

Pneumatic Control Valve Type 3510-1 and Type 3510-7

Micro-flow Valve Type 3510

SAMSON

DIN version

Application

Control valve especially designed for controlling low flow rates in pilot plants and technical research facilities

Nominal sizes G $\frac{1}{8}$ · G $\frac{1}{4}$ · G $\frac{3}{8}$ · G $\frac{1}{2}$ · G $\frac{3}{4}$
 $\frac{1}{8}$ NPT · $\frac{1}{4}$ NPT · $\frac{3}{8}$ NPT · $\frac{1}{2}$ NPT · $\frac{3}{4}$ NPT

DN 10 · DN 15 · DN 25

Nominal pressure PN 40 to PN 400

Temperatures -200 to +450 °C

The pneumatic control valve essentially consists of:

- Type 3510 Micro-flow Valve and
- Type 3271-5 Actuator or optionally Type 3277-5 Actuator.

The Type 3510 Micro-flow Valves are available either as:

- Globe valves or
- Angle valves.

Their valve bodies have either:

- Screwed connections with G or NPT thread,
- Welding ends or flanges.

Stainless steel is used as the standard body material. However, a wide variety of special materials can also be used on customer request.

Versions

Standard version

- For temperatures ranging from -10 to +220 °C
- PN 40 to 400
- Globe or angle valve
- Female thread G $\frac{1}{8}$, G $\frac{1}{4}$, G $\frac{3}{8}$, G $\frac{1}{2}$, G $\frac{3}{4}$ or $\frac{1}{8}$ NPT, $\frac{1}{4}$ NPT, $\frac{3}{8}$ NPT, $\frac{1}{2}$ NPT, $\frac{3}{4}$ NPT
- Flanges DN 10, 15 or 25
- Welding ends DN 10, 15 or 25

Type 3510-1 (Fig. 3) · With Type 3271-5 Pneumatic Actuator, 120 cm² effective area or Type 3271-52 with 60 cm² effective area (see Data Sheet T 8310-1 EN)

Type 3510-7 (Figs. 1 and 2) · With Type 3277-5 Pneumatic Actuator, 120 cm² effective area designed for integral positioner attachment (see Data Sheet T 8310-1 EN).

Other versions with

- **Extension bonnet** for temperatures from -200 to +450 °C, made of special material up to +650 °C
- **Metal bellows seal** up to PN 250 with a sealing performance of $\leq 10^{-5} \frac{\text{mbar} \cdot \text{l}}{\text{s}}$, higher pressure ratings on request
- **Handwheel**
- **Electric actuator** · On request
- **Body connections with threaded flanges** and lens ring gaskets in nominal sizes DN 6 and DN 10, nominal pressure PN 325, dimensions acc. to IG standard ($K_{V_{\text{max}}} = 0.4$)

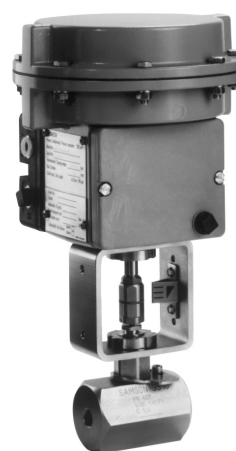


Fig. 1 · Type 3510-7 Control Valve with Type 3760 Positioner



Fig. 2 · Type 3510-7 Control Valve with Type 3767 Positioner



Fig. 3 · Type 3510-1 Control Valve with Type 3271-52 Actuator

Principle of operation

The process medium flows through the micro-flow valve in the direction indicated by the arrow. The position of the valve plug (3) determines the cross-sectional area of flow between the seat (2) and the plug.

The plug stem (6) is connected to the actuator stem (8.1) via the stem connector (7) and sealed with an adjustable packing (4).

To comply with stricter environmental emissions requirements, the valve can be equipped with a double-walled metal bellows (10).

The anti-rotation device (13) prevents loosening of the screw connection between the valve body (1) and the bonnet (5) or the intermediate piece (9).

Fail-safe position

Depending on how the springs are arranged in the actuator (8) (see Data Sheet T 8310-1 EN for details), the control valve has two different fail-safe positions:

Actuator stem extends (FA)

The valve is closed upon air supply failure.

Actuator stem retracts (FE)

The valve is opened upon air supply failure.

