

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

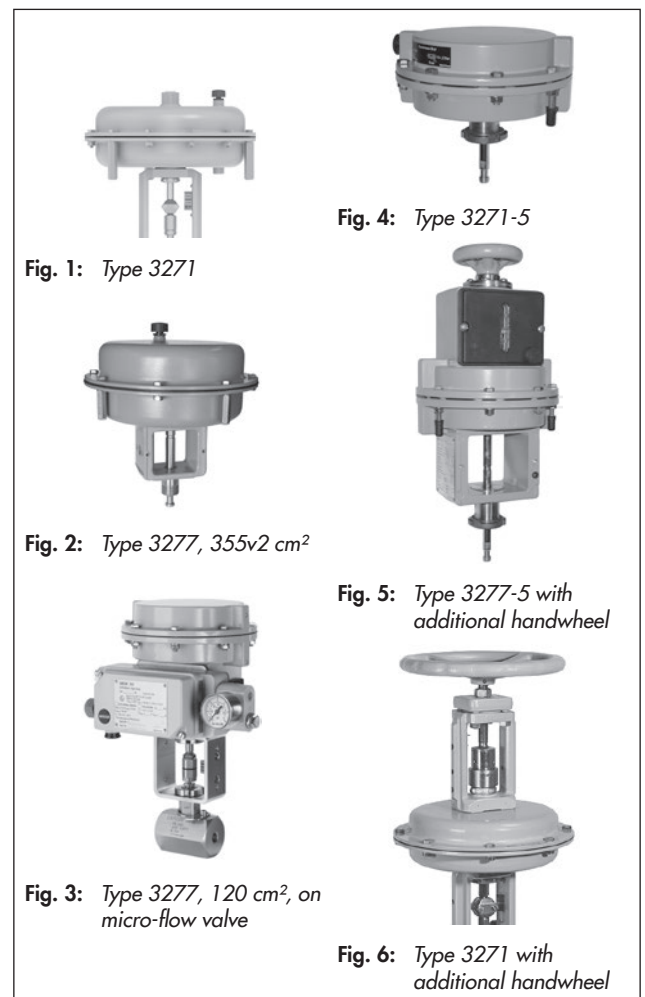
Actuator area	120 to 750v2 cm²
Rated travel	7.5 to 30 mm

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 · 240, 350 or 700 cm²** actuator areas (Fig. 1), optional stainless steel (1.4301) version
- **Type 3277 with clamped-in diaphragm · 240, 350 or 700 cm²** actuator areas 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 (not for 240 cm²)
- 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 240, 350 and 700 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, 240, 350v2, 355, 700 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.

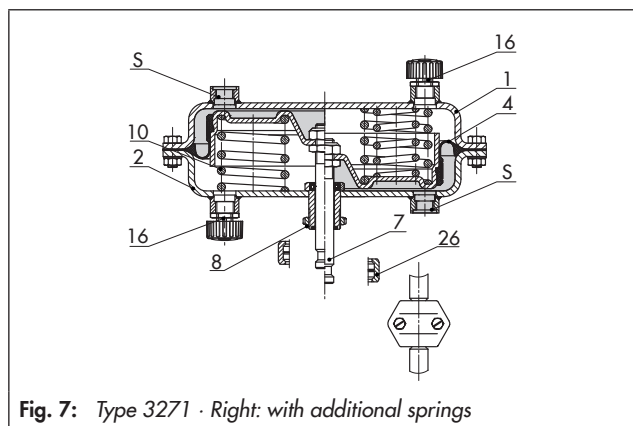


Fig. 7: Type 3271 · Right: with additional springs

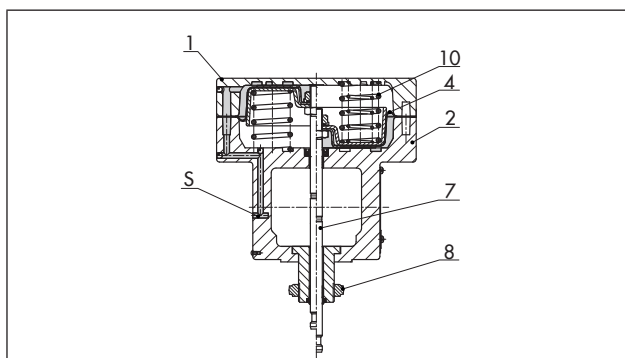


Fig. 8: Type 3277-5 for direct attachment of accessories (120 cm²)

