

## T 8003-GR EN

### Series SMS · SMS MG-1 and SMS MG-7 Pneumatic Control Valves

#### Type 251GR Globe Valve

DIN version



#### Application

Control valve for process engineering applications with high industrial requirements

<b>Nominal size</b>	<b>DN 15 to 200</b>
<b>Pressure rating</b>	<b>PN 16 to 160</b>
<b>Temperatures</b>	<b>-50 to +600 °C</b>

Type 251GR Globe Valve operated with

- Type 3271 Pneumatic Actuator (SMS MG-1 Control Valve)
- Type 3277 Pneumatic Actuator (SMS MG-7 Control Valve) for integral positioner attachment

#### Special features

- Plug and cage trim replaceable in the field
- Body made of cast steel
- Body made of cast stainless steel
- Soft seal
- Metal seal
- High-performance metal seal
- Balanced to handle high differential pressures

Optional with RFID tags with unique identification according to DIN SPEC 91406.

The control valves with their modular design can be equipped with various accessories:

Positioners, limit switches, solenoid valves and other valve accessories according to IEC 60534-6-1<sup>1)</sup> and NAMUR recommendation (see Information Sheet ▶ T 8350).

#### Versions

Operating temperature (medium temperature) with PTFE packing for temperatures from -29 to +250 °C, with graphite packing in combination with insulating section from -50 to +600 °C or with bellows seal (independent from the packing version) up to +425 °C, nominal size DN 15 to 200, PN 16 to 160 (see Table 1)

- **SMS MG-1** (Fig. 1) · Type 251GR Globe Valve and Type 3271 Actuator with 350 to 2800 cm<sup>2</sup> actuator area (see Data Sheets ▶ T 8310-1, ▶ T 8310-2 and ▶ T 8310-3)
- **SMS MG-7** · Type 251GR Globe Valve and Type 3277 Actuator with 350 to 750v2 cm<sup>2</sup> actuator area for integral positioner attachment (see Data Sheet ▶ T 8310-1)

<sup>1)</sup> Accessories required. See associated actuator documentation.



**Fig. 1:** SMS MG-1: Type 251GR Globe Valve with Type 3271 Pneumatic Actuator

#### Further versions

- **Valve plug with pressure balancing**
- **Additional handwheel** · See Data Sheet ▶ T 8310-1
- **Type 251GR Valve with Type 3273 Hand-operated Actuator** · For valves with max. 30 mm rated travel and side-mounted handwheel for travel > 30 mm · See Data Sheet ▶ T 8312
- **SMS MG-TP Electric Control Valve** · On request
- Version with **clamped-in** or **screwed-in seat** or with **cage trim**
- **Version with insulating section for high temperatures**
- **Version with bellows seal**

### Principle of operation of version with clamped-in/screwed-in seat

The medium flows through the valve in the direction indicated by the arrow. The valve plug determines the cross-sectional area of flow.

The valves can be equipped with a flow divider ST 1 (see Data Sheet ▶ T 8081) for noise reduction.

Pressure balancing must be used when high pressures or differential pressures act on the plug.

Fig. 2 and Fig. 3 show configuration examples.

