

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



## Type 3271 and Type 3277 for integral positioner attachment

### Application

Linear actuator for attachment to final control elements, particularly suitable for 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 Type 3271 and Type 3277 Pneumatic Actuators are diaphragm actuators equipped with a rolling diaphragm and internal springs.

### Special features

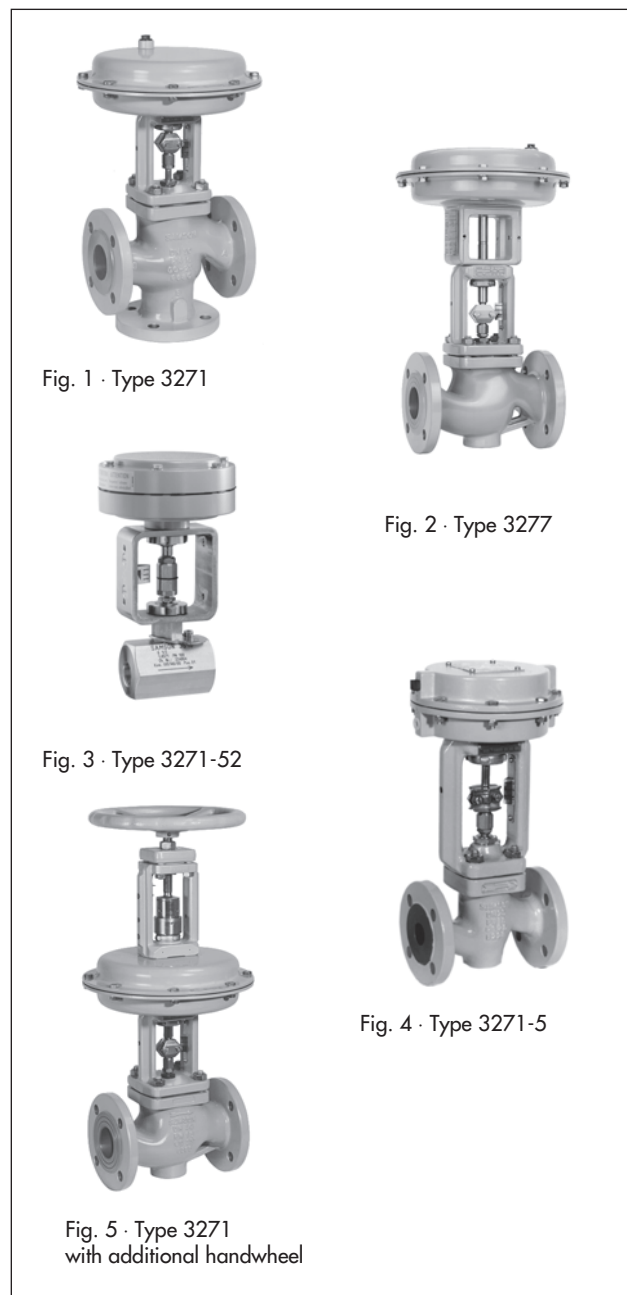
- Low overall height
- Powerful thrust at high response speed
- Low friction
- Various bench ranges by varying the number of springs and their compression
- No special tools required to change the bench range and to reverse the actuator action (also in version with handwheel)
- Designed for supply pressures up to 6 bar
- Continuous operation at temperatures from -35 to +90 °C
- Direct attachment of accessories on additional yoke for Type 3277 Actuator with concealed travel pick-off (Fig. 2)

### Versions

- **Type 3271** · Diaphragm areas 80, 240, 350, 700 cm<sup>2</sup> (Fig. 1), optional stainless steel version (1.4301)
- **Type 3277** · Diaphragm area 240, 350, or 700 cm<sup>2</sup> for direct attachment of accessories (Fig. 2), optional stainless steel version (1.4301)
- **Type 3271-52** · Diaphragm area 60 cm<sup>2</sup>, die-cast aluminum body, particularly for Type 3510 Micro-flow Valve (Fig. 3 and Data Sheet T 8091 EN)
- **Type 3271-5** · Diaphragm area 120 cm<sup>2</sup>, die-cast aluminum body (Fig. 4)
- **Type 3277-5** · Diaphragm area 120 cm<sup>2</sup>, die-cast aluminum body for direct attachment of accessories (Fig. 8)
- **Type 3271 or 3277** · **Additional handwheel** for pneumatic actuators with diaphragm areas of 240, 350, or 700 cm<sup>2</sup> (Fig. 5 and Data Sheet T 8312 EN)
- **Type 3271** · **Mechanical travel stop** (sectional drawing 10), minimum or maximum travel mechanically adjustable in version with 240, 350, or 700 cm<sup>2</sup>
- **Type 3271/7** · **Fire-Lock version** (Fig. 11) fail-safe action in case of fire, diaphragm areas of 240, 350, 700 cm<sup>2</sup>

