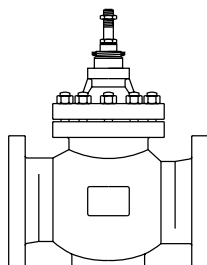
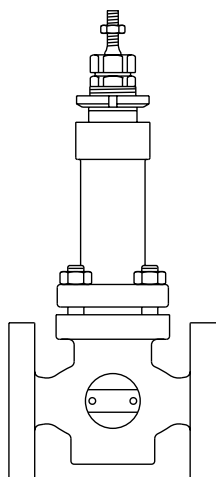


K and L Series Two-port Control Valves Installation and Maintenance Instructions



- 1. Safety information*
- 2. General product information*
- 3. Installation and commissioning*
- 4. Maintenance*
- 5. Spare parts*

1. Safety information

Safe operation of these products can only be guaranteed if they are properly installed, commissioned, used and maintained by qualified personnel (see Section 1.11) in compliance with the operating instructions. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

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 of 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.

1.1 Intended use

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended use / application. The products listed on pages 3, 4 and 5 comply with the requirements of the European Pressure Equipment Directive 97/23/EC, carry the mark when so required and fall within the Pressure Equipment Directive categories stated.

- i) The products have been specifically designed for use on steam, air or condensate which are in Group 2 of the above mentioned Pressure Equipment Directive. It can also be used on propane or methane gases which are in Group 1 of the above mentioned Pressure Equipment Directive. The products' use on other fluids may be possible but, if this is contemplated, Spirax Sarco should be contacted to confirm the suitability of the product for the application being considered.
- ii) Check material suitability, pressure and temperature and their maximum and minimum values. If the maximum operating limits of the product are lower than those of the system in which it is being fitted, or if malfunction of the product could result in a dangerous overpressure or overtemperature occurrence, ensure a safety device is included in the system to prevent such over-limit situations.
- iii) Determine the correct installation situation and direction of fluid flow.
- iv) Spirax Sarco products are not intended to withstand external stresses that may be induced by any system to which they are fitted. It is the responsibility of the installer to consider these stresses and take adequate precautions to minimise them.
- v) Remove protection covers from all connections before installation.

KE valves

Product		Group 1 Gases	Group 2 Gases	Group 1 Liquids	Group 2 Liquids
KE43	PN40	DN15 - DN25	SEP	SEP	SEP
		DN32	2	SEP	SEP
		DN40 - DN50	2	1	SEP
		DN65 - DN100	2	1	2
KE43B1	PN40	DN15 - DN25	SEP	SEP	SEP
		DN32	2	SEP	SEP
		DN40 - DN50	2	1	SEP
		DN65 - DN100	2	1	2
KE43B4	PN40	DN15 - DN25	SEP	SEP	SEP
		DN32	2	SEP	SEP
		DN40 - DN50	2	1	SEP
		DN65 - DN100	2	1	2
KE61	PN40	DN15 - DN25	SEP	SEP	SEP
KE63	PN40	DN15 - DN25	SEP	SEP	SEP
		DN32	2	SEP	SEP
		DN40 - DN50	2	1	SEP
		DN65 - DN100	2	1	2
KE71	PN25	DN15 - DN25	SEP	SEP	SEP
		DN32 - DN40	1	SEP	SEP
		DN50	2	1	SEP
KE71B1	PN25	DN15 - DN25	SEP	SEP	SEP
		DN32 - DN40	1	SEP	SEP
		DN50	2	1	SEP
KE71B4	PN25	DN15 - DN25	SEP	SEP	SEP
		DN32 - DN40	1	SEP	SEP
		DN50	2	1	SEP
KE73	PN25	DN15 - DN25	SEP	SEP	SEP
		DN32 - DN40	1	SEP	SEP
		DN50 - DN80	2	1	SEP
		DN100	2	1	2
KE73B1	PN25	DN15 - DN25	SEP	SEP	SEP
		DN32 - DN40	1	SEP	SEP
		DN50 - DN80	2	1	SEP
		DN100	2	1	2
KE73B4	PN25	DN15 - DN25	SEP	SEP	SEP
		DN32 - DN40	1	SEP	SEP
		DN50 - DN80	2	1	SEP
		DN100	2	1	2

KEA valves

Product		Group 1 Gases	Group 2 Gases	Group 1 Liquids	Group 2 Liquids
KEA41	ANSI 300	DN15 - DN25	SEP	SEP	SEP
		DN32	2	SEP	SEP
		DN40	2	1	SEP
		DN50	2	1	2
KEA43	ANSI 150	DN15 - DN25	SEP	SEP	SEP
		DN40 - DN50	1	SEP	SEP
		DN65 - DN100	2	1	SEP
		DN150	2	1	2
		DN200	3	2	2
	ANSI 300	DN15 - DN25	SEP	SEP	SEP
		DN40	2	1	SEP
		DN50 - DN100	2	1	2
KEA61	ANSI 300	DN15 - DN25	SEP	SEP	SEP
		DN32	2	SEP	SEP
		DN40	2	1	SEP
		DN50	2	1	2
KEA63	ANSI 150	DN15 - DN25	SEP	SEP	SEP
		DN40 - DN50	1	SEP	SEP
		DN65 - DN100	2	1	SEP
		DN150	2	1	2
		DN200	3	2	2
	ANSI 300	DN15 - DN25	SEP	SEP	SEP
		DN40	2	1	SEP
		DN50 - DN100	2	1	2
KEA71	ANSI 250	DN15 - DN25	SEP	SEP	SEP
		DN32 - DN50	2	2	2
KEA73	ANSI 125	DN15 - DN25	SEP	SEP	SEP
		DN40 - DN65	1	SEP	SEP
		DN80 - DN100	2	1	SEP
		DN150 - DN200	2	1	2
	ANSI 250	DN15 - DN25	SEP	SEP	SEP
		DN40 - DN50	2	1	SEP
		DN65 - DN100	2	1	2
		DN150 - DN200	3	2	2

LE valves

Product			Group 1 Gases	Group 2 Gases	Group 1 Liquids	Group 2 Liquids
LE31	PN16	DN15 - DN50	-	SEP	-	SEP
LE31B1	PN16	DN15 - DN50	-	SEP	-	SEP
LE33	PN16	DN15 - DN50	-	SEP	-	SEP
		DN65 - DN100	-	1	-	SEP
LE33B1	PN16	DN15 - DN50	-	SEP	-	SEP
		DN65 - DN100	-	1	-	SEP

LEA valves

Product			Group 1 Gases	Group 2 Gases	Group 1 Liquids	Group 2 Liquids
LEA31	ANSI 125	DN15 - DN50	-	SEP	-	SEP
LEA33	ANSI 125	DN25 - DN65	-	SEP	-	SEP
		DN80 - DN100	-	1	-	SEP

1.2 Access

Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.

1.3 Lighting

Ensure adequate lighting, particularly where detailed or intricate work is required.

1.4 Hazardous liquids or gases in the pipeline

Consider what is in the pipeline or what may have been in the pipeline at some previous time. Consider: flammable materials, substances hazardous to health, extremes of temperature.

1.5 Hazardous environment around the product

Consider: explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.

1.6 The system

Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk?

Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

1.7 Pressure systems

Ensure that any pressure is isolated and safely vented to atmospheric pressure. Consider double isolation (double block and bleed) and the locking or labelling of closed valves. Do not assume that the system has depressurised even when the pressure gauge indicates zero.

1.8 Temperature

Allow time for temperature to normalise after isolation to avoid the danger of burns and consider whether protective clothing (including safety glasses) is required.

PTFE SEALS

If seals made from PTFE have been subjected to a temperature approaching 260°C (500°F) or higher, they will give off toxic fumes, which if inhaled are likely to cause temporary discomfort. It is essential for a no smoking rule to be enforced in all areas where PTFE is stored, handled or processed as persons inhaling the fumes from burning tobacco contaminated with PTFE particles can develop 'polymer fume fever'.

1.9 Tools and consumables

Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco replacement parts.

1.10 Protective clothing

Consider whether you and/or others in the vicinity require any protective clothing to protect against the hazards of, for example, chemicals, high /low temperature, radiation, noise, falling objects, and dangers to eyes and face.

1.11 Permits to work

All work must be carried out or be supervised by a suitably competent person. Installation and operating personnel should be trained in the correct use of the product according to the Installation and Maintenance Instructions.

Where a formal 'permit to work' system is in force it must be complied with. Where there is no such system, it is recommended that a responsible person should know what work is going on and, where necessary, arrange to have an assistant whose primary responsibility is safety. Post 'warning notices' if necessary.

1.12 Handling

Manual handling of large and /or heavy products may present a risk of injury. Lifting, pushing, pulling, carrying or supporting a load by bodily force can cause injury particularly to the back. You are advised to assess the risks taking into account the task, the individual, the load and the working environment and use the appropriate handling method depending on the circumstances of the work being done.

