

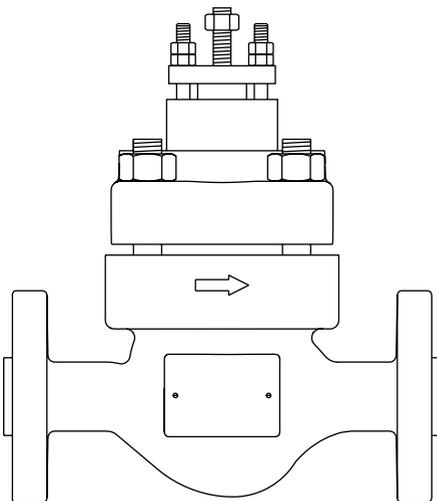
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**SPIRA-TROL Two-port Control Valves**  
**EN Standard JE, JF and JL DN15 to DN200 and**  
**ASME Standard JEA, JFA and JLA 1/2" to 8"**  
Installation and Maintenance Instructions

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1. Safety information
2. General product information
3. Installation and commissioning
4. Maintenance  
DN15 - DN100
5. Maintenance  
DN125 - DN200
6. Spare parts

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# 1. Safety information

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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 or personal cleanliness by washing hands and removing any PTFE particles lodged under the fingernails.

## 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 in the Table on page 3 comply with the requirements of the European Pressure Equipment Directive 97/23/EC, carry the  $\text{C}\epsilon$  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. They can also be used on fluids, gases and liquids which are in Group 1. 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 and protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.

## JE valves

Size	Material	Group 1 Gases	Group 2 Gases	Group 1 Liquids	Group 2 Liquids
DN15 DN20 DN25	1.0619+N / WCB 1.7357 / WC6 1.4408 / CF8M	SEP	SEP	SEP	SEP
DN32	1.0619+N / WCB 1.7357 / WC6 1.4408 / CF8M	2	SEP	2	SEP
DN40 DN50 DN65 DN80 DN100	1.0619+N / WCB 1.7357 / WC6 1.4408 / CF8M	2	1	2	SEP
DN125 DN150 DN200	1.0619+N / WCB 1.7357 / WC6 1.4408 / CF8M	3	2	2	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.

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## 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.

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### **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 590°C (1094°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

## 2.1 General description

SPIRA-TROL is a range of two-port single seat globe valves with cage-retained seats conforming to either EN (DIN) or ASME standards. These valves are available in three body materials. When used in conjunction with a pneumatic or electric linear actuator they provide modulating control or on / off service.

### SPIRA-TROL valve characteristic - options:

**JE and JEA** **Equal percentage (E)** - Suitable for most modulating process control applications providing good control at low flowrates.

**JF and JFA** **Fast opening (F)** - For on/off applications only.

**JL and JLA** **Linear (L)** - Primarily for liquid flow control where the differential pressures across the valve is constant.

**Important note:** Throughout this document, reference has been made to the standard JE, JEA control valves. With the exception of trim type, all derivatives are identical.

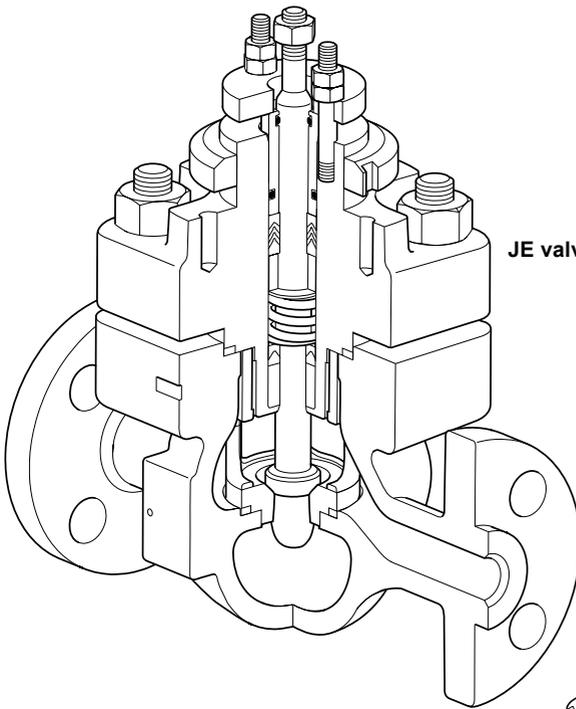
### SPIRA-TROL two-port control valves are compatible with the following actuators and positioners:

<b>Electric</b>	DN15 - DN100: EL3500, AEL5 and AEL6
	DN125 - DN200: EL5600
<b>Pneumatic</b>	All sizes: PN1000, PN9000
	DN125 - DN200 : PN1000 , PN9000 and TN2000
	PP5 (pneumatic) or EP5 (electropneumatic) ISP5 (intrinsically safe electropneumatic)
<b>Positioners</b>	SP200is, SP400 and SP500 (microprocessor based electropneumatic)
	SP500 HART®
	SP300 (digital communications)

Refer to the relevant Technical Information sheet for further details.

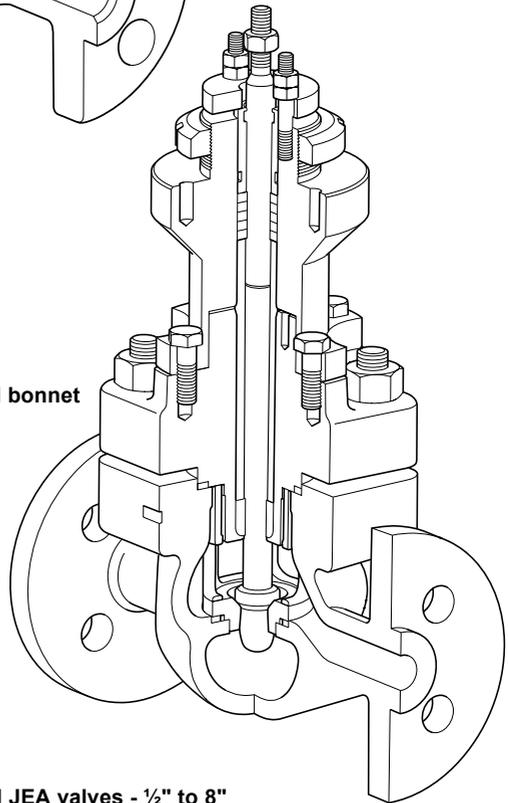
## 2.2 Technical data

<b>Plug design</b>			Parabolic	
	Metal-to-metal	JE series	Class IV	
		JEA series	ASME Class IV	
<b>Leakage</b>	Soft seal	JE series	Unbalanced	Class VI
			Balanced	Class IV
		JEA series	Unbalanced	ASME Class VI
			Balanced	ASME Class IV
<b>Rangeability</b>			50:1	
<b>Travel</b>	DN15 to DN50	(½" to 2")	20 mm (¾")	
	DN65 to DN100	(2½" to 4")	30 mm (1¼")	
	DN125 to DN200	(5" to 8")	70 mm (2¾")	
<b>Pressure/temperature limits</b>	JE		See Section 2.3	
	JEA		See Section 2.5	