### Further versions

- For other process media (e.g. water or oxygen) · Details available on request
- For high temperatures up to 120 °C · On request



- For low temperatures down to -40 °C · On request

### Principle of operation

The signal pressure  $p_{st}$  generates a force  $F = p_{st} \cdot A$  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 (10) of the valve.

The adjustable **mechanical travel stop** (Fig. 10) is suitable for actuators made of sheet steel with effective diaphragm areas of 240, 350, or 700 cm<sup>2</sup>. Using the limit stop, the actuator travel can be limited by up to 50 % in both directions (actuator stem "extends" or "retracts") and permanently adjusted. A special version with one-sided travel stop for actuators with an effective diaphragm area of 120 cm<sup>2</sup> is available.

### 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.

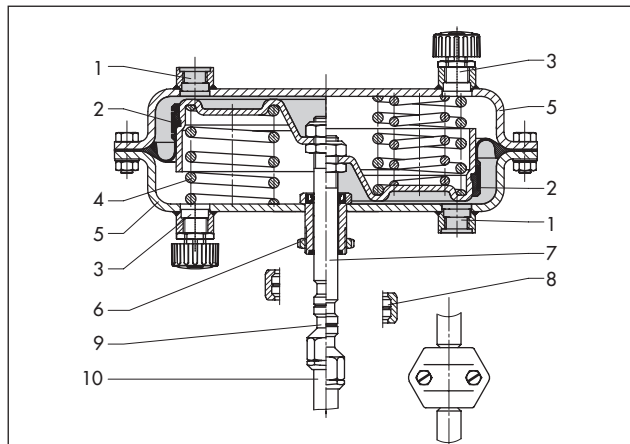


Fig. 6 · Type 3271 (right: with additional springs)

