

T 8310-11/14/15/16 EN

Pneumatic actuators up to 750v2 cm² 1)

Type 3271 · Type 3277 for integral positioner attachment · Customer standard SAM001

SAM OO1

Application

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

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.

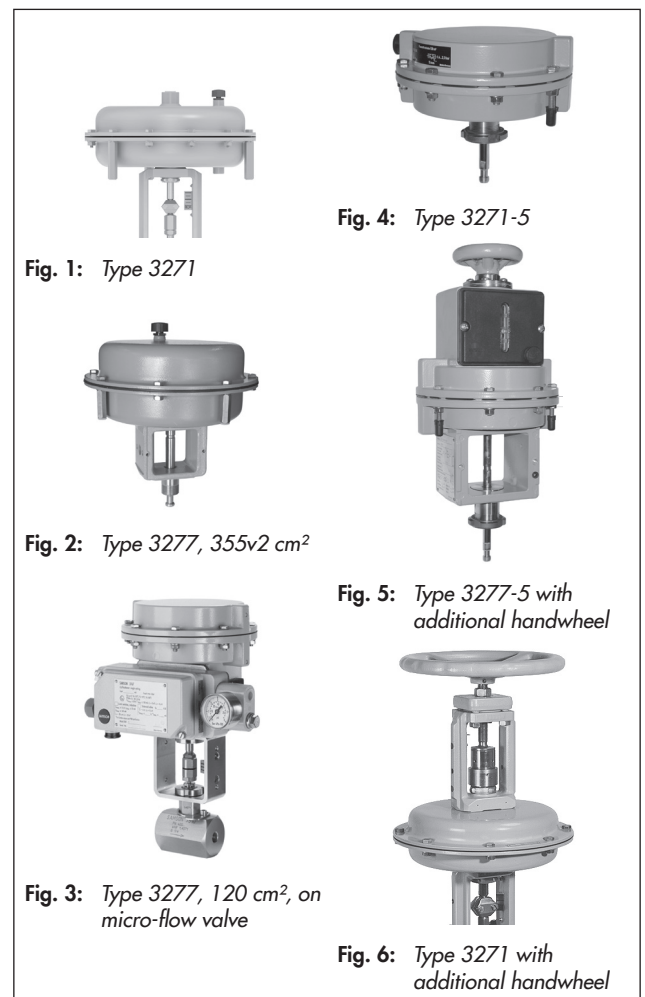
Actuator area	120 to 750v2 cm²
Rated travel	7.5 to 30 mm

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)
- **Type 3277 with clamped-in diaphragm · 350 cm² actuator area** for direct attachment of accessories
- **Type 3271 with full diaphragm · 175v2, 350v2, 355v2 or 750v2 cm² actuator areas** (Fig. 1)
- **Type 3277 with full diaphragm · 175v2, 350v2, 355v2 or 750v2 cm² actuator areas** for direct attachment of accessories (Fig. 2)
- **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 pneumatic actuators with 175v2 to 750v2 cm² actuator areas (Fig. 6)
- **Type 3271 · Travel stop** (Fig. 13), minimum and maximum travel mechanically adjustable in versions with 175v2 to 750v2 cm²



Further versions

- **Type 3273 Side-mounted Handwheel** ► T 8312
- Versions for other control media (e.g. water) available on request

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

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. 9). The diaphragm of actuators with 350 cm² actuator areas is clamped-in (see Fig. 7).

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.

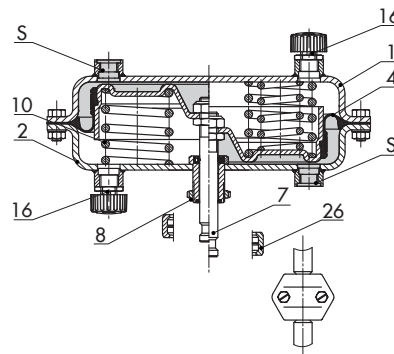


Fig. 7: Type 3271 - Right: with additional springs

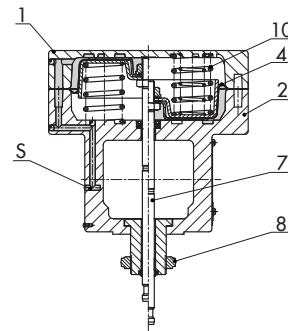


Fig. 8: Type 3277-5 for direct attachment of accessories (120 cm²)

