BARTEC

Manual Ex p Control Unit

APEX^{mpc}

SILAS^{mpc}

BARTEC

Operating instructions
Safety manual

Ex p control units

APEX^{mpc}, type 07-37A2-2211/*M5*
ATEX / IECEx zone 1 / 21

SILAS^{mpc}, type A7-37S2-2111/*M5*
ATEX / IECEx zone 2 / 22

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0 Table of Contents

1 About these operating instructions

Read carefully before using the device.
Observe the corresponding operating instructions.

This manual contains the information required for the intended use of the control unit. It is aimed at technically qualified personnel.

Knowledge of, as well as the technically correct implementation of the safety instructions and warning notes contained within this manual are prerequisites for a safe installation and start-up. Only qualified personnel have the necessary specialist knowledge to correctly interpret the general safety notes and warnings in these operating instructions, as well as to put them into practice.

These operating instructions form an integral part of the scope of delivery, even if, for logistical reasons, separate orders and deliveries were chosen as an option.

- Should you require further information, please request the required information from your local or responsible BARTEC branch. Read the operating instructions and especially the safety instructions carefully before using the device.
- Please retain these operating instructions for the entire service life of the device.
- Please make the brief instructions available to all persons entrusted with handling the device.

1.1 Highlighted sections in this document

1.1.1 Warning notices

In these operating instructions, warning notices are used to warn of potential property damage and personal injury.

► Always read and note these warning notices.

Warning notices are particularly highlighted in these operating instructions and identified by symbols:

⚠ DANGER

DANGER indicates a hazardous situation which, if the safety measures are not observed, can lead to death or serious injuries with permanent damage.

⚠ WARNING

WARNING indicates a hazardous situation which, if the safety measures are not observed, can lead to serious injuries without permanent damage.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if the safety measures are not observed, can lead to minor injuries.

ATTENTION

ATTENTION indicates a hazardous situation which, if the safety measures are not observed, can lead to property damage.

Explanation regarding the structure of warning notices

⚠ WARNING WORD

Stipulation of the source of danger, cause or type of danger

Consequences if the described safety measure is not observed.

► Safety measure

Example of a warning notice

⚠ DANGER

Operation of the control unit in the event of damage!

Death or serious bodily injury.

► Shut down the control unit and secure it to prevent it from being switched on again.

1.1.2 Symbols and means of illustration

Symbol	Explanation
	Important notes and information for the effective, efficient and environmentally compatible use of the product.
	Ex application, these symbols indicate special instructions for Ex applications
	Safety function, these symbols indicate special instructions for safe functions in accordance with IEC 61508.

Table 1: Symbols and means of illustration

1.2 Technical changes

The current versions of the data sheets, operating instructions, certificates and EU declarations of conformity, as well as information on new accessories can be downloaded from www.bartec.de under “Products & Solutions” in the “Control and Connection Technology” product area or may be requested directly from BARTEC GmbH.

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 other languages are required, these must be requested from BARTEC or specified when placing the order.

2 Safety

2.1 Intended use

2.1.1 Exclusive use

The APEX control device in the mpc version is used exclusively as a control and monitoring device for pressurised equipment and is intended for use in explosion group II, category 2GD and temperature class T4 or for use in dust with surface temperatures of T130 ° C.

Furthermore, the safety function of the APEX control device fulfils the requirements for 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.

The SILAS control device in the mpc version is used exclusively as a control and monitoring device for pressurised equipment and is intended for use in explosion group II, category 3GD and temperature class T4 or for use in dust with surface temperatures of T130 ° C.

The permissible operating data of the device used must be observed.

2.1.2 Improper use

Any other use is improper and can lead to damage and accidents. The manufacturer is not liable for any use beyond the exclusive purpose.

2.2 Personnel qualifications

Target group	Competencies
Construction / engineering	• Technical training • Knowledge and experience to recognise and avoid hazards that can arise from electricity • Understanding of the overall system • Configuration/ programming • Special instructions for the Ex area
Qualified electricians/ fitters	• Technical training • Knowledge and experience to recognise and avoid hazards that can arise from electricity • Understanding of the overall system • Special instructions for the Ex area
Operators	• Instruction by the operator in regard to the operation • Special instructions for the Ex area
Storage and transport companies	• Loading and transport activities • Proper storage

Table 2: Responsibilities of individual target groups

2.3 Guarantee

WARNING

UNAUTHORIZED MODIFICATIONS AND/ OR CHANGES TO THE CONTROLLER.

The explosion protection, as well as the stress and safety-oriented construction and production are no longer guaranteed.

- Contact the manufacturer before making changes and modifications and obtain written approval.
- Only use original and replacement wear parts.

Assumption of guarantee services

The manufacturer assumes the full guarantee only and exclusively for spare parts ordered from them.

In principle, our “General Terms and Conditions of Sale and Delivery” shall apply. These are available to the operating company upon conclusion of the contract at the latest. Warranty and liability claims for personal injury and property damage are excluded, if these can be linked to one or more of the following causes:

- Improper use of the control unit.
- Improper assembly, commissioning, operation and maintenance of the control unit.
- Failure to observe the instructions in the manual regarding transport, storage, assembly, commissioning, operation and maintenance.
- Unauthorised structural changes to the control unit.
- Inadequate monitoring of parts that are subject to wear.
- Repairs having been carried out incorrectly
- Disasters caused by the effects of foreign bodies and force majeure.

We grant a guarantee period of one year from the date of delivery to the Bad Mergentheim plant on the APEX or SILAS control unit and its accessories.

This warranty covers all parts of the delivery and is limited to the free replacement or repair of the defective parts in our Bad Mergentheim plant. For this purpose, the packaging supplied must be kept where possible. Where required, the goods must be sent to us after agreeing the same in writing. There shall be no right to a rectification of defects at the place of installation.

2.4 Safety information

2.4.1 General

- Do not dry wipe or clean devices in potentially explosive areas!
- Do not open devices in potentially explosive areas.
- General legal regulations or guidelines on occupational safety, accident prevention regulations and environmental protection laws must be observed, e.g. Industrial Safety Ordinance (BetrSichV) or nationally applicable ordinances.
- Wear suitable clothing and footwear because of the risk of dangerous static electricity build-up.
- Avoid the effects of heat outside the specified temperature range (see chapter on general technical data).
- Avoid the effects of moisture.

2.4.2 Operational safety information

Installation

- Before the installation, it must be checked that all components and documents are available.

Inspection

- According to EN / IEC 60079-17 / ГОСТ IEC 60079-17-2013, the operator of electrical systems in potentially explosive areas is obliged to have them checked for proper condition by a qualified electrician.

Repairs

- The relevant installation and operating regulations must be observed for electrical systems (e.g. RL 99/92 / EG, RL 2014/34 / EU, BetrSichV or the nationally applicable regulations EN / IEC 60079-14 / ГОСТ IEC 60079-14-2013 and the DIN VDE 0100 series)!
- Please observe the national waste disposal regulations for disposal.

Maintenance

- If the device is operated properly, considering the installation instructions and ambient conditions, no constant maintenance is required.
- BARTEC recommends performing annual maintenance and testing.
- See chapter on maintenance and care.

Repairs

- Repairs to explosion-protected equipment may only be carried out by authorised persons using original spare parts and in line with the state of the art. The applicable regulations must be observed.
- Repairs must be carried out in accordance with EN / IEC 60079-19 / ГОСТ 31610.19-2014
- In the case of SIL-qualified devices, only corresponding electronic inserts with SIL qualification may be used.
- All application-specific settings must be re-entered. This is why you have to start up again after repairs. If you saved the parameterisation data when you started up the Ex p control unit for the first time, you can transfer them back to the replacement control unit. You will find detailed information on replacing spare parts in these operating instructions. You must verify the parameters after starting up or after transferring the parameterisation data. Only then is the device ready for operation again.
- In Ex applications, only one device and one electronics module with the appropriate Ex approval may be used. Order the spare parts from your distributor. The serial number can be found on the type label of the device, inside the housing.

2.5 Avoidance of property damage

2.5.1 Short circuit due to improper connection

An incorrect supply connection leads to the destruction of the electronics and invalidates the guarantee.

2.5.2 Triggering of the safety function

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

2.5.3 EMV-compliant connection

For the safe functioning of the Ex p control unit, it is important that the wiring is EMC-compliant. This includes observing the chapter on electrical connections with regard to EMC-compliant wiring and inductive loads.

2.5.4 Storage at too high a temperature

Please store the Ex p control unit at the intended storage temperature, otherwise the electronics or seals may be damaged. Provide adequate air conditioning at high storage temperatures.

2.5.5 Aggressive cleaning agents

When choosing the right cleaning agent, it is essential to ensure that it is suitable, otherwise seals and connections may be damaged. Flammable products are generally not permitted.

2.5.6 Danger to health in the event of improper disposal

According to the European WEEE directive, electrical and electronic devices may not be disposed of with household waste. Their components must be recycled or disposed of separately because toxic and hazardous components can cause lasting damage to health and the environment if not disposed of properly.

As consumers, according to the ElektroG, you are obliged to return electrical and electronic devices at the end of their service life to the manufacturer, the point of sale or to public collection points set up for this purpose. Details on this can be found in the respective state law. The symbol on the product, the operating instructions and/ or the packaging refers to these provisions. By separating the material, as well as recycling and disposing of old devices, you are making an important contribution towards protecting our environment.

2.6 Obligations of the operating company

The operator undertakes to only allow people to work with and on the APEX / SILAS control unit who:

- are familiar with the basic regulations on safety and accident prevention and have been instructed in the use of the APEX and SILAS control unit;
- have read and understood the documentation, the safety chapter and the warning notices.
- The operating company will check that the safety and accident prevention regulations applicable in the respective application are complied with.

2.7 Instructions for use

- 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 housing has a locking system so that the fuses are not live when they are replaced.

2.8 Marking and test certificate

The Ex p control unit has been approved for the following areas:

2.8.1 Ex p control unit APEX, type 07-37A2-2211/*M5*

ATEX (Europe)	
Marking	Ⓔx II 2(1)G Ex eb mb ib [ib pxb] [ia Ga] IIC T4 Gb Ⓔx II 2(1)D Ex tb [ib pxb] [ia Da] IIIC T130 °C Db
Test certificate	BVS 19 ATEX E 015 X

IECEx (International)	
Marking	Ex eb mb ib [ib pxb] [ia Ga] IIC T4 Gb Ex tb [ib pxb] [ia Da] IIIC T130 °C Db
Test certificate	IECEx BVS 19.0038 X

EAC (Eurasian Economic Union)	
Marking	1Ex e mb ib [ib px] [ia Ga] IIC T5 Gb X 1Ex e mb ib [ib px] [ia Ga] IIC T4 Gb X Ex tb [ib px] [ia Da] IIIC T95 °C Db X Ex tb [ib px] [ia Da] IIIC T130 °C Db X
Test certificate	ЕАЭС RU C-DE.АЖ58.В.01809/21

2.8.2 Ex p control unit SILAS, type A7-37S2-2111/*M5*

ATEX (Europe)	
Marking	Ⓔx II 3G Ex ec mc ic [ic pzc] IIC T4 Gb Ⓔx II 3D Ex tc [ic pzc] IIIC T130 °C / T95 °C Db
Test certificate	BVS 19 ATEX E 016 X

IECEx (International)	
Marking	Ex ec mc ic [ic pzc] IIC T4 Gb Ex tc [ic pzc] IIIC T130 °C / T95 °C Db
Test certificate	IECEx BVS 19.0038 X

EAC (Eurasian Economic Union)	
Marking	2Ex ic e mc [ic pz] [ia Ga] IIC T5 Gc X 2Ex ic e mc [ic pz] [ia Ga] IIC T4 Gb X Ex tc [ic pz] IIIC T95 °C Dc X Ex tc [ib pz] IIIC T130 °C Dc X
Test certificate	ЕАЭС RU C-DE.АЖ58.В.01809/21

2.9 Standards complied with

2.9.1 Ex p control unit APEX, type 07-37A2-2211/*M5*

Standard	Description
EN IEC 60079-0:2018/AC:2020 IEC 60079-0:2011 Edition: 6.0 ГОСТ 31610.0-2014	Hazardous areas – Part 0: General provisions
EN 60079-2:2014 IEC 60079-2:2007 Edition: 5.0 ГОСТ IEC 60079-2-2011	Explosive atmosphere – Part 2: Equipment protection through pressurised enclosure “p”
EN 60079-7:2015/A1:2018 IEC 60079-7:2006 Edition: 4.0 ГОСТ Р МЭК 60079-7-2012	Explosive atmosphere – Part 7: Equipment protection through increased safety “e”
EN 60079-11:2012 IEC 60079-11:2011 Edition: 6.0 ГОСТ 31610.11-2014	Explosive atmosphere – Part 11: Equipment protection through intrinsic safety “i”
EN 60079-18:2015/A1:2017 IEC 60079-18:2014 Edition: 4.0 ГОСТ Р МЭК 60079-18-2012	Hazardous areas – Part 18: Equipment protection through encapsulation “m”
EN 60079-31:2014 IEC 60079-31:2013 Edition: 2.0 ГОСТ IEC 60079-31-2013	Hazardous areas – Part 31: Device dust explosion protection through housing “t”
EN 61010-1:2010 IEC 61010-1:2010 Edition 3.0	Safety regulations for electrical measuring, control, regulating and laboratory devices – Part 1: General requirements
EN 61000-6-4:2007 + A1:2011 IEC 61000-6-4:2018 Edition 3.0	Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – emitted interference for industrial areas
EN 61000-3-2:2014 IEC 61000-3-2:2018 Edition 5.0	Electromagnetic compatibility (EMC) – Part 3-2: Limit values – limit values for harmonic currents (device input current <= 16 A per conductor)
EN 61000-3-3:2013 EN 61000-3-3:2013 + AMD1:2017 Edition 3.1	Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply networks for devices with a rated current <= 16 A per conductor that are not subject to any special connection conditions
EN 61326-1:2013 IEC 61326-1:2012	Electrical measuring, control, regulating and laboratory devices - EMC requirements - Part 1: General requirements
EN ISO 13849-1:2015	Safety of machines - Safety-related parts of control systems - Part 1: General design principles
EN ISO 13849-2:2012	Safety of machines - Safety-related parts of control systems - Part 2: Validation
DIN EN 62061:2016 IEC 62061:2015	Machine safety - functional safety of safety-related electrical, electronic and programmable electronic control systems

2.9.2 Ex p control unit SILAS, type A7-37S2-2111/*M5*

Standard	Description
EN IEC 60079-0:2018/AC:2020 IEC 60079-0:2011 Edition: 6.0 ГОСТ 31610.0-2014	Hazardous areas - Part 0: General provisions
EN 60079-2:2014 IEC 60079-2:2007 Edition: 5.0 ГОСТ IEC 60079-2-2011	Explosive atmosphere - Part 2: Equipment protection through pressurised enclosure "p"
EN 60079-7:2015/A1:2018 IEC 60079-7:2006 Edition: 4.0 ГОСТ Р МЭК 60079-7-2012	Explosive atmosphere - Part 7: Equipment protection through increased safety "e"
EN 60079-11:2012 IEC 60079-11:2011 Edition: 6.0 ГОСТ 31610.11-2014	Explosive atmosphere - Part 11: Equipment protection through intrinsic safety "i"
EN 60079-18:2015/A1:2017 IEC 60079-18:2014 Edition: 4.0 ГОСТ Р МЭК 60079-18-2012	Hazardous areas - Part 18: Equipment protection through encapsulation "m"
EN 60079-31:2014 IEC 60079-31:2013 Edition: 2.0 ГОСТ IEC 60079-31-2013	Hazardous areas - Part 31: Device dust explosion protection through housing "t"
EN 61010-1:2010 IEC 61010-1:2010 Edition 3.0	Safety regulations for electrical measuring, control, regulating and laboratory devices - Part 1: General requirements
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EN 61000-3-2:2014 IEC 61000-3-2:2018 Edition 5.0	Electromagnetic compatibility (EMC) - Part 3-2: Limit values - limit values for harmonic currents (device input current <= 16 A per conductor)
EN 61000-3-3:2013 EN 61000-3-3:2013 + AMD1:2017 Edition 3.1	Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply networks for devices with a rated current <= 16 A per conductor that are not subject to any special connection conditions
EN 61326-1:2013 IEC 61326-1:2012	Electrical measuring, control, regulating and laboratory devices - EMC requirements - Part 1: General requirements

2.10 SIL – qualification/ safety in accordance with IEC 61508

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

SIL

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 APEX, particular attention is paid to the avoidance of systematic errors as well as the detection and control of random errors. Here are the most important properties and requirements from the point of view of functional safety according to IEC 61508:

- Internal monitoring of safety-relevant circuit parts
- In the event of an error, the safety-relevant outputs go into a defined safe state
- Determination of the failure probability of the defined safety function
- Safe parameterisation in an unsafe operating environment
- Repeat checks

The SIL qualification of components is documented within this manual. This chapter summarises all safety-relevant characteristics that users and planners need for planning and operating the safety-instrumented system. Further SIL relevant information is included in this manual.

2.11 Safety function

The safety function of the Ex p control unit APEX is characterised by the flushing with a defined amount of flushing gas, the safe monitoring of the internal overpressure of the protected equipment and the release of the operation. The safe state means that in the event of a pressure drop or malfunction, the APEX control unit changes to the safe state = deactivation of the protected equipment. The “safe state” is triggered by:

- A fall 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 APEX control unit does not deactivate the protected equipment or does not change to the safe state on request or in the event of a fault, a dangerous failure has occurred.

2.11.1 Safety values

THE FOLLOWING SAFETY VALUES ARE WITHOUT OPTIONAL SENSORS.

SIL

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

- ▶ The safety values can be found in the documentation for the optional sensors used.

Safety values in accordance with 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)

Repeat test interval = 1 year
Category 3

2.11.2 Response time

The reaction time of the Ex p control unit APEX to safety-relevant functions, without specific user delay times, is less than 2 seconds.

With the Ex p control unit APEX, it is possible to set a delay time in the event of pressure fluctuations below the minimum pressure.

This results in a delay time of

$T_{reaction}$ = $T_{control} + T_{delay}$

$T_{reaction}$ = Time until the Ex p APEX control unit reacts to a safety-relevant function

$T_{control}$ = Internal time that the Ex p control unit needs to recognise the safety-relevant triggering. <2 seconds

T_{delay} = Adjustable delay time for safety-relevant releases which is added to the response time $T_{control}$.

2.11.3 Residual risk

Residual risks can arise from:

- ➡ Errors in the configuration
- ➡ Errors in the operation
- ➡ Errors in the wiring

3 Product description

3.1 General

The type of protection Ex p, called “pressurised enclosure”, is based on the measure that explosive gases present in a closed volume are flushed out and then an overpressure is generated and maintained in relation to the surrounding atmosphere. Due to the higher pressure inside the housing compared to the atmosphere, explosive gases cannot penetrate the inside of the housing at any time. This creates an explosion-free area in which electrical devices can be installed and operated, which are not themselves explosion-proof.

The APEX^{mpc} or SILAS^{mpc} control units described in these operating instructions operate using the “pressurised enclosure with compensation of leakage losses” technology. In detail, this refers to the maintaining of an overpressure in a housing by supplying purging gas in order to compensate for any leakage losses that occur in the housing.

The housing must be purged with purge gas prior to starting up, so that the explosive atmosphere (gas) that has penetrated during downtime does not become a hazard. The amount depends on the flow rate determined during the initial start-up.

Since a safe state in the housing is only achieved at the beginning of the operating phase, the Ex p control unit and its system components must be designed to be explosion-proof.

3.2 Ex p control unit APEX^{mpc} / SILAS^{mpc}

The APEX^{mpc} or SILAS^{mpc} control unit with its system components is an automatically operating control for monitoring, controlling and regulating pressurised motors in the hazardous areas of zone 1/21 or zone 2/22.

The Ex p control units are suitable for all common applications in the pressurised enclosure of electric motors. Each system structure consists of an Ex p control unit APEX^{mpc} or SILAS^{mpc} and the associated pressure monitor mpv. The APEX^{mpc} or SILAS^{mpc} control unit is intended for installation onto the pressurised motor and the associated mpv at the purge air outlet point.

