# Types 3267/5824, 3267/5825, 3267/3374, 3267/3274 Electric Control Valves with Jet Pump

# Types 3267-1, 3267-7 Pneumatic Control Valve with Jet Pump

# Flanged version of Type 3267 Valve with Jet Pump

**Application**

Control circuits in plant engineering and in HVAC systems, especially for district heating networks

**Nominal size** DN 15 to 80
**Nominal pressure** PN 16 and 25
**Temperatures** –10 to +220 °C

In temperature control circuits, the Type 3267 Valves with Jet Pump assume both the function of a valve and that of a circulation pump. They can be optionally combined with electric, electrohydraulic and pneumatic actuators.

**Type 3267 Valve** · Nominal inlet sizes DN 15 to 80 with a mixing nozzle and diffuser with nominal outlet sizes DN 20 to 100. The nominal outlet size of flanged version of Type 3267 Valve with Jet Pump is always one size larger than the inlet size.

The flanged version of Type 3267 Valve with Jet Pump is available with two different characteristics (Characteristic 1 and Characteristic 2). Refer to Table 9 on page 8.

**Versions**

| | | |
|---|---|---|
| **Electric control valves with jet pump** | | |
| Type 3267/5824 | PN 16/25 | DN 15 to 80 [2] |
| Type 3267/5825 [1] · Fig. 2 | PN 16/25 | DN 15 to 80 [2] |
| Type 3267/3374 [1] | PN 16/25 | DN 15 to 80 [2] |
| Type 3267/3274 [1] · Fig. 1 | PN 16/25 | DN 65 to 80 [2] |
| | | |
| **Pneumatic control valves with jet pump** | | |
| Type 3267-1 (Type 3271 Actuator) | PN 16/25 | DN 15 to 80 [2] |
| Type 3267-7 (Type 3277 Actuator) | PN 16/25 | DN 15 to 80 [2] |

[1] With fail-safe action tested according to DIN EN 14597
[2] Nominal inlet size

Control valves with handwheel can be used as jet pumps with handwheel when equipped with a Type 3273 Hand-operated Actuator (see ▶ T 8312 EN).

**Also available:**

Electric and pneumatic valves with jet pump in version with screwed ends, see ▶ T 5895 EN.

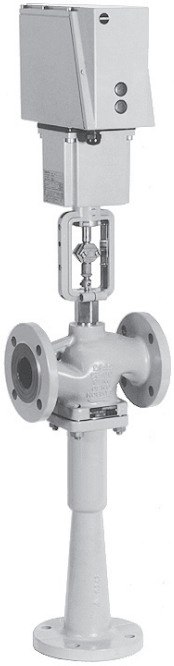


**Fig. 1:** *Type 3267/3274*

**Fig. 2:** *Type 3267/5824*

**Principle of operation**

Fig. 3 schematically illustrates a SAMSON valve with jet pump. It consists of a valve body (1) with jet nozzle (2) and plug (3), mixing nozzle (1.1) and diffuser (1.2). The variable cross-sectional area between the valve plug and jet nozzle determines the jet stream $Q_1$.

The jet stream $Q_1$ is accelerated in the jet nozzle and flows to the mixing nozzle at high speed. The exiting jet draws the partial flow $Q_2$ with it. In the mixing nozzle, the two flows are mixed together. During the mixing process, the jet stream releases a portion of its kinetic energy to the intake flow. This exchange of energy causes an increase in pressure and, at the same time, a decrease in jet stream velocity. In the downstream diffuser, the velocity is further reduced, and the pressure increases to the output value $p_3$.

The turbulence in both the mixing chamber and the mixing nozzle does not only cause the exchange of energy described above, but also causes an exceptionally thorough mixing of the supplied process media. This improved mixing effect guarantees a homogenous condition of the output flow directly downstream of the diffuser.

Types 5824/5825 Electric Actuators can be mounted onto the **flanged version of the Type 3267 Valve** (Fig. 3.1). In these configurations, the maximum permissible medium temperature is 130 °C. This temperature can be increased to 220 °C by using an additional yoke (Fig. 3.2). The valves with yoke as shown in Fig. 3.3 are also approved for a maximum medium temperature of 220 °C. These valves can be combined with Type 3374 Electric Actuator, Type 3274 Electrohydraulic Actuator or Type 3271 Pneumatic Actuator.