**JE valves - DN15 to DN200 (½" to 8")**

**JE valve with extended bonnet**



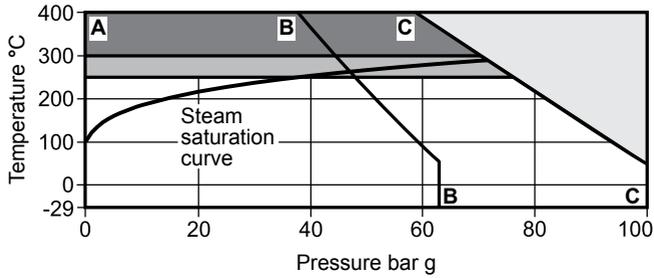
**Fig. 1 JE valves - DN15 to DN200 and JEA valves - ½" to 8"**

### 2.3 Pressure/temperature limits - JE43 and JEA43

Body design conditions		PN100 / ASME Class 600		
PMA	Maximum allowable pressure	EN	PN63 <b>JE43</b> 63 bar g @ 50°C	
			PN100 <b>JE43</b> 100 bar g @ 50°C	
and	Maximum operating pressure	ASME 600, Butt-weld and Socket weld	<b>JEA43</b> 102.1 bar g @ 38°C (1480 psi g @ 100°F)	
PMO		JIS / KS 30	<b>JEA43</b> 51 bar g @ 120°C	
		JIS / KS 40	<b>JEA43</b> 68 bar g @ 120°C	
TMA	Maximum allowable temperature	EN	<b>JE43</b> 400°C	
			ASME 600, Butt-weld and Socket weld	<b>JEA43</b> 425°C (797°F)
			JIS / KS 30	<b>JEA43</b> 425°C
			JIS / KS 40	<b>JEA43</b> 425°C
Minimum allowable temperature			-29°C (-20°F)	
TMO	Maximum operating temperature	Standard packing PTFE chevron	(Stem sealing - Options P and N) 250°C	
		High temperature packing	(Stem sealing - Option H) 425°C	
		Extended bonnet with PTFE chevron	250°C	
	For clarification of the <b>Options</b> see below	Extended bonnet with graphite packing	425°C	
		PTFE soft seat	(Seating - Option G) 200°C	
		PEEK soft seat	(Seating - Options K and P) 250°C	
Minimum operating temperature			-29°C (-20°F)	
<b>Note:</b> For lower operating temperatures consult Spirax Sarco.				
Designed for a maximum cold hydraulic test pressure of:			156 bar g (2262 psi g)	

<b>Options</b>	<b>Stem sealing</b>	H = Graphite
		N = PTFE and Nitronic bearing
		P = PTFE
<b>Seating</b>		G = PTFE soft seat
		K = PEEK soft seat
		P = Full PEEK

**PN63  
PN100**



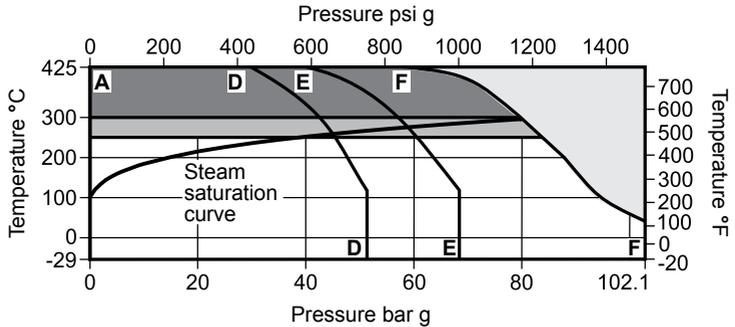
**ASME 600**

**JIS / KS 30**

**JIS / KS 40**

**Butt-weld**

**Socket weld**



-  The product **must not** be used in this region.
-  Extended cover is required for use in this region.
-  High temperature packing required for use on this region.

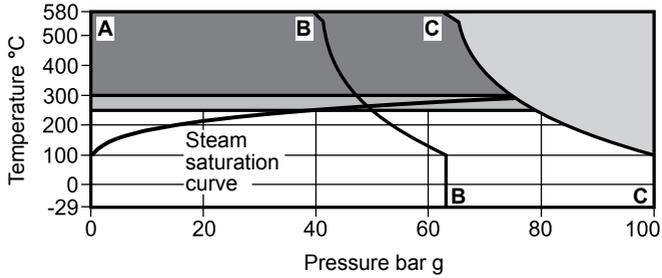
- A - B** Flanged EN 1092 PN63
- A - C** Flanged EN 1092 PN100
- A - D** Flanged JIS/KS 30
- A - E** Flanged JIS/KS 40
- A - F** Flanged ASME 600, Butt-weld and Socket weld

**Notes:** 1. Where the process fluid temperature is sub-zero and the ambient temperature is below +5°C (+41°F), the external moving parts of the valve and actuator must be heat traced to maintain normal operation.

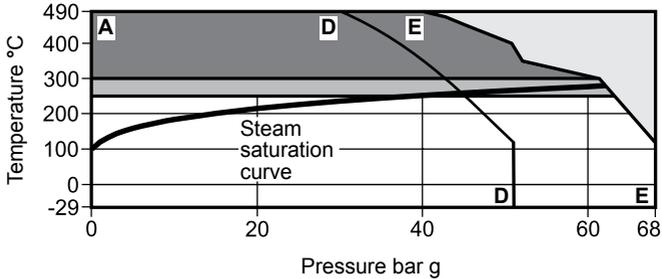
## 2.4 Pressure/temperature limits - JE63 and JEA63

Body design conditions		PN100 / ASME Class 600	
PMA	Maximum allowable pressure	EN	63 bar g @ 100°C
		PN63 <b>JE63</b>	
and	Maximum operating pressure	PN100 <b>JE63</b>	100 bar g @ 100°C
		ASME 600, Butt-weld and Socket weld	<b>JEA63</b> 99.3 bar g @ 38°C (1440 psi g @ 100°F)
PMO	Maximum operating pressure	JIS / KS 30	<b>JEA63</b> 51 bar g @ 120°C
		JIS / KS 40	<b>JEA63</b> 68 bar g @ 120°C
TMA	Maximum allowable temperature	EN	<b>JE63</b> 580°C
		ASME 600, Butt-weld and Socket weld	<b>JEA63</b> 538°C (1000°F)
		JIS / KS 30	<b>JEA63</b> 490°C
		JIS / KS 40	<b>JEA63</b> 490°C
Minimum allowable temperature		-29°C (-20°F)	
TMO	Maximum operating temperature	Standard packing PTFE chevron (Stem sealing - Options P and N)	250°C
		High temperature packing (Stem sealing - Option H)	580°C
		Extended bonnet with PTFE chevron	250°C
	For clarification of the <b>Options</b> see below	Extended bonnet with graphite packing	580°C
		PTFE soft seat (Seating - Option G)	200°C
		PEEK soft seat (Seating - Options K and P)	250°C
Minimum operating temperature		-29°C	
<b>Note:</b> For lower operating temperatures consult Spirax Sarco.		(-20°F)	
Designed for a maximum cold hydraulic test pressure of:		156 bar g (2262 psi g)	
<b>Options</b>	<b>Stem sealing</b>	H = Graphite	
		N = PTFE and Nitronic bearing	
<b>Seating</b>	P = PTFE		
	G = PTFE soft seat		
	K = PEEK soft seat		
	P = Full PEEK		

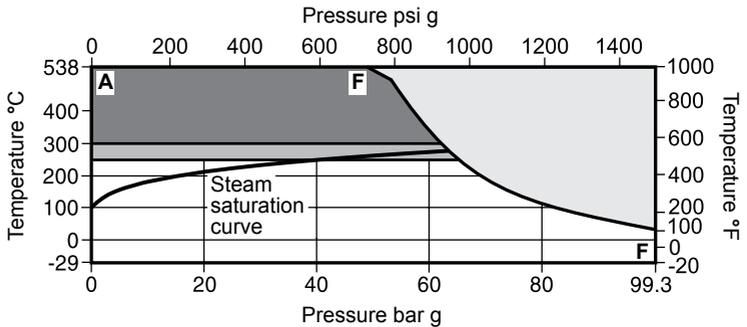
**PN63  
PN100**



**JIS / KS 30  
JIS / KS 40**



**ASME 600  
Butt-weld  
Socket weld**



- The product **must not** be used in this region.
- Extended cover is required for use in this region.
- High temperature packing required for use on this region.

