVER OF THE CONTROL UNIT APEX IS OPENED IN AN EXPLOSIVE ATMOSPHERE.**

Risk of explosion.

- ▶ Before opening the lid of the enclosure, check the atmosphere for any explosive gases.

#### ATTENTION

**SHORT-CIRCUITS DUE TO LOOSE OR PROTRUDING WIRES IN THE CONTROL UNIT APEX.**

The control unit APEX may be damaged.

- ▶ All core wires, including those not required, must be attached to a terminal.
- ▶ Lay the wires only in the space between the shield bus and the connecting terminal.
- ▶ Make sure that none of the wires are loose or jump out/protrude.

#### **AVOID DAMAGE TO THE SEAL.**

Cancellation of the Ex protection concept.

- ▶ Visual inspection of the seal when closing the control unit APEX (cleanliness, seat and integrity).

#### **AVOID RAPID DISCONNECTION AND RECONNECTION OF THE POWER SUPPLY.**

Internal protection circuits can trip

- ▶ Wait approx. 30 seconds between switching off and switching on again.



Recommendation for the securing of active parts

The Ex e terminals should be protected against contact by a protective cover.

The procedure for connecting cables to the Exp control unit is described in the following:

#### **Procedure:**

- ▶ Establish the electrical connections in accordance with the terminal assignment. Terminals are designed in tension spring technology. A suitable tool must be used for this purpose.

### 6.1.2 EMC-compliant connection



The electromagnetic compatibility of a complete system in accordance with the EMC Directive must be ensured by the manufacturer (EMC-compliant design of a system) and the user (interference-resistant construction of a complete system).

BARTEC Ex p control units can only operate safely and trouble free with an EMC-compliant wiring. This chapter supports you in the EMC-compliant design of your system.

During operation of an electronic or electrical device, interactions occur with other neighbouring devices. The neighbouring devices act as a source of interference, affecting the other device as a susceptible device.

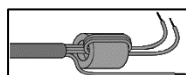
BARTEC Ex p control units are considered to be electromagnetically compatible and have been developed in compliance with the applicable EMC standards and limits.

A large part of the safe operation of the Ex p control unit under EMC influences is ensured by professional, clean line connections.

#### 6.1.2.1 Cables and connections

Please observe the following points:

- ▶ Divide the cables into groups.
    - ➔ Power cables (power lines, power supply)
    - ➔ Signal cables, shielded, min 0.5 mm<sup>2</sup>
    - ➔ Data cables, shielded.
  - ▶ Ensure that the wiring is correct. Ensure that overcouplings between signal/data cables and power cables is avoided.
  - ▶ Signal cables and power cables may only cross at right angles.
  - ▶ Route signal and data cables as closely as possible to ground surfaces.
  - ▶ Unused wires in signal and data cables should be short-circuited and earthed (additional shielding effect).
  - ▶ Where possible, lay signal cables only on one level in the device and insert them only from one side into the device.
  - ▶ Avoid the formation of current loops.
  - ▶ Ensure that unshielded cables within a circuit (outgoing and return conductors) are twisted in pairs as far as possible.
  - ▶ Where possible, lay short cables. This avoids coupling capacities and inductances.
  - ▶ Do not lay cables and wires freely in the device but run them as tightly as possible along the enclosure wall or earthed mounting surfaces.
- Use ferrite cores for the inserted cables.



The individual conductors must be looped through the ferrite core here.

### 6.1.2.2 Earthing cables

The earthing of a system satisfies protective and functional measures.

Please observe the following points:

- ▶ Earthing cables should be as short as possible.
- ▶ Avoid ground loops.
- ▶ Use ground straps with a width of at least 10 mm.

### 6.1.2.3 Shielding

In order to ensure trouble free operation of a system, cables with the largest possible surface area (not cross section) are important. High frequency currents do not flow through the entire cross section of the conductor, but predominantly on the outer skin of a conductor.

Please observe the following points:

- ▶ Always connect the shield over a large area using metal cable clips.
- ▶ Avoid placing the shield on the ground with long wires.

### 6.1.3 Pre-Fuse

#### ATTENTION

**NOTE THE RATED CURRENT OF THE RELEASE CIRCUIT (K1) AND ADD IT TO THE FOLLOWING VALUES. THE FOLLOWING VALUES ARE ONLY FOR THE EX P CONTROL DEVICE.**

If the dimensions are too small, the Exp control unit may be destroyed.

- ▶ Rated current (controller) + rated current release circuit (K1).

| Variant                    | APEX, AC                     |
|----------------------------|------------------------------|
| Rated current control unit | $\geq 2 \text{ A}$           |
| Rated voltage control unit | $\geq 277 \text{ V AC}$      |
| Response time              | Time lag                     |
| Switch-off current         | $\geq 1,5 \text{ kA}$        |
| Melt integral              | 9,7... 14,7 A <sup>2</sup> s |

### 6.1.4 Inductive loads

#### ATTENTION

#### INTERFERENCE FROM INDUCTIVE LOADS CAN DESTROY THE EXP CONTROL UNIT.

Overtages occur when switching off inductive loads (e.g. contactor coils). Voltage peaks of up to 4 kV can occur with a voltage slope of 1 kV / microsecond.

- ▶ Interference suppression of AC-fed inductive loads by means of a varistor.
- ▶ Suppressing DC-fed inductive loads by means of a freewheeling diode.

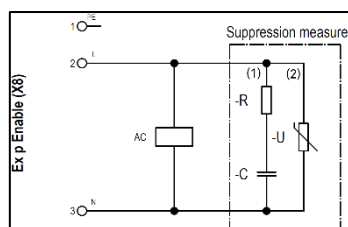
For inductive loads, use protective circuits to limit the voltage peaks that occur during switch-off.

The consequences of this can be:

- Coupling of interference signals that generate false signals
- Destroy the Exp p control unit.

Protective circuits protect the Exp p control unit from premature failure due to the overvoltage that occurs when the current flowing through an inductive load is interrupted. In addition, protective circuits limit the electrical disturbances that occur when switching inductive loads.

#### 6.1.4.1 Protective circuit for AC supplied inductive loads

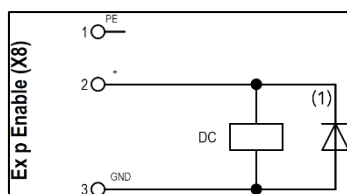


This circuit variant is used for inductive loads AC voltage fed relays / contactors. In this circuit variant, the property of the VDR resistor is exploited to become low-resistance above a certain threshold voltage. This short-circuits the self-induction voltage.

The RC snubber damps any oscillation that arises.

| Position | Interference suppression measure,<br>e.g. BARTEC 07-7311-93GU/K000 |
|----------|--------------------------------------------------------------------|
| (1)      | RC snubber                                                         |
| (2)      | Varistor                                                           |

#### 6.1.4.2 Protective circuit with varistor

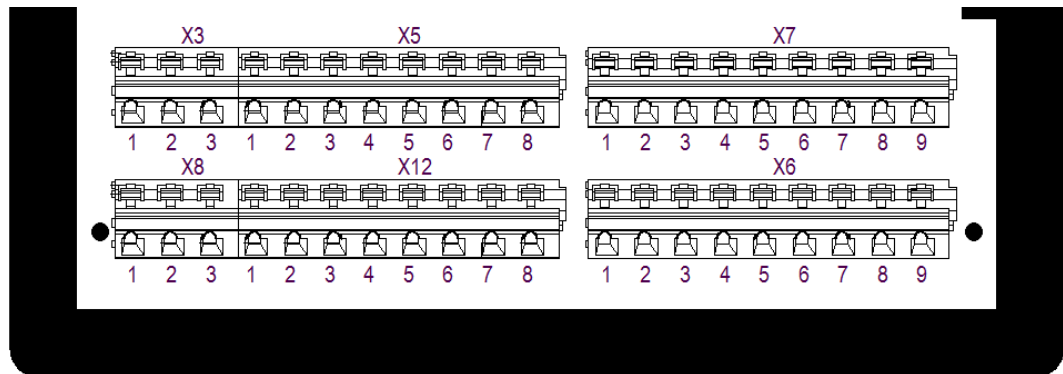


This circuit variant is used for DC-powered relays / contactors. A diode is connected in reverse direction parallel to the coil.

| Position | Interference suppression measure,<br>e.g. BARTEC 07-7311-61GF/5400 |
|----------|--------------------------------------------------------------------|
| (1)      | Free-wheeling diode                                                |



## 6.2.1 Connection terminals “Ex e”



### 6.2.1.1 Terminal row “X3”

#### ATTENTION

#### MATERIAL DAMAGE DUE TO INCORRECT SUPPLY VOLTAGE.

Internal electronics of the Ex p control unit can be destroyed.

- ▶ Before activating the supply voltage, compare the value of the supply voltage with the printed value of the control unit.

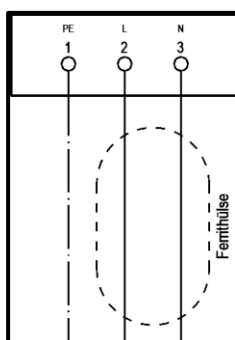
#### Active protective measure.

- ▶ As an active protective measure, the supply voltage is protected by a fuse (min 1500 A breaking capacity) and an FI current circuit breaker.

#### EMC-compliant wiring

Internal electronics can be disturbed by a lack of EMC measures and cause unforeseen shutdowns.

- ▶ Loop the supplied ferrite sleeve into the power supply.
- ▶ See EMC-compliant wiring



The supply voltage is connected to terminal row X3.

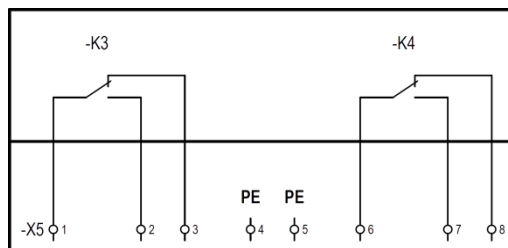
#### ▲ Assembly of ferrite sleeve

Procedure:

- ▶ Loop the conductors “L” and “N” through the ferrite sleeve once more.
- ▶ Connect the conductors “L” and “N” to the terminals provided.

| Terminal | Connection | Function                         |
|----------|------------|----------------------------------|
| 1        | PE         | PE power supply                  |
| 2        | L (+)      | Phase (+ conductor) power supply |
| 3        | N (-)      | Neutral (GND) power supply       |

### 6.2.1.2 Terminal row "X5"



The Ex p control unit has one floating changeover contact K3 and one floating changeover contact K4 for signaling and processing signals. The associated switching function can be set in the Ex p control unit via the WEB interface and is freely programmable.

| Terminal | Connection | Function                |
|----------|------------|-------------------------|
| 1        | K3 – COM   | Foot contact            |
| 2        | K3 – NO    | Normally open contact   |
| 3        | K3 – NC    | Normally closed contact |
| 4 / 5    | PE         |                         |
| 6        | K4 – COM   | Foot contact            |
| 7        | K4 – NO    | Normally open contact   |
| 8        | K4 – NC    | Normally closed contact |

### 6.2.1.3 Terminal row "X8"

#### ATTENTION

#### MATERIAL DAMAGE DUE TO OVERCURRENT IN THE CONTROL ELECTRONICS.

Welding the enable relays.

- The Ex p enable (relay K1, X8 terminal 2 and 3) can only be operated in conjunction with a mains fuse (max. 5 A, 1,500 A switching capacity, fast).

The supply voltage is connected to terminal row X8.

| Terminal | Connection | Function                   |
|----------|------------|----------------------------|
| 1        | PE         | PE power supply            |
| 2        | L' (+)     | Enable phase Ex p device   |
| 3        | N' (-)     | Enable neutral Ex p device |

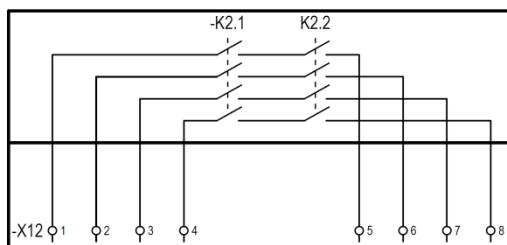
The application within the pressurized enclosure is enabled by the Ex p control unit. There may be no voltage in the pressurized enclosure when the Ex p control unit is deactivated.

The Ex p enable can switch a maximum of one circuit of one phase with neutral conductor and can be loaded with a maximum of 5 A. If the current load within the pressurized enclosure has more than 5 A or more than one phase, this must be implemented with a separately certified Ex d pre-conductor which is controlled by the Ex p control unit.

## 6.2.1.4 Terminal row "X12"



Floating signaling K2 can be classified as pure enable according to SIL when used.



