

T 8310-1/4/5/6 EN

Pneumatic actuators up to 750v2 cm² ¹⁾

Type 3271 · Type 3277 for integral positioner attachment

Application

Linear actuators particularly suitable for attachment to Series 240, 250, 280 and 290 Valves as well as Type 3510 Micro-flow Valves

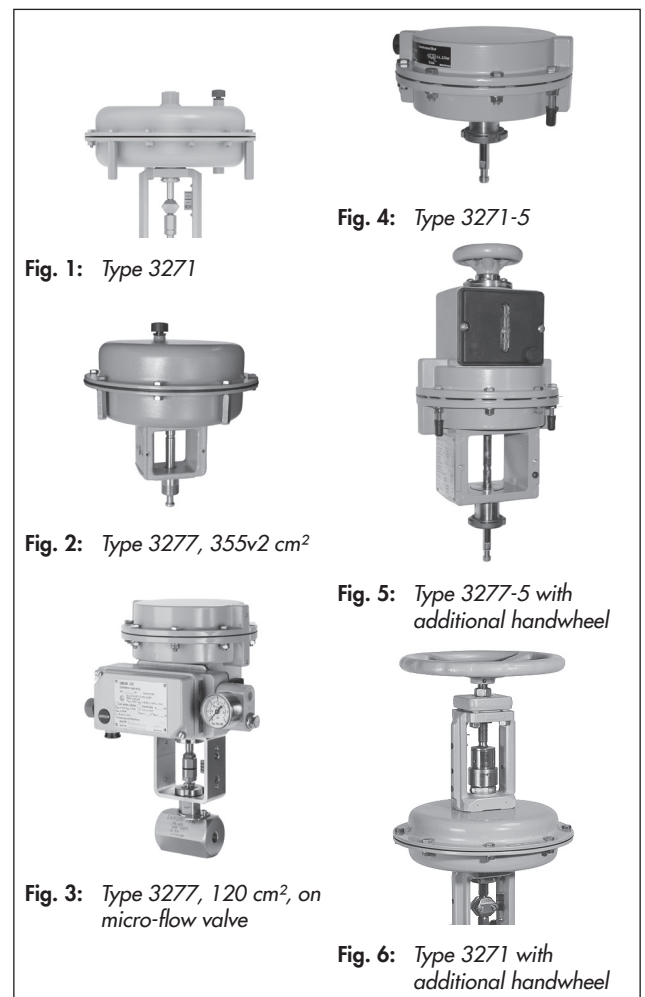
Actuator area	120 to 750v2 cm²
Rated travel	7.5 to 30 mm

The Type 3271 and Type 3277 Pneumatic Actuators contain a rolling diaphragm and internal springs and have the following special features:

- Low overall height
- Powerful thrust at high stroking speed
- Low friction
- Various bench ranges by varying the number of springs or their compression
- No special tools required to change the bench range or reverse the direction of action (also version with handwheel)
- Permissible operating temperatures from -60 to +120 °C
- Direct attachment of accessories on additional yoke for Type 3277 with concealed travel pick-off (Fig. 2 and Fig. 5)

Versions

- **Type 3271 with clamped-in diaphragm · 350 cm² actuator area** (Fig. 1), optional stainless steel (1.4301) version
- **Type 3277 with clamped-in diaphragm · 350 cm² actuator area** for direct attachment of accessories, optional stainless steel (1.4301) version
- **Type 3271 with full diaphragm · 175v2, 350v2, 355v2 or 750v2 cm² actuator areas** (Fig. 1), optional stainless steel (1.4301) version (not for 355v2 cm²)
- **Type 3277 with full diaphragm · 175v2, 350v2, 355v2 or 750v2 cm² actuator areas** for direct attachment of accessories (Fig. 2), optional stainless steel (1.4301) version (not for 355v2 cm²)
- **Type 3271-5 · 120 cm² actuator area**, die-cast aluminum housing (Fig. 4), optionally with additional handwheel (Fig. 12)
- **Type 3277-5 · 120 cm² actuator area**, die-cast aluminum housing for direct attachment of accessories (Fig. 8), optionally with additional handwheel (Fig. 5)
- **Type 3271 or Type 3277 · Additional handwheel** for actuators with 175v2 to 750v2 cm² actuator areas (Fig. 6 and Fig. 11)