- A - B** Flanged EN 1092 PN63
- A - C** Flanged EN 1092 PN100
- A - D** Flanged JIS/KS 30
- A - E** Flanged JIS/KS 40
- A - F** Flanged ASME 600, Butt-weld and Socket weld

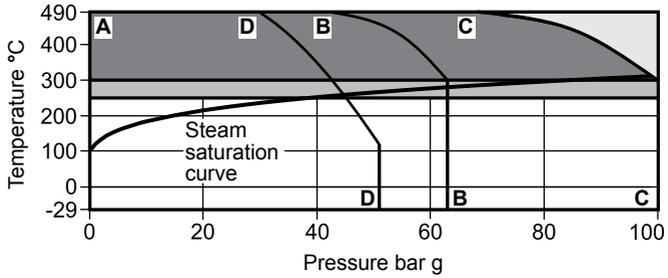
**Notes:** 1. Where the process fluid temperature is sub-zero and the ambient temperature is below +5°C (+41°F), the external moving parts of the valve and actuator must be heat traced to maintain normal operation.

## 2.5 Pressure/temperature limits - JE83 and JEA83

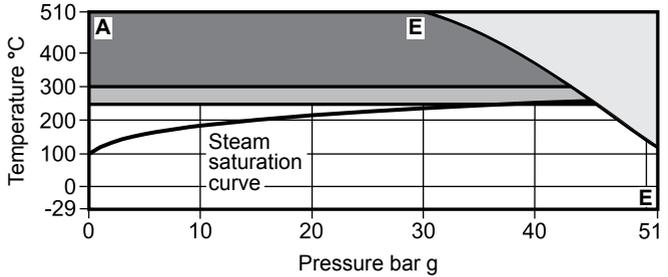
Body design conditions			PN100 / ASME Class 600
PMA	Maximum allowable pressure	EN	PN63 <b>JE83</b> 63 bar g @ 100°C
			PN100 <b>JE83</b> 100 bar g @ 100°C
and		ASME 600, Butt-weld and Socket weld	<b>JEA83</b> 103.4 bar g @ 38°C (1499 psi g @ 100°F)
PMO	Maximum operating pressure	JIS / KS 30	<b>JEA83</b> 51 bar g @ 120°C
		JIS / KS 40	<b>JEA83</b> 68 bar g @ 120°C
TMA	Maximum allowable temperature	EN	<b>JE83</b> 490°C
			ASME 600, Butt-weld and Socket weld <b>JEA83</b> 538°C (1000°F)
		JIS / KS 30	<b>JEA83</b> 490°C
		JIS / KS 40	<b>JEA83</b> 510°C
Minimum allowable temperature			-29°C (-20°F)
TMO	Maximum operating temperature	Standard packing PTFE chevron	(Stem sealing - Options P and N) 250°C
		High temperature packing	(Stem sealing - Option H) 538°C
		Extended bonnet with PTFE chevron	250°C
	For clarification of the <b>Options</b> see below	Extended bonnet with graphite packing	538°C
		PTFE soft seat	(Seating - Option G) 200°C
		PEEK soft seat	(Seating - Options K and P) 250°C
Minimum operating temperature			-29°C
<b>Note:</b> For lower operating temperatures consult Spirax Sarco.			(-20°F)
Designed for a maximum cold hydraulic test pressure of:			156 bar g (2262 psi g)
<b>Options</b>	<b>Stem sealing</b>	H = Graphite	
		N = PTFE and Nitronic bearing	
<b>Seating</b>	P = PTFE		
	G = PTFE soft seat		
	K = PEEK soft seat		
	P = Full PEEK		

PN63  
PN100

JIS / KS 30



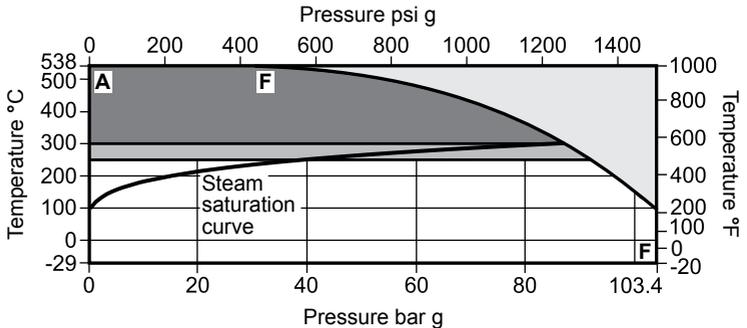
JIS / KS 40



ASME 600

Butt-weld

Socket weld



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



Extended cover is required for use in this region.



High temperature packing required for use on this region.

- A - B Flanged EN 1092 PN63
- A - C Flanged EN 1092 PN100
- A - D Flanged JIS/KS 30
- A - E Flanged JIS/KS 40
- A - F Flanged ASME 600, Butt-weld and Socket weld

**Notes:** 1. Where the process fluid temperature is sub-zero and the ambient temperature is below +5°C (+41°F), the external moving parts of the valve and actuator must be heat traced to maintain normal operation.

# — 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 protection covers from all connections and protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.

**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 (see Figure 2). 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.

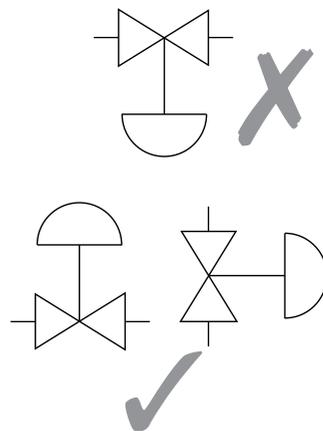
**3.5** Support pipework should be used to prevent stresses being exerted on the valve body. **Note:** If a DN125 to DN200 valve is to be installed in vertical pipework the actuator will require additional support.

**3.6** Ensure adequate space is provided for the removal of the actuator from the valve body for maintenance purposes:

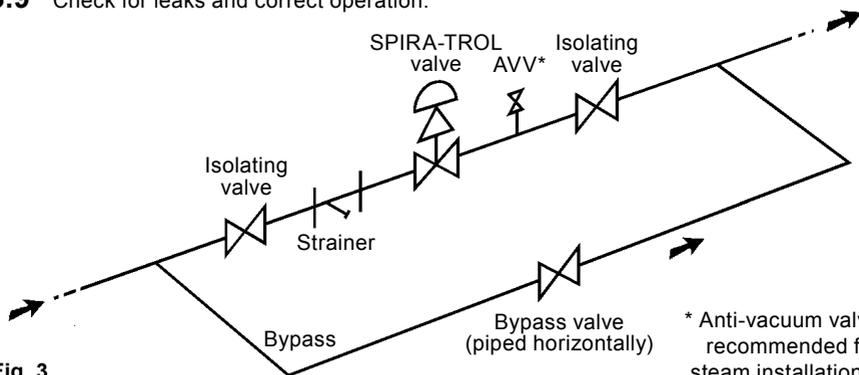
**3.7** Isolate connecting pipework. Ensure it is clean from dirt, scale etc. Any debris entering the valve may damage the head seal preventing the specified shut off.

