

# 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 <sup>2)</sup>
Type 3267/5825 <sup>1)</sup> · Fig. 2	PN 16/25	DN 15 to 80 <sup>2)</sup>
Type 3267/3374 <sup>1)</sup>	PN 16/25	DN 15 to 80 <sup>2)</sup>
Type 3267/3274 <sup>1)</sup> · Fig. 1	PN 16/25	DN 65 to 80 <sup>2)</sup>
Pneumatic control valves with jet pump		
Type 3267-1 (Type 3271 Actuator)	PN 16/25	DN 15 to 80 <sup>2)</sup>
Type 3267-7 (Type 3277 Actuator)	PN 16/25	DN 15 to 80 <sup>2)</sup>

<sup>1)</sup> With fail-safe action tested according to DIN EN 14597

<sup>2)</sup> 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.

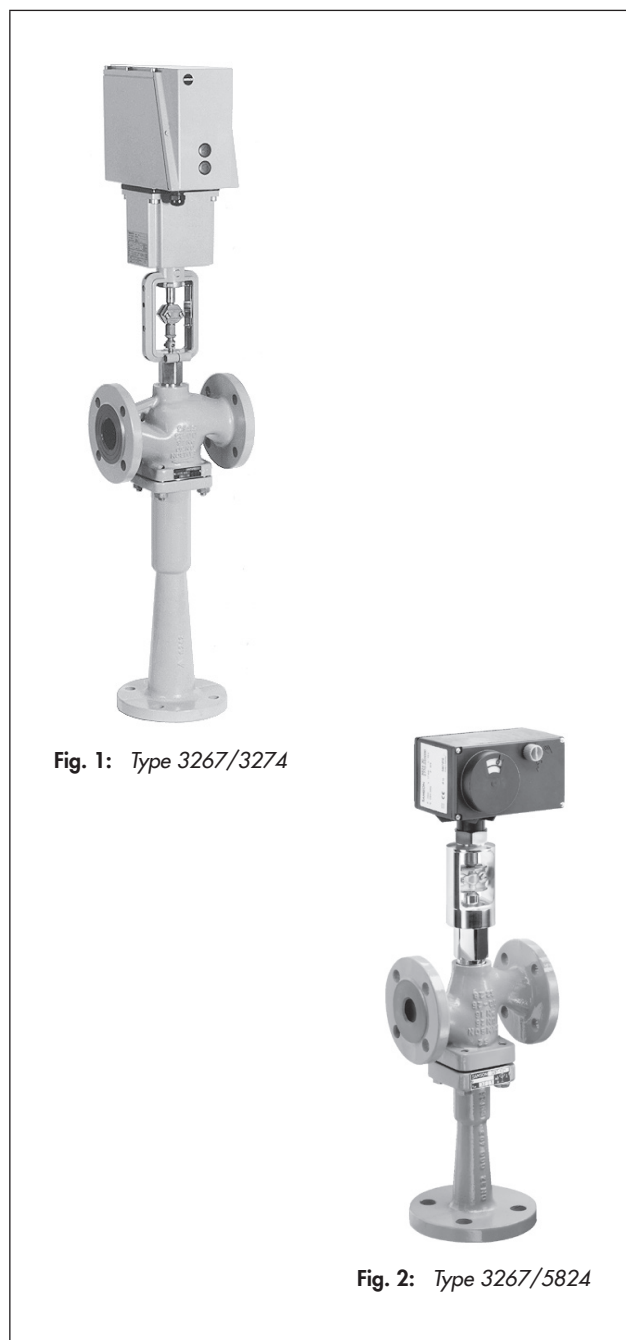


Fig. 1: Type 3267/3274

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.

