

## Series 250

# Type 3251-1 and Type 3251-7 Pneumatic Control Valves

## Type 3251 Globe Valve



DIN version

### Application

Control valve for process engineering applications with high industrial requirements

**Nominal size** DN 15 to 500

**Nominal pressure** PN 16 to 400

**Temperatures** -196 to +550 °C



Type 3251 Globe Valve operated with

- Type 3271 Pneumatic Actuator (Type 3251-1 Control Valve)
- Type 3277 Pneumatic Actuator (Type 3251-7 Control Valve) for integral positioner attachment

Valve body made of

- Cast steel
- Cast stainless steel, high-temperature cast steel or cast cold-resisting steel
- Special materials

Low-noise valve plug

- Metal seal
- Soft seal up to PN 40
- High-performance metal seal
- Balanced to handle high differential pressures

The control valves, designed according to the modular assembly principle, can be equipped with various accessories:

Positioners, limit switches, solenoid valves and other accessories according to IEC 60534-6 and NAMUR recommendation (see Information Sheet ▶ T 8350 for more details).

### Versions

**Standard version** with PTFE packing for temperatures from -10 to +220 °C or with adjustable high-temperature packing for -10 to +350 °C, nominal size DN 15 to 500, nominal pressure PN 16 to 400 (see Table 1)

- **Type 3251-1** (Fig. 1) · Type 3251 Valve and Type 3271 Actuator with 350 to 2800 cm<sup>2</sup> actuator area (see ▶ T 8310-1, ▶ T 8310-2, and ▶ T 8310-3)
- **Type 3251-7** · Type 3251 Valve and Type 3277 Actuator with 350 to 750 cm<sup>2</sup> actuator area, for integral positioner attachment (▶ T 8310-1)

### Further versions

- **Welding ends or welding-neck ends** · According to DIN EN 12627
- **Flow divider** or **AC-1/AC-2/AC-3** Trim for noise reduction (see ▶ T 8081, ▶ T 8082, and ▶ T 8083)
- **Valve plug with pressure balancing** · See Table 3
- **Perforated plug** · See Data Sheet ▶ T 8086



**Fig. 1:** Type 3251-1 Pneumatic Control Valve with Type 3271 Actuator

- **Insulating section or bellows seal** · See Technical data
- **Heating jacket** · Details on request
- **Additional handwheel** · See Data Sheet ▶ T 8310-1
- **ANSI version** · NPS ½ to 20, Class 150 to 2500, see Data Sheet ▶ T 8052
- **Type 3251 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
- **Type 3251-2 Electric Control Valve** · Details on request

### Principle of operation

The medium flows through the valve in the direction indicated by the arrow. The valve plug determines the cross-sectional area of flow. The version with bellows seal (Fig. 4) is fitted with a test connection to monitor the stainless steel bellows.

The valves can be equipped with a flow divider (► T 8081) for noise reduction.

Pressure balancing must be used when high pressures or differential pressures act on the plug (Fig. 3).

### 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 effective upon air supply failure.

#### Actuator stem extends (fail-close)

The valve is closed upon air supply failure.

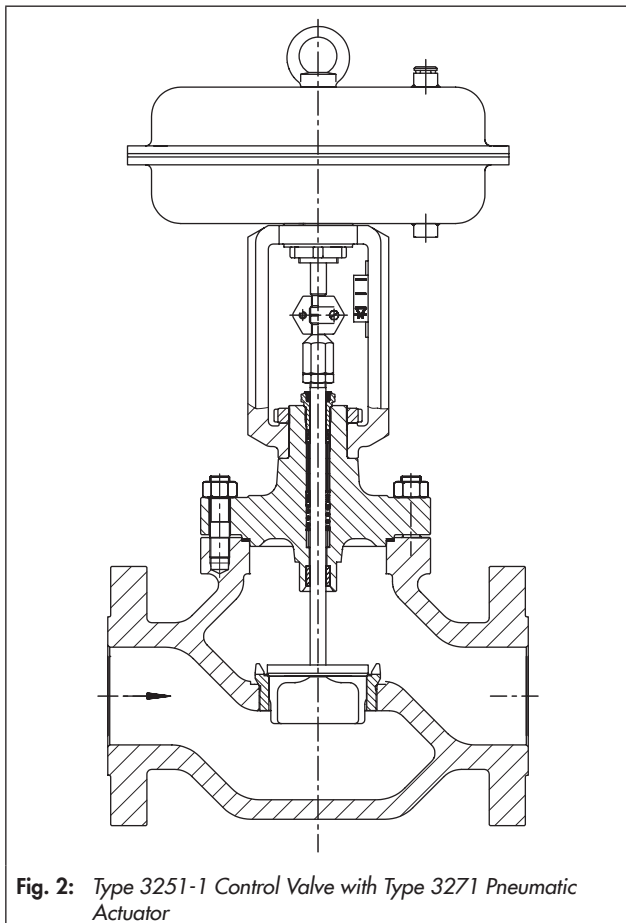
#### Actuator stem retracts (fail-open)

