



## SH 8015 EN

Translation of original instructions



## Type 3241 Globe Valve

## Definition of signal words

### **DANGER**

*Hazardous situations which, if not avoided, will result in death or serious injury*

### **WARNING**

*Hazardous situations which, if not avoided, could result in death or serious injury*

### **NOTICE**

*Property damage message or malfunction*

### **Note**

*Additional information*

### **Tip**

*Recommended action*

## Purpose of this manual

The Safety Manual SH 8015 contains information relevant to the use of the Type 3241 Globe Valve in safety-instrumented systems according to IEC 61508 and IEC 61511. The safety manual is intended for planners, constructors and operators of safety-instrumented systems.

### NOTICE

#### **Risk of malfunction due to incorrect installation or start-up of the device.**

- ➔ Refer to the mounting and operating instructions on how to install and start-up the device.
- ➔ Observe the warnings and safety instructions written in the mounting and operating instructions.

### Revisions

Old version	New version	Revisions
November 2022	July 2023	Technical data changed (see section 2) <ul style="list-style-type: none"><li>– Temperature range of body without insulating section</li><li>– Temperature range of balanced valve plug with graphite ring</li></ul>
		Additional information on the mounting position (see section 4)
		Additional information on proof test coverage (PTC) (see section 1.10)
		New safety-related data (see section 8) (replacing certification no. 968/V 1046.00/18 of 22 March 2018)

## Further documentation

The documents listed below contain descriptions of the start-up, functioning and operation of the valve. You can download these documents from the SAMSON website.

### Type 3241 Globe Valve

- ▶ T 8015: Data sheet (DIN)
- ▶ T 8012: Data sheet (ANSI)
- ▶ T 8012-2: Data sheet (JIS)
- ▶ T 8015-1: Data sheet for PSA version (DIN)
- ▶ T 8012-1: Data sheet for PSA version (ANSI)
- ▶ T 8016: Data sheet for version with safety function
- ▶ T 8020-2: Data sheet for Type 3241-Gas (valve class D)
- ▶ EB 8015: Mounting and operating instructions (DIN)

- ▶ EB 8012: Mounting and operating instructions (ANSI, JIS)
- ▶ EB 8020: Mounting and operating instructions for Type 3241-Gas

**i Note**

*In addition to the valve documentation, observe the technical documentation for the actuator and valve accessories.*

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# 1 Scope

## 1.1 General

The SAMSON Type 3241 Globe Valve in combination with an actuator (e.g. Type 3271 or Type 3277 Pneumatic Actuator) is designed to regulate the flow rate, pressure or temperature of liquids, gases or vapors.

## 1.2 Use in safety-instrumented systems

The valve can be used in safety-instrumented systems according to IEC 61508 and IEC 61511. The valve can be used in safety-instrumented systems up to SIL 2 (single device) and SIL 3 (redundant configuration) on observing the requirements of IEC 61508.

The safety-instrumented function of the valve is to be regarded as a Type A element in accordance with IEC 61508-2.

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**i Note**

*The architecture and the interval between proof tests must be considered in order to achieve the safety integrity level.*

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**💡 Tip**

*The diagnostic coverage can be increased and, as a result, the probability of failure on demand reduced by mounting a positioner with diagnostic capabilities on the control valve.*

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## 1.3 Versions and ordering data


Valves combined with actuators with travel stop and/or handwheel are **not** suitable for use in safety-instrumented systems. All other versions are suitable for use in safety-instrumented systems.

## 1.4 Mounting

The valve and actuator are normally delivered already assembled by SAMSON.

