

# Pneumatic Actuators up to 700 cm<sup>2</sup>



## Type 3271 and Type 3277 for integral positioner attachment

### Application

Linear actuators in particular for attachment to Series 240, 250, 280 Control Valves and Type 3510 Micro-flow Valves

**Diaphragm area** 60 to 700 cm<sup>2</sup>

**Rated travel** 7.5 to 30 mm

The Types 3271 and 3277 Pneumatic Actuators contain a rolling diaphragm and internal springs.

### Special features

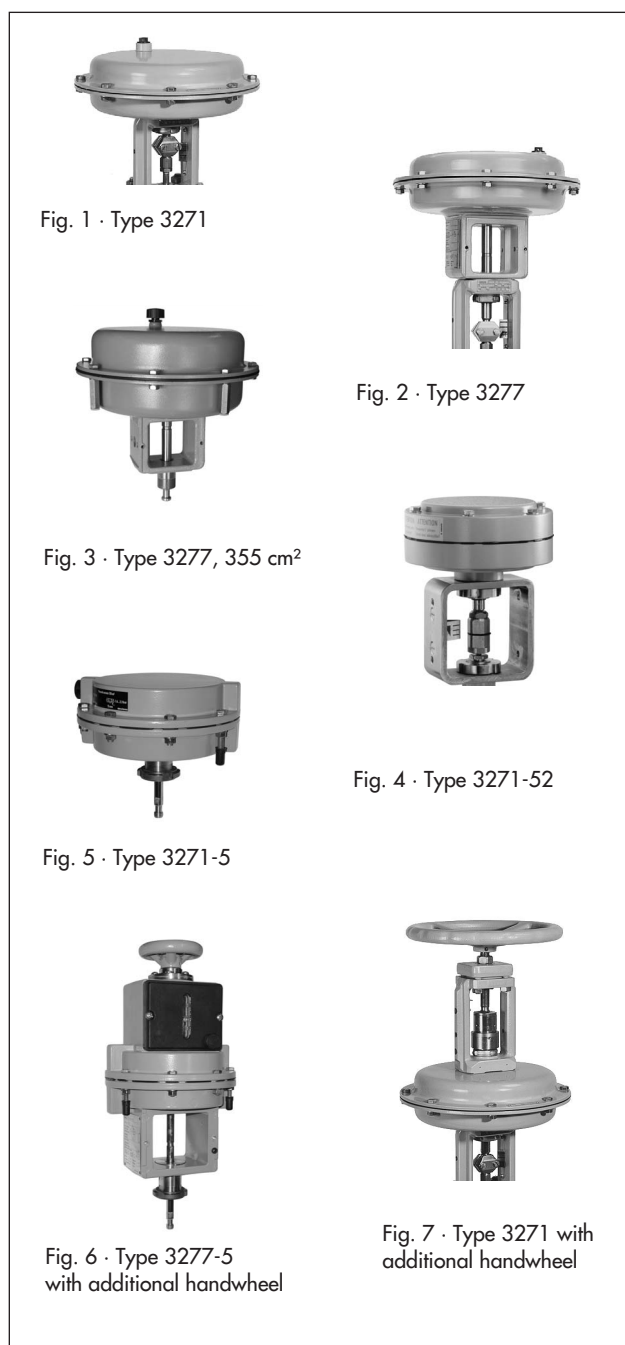
- Low overall height
- Powerful thrust at high response speed
- Low friction
- Various bench ranges by varying the number of springs or their compression
- No special tools required to change the bench range and to reverse the actuator action (also version with handwheel)
- Permissible operating temperatures from -50 to +120 °C
- Direct attachment of accessories on additional yoke for Type 3277 with concealed travel pick-off (Figs. 2, 3 and 6)

