



## Type 7301 Single-channel Backflow Protection Unit

### Application

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

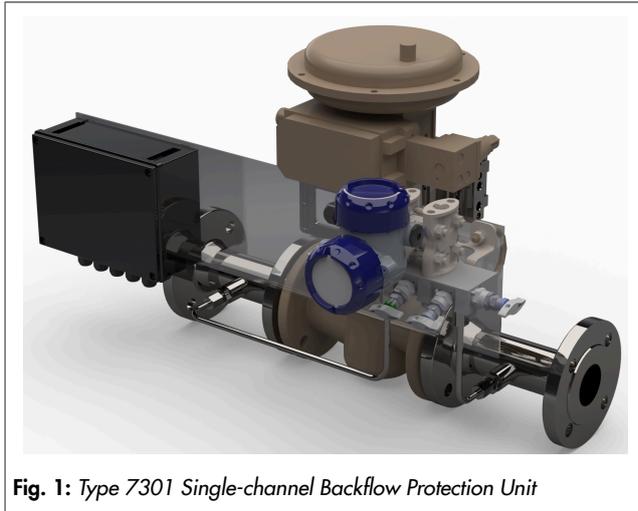


Fig. 1: Type 7301 Single-channel Backflow Protection Unit

### Special features

- Monitoring of the backflow
- SIL 2

### 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 7305 Backflow Protection Unit is used for dual-channel systems (SIL 3). 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 7301 Single-channel Backflow Protection Unit

A differential pressure transmitter (Pos. 03) is used in the single-channel backflow protection unit to monitor the medium flow across the valve assembly (Pos. 01). It cannot be ruled out that the medium flows back once the flow rate falls below a certain limit. The single-channel backflow protection unit shuts off the pipeline in a safety-instrumented system.

### Design and function

The Type 7301 Single-channel Backflow Protection Unit consists of a control valve (Pos. 01), a five-way valve block (Pos. 02), a mounted differential pressure transmitter (Pos. 03), a supply air station (Pos. 04) and a SIS logic solver (Pos. 05). The control valve (Pos. 01) 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 measured differential pressure. A drop in differential pressure below a predetermined limit triggers the emergency shutdown function to shut off the pipeline.

The five-way valve block (Pos. 02) is used for testing and calibrating the differential pressure transmitter (Pos. 03).

The control function and shutdown logic are included in the Type 7401 SIS Logic Solver (Pos. 5). 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 7301 Single-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.