## 2 Technical data

Table 1: DIN version

Valve size	DN	15 to 250	15 to 150	15 to 300				15 · 25 · 40 · 50 · 80		
Material		Cast iron EN-GJL-250 (EN-JL1040)	Spheroidal graphite iron EN-GJS-400-18-LT (EN-JS1049)	Cast steel 1.0619	Cast stainless steel 1.4408	Cast steel 1.6220/1.1138	Cast stainless steel 1.4308	Forged steel 1.0460	Forged stainless steel 1.4404	
Pressure rating	PN	10 · 16	16 · 25	10 · 16 · 25 · 40						
Type of connection	Flanges	All DIN versions								
	Welding ends	-						DIN EN 12627 only for DN 25, 40, 50, 80, 100, 150, 200, 250, 300		-
Seat-plug seal	Metal seal · Soft seal · High-performance metal seal									
Characteristic	Equal percentage · Linear (according to Information Sheet ▶ T 8000-3)									
Rangeability	50:1 for DN 15 to 50 · 30:1 for DN 65 to 150 · 50:1 for DN 200 and larger									
Heating jacket	Up to DN 100: PN 25 · DN 125 and larger: PN 16									
RFID tag (optional)	Application range according to the technical specifications and the explosion protection certificates. Documents ▶ <a href="http://www.samsunggroup.com">www.samsunggroup.com</a> > Service & Support > Electronic nameplate									
Conformity										
<b>Temperature ranges in °C · Permissible operating pressures acc. to pressure-temperature diagrams (see Information Sheet ▶ T 8000-2)</b>										
<b>Body without insulating section</b>		All valve sizes: -10 to +220 Valve sizes DN 200 to 300 with high-temperature packing: -10 to +350								
Body with	Insulating section	-10 to +300	-10 to +350	-10 <sup>5)</sup> to +400 <sup>1)</sup>	-50 to +450 <sup>2)</sup>	-50 to +300	-50 to +300 <sup>2)</sup>	-10 <sup>5)</sup> to +400	-50 to +450	
	Long <sup>3)</sup>	-			-196 to +450	-	-196 to +300	-	-196 to +450	
	Bellows seal	-10 to +300	-10 to +350	-10 <sup>5)</sup> to +400 <sup>1)</sup>	-50 to +450 <sup>2)</sup>	-50 to +300	-50 to +300 <sup>2)</sup>	-10 <sup>5)</sup> to +400	-50 to +450	
	Long <sup>3)</sup>	-			-196 to +450	-	-196 to +300	-	-196 to +450	
Valve plug	Standard	Metal seal	-196 to +450							
		Soft seal	-196 to +220							
	Balanced	PTFE ring	-50 to +220 · Lower temperatures on request							
		With graphite ring	10 to 450							
RFID tag (optional)	Max. permissible operating temperature: 85 °C									
<b>Leakage class according to IEC 60534-4</b>										
Valve plug		Metal seal	Standard: IV · High-performance metal seal: V <sup>4)</sup>							
		Soft seal	VI							
	Balanced	Metal seal	Standard: IV · With PTFE or graphite pressure-balancing ring Special version: V · For high-performance (only with PTFE balancing ring) on request							

<sup>1)</sup> Special version: extended temperature range up to 450 °C when pressurized parts are made of cast steel 1.0619


