
PN16 Bellows Sealed 2-Port Control Valves
KE71B1, KE73B1 and KE43B1
Installation and Maintenance Instructions

- 1. Operation*
- 2. Installation and
commissioning*
- 3. Maintenance*
- 4. Spares*

1. Operation

1.1 General description

Two port bellows sealed control valves with either equal percentage, linear or fast opening characteristics, for use with the Spirax Sarco range of pneumatic and electric actuators.

1.2 Range

Type	Control valve	Valve size	Material
2-port valves	KE71B1 screwed	½" to 2"	SG iron
	KE73B1 flanged	DN15 to DN100	SG iron
2-port valves	KE43B1	DN15 to DN100	Carbon steel

Maximum differential against which the valve will shut off is dependent upon the actuator used. Refer to appropriate actuator TI sheet.

1.3 Technical details

Body pressure rating at 120°C	KE71B1 / KE73B1	SG iron	25 bar *
	KE43B1	Carbon steel	40 bar *
Maximum working pressure	16 bar *		
Maximum allowable temperature	300°C standard version		
	350°C version with high temperature bolting		

* **Note: 1.** Although the maximum allowable body pressure is as indicated, the bellows is limited to a maximum inlet pressure of 16 bar g. Pressure higher than this may lead to a bellows rupture and consequential leakage of media to the atmosphere.

2. In the event of a bellows failure, the auxiliary gland (item 3, Fig. 2, page 3) can be tightened as a temporary measure to prevent these emissions.

2. Installation and commissioning

2.1 Valves should be installed in a horizontal pipeline so that flow is in the direction indicated by the arrow cast on the body. Valves should be mounted in the pipeline in accordance with the actuator installation and maintenance instructions.

A suitable strainer should always be fitted before the control valve. Additionally on steam installations a separator should be fitted before the valve, plus a steam trap set on applications where condensate may accumulate upstream of the valve.

2.2 Bypass arrangements

It is recommended that isolating valves be fitted upstream and downstream of the control valve together with a manual regulating valve to bypass the group. The process may then be controlled by the bypass valve while the control valve is isolated for maintenance purposes.

2.3 Commissioning

For commissioning instructions refer to the Operation, Installation and Maintenance Instructions, covering Spirax Sarco actuators.

3. Maintenance

3.1 Procedure for renewing stem seals Fig. 2

Safety note: Care should be taken when handling gaskets, since the stainless steel reinforcing strip can easily inflict cuts.

- a. Isolate valve on both sides.
- b. Remove actuator from valve. **Note:** take care not to rotate the valve stem when removing the actuator from the valve, since this will destroy the bellows. Refer to Installation and Maintenance Instructions covering Spirax Sarco actuators.
- c. Remove lock-nut (1).

Caution: Care should be taken in removing the stem seal if the bellows has failed, since fluid under pressure may be trapped between the isolating valves.

- d. Unscrew gland nut (3), remove the gland bush (2), remove and discard the stem seal set (4).
- e. Examine parts for signs of damage or deterioration and renew as necessary. Note the stem seal set on this valve is intended for emergency use in the event of bellows failure. Score marks or scaly deposits on the valve stem (5) will impair sealing efficiency.
- f. Clean parts taking care to avoid scratching the stem or bore of the bellows assembly top end (6).
- g. New graphite stem seals (4) should be inserted into the bellows assembly top end (6), care being taken to avoid damage.
- h. Refit gland bush (2) and finger tighten the gland nut (3) over the valve stem (5).
- i. Ensure that the stem (5) moves freely.
- j. Refit valve lock-nut (1).
- k. Bring the valve back into service.

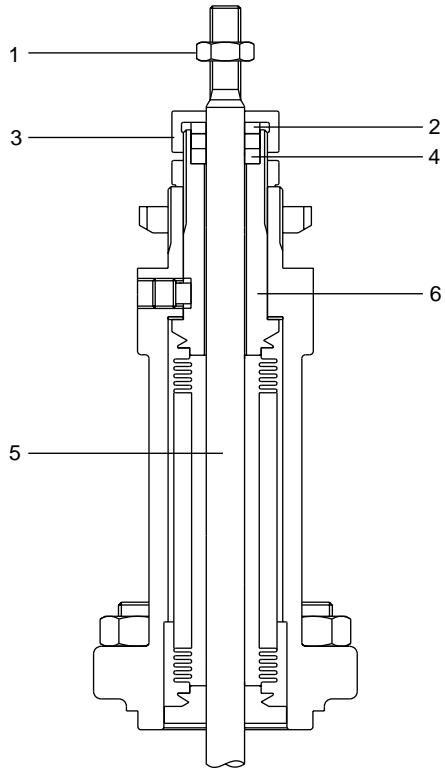


Fig. 2

Table 1. Recommended tightening torques (N m)

Valve size	Seat (15)	Bellows housing nuts (12)	Bellows lock-nut (7)
DN15 ½"	150 - 155	15 - 20	25 - 30
DN20 ¾"	150 - 155	20 - 25	25 - 30
DN25 1"	180 - 190	25 - 30	25 - 30
DN32 1¼"	180 - 190	40 - 45	25 - 30
DN40 1½"	180 - 190	40 - 45	25 - 30
DN50 2"	180 - 190	60 - 65	25 - 30
DN65	200 - 220	47 - 53	40 - 45
DN80	200 - 220	55 - 61	40 - 45
DN100	200 - 220	45 - 51	40 - 45

3.2 Procedure for renewing valve plug, seats and bellows assembly Fig. 3

Note: Due to the delicate nature of the bellows assembly, it is highly recommended that for renewal of the stem/bellows assembly, valve plug and/or seats, the complete valve is returned to Spirax Sarco service department.

a. Isolate and remove valve from the pipeline.