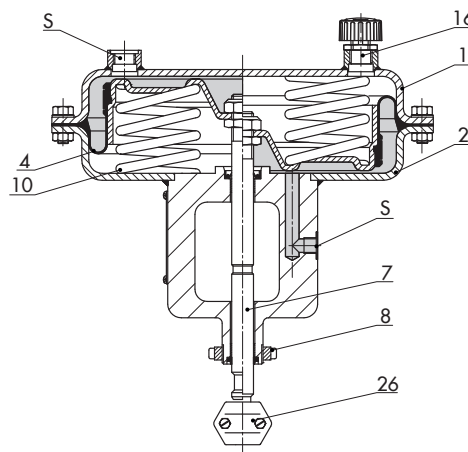


Fig. 9: Type 3277 for direct attachment of accessories (350 cm²)

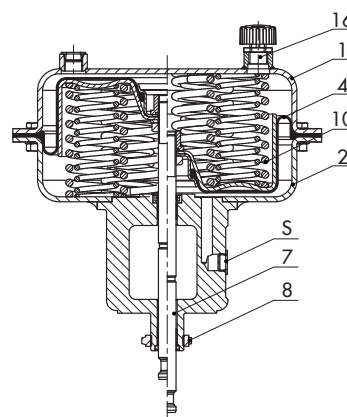


Fig. 10: Type 3277 with additional springs (355v2 cm²)

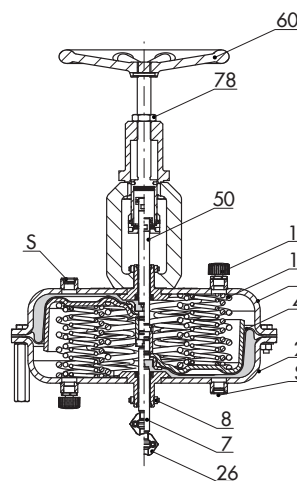


Fig. 11: Type 3271 with 750v2 cm² and additional handwheel

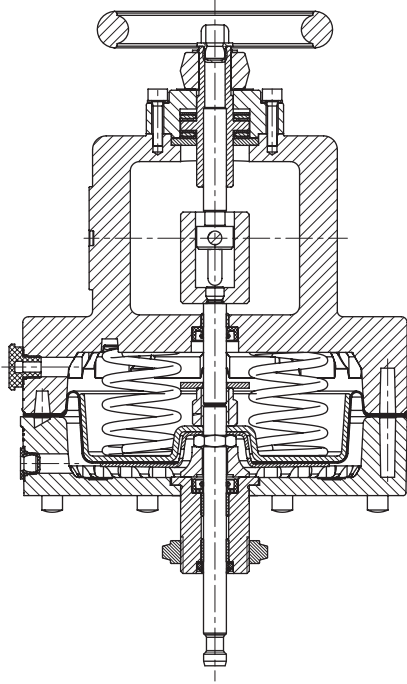


Fig. 12: Type 3271-5, "stem extends" fail-safe action, with additional handwheel

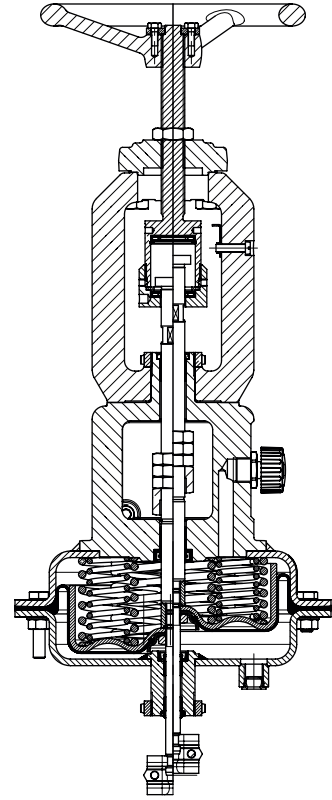


Fig. 14: Type 3271 (175v2 cm²) - Combined version with hand-wheel and travel stops on both sides