A floating signal (4x NO) is available on the Ex p control unit. This signal can either be used as an enable that is also safety related. Or it can be used as a floating signal.

| Terminal | Connection | Function              |
|----------|------------|-----------------------|
| 1        | K2_1 - NO  | Normally open contact |
| 2        | K2_2 - NO  | Normally open contact |
| 3        | K2_3 - NO  | Normally open contact |
| 4        | K2_4 - NO  | Normally open contact |
| 5        | K2_1' - NO | Normally open contact |
| 6        | K2_2' - NO | Normally open contact |
| 7        | K2_3' - NO | Normally open contact |
| 8        | K2_4' - NO | Normally open contact |

## 6.2.1.5 Terminal row "X7"

**ATTENTION****MATERIAL DAMAGE DUE TO INCORRECT PRE-FUSING.**

Valve or Ex p control unit may be damaged.

- Operate the digital outlet valve only with a 1.0 A pre-fuse and the proportional outlet valve only with a 1.6 A pre-fuse.

The terminal row X7 is used to connect the purge gas valve and the accompanying valve fuse. Furthermore, the terminal points 6 – 9 are intended for unused wires of the LAN connection cable.

| Terminal | Connection | Function                  |
|----------|------------|---------------------------|
| 1        | Pre-fuse   | Connection pre-fuse valve |
| 2        | Pre-fuse   | Connection pre-fuse valve |
| 3        | Valve +    | + conductor valve         |
| 4        | Valve -    | GND valve                 |
| 5        | Valve - PE | PE valve                  |
| 6        | L1 BU      | For unused LAN cable wire |
| 7        | L2 BUWH    | For unused LAN cable wire |
| 8        | L3 BNWH    | For unused LAN cable wire |
| 9        | L4 BN      | For unused LAN cable wire |

## 6.2.1.6 Terminal row "X6"

**ATTENTION****MATERIAL DAMAGE DUE TO INCORRECT PRE-FUSING.**

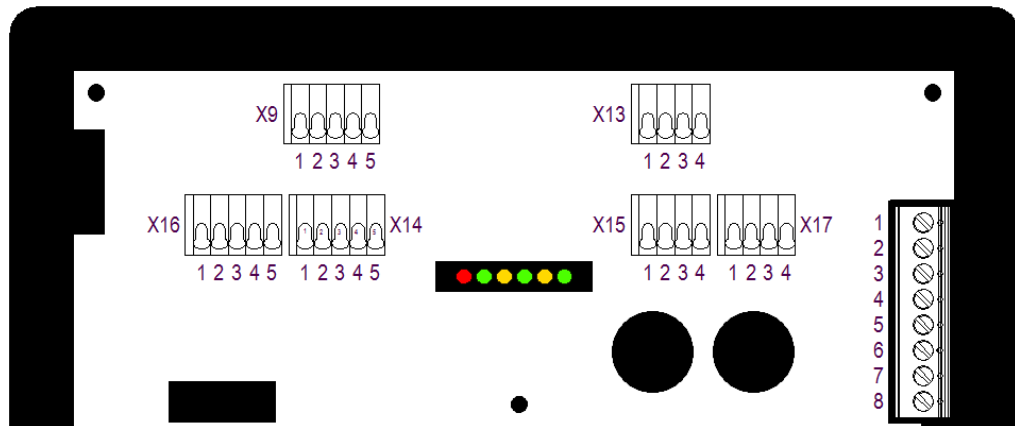
Valve or control electronics may be damaged.

- Operate the digital outlet valve only with a 1.0 A pre-fuse and the proportional outlet valve only with a 1.6 A pre-fuse.

The terminal row X6 is used to connect the purge gas valve and the accompanying valve fuse. Furthermore, the terminal points 6 – 9 are intended for wires of the LAN connection cable.

| Terminal                                     | Connection |      |                                                                                     | Function                  |
|----------------------------------------------|------------|------|-------------------------------------------------------------------------------------|---------------------------|
| 1                                            | Pre-fuse   |      |                                                                                     | Connection pre-fuse valve |
| 2                                            | Pre-fuse   |      |                                                                                     | Connection pre-fuse valve |
| 3                                            | Valve +    |      |                                                                                     | + conductor valve         |
| 4                                            | Valve -    |      |                                                                                     | GND valve                 |
| 5                                            | Valve - PE |      |                                                                                     | PE valve                  |
| Connection of the original programming cable |            |      |                                                                                     |                           |
| 6                                            | L1         | GN   |  | Send, negative            |
| 7                                            | L2         | GNWH |  | Send, positive            |
| 8                                            | L3         | OG   |  | Receive, negative         |
| 9                                            | L4         | OGWH |  | Receive, positive         |

## 6.2.2 Connection terminals “Ex i”



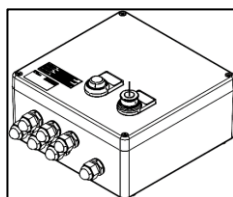
### 6.2.2.1 Terminal row “X9”

#### DANGER

**DEATH OR SERIOUS PHYSICAL INJURY DUE TO COMMISSIONING WITH BYPASS KEY SWITCH IN POTENTIALLY EXPLOSIVE ATMOSPHERE.**

Risk of explosion.

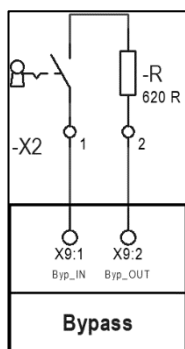
- ▶ Have the commissioning with a bypass key switch approved by the factory manager or his representative. Approval may only be given if it has been ensured that there will not be any explosive atmosphere for the duration of the commissioning or if the necessary precautions have been taken to protect against the risk of explosion (fire permit).
- ▶ A marking on the bypass key switch that the Ex protection will no longer exist if the key switch is activated must be affixed in the direct vicinity of the key switch.



A bypass key switch is mounted separately in the accompanying Ex e control station. The active bypass mode is signaled via the indicator light.

The bypass key switch is marked according to the following marking plate and is placed in the immediate vicinity of the bypass key switch.

|                                                                      |
|----------------------------------------------------------------------|
| Bei aktiviertem Schlüsselschalter<br>- Ex-Schutz aufgehoben -        |
| If Bypass key switch is activated<br>- Ex protection is eliminated - |
| Si clé de bypass activée<br>- La protection Ex n'est plus assurée -  |



In order for the bypass switch to be recognized and the function to be carried out, a resistor with 620  $\Omega$  must be connected to the closing contact.

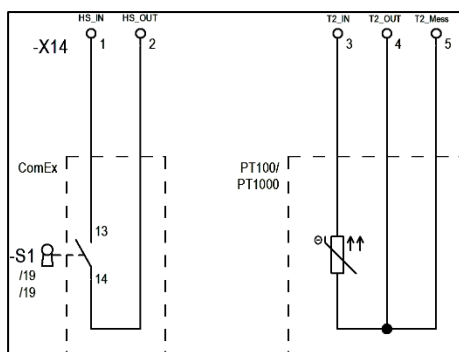
The temperature sensor can be a PT 100 or 1000. Settings for the sensor are made in the unit. Two or three wire sensors can be used.

| Terminal | Connection      | Function                      |
|----------|-----------------|-------------------------------|
| 1        | Bypass IN       | Contact for the bypass switch |
| 2        | Bypass OUT      | Contact for the bypass switch |
| 3        | T-Sensor 1 IN   | Temperature sensor connection |
| 4        | T Sensor 1 OUT  | Temperature sensor connection |
| 5        | T Sensor 1 MESS | Temperature sensor connection |

#### 6.2.2.2 Terminal row "X14"

As an additional enable, an enable switch can be connected after the control unit APEX has given the enable. The additional enable is provided with a bridge as standard.

This function gives the enable when the control unit is enabled and the main switch is activated.



The main switch does not require a combination of resistors.

The temperature sensor can be a PT 100 or 1000. Settings for the sensor are made in the device. Two or three wire sensors can be used.

| Terminal | Connection      | Function                      |
|----------|-----------------|-------------------------------|
| 1        | Main switch IN  | Contact for the main switch   |
| 2        | Main switch OUT | Contact for the main switch   |
| 3        | T sensor 2 IN   | Temperature sensor connection |
| 4        | T sensor 2 OUT  | Temperature sensor connection |
| 5        | T sensor 2 MESS | Temperature sensor connection |

## 6.2.2.3 Terminal row "X16"

**WARNING**

**RISK OF DEATH OR INJURY DUE TO UNINTENTIONAL ALTERATION OF THE EX-RELEVANT PARAMETERS.**

Explosion protection is no longer guaranteed.

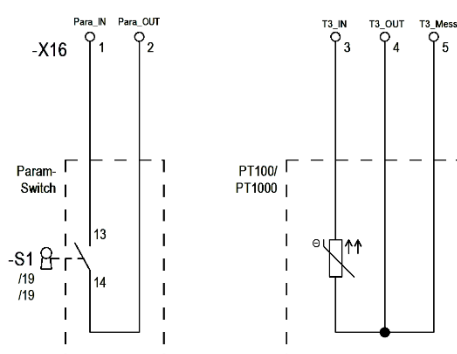
- ▶ Remove the programming enable again after deliberately changing parameters.
- ▶ After changing or adapting parameters, a subsequent functional test must be performed.

The programming enable must be connected and activated in order to change settings and setpoint values on the device.

It must only be connected during the deliberate modification of parameters.

After changing or adapting parameters, a final function test must be performed.

During normal operation of the Exp system it may not be connected.



The BARTEC parameter-setting switch must be used to change the parameters.

The temperature sensor can be a PT 100 or 1000. Settings for the sensor are made in the device. Two or three wire sensors can be used.

| Terminal | Connection      | Function                                 |
|----------|-----------------|------------------------------------------|
| 1        | Parameter IN    | Contact for the parameter setting switch |
| 2        | Parameter OUT   | Contact for the parameter setting switch |
| 3        | T sensor 3 IN   | Temperature sensor connection            |
| 4        | T sensor 3 OUT  | Temperature sensor connection            |
| 5        | T sensor 3 MESS | Temperature sensor connection            |

6.2.2.4 Terminal row “X13“

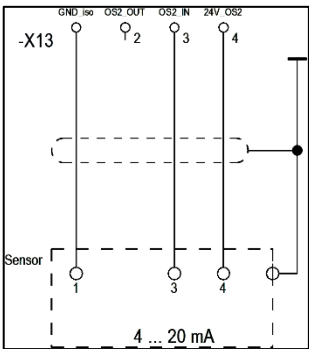
ATTENTION

ATTENTION WHEN CONNECTING EXTERNAL SENSORS TO THE EX P CONTROL UNIT.

Ensure functional safety when connecting external sensors to the Ex p control unit!

- The external sensors must meet the requirements placed on SIL 2.

Two functions can be executed at the optional current input as standard. Firstly, an additional pressure sensor can be connected or a current signal can be used to trigger purge without deactivation. Pressure sensor for additional pressure monitoring. The function is set via the WEB interface.



Pressure or gas sensors with 4...20 mA output can be connected to the sensor input OS 2 [Ex ia]. The signal is processed depending on the setting of the functions.

| Terminal | Connection | Function              |
|----------|------------|-----------------------|
| 1        | GND iso    | Ground connection     |
| 2        | OS2 Out    | Sensor output         |
| 3        | OS2 IN     | Sensor input          |
| 4        | 24V OS2    | Power supply sensor 2 |

## 6.2.2.5 Terminal row "X15"

**ATTENTION****ATTENTION WHEN CONNECTING EXTERNAL SENSORS TO THE EX P CONTROL UNIT.**

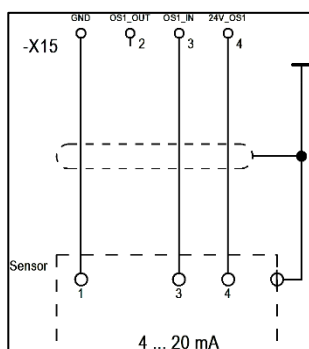
Ensure functional safety when connecting external sensors to the Ex p control unit!

- The external sensors must meet the requirements placed on SIL 2.

Two functions can be executed at the optional current input as standard.

Firstly, an additional pressure sensor can be connected or a current signal can be used to trigger purge without deactivation.

Pressure sensor for additional pressure monitoring. The function is set via the WEB interface.

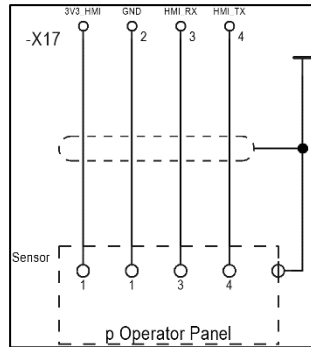


Pressure or gas sensors with 4...20 mA output can be connected to the sensor input OS 1 [Ex ib].