1.13 Residual hazards

In normal use the external surface of the product may be very hot. If used at the maximum permitted operating conditions the surface temperature of some products may reach temperatures of 350°C (662°F).

Many products are not self-draining. Take due care when dismantling or removing the product from an installation (refer to 'Maintenance instructions').

1.14 Freezing

Provision must be made to protect products which are not self-draining against frost damage in environments where they may be exposed to temperatures below freezing point.

1.15 Disposal

Unless otherwise stated in the Installation and Maintenance Instructions, this product is recyclable and no ecological hazard is anticipated with its disposal providing due care is taken. However, if the valve is fitted with a Viton or PTFE seat, special care must be taken to avoid potential health hazards associated with decomposition / burning of these seats.

PTFE:

- Can only be disposed of by approved methods, not incineration.
- Keep PTFE waste in a separate container, do not mix it with other rubbish, and consign it to a landfill site.

1.16 Returning products

Customers and stockists are reminded that under EC Health, Safety and Environment Law, when returning products to Spirax Sarco they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk. This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous or potentially hazardous.

2. General product information

The K and L series control valve range consists of; two-port single seat globe valves with cage-retained seats conforming to either EN 1092 or ANSI/ASTM specification. These valves are available in three body materials: SG iron, cast steel or stainless steel (with the exception of the L series, which is available in cast iron only) in sizes DN15 to DN100 (½" to 4").

2.1 Pressure/temperature limits - KE and LE valves

Body design conditions	KE43, KE61 and KE63	PN40
	KE71 and KE73	PN25
	KE43B1, KE61B1, KE63B1, KE71B1 and KE73B1	PN16
	LE31, LE31B1, LE33 and LE33B1	PN16
Maximum design pressure	KE43	40 bar g @ 120°C
	KE61 and KE63	40 bar g @ 50°C
	KE71 and KE73	25 bar g @ 110°C
	KE43B1, KE61B1, KE63B1, KE71B1 and KE73B1	16 bar g @ 110°C
	LE31, LE31B1, LE33 and LE33B1	16 bar g @ 110°C
Maximum design temperature	KE43, KE61 and KE63	400°C
	KE71 and KE73	350°C
	KE43B1, KE61B1, KE63B1, KE71B1 and KE73B1	300°C
	LE31, LE31B1, LE33 and LE33B1	300°C
Minimum design temperature	KE43B1, KE61B1, KE63B1, KE71B1 and KE73B1	-10°C
	KE61 and KE63	-10°C
	LE31, LE31B1, LE33 and LE33B1	-10°C
Maximum operating temperature	Standard packing PTFE chevron	250°C
	PTFE soft seat (G)	200°C
	High temperature packing (H) LE Valves	300°C
	High temperature packing (H)	400°C
	Extended bonnet (E) with PTFE chevron	250°C
	Extended bonnet (E) with graphite packing	300°C
	Bellows (B1)	300°C
Designed for a maximum cold hydraulic test pressure of:	KE43	60 bar g
	KE61 and KE63	60 bar g
	KE71 and KE73	38 bar g
	LE31 and LE33	24 bar g

Warning for valves fitted with bellows - Remove bellows before hydraulic testing is done

Maximum differential pressures: See relevant actuator Technical Information sheet

Key to charts on page 9:



The product **must not** be used in this region.



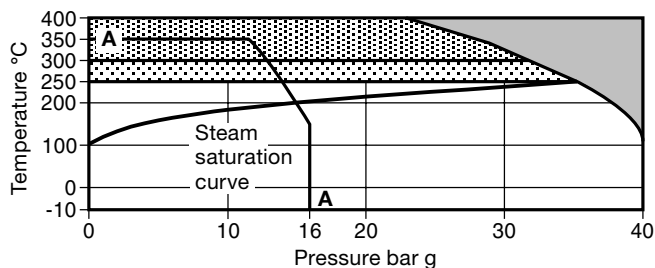
High temperature packing is required for use in this region.



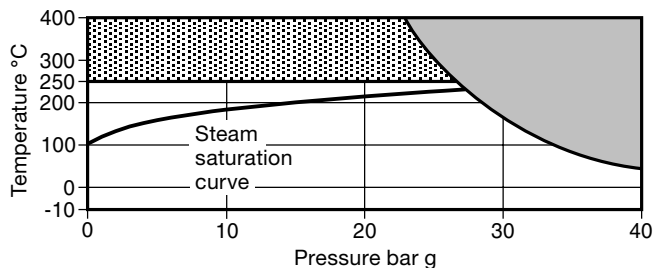
High temperature bolting and packing is required for use in this region.

A - A Note: Valves fitted with PN16 bellows (B1) are limited to the maximum bellows rating of 16 bar.

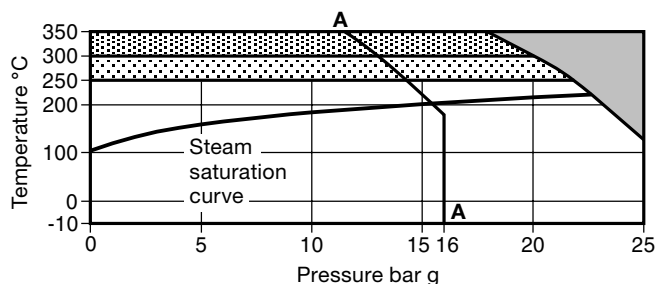
**KE43, KE43B1
and KE43B4
(cast steel)**



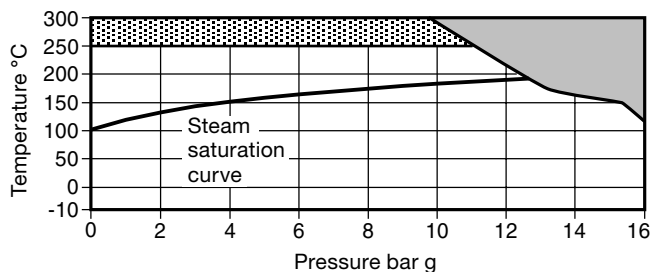
**KE61 and KE63
(stainless steel)**



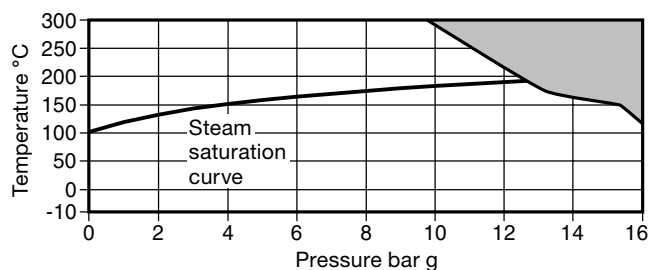
**KE71 and KE71B1,
KE73 and KE73B1
(SG iron)**



**LE31 and LE33
(cast iron)**



**LE31B1 and LE33B1
(cast iron)**



2.2 Pressure / temperature limits - ANSI KEA and LEA valves

Body design conditions	KEA41 and KEA43		ANSI 150 or ANSI 300	
	KEA61 and KEA63		ANSI 150 or ANSI 300	
	KEA71 and KEA73		ANSI 125 or ANSI 250	
	LEA31 and LEA33		ANSI 125	
Maximum design pressure	KEA41 and KEA43		740 psi g @ 100°F	
	KEA61 and KEA63		720 psi g @ 100°F	
	KEA71 and KEA73		450 psi g @ 200°F	
	LEA31 and LEA33		200 psi g @ 150°F	
Maximum design temperature	KEA41, KEA43, KEA61 and KEA63		800°F	
	KEA71 and KEA73		450°F	
	LEA31 and LEA33		450°F	
Minimum design temperature	KEA41, KEA43, KEA71 and KEA73		14°F	
	KEA61 and KEA63		-20°F	
	LEA31 and LEA33		14°F	
Maximum operating temperature	Standard packing PTFE chevron		482°F	
	PTFE soft seat (G)		400°F	
	KEA41, KEA43, KEA61 and KEA63	High temperature packing (H)	800°F	
	KEA71 and KEA73	High temperature packing (H)	450°F	
	LEA31 and LEA33			
	Maximum cold hydraulic test pressure:	KEA41 and KEA43	ANSI 150	450 psi g
ANSI 300			1 125 psi g	
KEA61 and KEA63		ANSI 150	425 psi g	
		ANSI 300	1 100 psi g	
KEA71 and KEA73		ANSI 125	300 psi g	
		ANSI 250	750 psi g	
LEA31 and LEA33		ANSI 125	300 psi g	
Warning for valves fitted with bellows - Remove bellows before hydraulic testing is done				
Maximum differential pressures:		See relevant actuator Technical Information sheet		

Key to charts on page 11:



The product **must not** be used in this region.



Graphite stem sealing is required for use in this region. Note: As standard the KEA, KFA, KLA series two-port control valves are supplied with the PTFE stem sealing option.