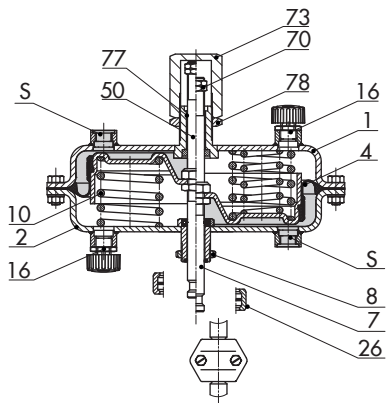


Fig. 13: Type 3271 with adjustable travel stop

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	240 · 350 · 700	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⁾	
Materials			
Actuator stem	1.4404		1.4305
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

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, 240, 350, 350v2, 355v2 cm ² 700 cm ² (only for spring upper range value ≤3.3 bar) 750v2 cm ² (only for spring upper range value ≤3.1 bar)
Material	Housing	See Table 1
	Spindle	1.4305
	Handwheel	Aluminum, powder paint coated
		Stainless steel 1.4104
		Cast iron EN-GJL-250 (EN-JL1040), powder paint coated

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	0.4 to 0.8	0	–	3	0.48	0.96	0.72	1.44	2.64	3.84	5.04	6.24
					0.8 to 1.6						–	0.48	1.68	2.88	4.08	5.28
					1.7 to 2.1 ³⁾						–	–	1.08	2.28	3.48	4.68
					2.4 to 3.0 ³⁾						–	–	–	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						–	–	1.2	2.4	3.6	4.8
				15	1.4 to 2.3 ³⁾						–	–	0.84	2.04	3.24	4.44
					2.1 to 3.3 ³⁾						–	–	–	0.84	2.04	3.24