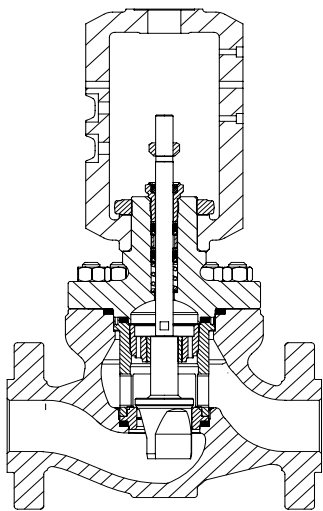


Fig. 2: Type 251GR Globe Valve operated with clamped-in seat

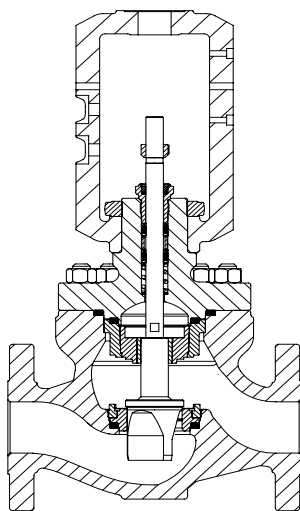


Fig. 3: Type 251GR Globe Valve operated with screwed-in seat

### Principle of operation of cage version

The medium flows through the valve as indicated by the arrow on the valve body. A change in the pneumatic signal acting on the actuator changes the piston travel and how far the valve is opened as a result. The piston position and cage design determine the released cross-section and the resulting flow rate.

Fig. 4 shows a configuration example.

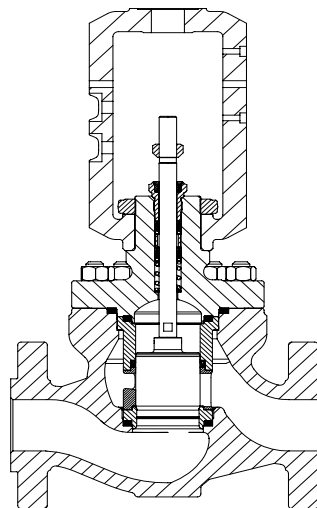


Fig. 4: Type 251GR Globe Valve with cage trim

All the trims shown in Fig. 2 to Fig. 4 are interchangeable in the field without any revisions necessary to the pressure-bearing or pressure-retaining parts.

### Fail-safe action


Depending on how the springs are arranged in the pneumatic actuator (see Data Sheets ▶ T 8310-1, ▶ T 8310-2 and ▶ T 8310-3), the valve has two different fail-safe positions that become effective when the supply air fails.

- **Actuator stem extends (fail-close)**  
The valve closes when the supply air fails.
- **Actuator stem retracts (fail-open)**  
The valve opens when the supply air fails.

### Differential pressures

The permissible differential pressures can be found in the Information Sheet ▶ T 8000-4.

**Table 1: Technical data for Type 251GR**

Material	Cast steel 1.0619	Cast stainless steel 1.4408
Nominal size and pressure rating	DN 15 to 200 · PN 16 to 160	
Type of end connections	Flanges	B1 and B2 according to DIN EN 1092
	Welding ends	DIN EN 12627
Seat-plug seal	Metal seal · High-performance metal seal	
Characteristic	Equal percentage · Linear · Mod. linear · On/off	
Rangeability	50:1	
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> > Products > Electronic nameplate	
Conformity		
<b>Temperature ranges</b> in °C · Permissible operating pressures acc. to pressure-temperature diagrams (see Information Sheet ► T 8000-2)		
Body without insulating section	-10 to +250 with PTFE packing Up to +425 with graphite packing	-29 to +250 with PTFE packing
Body with insulating section	-10 to +425	-50 to +600
Body with bellows seal	-10 to +425	-50 to +425
Trim <sup>1)</sup>	Metal seal	-50 to +600
	Balanced with PTFE	-50 to +250
RFID tag (optional)	Max. permissible temperature at the RFID tag: 85 °C	
<b>Leakage class</b> according to IEC 60534-4		
Trim	Metal seal	Standard: IV · High-performance metal seal: V
	Balanced, metal seal	With PTFE (standard): IV · High-performance metal seal: V

