

Electric control valves with jet pump

Type 3267/5824, Type 3267/5825,
Type 3267/3374, Type 3267/3274

Pneumatic control valves with jet pump

Type 3267-1, Type 3267-7

Flanged version of valve with jet pump

SAMSON



Fig. 1: Type 3267/3274



Fig. 2: Type 3267/5824

Mounting and Operating Instructions

EB 5894 EN

Edition June 2013

Definition of the signal words used in these mounting and operating instructions



DANGER!

indicates a hazardous situation which, if not avoided, will result in death or serious injury.



WARNING!

indicates a hazardous situation which, if not avoided, could result in death or serious injury.



NOTICE

indicates a property damage message.



Note:

Supplementary explanations, information and tips

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1 General safety instructions

For your own safety, follow these instructions concerning the mounting, start up and operation of the device:

- The control valves with jet pump must be mounted, started up or serviced by fully trained and qualified personnel only; the accepted industry codes and practices are to be observed. Make sure employees or third persons are not exposed to any danger. All safety instructions and warnings given in these mounting and operating instructions, particularly those concerning installation, start-up and maintenance, must be strictly observed.
- To ensure appropriate use, only use the control valve in applications where the operating pressure and temperatures do not exceed the specifications used for sizing the valve at the ordering stage. The manufacturer does not assume any responsibility for damage caused by external forces or any other external factors. Any hazards that could be caused in the valve by the process medium, the operating pressure, the signal pressure or by moving parts are to be prevented by taking appropriate precautions.
- For installation and maintenance, make sure the relevant section of the pipeline is depressurized and, depending on the process medium, drained as well. Depending on the field of application, allow the valve to cool down or heat up to reach ambient temperature before starting any work on it.
- The actuators are designed for use in low voltage installations. For wiring and maintenance, you are required to observe the relevant safety regulations.
- Take necessary measures to ensure that the power supply cannot be reconnected inadvertently.
- Take care while performing adjustment work on live parts. Never remove any covers!

To avoid damage to any equipment, the following also applies:

- Proper shipping and storage are assumed.



Note:

The control valves comply with the requirements of the European Pressure Equipment Directive 97/23/EC. Valves with a CE marking have a declaration of conformity which includes information about the applied conformity assessment procedure. The declaration of conformity is available on request.

2 Design and principle of operation

Control valves with jet pumps are used in control circuits, especially in district heating supply plants. They assume both the function of a valve for temperature control and that of a circulation pump for the heating water circuit. Configured as mixing valves, they replace the reducing valve and circulation pump usually installed.

The control valves with jet pumps consist 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 .

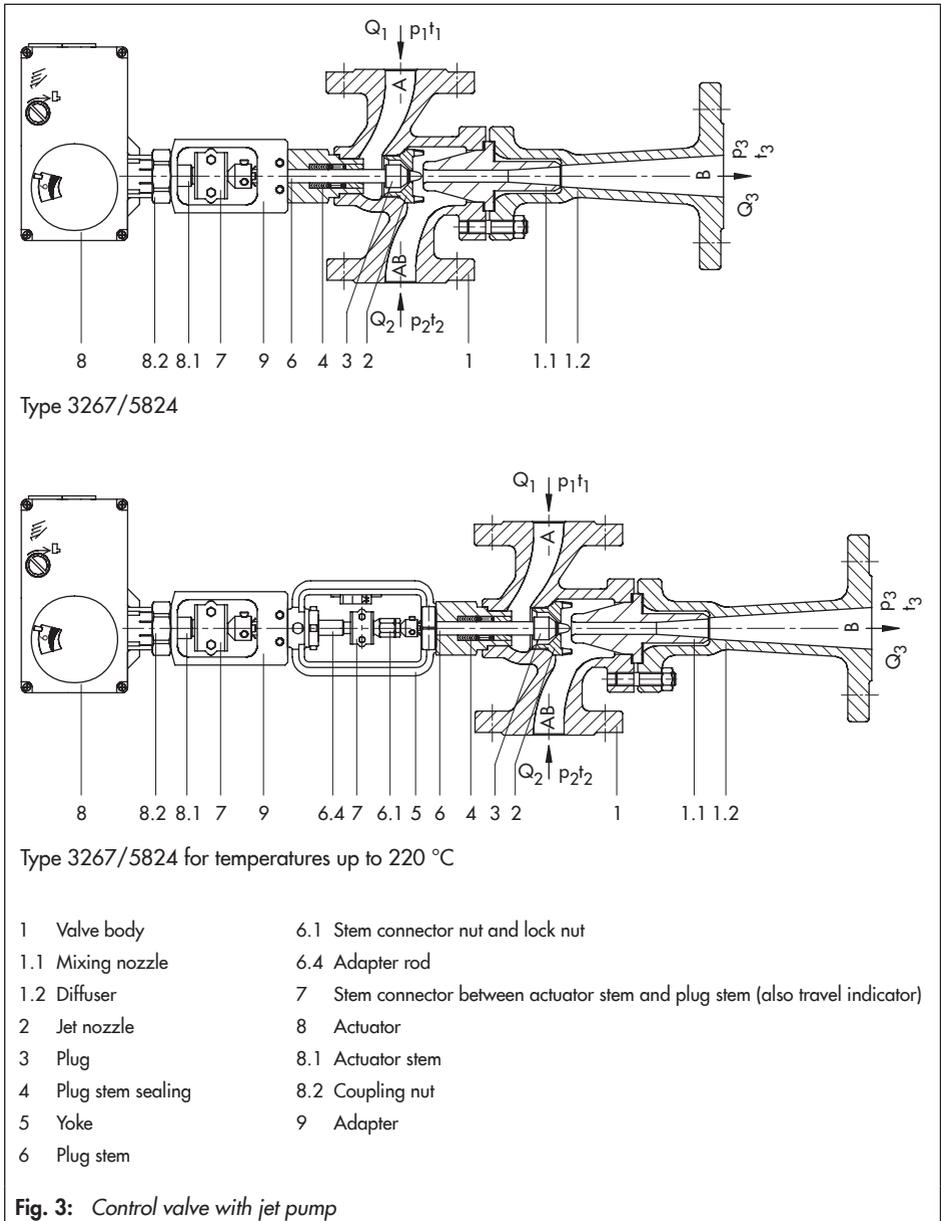
The jet stream Q_1 is accelerated in the jet nozzle and flows to the mixing nozzle at high speed. The exiting jet draws the partial flow Q_2 with it. In the mixing nozzle, the two flows are mixed together. During the mixing process, the jet stream releases a portion of its kinetic energy to the intake 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.