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	
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		0.8 to 2.4	6	0.7	3.5	-	-	1.75	3.5	5.25	7	
					0.5 to 2.5		1.0 to 3.0	9	0.88	4.38	-	-	0.88	2.63	4.38	6.13	
					0.6 to 3.0		1.2 to 3.6	12	1.05	5.25	-	-	-	1.75	3.5	5.25	
					1.3 to 2.9		1.7 to 3.3	12	2.28	5.08	-	-	0.18	1.93	3.68	5.43	
240	15	0.36	0.38	17	0.2 to 1.0	12.5	0.3 to 1.1	3	0.48	2.4	0.96	2.4	4.8	7.2	9.6	12	
					0.4 to 2.0		0.6 to 2.2	6	0.96	4.8	-	-	2.4	4.8	7.2	9.6	
					0.6 to 3.0		0.9 to 3.3	12	1.44	7.2	-	-	-	2.4	4.8	7.2	
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		0.8 to 2.4	6	1.4	7	-	-	3.5	7	10.5	14	
					0.6 to 3.0		1.2 to 3.6	12	2.1	10.5	-	-	-	3.5	7	10.5	
				15	1.4 to 2.3 ³⁾		0	1.4 to 2.3	6	4.9	8.05	-	-	2.45	5.95	9.45	13
					2.1 to 3.3 ³⁾			2.1 to 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		0.8 to 2.4	6	1.4	7	-	-	3.5	7	10.5	14	
					0.5 to 2.5		1.0 to 3.0	9	1.75	8.75	-	-	1.75	5.25	8.75	12.25	
					0.6 to 3.0		1.2 to 3.6	12	2.1	10.5	-	-	-	3.5	7	10.5	
					1.4 to 2.3		1.7 to 2.6	6	4.9	8.05	-	-	2.45	5.95	9.45	12.95	
					2.0 to 3.2		2.3 to 3.5	12	7	11.2	-	-	-	2.8	6.3	9.8	
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		0.8 to 2.4	6	1.4	7.1	-	-	3.55	7.1	10.6	14.2	
					0.6 to 3.0		1.2 to 3.6	12	2.1	10.6	-	-	-	3.55	7.1	10.6	
					0.9 to 1.7		1.1 to 1.9	4	3.2	6.0	-	1.1	4.6	8.2	11.7	15.3	
					1.4 to 2.6		1.75 to 2.95	8	5.0	9.2	-	-	1.4	5.0	8.5	12.1	
					1.9 to 3.3		2.25 to 3.65	10	6.5	11.7	-	-	-	2.5	6.0	9.6	
700	30	2.1	2.4	38	0.2 to 1.0	25	0.4 to 1.2	3	1.4	7	2.8	7	14	21	28	35	
					0.4 to 2.0		0.8 to 2.4	6	2.8	14	-	-	7	14	21	28	
					0.6 to 3.0		1.2 to 3.6 ⁴⁾	12	4.2	21	-	-	-	7	14	21	
				30	1.4 to 2.3 ³⁾	0	1.4 to 2.3	8	9.8	16.1	-	-	4.9	11.9	18.9	25.9	
					2.1 to 3.3 ³⁾		2.1 to 3.3	12	14.7	23.1	-	-	-	4.9	11.9	18.9	
					2.35 to 3.8 ^{3) 4)}		2.35 to 3.8 ⁴⁾	15	16.5	26.6	-	-	-	1.4	8.4	15.4	
					2.6 to 4.3 ^{3) 4)}		2.6 to 4.3 ⁴⁾	18	18.2	30.1	-	-	-	-	4.9	11.9	

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
750v2	30	2.17	1.28	38	0.2 to 1.0	25	0.4 to 1.2	3	1.5	7.5	3.0	7.5	15	22.5	30	37.5
					0.4 to 2.0		0.8 to 2.4	6	3.0	15	-	-	7.5	15	22.5	30
					0.5 to 2.5		1.0 to 3.0	9	3.7	18.8	-	-	-	11.2	18.5	26.2
					0.6 to 3.0		1.2 to 3.6 ⁴⁾	12	4.5	22.5	-	-	-	7.5	15	22.5
					1.4 to 2.4		1.65 to 2.65	9	10.5	18	-	-	4.5	12	19.5	27
					1.9 to 3.1		2.2 to 3.4 ⁴⁾	14	14.3	23.3	-	-	-	-	-	-
					2.1 to 3.8 ^{4) 5)}		2.5 to 4.2 ^{4) 5)}	16	15.8	28.5	-	-	-	-	-	-
					2.3 to 4.2 ^{4) 5)}		2.8 to 4.7 ^{4) 5)}	17	17.3	31.5	-	-	-	-	-	-

1) Based on lower bench range value, not taking zero travel (to unseat the plug) 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