The signal is processed depending on the setting of the functions.

| Terminal | Connection | Function              |
|----------|------------|-----------------------|
| 1        | GND        | Ground connection     |
| 2        | OS1 Out    | Sensor output         |
| 3        | OS1 IN     | Sensor input          |
| 4        | 24V OS1    | Power supply sensor 1 |

#### 6.2.2.6 Terminal row “X17”



The optionally available p operator panel can be connected to the terminal row “X17”.

| Terminal | Connection | Wire | Function          |
|----------|------------|------|-------------------|
| 1        | 3V3V_HMI   | BK   | Power supply      |
| 2        | GND        | WH   | Ground connection |
| 3        | HMI_RX     | RD   | Data cable        |
| 4        | HMI_TX     | YE   | Data cable        |

#### 6.2.2.7 Terminal row – measurement card

The pressure sensor board belonging to the Ex p control unit is connected to the terminal row (screw connection).

| Terminal | Connection | Wire | Function               |
|----------|------------|------|------------------------|
| 1        | SCL_H1     | WH   | Data cable             |
| 2        | SDA_H1     | BN   | Data cable             |
| 3        | 3V3_H1     | GN   | Power supply channel 1 |
| 4        | SCL_H2     | YE   | Data cable             |
| 5        | SDA_H2     | GY   | Data cable             |
| 6        | 3V3_H2     | PK   | Power supply channel 2 |
| 7        | GND        | BU   | GND                    |
| 8        | Diagnosis  | RD   | Diagnostic cable       |

## 7 Operation

The operation of the Ex p control unit by the end user is described in the following chapters. Configuration and setting descriptions are provided in separate operating instructions.

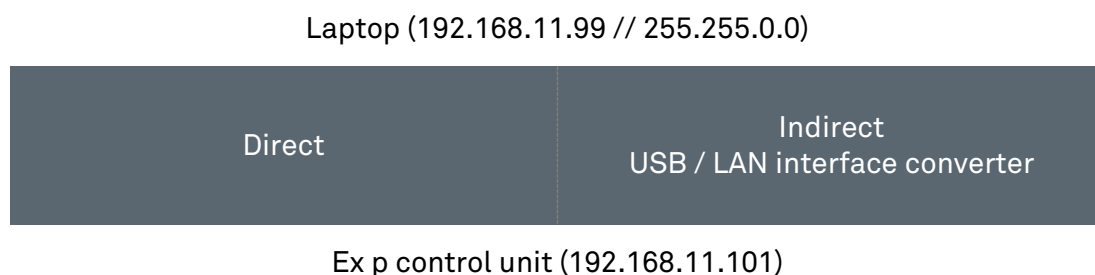
The complete solution starts automatically after connection of the purge gas supply and supply voltage. System states can be requested via the WEB interface.

### 7.1 WEB interface

The Ex p control unit is delivered with a fixed IP address as standard.

Standard IP address (delivery status): 192.168.11.101

The following options are available for establishing a connection between laptop and PC.



#### 7.1.1 Setting the LAN connection

The settings on the PC (or convertor/managed switch) LAN interface must be parameterized such that it can communicate with the Ex p control unit.

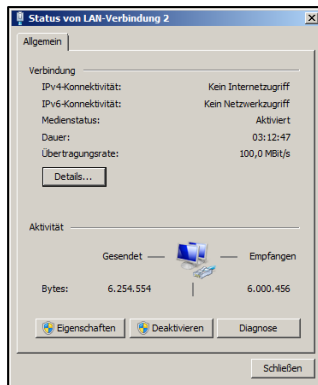
Settings:

LAN interface configuration:

- ➔ Extended / speed: 100 Mbps full duplex

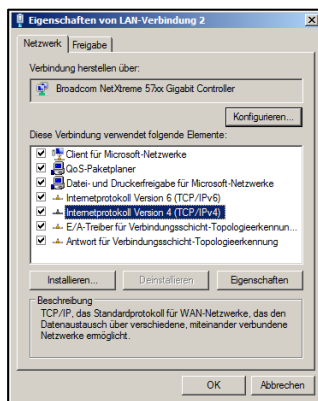
Properties of the internet protocol Version 4 (TCP/IPv4):

- ➔ Activation of fixed IP address
- ➔ IP address: 192.168.11.99
- ➔ Subnet mask: 255.255.0.0

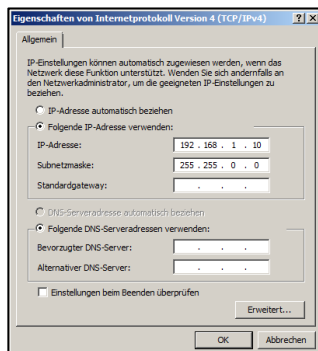
**Procedure:**

Open the network settings of the LAN interface on the PC/laptop.

Select the properties of the LAN connection by way of the “Properties” button



Select internet protocol version 4 (TCP/IP4) with double click.



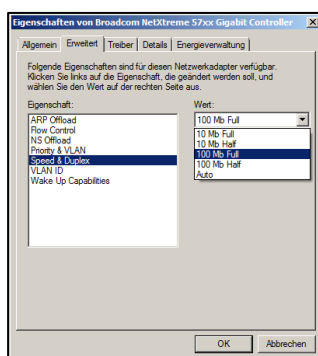
Properties of internet protocol Version 4 (TCP/IPv4):

Click to change “Automatically obtain IP address” to “Use following IP address”.

Enter IP address 192.168.11.50 for “IP address”

Enter subnet mask 255.255.0.0.

Confirm entry with OK.



Use the “Configure...” button to open settings for the network adapter.

In the left field “Property“, click the function “Speed & Duplex”.

In the right field “Value“, click “100 Mb full” and select in drop-down menu

Confirm changes with “OK”.

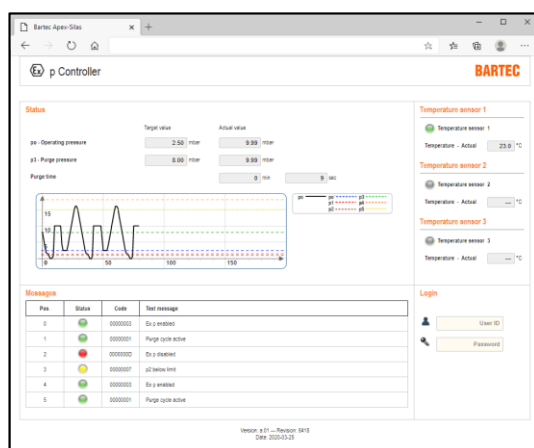
Confirm properties with OK and close status window of the LAN connection with “Close”.

## 7.2 Operating the WEB interface

The WEB interface is operated via the input devices of the PC.

## 7.3 Registering with the WEB interface

The WEB interface provides two levels for logging in



**Level 1 = Guest access**

User ID = guest

Password = guest

**NB:** No change of settings possible. Language change and query status and messages possible.

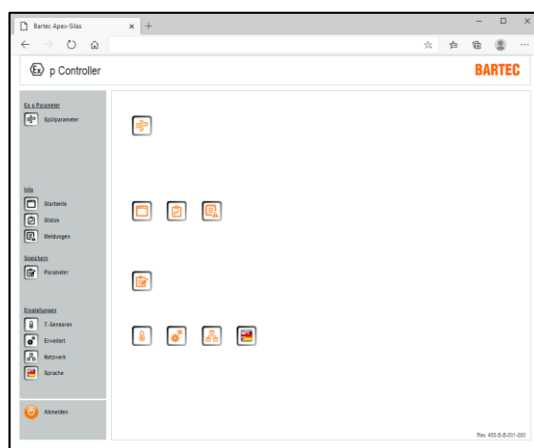
**Level 2 = User access**

User ID = user

Password = 0000

**NB:** Settings can be changed when the programming switch is set.

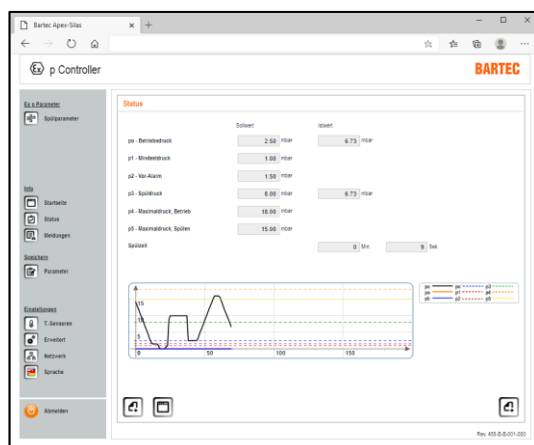
## 7.4 Navigating the WEB interface



Clicking on the grey navigation bar on the left enables you to jump directly to the specific submenus.

To the left are the icons for the submenus.

The icon for logging out is located bottom left. By pressing the button, the WEB interface logs out and changes to the log-in view.



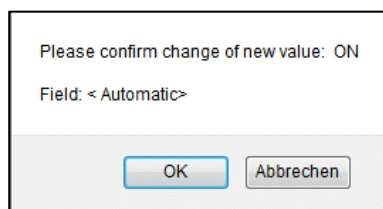
In the submenus, three icons are located in the lower area, which satisfy the forward / back and home functions.

## 7.5 Entering parameters

Changing parameters in the web interface must be carried out in a specific order:

Procedure for changing parameters:

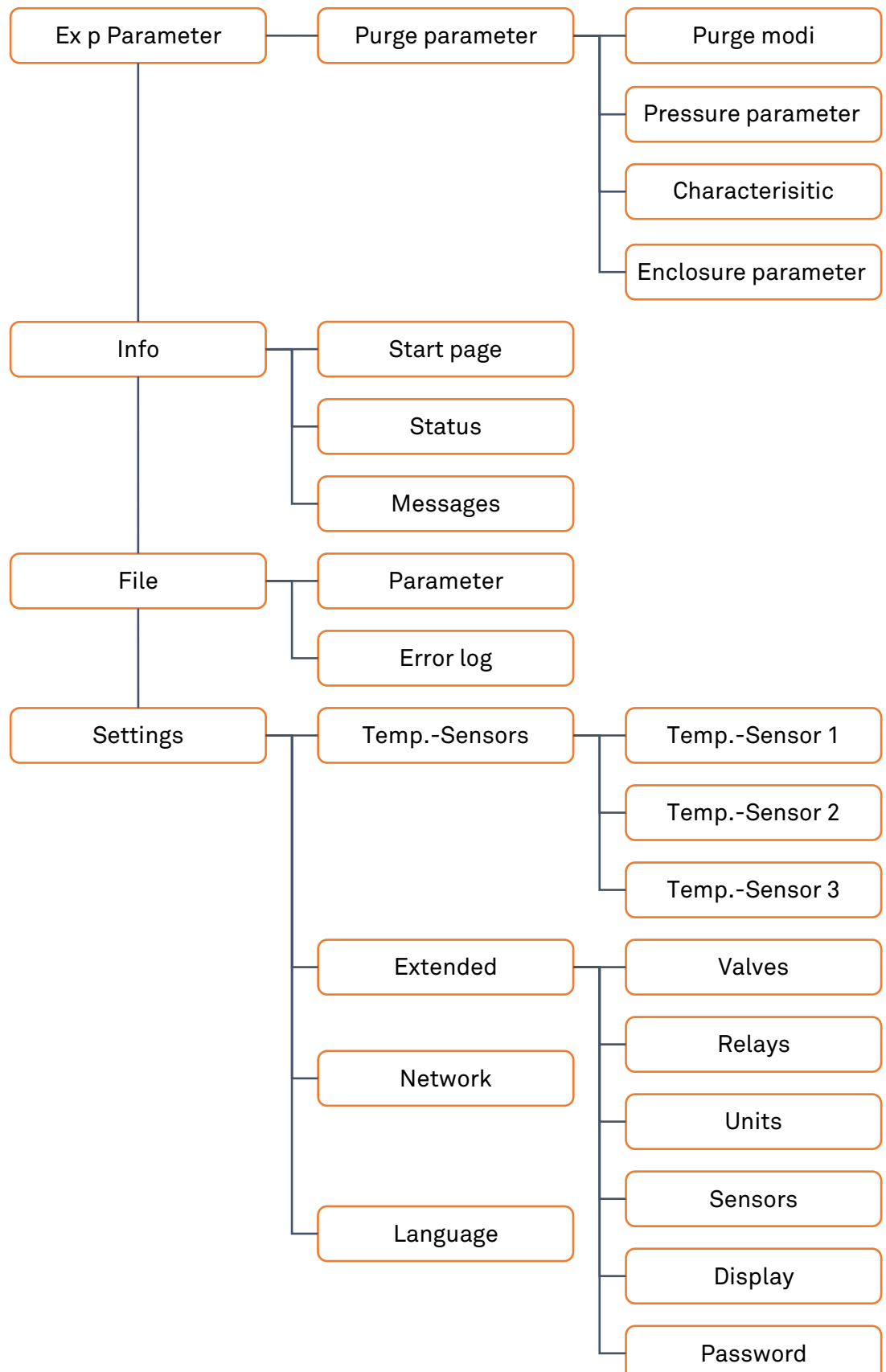
- ▶ Activate the parameter switch.
- ▶ Log in to the web interface  
If you are already logged in, the web interface requires a new log-in
- ▶ Select the desired parameter  
👉 e.g. po – operating pressure 2,5 mbar (250 Pa)
- ▶ Enter parameter  
👉 Enter value 250
- ▶ Confirm with the “Enter” key
- ▶ The following window opens. This is to confirm and check the changed parameter value.