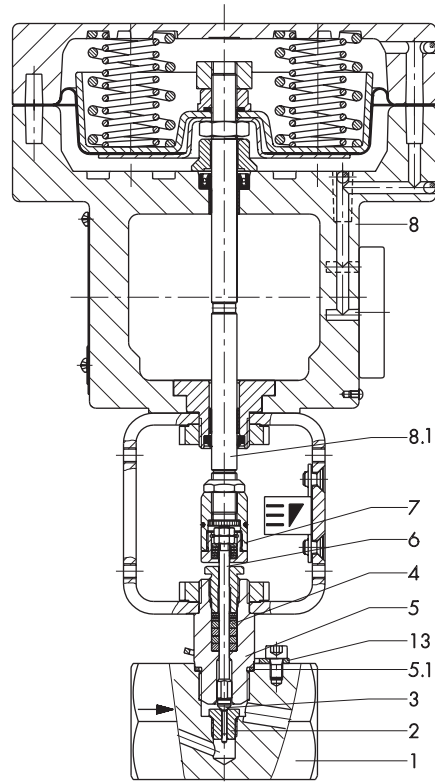


Fig. 4 · Type 3510-7 Control Valve

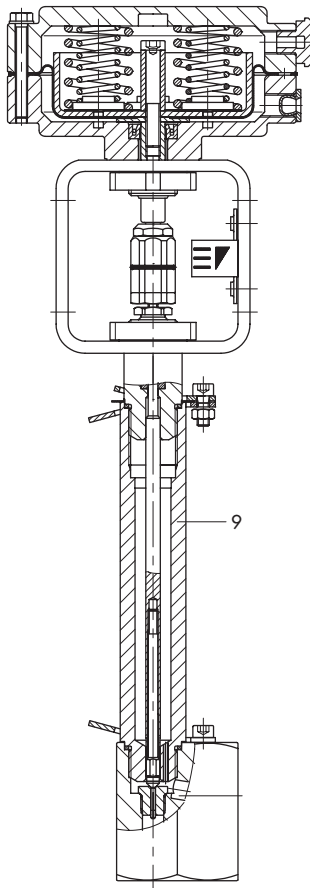


Fig. 5 · Type 3510 Valve, angle valve with extension bonnet and Type 3271-52 Actuator (60 cm²)

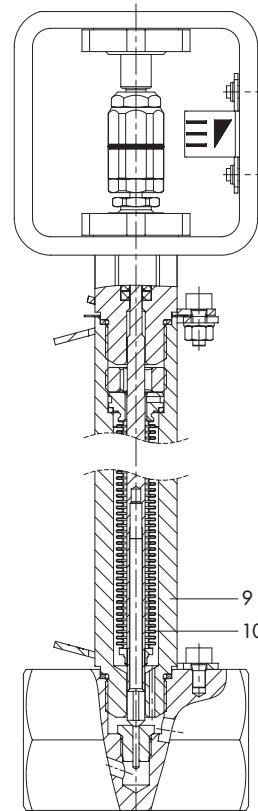


Fig. 6 · Type 3510 Valve, globe valve with metal bellows seal

Table 1 · Technical data for Type 3510

Connection	Female thread	Welding ends	Flanges
Nominal size	G 1/8 · G 1/4 · G 3/8 · G 1/2 · G 3/4 1/8 NPT · 1/4 NPT · 3/8 NPT · 1/2 NPT · 3/4 NPT	DN 10 · DN 15 · DN 25	DN 10 · DN 15 · DN 25
Nominal pressure	PN 40 to PN 400		
Seat-plug seal	Metal sealing		
Characteristic	Equal percentage with $K_{VS} \geq 0.01$ · Linear · Quick opening		
Rangeability	50 : 1 · Lower than 50 : 1 for $K_{VS} < 0.1$		
Temperature range ¹⁾	-10 to 220 °C · -200 to 450 °C with extension bonnet		
Leakage rate acc. to DIN EN 1349	Metal sealing Lapped-in metal For $K_{VS} < 0.01$: Metal sealing Lapped-in metal	IV IV-S2 III IV	