**Table 2: Materials**

Standard version	Cast steel 1.0619	Cast stainless steel 1.4408			
Body					
Valve bonnet	1.0619	1.4408			
Plug stem	1.4401/1.4404 or XM-19-H				
Seal ring for balanced plug	PTFE with carbon · Graphite				
Guide bushing	1.4125	2.4610			
Packing	PTFE packing loaded by internal or external springs or adjustable graphite packing				
Body gasket	Spiral-wound gasket, graphite/1.4401/1.4404				
Version with screwed-in seat and plug	Plug <sup>3)</sup>	1.4006/1.4008	1.4125	1.4401/1.4404	1.4401/1.4404
	Seat	1.4006/1.4008	1.4125 <sup>1)</sup>	1.4401/1.4404 <sup>2)</sup>	1.4401/1.4404 <sup>2)</sup>
	Seat fastenings	1.4006/1.4008			1.4401/1.4404 <sup>2)</sup>
Version with clamped-in seat and plug	Plug <sup>3)</sup>	1.4006/1.4008	1.4125	1.4401/1.4404	1.4401/1.4404
	Seat	1.4006/1.4008	1.4125 <sup>1)</sup>	1.4401/1.4404 <sup>2)</sup>	1.4401/1.4404 <sup>2)</sup>
	Seat fastenings	1.7379			1.4408
Version with piston and cage	Piston	1.4006 <sup>1)</sup>	1.4125	1.4401/1.4404 <sup>4) 5)</sup>	1.4401/1.4404 <sup>2) 4) 5)</sup>
	Cage	1.4006 <sup>1)</sup>	1.4125	1.4401/1.4404	1.4401/1.4404
	Seat	1.4006 <sup>1)</sup>	1.4125	1.4401/1.4404 <sup>2)</sup>	1.4401/1.4404 <sup>2)</sup>
	Cylinder	1.4006 <sup>1)</sup>	1.4125	1.4401/1.4404 <sup>2)</sup>	

1) Heat treated

2) Also Stellite®-faced facing

3) Plug made of Stellite® 6 (up to seat bore Ø ≤55 mm) available

4) Guiding surface with hard chrome plating

5) Guiding surface also Stellite® faced when the facing is Stellite®-faced

**Table 3:**  $K_{VS}$  coefficients for version with plug · **Equal percentage** or **linear**

Terms for control valve sizing according to IEC 60534, Parts 2-1 and 2-2: FL = 0.95, XT = 0.75

**Table 3.1:** Version with **screwed-in seat (equal percentage or linear)**

$K_{VS}$	0.26	0.43	0.65	0.95	1.7	2.6	4.3	6.9	13	21	32	47	74	110	190	273	400	700
$K_{VS-1}$	–	–	–	–	1.6	2.3	3.9	6.2	12	19	29	42	66	100	171	245	363	630
Seat bore in mm	4/8	6/8	6/8	6/8	12	12	24	24	27	33	42	55	70	85	110	130	170	228
Travel in mm	15	15	15	15	15	15	15	15	15	19	19	30	38	38	60	60	60	90

**Table 3.2:** Versions without flow divider (screwed-in seat)

$K_{VS}$	0.26	0.43	0.65	0.95	1.7	2.6	4.3	6.9	13	21	32	47	74	110	190	273	400	700
DN																		
15	•	•	•	•	•	•	•											
25			•	•	•	•	•	•	•									
40					•	•	•	•	•	•	•							
50									•	•	•	•						
80											•	•	•	•				
100												•	•	•	•			
150														•	•	•	•	
200															•	•	•	•

**Table 3.3:** Versions with flow divider ST 1 ( $K_{VS-1}$ ) (screwed-in seat)

$K_{VS-1}$	–	–	–	–	1.6	2.3	3.9	6.2	12	19	29	42	66	100	171	245	363	630
DN																		
15					•	•	•											
25					•	•	•	•	•									
40					•	•	•	•	•	•	•							
50									•	•	•	•						
80											•	•	•	•				
100												•	•	•	•			
150														•	•	•	•	
200															•	•	•	•

**Table 3.4:** Version with **clamped-in seat (equal percentage or linear)**

$K_{VS}$	0.26	0.43	0.65	0.95	1.7	2.6	3.9	4.3	6.9	12	13	21	29	32	42	47	74	100	110	171	190	273	363	400	630	700
Seat bore in mm	4/8	6/8	6/8	6/8	12	12	24	24	24	27	27	33	42	42	55	55	70	85	85	110	110	130	170	170	228	228
Travel in mm	15	15	15	15	15	15	15	15	15	15	15	19	19	19	30	30	38	38	38	60	60	60	60	60	90	90