The Type 5824 and Type 5825 Electric Actuators are designed to operate at a maximum ambient temperature of +50 °C; Type 3274 Electrohydraulic Actuator as well as the Type 3374 Electric Actuator for +60 °C. It is important to make sure these temperature values are not exceeded during operation.

All electric actuators can be controlled by three-point stepping signals or, with installation of a positioner, signals from 0/4 to 20 mA or 0/2 to 10 V. Various electrical accessories can be optionally installed.

| **Refer to the data sheets of the actuators for details** | |
|---|---|
| Type 5824 | → Data Sheet ▶ T 5824 EN |
| Type 5825 | → Data Sheet ▶ T 5824 EN |
| Type 3374 | → Data Sheet ▶ T 8331 EN |
| Type 3274 | → Data Sheet ▶ T 8340 EN |
| Type 3271 | → Data Sheet ▶ T 8310-1 EN |
| Type 3277 | → Data Sheet ▶ T 8310-1 EN |
| Type 3273 | → Data Sheet ▶ T 8312 EN |

**Mounting position**

The Type 3267 Valve with Jet Pump must be installed with the diffuser in the horizontal position.

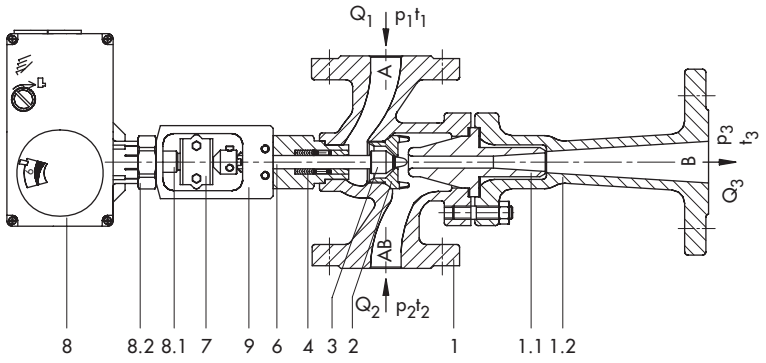



**Fig. 3.1:** *Type 3267/5824*

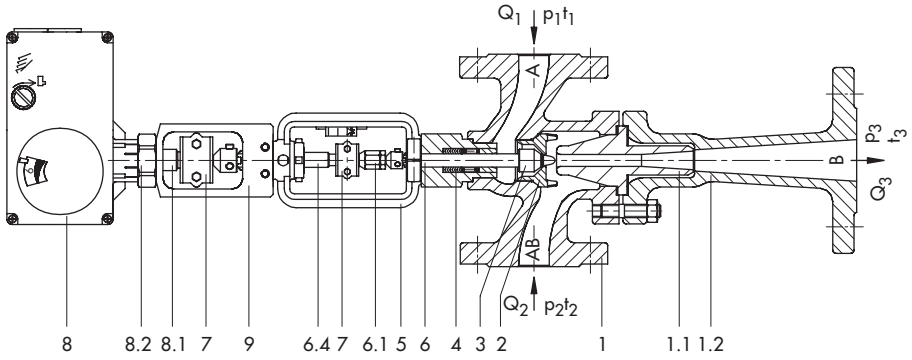



**Fig. 3.2:** *Type 3267/5824 for temperatures up to 220 °C*

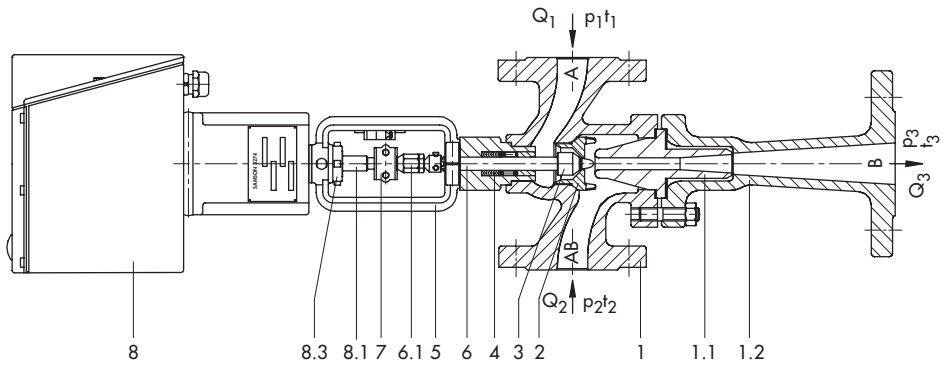



**Fig. 3.3:** *Type 3267/3274*

1 Valve body
1.1 Mixing nozzle
1.2 Diffuser
2 Jet nozzle
3 Plug
4 Plug stem sealing
5 Yoke
6 Plug stem
6.1 Stem connector nut and lock nut
6.4 Adapter rod
7 Stem connector between actuator stem and plug stem (also travel indicator)
8 Actuator
8.1 Actuator stem
8.2 Coupling nut
8.3 Ring nut
9 Adapter