- **Type 3271 · Travel stop** (Fig. 13), minimum and maximum travel mechanically adjustable in versions with 175v2 to 750v2 cm²

¹⁾ v2 is added to the actuator area (e.g. 175v2 cm²) to indicate actuators with a full diaphragm

Further versions

- **Type 3273 Side-mounted Handwheel** ▶ T 8312
- **Type 3271 or Type 3277 · Combined version with handwheel and travel stops on both sides** (Fig. 14) for 175v2 to 750v2 cm² actuator areas
- Versions for other control media (e.g. water) available on request

Principle of operation

The signal pressure p_{st} creates the force $F = p_{st} \cdot A$ at the diaphragm surface A which is opposed by the springs (10) in the actuator. The bench range is determined by the number of springs used and their compression, taking into account the rated travel. The travel H is proportional to the signal pressure p_{st} . The direction of action of the actuator stem (7) depends on how the springs are installed in the actuator and the location of the signal pressure connection (S).

Actuators with 175v2, 350v2, 355v2 and 750v2 cm² actuator areas are designed with a full rolling diaphragm (see Fig. 10). The diaphragm of actuators with 350 cm² actuator areas is clamped-in (see Fig. 9).

The stem connector (26) connects the actuator stem (7) with the plug stem of the valve.

The adjustable **mechanical travel stop** (Fig. 13) is suitable for actuators with actuator areas of 120, 175v2, 350, 350v2, 355v2 or 750v2 cm². 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.

Direction of action

Actuators are available with the following directions of action:

- **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.

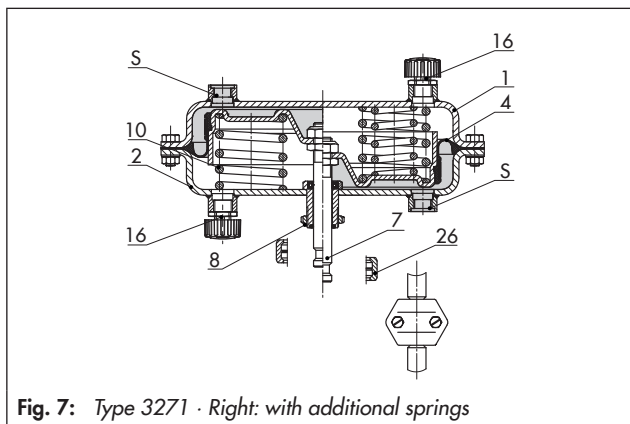


Fig. 7: Type 3271 · Right: with additional springs

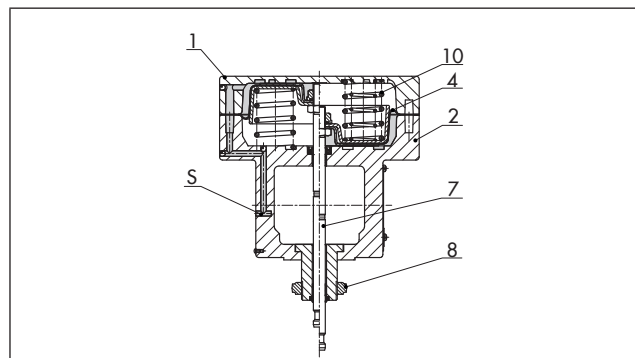


Fig. 8: Type 3277-5 for direct attachment of accessories (120 cm²)

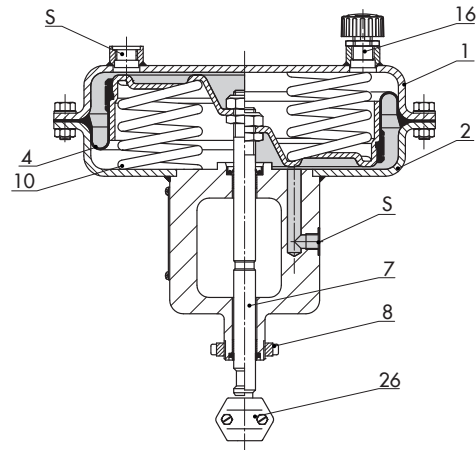


Fig. 9: Type 3277 for direct attachment of accessories (350 cm²)