### Pneumatic actuator versions

- **Type 3271** · Diaphragm areas 80, 240, 350, 700 cm<sup>2</sup> (Fig. 1), optional stainless steel version (made of 1.4301 for 240, 350 and 700 cm<sup>2</sup>)
- **Type 3277** · Diaphragm areas 240, 350, 355, 700 cm<sup>2</sup> for direct attachment of accessories (Figs. 2, 3), optional stainless steel version (made of 1.4301 for 240, 350, 700 cm<sup>2</sup>)
- **Type 3271-52** · Diaphragm area 60 cm<sup>2</sup>, aluminum housing, especially for Type 3510 Micro-flow Valve (Fig. 4 and Data Sheet T 8091 EN)
- **Type 3271-5** · Diaphragm area 120 cm<sup>2</sup>, die-cast aluminum housing (Fig. 5), optionally with additional handwheel (Fig. 13a)
- **Type 3277-5** · Diaphragm area 120 cm<sup>2</sup>, die-cast aluminum housing for direct attachment of accessories (Fig. 10), optionally with additional handwheel (Figs. 6 and 13b)
- **Types 3271 or 3277** · **Additional handwheel** with diaphragm areas of 240, 350 or 700 cm<sup>2</sup> (Fig. 7, 12 and Data Sheet T 8312 EN)
- **Type 3271** · **Mechanical travel stop** (Fig. 14), min. or max. travel mechanically adjustable in versions with 120, 240, 350 or 700 cm<sup>2</sup>
- **Type 3271/7** · **Fire-Lock version** (Fig. 15) fail-safe action in case of fire, in versions with 240, 350, 700 cm<sup>2</sup>

### Further versions

- Versions for other control media (e.g. water) · Details available on request



### Principle of operation

The signal pressure  $p_{st}$  generates a force  $F = p_{st} \times A$  on the diaphragm area  $A$  (2). This force is balanced by the actuator springs (4). Taking into account the rated travel, the number of springs and their compression determine the bench range. The travel  $H$  is proportional to the signal pressure  $p_{st}$ . The operating direction of the actuator stem (7) depends on the arrangement of the springs and the signal pressure connection (1).

The stem connector (8) connects the actuator stem (7) with the plug stem of the valve.

The adjustable **mechanical travel stop** (Fig. 14) is suitable for actuators made of sheet steel with effective diaphragm areas of 120, 240, 350 or 700 cm<sup>2</sup>. Using the travel stop, the actuator travel can be limited by up to 50 % in both directions (actuator stem extends or retracts) and permanently adjusted.

### Actuators are available with the following fail-safe actions:

#### “Actuator stem extends (FA)”

The springs cause the actuator stem to move to the lower end position (sectional drawings, right) when the diaphragm is relieved of pressure or when the supply air fails.

#### “Actuator stem retracts (FE)”

The springs cause the actuator stem to retract (sectional drawings, left) when the diaphragm is relieved of pressure or when the supply air fails.

