Type 7305 Dual-channel Backflow Protection Unit

Application

Backflow protection of (supply) networks as a safety-instrumented system to protect downstream plants and consumers
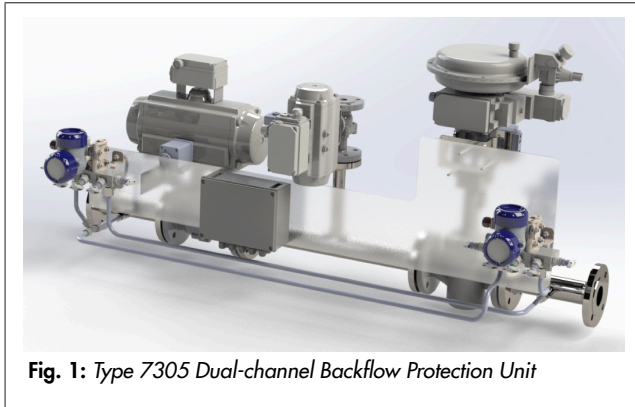

Fig. 1: *Type 7305 Dual-channel Backflow Protection Unit*

Special features

- Monitoring of the backflow
- SIL 2 and SIL 3

General SIL solutions

Our emergency shutdown systems include single-channel solutions for SIL 2 applications and dual-channel solutions for applications up to SIL 3.

SAMSON's safety-instrumented systems consist of one SAMSON on/off valve (single-channel) or two SAMSON on/off valves (dual-channel), a SAMSON SIS logic solver and the application-specific sensor instrumentation.

All SAMSON SIL solutions use components that are perfectly tailored to one another. The safety integrity level of the safety-instrumented system (including all the PFD values) is documented in a manufacturer's declaration.

Application range

SAMSON safety-instrumented systems are designed exclusively for **low demand mode**. SAMSON emergency shutdown systems are available with a probability of failure (PFD_{AVG}) to meet SIL 2 or SIL 3 requirements.

Application

Backflow protection units monitor the medium flow by measuring the differential pressure across the valve assembly unit. The Type 7301 Backflow Protection Unit is used for single-channel systems (SIL 2). The Type 7315 Single-channel Emergency Shutdown System (SIL 2) and Type 7316 Dual-channel Emergency Shutdown System (SIL 3) protect a downstream network, plant or heat exchanger etc. against excessively high or excessively low pressures or temperatures.

Version

Type 7305 Dual-channel Backflow Protection Unit

Differential pressure transmitters (Pos. 05A and Pos. 05B) are used in the dual-channel backflow protection unit to monitor the medium flow across the valve assembly unit (Pos. 01/Pos. 02). It cannot be ruled out that the medium flows back once the flow rate falls below a certain limit. The dual-channel backflow protection unit shuts off the pipeline in a safety-instrumented system.

Design and function

The dual-channel backflow protection unit consists of a control valve (Pos. 02) and an on/off valve (Pos. 01). The control valve (Pos. 02) is fitted with a positioner for the control function and a solenoid valve for the on/off function. The control valve regulates the flow rate proportional to the differential pressure measured across the valve assembly unit (Pos. 01/Pos. 02). A drop in differential pressure below a predetermined limit triggers the emergency shutdown function to shut off the pipeline.

The bleed function (Pos. 03) ensures that any leakage through the valve is safely discharged to another location. As a result, the overall system meets the strictest safety requirements.

The five-way valve block (Pos. 04A/Pos. 04B) is used for testing and calibrating the pressure transmitter.

The control function and shutdown logic are included in the Type 7402 SIS Logic Solver. The logic solver also contains isolators required for use in hazardous areas.

Signals to indicate the safety demand, status and malfunction of the SIS logic solver can be transmitted to a higher-level control system These signals are optional since the control system works independently.

The Type 7305 Dual-channel Backflow Protection Unit can optionally be constructed for use in hazardous areas. The SIS logic solver must always be installed outside the hazardous area.

