Gönnheimer
Elektronic GmbH

The new reference class

Pressurized enclosure system **F870S**

Suitable for hazardous areas Zone 1 and 21
Extended measurement and control
BVS 10 ATEX E 112, IECEx BVS 10.0095
SIL 2 - safety standard

Properties

Compact system, mounting inside hazardous area or inside Ex p- enclosure

Ex- protection

- Ex px control unit for use in hazardous area Zone 1 and 21, Device group II 2 G/D
- ATEX certificate: BVS 10 ATEX E 112 according to EN 60079 and EN 61241
- IECEx certificate: IECEx BVS 10.0095 according to IEC 60079 and IEC 61241

Measurement- and control technology

- Wide range flow measurement, with dynamic range 1:50 (comparison: plate orifice 1:5!)
- Flow measurement without plate orifice, low back pressure
- Further lowering of back pressure by active proportional outlet valve
- Simultaneous PID- control of cabinet pressure and flow rate (patented)
- No increased pressure inside Ex p cabinet while pre purging phase - constant low pressure level while purge and operating phase protects the Ex p- cabinet

Flexibility

- Wide range power supply: 110 V – 240 VAC or 24VDC
- Same solenoid valve type for all supply voltages
- Compact system – no external pressure- / flow sensors or vents necessary
- Reduced type variety by elimination of plate orifice and wide range power supply
- Simultaneous input and output sided PID control offers wide ranging, free programmable cabinet pressure levels and flow rates

User-friendly operation

- Graphic display with backlight
- Single button programming and operation
- Simple, menu-based programming
- Clear text messaging in selectable language
- Simultaneous indication of multiple system information and measurements
- Internal log file (e.g. for system diagnosis)
- Optional, external operator panel BT871 with graphic display and backlight

High safety standard

- Functional safety SIL 2 according to IEC 61508
- Performance level “d” according to DIN EN ISO 13849

Interfaces

- Ethernet interface (Ex e) for connection to supervisory control system - Web interface (integrated web server) for process monitoring via WWW (option)
- Ex i- interface for intelligent operator panel BT871
- Ex i- bus interface for external proportional pressure sensor ES872
- Ex i- bus interface for customer specific data module CM873
- Discrete Ex i- I/Os (BYPASS, ON/OFF, LED output for „System OK“, "System-ON", etc.)
- External Ex i- alarm input for safety loops
- Programmable, potential free alarm contact output
- Design compatible to established system F850S

Applications

- Analyzer instruments with special requirements within the operation mode "continuous flow" (flow rate control and monitoring)
- Applications with high purge flow rate at low cabinet pressure

Description

The FS870S is the revolutionary control device for pressurized enclosure systems (Ex px- systems) for uses within the Ex- Zones 1 and 21.

Based on the development and introduction of the proportional valve technology for pressurized enclosure systems (Gönnheimer, patented system F850), the FS870S contains an additional, active, proportional outlet valve.

This system design allows a simultaneous PID- control of cabinet pressure and flow rate and opens new possibilities within the construction of pressurized enclosure systems and applications. In operation mode "continuous flow" the FS870S is capable to lower the flow rate from a high value during purging to a low value during normal operation at a constant, low cabinet pressure level. (Example: 3 liters/sec. to 0.1 liters/sec. decrease without pressure variation)

The use of the F870S system leads to a considerable stress relief of the Ex p cabinet and sensitive parts like foil keyboards, windows etc.. In comparison to conventional Ex p- systems, the FS870S requires a much lower cabinet pressure to achieve a comparable flow rate. (Example: A reduction of the cabinet pressure by 5 mbar leads to 50 kg / m² decreased load at the cabinet walls).

Ex i- bus interface

The intrinsically safe bus interface is used to transmit measurement values from the external proportional sensor module ES872 to the control unit. This allows the integration of additional safety control features into the purge control system.

Using the same Ex i- bus, the customer can connect the optional configuration module CM873 to load application specific configuration data and parameters into the control unit without further manual programming.

Ethernet interface

Use the supervisory control system / SCADA system or the web browser of your PC to check the system status, the system configuration and the log file of the FS870S.