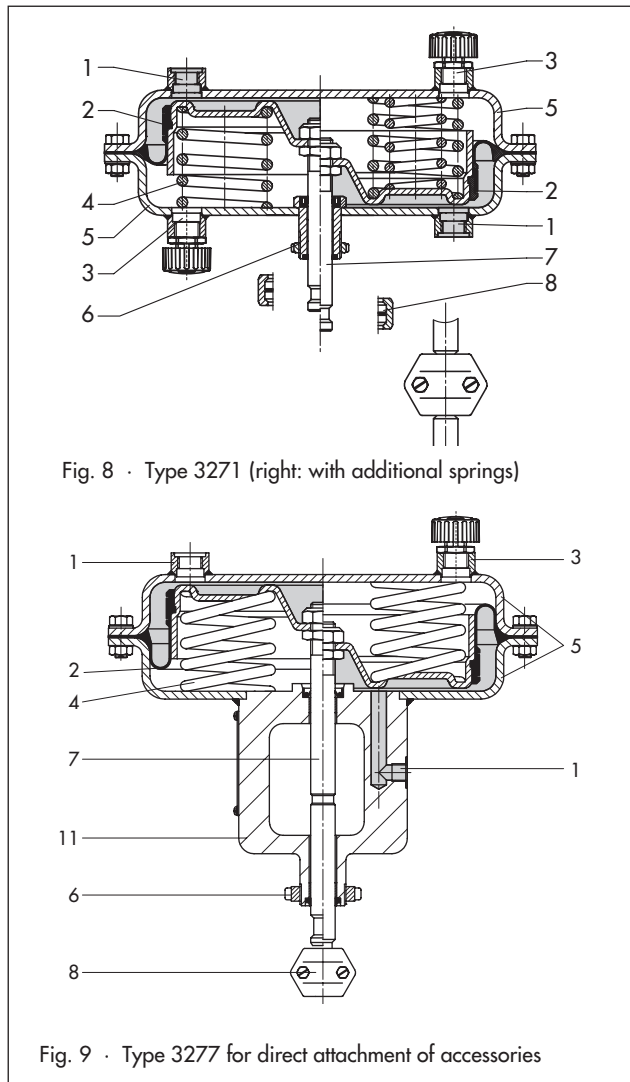


Fig. 8 · Type 3271 (right: with additional springs)