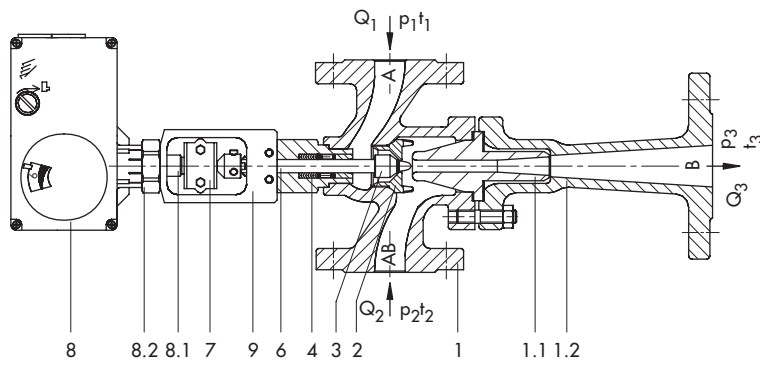


Fig. 3.1: Type 3267/5824

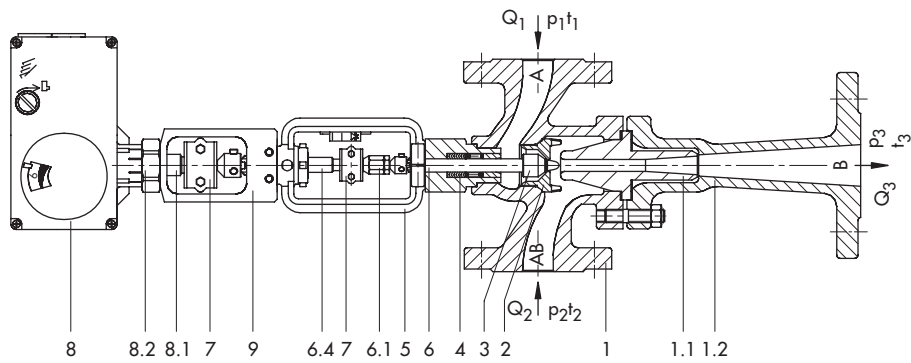


Fig. 3.2: Type 3267/5824 for temperatures up to 220 °C

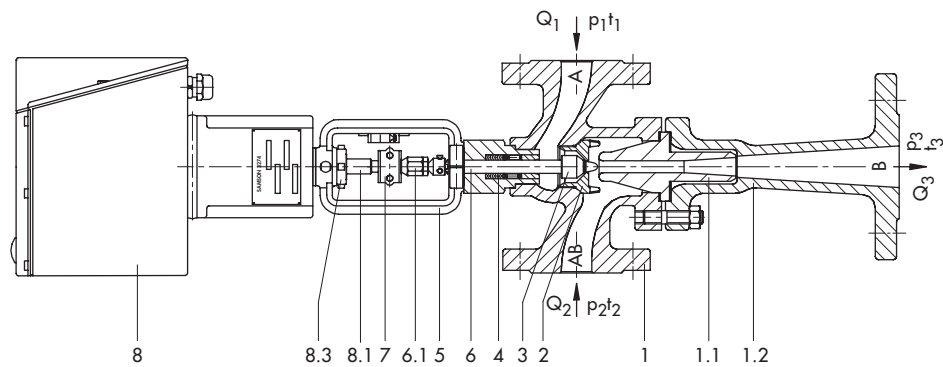


Fig. 3.3: Type 3267/3274

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

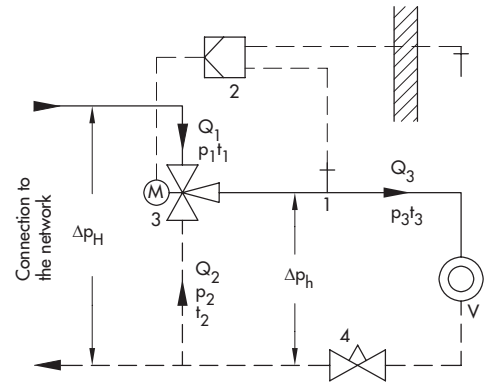


Fig. 4: Simplified functional diagram with a consumer circuit with jet pump

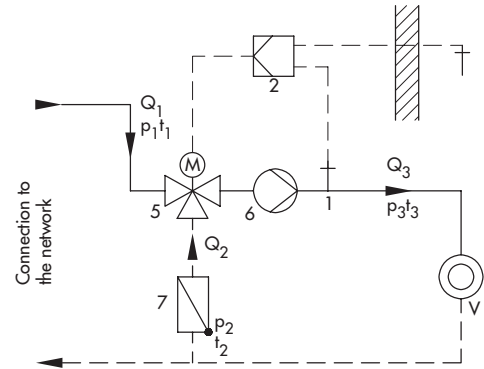


Fig. 5: Simplified functional diagram with a consumer circuit with circulation pump and three-way valve

## 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

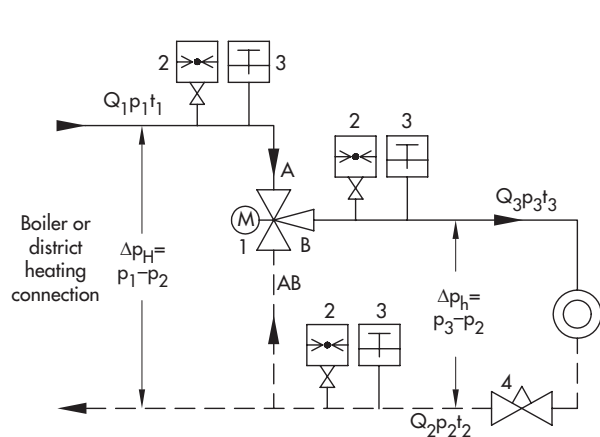


Fig. 6: Required pressure gauges and thermometers for a control valve with jet pump