The product should not be used in this region or beyond its operating range as damage to the internals may occur.

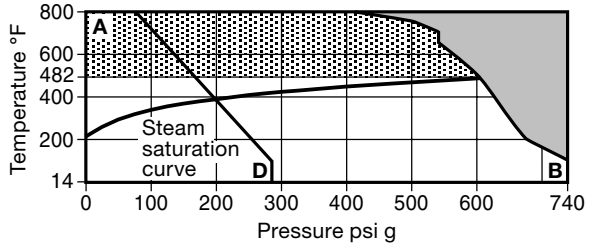
A - B Flanged ANSI 300 and screwed NPT (KEA41 and KEA61).

A - D Flanged ANSI 150.

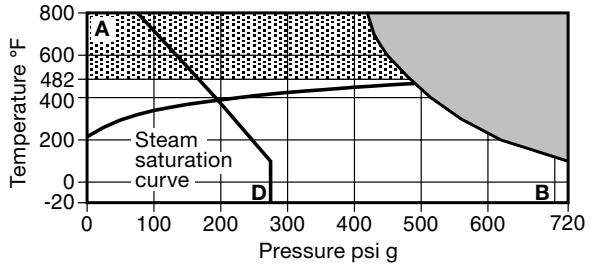
A - C Flanged ANSI 250 and screwed NPT (KEA71).

A - E Flanged ANSI 125.

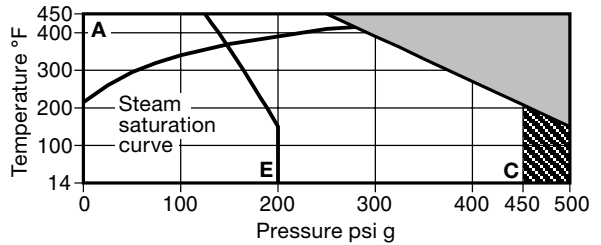
**KEA41 and KEA43
(cast steel)**



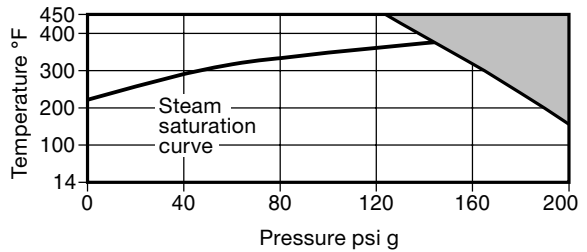
**KEA61 and KEA63
(stainless steel)**



**KEA71 and KEA73
(ductile iron)**



**LEA31 and LEA33
(ductile iron)**

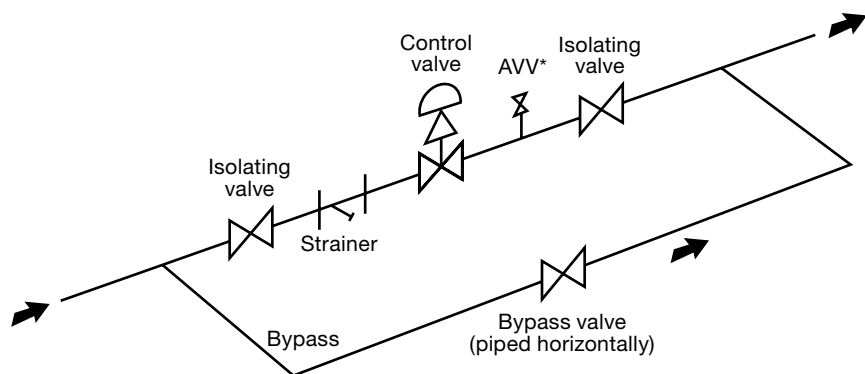


— 3. Installation and commissioning —

Note: Before actioning any installation, observe the ‘Safety information’ in Section 1.

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended installation:

- 3.1** Check materials, pressure and temperature and their maximum values. **Do not exceed the performance rating of the valve.** If the maximum operating limit of the product is lower than that of the system in which it is being fitted, ensure that a safety device is included in the system to prevent overpressurisation.
- 3.2** Remove protective covers from all connections.
- 3.3** Determine the correct installation situation and the direction of fluid flow. The valve should preferably be installed along a horizontal pipeline with the valve mounted above the pipe. When mounting an actuator to the valve body, the actuator Installation and Maintenance Instructions must be followed.
- 3.4 Bypass arrangements** - It is recommended that isolating valves be fitted upstream and downstream of the control valve, together with a manual bypass control valve. This enables the process to be controlled manually using the bypass valve while the pneumatic valve is isolated for maintenance.
- 3.5** Support pipework should be used to prevent stresses being exerted on the valve body.
- 3.6** Ensure adequate space is provided for the removal of the actuator from the valve body for maintenance purposes:
- 3.7** Isolate connecting pipework. Ensure it is clean from dirt, scale etc. Any debris entering the valve may damage the PTFE head seal preventing a tight shut-off.
- 3.8** Open isolation valves slowly, until normal operating conditions are achieved.
- 3.9** Check for leaks and correct operation.



* Anti-vacuum valve recommended for steam installations.

Fig. 1

4. Maintenance

KEA61 and KEA63 Warning

The 316 type stainless steel used in the construction of this product particularly for screwed or close fitting parts, is very susceptible to galling or cold welding. This is an inherent characteristic of this type of material and great care should therefore be taken when dismantling or reassembling.

If the application permits, it is recommended that a lighter smear of a PTFE based grease is applied to any mating parts before reassembly.

4.1 Periodic maintenance

After 24 hours of operation

After 24 hours of operation check the flange bolts for tightness.

On valves with graphite stem seal packing compress the gland seal packing by tightening the gland nut by ¼ of a turn. Care should be taken not to overtighten as this may cause the spindle to lock-up.

Every 3 months of operation

Every 3 months of normal operation check the stem gland seal for leakage. In the case of leakage proceed as follows:

- For valves with a PTFE gland seal renew the gland seal by following the procedure in Section 4.2.
- For valves with a graphite stem seal packing compress the gland seal packing by tightening the gland nut by ¼ of a turn. If leakage cannot be eliminated, renew the graphite gland seal by following the procedure in Section 4.3.

Annually

Inspect the valve to check for wear or scale deposits. Worn or damaged parts, like the plug or seat may need to be replaced, as well as the gland seal packing.

The graphite packing is normally subject to wear. Therefore it is recommended to renew the packing rings annually.

Table 1 Recommended tightening torques N m (lbf ft)

Size	Seat (4)		Bonnet nuts (15)		Gland nut (chevron seals) (9)	
DN15 (½")	40 ±5	(30 ±4)	30 ±1.5	(22 ±1)	25 - 30	(19 - 22)
DN20 (¾")	53 ±3	(39 ±2)	30 ±1.5	(22 ±1)	25 - 30	(19 - 22)
DN25 (1")	80 ±5	(59 ±4)	40 ±2	(29 ±1.5)	25 - 30	(19 - 22)
DN32 (1¼")	130 ±5	(96 ±4)	45 ±2	(33 ±1.5)	25 - 30	(19 - 22)
DN40 (1½")	220 ±5	(160 ±4)	45 ±2	(33 ±1.5)	25 - 30	(19 - 22)
DN50 (2")	150 ±5	(110 ±4)	65 ±3	(48 ±2.5)	25 - 30	(19 - 22)
DN65 (2½")	300 ±12	(220 ±9)	65 ±3	(48 ±2.8)	32 - 38	(24 - 28)
DN80 (3")	400 ±16	(295 ±12)	60 ±3	(44 ±2)	32 - 38	(24 - 28)
DN100 (4")	600 ±24	(442 ±18)	60 ±3	(44 ±2)	32 - 38	(24 - 28)
DN150 (6")	678	(500)	488	(360)	81	(60)
DN200 (8")	678	(500)	488	(360)	81	(60)

4.2 Procedure for renewing PTFE chevron gland seals

- Isolate the valve on both sides.
- Remove the actuator from the valve. Refer to the Installation and Maintenance Instructions covering Spirax Sarco actuators.
Caution: Care should be taken in removing the bonnet since fluid under pressure may be trapped between the isolating valves.
- Remove the lock-nut (7).
- Unscrew the bonnet nuts securing the bonnet to the body and remove the bonnet (2) complete with the plug/stem assembly.
- Unscrew the gland nut (8), withdraw the plug/stem assembly, remove and discard the gland seal set (10 + 11 + 15) and gland nut gasket (6).
- Examine the parts for signs of damage or deterioration and renew as necessary. Note that score marks or scaly deposits on the valve stem (5) will lead to early failure of the seals.
- Clean the parts taking care to avoid scratching the stem or bore of the gland nut. Refit the plug assembly into the valve body.
- Using a new bonnet gasket refit the bonnet (2) onto the valve body, leaving the stem protruding. Replace the bonnet nuts and tighten to the recommended torque (see Table 1, page 13), ensuring that the valve plug is centrally located in the seat whilst tightening.
- To replace the new gland seal assembly (10, 11, 15), firstly fit the gland spring (11) over the valve stem (5). New chevron gland seals should be firmly inserted into the gland nut (8), as shown in Figure 2. Being careful to avoid damage to the sealing edges, replace the gland nut gasket (6). Refit the gland nut (8) over the valve stem (5), screwing down to ensure the gasket is bedded down onto the bonnet (2).
- Ensure that the stem (5) moves freely.
- Refit the valve lock-nut (7).
- Refit the actuator, clamping nut (9) and connect the actuator to the valve stem.
- Bring the valve back into service.
- Check for any leakage at the gland.