3.3 Pressure monitor, mpv

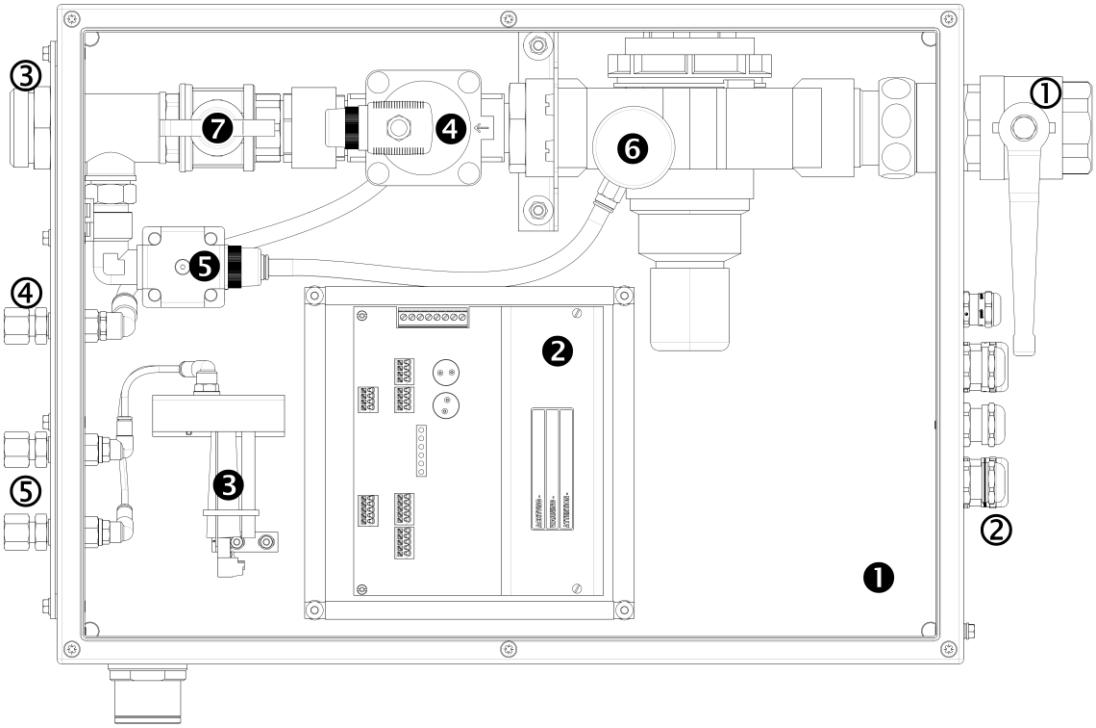
The pressure monitor mpv has two functions within the Ex p control unit. First, it serves as a pressure relief valve, which opens when the internal pressure is too high and reduces the excess pressure. Second, an orifice is integrated in the pressure monitor, via which the differential pressure is measured by means of the sensor function unit.

In connection with the motor purge controller, this must be installed separately on the pressurised motor. Furthermore, measuring hoses must be connected between the pressure monitor and the sensor function unit.

3.4 System structure

3.4.1 Ex p control unit [mpc,] standard

The system structure of the APEX[mpc] or SILAS[mpc] control unit is shown below. The protective housing is designed according to Ex e and can be mounted outside onto the pressurised enclosure/ motor.



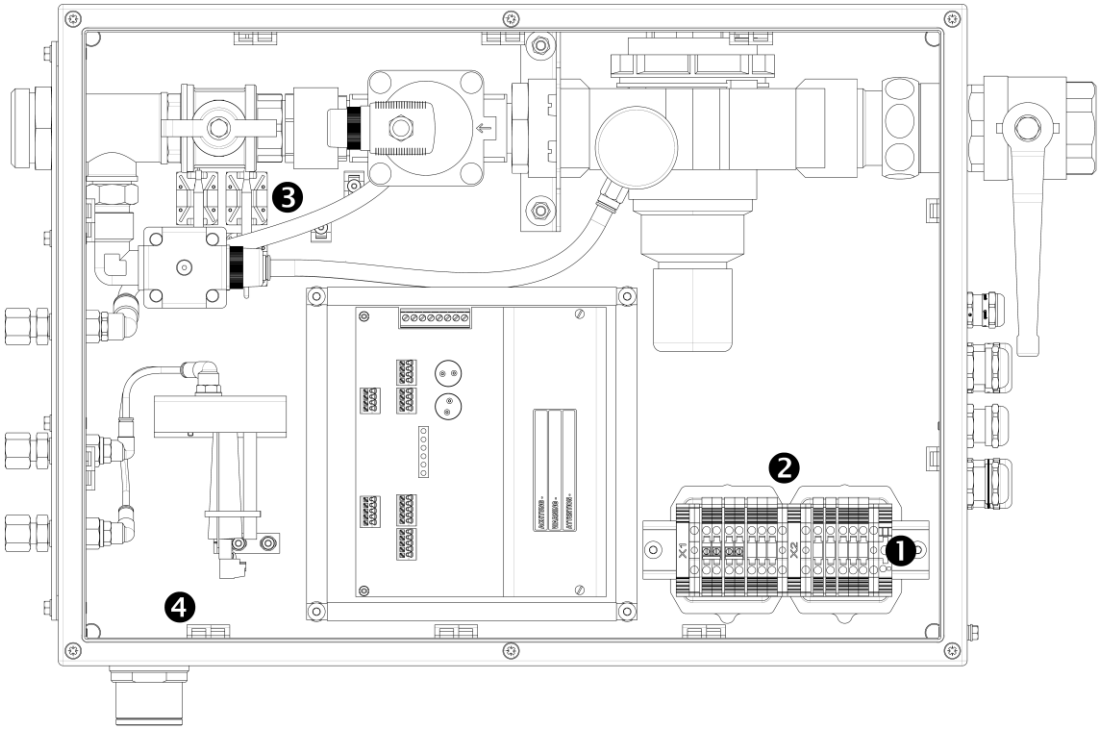
Pos.	Description
❶	Protective housing
❷	Ex p functional unit
❸	Ex p pressure measuring board
❹	Flush valve
❺	Leakage compensation valve
❻	Pressure reducing station
❼	Flush flow regulation
①	Purge gas supply
②	Cable entries
③	Purge gas supply motor
④	Control of mpv
⑤	Pressure measurement

3.4.2 Ex p control unit mpc, high temperature

In addition to the standard variant, the APEXmpc or SILAS^{mpc} control unit is available in the extended temperature range version.

This is approved for a range from -50 ° C to + 50 ° C instead of -25 ° C to +50 ° C.

The extended temperature range is implemented through internal heating, which is operated via the following connection option. All other components are designed in the same way as the standard variant.

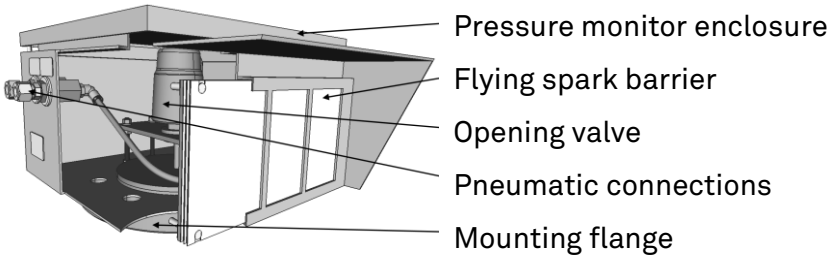


Pos.	Description
❶	Connection of power supply Ex p control unit and heating
❷	Temperature switch
❸	Capillary tube sensors
❹	Inside, all-round heating

3.4.3 Pressure monitor mpv

Each APEX complete control unit in the MPC design has a separate MPV pressure monitor attached to the motor.

The structure of the pressure monitor is shown below:

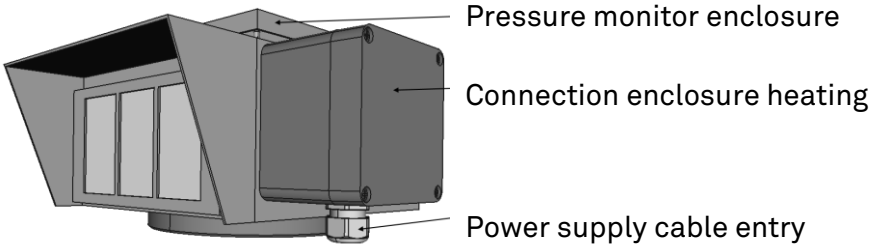


3.4.4 MPV pressure monitor with an extended temperature range

Each APEX complete control unit in the MPC design has a separate MPV pressure monitor attached to the motor. The following pressure monitor is suitable for a temperature range from -50 ° C to +60 ° C.

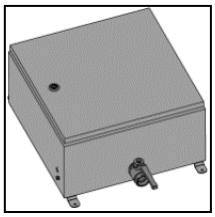
The structure is technically identical to the standard pressure switch and is supplemented by internal heating that is controlled via the connection enclosure flanged on the outside.

The structure of the pressure monitor is shown below:



3.5 Accessories

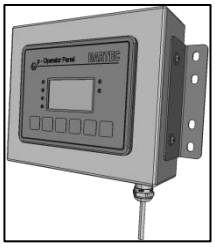
3.5.1 Manual leakage air boost



Manual leakage air boost, type: 05-0056-0069

The manual leakage air boost is used to increase the amount of leakage air so that the basic amount of required leakage air is carried out via the leakage air boost and the peak amounts via the APEX^{mpc} or SILAS^{mpc}.

3.5.2 p operator panel



p operator panel, type 17-51P5-*111

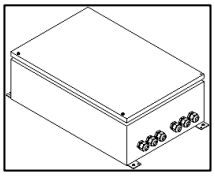
The p operator panel is a visualisation unit for the APEX control unit. It can be connected optionally and is used to display the system states, as well as to parameterise the control units

Using mounting brackets, this can be either used as a structure or as an installation in the basic version.

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

The utilisation for the p operator panel is described in a separate operating manual.

3.5.3 Ex i separation box



Ex i separation box, type 07-3194-4121/0002

The Ex i separation box is used for the safe separation of intrinsically safe signals and is designed with special separation relays that ensure the required separation between Ex e and Ex i.

3.5.4 Programming approval

Programming switch, type 05-0003-0089

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

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

3.5.5 Programming cable

Programming cable, type 03-9828-0062

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

4 Transport and storage

4.1 Scope of delivery

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

Please check the completeness of the scope of delivery using the delivery note.

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

- Control unit
- Parameterisation cable LAN
- Parameterisation switch
- Operating manual

4.2 Packaging

The control unit is delivered packed in foil, on a pallet and/ or in cardboard boxes.

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

4.3 Transport

WARNING

RISK OF DEATH OR INJURY FROM FALLING HEAVY LOADS.

- Never stand under suspended loads.
- Secure the control unit with a suitable attachment (e.g. straps) before transport.

ATTENTION

AVOID HARD IMPACTS, E.G. FROM FALLING OR HARSH PUTTING DOWN.

The control unit could be damaged.

- Only use hoists and load handling devices with sufficient load-bearing capacity.
- The permissible lifting weight of a lifting device must not be exceeded
- Put the control unit down slowly.

Pay attention to the mass of the goods to be transported and choose an adequate transport device.

4.4 Storage

Store the control unit in a horizontal position and at a temperature between -20 ° C and +60 ° C in the 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

ATTENTION

AVOID DAMAGE TO THE SEAL.

Cancellation of the Ex protection concept

- Visual inspection of the seal when closing the Ex p control unit (cleanliness, fit and intactness)

Before starting the work, find out about the general safety instructions (see chapter 2.4 safety instructions).

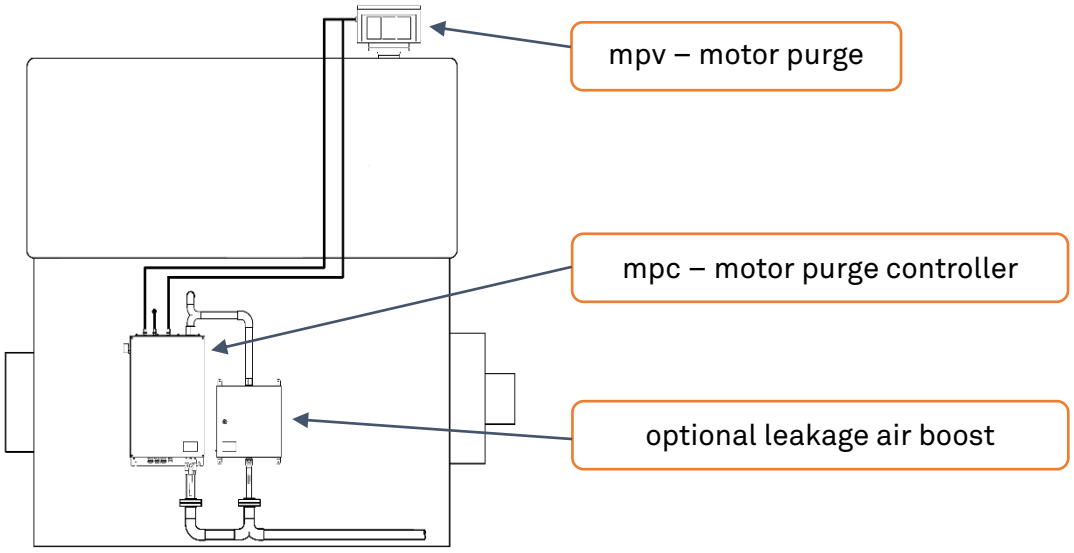
There may be deviations in the assembly of customer-specific structures.

Please observe the chapters on installation and electrical connections.

5.1 General

Mount the APEX^{mpc} or SILAS^{mpc} and system accessories in the desired position using the fastening devices provided.

The associated fastening dimensions are available in the appendix.



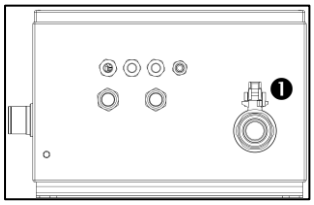
The APEX^{mpc} or SILAS^{mpc} is attached to the motor with the additional system components, e.g. leakage boost, on the outside of the motor using the fastening straps located on the housing.

The mpv is attached to the motor outlet using a flange.

The motor purge controller and the pressure monitor mpv are position-independent.

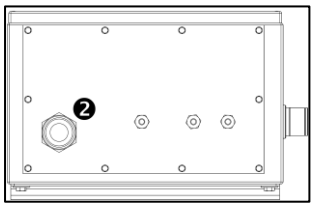
5.2 Purge gas and pneumatic connections

5.2.1 Purge gas supply



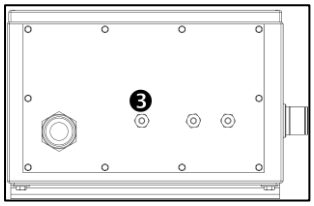
The purge gas supply (❶) on the motor purge controller is designed with a G 1 ½ “internal thread connection.

5.2.2 Purge gas supply to the motor



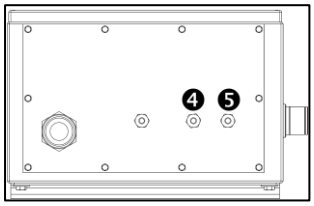
The purge gas supply (❷) from the motor purge controller to the protected motor is designed with a G 1 ½ “external thread.

5.2.3 Activation mpv



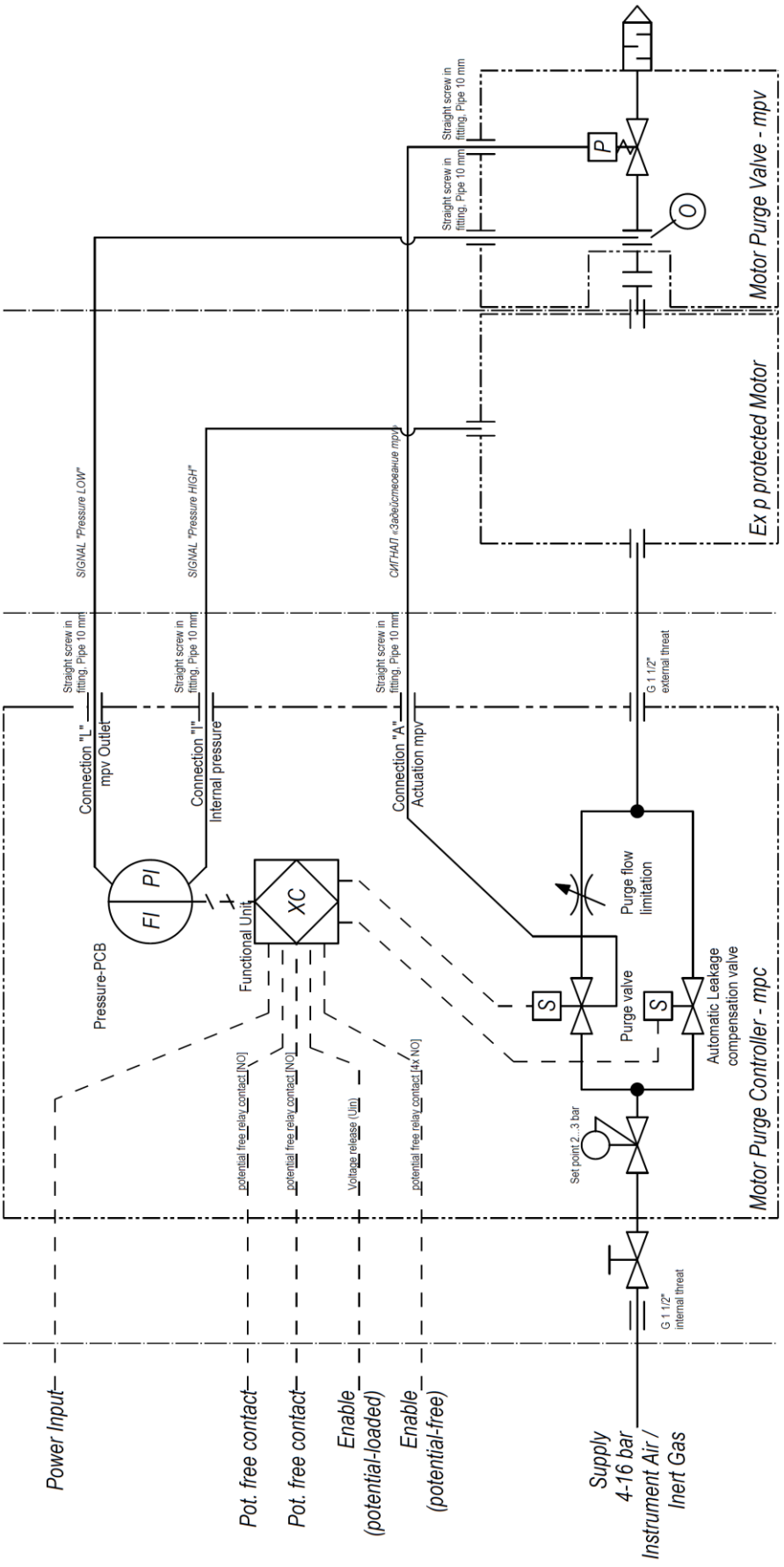
A 10 mm pipe connection is available for activating the mpv (❸)

5.2.4 Pressure measurement connections



The pressure measurement connections "I internal pressure" (❹) and "L mpv pressure" (❺) are each designed with a 10 mm pipe connection.

5.3 Flow chart



6 Electrical connections

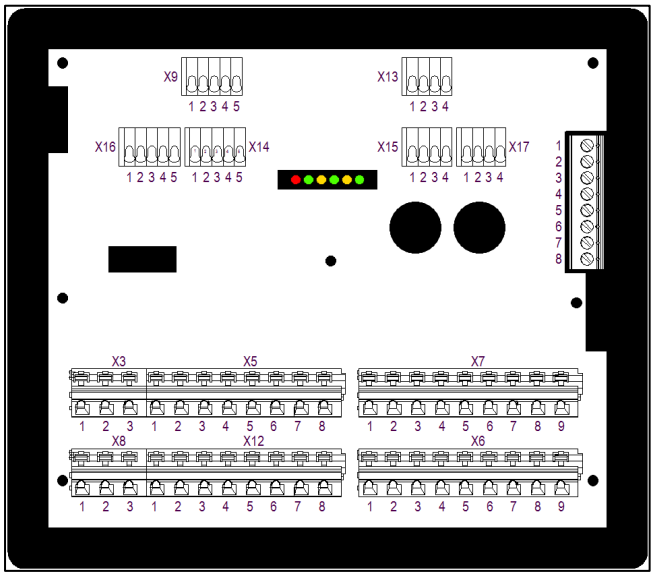
DANGER

DEATH OR SERIOUS PERSONAL INJURY FROM WORKING ON LIVE VOLTAGE PARTS.

Danger to life from electrical current.

- Observe the 5 safety rules for working on electrical systems: disconnect; secure against being switched on again; determine the absence of tension; earth and short-circuit; cover or cordon off neighbouring live parts

The connection terminals with type of protection “Ex e” or “Ex i” are located on the connection board of the Ex p control unit.