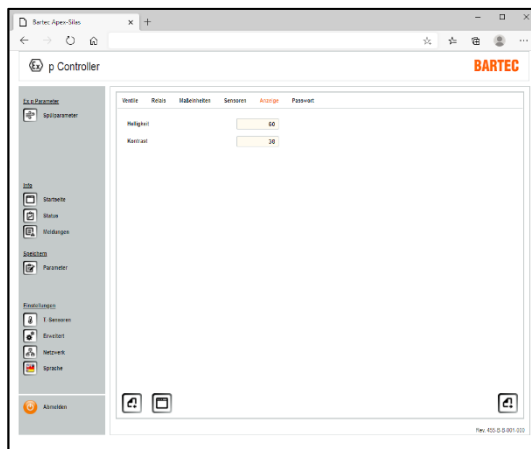
## 7.6 LED indicators

| LED     | Colors | Function                                                                                        |
|---------|--------|-------------------------------------------------------------------------------------------------|
| p1      | Green  | Minimum pressure<br>→ Lights up when the minimum pressure is exceeded                           |
| p2      | Yellow | Pre-alarm<br>→ Lights up when the value falls below the set value                               |
| p3      | Green  | Purge pressure<br>→ Lights up during the purge phase and exceeding of the setpoint value        |
| p4      | Red    | Maximum pressure<br>→ Lights up when the maximum pressure p4 or p5 is exceeded                  |
| Operate | Green  | Enable / Purge process<br>→ Flashes during purge and lights up when enable given after purge    |
| Status  | Green  | Supply / Bypass<br>→ Lights up when supply voltage is applied and flashes when bypass activated |

## 7.7 WEB interface menu structure

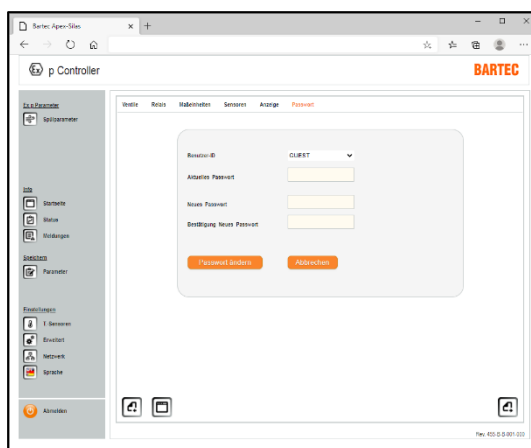


## 7.8 “Display” menu



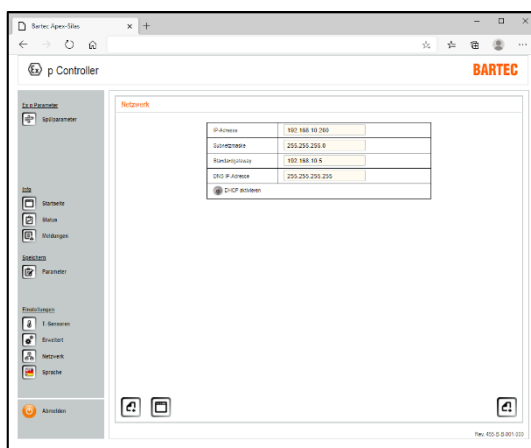
The contrast and brightness of the LCD display on the p-operator panel can be set in the Display tab.

## 7.9 “Passwort” menu



A new password for the guest and user can be stored in the Password tab.

## 7.10 “Network” menu



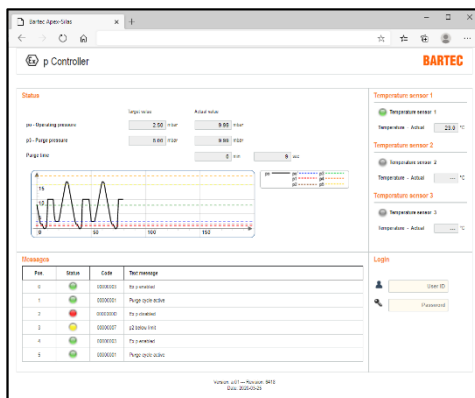
All network-specific settings can be made in the network menu.

As standard, the Exp control unit is set to a static IP address. The possibility also exists to activate a DHCP mode.

## 7.11 Requesting “system status”

### Procedure for requesting system status

- Log-in to the WEB interface by opening the browser and entering the IP address 192.168.11.101

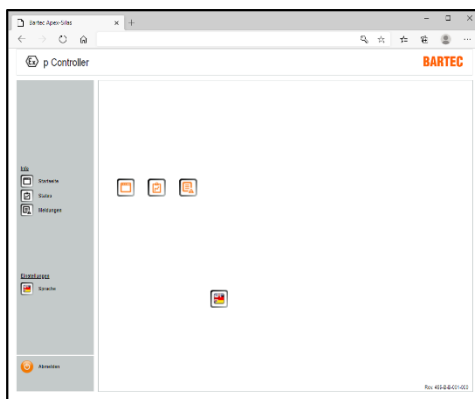


- Log in to web interface

User ID: guest

Password: guest

Confirm with Enter



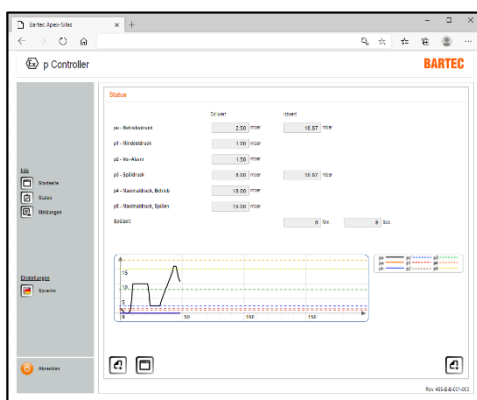
start screen opens

Status:

Shows the target values and measured actual values. A pressure/time diagram is also shown

Messages:

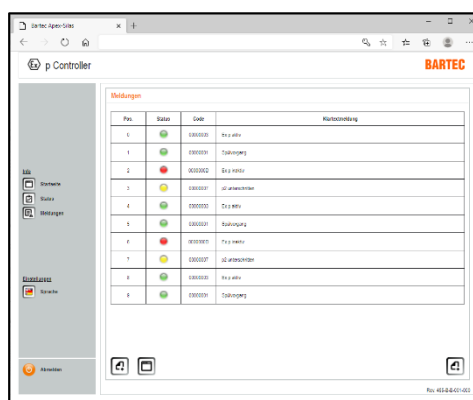
Displays plain text messages about the system status.



- Click to open status

Top area: List of setpoint values with comparison of actual values

Lower area: Time diagram of the pressure curve



- Click to open messages

Displays plain text messages from the system

Green button = Positive messages

Yellow button = Warning messages

Red button = Error messages

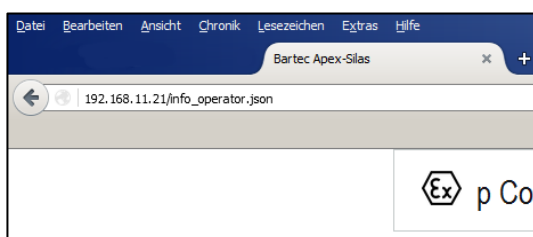


## 7.13 Reading out data container

Data are requested for the controller via a web browser or by a corresponding software tool to be provided by the customer that is in a position to send an HTML GET message equivalent to a browser request via the network to the APEX device.

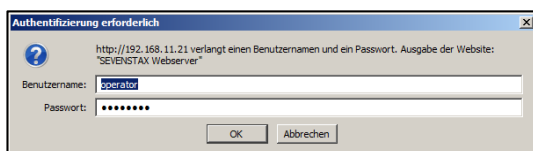
The data format returned by the device is JSON  
(see [https://de.wikipedia.org/wiki/JavaScript\\_Object\\_Notation](https://de.wikipedia.org/wiki/JavaScript_Object_Notation))

Request:



The data for the controller can be requested via the URL:

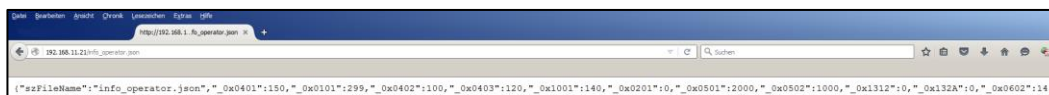
 [http://<ip-addr>/info\\_operator.json](http://<ip-addr>/info_operator.json)  
e.g. [http://192.169.1.101/info\\_operator.json](http://192.169.1.101/info_operator.json)



The user name/password must be entered.

User name: "operator"  
Password: "operator"

Reply from the control unit:



```
{ "szFileName": "info_operator.json", "_0x0401": 150, "_0x0101": 299, "_0x0402": 100, "_0x0403": 120, "_0x1001": 140, "_0x0201": 0, "_0x0501": 2000, "_0x0502": 1000, "_0x1312": 0, "_0x132A": 0, "_0x0602": 14 }
```

Code table:

| Key/ID  | Parameter                                        | Unit    |
|---------|--------------------------------------------------|---------|
| _0x0401 | Operating pressure po (setpoint value)           | Pa      |
| _0x0101 | Operating pressure po (actual value)             | Pa      |
| _0x0402 | Minimum pressure (shut-down value)               | Pa      |
| _0x0403 | Pre-alarm (switching value)                      | Pa      |
| _0x1001 | Purge pressure p3 (setpoint value)               | Pa      |
| _0x0201 | Purge pressure p3 (actual value)                 | Pa      |
| _0x0501 | Maximum pressure, operation p4 (switching value) | Pa      |
| _0x0502 | Maximum pressure, purge p5 (switching value)     | Pa      |
| _0x1312 | Pressure sensor A pa (actual value)              | Pa      |
| _0x132A | Pressure sensor B pb (actual value)              | Pa      |
| _0x0602 | Purge time                                       | Seconds |

## 8 Commissioning

### DANGER

**DEATH OR SERIOUS BODILY INJURY DUE TO CHANGES IN EX P RELEVANT PARAMETERS.**

Changing Ex p relevant parameters can put the system in a non-safe state.

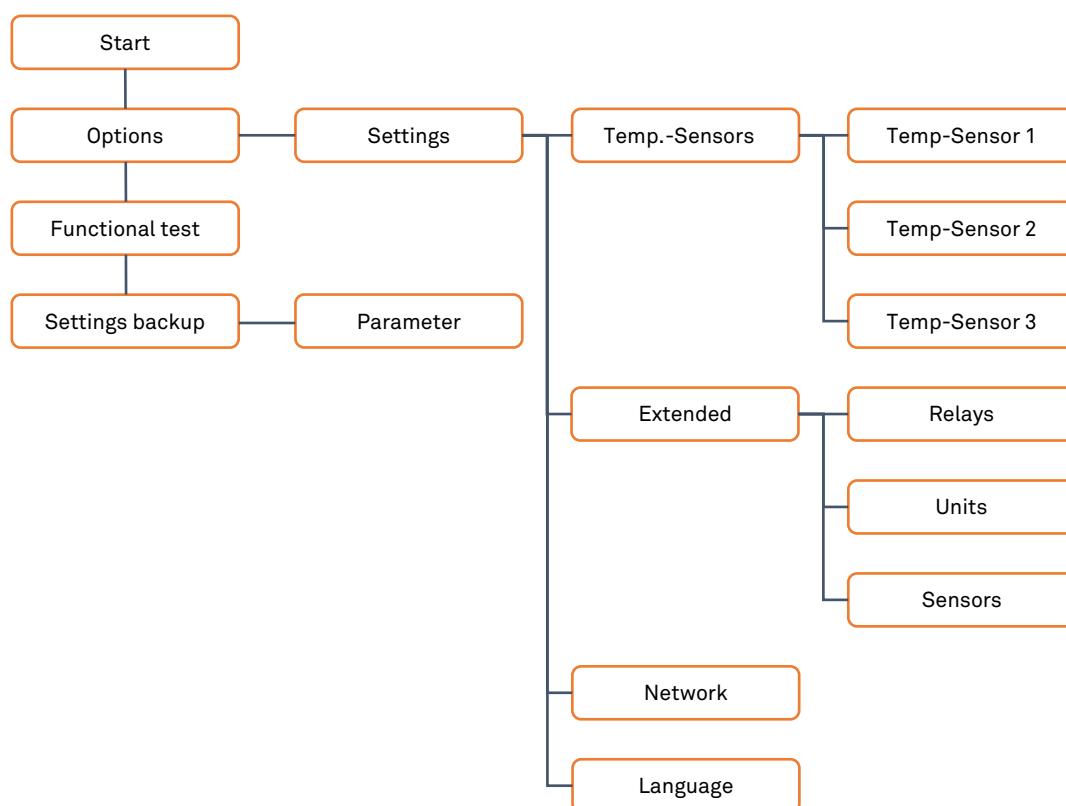
- ▶ The Ex p control unit from the SET SIEMENS is preset for the use of the gas analyzers types OXYMAT 6F, ULTRAMAT 6F and CALOMAT 62F and certificate SIEMENS TÜV 01 ATEX 1708X.
- ▶ - The settings are preset for operation from one gas analyzer.