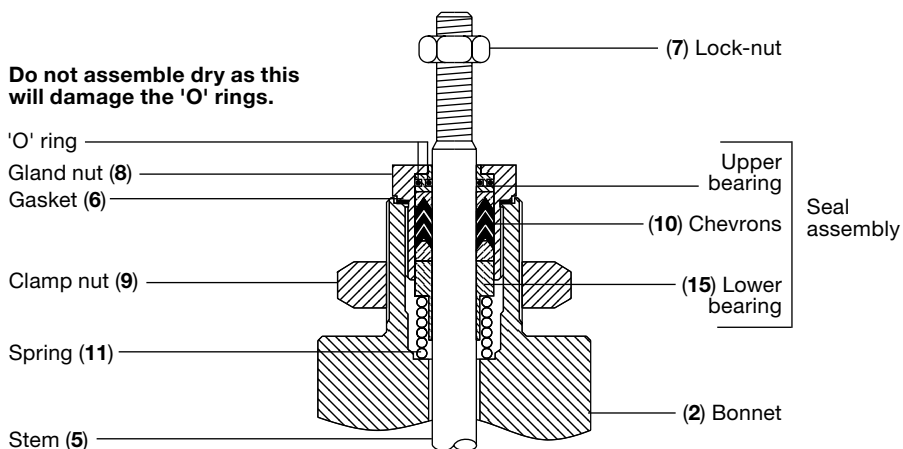


Fig. 2

4.3 Procedure for renewing graphite gland seals

- Isolate the valve on both sides.
- Remove the actuator from the valve. Refer to the Installation and Maintenance Instructions covering Spirax Sarco actuators.
Caution: Care should be taken in removing the bonnet since fluid under pressure may be trapped between the isolating valves.
- Remove the lock-nut (7).
- Unscrew the bonnet nuts securing the bonnet to the body and remove the bonnet (2) complete with the plug/stem assembly.
- Unscrew the gland nut (8). Withdraw the plug/stem assembly, remove and discard the gland seal set (10 + 15), and gasket from the bonnet.
- Examine the parts for signs of damage or deterioration. Note that score marks or scaly deposits on the valve stem (5) will lead to early failure of the seals.
- Clean the parts taking care to avoid scratching the stem or bore of the gland nut.
- The replacement graphite gland seal should now be fitted. Note that the gland seal set contains a top and bottom support ring and a graphite pack. The order of the graphite pack should be maintained as supplied during the fitting procedure. Place the bottom support ring into the bonnet. One by one add the graphite rings and each time use the gland nut (8) to drive the ring down into the bonnet. Ensuring the junction of the ring ends are rotated by 90°. Leave the gland nut loosely assembled so that the seals are not compressed.

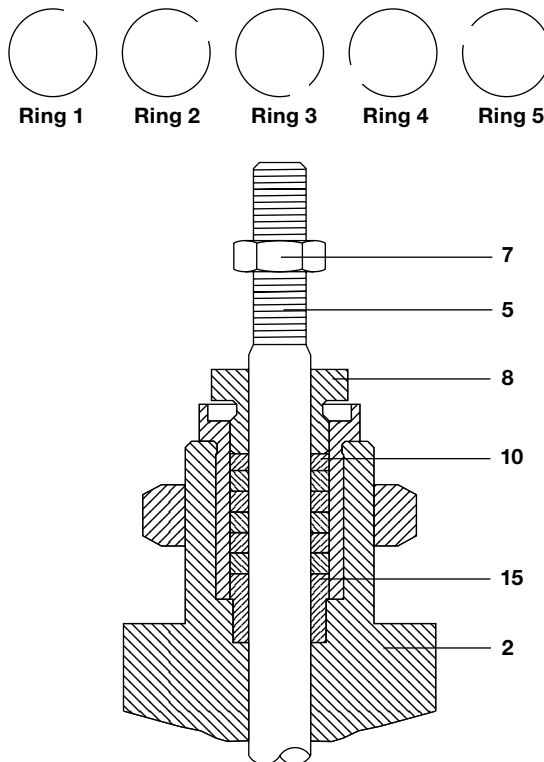


Fig. 3

- Refit the valve plug/stem assembly by carefully sliding the valve stem in order to pass through the seals.
- Using a new bonnet gasket refit the bonnet (2) onto the valve body, ensuring the plug is on the valve seat, and replace the nuts and tighten to the recommended torque (see Table 1, page 13), ensuring that the valve plug is centrally located in the seat whilst tightening.
- Screw down the gland nut until it just starts to compress the packing. Compress the gland seal packing by tightening the gland nut (8) by 1½ turns. Raise and lower the valve stem after each tightening of the gland nut to encourage the seals to bed down correctly.
- Ensure that the valve spindle is able to travel fully open and fully closed a minimum of 5 times to ensure a smooth operation.
- Tighten the gland nut (8) by approximately ½ turn to ensure seats are under load and re-stroke the valve.
- Commission the actuator according to the appropriate Installation and Maintenance Instructions.
- Bring the valve back into service.
- Should there be a small amount of seepage from the valve stem, this may be stopped by carefully tightening the gland nut. Care should be taken not to overtighten as this may cause the spindle to lock-up.

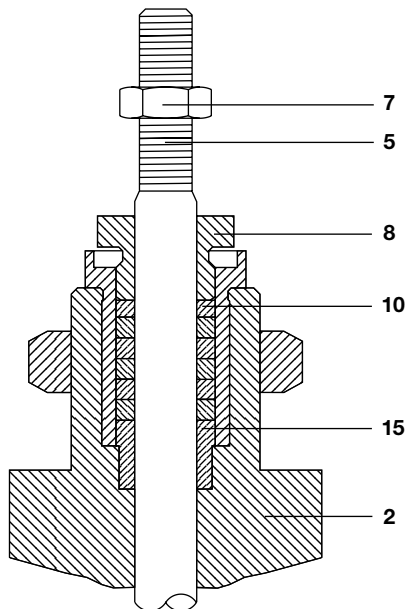


Fig. 4

4.4 Procedure for renewing the valve plug and seat

- Isolate the valve on both sides.
- Remove the actuator from the valve. Refer to the Installation and Maintenance Instructions covering Spirax Sarco actuators.
Caution: Care should be taken in removing the bonnet since fluid under pressure may be trapped between the isolating valves.
- Remove the lock-nut (7).
- Unscrew the four bonnet nuts (13) securing the bonnet to the body and remove the bonnet (2) complete with the stem and plug (3 + 5).
- Unscrew the gland nut (8), withdraw the stem and plug (3 + 5) and remove and discard the gland seal set (10 + 11 + 15) along with the gasket (6), taking care not to damage the bore of the gland nut (8). Clean the bonnet and then replace new stem and plug.
- Unscrew and remove the valve seat (4). Remove the seat gasket (16) and replace with a new seat gasket.
- Lightly smear the threads of the new seat (4) with silicon grease and screw it into the body. Tighten to the recommended torque (see Table 1, page 13) ensuring the valve plug is on its seat.
- Using a new bonnet gasket (12) refit the bonnet (2) onto the valve body. Replace the four bonnet nuts (13) and tighten to the recommended torque (see Table 1, page 13).
- Fit new gland seal and gasket as described in Section 4.2. If graphite seals are used refer to Section 4.3. Ensure the valve stem (5) moves freely after assembly.
- Bring the valve back into service.
- Check for any leakage at the gland.