	Terminal row	Function
Ex e	X3	Power supply
	X5	2x signal relays, each 1x CO
	X8	Release, subject to tension
	X12	Release, 4x NO (optionally as signal relays)
	X7	Purge gas valve, spare contacts
	X8	Purge gas outlet, LAN
Ex i	X9	Bypass, temperature sensor 1
	X16	Parameter release, temperature sensor 2
	X14	Main switch, temperature sensor 3
	X13	opt. sensor 1 [ia]
	X15	opt. sensor 2 [ib]
	X17	p operator panel
	Measuring board	Pressure measuring board

6.1 General

6.1.1 Connection information

DANGER

DEATH OR SERIOUS PERSONAL INJURY DUE TO OPENING THE COVER OF THE APEX CONTROL UNIT IN AN EXPLOSIVE ATMOSPHERE.

Risk of explosion.

- Before opening the housing cover, check the atmosphere for any explosive gases.

ATTENTION

SHORT CIRCUITS THROUGH LOOSE OR PROJECTING CABLES IN THE APEX CONTROL UNIT.

The APEX control could be damaged.

- Connect all core cables, including those not required, to the terminal.
- Lay cables only in the space between the shield bus and the connection terminal.
- Check that no cables are loose or protrude.

AVOID DAMAGE TO THE SEAL.

Cancellation of the Ex protection concept.

- Visual inspection of the seal when closing the APEX control unit (cleanliness, fit and intactness).

AVOID SWITCHING OFF AND TURNING ON THE POWER SUPPLY QUICKLY.

Internal protective circuits can trip

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

Recommendation for securing active parts

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

The following describes the procedure for attaching connecting cables to the Ex p control unit:

Procedure:

- Establish the electrical connections as per the terminal assignment. The clamps are designed using tension spring technology. A suitable tool must be used for this.

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 construction of a system) and the user (interference-free structure of a complete system).

The BARTEC Ex p control units can only work safely and trouble-free with EMC-compliant wiring. This chapter supports you in setting up your system in accordance with EMC.

When an electronic or electrical device is in operation, it interacts with other neighbouring devices. The neighbouring devices act as a source of interference, which in turn affects 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 limit values.

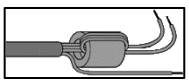
A professional, clean line connection contributes greatly towards the safe operation of the Ex p control unit under the influence of EMC.

6.1.2.1 Lines and connections

Please note the following points:

- Divide the lines into groups.
  - ➡ Power cables (power lines, power supplies)
  - ➡ Signal lines, shielded, min. 0.5 mm²
  - ➡ Data lines, shielded

- When wiring, ensure that the cables are routed properly. Make sure that cross-coupling between signal / data lines and power cables is avoided.
- Signal lines and power cables may only cross at right angles
- Route signal and data lines as close as possible to ground planes
- Unused wires in the signal and data lines should be short-circuited and grounded (additional shielding effect)
- If possible, lay signal lines only on one level in the device and only insert them into the device from one side.
- Avoid the formation of current loops.
- Make sure that unshielded lines within a circuit (forward and return conductors) are twisted in pairs as far as possible.
- If possible, lay short cables. This means that coupling capacities and inductance can be avoided.
- Do not lay cables and wires freely in the device, but route them as close as possible to the housing wall or to grounded mounting surfaces.
- Use ferrite cores for the inserted cables.



Here, the individual conductors have to be led through the ferrite core in a loop.

6.1.2.2 Grounding lines

The grounding of a system fulfils protective and functional measures.

Please note the following points:

- Grounding lines 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 the fail-safe operation of a system, cables with the largest possible surface (not cross-section) are important. High-frequency currents do not flow through the entire cable cross-section, but predominantly on the outer skin of a conductor.

Please note the following points:

- Always connect the shield over a large area using metal cable clamps.
- Avoid connecting the shield with long additional wires.

6.1.3 Backup fuse

ATTENTION

NOTE THE NOMINAL CURRENT OF THE ENABLING CIRCUIT (K1) AND ADD THIS TO THE FOLLOWING DATA. THE FOLLOWING VALUES ARE FOR THE EX P CONTROL UNIT ONLY.

If the dimensions are too small, the Ex p control unit could be destroyed.

- Nominal current (controller) + nominal current enabling circuit (K1).

Variant	APEX, DC	APEX, AC
Nominal current control unit	>= 3,15 A	>= 2 A
Nominal voltage control unit	>= 63 V DC	>= 277 V AC
Response time	delayed	delayed
Breaking current	>= 1,5 kA	>= 1,5 kA
Melting integral	12... 34 A²s	9,7... 14,7 A²s

6.1.4 Inductive loads

ATTENTION

INTERFERENCES FROM INDUCTIVE LOADS MAY DESTROY THE EXP CONTROL UNIT.

When switching off inductive loads (e.g. contactor coils), over-voltages occur. Voltage peaks of up to 4 kV can occur with a voltage gradient of 1 kV / microsecond.

- ▶ Use suitable measures to suppress inductive loads.

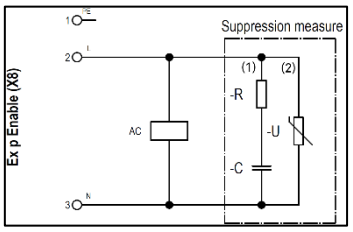
Use protective circuits with inductive loads to limit the voltage peaks that occur when switching off.

The consequences could be as follows:

- Coupling of interference signals that generate false signals
- The Ex p control unit could be destroyed

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

6.1.4.1 Protective circuit for AC fed inductive loads



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

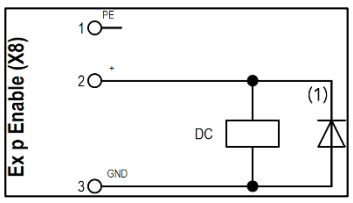
The resulting vibrations are dampened by the RC suppressor (snubber).

Interference suppression measure, e.g. BARTEC 07-7311-93GU / K000

RC suppressor (snubber)

Varistor

6.1.4.1 Protective circuit for DC fed inductive loads

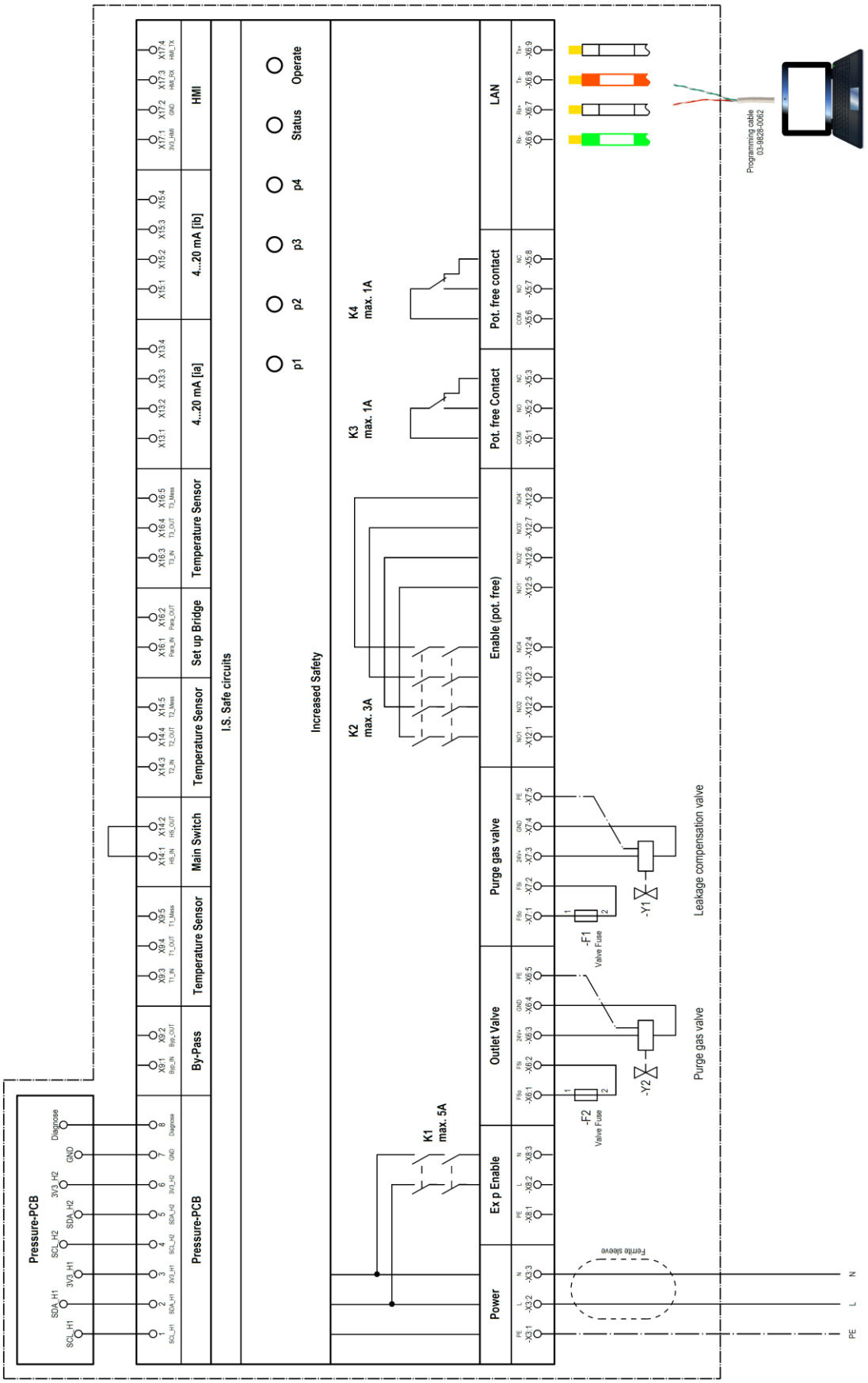


This circuit variant is used for DC-powered relays / contactors. A diode is connected in the reverse direction parallel to the coil.

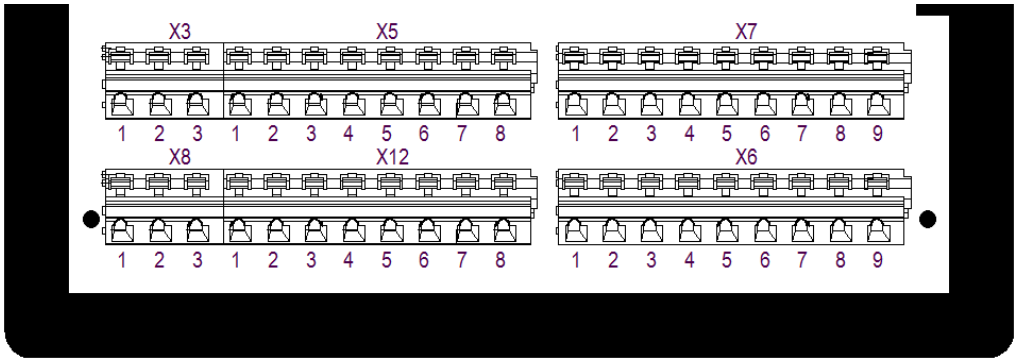
Interference suppression measure, e.g. BARTEC 07-7311-61GF/5400

Freewheeling diode

6.2 Electrical wiring APEX^{mpc} / SILAS^{mpc}



6.2.1 Terminals “Ex e”



6.2.1.1 Terminal row “X3”

There are two different connection designs for the control units of the MPC series. When connecting the power supply, please note the type and design.

<u>APEXmpc / SILASmpc, standard</u>

ATTENTION

PROPERTY DAMAGE CAUSED BY INCORRECT SUPPLY VOLTAGE.

The internal electronics of the control unit could be destroyed.

- Before activating the supply voltage, compare the value of the supply voltage with the value printed on the controller.

Active protective measure.

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

The supply voltage is connected to terminal row X3.

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

APEXmpc / SILASmpc, HAT with extended ambient temperature range

ATTENTION

PROPERTY DAMAGE CAUSED BY INCORRECT SUPPLY VOLTAGE.

The internal electronics of the control unit could be destroyed.

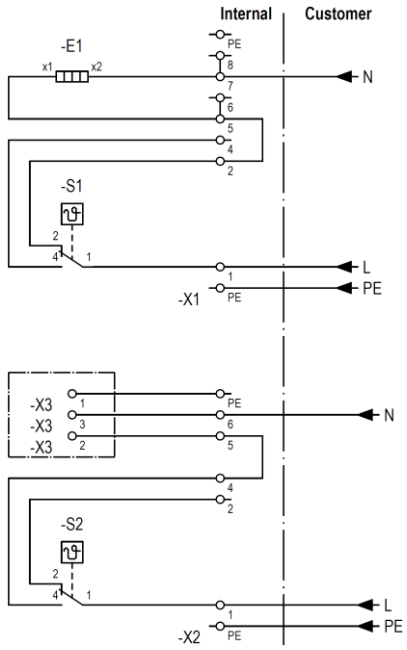
- Before activating the supply voltage, compare the value of the supply voltage with the value printed on the controller.

Active protective measure.

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

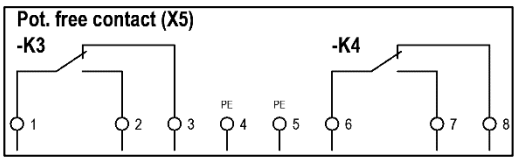
The power supply for the heating and the Ex p control unit is provided via the laterally integrated terminal rows –X1 and –X2.

The connection is to be made according to the following table.



Terminal	Connection	Function
-X1		
PE	PE	Grounding
1	L	Power supply heating
7 / 8	N	Power supply heating
-X2		
PE	PE	Grounding
1	L	Power supply controller
6	N	Power supply controller

6.2.1.2 Terminal row “X5”



A potential-free changeover contact K3 and K4 is available on the Ex p control unit for reporting and processing signals. The associated switching function can be set in the Ex p control unit via the WEB interface and is freely programmable. The maximum switching current is 1 A.

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

PROPERTY DAMAGE CAUSED BY OVERCURRENT TO THE CONTROL ELECTRONICS.

Welding of the release relays or destruction of the electronics by inductive loads.

- The Ex p release (relay K1, X8 terminals 2 and 3) can only be operated in conjunction with a mains fuse (max. 5 A, 1,500 A switching capacity, fast-acting).
- Supplement inductive loads with suitable interference suppression measures. See chapter 6.1.4.

The supply voltage is connected to terminal row X8.

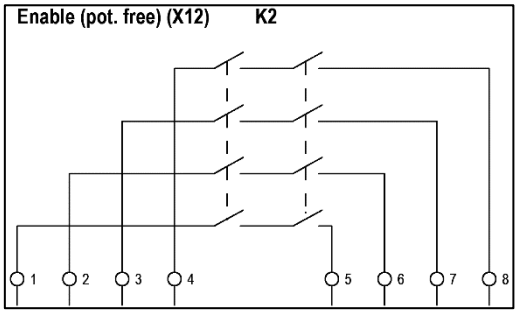
Terminal	Connection	Function
1	PE	PE power supply
2	L´ (+)	Release phase Ex p equipment
3	N´ (-)	Release neutral Ex p equipment

The application within the pressurised enclosure is released by the Ex p control unit. There must be no voltage in the pressurised enclosure when the Ex p control is deactivated.

The Ex p release can switch a maximum of one circuit of one phase with a neutral conductor and be loaded with a maximum of 5 A. If the current load inside the pressurised enclosure is more than 5 A or more than one phase, this must be carried out with a separately certified Ex d contactor, which is controlled by the Ex p control unit.

6.2.1.4 Terminal row “X12”

Potential-free signal K2 can be classified as a pure release according to SIL when used.



A potential-free message (4x NO) is available on the APEX / SILAS control unit. This message can either be used as a release, which is also safety-related.

Or used as a potential-free message.

Switching values for the relay can be assigned individually.

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

PROPERTY DAMAGE CAUSED BY INCORRECT PRECAUTIONS.

Valve or control electronics could be damaged.

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

The terminal row X7 is used to connect the purging gas valve with the associated valve safety device. In addition, the terminal points 6 - 9 are intended to accommodate the unused wires of the LAN connection cable.

Terminal	Connection		Function
1	Backup fuse		Proportional valve (leakage compensation)
2	Backup fuse		Proportional valve (leakage compensation)
3	Valve +		Proportional valve (leakage compensation)
4	Valve GND		Proportional valve (leakage compensation)
5	Valve PE		Proportional valve (leakage compensation)
6	L1	BU	Intake of unused wire LAN cables
7	L2	BUWH	Intake of unused wire LAN cables
8	L3	BNWH	Intake of unused wire LAN cables
9	L4	BN	Intake of unused wire LAN cables

6.2.1.6 Terminal row “X6”

ATTENTION

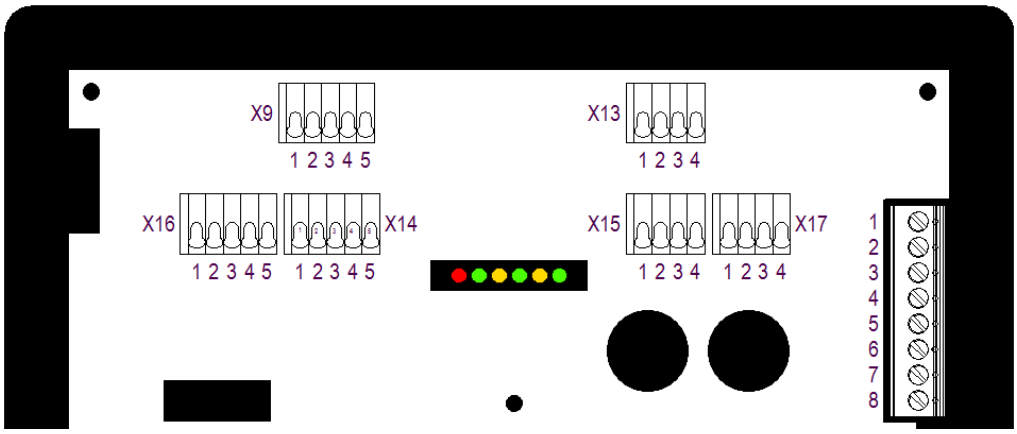
PROPERTY DAMAGE CAUSED BY INCORRECT PRECAUTIONS.

Valve or control electronics could be damaged.

- ▶ Only use original mpc spare parts

Terminal	Connection			Function
1	Backup fuse			Digital valve (flushing)
2	Backup fuse			Digital valve (flushing)
3	Valve +			Digital valve (flushing)
4	Valve GND			Digital valve (flushing)
5	Valve PE			Digital valve (flushing)
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

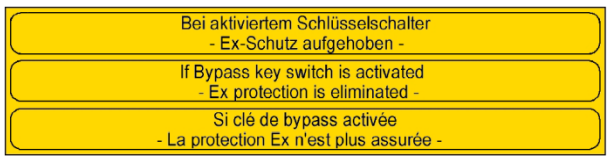
DEATH OR SERIOUS PERSONAL INJURY DUE TO OPERATION WITH BYPASS KEY SWITCH IN EXPLOSIVE ATMOSPHERE.

Risk of explosion.

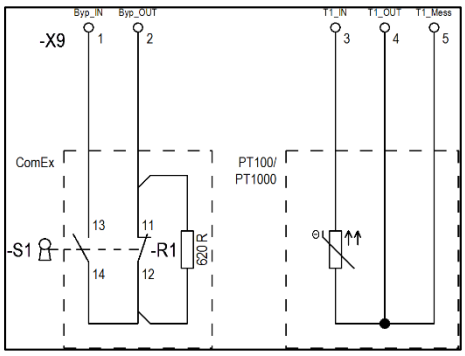
- Have the start-up with the bypass key switch approved by the operations manager or his representative. Approval may only be granted if it is ensured that there is no explosive atmosphere for the period of start-up, or, where necessary, protective measures against the risk of explosion have been taken (fire permit).
- A label on the bypass key switch stating that the explosion protection is deactivated when the key switch is activated must be attached in the direct area of the key switch.

A bypass key switch can be connected separately to the APEX / SILAS control unit.

The bypass key switch must be labelled according to the label below and must be attached in the immediate vicinity of the bypass key switch.



The position of the bypass key switch is queried by the control electronics in an intrinsically safe manner.



So that the bypass switch is recognised, and the function can be carried out, a resistor with 620R must be connected to the closing contact.

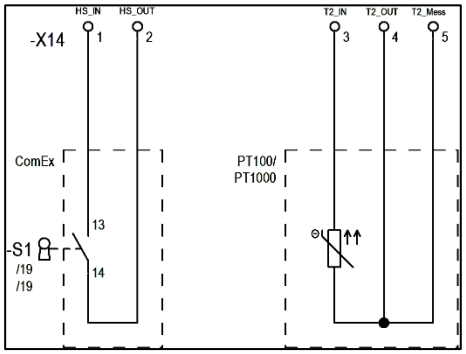
The temperature sensor can be a PT 100 or 1000. Settings for the sensor are made in the device. Two or three wire sensors can be used.

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

6.2.2.2 Terminal row “X14”

As an additional release, a release switch can be connected after the APEX control unit has authorised the release.

