PROCESS AUTOMATION

5000Q SERIES

CONTROL SYSTEM FOR THE ZONE 2 PRESSURIZING SYSTEM

PEPPERL+FUCHS

Table of contents

Preface

We are pleased that you have chosen a quality product from Pepperl+Fuchs.
These operating instructions will help you to meet the safety and protection requirements for systems with explosion protection in equipment Group II, Zones 2 and 22 when installing, commissioning, and using the 5000Q controller and its components.
This important safety and hazard information will help you to use the 5000Q controller safely and correctly.

We reserve the right to make technical changes. Failure to follow these installation instructions and use the device for what it is intended may impair the safety of the product.

Publisher with responsibility for content:
Pepperl+Fuchs
1600 Enterprise Pkwy
Twinsburg, Ohio 44087

1. General information

Safety note and symbols used

It is strongly urged that you follow all instructions and recommendations in this manual, in addition to all applicable codes, standards, and local requirements. Failure to do so voids all warranties, both implicit and explicit, and relieves the manufacturer of all liability.

 Attention	This symbol calls your attention to instructions or requirements that must be followed. Failure to observe the instructions and information that this symbol calls attention to may result in the failure of the device and any devices or systems connected to it.
 Note	This symbol draws your attention to important information.
 Warning	This symbol warns the user of potential danger. Failure to observe this warning may lead to personal injury or death and/or property damage.
	This symbol accompanies a list of tools you will need to install the unit.

Directive 2014/34/EU regulates explosion protection for technical equipment and protective systems.
It is restricted to the manufacture and placing on the market of safe products for use in hazardous areas.

Directive 1999/92/EC is aimed at operators of installations in hazardous areas and regulates the safety of persons involved in installation, operation, and maintenance.

In addition, the rules and regulations relating to electrical installation and accident prevention at the place of use must be followed.

2. Information on these operating instructions

Knowledge of the basic safety regulations and additional training and experience in the area of explosion protection are essential for the safe handling and failure-free operation of this 5000Q controller.

These operating instructions contain important data and information to ensure the safe use of the 5000Q pressurizing system in hazardous areas and to meet the requirements of Directive 94/9/EC.

These operating instructions, particularly the safety information, must be followed by all personnel who work on the unit.

3. Responsibility of the operator and/or installer

The operator and/or installer undertake to ensure that only specialist, trained personnel work on the 5000Q pressurizing system and that they

- are familiar with the occupational safety and accident prevention regulations and have been briefed regarding handling of the unit.
- have the additional knowledge of explosion protection that is required for work on explosion protected components.
- are familiar with the relevant rules and regulations for the installation, operation and maintenance of explosion-protected systems.
- have read the safety section and warnings in these operating instructions.

The operator and/or installer must also ensure that

- The 2 wire RTDs for temperature sensors are suitable for the area classification, Zone 2 or Zone 22, or both if applicable. Maximum length is 3 m.
- The bypass switch is suitable for the area classification, Zone 2 or 22, or both if applicable.

4. General information on the ignition protection class - pressurizing system

Pressurizing systems are one of the most versatile ignition protection classes. They are based on the principle that in Zone 2 (gas) the gas mixture in the ambient atmosphere, which may ignite under certain circumstances, is removed from the housing by an initial purge process. After the purge phase, sufficient compressed air is supplied to compensate for leaks in the housing and any installed equipment. This permanent overpressure, achieved using compressed air, prevents any potentially explosive atmosphere in the ambient air from entering the housing.

During the purge phase (Zone 2), an internal pressure of approx. 10-12 mbar is achieved; during operation this internal pressure reaches 2.0-3 mbar.
Any hotspots that may occur on individual components within the control cabinet are monitored by temperature sensors (optional) and switched off safely if necessary. This ensures that no unacceptably high surface temperatures can reach the exterior.

For applications in Zone 22 (dust) the purge process is omitted because purging would raise explosive dust. Instead of pre-purging, the interior of the housing is inspected for dust and cleaned manually if dust is present.

The pressurizing system is particularly suitable for installed equipment that is not approved for use in hazardous areas. It can then be used directly in the hazardous area.

5. Purge gas quality

Attention

In order to ensure failure-free operation of the pressurizing system, the purge gas quality must comply with Class 1 of the compressed air quality classes specified in DIN ISO 8573-1.

Purge gas quality is summarized in the table below.

Class	Particles		Water		Oil
	Particle size max. in µm	Particle density max. in mg/m³	Pressure dew point in °C	Water content in mg/m³	Residual oil content in mg/m³
1	0.1	0.1	-70	3	0.01
2	1	1	-40	120	0.1
3	5	5	-20	880	1
4	15	8	3	6000	5
5	40	10	7	7800	25
6			10	9400	

6. The 5000Q controller

The 5000Q controller is a control device in ignition protection class Ex pz in accordance with EN 60079-2. It is suitable for purge time and pressure monitoring in Ex Zones 2 and 22. It controls the volume of purge gas flowing into the explosion protected control cabinet and maintains and monitors an overpressure relative to the ambient air when purging is complete. The installed equipment is activated after the overpressure has been created. Any size control cabinet can be monitored because the 5000Q controller can be fitted with separate components.

The components available for Zone 2 (gas) are as follows:

6.1 5000Q controller
6.2 5000Q-DV digital valve with leakage valve

PEPPERL+FUCHS

6.3 5000Q-PRE pressure regulator with pressure gage

Pressure regulator with pressure gage

Pressure regulator for dust with pressure gage

6.4 EPV5000Q vent

6.5 Mounting set for installing the 5000Q in the explosion protection housing

For use in Zone 22, only a pressure regulator with needle valve is required. Dust deposits must be removed with a damp cloth.

Warning

Warning!
Purging must not be carried out in Zone 22 because purging will raise any dust deposits inside the housing and form an explosive mixture with oxygen.

In Zone 22, an EPV5000Q vent (Section 6.4) is required in addition to the pressure regulator. It is used to relieve the pressure in the control cabinet if the pressure becomes too high. Purge program 5 is intended specifically for Zone 22 (see Section 15.1).

7. Installing the controller

7.1 Installation on the exterior of the control cabinet

The 5000Q controller is easily installed on the exterior of the control cabinet. Drill four thru holes, 6.2 mm in diameter, to fix the housing in place (see Section 7.4 for hole pattern). Drill a 13 mm diameter hole for internal pressure measurement. Push the M12 x 1.5 cord grip on the rear of the 5000Q controller through this hole. The measuring hose protrudes from the cord grip. A seal bonded to the rear of the controller ensures that there are no leaks between the controller and the housing to be purged. Fix the housing to the control cabinet using the 6.2 mm holes and standard DIN screws and nuts.

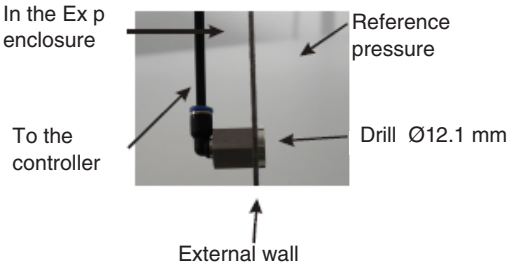
Attention

Do not collapse the measuring hose where it passes through the cord grip.

7.2 Installation inside the control cabinet

The controller is set up at the factory for mounting outside the enclosure. The controller can also be installed in the pressurized housing. The mounting set is used for this. See page 8 (top).
The end of the hose at the cord grip is connected to the free end of the 4 mm diameter quick-release connector.
In order to achieve the necessary reference pressure relative to the ambient atmosphere, drill a 13.5 mm diameter hole through the outer shell of the Ex p housing. This hole will receive the blind plug on the mounting set. This blind plug has a 2 mm hole and is simply screwed through the hole in the Ex p housing into the angled connector included with the mounting set. The O-ring on the plug makes the system air-tight.
The 5000Q controller can then be mounted on the mounting plate. The stud bolts are included with the mounting set.