## 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 <sup>1)</sup>	$Q_w$ in kW
Network supply <sup>1)</sup>	$p_1$ in bar/ $t_1$ in °C
Plant return flow <sup>1)</sup>	$p_2$ in bar/ $t_2$ in °C
Plant supply <sup>1)</sup>	$p_3$ in bar/ $t_3$ in °C
Nominal pressure	PN ...
Body material	according to Table 9 on page 8

<sup>1)</sup> 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 <sup>1)</sup>	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) <sup>2)</sup> PN 25 (type of connection acc. to DIN EN 1092-1)							
Rated travel	7.5 mm						15 mm	
Permissible temperatures	-10 to 220 °C <sup>3)</sup>							
Seat/plug seal	Metal seal							
Characteristic	Linear							
Leakage rate according to IEC 60534-4	Class III ( $\leq 0.01$ % of $K_{VS}$ coefficient)							

<sup>1)</sup> The nominal inlet sizes are listed. The nominal outlet size is always one size larger than the nominal inlet size.

<sup>2)</sup> 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

<sup>3)</sup> **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 <sup>1)</sup>	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							

<sup>1)</sup> 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 <sup>1)</sup>							
			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	•	•	•	•	•	•	•	•

<sup>1)</sup> 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.

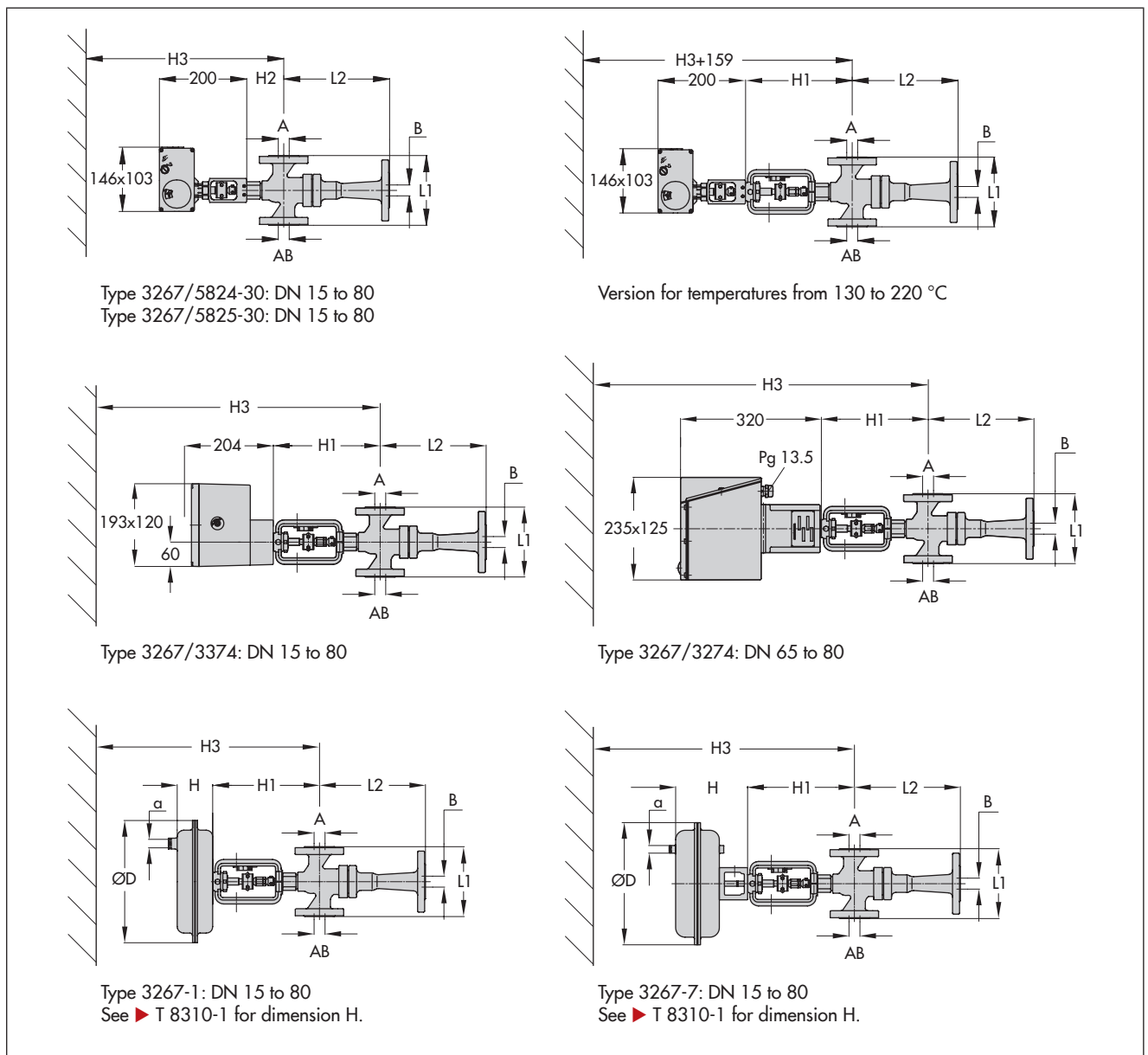
Type	Electric actuators					Signal pressure	Pneumatic actuators		
	5824-30	5825-30	3374-15	3374-26	3274-11 3274-21		3271/3277		
Positioning force	0.7 kN	0.28 kN	2.5 kN	0.5 kN	1.8 kN			0.2 to 1 bar	0.4 to 2 bar
$K_{VS}$ coefficients	$\Delta p_H$ [bar]						Actuator [cm <sup>2</sup> ]	$\Delta p_H$ [bar]	
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