**Table 3.5:** Versions without flow divider (clamped-in seat)

$K_{VS}$	0.26	0.43	0.65	0.95	1.7	2.6	3.9	4.3	6.9	12	13	21	29	32	42	47	74	100	110	171	190	273	363	400	630	700
DN																										
15	•	•	•	•	•	•	•																			
25			•	•	•	•		•	•	•																
40					•	•		•	•		•	•	•													
50										•	•		•	•												
80												•		•	•	•										
100													•	•				•	•							
150																		•		•	•	•				
200																				•	•		•	•		

**Table 4:** Dimensions in mm**Table 4.1:** SMS MG-1 and SMS MG-7 Pneumatic Control Valve

Valve	DN	15	25	40	50	80	100	150	200
Length L Flanges	PN 16 to 40	130	160	200	230	310	350	480	600
	PN 63 to 160	210	230	260	300	380	430	550	650
Length L Welding ends	PN 16 to 40	130	160	200	230	310	350	480	600
	PN 63 to 160	210	230	260	300	380	430	550	650
Height H4 <b>standard version</b>		130	140	156	176	200	250	320	400
Height H4 with <b>insulating section</b>		225	225	255	290	315	375	530	610
Height H4 with <b>bellows seal</b>		On request	416	On request	464	560	575	861	On request
H8 for actuator	350 cm <sup>2</sup>	286	286	286	286	286	286	503	–
	350v2 cm <sup>2</sup>	286	286	286	286	286	286	503	–
	355v2 cm <sup>2</sup>	286	286	286	286	286	286	503	–
	750v2 cm <sup>2</sup>	286	286	286	286	286	286	503	–
	1000 cm <sup>2</sup>	341	341	341	341	341	341	503	503
	1400-60 cm <sup>2</sup>	341	341	341	341	341	341	503	503
	1400-120 cm <sup>2</sup>	–	–	–	526	526	526	588	588
	2800 cm <sup>2</sup>	–	–	–	526	526	526	588	588
	2x 2800 cm <sup>2</sup>	–	–	–	526	526	526	588	588
H2 <sup>1)</sup>	PN 16 to 40	47.5	57.5	75	82.5	105.5	136	185	215
	PN 63	52.5	70	85	90	107.5	136	185	215
	PN 100	52.5	70	85	97.5	115	136	185	215
	PN 160	52.5	70	85	97.5	115	136	185	–

<sup>1)</sup> The H2 dimension is the distance from the middle of the flow path to the bottom of the valve body. The dimension up to the bottom of the flange may differ. It may be lower or higher. Flange standards (see Table 1).

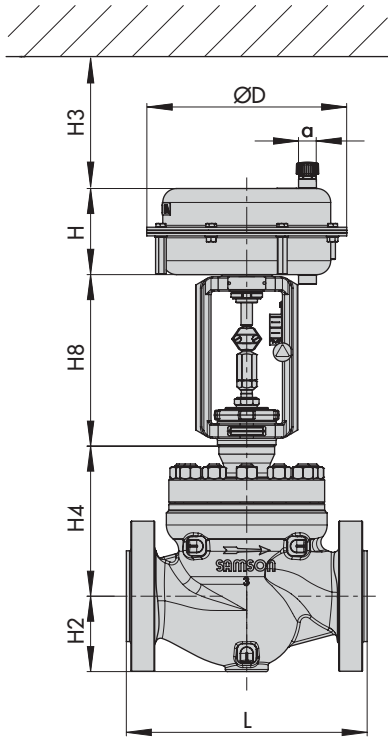
**Table 4.2:** Type 3271 and Type 3277 Pneumatic Actuators

