Pneumatic Actuator Type 3277
for Integral Positioner Attachment

Application

Single-acting, linear pneumatic actuator for final control elements such as Series 240, 250 and 280 Control Valves and butterfly valves.

Effective diaphragm areas from 120 to 700 cm² · Rated travel from 7.5 to 30 mm

The Type 3277 Pneumatic Actuators are diaphragm actuators containing a rolling diaphragm and multiple, internal springs. Their design and operating principle corresponds to that of the Type 3271 Pneumatic Actuator (see Data Sheet T 8310 EN for details). The bottom diaphragm case is affixed to the yoke, on which an optional positioner can be attached (pneumatic or electropneumatic models available).

Advantages of direct attachment:

- Interference fit providing exact mechanical connection; no alteration of adjustment during shipping
- Travel linkage protected against unwanted contact and external influences; corresponds to the accident prevention requirements of UVV (VBG 5)
- Simple air connection between the actuator and the positioner

Additional features:

- Low overall height
- Powerful thrusts
- High speeds of response
- Various bench ranges (signal pressure ranges) possible
- No special tools required to reverse the actuator action and modify the bench range

With the Type 3277-5 Pneumatic Actuator for Integral Positioner Attachment, the positioner output pressure p_{st} is introduced as loading pressure either to the top or bottom diaphragm chamber, resp. independent of the operating direction of the actuator and positioner. No additional piping is necessary. Only the changeover plate needs to be set correspondingly.

Versions

Type 3277 Pneumatic Actuator (Fig. 1) · Effective diaphragm areas of 240, 350 or 700 cm².

Type 3277 Pneumatic Actuator with top-mounted handwheel · Effective diaphragm areas of 240, 350 or 700 cm².

Type 3277-5 Pneumatic Actuator (Fig. 2) · Effective diaphragm area of 120 cm².

Type 3277 Pneumatic Actuator in Fire-Lock version (Fig. 5) · Fail-safe position in case of fire, effective diaphragm area of 240, 350 and 700 cm².

Fig. 1 · Type 3277 Pneumatic Actuator on Type 241 Globe Valve

Fig. 2 · Type 3277-5 Pneumatic Actuator for Integral Positioner Attachment on Type 3510 Micro-flow Valve

Principle of operation (Figs. 3 and 4)

The signal pressure p_{st} exerts a force on the rolling diaphragm (2). This force is balanced by the springs (4) installed in the actuator. The number of springs and their compression determine the signal pressure range with consideration to the rated travel H, which is proportional to the signal pressure p_{st}. The actuator action depends on how the springs are arranged in the actuator case and where the loading pressure is introduced (top or bottom diaphragm case, resp.).

Fail-safe action

Actuator stem "extends" (fail-close)

Whenever the pressure acting on the diaphragm of the actuator is reduced or the air supply fails, the spring force "extends" the actuator stem (6) in the lower end position.

Actuator stem "retracts" (fail-open)

Whenever the pressure acting on the diaphragm of the actuator is reduced or the air supply fails, the spring force "retracts" the actuator stem (6) in the upper end position.

With the Type 3277 Pneumatic Actuator, the signal pressure p_{st} is introduced to the bottom diaphragm chamber via an internal air guide. Therefore, no piping is required for the most frequently used fail-safe action: "Actuator stem "extends" (valve closes).

The Type 3277-5 Pneumatic Actuator for Integral Positioner Attachment is designed such that the signal pressure p_{st} can be introduced to either the top or the bottom diaphragm chamber via the internal guides. In each case, the spring chamber is positively connected to the interior chamber of the yoke. As a result, no external air from the atmosphere can enter, and the positioner is protected against potential corrosion .

A switchover plate determines the air routing. Four options can be selected, determined by: 1) the intended fail-safe position and 2) the operating direction of the positioner.

Fire-Lock version (Fig. 5): In case of fire, the valve assumes its fail-safe position and is kept there by expansion cartridges installed in the actuator.

Throttling or flow-switching service

The Type 3277 Pneumatic Actuators are designed for a supply pressure of maximum 6 bar.

In flow-switching (ON/OFF) service, the fast stroking speed causes an increase in pressure which depends on the supply pressure applied. If the pressure increase is too high, the actuator version with the fail-safe position "Actuator stem retracts" may be damaged due to the additional load.