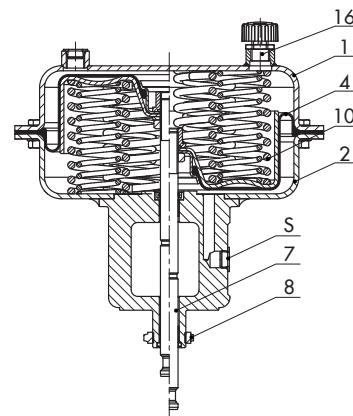


Fig. 10: Type 3277 with additional springs (355v2 cm²)

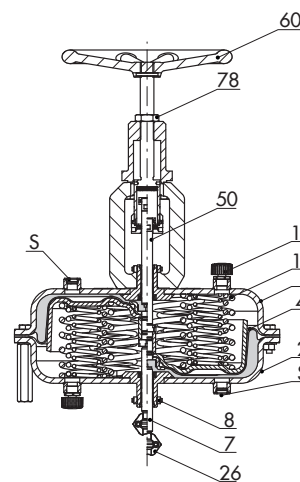


Fig. 11: Type 3271 with 750v2 cm² and additional handwheel

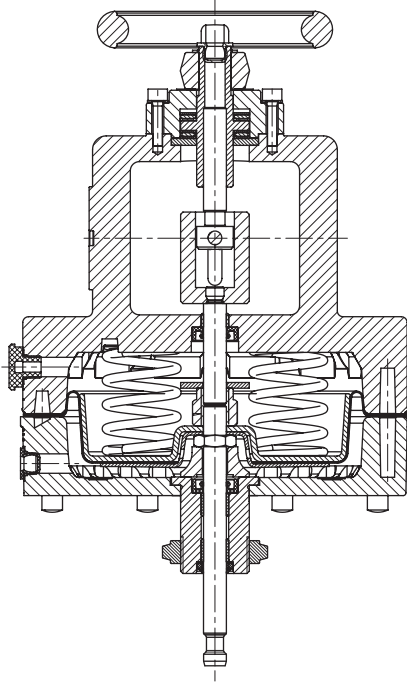


Fig. 12: Type 3271-5, "stem extends" fail-safe action, with additional handwheel

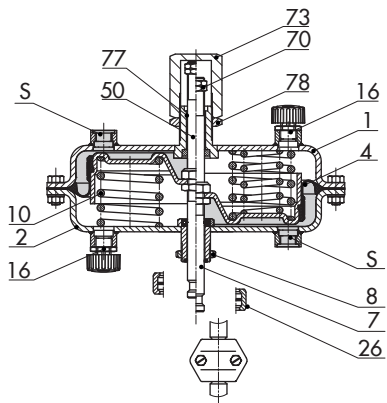


Fig. 13: Type 3271 with adjustable travel stop

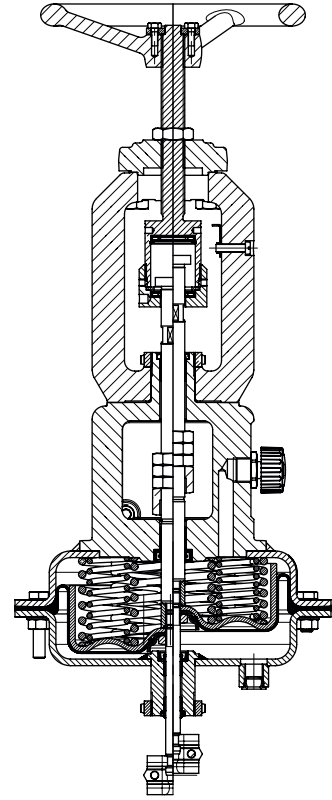


Fig. 14: Type 3271 (175v2 cm²) - Combined version with hand-wheel and travel stops on both sides

Legend for Fig. 7 to Fig. 14

- | | | | | | |
|---|-----------------------|----|----------------|----|----------------------------|
| 1 | Top diaphragm case | 10 | Springs | 70 | Nut |
| 2 | Bottom diaphragm case | 16 | Vent plug | 73 | Cover |
| 4 | Diaphragm | 26 | Stem connector | 77 | Dry bearing |
| 7 | Actuator stem | 50 | Actuator stem | 78 | Lock nut |
| 8 | Ring nut | 60 | Handwheel | S | Signal pressure connection |