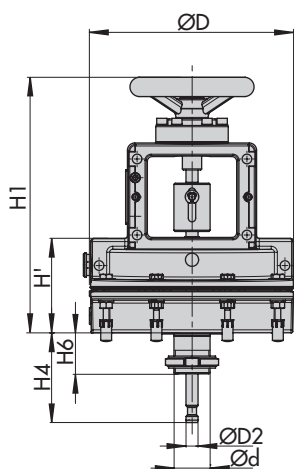


Fig. 15: Type 3271-5 with additional handwheel

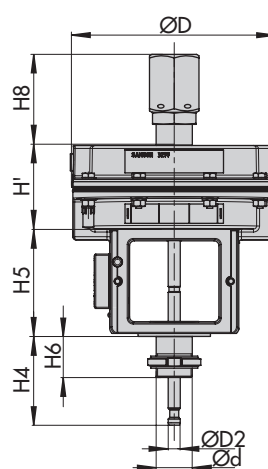


Fig. 16: Type 3277-5 with travel stop

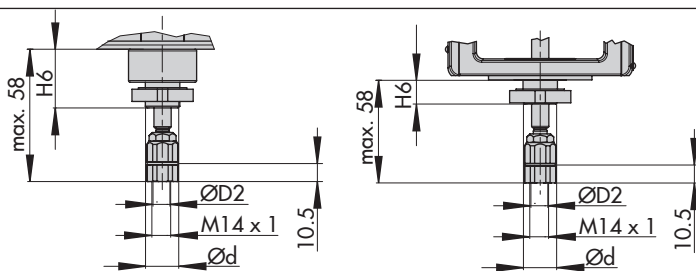


Fig. 17: Type 3271-5 and Type 3277-5 with 7.5 mm travel for Type 3510 Micro-flow Valve

Dimension diagrams (continued)

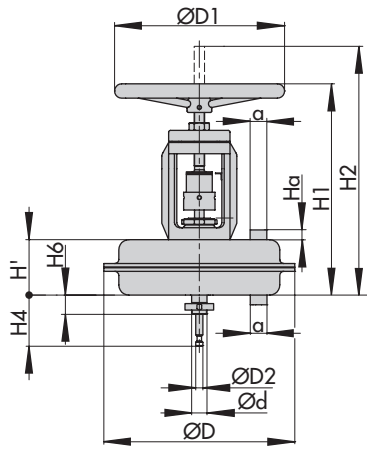


Fig. 18: Type 3271 with additional handwheel

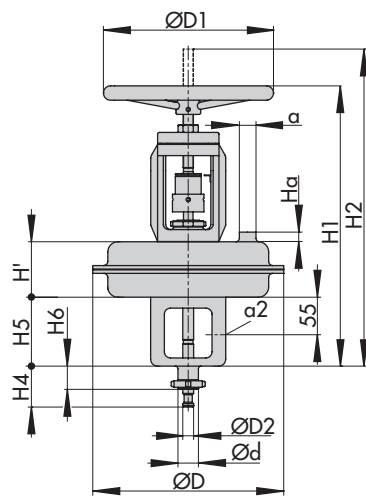


Fig. 19: Type 3277 with additional handwheel

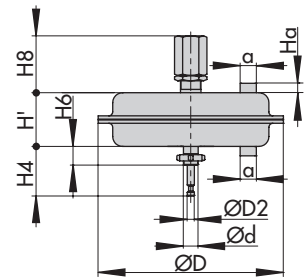


Fig. 20: Type 3271 with travel stop

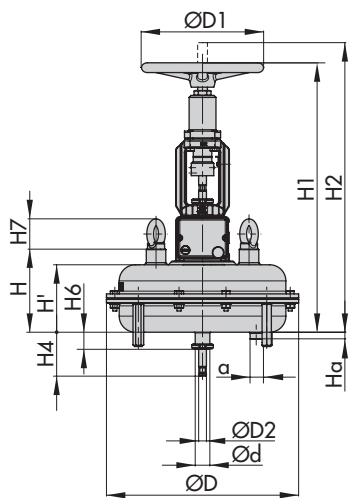


Fig. 21: Type 3271 Pneumatic Actuator with handwheel and travel stops on both sides

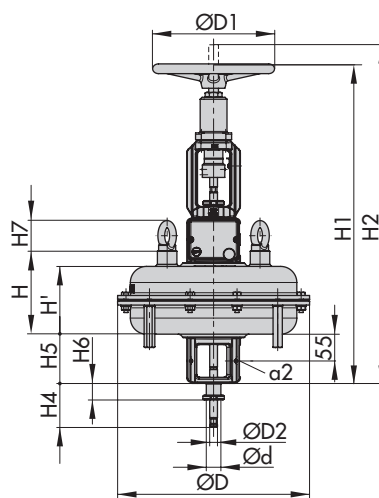


Fig. 22: Type 3277 Pneumatic Actuator with handwheel and travel stops on both sides