<sup>2)</sup> DN 200 and larger: down to -196 °C

<sup>3)</sup> Long insulating section or bellows seal up to DN 150

<sup>4)</sup> Leakage class V for temperatures <-50 °C on request

<sup>5)</sup> Version for lower temperatures on request

Table 2: ANSI version

Valve size	NPS	1 to 10	½ to 2	½ to 12			½, 1, 1½, 2, 3 <sup>2)</sup>		
ASTM material		Cast iron A126 B		Cast steel A216 WCC	Cast stainless steel A351 CF8M	Cast steel A352 LCC	Cast stainless steel A351 CF8	Forged steel A105	Forged stainless steel A182 F316
Pressure rating	Class	125	250	150/300			300		
Type of con- nection	Flanges	FF	–	RF <sup>1)</sup>			RF <sup>1)</sup>		
	Welding ends	–	–	ASME B16.25			–		
	Thread	–	NPT	–			–		
Seat-plug seal		Metal seal · Soft seal · High-performance metal seal							
Characteristic		Equal percentage · Linear (according to Information Sheet ▶ T 8000-3)							
Rangeability		50:1 for NPS ½ to 2 · 30:1 for NPS 2½ to 6 · 50:1 for NPS 8 and larger							
Heating jacket		Class 150							
RFID tag (optional)		Application range according to the technical specifications and the explosion protection certificates. Documents ▶ <a href="http://www.samsongroup.com">www.samsongroup.com</a> > Service & Support > Electronic nameplate							
Conformity									
<b>Temperature ranges in °C (°F)</b> · Permissible operating pressures according to pressure-temperature diagram (see Information Sheet ▶ T 8000-2)									
Body with standard bonnet		All valve sizes: –10 to +220 °C (14 to 428 °F) Valve sizes NPS 8 to 12 with high-temperature packing: –10 to +350 °C (14 to 662 °F)							
Body with	Insulating section in °C (°F)	–29 to +232 (–20 to +449)	–29 to +425 (–20 to +797)	–50 to +450 <sup>3)</sup> (–58 to +842)	–46 to +345 (–50 to +653)	–50 to +450 <sup>3)</sup> (–58 to +842)	–29 to +425 (–20 to +797)	–50 to +450 <sup>3)</sup> (–58 to +842)	
	Long	–	–	–196 to +450 (–320 to +842)	–	–196 to +450 (–320 to +842)	–	–196 to +450 (–320 to +842)	
	Bellows seal in °C (°F)	–29 to +232 (–20 to +449)	–29 to +425 (–20 to +797)	–50 to +450 <sup>3)</sup> (–58 to +842)	–46 to +345 (–50 to +653)	–50 to +450 <sup>3)</sup> (–58 to +842)	–29 to +425 (–20 to +797)	–50 to +450 <sup>3)</sup> (–58 to +842)	
	Long	–	–	–196 to +450 (–320 to +842)	–	–196 to +450 (–320 to +842)	–	–196 to +450 (–320 to +842)	
Valve plug	Standard	Metal seal		–196 to +450 °C (–320 to +842 °F)					
		Soft seal		–196 to +220 °C (–320 to +428 °F)					
	Balanced	PTFE ring		–50 to +220 °C (–58 to +428 °F) · Lower temperatures on request					
		With graphite ring		10 to 450 °C (50 to 842 °F)					
RFID tag (optional)		Max. permissible operating temperature: 85 °C (185 °F)							
<b>Leakage class according to ANSI/FCI 70-2</b>									
Valve plug	Standard	Metal seal		Standard: IV · High-performance metal seal: V <sup>4)</sup>					
		Soft seal		VI					
	Balanced	Metal seal		Standard IV · With PTFE or graphite balancing ring Special version V · For high-performance (only with PTFE balancing ring) on request					

<sup>1)</sup> Other versions on request

<sup>2)</sup> NPS 3 only in A 105

<sup>3)</sup> DN 200 and larger: down to –196 °C (–320 °F)

<sup>4)</sup> Leakage class V for temperatures <–50 °C (<–58 °F) on request

### **i** Note

*Technical data for the other versions (e.g. PSA, Type 3241-Gas) can be found in the corresponding data sheets. See section 'Further documentation'.*

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## 3 Safety-related functions

### 3.1 Safety-related fail-safe action

The valve, in combination with a pneumatic actuator, controls the process medium flowing through it. When the signal pressure acting on the actuator is changed, the springs in the actuator move the actuator stem downward or upward to close or open the valve. The fail-safe action is triggered when no signal pressure is applied to the actuator.

### 3.2 Fail-safe action

The signal pressure is normally applied to the actuator. The actuator is vented upon demand as part of the safety-instrumented function. As soon as the actuator is vented (signal pressure = atmospheric pressure), the spring forces cause the actuator stem to move to the fail-safe position. The valve is completely open or completely closed.

Depending on the actuator's direction of action (see the associated actuator documentation), the valve has one of the following fail-safe positions:

- "Actuator stem extends" fail-safe action: in the event of emergency, the springs move the actuator stem downward and close the valve.
- "Actuator stem retracts" fail-safe action: in the event of emergency, the springs move the actuator stem upward and open the valve.

### 3.3 Protection against unauthorized changes to the configuration

The valve's fail-safe position depends on the mounted actuator's direction of action. The actuator's direction of action can be reversed. However, this is not possible while the process is running.