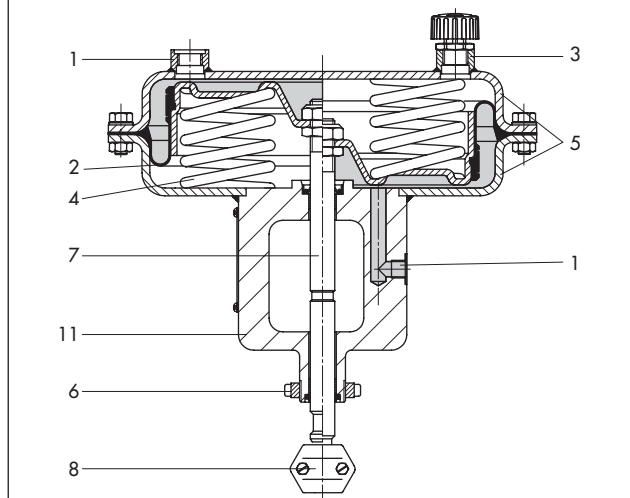


Fig. 7 · Type 3277

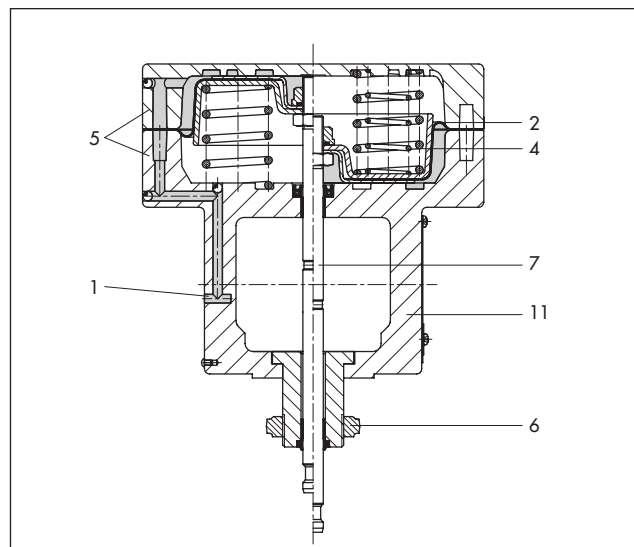


Fig. 8 · Type 3277-5

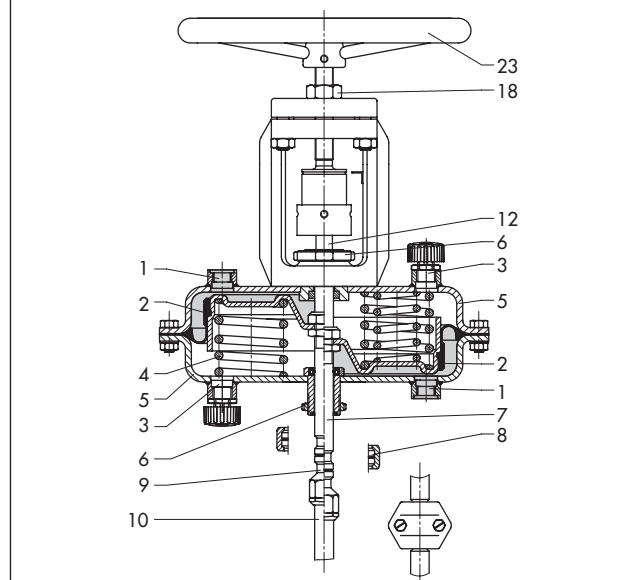


Fig. 9 · Type 3271 with handwheel

### Legend

|                              |                               |
|------------------------------|-------------------------------|
| 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                  |
| 9 Coupling nut               |                               |
| 10 Plug stem                 |                               |

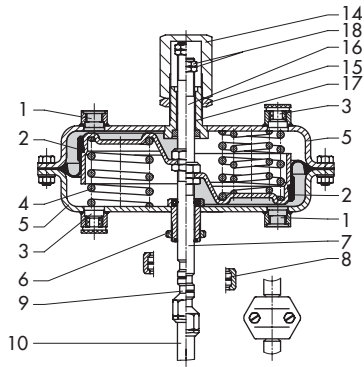


Fig. 10 · Type 3271 with adjustable travel stop

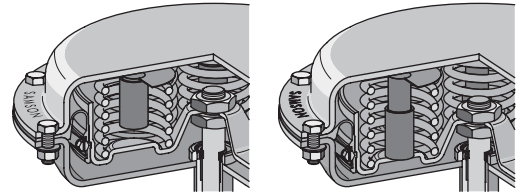


Fig. 11 · Fire-Lock version, in fail-safe position (right)

Table 1a · Technical data for Type 3271 Pneumatic Actuator

| Version   | Type 3271  | Type 3271<br>Stainless steel       | Type 3277                                | Type 3277<br>Stainless steel | Type 3271-52<br>for micro valve             | Type 3271-5<br>Type 3277-5 |
|---|--|------------------------------------|--|------------------------------|---|----------------------------|
| Diaphragm area                                      | cm <sup>2</sup>  | 80 · 240 · 350 · 700 <sup>1)</sup> | 240 · 350 · 700 <sup>1)</sup>            |                              | 60  | 120                        |
| Max. supply pressure                                | 6 bar · See restrictions in on/off service on page 6   |                                    |  |                              |   |                            |
| Permissible temperatures<br>in continuous operation | -35 to 90 °C made of standard material NBR   |                                    |  |                              | -35 to 80 °C                                | -35 to 90 °C               |
|   | -40 to 120 °C 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 insert  |                                    |  |                              | NBR with fabric insert                      |                            |
|   | EPDM with fabric insert  |                                    |  |                              |   |                            |
| Actuator stem                                       | 1.4305   |                                    |  |                              | 1.4305/1.4571                               | 1.4305                     |
| Actuator stem sealing                               | NBR  |                                    |  |                              | NBR   | NBR                        |
|   | EPDM   |                                    |  |                              |   |                            |
| Diaphragm cases                                     | Sheet steel,<br>powder-varnish<br>coated   | Stainless steel<br>1.4301          | Sheet steel,<br>powder-varnish<br>coated | Stainless steel<br>1.4301    | Die-cast aluminum,<br>powder-varnish coated |                            |