**3.8** Open isolation valves slowly, until normal operating conditions are achieved.

**3.9** Check for leaks and correct operation.



**Fig. 2**



**Fig. 3**

\* Anti-vacuum valve recommended for steam installations.

# 4. Maintenance

## DN15 to DN100

**Note:** Before actioning any installation, observe the 'Safety information' in Section 1.

### Warning for all stainless steel valves

The 316 type stainless steel used in the construction of these products 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 light smear of a PTFE based grease is applied to any mating parts before reassembly.

### 4.1 General

Valve parts are subject to normal wear and must be inspected and replaced as necessary. Inspection and maintenance frequency depends on the severity of the service conditions. This section provides instructions on replacement packing, stem, plug and seat and bellows. All maintenance operations can be performed with the valve body in the line.

#### Annually

The valve should be inspected for wear and tear replacing any worn or damaged parts such as valve plug and stem, valve seat and gland seals, refer to Section 6 'Spare parts'.

**Note 1:** High temperature graphite packed seals are subject to wear during normal operation. We therefore recommend the graphite packing be replaced during this routine inspection to prevent premature failure of the packing during normal operation.

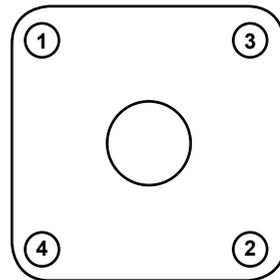
**Note 2:** It is recommended that all soft seals and gaskets be replaced whenever the valve is disassembled.

#### New torque values with lubrication:

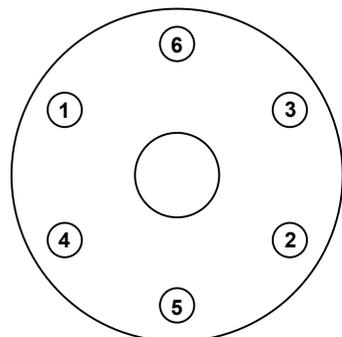
The following new torque values should be used with lubricated nuts/bolts:

**Table 1** Recommended tightening torques - Control valve sizes DN15 to DN100

SPIRA-TROL valve size	Torque (N m) JE / JEA
DN15 - DN25	100
DN32 - DN50	130
DN65 - DN80	130
DN100	130



DN15 - DN50  
bonnet tightening sequence



DN65 - DN100  
bonnet tightening sequence

Fig. 4

## 4.2 Removal of valve bonnet

**Note:** This procedure is necessary before carrying out any of the maintenance procedures detailed below:

- Ensure that the valve is depressurised and clear of media and isolate it both upstream and downstream.
- **Caution:** care should be taken when disassembling the valve in case of residual pressure being trapped between the isolation points.
- Remove the actuator from the valve. Refer to the Installation and Maintenance Instructions covering Spirax Sarco actuators.
- Unscrew the stuffing box nuts (18).
- Undo and remove the bonnet nuts (27).
- Remove the bonnet (2) and plug and stem assembly (8).
- Remove and discard the body gasket.

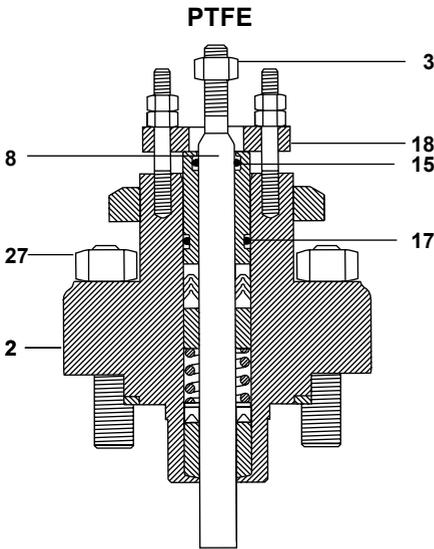


Fig. 5

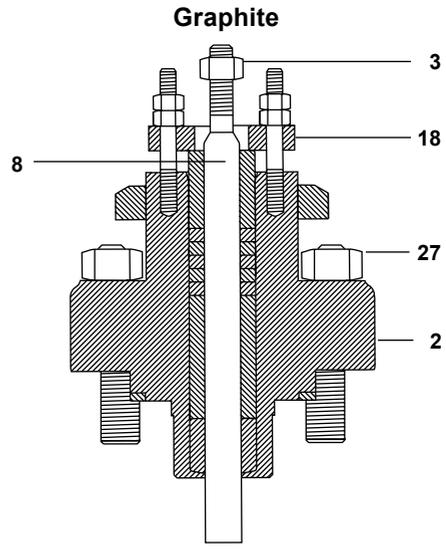
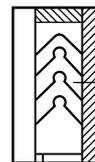


Fig. 6

## 4.3 Replacement of PTFE gland packings

- Remove the lock-nut (3), stuffing box nuts, gland flange and gland follower (18), 'O' rings (15 and 17) and replace with new items. The use of silicone grease on the 'O' rings is recommended.
- Withdraw the gland components and discard (9, 10, 12 and 14).
- Clean the gland cavity and fit new gland components in the order shown in Figure 7. **Note** that the lower bearing must be fitted with the radiused edge downwards. When fitting the chevron seals they should be inserted with correct orientation, one at a time to ease the assembly process - See the adjacent illustration: →



**Correct**  
orientation  
of the  
**chevron**  
**seals**

- Fit the packing follower and stuffing box ring into position. Lubricate the stuffing box nuts. Install and tighten the packing flange nuts finger tight. At this stage the packing must not be significantly compressed.
- Final adjustment of the gland must be carried out after refitting the bonnet as detailed in Section 4.6.

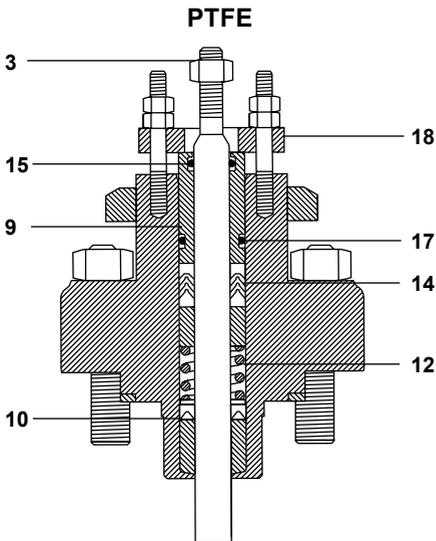


Fig. 7

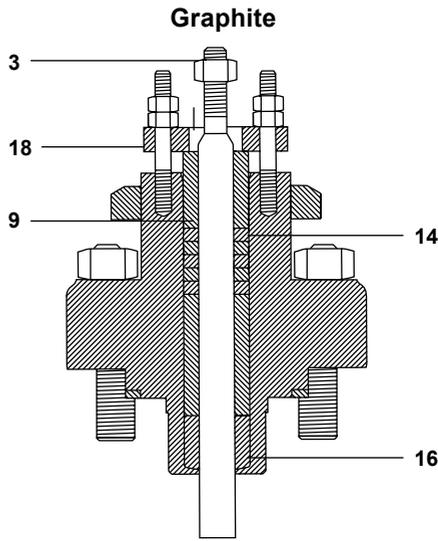


Fig. 8

#### 4.4 Replacement of graphite gland packing

- Remove the lock-nut (3), stuffing box nuts, gland flange and gland follower (18), ensuring that the groove is clean and undamaged, replace with new item.
- Remove the gland follower (9) and retain, withdraw the graphite packing (14) and discard. Remove the spacer and lower bearing (16). Clean and examine these components and the upper bearing replacing any that show signs of damage or deterioration.
- Clean the gland cavity and reassemble the gland components in the order shown in Figure 8. **Note** that the lower bearing must be fitted with the radiused edge downwards. When fitting the graphite seals, the scarf joints in each seal must be offset from the one below by 90° as shown in Figure 9:



Fig. 9

- Fit the packing follower and stuffing box ring into position. Lubricate the stuffing box nuts. Install and tighten the packing flange nuts finger tight and hold the packing without compressing them.
- Final adjustment of the gland must be carried out after refitting the bonnet as detailed in Section 4.6.