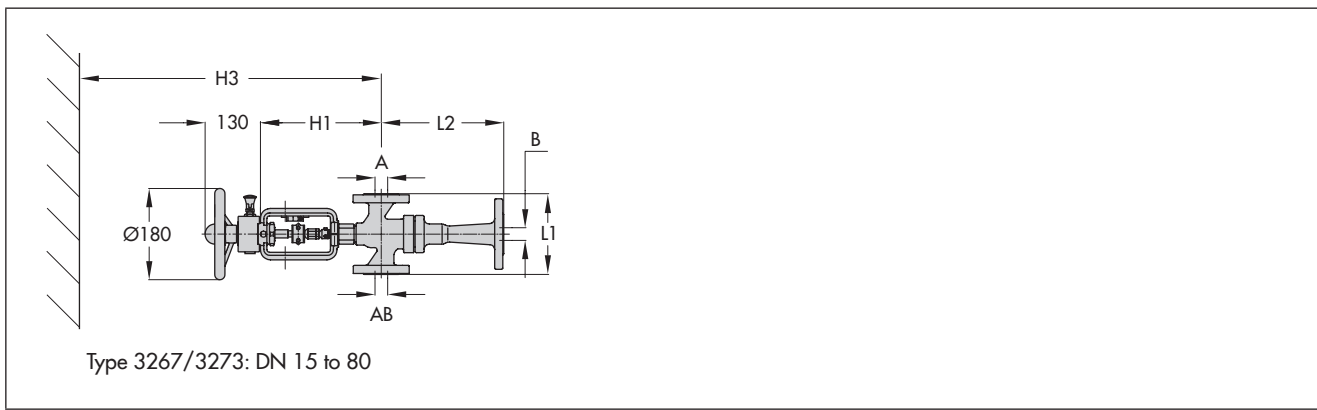
**Table 5: Dimensions and weights · Type 3267 Valve with Jet Pump**

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 <sup>1)</sup>	mm	-			-			760	
	Type 3271/3277	mm	320 + H <sup>2)</sup>			345 + H <sup>2)</sup>			370 + H <sup>2)</sup>	
	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

<sup>1)</sup> Values for actuators with electric override. For version with mechanical override, H3 increases by 92 mm.

<sup>2)</sup> Refer to Data Sheet T 8310-1 EN for dimension H





**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 <sup>2</sup>	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 ¾	G ¾	G ¼	G ¾	G ¾	G ¾
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 PN 25/EN-JS1049 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	15 mm	PN 16/EN-JL1040 PN 16/EN-JS1049 PN 25/EN-JS1049 PN 25/1.0619
65	8.0 to 32	8.0 to 12.5		
80	12.5 to 50	12.5 to 20		

Specifications subject to change without notice



SAMSON AG · MESS- UND REGELTECHNIK  
Weismüllerstraße 3 · 60314 Frankfurt am Main · Germany  
Phone: +49 69 4009-0 · Fax: +49 69 4009-1507  
Internet: <http://www.samson.de>

**T 5894 EN**

2013-08-27