1) Only for initial spring value ≤ 2.1 bar

Table 1b · Technical data for additional handwheel

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

**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]<br>(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               | 0.09   | 0.1                            | 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                           | 16<br>(17)                        | 12.5   | 0.2...1.0                                    | 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<br>(17)                        |  | 0  | 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                                | 25   | 0.2...1.0                                    | 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   |      |      |
|   |                   |  |                                |                                   |  | 0.6...3.0                                    | 12  | 2.1               | 10.5   | -                                 | 3.5  | 7    | 10.5 |      |      |      |
|   |                   |  |                                | 15                                | 0  | 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   |                                   |  |      |      |      |      |      |
| 700   | 30                | 2.1  | 2.4                            | 38                                | 25   | 0.2...1.0                                    | 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                                | 0  | 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

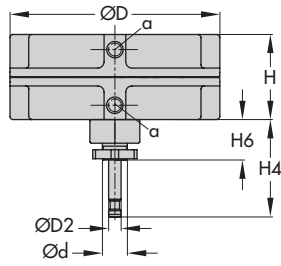


Fig. 12 · Type 3271-5

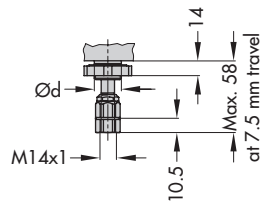


Fig. 12a · Types 3271-5/3277-5 with 7.5 mm travel for Type 3510 Micro Valve

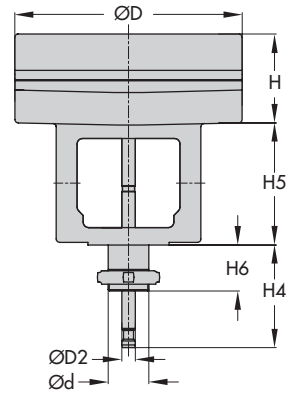


Fig. 13 · Type 3277-5

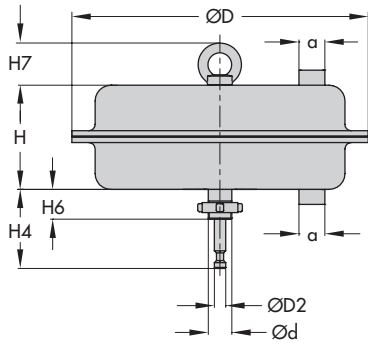


Fig. 14 · Type 3271 (700 cm<sup>2</sup> version with lifting ring)

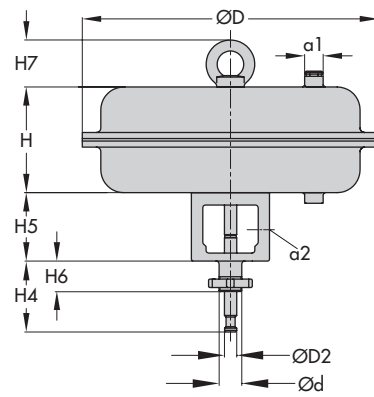


Fig. 15 · Type 3277 (700 cm<sup>2</sup> version with lifting ring)