## 4.5 Removal and refitting of the valve plug/stem assembly and seat

- Lift out the seat retaining cage (5) followed by the seat (6).
- Remove the seat back gasket (7) and discard.
- Clean all components, including the seat recess in the valve body.
- Examine the seat and plug/stem assembly for damage or deterioration and renew as necessary.  
**Note:** Score marks or scaly deposits on the valve stem will lead to early failure of the gland seals and damage to seat and plug sealing faces will result in leakage rates higher than those specified for the valve.
- Fit a new seat gasket (7) in the body seat recess followed by the seat (6).
- Refit the cage (5) ensuring that the flow windows are lower most and that it sits squarely on the seat without impinging on the valve body.

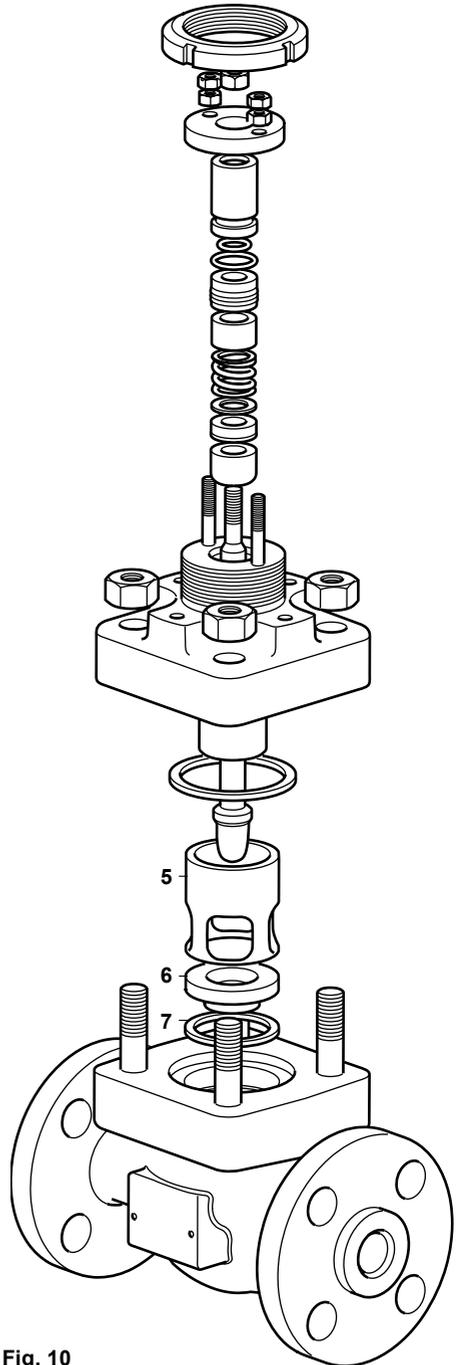


Fig. 10

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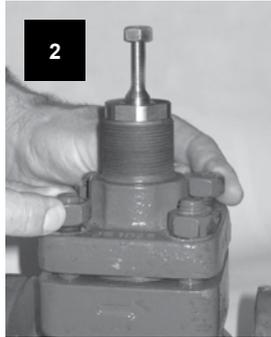
## 4.6 Refitting the bonnet

**Caution:** The following must be carefully followed to enable the correct reassembly of the control valve, and the subsequent test that is required to ensure that the plug moves freely inside the valve seat:

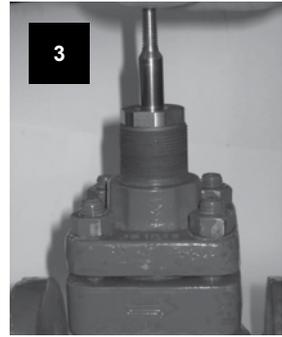
- Fit new bonnet gasket.
- Ensure the plug stem is fully extended without the upper stem threads making contact with stem seals on the top of the bonnet.
- Replace the bonnet and stem assembly to the valve body, locating the plug centrally into the seat.
- Holding the Plug in position, push the bonnet down on to the valve body.
- Proceed to tighten the bonnet into position by following Step 1 through to 7:



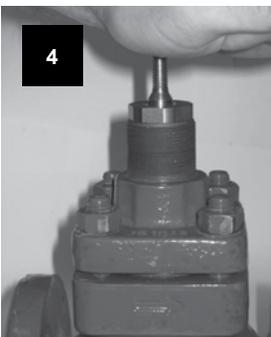
Fit bonnet nuts.



Finger tighten opposing bonnet nuts or bolts evenly in pairs.



Raise the stem to the highest position.

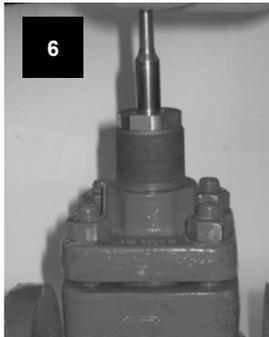


Firmly and briskly push the stem fully down.

Repeat Steps 1 to 4 finger tightening bonnet nuts or bolts individually until tight.



Using a torque wrench lightly and evenly tighten each bolt or nut by 45°, following the sequence illustrated in Figure 4, page 15.



After each tightening sequence lift the stem fully.



Firmly and briskly push the stem fully down.

- Repeat Steps 5, 6 and 7 until the bonnet nuts or bolts have an even tension.
- Continue Steps 5, 6 and 7 but use a torque wrench set at 10% of maximum required torque setting.
- Again, repeat Steps 5, 6 and 7, incrementally increasing the torque value to 20%, 40%, 60%, 80% and finally 100% of the required torque value (as specified in Table 1, page 15).
- Pull the plug off its seat, rotate by 120° and slowly push it back down into the seat checking for any signs of resistance as the plug comes into contact with the seat.
- Repeat the above Step, three more times.
- If any resistance is felt, this can indicate the plug and seat is misaligned and the process will need repeating.
- Tighten the the stuffing box nuts (18) until:
  - i) PTFE gland assembly: A gap of 10 mm between the underside of the gland flange and the bonnet is achieved.
  - ii) Graphite gland assembly: A gap of 12 mm between the underside of the gland flange and the bonnet is achieved. See Figure 11.
- Refit the lock-nut (3).
- Reinstall the actuator.
- Bring the valve back into service.
- Check for leakage at the gland.

**Note:** Recheck the graphite seals and retighten the gland if necessary after a few hundred cycles as the seals fully bed in.

