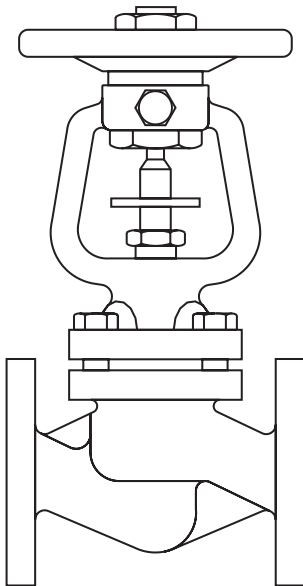


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**BSA6T and BSA64T**  
**Stainless Steel Bellows Sealed Stop Valves**  
Installation and Maintenance Instructions

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1. Safety information
2. General product information
3. Installation
4. Commissioning
5. Operation
6. Maintenance
7. Spare parts



# 1. Safety information

Safe operation of the unit can only be guaranteed if it is properly installed, commissioned and maintained by a qualified person (see Section 11 of the attached Supplementary Safety Information) 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.

## Warning

The body/bonnet collar gaskets contain a thin stainless steel support ring which may cause physical injury if they are not handled and disposed of carefully.

Care must be taken when opening and closing the handwheel to prevent any possible injury to the hands from the locking screw.

## Lifting

Although the bonnet and handwheel will support the weight of the valve, it is recommended the slings for lifting are positioned around the back of the pipe flanges on the main body.

## Isolation

Consider whether closing isolating valves will put any other part of the system or personnel at risk. Dangers might include; isolation of vents and protective devices or alarms. Ensure isolation valves are turned off in a gradual way to avoid system shocks.

## Pressure

Before attempting any maintenance consider what is or may have been in the pipeline. Ensure that any pressure is isolated and safely vented to atmospheric pressure before attempting to maintain the product, this is easily achieved by fitting Spirax Sarco depressurisation valves type DV (see separate literature for details). Do not assume that the system is depressurised even when a pressure gauge indicates zero.

## 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.

## Disposal

The product is recyclable. No ecological hazard is anticipated with the disposal of this product providing due care is taken, EXCEPT:

### R-PTFE

The soft sealing disc insert (soft sealing disc option only) is made of R-PTFE, therefore, any scrap or waste material containing this part must be disposed of as follows:

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

## 2. General product information

### 2.1 General description


A range of bellows sealed, in-line stop valves having flanged PN40 connections are available for steam, gas, liquid, condensate and water systems.

The **BSA6T** is a completely stainless steel bellows sealed stop valve, and the **BSA64T** has a stainless steel body and carbon steel bonnet.

As standard both valves are available with twin ply bellows, throttling plug, locking device, grease nipple and provision for a stroke limiter.

Soft seats are available for certain applications.

### Standards

The products listed comply with the requirements of the EU Pressure Equipment Directive / UK Pressure Equipment (Safety) Regulations (except when fitted with JIS/KIS flanges) and carry the  mark when so required.

### Certificate

These products are available with certification to EN 10204 3.1.

**Note:** All certification/inspection requirements must be stated at the time of order placement.

**Note:** For any additional information see technical Information Sheets, TI-P184-02 and TI-P137-19.

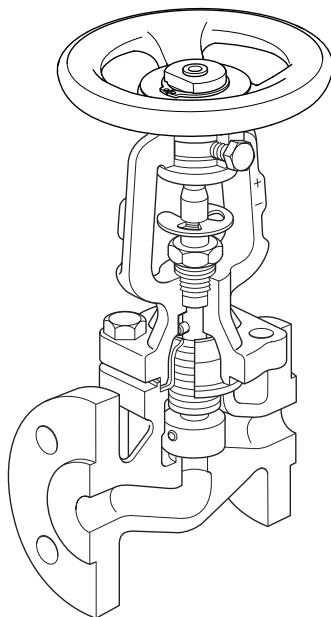


Fig. 1

### 2.2 Sizes and pipe connections

DN15, 20, 25, 32, 40, 50, 65, 80 and 100

Flanged EN 1092 PN40

Face-to-face EN 558

### Stroke limiter for throttling versions

The handwheel nut on the **BSA6T, BSA64T** has a threaded hole for provision of a stroke limiter. Customer to supply standard nuts and bolts as indicated in the table below:

Size	Hexagon bolt
DN15 - DN80	M8 x 50 mm
DN100	M12 x 75 mm

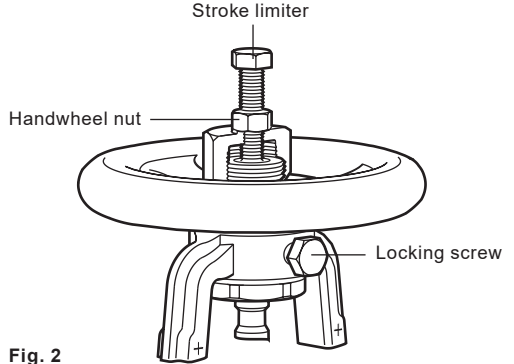


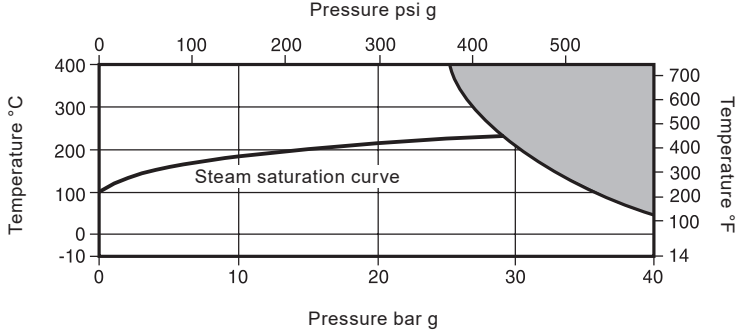
Fig. 2

### Optional soft sealing disc



Fig. 3

## 2.3 Pressure/temperature limits



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

Body design conditions		PN40	
PMA	Maximum allowable pressure	40 bar g @ 50°C	(580 psi g @ 122°F)
TMA	Maximum allowable temperature	400°C @ 25 bar g	(752°F @ 362.5 psi g)
Minimum allowable temperature		-10°C	(14°F)
PMO	Maximum operating pressure for saturated steam service	<b>Metal seat</b>	29.8 bar g @ 236°C (432 psi g @ 456.8°F)
		<b>Soft seat</b>	27.0 bar g @ 230°C (391.5 psi g @ 446°F)
TMO	Maximum operating temperature	<b>Metal seat</b>	400°C @ 25.6 bar g (752°F @ 371 psi g)
		<b>Soft seat</b>	230°C @ 27.0 bar g (446°F @ 391.5 psi g)
Minimum operating temperature		-10°C	(14°F)
		<b>On/off function</b>	Limited to the PMO
ΔPMX	Maximum differential pressure	<b>Throttling function</b>	
		DN15 - DN80	2 bar (29.0 psi)
		DN100	1.5 bar (21.75 psi)
Designed for a maximum cold hydraulic test pressure of:		60 bar g	(870 psi g)
PTMX	Maximum test pressure	60 bar g	(870 psi g)

## 3. Installation

**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. 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 the protective covers from all connections.
- 3.3** Install the valve in the direction of flow given by the arrow on the body. The preferred position is with the spindle vertical. The valve can be installed from the vertical to the horizontal plane (see Figure 4).
- 3.4** When installed on steam systems a suitable steam trap should be fitted immediately upstream of the isolation valve to drain condensate. This will ensure drainage of the pipe when the valve is closed, and will prevent damage of the valve due to waterhammer. The drain trap should be either a ball float (FT) or thermodynamic (TD) type. Correct condensate drainage of all upstream pipework is also vital.
- 3.5** Always open isolation valves slowly to avoid system shocks.
- 3.6** Note: It is advisable that when work is being carried out downstream of a valve installation, double isolation (block and bleed) should be fitted. In addition when installed as the final valve in a pipeline, as a safety precaution, a blanking plate or blank flange must be fitted to the outlet flange of the valve.

## 4. Commissioning

After installation or maintenance ensure that the system is fully functioning. Carry out tests on any alarms or protective devices.