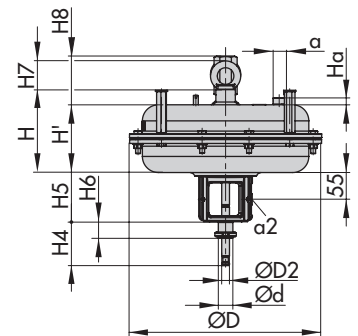


Fig. 23: Type 3277 with travel stop

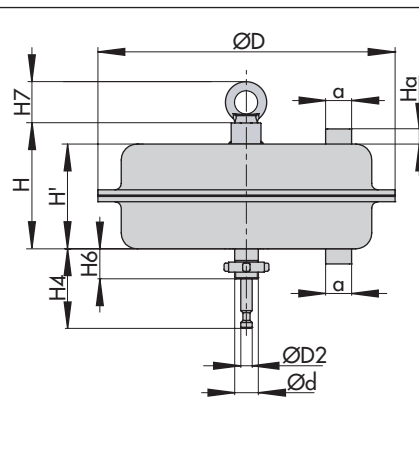


Fig. 24: Type 3271

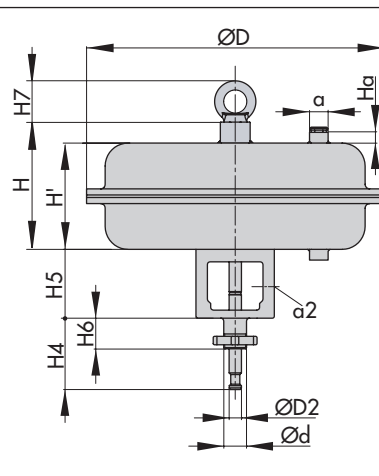


Fig. 25: Type 3277 with yoke for direct attachment of accessories

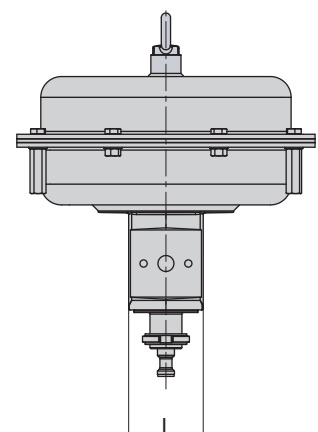


Fig. 26: Type 3277 with yoke (side view)

Table 4: Dimensions and weights

Table 4.1: Type 3271 Actuator

Version		3271-5	3271							
Actuator area cm ²		120	175v2	240	350	350v2	355v2	700	750v2	
Refer to		Fig. 15 Fig. 17	Fig. 18 · Fig. 20 · Fig. 21 · Fig. 24							
Height	H ⁴⁾	–	–	–	–	–	–	134	171	
	H'	69	78	62	82	81	121	134	139	
	H _a	–	15	15	15	15	15	15	15	
	H1	Only with handwheel	205	313	300	320	319	486	490	493
		With handwheel and travel stop	–	413	400	420	419	586	590	593
	H2 _{max}	Only with handwheel	–	358	345	365	364	526	540	543
		With handwheel and travel stop	–	458	445	465	464	626	640	643
	H4 _{rated} FA	75	75	75	75	75	90	90	90	
	H4 _{max} FA	78	78	78	78	78	93	95	93	
	H4 _{max} FE	78	78	78	85	85	96	104	98	
	H5	–	–	–	–	–	–	–	–	
	H6	34	34	34	34	34	34	34	34	
	H7 ³⁾	–	–	–	–	–	–	65	65	
Travel limitation	H8 ¹⁾	75	75	75	85	85	115	115	129	
Diameter	ØD	168	215	240	280	280	280	390	394	
	ØD1	80	180	180	250	250	250	315	315	
	ØD2	10	10	10	16	16	16	16	16	
Ød (thread)		M30x1.5 ²⁾								
Connection (α optionally)	α	G 1/8	G 1/4	G 1/4	G 3/8	G 3/8	G 3/8	G 3/8	G 3/8	
		1/8 NPT	1/4 NPT	1/4 NPT	3/8 NPT	3/8 NPT	3/8 NPT	3/8 NPT	3/8 NPT	
	α2	–	–	–	–	–	–	–	–	
Weight [kg]										
Without handwheel		2.5	6	5	8	11.5	15	22	36	
With handwheel		4	10	9	13	16.5	20	27	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.