7.3 Picture of mounting set installation

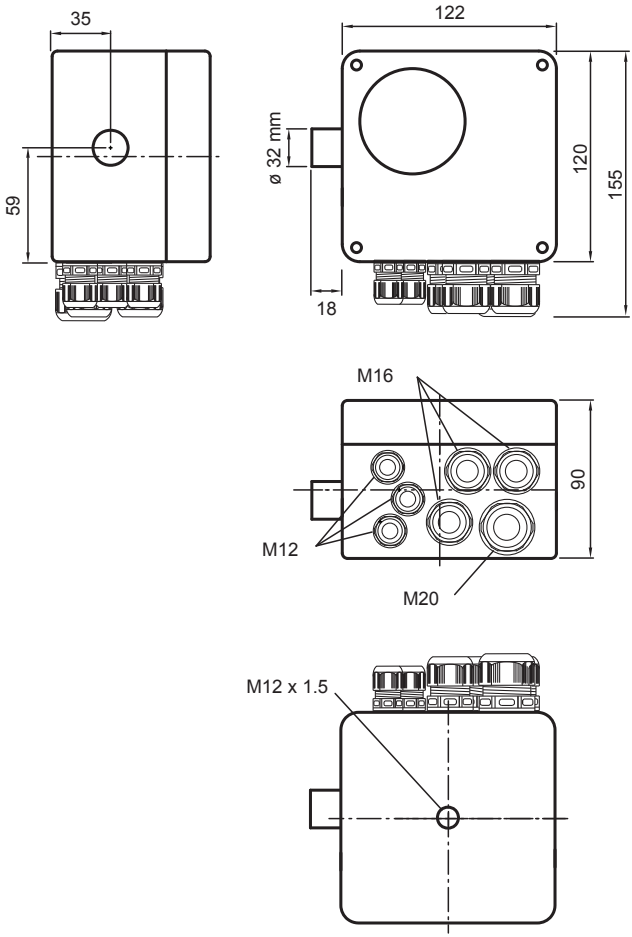


Fittings and tubing for internal mounting are included with the control unit.

The pressure switch on the control unit will have two ports. When mounting inside the enclosure, the tube will have to be removed from the high port side and placed on the low port side. For external mounting, nothing needs to be switched.

See Section 19.

7.4 Dimensions of the 5000Q controller



8. 5000Q-DV digital purge valve

A digital valve (open/closed) is available as a purge air valve. It is fitted with an adjustable needle valve as standard.
The performance data stated on the solenoid valve nameplate, such as nominal voltage, nominal current and operating pressure, must be compared with the data in the test report.

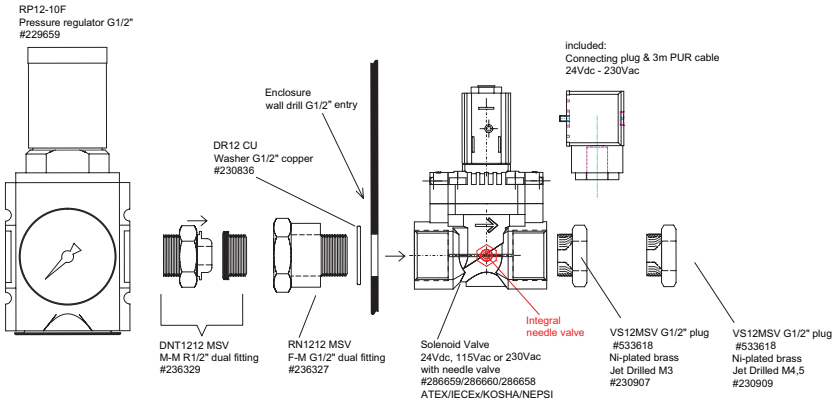
Note on installation

The valve has an internal thread on both sides.
The valve body of the digital valve is marked with an arrow. The arrow indicates the direction of purging. Install the digital valve on the inside or outside of the housing using the bulkhead connectors and brass washers. The arrow must always point towards the interior of the housing.

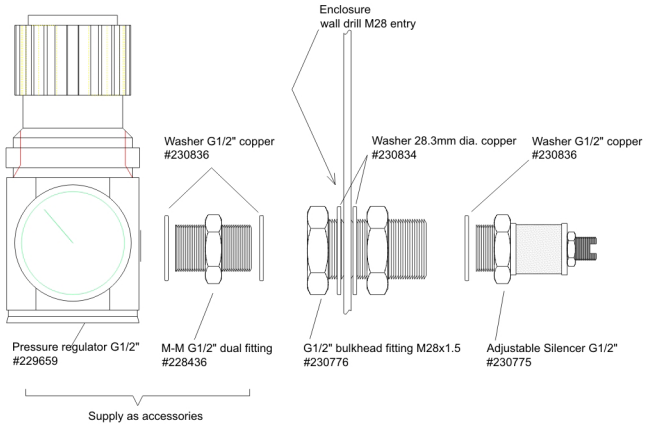
Warning!
During installation, ensure that no foreign bodies lie inside or can enter the valve.
The digital valve must be “EX” rated for mounting in a hazardous area.

8.1 Installing the pneumatic connections

For hazardous gas assembly



For hazardous dust assembly



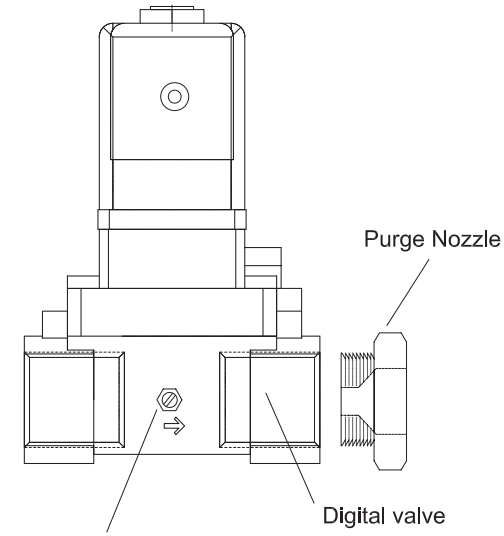
PEPPERL+FUCHS

8.2 Setting the air leakage rate and purge flow rate

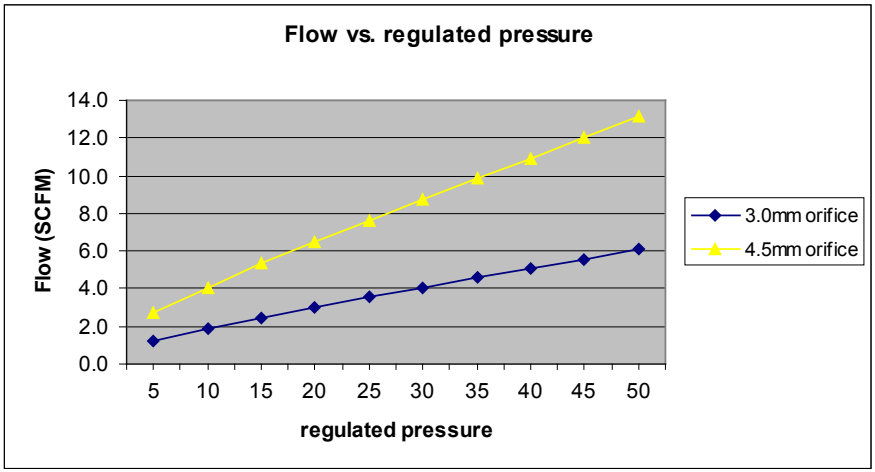
The air leakage volume can be set by using the integrated needle valve. This is done by using the purge air nozzle inside the purge valve.
Using a screwdriver with a maximum blade width of 2 mm, tighten the adjusting screw by turning it clockwise. Set the required air leakage volume by turning the adjusting screw counter-clockwise.
The table on page 14 shows the air leakage rate in relation to pressure and revolutions.
The air leakage rate pre-set at the factory is approx. 10 l/min at a primary pressure of 2 bar.
The pressure inside the housing after adjustment should be between 2.0 and 3.5 mbar.