In flow-switching service, the permissible supply pressure may not exceed the upper bench range value by more than 3 bar.

Example

Bench range	Fail-safe position	Max. supply pressure
0.2 ... 1.0 bar	Actuator stem retracts	4 bar
0.4 ... 2.0 bar		5 bar
0.6 ... 3.0 bar		6 bar

Actuators used for throttling service are suitable for a supply pressure of up to 6 bar irrespective of the fail-safe position and the bench range. Actuators with a reduced supply pressure are marked with a special label.

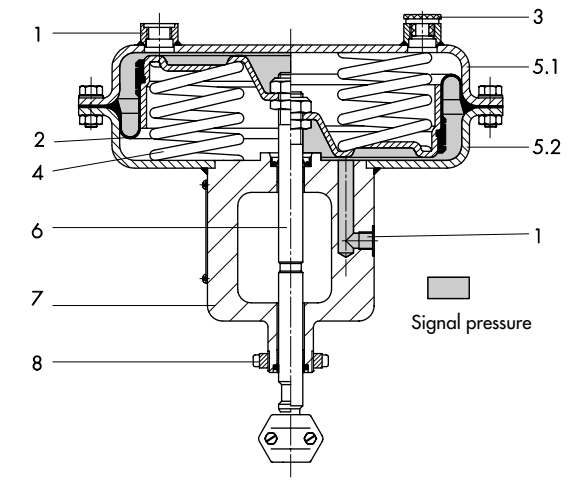
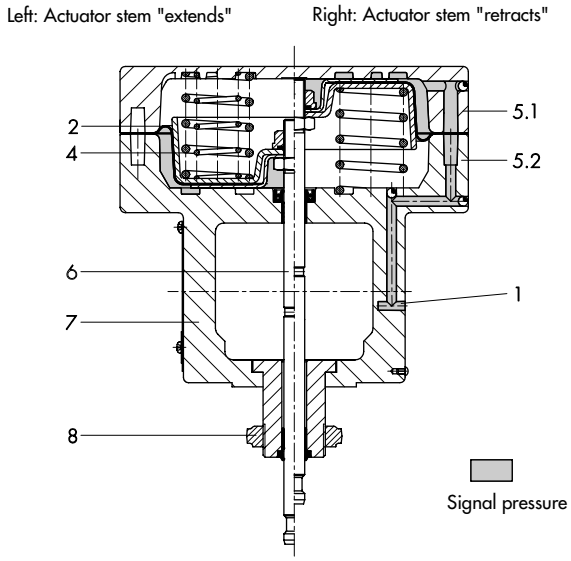


Fig. 3 · Sectional view of Type 3277 Pneumatic Actuator



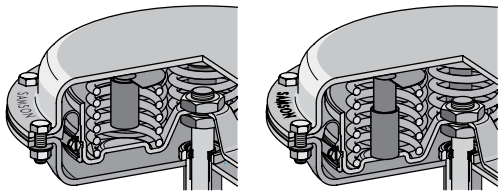


Fig. 5 · Fire-Lock version; in fail-safe position (on right)

Legend to Figs. 3 and 4

1	Signal pressure connection	5.2	Bottom diaphragm case
2	Diaphragm	6	Actuator stem
3	Venting	7	Yoke
4	Spring	8	Annular nut

Table 1 · Technical data

Actuator version	Type 3277	Type 3277-5
Max. supply pressure	6 bar · For limitations in flow-switching service, see page 2	
Permissible temperatures in continuous operation	–35 to +90 °C with standard material NBR	
	Special material EPDM –35 to +120 ° with air free of oil and grease	–
	Fire-Lock up to 80 °C	–
Materials (WN = Material number acc. to DIN)		
Rolling diaphragm	NBR (nitrile rubber) with fabric insert	
	EPDM with fabric insert	–
Actuator stem	WN 1.4305	
Sealing of actuator stem	NBR (nitrile rubber)	
	EPDM	–
Diaphragm case	Sheet steel, plastic-coated	Die-cast aluminum, plastic-coated
Handwheel	Spindle WN 1.4104 · Nut WN 1.4006	–

Table 2 · Bench ranges for Type 3277 · All pressures in bar (gauge)

Values specified in the shadowed columns correspond to the standard bench range, i.e. operation at rated travel. The maximum travel listed can be used when the supply pressure is increased.