If the Ex p control unit is in programming mode (parameter switch activated and password entered), the display of the pressure values is in Pa. Settings are made in Pa.

### 8.1 General information

The user settings are limited to the additional settings such as messages, optional sensors or display units, since the Ex p control itself is already preset for operation.



\* = Setting is to be performed in case of automatic flushing

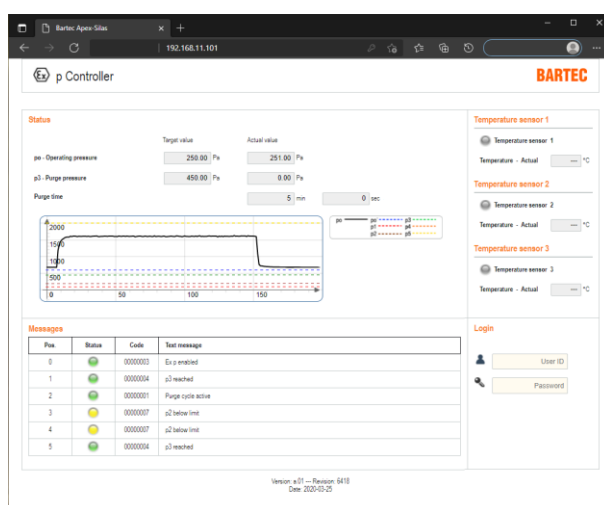
## 8.2 Pre Configuration Ex p control unit “SIEMENS Set”



The Ex p control unit is factory-set for the use of SIEMENS analyzers of the 6 series.

The Ex p control unit performs purging with the parameters specified in the SIEMENS certificate. After purging has been completed, the operating phase of the protected equipment is initiated and the equipment is purged with the specified minimum quantity of purge gas.

### Procedure:



### 8.2.1 Purge phase

**Manual purge** is based on the fact that the values for purge time and pressures are permanently stored in the device.

The set values must be exceeded or fulfilled for the Ex p control to run correctly.

### 8.2.2 Dilution phase

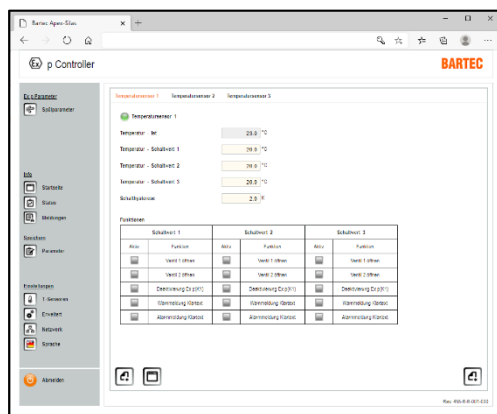
After purge is complete, the Exp control unit switches to a reduced amount of purge gas flow, diluting any escaping gases.

If the amount of continuous flow of purge gas is insufficient, the internal pressure of the Ex p protected equipment drops below the preset level and the purge gas valve opens intermittently to maintain flow.

## 8.3 Configuration of system accessories

The following chapters describe how the available options, such as temperature sensors, are set and used.

### 8.3.1 “Temperature sensors” setting



Up to three PT100/1000 sensors can be configured in the “T. sensors” menu option.

Various functions for the collated temperature can be executed during the course of the control process.

This function can be used, for example, to monitor frequency converters.

#### Parameters

| Parameters                    | Function                                                                          |
|-------------------------------|-----------------------------------------------------------------------------------|
| Temperature - actual          | Display of the measured temperature                                               |
| Temperature switching value 1 | If the switching value is exceeded, the assigned function will be executed        |
| Temperature switching value 2 | If the switching value is exceeded, the assigned function will be executed        |
| Temperature switching value 3 | If the switching value is exceeded, the assigned function will be executed        |
| Switching hysteresis          | Switching hysteresis between activation and deactivation of the assigned function |

#### Functions

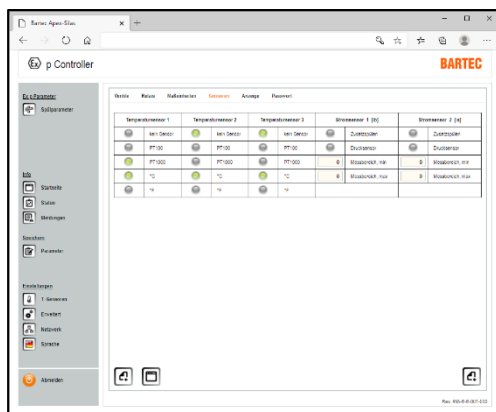
| Switching value            | Function                                                                               |
|----------------------------|----------------------------------------------------------------------------------------|
| Open valve 1               | Cooling via purge air                                                                  |
| Open valve 2               | Cooling via valve 2, e.g. Vortex                                                       |
| Deactivation Ex p (K1)     | The enable is taken back if the temperature is exceeded                                |
| Warning message plain text | Exceeding of the temperature is read out as warning in plain text in the messages area |
| Alarm message plain text   | Exceeding of the temperature is read out as alarm in plain text in the messages area   |

**Procedure**

- ▶ Connect computer with Exp control unit
- ▶ Activate programming switch
- ▶ Log in to the WEB interface with the user level
- ▶ Selected Extended / Sensors menu
- ▶ Activate the required temperature sensor, e.g. temperature sensor 1, by clicking PT100 or 1000  
Manual button changes to   
Confirm pop-up window with altered value
- ▶ Activate display unit in °C or °F by clicking on the button. Display changes to   
Confirm pop-up window with altered value
- ▶ Select T sensors / temperature sensor 1 menu
- ▶ Signaling for active sensor is displayed by way of the green indicator 
- ▶ Store switching value 1  
 e.g. 25 °C
- ▶ Confirm pop-up window with altered value
- ▶ Store switching value 2  
 e.g. 35 °C
- ▶ Confirm pop-up window with altered value
- ▶ Store switching value 3  
 e.g. 60 °C
- ▶ Confirm pop-up window with altered value
- ▶ Store switching hysteresis  
 e.g. 5 K → Functions are activated or deactivated with a hysteresis of 5K
- ▶ Select function for switching value 1  
 e.g. open valve 1 → Function “cooling via purge air “
- ▶ Confirm pop-up window with altered value
- ▶ Select function for switching value 2  
 e.g. warning message plain text → Function “warning message is read out as plain text message”
- ▶ Confirm pop-up window with altered value
- ▶ Select function for switching value 3  
 e.g. deactivation Exp (K1) and alarm message plain text → Function “Taking back of the enable of the Exp equipment and issue of an alarm message as plain text“
- ▶ Confirm pop-up window with altered value



### 8.3.3 “OS 1 / OS 2“ sensor input setting



In the standard version, the sensor inputs OS1 and OS2 can be provided with an "additional pressure monitoring" or with an "additional purge function"

#### Use as “additional pressure monitoring“

The Ex p control APEX with additional pressure monitoring is based on the standard version. The purge and operating phases are carried out in the same way.

The deviation from the standard is during the operating phase, the control additionally monitors, by means of two optionally connectable pressure sensors during the operating phase, the operating media are at minimum pressure.

#### Procedure:

- ▶ Connect computer with Ex p control unit
- ▶ Activate programming switch
- ▶ Log in to the WEB interface with the user level
  - ☞ Select “Extended / Sensors“ menu
  - ☞ In the table displayed, you can activate the “pressure sensor” function current sensor 1 or current sensor 2. Additionally, the minimum and maximum measuring range of the sensor must be entered.
- ▶ Confirm pop-up window with altered value
- ▶ Select “pressure parameters“ menu and enter the desired setpoints for the optional pressure sensors “pa and pb“
  - ☞ E.g. specify pa – pressure sensor A with trigger value 2.00 mbar.
  - ☞ If the pressure at the measuring point falls below 2.00 mbar, the associated Ex p equipment is deactivated.
- ▶ Confirm pop-up window with altered value/s
- ▶ Active pressure sensors as marked as active in the “purge parameters/purge modes“ menu for the respective purge program.
- ▶ Deactivate programming switch

### “Additional purge” function

Additional purge can be activated on the Exp control unit by means of the current inputs. In this case, the Exp equipment remains in the operating phase and can be additionally purged again.

To use this function, the additional purge function must be activated in the "Extended / Sensors" parameter menu for the corresponding current input.

4 mA = purge with active operating phase

7 mA = normal operating phase

#### Procedure:

- ▶ Connect computer with Exp control unit
- ▶ Activate programming switch
- ▶ Log in to the WEB interface with the user level
  -  Select the “Extended / Sensors” menu
  -  In the table displayed, you can activate the “additional purge” function current sensor 1 or current sensor 2..
- ▶ Confirm pop-up window with altered value
- ▶ Deactivate programming switch
- ▶ Activate additional purge (can be actively used during the operating phase)
  -  Normal mode = 7 mA on current sensor input
  -  Additional purge = 4 mA on current input

## 8.4 Start up Ex p System

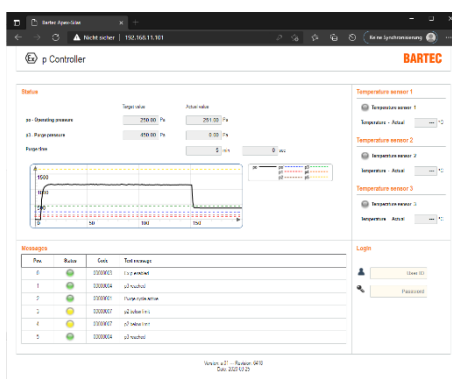
For the first commissioning of the SIEMENS set in connection with a SIEMENS gas analyzer, proceed as follows.

### Procedure:

- ▶ The pneumatic tubing of the Ex p control unit is connected to the gas analysis system as described in chapter 5.
- ▶ The electrical wiring of the Ex p control unit is connected as described in chapter 6.
- ▶ Activate the Ex p control unit power supply
  - ☞ Status LED lights up
  - ☞ LED p2 lights up
- ▶ Activate purge gas supply
- ▶ The mounted pressure reducer is set to a minimum of 2 bar and a maximum of 3 bar.
- ▶ The purge gas entering via the operating flow causes a pressure increase
  - ☞ LED p2 goes off
  - ☞ LED p1 lights up green
- ▶ The purge gas valve switches to purge
  - ☞ LED Operate flashes green
- ▶ Purge time runs for 5 minutes
- ▶ After the purge time has expired, the valve switches back to operating flow
  - ☞ LED Operate lights up green
- ▶ Operation SIEMENS analyzer is enabled



If the valve switches between the purge flow and the operating flow, this is a sign that either the pressure reducer is set too low or the leakage losses, e.g. through cable glands that are not closed, are too high. If the leakage losses are too high and cannot be compensated, the gas analyzer will not be released for operation.



View of the sequence described above in the WEB interface:

The sequence of the purging can be followed in the web interface of the Ex p control unit.

## 9 Function check and sequence

### 9.1 Safety during operation



#### DANGER

**DEATH OR SERIOUS BODILY INJURY DUE TO DAMAGED EXPLOSION PROTECTION MEASURE.**

It is no longer possible to operate the control unit safely.

Danger of explosion

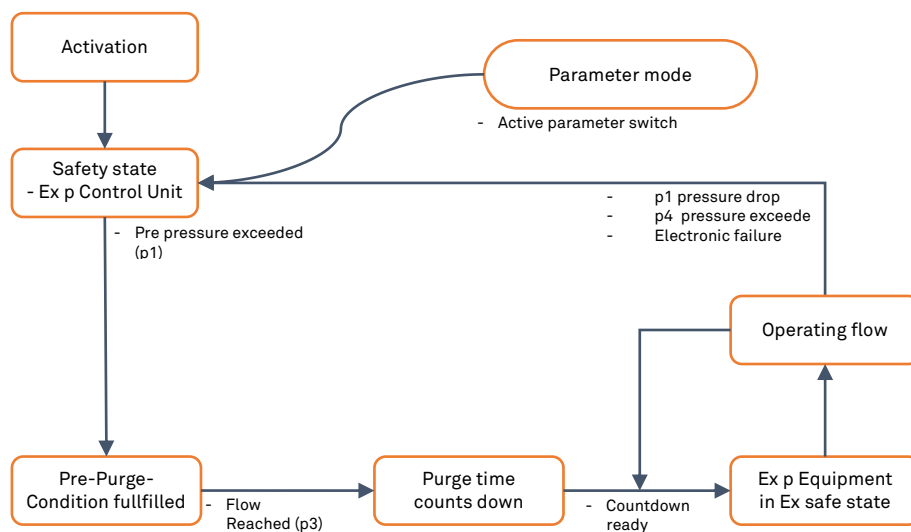
- Put APEX control unit out of operation and ensure that it is not restarted.