**Fig. 3:** *Control valve with jet pump*

**Application**

Fig. 4 illustrates the simplified functional diagram of a plant equipped with a control valve with jet pump. The network supply flow ($Q_1$) forms the jet stream of the jet pump by drawing the water in from the plant return flow ($Q_2$). The mixing ratio of the flow rates $Q_1$ and $Q_2$ as well as the associated temperatures $t_1$ and $t_2$ determine the temperature $t_3$ supplied to the consumer. In this arrangement, the output flow ($Q_3$) decreases with decreasing heat demand and increases with increasing load.

Fig. 5 illustrates the simplified functional diagram of a plant utilizing an electric circulation pump and a control valve with three-way valve. In this assembly, the output flow $Q_3$ remains constant over the entire load range.

Advantages on the using control valves with jet pumps:

- Low investment, planning, assembly and start-up costs because the circulator pumps with the shut-off valves are not required and there is no expense for the associated switching gear; expense of wiring and switch cabinet is also eliminated.
- High operational reliability and minimum maintenance costs since jet pumps are self-operated (depending on equipment).
- Considerable savings in energy since there are no costs for powering the circulation pump. Moreover, the water circulation in the network is lower since the output flow of the jet pump decreases with decreasing heat demand.
- Improved system controllability and significant noise level reduction because there is no circulation pump, and the output flow decreases with reduced load. Thus, improved operating characteristic of downstream valves, e.g. no whistling of radiator valves.

**Required pressure gauges and thermometers**

For plants employing jet pumps, the pressure gauges and thermometers as illustrated in Fig. 6 are required for adjusting and readjusting the system. The pressure gauge/thermometer or equivalent test connections are to be arranged to keep the distance to the connections of the valves (A, B and AB) as small as possible. The pressure gauges for pressures $p_1$, $p_2$ and $p_3$ are used to determine the differential pressures $\Delta p_H = p_1 - p_2$ and $\Delta p_h = p_3 - p_2$.

The throttle valve (4) serves to adapt pressure and temperature conditions.

**Design notes**

Similar to the consumer flow temperature $t_3$, the output flow $Q_3$ of jet pump systems is load-dependent, in comparison to heating systems with circulation pumps. To achieve an equal supply and optimum control of flow temperature, the following points must be observed:

– Balance all consumers (radiators)
– Make sure that the radiator is not installed at a lower point of installation than the jet pump
– Limit the horizontal expansion of the plant
– Lead back the return flow of the heating circuit directly to the jet pump first, before mixing it with other heating circuits