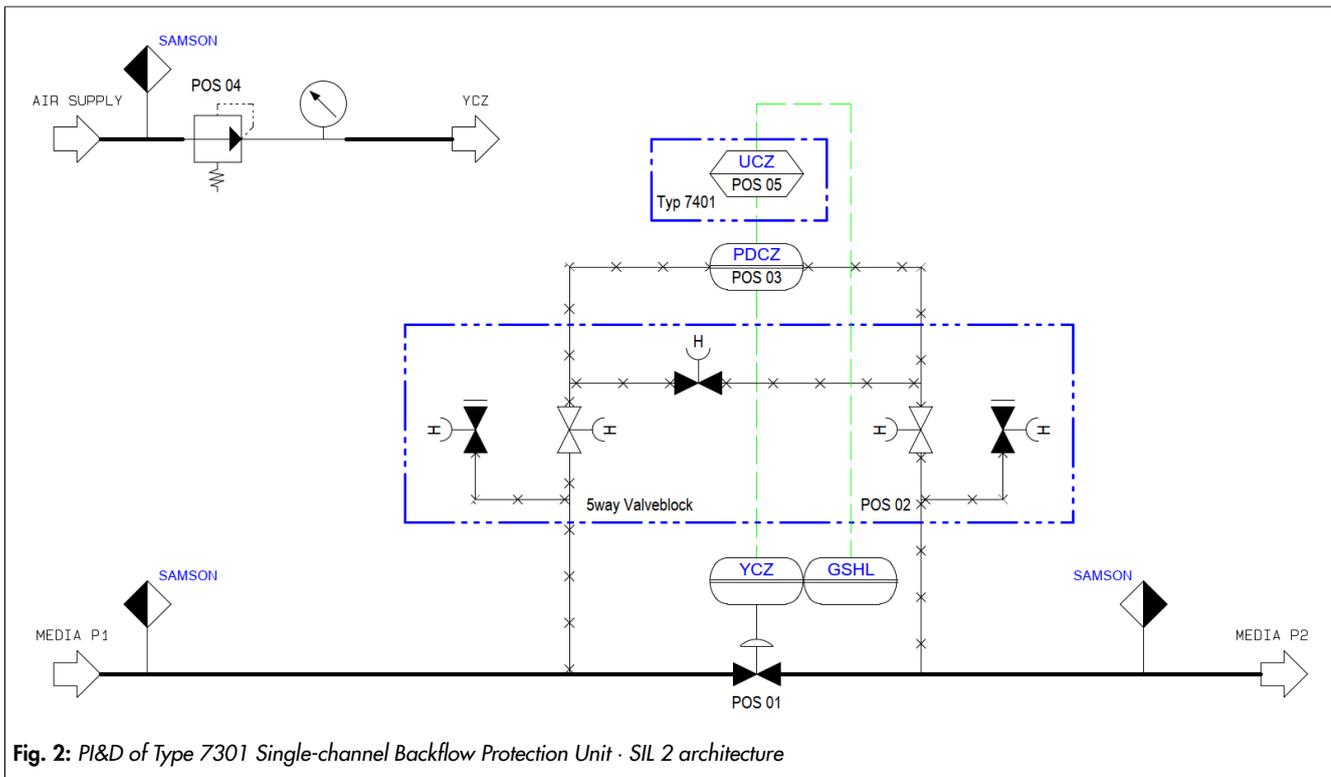


Fig. 2: PI&D of Type 7301 Single-channel Backflow Protection Unit · SIL 2 architecture

SIL 2 Block diagram:

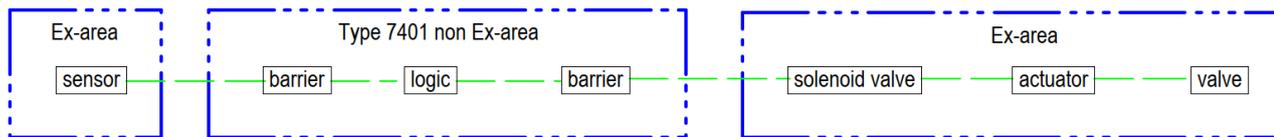


Fig. 3: SIL 2 single-channel block diagram

Table 1: Components

| Item | Designation                       | Types                                     |
|------|-----------------------------------|---|
| 01   | Valve body                        | Type 3241/Type 3251/Type 3510 Globe Valve |
|      | Actuator                          | Type 3271/Type 3277 Pneumatic Actuator    |
| 02   | Valve block                       | 5-way valve block                         |
| 03   | Differential pressure transmitter | E+H Type PMD75                            |
|      |                                   | ABB Type 266 DSH                          |
| 04   |                                   | Type 4708/Type 3999 Supply Air Station    |
| 05   |                                   | Type 7401 SIS Logic Solver                |

**Table 2: Technical data**

| <b>Single-channel backflow protection unit</b>      | <b>Type 7301 <sup>1)</sup></b>   |
|---|--|
| Safety integrity level                              | SIL 2  |
| Medium  | Gases and liquids according to the data sheets for Type 3241 Valve (▶T 8015)/ Type 3251 Valve (▶T 8051). 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                                      | Without  |
| Supply  | 24 V DC/instrument air according to ISO 8573-1   |
| Feedback signal to meet SIL requirements            | 1 x 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   |

<sup>1)</sup> Special versions on agreement



# Type 7301 Single-channel Backflow Protection Unit

| Customer data  |  |
|--|--|
| <b>Company</b>   |  |
| <b>Address</b>   |  |
| <b>Name</b>  |  |
| <b>Phone number</b>  |  |
| <b>E-mail</b>  |  |
| <b>Send your inquiry to your regional SAMSON contact or e-mail it to ► <a href="mailto:systems-de@samsongroup.com">systems-de@samsongroup.com</a>.</b> |  |
| Operating data   |  |
| Nominal size/pressure rating   | DN = _____ PN = _____  |
| Instrument air   | _____ bar(g)   |
| Process medium   | Process medium = _____ T <sub>max</sub> = _____ °C P <sub>max</sub> = _____ bar(g) |
| Min. flow rate   | _____ kg/h _____ Nm <sup>3</sup> /h (gases)  |
| Max. flow rate   | _____ kg/h _____ Nm <sup>3</sup> /h (gases)  |
| Flow rate during operation   | _____ kg/h _____ Nm <sup>3</sup> /h (gases)  |
| Operating pressure   | P <sub>1</sub> = _____ bar(g) (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 _____  |
| Version  | ✓ According to SAMSON standard   |
| SIS logic solver   | ✓ SAMSON Type 7401 (indoor installation)<br>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)<br>3-way valve block                                  |
| Differential pressure measurement  | E+H PMD75<br>ABB 266DSH  |
| SIL  | ✓ <b>SIL 2</b> = 1x differential pressure measurement                              |
| ATEX   | Without<br>Up to Zone 1 (intrinsically safe)                                       |
| Notes  |  |
|  |  |