The valve is opened upon air supply failure.

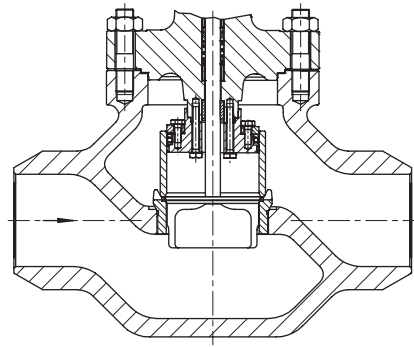
### Differential pressures

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

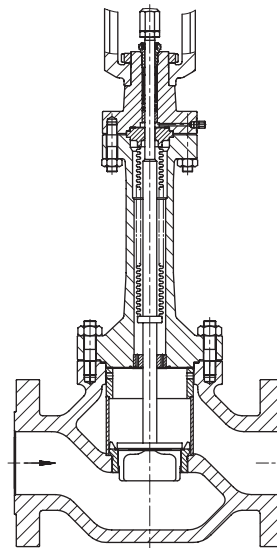
Figs. 2 to 4 show configuration examples.



**Fig. 2:** Type 3251-1 Control Valve with Type 3271 Pneumatic Actuator




**Fig. 3:** Type 3251 Valve with welding ends and balanced plug



**Fig. 4:** Type 3251 Valve with flow divider St I and additional bellows seal with test connection

**Table 1: Technical data for Type 3251**

Material		Cast steel · 1.0619		Cast steel · 1.7357		Cast stainless steel 1.4408	
Nominal size <sup>1)</sup>	DN	15 to 150	200 to 300	15 to 150	200 to 300	15 to 150	200 to 300
Nominal pressure <sup>1)</sup>	PN	16 to 400	Up to PN 160	16 to 400	Up to PN 160	16 to 400	Up to PN 160
Type of end connections	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 · Quick opening (▶ T 8000-3)					
Rangeability		50:1					
Compliance							
<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 220 °C · Up to 350 °C with high-temperature packing					
Body with	Insulating section or bellows seal	-10 to +400	-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	-50 to +220 <sup>3)</sup>					
	Balanced with graphite ring	220 to 550					
<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: PN 16 to 63 · DN 500: PN 16 to 40

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

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

**Table 2: Materials (EN material number)**

Standard version Body <sup>1)</sup>		Cast steel · 1.0619	Cast steel · 1.7357	Cast stainless steel 1.4408
Valve bonnet		1.0460/1.0619	1.7335/1.7357	1.4408/1.4401
Seat and plug <sup>2)</sup>	Metal seal	1.4006/1.4008		1.4404/1.4409
Seal ring for	Soft seal	PTFE with 15 % glass fiber		
	Pressure balancing	PTFE with carbon · Graphite		
Guide bushings		1.4112		2.4610
Packing <sup>3)</sup>		V-ring packing: PTFE with carbon; spring: 1.4310 · High-temperature packing		
Body gasket		Graphite seal on metal core		
<b>Insulating section</b>		1.0460/1.0619	1.7335/1.7357	1.4408/1.4401
<b>Metal bellows seal</b>				
Intermediate piece		1.0460/1.0619	1.7335/1.7357	1.4408/1.4401
Metal bellows		1.4571 <sup>4)</sup>		
<b>Heating jacket</b>		1.4404		