Table 1: Technical data for Type 3271 and Type 3277 Pneumatic Actuators

Actuator area	cm ²	350	175v2 · 350v2 · 355v2 · 750v2	120 Type 3271-5/Type 3277-5
Diaphragm		Clamped-in	Full	-
Max. supply pressure		6 bar ¹⁾		
Permissible ambient temperatures		Diaphragm material NBR: -35 to +90 °C ^{2) 4)}		Diaphragm material NBR: -35 to +80 °C ²⁾
		Diaphragm material EPDM: -50 to +120 °C ^{3) 4)}	Diaphragm material PVMQ: -60 to +90 °C ⁴⁾	
Degree of protection		IP 54 ⁶⁾		
Materials				
Actuator stem		Stainless steel		
Actuator stem sealing		NBR		NBR
		EPDM		
Housing		1.0332/1.0335 Sheet steel, painted Ambient temperature ≥ -50 °C	1.0976/1.0982 Sheet steel, painted Ambient temperature ≥ -60 °C	Die-cast aluminum, painted
		1.4301 · Stainless sheet steel · Ambient temperature ≥ -60 °C ⁵⁾		

1) Observe supply pressure restrictions.

2) In on/off service, lowest temperature restricted to -20 °C

3) In on/off service, lowest temperature restricted to -40 °C

4) Install vent plug (▶ AB 07) for temperatures below -20 °C.

5) 1.4301 not available for 355v2 cm²

6) The pneumatic actuators do not pose any risk in the sense of the protection requirements described in DIN EN 60529. The IP rating depends on the connecting parts used on the pressurized side and the spring chamber side of the actuator. In this case, components (air vents as well as valves accessories, such as solenoid valves, positioners etc.) must be used that comply with the requirements. The maximum rating that can be achieved with the standard air vent is IP 54 ▶ AB 07. Depending on the IP rating of the valve accessories, a maximum rating of IP 66 can be achieved for an actuator with air purging of the actuator spring chamber.

Table 2: Technical data for additional handwheel

Version for actuator	Type 3271-5 · Type 3277-5	Type 3271 · Type 3277
Actuator area	120 cm ²	175v2, 350, 350v2, 355v2 cm ² 750v2 cm ² (only for spring upper range value ≤ 3.1 bar)
Housing	See Table 1	
Material	Spindle 1.4305	Stainless steel 1.4104
	Handwheel Aluminum, powder coating	Cast iron EN-GJL-250 (EN-JL1040), powder coating