### 9.2 Function flow diagram of the Ex p control unit

The operation of a pressurized device can be divided into three phases.

#### 9.2.1 Flow diagram of the Ex p control unit

The Ex p control executes the following sequence during commissioning:



## 10 Maintenance and care



Find out about the general safety instructions before starting work (see Chapter 2.4 Safety instructions).

Carry out maintenance and care in accordance with the following sections, unless otherwise agreed for customer-specific versions.

### 10.1 Types of purge gas

Only inert gas (e.g. nitrogen) or purified and dry instrument air is permitted as purge gas. In any case, a filter must be installed upstream if the quality with regard to foreign particles is not guaranteed. The following quality characteristics of the purge gas should be met:

- ➔ Residual dust: < 40 µm
- ➔ Residual water: dew point +3 °C
- ➔ Residual oil content: 1 mg/m<sup>3</sup>

### 10.2 Maintenance work

#### 10.2.1 Maintenance intervals

##### MAINTENANCE INTERVALS



Maintenance according to the following maintenance schedule is recommended in the case of proper operation, observing the installation instructions and ambient conditions.

#### ATTENTION

##### MAINTENANCE AND CARE

- ▶ The currently applicable regulations and the national provisions must be observed for maintenance, service and inspection of the equipment!
- ▶ Operation and maintenance work may be performed by trained specialist personnel only. The statutory regulations and the other binding directives on occupational health and safety, accident prevention and environmental protection must be observed.
- ▶ When opening covers or removing parts, unless possible by hand, live parts may be exposed. Connecting parts may also be live.

| Maintenance interval | Work to be performed                            |
|----------------------|-------------------------------------------------|
| Monthly              | Visual inspection according to Chapter 10.2.2   |
| Semi-annually        | Cleaning according to Chapter 10.2.3            |
| Annually             | Regular maintenance according to Chapter 10.2.4 |

### 10.2.2 Visual inspection

Perform a visual inspection monthly by:

- ▶ Checking the enclosure, cable entries and cables for damage.
- ▶ Checking the screwed connections for tight fit.
- ▶ Checking the error memory for content.

### 10.2.3 Cleaning

No solvents should be used to clean the control unit as these can impair the properties on contact with the seals.

### 10.2.4 Regular maintenance

Depending on the purity of purge air used, the inlet and outlet of the control unit must be checked regularly for impurities (e.g. oil, dust, etc.) or corrosion.

In the case of anomalies, the operator should weigh up the possibility of a timely and proper cleaning by BARTEC GmbH against a spontaneous failure of the control unit.

Furthermore, the function of the overall system should be checked. The correct sequence of the purge phase and of the operating phase should be checked.

## 10.3 Repairs

- ➔ Repairs on explosion-protected equipment may be done only by authorized persons working in accordance with the latest development in technology and using original spare parts. The applicable provisions must be observed.
- ➔ Repairs must be carried out in accordance with EN / IEC 60079-19.
- ➔ For SIL-qualified devices, only a corresponding electronics module with SIL qualification may be used.

All application settings must be re-entered. Therefore, you must conduct a restart after a repair. If you have saved the data of parameter assignment the first time you commissioned the Exp control unit, you can transfer them back to the replacement control unit. Detailed information on the replacement of spare parts can be found in these operating instructions. After restart or transfer of the parameter assignment data, you must verify the parameters. Only then will the device be ready for operation again.

- ➔ For Ex applications, only one device and one electronic module may be used with corresponding Ex approval. Order the spare parts from your local representative. The serial number can be found on the type plate of the device, inside the enclosure.

## 10.4 Faults and troubleshooting

### ATTENTION

**AN ALTERED OPERATING BEHAVIOUR CAN BE AN INDICATION OF ALREADY EXISTING DAMAGE TO THE CONTROL UNIT.**

- Only put the Exp system back into operation after the cause of a fault has been rectified.

It is assumed that all external electrical and mechanical equipment have been properly connected. Therefore, the correct installation and connection of the electrical devices should be checked first.

### 10.4.1 Faults

| Error / Fault                                                       | Possible cause                                                               | Remedy                                                                    |
|---------------------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Sporadic failure                                                    | Cable break                                                                  | Check connections                                                         |
|                                                                     | Pressure drop / leakage                                                      | Check tightness and leak compensation                                     |
| Control unit without function                                       | Mains voltage not available                                                  | Check supply voltage                                                      |
|                                                                     | Device defective                                                             | Return to manufacturer                                                    |
| The protected devices are switched on without pre-purge             | Bypass activated                                                             | Deactivate bypass                                                         |
|                                                                     | Incorrect purge program activated                                            | Check purge program                                                       |
| During pre-purge, the purge gas valve switches off for a short time | Excessive amounts of purge gas are introduced into the pressurized enclosure | Reduce the purge gas nozzle                                               |
| “Operate” LED does not flash during purge time                      | No purge gas                                                                 | Check purge gas valve for the presence of supply voltage                  |
|                                                                     | Purge gas valve does not open or opens only partially                        | Check purge gas valve for foreign particles in the mechanical part        |
|                                                                     |                                                                              | Increase inlet pressure to setpoint value                                 |
|                                                                     | An insufficient amount of purge gas flows through the Exp enclosure          | Check purge gas nozzle for correct value                                  |
|                                                                     |                                                                              | Check setpoint values “p3” and “p1” of the control unit                   |
|                                                                     |                                                                              | Increase the cross section of the purge gas supply line                   |
|                                                                     |                                                                              | Purge gas supply line too small. Enlarge cross section of the supply line |

| Error / Fault                                                                                      | Possible cause                                                                | Remedy                                                                                                                      |
|----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| “Operate” LED does not flash during purge time                                                     | Setpoint pressure of the pressure reducer is not reached                      | Remove the cap or eliminate the reduction by taking suitable measures                                                       |
|                                                                                                    | Pressure monitor of the control unit is inadmissibly closed or has a reducer  | Seal enclosure using suitable measures                                                                                      |
|                                                                                                    | Enclosure leaks during the pre-purge phase due to increased internal pressure | Check purge gas valve for the presence of supply voltage                                                                    |
| Digital purge gas valve does not switch to the small nozzle after the pre-purge phase              | Temperature sensor is connected, internal temperature too high                | Check purge gas valve for foreign particles in the mechanical part                                                          |
|                                                                                                    |                                                                               | Wait until the increased flow rate has caused the internal temperature to drop or check the set temperature switching value |
|                                                                                                    | Main switch or bridge to the terminals Hs_In / Hs_Out not connected           | Switch on main switch or connect bridge to terminal Hs_In / Hs_Out                                                          |
| Control unit does not switch on the electrical devices after the pre-purge phase                   | Purge gas valve does not close                                                | Check purge gas valve for disconnected supply voltage                                                                       |
|                                                                                                    | Pressure in the enclosure higher than the switching value “p4”                | Reduce the flow rate of the air leak needle                                                                                 |
|                                                                                                    | Switching value “p4” too low                                                  | Check switching value “p4”                                                                                                  |
| The control unit switches off the electrical devices after the purge time with a 5 sec. time delay | Pressurized enclosure leaking, switching value “p1” not reached               | Seal pressurized enclosure                                                                                                  |
|                                                                                                    | Leakage air needle of digital valve too small                                 | Increase the air flow rate of the leakage air needle                                                                        |
|                                                                                                    | Switching value “p3” too high                                                 | Check switching value “p3”                                                                                                  |
| Relays K4 or K5 do not switch                                                                      | Wrong selection of switching parameters                                       | Check switching parameters                                                                                                  |

| Error / Fault                                                          | Possible cause                                                  | Remedy                     |
|------------------------------------------------------------------------|-----------------------------------------------------------------|----------------------------|
| Digital purge gas valve switches on briefly during the operating phase | Value “po” too high                                             | Reduce “po” value          |
|                                                                        | Pressurized enclosure leaking, switching value “p1” not reached | Seal pressurized enclosure |
|                                                                        | Pressurized enclosure leaking, switching value “p1” not reached | Adjust leak compensation   |
| If the pressure drops, the electrical devices do not switch off        | Key switch switched on                                          | Switch off key switch      |

### 10.4.2 Error messages

The control units give plain text messages which are divided into 3 categories.

- ▶ Positive messages are notifications that do not affect system availability.
- ▶ Warning messages are notifications that affect parts of the system.
- ▶ Alarm messages are notifications that lead to the shutdown of the protected device.

#### 10.4.2.1 Positive messages

| Status                                                                                                                        | Code     | Plain text    |
|-------------------------------------------------------------------------------------------------------------------------------|----------|---------------|
|                                            | 00000001 | Purge process |
| The control unit has started the purge process.                                                                               |          |               |
|                                            | 00000002 | Exp ready     |
| The control unit has successfully completed the purge process. The main switch or bridge HS_IN / HS_OUT is not closed.        |          |               |
|                                            | 00000003 | Exp active    |
| The control unit has successfully completed the purge process. The main switch or bridge HS_IN / HS_OUT is closed and enabled |          |               |
|                                            | 00000004 | p3 reached    |
| The setpoint value “p3” purge flow is reached and the purge time counts down.                                                 |          |               |

## 10.4.2.2 Warning messages

| Status                                                                              | Code     | Plain text                                                                                 |
|-------------------------------------------------------------------------------------|----------|--------------------------------------------------------------------------------------------|
|    | 00000005 | Bypass active<br>The bypass is activated on the control unit.                              |
|    | 00000006 | Door contact / main switch open<br>The main switch or bridge HS_IN / HS_OUT is not closed. |
|    | 00000007 | p2 not reached<br>The setpoint value p2 "pre-alarm" is not reached.                        |
|    | 00000008 | p4 exceeded<br>The setpoint value p4 "Maximum pressure – operation" is exceeded.           |
|    | 00000009 | p5 exceeded<br>The setpoint value p5 "Maximum pressure – Purge" is exceeded.               |
|    | 0000000A | Temperature sensor 1 exceeded<br>Temperature sensor 1 exceeded                             |
|   | 0000000B | Temperature sensor 2 exceeded<br>The setpoint temperature value at sensor 2 is exceeded.   |
|  | 0000000C | Temperature sensor 3 exceeded<br>The setpoint temperature value at sensor 3 is exceeded.   |

## 10.4.2.3 Alarm messages

| Status                                                                              | Code     | Plain text                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | 0000000D | Ex p inactive<br>The protected device is deactivated.                                                                                                                                              |
|  | 0000000E | Device fault 1<br>HW test error in safety processors with the exception of the barriers and sensor errors. The message is generated for the service processor if an error occurs in the HW status. |
|  | 0000000F | Device fault 2<br>Status of the barriers without sensor board feedback                                                                                                                             |
|  | 00000010 | Device fault 3<br>There is an error in the area of the internal temperature monitoring / sensors.                                                                                                  |
|  | 00000011 | Device fault 4<br>The system status for safety processors equals "serious error"                                                                                                                   |
|  | 00000012 | Sensor error 1<br>Pressure sensor error or sensor board status error                                                                                                                               |
|  | 00000013 | Sensor error 2<br>Power sensor error.<br>Error is only shown if the sensors are active.                                                                                                            |

| Status                                                                              | Code     | Plain text                                                                          |
|-------------------------------------------------------------------------------------|----------|-------------------------------------------------------------------------------------|
|    | 00000014 | Sensor error 3                                                                      |
|                                                                                     |          | External temperature sensors 1-3.<br>Error is only shown if the sensors are active. |
|    | 00000015 | p1 has not been reached                                                             |
|                                                                                     |          | The setpoint p1 "Minimum pressure" has not been reached.                            |
|    | 00000016 | p3 has not been reached                                                             |
|                                                                                     |          | The setpoint p3 "Purge pressure" has not been reached.                              |
|    | 00000017 | p4 exceeded                                                                         |
|                                                                                     |          | The setpoint p4 "Maximum pressure - operation" is exceeded.                         |
|    | 00000018 | p5 exceeded                                                                         |
|                                                                                     |          | The setpoint p5 "Maximum pressure - purge" is exceeded.                             |
|    | 00000019 | Temperature sensor 1 exceeded                                                       |
|                                                                                     |          | The setpoint temperature at sensor 1 is exceeded.                                   |
|    | 0000001A | Temperature sensor 2 exceeded                                                       |
|                                                                                     |          | The setpoint temperature at sensor 2 is exceeded.                                   |
|  | 0000001B | Temperature sensor 3 exceeded                                                       |
|                                                                                     |          | The setpoint temperature at sensor 3 is exceeded.                                   |