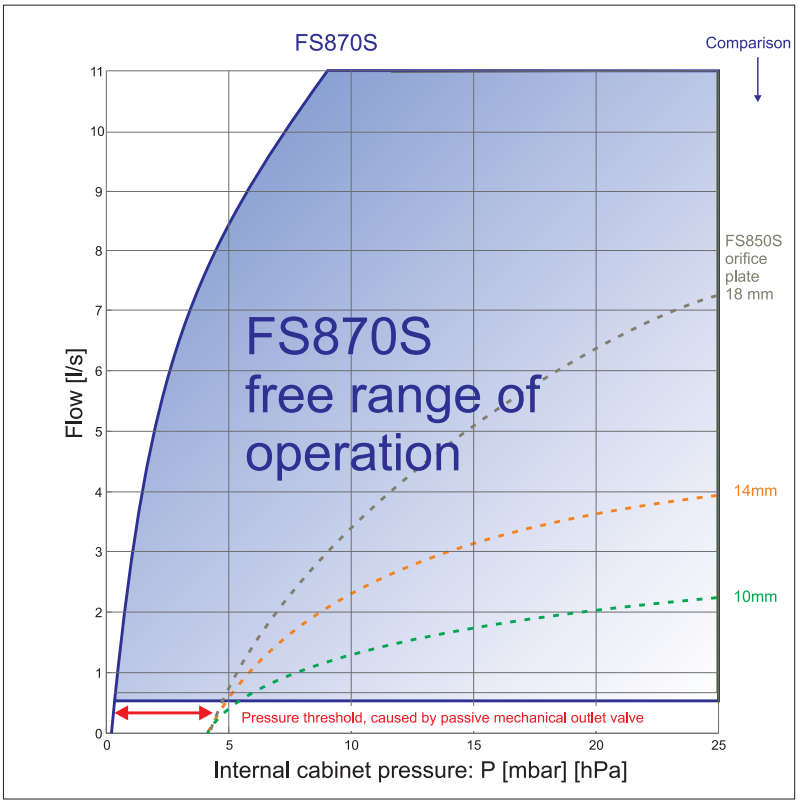
The Ethernet interface and the integrated web server support a wide ranging information interchange to the SCADA system across the application layers.

Technical Details

		Control unit FS870S
General	Mounting	Inside Hazardous Area (Zone 1/21)
	Group	2 II G/D
	Ex- protection	II 2 G, Ex e d mb ib [px] IIC T4 II 2 D, Ex tD [ibD] [pD] A21 IP65 T 100°C
	Certificates	ATEX: BVS 10 ATEX E 112 IECEx: IECEx BVS 10.0095
	Safety standards	SIL 2 acc. to IEC 61508 Performance level “d” acc. to DIN EN ISO 13849
Housing	Dimensions	H x W x D: 220 mm x 120 mm x 90 mm
	Purging gas in- and outlets	G1“ - inside thread
	Protection class	IP65 (except purging gas in- and outlet)
	Material	Aluminum, coated / RAL 7035
Electrical Specifications	Power supply	24 V DC; 110.. 230 V AC
	Potential free relay contacts	250 VAC / 5A cos (φ) = 0,7 U ≤ 30 VDC, I ≤ 5 A, P ≤ 150 W
Pneumatics	Pressure range	0 ... 18 mbar Optional: 0 … 350 mbar
	Flow range	0 .. 10 ltr./sec. (0 .. 36 m³/h), at cabinet pressure < 10 mbar (hPa) Extended measurement ranges on demand
	Ambient temperature	-10°C ...+60°C (T4)
	Humidity	5-95%, non-condensing
Configuration	Parameter input	Guided menus at graphic LC display, Selectable language, Single button programming and operation
	Visualization	Simultaneous clear text indication of multiple system information and measurement values
	Shut down delay	Programmable 0..10 sec. (default 2 sec.)
	System diagnosis	Integrated log file memory
	Ethernet Option	Ethernet interface and web server for remote system monitoring

Systems comparison: FS870S ⇔ conventional Ex p control devices

Lowered cabinet stressing due to smaller absolute pressure and pressure gradients



During the purging phase a high flow rate should be achieved to shorten the purge time. Based on their construction, conventional Ex p- systems show only a smooth rising of the flow rate while increasing the cabinet pressure.

In this aspect, the FS870S with its reduced flow restriction and back pressure is superior to any conventional Ex p system.