Table 3: Bench ranges for pneumatic actuators up to 750v2 cm² actuator area

Actuator area in cm ²	Rated travel in mm	Travel volume at rated travel in dm ³	Dead volume in dm ³	Max. travel in mm ^{1) 2)}	Bench range in bar (Signal pressure range at rated travel)	Add. possible spring compression in %	Operating range with spring compression in bar	No. of springs	Spring force at 0 mm travel in kN ¹⁾	Spring force at rated travel in kN	Thrust in kN at rated travel and supply pressure in bar of					
											1.4	2.0	3.0	4.0	5.0	6.0
120	7.5	0.09	0.12	9	0.8 to 1.6		-	6	0.96	1.92	-	0.48	1.68	2.88	4.08	5.28
					Version for Type 3510 Micro-flow Valve		1.7 to 2.1 ³⁾	6	2.04	2.52	-	-	1.08	2.28	3.48	4.68
					2.4 to 3.0 ³⁾		12	2.88	3.6	-	-	-	1.2	2.4	3.6	
120	15	0.2	0.10	17	0.2 to 1.0	0	-	3	0.24	1.2	-	1.2	2.4	3.6	4.8	6
					0.4 to 2.0		6	0.48	2.4	-	-	1.2	2.4	3.6	4.8	
				15	1.4 to 2.3 ³⁾		6	1.68	2.76	-	-	0.84	2.04	3.24	4.44	
					2.1 to 3.3 ³⁾		12	2.52	3.96	-	-	-	0.84	2.04	3.24	
175v2	15	0.26	0.24	19	0.2 to 1.0	25	0.4 to 1.2	3	0.35	1.75	0.7	1.75	3.5	5.25	7	8.75
					0.4 to 2.0		6	0.7	3.5	-	-	1.75	3.5	5.25	7	
					0.5 to 2.5		9	0.88	4.38	-	-	0.88	2.63	4.38	6.13	
					0.6 to 3.0		12	1.05	5.25	-	-	-	1.75	3.5	5.25	
					1.3 to 2.9		12	2.28	5.08	-	-	0.18	1.93	3.68	5.43	
350	15	0.53	0.6	22	0.2 to 1.0	25	0.4 to 1.2	3	0.7	3.5	1.4	3.5	7	10.5	14	17.5
					0.4 to 2.0		6	1.4	7	-	-	3.5	7	10.5	14	
					0.6 to 3.0		12	2.1	10.5	-	-	-	3.5	7	10.5	
				15	1.4 to 2.3 ³⁾		6	4.9	8.05	-	-	2.45	5.95	9.45	13	
					2.1 to 3.3 ³⁾		12	7.35	11.6	-	-	-	2.45	5.95	9.45	
350v2	15	0.54	0.45	19	0.2 to 1.0	25	0.4 to 1.2	3	0.7	3.5	1.4	3.5	7	10.5	14	17.5
					0.4 to 2.0		6	1.4	7	-	-	3.5	7	10.5	14	
					0.6 to 3.0		12	2.1	10.5	-	-	-	3.5	7	10.5	
				15	1.4 to 2.3 ³⁾		6	4.9	8.05	-	-	2.45	5.95	9.45	13	
					2.1 to 3.3 ³⁾		12	7.35	11.6	-	-	-	2.45	5.95	9.45	
355v2	30	1.06	0.8	38	0.2 to 1.0	25	0.4 to 1.2	3	0.7	3.55	1.4	3.55	7.1	10.6	14.2	17.7
					0.4 to 2.0		6	1.4	7.1	-	-	3.55	7.1	10.6	14.2	
					0.6 to 3.0		12	2.1	10.6	-	-	-	3.55	7.1	10.6	
					0.9 to 1.7		4	3.2	6.0	-	1.1	4.6	8.2	11.7	15.3	
					1.4 to 2.6		8	5.0	9.2	-	-	1.4	5	8.5	12.1	
					1.9 to 3.3		10	6.5	11.7	-	-	-	2.5	6	9.6	
750v2	30	2.17	1.28	38	0.2 to 1.0	25	0.4 to 1.2	3	1.5	7.5	3	7.5	15	22.5	30	37.5
					0.4 to 2.0		6	3.0	15	-	-	7.5	15	22.5	30	
					0.6 to 3.0		14	4.5	22.5	-	-	-	7.5	15	22.5	
					1.4 to 2.4		9	10.5	18	-	-	4.5	12	19.5	27	
					1.9 to 3.1		12	14.3	23.3	-	-	-	6.8	14.3	21.8	
					2.1 to 3.8 ^{4) 5)}		16	15.8	28.5	-	-	-	1.5	9	16.5	
					2.3 to 4.2 ^{4) 5)}		19	17.3	31.5	-	-	-	-	6	13.5	

¹⁾ Based on lower bench range value. The zero travel is not taken into account.

²⁾ Zero travel as listed in Table 4 depending on fail-safe action

³⁾ Preloaded springs

⁴⁾ Version not available with top-mounted handwheel

⁵⁾ Not available with "stem retracts" fail-safe action

Dimensional drawings

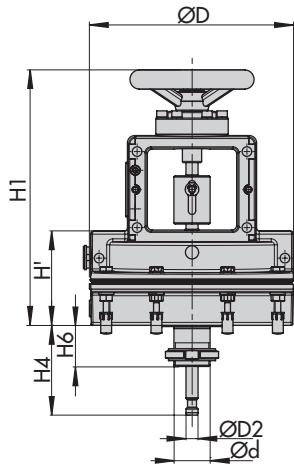


Fig. 15: Type 3271-5 with additional handwheel

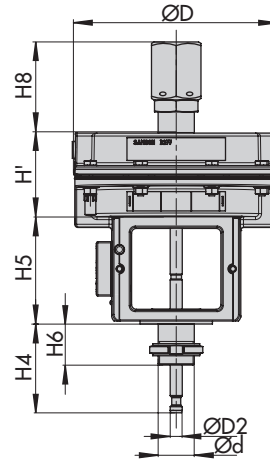


Fig. 16: Type 3277-5 with travel stop

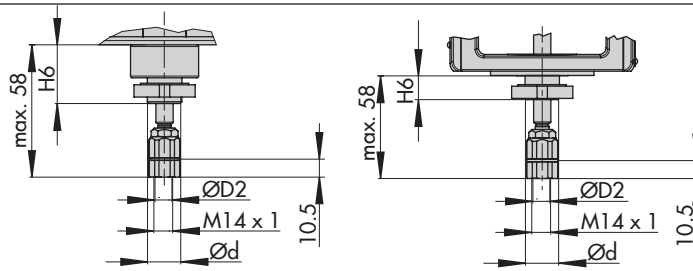


Fig. 17: Type 3271-5 and Type 3277-5 with 7.5 mm travel for Type 3510 Micro-flow Valve