Fig. 9 · Type 3277 for direct attachment of accessories

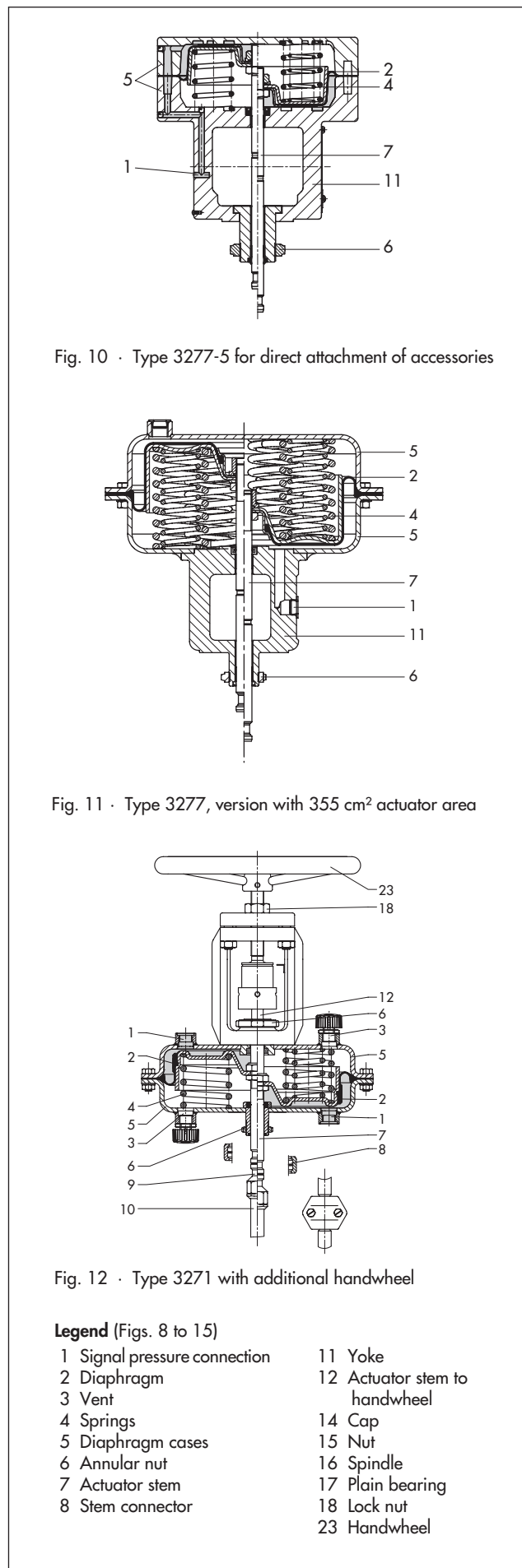


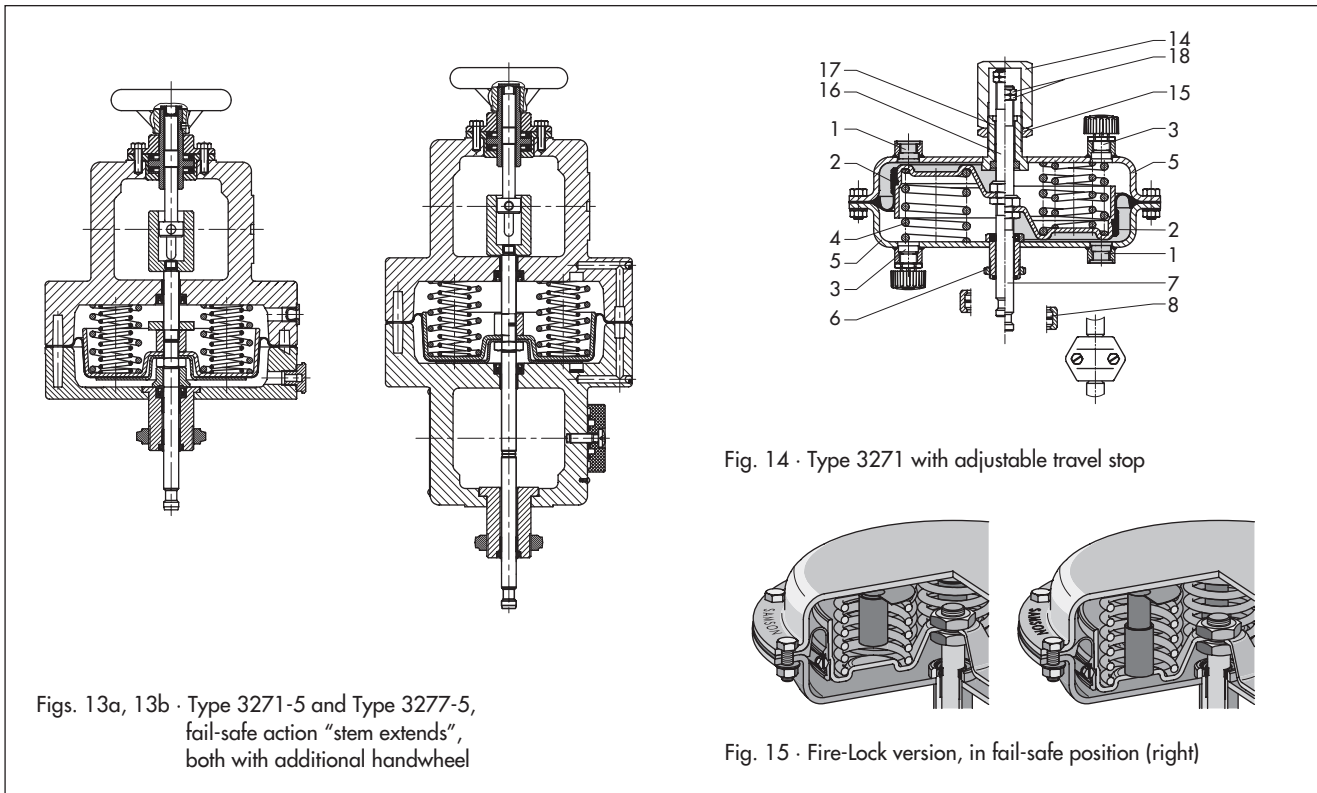
Fig. 10 · Type 3277-5 for direct attachment of accessories

Fig. 11 · Type 3277, version with 355 cm<sup>2</sup> actuator area

Fig. 12 · Type 3271 with additional handwheel

#### Legend (Figs. 8 to 15)

- |                              |                               |
|------------------------------|-------------------------------|
| 1 Signal pressure connection | 11 Yoke                       |
| 2 Diaphragm                  | 12 Actuator stem to handwheel |
| 3 Vent                       | 14 Cap                        |
| 4 Springs                    | 15 Nut                        |
| 5 Diaphragm cases            | 16 Spindle                    |
| 6 Annular nut                | 17 Plain bearing              |
| 7 Actuator stem              | 18 Lock nut                   |
| 8 Stem connector             | 23 Handwheel                  |