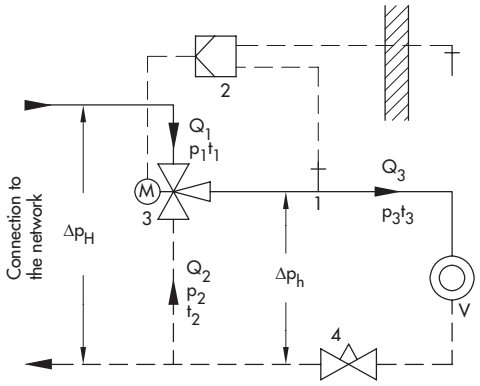



**Fig. 4:** *Simplified functional diagram with a consumer circuit with jet pump*

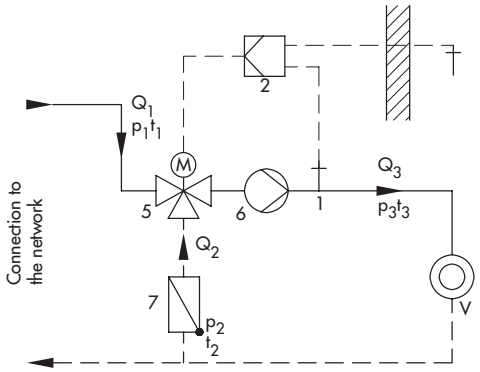



**Fig. 5:** *Simplified functional diagram with a consumer circuit with circulation pump and three-way valve*

**Legend for Fig. 4 and Fig. 5**

| | | | |
|---|---|---|---|
| 1 | Temperature sensor | 6 | Circulator pump |
| 2 | Controller | 7 | Swing check valve |
| 3 | Control valve with jet pump | $Q_1$ | Jet flow (network supply) |
| 4 | Balancing valve | $Q_2$ | Intake flow (plant return flow) |
| 5 | Control valve with three-way valve | $Q_3$ | Output flow |
| | | V | Consumer |

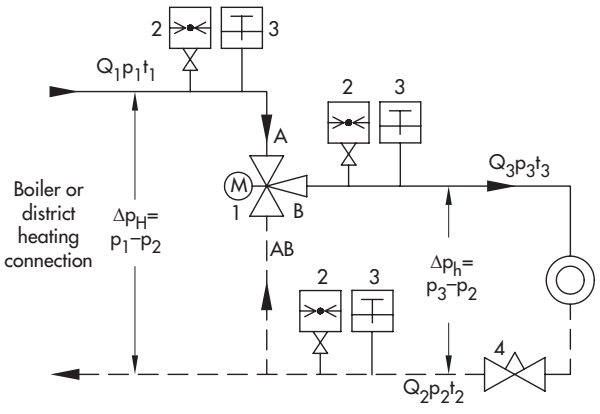



**Fig. 6:** *Required pressure gauges and thermometers for a control valve with jet pump*

**Legend for Fig. 6**

| | | | |
|---|---|---|---|
| 1 | Control valve with jet pump | 3 | Thermometer |
| 2 | Pressure gauge | 4 | Throttle valve |

**Jet pump sizing**

SAMSON will be responsible for jet pump sizing. For this purpose, please submit the following information:

| | |
|---|---|
| Thermal output [1] | $Q_w$ in kW |
| Network supply [1] | $p_1$ in bar/$t_1$ in °C |
| Plant return flow [1] | $p_2$ in bar/$t_2$ in °C |
| Plant supply [1] | $p_3$ in bar/$t_3$ in °C |
| Nominal pressure | PN ... |
| Body material | according to Table 9 on page 8 |

[1] Specify minimum and maximum summertime/wintertime values, a questionnaire available on request

**Electric actuator:** Type …, ... V, ... Hz

Without/with fail-safe action

Additional electrical equipment, such as limit switch, resistance transmitter, positioner (see data sheets of actuators)

**Pneumatic actuator:** Type ...

Without/with handwheel

Actuator stem extends/retracts

Max. supply pressure ... bar

Attachment of pneumatic/electropneumatic positioner and/or an electric or pneumatic limit switch module, solenoid valve

Type 3273 Hand-operated Actuator

**Table 1:** *Technical data · Type 3267 Valve with Jet Pump*

| **Nominal size** [1] | **15** | **20** | **25** | **32** | **40** | **50** | **65** | **80** |
|---|---|---|---|---|---|---|---|---|
| **Connection size** | – | | | | | | | |
| Nominal pressure | PN 16 (type of connection depending on material acc. to DIN EN 1092-1/-2) [2]<br>PN 25 (type of connection acc. to DIN EN 1092-1) | | | | | | | |
| Rated travel | 7.5 mm | | | | | | 15 mm | |
| Permissible temperatures | –10 to 220 °C [3] | | | | | | | |
| Seat/plug seal | Metal seal | | | | | | | |
| Characteristic | Linear | | | | | | | |
| Leakage rate according to IEC 60534-4 | Class III (≤ 0.01 % of $K_{VS}$ coefficient) | | | | | | | |

[1] The nominal inlet sizes are listed. The nominal outlet size is always one size larger than the nominal inlet size.
[2] Type of connection according to DIN EN 1092-1 with material 1.0619
Type of connection according to DIN EN 1092-2 with materials EN-JL1040 and EN-JS1049
[3] **Type 3267/5824 and Type 3267/5825:** Use an additional yoke for medium temperatures from 130 to 220 °C.