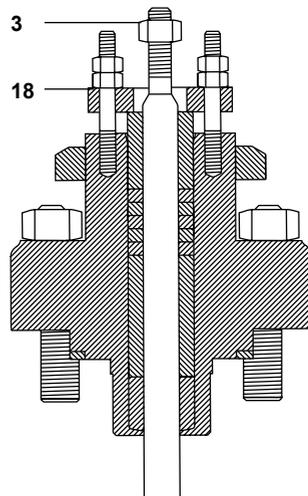


Fig. 11

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# 5. Maintenance

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## DN125 to DN200

**Note:** Before actioning any installation, observe the 'Safety information' in Section 1.

### 5.1 General

Valve parts are subject to normal wear and must be inspected and replaced as necessary. Inspection and maintenance frequency depends on the severity of the service conditions. This Section provides instructions on the replacement of the packing, stem, plug and seat. All maintenance operations can be performed with the valve body in the line.

**Note:** It is recommended that all soft seals and gaskets are replaced whenever the valve is disassembled.

#### Annually

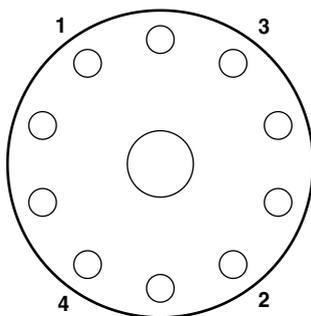
The valve should be inspected for wear and tear replacing any worn or damaged parts such as valve plug and stem, valve seat and gland seals, refer to Section 6 'Spare parts'.

**Note 1:** High temperature graphite packed seals are subject to wear during normal operation. We therefore recommend the graphite packing be replaced during this routine inspection to prevent premature failure of the packing during normal operation.

**Note 2:** It is recommended that all soft seals and gaskets be replaced whenever the valve is disassembled.

**Table 2** Recommended tightening torques - Control valve sizes DN125 to DN200

	DN125	DN150	DN200
JE and JEA	203 N m	245 N m	365 N m

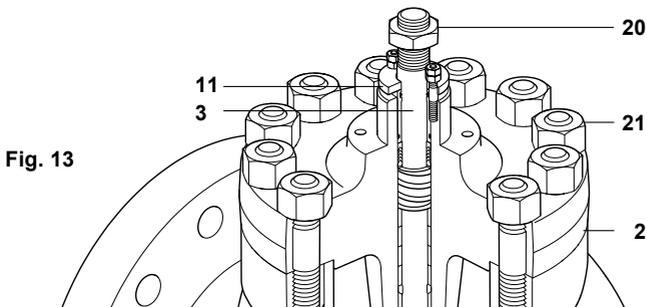


**Fig. 12** DN125 to DN200

## 5.2 Removal of the valve bonnet

**Note:** This procedure is necessary before carrying out any of the maintenance procedures detailed below:

- Ensure that the valve is depressurised and clear of media and isolate it both upstream and downstream.  
**Caution:** care should be taken when disassembling the valve in case of residual pressure being trapped between the isolation points.
- Remove the actuator from the valve. Refer to the Installation and Maintenance Instructions covering Spirax Sarco actuators.
- Loosen the the stuffing box ring (11).
- Undo and remove the bonnet nuts (21).
- Using suitable lifting equipment, remove the bonnet (2) with the plug and stem assembly (3). **Note:** for balanced valves the cage will most likely be attached to the plug (due to the tight fit of the balanced seal).

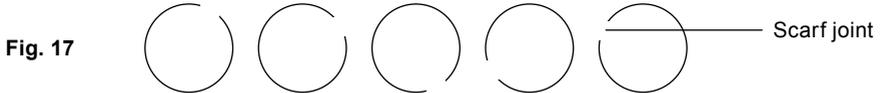


## 5.3 Replacement of PTFE gland packings (reference Figure 14)

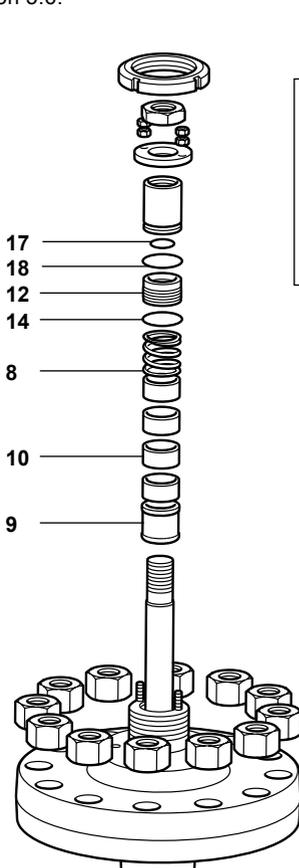
- Remove the lock-nut from the stem (20), and withdraw the plug stem assembly (with cage on balanced versions).
- Remove the 'O' rings (17 and 18) from the gland follower, ensuring that the grooves are clean and undamaged, replace with new items. The use of silicone grease on the 'O' rings is recommended.
- Withdraw the PTFE packing (12) and discard. Remove all metal components, washer (14), spring (8), bearing (9) and spacers (10) carefully noting how many components have been removed as it will differ on each valve size. Clean and examine these components replacing any that show signs of damage or deterioration.
- Clean the gland cavity and reassemble the gland components in the order shown in Figure 13.  
**Note** that the lower bearing must be fitted with the radius edge downwards. When fitting the chevron seals they should be inserted one at a time (see Figure 15). It may be necessary to compress the spring and seat using the gland flange and gland follower after fitting two or three chevrons and to repeat this at similar intervals until all PTFE components are in place.
- Tighten the gland flange a few millimetres using the stuffing box nuts. At this stage the packing must not be significantly compressed.
- Final adjustment of the gland must be carried out after refitting the bonnet as detailed in Section 5.6.

## 5.4 Replacement of graphite gland packings (reference Figure 16)

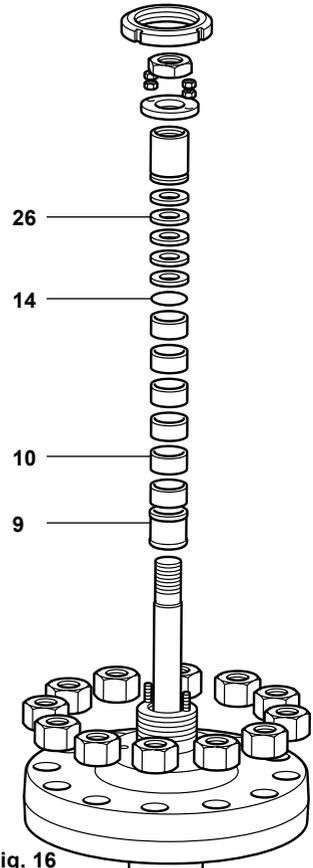
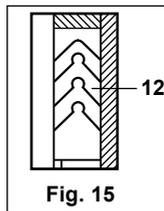
- Remove the lock-nut from the stem (20), and withdraw the plug stem assembly (with cage on balanced versions).
- Withdraw the graphite packing (26) and discard. Remove all metal components, washer (14) and spacers (10) carefully noting how many components have been removed as it will differ on each valve size. Clean and examine these components replacing any that show signs of damage or deterioration.
- Clean the gland cavity and reassemble the gland components in the order shown in Figure 16. **Note** that the lower bearing must be fitted with the radiused edge downwards. When fitting the graphite seals, the scarf joints in each seal must be offset from the one below by 90° as shown in Figure 17:



- Fit the packing follower and stuffing box ring into position. Lubricate the stuffing box nuts. Install and tighten the packing flange nuts finger tight.
- Final adjustment of the gland must be carried out after refitting the bonnet as detailed in Section 5.6.