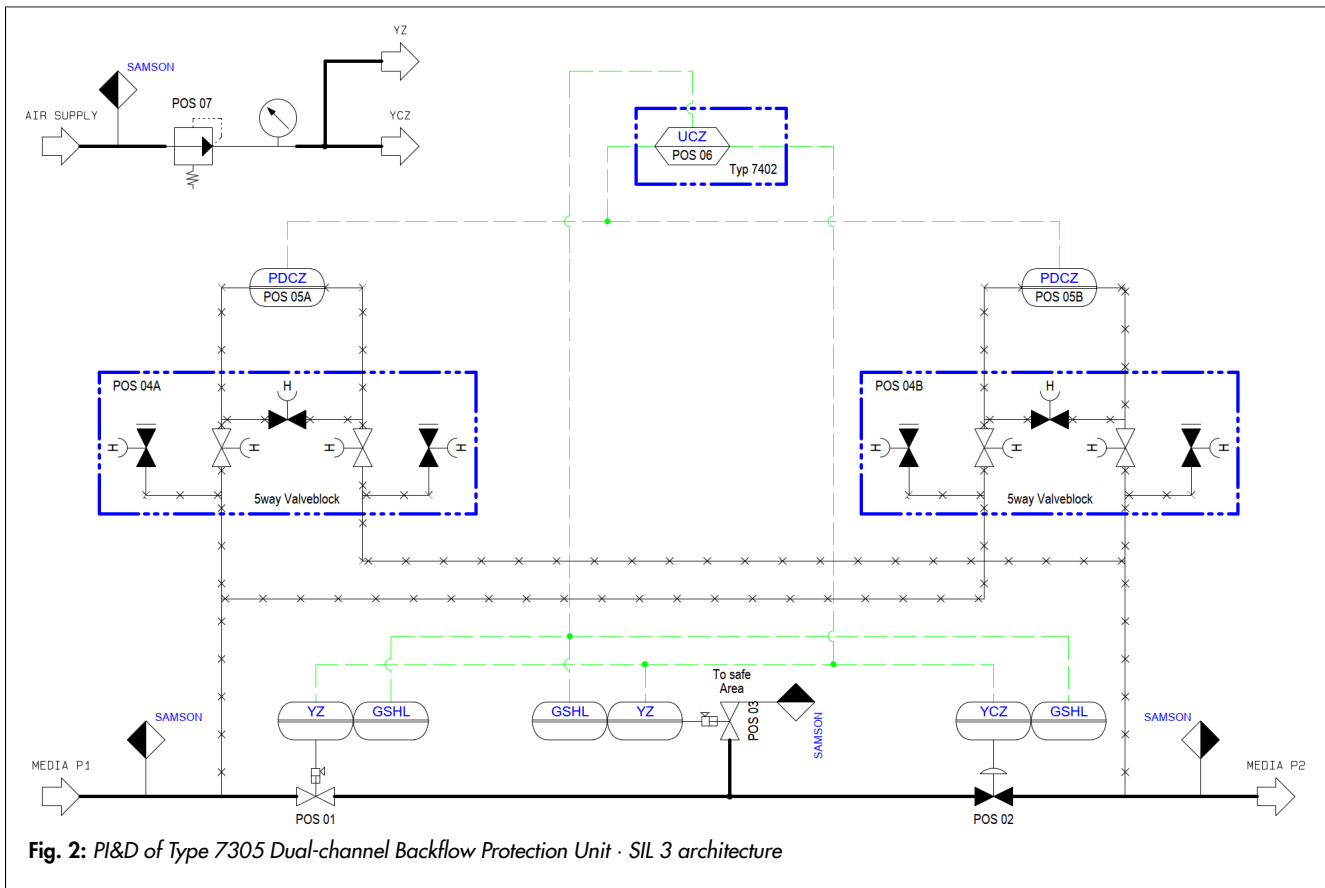Any component not shown in Fig. 3 is not part of the SIS loop.