**Table 2:** *Materials · Type 3267 Valve with Jet Pump*

| **Nominal size** [1] | **15** | **20** | **25** | **32** | **40** | **50** | **65** | **80** |
|---|---|---|---|---|---|---|---|---|
| Body | EN-JL1040 · EN-JS1049 · 1.0619 | | | | | | | |
| Diffuser | EN-JS1049 | | | | | | | |
| Mixing nozzle | CW602N | | | CW617N | | | EN-JS1049 | |
| Jet nozzle | 1.4006 | | | | | | | |
| Plug and plug stem | 1.4404 | | | | | | | |
| Guide bushing (packing chamber) | CW617N | | | | | | | |
| Packing/stem sealing | V-ring packing: PTFE with carbon · Spring: 1.4310 | | | | | | | |
| Body gasket | Graphite on metal core | | | | | | | |

[1] The nominal inlet sizes are listed. The nominal outlet size is always one size larger than the nominal inlet size.

**Table 3:** *Possible combinations of Type 3267 Valve with Jet Pump/actuator*

| Actuator | Type | Refer to Data Sheet | Nominal size [1] | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 15 | 20 | 25 | 32 | 40 | 50 | 65 | 80 |
| Electric actuators | 5824-30 | ▶ T 5824 EN | • | • | • | • | • | • | • | • |
| | 5825-30 | | • | • | • | • | • | • | • | • |
| | 3374-15 | ▶ T 8331 EN | • | • | • | • | • | • | • | • |
| | 3374-26 | | • | • | • | • | • | • | • | • |
| Electrohydraulic actuators | 3274-11 | ▶ T 8340 EN | – | – | – | – | – | – | • | • |
| | 3274-21 | | – | – | – | – | – | – | • | • |
| Pneumatic actuators | 3271 | ▶ T 8310-1 EN | • | • | • | • | • | • | • | • |
| | 3277 | | • | • | • | • | • | • | • | • |
| Handwheel | 3273 | ▶ T 8312 EN | • | • | • | • | • | • | • | • |

[1] The nominal inlet sizes are listed. The nominal outlet size is always one size larger than the nominal inlet size.

**Table 4:** *Permissible differential pressures · All pressures stated in bar (gauge)*

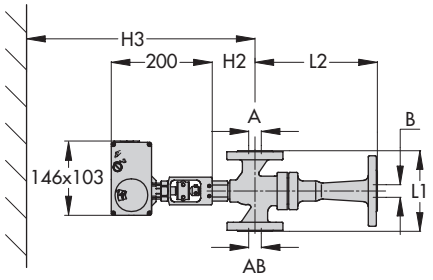
The permissible differential pressures stated are nominal values. They are limited by the pressure-temperature diagram and the pressure ratings. In the closed position, the leakage rate indicated in Table 1 is not exceeded.
Pneumatic control valves can only be used without a positioner in the 0.2 to 1.0 bar signal pressure range. For all other cases, a positioner is required.

| | Electric actuators | | | | | | Pneumatic actuators | | |
|---|---|---|---|---|---|---|---|---|---|
| Type | 5824-30 | 5825-30 | 3374-15 | 3374-26 | 3274-11<br>3274-21 | | 3271/3277 | | |
| Positioning force | 0.7 kN | 0.28 kN | 2.5 kN | 0.5 kN | 1.8 kN | Signal pressure | | 0.2 to 1 bar | 0.4 to 2 bar |
| $K_{VS}$ coefficients | $\Delta p_H$ [bar] | | | | | | Actuator [$cm^2$] | $\Delta p_H$ [bar] | |
| 0.25 to 0.4 | 25 | 25 | 25 | 25 | – | | 80 | 14 | – |
| | | | | | | | 240 | 25 | – |
| 0.5 to 0.8 | 25 | 25 | 25 | 25 | – | | 80 | 14 | – |
| | | | | | | | 240 | 25 | – |
| 1.0 to 1.6 | 25 | 25 | 25 | 25 | – | | 80 | 14 | – |
| | | | | | | | 240 | 25 | – |
| 2.0 to 3.2 | 25 | 16.5 | 25 | 25 | – | | 80 | 14 | – |
| | | | | | | | 240 | 25 | 25 |
| 4.0 to 5.0 | 25 | 10 | 25 | 25 | – | | 80 | 10 | – |
| | | | | | | | 240 | 25 | 25 |
| 6.3 and 8.0 | 23 | 5 | 25 | 15 | – | | 80 | 5.4 | – |
| | | | | | | | 240 | 13 | 25 |
| 10 and 12.5 | 14 | 2.5 | 25 | 8.5 | – | | 80 | 3.1 | – |
| | | | | | | | 240 | 6.7 | 19 |
| 16 and 20 | 8 | 1.0 | 25 | 4.5 | – | | 80 | 1.9 | – |
| | | | | | | | 240 | 3.5 | 11 |
| 25 and 32 | 4 | – | 23 | 2.0 | 15.5 | | 240 | 3.9 | 8.2 |
| | | | | | | | 350 | 5.8 | 12.1 |
| 40 and 50 | 2.5 | – | 15 | 1.0 | 10.0 | | 240 | 2.6 | 5.7 |
| | | | | | | | 350 | 3.9 | 8.1 |