## 11 Technical data

### 11.1 Ex p Control Unit APEX

#### Parameters

Product  
Type  
EU type examination certificate  
IECEX certification  
ATEX marking  
IECEX marking  
Operating temperature range  
Storage and transport  
Mains voltage AC (variant)  
Power consumption electronics  
Maximum power consumption  
Enable relay K1 (SIL)  
  
Enable relay K2 (SIL)  
  
Signal relays K3 and K4  
  
Pre-pressure purge gas supply  
Pressure range  
Tolerance range  
Shut-down value p1  
  
Pre-purge phase duration  
  
Pre-purge volume  
Pre-purge phase flow  
  
Operating flow  
  
Purge gas valve  
Connection terminal "Ex e"  
    With wire end ferrule  
    / plastic collar  
Connection terminal "Ex i"  
    With wire end ferrule  
    / plastic collar  
Enclosure material  
IP degree of protection  
  
Cable gland  
Dimensions  
Mounting  
Weight

#### Specifications

Ex p control unit APEX  
07-37A2-3211/2726  
BVS 19 ATEX E 015 X  
IECEX BVS 19.0038X  
Ⓔ II 2(1)G Ex eb mb ib [ib pxb] [ia Ga] IIC T4 Gb  
Ex eb mb ib [ib pxb] [ia Ga] IIC Gb  
-25 °C to +50 °C @ T4  
-25 °C to +60 °C  
100 Vac to 230 Vac, +/- 10%  
0.5 A – 1.5 A  
35 W (incl. purge valve)  
2 non-floating NO contacts,  
230 Vac @ 5 A (AC1) or 24 Vdc @ 5 A (DC1)  
Floating, 4 x NO,  
230 Vac @ 3 A, 24 Vdc @ 3 A  
Floating, 1x changeover contact,  
230 Vac @ 1 A, 24 Vdc @ 1 A  
Max 3.5 bar  
0 ... 25 mbar  
0 ... 25 mbar = ±0.4 mbar  
At least 50 Pa (0.5 mbar)  
Pre-set to 100 Pa (1.0 mbar)  
Preset to 5 minutes  
Purge time can be set from 1 minute to 120 minutes  
250 l  
Pre-set to 50 l/min (3000 l/h)  
Can be set to up to 65 l/min (3900 l/h)  
Pre-set to 3,5 l/min (shut-down value 3 l/min)  
Can be set to up to 30 l/min  
Changeover valve  
0.08 ... 2.5 mm<sup>2</sup> (28 ...12 AWG)  
0.25 ... 1,5 mm<sup>2</sup>  
0.20 ... 2.0 mm<sup>2</sup> (20 ...14 AWG)  
0.25 ... 0.75 mm<sup>2</sup>  
  
Polyester, Glass Fiber Reinforced A  
IP 64 acc. to IEC/EN 60079-0  
IP 66 acc.to IEC/EN 60529  
6x M20, clamp range 7-12 mm, black  
250 (W) x 300 (H) x 120 (D) mm  
Wall mounted  
10.7 kg

## 11.2 Ex e control station

### Parameters

Product  
 Type  
 EU type examination certificate  
 IECEx certification  
 ATEX marking  
 IECEx marking  
 Operating temperature range  
 Storage and transport  
 Mains voltage AC  
 Control voltage  
 Front equipment  
  
 Cable gland  
  
 Enclosure material  
 IP degree of protection  
 Dimensions  
 Mounting

### Specifications

Ex e control station  
 07-3103-2512/0639  
 IBExU 12 ATEX 1099 X  
 IBE 12.0031X  
 Ex II 2G Ex db eb ib IIC T4 Gb  
 Ex db eb ib IIC T4 Gb  
 -25 °C bis +50 °C @ T4  
 -25 °C bis +60 °C  
 100 Vac bis 230 Vac, +/- 10%  
 24 Vdc  
 1x Key-Switch-Module, Marking Bypass  
 1x Light-Module, Marking: Bypass aktiv  
 4x M20, clamp range 7-13 mm, black  
 1x M20, clamp range 7-13 mm, blue  
 Polyester, glas fibre reinforced  
 IP 66 a.. IEC/EN 60079-0  
 250 (W) x 250 (H) x 120 (D) mm  
 Wall mounted

## 12 Order numbers

### 12.1 Ex px purge unit, Version SIEMENS

Consisting of Ex p control unit, Ex e Control Station, connecting cable

|                                          | BARTEC selection number     |
|------------------------------------------|-----------------------------|
|                                          | SIEMENS order number        |
| SIEMENS version without p-operator panel | 05-0089-0076<br>7MB8000-7CA |
| SIEMENS version with p-operator panel    | 05-0089-0077<br>7MB8000-7CB |

### 12.2 Ex p control unit APEX

Standard, polyester housing

|                                          | BARTEC selection number |
|------------------------------------------|-------------------------|
| Control unit APEX, AC wide voltage range | 07-37A2-3211/2726       |

### 12.3 Ex e control station

Standard, polyester housing

|                                                            | BARTEC selection number |
|------------------------------------------------------------|-------------------------|
| Ex e control station associated with Ex px purge unit APEX | 07-3103-2512/0639       |

### 12.4 Valve fuse

|                                                            | BARTEC selection number |
|------------------------------------------------------------|-------------------------|
| Valve fuse 1.0 A (application for digital purge gas valve) | 05-0080-1016            |

### 12.5 Operator panel

|                                      | BARTEC selection number |
|--------------------------------------|-------------------------|
| Permanently wired and add-on mounted | 17-51P5-1111            |

### 12.6 Optional cradle relay

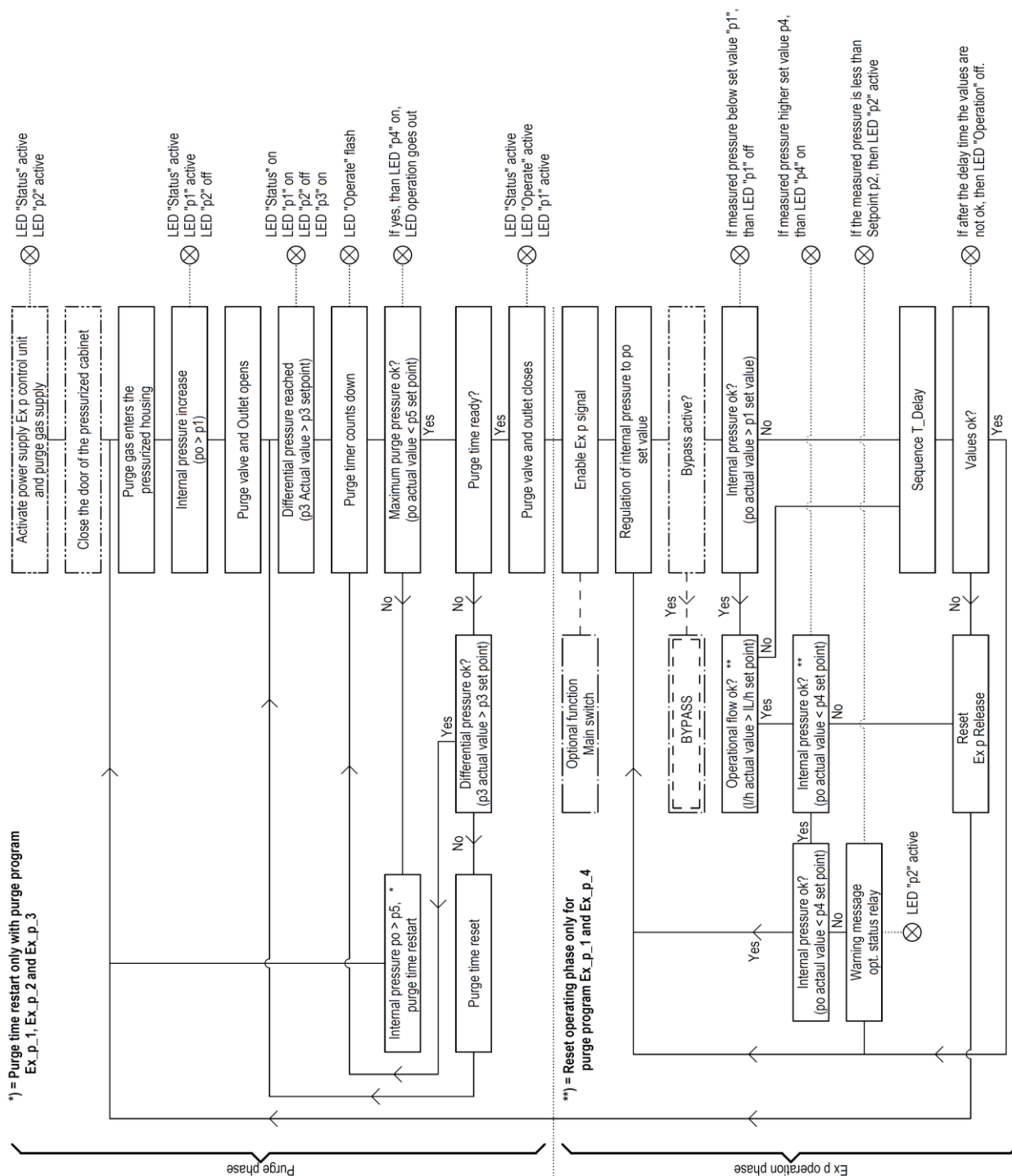
|                                      | BARTEC selection number           |
|--------------------------------------|-----------------------------------|
|                                      | SIEMENS order number              |
| Variant AC 230/240 V, 8x NO          | 07-73121-977C/J730<br>7MB8000-4AA |
| Variant AC 110/120 V, 50/60Hz, 8x NO | 07-73121-977C/R730<br>7MB8000-4AB |
| Variant DC 24 V, 8x NO               | On request                        |

### 12.7 Accessories

|                                                              | BARTEC selection number |
|--------------------------------------------------------------|-------------------------|
| Pressure reducer G1/4", stainless steel, incl. double nipple | 05-0056-0023            |

## 13 Appendix

### 13.1 Flow chart



### 13.2 Software packages used



The service area of hardware / software of the control unit APEX uses the freeware freertos

### 13.3 Dimensions

#### 13.3.1 Dimensions Exp control unit APEX, type 07-37A2-3211/2726

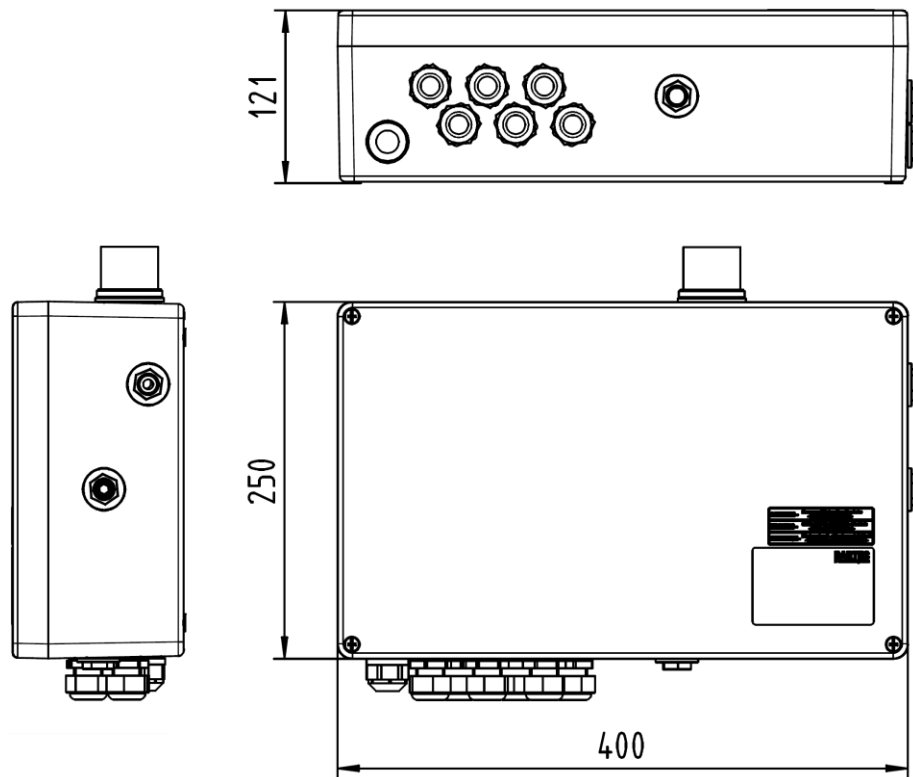


Illustration not true to scale.