<sup>1)</sup> Further materials (e.g. for high or low-temperature applications) as well as special materials for applications with sea water: 1.4538, duplex 1.4470, nickel-based alloy: 9.4610, see pressure-temperature diagrams (Information Sheet ▶ T 8000-2)

<sup>2)</sup> Seats and metal-seated plug also with Stellite facing or plug made of solid Stellite available (up to max. K<sub>VS</sub> 630)

<sup>3)</sup> Other packings on request (▶ T 8000-1)

<sup>4)</sup> Other bellows materials on request

**Table 3:** Available  $K_{VS}$  coefficients · Versions highlighted in gray also available with balanced plug

Terms for control valve sizing according to IEC 60534, Parts 2-1 and 2-2:  $F_L = 0.95$ ,  $X_T = 0.75$

**Table 3.1:** Overview with flow divider St I ( $K_{VS I}$ ), St II ( $K_{VS II}$ ) and St III ( $K_{VS III}$ )

$K_{VS}$	0.1 · 0.16 0.25 · 0.4	0.63	1.0	1.6	2.5	4	6.3	10	16	25	40	63	100	160	250	360	630	1000	1500	2000	2500	3600	
$K_{VS I}$				1.45	2.2	3.6	5.7	9	14.5	22	36	57	90	144	225	320	560	900	1350	1800	2250	3200	
$K_{VS II}$						3.2	5.0	8	13.0	20	32	50	80	125	200	290	500	800	1200	1600	2000	–	
$K_{VS III}$						3	4.8	7.5	12	20	30	47	75	120	190	270	480	750	1100	1500	1900	–	
Seat $\varnothing$ [mm]	6		12		24			31	38	50	63	80	100	125	150	200	250	300	350	400	500		
Rated travel [mm]	15									30			60			120							

**Table 3.2:** Versions without flow divider · PN 16 to 400

$K_{VS}$	0.1 · 0.16 0.25 · 0.4	0.63	1.0	1.6	2.5	4	6.3	10	16	25	40	63	100	160	250	360	630	1000	1500	2000	2500	3600	
DN																							
15	•	•	•	•	•	•																	
25	•	•	•	•	•	•	•	•															
40	•	•	•	•	•	•	•	•	•	•													
50						•	•	•	•	•	•												
80						•	•	•	•	•	•	•	•										
100									•	•	•	•	•	•									
150											•	•	•	•	•								
200												•	•	• <sup>1)</sup>	•	•	•						
250													•	•	• <sup>1)</sup>	•	•	•	•				
300													•	•	• <sup>1)</sup>	•	•	•	•	•			
400																•	•	•	•	•	•	•	•
500																		•	•	•	•	•	•

<sup>1)</sup> Pressure balancing only for  $\geq$  PN 63

**Table 3.3:** Versions with flow divider St I · PN 16 to 160 <sup>1)</sup>

$K_{VS I}$	–	1.45	2.2	3.6	5.7	9	14.5	22	36	57	90	144	225	320	560	900	1350	1800	2250	3200		
DN																						
15				•	•	•																
25				•	•	•	•	•														
40					•	•	•	•	•	•												
50						•	•	•	•	•	•											
80						•	•	•	•	•	•	•	•									
100								•	•	•	•	•	•	•								
150										•	•	•	•	•	•							
200											•	•	• <sup>2)</sup>	•	•	•						
250												•	•	• <sup>2)</sup>	•	•	•	•				
300												•	•	• <sup>2)</sup>	•	•	•	•	•			
400															•	•	•	•	•	•	•	•
500																•	•	•	•	•	•	•

<sup>1)</sup> PN 250 to 400 with flow divider St I and pressure balancing on request