**Fig. 14**



**Fig. 16**

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## 5.5 Procedure for removal and refitting of valve plug /stem assembly and seat

### 5.5.1 Unbalanced valves

- Using lifting equipment as appropriate, withdraw the plug /stem assembly (3).
- Lift out the cage (4) followed by the seat (6).
- Remove the seat back gasket (16) and discard.
- Clean all the components, including the seat recess in the valve body.
- Examine the seat and plug/stem assembly for damage or deterioration and renew as necessary.  
**Note:** Score marks or scaly deposits on the valve stem will lead to early failure of the gland seals and damage to seat and plug sealing faces will result in leakage rates higher than those specified for the valve.
- Fit a new seat gasket (16) in the body seat recess followed by the seat (6).
- Refit the cage (4) ensuring that the flow windows are lower most and that it sits squarely on the seat without impinging on the valve body.
- Lower the plug/stem assembly squarely onto the seat ring ensuring that the stem is left vertical.

### 5.5.2 Balanced valves

- Using lifting equipment as appropriate, withdraw the plug / stem assembly (3) taking care not to let the cage fall back into the valve body.
- Remove and discard the upper cage seal (19).
- Remove and discard the balance seal (31).
- Lift out the seat (6).
- Remove the seat gasket (16) and discard.
- Clean all the components, including the seat recess in the valve body.
- Examine the cage, seat and plug/stem assembly for damage or deterioration and renew as necessary.  
**Note:** Score marks or scaly deposits on the cage internal surface or valve stem will lead to early failure of the seals and damage to the seat and plug sealing faces will result in leakage rates higher than those specified for the valve.
- Fit a new seat gasket (16) in the body seat recess followed by the seat (6).
- Refit the cage (4) ensuring that the flow windows are lower most and that it sits squarely on the seat without impinging on the valve body.
- Fit a new balance seal (31) into the plug groove.
- Refit the plug /stem into the cage ensuring that the balanced seal is not damaged during this process - **Note:** a light smear of silicone grease on the inner surface of the cage will aid fitting. The plug /stem assembly should easily move up and down in the cage, using moderate hand force, until it is located in the seat.
- Fit a new upper cage seal (19).

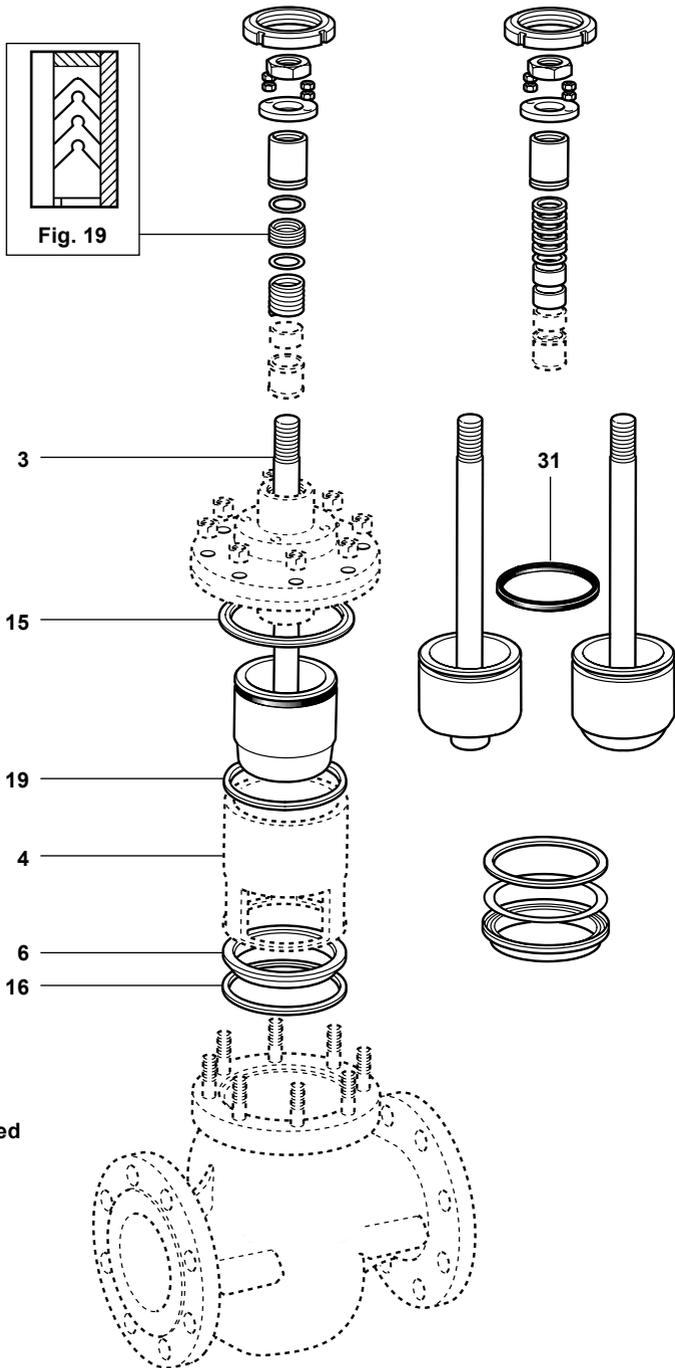


Fig. 18 Balanced

## 5.6 Refitting the bonnet

- Fit a new bonnet gasket (15).
- Using appropriate lifting equipment, carefully lower the bonnet into place over the valve stem. Care must be taken not to damage the new gland packing at this stage. **Note:** that the actuator mounting hole orientation should be in line with the valve flow axis.
- By hand tightening only, refit the bonnet nuts (21) to secure the bonnet in place.
- Raise the plug and stem assembly fully and forcefully push it back into the seat to align the internal components. Repeat a further two times. Re-tighten all bonnet nuts, hand tight.
- Apply a load to the stem (preferably replace the actuator), then re-tighten the bonnet nuts in sequence (see Figure 12 and Table 2) page 21.
- Tighten the bonnet nuts to 30% of required torque setting following a diametrically opposed sequence (see Figure 12 and Table 2) page 21.
- Repeat the above, using 60% of the required torque.
- Repeat the above, apply maximum torque value for the appropriate valve size.
- Raise the plug and stem assembly fully and forcefully push it back into the seat, repeat a further two times.
- Tighten the stuffing box nuts (11) until:
  - i) PTFE gland assembly: a gap of approximately 10 mm between the underside of the gland flange and the bonnet is achieved.
  - ii) Graphite gland assembly: a gap of 12 mm between the underside of the gland flange and the bonnet is achieved.