This function issues the operational release when the control unit is released plus 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	Connection temperature sensor 2
4	T-Sensor 2 OUT	Connection temperature sensor 2
5	T-Sensor 2 MESS	Connection temperature sensor 2

6.2.2.3 Terminal row “X16”

WARNING

RISK OF DEATH OR INJURY DUE TO UNINTENDED CHANGES IN EX-RELEVANT PARAMETERS.

The explosion protection is no longer guaranteed.

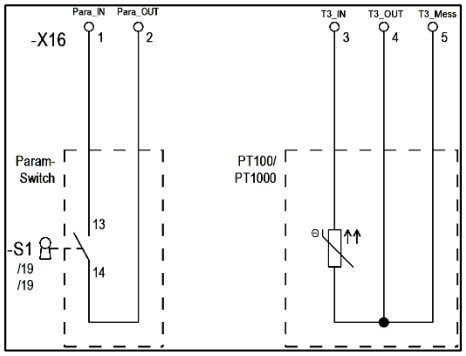
- Die Remove the programming release after deliberately changing parameters.
- After changing or adapting parameters, a subsequent functional test must be carried out

In order to change settings and specified values on the device, the programming release must be connected and activated.

This is only to be connected while parameters are being actively changed.

After changing or adapting parameters, a subsequent functional test must be carried out.

This must not be connected during normal operation of the Ex p system.



The BARTEC parameter switch must be used to change parameters.

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

Terminal	Connection	Function
1	Parameter IN	Contact for the parameterisation switch
2	Parameter OUT	Contact for the parameterisation switch
3	T Sensor 3 IN	Connection temperature sensor 3
4	T Sensor 3 OUT	Connection temperature sensor 3
5	T Sensor 3 MESS	Connection temperature sensor 3

6.2.2.4 Terminal row “X13”

ATTENTION

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

When connecting external sensors to the Ex p control unit, please ensure functional safety!

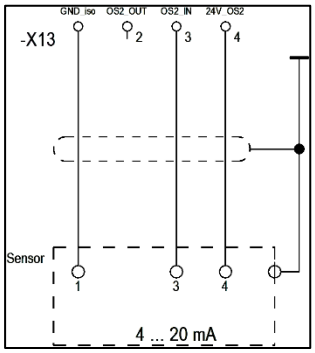
- The external sensors must meet the requirements of SIL 2.

The "optional sensor" function is only available with the Ex p control unit APEXmpc.

As standard, two functions can be carried out on the optional current input.

On the one hand, an additional pressure sensor may be connected, or flushing can be triggered without deactivation by means of a current signal.

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



Pressure or gas sensors with a 4... 20 mA output may be connected to sensor input OS 2 [Ex ia].

The processing of the signal takes place depending on the setting of the respective functions.

Terminal	Connection	Function
1	GNDiso	Ground connection
2	OS2 Out	Sensor output
3	OS2 IN	Sensor output
4	24V OS2	Power supply sensor 2

6.2.2.5 Terminal row ”X15”

ATTENTION

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

When connecting external sensors to the Ex p control unit, please ensure functional safety!

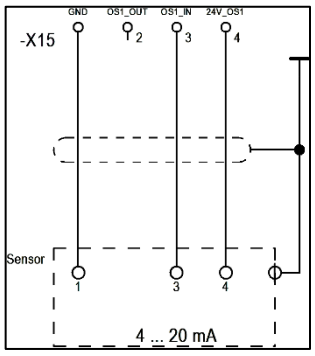
- The external sensors must meet the requirements of SIL 2.

The "optional sensor" function is only available with the Ex p control unit APEX.

As standard, two functions can be carried out on the optional current input.

On the one hand, an additional pressure sensor may be connected, or flushing can be triggered without deactivation by means of a current signal.

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

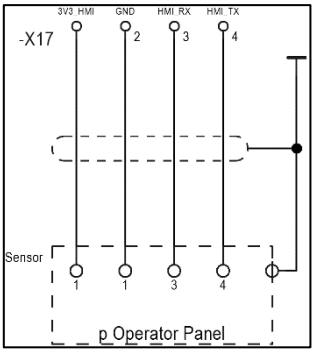


Pressure or gas sensors with a 4... 20 mA output may be connected to sensor input OS 1 [Ex ib].

The processing of the signal takes place depending on the setting of the respective functions.

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

6.2.2.6 Terminal row “X17”



The optionally available p operator panel may be connected to terminal row "X17".

Terminal	Connection	Conductor	Function
1	3V3V_HMI	BK	Power supply
2	GND	WH	Ground connection
3	HMI_RX	RD	Data line
4	HMI_TX	YE	Data line

6.2.2.7 Terminal row – measuring board

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

Terminal	Connection	Function
1	SCL_H1	Data line
2	SDA_H1	Data line
3	3V3_H1	Power supply channel 1
4	SCL_H2	Data line
5	SDA_H2	Data line
6	3V3_H2	Power supply channel 2
7	GND	GND
8	Diagnose	Diagnostic line

7 Operation

The following chapters describe the operation of the Ex p control unit for the end user. The configuration and setting description is given in a separate operating manual.

The complete solution is self-starting after connection of purge gas supply and supply voltage. System states can be queried via the WEB interface.

7.1 Web interface

The Ex p control unit is supplied 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.

Laptop (192.168.11.99 // 255.255.0.0)

Direct	Indirect USB / LAN Interface converter

Ex p control unit (192.168.11.101)

7.1.1 Setting the LAN connection

The settings of the LAN interface on the PC (or converter / managed switch) must be parameterised so that it can communicate with the Ex p control unit.

Settings:

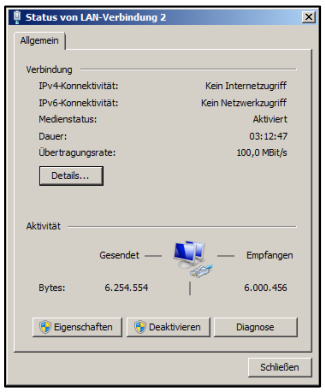
Configuration LAN interface:

- Extended / speed: 100 Mbps full duplex

Properties of the Internet Protocol Ver. 4 (TCP/IPv4):

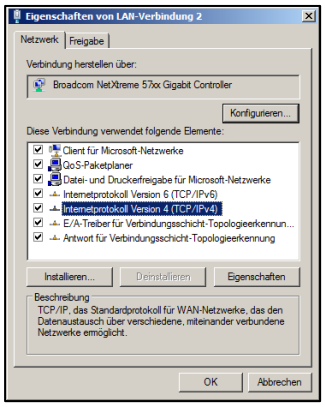
- Activation of fixed IP address
- IP address: 192.168.11.99
- Subnet mask: 255.255.0.0

Procedure:

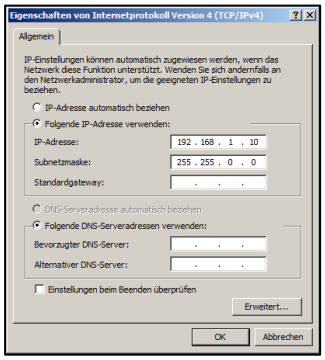


Open the network settings of the LAN interface on the PC/laptop.

Call up the properties of the LAN connection by selecting the “Properties” button.



Call up Internet protocol version 4 (TCP/IP4) with a double click.



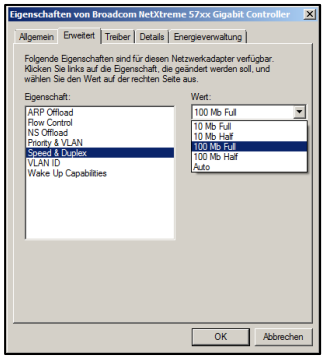
Properties of the Internet Protocol Version 4 (TCP/IPv4):

Change “Obtain IP address automatically” to “Use the following IP address” by clicking on it.

Enter IP address 192.168.11.99 at “IP address”.

Enter subnet mask 255.255.0.0.

Confirm entries with OK.



Open the settings for the network adapter by clicking the “Configure...” button.

Select the “Speed & Duplex” function in the left field “Property” by clicking on it.

Set “Value” in the right field to “100 Mb Full” by clicking and selecting from the drop-down menu.

Confirm changes with “OK”.

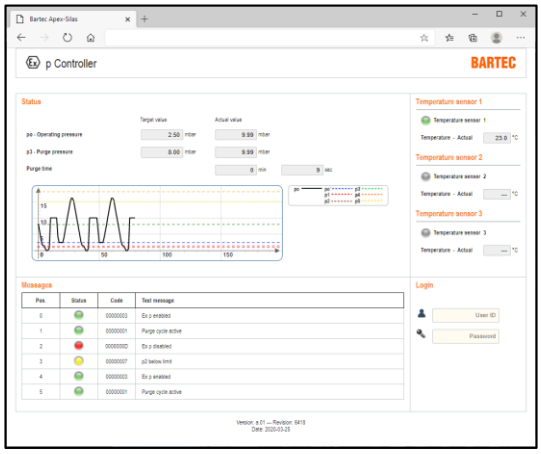
Confirm properties with OK and close the status window of the LAN connection with “Close”.

7.2 Operating the WEB interface

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

7.3 Logging in to the WEB interface

There are two levels which are available for logging in to the WEB interface.



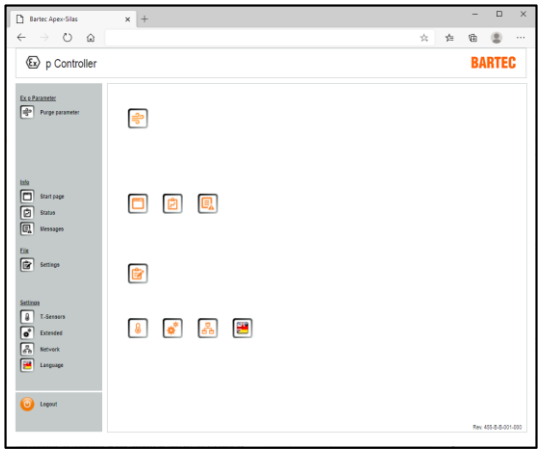
Level 1	**=**	**Guest access**
User ID	=	guest
Password	=	guest

Note: Changing the settings is not possible. However, changing the language, query of status and messages is possible.

Level 2	**=**	**User access**
User ID	=	user
Password	=	0000

Note: Changing the settings is possible in connection with a set programming switch.

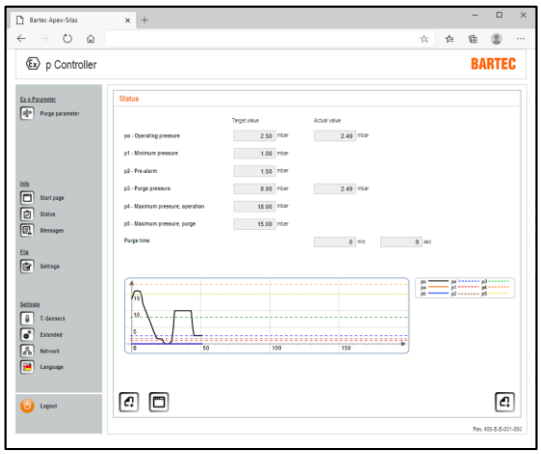
7.4 Navigating in the WEB interface



You can jump directly to the specific submenus by clicking on the grey navigation bar on the left.

The icons for the submenus are arranged on the left side.

The logout icon is located at the in the bottom left-hand corner. By pressing the button, the WEB interface logs out and changes to the log in view.



In the lower area of the submenus, there are three icons which fulfil the functions Forward / Back and Home.

7.5 Entering parameters

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

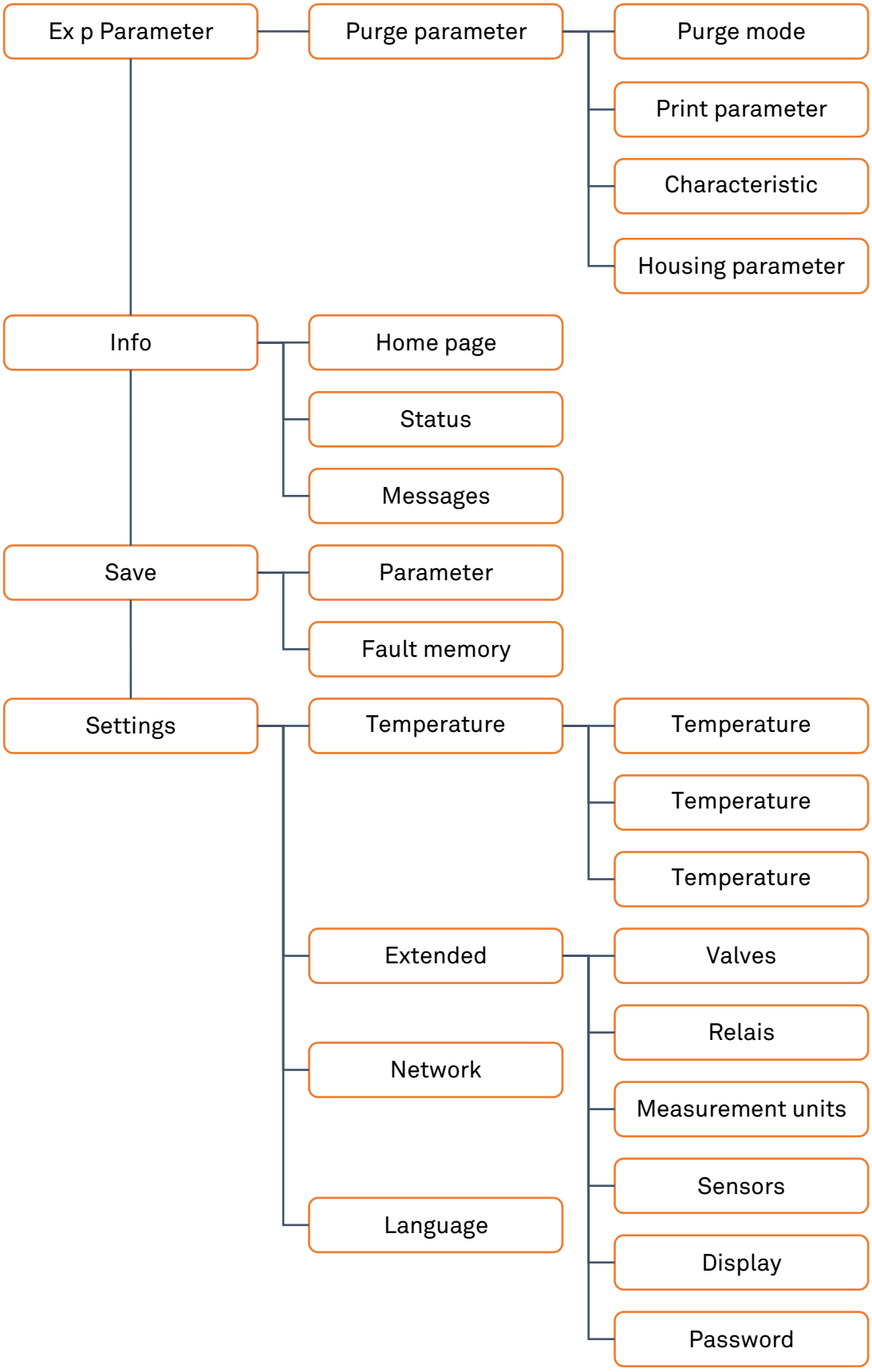
Procedure for changing parameters:

- Activate parameter switch.
- Log into the web interface.
  If you are already logged in, the web interface requires you to log in again.
- Select the desired parameter.
  ☞ e.g. po - operating pressure 2.5 mbar (250 Pa)
- Enter parameter.
  ☞ Enter the value 250
- Confirm with the “Enter” key.
- The following window opens. This is to confirm and check the changed parameter value.

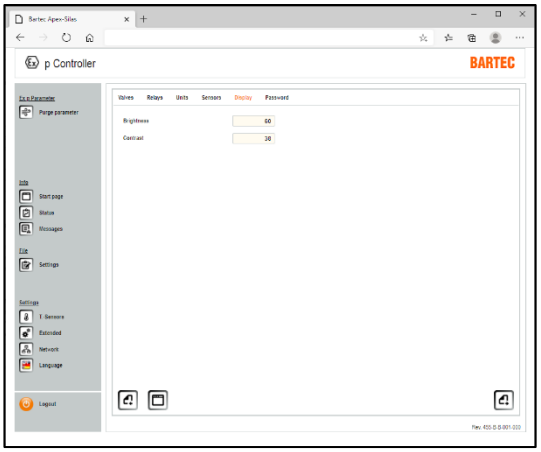
7.6 LED displays

LED	Colour	Function
p1	Green	Minimum pressure → Lights up when the minimum pressure is exceeded
p2	Yellow	Pre-alarm → Lights up when the pressure falls below the set value
p3	Green	Flushing pressure → Lights up during the purging phase and when the set point is exceeded
p4	Red	Maximum pressure → Lights up when maximum pressure p4 or p5 is exceeded
Operate	Green	Release / Purging → Flashes during purging and lights up after purging when enabled
Status	Green	Supply / Bypass → Lights up when supply voltage is applied and flashes when bypass is activated

7.7 Menu structure WEB interface

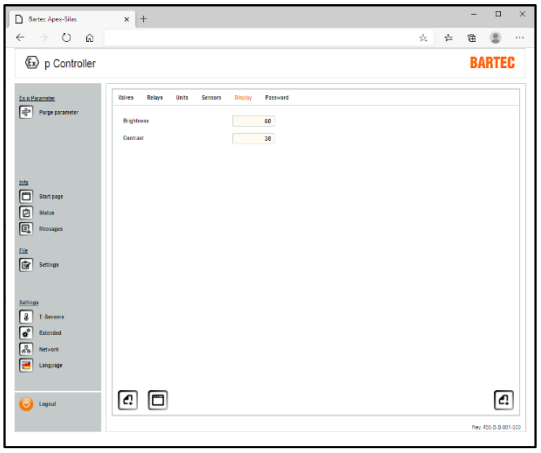


7.8 “Display” menu



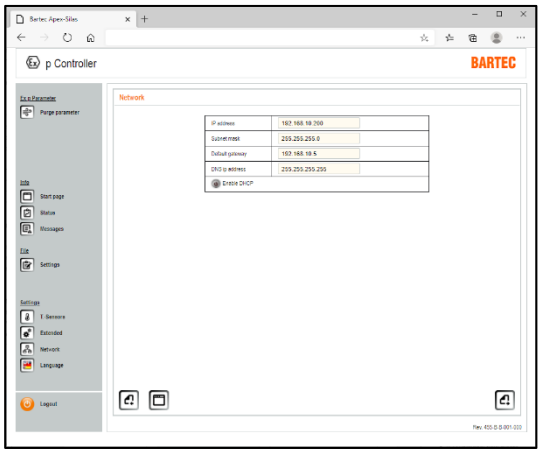
The contrast and brightness of the LCD display on the p-Operator panel can be set in the “Display” tab.

7.9 “Password” menu



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

7.10 “Network” menu



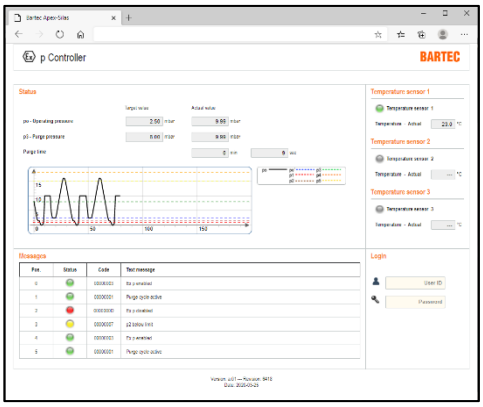
All network-specific settings are carried out in the “Network” menu.

By default, the Ex p control unit is set to a static IP address. In addition, it is possible to activate a DHCP mode.

7.11 Query system status

Procedure for querying the system status

- ▶ Logging into the WEB interface by opening the browser and entering the IP address 192.168.11.101
- ▶ Logging into the web interface



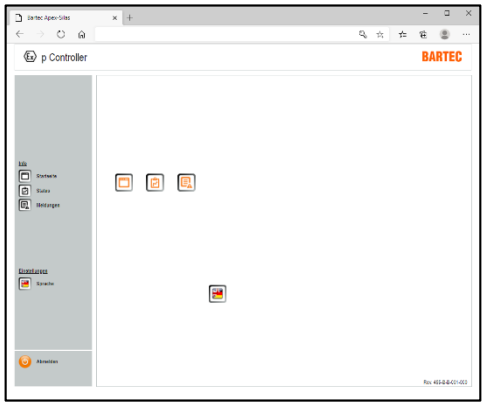
User ID: guest

Password: guest

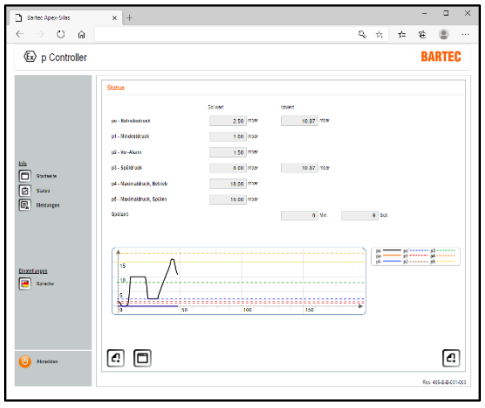
Confirm with “Enter”

The start screen opens.