Figs. 13a, 13b · Type 3271-5 and Type 3277-5, fail-safe action "stem extends", both with additional handwheel

Fig. 14 · Type 3271 with adjustable travel stop

Fig. 15 · Fire-Lock version, in fail-safe position (right)

Table 1a · Technical data for Type 3271 Pneumatic Actuator

Version	Type 3271	Type 3271 Stainless steel	Type 3277	Type 3277 Stainless steel	Type 3271-52 f. micro-flow valve	Type 3271-5 Type 3277-5
Diaphragm area cm <sup>2</sup>	80* · 240 · 350 · 700		240 · 350 · 355* · 700		60	120
Max. supply pressure	6 bar · See restrictions in on/off service on page 6					
Permissible operating temperatures	-35 to 90 °C <sup>1)</sup> made of standard material NBR				-35 to 80 °C <sup>1)</sup>	-35 to 90 °C <sup>1)</sup>
	-50 to 120 °C <sup>2)</sup> made of special material EPDM, for air free of oil and grease and actuator versions with 240, 350 and 700 cm <sup>2</sup>					
	Up to 80 °C in Fire-Lock version (for 240, 350 and 700 cm <sup>2</sup> )					
<b>Materials</b>						
Rolling diaphragm	NBR (nitrile rubber) with fabric reinforcement				NBR with fabric reinforcement	
	EPDM with fabric reinforcement (not for 355 cm <sup>2</sup> )					
Actuator stem	CrNiMo steel				1.4305/1.4571	1.4305
Actuator stem sealing	NBR				NBR	NBR
	EPDM					
Diaphragm cases	Sheet steel, powder-varnish coated	Stainless steel 1.4301 (not for 80 and 355 cm <sup>2</sup> )	Sheet steel, powder-varnish coated	Stainless steel 1.4301 (not for 355 cm <sup>2</sup> )	Aluminum, powder-varnish coated	Die-cast aluminum, powder-varnish coated

\* Versions with 80 and 355 cm<sup>2</sup> only in sheet steel, not corrosion-resistant

<sup>1)</sup> Lower temperature limited to -20 °C in on/off service

<sup>2)</sup> Lower temperature limited to -40 °C in on/off service

Table 1b · Technical data for additional handwheel

Version for actuator		Type 3271-5 Type 3277-5	Type 3271 Type 3277
Diaphragm area		120 cm <sup>2</sup>	240 cm <sup>2</sup> , 350 cm <sup>2</sup> 700 cm <sup>2</sup> (only for initial spring value ≤ 2.1 bar)
Materials	Housing	Die-cast aluminum, powder-varnish coated	St 37-2, powder-varnish coated
	Spindle	1.4305	Stainless steel 1.4104
	Handwheel	Aluminum, powder-varnish coated	Cast iron, powder-varnish coated

