



## SH 8065 EN

Translation of original instructions



Type 3256 Valve with Type 3271 Actuator

## Type 3256 Angle 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 8065 contains information relevant for the use of the Type 3256 Angle 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.

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### **!** 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: EB 8065 (DIN version) or EB 8066 (ANSI version).*
  - ➔ *Observe the warnings and safety instructions written in the mounting and operating instructions: EB 8065 (DIN version) or EB 8066 (ANSI version).*
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## 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 3256 Angle Valve

- ▶ T 8065: Data sheet (DIN)
  - ▶ T 8066: Data sheet (ANSI)
  - ▶ T 8071: Data sheet for version with ceramic trims
  - ▶ EB 8065: Mounting and operating instructions (DIN)
  - ▶ EB 8066: Mounting and operating instructions (ANSI)
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### **i** Note

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

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# 1 Scope

## 1.1 General

The SAMSON Type 3256 Angle 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.

## 1.3 Versions and ordering data

Valves combined with Type 3271 or Type 3277 Pneumatic Actuators are suitable for use in safety-instrumented systems. This does not apply to combinations including pneumatic actuators with travel stop and/or handwheel. They are not 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

Material		Cast steel 1.0619		Cast steel 1.7357		Cast stainless steel 1.4408	
Valve size <sup>1)</sup>	DN	15 to 150	200 to 300	15 to 150	200 to 300	15 to 150	200 to 300
Pressure rating <sup>1)</sup>	PN	16 to 400	16 to 100	16 to 400	16 to 100	16 to 400	16 to 100
Type of connection	Flanges	All DIN EN versions					
	Welding ends	DIN EN 12627					
Seat-plug seal		Metal seal · Soft seal · High-performance metal seal					
Characteristic		Equal percentage · Linear · On/off (▶ T 8000-3)					
Rangeability		50:1					
Compliance							
<b>Temperature ranges</b> in °C · Permissible operating pressures acc. to pressure-temperature diagram (see Information Sheet ▶ T 8000-2)							
Body without insulating section		-10 to +220 °C · Up to +350 °C with high-temperature packing					
Body with	Insulating section or bellows seal	-10 to +400 <sup>3)</sup>		-10 to +500		-196 to +550	
Valve plug <sup>2)</sup>	Standard	Metal seal		-196 to +550			
		Soft seal		-196 to +220			
	Balanced with PTFE ring			-50 to +220 <sup>3)</sup>			
	Balanced with graphite ring			200 to 500 <sup>4)</sup>			
<b>Leakage class</b> according to IEC 60534-4							
Valve plug	Standard	Metal seal	Standard: IV · High-performance metal seal: V				
		Soft seal	VI				
	Balanced, metal seal			With PTFE (standard): IV · High-performance metal seal: V			
With graphite ring: IV							

<sup>1)</sup> DN 400 and 500 on request; up to PN 400 on request

<sup>2)</sup> Only in combination with suitable body material

<sup>3)</sup> Lower temperatures on request

<sup>4)</sup> Higher temperatures on request

**Table 2: ANSI version**

Material		Cast steel A216 WCC	Cast steel A217 WC6	Cast stainless steel A351 CF8M
Valve size and pressure rating		NPS ½ to 12 in Class 150 to 2500 NPS 16 to 20 on request		
Type of connection	Flanges	All ANSI versions		
	Welding ends	According to ANSI B16.25		
Seat-plug seal		Metal seal · Soft seal · High-performance metal seal		
Characteristic		Equal percentage · Linear · On/off (▶ T 8000-3)		
Rangeability		50:1		
Compliance				
Temperature ranges in °F (°C) · Permissible operating pressures according to pressure-temperature diagrams (see Information Sheet ▶ T 8000-2)				
Body without insulating section		14 to 428 °F/–10 to +220 °C Up to 662 °F/350 °C with high-temperature packing		
Body with insulating section or bellows seal		–20 to +800 °F (–29 to +425 °C)	–20 to +932 °F (–29 to +500 °C)	–325 to +1022 °F (–196 to +550 °C)
Valve plug <sup>1)</sup>	Standard	Metal seal –325 to +1022 °F (–196 to +550 °C) <sup>2)</sup>		
		Soft seal –325 to +428 °F (–196 to +220 °C) <sup>2)</sup>		
		Balanced with PTFE ring –58 to +428 °F (–50 to +220 °C) <sup>3)</sup>		
		Balanced with graphite ring 428 to 932 °F (220 to 500 °C) <sup>4)</sup>		
<b>Leakage class</b> according to ANSI/FCI 70-2				
Valve plug	Standard	Metal seal Standard: IV · High-performance metal seal: V		
		Soft seal VI		
	Balanced, metal seal	With PTFE (standard): IV · High-performance metal seal: V With graphite ring: IV		