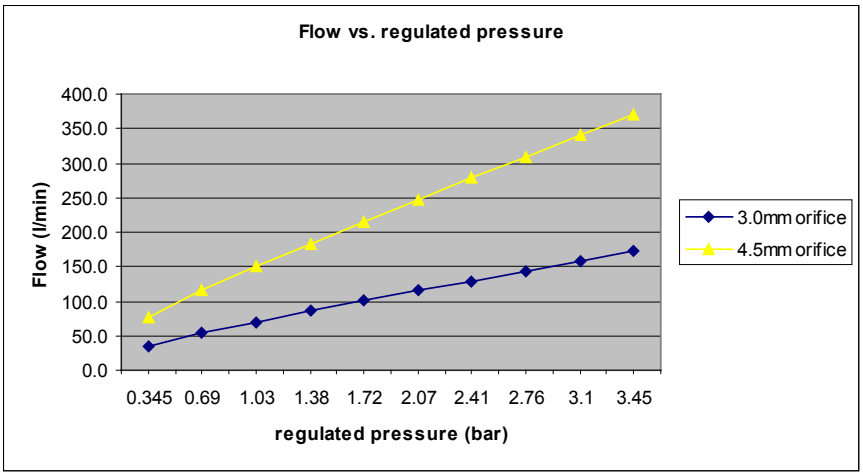
For purging, the 3.0 or 4.5 orifice allows a controlled flow rate according to regulated pressure for determining purging times. For flow rates vs regulated pressures for each orifice see the table on page 14.

Setting the air leakage rate:



Flow rate for purging – pressure vs flow for 3.0 mm and 4.5 mm orifices





9. 5000Q-PRE pressure regulator

The pressure regulator with pressure gage and automatic vent is screwed into the bulkhead connector for the purge air valve using the double nipple supplied. This double nipple can be sealed using glue or commercial Teflon tape. The double nipple is removable, allowing adjustment of the valve and pressure gage in relation to one another. The pressure regulator has a fixing nut with a width of 13 across the flats. After setting the pre-purge pressure to 2.5 bar, tighten this nut to prevent accidental adjustment.

Pressure regulator with pressure gage

Pressure regulator for dust with pressure gage

10. EPV-5000Q vent

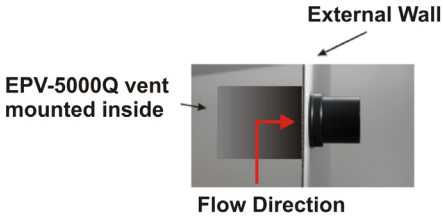
The EPV5000Q vent is made of plastic and has two holes with a M36 x 1.5 thread. The vent can be installed inside or outside the Ex p housing.
A 37 mm diameter hole is required to install the vent. The EPV-5000Q vent is equipped with a spark arrestor at the exhaust.

Attention

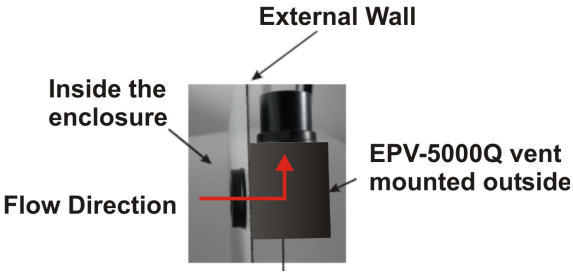
Pay attention to the mounting position. See the pictures in Sections 10.1 and 10.2. The control cabinet may be permanently damaged if the vent is mounted in the wrong position.

The vent is a mechanical component. If a pressure rises higher than 5 mbar inside the Ex p housing, the vent opens and the purge process starts. The purge pressure during the purge phase is approx. 10-12 mbar and can be set via pressure D3.
When the purge time ends, the internal pressure falls below 5 mbar and the vent closes automatically.
A second vent may be used in large housings. This increases the flow and reduces the purge time.
The vent is designed to be mounted inside the enclosure with the oulet showing on the outside. For outside mounting please contact factory for special mounting hardware.
All vents are equipped with a spark arrestor screen.

10.1 Picture of vent mounted inside the housing



10.2 Picture of vent mounted outside the [housing]



11. Transport and storage

Attention

During transport and storage, ensure that all components, e.g., 5000Q controller, digital valve, and pressure gage, are not subjected to any mechanical stress or dropped.

The following ambient temperatures should be maintained:

Storage/transport: -20 °C to +60 °C
Operation: -20 °C to +60 °C

12. Maintenance

The 5000Q controller and all its components are maintenance-free and self-monitoring. All work on the controller and/or its components must be carried out by a qualified staff member.

Note

Ignoring this instruction will render the approval and any warranty claims against Pepperl+Fuchs null and void. When working on the interior of the controller, the relevant provisions of the regulations and the ATEX guidelines must be followed.

13. Commissioning

The 5000Q controller must not be opened unless it has been established that the atmosphere is not potentially explosive or the system is not live.

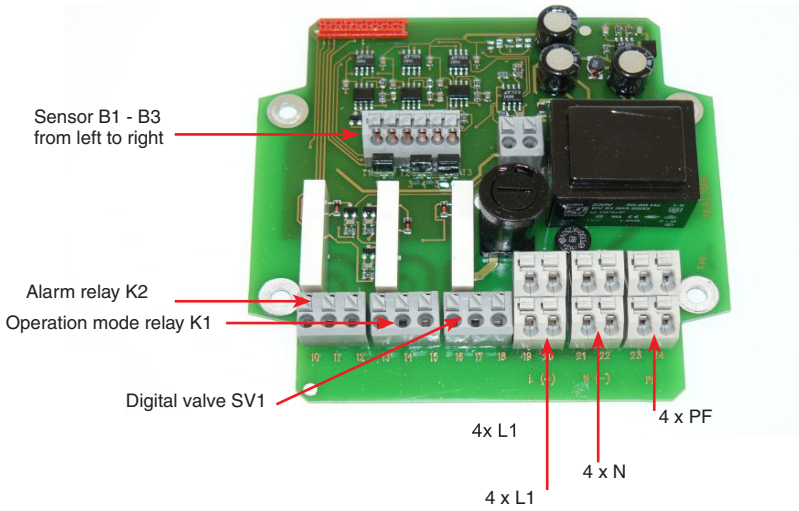
The 5000Q controller and its components must always be fully assembled before operation.

The control unit is password protected so that only competent persons can change the set parameters (see Section 15.13).

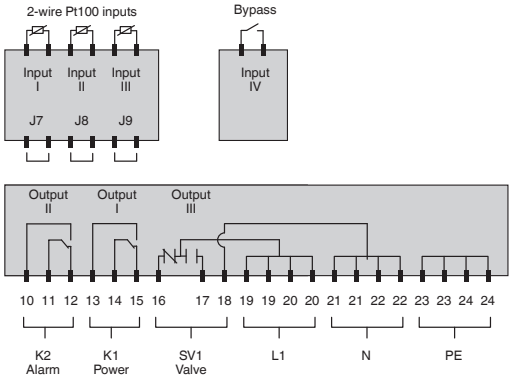
13.1. Electrical connections

The 5000Q controller has spring-type terminals with activation buttons. Press the activation button to connect or release the terminal connection. Terminal connections are provided for the mains power supply, the purge valve, and three temperature sensors. Changeover contacts are also provided for the floating alarm relay and the enable relay.