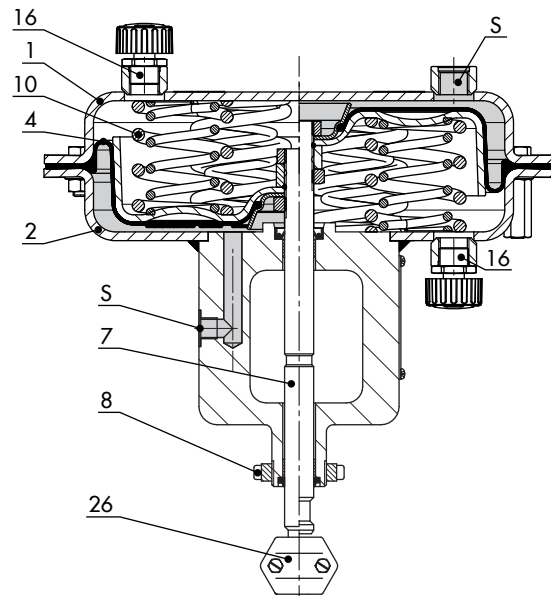


Fig. 9: Type 3277 for direct attachment of accessories (350v2 cm²)

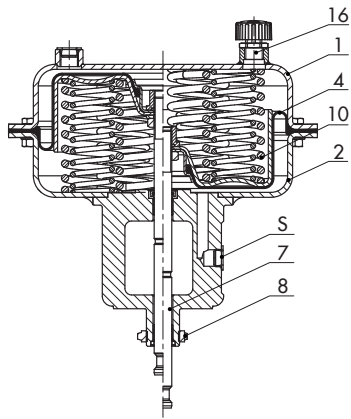


Fig. 10: Type 3277 with additional springs (355v2 cm²)

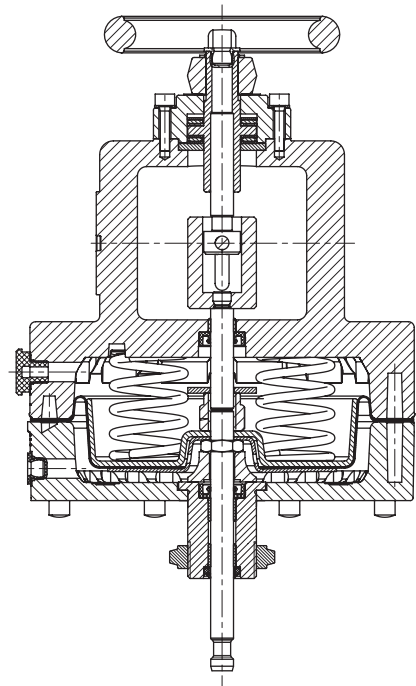


Fig. 12: Type 3271-5, "stem extends" fail-safe action, with additional handwheel

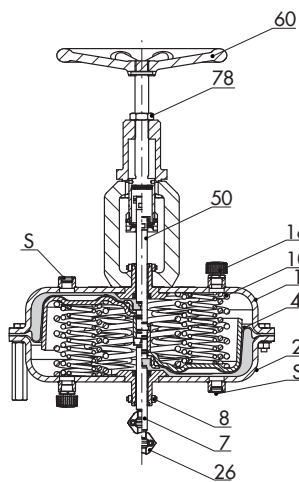


Fig. 11: Type 3271 with 750v2 cm² and additional handwheel

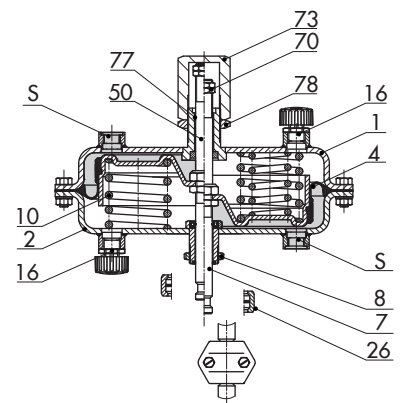


Fig. 13: Type 3271 with adjustable travel stop

Legend for Fig. 7 to Fig. 13

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) 3)}		Diaphragm material NBR: -35 to +80 °C ²⁾
Degree of protection		IP54 ⁴⁾		
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) Observe supply pressure restrictions.

