



**Gönnheimer
Elektronik GmbH**

Pressurized Enclosure

In accordance with CENELEC specifications DIN EN 50 016

PTB No. Ex-82/2114/2116/1107 U

PTB No. Ex-88.B.1019U

E EX p

Pressurized Enclosure EEx p according to DIN EN 50 016

System Description

The type of protection "pressurization" is based on the principle of maintaining a constant overpressure using air or a protective gas to prevent an explosive mixture from forming near the apparatus inside the pressurized enclosure.

Before startup, the pressurized enclosure must be purged with air, in a quantity which corresponds to five times the volume of the free space in the enclosure to remove any explosive mixture which may be

1. Control unit (FS 811 for mounting in the hazardous area, FS 810 for mounting in the non-hazardous area)
 - Setting of purging time by means of decade switches
 - Processing of pressure switch signals
 - Control of solenoid valve and, if required, pilot lamps in the enclosure
 - Connection and disconnection of the power supply to the pressurized enclosure
 - Power supply to pushbuttons and signal lamps in the operating panel

The combination of individual components can be seen in Fig. 3.

Mode of Operation

Pressurization with leakage compensation (EN 50016, 2.5)

When power is switched on, voltage is applied to the valve by way of the control unit. The air or protective gas can now flow into the pressurized enclosure through a nozzle with a large cross-section. The purging agent also flows through pressure monitor DW 812 causing pressure switch P2 (Fig. 2) to close and the timer in the control unit to begin operating. The purging phase controlled by the timer depends on the enclosure volume, the valve inlet pressure and the nozzle cross-section, and can be determined from the purging time diagrams.

When the set time has elapsed, the valve changes over to a smaller cross-section. The air which now flows into the enclosure is adequate

present. The overpressure in the enclosure must be monitored continuously. If the pressure drops below the specified minimum, e.g. when the enclosure door is opened, or if the pressure becomes too high, the electrical supply to the pressurized enclosure is disconnected.

The system consists of the following components:

2. Pressure monitor DW 812
 - Monitoring of specified pressures with three pressure switches
3. Solenoid valve
 - Maintenance of a defined flow of air during purging and operation
4. Pressurized enclosure to protection class IP 55
 - Housing of installed apparatus

to maintain an overpressure of 0.8 mbar there. This overpressure is monitored continuously by pressure switch P3 in the control unit. The supply voltage for the apparatus mounted inside the pressurized enclosure is now switched on by the control unit.

If the overpressure in the enclosure drops below 0.8 mbar, e.g. when the enclosure door is opened, or exceeds 15 mbar (pressure switch P1), the electrical supply to the apparatus in the pressurized enclosure is disconnected and the purging procedure restarted. The switching state of pressure switches P2 and P3 is displayed by LEDs in the pressure monitor. The remaining purging time can be read on the four-digit display in the control unit (accessory).

Pressurization with continuous flow of protective gas (EN 50016, 2.4)

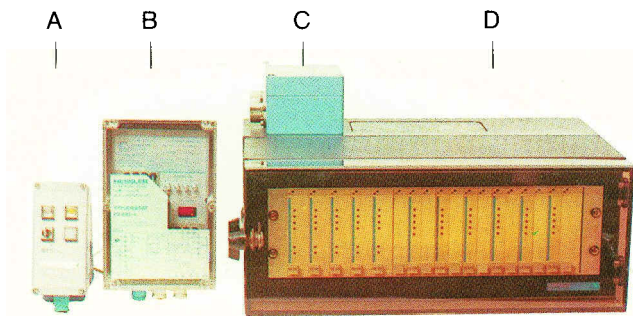
This mode of operation is selected when a cooling of the installed apparatus should be achieved. After the purging phase has been completed, a continuous flow of protective gas through the enclosure is maintained instead of an overpressure. The pressure monitor can be switched over to this mode of operation by exchanging two screw plugs as shown in Fig. 2.

