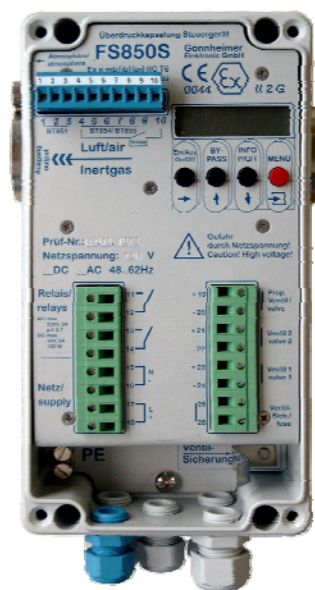
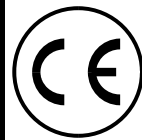
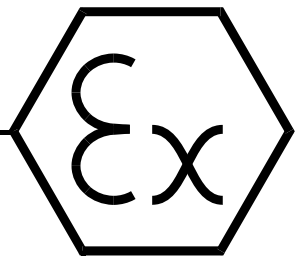


User's manual

Pressurized enclosure system **F850S**

safety standard SIL 2



Software version 3.3.2 - manual rev.7



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The symbols WARNING, CAUTION, NOTE

| | |
|--|--|
|  Warning | <p>This symbol warns of a serious hazard. Failure to observe this warning may result in death or the destruction of property.</p> |
|  Caution | <p>This symbol warns of a possible failure. Failure to observe this caution may result in the total failure of the device or the system or plant to which it is connected.</p> |
|  Note | <p>This symbol highlights important information.</p> |

Safety Measures: to read and to comply

| | |
|---|---|
|  Warning | <p>Warning! Extreme caution is advised when handling this device. High electrical discharge is possible and can be fatal.</p> <p>Work on electrical installations and apparatus in operation is generally forbidden in hazardous locations, with the exception of intrinsically safe circuits. In special cases work can be done on non-intrinsically safe circuits, on the condition that during the duration of such work no explosive atmosphere exists.</p> <p>Only explosion protected certified measuring instruments may be used to ensure that the apparatus is voltage-free. Grounding and short-circuiting may only be carried out, if there is no explosion hazard at the grounding or short circuit connection.</p> |
|---|---|

1 Operation instruction for Explosion protected device

Application and Standards

This instruction manual applies to explosion-protected devices of types below. This apparatus is only to be used as defined and meets requirements of EN 60 079 particularly EN60 079-14 "electrical apparatus for potentially explosive atmospheres".

Use this manual in hazardous locations, which are hazardous due to gases and vapours according to the explosion group and temperature class as stipulated on the type label. When installing and operating the explosion protected distribution and control panels you should observe the respective nationally valid regulations and requirements.

General Instructions

Work on electrical installations and apparatus in operation is generally forbidden in hazardous locations, with the exception of intrinsically safe circuits. In special cases work can be done on non-intrinsically safe circuits, on the condition that during the duration of such work no explosive atmosphere exists.

Only explosion protected certified measuring instruments may be used to ensure that the apparatus is voltage-free. Grounding and short-circuiting may only be carried out, if there is no explosion hazard at the grounding or short circuit connection.

To achieve an impeccable and safety device operation, please take care for adept transportation, storage and mounting, as well as accurate service and maintenance. Operation of this device should only be implemented by authorised persons and in strict accordance with local safety standards.

The electrical data on the type label and if applicable, the "special conditions" of the test certificate BVS 06 ATEX E 088 are to be observed.

For outdoor installation it is recommended to protect the explosion protected distribution and control panel against direct climatic influence, e.g. with a protective roof. The maximum ambient temperature is 40°C, if not stipulated otherwise.

Terminal compartment in Increased Safety

When closing, it is to be ensured that the gaskets of the terminal compartment remain effective, thus maintaining degree of protection IP 54 according to EN 60529. Close unused entries by impact-proof stopping plugs, which are secured against self-loosening and turning.

Do not open the device in Ex area, as long the device is energized.

Inside area with explosive dust do clean the inner of the housing of the dust before closing the housing.

Maintenance Work

The gaskets of Ex e enclosures are to be checked for damages and replaced, if required. Terminals, especially in the Ex e chamber are to be tightened. Possible changes in colour point to increased temperature. Cable glands, stopping plugs and flanges are to be tested for tightness and secure fitting.

Intrinsically Safe Circuits

Erection instructions in the testing certificates of intrinsically safe apparatus are to be observed. The electrical safety values stipulated on the type label must not be exceeded in the intrinsically safe circuit. When interconnecting intrinsically safe circuits it is to be tested, whether a voltage and/or current addition occurs. The intrinsic safety of interconnected circuits is to be ensured. (EN 60079-14, section 12)

2 Introduction: Pressurized enclosure system F850S

2.1 Explosion protection: pressurized enclosure

The use of pressurized enclosures allows the operation of 'non explosion protected' devices in hazardous areas inside zone 1 and zone 2. The protection type 'pressurisation' is based on the principle of maintaining a constant pressure using air or a protective gas to prevent an explosive mixture forming near the device inside the pressurized enclosure.

Before start-up, the pressurized enclosure must be purged with air or protective gas to remove any explosive mixture that may be inside the enclosure.

2.2 Pressurized enclosure system with safety standard SIL 2

Since the second issue of the norm EN 50016 (pressurized enclosure "p", 05.1996) Ex p- control devices are declared as security devices.

At that time the notified bodies (PTB, EXAM, TÜV Nord, etc.) demanded that the Ex p- control devices must fulfil the category 3 of EN 954-1. This demand was also taken over into the standards EN 60079.

After the replacement of EN 954-1 by the norms IEC / DIN EN 61508-1 and-2, respectively DIN EN ISO 13849-1 and-2 and DIN EN 50495 a security level by at least SIL 2 is demanded to a pressurized enclosure system to EN 60079-2. This should be seen as an informal understanding between the German notified bodies.

Therefore the pressurized enclosure system F850S with Ex p- control device FS850S was tested by the 3rd amendment of the EC- type certificate (BVS 06 ATEX E 086) with the result:

SIL Level 2.

2.3 Pressurized enclosure system F850S

The pressurized enclosure system F850S contains at least the control unit FS 850S and a solenoid valve. Each can be mounted in- or outside the enclosure. Furthermore several remote controls (operation panels) are available to improve ease of operation. It is also possible to connect intrinsically safe sensors to the control unit FS 850S.

The pressurized enclosure system F850S operates in two different modes: Pressurization using leakage compensation and Pressurization using continuous flow of protective gas.

2.3.1 Mode pressurization using leakage compensation

After purging, the control unit FS 850S holds the pressure inside the enclosure at a minimum of 0,8 mbar. Two different solenoid valve techniques are available: digital working solenoid valve (DSV) technique or proportional working solenoid valve (PSV) technique.

a) *Digital solenoid valve technique*

While purging, the DSV is activated and a large amount of purge medium flows inside the enclosure through a nozzle with a large cross-section. After purging, the control unit turns off the DSV. The leakage compensation is made by a bypass choke, with a very small adjustable cross-section (diameter 0,3 ...1 mm), inside the valve. The protective medium that flows into the enclosure now is adequate to maintain a pressure of at least 0,8 mbar. The pressure is monitored by the control unit FS 850S. The maximum and minimum pressure of the enclosure is programmable.

For purging, a traditional and a new integrating method are available:

1. Using the traditional method the purge quantity is a product of a pre-set minimum of flow rate and time. The flow rate depends on the size of the internal nozzle (diameter 1 ...6 mm)

of the valve and can be specified by matched charts. The common rule of purging must be considered: let in minus leakage loss is bigger than flow minimum. This purging method is called as **time based purging method**.

2. In contrast to the traditional one the **integrating purging method** measures the real volume flow through the enclosure outlet and adds it up to get the real purge volume. Also, the flow rate is monitored, depending on the size of the plate orifice of the control unit. If the flow rate sinks below its minimum, it will be ignored and it will not contribute to volume integration. Therefore we achieve a safe and economical purging method. See also Figure_1.

Pressure inside the enclosure will be observed by each purging method.

The digital solenoid valve technique has a considerable disadvantage: during purging process and normal operation, a constant rate of protective gas is needed. For safety reasons the rate must be larger than leakage rate of the enclosure. Wasting protective gas causes high costs in many applications.

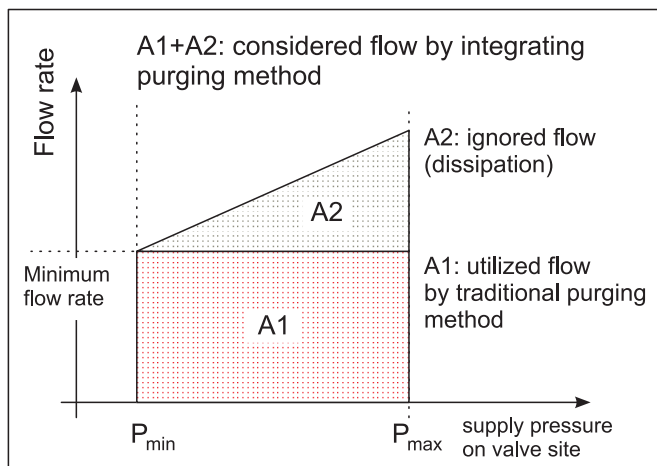


Figure 1: Consumption of protective gas

b) Proportional solenoid valve technique

Using proportional solenoid valve technique prevents unnecessary wasting protective gas. The internal proportional working sensory equipment and a proportional valve as actuator are combined to a **pressure feedback control system**.

The benefits of pressure feedback control are:

1. Considerable less consumption of protective gas - additional costs for proportional valve will be amortised soon
2. Increased service reliability achieved by constant pressure inside enclosure - increasing leakage caused by e.g. ageing of the enclosure will be balanced and sudden failure is prevented
3. Almost no flow noise and only a small protective gas consumption using a solid enclosure

Another advantage using a proportional solenoid valve is; that pressure control is also used during purging. A set-point pressure will be achieved in the enclosure, while the flow volume, that leaves the enclosure, will be recorded and integrated through time, until the required purge volume is achieved. Advantages of this method are:

1. A definite pressure while purging - pressure sensitive parts of the enclosure, like membrane switch panels or windows, will not be overloaded.
2. Purge volume accuracy is achieved by integration of the purge medium flow volume at the outlet. Wasting purge medium is no more a topic of today.

2.3.2 Mode pressurization using Continuous flow

The control unit FS 850S incorporates the operation mode „continuous flow“. This operation mode is necessary, for example if an analyser produces an explosive atmosphere inside the enclosure (containment system). The operation mode continuous flow flushes the enclosure permanently. After the (pre-) purging procedure (purging process) a set-point flow rate is adjusted during normal operation. The monitored flow rate minimum is adjustable. The continuous flow operation mode can be realised using 2 digital solenoid valves as well as using one proportional solenoid valve.

2.3.3 F850S -Application using „Containment Systems“

„Containment Systems“ are defined as parts of a device within a pressurized enclosure, which could emit combustible gas (or occasionally an explosive environment: zone 1, explosive mixture) from within the enclosure.

In order to receive an Ex p-System including a „Containment System“, which is failsafe according EN 50016, with the attribute 'no emission', the following conditions must be met:

1. The flammable substance inside the containment system is in the gas or vapour phase when operating between the specified temperature limits
2. The minimum pressure specified for pressurized enclosure is at least 50 Pa higher than the maximum pressure specified for the containment system
3. An automatic safety device initiates, if the pressure difference falls below 50 Pa.

This automatic safety device can be activated by a difference pressure switch, looped into the external alarm loop (terminal 4/10 on FS 850S). If an alarm occurs on this loop, the control device FS 850S will turn off the ignition-capable device immediately. After alarm cancelling the control device FS 850S starts operation automatically with the purging procedure. The external alarm loop is made by a normal closed connection method.

2.4 Peripherals

2.4.1 Operating panels

For the control unit FS 850S several operating and visualising panels are available. These panels consist of the explosion protection class 'intrinsically safe' and are considerably advantageous, particularly when the control unit is mounted inside the enclosure.

2.4.2 Common operating panels: BT 854.1 and BT 855.1

The operator panels BT854.x and BT855.x are simple group of pure passive (according to EN 60079-11) simple electrical devices, which can be operated without an extra certification only in line to an intrinsically safe circuit. Connect the common operator panels to the certified Exi circuits on the control unit FS850S. Therefore they are not explicit listed on the EC certificate BVS 06 ATEX E 088 of the FS850S.

The common operator panels have the following features:

- On/Off-Switch
- Key-operated switch for bypass
- LED-indicator for READY and ON

The connection to the control unit consists of 6 wires.

2.4.3 Intelligent operating panel type BT 851

This operation panel indicates operation and malfunction reports as plain text. The 4 membrane switches offer total command of the control unit. Status, momentary pressure, flow rate as well as remaining purge time are always available.

The connection to the control unit consists of only 3 wires.

Alarm signal lamp on BT851

The red alarm signal lamp (LED) is just below the Display. The lamp is blinking, if the pressure inside of the cabinet is below the programmed minimum pressure. The lamp is continuously on while the FS850S is switched into BYPASS mode. In normal operation the alarm signal lamp is dark.

2.4.4 Disconnecter unit SR852 and SR853

According to EN 60079-2 all non- intrinsically safe connections of the ignition capable apparatus must be disconnect, if the protection gas pressure falls below the safety limit. In many applications more than the two connector terminals on the control unit FS850S are needed.

In these cases the disconnecter unit SR852 provides 8 respectively 16 galvanically separated connectors to separate the additional non- intrinsically safe lines.

The SR853 is available for an line separation with higher switch capacity (400 V, 16A).