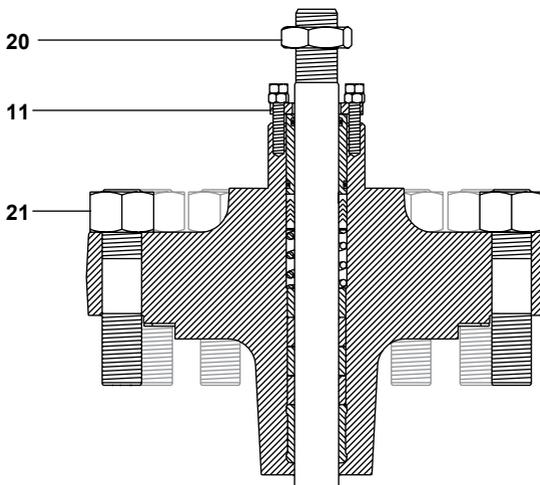
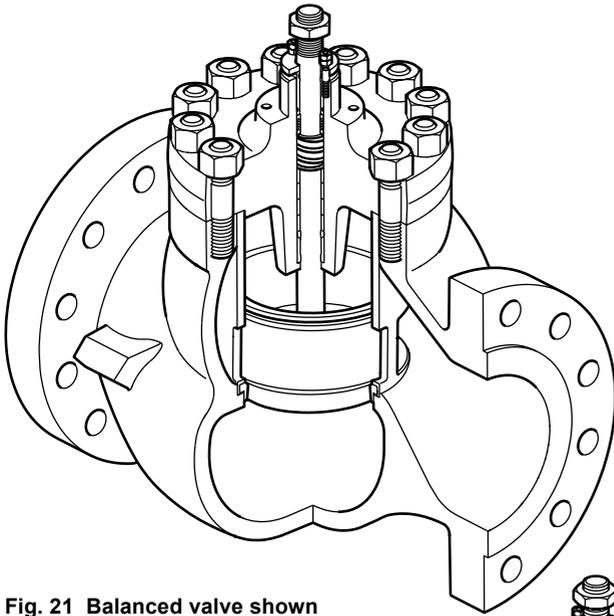


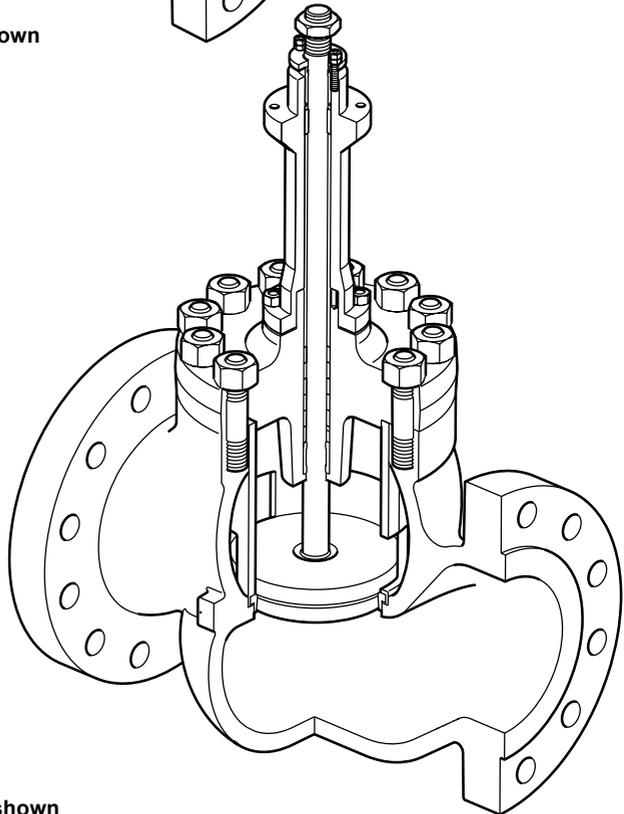
Fig. 20

- Refit the lock-nut (20).
- Reinstall the actuator.
- Bring the valve back into service.
- Check for leakage at the gland.

**Note:** Recheck the graphite seals and retighten the gland if necessary after a few hundred cycles as the seals fully bed in.



**Fig. 21** Balanced valve shown



**Fig. 22** Extended bonnet shown

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## 6. Spare parts

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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 spare parts please specify clearly the full product description as found on the label of the valve body, as this will ensure that the correct spare parts are supplied.

### Available spares – JE and JEA

Actuator clamping nut		<b>A</b>
Gasket set		<b>B, G</b>
Stem seal kits	PTFE chevrons	<b>C</b>
	Graphite packing	<b>C1</b>
Plug stem and seat kit	Equal percentage trim (No gaskets supplied)	<b>D, E</b>
	Fast opening trim (No gaskets supplied)	<b>D1, E</b>
	Linear trim (No gaskets supplied)	<b>D2, E</b>

#### 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 full product description of the product.

**Example:** 1 - Plug stem and seat kit for a Spirax Sarco DN32 SPIRA-TROL JE43PTSUSS.2 Kvs 16 two-port control valve having flanged PN63 connections.

#### How to fit spares

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

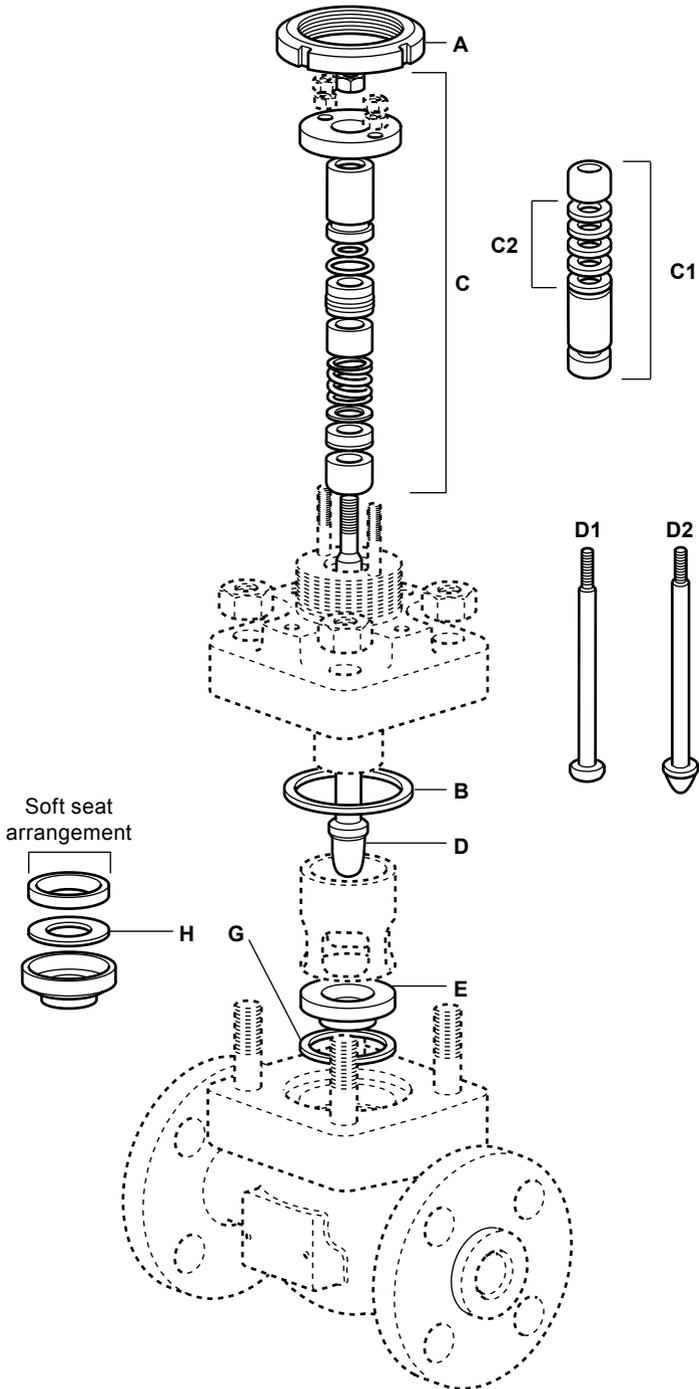


Fig. 23