The automatic device can be bypassed by means of a keylock switch for adjustments to the pressurized enclosure. (Obtain work permit). The size and shape of the pressurized enclosure is adapted to the installed apparatus.

Upon request, we also supply cabinets along with the electronic equipment - certified for operation in hazardous areas.

Documentation on systems already in operation:

- explosion protection for analyzers
- explosion protection for keyboard and monitors
- explosion protection for hard-wired and programmable controllers will gladly be provided upon request.



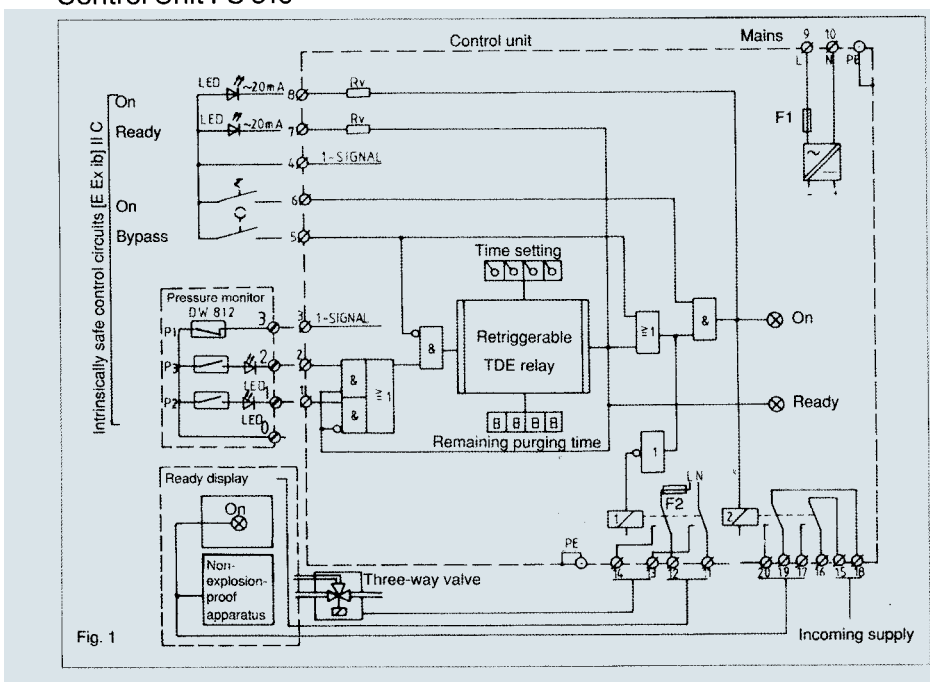
A Operating panel BT 813
 B Control unit FS 810
 C Pressure monitor DW 812
 D Pressurized enclosure
 E 3/2-way solenoid valve
 Units in standard design

TECHNICAL DATA

- Control Unit : FS 810
- Mounting : In non-hazardous area
- Explosion protection : [EEx ib] II C
- Protection class : IP 54
- Dimensions L x W x H : 250 x 160 x 90
- Material : Macrolon
- Control circuit : U ~ 10 V
 $L_a \leq 1 \text{ mH}$
 $C_a \leq 380 \text{ nF}$
 Max. distance between control unit and pressure monitor is 1.9 km!
- Purging time : Digital time setting up to 9999 sec.
 Display of remaining purging time
- Power consumption : 2.5 VA without external loads
- Supply voltage : 24 V, 42 V, 110 V, 220 V AC, 48-62 Hz
- Open circuit : $U \leq 250 \text{ V AC}$, $I \leq 4 \text{ A}$, $\cos \varphi \geq 0.7$
 $U \leq 60 \text{ V DC}$, $I \leq 0.5 \text{ A}$, $L/R \leq 200 \text{ ms}$
- Ambient temperature : -20°C to $+50^\circ\text{C}$