13.2 Terminal assignment



13.3. Terminal description



See technical data for allowable wire size.

Four terminals each are provided for the input supply voltage. They consist of a block and are marked on the controller board as follows:

- *L1 (+) phase for AC 115 V or AC 230 V or plus for DC 24 V*
- *N (-) zero for AC 115 V or AC 230 V or minus for DC 24 V*
- *PE for AC 115 V or AC 230 V or for DC 24 V*

Terminal block 16 - 18 is used to connect the digital valve. This terminal block is designed as a two-way switch and is assigned as marked on the controller board:

- *16 = NC contact*
- *17 = NO contact*
- *18 = shared contact*

Both terminal blocks K1 (terminals 13, 14, 15) and K2 (terminals 10, 11,12) are floating relay contacts and also have changeover contacts. Terminal block K1 is the enable relay and is used to enable the voltage on completion of purging.
Terminal block K2 is the alarm relay. It is freely programmable and can be used to display a variety of states (see Section 15.2). The terminal markings on both relays are as follows:

- *10 and 13 = NO contact*
- *11 and 14 = shared contact*
- *12 and 15 = NC contact*

The following must be done for power and contact connections:

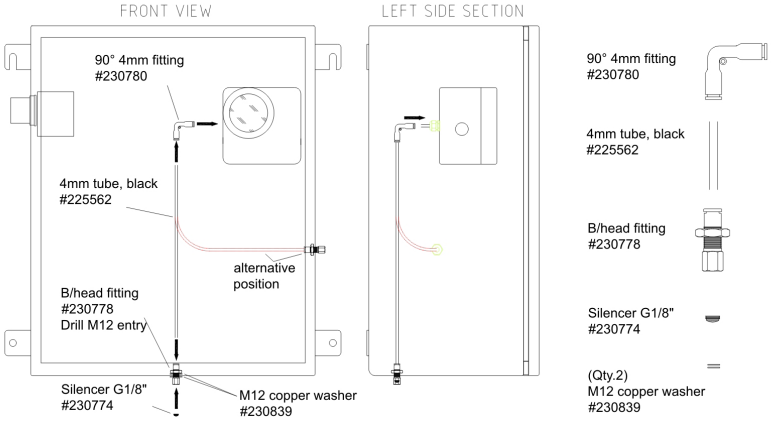
1. A switch or circuit breaker must be included in the installation
2. It must be suitably located and easily reached by the operator
3. It must be marked as the disconnecting device for the equipment

Attention

Wiring should be properly rated for the voltage and temperatures it will be exposed to. With wire insulation temperature above ambient conditions of 50 °C, the terminal area will exceed 60 °C.

14. Installing the 5000Q—alternative mounting options

NOTE: When using the internal adaptor kit, the differential pressure monitoring tube connection in the controller must be changed over to the other port of the pressure gauge - located under the upper circuit board.



15. Setting the 5000Q controller

The 5000Q controller has four pushbuttons and five LEDs. Refer to section 6.1.

1. If button S1 is activated for longer than 2 seconds, the 5000Q controller changes to the programming level. The settings are displayed in the sequence described below. The programming mode can also be accessed during operation by pressing the “set, +, -, -, +, set” buttons one after the other within 1-2 seconds. For safety reasons, the system does not operate in programming mode.
2. Buttons S1 to S3 are used to make settings and for programming.
3. Buttons S3 “+” and S2 “-” are used to change the settings on the display. Push button S1 “SET” is used to save the values set.
4. Push button S4 is the reset button. It can be used to reset the controller, which means that all saved parameters are retained.

The following settings are pre-programmed:

Display		Setting
FLUSHPRO	Purge program	3*
FLUSHTIM	Purge time setting	FT 00:30*
VALUE P1	Shutdown pressure	P1 01.0*
VALUE P2	Signal pressure	P2 02.0*
VALUE P3	Pre-purge pressure	P3 10.0*
VALUE P4	Maximum pressure	P4 20.0*
HYST	Leakage hysteresis	0.5*
PROGR K2	Programming K2	C1
DELAY	Shutdown time K1	DY 05*
NUMBERPT	Number of PTs used	0*
T-FV-PT1..3	Threshold value 1 PT1 …PT3	TMP 35*
T-K2-PT1..3	Threshold value 2 PT1 …PT3	TMP 45*
T-C1-PT1..3	Threshold value 3 PT1 …PT3	TMP 50*
Bypass	Bridging	BP No*
PASSWORD	Change password	PWD:0000

15.1 Setting the purge programs

The 5000Q controller has 5 purge programs that can be selected according to the application.

FLUSHPRO
The FLUSHPRO setting is used to select the program required. The following programs are available:

1
Purge time:
The purge valve is activated immediately. Relay K1 is activated at the end of the purge time. If the value of P4 (max) is exceeded during purging, the purge time continues.
Operating phase:
If the internal pressure during the operating phase falls below the value of P1, **K1 does not cut out**. The system remains operational.

2
Purge time:
The purge valve is not activated until the value of P1 is reached. Relay K1 is activated at the end of the purge time. If the value of P4 (max) is exceeded during purging, the purge time continues. The display shows Max.
Operating phase:
If the internal pressure during the operating phase falls below the value of P1, **K1 does not cut out**. The system remains operational.

3

Purge time:

The purge valve is not activated until the value of P1 is reached. Relay K1 is activated at the end of the purge time. If the value of P4 (max) is exceeded during purging, the purge time continues. The display shows Max.

Operating phase:

If the internal pressure during the operating phase falls below the value of P1,**K1 cuts out when the timer ends (cutout delay).** The system does not remain operational.

4

Purge time:

The purge valve is not activated until the value of P1 is reached. Relay K1 is activated at the end of the purge time. If the value of P4 (max) is exceeded during purging, the purge time **does not** continue.

Operating phase:

If the internal pressure during the operating phase falls below the value of P1, **K1 does not cut out**. The system remains operational.

5

This program is specially designed for use in Zone 22.

Purge phase:

Warning!

Do not pre-purge!

The Ex p cabinet must be wet cleaned in case dust deposits are present.

Operating phase:

After the cabinet has been cleaned and the doors locked, an internal pressure of approx. 2.5-3 mbar is maintained and monitored. A purge valve is not necessary in this application.

15.2 Purge time

FLUSHTIM

The purge time calculated as shown in Section 17 can be entered here (except program 5). When the set pre-purge pressure P3 is reached, the set purge time runs automatically. The purge time is displayed and counts down. Press button S3 “+” to display the internal pressure during the purge phase. Press button S2 “-” to display the purge time again.

15.3 Shutdown pressure P1

VALUE P1
In accordance with the standard, the default minimum shutdown pressure is 0.25 mbar (Zone 2). The pressure can only be adjusted upwards and for use in Zone 22 it must be set to a pressure of at least 0.5 mbar.

If the pressure falls below the set pressure P1 and the purge valve cannot compensate for the loss of pressure, the system switches to voltage-free via relay K1 when the programmable bridging delay ends, depending on the program.
Pressure P1 acts as a threshold value for activating the 5000Q-DV purge valve (depending on the program).