#### 13.3.2 Drilling pattern APEX, type 07-37A2-3211/2726

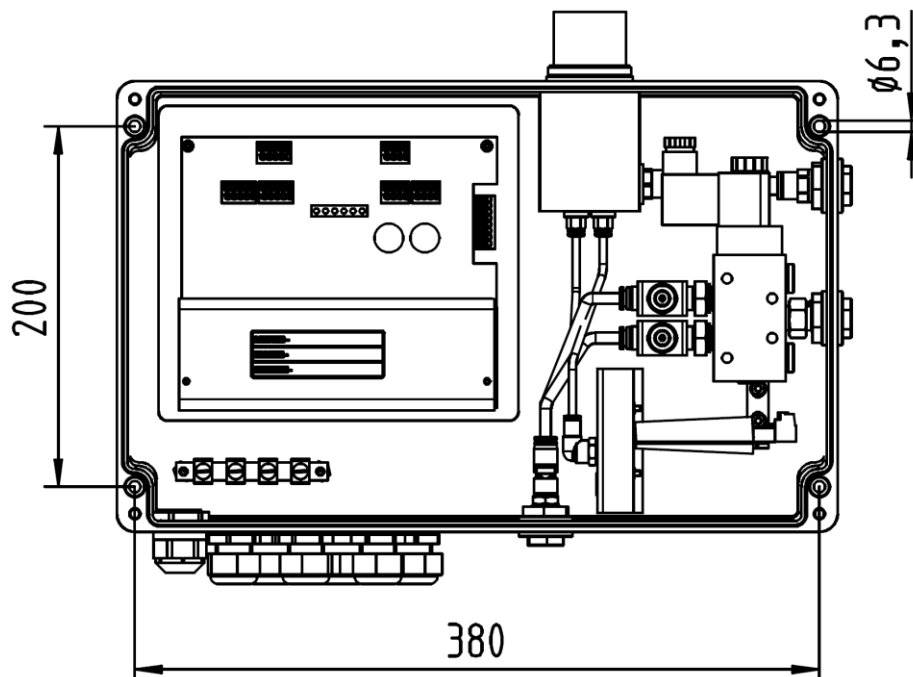


Illustration not true to scale.

## 13.3.3 Dimensions Ex e control station, type 07-3103-2512/0639

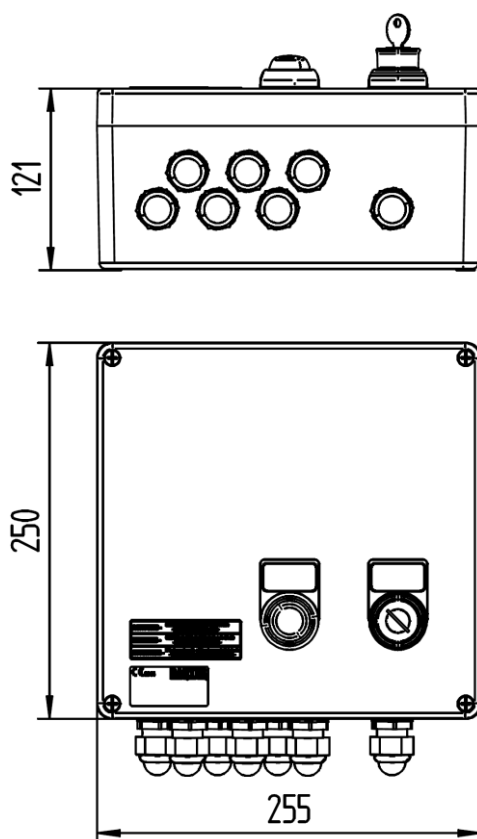


Illustration not true to scale.

## 13.3.4 Drilling pattern Ex e control station, type 07-3103-2512/0639

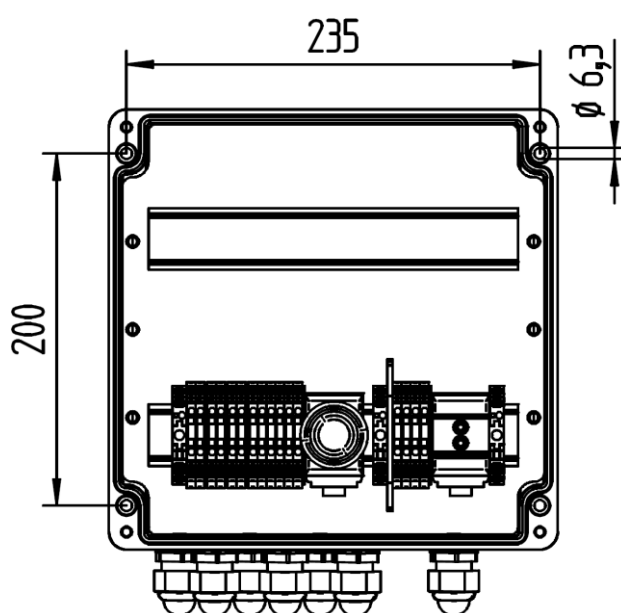


Illustration not true to scale.

## 14 Declaration of conformity

### 14.1 Ex p control unit APEX, type 07-37A2-3211/2726

EU Konformitätserklärung  
EU Declaration of Conformity  
Déclaration UE de conformité  
Nº 01-37A2-7C0001\_A

**BARTEC**

| Wir                                                                                      | We                                                                                    | Nous                                                                                         |
|------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
|                                                                                          | <b>BARTEC GmbH</b><br>Max-Eyth-Straße 16<br>97980 Bad Mergentheim<br>Germany          |                                                                                              |
| erklären in alleiniger<br>Verantwortung, dass das Produkt<br><b>Ex p Kontrolleinheit</b> | declare under our sole<br>responsibility that the product<br><b>Ex p control unit</b> | attestons sous notre seule<br>responsabilité que le produit<br><b>Unité de contrôle Ex p</b> |

**Typ 07-37A2-\*1\*1/\*\*\*\* APEX<sup>py</sup> und 07-37A2-\*2\*1/\*\*\*\* APEX<sup>px</sup>**  
**Type 07-37A2-\*1\*1/\*\*\*\* APEX<sup>py</sup> and 07-37A2-\*2\*1/\*\*\*\* APEX<sup>px</sup>**

|                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| auf das sich diese Erklärung<br>bezieht den Anforderungen der folgen-<br>den <b>Richtlinien (RL)</b> entspricht<br><b>ATEX-Richtlinie 2014/34/EU</b><br><b>EMV-Richtlinie 2014/30/EU</b><br><b>RoHS-Richtlinie 2011/65/EU</b><br><b>WEEE-Richtlinie 2012/19/EU</b><br>und mit folgenden Normen oder nor-<br>mativen Dokumenten<br>übereinstimmt | to which this declaration relates is in<br>accordance with the provision of the<br>following <b>directives (D)</b><br><b>ATEX-Directive 2014/34/EU</b><br><b>EMC-Directive 2014/30/EU</b><br><b>RoHS-Directive 2011/65/EU</b><br><b>WEEE-Directive 2012/19/EU</b><br>and is in conformity with the<br>following standards or other<br>normative documents | se référant à cette attestation<br>correspond aux dispositions des <b>direc-<br/>tives (D)</b> suivantes<br><b>Directive ATEX 2014/34/UE</b><br><b>Directive CEM 2014/30/UE</b><br><b>Directive RoHS 2011/65/UE</b><br><b>Directive WEEE 2012/19/UE</b><br>et est conforme aux normes ou docu-<br>ments normatifs ci-dessous |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

EN IEC 60079-0:2018/AC:2020  
EN 60079-2:2014  
EN IEC 60079-7:2015/A1:2018  
EN 60079-11:2012  
EN 60079-18:2015/A1:2017  
EN 60079-31:2014  
EN 61010-1:2010

EN 61000-6-4:2007 +A1:2011  
EN 61000-3-2:2014  
EN 61000-3-3:2013  
EN 61326-1:2013  
EN 62061:2005 + Cor.:2010 + A1:2013 + A2:2015  
EN ISO 13849-1:2015  
EN ISO 13849-2:2012

|                                                          |                                                     |                                                      |
|----------------------------------------------------------|-----------------------------------------------------|------------------------------------------------------|
| Verfahren der EU-Baumuster-<br>prüfung / Benannte Stelle | Procedure of EU-Type Examination /<br>Notified Body | Procédure d'examen UE de type /<br>Organisme Notifié |
|----------------------------------------------------------|-----------------------------------------------------|------------------------------------------------------|

**BVS 19 ATEX E 015 X**

0158, DEKRA Testing and Certification GmbH, 44809 Bochum

**CE 0044**

Bad Mergentheim, 30.06.2021

*i. V. Jens Schurwanz*  
i.V. Jens Schurwanz  
Global Product Line Manager  
Ex p

*i. A. Steffen Mika*  
i.A. Steffen Mika  
Certification Manager

## 14.2 Ex e control station, type 07-3103-2512/0639

EU Konformitätserklärung  
EU Declaration of Conformity  
Déclaration UE de conformité  
N° 01-3000-7C0001\_D

**BARTEC**

| Wir                                                                                                                                                                                                                                                                                                        | We                                                                                                                                                                                                                                                                                                                    | Nous                                                                                                                                                                                                                                                                                                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>BARTEC GmbH</b><br>Max-Eyth-Straße 16<br>97980 Bad Mergentheim<br>Germany                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                      |
| erklären in alleiniger<br>Verantwortung, dass das Produkt<br><b>Schaltgerätekombination</b>                                                                                                                                                                                                                | declare under our sole<br>responsibility that the product<br><b>Measuring, Control and<br/>           Switchgear combination</b>                                                                                                                                                                                      | attestons sous notre seule<br>responsabilité que le produit<br><b>Ensemble d'appareillage de con-<br/>           nexion et de commande</b>                                                                                                                                                           |
| <b>Typ 07-3***-****/****</b>                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                      |
| auf das sich diese Erklärung<br>bezieht den Anforderungen der folgen-<br>den <b>Richtlinien (RL)</b> entspricht<br><b>ATEX-Richtlinie 2014/34/EU</b><br><b>EMV-Richtlinie 2014/30/EU</b><br><b>RoHS-Richtlinie 2011/65/EU</b><br>und mit folgenden Normen oder nor-<br>mativen Dokumenten<br>übereinstimmt | to which this declaration relates is in<br>accordance with the provision of the<br>following <b>directives (D)</b><br><b>ATEX-Directive 2014/34/EU</b><br><b>EMC-Directive 2014/30/EU</b><br><b>RoHS-Directive 2011/65/EU</b><br>and is in conformity with the<br>following standards or other<br>normative documents | se référant à cette attestation<br>correspond aux dispositions des <b>direct-<br/>           tives (D)</b> suivantes<br><b>Directive ATEX 2014/34/UE</b><br><b>Directive CEM 2014/30/UE</b><br><b>Directive RoHS 2011/65/UE</b><br>et est conforme aux normes ou docu-<br>ments normatifs ci-dessous |
| <b>EN IEC 60079-0:2018</b><br><b>EN 60079-1:2014</b><br><b>EN 60079-5:2015</b><br><b>EN IEC 60079-7:2015/A1 :2018</b><br><b>EN 60079-11:2012</b><br><b>EN 60079-18:2015/A1 :2017</b>                                                                                                                       |                                                                                                                                                                                                                                                                                                                       | <b>EN 60079-28:2015</b><br><b>EN 60079-31:2014</b><br><b>EN 60445:2017-11</b><br><b>EN 62208:2011</b><br><b>EN 60529:1991</b><br><b>+ A1:2000 + A2:2013</b>                                                                                                                                          |
| Eine Übereinstimmung mit den auf-<br>geführten Normen ist variabel und<br>abhängig von den eingebauten<br>Komponenten.                                                                                                                                                                                     | A conformity with the listed stand-<br>ards is variable and depends on the<br>installed components.                                                                                                                                                                                                                   | La conformité aux normes citées est<br>variable et dépend des composants<br>installés.                                                                                                                                                                                                               |
| <b>Verfahren der EU-Baumuster-<br/>           prüfung / Benannte Stelle</b>                                                                                                                                                                                                                                | <b>Procedure of EU-Type Examination /<br/>           Notified Body</b>                                                                                                                                                                                                                                                | <b>Procédure d'examen UE de type /<br/>           Organisme Notifié</b>                                                                                                                                                                                                                              |

**IBExU 12 ATEX 1099 X**

0637, IBExU, Fuchsmühlenweg 7, 09599 Freiberg, DE

**CE 0044**

Bad Mergentheim, 05.07.2021



Sebastian Werner  
Team Leader –  
Engineering to Order



Jan Kirschner  
Head of Global  
Product Management

## 15 Note



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