! NOTICE

The plant data used to size the jet pump must match the actual plant data to allow the jet pump to fully function.

The jet pump is sized by SAMSON AG based on the specifications made in the questionnaire for determining the operating conditions (TV-SK 8852).



2.1 Versions

2.1.1 Control valve with jet pump

Electric control valves with jet pump		
Type 3267/5824	PN 16/25	DN 15 to 80 ²⁾
Type 3267/5825 ¹⁾	PN 16/25	DN 15 to 80 ²⁾
Type 3267/3374 ¹⁾	PN 16/25	DN 15 to 80 ²⁾
Type 3267/3274 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. Register number available on request.

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).

2.1.2 Flanged version of Type 3267 Valve

Nominal size, K_{VS} coefficients, 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		
65	8.0 to 32	8.0 to 12.5	15 mm	PN 16/EN-JL1040 PN 16/EN-JS1049 PN 25/EN-JS1049 PN 25/1.0619
80	12.5 to 50	12.5 to 20		

2.2 Possible combinations: Flanged version of Type 3267

	Type	For details, refer to	Nominal size ¹⁾							
			15	20	25	32	40	50	65	80
Electric actuators	5824-30	▶ EB 5824 EN	•	•	•	•	•	•	•	•
	5825-30		•	•	•	•	•	•	•	•
	3374-15	▶ EB 8331 EN	•	•	•	•	•	•	•	•
	3374-26		•	•	•	•	•	•	•	•
Electrohydraulic actuators	3274-11	▶ EB 8340 EN	–	–	–	–	–	–	•	•
	3274-21		–	–	–	–	–	–	•	•
Pneumatic actuators	3271	▶ EB 8310-x EN	•	•	•	•	•	•	•	•
	3277	▶ EB 8311 EN	•	•	•	•	•	•	•	•
Hand-operated actuator	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.

2.3 Technical data: Flanged version of Type 3267

Nominal size ¹⁾	15	20	25	32	40	50	65	80
Nominal pressure	PN 16 (type of connection depending on material acc. to DIN EN 1092-1/-2) ²⁾ 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.

Materials

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.

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 Technical data 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}	Δp_H [bar]						Actuator [cm ²]	Δp_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	-

	Electric actuators						Pneumatic actuators		
Type	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	Signal pressure		0.2 to 1 bar	0.4 to 2 bar
K_{VS}	Δp_H [bar]						Actuator [cm ²]	Δp_H [bar]	
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

2.4 Nameplate: Flanged version of Type 3267



- 1 Model number
- 2 Order number
- 3 K_{vs} coefficient
- 4 Version

2.5 Customer inquiries

Please submit the following details:

- Type designation
- Model number
- Order number

3 Installation

NOTICE

- The mounting position of the jet pump must be lower than the position of the consumer (radiator, air heater etc.). This ensures that the circulation is intensified at small loads by the thermal conditions. Otherwise, difficulties may arise while the plant is in operation.
- If air heaters are used, we recommend mounting the jet pumps directly to them.
- Keep the mixing line AB (Fig. 4) as short as possible. Do not install check valves or shut-off valves in this line.
- Refer to the installation schematic drawing (Fig. 4) for the arrange-

ment of the jet pump with the required additional instruments.