The signal pressure ranges in the white columns apply to maximum pre-tensioned springs. They apply for both rated travel and reduced travel.

Springs of actuators employing fail-safe action "Actuator stem retracts" cannot be pre-tensioned.

Effective diaphragm area [cm²]	Rated travel [mm]	Travel volume at rated travel [dm³]	Dead volume [dm³]	Max. travel [mm] [1) 2)]	Bench range (signal pressure range at rated travel) [bar]	Additional spring compression [%]	Operating range with spring compression [bar]	Number of springs	Spring force at 0 mm travel [kN]	Spring force at rated travel [kN]	Thrust at rated travel [kN] and supply pressure of					
											1.4 bar	2 bar	3 bar	4 bar	5 bar	6 bar
120	7.5	0.09	0.1	9	0.4...0.8	0	–	3	0.48	0.96	0.72	1.44	2.64	3.84	5.04	6.24
					0.8...1.6	0	–	6	0.96	1.92	–	0.48	1.68	2.88	4.08	5.28
					1.7...2.1 [3)]	0	1.7...2.1	6	2.04	2.52	–		1.08	2.28	3.48	4.68
					2.4...3.0 [3)]	0	2.4...3.0	12	2.88	3.6	–			1.2	2.4	3.6
	15	0.18		17	0.2...1.0	0	–	3	0.24	1.2	–	1.2	2.4	3.6	4.8	6
					0.4...2.0	0	–	6	0.48	2.4	–		1.2	2.4	3.6	4.8
					1.4...2.3 [3)]	0	1.4...2.3	6	1.68	2.76	–		0.84	2.04	3.24	4.44
					2.1...3.3 [3)]		2.1...3.3	12	2.52	3.96	–			0.84	2.04	3.24
240	15	0.36	0.38	17	0.2...1.0	12.5	0.3...1.1	3	0.48	2.4	0.96	2.4	4.8	7.2	9.6	12
					0.4...2.0		0.6...2.2	6	0.96	4.8	–		2.4	4.8	7.2	9.6
					0.6...3.0		0.9...3.3	12	1.44	7.2	–			2.4	4.8	7.2
350	15	0.56	0.6	22	0.2...1.0	25	0.4...1.2	3	0.7	3.5	1.4	3.5	7	10.5	14	17.5
					0.4...2.0		0.8...2.4	6	1.4	7	–	0	3.5	7	10.5	14
					0.6...3.0		1.2...3.6	12	2.1	10.5	–		0	3.5	7	10.5
					1.4...2.3 [3)]	0	1.4...2.3	6	4.9	8.05	–		2.45	5.95	9.45	13
					2.1...3.3 [3)]		2.1...3.3	12	7.35	11.6	–			2.45	5.95	9.45
700	30	2.1	2.4	38	0.2...1.0	25	0.4...1.2	3	1.4	7	2.8	7	14	21	28	35
					0.4...2.0		0.8...2.4	6	2.8	14	–		7	14	21	28
					0.6...3.0		1.2...3.6	12	4.2	21	–			7	14	21
					1.4...2.3 [3)]	0	1.4...2.3	6	9.8	16.1	–		4.9	11.9	18.9	25.9
					2.1...3.3 [3)]		2.1...3.3	12	14.7	23.1	–			4.9	11.9	18.9
					2.6...4.3 [3)]		2.6...4.3	18	18.2	30.1	–				4.9	11.9

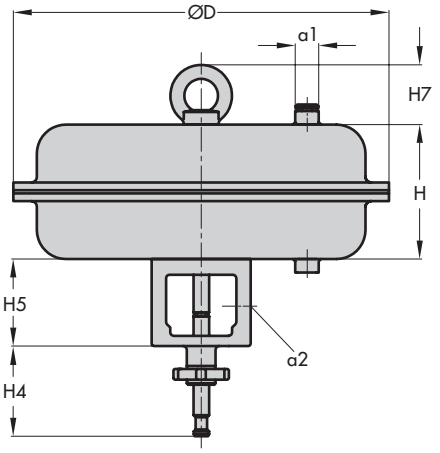
[1)] Starting from the lower bench range value, taking zero travel (travel up to the lower range bench range value) into consideration.