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

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

4) 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 IP54 (▶ AB 07). Depending on the IP rating of the valve accessories, a maximum rating of IP66 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)
Material	Housing	See Table 1	
	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

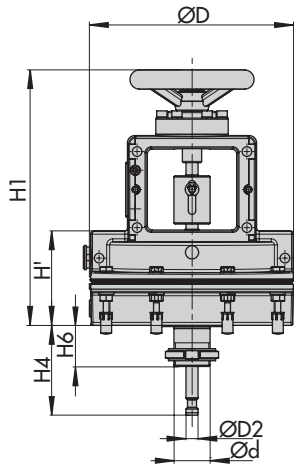


Fig. 14: Type 3271-5 with additional handwheel

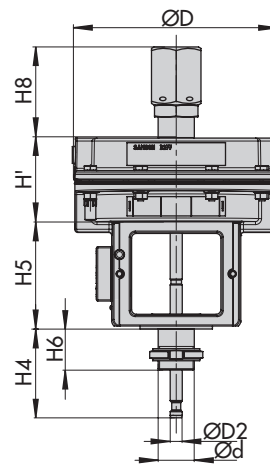


Fig. 15: Type 3277-5 with travel stop

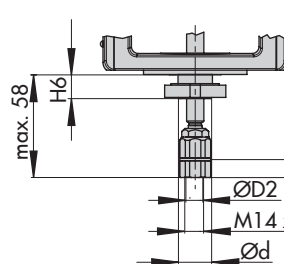
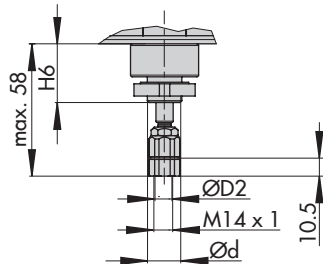


Fig. 16: Type 3271-5 and Type 3277-5 with 7.5 mm travel for Type 3510 Micro-flow Valve

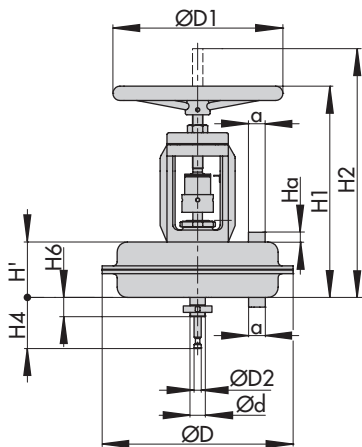


Fig. 17: Type 3271 with additional handwheel

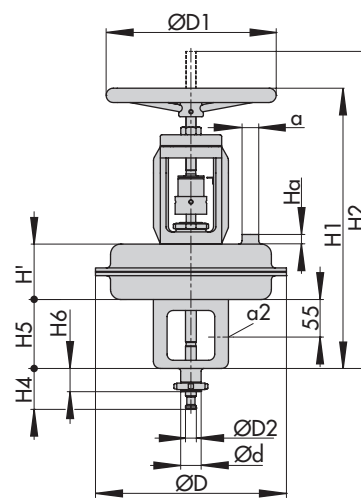


Fig. 18: Type 3277 with additional handwheel

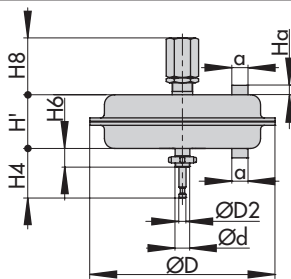


Fig. 19: Type 3271 with travel stop

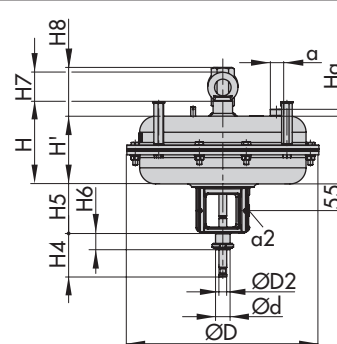


Fig. 20: Type 3277 with travel stop

Dimension diagrams (continued)