Within midrange flow rates, the load to the Ex p- cabinet walls is up to **four times lower** in comparison to conventional systems!

Figure 1: free range of operation

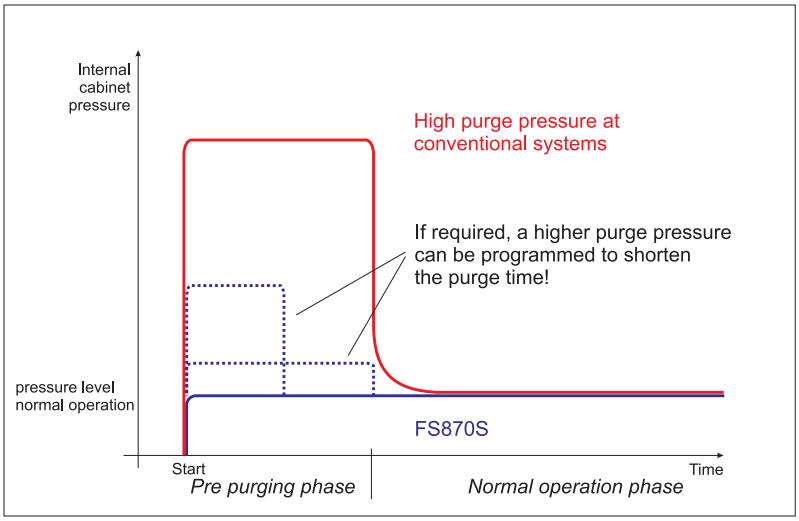
Enlarged, free programmable range of operation

In comparison to common Ex p control systems, the FS870S offers an increased and free programmable range of operation (characteristic pressure / flow curve).

The conventional systems are characterized by a fixed pressure / flow curve (see e.g. FS850S) with an offset, caused by the opening pressure of the passive mechanical outlet valve. This typical opening pressure (2.. 4 mbar at standard systems) is required to minimize the system leakage rate during normal operation.

The input and output sided PID-control loops allow the FS870S to perform in the whole range of operation (see figure 1).

Reduced purge pressure



At conventional Ex p- control systems, the purge pressure has to be set several times higher than the pressure during normal operation, to achieve an adequate and quick purging phase.

Using the FS870S, the pressure level during purging and normal operation phase can stay constant.

Thereby, the flow rate is increased in comparison to comparable, conventional purge systems.

If required, the operator can program a higher purge pressure level, e.g. to reach a further shortening of the purging time.

Figure 2: pressure levels

Performance and Service

The Ex p- system F870S is approved and certified according to EN 60079-2. The complete purged application, consisting of Ex p- cabinet with customer specific embedded non Ex- components and attached Ex p control system should get a further system approval by a notified body.

Gönnheimer Elektronic offers you:

1. The purge system F870S – certified components
2. Construction and manufacturing of your Ex p- cabinet
3. The **complete solution**: Purge system F870S, customer specific Ex p- cabinet, integration of your supplied non Ex components, system test and certification, based on the Gönnheimer **ATEX system certificate "DMT 02 ATEX E 086"** (including documentation and type plate).