¹⁾ Higher temperatures available on request

Table 2 · Materials

Valve body ¹⁾ and bonnet ²⁾	1.4571 / A 316 Ti	2.4610
Seat and plug	1.4404 / 1.4404 1.4122 / 1.4112 1.4122 / Stellite Stellite / Stellite	2.4610 / 2.4610
Packing	PTFE compound	
Body gasket	1.4571	2.4610
Extension bonnet	1.4571	2.4610
Metal bellows seal		
Intermediate piece	1.4571	2.4610
Metal bellows up to PN 250	1.4571	2.4819

¹⁾ Other materials on request

²⁾ Wetted parts

Legends for Figs. 4 to 6

- 1 Valve body
- 2 Seat
- 3 Plug
- 4 Packing
- 5 Valve bonnet
- 5.1 Body gasket
- 6 Plug stem
- 7 Stem connector
- 8 Actuator
- 8.1 Actuator stem
- 9 Intermediate piece for extension bonnet or bellows seal
- 10 Metal bellows
- 13 Anti-rotation device

Table 3 · Available K_{Vs} coefficients
Table 3a · Overview

K _{Vs}		0.0001 to 0.0063 ¹⁾	0.01 to 0.25	0.4	0.63 to 1.6 ²⁾
Rangeability		< 15 : 1	15 : 1 to 50 : 1	50 : 1	
Seat Ø	mm	2	3	4	10
Plug stem Ø	mm	4			4
Travel	mm	7.5			7.5

1) Seat and plug made only of 1.4122/Stellite or Stellite/Stellite

2) Only up to PN 100.

Table 3b · K_{Vs} coefficients and associated nominal sizes

End connections			Female thread			Welding ends			Flanges		
Flow rate K _{Vs}	Characteristic		G 1/8, G 1/4 1/8, 1/4 NPT	G 3/8 3/8 NPT	G 1/2, G 3/4 1/2, 3/4 NPT	DN 10	DN 15	DN 25	DN 10	DN 15	DN 25
	Equal percentage	Linear									
0.00010	-	•	•	•	•	•	•	•	•	•	•
0.00016		•	•	•	•	•	•	•	•	•	•
0.00025		•	•	•	•	•	•	•	•	•	•
0.00040		•	•	•	•	•	•	•	•	•	•
0.00063		•	•	•	•	•	•	•	•	•	•
0.0010		•	•	•	•	•	•	•	•	•	•
0.0016		•	•	•	•	•	•	•	•	•	•
0.0025		•	•	•	•	•	•	•	•	•	•
0.0040		•	•	•	•	•	•	•	•	•	•
0.0063		•	•	•	•	•	•	•	•	•	•
0.010		•	•	•	•	•	•	•	•	•	•
0.016	•	•	•	•	•	•	•	•	•	•	
0.025	•	•	•	•	•	•	•	•	•	•	
0.040	•	•	•	•	•	•	•	•	•	•	
0.063	•	•	•	•	•	•	•	•	•	•	
0.10	•	•	•	•	•	•	•	•	•	•	
0.16	•	•	•	•	•	•	•	•	•	•	
0.25	•	•	•	•	•	•	•	•	•	•	
0.40	•	•	•	•	•	•	•	•	•	•	
0.63 ¹⁾	•	•	-	-	•	-	•	•	-	•	•
1.0 ¹⁾	•	•			•		•	•		•	
1.6 ¹⁾	•	•			•		•	•		•	

¹⁾ Versions up to max. PN 100 can be used.

Table 4 · Permissible differential pressures · Pressures in bar (gauge)

Table 4a · Standard version without bellows seal · Fail-safe position "Valve CLOSED"

Bench range for actuator size		60 cm ²	0.2 ... 1.0	0.4 ... 2.0	1.4 ... 2.3	2.1 ... 3.3
		120 cm ²	0.4 ... 0.8	0.8 ... 1.6	1.7 ... 2.1	2.4 ... 3.1
Nominal size	K _{VS}	Actuator	Δp when p ₂ = 0 bar			
G 1/8 · G 1/4 · G 3/8 · G 1/2 · G 3/4 1/8 NPT · 1/4 NPT · 3/8 NPT · 1/2 NPT · 3/4 NPT DN 10 · DN 15 · DN 25	0.0001 to 0.4	60 cm ²	25	100	400	–
		120 cm ²	250	400	–	–
G 1/2 · G 3/4 1/2 NPT · 3/4 NPT DN 15 · DN 25	0.63 to 1.6	60 cm ²	–	11	72	100
		120 cm ²	35	84	100	–