Status:
Displays the target values and measured actual values. In addition, a pressure/time diagram is displayed.



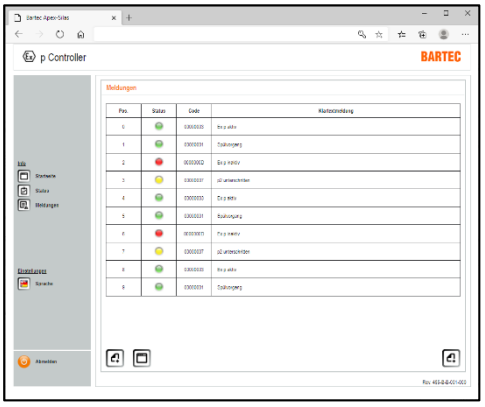
Messages:
Displays plain text messages about the system status.



▶ Open status by clicking on it.

Upper area: List of set values with comparison of actual values

Lower area: Time diagram of the pressure curve



▶ Open messages by clicking on it.

Display of plain text messages from the system

Green button = Positive messages

Yellow button = Warning messages

Red button = Error messages

7.12 Read out data containers

Querying of data for the control room is done via a web browser or an appropriate software tool to be provided by the customer, which is able to send an HTML GET message equivalent to a browser query via the network to the APEX device.

The data format returned by the device is JSON

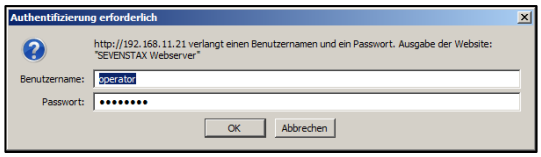
(see https://de.wikipedia.org/wiki/JavaScript_Object_Notation)

Query:

The data for the control room can be retrieved via the URL:

http://<ip-addr>/info_operator.json

e.g. http://192.169.1.101/info_operator.json



The username/password must be entered.

User name: “operator”
Password: “operator”

Response from the control unit:

{"szFileName":"info_operator.json","_0x0401":49,"_0x0101":1,"_0x0402":65, "_0x0403":150," _0x1001":300," _0x0201":1,"_0x0501":2000,"_0x0502":1500, "_0x1312":0,"_0x132A":0,"_0x0602":0}

Code table:

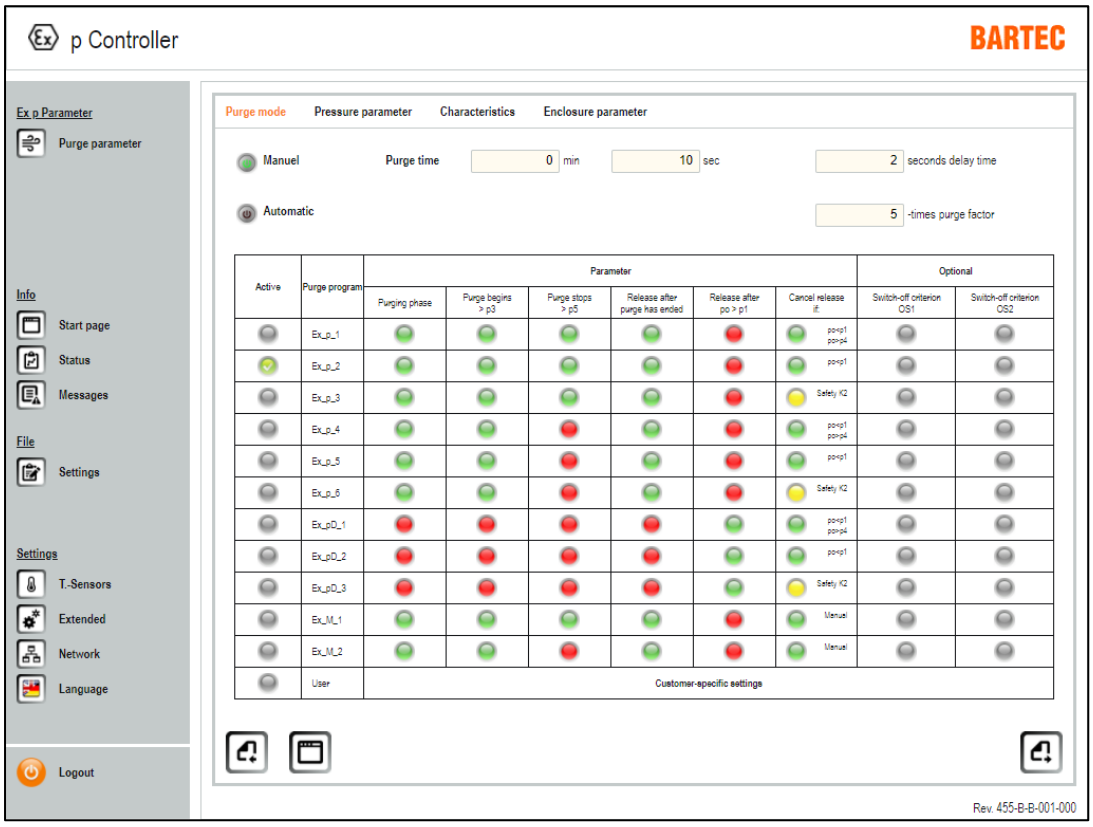
Key/ID	Parameter	Unit
_0x0401	Operating pressure po (setpoint)	Pa
_0x0101	Operating pressure po (actual value)	Pa
_0x0402	Minimum pressure (switch-off value)	Pa
_0x0403	Pre-alarm (switching value)	Pa
_0x1001	Purging pressure p3 (setpoint)	Pa
_0x0201	Purging pressure p3 (actual value)	Pa
_0x0501	Maximum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

7.13 Purge parameters

7.13.1 Purge mode tab

The Ex p control unit has two different modes for determining the purging time.

The setting for selecting the purge mode is made under purge parameters / purge modes.



7.13.1.1 Manual / Automatic

Automatic

Automatic determination of purging time based on the pressure value p5

At the beginning of the purging phase, the control unit regulates to 87.5 % of the permissible pressure value p5 (maximum purging pressure) and automatically calculates the purging time corresponding to the measured pressure value p3 (purging pressure) and the stored purging air curves.

Manual

Manual determination of purging time

In this regard, the purging pressure p3 and the calculation of the purging time must be carried out manually by means of the on the basis of the purging air curves.

7.13.1.2 Delay

The “Delay” setting can be used to store a delay time which delays the shutdown if the pressure falls below the minimum value.

The set delay time means that if the pressure falls below the minimum pressure p1, the immediate switch-off is delayed by the delay time. If the pressure rises above the minimum pressure again during the delay time, no shutdown occurs.

7.13.1.3 Purging programmes

DANGER

DEATH OR SERIOUS PERSONAL INJURY DUE TO THE USE OF AN INCORRECT PURGING PROGRAM

Danger to life due to unsafe condition.

- ▶ Use only the purging programmes intended for the application.

The release relay K2 switches depending on the set configuration.

The following purging programmes with functions are available for purging a pressurised motor with the Motor Purge Controller.

Purging programmes for gas application:

Programme	Application	Functions				
		Purging phase	Purging time starts when p3 is exceeded	Purging time stops when p5 has been reached	Ex p active after	Ex p inactive after
Ex_p_1	Gas	Yes	Yes	Yes	purging time has elapsed	po < p1 po > p4
Ex_p_2	Gas	Yes	Yes	Yes	purging time has elapsed	po < p1
Ex_p_4	Gas	Yes	Yes	No	purging time has elapsed	po < p1 po > p4
Ex_p_5	Gas	Yes	Yes	No	purging time has elapsed	po < p1

7.13.1.4 Purging time

It is assumed below that the amount of purge gas is determined as a function of the housing volume of the pressurised enclosure (volume-dependent purging time).

The flow rate of purge gas at the outlet of the pressurised enclosure is used to calculate the purge time.

➡ Select orifice size based on the type

Orifice	Diameter [mm]	MPV
8	50	Type: 17-51P3-3803; mpv 2
9	100	Type: 17-51P3-3903; mpv 3

➡ The purge gas flow can be read from the diagram by using the determined pressure “p3”. Diagrams are available in the Appendix.

Calculation of the pre-purge time by using the following formula:

$$Purge\ time[Min] = \frac{Housing\ volume\ [Litre] \times 5[-fold\ purging]}{Flow\ rate\ [\frac{Litre}{Hour}]} \times 60$$

➡ Connect the PC with the Ex p control unit

➡ Activate the programming switch

➡ Log into the WEB interface with the user level

➡ Call up the purging parameters / purging modes menu

➡ Enter the calculated purging time via the keyboard at “purging time” and confirm with Enter.
☞ *e.g. 10 minutes 30 seconds*

➡ Confirm pop-up window with the changed value

➡ Deactivate programming switch

➡ Call up the Status menu

7.13.1.5 Flushing

⚠ DANGER

DEATH OR SERIOUS **PERSONAL** INJURY DUE TO AN INSUFFICIENT VOLUME OF PURGE GAS

Danger to life due to unsafe condition.

▶ The purge factor must not be set below the required purge factor.

When activating "Automatic" for purging the Ex p room, the purge factor must be set.

The flushing of the volume specified in the “Enclosure parameters” tab is purged through several times by this factor.

Example:

Stored enclosure volume = 100 litres

Stored flushing factor = 5

Resulting flow through the enclosure is equal to

Volume x factor = flow rate of purging gas

100 litres x 5 = 500 litres

7.13.2 Pressure parameter

7.13.2.1 po – Operating overpressure

The value “po” is the internal operating overpressure of the pressurised equipment.

This value is monitored by the Ex p control unit and compensated, if necessary. By default, the operating pressure for the digital purging gas valve is set to 2.5 mbar.

The APEXmpc is equipped with proportional valve technology to compensate for any leakage. The proportional valve adjusts the internal pressure of the enclosure to the set point of “po”. This is done by controlling the proportional purge gas valve through the APEXmpc in such a way that only the occurring leakage losses are compensated.

7.13.2.2 p1 – Minimum pressure (Ex-relevant)

The value “p1” is the minimum pressure of the pressurised enclosure. This value is safely monitored by the Ex p control unit. If the pressure falls below this value, the pressurised enclosure is switched to the “safe state” (deactivation).

7.13.2.3 p2 – Pre-alarm

The value “p2” is a pre-alarm of the internal pressure of the enclosure. This value is monitored by the Ex p control unit. If the pressure falls below this value, it is possible to set off an alarm via a signal relay.

7.13.2.4 p3 – Purge pressure (Ex relevant)

The value “p3” is the purging pressure of the pressurised enclosure during the purging operation. The measured value is the resulting differential pressure during purging from the internal pressure of the engine and the pressure after the orifice in the mpv. This value is monitored by the Ex p control unit during the purging phase. If the pressure falls below this value during the purging phase, the pressurised equipment is not released and the purging time does not elapse.

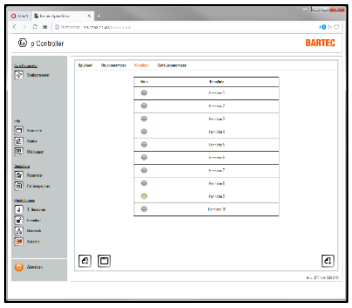
7.13.2.5 p4 – Maximum pressure operation

The value “p4” is the maximum pressure of the enclosure during the operating phase. This value is monitored by the Ex p control unit. If this value is exceeded, there is the option to set off an alarm or to cause a shutdown (safe state Ex p equipment).

7.13.2.6 p5 – Maximum purging pressure

The value “p5” is the maximum pressure of the enclosure during the purging phase. This value is monitored by the Ex p control unit. If this value is exceeded, there is the option to set off an alarm or to interrupt the purging operation.

7.13.3 Characteristic curve

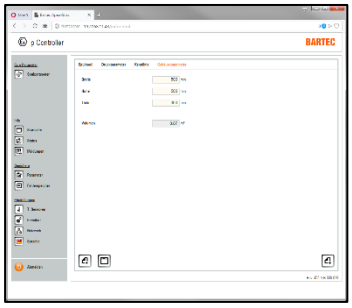


The specifically mounted pressure monitor is specified in the “Characteristic curve” tab. This must be set correctly for the correct automatic purge time calculation.

Determine the orifice by reading the type designation on the pressure monitor and selecting the associated characteristic curve.

Orifice	Diameter [mm]	MPV
8	50	Type: 17-51P3-3803; mpv 2
9	100	Type: 17-51P3-3903; mpv 3

7.13.4 Enclosure-related parameters tab



The internal volume of the pressurised equipment is specified in the “Enclosure-related parameters” tab. For this purpose, length, width and height must be entered in mm.

Width	Width of the Ex p equipment
Length	Length of the Ex p equipment
Depth	Depth of Ex p equipment
Volume	Calculated volume based on width, length and height

7.14 Manual purging phase

Manual purging phase - The Ex p control unit can be programmed manually with the determination of the required pressure values, which are the data needed for the purging. This means that all values, such as purging pressure p3 and the corresponding purging time are permanently written into the memory.

In order to determine the purging pressure p3, the pressurised enclosure must be closed and the Ex p control unit put into operation.

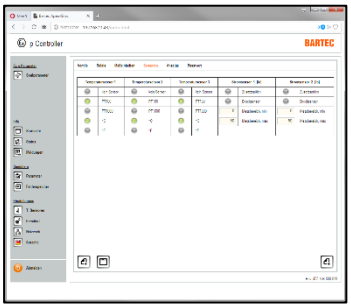
7.14.1 Determining the purging pressure p3

Procedure:

- Call up the Purge parameters / Purge modes menu
- Activate the Manual button by clicking on it;
  The Manual button changes from to
- Call up the Purge parameters / Pressure parameters menu
- Use the keypad to increase the setpoint “p3” and confirm with the “Enter” key.
  > e.g. 15 mbar
- Confirm pop-up window with the changed value
- Deactivate programming switch
- Call up the Status menu
- Establish purge gas connection and set inlet pressure at the pressure reducer.
  > e.g. 2 bar
- Ex p APEX control unit into purging phase.
- Record and note maximum “p3” actual value.
  > e.g. recorded value = 6.5 mbar
- Activate programming switch
- Perform re-login in the WEB interface
- Call up the menu Purge parameters / Pressure parameters
- Use the keypad to set the setpoint
- Set “p3” to 6.0 mbar and confirm with the “Enter” key.
  > e.g. recorded value 6.5 mbar – 0.5 mbar = 6.,0 mbar
- Confirm pop-up window with the changed value
- Call up the Purging parameters / Purging modes menu
- Enter the time for a purge test via the keyboard at Purging Time.
  > e.g. 30 seconds
- Confirm pop-up window with the changed value
- Deactivate programming switch
- Call up the Status menu
- The Ex p control unit starts and the purging time begins to count down.

7.15 Optional sensors

Upon delivery, the “Optional sensors” are deactivated and can be activated if required.



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

The deviation from the standard is during the operating phase. By means of two optional connectable pressure sensors during the operating phase, the control unit also monitors that the operating equipment is at minimum pressure.

Procedure:

- ➡ Connect the PC with the Ex p control unit
- ➡ Activate the programming switch
- ➡ Log in to the WEB interface with the user level
- ➡ Call up the “Extended / Sensors” menu

> You can activate the “Pressure sensor” function under Current sensor 1 and Current sensor 2 in the displayed table displayed. In addition, the minimum and maximum measuring range of the sensor must be entered.

- ➡ Confirm pop-up window with the changed value(s)
- ➡ Call up the “Pressure parameters” menu and enter the required setpoints for the optional pressure sensors “pa and pb”.

> e.g. specify pa - pressure sensor A with a trigger value of 2.00 mbar.

> If the value falls below 2.00 mbar at the measuring point, the associated Ex p equipment is deactivated.

- ➡ Confirm pop-up window with the changed value(s).
- ➡ Active pressure sensors are marked as active in the “Purge parameters/Purge modes” menu for the associated purge program.
- ➡ Deactivate programming switch
- ➡ Allow purging phase to run
- ➡ Functional test: Ex p operating equipment is deactivated if the pressure falls below the limit.

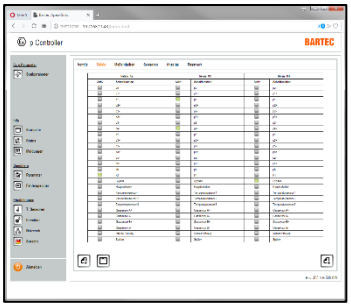
7.15.1 Additional purging via a signal

Additional purging can be activated on the Ex p control unit by means of the current inputs. In this case, the Ex p operating equipment remains in the operating phase and it can be purged once again. In order to use this function, the “Additional purging” function must be activated in the “Extended / Sensors” parameter menu for the associated current input.

4 mA = purging with active operating phase

7 mA = normal operating phase

7.16 Messages



In the “Extended / Relays” menu, the switching points can be assigned to the relays K2, K3 and K4.

⚠ Attention! When programming K2 to switch to K1.

If the relay K2 is used as a release relay, further message values for relay K2 are not taken into account. SIL relevant.

Assign messages to the signalling relays K3 and K4.

In the following example, the relays are set for the following messages.

Relay K2: Additional release (SIL)

Relay K3: Alarm message when falling below p1 and if p4 is exceeded

Relay K4: Indicates bypass operation

Procedure:

- ➡ Call up the Advanced / Relay menu
- ➡ Activate the specific message(s) in the “Relay K2” column by clicking on the corresponding button.
- > Click on the “K1” button.
  The button changes from ☐ to ☑
- ➡ Confirm pop-up window with the changed value(s)
- ➡ Activate the specific message(s) in the “Relay K3” column by clicking on the corresponding button.
- > Click on the “p1-” and “p4+” buttons.
  The button changes from ☐ to ☑
- ➡ Confirm pop-up window with the changed value(s)
- ➡ Activate the specific message(s) in the “Relay K4” column by clicking on the corresponding button.
- > Click on the “Bypass” button
  The button changes from ☐ to ☑
- ➡ Confirm pop-up window with the changed value(s)
- ➡ Deactivate the programming switch

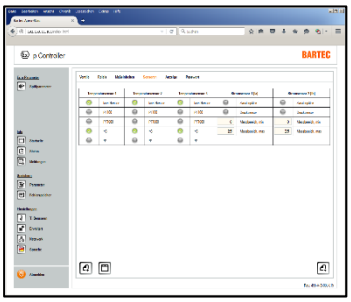
In the case of any messages with a “minus” sign, it indicates that the relay will be activated if the value falls below the limit.

In the case of any messages with a “plus” sign, it indicates that the relay will be activated if the value is exceeded.

Messages without any plus/minus sign are activated when the respective value is activated.

7.17 Temperature sensors

7.17.1 Activation and adjustment of temperature sensors



The temperature sensors are configured in the “Extended / Sensors” menu.

Procedure:

- ➡ Connect the PC with the Ex p control unit
- ➡ Activate the programming switch
- ➡ Log in with the user level
- ➡ Call up the menu page “Extended / Sensors” in the WEB interface
- > Activate the desired temperature sensor by clicking on “PT 100 / PT 1000”
  e.g. when using three PT100 sensors:
  Temperature sensor 1 to 3 on PT 100
- > Activate the desired display unit “° C / ° F” by clicking on it
  Display unit is set on ° C

7.17.2 Setting the temperature switching values

The temperature switching values for temperature sensors 1 to 3 are configured in the “Temperature sensors” menu.