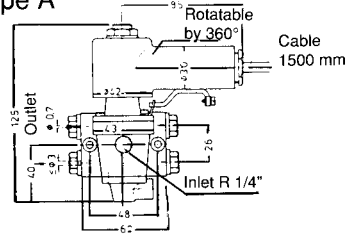
Block Diagram

Control Unit FS 810



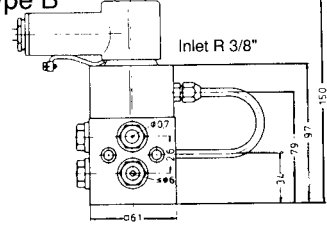
Purging Agent Valve

Type A



Enclosure volume < 1000 l

Type B



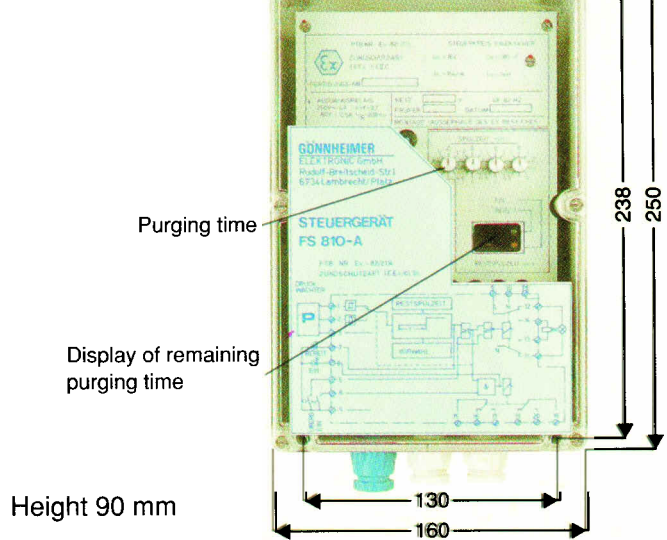
Enclosure volume < 5000 l

In mode of operation with continuous flow of protective gas, replace nozzle 0.7 mm in diameter by one ~2 mm in diameter

Dimensions

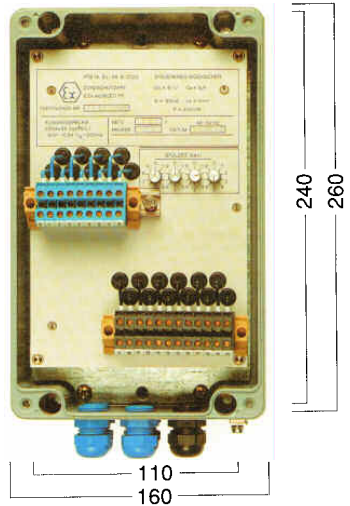
Control Unit

FS 810



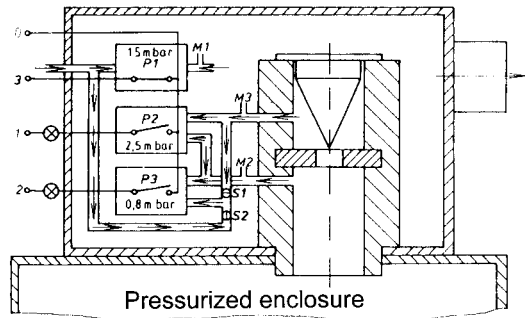
FS 821

Illustration without cover



Pressure Monitor:

Equivalent circuit diagram for pressure monitor DW 812



Leakage Compensation	Continuous Flow of Protective Gas
S2 short red	S2 long blue
S1 long blue	S1 short red

Mode of Operation

With leakage compensation

- S1 closed
- S2 open
- P1 Overpressure in pressure monitor
- P2 Flow measurement during purging
- P3 Overpressure measurement in pressurized enclosure after purging (measurement against atmospheric pressure).