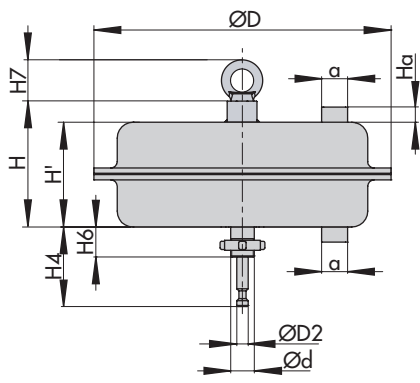


Fig. 21: Type 3271

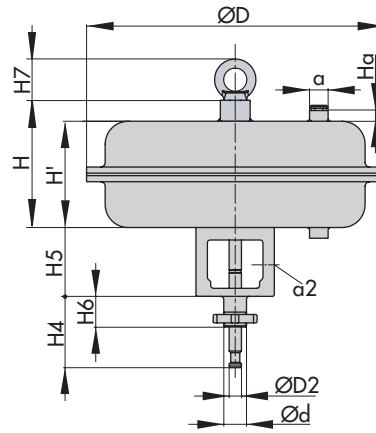


Fig. 22: Type 3277 with yoke for direct attachment of accessories

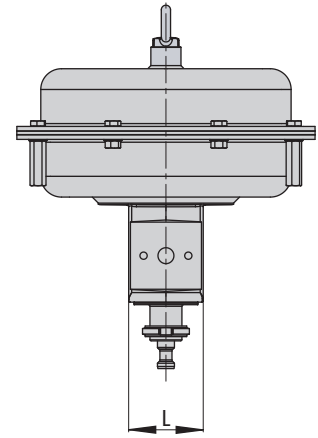


Fig. 23: Type 3277 with yoke (side view)

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. 14 Fig. 16	Fig. 17 · Fig. 19 · Fig. 21				
Height	H ⁴⁾	–	–	–	–	–	171
	H'	69	78	82	92	131	139
	H _a	–	15	15	15	15	15
	H1	205	313	320	330	486	493
	H2 _{max}	–	358	365	375	536	543
	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
Travel stop	H7 ³⁾	–	–	–	–	–	65
	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 (approx.)		2.5	6	8	11.5	15	36
With handwheel (approx.)		4	10	13	16.5	20	41

1) Travel stop on both sides (see Fig. 19)

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. 15 · Fig. 16						Fig. 18 · Fig. 20 · Fig. 22 · Fig. 23					
Height	H ⁴⁾	–	–	–	–	–	171						
	H'	70	78	82	82	121	139						
	H _a	–	15	15	15	15	15						
	H ₁	293	413	420	419	576	595						
	H _{2max}	–	458	465	464	626	643						
	H _{4rated} FA	75	75	75	75	90	90						
	H _{4max} FA	78	78	78	78	93	93						
	H _{4max} FE	78	78	85	85	96	98						
	H ₅	88	101	101	101	101	101						
	H ₆	34	34	34	34	34	34						
	H ₇ ³⁾	–	–	–	–	–	65						
Travel stop	H ₈ ¹⁾	75	75	85	85	115	129						
Yoke width (see Fig. 23)	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 (approx.)		3.2	10	12	15	19	40						
With handwheel (approx.)		4.5	14	17	20	24	45						

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.).

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	▶ T 8310-1/4/5/6	Included in this data sheet	▶ 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			–
	1400-60	▶ T 8310-3	▶ T 8310-13	▶ EB 8310-3
	1400-250	▶ T 8310-8	–	▶ EB 8310-8

¹⁾ Separate data sheets have been created for Type 3271 and Type 3277 Pneumatic Actuators that comply with 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
Standard	Customer standard SAM001
Bench range	... bar
Direction of action	Actuator stem extends (FA) Actuator stem retracts (FE)
Signal pressure connection	G .../... NPT
Rolling diaphragm	NBR (175v2, 350v2, 355v2 and 750v2 cm ² only)

Information Sheet for control valves

▶ T 8000-1