2.5 Special demands in operation zone 21 (Dust)

2.5.1 Purging period -> cleaning period: cleaning the housing inside

In zone 21 the housing **must not** be purged in comparison to the operation in gas zone 1. The operator has to insert the purging volume zero "0 [l]" into the parameter menu.

Purging in the presence of combustible dust would generate a dangerous explosive atmosphere inside the cabinet.

In the zone 21 the purging period is replaced by a cleaning period, viz. the operator has to remove thoroughly the combustible dust inside before he is energizing the electrical parts inside the cabinet.

After cleaning the pressure inside of the cabinet prevent an infiltration of dust.

2.5.2 Additional marking

The cabinet must contain a well viewable sign with the following content:

„WARNING: REMOVE ALL DUST FROM THE INSIDE OF THE ENCLOSURE BEFORE CONNECTING OR RESTORING THE ELECTRICAL SUPPLY“

On Ex p cabinets suitable for zone 21, which can be opened without tools, has to be placed the following mark:

„WARNING: DO NOT OPEN WHILE ENERGIZED UNLESS IT IS OBVIOUS THAT NO COMBUSTIBLE DUST IS PRESENT“

2.6 Additional information: EC- type certificate F850-SYST

Gönnheimer features as manufacturer of Ex p- Systems a comprehensive ATEX Ex p- SYSTEM Certification of a notified body.

Provides a economical solution for small quantities

- certified for Ex- Zone 1
- enhanced for Dust- Ex, Zone 21 (category 2D)
- the first ATEX certification of this type in Europe
- matches > 80% of all individual customer systems
- enhanced pressure ranges: 27mbar, 350mbar and 1 bar

Customer advantages:

+ usual delivery time, + usual quality,+ usual costs,+ no additional efforts

2.7 Conformity with standards

The explosion proof device type FS850S meets requirements of listed standards in the attachment (Declaration of conformity). They were developed, manufactured and tested in accordance with state-of-the-art engineering practice and ISO9001:2008.

2.8 Transport, Storing, Disposal and Repairs

| | |
|------------------|--|
| Transport | Vibration-free in origin package, do not drop, handle carefully |
| Storing | Store the device dry, inside of the origin package |
| Disposal | When the explosion proof multipurpose distribution, switching and control units are eventually disposed of, the national regulations governing the disposal of waste materials in the country concerned must be rigorously observed. |
| Repairs | Defective parts may only be replaced by the Manufacturer or by personnel specially trained and supervised by the Manufacturer. Only genuine spare parts from the Manufacturer may be fitted. |

2.8.1 Repair of the control device

Only Gönnheimer Elektronik GmbH should proceed repairs on the pressurized enclosure system.

3 Installation and connection

This Chapter contains important steps for mounting, connecting and starting.

3.1 Mounting

3.1.1 Control unit FS 850S

The control unit FS 850S can be placed inside a hazardous area. The location (inside or outside the enclosure) as well as the position is almost arbitrary. Only intake and outlet of the control unit should be lined up on a horizontal axis. See also Figure 12 in the Appendix.

The control unit has 4 holes on the rear plate for mounting, although fixing only with the screw connection of intake or outlet is sufficient.



Caution

Observe local safety guidelines and the regulative DIN EN 60079-14.



Caution

The reference input (M5 thread on the left side of the housing FS850S) must have ambient pressure level.

If the location of the control device FS850S is inside the Ex p cabinet, the preference input must be connected with a small pipe to ambient pressure level.



Note

The solenoid valve(s) and the control unit (respectively pressure monitor) should be mounted on the enclosure as far away from each other as possible (E.g. space diagonal arrangement), to achieve a total purging.



Note

**The inner diameter of a pipe connected to the air in- or outlet of the FS850S must be one and a half time (1,5 x) bigger than the orifice plate inside of the FS850S.
Keep the air pipes as short as possible**

Particle barrier

The control device is equipped with a particle barrier according to EN 60079-2. Hence, the purge gas flow on the outlet of the control device can be stream directly into the Ex zone.

3.1.2 Solenoid valves

The solenoid valves can be mounted inside or outside the enclosure. For mounting position see manufacturer's guide.

3.1.3 Purge gas supply

Important items:

| | |
|------------------------|--|
| Quality | Instrument air, rep. Inert gas pressured air class 533 according to ISO 8573-1 = particle 40µm (class 5) / dew-point -20°C (class 3) / oil 1 mg/m ³ (class 3) according to the demands of the buid-in devices inside the cabinet, the air quality should be better |
| Supply pressure | If not differently given 2 ..4 bar |
| Purge gas pipes length | According to diameter of the supply pipe big pressure losses arise during the pre purge phase (high flow rate). The following items are to be considered by choosing the right purge gas pipe. Reference values: At a pipe diameter of 4 mm (inner diameter) and a flow rate of 2 liters/sec. generates a pressure loss of 500 mbars per meter . The pressure losses causes lower purge gas flow rate and result into longer or never ending pre purge period. |

3.1.4 Operating panels BT 8xx.x

↻ Operating panel BT 851.0

The Operating panel BT 851.0 is mounted, without rear plate, directly on the enclosure. For mounting and bushing of the wire, several holes must be made. For location and drill size see Figure 13: Dimensions and template BT 851 in appendix.

↻ Operating panel BT 851.5

The operating panel BT 851.5 has housing with environment protection IP 65. It can be located anywhere in hazardous area zone 1. For location and drill size see Figure 13: Dimensions and template in appendix.

↻ Operating panel BT 854.x

The operating manual BT 854.x consists only of 2 LEDs and an ON/OFF-switch, directly fixed on the enclosure. The BT 854.1 has an additional key-operated switch for bypass. For location and drill size see Figure 14: Dimensions BT 855, template BT 854 in appendix.

↻ Operating panel BT 855.x

The operating panel BT 855.5 has housing with environment protection IP 65. It can be located anywhere in hazardous area zone 1. For location and drill size see Figure 14: Dimensions BT 855, template BT 854 in appendix.

3.1.5 Disconnecter units SR852 / SR853

The disconnecter unit SR852 / SR853 can be mounted and operated in hazardous area zone 1. It represents an Ex-e terminal box.

3.2 Connecting and Commissioning

After mounting, connect the 'intrinsically safe' peripherals to terminal 1-10, and the power supply, valves and ignition-capable apparatus to increased safety terminals of the control unit.

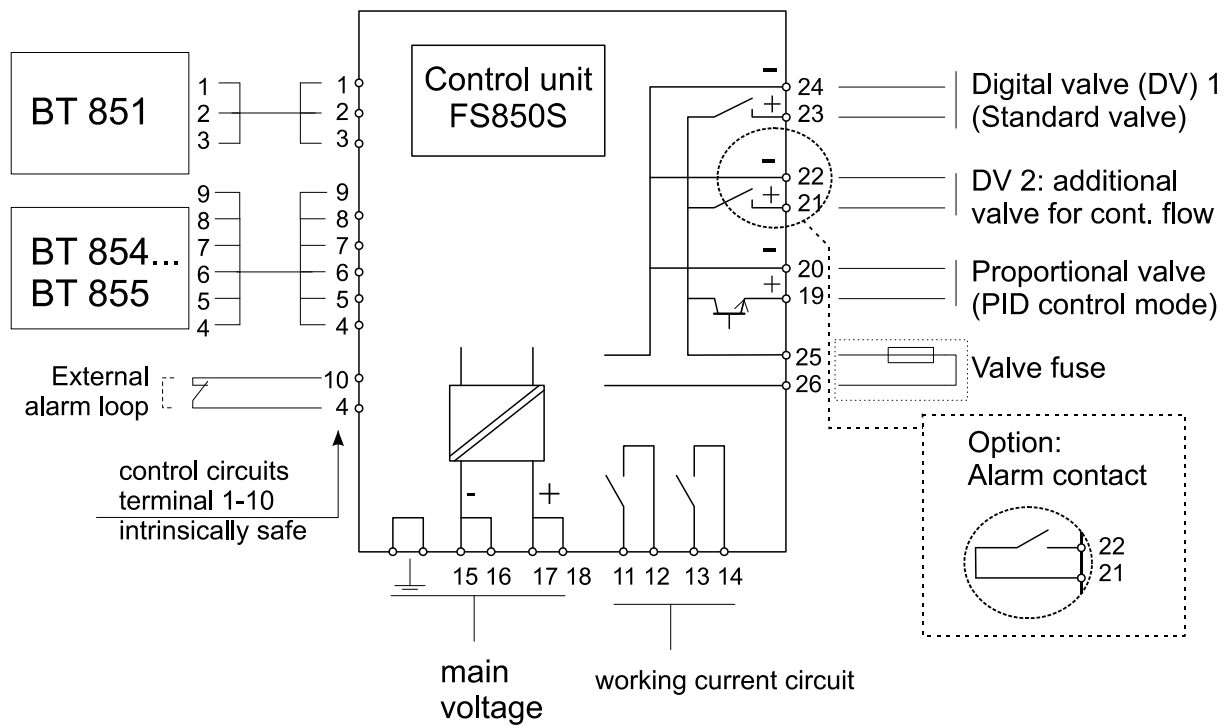


Figure 2: Block diagram FS850S

3.2.1 Connection details

Please obey the following limits

| | |
|-----------------------------------|---|
| Min. and max. clamping torque | min. 0,3 Nm max. 0,4 Nm |
| Min. und Max. wire cross- section | steep: 0,2 – 2,5 mm ² flexible: 0,2 – 2,5 mm ² |



Warning



Caution

LINE VOLTAGE !

Extreme caution is advised when handling this device. High electrical discharge is possible and can be fatal.

Please note the following Standard of Compliance: BVS 06 ATEX E 088 and the regulative DIN EN 60079-14.

Do not exceed terminal safety limits of each terminal. See limits in technical details or declarations of conformity.

The solenoid valve fuse value must match the used solenoid valve type

3.2.2 Terminal description FS 850S

| Terminal | | Description |
|----------------------------|----------------------------|---|
| FS850S | BT 85x SR 852 | |
| 1 2 3 | 1 2 3 | Terminals exclusively for connecting the operating panel BT 851 |
| 4 5 6 7 8 9 | 4 5 6 7 8 9 | Terminals of operating panel BT 813, BT 814 and BT 815 |
| 4 10 | | External alarm loop (intrinsically safe), opening circuit alarms Ex p-System and switching off ignition-capable device. |
| 11,12 | | Working current circuit 1 |
| 13,14 | | Working current circuit 2 |
| 15,16 | - | Line voltage, either neutral conductor at AC or minus pole at DC |
| 17,18 | + | Line voltage, either outer conductor at AC or plus pole at DC |
| 19,20 | +, - | Terminals for proportional solenoid valve |
| 21,22 | +, - | Terminals for additional solenoid valve 2 <i>respective signal pressure alarm (Option: FS850S.x.x.1)</i> |
| 23,24 | +, - | Terminals for digital solenoid valve 1 |
| 25,26 | | Terminals for solenoid valve fuse inside FS 850S |



If the BT854.1 or BT855.1 operator panel is being used, the bypass function can be activated via an external key switch. In this case set the bypass code to 9999 to prevent a secondary bypass function by bypass code directly from the control unit. The key switch is to be connected to terminals 4 and 5 of the control unit.

If external operation panels BT 81x or additional pressure monitor are not used, it is possible to connect terminal 4 and 6 of the control unit FS850S to a shorting bridge, to enable an automatic switch after purging process.

In this case, the On/Off-function of the far left button on the control unit FS 850S is non-operational.

3.2.3 Power off relays



The maximum current limits (5 A) on the clamps 11,12 and 13,14 should not be exceeded at any time!

E.G. By an application of switched power supply a multiple higher current as the nominal max. current may occur. In this case a switching on current limitation (e.g., NTC) must be added to avoid the off-limits high current. If this is missed the risk of welded relay contacts and within the loss of the explosion protection exists!!

3.2.4 Commissioning and parameter defaults

The following parameters are pre-set after connecting the FS850S to mains supply:

| | Parameter | Display | Text | Comment |
|-------------------|--|---|---|--|
| Structure | Mode: leakage compensation Purging method: time based Type of valve: proportional | | | |
| Codes | Main menu (M-Code) Bypass (By-Code) On/Off-Code (On/Off-C.) | 0001 0002 0000 | | The setting 0000 disables the coding (not in the case of M code) The setting 9999 switches off bypass by coding |
| Pressure and flow | Purging time Purging volume Min. flow while purging Min. flow while operating Flow set-point Min. pressure inside enclosure Max. press. inside enclosure Set-point press. while purging Set-point press. while operating | 00-10-00 . 500.0 0.9 0.5 2.0 0.8 15.0 10.0 2.0 | 10 [min] . 500.0 [l] 0.9 [l/s] 0.5 [l/s] 2.0 [l/s] 0.8 [mbar] 15.0 [mbar] 10.0 [mbar] 2.0 [mbar] | time based purging method selected integ. purging method selected time based purging meth. selected operation mode continuous flow selected proportional solenoid valve selected |



Note

Triggering the Reset

Press red bottom (*ENTER-Button*)* while switching on the control unit FS 850S to reset all parameters to the values in table above.

*: used only on control unit FS 850S.

3.2.5 Purging process

The control unit FS 850S starts the purging process immediately after start up, providing the programmed minimal pressure (minimum 0.8 mbar) is present. Parallel to pressure monitoring, the flow rate will be watched, to get a safe purging process.

If the purging flow rate passes its minimum (e.g. temporary shut at the outlet), then the purging process will be interrupted and the control unit continues purging, after the disturbance is gone. But if purging pressure exceeds the min or max limits then the purging process will be terminated and the control unit will start a new purging process automatically after achieving purging condition.