- Thermometers and pressure gauges must be installed in the generator and consumer flow pipe and in the return flow pipe. A manually operated throttle valve or balancing valve (4) is absolutely necessary in the plant's return flow pipe.
- When using the jet pump in ventilation systems, it is absolutely necessary to include a soft-start for winter conditions!

Flush the pipelines thoroughly before installation.

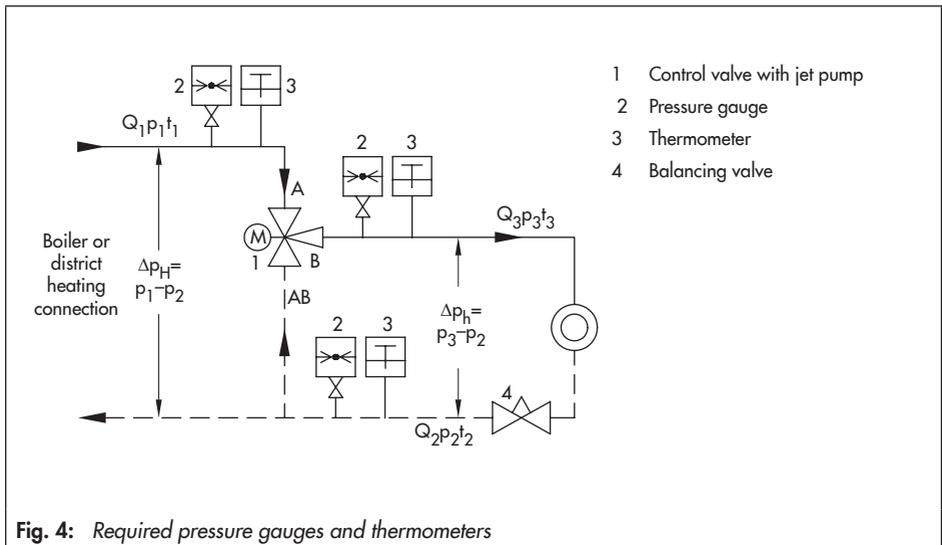


Fig. 4: Required pressure gauges and thermometers

3.1 Mounting position

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

! **NOTICE**

- *The flow direction of ports A, B and AB must match those specified in the plant schematics (Fig. 4).*
 - *Choose a place of installation that allows you to freely access the control valve even after the entire plant has been completed.*
 - *Make sure the valve body is installed free of stress. If necessary, support the pipelines near the connections. Do not attach supports directly to the jet pump or actuator.*
-

3.2 Strainer

Install a strainer (e.g. SAMSON Type 2 NI) at the valve inlets to prevent any sealing parts, weld spatter and other impurities carried along by the process medium impairing the proper functioning of the valve, above all the tight shut-off.

! **NOTICE**

- *The direction of flow must correspond to the arrow on the body.*
 - *The filter element must be installed to hang downwards.*
 - *Remember to leave enough space to remove the filter element.*
-

3.3 Additional mounting instructions

We recommend installing a hand-operated shut-off valve upstream of the strainer and downstream of the control valve to be able to shut down the plant for cleaning and maintenance, and when the plant is not used for longer periods of time.

4 Mounting, connecting and configuring the actuator



NOTICE

The instructions to mount the valve onto the actuator, to perform electrical or pneumatic connections as well as to configure the actuator are described in detail in the Mounting and Operating Instructions (EB):

- Type 5824 Electric Actuator
 - ▶ EB 5824 EN
- Type 5825 Electric Actuator
 - ▶ EB 5824 EN
- Type 3374 Electric Actuator
 - ▶ EB 8331 EN
- Type 3274 Electrohydraulic Actuator
 - ▶ EB 8340 EN
- Type 3271 Pneumatic Actuator
 - ▶ EB 8310-x EN
- Type 3277 Pneumatic Actuator
 - ▶ EB 8311 EN

Read the actuator's mounting and operating instructions!

4.1 Attachment

Mounting Types 3374, 3274, 3271, 3277 and 3273 Actuators (Fig. 5)

The actuator is mounted onto the valve using a yoke (which yoke is to be used depends on the actuator and the nominal size of the valve). Refer to Fig. 8 and Fig. 9.

1. Place yoke (5) on the valve body (1) and fasten them together.
2. Place stem connector rod (6.3) on the plug stem (6) and fasten using the threaded pins.
3. Press the plug together with the plug stem (6) firmly into the seat.
4. If necessary, remove stem connector (7) and ring nut (8.3) from the actuator.
5. Slide ring nut (8.3) over the stem connector rod (6.3).
6. Place actuator (8) onto the yoke (5) and fasten them together using the ring nut (8.3).
7. Extend the actuator stem (8.1) as far as it will go.
8. Screw on the stem connector nut (6.1) by hand until it touches the actuator stem. Then turn it a further $\frac{1}{4}$ turn and secure this position with the lock nut (6.2)
9. Position clamps of the stem connector (7) and screw them tight. Align travel indicator scale with the tip of the stem connector.