Procedure:

- ➡ Call up the menu page “Temperature sensors” in the WEB interface
- > When activated, the indicator light for temperature sensor x shows that this sensor is active.
- ➡ Store temperature switching values 1, 2 and 3
- > e.g. T. switching value 1 = 35 ° C; T. switching value 2 = 45 ° C; T. switching value 3 = 60 ° C
- ➡ Store functions for switching values
- > e.g. function switching value 1 = open valve 1, switching value 2 = warning message; Switching value 3 = deactivation of Ex p + alarm message
- > If switching value 1 is exceeded, the purging gas valve is opened for cooling; if switching value 2 is exceeded, a plain text message is sent in the web interface; if the value continues to rise to 3, the Ex p system is deactivated

8 Commissioning

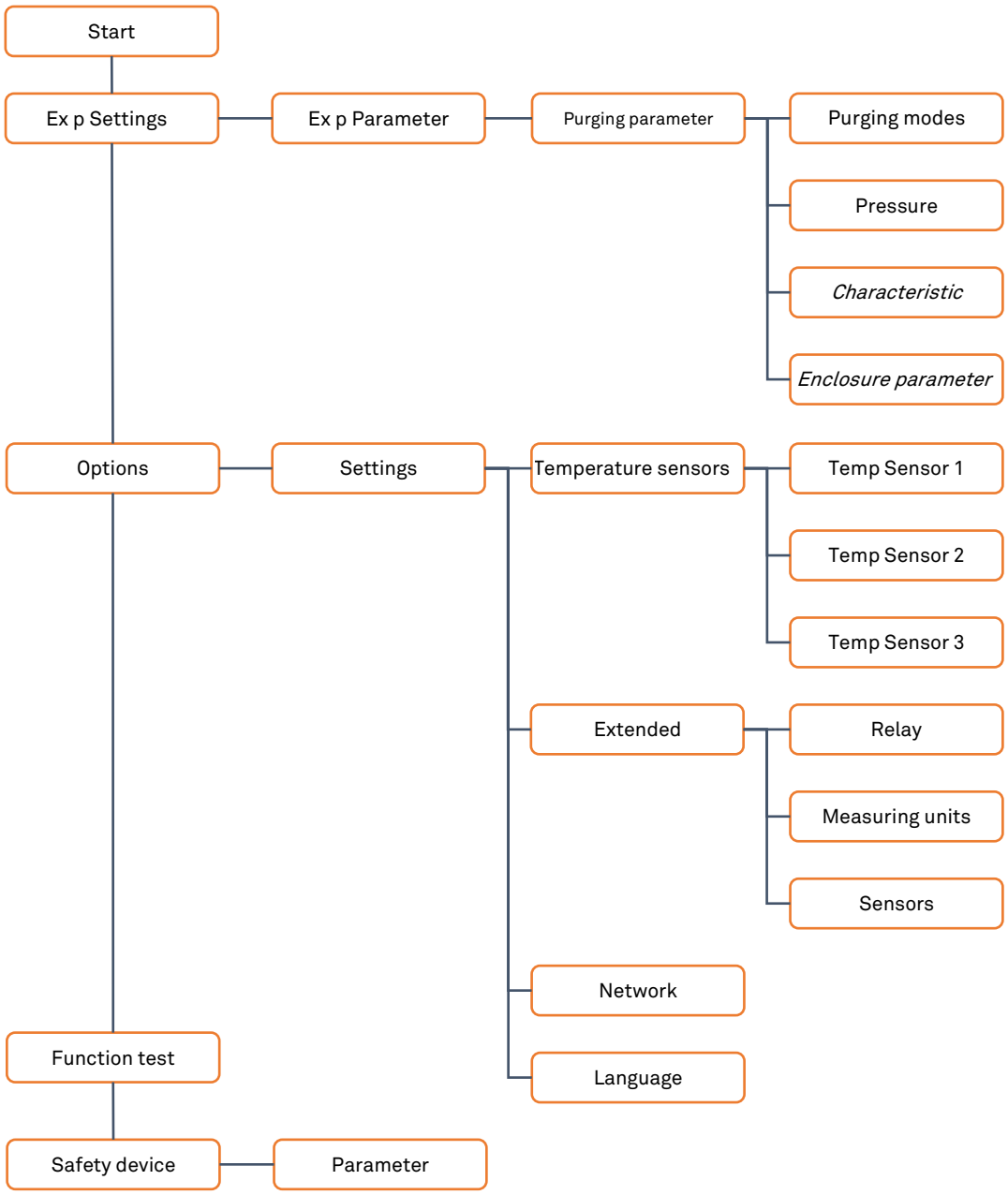
8.1 Initial commissioning

For systems that have been commissioned for the first time and have not yet been parameterised, please follow the routine from Chapter 8.

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

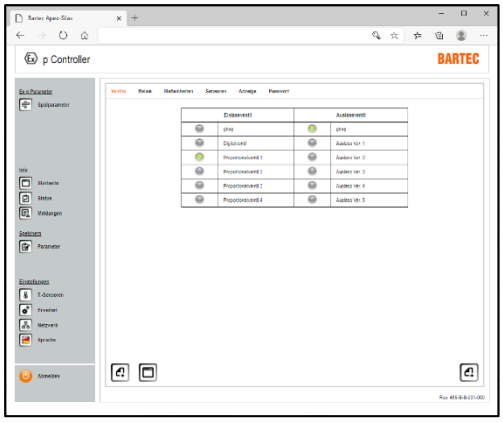
8.1.1 General

The following procedure for setting the function parameters is recommended:



* = Adjustment to be carried out in case of automatic purging

8.1.2 “Purge gas valve” setting



The inlet and outlet valves are preset on the Ex p control unit APEX^{mpc} or respectively on the SILAS^{mpc}. The settings should not be changed, otherwise the function is no longer guaranteed.

The valves are set to the following settings:

Inlet valve		Outlet valve	
Active	Type	Active	Type
activated	Proportional valve 1		Outlet Var. 1

8.1.3 Configuration

It must be ensured that the electrical wiring is as described in the associated operating instructions and that the purging gas supply is connected.

Log into the user level of the WEB interface in order to carry out the configuration. The structure of the chapters corresponds to the flow chart in Chapter 7.1 and can thus be worked through from chapter to chapter.

8.1.3.1 Differentiation between automatic purging and manual purging

The automatic purging automatically calculates the corresponding purging time during the initial purging phase on the basis of the parameters stored in the Ex p control unit, i.e. enclosure size and applied purging gas outlet.

Manual purging is based on the fact that the values for purging time and pressures are permanently stored in the device during initial start-up. In this regard, the purging time is calculated and programmed by the commissioning technician on the basis of the determined flow rate and enclosure volume.

8.1.3.2 Ex p settings – Manual purging

Follow the individual chapters for the correct procedure to the parameters to be carried out.

8.1.3.3 “Purge program / purge mode” setting

DANGER

DEATH OR SERIOUS **PERSONAL** INJURY DUE TO THE USE OF AN UNSUITABLE PURGING MODE.

Risk of explosion:

- Only activate purging programmes that are suitable for the application.
- Purging programs Ex_p_3, Ex_p_6, Ex_M_1 and Ex_M_2 are special purging modes which must not be used for standard applications.

The purging mode as well as the sequence control can be adjusted within the WEB interfaces “Purge parameters / Purge modes”.

The precondition for all purging programs is po > p1, so that the other phases can be initiated.

Procedure

- Connect the PC with the Ex p control unit and activate the programming switch
- Log into the WEB interface with the user level
- Call up the menu “Purging parameters / Purging modes”
- Select the applied purging program by clicking the left button
  - Purging program Ex_p_1 by clicking the button
    - Button changes from to
- Confirm pop-up window with the changed value
- The purging mode should be set to “Manual” for the purging described here.

Purging programmes for gas application:

Programme	Application	Functions				
		Purging phase	Purging time starts when p3 has been exceeded	Purging time stops when p5 has been reached	Ex p active after	Ex p inactive after
Ex_p_1	Gas	Yes	Yes	Yes	purging time has elapsed	po < p1 po > p4
Ex_p_2	Gas	Yes	Yes	Yes	purging time has elapsed	po < p1
Ex_p_4	Gas	Yes	Yes	No	purging time has elapsed	po < p1 po > p4
Ex_p_5	Gas	Yes	Yes	No	purging time has elapsed	po < p1

8.1.3.4 “Purge time” setting

The procedure described here for determining the purge time is based on the principle of manual purge time calculation

Assumptions for determining the purge time:

- All relevant parameters are assumed values -

When using the APEX^{mpc} or SILAS^{mpc}, the purging pressure p3 is set by means of the purging flow control.

Procedure

- ▶ Connect the PC with the Ex p control unit and activate the programming switch
- ▶ Log into the WEB interface with the user level
- ▶ Call up the menu “Purging parameters / Pressure parameters”
- ▶ Pressure parameter p3 - Set purging pressure to 2000 Pa (20 mbar)
  - A pop-up window displaying the changed value opens; Confirm
- ▶ Pressure parameter p5 - Set maximum purging pressure to the highest value which the pressurised equipment is permitted to reach during purging, e.g. set 2000 Pa (20 mbar)
  - A pop-up window displaying the changed value opens; Confirm
  - Deactivate programming switch
  - The Ex p control unit changes from programming mode to control/monitoring mode.
- ▶ Press the “F5” key on the PC to refresh the browser window.
- ▶ The Start screen opens.
- ▶ Set the desired p3 purging pressure (actual value) by slowly opening the purging flow control. Make a note of the reached p3 purging pressure, e.g. 10 mbar.
  - ☞ Open the chapter “Purge air diagram" in the operating instructions
  - ☞ Read out the corresponding flow rate Q from the diagram as a function of the determined p3, e.g. 220 000 l/h
  - ☞ Using the formula
    t [min] = ((V [l] x purging factor) / Q [l/h]) x 60
    3.5 min = ((2567 l x 5 times purging) / 220 000 l/h) x 60
- ▶ Activate programming switch
- ▶ Log into the WEB interface with the user level
- ▶ Call up the menu “Purging parameters / Pressure parameters”
- ▶ Pressure parameter p3 - Set purging pressure to the determined value
  - Pop-up window with display of changed value opens; Confirm
- ▶ Call up the menu “Purging parameters / Purging modes”
- ▶ Set purging time to the calculated purging time
  - A pop-up window displaying the changed value opens; Confirm
- ▶ Deactivate the programming switch

8.1.3.5 “Ex p parameters / pressure parameters” setting

The pressure parameters to be observed are part of IEC / EN 60079-2.

Furthermore, the pressure parameters are application-dependent and must be checked during the initial commissioning.

The following values can be used as basic settings:

po = 2.5 mbar (250 Pa)
p1 = 1.0 mbar (100 Pa)
p2 = 1.5 mbar (150 Pa)
p3 = Determined by Chapter 8.1.2.5
p4 = Application-dependent
P5 = Application-dependent

- ▶ Connect the PC with the Ex p control unit and activate the programming switch
- ▶ Log into the WEB interface with the user level
- ▶ Call up the menu “Purging parameters / Pressure parameters”
- ▶ Enter the parameter “po - operating overpressure” and confirm

  ☞ e.g. 250 Pa (2.5 mbar)
  The value “po” is the internal operating overpressure of the pressurised enclosure. This value is monitored by the Ex p control unit and compensated, if necessary.
  - A pop-up window displaying the changed value opens;
- ▶ Confirm the pop-up window with the changed value
- ▶ Enter pressure parameter “p1 - minimum pressure” and confirm

  ☞ e.g. 100 Pa (1.0 mbar)
  - A pop-up window displaying the changed value opens;
- ▶ Confirm the pop-up window with the changed value
- ▶ Enter pressure parameter “p2 – pre-alarm” and confirm

  ☞ e.g. 150 Pa (1.5 mbar)
- ▶ Confirm the pop-up window with the changed value

... Follow the same procedure for the other pressure parameters.

- ▶ Deactivate the programming switch

8.1.4 Ex p settings – Automatic purging

8.1.4.1 “Purging program / Purging mode” setting

DANGER

DEATH OR SERIOUS PERSONAL INJURY DUE TO THE USE OF AN UNSUITABLE PURGING MODE.

Risk of explosion:

- Only activate purging programmes that are suitable for the application.
- Purging programs Ex_p_3, Ex_p_6, Ex_M_1 and Ex_M_2 are special purging modes which must not be used for standard applications.

The purging mode as well as the sequence control can be adjusted within the WEB interfaces “Purge parameters / Purge modes”.

The precondition for all purging programs is po > p1, so that the other phases can be initiated.

Procedure

- Connect the PC with the Ex p control unit and activate the programming switch
- Log into the WEB interface with the user level
- Call up the menu “Purging parameters / Purging modes”
- Select the applied purging program by clicking the left button
  - Purging program Ex_p_1 by clicking the button
    - Button changes from to
- Confirm the pop-up window with the changed value
- Activate the purging mode to “Automatic” by clicking the button .
  - Click on the button
    - Button changes from to
- Confirm the pop-up window with the changed value
- Enter the desired purging factor

  The purging factor indicates how often the protected volume should be flushed through, e.g. 5-fold purging means that a protected volume of 100 litres is purged through with at least 500 litres of purge gas.
  - Enter the value “5” and confirm with Enter.
    - Confirm the confirmation window

Purging programmes gas applications:

Programme	Application	Functions				
		Purging phase	Purging time starts when p3 has been exceeded	Purging time stops when p5 has been reached	Ex p active after	Ex p inactive after
Ex_p_1	Gas	Yes	Yes	Yes	purging time has elapsed	po < p1 po > p4
Ex_p_2	Gas	Yes	Yes	Yes	purging time has elapsed	po < p1
Ex_p_4	Gas	Yes	Yes	No	purging time has elapsed	po < p1 po > p4
Ex_p_5	Gas	Yes	Yes	No	purging time has elapsed	po < p1

8.1.4.2 “Ex p Parameters / Pressure parameters” setting

The pressure parameters to be observed are part of IEC / EN 60079-2.
Furthermore, the pressure parameters are application-dependent and must be checked during the initial commissioning.

The following values can be used as basic settings:
po = 2.5 mbar (250 Pa)
p1 = 1.0 mbar (100 Pa)
p2 = 1.5 mbar (150 Pa)
p3 = automatic determination by Ex p control unit
p4/ P5 = Application-dependent, e.g. pressure-sensitive components?

Procedure

- ▶ Connect the PC with the Ex p control unit and activate the programming switch
- ▶ Log into the WEB interface with the user level
- ▶ Call up the menu “Purging parameters / Pressure parameter”
- ▶ Enter the “po - operating overpressure” parameter and confirm
  ☞ e.g. 250 Pa (2.5 mbar)
  The value “po” is the internal operating overpressure of the pressurised enclosure. This value is monitored by the Ex p control unit and compensated, if necessary.
  - A pop-up window displaying the changed value opens;
- ▶ Confirm the pop-up window with the changed value
- ▶ Enter the pressure parameter “p1 - minimum pressure” and confirm
  ☞ e.g. 100 Pa (1.0 mbar)
  - A pop-up window displaying the changed value opens;
- ▶ Confirm the pop-up window with the changed value
- ▶ Enter the pressure parameter “p2 – pre-alarm” and confirm
  ☞ e.g. 150 Pa (1.5 mbar)
- ▶ Confirm the pop-up window with the changed value
  ... Follow the same procedure for the other pressure parameters
- ▶ Deactivate the programming switch

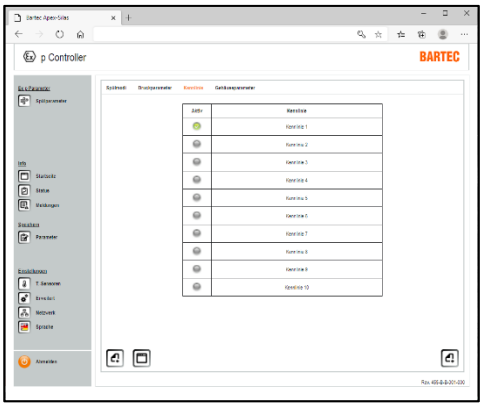
8.1.4.3 “Ex p Parameters / Characteristic curve” setting

DANGER

DEATH OR SERIOUS PERSONAL **INJURY DUE TO INCORRECT SETTING OF THE CHARACTERISTIC CURVE**

The explosion protection is no longer guaranteed.

- ▶ Check the type number and the associated characteristic curve of the pressure monitor.



The application-specific mounted pressure monitor is specified in the “Characteristic curve” tab.

This must be set correctly for the calculation of the automatic purging time.

The pressure monitor used can be selected by “clicking” on the button ( ).

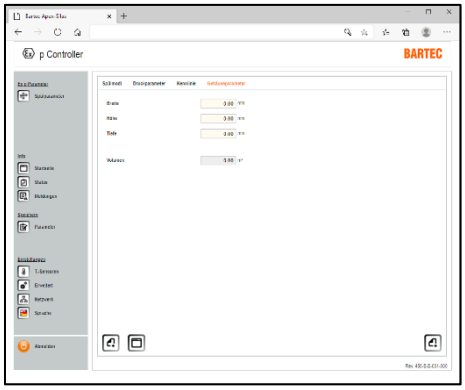
Selection table

Parameter	Measuring orifice	BARTEC outlet type
Characteristic curve 8	mpv 2	17-51P3-3803/****
Characteristic curve 9	mpv3	17-51P3-3903/****

8.1.4.4 “Ex p parameters / Enclosure parameters” setting

If the Ex p control unit is in programming mode (parameter switch activated and password entered), the units of measurement are displayed in mm.

Settings are made in mm.



The internal volume of the pressurised equipment is specified in the “Enclosure parameters” tab.

For this purpose, length, width and height must be entered in mm.

8.2 Commissioning

8.2.1 Preparation phase

The preparation phase begins with switching on the supply voltage for the Ex p control unit and the purging gas supply.

After activation of the Ex p control unit and non-activated purging gas supply or opened Ex p operating equipment, the following initial state is shown:

- ● LED “Status” lights up
- ● LED “p2” lights up

Procedure of the preparation phase:

The inflowing purging gas increases the internal pressure of the pressurised purging gas.

- ➡ The minimum pressure “p1” of the enclosure is exceeded.
  - ● LED “p1” lights up
  - ◎ LED “p2” goes out
- ➡ The purging gas valve is opened via the control unit.
- ➡ The next phase “Purging phase” is initiated.

8.2.2 Purging phase

The pressurised enclosure is purged with the purge gas in order to remove any explosive gas-air mixture or to dilute it to a non-hazardous concentration before the possible ignition sources in the pressurised enclosure are switched on.

This process prepares the pressurised enclosure for the operating phase. The amount of purging required depends on the free volume of the pressurised enclosure. The pre-purge process is constantly monitored by the sensors in the sensor module and the pressure monitor.

In order to prevent the internal enclosure pressure from reaching an excessively high value as a result of an impermissibly high flow resistance at the pressure monitor of the Ex p control unit, the purging gas pressure is limited to the value of “p5” during the pre-purge period.

Procedure of the purging phase:

- ➡ Increase in the flow rate with purge gas.
- ➡ The plate integrated in the pressure switch is raised.
- ➡ Switching values of “p3” are exceeded.
  - ● LED “p3” lights up
- ➡ The pre-purge time is counted down.
  - ✹ The “Operate” LED flashes
- ➡ After the purging time has elapsed, the purging gas valve is closed.
- ➡ The next phase “Operating phase” is initiated.
  - ◎ LED “p3” goes out

8.2.3 Operating phase

The operating phase begins with the closing of the purge gas valve.

The operating pressure must be maintained during the entire operation of the pressurised enclosure in order to prevent the ingress of flammable substances. The electrical installations in the pressurised enclosure are switched on via a relay integrated in the control electronics.

If the enclosure pressure falls below the set minimum values during the operating phase, all electrical installations in the pressurised enclosure which are not explosion-proof themselves are switched off and a new pre-purge is initiated.

Procedure of the operating phase:

> The purging valve closes and the leakage losses are compensated.
  - LED “p1” lights up
  - LED “Operate” lights up
  - LED “Status” lights up
> Relay K1 switches on the mains voltage.
> Relay K2, K3 and K4 switch depending on the configuration.

9 Operation

9.1 Safety during operation

DANGER

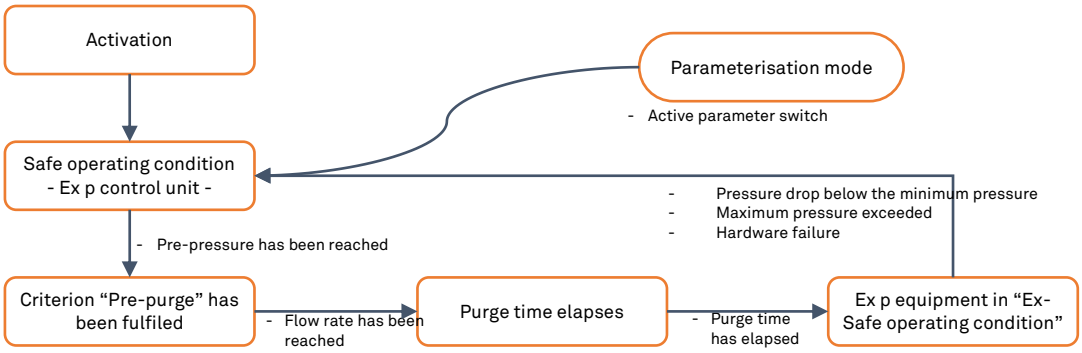
DEATH OR SERIOUS PERSONAL INJURY DUE TO A DAMAGED EXPLOSION PROTECTION MEASURE. SAFE OPERATION OF THE CONTROL UNIT IS NO LONGER POSSIBLE.