The table below shows the minimum flow rate in accordance of the used plate orifice.

| Plate orifice in control unit | Minimum flow rate |
|-------------------------------|-------------------|
| ∅ = 4 mm | 0,07 liter /sec. |
| ∅ = 6 mm | 0,15 liter/sec. |
| ∅ = 10 mm | 0,35 liter/sec. |
| ∅ = 14 mm | 0,85 liter/sec. |
| ∅ = 18 mm | 1,25 liter/sec. |

3.3 Maintenance

Purge gas pipe system

Depending upon purity of the assigned purging air the inlet and outlet opening of the FS850S must regularly be examined on impurities (e.g. oil, dust, etc) or corrosion. In case of serious impurities the

operator should weigh the possibility of a punctual appropriate cleaning by Gönzheimer Elektronik GmbH in relation to a spontaneous loss of the controller.

Test of the power supply disconnection

In the maintenance interval the function of the power supply disconnection of the control device FS850S must be tested:

Turn off power supply of the control device (switched off).

Measure the status of the relay contacts terminals (11-12 and 13-14): **no contact**

If a relay contact (connecting terminal 11-12 or 13-14), nevertheless, remain closed, the control device is immediately to be exchanged, because it cannot fulfil ex protecting function (i.e. switching of the non ex- devices in the Ex p cabinet) any more.

Maintenance cycle

Maintenance cycle: at least all 3 years

4 Operation

4.1 Human interface











The user has total control of the purging system F850S by the use of 4 keys on the control unit FS850S respectively by using the external operating panel BT851. Operation on control unit FS850S panel BT851 is equal. Using the other operating panels only a restricted operation is possible.

4.1.1 Display

The built-in display indicates operation modes, present pressure or flow rate data, as well as malfunction.

4.1.2 Keyboard

The four multi-functional keys have different meanings and functions depend on the present operation mode.

| Key | Mode | Function |
|---|---|--|
| Ein/Aus  | normal operation | Toggles the ignition-capable device on and off, if purging system state is ready |
| „Shift right“-button  | running menu | Shift cursor one position right. |
| BYPASS  | normal operation | Activates Bypass. |
| „Up“-button  |  Caution | Fire certificate required ! |
| INFO /P/Q/T  | running menu | Get menu next item |
| „Down“-button  | normal operation | Changes indication of the display: present pressure, flow rate, remaining purge time respectively purge volume and present state of the purging system |
| MENU  | running menu | Get previous menu item |
| „Enter“-button  | normal operation | Executes main menu |
| „Enter“-button  | running menu | Initiates and confirms parameter input |

4.2 How to enter and leave the bypass mode



Caution

Utilise bypass only, if it is sure that no explosive atmosphere is inside the cabinet!

Fire certificate required !



Caution

The bypass mode is denied, if it is possible that a explosive atmosphere can arise inside the Ex p- housing !



The origin state is normal operation, the Ex p housing can be purged, unpurged or while purging. The steps shown below are according to the control device FS850 not to the operation panel BI851.x.

If you have a operation panel BT81x.1 use the key switch instead.

By-CODE

The bypass code is needed

0002

The ex works Bypass code is '0002'.



Enter is right code using the arrow keys and confirm with the *ENTER*- key.

Bypass

The bypass mode is now active.

Or

On

If the control unit is set to "automatic on" the display shows "bypass" and "On" alternately and the relay contacts (Ter. 11,12 and 13,14) are closed.



Now you can toggle the relay contacts by pressing the "right-" button. Remark: if the E/A- code is unequal to zero, you must enter them each time you want to change the relay contacts state.



Note

Leave the bypass mode in the same way as entered.

4.3 Indications during normal operation

The info-indication shows the present state of the purging system. In addition to this indication, it is possible to select current pressure-, flow rate-, or remaining purge time- indication. See below:

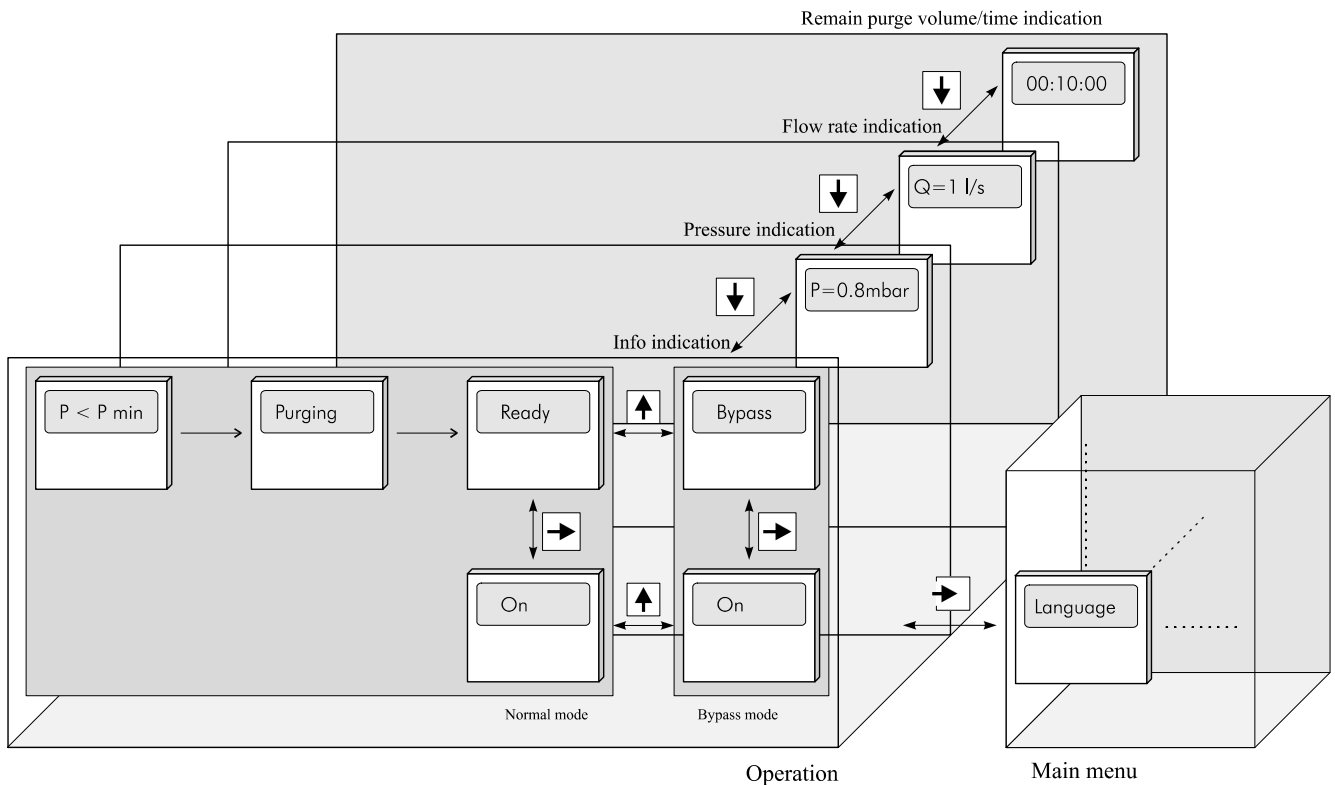


Figure 3 Flow chart: state of purging system and corresponding display

4.4 Configuration

You must configure and enter the parameters of the control unit FS850S to achieve a desired mode of operation. All parameters of the control unit are structured in form of a menu. See also the flow charts in chapter 5.

4.4.1 The menu structure

Main menu The main menu is sub-divided into 4 separate categories:

- Language
- Structure
- Parameters
- Codes

Language These are the 5 languages available:

- German
- English
- French
- Dutch
- Spanish

Structure Selecting a purging system structure with the following alternatives:

- Operation mode leakage compensation or continuous flow
- Using digital or proportional solenoid valves
- Integration or time based purging method
- Using an additional pressure monitor
- Using the disconnecter unit SR852

Parameters This category contains the necessary parameters depending on the structure defined above. Examples for parameters are:

- Purging time
- Minimum flow while purging process
- Minimum pressure
- Maximum pressure

Codes The control unit has 3 different code words:

- M-Code: to enter main menu
- By-Code: to activate Bypass
- E/A-Code: to switch ignition-capable apparatus on or off



Note

The FS850S does not working while the main menu is active. - That means the solenoid valves and the ignition capable device inside the cabinet are switched off.

4.4.2 Description of the menu items

The display of the control unit has only 8 digits. For this purpose the names of the structures and parameters are often abbreviations.

In the following table below are some explanations of the menu items. The table as a reference guide for programming the desired system structure and to set the appropriate parameters correctly. The menu items are roughly sorted by class.

Please note that the viewable conditions of parameters are not included. The category 'Language' is also excluded, because of it's simplicity.

See also the corresponding flow charts in section 5.

| Hierachy | | | Description, Explanation | |
|-----------|-----------|------------|--|--|
| 1.Level | 2.Level | 3.Level | | |
| Structure | Valves | P-Valve | Selecting 'valves' on level 2 means that a proportional solenoid valve or a digital solenoid valve is available on level 3 | |
| | | D-Valve | | |
| | Integra. | Integ. Y | Integration purging method, Yes Configures integration purging method. | |
| | | Integ. N. | Integration Purging method, No Selects time based purging method. | |
| | Cont.Flow | C. Flow Y. | C. Flow Y. | Continuous Flow, Yes Activates the operation mode 'continuous flow'. |
| | | | C. Flow N. | Continuous Flow, No Activates the operation mode 'leakage compensation'. |
| Param. | Pur. Time | ..... | Purge time - Enter a fixed purge time in h/min/sec. The purge time only appears, if the time based purging method is chosen. | |




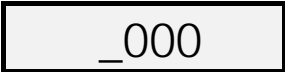


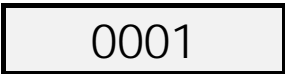

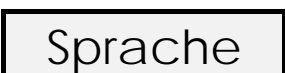

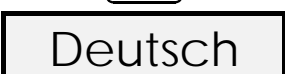


| | | | |
|-------------|-------------|-------|--|
| | Pur. Vol. | ..... | Purge volume - The purge volume only appears, if integration purging method is chosen. |
| | Min.Fl. P. | ..... | Minimum flow rate during purging process |
| | Min.Fl .O. | ..... | Minimum flow rate during operating |
| | Rated Fl. | ..... | Flow rate set-point - In operation mode 'continuous flow' this flow rate will be regulated, while normal operation. |
| | Min.Pres. | ..... | Minimum pressure inside enclosure Only values above ≥ 0.8 mbar can be entered. (Additional safety regulativ to EN 50016) |
| | Max.Pres. | ..... | Maximum pressure inside enclosure Maximum pressure ≤ 18 mbar |
| | R. Pre. Pu. | ..... | Pressure set-point during purging, This pressure value will be regulated during purging process. |
| | Rated Pr. | ..... | Pressure set-point during normal operation, This pressure value will be regulated during normal operation. |
| - Option! - | Sig. Pres | ..... | Signal pressure during normal operation, If the housing pressure is below the signal pressure the Terminals 21/22 are open! |
| Codes | M-Code | ..... | Menu code - Code word to enter main menu out of operation mode. The M-code could not switched of by setting M-Code = „0000“ . |
| | By-Code | ..... | Bypass code - Code word to activate the bypass. The bypass code word can be switched off by setting „0000“. The bypass code „9999“ blocks the bypass function. In that case a bypass can only be activated by key-operated switch on BT 81x. |
| | On/Off-C. | ..... | On/ Off code , enables switching on or off the ignition-capable device. The On/Off code word can be switched off with „0000“. |