<sup>2)</sup> Pressure balancing only for  $\geq$  PN 63

**Table 3.1:** Overview with flow divider St I ( $K_{VS I}$ ), St II ( $K_{VS II}$ ) or St III ( $K_{VS III}$ )

$K_{VS}$	0.1 · 0.16 0.25 · 0.4	0.63	1.0	1.6	2.5	4	6.3	10	16	25	40	63	100	160	250	360	630	1000	1500	2000	2500	3600
$K_{VS I}$				1.45	2.2	3.6	5.7	9	14.5	22	36	57	90	144	225	320	560	900	1350	1800	2250	3200
$K_{VS II}$						3.2	5.0	8	13.0	20	32	50	80	125	200	290	500	800	1200	1600	2000	–
$K_{VS III}$						3	4.8	7.5	12	20	30	47	75	120	190	270	480	750	1100	1500	1900	–
Seat Ø [mm]	6			12		24			31	38	50	63	80	100	125	150	200	250	300	350	400	500
Rated travel [mm]	15										30			60			120					

**Table 3.4:** Versions with flow divider St II · PN 16 to 160 <sup>1)</sup>

$K_{VS II}$	–										3.2	5.0	8	13	20	32	50	80	125	200	290	500	800	1200	1600	2000	–	
DN																												
50																												
80																												
100																												
150																												
200																												
250																												
300																												
400																												
500																												

<sup>1)</sup> PN 250 to 400 with flow divider St II and pressure balancing on request

<sup>2)</sup> Pressure balancing only for ≥ PN 63

**Table 3.5:** Versions with flow divider St III · PN 16 to 160 <sup>1)</sup>

$K_{VS III}$	–										3.0	4.8	7.5	12	20	30	47	75	120	190	270	480	750	1100	1500	1900	–	
DN																												
50																												
80																												
100																												
150																												
200																												
250																												
300																												
400																												
500																												

<sup>1)</sup> PN 250 to 400 with flow divider St III and pressure balancing on request

<sup>2)</sup> Pressure balancing only for ≥ PN 63

**Table 4:** Dimensions in mm for Type 3251-1 and Type 3251-7 in standard version**Table 4.1:** Type 3251 Valve · Face-to-face dimensions according to DIN EN 558

Valve	DN	15	25	40	50	80	100	150	200	250	300	400	500			
Length L (flanges and welding ends)	PN 10 to 40	130	160	200	230	310	350	480	600	730	850	1100	1250			
	PN 63 to 160	210	230	260	300	380	430	550	650	775	900	1150 <sup>3)</sup>	–			
	PN 250	230	260	300	350	450	520	700	–							
	PN 320	230	260	300	350	450	520	700	–							
	PN 400	264 <sup>1)</sup>	308 <sup>1)</sup>	378 <sup>1)</sup>	444 <sup>1)</sup>	570 <sup>1)</sup>	666 <sup>1)</sup>	908 <sup>1)</sup>	–							
Height H4	PN 10 to 40	152	152	164	217	222	242	314	387	442	655	640	760			
	519									640 <sup>3)</sup>		–				
	PN 250 to 400	186	186	195	251	288	348	443	–							
H8 for actuator	350 cm <sup>2</sup>	240	240	240	240	240	240	–								
	355 cm <sup>2</sup>	240	240	240	240	240	240	418	–							
	700 cm <sup>2</sup>	240	240	240	240	240	240	418	418	418	–					
	750 cm <sup>2</sup>	240	240	240	240	240	240	418	418	418	–					
	1000 cm <sup>2</sup>	–				295	295	295	418	418	On request					
	1400-60 cm <sup>2</sup>					295	295	295	418	418	On request					
	1400-120 cm <sup>2</sup>					480	480	480	503	503	503 <sup>2)</sup>	650	650	650		
	2800 cm <sup>2</sup>					480	480	480	503	503	503 <sup>2)</sup>	650	650	650		
2x2800 cm <sup>2</sup>	480					480	480	503	503	503 <sup>2)</sup>	650	650	650			
PN 10 to 40	50					60	80	90	100	160	220	250	310	370	415	On req.
PN 63 to 160	60					70	90	100	120	180	235	270	300	390	On req. <sup>3)</sup>	–
PN 250	70					80	100	110	140	220	285	–				
PN 320	70	80	100	110	140	220	On req.	–								
PN 400	75	90	110	120	160	237	320	–								