Table 4b · Standard version with bellows seal · Fail-safe position "Valve CLOSED"

Bench range for actuator size		60 cm ²	0.2 ... 1.0	0.4 ... 2.0	1.4 ... 2.3	2.1 ... 3.3
		120 cm ²	0.4 ... 0.8	0.8 ... 1.6	1.7 ... 2.1	2.4 ... 3.1
Nominal size	K _{VS}	Actuator	Δp when p ₂ = 0 bar			
G 1/8 · G 1/4 · G 3/8 · G 1/2 · G 3/4 1/8 NPT · 1/4 NPT · 3/8 NPT · 1/2 NPT · 3/4 NPT DN 10 · DN 15 · DN 25	0.0001 to 0.4	60 cm ²	–	10	61	95
		120 cm ²	30	72	160	250
G 1/2 · G 3/4 1/2 NPT · 3/4 NPT DN 15 · DN 25	0.63 to 1.6	60 cm ²	–	5	55	90
		120 cm ²	25	68	100	–

Table 4c · Standard version without bellows seal · Fail-safe position "Valve OPEN"

Bench range for actuator size		60 cm ²	0.2 ... 1.0		
		120 cm ²	0.4 ... 0.8		
		Supply pressure	1.2	2.5	3.5
Nominal size	K _{VS}	Actuator	Δp when p ₂ = 0 bar		
G 1/8 · G 1/4 · G 3/8 · G 1/2 · G 3/4 1/8 NPT · 1/4 NPT · 3/8 NPT · 1/2 NPT · 3/4 NPT DN 10 · DN 15 · DN 25	0.0001 to 0.4	60 cm ²	24	400	–
		120 cm ²	254	400	–
G 1/2 · G 3/4 1/2 NPT · 3/4 NPT DN 15 · DN 25	0.63 to 1.6	60 cm ²	–	79	100
		120 cm ²	36	100	–

Table 4d · Standard version with bellows seal · Fail-safe position "Valve OPEN"

Bench range for actuator size		60 cm ²	0.2 ... 1.0		
		120 cm ²	0.4 ... 0.8		
		Supply pressure	1.2	2.5	3.5
Nominal size	K _{VS}	Actuator	Δp when p ₂ = 0 bar		
G 1/8 · G 1/4 · G 3/8 · G 1/2 · G 3/4 1/8 NPT · 1/4 NPT · 3/8 NPT · 1/2 NPT · 3/4 NPT DN 10 · DN 15 · DN 25	0.0001 to 0.4	60 cm ²	–	63	100
		120 cm ²	27	160	250
G 1/2 · G 3/4 1/2 NPT · 3/4 NPT DN 15 · DN 25	0.63 to 1.6	60 cm ²	–	63	100
		120 cm ²	27	100	–

Table 5 · Dimensions in mm

End connections		Female thread	Welding ends	Flanges		
Valve		G/NPT	DN 10, 15, 25	DN 10	DN 15	DN 25
L	PN 40	74	80	130	130	160
	PN 63 to 160			210	210	230
	PN 250 to 320			230	230	260
	PN 400			230	230	308
H1	60/120 cm ²			122		
H4 with ext. bonnet	PN 40 to 400			263		
H4 with bellows seal	PN 40 to 100			263		
	PN 160 to 250			365		
H2 or flange Ø D1	PN 40	23	23	90	95	115
	PN 63 to 160			100	105	140
	PN 250 to 320			125	130	160
	PN 400			125	145	180
H3	60/120 cm ²			150		
L1	PN 40	34	40	85	90	100
	PN 63 to 160			105	105	115
	PN 250 to 320			115	115	130
	PN 400			115	115	154