Actuator area	cm <sup>2</sup>	350	350v2	355v2	750v2	1000	1400-60	1400-120	2800	2 x 2800
Diaphragm ØD	mm	280	280	280	394	462	530	534	770	770
H <sup>1)</sup>	Type 3271 mm	82	92	131	236	403	337	598	713	1213
	Type 3277 mm	82	82	121	236	–	–	–	–	–
H3 <sup>2)</sup>	mm	110	110	110	190	610	610	650	650	650
H5	Type 3277 mm	101	101	101	101	–	–	–	–	–
Thread	Type 3271	M30x1.5				M60x1.5		M100x2		
	Type 3277	M30x1.5				–	–	–	–	–
α	Type 3271	G 3/8 (3/8 NPT)	G 3/8 (3/8 NPT)	G 3/8 (3/8 NPT)	G 3/8 (3/8 NPT)	G 3/4 (3/4 NPT)	G 3/4 (3/4 NPT)	G 1 (1 NPT)	G 1 (1 NPT)	G 1 (1 NPT)
α2	Type 3277	G 3/8	G 3/8	G 3/8	G 3/8	–	–	–	–	–

<sup>1)</sup> Height including lifting eyelet or female thread and eyebolt according to DIN 580. Height of the swivel hoist may differ. Actuators up to 355v2 cm<sup>2</sup> without lifting eyelet or female thread

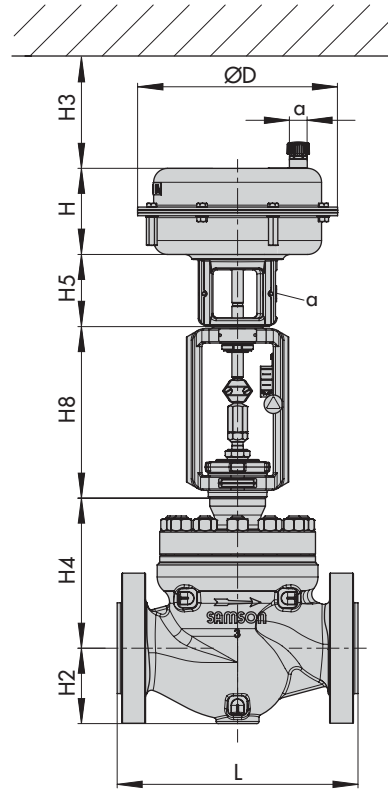
<sup>2)</sup> Minimum clearance required to remove the actuator