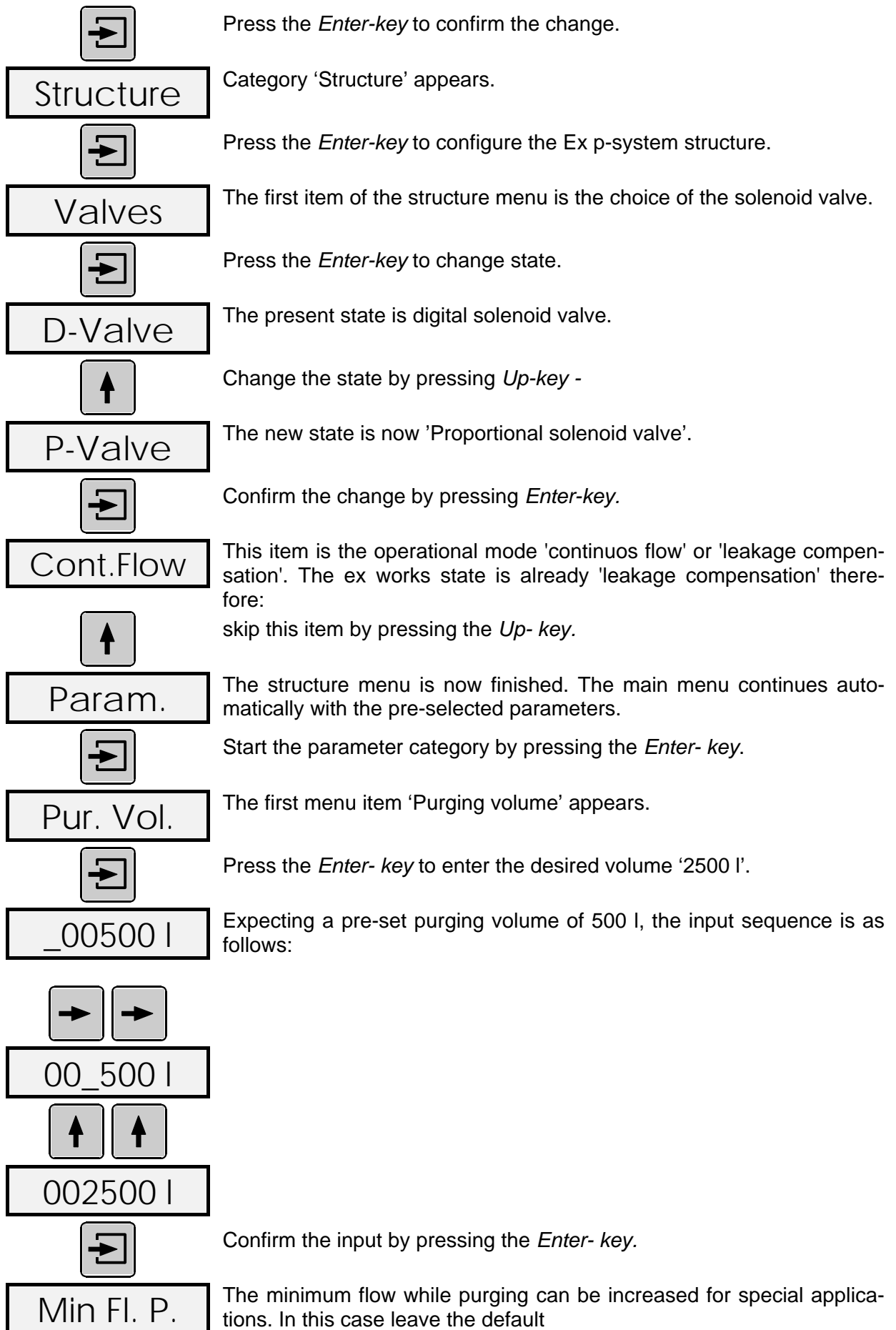
4.4.3 Configuration Example


Example- Ex p-System

- ⇒ Enclosure volume: 500 l
- ⇒ Language : English
- ⇒ Structure :
 - Operation mode: leakage compensation
 - Integration purging method
 - Proportional solenoid valve
- ⇒ Parameters
 - Purging volume: 2500 l
 - Minimum pressure of enclosure: 0.8 mbar
 - Maximum pressure of enclosure: 12 mbar
 - Set-point pressure purging process: 10 mbar
 - Set-point pressure normal operation: 1.5 mbar
- ⇒ Codes
 - M- Code: 0100
 - By-Code: 1200
 - E/A-Code: 0003

Procedure:

| | |
|---|--|
|  | Press the <i>Enter-button</i> to start main menu. The control unit calls for the M-code to be entered. |
|  | The ex works M-code is '0001'. |
|  | Press the <i>Enter-button</i> to insert M-Code. |
|  | Display shows '0000', the far left digit is flashing. |
|  | Press the key sequence on the left side |
|  | to enter code '0001', |
|  | (the present M-Code). |
|  | Confirm the code input pressing <i>Enter-button</i> |
|  | The main menu is now active. The first sub menu 'Language' appears on the display. The default language of ex works is German. |
|  | To alter the language, press <i>Enter</i> . |
|  | On the left appears the word 'Deutsch' |
|  | Press the <i>Up-button</i> to change the language. |
|  | The language 'English' is now selected. |



| | |
|---|---|
| Min.Pres | The desired minimum pressure of 0.8 mbar is already adjusted ex works. Continue skipping this menu item by pressing the <i>Up-</i> key or view by pressing the <i>Enter-</i> key. |
| Max.Pres. | Now enter the desired value of the maximum pressure. Modify the present parameter as shown above. |
| 012.0mbar | The desired maximum pressure is 12.0 mbar. |
| R. Pre. Pu | The desired set-point pressure during the purging process of 10.0 mbar is already adjusted ex works. Continue passing this menu item by pressing the <i>up-</i> key. |
| Rated Pre. | The desired set-point pressure during normal operation must be adjusted. Modify the present parameter to 1.5 mbar as shown above. |
| Codes | The parameter category is now finished. The main menu continues automatically with the sub menu codes. |
| M-Code | Modify M-Code to '0100' as shown above. Please note: the M-Code cannot be set to '0000' . |
| By-Code | Modify By-Code to '1200' as shown above. |
| On/Off-C. | Set the On/Off-Code to switch the ignition-capable apparatus on or off to '0003'. |
| End | The main menu settings are now complete. |
|  | After pressing the <i>Enter-</i> key, the purging system is in operation state. |

4.5 Alarm and malfunction indications

| <i>Alarm</i> | <i>Cause</i> | <i>Actions</i> |
|--------------|--|---|
| Ext.Alar | The external alarm occurred, i.e. the external alarm loop is broken. If the external alarm loop is not used, disable the external alarm loop by a shorting bridge. | Fix shorting bridge to terminal 4 and 10 of the control unit FS 850S. |

| <i>Error message</i> | <i>Cause</i> | <i>Remedy</i> |
|----------------------|--|---|
| Error E. | EEPROM Read Error Stored configuration data is incomplete or corrupt. | Turn FS 850S off. Turn FS 850S on. If the error message occurs again, then return the control unit FS 850S to Gönzheimer Elektronik. |
| Error P. | Pressure sensor Error - The integrated pressure sensors do not work properly | |
| Error F. | flow sensor Error - The integrated flow sensors do not work properly | |
| Error C. | Hardware - fault | |