Table 4.2: Type 3277 Actuator

Version		3277-5	3277							
Actuator area cm ²		120	175v2	240	350	350v2	355v2	700	750v2	
Refer to		Fig. 16 Fig. 17	Fig. 19 · Fig. 22 · Fig. 23 · Fig. 25 · Fig. 26							
Height	H ⁴⁾	–	–	–	–	–	–	135	171	
	H'	70	78	65	82	81	121	135	139	
	Ha	–	15	15	15	15	15	15	15	
	H1	Only with handwheel	293	413	400	420	419	576	590	595
		With handwheel and travel stop	–	513	500	520	519	676	690	695
	H2 _{max}	Only with handwheel	–	458	445	465	464	626	640	643
		With handwheel and travel stop	–	558	545	565	564	726	740	743
	H4 _{rated} FA	75	75	75	75	75	90	90	90	
	H4 _{max} FA	78	78	78	78	78	93	95	93	
	H4 _{max} FE	78	78	78	85	85	96	104	98	
	H5	88	101	101	101	101	101	101	101	
	H6	34	34	34	34	34	34	34	34	
	H7 ³⁾	–	–	–	–	–	–	65	65	
	Travel limitation	H8 ¹⁾	75	75	75	85	85	115	115	129
Yoke width (see Fig. 26)	L	70								
Diameter	ØD	168	215	240	280	280	280	390	394	
	ØD1	80	180	180	250	250	250	315	315	
	ØD2	10	16	16	16	16	16	16	16	
Ød (thread)	M30x1.5 ²⁾									
Connection (a optionally)	a	G ½	G ¼	G ¼	G ¾	G ¾	G ¾	G ¾	G ¾	
		½ NPT	¼ NPT	¼ NPT	¾ NPT	¾ NPT	¾ NPT	¾ NPT	¾ NPT	
	a2	–	G ¾	G ¾	G ¾	G ¾	G ¾	G ¾	G ¾	
Weight [kg]										
Without handwheel		3.2	10	9	12	15	19	26	40	
With handwheel		4.5	14	13	17	20	24	31	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, H' and H are identical. The value H' applies.

Throttling or on/off service

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

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

For the direction of action "actuator stem retracts (FE)", the permissible supply pressure must not exceed the upper bench range value by more than 3 bar:

Signal pressure 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

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.

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. Actuators with 700 cm² actuator area have a welded-on lifting eyelet.

List of documentation

Device type	Actuator area in cm ²	Data sheet	Mounting and operating instructions
Types 3271 and 3277 Pneumatic Actuators	120	Included in this data sheet	▶ EB 8310-1
	240 · 350 · 700		▶ EB 8310-6
	175v2 · 350v2 · 750v2		▶ EB 8310-5
	355v2		▶ EB 8310-4
Type 3271 Pneumatic Actuator	1000	▶ T 8310-2/7	▶ EB 8310-2
	1400-120 · 2800 · 2 x 2800		▶ EB 8310-7
	1400-60	▶ T 8310-3	▶ EB 8310-3
	1400-250	▶ T 8310-8	▶ EB 8310-8

Ordering text

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

Associated Information Sheet
Information Sheet for control valves
Data Sheet for actuators >750 cm²

▶ T 8300
▶ T 8000-1
▶ T 8310-2/-3