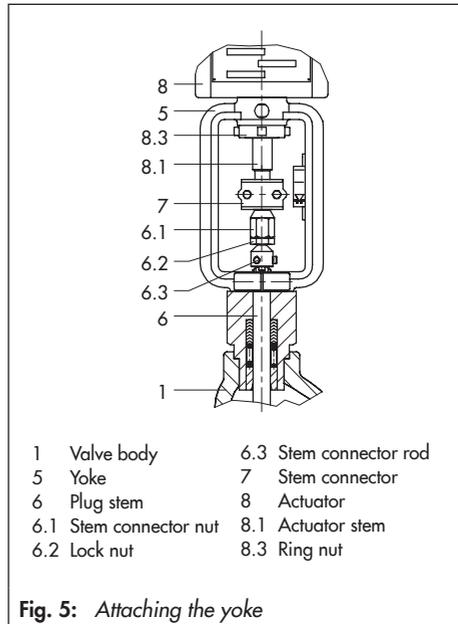
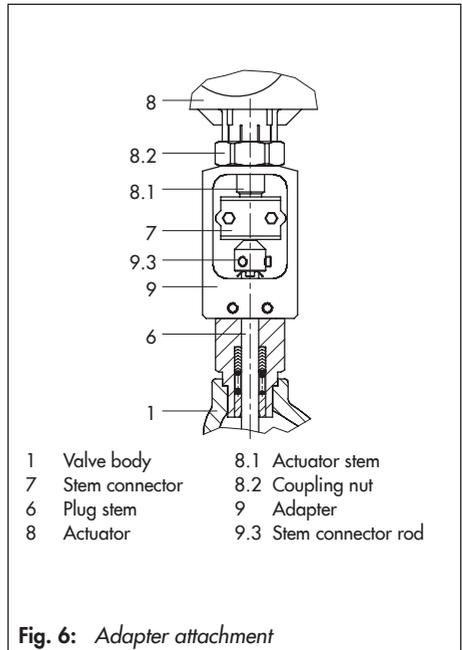


Fig. 5: Attaching the yoke

Mounting Type 5824 and Type 5825 Actuators (Fig. 6)

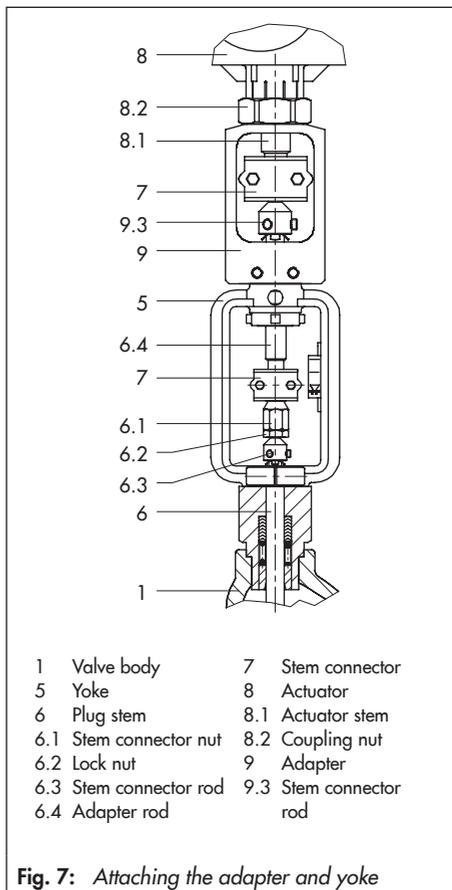
The actuator is mounted onto the valve using an adapter (9) (which adapter is to be used depends on the nominal size). Refer to Fig. 8.

1. Place adapter (9) on the valve body (1) and fasten using the threaded pins.
2. Place stem connector rod (9.3) on the plug stem and fasten using the threaded pins
3. Press the plug together with the plug stem (6) firmly into the seat.
4. Place actuator (8) on the adapter (9) and fasten together using the coupling nut (8.2) (tightening torque: 20 Nm).
5. Extend the actuator stem (8.1) until it touches the stem connector rod (9.3).
6. Position clamps of the stem connector (7) and screw them tight.



For Type 5824 and Type 5825 Actuators as well as medium temperatures above 130 °C, a yoke (1070-6127) needs to be attached between the adapter and valve (Fig. 7).

1. Place yoke (5) on the valve body (1) and fasten them together.
2. Place stem connector rod (6.3) on the plug stem (6) and fasten using the threaded pins.
3. Push the plug together with the plug stem (6) firmly into the seat.
4. Insert adapter rod (6.4) from the top through the yoke.
5. Place adapter (9) on the yoke and fasten using the threaded pins.
6. Place stem connector rod (9.3) on the adapter rod (6.4) and fasten using the threaded pins.
7. Place actuator (8) on the adapter (9) and fasten together using the coupling nut (8.2) (tightening torque: 20 Nm).
8. Extend the actuator stem (8.1) as far as it will go.
9. Screw on the stem connector nut (6.1) by hand until it touches the bottom of the adapter rod (6.4) and until the top of the adapter rod (6.4) touches the actuator stem (8.1). Turn it a further ¼ turn and secure it with the lock nut (6.2).
10. Position clamps of both stem connectors (7) at the top and bottom of the adapter rod (6.4) and screw them tight. Align travel scale with the tip of the stem connector.