Dimensional drawings



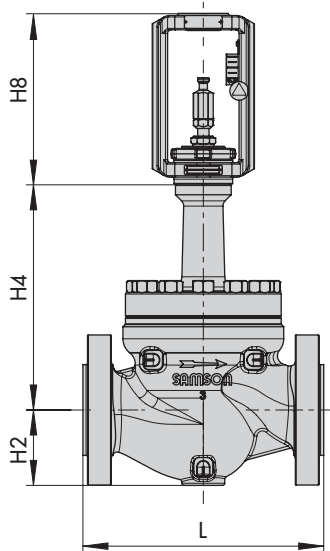
SMS MG-1 Control Valve

Type 251GR Valve with Type 3271 Pneumatic Actuator

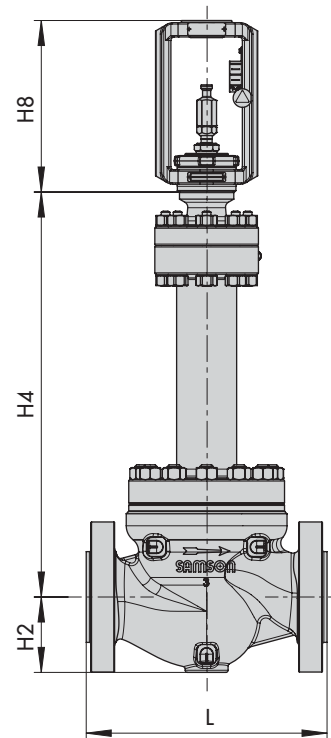


SMS MG-7 Control Valve

Type 251GR Valve with Type 3277 Pneumatic Actuator



Type 251GR Valve with insulating section



Type 251GR Valve with bellows seal

**Table 5: Weights in kg**

**Table 5.1: Type 251GR Valve with B1 flanges according to DIN EN 1092-1**

Valve	DN	15	25	40	50	80	100	150	200
<b>Standard version</b>									
Valve <sup>1)</sup> without actuator	PN 16	9	13	19	28	43	65	136	232
	PN 25				31	46	70	150	-
	PN 40				37	53	90	196	353
	PN 63	11	17	24	41	62	99	207	377
	PN 100				44	78	117	281	-
	PN 160	13	17	25	44	78	117	281	-
<b>Version with insulating section</b>									
Valve <sup>1)</sup> without actuator	PN 16	10	14	21	30	49	74	163	267
	PN 25				33	53	79	178	-
	PN 40				40	55	93	210	367
	PN 63	12	18	26	43	64	103	221	392
	PN 100				46	81	121	295	-
	PN 160	14	20	28	46	81	121	295	-
<b>Version with bellows seal</b>									
Valve <sup>1)</sup> without actuator	PN 16	-	13	18	26	40	63	130	212
	PN 25				29	43	69	145	-
	PN 40				35	46	79	171	294
	PN 63		17	23	39	55	88	181	318
	PN 100				-	-	-	-	-
	PN 160		-	-	-	-	-	-	-

<sup>1)</sup> The weights specified apply to a specific standard device configuration. Weights of other valve configurations may differ depending on the version (material, trim etc.).

**Table 5.2: Type 3271 and Type 3277 Pneumatic Actuators**

Actuator area	cm <sup>2</sup>	350	350v2	355v2	750v2	1000	1400-60	1400-120	2800	2 x 2800
Type 3271	Without hand-wheel kg (approx.)	8	11.5	15	36	80	70	175	450	950
	With Type 3273 Hand-operated Actuator kg (approx.)	13	16.5	20	41	180	175	300 <sup>2)</sup> /425 <sup>3)</sup>	575 <sup>2)</sup> /700 <sup>3)</sup>	On request
Type 3277	Without hand-wheel kg (approx.)	12	15	19	40	-	-	-	-	-
	With Type 3273 Hand-operated Actuator kg (approx.)	17	20	24	45	-	-	-	-	-

<sup>1)</sup> The weights specified apply to a specific standard device configuration. Weights of other actuator configurations may differ depending on the version (material, number of actuator springs etc.).

<sup>2)</sup> Side-mounted handwheel up to 80 mm travel

<sup>3)</sup> Side-mounted handwheel above 80 mm travel

### Selection and sizing of the valve

1. Calculate the  $K_{VS}$  coefficient according to IEC 60534-6
2. Select nominal size DN and  $K_{VS}$  coefficient
3. Determine the permissible differential pressure from the Information Sheet ► T 8000-4.
4. Select the valve body material from Table 1 and Table 2 as well as from the pressure-temperature diagrams (see Information Sheet ► T 8000-2).
5. Select accessories from Table 1 and Table 2.

### The following specifications are required on ordering:

Nominal size	DN
Pressure rating	PN
Body material	See Table 2
Bonnet	Standard bonnet, insulating section or bellows seal
Type of end connections	Flanges/welding ends
Plug/piston	Standard or balanced Soft seal, metal seal or high-performance metal seal
Characteristic	Equal percentage, linear, mod. linear or on/off
Actuator	Type 3271 or Type 3277 (see Data Sheets ► T 8310-1, ► T 8310-2 and ► T 8310-3)
Fail-safe position	Fail-close or fail-open
Process medium	Density in $\text{kg}/\text{m}^3$ and temperature in $^{\circ}\text{C}$
Flow rate	$\text{kg}/\text{h}$ or $\text{m}^3/\text{h}$ in standard or operating state
Pressure	$p_1$ and $p_2$ in psi (bar) (absolute pressure $p_{\text{abs}}$ ) (with minimum, normal and maximum flow rate)
RFID tag	Yes/No
Valve accessories	Positioner and/or limit switch

<b>Associated Information Sheet</b>	► T 8000-X
<b>Associated Data Sheets for pneumatic actuators</b>	► T 8310-1 to -3
<b>Associated Mounting and Operating Instructions</b>	► EB 8003-GR