**Table 2 · Bench ranges for pneumatic actuators up to 700 cm<sup>2</sup>**

Effective diaphragm area [cm <sup>2</sup> ]	Rated travel [mm]	Travel volume at rated travel [dm <sup>3</sup> ]	Dead volume [dm <sup>3</sup> ]	Max. travel [mm] <sup>1) 2)</sup>	Bench range [bar] (signal pressure range at rated travel)	Additionally possible spring compression [%]	Operating range with spring compression [bar]	Number of springs	Spring force at 0 mm travel [kN] <sup>1)</sup>	Spring force at rated travel [kN]	Thrust [kN] at rated travel and a supply pressure [bar] of					
											1.4	2.0	3.0	4.0	5.0	6.0
60	7.5	0.05	0.06	10.5	0.2...1.0	0	-	2	0.12	0.6	0.24	0.6	1.2	1.8	2.4	3
					0.4...2.0		-	4	0.24	1.2	-	0.6	1.2	1.8	2.4	
					1.4...2.3 <sup>3)</sup>		-	4	0.84	1.38	-	-	1.02	1.62	2.22	
					2.1...3.3 <sup>3)</sup>		-	8	1.26	1.98	-	-	0.42	1.02	1.62	
80	15	0.12	0.13	16	0.2...1.0	12.5	0.3...1.1	3	0.16	0.8	0.32	0.8	1.6	2.4	3.2	4
					0.4...2.0		6	0.32	1.6	-	0.8	1.6	2.4	3.2		
					0.6...3.0		12	0.48	2.4	-	-	0.8	1.6	2.4		
120	7.5	0.09	0.12	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		-	6	0.96	1.92	-	0.48	1.68	2.88	4.08	5.28
					1.7...2.1 <sup>3)</sup>		6	2.04	2.52	-	-	1.08	2.28	3.48	4.68	
					2.4...3.0 <sup>3)</sup>		12	2.88	3.6	-	-	1.2	2.4	3.6		
120	15	0.2	0.10	17	0.2...1.0	0	-	3	0.24	1.2	-	1.2	2.4	3.6	4.8	6
					0.4...2.0		-	6	0.48	2.4	-	-	1.2	2.4	3.6	4.8
				15	1.4...2.3 <sup>3)</sup>		-	6	1.68	2.76	-	0.84	2.04	3.24	4.44	
					2.1...3.3 <sup>3)</sup>		-	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		6	0.96	4.8	-	-	2.4	4.8	7.2	9.6	
					0.6...3.0		12	1.44	7.2	-	-	2.4	4.8	7.2		
350	15	0.53	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		6	1.4	7	-	-	3.5	7	10.5	14	
				15	0.6...3.0		12	2.1	10.5	-	-	3.5	7	10.5		
					1.4...2.3 <sup>3)</sup>		6	4.9	8.05	-	-	2.45	5.95	9.45	13	
					2.1...3.3 <sup>3)</sup>		12	7.35	11.6	-	-	2.45	5.95	9.45		
355	30	1.06	0.8	38	0.2...1.0	25	0.4...1.2	3	0.7	3.55	1.4	3.55	7.1	10.6	14.2	17.7
					0.4...2.0		6	1.4	7.1	-	-	3.55	7.1	10.6	14.2	
					0.6...3.0		12	2.1	10.6	-	-	-	3.55	7.1	10.6	
					0.9...1.7		4	3.2	6.0	-	1.1	4.6	8.2	11.7	15.3	
					1.4...2.6		8	5.0	9.2	-	-	1.4	5.0	8.5	12.1	
					1.9...3.3		10	6.5	11.7	-	-	-	2.5	6.0	9.6	
					2.25...3.65		10	6.5	11.7	-	-	-	2.5	6.0	9.6	
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		6	2.8	14	-	-	7	14	21	28	
					0.6...3.0		12	4.2	21	-	-	7	14	21		
				30	1.4...2.3 <sup>3)</sup>		8	9.8	16.1	-	-	4.9	11.9	18.9	25.9	
					2.1...3.3 <sup>3)</sup>		12	14.7	23.1	-	-	4.9	11.9	18.9		
					2.35...3.8 <sup>3) 4)</sup>		15	16.5	26.6	-	-	1.4	8.4	15.4		
					2.6...4.3 <sup>3) 4)</sup>		18	18.2	30.1	-	-	-	4.9	11.9		

- 1) Based on lower bench range value, taking zero travel (to unseat the plug) into account
- 2) Zero travel as in Table 3 depending on fail-safe action
- 3) Pretensioned springs
- 4) Version not available with additional handwheel