With continuous flow of protective gas

- S1 open
- S2 closed
- P1 Overpressure in pressure monitor
- P2 Flow measurement during purging
- P3 Flow measurement after purging (operating phase)

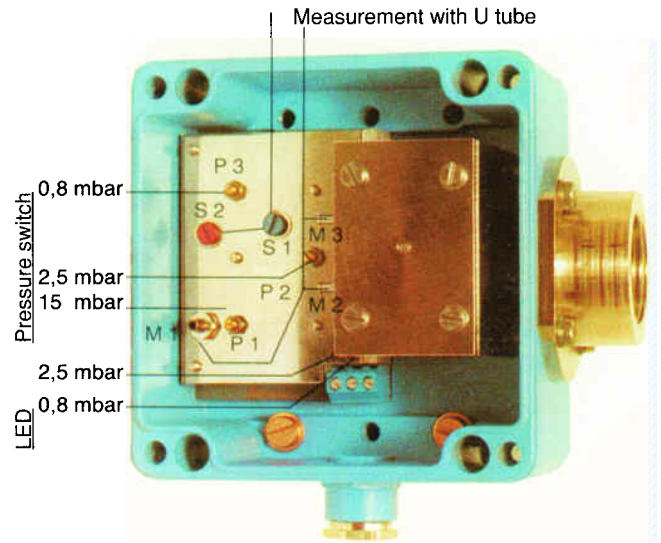
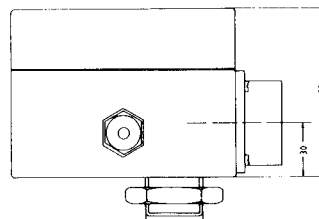