5 Flow charts

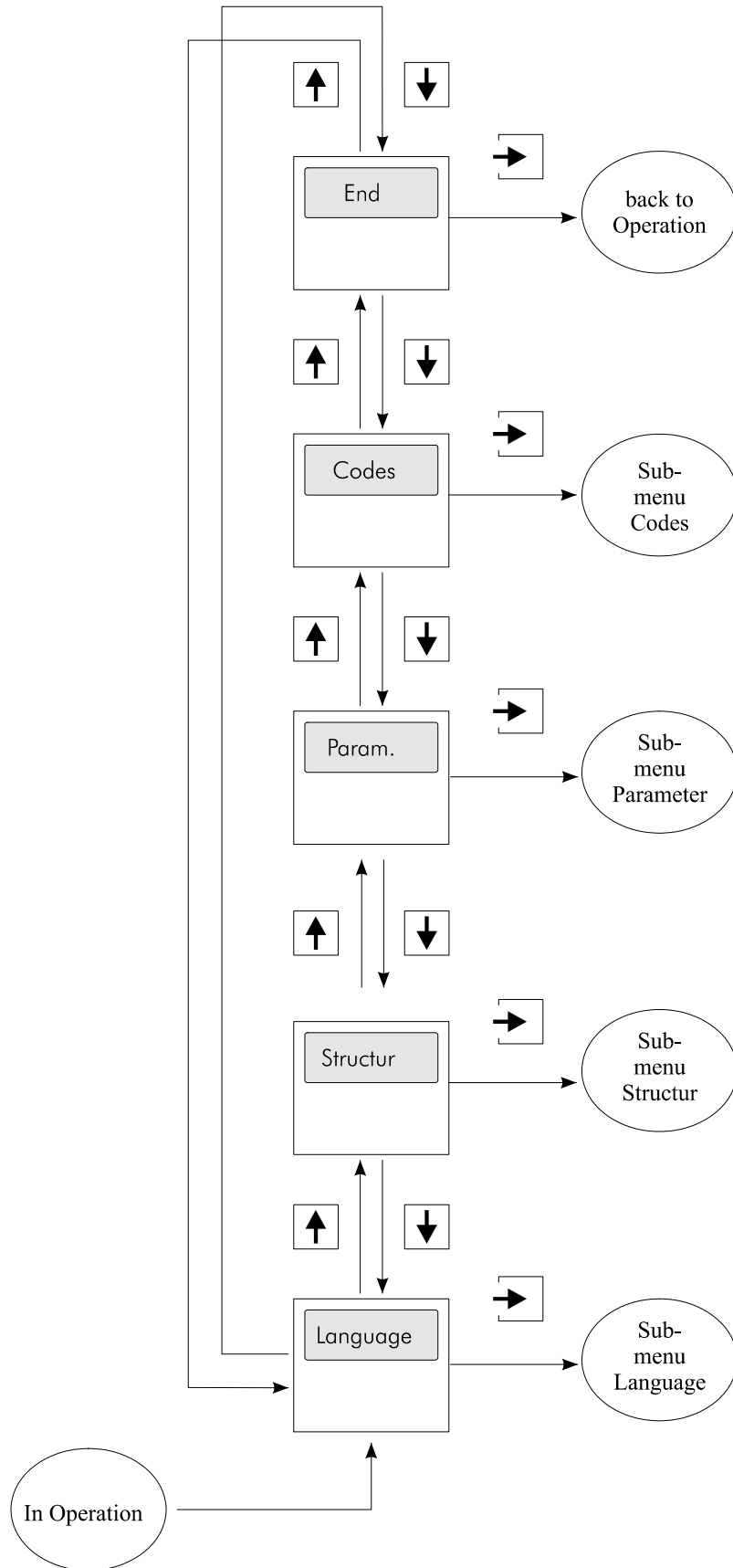


Figure 4 Flow chart main menu

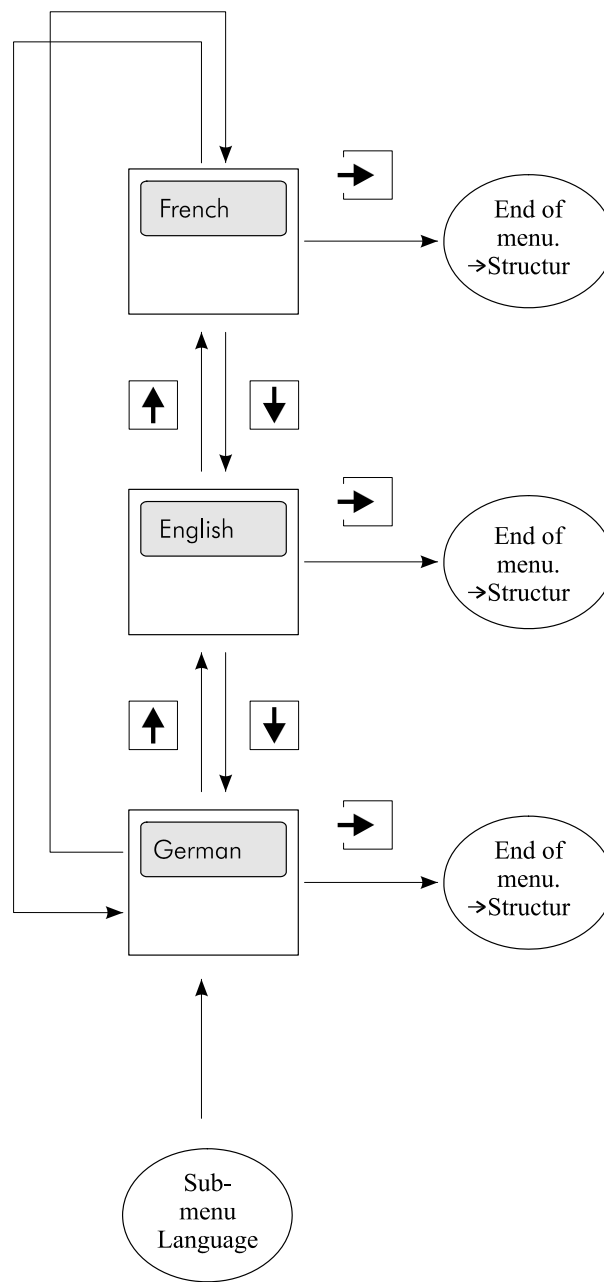


Figure 5 Flow chart language menu

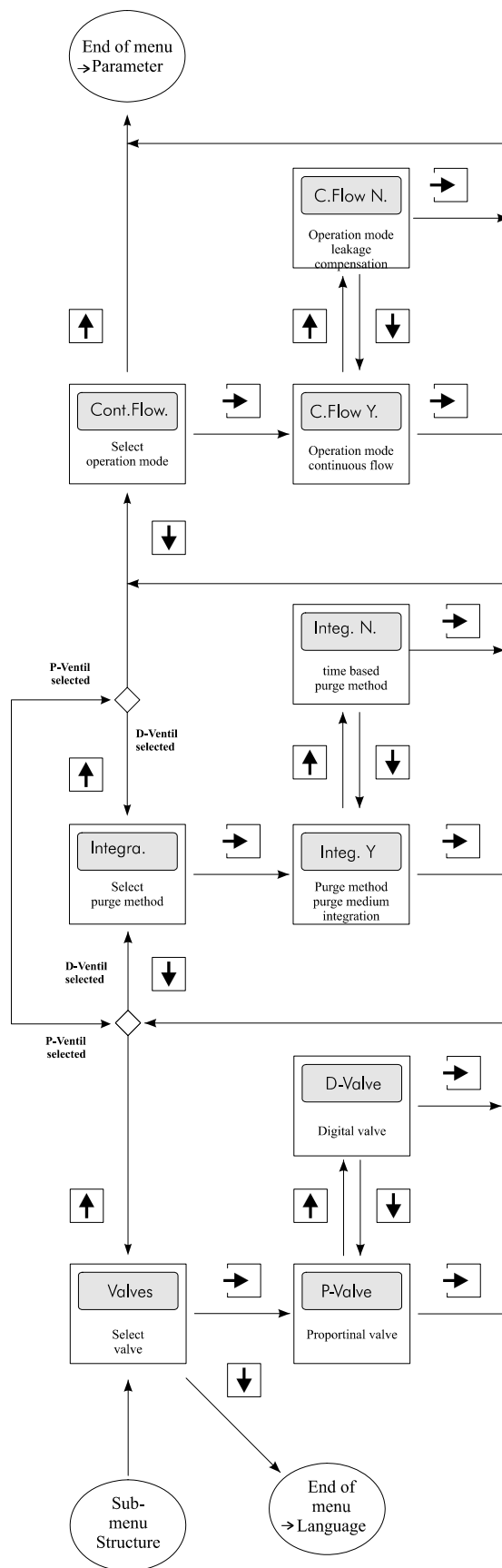


Figure 6 Flow chart structure category

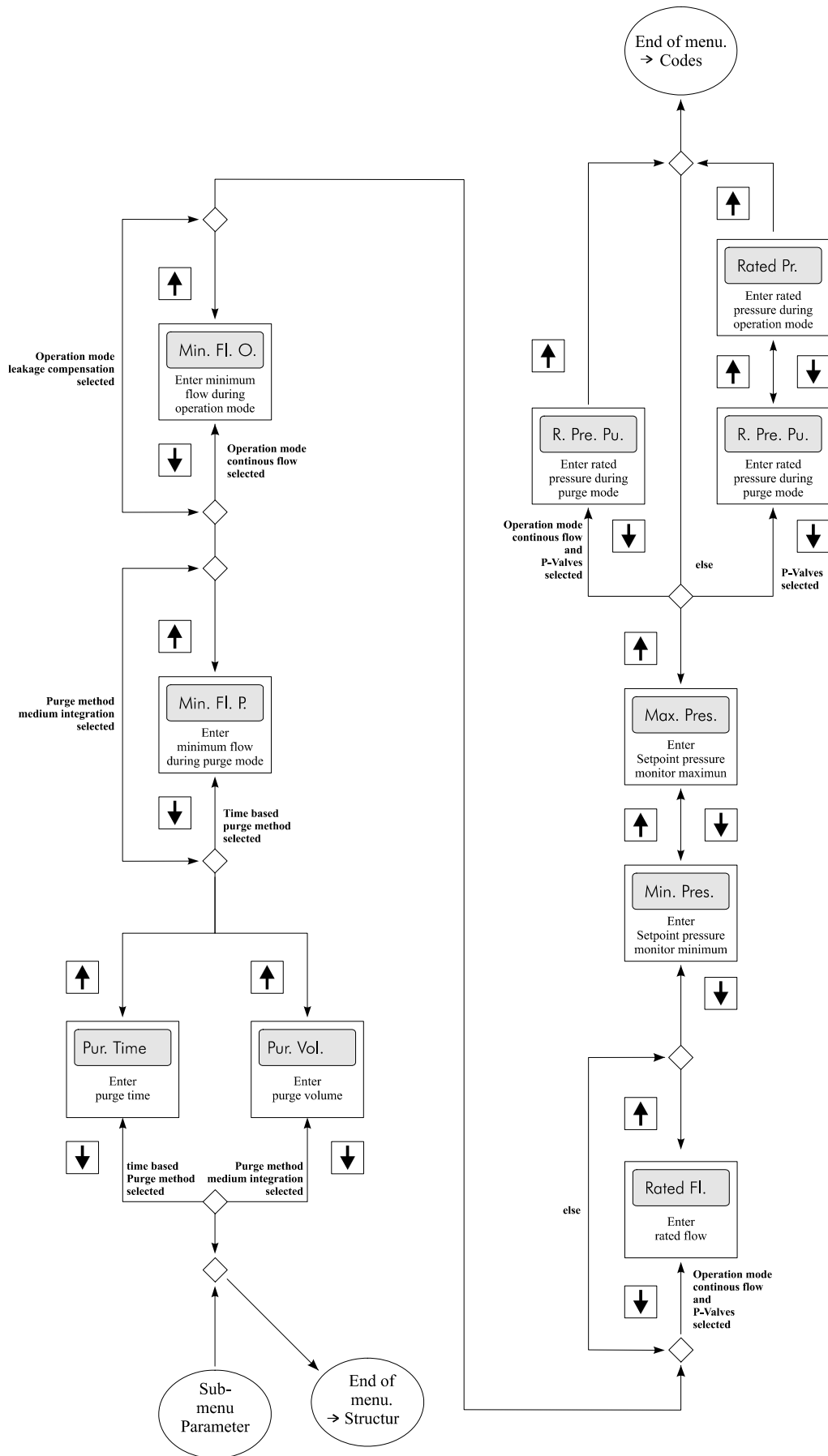


Figure 7 Flow chart parameter category

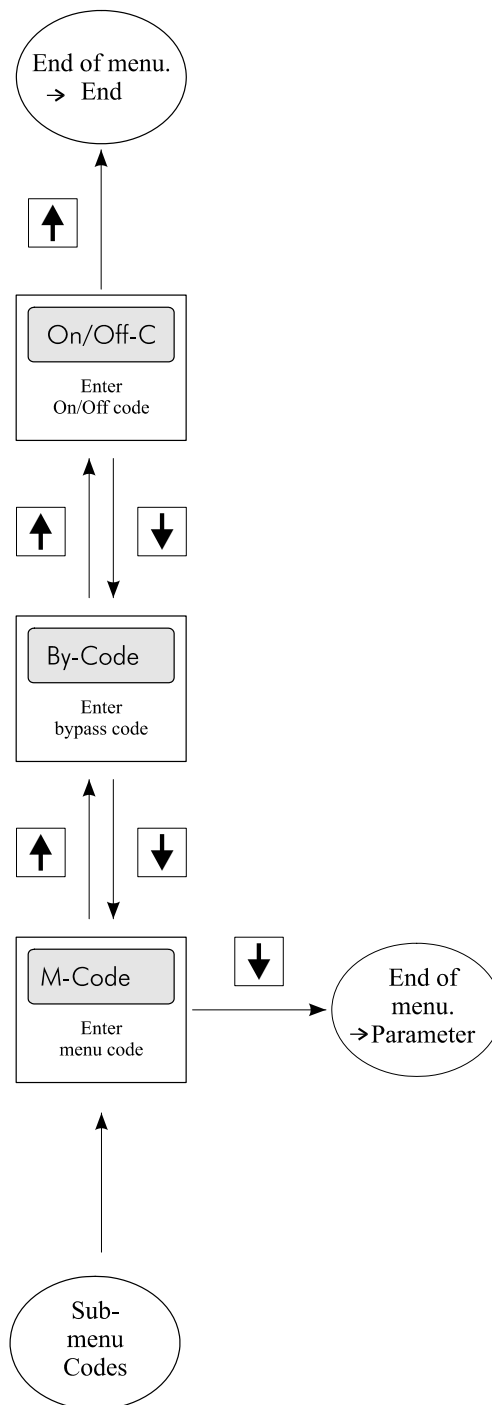


Figure 8 Flow chart code category

6 Appendix

6.1 Tables

plate orifice size

| Plate orifice [mm] | Flow rate is about [m ³ /h] |
|--------------------|--|
| 4 | 0,5 ... 1,1 |
| 6 | 1,1 ... 2,7 |
| 10 | 2,5 ... 6,5 |
| 14 | 6 ... 11 |
| 18 | 9 ... 15 |

The right diameter of the plate orifice depends upon the desired volume flow rate on the enclosure outlet and the built in nozzle of the solenoid valve. Flow rates into enclosure depend upon primary pressure and nozzle diameter.

| Pressure [bar] [10 ⁵ Pa] | Flow rate [l/s] $\rho_{\text{Air}} = 1,293 \text{ kg/m}^3$ | | | | | | | | | |
|-------------------------------------|--|--------|-------|-------|-------|-------|-------|-------|--------|--------|
| | Nozzle diameter [mm] | | | | | | | | | |
| | 0,3 | 0,5 | 0,7 | 1 | 1,5 | 2 | 3 | 4 | 5 | 6 |
| 1,5 | 0,0275 | 0,076 | 0,149 | 0,304 | 0,693 | 1,208 | 2,676 | 4,653 | 7,06 | 9,796 |
| 2 | 0,0338 | 0,094 | 0,184 | 0,374 | 0,838 | 1,48 | 3,27 | 5,651 | 8,511 | 11,098 |
| 2,5 | 0,0391 | 0,109 | 0,213 | 0,433 | 0,968 | 1,708 | 3,759 | 6,471 | 9,685 | 13,199 |
| 3 | 0,0438 | 0,0121 | 0,238 | 0,484 | 1,063 | 1,908 | 4,186 | 7,177 | 10,682 | 14,445 |
| 3,5 | 0,048 | 0,133 | 0,261 | 0,53 | 1,195 | 2,087 | 4,569 | 7,804 | 11,554 | 15,511 |
| 4 | 0,0518 | 0,144 | 0,282 | 0,573 | 1,28 | 2,252 | 4,917 | 8,37 | 12,33 | 16,441 |
| 4,5 | 0,0554 | 0,154 | 0,301 | 0,612 | 1,367 | 2,404 | 5,239 | 8,883 | 13,032 | 17,263 |

6.2 Type code

| | | | |
|---|----|---|---|
| Control unit FS850S | . | . | . |
| Mains voltage: 230 VAC | .0 | | |
| 120 VAC | .2 | | |
| 24 VDC | .6 | | |
| Plate orifice: 4 mm, range 0.5 ...1,1 m ³ /h | .0 | | |
| 6 mm, range 1.1 ...2,7 m ³ /h | .2 | | |
| 10 mm, range 2.5 ...6,5 m ³ /h ... | .4 | | |
| 14 mm, range 6 ...11 m ³ /h | .6 | | |
| 18 mm, range 9 ...15 m ³ /h | .8 | | |
| Alarm contact: | | | |
| Absent (2 nd digital valve on te. 21,22) | .0 | | |
| Present | .1 | | |

More voltages on demand;

Accessories: Additive window in control unit (recommendable, if no operation panel is used)

| Operation panels | BT |
|--|----------------|
| Intelligent operation panel, Ex ib IIC T6, for mounting on the front | BT851.0 |
| Intelligent operation panel, Ex ib IIC T6, with IP65 housing | BT851.5 |
| Operation panel, Ex ib IIC T6, for mounting on the front | BT854.0 |
| with key-operated switch | BT854.1 |
| Operation panel, Ex ib IIC T6, with IP65 housing | BT855.0 |
| with key-operated switch | BT855.1 |

| Solenoid valve | SV | . | - | | | |
|--|----|---|---|--|--|--|
| Working type: | | | | | | |
| digital | D | | | | | |
| proportional | P | | | | | |
| Effective channel diameter: | | | | | | |
| 2 mm..... | .2 | | | | | |
| 3 (SVP: up to 300 ltr. Cabinet size)..... | .3 | | | | | |
| 5 (SVP: bigger than 300 ltr. Cabinet size)..... | .5 | | | | | |
| n mm (at SVD; diameter of the built in nozzle) | .n | | | | | |
| Standard area | | | | | | |
| Europe (ATEX) | -A | | | | | |
| USA (NEC 500) | -U | | | | | |
| Power supply | | | | | | |
| 230V | 0 | | | | | |
| 110 – 120V | 2 | | | | | |
| 24 V | 6 | | | | | |
| Work out | | | | | | |
| Standard with 3m cable, brass body | .0 | | | | | |
| With Ex e terminal box, brass body | .K | | | | | |

| Fuse for solenoid valve | | | Nominal | Order.Nr |
|-------------------------|-------|-------|---------|----------|
| (Ex-version) | | | 100 mA | SI850.0 |
| U _{Nominal} | SVP | SVD | 160mA | SI850.1 |
| | | | 200 mA | SI850.2 |
| 230 VAC, 220 VAC | 200mA | 100mA | 315 mA | SI850.3 |
| | | | 500 mA | SI850.4 |
| 120 VAC, 110 VAC | 315mA | 160mA | 630 mA | SI850.5 |
| | | | 1000 mA | SI850.6 |
| 24 VAC, 24 VDC | 1,6 A | 630mA | 1600 mA | SI850.7 |
| | | | 2000mA | SI850.8 |


Remark: please order the Ex- solenoid valve fuse separately

6.3 Technical Details


| | | Control unit FS850S |
|---------------------------|---|--|
| General | Mounting | inside hazardous area |
| | Ex- protection class | See paragraph 6.4 Marking |
| | EC- type exam.cert. | DMT 99 ATEX E 003 BVS 06 ATEX E 088 |
| | Environment protection | IP 65 (Remark: without outlet drill) |
| Housing | Dimensions | H x W x D: 220 mm x 120 mm x 90 mm |
| | Material | Aluminium, lacquered / Ral 7035 |
| Electrical specifications | Power consumption | About 2.5 VA (without peripherals) |
| | Main voltage | 24VDC, 24VAC, 110VAC, 120VAC, 220VAC, 230VAC 48 ...62 Hz |
| | Working circuits Terminal 11, 12, 13, 14 | AC: U ≤ 250VAC, I ≤ 5A at cos φ > 0,7 DC: U ≤ 30 VDC, I ≤ 5 A, P ≤ 150 W |
| | Control circuits Terminal 1..10 | Ex protection class: intrinsically safe Ex ib IIC see declaration of conformity for further details |
| | Min. and max. clamping torque | min. 0,3 Nm max. 0,4 Nm |
| | Min. und Max. wire cross- section | steep: 0,2 – 2,5 mm ² flexible: 0,2 – 2,5 mm ² |
| Pneumatic | Pressure range | 0 - 22 mbars |
| | Flow rate range | 0,5.. 15 m ³ /h, dependent upon plate orifice size |
| Mounting | Position | Position independent, only intake and outlet of the control unit should be lined up on a horizontal axis. |
| | Environment tempera- ture | -10°C ...+50°C at T6 -10°C ...+60°C at T4 |
| | Humidity | 5-95%, non-condensing |
| Ex p Configuration | Parameter input | LC-Display, menu guided Different languages : German, English, French, Dutch, Spanish |
| | Storage | by EEPROM double saved with CRC |
| Safety standard | SIL parameters | HFT = 1 device category 3 PFH = 170 FIT SIL 2 service interval: 3 years |