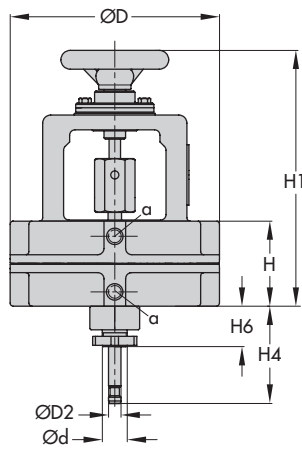


Fig. 16 · Type 3271-5 with additional handwheel

Fig. 17a · Type 3277-5 with 7.5 mm travel for Type 3510 Micro-flow Valve

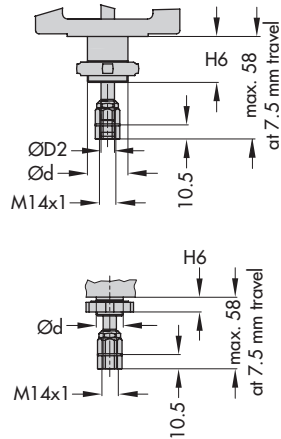


Fig. 17a · Types 3271-5 with 7.5 mm travel for Type 3510 Micro-flow Valve

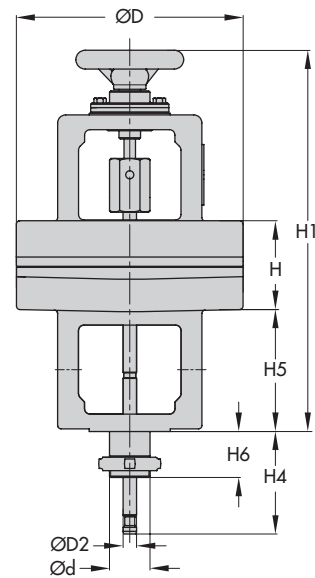


Fig. 17 · Type 3277-5 with additional handwheel

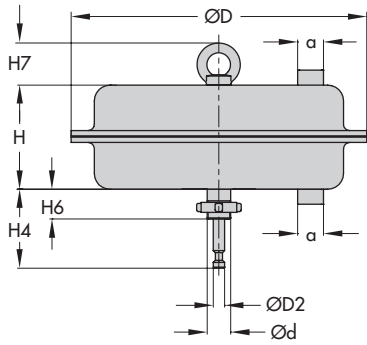


Fig. 18 · Type 3271 (700 cm<sup>2</sup> version with lifting ring)

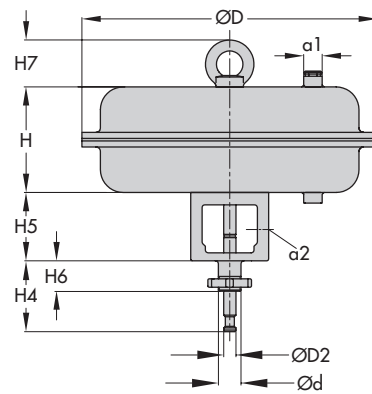


Fig. 19 · Type 3277 (700 cm<sup>2</sup> version with lifting ring)