Contact us for free consulting and engineering support

Block diagrams

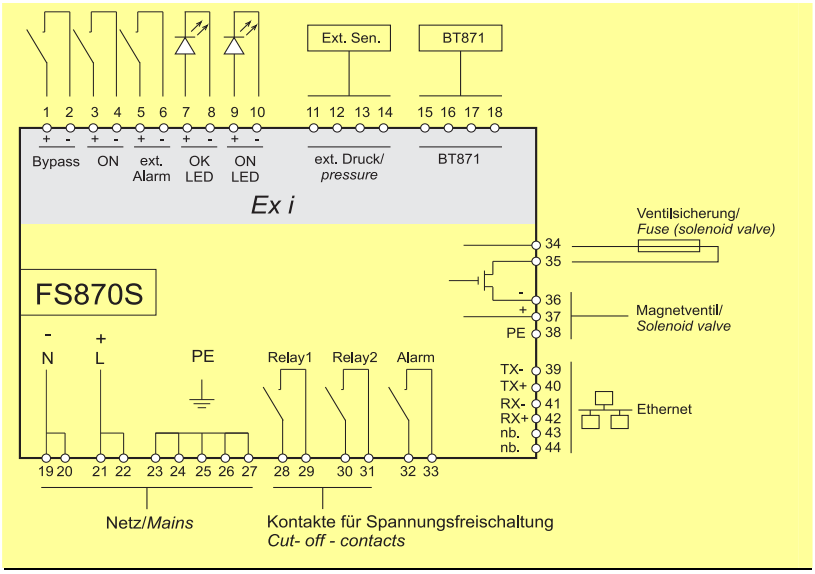


Figure 3: Electrical block diagram

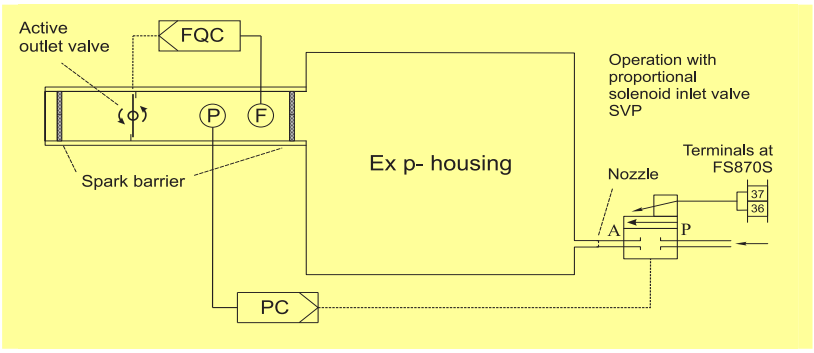


Figure 4: Pneumatic block diagram

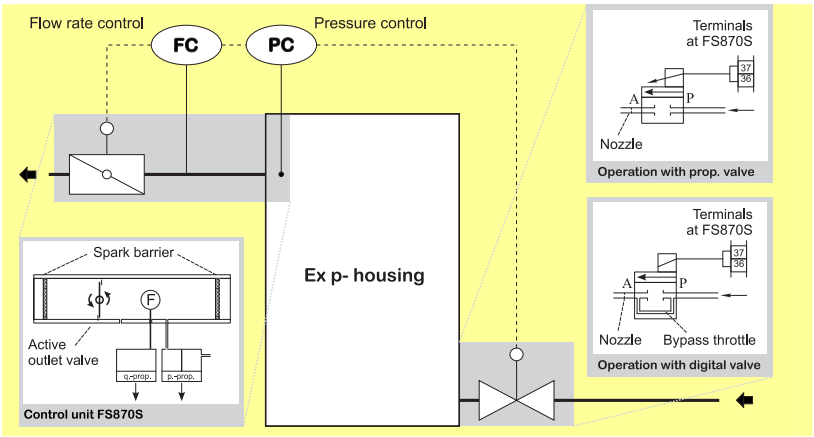


Figure 5:Simultaneous PID control block diagram

Dimensions

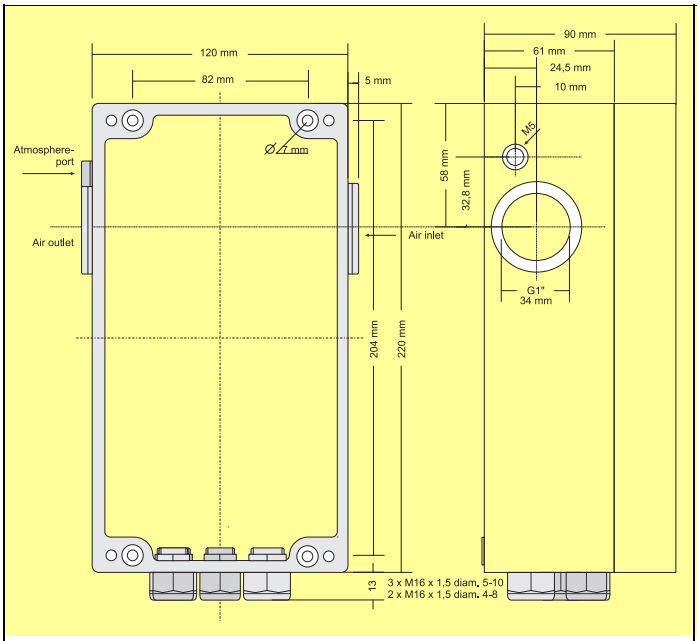


Figure 6: Dimensions FS850S

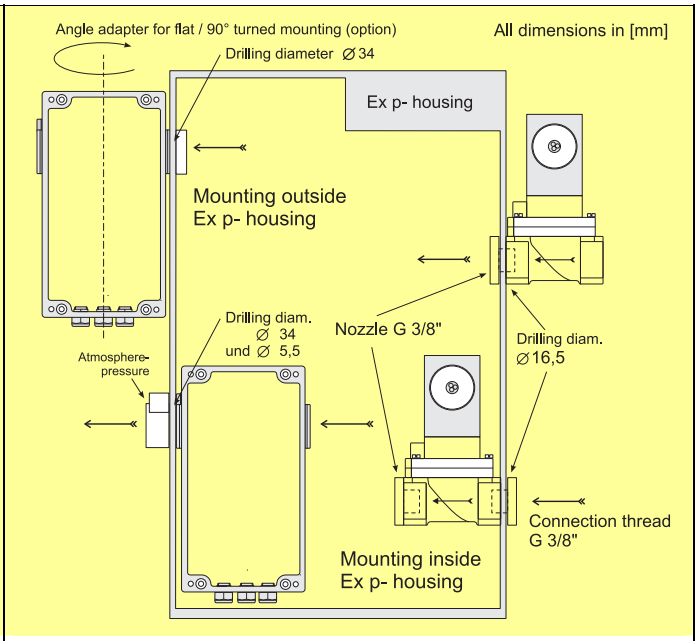


Figure 7: Mounting examples

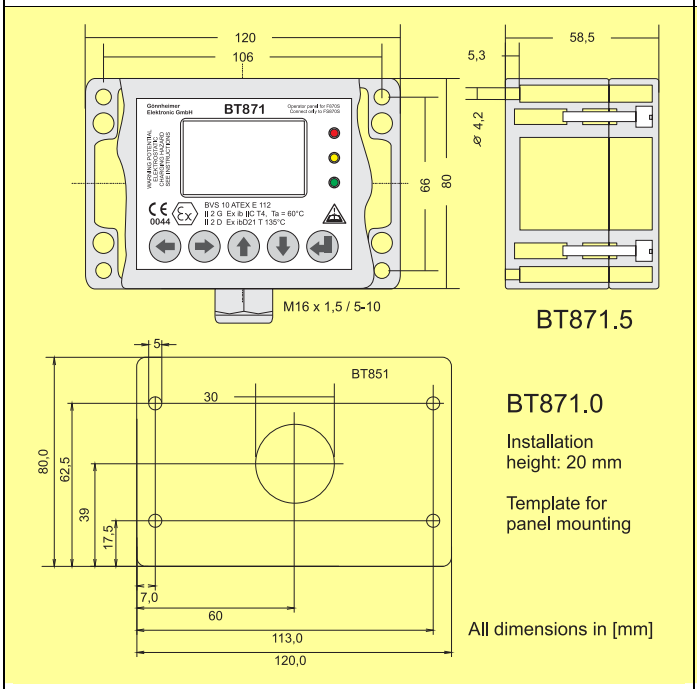


Figure 8: Dimensions and template BT851

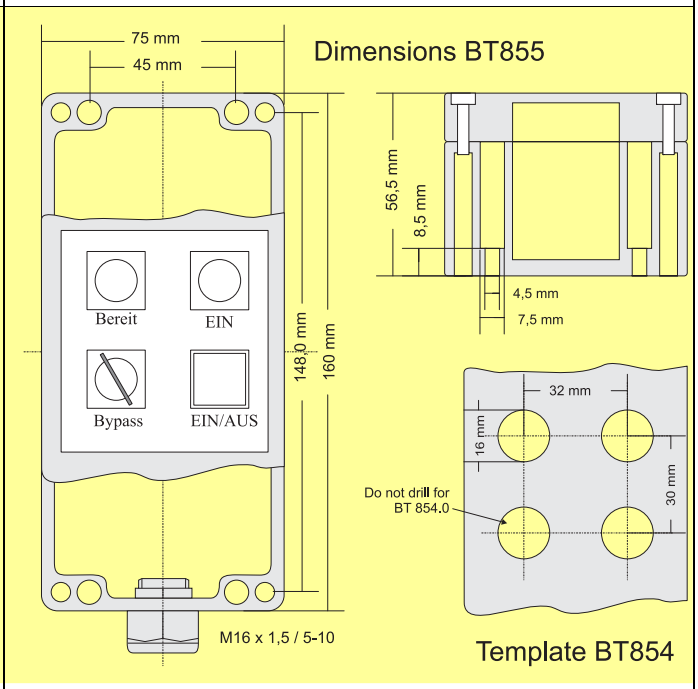


Figure 9: Dimensions BT855, template BT854

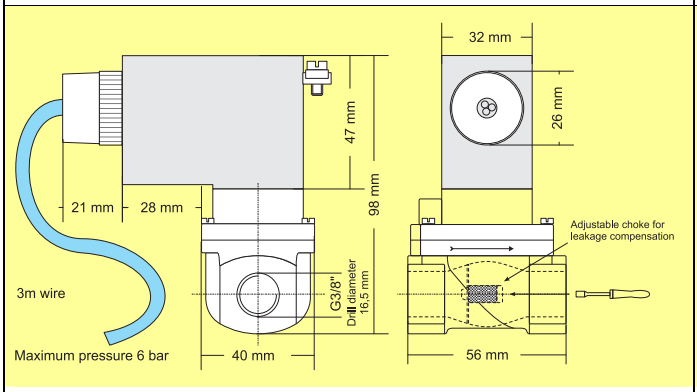


Figure 10: Dimensions digital solenoid valve

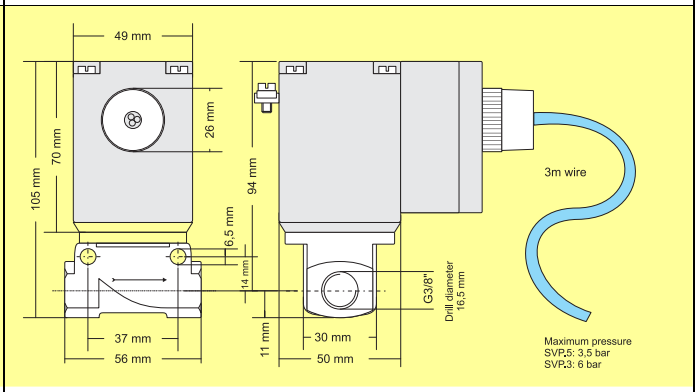


Figure 11: Dimensions proportional solenoid valve