6.4 Marking


Marking of type FS850S:

| | | |
|---|--|--------------------------------|
|  | I I 2 G Ex eb mb [ib] [pxb] IIC T6 oder Ex e mb [ib] [px] IIC T6 Gb | -20°C ≤ T _A ≤ +45°C |
| | II 2 G Ex eb mb [ib] [pxb] IIC T4 oder Ex e mb [ib] [px] IIC T4 Gb | -20°C ≤ T _A ≤ +60°C |
| | II 2 D Ex tb [ib] [p] IIIC T70 C IP65 oder Ex tb [ib] [p] IIIC T70 C Db IP65 | -20°C ≤ T _A ≤ +60°C |

Marking of type FS850S.*.*.HT:

| | | |
|---|--|--------------------------------|
|  | II 2 G Ex eb mb [ib] [pxb] IIC T4 oder Ex e mb [ib] [px] IIC T4 Gb | -20°C ≤ T _A ≤ +70°C |
|---|--|--------------------------------|

Marking of operator panel BT851:

| | |
|---|--|
|  | I I 2 G Ex ib IIC T6 oder Ex ib IIC T6 Gb II 2 D Ex ib IIIC T 80 C Db oder II 2 D Ex ib IIIC T 80 C |
|---|--|

6.5 Block diagrams

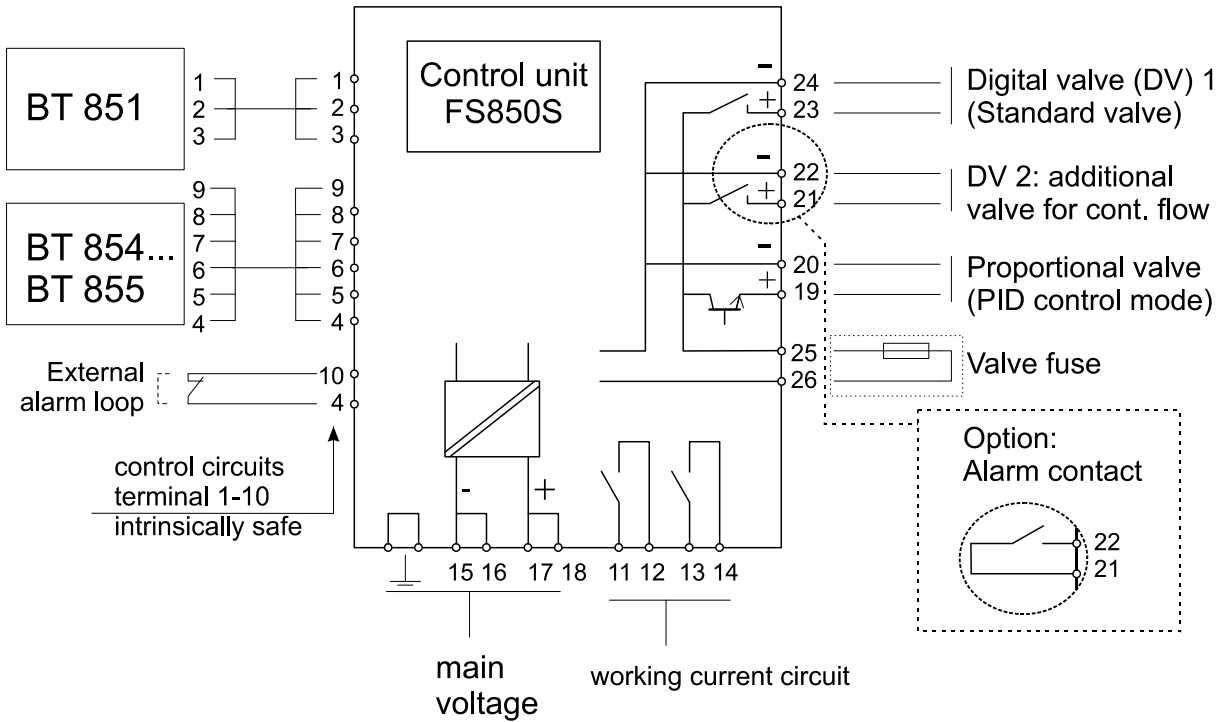


Figure 9 Electrical block diagram

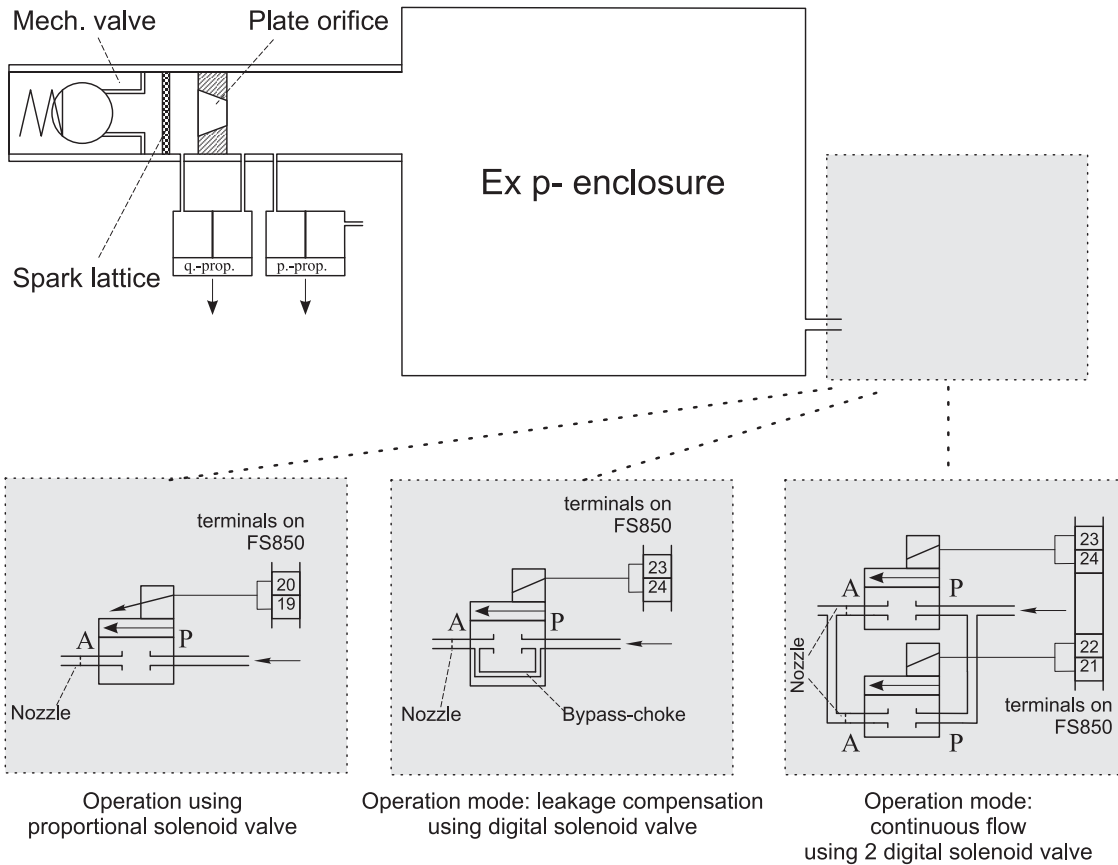


Figure 10 Pneumatic block diagram

6.6 Dimensions

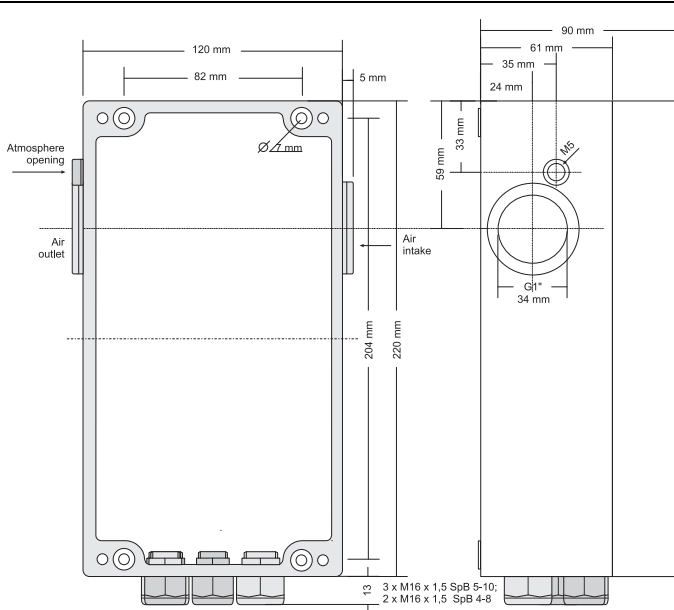


Figure 11: Dimensions FS 850S

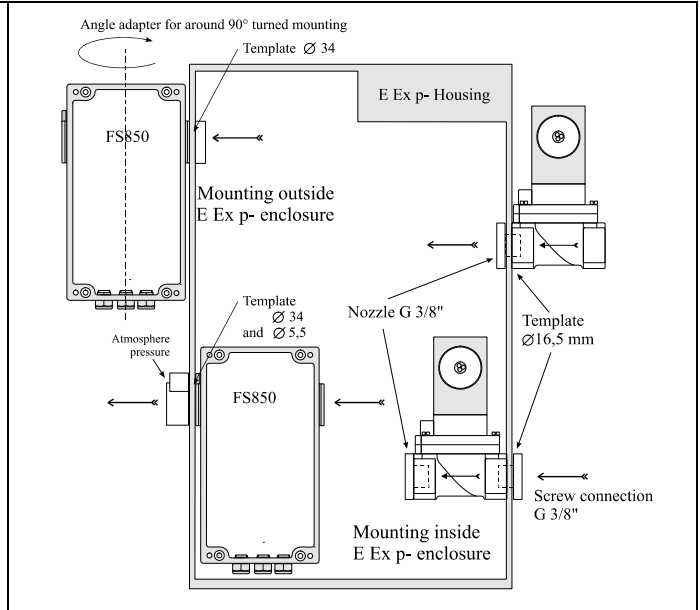


Figure 12: Mounting examples

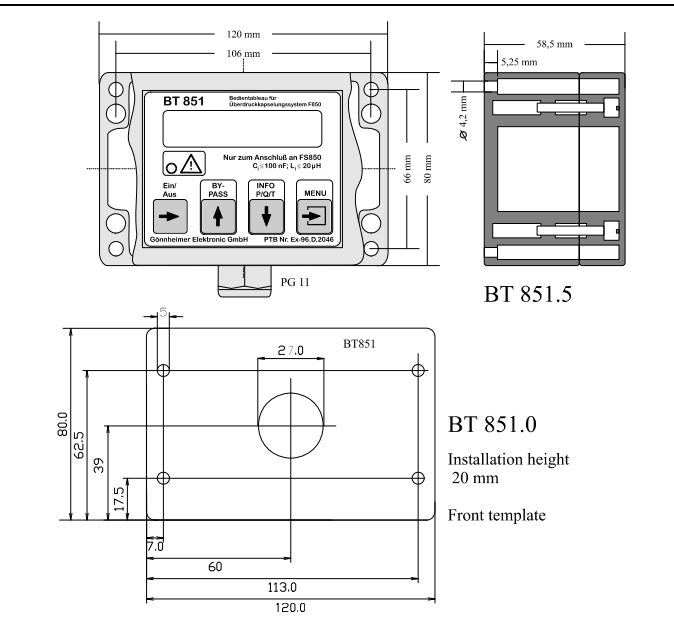


Figure 13: Dimensions and template BT 851

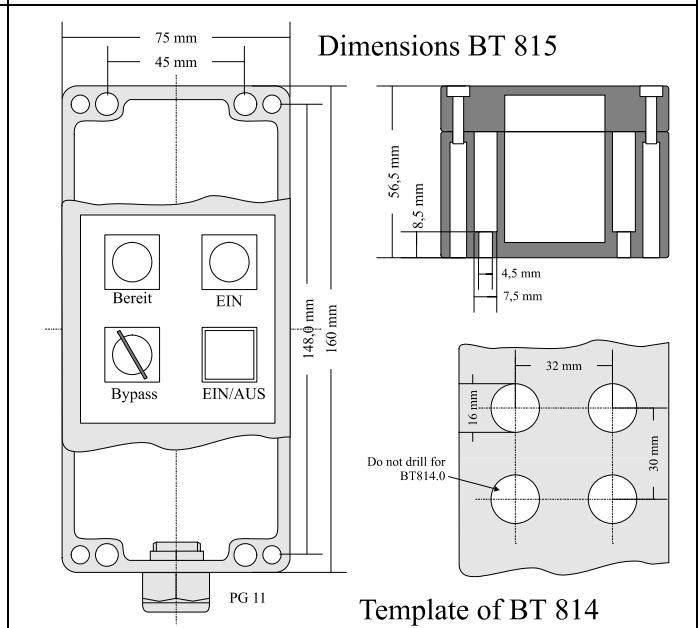


Figure 14: Dimensions BT 855, template BT 854

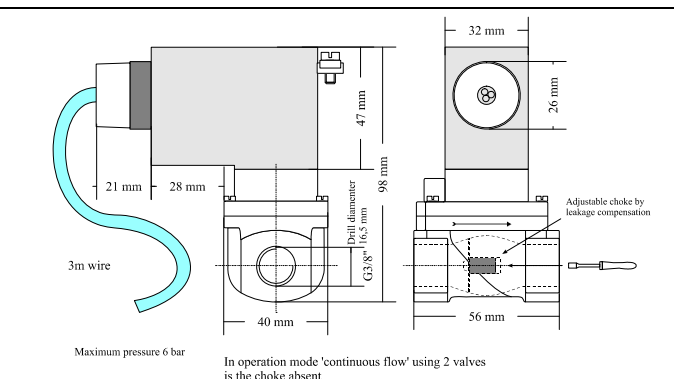


Figure 15: Dimensions digital solenoid valve

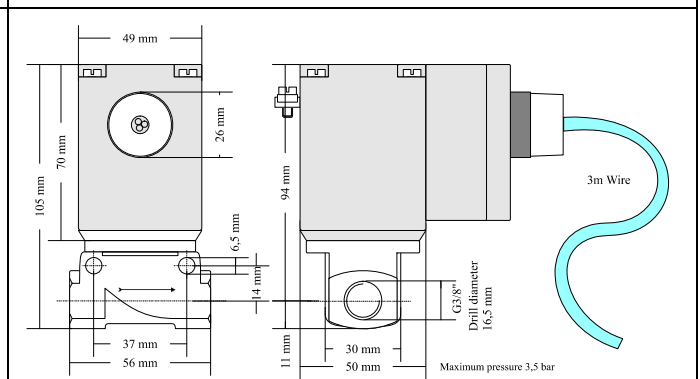


Figure 16: Dimensions proportional solenoid valve

6.7 Sequence of operation diagram

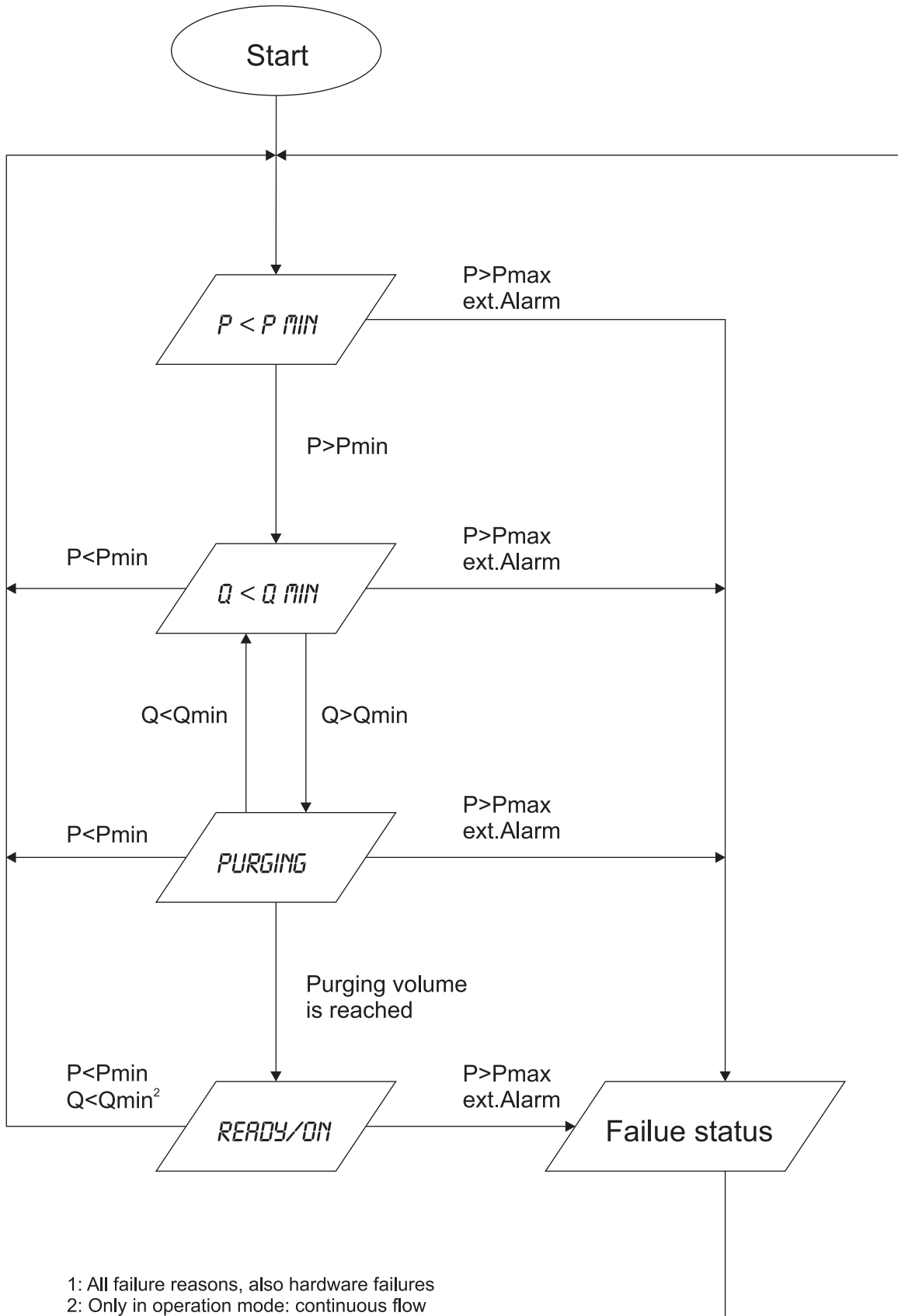


Abbildung 17: Flow chart operation diagram

6.8 List of Parameters

| | | | |
|------------------------------|-------------------|----------------|------|
| System identification | Installation no.: | Date: | |
| FS 850S. . | Production no.: | Solenoid valve | BT 8 |

| Inputs | Description | Display | Value/ state |
|-------------------------|--|------------------------|---|
| Language | F850S language | Language | |
| Structure | | | |
| Valve | Solenoid valve type used with this purging system? | Valves Tick box | P-Valve <input type="checkbox"/> D-Valve <input type="checkbox"/> |
| Purging method | Time based purging method (Integ N.) or integration purging method (Integ. Y.) | Integra. Tick box | Integ. Y. <input type="checkbox"/> Integ. N. <input type="checkbox"/> |
| Operational mode | Continuous flow (C. flow Y.) or leakage compensation (C. flow N.) | Cont. Flow Tick box | C. Flow Y. <input type="checkbox"/> C. Flow N. <input type="checkbox"/> |
| Parameters | Purge time | Pur. Time | |
| | Purge volume | Pur. Vol. | |
| | Minimum flow rate during purging procedure | Min. Fl. P. | |
| | Minimum flow rate during normal operation by op. mode continuous flow | Min.Fl. O. | |
| | Set-point flow rate by operation mode continuous flow | Rated Fl. | |
| | Pressure monitor, minimum pressure | Min. Pres. | |
| | Pressure monitor, maximum pressure | Max. Pres | |
| | Set-point pressure during purging | R. Pre. Pu. | |
| | Set-point pressure during normal operation | Rated Pr. | |
| Codes | Code for main menu | M-Code | |
| | Code for bypass | By-Code | |
| | Code to enable switching ignition-capable device | On/Off-C. | |

7 Additions/changes of the manual for F850S

7.1 Ergänzungen / Änderungen zu Softwareversion 9.7.4

Connections:

Alarm contact: term. 21,22

Seite 9

Basic settings:

| | |
|--|----------|
| Purge volume | 1000 l |
| Min. flow | 3,0 l/s |
| Min. pressure | 1,5 mbar |
| Max. pressure | 27 mbar |
| Set point pressure while purging phase | 18 mbar |
| Set point pressure while normal op. | 3,0 mbar |
| Alarm pressure | 2,0 mbar |

Seite 10

Technische Details:

| | |
|---------------------------|--------------|
| Pressure measurement | 0,0 – 30mbar |
| Adjustable min. pressure: | 0,8 mbar |
| Adjustable max. pressure: | 27 mbar |

Seite 23

7.2 Additions/changes of the manual for F850S, option: Decrease of pressure signal alarm

Device types: FS850S.x.x.1; Software version 2.0.7 and higher

Connection:

Alarm relay, clamps 22,21

Page 7

Function:

With this option a spontaneous decrease of pressure is announced over a passive relay contact. In the parameter menu of the FS850S the reporting pressure is specified. If the housing internal pressure falls during the enterprise below this reporting pressure, then the early warning opens relay contact. This signal can be evaluated problem-free in the control room. The relay contact is implemented in Ex e clamps, therefore the inquiry signal cannot be intrinsically safe implemented into the control room.

Function table:

| Status, operating condition | Relay contact |
|----------------------------------|----------------------|
| P > reporting pressure, broad or | Relay contact closed |
| Otherwise | Relay contact open |

7.3 Additions/changes of the manual for F850S, option: bypass monitor

Device types: FS850S.x.x.1; Software version 3.1.3 or higher

Connection:

Alarm relay, clamps 22,21

Page 7

Function:

If the user activates the pressure bypass function the Contact 21-22 is open, otherwise it's closed.

Function table:

| Status, operating condition | Relay contact |
|-----------------------------|----------------------|
| Bypass mode is active | Relay contact open |
| Otherwise | Relay contact closed |



Translation