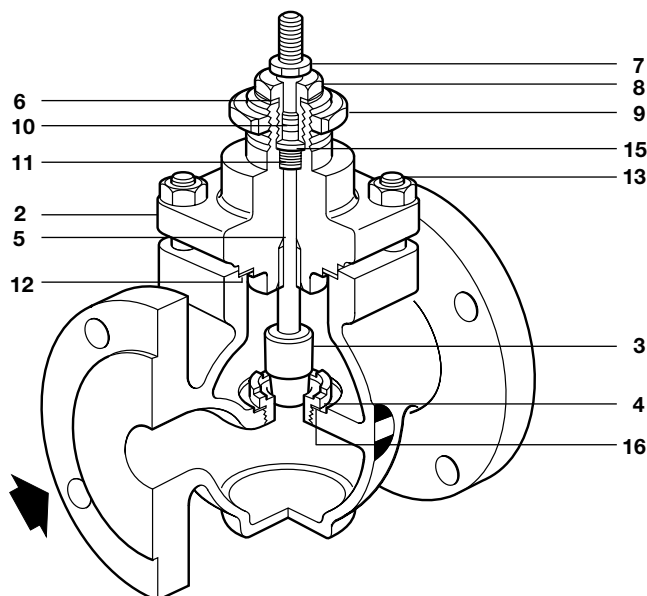


Fig. 5 LE33 DN15 to DN65 shown

4.5 Replacing a PTFE soft seal (DN150 and DN200 valves)

When replacing a soft seal plug/assembly, proceed as follows:

- Taking care not to damage the stem, post or head remove the 6 bolts which attach the retaining cover (A) to the valve head (B) and remove the old PTFE seal.
- Clean all mating surfaces and fit the new PTFE seal (C). Refit the retaining cover (A), by assembling the 6 bolts (D) and tightening to a torque of 40 N m (30 lbf ft). The threaded holes in the valve head have locking wire thread inserts which provide a locking function for the bolts.
- Reassemble the plug/stem assembly, then reassemble the valve using a new bonnet gasket.
- Bring the valve back into service.
- Check for any leakage at the gland.

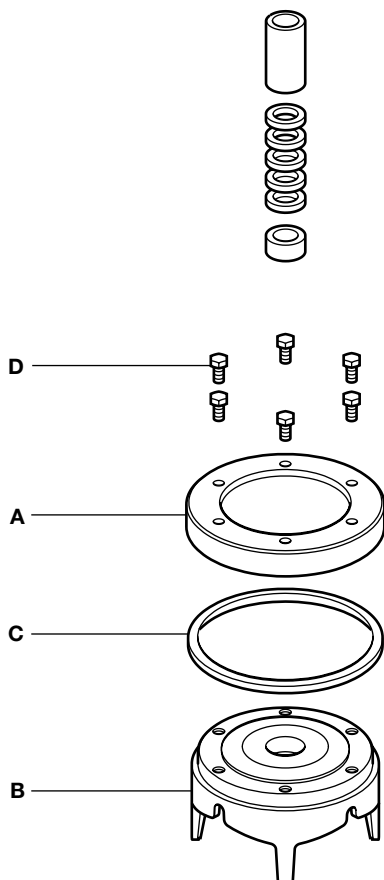


Fig. 5

4.6 Procedure for renewing stem seals on bellows sealed valves

Note: These valves are fitted with a bellows stem seal as the primary seal together with a supplementary graphite stem seal. Any leakage from the stem will indicate a failure of the bellows seal. In normal service the supplementary graphite seal should be left finger tight and only tightened to provide a temporary stem seal if the bellows stem seal is leaking.

- Isolate the valve on both sides.
- Remove the actuator from the 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 the Installation and Maintenance Instructions covering Spirax Sarco actuators.
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.
- Remove the lock-nut (7).
- Unscrew the gland nut (8), remove the gland nut gasket (6), remove and discard the stem seal set (10 + 15).
- Examine the 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 of scaly deposits on the valve stem (5) will impair sealing efficiency.
- Clean the parts taking care to avoid scratching the stem or bore of the bellows assembly top end.
- New graphite stem seal set (10 + 15), should be fitted into the bellows assembly top end, care being taken to avoid damage (see Section 4.3).
- Refit the gland nut gasket (6) and finger tighten the gland nut (8) over the valve stem.
- Ensure the valve stem (5) moves freely.
- Refit the lock-nut (7).

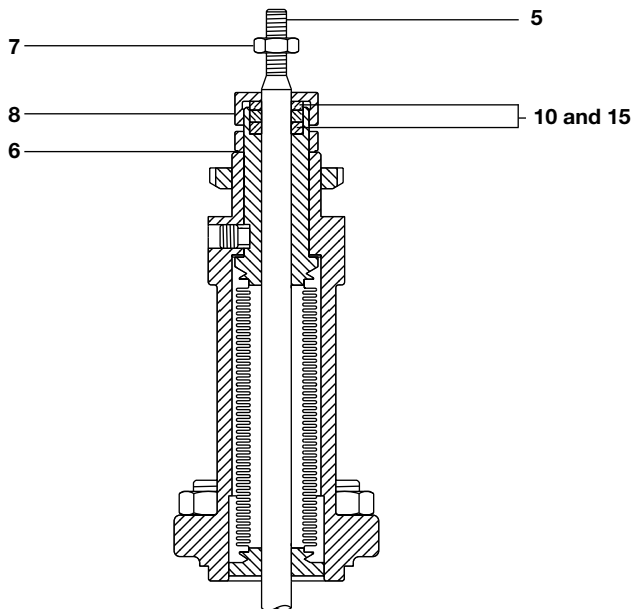


Fig. 6

4.7 Procedure for renewing the valve plug, seat and bellows assembly (Figure 7)

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.

- Isolate and remove the valve from the pipeline.
Caution: Care should be taken in removing the valve since fluid under pressure may be trapped between the isolating valves.
- Remove the actuator from the 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 the Installation and Maintenance Instructions covering Spirax Sarco actuators.
- Remove the lock-nut (7).
- Unscrew the nuts (13) securing the bonnet.
- Withdraw the bonnet (2) together with the plug stem/bellows assembly (5). Remove the gland nut (8), gland nut gasket (6) and the stem seal set (10 + 15) see Figure 7. Unscrew the plug/stem/bellows assembly lock-nut (25) and anti-rotation screw (22) withdraw the assembly from the bonnet.
- Unscrew and remove the valve seat (4).
Note: To remove and replace seat (4) a special tool is required which can be obtained from Spirax Sarco by quoting the valve size and type.
- Replace seat gasket (16) and insert the new seat (4) into the body. Tighten to the recommended torque (see Table 2, below).
- Insert the new stem/bellows assembly into the bore of the new plug and secure with the cross pin (24). 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 - any raised metal should be removed.
- Insert the replacement plug/stem/bellows assembly (5) with new bellows flange gasket (21) and bonnet gasket (12) into the bonnet (2) taking care not to damage the bellows. Replace the bellows assembly anti-rotation washer (20) and lock-nut (25) and tighten to the recommended torque (see Table 2, below).

Table 2 Recommended tightening torques N m (lbf ft)

Valve size		Seat (4)		Bellows housing nuts (13)	Bellows lock-nut (8)
		KE	LE		
DN15	½"	205 (150)	40 (55)	16 (25)	25 (35)
DN20	¾"	205 (150)	53 (72)	20 (30)	25 (35)
DN25	1"	180 (245)	90 (122)	25 (35)	25 (35)
DN32	1¼"	180 (245)	130 (176)	40 (55)	25 (35)
DN40	1½"	180 (245)	220 (300)	40 (55)	25 (35)
DN50	2"	180 (245)	180 (244)	60 (80)	25 (35)
DN65	2½"	220 (300)	300 (405)	47 (65)	40 (55)
DN80	3"	220 (300)	400 (545)	55 (75)	40 (55)
DN100	4"	220 (300)	600 (815)	45 (60)	40 (55)
DN150	6"	500 (678)	-	-	-
DN200	8"	500 (678)	-	-	-

- Using a new gasket (**12**) refit the bonnet and stem/bellows assembly onto the valve body. While pushing the stem so that the valve plug is on the seat, tighten the bonnet nuts (**13**) to the recommended torque (see Table 2).
 - Fit the new stem seal set (**10 + 15**) see Section 4.3, Figure 3 as described in Section 3.1, ensuring that the valve stem (**5**) moves freely after assembly.
 - Refit the actuator and connect the actuator to the 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 the Installation and Maintenance Instructions covering Spirax Sarco actuators.
- Bring the valve back into service.
 - Check for leakage around all gasket joints.