4.2 Connection

Perform the electrical or pneumatic connection of the actuator as described in the corresponding mounting and operating instructions.

4.3 Configuration

The electric actuator versions with positioner can be adapted to the control task.

Configure the actuator as described in the corresponding mounting and operating instructions.

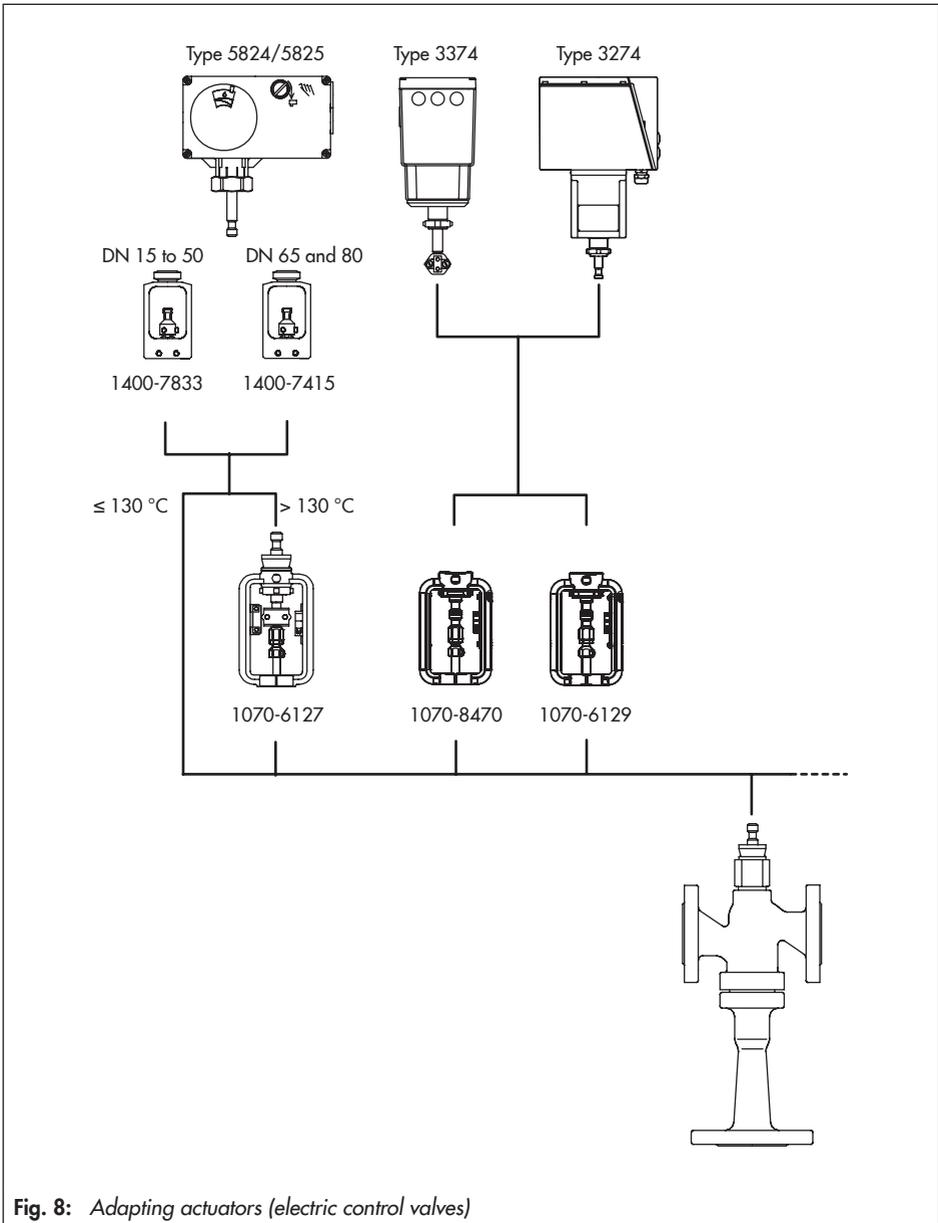


Fig. 8: Adapting actuators (electric control valves)