15.4 Signal pressure P2

VALUE P2
This parameter is used to set the internal pressure at which a floating contact on relay K2 is activated. This can be used, for example, for early detection of a pressure loss in the control cabinet.
If the pressure falls below this pressure value, the 5000Q-DV purge valve is briefly activated in order to compensate for the pressure loss. To prevent this brief activation, increase pressure value P2 or set the leakage compensation at the needle valve.

15.5 Pre-purge pressure P3

VALUE P3
The purge time starts automatically when the pressure value of P3 is reached. The purge time is displayed and counts down. In order to monitor the actual internal pressure, press button S3 “+” to see the current internal pressure. In programs 1-4 the minimum input for P3 is restricted to 0.3 mbar and in program P5 it is restricted to 0.6 mbar. These values comply with the standard for gas and dust.
Press button S2 “-” to display the current purge time again.

15.6 Maximum internal pressure P4

VALUE P4
When the threshold value for P4 is reached, the display shows ‘Max’. The purge process continues until the timer setting ends. The QOC shuts down if the pressure does not fall below the Max value during this set time. If the pressure falls below the Max value, the purge time continues.

15.7 Leakage hysteresis HYST

The 5000Q controller automatically compensates for leakage losses that may occur, for example, if the seal on the pressurized housing is old. Leakage compensation is activated if the pressure falls below the set pressure P2.
The leakage behavior of the purge valve can be changed by setting the hysteresis value i.e., the valve purges to the set hysteresis value plus the set internal pressure value P2. This means that P2 = 2 mbar + HYST 1.5 = leakage compensation up to an internal pressure of 3.5 mbar when 3.5 mbar is reached. Leakage compensation is turned off until pressure drops below P2 = 2 mbar.

15.8 Programming K2

PROG K2
Relay K2 has a floating changeover contact that can be programmed to be used for a variety of switching functions.

The following settings are possible:

K1	Switches simultaneously with K1
P1+	Switches on when pressure exceeds P1
P1-	Switches off when pressure falls below P1
P2+	Switches on when pressure exceeds P2
P2-	Switches off when pressure falls below P2
P3+	Switches on when pressure exceeds P3
P4+	Switches on when pressure exceeds P4
P4-	Switches off when pressure falls below P4
FT+	Switches on when purge time ends
Temp AL	Switches on when a sensor temperature is exceeded
Bypass	Switches on when the bypass function is activated
Internal failure	Switches off when an internal malfunction occurs

15.9 Shutdown time C1

DELAY
When the enclosure pressure falls below the value of P1, relay C1 switches off enable status (depending on the program). The timer can be used to extend or reduce this shutdown time
The standard setting is 5 seconds. The timer can be set to 0-60 seconds.

Warning!
The operator decides to extend the shutdown time at his own risk.

15.10 Number of temperature sensors used

NUMBERPT
The 5000Q controller allows up to (3) PT100RTD 2-wire sensors to be connected to the control unit for monitoring temperatures within the enclosure. Each sensor can be located up to three meters from the control input. This allows optimum monitoring of temperatures inside the control cabinet.
Three temperature sensors may be used. They can be arranged in the control cabinet to provide optimum measurement of the internal temperature detecting excessive heat or cold. When locating the sensors, ensure that a sensor is located at the hotspots inside the cabinet, e.g., immediately above a frequency converter or in the upper area of the control cabinet. The available bridges must be used to activate the individual sensors. Breakage detection is activated by closing the contacts.
Sensors in use are bridged, sensors not in use are open.

Warning!
The temperature sensors must be suitable for use in Zone 2 or 22, and it is the responsibility of the user to ensure proper installation.

15.11 Temperature sensor PT1-PT3

T-FV-PT1 . . . . T-FV-PT3
The temperature sensors are connected to the 5000Q-DV purge valve. For example, if the temperature on one of the sensors reaches the set value, e.g., 35 °C, the purge valve is activated and supplies the control cabinet with cool compressed air which can escape via the vent (not in program 5). During this procedure, the internal pressure can increase to the value of P4.
The heated air can escape and the temperature sensor switches off automatically when the temperature falls to 3 °C below the set temperature; in the example, this would be at a temperature of 32°.
T-K2-PT1 . . . . T-K2-PT3
If the compressed air supply cannot reduce the temperature and the temperature inside the control cabinet continues to rise, threshold value 2 reacts and activates an alarm via relay K2, if, for example, the temperature at the sensor reaches 45 °C.
The operator can then respond and check the source of the excessive heating.
The alarm switches off when the temperature falls to 3 °C below the threshold.

T-C1-PT1 . . . . T-C1-PT3
If the alarm was not heard, the sensor takes on the function of shutting down the system at the set threshold value, e.g., 50 °C. The system is permanently disabled and will not be activated automatically when it cools down. The message OVER TMP flashes on the display.

The system cannot be reset until it has cooled down completely and the 5000Q controller has been opened!

The cause of the heating must be identified before the system is used again. The 5000Q controller can be reset when the temperature is 3 °C below the set value.
Press button S1 or button S4 to restart the purge process.

15.12 Bridging BYPASS

BYPASS
Electricity is not supplied to the equipment installed in an Ex p cabinet until the purge cycle has ended. In practice, it may be necessary to open the control cabinet before purging or during operation in order to configure new software or carry out servicing.
Two different bypass options are available. The menu option **BP YES** allows the bypass to be switched on and off via the controller, and menu option **EXTERN** provides the option of installing a key-operated switch.
on the control cabinet and activating the bypass from there. A two-core cable must be connected to the controller board in order to do this. A terminal block with two terminals is available for this connection.

Warning

Warning!
Before opening a live cabinet, permission must be obtained from an authorized person and the atmosphere must be safe from risk of explosion. The bypass switch must be suitable for use in Zone 2 or 22, and it is the responsibility of the user to ensure proper installation.
The bypass can be implemented before purging and should only be implemented when the surrounding area and inside the enclosure is safe.

The BYPASS function is activated by pressing the following buttons:

Hold down button S1 for more than two seconds. The display shows
FLUSHPRO

Press button S2 “-” – the display changes to
BYPASS

Press button S1 to display the bypass setting
BP NO*

Press the plus button to display
BP YES
or
EXTERN

To save the setting, press button S1; the display shows
BP YES*
Press button S1 again to change the display to
BYPASS

Now press button S1 for approx. 2 seconds; the display shows
ATWORK

Release S1 to display
BYPASS

LED H2 and LED H4 also light up.

15.13 Setting and entering the PASSWORD

PASSWORD
A password must be entered and confirmed before changes can be made on the program. The factory setting for the password is 0000. This can be retained or changed. Use the “+” and “-” buttons to enter the password; use the “SET” button to change the digits. After you have entered the final digit, press the “SET” button to confirm the password.
At this programming level, you can enter a new password in the “Password” option. The password always consists of four digits. After you have entered the final digit, press the “SET” button to save the new password.

16. Purge program cycle and operating phase

After you have changed the parameters, press button S1 to exit the programming level. The display briefly shows the message **ATWORK!**, followed by the message MIN. The selected program will now run if the Ex p cabinet is charged with compressed air.

Warning!
Before commissioning, check that all the door locks and all screw connections are closed correctly.

If the pressure exceeds the set pressure P3 the display changes from MIN to purge time FT, which now begins to run. Press button S3 to read the actual internal pressure; the current internal pressure is displayed. Press button S2 to change the display back to the purge time.

17. Pre-purge time

Commissioning can start after the EPV5000Q vent, a 5000Q-DV purge valve, a PRE pressure regulator and the 5000Q controller have been installed. To do this, the power supply to the controller and purge air supply to the pressure regulator are activated. The primary pressure at the pressure regulator is read via the pressure gage and set to 2 bar. The housing is then automatically purged.
Before this happens, the control cabinet must be locked correctly and all the cord grips must be tightened in order to prevent inadmissible losses.