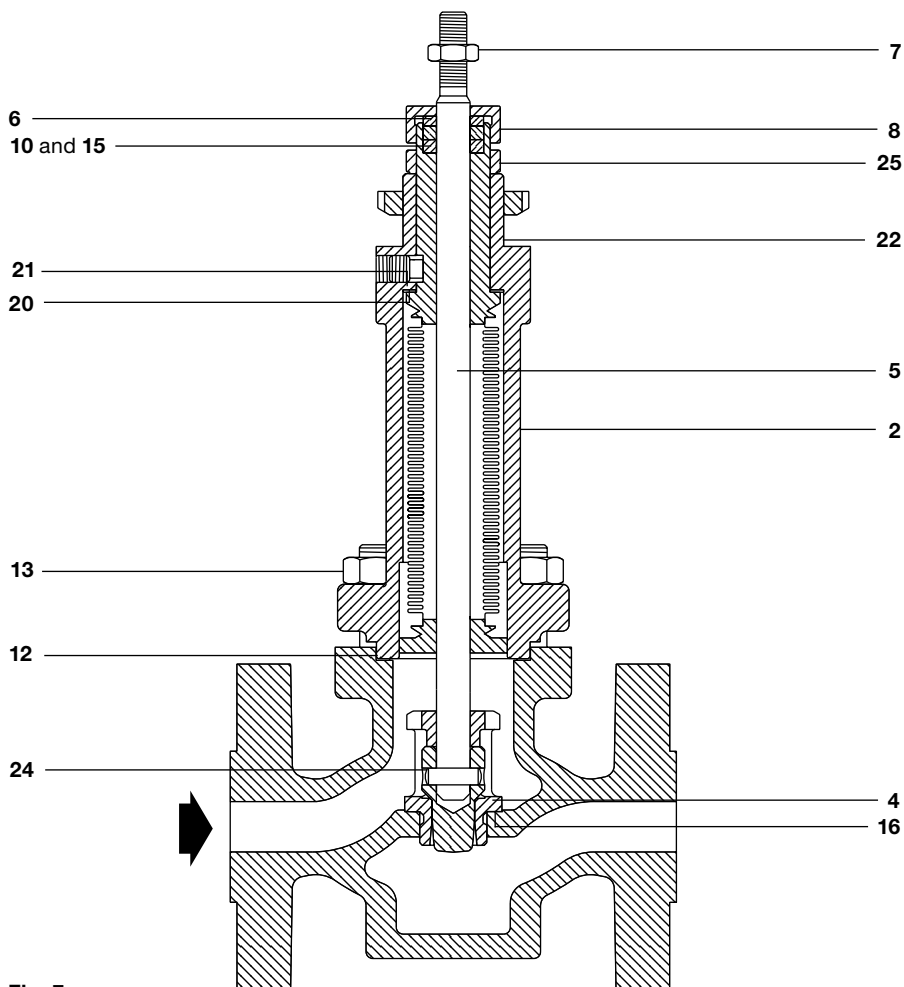


Fig. 7

5. Spare parts

Spare parts - KE43, KE61, KE63, KE71 and KE73 - DN15 to DN100

All spare parts available are shown in solid outline. Parts shown in broken line are not supplied as spares.

Note: When placing an order for spares please indicate clearly the date code (found on the label of the valve body e.g. C04), this will ensure that the correct spare parts are supplied.

Available spares

Actuator clamping nut	A
PTFE gland seal kit for DN15 to DN50 (gasket, chevrons, spring, upper and lower bearings, 'O' ring and gland nut)	B
PTFE gland seal kit for DN65 to DN100 (gasket, chevrons, guide bush and spring)	B1
Gland seal kits	C
Graphite gland seal kit (H - high temperature seal) (graphite stem seals, stuffing box gasket) Note: The graphite gland seal kit is suitable for stuffing box and bonnet designs.	
Plug and stem	D, E
Standard plug and stem assembly with bonnet gasket	
Soft seated plug and stem assembly with bonnet gasket	D1, E
Note: Please state equal percentage, linear or fast opening plug when placing an order	
Bonnet gasket (set of 3)	E
Seat, seat gasket and bonnet gasket	F, G, E

How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of valve including the date code.

Example: 1 - PTFE gland seal kit for a Spirax Sarco DN25 KE73 two-port control valve. Date coded C04.

How to fit spares

Full fitting instructions are given in the Installation and Maintenance Instructions supplied with the spare.

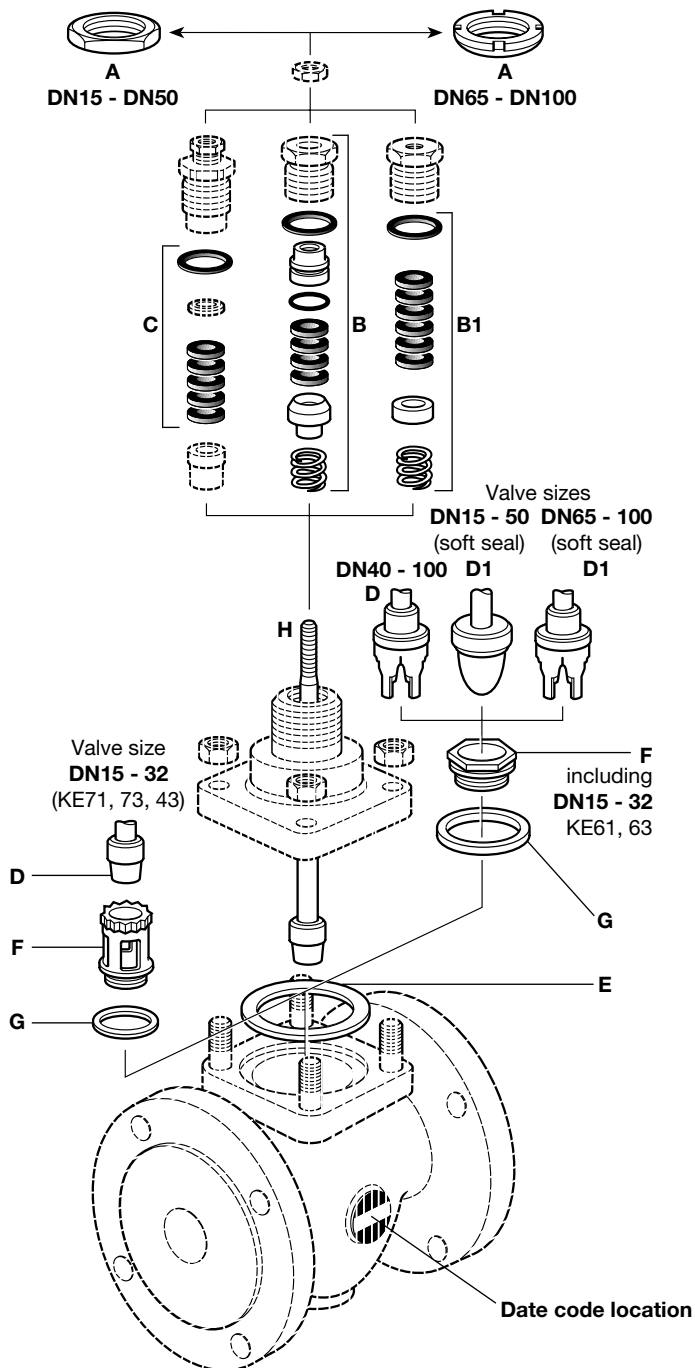


Fig. 8 KE43, KE61, KE63, KE71 and KE73 - DN15 to DN100

Spare parts - KEA series 6" and 8" (DN150 and DN200)

The spare parts available are shown in solid outline. Parts drawn in broken line are not supplied as spares.

Note: When placing an order for spares please indicate clearly the date code (found on the label of the valve body e.g. C04) this will ensure that the correct spare parts are supplied.

Available spares

Actuator clamping nut	A
PTFE gland seal kit for DN15 to DN50 (gasket, chevrons, guide bush and spring)	B
Gland seal kits	C
Graphite gland seal kit (H - high temperature seal option) (top support ring, graphite stem seal, bottom support ring)	
Plug and stem	D, E
Standard plug and stem assembly with bonnet gasket	D, E
Soft seated plug and stem assembly with bonnet gasket	D, E
Note: Please state equal percentage, linear or fast opening plug when placing an order	
Bonnet gasket (set of 3)	E
Seat, seat gasket and bonnet gasket	F, G, E
Soft seat seal kit (PTFE) soft seal and bonnet gasket	H, E

How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of valve including the date code.

Example: 1 - Seat, seat gasket and bonnet gasket for a Spirax Sarco 6" KEA73 two-port control valve Cv 280 having flanged ANSI 250 connections. Date coded C04.

How to fit spares

Full fitting instructions are given in the Installation and Maintenance Instructions supplied with the spare.