Type code

Control unit FS870S						
FS870S	.	.	.	.	.	.
Mains voltage:						
110 - 230 V AC 0						
24 V DC 6						
Nominal width:						
Standard 0						
Custom x						
Pressure range:						
Standard (0-18 mbar) 0						
Extended x						
Ethernet- interface (Ex e):						
Not installed 0						
Ethernet- interface 1						

X: on demand

Operator panel	BT871
Intelligent Operator panel	
Panel mounting type.....	BT871.0
Type with separate IP65 housing.....	BT871.5

Operator panel	BT85x
Operator panel for panel mounting	
Without key-operated switch.....	BT854.0
With key-operated switch „Bypass“.....	BT854.1
Operator panel in separate IP65 housing	
Without key-operated switch.....	BT855.0
With key-operated switch „Bypass“.....	BT855.1

Accessories: Window in cover of FS870S housing (recommended, if no operator panel is used)

Purge medium valve:

Digital			Proportional	
SVD.	.	.	**SVP.**	
Continuous flow	.D		Suitable for Ex p- housing size	
Leakage compensation	.L			
Nozzle: 1 mm	.1		Up to 300 l	**.3**
1,5 mm.....	.1.5			
2 mm.....	.2		Bigger than 300l	**.5**
3 mm.....	.3			
4 mm.....	.4			
5 mm.....	.5			
6 mm	.6			

Valve type with integrated Ex e terminal box to connect customer specific cable types available on demand

Ex- solenoid valve fuse

	Nominal	Order.Nr.
SVD.x.x	630 mA	SI870.5
SVP.x	1600 mA	SI870.7

Remark: please order the Ex- solenoid valve fuse separately

External pressure sensor	ES872
External pressure sensor.....	ES872

Various pressure ranges on demand

Configuration module	CM873
Configuration module.....	CM873

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