## 4 Installation and start-up

The valve is delivered ready to install and can be installed into the pipeline without the need for any additional installation work. Refer to the valve documentation on how to install and start-up the valve.

- Generally, we recommend installing the valve with the actuator upright and on top of the valve. If another mounting position is used that is less favorable, the plant operator must ensure that the functional safety is not impaired as a result. This can be achieved, for example, by changing the test plan accordingly or shortening the intervals between tests.
- Tilting or tipping over of the valve must be prevented.



**Tip**

*We recommend checking the installation and start-up using a checklist. Examples of such checklists are included in VDI 2180-2 and the SAMSON brochure WA 236 (Functional safety of globe valves, rotary plug valves, ball valves and butterfly valves).*

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## 5 Required conditions



**WARNING**

***Risk of malfunction due to incorrect selection or wrong installation and operating conditions.***

- *Only use valves in safety-instrumented systems if the necessary conditions in the plant are fulfilled.*
- 



**Tip**

*We recommend checking the necessary conditions using a checklist. Examples of such checklists are included in VDI 2180-2 and the SAMSON brochure WA 236 (Functional safety of globe valves, rotary plug valves, ball valves and butterfly valves).*

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## Required conditions

### 5.1 Selection

- The suitability of the entire control valve assembly (valve, actuator, valve accessories) for the intended use (pressure, temperature) has been checked.
- The valve materials are suitable for the process medium.
- The actuator is correctly sized based on the required transit time and thrust.

### 5.2 Mechanical and pneumatic installation

- The valve is installed properly into the pipeline as described in the mounting and operating instructions and the actuator is mounted on it. Valve accessories are mounted correctly.
- The prescribed direction of flow is observed. The arrow on the valve indicates the direction of flow.
- The control valve is configured with the correct fail-safe position (stem extends or retracts).
- The tightening torques (e.g. for the flanged joints) are observed.
- A strainer must be installed when the process medium contains solids, which could block the valve.

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#### **⚠ WARNING**

***The strainer may block the medium flow in a control valve assembly with "actuator stem retracts" fail-safe action.***

- *Valves with "actuator stem retracts" fail-safe action must not be fitted with a strainer.*
- 

### 5.3 Operation

- The plug stem is not blocked.
- The medium flow through the valve is not blocked.
- The valve is only used in operating conditions that meet the specifications used for sizing at the ordering stage.

## 5.4 Maintenance

- Maintenance is only performed by fully trained, qualified operating personnel.
- Only original parts are used for spare parts.
- Service work is performed as described in the 'Servicing' section of the associated valve documentation.



### Tip

Contact SAMSON's After-sales Service concerning any work not described in the 'Servicing' section in the associated valve documentation.

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## 6 Proof testing

The proof test interval and the extent of testing lie within the operator's responsibility. The operator must draw up a test plan, in which the proof tests and the interval between them are specified. We recommend summarizing the requirements of the proof test in a checklist.

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### **! WARNING**

***Risk of dangerous failure due to malfunction in the event of emergency (valve does not move to the fail-safe position).***

- Only use devices in safety-instrumented systems that have passed the proof test according to the test plan drawn up by the operator.
- 

To test the safety-instrumented function properly, the following requirements must be met:

- Valve and actuator are assembled together properly.
- The control valve is installed properly into the plant.

Regularly check the safety-instrumented function of the entire SIS loop. The test intervals are determined, for example on calculating each single SIS loop in a plant ( $PFD_{avg}$ ).

## Required conditions

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### Tip

We recommend performing the proof tests based on a checklist. An example of such a checklist is included in the SAMSON brochure WA 236 (Functional safety of globe valves, rotary plug valves, ball valves and butterfly valves).