The appropriate purge time for the housing is calculated using the formula below for 5 volume changes:
For the 3.0 mm orifice at 2 bar**:**

$$t_{sp} = \text{rounded up}\left(\frac{V}{21}\right) \qquad (t_{sp} \text{ in display} = FT)$$

For the 4.5 mm orifice at 2 bar**:**

$$t_{sp} = \text{rounded up}\left(\frac{V}{44}\right) \qquad (t_{sp} \text{ in display} = FT)$$

t_{sp} = purge time [min]
V = housing volume [l]

Purging then corresponds to five times the air exchange in the housing, as required by the standard. The calculated purge time is always rounded up.

17.1 Example of purge time calculation

Example calculation:

For a housing with external dimensions

width = 60 cm, height = 60 cm, depth = 30 cm

60 cm x 60 cm x 30 cm = 108,000 cm³

1000 cm³ corresponds to a volume of 1 liter. This gives a free volume of **108** liters.
Using the calculation formula shown above, we get a purge time of:
For the 3.0 mm orifice at 2 bar**:**

$$t_{sp} = \frac{108}{21} = 5.2 \text{ min}$$

When rounded up, this gives a purge time of exactly **6 minutes**.
The purge time is set and saved as described in Section 19.2.

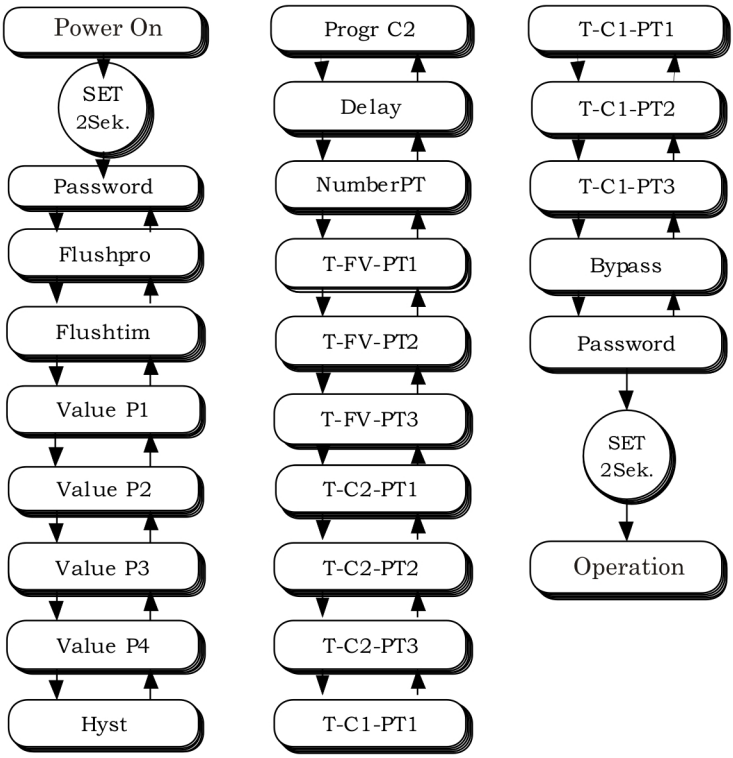
18. Parameter settings

The parameters set should be entered in this report and attached to the documentation for the control cabinet.

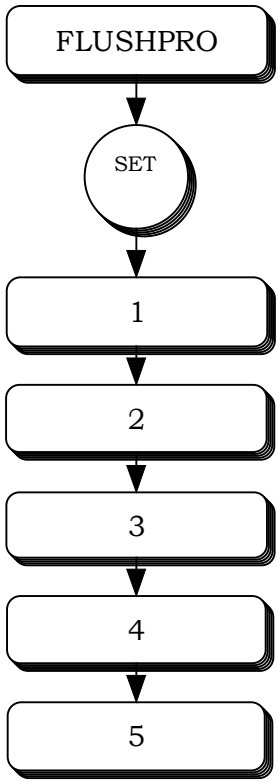
18.1 Report for 5000Q controller

Display		Setting
FLUSHPRO	Purge program	
FLUSHTIM	Purge time setting	
VALUE P1	Shutdown value	
VALUE P2	Signal pressure	
VALUE P3	Pre-purge pressure	
VALUE P4	Maximum pressure	
HYST	Hysteresis	
PROGR K2	Programming K2	
DELAY	Shutdown time C1	
NUMBERPT	Number of PTs used	
T-FV-PT1	Valve cooling, sensor PT1	
T-FV-PT2	Valve cooling, sensor PT2	
T-FV-PT3	Valve cooling, sensor PT3	
T-K2-PT1	Alarm PT1	
T-K2-PT2	Alarm PT2	
T-K2-PT3	Alarm PT3	
T-C1-PT1	Shutdown PT1	
T-C1-PT2	Shutdown PT2	
T-C1-PT3	Shutdown PT3	
BYPASS	Bridging K1	
PASSWORD	Password setting	

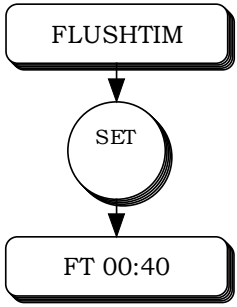
19. Flow diagram - programming



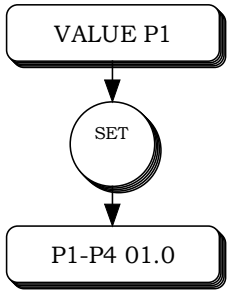
19.1. Flow diagram – programming options