Dimension diagrams (continued)

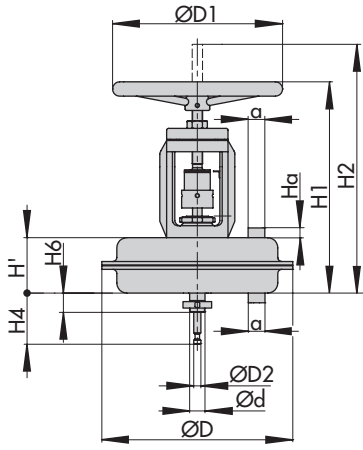


Fig. 18: Type 3271 with additional handwheel

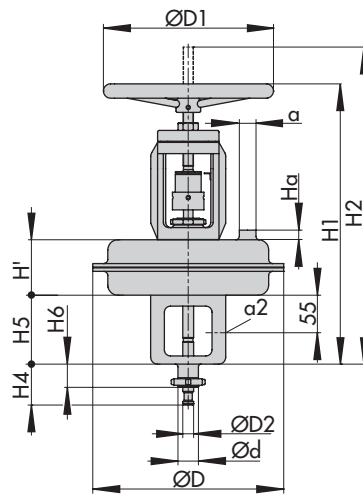


Fig. 19: Type 3277 with additional handwheel

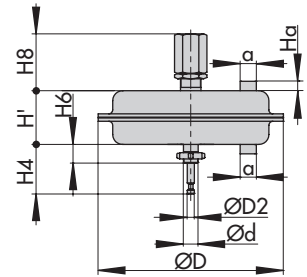


Fig. 20: Type 3271 with travel stop

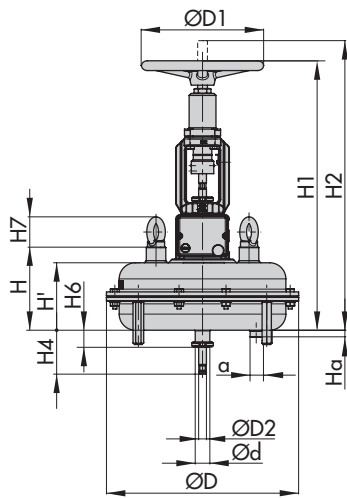


Fig. 21: Type 3271 Pneumatic Actuator with handwheel and travel stops on both sides

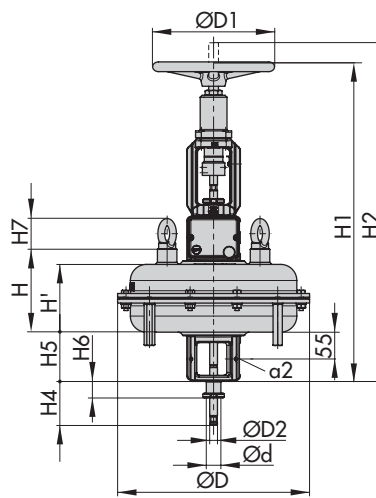


Fig. 22: Type 3277 Pneumatic Actuator with handwheel and travel stops on both sides