Explosion hazard

- ▶ The APEX control unit must be taken out of operation and secured against being switched on again.

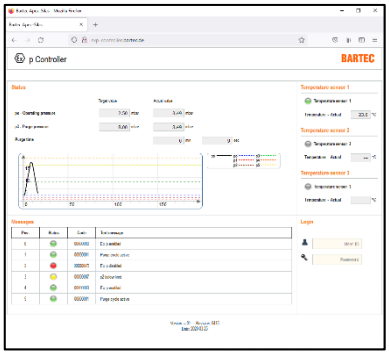
9.2 Operating phases of the Ex p control unit

The operation of a pressurised enclosure can be divided into three phases. The three phases are divided into the preparation, pre-purge and operating phases.



9.3 Querying system status

- ➡ Logging into the web interface by opening the browser and entering the IP address 192.168.11.101
- ➡ The start screen shows a first overview of the system status.



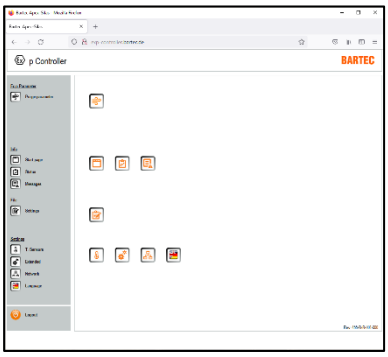
➡ Login
User ID: guest
Password: guest

or

User ID: user
Password: 0000

➡ Confirm with Enter

➡ The start screen opens.



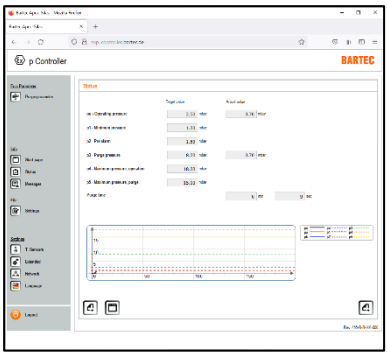
➡ Status:

Displays the target values and measured actual values. In addition, a pressure/time diagram is output.

➡ Messages:

Displays plain text messages about the system status.

➡ Status display:



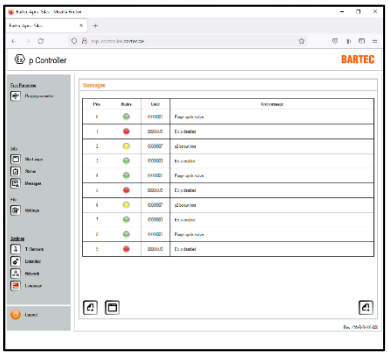
➡ Upper area:

Listing of setpoint values with comparison of actual values.

➡ Lower area:

Time diagram of the pressure curve

➡ Messages:



➡ Display of plain text messages from the system

Green button = Positive messages

Yellow button = Warning message

Red button = Fault message

10 Maintenance and repair

Read the general safety instructions carefully before starting any work (see Chapter 2.4 Safety instructions).

Perform any maintenance and repair work in accordance with the following sections, unless otherwise agreed for customer-specific control units.

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 connected upstream if the quality is not guaranteed with regard to foreign particles. 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/m³

10.2 Maintenance work

10.2.1 Maintenance intervals

MAINTENANCE INTERVALS

If the unit is operated properly and the installation instructions and ambient conditions are observed, maintenance is recommended in accordance with the following maintenance interval schedule.

CAUTION

MAINTENANCE AND REPAIR

- Comply with the currently applicable provisions and the national regulations for the maintenance, servicing and inspection of the operating equipment!
- Any operating and maintenance work may only be carried out by trained specialist personnel. The legal regulations and other binding guidelines for occupational safety, accident prevention and environmental protection must be observed.
- When opening covers or removing parts, unless this is possible by hand, live parts may be exposed. Connecting parts may also be under voltage.

Maintenance interval	Work to be performed
Monthly	Visual inspection in accordance with Chapter 11.1.2
Semi-annual	Cleaning in accordance with Chapter 11.1.3
Annually	Regular maintenance in accordance with Chapter 11.1.4

10.2.2 Visual inspection

Perform a visual inspection every month:

- Check the enclosures, cable entries and cables for any damage.
- Check if the screw connections are mechanically secured.
- Check fault memory for any contents.

10.2.3 Cleaning

Solvents should not be used to clean the control unit, as these can impair its properties if they come into contact with seals.

10.2.4 Regular maintenance

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

In the event of any abnormalities, the operator should weigh up the possibility of a timely and appropriate cleaning at BARTEC GmbH against a spontaneous failure of the control unit.

Furthermore, the function of the entire system should be checked. In this regard, the correct sequence of the purging phase and operating phase should be checked.

10.3 Repair work

Any repairs to the control unit and the accessories may only be carried out by BARTEC GmbH.

10.4 Faults and troubleshooting

CAUTION

A CHANGE IN OPERATING BEHAVIOUR MAY BE AN INDICATION OF PRE-EXISTING DAMAGE TO THE CONTROL UNIT.

- ▶ Do not put the Ex p system back into operation until the cause of the fault has been eliminated.

It is assumed that the connection of all external electrical and mechanical devices has been carried out correctly. Therefore, the proper setup and connection of the electrical equipment 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 leakage compensation
Control unit out of order	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
	Wrong purging program activated	Check purging program
During the pre-purging, the purging gas valve switches off briefly	Excessive amount of purging gas is introduced into the pressurised enclosure	Reduce the size of the purging gas nozzle
The “Operate” LED does not flash during the purging time	Purging gas is not available	Check purging gas valve for supply voltage
	Purging gas valve does not open or it opens only partially	Check purging gas valve for foreign particles in the mechanical part
		Increase inlet pressure to setpoint
	Purging gas does not flow through the Ex p enclosure in sufficient quantity	Check purging gas nozzle for the correct value
		Check setpoints “p3”, and “p1” of the control unit
		Increase cross-section of the purging gas supply line
		The purging gas supply line too small. Increase cross-section of the supply line
	The target pressure of pressure reducer is not reached.	Remove closure or take appropriate measures to eliminate the reduction

	The pressure monitor of the control unit is inadmissibly closed or provided with a reducer.	Seal enclosure by using suitable measures
	The enclosure leaks during the pre-purging phase due to increased internal pressure.	Check purging gas valve for supply voltage
Digital flushing gas valve does not switch to the small nozzle after the pre-purging phase	The temperature sensor is connected. The internal temperature is too high.	Check purging gas valve for foreign particles in the mechanical part
		Wait until the internal temperature has dropped due to the increased flow, or check the set temperature switch value.
	Main switch or bridge at the terminals Hs_In / Hs_Out is not connected.	Switch on main switch or connect jumper to the terminals Hs_In / Hs_Out.
	Purging gas valve does not close.	Check purging gas valve for switched off supply voltage.
The control unit does not switch on the electrical devices after the pre-purging phase.	The pressure in the enclosure is higher than the switching value “p4”.	Reduce the flow rate of the leakage air needle.
	The switching value “p4” is too low.	Check the switching value “p4”.
	The pressurised enclosure is leaking. The switching value is below “p1”.	Seal pressurised enclosure.
After the purging time, the control unit switches off the electrical devices with a time delay of 5 seconds.	The leakage air needle of the digital valve is too small.	Increase air flow rate of leakage air needle.
	The switching value “p3” is too high.	Check switching value “p3”.
Relay K4 or K5 do not switch.	The switching parameter has been incorrectly selected.	Check switching parameters.
The digital purging gas valve switches on briefly during the operating phase.	The value “po” is too high.	Reduce the “po” value.
	The pressurised enclosure is leaking. The switching value is below “p1”.	Seal the pressurised enclosure.
	The pressurised enclosure is leaking. The switching value is below “p1”.	Adjust leakage compensation.
If the pressure drops, the electrical devices do not switch off.	The key switch is switched on.	Switch off key switch.

10.4.2 Fault messages

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

- Positive messages are notifications that do not affect the readiness of the system.
- Warning messages are messages that partially affect the system.
- Alarm messages are messages which lead to the shutdown of the protected equipment.

10.4.2.1 Positive messages

Status	Code	Plain text
	00000001	Purging process
The control unit has started the purging process.		
	00000002	Ex p Ready
The control unit has successfully completed the purging process. The main switch or jumper HS_IN / HS_OUT not closed.		
	00000003	Ex p Active
The control unit has successfully completed the purging process. The main switch or jumper HS_IN / HS_OUT is closed and the release is given.		
	00000004	p3 reached
The setpoint “p3” purge flow is reached and purging time counts down.		

10.4.2.2 Warning messages

Status	Code	Plain text
	00000005	Bypass active
The bypass has been activated on the control unit.		
	00000006	Door contact / main switch open
The main switch or jumper HS_IN / HS_OUT is not closed.		
	00000007	p2 is not reached
Setpoint p2 “Pre-alarm” is not reached.		
	00000008	p4 exceeded
Setpoint p4“Maximum pressure – operation” is exceeded		
	00000009	p5 exceeded
Setpoint p5 “Maximum pressure – purging” is exceeded		
	0000000A	Temperature at sensor 1 is exceeded
Setpoint temperature at sensor 1 is exceeded		
	0000000B	Temperature at sensor 2 is exceeded
Setpoint temperature at sensor 2 exceeded		
	0000000C	Temperature at sensor 3 is exceeded
Setpoint temperature at sensor 3 exceeded		

10.4.2.3 Alarm messages

Status	Code	Plain text
	0000000D	Ex p inactive
The protected equipment is deactivated.		
	0000000E	Device fault 1
HW test error (processors)		
	0000000F	Device fault 2
HW test error (barriers)		
	00000010	Device fault 3
HW test error (internal temperature monitoring)		
	00000011	Device fault 4
HW test error (Severe error)		
	00000012	Sensor error 1
HW test error (Pressure sensor / Sensor board status)		
	00000013	Sensor error 2
HW test error (opt. current sensors)		
	00000014	Sensor error 3
HW test error (ext. temperature sensors)		
	00000015	p1 is not reached
Setpoint p1 “Min pressure” is not reached.		
	00000016	p3 is not reached
Setpoint p1 “Purging pressure” is not reached.		
	00000017	p4 is exceeded
Setpoint p4 “Maximum pressure - Operation” is exceeded.		
	00000018	p5 is exceeded
Setpoint p4 “Maximum pressure – Purging” is exceeded.		
	00000019	Temperature sensor 1 is exceeded
Setpoint temperature at sensor 1 is exceeded.		
	0000001A	Temperature sensor 2 is exceeded
Setpoint temperature at sensor 2 is exceeded.		
	0000001B	Temperature sensor 3 is exceeded
Setpoint temperature at sensor 3 is exceeded.		

11 Technical data

11.1 Ex p control unit APEXmpc

Parameter	Technical details
Type	07-37A2-2211/.M5.
EU type examination certificate	BVS 19 ATEX E 015 X
IECEx certification	IECEx BVS 19.0038X
EAC certification	EAЭC RU C-DE.AЖ58.B.01809/21
ATEX Marking	⟨Ex⟩ II 2(1)G Ex eb mb ib [ib pxb] [ia Ga] IIC T5 / T4 Gb ⟨Ex⟩ II 2(1)D Ex tb [ib pxb] [ia Da] IIIC T95°C / T130 °C Db
IECEx Marking	Ex eb mb ib [ib pxb] [ia Ga] IIC Gb Ex tb [ib pxb] [ia Da] IIIC T95°C / T130 °C Db
EAC Marking	1Ex e mb ib [ib px] [ia Ga] IIC T5 Gb X 1Ex e mb ib [ib px] [ia Ga] IIC T4 Gb X Ex tb [ib px] [ia Da] IIIC T95 °C Db X Ex tb [ib px] [ia Da] IIIC T130 °C Db X
SIL-Level / Performance Level	SIL 2 / d
Operating ambient temperature	-25 °C to +50 °C, -50 °C to +50 °C (variant)
Storage and transport	-25 °C to +60 °C @ T4
Material	Stainless steel V4A
Mains Voltage DC (Variant)	24 V dc to 44 V dc
Mains Voltage AC (Variant)	100 V ac to 230 V ac
Current consumption control unit	2 A
Maximum power consumption	25 W (incl. purge valve)
Release relay K1 (SIL)	2 potential-related NO contacts,, 230 V ac @ 5 A (AC1) or 24 V dc @ 5 A (DC1)
Release relay K2 (SIL)	Potential-free, 4 x NO, 230 Vac @ 3 A, 24 Vdc @ 3 A
Signal relay K3 and K4	Potential-free, 1x changeover contact, 230 Vac @ 1 A, 24 Vdc @ 1 A
Pressure range	0 ... 25 mbar
Tolerance range	±0,4 mbar
Purge volume	0 ... 500 m³/h with mpv 3 0 ... 200 m³/h with mpv 2
Purge time	Up to max. 2 hours
Purge gas valve	Digital (purging) and proportional (leakage compensation)
Connecting terminal “Ex e”	0.08 ... 2.5 mm² (28 ...12 AWG)
With wire end ferrule with plastic collar	0.25 ... 1,5 mm²
Connecting terminal “Ex i”	0.2 ... 2.0 mm² (20 ...14 AWG)
With wire end ferrule with plastic collar	0.25 ... 0.75 mm²
Dimensions	550W x 400H x 250D mm
Assembly	External
Cable entry	3 x M20, 2x M25
Ingress Protection (IP) Rating	IP 64 acc. IEC/EN 60079-0, IP 66 acc. IEC/EN 60529
Purge gas feed – mpc	G ½” (i)
Purge gas supply – motor	G 1 ½“ (a)
Pressure measurement connections	3x tubes 10 mm
Weight	40 kg

11.2 Ex p control unit SILASmpc

Parameter	Technical details
Type	A7-37S2-2111/.M5.
EU type examination certificate	BVS 19 ATEX E 016 X
IECEx certification	IECEx BVS 19.0038X
EAC certification	EAЭC RU C-DE.AЖ58.B.01809/21
ATEX Marking	⟨Ex⟩ II 3G Ex ec mc ic [ic pzc] IIC T4 Gc ⟨Ex⟩ II 3D Ex tc [ic pzc] IIIC T130 °C Dc
IECEx Marking	Ex ec mc ic [ic pzc] IIC T4 Gc Ex tc [ic pzc] IIIC T130 °C Dc
EAC Marking	2Ex ic e mc [ic pz] [ia Ga] IIC T5 Gc X 2Ex ic e mc [ic pz] [ia Ga] IIC T4 Gb X Ex tc [ic pz] IIIC T95 °C Dc X Ex tc [ib pz] IIIC T130 °C Dc X
Operating ambient temperature	-25 °C tos +50 °C, -50 °C to +50 °C (variant)
Storage and transport	-25 °C to +60 °C @ T4
Material	Stainless steel V4A
Mains Voltage DC (Variant)	24 V dc to 44 V dc
Mains Voltage AC (Variant)	100 V ac to 230 V ac
Current consumption control unit	2 A
Maximum power consumption	25 W (incl. purge valve)
Release relay K1 (SIL)	2 potential-related NO contacts, 230 V ac @ 5 A (AC1) or 24 V dc @ 5 A (DC1)
Release relay K2 (SIL)	Potential-free, 4 x NO, 230 V ac @ 3 A, 24 V dc @ 3 A
Signal relay K3 and K4	Potential-free, 1x changeover contact, 230 V ac @ 1 A, 24 V dc @ 1 A
Pressure range	0 ... 25 mbar
Tolerance range	±0,4 mbar
Purge volume	0 ... 500 m³/h with mpv 3 0 ... 200 m³/h with mpv 2
Purge time	Up to max. 2 hours
Purge gas valve	Digital (purging) and proportional (leakage compensation)
Connecting terminal “Ex e”	0.08 ... 2.5 mm² (28 ...12 AWG)
With wire end ferrule with plastic collar	0.25 ... 1,5 mm²
Connecting terminal “Ex i”	0.2 ... 2.0 mm² (20 ...14 AWG)
With wire end ferrule with plastic collar	0.25 ... 0.75 mm²
Dimensions	550W x 400H x 250D mm
Assembly	External
Cable entry	3 x M20, 2x M25
Ingress Protection (IP) Rating	IP 64 in accordance with IEC/EN 60079-0 IP 66 in accordance with EN/IEC 60529
Purge gas feed – mpc	G ½” (i)
Purge gas supply – motor	G 1 ½“ (a)
Pressure measurement connections	3x tubes 10 mm
Weight	40 kg

11.3 Pressure monitor mpv

11.3.1 Pressure monitor mpv, standard

Parameter	Technical details	
Product	mpv2	mpv3
Type	17-51P3-3803/0000	17-51P3-3903/0000
Usage	Only in combination with APEX^{mpc} / SILAS^{mpc}	
Ingress Protection (IP) Rating	IP 65	
Spark and particle barrier	integrated	
Overpressure protection	integrated, release pressure approx. 40 mbar	
Ambient temperature	-25 °C to +60 °C	
Connection flange	165 mm	220 mm
Signal lines	2x pipe connection, 10mm	
Installation	location-independent	

11.3.2 Pressure monitor mpv, extended temperature range

Parameter	Technical details	
Product	mpv2	mpv3
Type	17-51P3-3803/0401	17-51P3-3903/0401
Usage	Only in combination with APEX^{mpc} / SILAS^{mpc}	
Ingress Protection (IP) Rating	IP 65	
Spark and particle barrier	integrated	
Overpressure protection	integrated, release pressure approx. 40 mbar	
Ambient temperature	-50 °C to +60 °C	
Connection flange	165 mm	220 mm
Signal lines	2x pipe connections, 10mm	
Installation	location-independent	

11.4 Recommended purge gas quality

Purge gas quality	
Residual dust	< 40 µm
Residual water	Dew point +3 °C
Residual oil content	<1mg/m³
Purge gas temperature	-10 °C to +55 °C

12 Order numbers

12.1 Motor purge controller APEX^{mpc}, Zone 1

Ta = -25 °C bis +50 °C	
Wide-range DC power supply (20 Vdc to 48 Vdc), 25 mbar	07-37A2-2211/1M50
Wide-range AC power supply (90 Vac to 253 Vac), 25 mbar	07-37A2-2211/2M50

Ta = -50 °C bis +50 °C	
Wide-range DC power supply (20 Vdc to 48 Vdc), 25 mbar, with heating 230 V ac	07-37A2-2211/1M51
Wide-range AC power supply (90 Vac to 253 Vac), 25 mbar, with heating 230 V ac	07-37A2-2211/2M51
Wide-range DC power supply (20 Vdc to 48 Vdc), 25 mbar, with heating 110 V ac	07-37A2-2211/1M52
Wide-range AC power supply (90 Vac to 253 Vac), 25 mbar, with heating 110 V ac	07-37A2-2211/2M52

12.2 Motor purge controller SILAS^{mpc}, Zone 2

Ta = -25 °C to +50 °C	
Wide-range DC power supply (20 Vdc to 48 Vdc), 25 mbar	A7-37S2-2111/1M50
Wide-range AC power supply (90 Vac to 253 Vac), 25 mbar	A7-37S2-2111/2M50

Ta = -50 °C to +50 °C	
Wide-range DC power supply (20 Vdc to 48 Vdc), 25 mbar, with heating 230 V ac	A7-37S2-2111/1M51
Wide-range AC power supply (90 Vac to 253 Vac), 25 mbar, with heating 230 V ac	A7-37S2-2111/2M51
Wide-range DC power supply (20 Vdc to 48 Vdc), 25 mbar, with heating 110 V ac	A7-37S2-2111/1M52
Wide-range AC power supply (90 Vac to 253 Vac), 25 mbar, with heating 110 V ac	A7-37S2-2111/2M52

12.3 Motor purge valve mpv

Standard:	
MPV2, orifice 50 mm, Ta -30 °C to +60 °C, stainless steel V4A	17-51P3-3803/0000
MPV3, orifice 100 mm, Ta -30 °C to +60 °C, stainless steel V4A	17-51P3-3903/0000

with heating AC 230 V:	
MPV2, orifice 50 mm, Ta -50 °C to +60 °C, stainless steel V4A	17-51P3-3803/0401
MPV3, orifice 100 mm, Ta -50 °C to +60 °C, stainless steel V4A	17-51P3-3903/0401

with heating AC 110 V:	
MPV2, orifice 50 mm, Ta -50 °C to +60 °C, stainless steel V4A	17-51P3-3803/0402
MPV3, orifice 100 mm, Ta -50 °C to +60 °C, stainless steel V4A	17-51P3-3903/0402