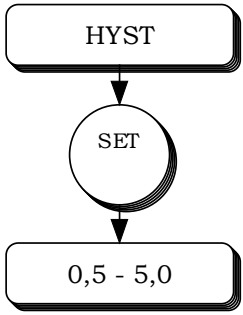
19.2. Flow diagram – purge time



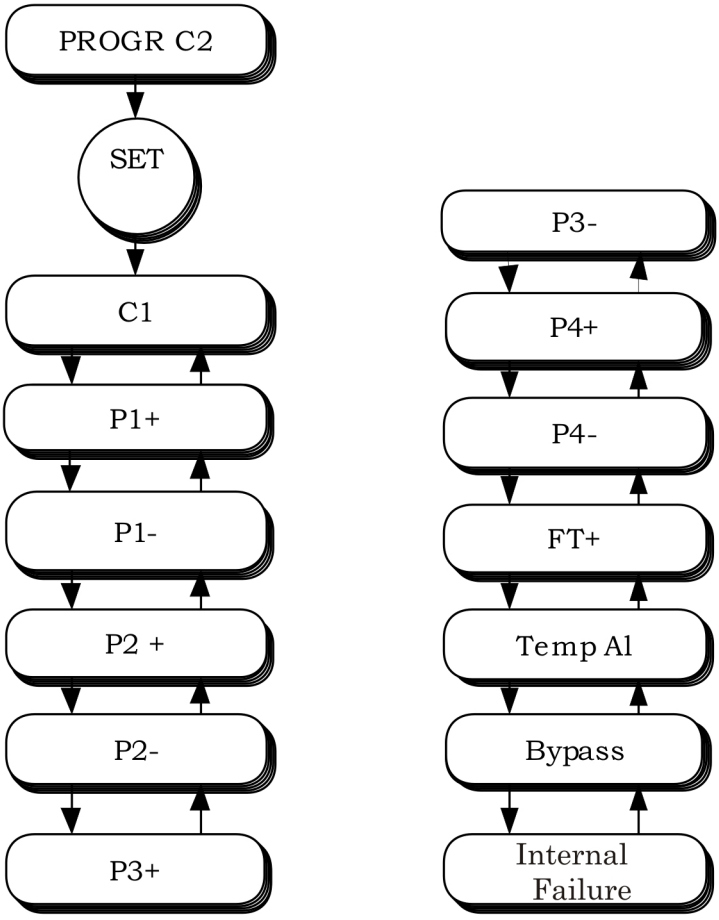
19.3. Flow diagram - pressure P1-P4



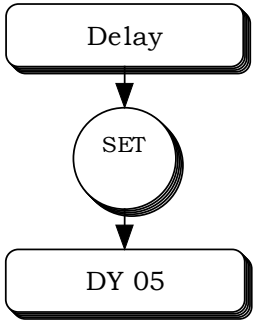
19.4. Flow diagram - hysteresis



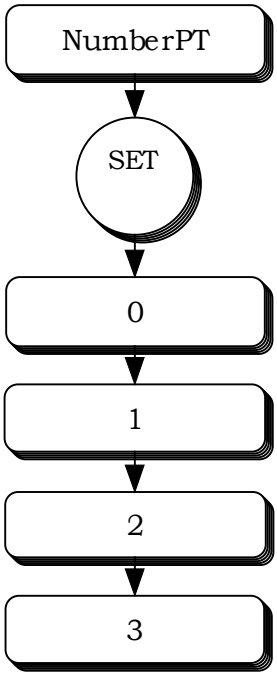
19.5. Flow diagram
Programmable relay C2



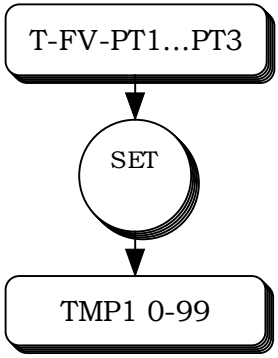
19.6. Flow diagram
Shutdown time C1



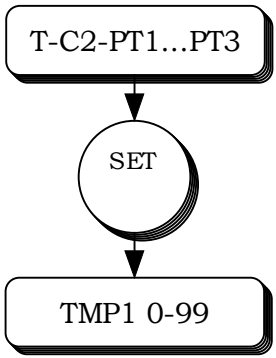
19.7. Flow diagram
Number of temperature sensors used



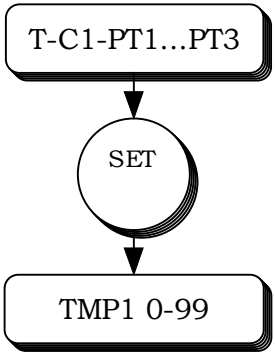
19.8. Flow diagram
Temperature sensor, cooling



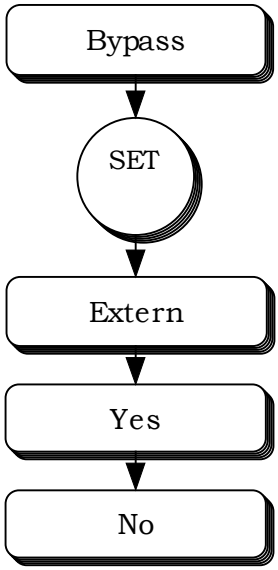
19.9. Flow diagram
Temperature sensor, alarm



19.10. Flow diagram
Temperature sensor, overtemp. shutdown



19.11. Flow diagram - Bypass



19.11. General information about programming

To access the programming menu, press button S1 “SET” for longer than 2 seconds. The display then changes to the flow diagram described in Section 17. The individual setting parameters can then be selected using S2 “-” (minus) and S3 “+” (plus). Press the S1 SET button again to access the individual sub-menus. Use S2 “-” and S3 “+” to select or set parameters according to the individual flow diagrams. At the end of each individual menu option, press button S1 to exit this option and save the changes.
The settings that are programmed are indicated by an asterisk *****.
To exit the programming menu, press button S1 “SET” for 2 seconds. The display shows

AT WORK

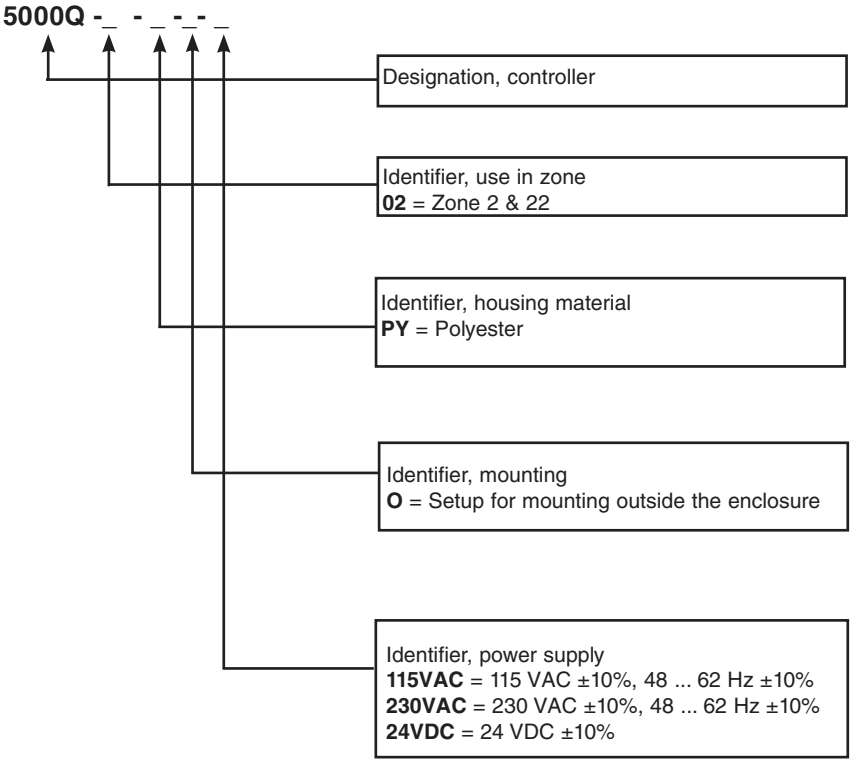
The current internal pressure then appears on the display.

Note

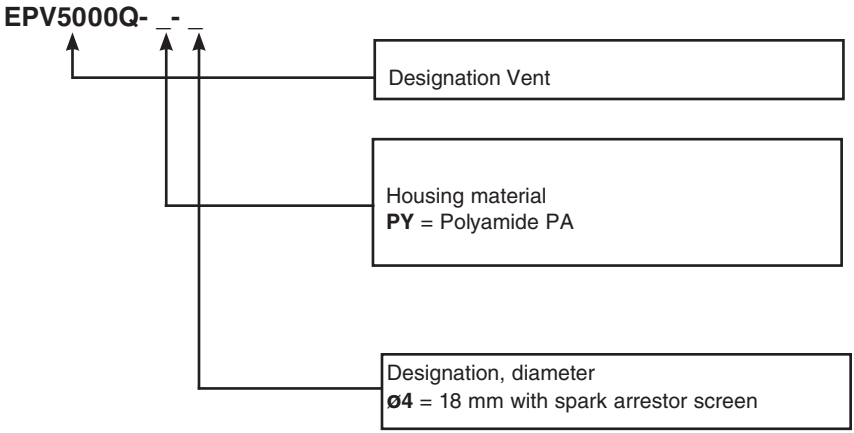
It is important to save all the changed settings that need to be retained by pressing button S1 and recording them in the 5000Q test report (Section 16.1)