[2)] Zero travel as in Tabele 3 depends on fail-safe position. [3)] Pre-tensioned springs.

Table 3 · Dimensions in mm and weights

Actuator Type		3277-5	3277		
Effective dia. area cm^2		120	240	350	700
Height	H	70	65	85	135
	H1	–	400	420	530
	$H2_{max}$	–	445	465	615
	$H4_{rated}$ [1]	78	75		90
	$H4_{max}$ [1]	78	78	78	95
	$H4_{max}$ [2]	78	78	85	104
	H5	84	101		
	H7	–	–		65
Diameter	D	168	240	280	390
	D1	–	180	250	250
a1 (top)		G 1/8	G 1/4	G 3/8	G 3/8
a2 (side)		–	G 3/8	G 3/8	G 3/8
Approx. weight in kg	Without handwheel	3.2	9	12	26
	With handwheel	–	13	17	31

[1] Actuator stem "extends" [2] Actuator stem "retracts"

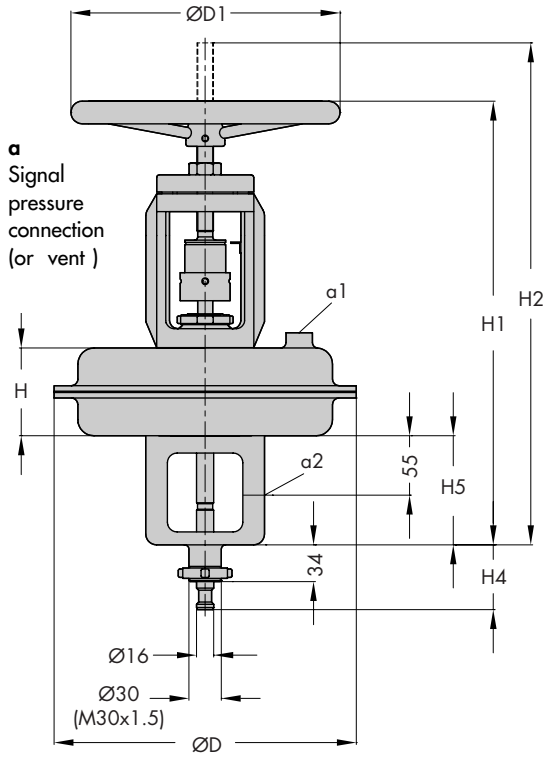


Type 3277 with effective diaphragm area of 700 cm^2

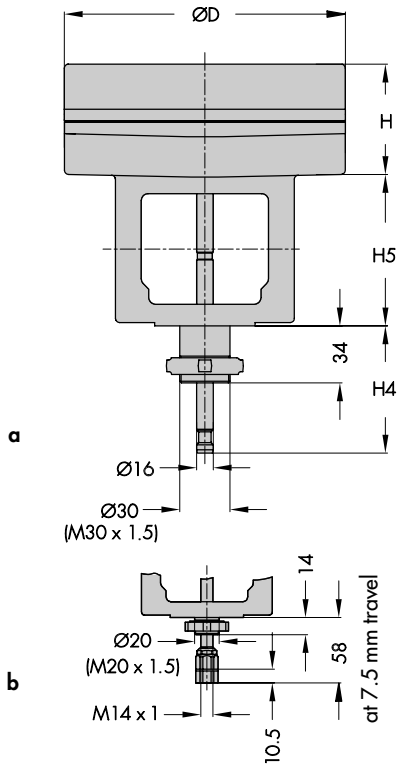
Please submit the following details on ordering:

Actuator	Type 3277 / Type 3277-5
	without/with handwheel
	Fire-Lock version
Diaphragm area	... cm^2
Travel	... mm
Bench range	... bar
Operating direction	Actuator stem extends/retracts
Diaphragm material	NBR/EPDM
Positioner	Type ...

Specifications subject to change without notice.



Type 3277 with additional handwheel



Dimensions for attachment to
a Series 240 Control Valves
b Type 3510 Micro-flow Valve

Type 3277-5 with 120 cm^2 effective diaphragm area

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