12.4 Operator panel

Hard-wired and surface-mounted	17-51P5-1111
Mobile with connector	17-51P5-0111

12.5 Protective circuits

Protective measure for inductive loads	
Overvoltage protection AC, ModEx, Ex db eb IIC	07-7311-93GU/K000
Free-wheeling diode, ModEx, Ex db eb IIC	07-7311-61GF/5400

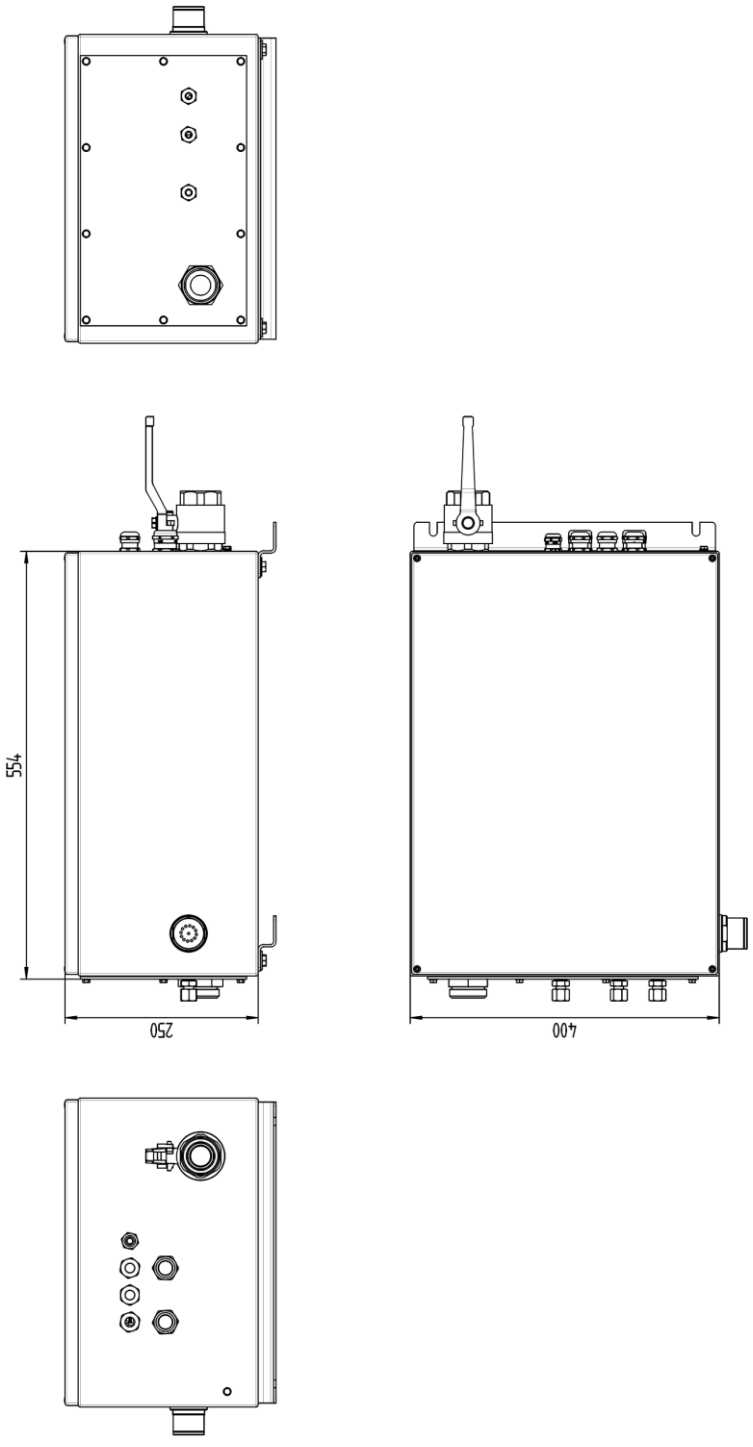
13 Appendix

13.1 Applied software packages

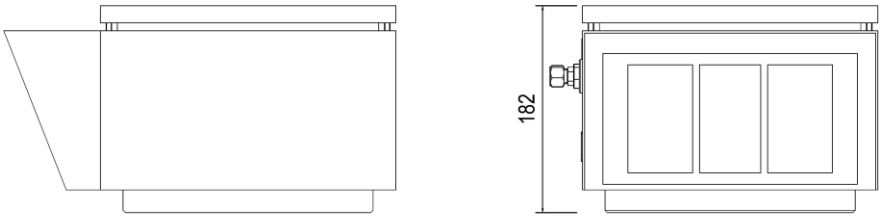
The service area of the hardware/software APEX / SILAS control unit uses the freeware freeRTOS.

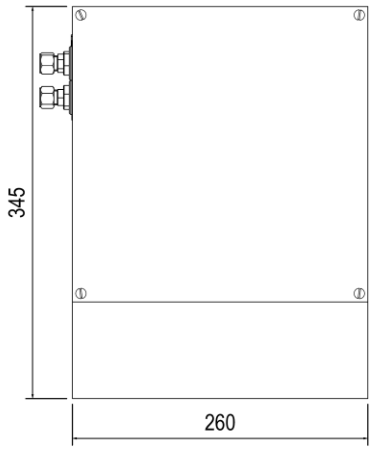
13.2 Dimensions

13.2.1 Dimensions APEXmpc / SILAS^{mpc}

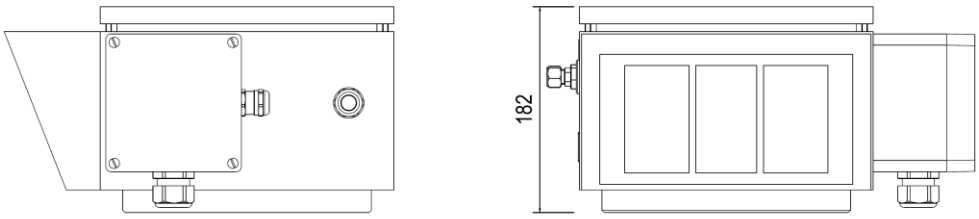


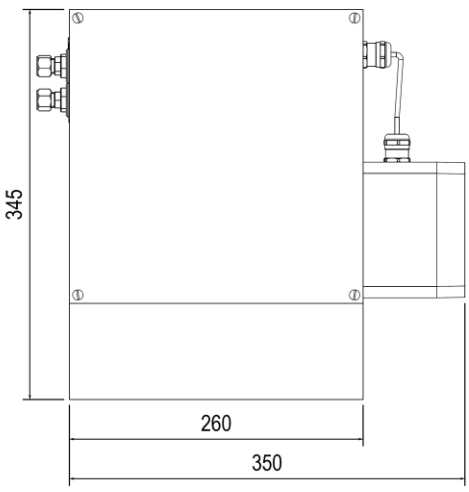
13.2.2 Dimensions mpv



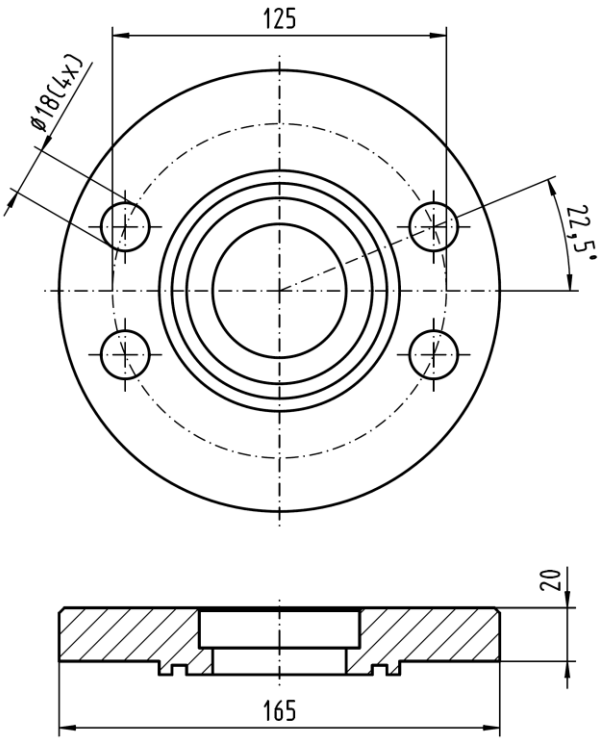


13.2.2.1 Dimensions mpv with extended ambient temperature

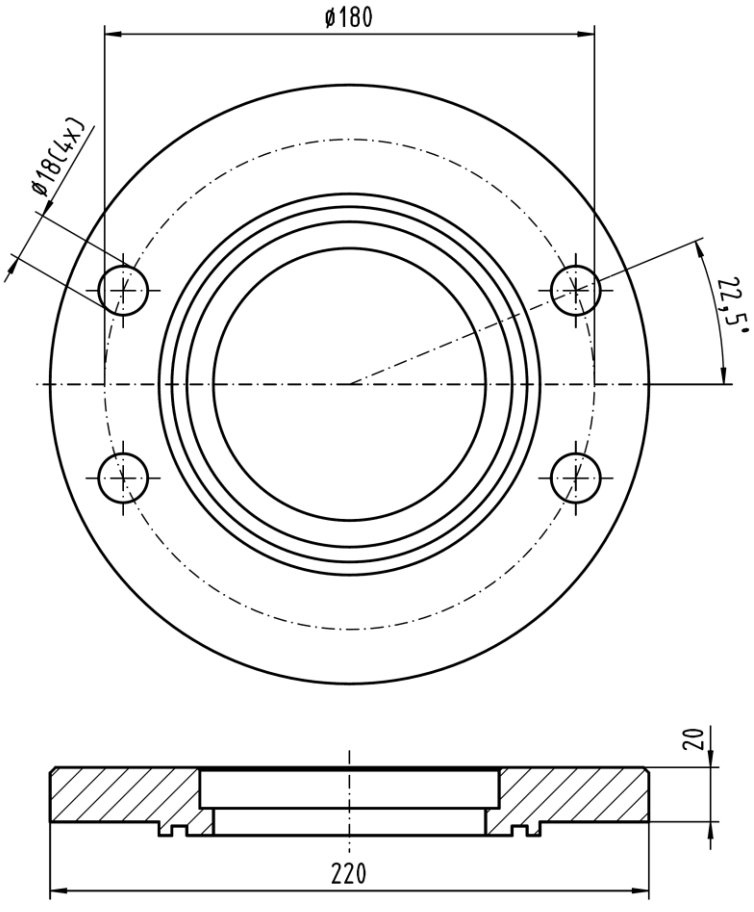




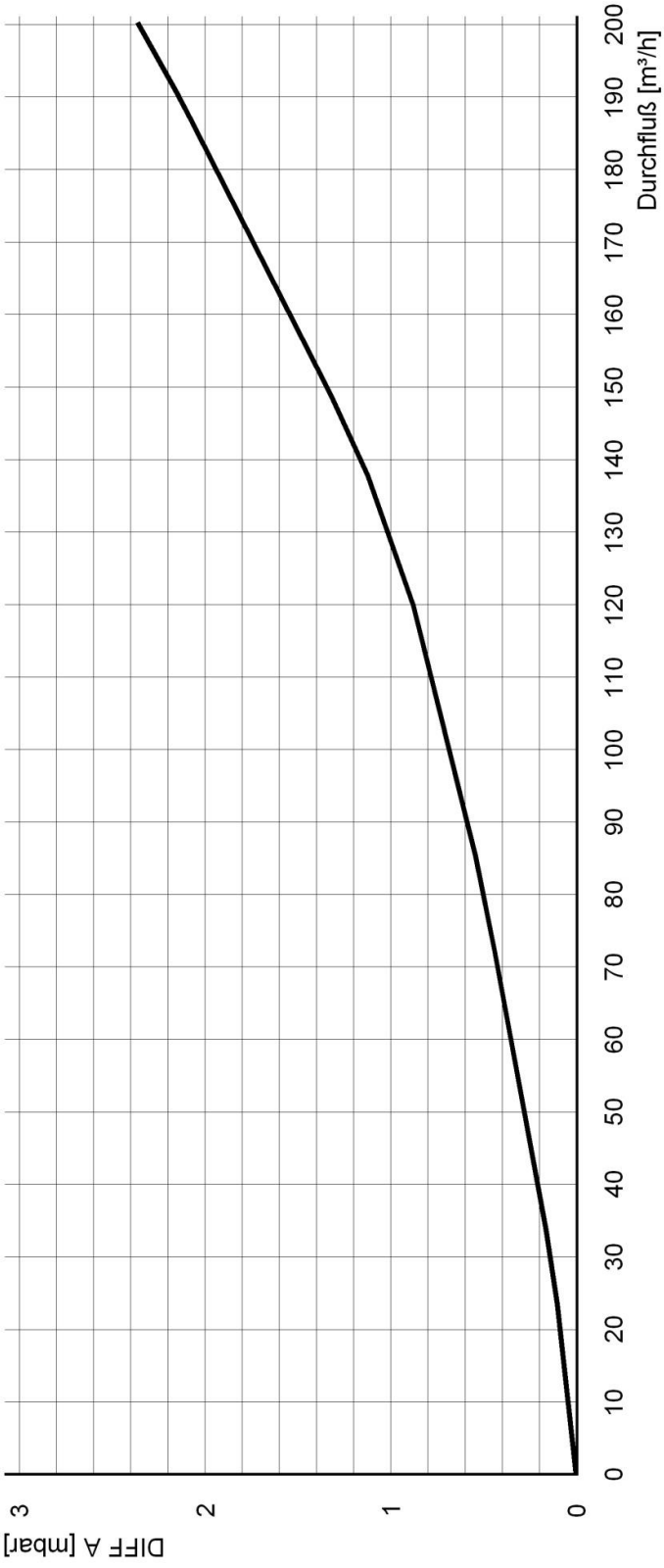
13.2.2.2 Flange dimensions mpv2



13.2.2.3 Flange dimensions mpv3

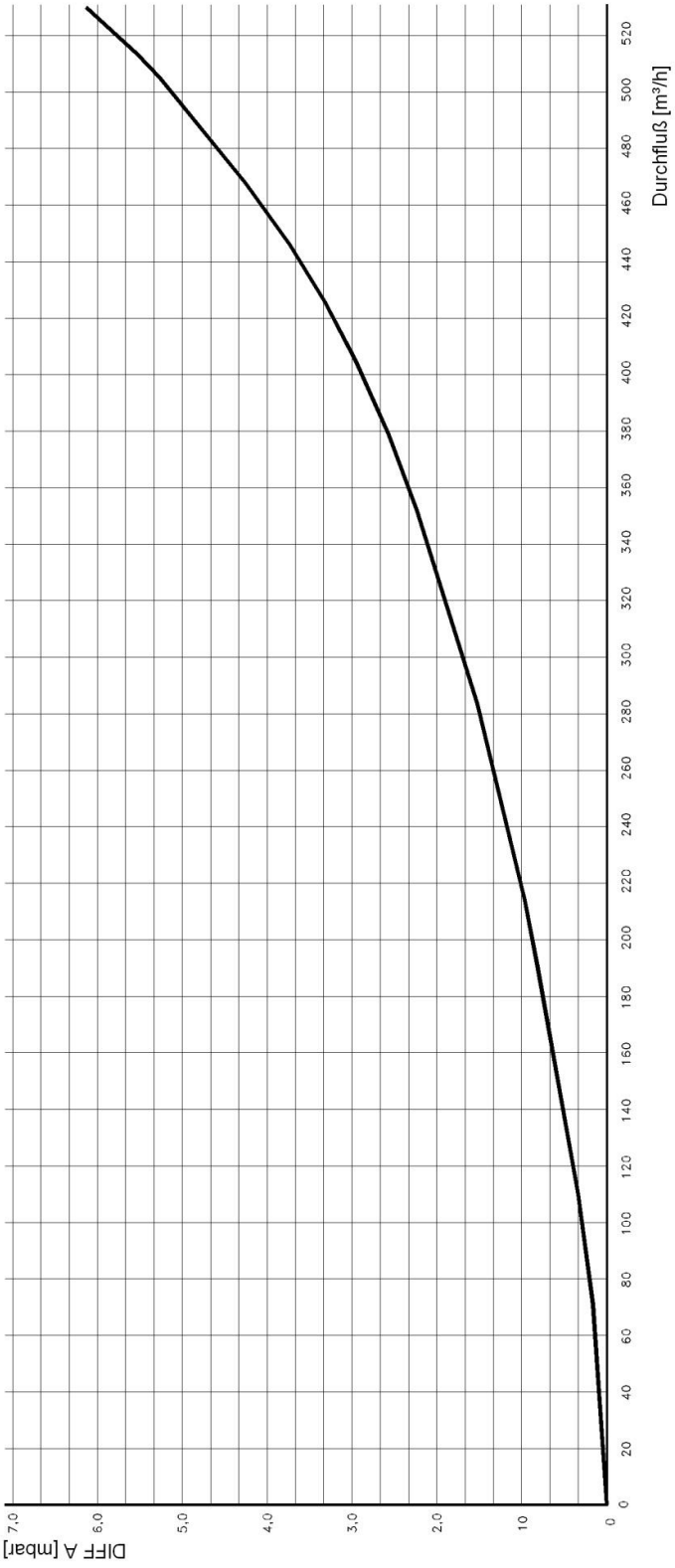


13.3 Diagram of purge air curve mpv 2



The purge air curve does not take any leakage losses into account!

13.4 Diagram of purge air curve mpv 3



The purge air curve does not take any leakage losses into account!

14 EU Declaration of Conformity

14.1 EU Declaration of Conformity APEX^{mpc}

EU Konformitätserklärung
EU Declaration of Conformity
Déclaration UE de conformité
№ 01-37A2-7C0003_A

BARTEC

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

Typ 07-37A2-*1*1/*M5* APEX^{py} und 07-37A2-*2*1/*M5* APEX^{px}
Type 07-37A2-*1*1/*M5* APEX^{py} and 07-37A2-*2*1/*M5* APEX^{px}

Variante / *Variant* : **Motor Purge Controller - mpc**

auf das sich diese Erklärung bezieht den Anforderungen der folgenden **Richtlinien (RL)** entspricht	to which this declaration relates is in accordance with the provision of the following **directives (D)**	se référant à cette attestation correspond aux dispositions des **directives (D)** suivantes
ATEX-Richtlinie 2014/34/EU	**ATEX-Directive 2014/34/EU**	**Directive ATEX 2014/34/UE**
EMV-Richtlinie 2014/30/EU	**EMC-Directive 2014/30/EU**	**Directive CEM 2014/30/UE**
RoHS-Richtlinie 2011/65/EU	**RoHS-Directive 2011/65/EU**	**Directive RoHS 2011/65/UE**
WEEE-Richtlinie 2012/19/EU	**WEEE-Directive 2012/19/EU**	**Directive WEEE 2012/19/UE**
und mit folgenden Normen oder normativen Dokumenten übereinstimmt	and is in conformity with the following standards or other normative documents	et est conforme aux normes ou documents 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-Baumusterprüfung / Benannte Stelle	Procedure of EU-Type Examination / Notified Body	Procédure d'examen UE de type / 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

FB-0170e

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14.2 EU Declaration of Conformity SILAS^{mpc}

EU Konformitätserklärung
EU Declaration of Conformity
Déclaration UE de conformité

№ A1-37S2-7C0002_A

BARTEC

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

Typ A7-37S2-*1*1/*M5* SILAS^{pz}
Type A7-37S2-*1*1/*M5* SILAS^{pz}

Variante / *Variant* : Motor Purge Controller - mpc

auf das sich diese Erklärung bezieht den Anforderungen der folgenden **Richtlinien (RL)** entspricht	to which this declaration relates is in accordance with the provision of the following **directives (D)**	se référant à cette attestation correspond aux dispositions des **directives (D)** suivantes
ATEX-Richtlinie 2014/34/EU	**ATEX-Directive 2014/34/EU**	**Directive ATEX 2014/34/UE**
EMV-Richtlinie 2014/30/EU	**EMC-Directive 2014/30/EU**	**Directive CEM 2014/30/UE**
RoHS-Richtlinie 2011/65/EU	**RoHS-Directive 2011/65/EU**	**Directive RoHS 2011/65/UE**
WEEE-Richtlinie 2012/19/EU	**WEEE-Directive 2012/19/EU**	**Directive WEEE 2012/19/UE**
und mit folgenden Normen oder normativen Dokumenten übereinstimmt	and is in conformity with the following standards or other normative documents	et est conforme aux normes ou documents 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 60529:1991+A1:2000+A2:2013
EN 61000-6-4:2007 +A1:2011
EN 61000-3-2:2014
EN 61000-3-3:2013
EN 61326-1:2013

Verfahren der internen Fertigungskontrolle	Procedure of internal control of production	Procédure de contrôle interne de fabrication
	BVS 19 ATEX E 016 X **0158, DEKRA Testing and Certification GmbH, 44809 Bochum**	

CE

Bad Mergentheim, 18.06.2021

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Certification Manager

FB-0172e

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15 Notes

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