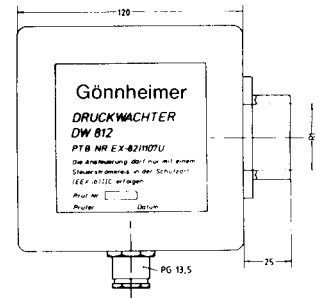
Fig. 2

Pressure Monitor DW 812

Single-hole mounting $\varnothing 34$ mm

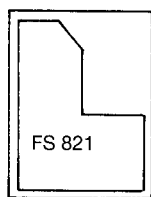


Single-hole mounting $\varnothing 34$ mm



Hazardous area

EEx eq [ib] II C T6
PTB No. Ex-82/2116



Non-hazardous area

[EEx ib] II C
PTB No. Ex-82/2114

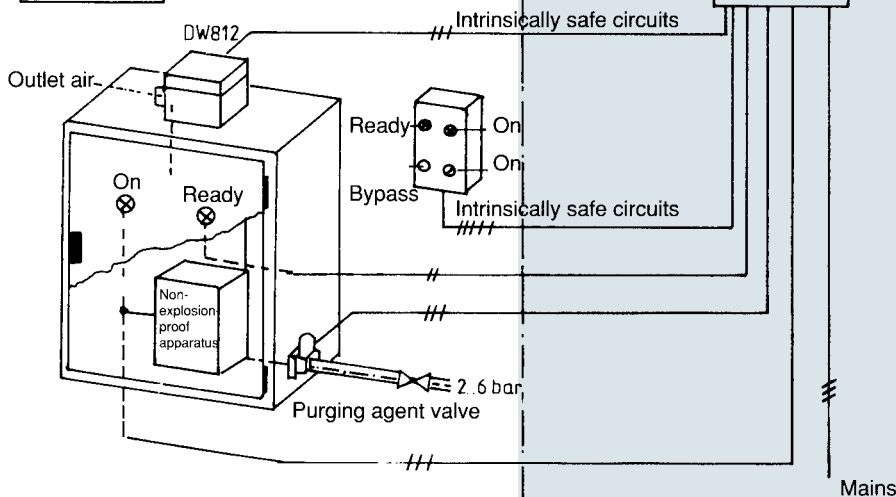
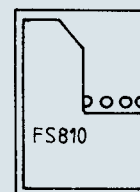
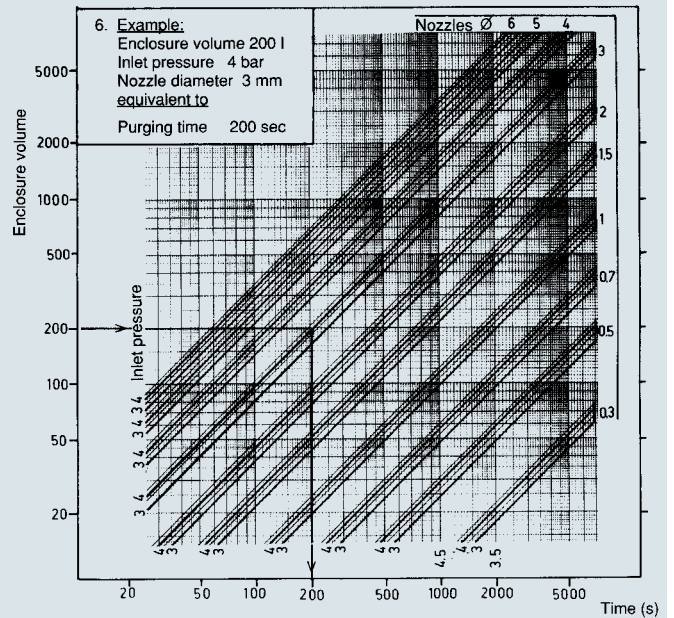
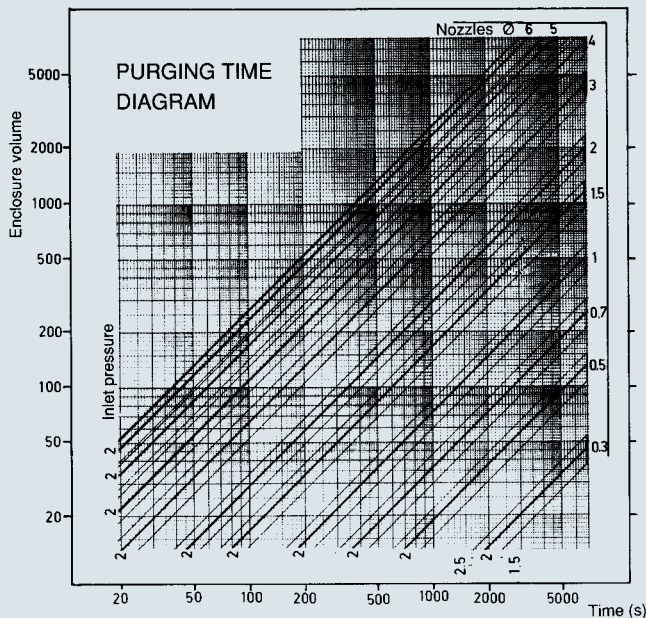


Fig. 3



Inlet pressure (bar) (10 ⁵ Pa)	Flow rate (l/s) (10 ³ m ³ /s) e air = 1.293 Kg/m ³				
	Nozzle diameter (mm)				
	0.3	0.7	2	3	6
2	0.034	0.18	1.48	3.27	11.7
2.5	0.039	0.21	1.71	3.76	13.2

Inlet pressure (bar) (10 ⁵ Pa)	Flow rate (l/s) (10 ³ m ³ /s) e air = 1.293 Kg/m ³				
	Nozzle diameter (mm)				
	0.3	0.7	2	3	6
3	0.044	0.24	1.91	4.17	14.45
4	0.052	0.28	2.25	4.92	16.44

Type Code:

Control unit, mounting in non-hazardous area FS 810.0

Control unit, mounting in non-hazardous area with display of remaining purging time FS 810.1

Control unit, mounting in hazardous area FS 821

EExi operating panel, mounting in hazardous area with:
 - ON control switch -
 - ON LED -
 - Ready LED - BT 813.0

Pressure monitor with LED DW 812

3/2-way valve, nozzle ≤ 3 mm Valve size A

3/2-way valve, nozzle ≤ 6 mm Valve size B

EExi operating panel, mounting in hazardous area with:
 - ON control switch -
 - keylock switch bypass -
 - ON LED -
 - Ready LED - BT 813.1

Pressurized enclosure to protection class IP 55, 65

According to client specification



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