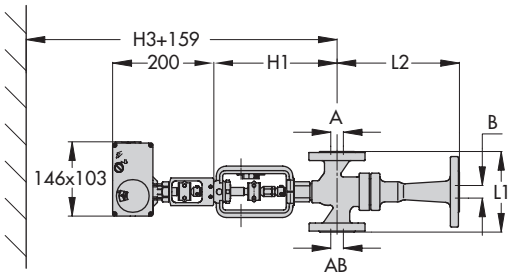
**Table 5:** *Dimensions and weights · Type 3267 Valve with Jet Pump*

| **Nominal size A, AB** | | **DN** | **15** | **20** | **25** | **32** | **40** | **50** | **65** | **80** |
|---|---|---|---|---|---|---|---|---|---|---|
| **Connection size B** | | **DN** | **20** | **25** | **32** | **40** | **50** | **65** | **80** | **100** |
| Overall length L1 | | mm | 130 | 150 | 160 | 180 | 200 | 230 | 290 | 310 |
| Length L2 | | mm | 155 | 190 | 245 | 300 | 375 | 480 | 590 | 735 |
| Height H1 | | mm | 240 | | | 265 | | | 290 | |
| Height H2 | | mm | 85 | | | 110 | | | 135 | |
| Height H3 (minimum height) | Type 5824/5825 | mm | 400 | | | 430 | | | 610 | |
| | Type 5824/5825 with yoke | mm | 560 | | | 585 | | | 769 | |
| | Type 3374 | mm | 700 | | | 725 | | | 750 | |
| | Type 3274 [1] | mm | – | | | – | | | 760 | |
| | Type 3271/3277 | mm | 320 + H [2] | | | 345 + H [2] | | | 370 + H [2] | |
| | Type 3273 | mm | 455 | | | 483 | | | 500 | |
| Weight | Without actuator | kg (approx.) | 5.8 | 7.6 | 9.1 | 13.3 | 16.3 | 27.3 | 52.3 | 64.6 |
| | With yoke | kg (approx.) | 6.5 | 8.3 | 9.8 | 14 | 17 | 28 | 53 | 65 |

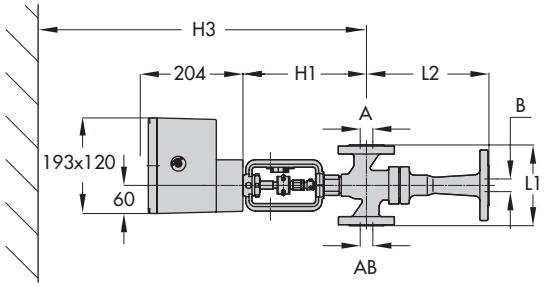
[1] Values for actuators with electric override. For version with mechanical override, H3 increases by 92 mm.
[2] Refer to Data Sheet T 8310-1 EN for dimension H