Caution: Care should be taken in removing the valve since fluid under pressure may be trapped between the isolating valves.

b. Remove actuator from valve.

Note: take care not to rotate the valve stem when removing the actuator from the valve, since this will destroy the bellows. Refer to Installation and Maintenance Instructions covering Spirax Sarco actuators.

c. Remove lock-nut (1).

d. Unscrew the nuts (12) securing the bonnet.

e. Withdraw the bonnet (11) together with the plug/stem/bellows assembly (5). Remove gland nut (3), gland bush (2) and stem seal set (4) see Fig. 2. Unscrew the plug/stem/bellows assembly lock-nut (7) and anti-rotation screw (18) withdraw the assembly from the bonnet.

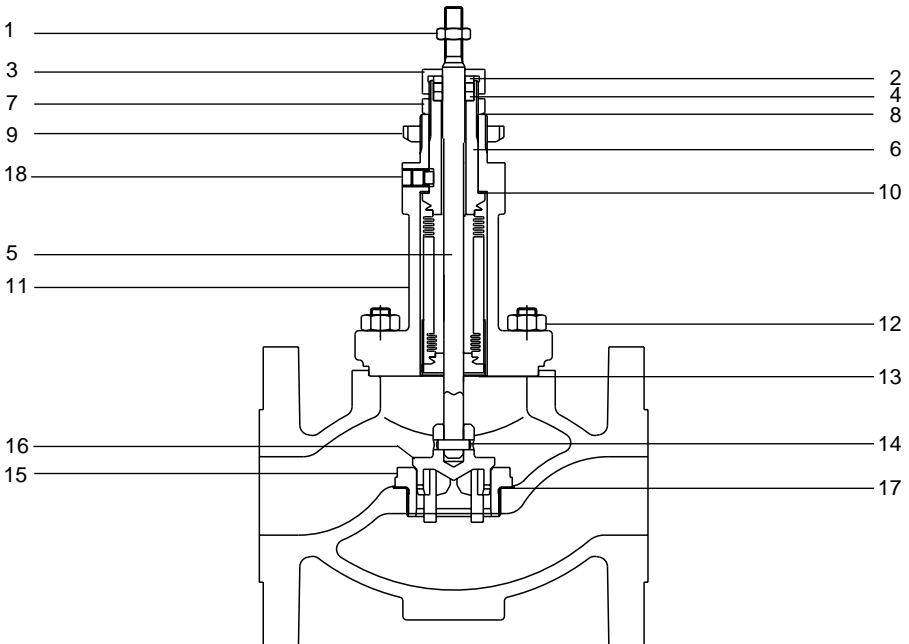


Fig. 3

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- f. Unscrew and remove the valve seat (15).
Note: To remove and replace seat (15) a special tool is required which can be obtained from Spirax Sarco by quoting the valve size and type.
- g. Replace seat gasket (17) and insert the new seat (15) into the body. Tighten to the correct torque (see Table 1, page 3).
- h. Insert the new stem/bellows assembly into the bore of the new plug and secure with the cross pin (14). The pin should be centralised within the plug and should be retained by deforming the metal around the pin hole by peening. Care should be taken to ensure that no metal is raised on the surface of the plug diameter and should be removed if necessary.
- i. Insert replacement plug/stem/bellows assembly (5) with new bellows flange gasket (10) into the bonnet (11) taking care not to damage the bellows. Replace bellows assembly anti-rotation washer (8) and lock-nut (7) and tighten to the correct torque (see Table 1, page 3).
- j. Using a new gasket (13) refit the bonnet and stem/bellows assembly on the valve body. While pushing the stem so that the valve plug is on the seat, tighten the bonnet nuts (12) to the correct torque (see Table 1, page 3).
- k. Fit new stem sealset (4) see Fig. 2, as described in section 3.1, ensuring valve stem (5) moves freely after assembly.
- l. Refit actuator and connect actuator to valve stem.
Note: take care not to rotate the valve stem when fitting the actuator to the valve since this will destroy the bellows.
Refer to Installation and Maintenance Instructions covering Spirax Sarco actuators.
- m. Bring valve back into service.
- n. Check for leakage around all gasket joints.

Safety Note Handling precautions

PTFE

Within its working temperature range PTFE is a completely inert material, but when heated to its sintering temperature it gives rise to gaseous decomposition products or fumes which can produce unpleasant effects if inhaled. The inhalation of these fumes is easily prevented by applying local exhaust ventilation to atmosphere as near to their source as possible.