- <sup>1)</sup> Only in combination with suitable body material
- <sup>2)</sup> Note: The temperature limits are not directly converted temperatures.
- <sup>3)</sup> Lower temperatures on request
- <sup>4)</sup> Higher temperatures on request

**Additional technical data:**

→ See Data Sheets ▶ T 8065 (DIN version) and ▶ T 8066 (ANSI version)

### 3 Safety-related functions

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.

#### 3.1 Fail-safe action

The signal pressure is normally applied to the actuator. The actuator is vented upon demand 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.

#### 3.2 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.

### Mounting orientation

The valve is installed with the actuator upright and on top of the valve. Tilting or tipping over of the actuator is 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.

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#### Tip

We recommend checking the necessary conditions using a checklist. Examples of such checklists are included in VDI 2780-5 and the SAMSON brochure WA 236 (Functional safety of globe valves, rotary plug valves, ball valves and butterfly valves).

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### 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.

## Required conditions

- 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 associated valve documentation (EB 8065 (DIN version) or EB 8066 (ANSI version)) 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.
- Control valves  $\geq$ DN 100 and  $\geq$ NPS 4 as well as valves with insulating section are installed in the pipeline with the actuator pointing up.
- Control valves  $<$ DN 100 and  $<$ NPS 4, which are not installed in the pipeline with the actuator pointing up, are supported or suspended.
- Control valves with "Actuator stem extends" fail-safe action: A strainer is installed upstream of the valve when the process medium contains solids, which could block the valve.  
Control valves with "Actuator stem retracts" fail-safe action: No strainer is installed upstream of the valve.

## 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 Servicing

- Service work 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 section on servicing or maintenance in the associated valve documentation (EB 8065 (DIN version) or EB 8066 (ANSI version)).

**Tip**

Contact SAMSON's After-sales Service department concerning any work not described in the section on servicing or maintenance in the associated valve documentation (EB 8065 (DIN version) or EB 8066 (ANSI version)).

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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.

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**NOTICE**

***Malfunction due to a non-observance of the required inspection requirements.***

To test the fail-safe action properly, the following requirements must be met:

- Valve and actuator are assembled together properly.
  - The control valve is installed properly into the plant.
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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<sub>avg</sub>).

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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 Function testing

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

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#### **i** Note

*Record any faults in the valve and inform SAMSON of them in writing.*

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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.

### 6.2 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)

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**ⓘ NOTICE**

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

→ *Only use original parts to replace worn parts.*

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## 7 Repairs

Only perform the work on the valve described in the associated valve documentation (EB 8065 (DIN version) or EB 8066 (ANSI version)).

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**ⓘ NOTICE**

***Fail-safe action impaired due to incorrect repair.***

→ *Service and repair work must be performed by trained staff only.*

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## 8 Safety-related data

The Type 3256 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

### Safety-related data

$\lambda_{\text{safe, undetected}}$	860 FIT
$\lambda_{\text{safe, detected}}$	0 FIT
$\lambda_{\text{dangerous, undetected}}$	54.6 FIT
$\lambda_{\text{dangerous, detected}}$	0 FIT
$\text{PFD}_{\text{avg.}}$ with annual test	$2.4 \times 10^{-4}$
HFT (Hardware Fault Tolerance)	0
DC (Diagnostic Coverage)	0
Device type	A
Safe failure fraction (SFF)	94 %
$\text{MTBF}_{\text{total}}$	125 years
$\text{MTBF}_{\text{dangerous, undetected}}$	2090 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 Mounting and Operating Instructions EB 8065
- 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 8065 EN



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