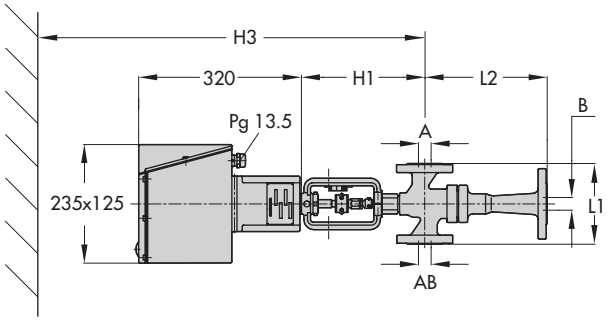

Type 3267/5824-30: DN 15 to 80
Type 3267/5825-30: DN 15 to 80



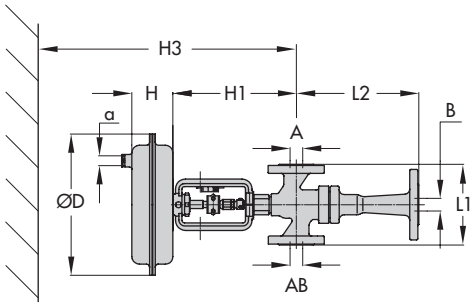

Version for temperatures from 130 to 220 °C



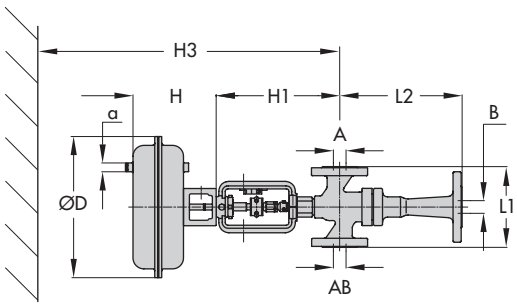

Type 3267/3374: DN 15 to 80



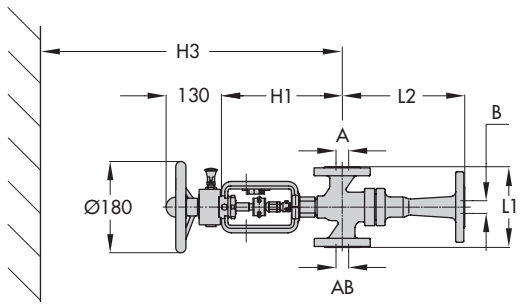

Type 3267/3274: DN 65 to 80




Type 3267-1: DN 15 to 80
See ▶ T 8310-1 for dimension H.




Type 3267-7: DN 15 to 80
See ▶ T 8310-1 for dimension H.




Type 3267/3273: DN 15 to 80

**Table 6:** *Weights · Electric actuators*

| Type | | 5824 | 5825 | 3274 | 3374 |
|---|---|---|---|---|---|
| Weight | kg (approx.) | – | 1.5 | 12 | 4 |
| With handwheel | kg (approx.) | 1.3 | – | 13 | – |

**Table 7:** *Dimensions and weights*

| Type | | 3271 | | | | 3277 | | | |
|---|---|---|---|---|---|---|---|---|---|
| Effective area | $cm^2$ | 80 | 240 | 350 | 700 | 240 | 350 | 355 | 700 |
| Diaphragm D | mm | 150 | 240 | 280 | 390 | 240 | 280 | 280 | 290 |
| Height H | mm | 62 | 62 | 82 | 134 | 65 | 82 | 121 | 135 |
| Signal pressure connection | | G ¼ | G ¼ | G ⅜ | G ⅜ | G ¼ | G ⅜ | G ⅜ | G ⅜ |
| Weight | kg (approx.) | 2 | 5 | 8 | 22 | 9 | 12 | 19 | 26 |
| With handwheel | kg (approx.) | – | 9 | 13 | 27 | 13 | 17 | – | 31 |

**Table 8:** *Weight of Type 3273 Hand-operated Actuator*

| Type | | 3273 |
|---|---|---|
| Weight | kg (approx.) | 2 |

**Table 9:** *Versions of jet pumps* · Nominal sizes, $K_{VS}$ coefficients and body materials

| DN | Characteristic 1: $K_{VS}$ | Characteristic 2: $K_{VS}$ | Travel | PN/material |
|---|---|---|---|---|
| 15 | 0.25 to 1.6 | 0.25 to 0.63 | 7.5 mm | PN 16/EN-JL1040<br>PN 25/EN-JS1049<br>PN 25/1.0619 |
| 20 | 0.5 to 3.2 | 0.5 to 1.25 | | |
| 25 | 0.8 to 5.0 | 0.8 to 2.0 | | |
| 32 | 2.0 to 8.0 | 2.0 to 3.2 | | |
| 40 | 3.2 to 12.5 | 3.2 to 5.0 | | |
| 50 | 5.0 to 20 | 5.0 to 8.0 | | |
| 65 | 8.0 to 32 | 8.0 to 12.5 | 15 mm | PN 16/EN-JL1040<br>PN 16/EN-JS1049<br>PN 25/EN-JS1049<br>PN 25/1.0619 |
| 80 | 12.5 to 50 | 12.5 to 20 | | |

Specifications subject to change without notice

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