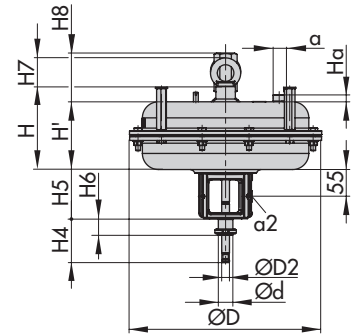


Fig. 23: Type 3277 with travel stop

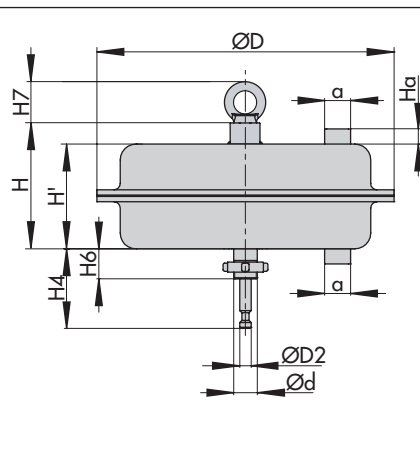


Fig. 24: Type 3271

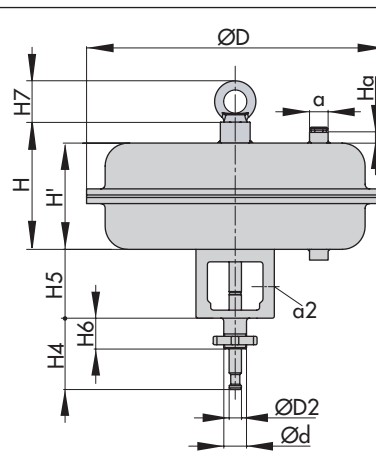


Fig. 25: Type 3277 with yoke for direct attachment of accessories

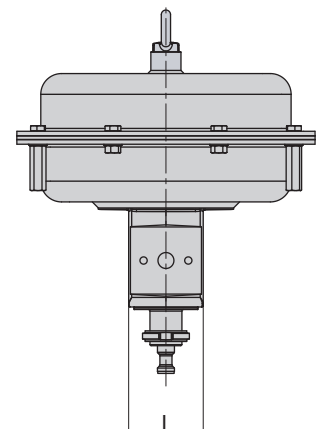


Fig. 26: Type 3277 with yoke (side view)

Table 4: Dimensions and weights

Table 4.1: Type 3271 Actuator

Version		3271-5	3271					
Actuator area cm ²		120	175v2	350	350v2	355v2	750v2	
See		Fig. 15 Fig. 17	Fig. 18 · Fig. 20 · Fig. 21 · Fig. 24					
Height	H ⁴⁾	–	–	–	–	–	171	
	H'	69	78	82	92	131	139	
	Ha	–	15	15	15	15	15	
	H1	Only with handwheel	205	313	320	330	486	493
		With handwheel and travel stop	–	413	420	430	586	593
	H2 _{max}	Only with handwheel	–	358	365	375	536	543
		With handwheel and travel stop	–	458	465	475	636	643
	H4 _{rated} FA	75	75	75	75	90	90	
	H4 _{max} FA	78	78	78	78	93	93	
	H4 _{max} FE	78	78	85	85	96	98	
	H5	–	–	–	–	–	–	
	H6	34	34	34	34	34	34	
	H7 ³⁾	–	–	–	–	–	65	
Travel stop	H8 ¹⁾	75	75	85	85	115	129	
Diameter	ØD	168	215	280	280	280	394	
	ØD1	80	180	250	250	250	315	
	ØD2	10	10	16	16	16	16	
Ød (thread)		M30x1.5 ²⁾						
Connection (a optionally)	a	G 1/8	G 1/4	G 3/8	G 3/8	G 3/8	G 3/8	
		1/8 NPT	1/4 NPT	3/8 NPT	3/8 NPT	3/8 NPT	3/8 NPT	
	a2	–	–	–	–	–	–	
Weight ⁵⁾ in kg								
Without handwheel		2.5	6	8	11.5	15	36	
With handwheel		4	10	13	16.5	20	41	

1) Travel stop on both sides (Fig. 20)

2) 120 and 175v2 cm² actuator areas with connection for Type 3510 Micro-flow Valve with M20x1.5 thread

3) Height of eyebolt according to DIN 580. Height of the swivel hoist may differ.

4) In versions in which the lifting eyelet is welded directly onto the housing, H' and H are identical. The value H' applies.

5) 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.).