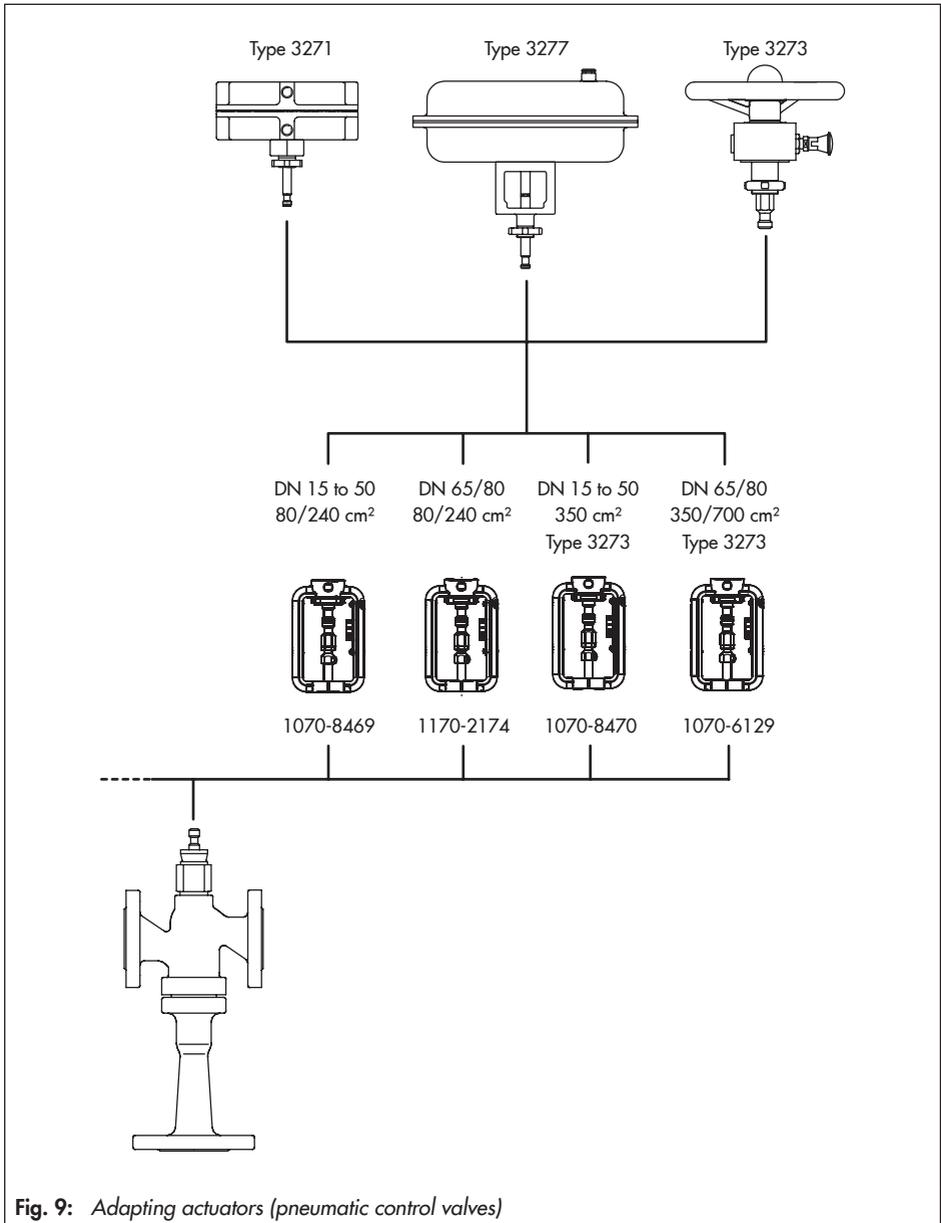


Fig. 9: Adapting actuators (pneumatic control valves)

5 Jet pump adjustment

Sizing

The jet pump is sized by SAMSON AG based on the specifications made in the questionnaire for determining the operating conditions (TV-SK 8852).

The plant data specified in the questionnaire must match the actual plant data to allow the jet pump to fully function.

Adjustment



NOTICE

To adjust the jet pump, the pressure gauges and thermometers shown in Fig. 10 are absolutely necessary.

The **required temperature** t_3 in the consumer plant results from the ratio of the flows Q_1 , Q_2 and Q_3 as well as the differential pressures Δp_H and Δp_h across the plant.

If the temperature t_3 in the consumer plant (at full rated travel H_{100}) is not achieved with the network pressure Δp_H available, the differential pressure Δp_h across the balancing valve (4) must be adjusted. To do this, proceed as follows:

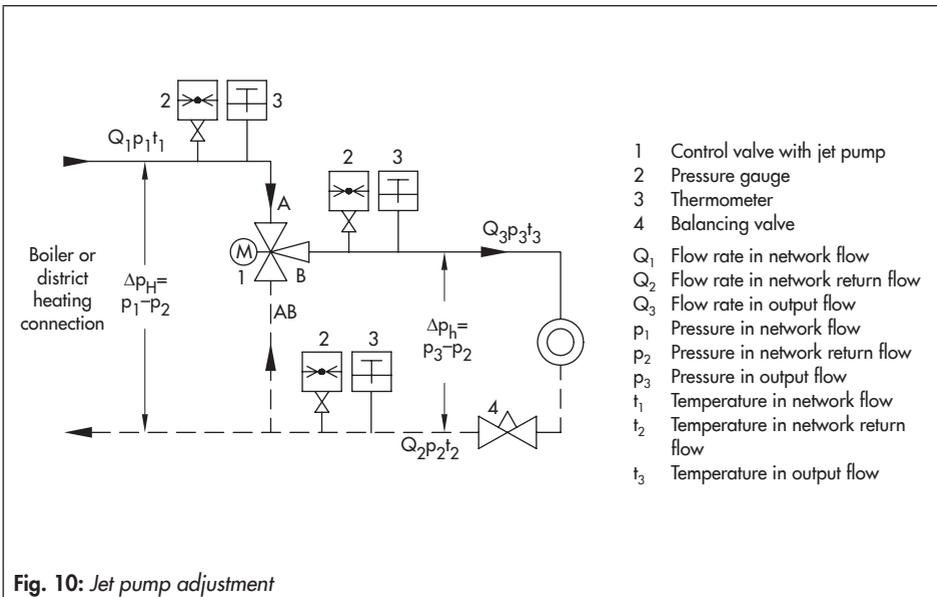


Fig. 10: Jet pump adjustment

1. Determine the flow rate ratio m_{100} from the temperatures t_1 , t_2 and t_3 (read off at the thermometers) using the following equation:

$$m_{100} = \frac{Q_1}{Q_3} = \frac{t_3 - t_2}{t_1 - t_2}$$

2. Determine the pressure ratio ε_{100} from the pressures p_1 , p_2 and p_3 (read off at the pressure gauges) using the following equation:

$$\varepsilon_{100} = \frac{\Delta p_h}{\Delta p_H} = \frac{p_3 - p_2}{p_1 - p_2}$$

3. Enter the flow rate ratio m_{100} and pressure ratio ε_{100} on the operating diagram (Fig. 11). The point of intersection (operating point) must be within the gray-

shaded operational area. If not, the jet pump has been incorrectly sized.

4. For optimal operation, the operating point lies on the marked limit. Shift the determined point of intersection horizontally (same flow rate ratio m_{100}) until it reaches the limit and read off the corresponding pressure ratio ε_{100} .
5. Using the value read from the diagram for ε_{100} and the known network pressure Δp_H , the plant differential pressure Δp_h can be calculated:

$$\Delta p_h = \Delta p_H \cdot \varepsilon_{100}$$

6. Adjust the balancing valve until the calculated differential pressure Δp_h is achieved or until the correct temperature ratio is achieved.

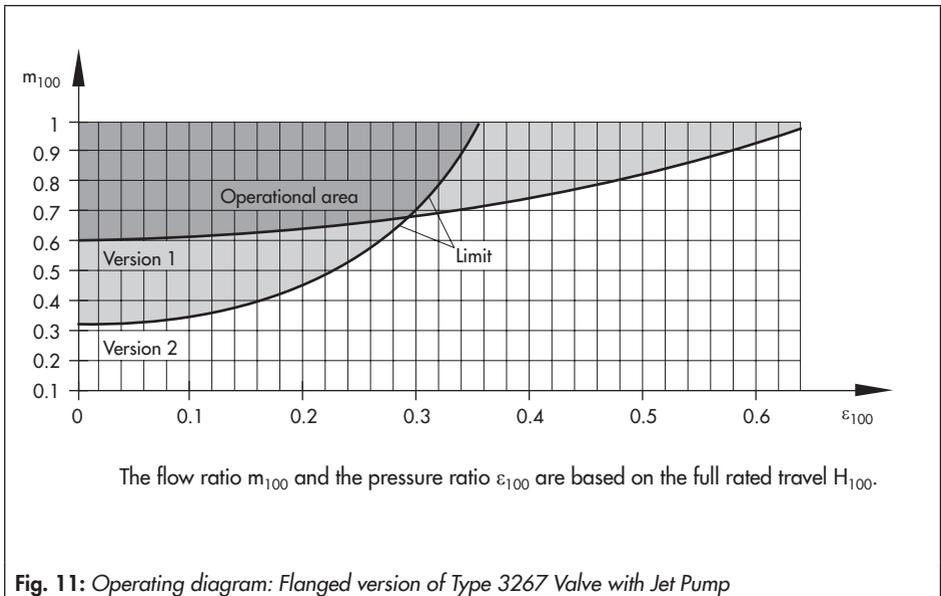


Fig. 11: Operating diagram: Flanged version of Type 3267 Valve with Jet Pump

6 Dimensions and weights

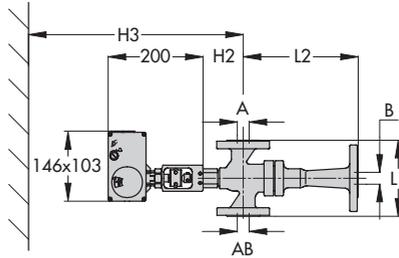
Electric control valves with jet pump in flanged version

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	
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

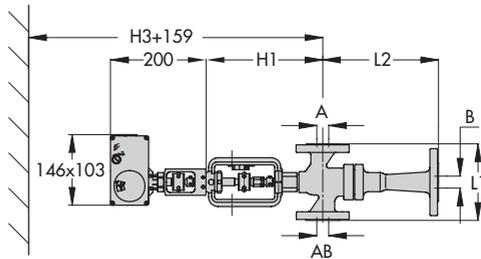
¹⁾ Values for actuators with electric override. For version with mechanical override, H3 increases by 92 mm.