Smoking should be prohibited in workshops where PTFE is handled because tobacco contaminated with PTFE will during burning give rise to polymer fumes. It is therefore important to avoid contamination of clothing, especially the pockets, with PTFE and to maintain a reasonable standard or personal cleanliness by washing hands and removing any PTFE particles lodged under the fingernails.

LAMINATED GASKETS

The metal foil sheet used to reinforce gaskets is very thin and sharp. Care should be taken when handling to avoid the possibility of cuts or lacerations to fingers or hands.

4. Spares

The following spares are available for the KE71B1, KE73B1 and KE43B1, PN16 bellows sealed range of control valves:-

Available spare

Gland seal kit (graphite seal set)	A
Plug* and pin	B, C
Soft plug and pin	C, D1
Seat and seat gasket	E, F
Bonnet gasket (packet of 3)	G
Bellows gasket (packet of 6)	H
Spindle/bellows assembly and plug pin	H, I, C

*Denote equal percentage, linear or fast opening plug.

How to order spares

Always order spares by using the description given in the column headed 'Available spare' and stating the following information.

Example: 1 - Seat and seat gasket kit for DN25 KE73B1 with K_{VS} 10 flanged to PN25.

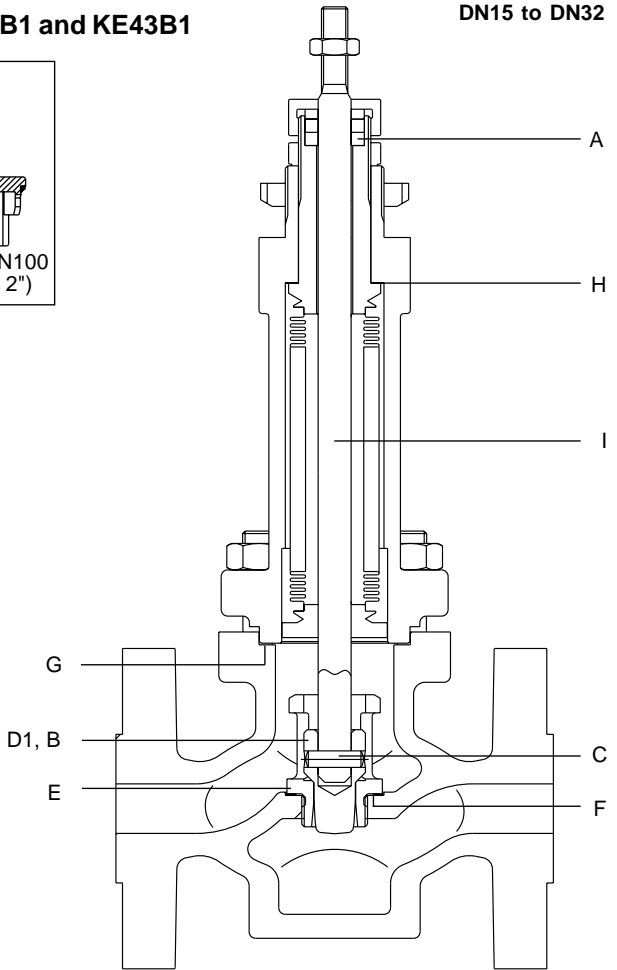
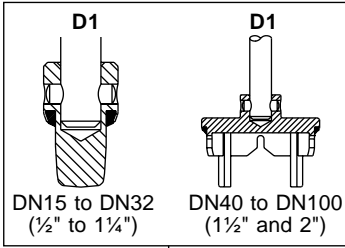
Bellows sealed valve selection guide

Valve size	Screwed = ½", ¾", 1", 1¼", 1½" and 2" Flanged = DN15, 20, 25, 32, 40, 50, 65, 80 and 100	<input type="text" value="DN25"/>
Valve series	K = K series 2-port	<input type="text" value="K"/>
Valve characteristic	L = Linear E = Equal percentage F = Fast opening	<input type="text" value="E"/>
Body material	4 = Carbon steel 7 = SG Iron	<input type="text" value="7"/>
Connections	1 = Screwed 3 = Flanged	<input type="text" value="3"/>
Stem sealing option	B1 = Bellows sealed rated PN16	<input type="text" value="B1"/>
Seating option	Blank = Standard metal-to-metal Class IV G = Soft seal (PTFE) Class VI W = Hard facing	<input type="text"/>
Trim	Blank = Standard N = Low noise C = Anti-cavitation	<input type="text"/>
Other options	Blank = Standard S = High temperature bolting	<input type="text"/>
Flow coefficient	To be specified	<input type="text" value="K<sub>VS</sub> 10"/>
Connection type	To be specified	<input type="text" value="PN25"/>

<input type="text" value="DN25"/>	<input type="text" value="K"/>	<input type="text" value="E"/>	<input type="text" value="7"/>	<input type="text" value="3"/>	<input type="text" value="B1"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text" value="K<sub>VS</sub> 10"/>	<input type="text" value="PN25"/>
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PN16 KE71B1, KE73B1 and KE43B1

DN15 to DN32



DN40 to DN100
(1 1/2" and 2")