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## 6.1 Visual inspection to avoid systematic failure

To avoid systematic failure, inspect the valve regularly. The frequency and the scope of the inspection lie within the operator's responsibility. Take application-specific influences into account, such as:

- Blockage of plug stem
  - Corrosion (destruction primarily of metals due to chemical and physical processes)
  - Material fatigue
  - Wear induced by the process medium
  - Abrasion (material removed by solids contained in the process medium)
  - Medium deposits
  - Aging (damage caused to organic materials, e.g. plastics or elastomers, by exposure to light and heat)
  - Chemical attack (organic materials, e.g. plastics or elastomer, which swell, leach out or decompose due to exposure to chemicals)
- 



### NOTICE

**Risk of malfunction due to the use of unauthorized parts.**

→ Only use original parts to replace worn parts.

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## 6.2 Function testing

Regularly check the safety-instrumented function according to the test plan drawn up by the operator.

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### Note

Record any positioner faults and e-mail (aftersaleservice@samsongroup.com) them to SAMSON.

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**Safety-related fail-safe action**

1. Supply the actuator with the signal pressure to allow the valve to move to the end position (completely open or closed).
2. Disconnect the signal pressure. This must cause the valve to move to its fail-safe position.
3. Check whether the valve reaches the end position within the required time.
4. Check whether the maximum permissible leakage is observed.

**Safety-instrumented function of valve accessories**

- Check the safety-instrumented function of valve accessories. Refer to the associated safety manuals.

### 6.3 Proof test coverage (PTC)

The proof test coverage (PTC) depends on the application in which the control valve is used and on the valve accessories mounted on the control valve.

- Contact SAMSON for the proof test coverage (PTC).  
Go to the SAMSON website ([www.samsongroup.com](http://www.samsongroup.com)) to find your local SAMSON subsidiary.

## 7 Repairs

Only perform the work on the valve described in the valve documentation.

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**NOTICE**

***Safety-instrumented function will be impaired if repair work is performed incorrectly.***

- *Only allow trained staff to perform service and repair work.*
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# 8 Safety-related data

The Type 3241 Valve is suitable for use in safety-instrumented systems according to IEC 61508 and IEC 61511. It is suitable for use in safety-instrumented systems up to SIL 2 (single device) and SIL 3 (redundant configuration) according to IEC 61508. The evidence is based on prior use combined with an FMEA.

## Safety-related data

$\lambda_{\text{safe, undetected}}$	1140 FIT
$\lambda_{\text{safe, detected}}$	0 FIT
$\lambda_{\text{dangerous, undetected}}$	73 FIT
$\lambda_{\text{dangerous, detected}}$	0 FIT
PFD <sub>avg.</sub> with annual test	$3.18 \times 10^{-4}$
HFT (Hardware Fault Tolerance)	0
DC (Diagnostic Coverage)	0
Device type	A
Safe failure fraction (SFF)	94 %
MTBF <sub>total</sub>	95 years
MTBF <sub>dangerous, undetected</sub>	1560 years

1 FIT = 1 failure per  $10^9$  hours

## Useful lifetime

According to IEC 61508-2, section 7.4.9.5, a useful lifetime of eight to twelve years can be assumed. Other values can be used based on the user's previous experience (prior use).

## Intended use

- See the mounting and operating instructions for the valve:
  - ▶ EB 8015: Mounting and operating instructions (DIN)
  - ▶ EB 8012: Mounting and operating instructions (ANSI, JIS)
  - ▶ EB 8020: Mounting and operating instructions for Type 3241-Gas
- Quality requirements for instrument air: see mounting and operating instructions or operating manual for mounted valve accessories (e.g. positioner, solenoid valve)

### **Safety-related assumptions**

In case of fault, the actuator is vented, causing the valve to move to its fail-safe position.

### **Note**

A positioner can be used to perform sophisticated diagnostics while the process is running. Depending on the application, this may result in a diagnostic coverage for dangerous failures of  $\geq 70\%$ .

### **Requirements**

- Short mean time to repair compared to the average rate of demand.
- Normal exposure to industrial environment and fluids.
- The user is responsible for ensuring that the device is used as intended.

SH 8015 EN



SAMSON AKTIENGESELLSCHAFT  
Weismüllerstraße 3 · 60314 Frankfurt am Main, Germany  
Phone: +49 69 4009-0 · Fax: +49 69 4009-1507  
samson@samsongroup.com · www.samsongroup.com