EC-Type Examination Certificate

(1)

(2)

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

(3)

BVS 06 ATEX E 088

(4)

Equipment: Pressurised enclosure systems types F 850 S and F 860 S

(5)

Manufacturer: Gönzheimer Elektronik GmbH

(6)

Address: 67433 Neustadt/Weinstraße, Germany

(7)

The design and construction of this equipment and any acceptable variation thereto are specified in the appendix to this type examination certificate.

(8)

The certification body of EXAM BBG Prüf- und Zertifizier GmbH, notified body no. 0158 in accordance with Article 9 of the Directive 94/9/EC of the European Parliament and the Council of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.
The examination and test results are recorded in the test and assessment report BVS PP 06.2078 EG.

(9)

The Essential Health and Safety Requirements are assured by compliance with:

| | | | |
|------------------|---|------------------------|------------------------------|
| EN 60079-0:2004 | General requirements | EN 60079-2:2004 | Pressurised Enclosure 'p' |
| EN 60079-7:2003 | Increased Safety 'e' | FDIS IEC 60079-11:2005 | Intrinsic Safety 'i' |
| EN 60079-18:2004 | Encapsulation 'm' | IEC 61241-0:2004 | General requirements |
| EN 61241-1:2004 | Protection by Enclosures 'tD' | IEC 61241-11:2005 | Intrinsically safe equipment |
| EN 954-1:1996 | Safety devices required for the safe functioning of equipment with respect to explosion risks | | |

(10)

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

(11)

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

(12)

The marking of the equipment shall include the following:



II 2G for FS850S, FS860S and BT 851
II 2D for FS850S and BT 851

details see 15.1

EXAM BBG Prüf- und Zertifizier GmbH

Bochum, dated 25th July 2006

signed: Migenda

signed: Dr. Arnold

Certification body

Special services unit

(13)

Appendix to

(14)

EC-Type Examination Certificate

BVS 06 ATEX E 088

(15) 15.1 Subject and type

Pressurised enclosure systems of types F 850 S and F 860 S

Control unit type FS850S:

| | |
|--|---|
| II 2G Ex e mb [ib] [px] IIC T6 | $-20\text{ °C} \leq T_A \leq +45\text{ °C}$ |
| II 2G Ex e mb [ib] [px] IIC T4 | $-20\text{ °C} \leq T_A \leq +60\text{ °C}$ |
| II 2D Ex tD [ibD] [pD] A21 IP 65 T 70 °C | $-20\text{ °C} \leq T_A \leq +60\text{ °C}$ |

Control unit type FS850S.***.HT:

| | |
|--------------------------------|---|
| II 2G Ex e mb [ib] [px] IIC T4 | $-20\text{ °C} \leq T_A \leq +70\text{ °C}$ |
|--------------------------------|---|

Control unit type FS860S:

| | |
|--------------------------------|---|
| II 2G Ex e mb [ib] [px] IIC T6 | $-20\text{ °C} \leq T_A \leq +45\text{ °C}$ |
| II 2G Ex e mb [ib] [px] IIC T4 | $-20\text{ °C} \leq T_A \leq +60\text{ °C}$ |

Operator panel BT 851:

| | |
|-------------------------|--|
| II 2G Ex ib IIC T6 | |
| II 2D Ex ibD 21 T 80 °C | |

15.2 Description

The pressurised enclosure systems of types F 850 S and F 860 S are used to assemble explosion proof electrical equipment for the type of protection Pressurised Enclosure (Pressurisation) according to EN/IEC 60079-2 and EN/IEC 61241-4. They consist of the control units FS 850 S or FS 860 S and the operator panel BT 851 plus additional accessory equipment.

The functional safety of the pressurised enclosure system type F 850 S was tested according to the standard "Safety devices required for the safe functioning of equipment with respect to explosion risks". It complies with category 3 of this standard.

15.3 Parameters

| | | | | | | | | | |
|--|---|-----|-----|-----------|----------|---------|---------|------------|-----------|
| Power supply (mains) (Terminals 15 to 18) | 230, 220, 120, 110, 24 V AC, or. 24 V DC Safety-relevant maximum value $U_m = 253\text{ V}$ | | | | | | | | |
| Valve fuse (Terminals 25/26) | accessory valve fuse of type SI850 | | | | | | | | |
| Valve connections (Terminals 21/22 and 23/24) | Same voltage as power supply (mains) | | | | | | | | |
| Proportional valve connection (Terminals 19/20) | Same voltage as power supply (mains) | | | | | | | | |
| Contact circuits (Terminals 11/12 and 13/14) | <table border="0"> <tr> <td>ACV</td> <td>DCV</td> </tr> <tr> <td>U = 250 V</td> <td>U = 30 V</td> </tr> <tr> <td>I = 5 A</td> <td>I = 5 A</td> </tr> <tr> <td>cosφ = 0.7</td> <td>P = 150 W</td> </tr> </table> | ACV | DCV | U = 250 V | U = 30 V | I = 5 A | I = 5 A | cosφ = 0.7 | P = 150 W |
| ACV | DCV | | | | | | | | |
| U = 250 V | U = 30 V | | | | | | | | |
| I = 5 A | I = 5 A | | | | | | | | |
| cosφ = 0.7 | P = 150 W | | | | | | | | |

Intrinsically safe connections

in type of protection Intrinsic Safety Ex ib IIC

The maximum values, the maximum permitted values and the outer reactances as well as the numbers of the terminals are shown in the table below:

| Terminal | U_0 | I_0 | P_0 | L_0 | C_0 |
|----------|-----------------------------|-------|--------|-------|-----------|
| 1, 9 | 8.61 V | 51 mA | 110 mW | 10 mH | 2 μ F |
| 4 | 8.61 V | 10 mA | 22 mW | 10 mH | 2 μ F |
| 3 | 8.61 V | 20 mA | 44 mW | 10 mH | 2 μ F |
| 5, 6, 10 | 8.61 V | 6 mA | 13 mW | | |
| 2 | Mass connection of circuits | | | | |

The intrinsically safe circuits (terminals 1 to 10) are safely galvanically separated from all other circuits up to the peak value of the nominal voltage of 375 V.