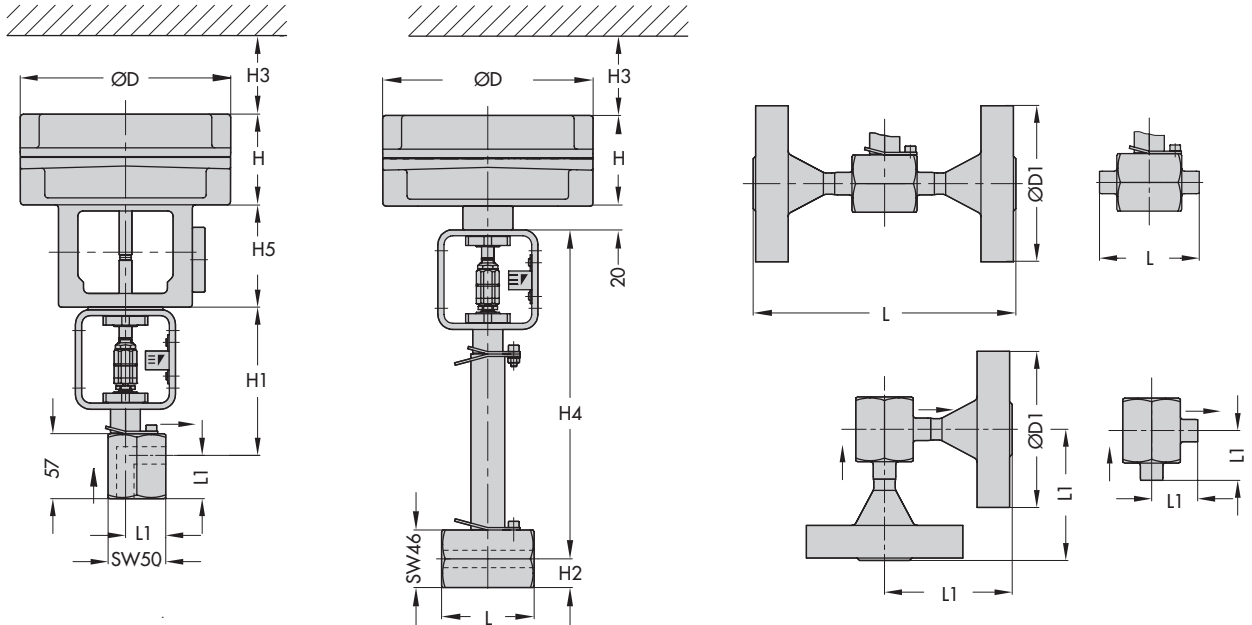
Actuator	60 cm ²	120 cm ²
Diaphragm Ø D	120	168
H	63	70
H3	150	150
H5	-	88
Thread	M20 x 1.5	M20 x 1.5
Supply pressure connection	G 1/8 or 1/8 NPT	G 1/8 or 1/8 NPT

Table 6 · Weights in kg

End connections		Female thread	Welding ends	Flanges		
Valve		G / NPT	DN 10, 15, 25	DN 10	DN 15	DN 25
Valve without actuator	PN 40	1.7	1.6	2.9	3.1	4.2
	PN 63 to 160			3.9	4.2	7.3
	PN 250 to 320			5.6	6.0	8.7
	PN 400			7.1	9.1	9.8
Optional	Extension bonnet			0.5		
	Bellows seal			0.6		

Actuator	60 cm ²	120 cm ²
Approx. kg	1.3	3.5

Dimensions in mm



Type 3510-7 - angle valve with female thread

Type 3510-1 - globe valve with female thread - with bellows seal/extension bonnet

Type 3510 - valve versions with flanges and welding ends

Ordering text

Micro-flow Valve Type 3510	Globe or angle valve
Nominal size	DN ...
Nominal pressure	PN ...
Valve body material	According to Table 2
End connections	Female thread G, NPT flanges or welding ends
Direction of flow	FTO or FTC
Characteristic	Equal percentage, linear, or quick-opening
Pneumatic actuator	Type 3271-5/Type 3277-5 60 or 120 cm ²
Fail-safe position	Valve CLOSED or OPEN
Process medium	...
Density	... kg/m ³
Maximum flow rate	... kg/h or m ³ /h in in standard or operating state
Pressure	p ₁ and p ₂ in bar (absolute pressure)
Process medium temperature	°C or K
Accessories	Positioner and/or limit switch

Specifications subject to change without notice.



SAMSON AG · MESS- UND REGELTECHNIK
Weismüllerstraße 3 · 60314 Frankfurt am Main · Germany
Phone: +49 69 4009-0 · Fax: +49 69 4009-1507
Internet: <http://www.samson.de>

T 8091 EN

2009-07