<sup>1)</sup> Face-to-face dimensions acc. to SAMSON standard

<sup>2)</sup> H8 = 650 mm with 250 mm seat bore

<sup>3)</sup> PN 63

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

Actuator area	cm <sup>2</sup>	350	355	700	750	1000	1400-60	1400-120	2800	2 x 2800	
Diaphragm ØD	mm	280	280	390	394	462	530	534	770	770	
H <sup>1)</sup>	mm	82	121	199	236	403	287	490 <sup>3)/</sup> 580 <sup>4)</sup>	630 <sup>3)/</sup> 695 <sup>4)</sup>	1130 <sup>3)/</sup> 1195 <sup>4)</sup>	
H3 <sup>2)</sup>	mm	110	110	190	190	610	610	650	650	650	
H5	Type 3277 mm	101	101	101	101	–	–	–	–	–	
Thread	Type 3271	M30 x 1.5				M60 x 1.5		M100 x 2			
	Type 3277	M30 x 1.5				–	–	–	–	–	
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 with welded-on lifting eyelet or height of eyebolt according to DIN 580. Height of the swivel lifting hook may differ. Actuators up to 355 cm<sup>2</sup> without lifting eyelet

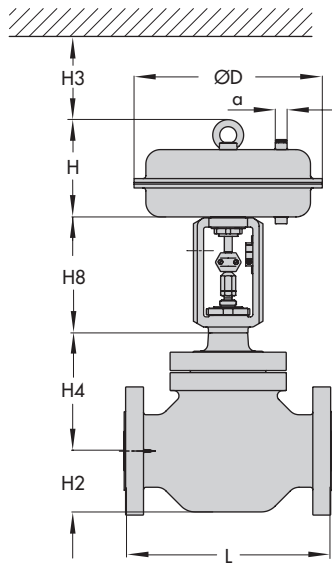
<sup>2)</sup> Minimum clearance required to remove the actuator

<sup>3)</sup> Height for version with welded-on lifting eyelet (material EN-JS1030)

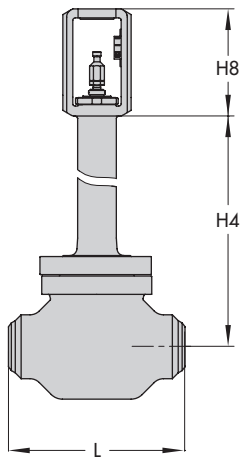
<sup>4)</sup> Height for version with female thread (material 1.5638/A352 LC3)