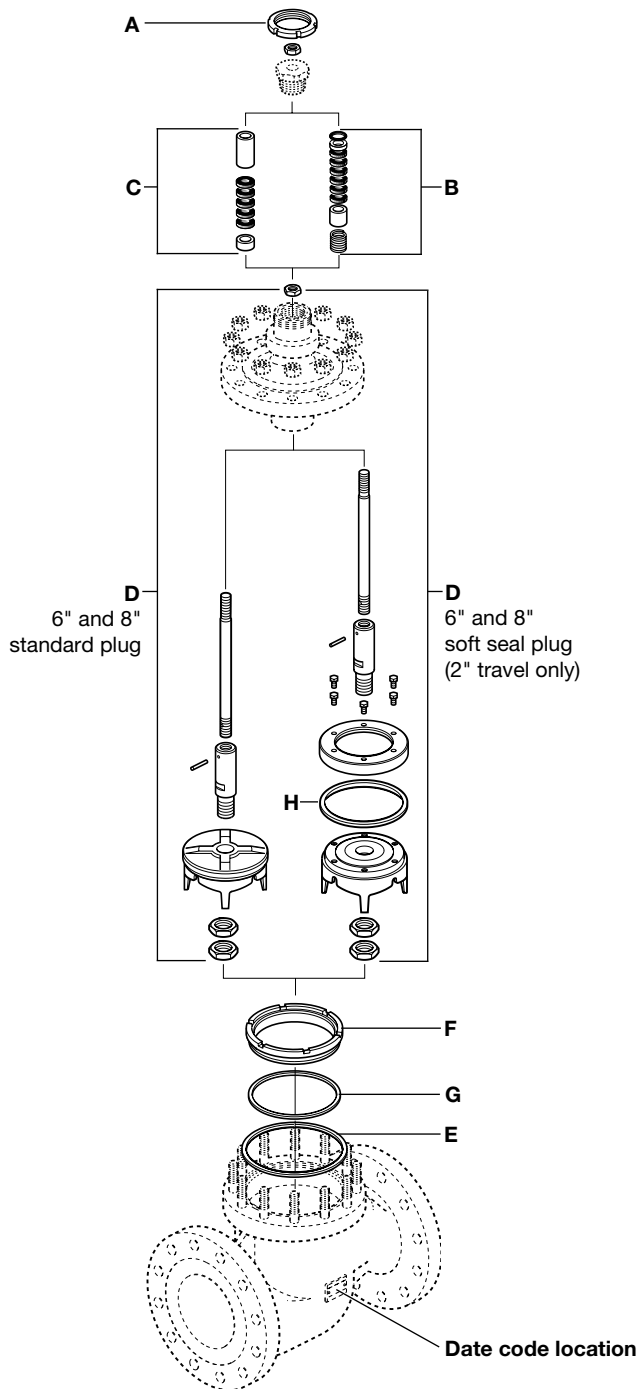


Fig. 9 KEA series 6" and 8" (DN150 and DN200)

Spare parts - LE31, LE33, LEA31 and LEA33 - DN15 to DN100

All spare parts available are shown in solid outline. Parts shown in broken line are not supplied as spares.

Note: When placing an order for spares please indicate clearly the date code (found on the label of the valve body e.g. C04) this will ensure that the correct spare parts are supplied.

Available spares

Actuator clamping nut		A
	PTFE gland seal kit for DN15 to DN50 (gasket, chevrons, spring, upper and lower bearings, 'O' ring and gland nut)	B
Gland seal kits	PTFE gland seal kit for DN65 to DN100 (gasket, chevrons, guide bush and spring)	B1
	Graphite gland seal kit (H - high temperature seal) (graphite stem seals, stuffing box gasket) Note: The graphite gland seal kit is suitable for stuffing box and bonnet designs.	C
Plug and stem	Standard plug and stem assembly with bonnet gasket	D, E
	Soft seated plug and stem assembly with bonnet gasket	D1, E
Note: Please state equal percentage, linear or fast opening plug when placing an order		
Bonnet gasket (set of 3)		E
Seat, seat gasket and bonnet gasket		F, G, E
Valve plug and stem kit	DN15 and DN100	H, D
Valve seat only	DN15 and DN100	F

How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of valve including the date code.

Example: 1 - PTFE gland seal kit for a Spirax Sarco 1" LEA33 two-port control valve. Date coded C04.

How to fit spares

Full fitting instructions are given in the Installation and Maintenance Instructions supplied with the spare.

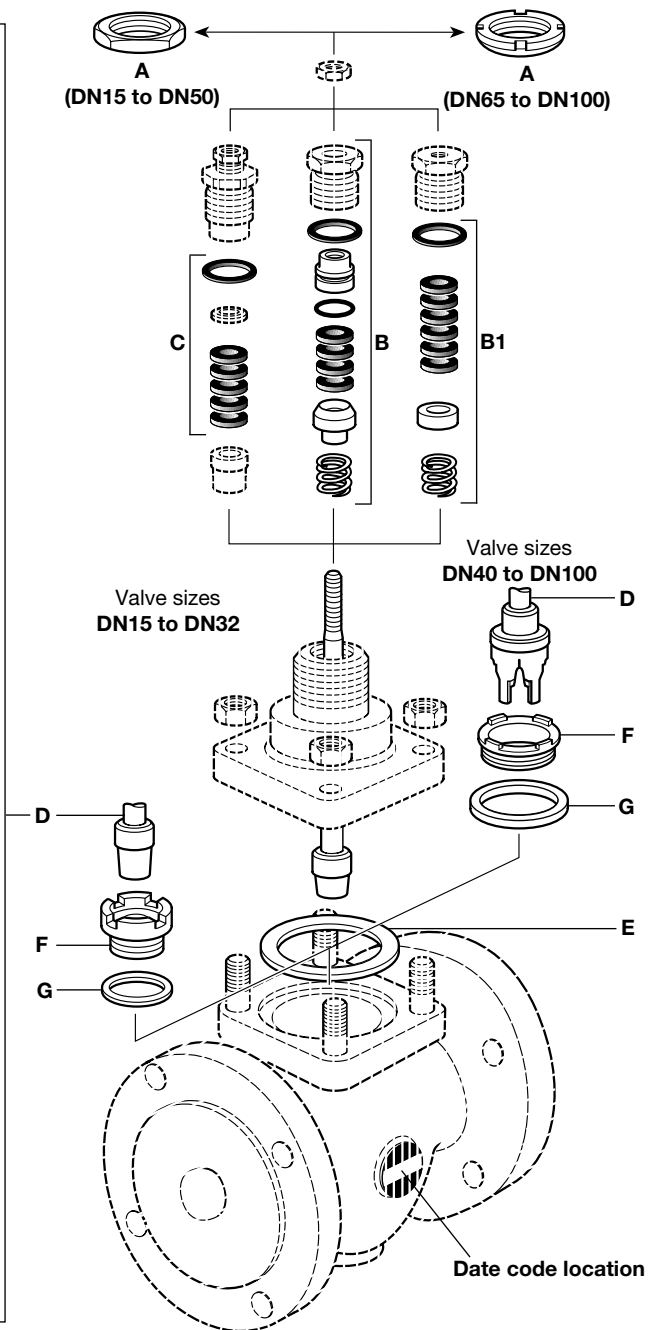
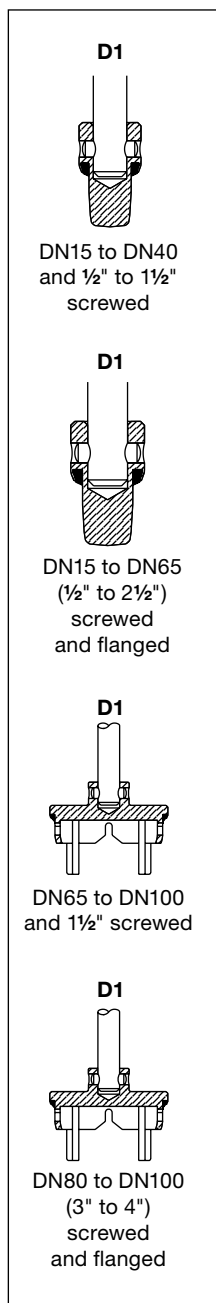


Fig. 10 LE, LE33, LEA31 and LEA33 - DN15 to DN100

Bellows sealed valve

Spares parts - KE series - DN15 to DN15 (½" to 8")

All available spare parts are identified below and clearly shown in Figure 11, page 29.

Note: when placing an order for spares please indicate clearly the date code (found on the label of the valve body e.g. C04) this will ensure that the correct spare parts are supplied.

Available spares

Gland seal kits	PTFE gland seal kit for DN15 to DN50 (gasket, chevrons, spring, upper and lower bearings, 'O' ring and gland nut)	B
	PTFE gland seal kit for DN65 to DN100 (gasket, chevrons, guide bush and spring)	B1
	Graphite gland seal kit (B1 only) (graphite stem seals, stuffing box gasket) Note: The graphite gland seal is suitable for stuffing box and bonnet designs.	C
Plug and pin	Standard plug	J, K
	Soft seated plug	J1, K
Note: Please state equal percentage, linear or fast opening plug when placing an order		
Seat and seat gasket		F, G
Bonnet gasket (pack of 3)		E
Bellows gasket (pack of 6)		M
B1 Spindle/bellows assembly and plug pin		K, L, M
B4 Spindle/bellows assembly and plug pin		K, L

How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of valve including the date code.

Example: 1 - Seat and seat gasket kit for a Spirax Sarco DN25 KE73B1 bellow sealed two-port control valve. Date coded C04.

How to fit spares

Full fitting instructions are given in the Installation and Maintenance Instructions supplied with the spare.