20. Type codes for the individual components

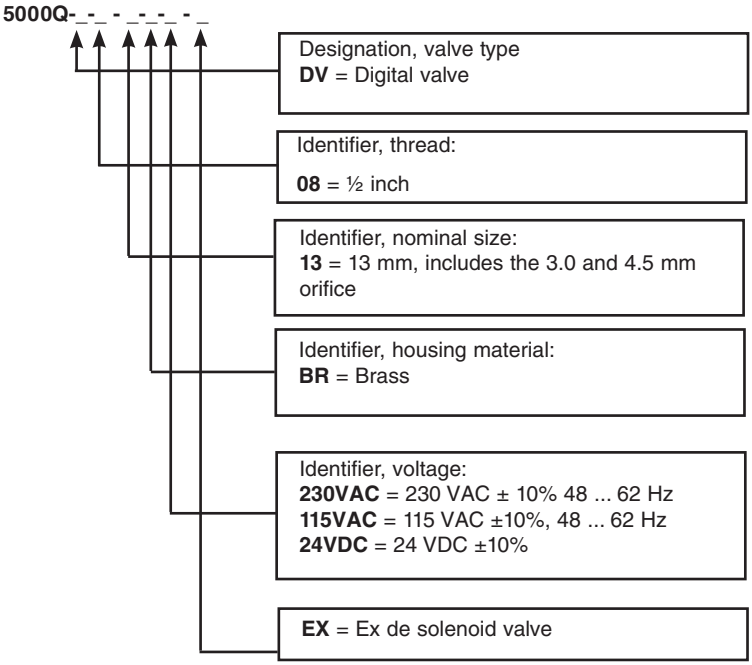
20.1 5000Q series controller



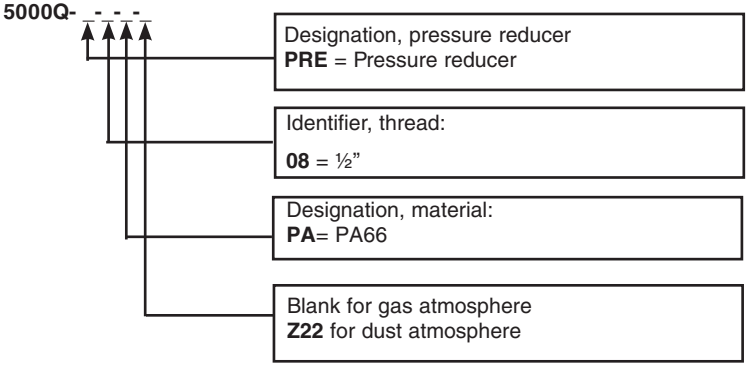
20.2 EPV5000Q vent



20.3 5000Q-DV purge valve (digital valve)



20.4 Pressure reducer PRE



21. Troubleshooting

Fault	Possible cause	Remedy
5000Q not working	No mains voltage	Check mains voltage supply cable
	5000Q faulty	Return 5000Q
The electrical equipment is activated without a pre-purge phase.	Purge program incorrectly programmed	Change programming as described in Section 15 Check if this is a dust application
The purge time does not start to countdown.	No purge gas	Connect purge gas
	Digital purge valve does not open or only opens partially	Check the power supply to the SV1 terminals
	Insufficient volume of purge gas flowing through the control cabinet	Check that the value for the purge air nozzle is correct
	Set pressure for pressure regulator is not reached	Purge gas supply is inadequate. Increase cross-section of supply tube
Digital purge valve does not switch to leakage mode after the pre-purge phase	Digital purge valve is not closing	Check digital purge valve – supply voltage may be disconnected
		Check the digital purge valve for foreign bodies
Digital purge valve activates briefly during the operation phase.	Cabinet leaking, valve trying to maintain the internal pressure by opening the purge air nozzle	Seal cabinet, or increase size of air leakage nozzle outlet
	Set pressure value D2 is too high	Reduce value of D2
Purging stops before purging time ends	Max. pressure too low Supply pressure too low	Change settings in program Check supply pressure Check if supply pressure is set to value in worksheet Check if max. pressure is set to worksheet

22. Maintenance

The Pepperl+Fuchs 5000Q pressurizing system and all its components are maintenance-free and self-monitoring.
The only maintenance required is to clean the controller housing using a damp cloth. Do not use aggressive cleaning products.

All work on the controller and its components must be carried out by qualified staff.

Ignoring this instruction will render the approval and the warranty null and void.

Warning!
In hazardous dust applications, periodically clean to avoid buildup of dust layers.

23. Technical data

Equipment group, Ex degree of protection	II 3 G Ex nAC [pz] II T4 -20 °C … + 60 °C II 3 G Ex nAC [pz] II T6 -20 °C … + 40 °C II 3 D Ex tD A22 [pD] IP64 T70°C
EC type examination certificate	EPS 10 ATEX 1263
International certifications	IECEx EPS 11.0010
Degree of protection	IP65
Material	Housing material: Polyester
Mains voltage Overvoltage Category II	230VAC = 230 VAC ± 10% 48 ... 62 Hz 115VAC = 115 VAC ± 10%, 48 ... 62 Hz 24VDC = 24 VDC ± 10%
Power consumption	230 VAC / 2.3 VA (without digital valve) 115 VAC / 2.3 VA (without digital valve) 24 VDC / 2.5 A (without digital valve)
Relay contact ratings	K1 – continuous = 5A @240 VAC / resistive, 5A @24 VDC, inrush = 5A @ 240 VAC K2 – continuous = 3A @240 VAC / resistive, 3A @24 VDC, inrush = 3A @240 VAC
Fuse type F1	AC – time lag, 5 x 20 mm, 20 mA DC – time lag, 5 x 20 mm, 500 mA
Valve control	Output voltage = mains voltage Protected by internal fuse
Max. cable diameter	1.5 mm²
Pressure measurement range	0 ... 25 mbar
Ambient temperature	-20 °C ...+40 °C at T6 -20 °C ...+60 °C at T4
Input	Via push buttons

Technical data, continued

Terminal connections	
Thermocouple	
Type	Push button
Cross section (mm²)	0.25 ... 1.5 mm²
Strip length	8.5 mm
Bypass connections	
Type	Push button
Cross section (mm²)	0.5 ... 1.5 mm²
Strip length	8.5 mm
Alarm contacts	
Type	Push button
Cross section (mm²)	0.5 ... 1.5 mm²
Strip length	8.5 mm
Power connections	
Type	Push button
Cross section (mm²)	0.5 ... 1.5 mm²
Strip length	9.0 mm
Cable glands	
12 mm cable gland	
Cable diameter	5 ... 7 mm²
Material	Polyamide
16 mm cable gland	
Cable diameter	5.5 ... 10 mm²
Material	Polyamide
20 mm cable gland	
Cable diameter	6 ... 13 mm²
Material	Polyamide

Notes

Your automation, our passion.

Explosion Protection

- Intrinsically Safe Barriers
- Signal Conditioners
- Fieldbus Infrastructure
- Remote I/O Systems
- HART Interface Solutions
- Wireless Solutions
- Level Measurement
- Purge and Pressurization Systems
- Industrial Monitors and HMI Solutions
- Electrical Explosion Protection Equipment
- Solutions with Explosion Protection

Industrial Sensors

- Proximity Sensors
- Photoelectric Sensors
- Industrial Vision
- Ultrasonic Sensors
- Rotary Encoders
- Positioning Systems
- Inclination and Acceleration Sensors
- AS-Interface
- Identification Systems
- Logic Control Units
- Connectivity

PEPPERL+FUCHS

www.pepperl-fuchs.com
Subject to modifications · © Pepperl+Fuchs
Printed in USA · Part. No. 514733 01/17