**Dimensional drawings**

Type 3271 Pneumatic Actuator

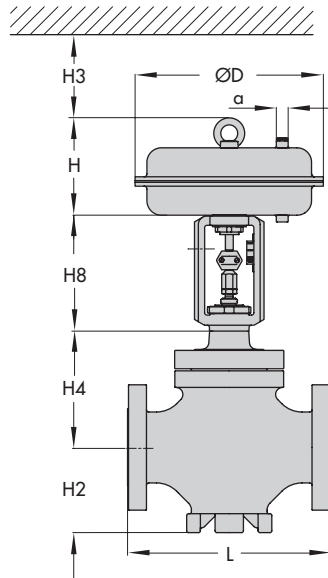


Type 3251-1 up to DN 80

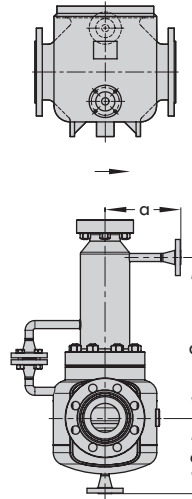


Type 3251 with bellows seal or insulating section

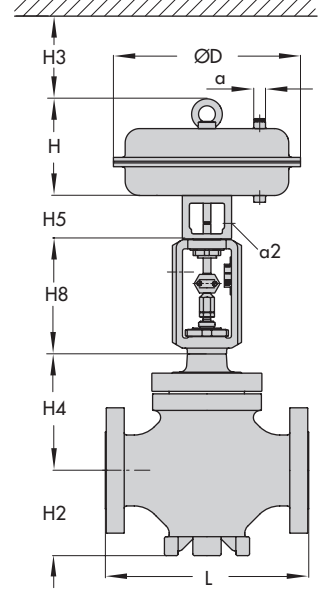
Type 3271 Pneumatic Actuator



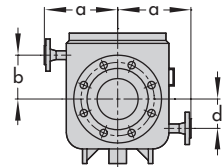
Type 3251-1 in DN 100 and larger



Type 3277 Pneumatic Actuator



Type 3251-7



Type 3251 with heating jacket  
Dimensions on request

**Table 5:** Weights for Type 3251-1 and Type 3251-7 in standard version**Table 5.1:** Type 3251 Valve

Valve	DN	15	25	40	50	80	100	150	200	250	300	400	500
Valve without actuator (approx. kg)	PN 16 to 40	15.5	17.5	21.5	38	59	78	201	427	858	920	1450	On request
	PN 63 to 160	20	25	30.5	54	89	116	334	642	1090	1480	2600 <sup>1)</sup>	–
	PN 250	On request						–					
	PN 320	On request						–					
	PN 400	On request						–					

<sup>1)</sup> PN 63

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

Actuator	cm <sup>2</sup>	350	355	700	750	1000	1400-60	1400-120	2800	2 x 2800
Type 3271 (approx. kg)	Without handwheel	8	15	22	36	85	70	175	450	950
	With handwheel	13	20	27	41	190	175	300 <sup>1)</sup> /425 <sup>2)</sup>	575 <sup>1)</sup> /700 <sup>2)</sup>	On request
Type 3277 (approx. kg)	Without handwheel	12	19	26	40	–				
	With handwheel	17	24	31	45					

<sup>1)</sup> Side-mounted handwheel up to 80 mm travel

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

**Table 6:** Dimensions and weights for the standard version of Type 3251 with insulating section · Without actuator

Nominal size	DN	15	25	40	50	80	100	150	200	250	300	400	500
Height H4	PN 10 to 160	353	353	365	487	492	512	665	947	1067	1151	1109 <sup>1)</sup>	On request <sup>2)</sup>
	PN 250 to 400	382	382	391	516	546	598	790	–				
Weight (kg) without actuator for	PN 16 to 40	19.5	21.5	24	44	65	84	237	492	928	1030	1497	On request
	PN 63 to 160	24	29	33	60	95	122	370	707	1160	1250	On request <sup>1)</sup>	–
	PN 250	On request						–					
	PN 320	On request						–					
	PN 400	On request						–					

<sup>1)</sup> Up to PN 63

<sup>2)</sup> Up to PN 40



**Table 7: Dimensions and weights for the standard version of Type 3251 with bellows seal · Without actuator**

Nominal size		DN	15	25	40	50	80	100	150	200	250	300	400	500	
		Travel													
Height H4 (mm)	PN 10 to 40	15 to 120	362	362	374	608	613	613	709	1024	1479	1514	1516	1590	
	PN 63 to 100	120	-								2381	2307	On req. <sup>1)</sup>	-	
	PN 63 to 160	15 to 60	362	362	374	608	613	613	842	On req.	1569	1635	On req. <sup>1)</sup>	-	
	PN 250 to 320		633	633	635	554	545	663	On req.	-					
	PN 400		633	633	635	On req.	On req.	On request		-					
Weight without actuator (kg)	PN 10 to 40		20	22	24	45	66	85	242	532	975	1010	On request		
	PN 63 to 160		25	30	34	61	96	123	375	768	1240	1240	On req. <sup>1)</sup>	-	
	PN 250 to 320		On request								-				
	PN 400		On request								-				

<sup>1)</sup> PN 63

### Selection and sizing of the control valve

- Calculate  $K_v$  coefficient according to IEC 60534.
- Select nominal size DN and  $K_{vs}$  coefficient from Table 3.
- Select the actuator and determine the permissible differential pressure from the Information Sheet ► T 8000-4.
- 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).
- Select accessories from Table 1 and Table 2.

### Order specifications

Nominal size	DN
Nominal pressure	PN
Body material	According to Table 2
Bonnet	Standard bonnet, insulating section or bellows seal
Type of end connections	Flanges/welding ends
Plug	Standard or balanced Soft seal, metal seal or high-performance metal seal
Characteristic	Equal percentage, linear or quick opening
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 $\text{m}^3/\text{h}$
Pressure	$p_1$ and $p_2$ in bar (absolute pressure $p_{\text{abs}}$ ), with minimum, normal and maximum flow rate
Valve accessories	Positioner and/or limit switch

Specifications subject to change without notice



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2015-12-16 · English