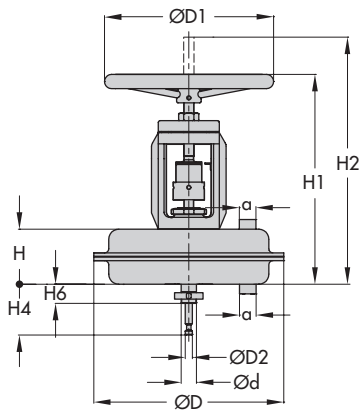


Fig. 20 · Type 3271 with additional handwheel

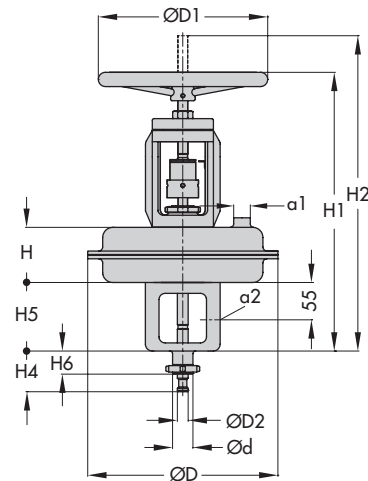


Fig. 21 · Type 3277 with additional handwheel

**Table 3 · Dimensions and weights**

Actuator	Type	3271			3271			3277	3277				
		Version	-52		-5			-5					
Refer to Fig.		16	18	16	18/20	18/20	18/20	17	19/21	19/21	19/21	19/21	
Effective area	cm <sup>2</sup>	60	80	120	240	350	700	120	240	350	355	700	
Height	H	63	62	69	62	82	134	70	65	82	121	135	
	H1	-		205	300	320	490	293	400	420	-	590	
	H2 <sub>max</sub>	-			345	365	540	-	445	465	-	640	
	H4 <sub>rated</sub> FA	51	75	75	75	75	90	75	75	75	90	90	
	H4 <sub>max</sub> FA	52.5	78	78	78	78	95	78	78	78	93	95	
	H4 <sub>max</sub> FE	52.5	78	78	78	85	104	78	78	85	96	104	
	H5	-							88	101	101	101	101
	H6	23.8	34	34	34	34	34	34					
Travel stop	H7	-					65	-				65	
	H8 <sup>2)</sup>	-		75	75	85	115	75	75	85	-	115	
Diameter	∅ D	120	150	168	240	280	390	168	240	280	280	390	
	∅ D1	-		80	180	250	400	80	180	250	-	400	
	∅ D2	10				16		10	16				
∅ d (thread)	M20x1.5	M30 x 1.5 <sup>1)</sup>					M30 x 1.5 <sup>1)</sup>						
Connection (a optionally)	a	G 1/8	G 1/4	G 1/8	G 1/4	G 3/8		G 1/8	G 1/4	G 3/8			
		1/8 NPT	1/4 NPT	1/8 NPT	1/4 NPT	1/4 NPT							
	a2	-							-	G 3/8			
Weight in kg													
Without handwheel		1.3	2	2.5	5	8	22	3.2	9	12	19	26	
With handwheel		-		4	9	13	27	4.5	13	17	-	31	

1) 120 cm<sup>2</sup> effective area with connection for Type 3510 Micro-flow Valve with M20 x 1.5

2) Travel stop on both sides (Fig. 22)

**Throttling or on/off service**

In throttling service, the pneumatic actuators can be used for supply pressures up to max. 6 bar.

In on/off service, the supply pressure must be restricted.

For fail-safe action "Actuator stem retracts (FE)", the permissible supply pressure must not exceed the upper bench range value by more than 3 bar.

**Example**

Bench range	Fail-safe action	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

For fail-safe action "Actuator stem extends (FA)" and travel stop, the supply pressure must not exceed the upper bench range value by more than 1.5 bar at the maximum.

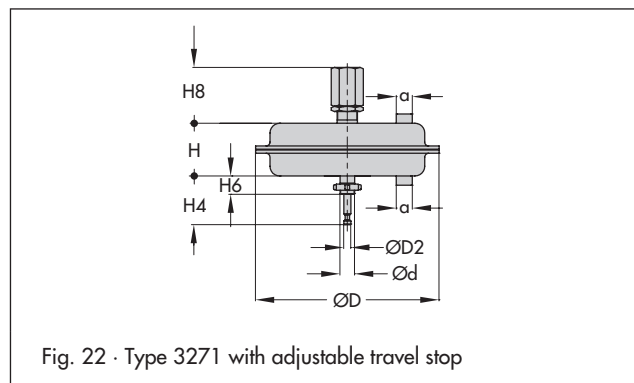


Fig. 22 · Type 3271 with adjustable travel stop

**Ordering text**

Actuator	Type 3271 or Type 3277 for direct attachment of accessories
Optional	Handwheel Travel stop Fire-Lock version
Diaphragm area	... cm <sup>2</sup>
Travel	... mm
Bench range	... bar
Fail-safe action	Actuator stem extends (FA) or Actuator stem retracts (FE)
Signal pressure connection	G ... / ... NPT
Rolling diaphragm	NBR/EPDM

Specifications subject to change without notice.