The permitted ambient temperature range is for temperature class T6 -20 °C to 45 °C and for temperature class T4: -20 °C to 60 °C.

For control unit type FS850S.*.*.HT (only T4) the permitted ambient temperature range is -20 °C to 70 °C.

(16) Test and assessment report

BVS PP 06.2078 EG, Stand 25.07.2006

(17) Special conditions for safe use

None

We confirm the correctness of the translation from the German original. In the case of arbitration only the German wording shall be valid and binding.

DEKRA EXAM GmbH
 44809 Bochum, 09.07.2012
 BVS-Schu/Ar E 1215/12

 Certification body

 Special services unit



Translation

1st Supplement

(Supplement in accordance with Directive 94/9/EC Annex III number 6)

to the EC-Type Examination Certificate BVS 06 ATEX E 088

Equipment: Pressurised enclosure systems types F 850 S and F 860 S
Manufacturer: Gönzheimer Elektronik GmbH
Address: 67433 Neustadt/Weinstraße, Germany

Description

The control units of the pressurised enclosure systems may now also be manufactured according to testing documents listed in the pertinent test and assessment report.

The Essential Health and Safety Requirements of the modified equipment are assured by compliance with:

| | | | |
|------------------|---|------------------------|------------------------------|
| EN 60079-0:2004 | General requirements | EN 60079-2:2004 | Pressurised Enclosure 'p' |
| EN 60079-7:2003 | Increased Safety 'e' | FDIS IEC 60079-11:2005 | Intrinsic Safety 'i' |
| EN 60079-18:2004 | Encapsulation 'm' | IEC 61241-0:2004 | General requirements |
| EN 61241-1:2004 | Protection by Enclosures 'tD' | IEC 61241-11:2005 | Intrinsically safe equipment |
| EN 954-1:1996 | Safety devices required for the safe functioning of equipment with respect to explosion risks | | |

The marking of the equipment shall include the following:

for type FS850S

II 2G Ex e mb [ib] [px] IIC T6 or

II 2G Ex e mb [ib] [px] IIC T4 and

II 2D Ex tD [ibD] [pD] A21 IP 65 T 70 °C

for type FS850S.*.*.HT

II 2G Ex e mb [ib] [px] IIC T4

for type FS860S

II 2G Ex e mb [ib] [px] IIC T6 or

II 2G Ex e mb [ib] [px] IIC T4

for type BT 851

II 2G Ex ib IIC T6 and

II 2D Ex ibD 21 T 80 °C



Test and assessment report
BVS PP 06.2078 EG, as of 23.10.2006

EXAM BBG Prüf- und Zertifizier GmbH
Bochum, dated 23rd October 2006

signed: Dr. Jockers

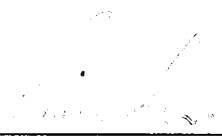
signed: Dr. Eickhoff

Certification body


Special services unit

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

DEKRA EXAM GmbH
44809 Bochum, 09.07.2012
BVS-Schu/Ar E 1215/12



Certification body



Special services unit

To the newly added control units the following constant flow-through volume applies in relation to the monitored minimum overpressure:

| Minimum overpressure | Constant flow-through volume | |
|----------------------|------------------------------|------------------|
| | FS850S... .BY1,2 | FS850S... .BY1,5 |
| 80 Pa | 0.013 l/s | 0.020 l/s |
| 100 Pa | 0.014 l/s | 0.022 l/s |
| 200 Pa | 0.020 l/s | 0.031 l/s |
| 400 Pa | 0.028 l/s | 0.044 l/s |
| 600 Pa | 0.034 l/s | 0.054 l/s |
| 800 Pa | 0.040 l/s | 0.062 l/s |
| 1000 Pa | 0.044 l/s | 0.070 l/s |

Special conditions for safe use

None

Test and assessment report

BVS PP 06.2078 EG, as of 29.05.2007

DEKRA EXAM GmbH

Bochum, 29th May 2007

signed: Dr. Jockers

signed: Dr. Eickhoff

Certification body

Special services unit

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

DEKRA EXAM GmbH
44809 Bochum, 09.07.2012
BVS-Schu/Ar E 1215/12

Certification body

Special services unit



Translation

2nd Supplement

(Supplement in accordance with Directive 94/9/EC, Annex III number 6)

to the EC-Type Examination Certificate BVS 06 ATEX E 088

Equipment: Pressurised enclosure systems types F 850 S and F 860 S
Manufacturer: Gönzheimer Elektronik GmbH
Address: 67433 Neustadt/Weinstraße, Germany

Description

The pressurised enclosure systems are supplemented by the following control units:

FS850S.*.*. BY1,2
FS850S.*.*. BY1,5
FS850S.*.*.HT. BY1,2
FS850S.*.*.HT. BY1,5.

These control units use an additional flow nozzle in the pressure monitoring module to achieve a continual purging which helps to control the minimum overpressure needed.

The Essential Health and Safety Requirements of the modified version are assured by compliance with:

| | |
|-------------------|---|
| EN 60079-0:2006 | General requirements |
| EN 60079-2:2004 | Pressurised Enclosure 'p' |
| EN 60079-7:2003 | Increased Safety 'e' |
| EN 60079-11:2007 | Intrinsic Safety 'i' |
| EN 60079-18:2004 | Encapsulation 'm' |
| EN 954-1:1996 | Safety devices required for the safe functioning of equipment with respect to explosion risks - general design principles |
| EN 61241-0:2006 | General requirements |
| EN 61241-1:2004 | Protection by Enclosure 'tD' |
| IEC 61241-11:2005 | Intrinsically safe equipment 'iD' |

The marking of the equipment remains unchanged.

Parameters

All electrical parameters remain unchanged.

Translation

(1) **3rd Supplement to the
EC-Type Examination Certificate**

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

(3) No. of EC-Type Examination Certificate: **BVS 06 ATEX E 088**

(4) Equipment: **Pressurised Enclosed Systems Types 850S and 860S**

(5) Manufacturer: **Gönzheimer Elektronik GmbH**

(6) Address: **67433 Neustadt an der Weinstraße, Germany**

(7) The design and construction of this equipment and any acceptable variation thereto are specified in the appendix to this type examination certificate.

(8) The certification body of DEKRA EXAM GmbH, notified body no. 0158 in accordance with Article 9 of the Directive 94/9/EC of the European Parliament and the Council of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive. The examination and test results are recorded in the test and assessment report BVS PP 06.2078 EG.


(9) The Essential Health and Safety Requirements are assured by compliance with:

- IEC 60079-0:2011 **General requirements**
- EN 60079-2:2007 **Pressurised Enclosure 'p'**
- EN 60079-7:2007 **Increased Safety 'e'**
- EN 60079-11:2012 **Intrinsic Safety 'i'**
- EN 60079-18:2009 **Encapsulation 'm'**
- EN 60079-31:2009 **Protection by Enclosure 't'**
- EN 50495:2010 **Safety devices required for the safe functioning of equipment with respect to explosion risks**

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

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

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

 **II 2G see section 15.1**
II 2D see section 15.1

DEKRA EXAM GmbH
Bochum, dated 10th May 2012

Signed: Simanski

Signed: Hauke

Certification body

Special services unit


- (13) Appendix to
- (14) **3rd Supplement to the EC-Type Examination Certificate
BVS 06 ATEX E 088**
- (15) 15.1 Subject and type

Pressurised enclosure systems of the following types:
type F850S.***, type F850S.***.BY1,*, type F860S.*** type F860S.***.BY1,*


The marking of the equipment has to include the following details:

Control unit type FS850S.*** and type FS850S.***.BY1,*:


alternatively

| | | | |
|---|--|------------------------------------|--------------------------------|
|  | II 2G Ex e mb [ib] [px] IIC T6 Gb | Ex eb mb [ib] [pxb] IIC T6 | -20°C ≤ T _a ≤ +45°C |
| | II 2G Ex e mb [ib] [px] IIC T4 Gb | Ex eb mb [ib] [pxb] IIC T4 | -20°C ≤ T _a ≤ +60°C |
| | II 2D Ex tb [ib] [p] IIIC T 70 °C Db IP 65 | Ex tb [ib] [pb] IIIC T 70 °C IP 65 | -20°C ≤ T _a ≤ +60°C |


Control unit type FS850S.***.HT und type FS850S.***.HT.BY1,*:

| | | | |
|---|-----------------------------------|----------------------------|--------------------------------|
|  | II 2G Ex e mb [ib] [px] IIC T4 Gb | Ex eb mb [ib] [pxb] IIC T4 | -20°C ≤ T _a ≤ +70°C |
|---|-----------------------------------|----------------------------|--------------------------------|

Control unit type FS860S.*** und type FS860S.***.BY1,*:

| | | | |
|---|-----------------------------------|----------------------------|--------------------------------|
|  | II 2G Ex e mb [ib] [px] IIC T6 Gb | Ex eb mb [ib] [pxb] IIC T6 | -20°C ≤ T _a ≤ +45°C |
| | II 2G Ex e mb [ib] [px] IIC T4 Gb | Ex eb mb [ib] [pxb] IIC T4 | -20°C ≤ T _a ≤ +60°C |

Operator panel BT 851:

| | | |
|---|-----------------------------|--------------------|
|  | II 2G Ex ib IIC T6 Gb | Ex ib IIC T6 |
| | II 2D Ex ib IIIC T 80 °C Db | Ex ib IIIC T 80 °C |

15.2 Description

The circuits of the control units may now also be manufactured according to the test documents provided in the pertinent test and assessment report. Another reason for issuing this supplement was to evidence the compliance of the equipment with the updated standards listed above which in turn also requires a modification of the marking. The pressurised enclosure systems of types F 850 S and F 860 S were tested according to standard EN 50495: 2010, "Safety devices required for the safe functioning of equipment with respect to explosion risks". With regard to their functionality the systems are suitable for use in safety functions up to a safety integrity level of SIL 2. This assessment applies to the "high demand mode of operation". The software considered here is version 3.1.x as of 22.11.2005. The requirements of category 3 regarding one-fault safety are met; this corresponds with a hardware fault tolerance of HFT = 1.

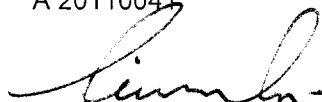
15.3 Parameters

All parameters remain unchanged.

- (16) Test and assessment report
BVS PP 06.2078 EG as of 10th May 2012
- (17) Special conditions for safe use
None

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

DEKRA EXAM GmbH
44809 Bochum, 10.05.2012
BVS-Kr/Ar A 20110041



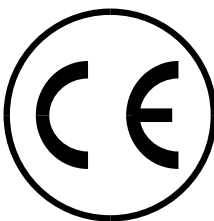
Certification body



Special services unit

EG-Konformitätserklärung

Declaration of conformity / Déclaration de conformité



Communauté Européenne

Anbieter:
Supplier:
Fournisseur

Gönzheimer Elektronik GmbH

Anschrift: Gewerbegebiet Nachtweide
Address: Dr.-Julius-Leber-Straße 2
Adresse: 67433 Neustadt/Weinstraße

Produkt: **FS850S,**
Product: **Überdruckkapselungssystem**
Produit:

Das oben beschriebene Produkt erfüllt die Schutzanforderungen der folgenden EG-Richtlinien / the product described above complies with the following EG- rules / le produit décrit ci-dessus accomplit CU- réglementations

2004/108/EG, 93/68/EWG, 94/9/EG

und ist konform mit / and is in conformity with / et est conforme á:

EN 60079-0:2012 Allgemeine Bestimmungen
EN 60079-02:2007 Überdruckkapselung 'p'
EN 60079-07:2007 Erhöhte Sicherheit 'e'
EN 60079-11:2012 Eigensicherheit 'i'
EN 60079-18:2009 Vergusskapselung 'm'
EN 60079-31:2009 Schutz durch Gehäuse 't'
EN 50495 : 2010 Sicherheitseinrichtungen
EN 1127-1: 2011, ATEX- Grundnorm
EN 61000-6-4: 2011, Fachgrundnorm Störaussendung: Industriebereich
EN 61000-6-2: 2005, Fachgrundnorm Störfestigkeit: Industriebereich

zusätzliche Angaben / additional information / informations supplémentaires:

Qualitätsmanagement- System nach ISO EN DIN 9001:2008
Anerkanntes Qualitätssicherungssystem nach Richtlinie 94/9/EG
Überwachung des QM-Systems durch TÜV- CERT-Zertifizierungsstelle; CE: [0044]

EG- Baumusterprüfbescheinigung / EC- Type certification / Attestation d'examen ce de type

BVS 06 ATEX E 088

DEKRA EXAM GmbH; CE: [0158]
Dinnendahlstraße 9
44809 Bochum

Diese Konformitätserklärung ist gültig für alle Produkte, die ab dem Datum der Unterzeichnung in Verkehr gebracht werden

Neustadt, den 08.08.2014

Gönzheimer (Geschäftsführer)