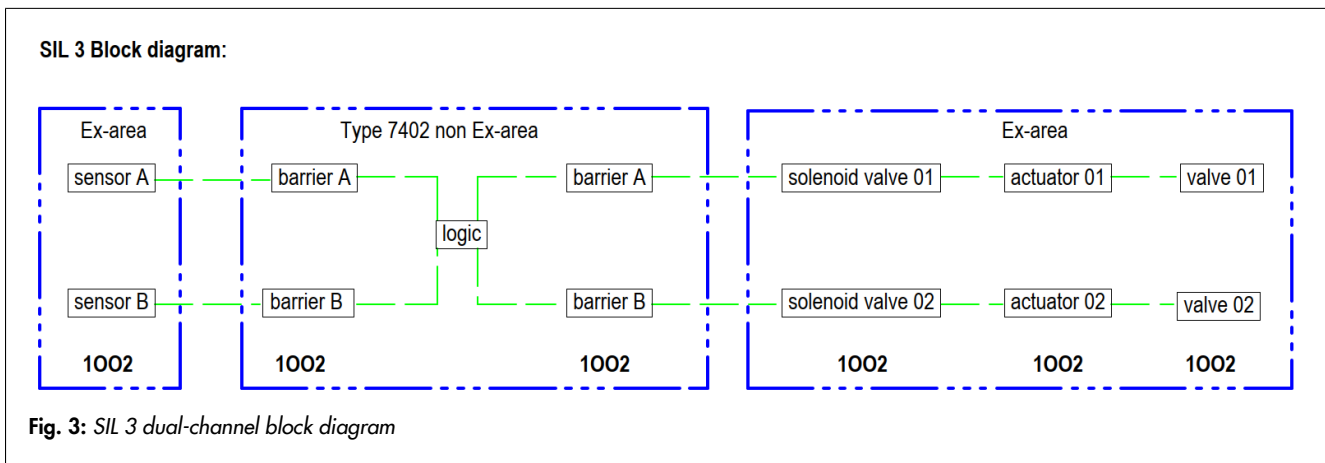**Fig. 2:** *PI&D of Type 7305 Dual-channel Backflow Protection Unit · SIL 3 architecture*

Fig. 3: *SIL 3 dual-channel block diagram*

Table 1: Components

Item	Designation	Types
01	Valve body	Type 26d Ball Valve (▶T 26d) < DN 100 < Type 14b Butterfly Valve (▶T 14b)
	Actuator	Type 31a Pneumatic Rotary Actuator (▶T 31a)
02	Valve body	Type 3241/Type 3251/Type 3510 Globe Valve
	Actuator	Type 3271/Type 3277 Pneumatic Actuator
03	Valve body and actuator	Type 26d Ball Valve with Type 31a Actuator
04A/04B	Valve block	5-way valve block
05A/05B	Differential pressure transmitter	E+H Type PMD75
		ABB Type 266 DSH
06		Type 7402 SIS Logic Solver
07		Type 4708/Type 3999 Supply Air Station

Table 2: Technical data

Dual-channel backflow protection unit	Type 7305 [1]
Safety integrity level	SIL 3/SIL 2 (version with a differential pressure transmitter)
Medium	Gases and liquids according to the data sheets for Type 3241 Valve (▶T 8015)/ Type 3251 Valve (▶T 8051)/Type 26d Valve (▶T 26d) and Type 14b Valve (▶T 14b). Special applications on request
Nominal size	DN 15 to 200 (larger nominal sizes on request)
Pressure rating	PN 16 to 63 (higher pressure ratings on request)
Standards	DIN EN 61508; DIN EN 61511; PED
Bleed function	DN 25
Supply	24 V DC/instrument air according to ISO 8573-1
Feedback signal to meet SIL requirements	1x floating contact
Standard pressure loss during operation	200 mbar for liquids, 100 mbar for gases
Differential pressure to trigger emergency shutdown	50 mbar for liquids, 30 mbar for gases

[1] Special versions on agreement

Type 7305 Dual-channel Backflow Protection Unit

Customer data	
Company	
Address	
Name	
Phone number	
E-mail	
Send your inquiry to your regional SAMSON contact or e-mail it to ▶ systems-de@samsongroup.com.	

Operating data	
Nominal size/pressure rating	DN = PN =
Instrument air	barg
Process medium	Medium = T_{max} = °C P_{max} = barg
Min. flow rate	kg/h Nm³/h (gases)
Max. flow rate	kg/h Nm³/h (gases)
Flow rate during operation	kg/h Nm³/h (gases)
Operating pressure	P_1 = barg (pressure upstream of the backflow protection unit)
Pressure loss	Standard 200 mbar/100 mbar
SIL differential pressure for emergency shutdown	Standard 50 mbar/100 mbar
Material	Pipeline Valve body material
Version	✓ According to SAMSON standard
SIS logic solver	✓ SAMSON Type 7402 (indoor installation) Outdoor installation
Terminal box	✓ According to SAMSON standard to connect SIS logic solver
Mounting plate	✓ For mounting the measuring equipment/terminal box
Valve type	✓ Sized by SAMSON
SIL probability of failure	✓ According to SAMSON manufacturer's declaration (overall system)
Valve block to connect and switch differential pressure measuring instruments	5-way valve block (standard) 3-way valve block
Differential pressure measurement	E+H PMD75 ABB 266DSH
SIL 2/SIL 3 selection	**SIL 2** = 1x differential pressure measurement **SIL 3** = 2x differential pressure measurement (standard)

Comments