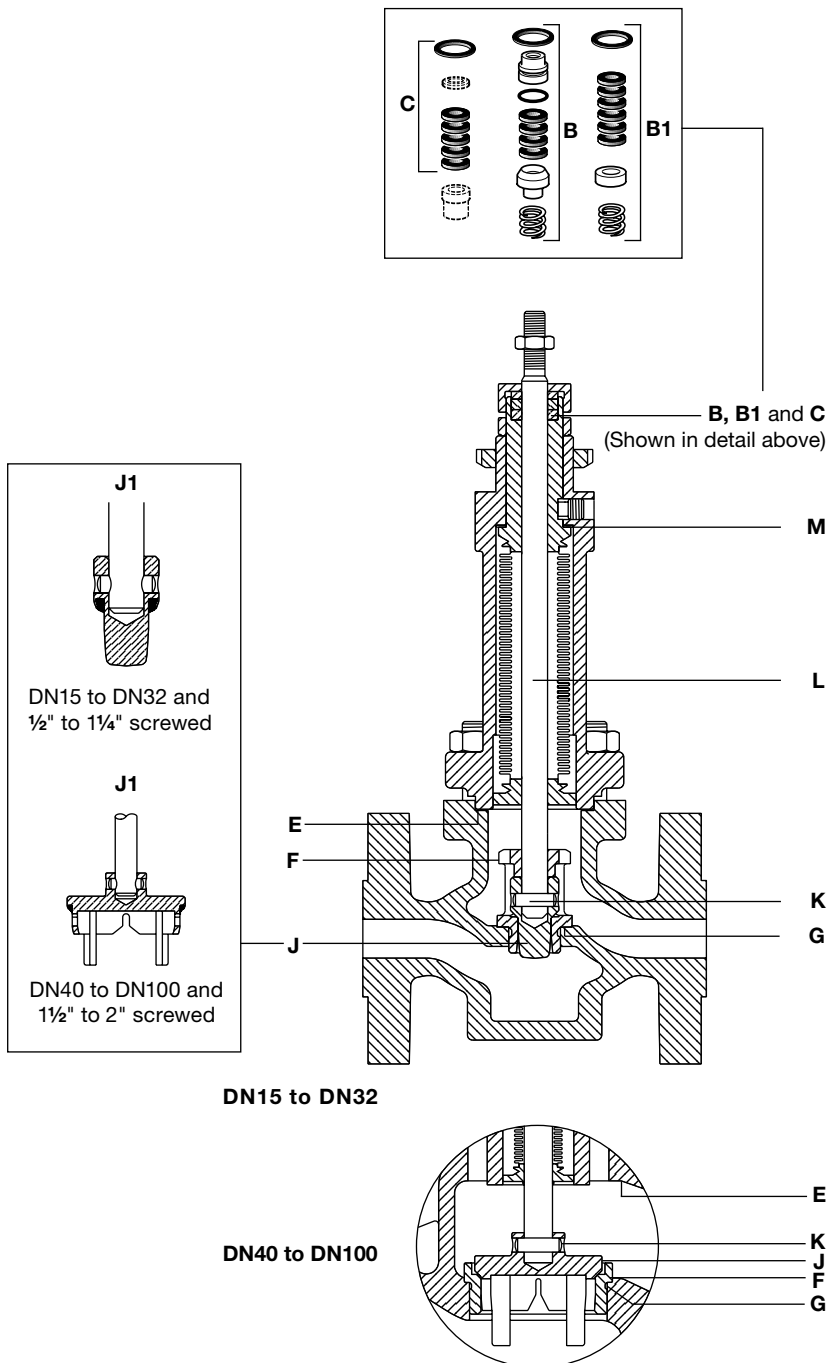


Fig. 11 Bellows sealed KE series - DN15 to DN200 (1/2" to 8")

Bellows sealed valve

Spare parts - LE31B1 and LE33B1 - DN15 to DN100

All available spare parts are identified below and clearly shown in Figure 12, page 31.

Note: When placing an order for spares please indicate clearly the date code (found on the label of the valve body e.g. C04) this will ensure that the correct spare parts are supplied.

Available spares

Gland seal kits	Graphite gland seal kit (B1 only) (graphite stem seals, stuffing box gasket)	C
	Note: The graphite gland seal is suitable for stuffing box and bonnet designs.	
Plug and pin	Standard plug	D, J
	Soft seated plug	D1, J
Note: Please state equal percentage, linear or fast opening plug when placing an order		
Seat and seat gasket		F, G
Bonnet gasket (pack of 3)		E
Bellows gasket (pack of 6)		M
B1 Spindle/bellows assembly and plug pin		H, J, M
B4 Spindle/bellows assembly and plug pin		H, L

How to order spares

Always order spares by using the description given in the column headed 'Available spares' and state the size and type of valve including the date code.

Example: 1 - Seat, seat gasket and bonnet gasket for a Spirax Sarco DN25 LE33B1 Kvs 10 flanged to PN16. Date coded C04.

How to fit spares

Full fitting instructions are given in the Installation and Maintenance Instructions supplied with the spare.

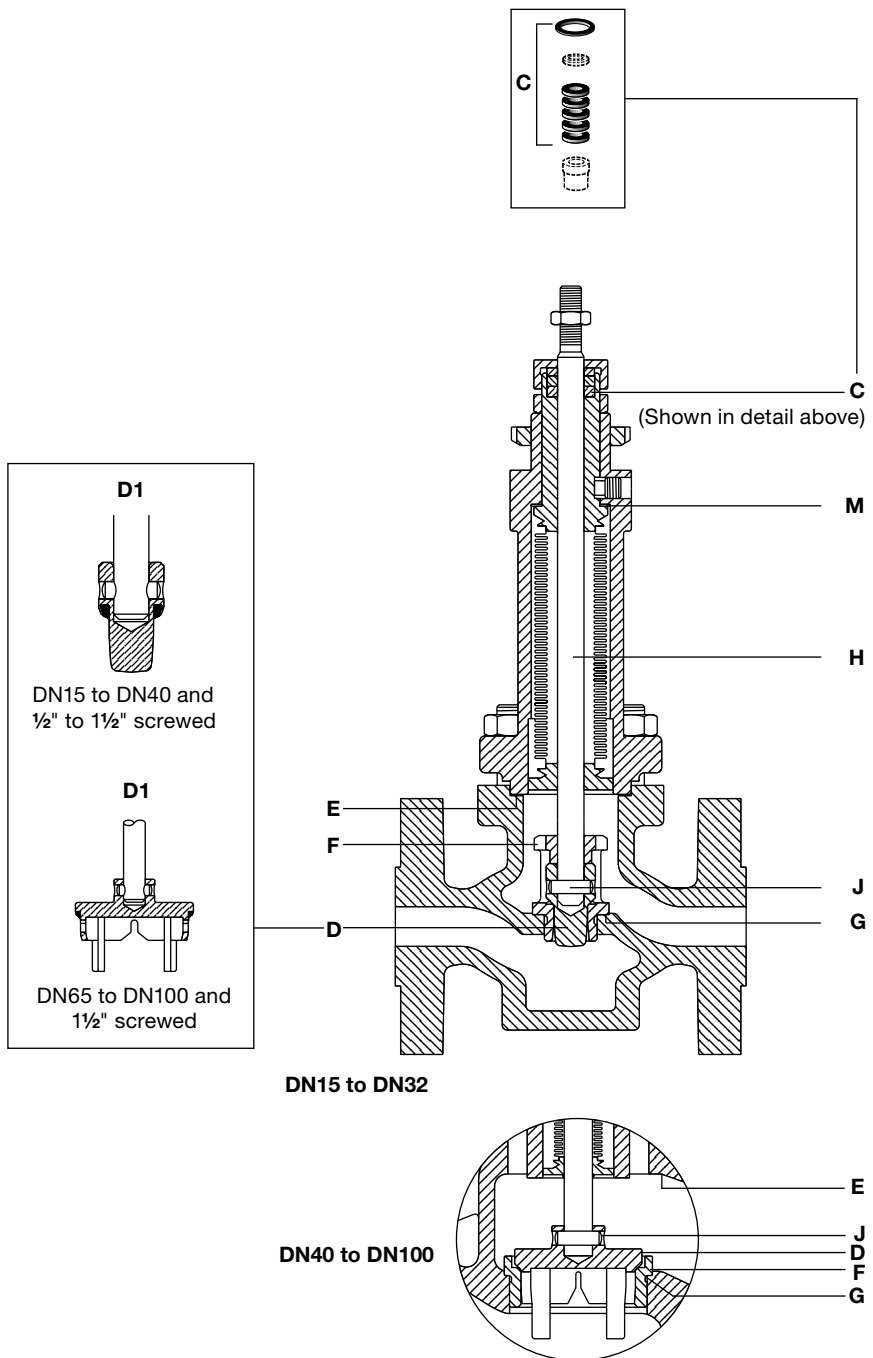


Fig. 12 LE31B1 and LE33B1 - DN15 to DN100