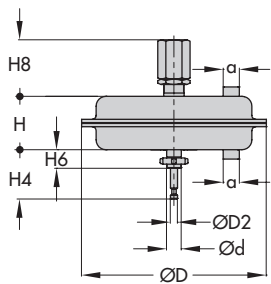


Fig. 16 · Type 3271 with adjustable travel stop

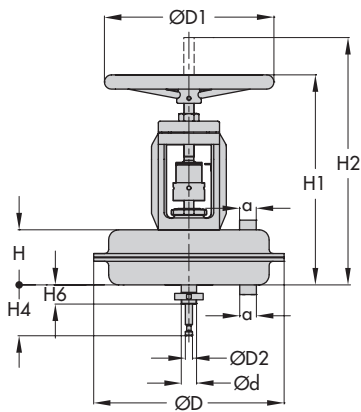


Fig. 17 · Type 3271 with additional handwheel

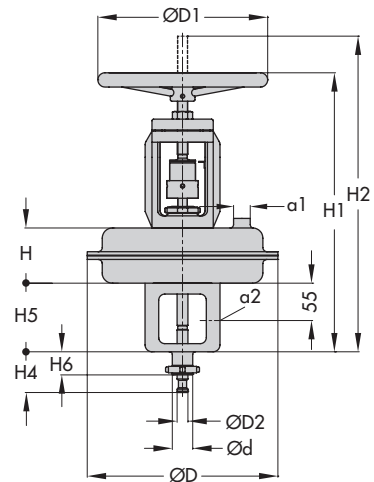


Fig. 18 · Type 3277 with additional handwheel

**Table 3 · Dimensions and weights**

| Actuator          | Type                   | 3271    |       |         | 3271    |         |     | 3277  | 3277  |       |     |
|-------------------|------------------------|---------|-------|---------|---------|---------|-----|-------|-------|-------|-----|
|                   |                        | -52     |       | -5      |         |         |     | -5    |       |       |     |
| Diaphragm area    | cm <sup>2</sup>        | 60      | 80    | 120     | 240     | 350     | 700 | 120   | 240   | 350   | 700 |
| Height            | H                      | 63      | 62    | 69      | 62      | 82      | 134 | 70    | 65    | 85    | 135 |
|                   | H1                     | -       |       |         | 300     | 320     | 490 | -     | 400   | 420   | 590 |
|                   | H2 <sub>max</sub>      | -       |       | 208     | 345     | 365     | 540 | -     | 445   | 465   | 640 |
|                   | H4 <sub>rated</sub> FA | 51      | 75    | 75      | 75      | 75      | 90  | 78    | 75    | 75    | 90  |
|                   | H4 <sub>max</sub> FA   | 52.5    | 78    | 78      | 78      | 78      | 95  | 78    | 78    | 78    | 90  |
|                   | H4 <sub>max</sub> FE   | 52.5    | 78    | 78      | 78      | 85      | 104 | 78    | 78    | 85    | 104 |
|                   | H5                     | -       |       |         |         |         |     | 84    | 101   | 101   | 101 |
|                   | H6                     | 23.8    | 34    | 34      | 34      | 34      | 34  | 14    | 34    |       |     |
|                   | H7                     | -       |       |         |         |         |     | 62    | -     |       | 65  |
| Diameter          | ∅ D                    | 120     | 150   | 168     | 240     | 280     | 390 | 168   | 240   | 280   | 390 |
|                   | ∅ D1                   | -       | -     | 80      | 180     | 250     | 250 | -     | 180   | 250   | 250 |
|                   | ∅ D2                   | 10      | 10    | 10      | 10      | 16      | 16  | 10    | 16    |       |     |
| ∅ d (thread)      | 20                     | 30      |       |         |         |         | 20  | 30    |       |       |     |
| a (optional)      |                        | G 1/8   | G 1/4 | G 1/8   | G 1/4   | G 3/8   |     | G 1/8 | G 1/4 | G 3/8 |     |
|                   |                        | 1/4 NPT |       | 1/8 NPT | 1/4 NPT | 3/8 NPT |     |       |       |       |     |
|                   | a2                     | -       |       |         |         |         | -   | G 3/8 |       |       |     |
| Weight in kg      |                        |         |       |         |         |         |     |       |       |       |     |
| Without handwheel |                        | 1.3     | 2     | 2       | 5       | 8       | 22  | 3.2   | 9     | 12    | 26  |
| With handwheel    |                        | -       |       | 4       | 9       | 13      | 27  | -     | 13    | 17    | 31  |

### 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 reduced.

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.

Actuators to be used with reduced supply pressures are labeled accordingly.

### 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.

### Ordering text

Actuator

Optionally

Diaphragm area

Travel

Bench range

Fail-safe action

Signal pressure connection

Rolling diaphragm

Type 3271 or  
Type 3277 for direct attachment  
of accessories

Handwheel  
Travel stop  
Fire-Lock version

... cm<sup>2</sup>

... mm

... bar

Actuator stem extends (FA) or  
Actuator stem retracts (FE)

G ... / ... NPT

NBR/EPDM

Specifications subject to change without notice.