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

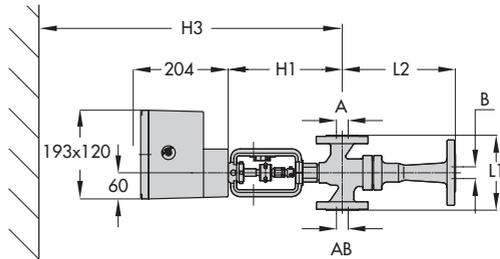
Type 3267/5824-30: DN 15 to 80
 Type 3267/5825-30: DN 15 to 80



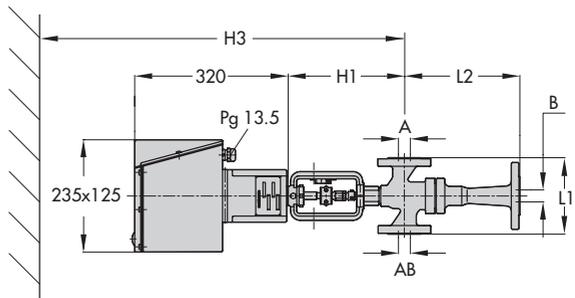
Type 3267/5824-30: DN 15 to 80
 Type 3267/5825-30: DN 15 to 80
 Version for temperatures from 130 to 220 °C



Type 3267/3374: DN 15 to 80



Type 3267/3274: DN 65 to 80



Pneumatic control valves with jet pump in flanged version

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 H3 (minimum height)	Type 3271/3277 mm	320 + H ¹⁾			345 + H ¹⁾			370 + H ¹⁾		
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⁾ Refer to Data Sheet T 8310-1 EN for dimension H

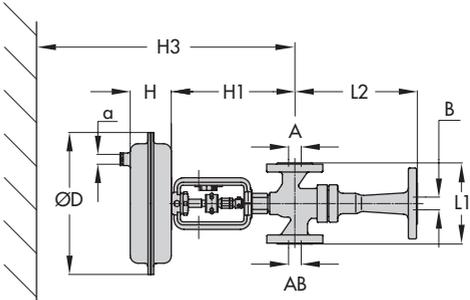
Pneumatic actuators	Type	3271				3277			
Effective area	cm ²	80	240	350	700	240	350	355	700
Diaphragm D	mm	150	240	280	390	240	280	280	290
Height H	mm	62	62	82	134	65	82	121	135
Signal pressure connection		G ¼	G ¼	G ¾	G ¾	G ¼	G ¾	G ¾	G ¾
Weight	kg (approx.)	2	5	8	22	9	12	19	26
With handwheel	kg (approx.)	–	9	13	27	13	17	–	31

Control valve with jet pump and handwheel

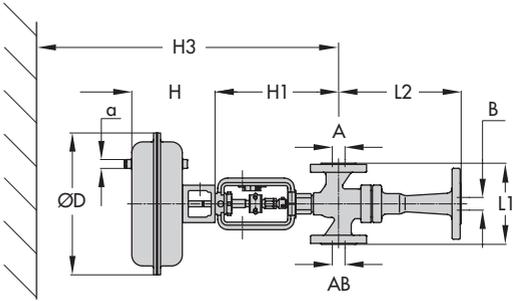
Nominal size A, AB	DN	15	20	25	32	40	50	65	80	
Connection size B	DN	20	25	32	40	50	65	80	100	
Overall length L1	mm	130	150	160	180	200	230	290	310	
Length L2	mm	155	190	245	300	375	480	590	735	
Height H1	mm	240			265			290		
Height H3	mm	455			483			500		
Weight	Without actuator	kg (approx.)	5.8	7.6	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

Hand-operated actuator	Type	3273
Weight	kg (approx.)	2

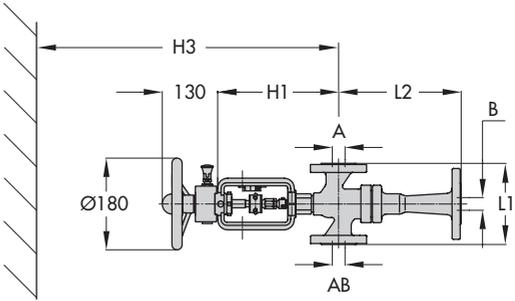
Type 3267-1: DN 15 to 80



Type 3267-7: DN 15 to 80



Type 3267/3273: DN 15 to 80





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