Table 4.2: Type 3277 Actuator

Version		3277-5	3277					
Actuator area cm ²		120	175v2	350	350v2	355v2	750v2	
See		Fig. 16 Fig. 17	Fig. 19 · Fig. 22 · Fig. 23 · Fig. 25 · Fig. 26					
Height	H ⁴⁾	-	-	-	-	-	171	
	H ¹	70	78	82	82	121	139	
	Ha	-	15	15	15	15	15	
	H1	Only with handwheel	293	413	420	419	576	595
		With handwheel and travel stop	-	513	520	519	676	695
	H2 _{max}	Only with handwheel	-	458	465	464	626	643
		With handwheel and travel stop	-	558	565	564	726	743
	H4 _{rated} FA	75	75	75	75	90	90	
	H4 _{max} FA	78	78	78	78	93	93	
	H4 _{max} FE	78	78	85	85	96	98	
	H5	88	101	101	101	101	101	
	H6	34	34	34	34	34	34	
	H7 ³⁾	-	-	-	-	-	65	
Travel stop	H8 ¹⁾	75	75	85	85	115	129	
Yoke width (see Fig. 26)	L	70						
Diameter	ØD	168	215	280	280	280	394	
	ØD1	80	180	250	250	250	315	
	ØD2	10	16	16	16	16	16	
Ød (thread)	M30x1.5 ²⁾							
Connection (a optionally)	a	G 1/8	G 1/4	G 3/8	G 3/8	G 3/8	G 3/8	
		1/8 NPT	1/4 NPT	3/8 NPT	3/8 NPT	3/8 NPT	3/8 NPT	
	a2	-	G 3/8	G 3/8	G 3/8	G 3/8	G 3/8	
Weight ⁵⁾ in kg								
Without handwheel		3.2	10	12	15	19	40	
With handwheel		4.5	14	17	20	24	45	

1) Travel stop on both sides (Fig. 23)

2) 120 and 175v2 cm² actuator areas with connection for Type 3510 Micro-flow Valve with M20x1.5 thread

3) Height of eyebolt according to DIN 580. Height of the swivel hoist may differ.

4) In versions in which the lifting eyelet is welded directly onto the housing, H¹ and H are identical. The value H¹ applies.

5) 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.).

Throttling or on/off service

The pneumatic actuators are designed for a maximum supply pressure of 6 bar when used for throttling service.

With "stem extends" direction of action and travel stop, the supply pressure must not exceed the upper bench range value by more than 1.5 bar.

The following also applies to actuators with 350 cm² actuator area:

- In on/off service, the supply pressure must be limited.
- For the direction of action "actuator stem retracts", the permissible supply pressure must not exceed the upper bench range value by more than 3 bar:

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

Accessories

The pneumatic actuators with 750v2 cm² actuator area have a female thread on the top diaphragm case to allow an eyebolt or swivel hoist to be screwed into it. The eyebolt can be used to vertically lift the actuator and is included in the scope of delivery. The swivel hoist is designed for setting a control valve assembly upright or for lifting the actuator without valve. The swivel hoist can be ordered (accessories).

Actuator area	Item no.	
	Ring bolt (DIN 580)	Swivel hoist
750v2 cm ²	8325-0131	8442-1017

Actuators with 355v2 cm² actuator area or smaller do not require a female thread or welded-on lifting eyelet due to their light weight.

List of documentation for Type 3271 and Type 3277 Pneumatic Actuators

Device type	Actuator area in cm ²	Data sheet		Mounting and operating instructions
		General product line	SAM001 ¹⁾ product line	
Types 3271 and 3277 Pneumatic Actuators	120	Included in this data sheet	▶ T 8310-11/14/15/16	▶ EB 8310-1
	350			▶ EB 8310-6
	175v2 · 350v2 · 750v2			▶ EB 8310-5
	355v2			▶ EB 8310-4
Type 3271 Pneumatic Actuator	1000	▶ T 8310-2/7	▶ T 8310-12	▶ EB 8310-2
	1400-120 · 2800 · 2 x 2800		–	▶ EB 8310-7
	1400-60	▶ T 8310-3	▶ T 8310-13	▶ EB 8310-3
	1400-250	▶ T 8310-8	–	▶ EB 8310-8

¹⁾ The customer standard SAM001 indicates SAMSON devices that comply with the NAMUR Recommendation NE 53. After subscribing to the ▶ NE53 newsletter, users of these devices automatically receive information on any hardware or software changes. Separate data sheets have been created for Type 3271 and Type 3277 Pneumatic Actuators that comply to the SAM001 standard.

Ordering text

Actuator	Type 3271 Type 3277 for direct attachment of accessories
Actuator area	... cm ²
Travel	... mm
Optional	Handwheel Travel stop Combined version with handwheel and travel stops on both sides
Bench range	... bar
Direction of action	Actuator stem extends (FA) Actuator stem retracts (FE)
Signal pressure connection	G .../... NPT
Housing material	Refer to Table 1
Rolling diaphragm	NBR/EPDM/PVMQ (175v2, 350v2, 355v2 and 750v2 cm ² only)

Information Sheet for control valves

▶ T 8000-1