# 5. Operation

**5.1** The bellows sealed isolation valve plays an important role in the conservation of energy by eliminating fugitive stem seal emissions.

**5.2** The valve is operated manually by a handwheel. Special care must be taken to ensure that the movement is made in the correct direction.

To open the valve fully, it is recommended to turn the handwheel until the shaft is raised to the maximum position, indicated by the (+) on the bonnet, then turn the handwheel clockwise an 1/a to ¼ turn to remove any backlash. This is to prevent the possibility of attempting to force open a valve, which is already fully open, resulting in damage to the stem, bellows unit or other components. Spirax Sarco BSA valves are fitted with a position indicator which can be found on the stem, and should align with the (+) or (-) on the bonnet support pillars. (+ = fully open/- = fully closed).

**5.3** If valve 'keys' are used care must be taken not to use excessive force when opening or closing the valve.

**5.4** BSA6T and BSA64T valves are fitted with a throttling plug to allow close control when opening the valve. The number of turns open will affect the flowrate through the valve.

Once correct flowrate is obtained ensure the locking screw and stroke limiter (see Fig. 5) are tightened. This will minimise any vibration. The effect of valve opening for each valve size can be seen in the BSAT flow chart.

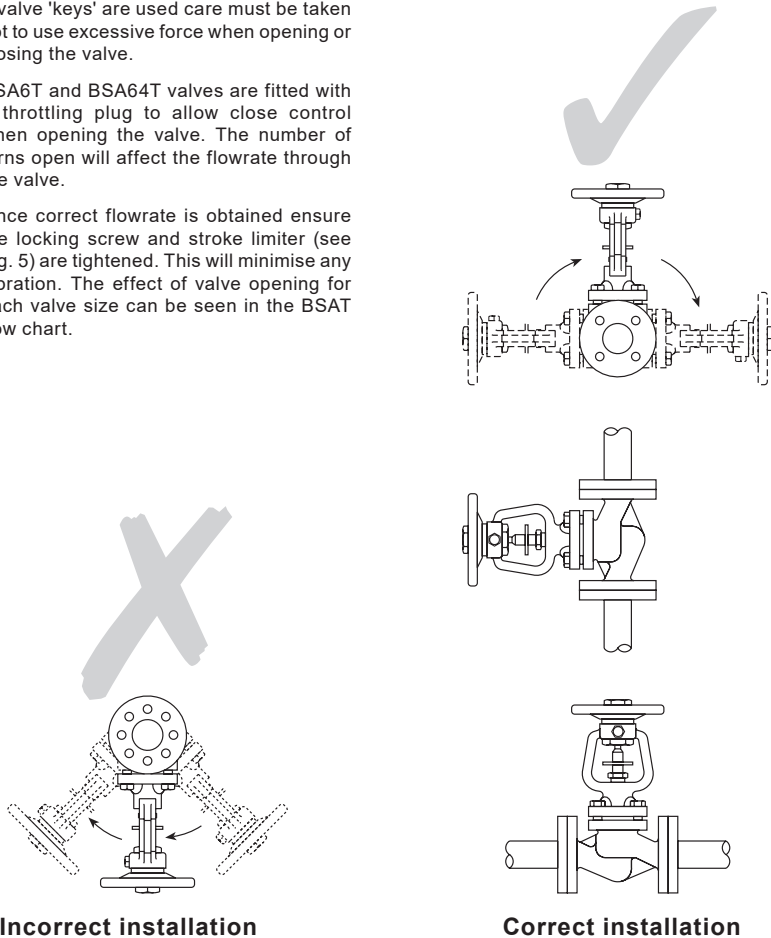


Fig. 4



**BSAT flow data - The effect of valve opening for each valve size**

Size DN	15	20	25	32	40	50	65	80	100
Hand-wheel rotations	Kv values for given handwheel rotations tested to EN 60534-2-3 Water at 20°C								
0	0	0	0	0	0	0	0	0	0
0.5	1.2	1.2	1.4	2.2	4.4	4.1	5.6	10.4	12.0
1	1.7	1.7	2.0	3.7	5.0	5.0	7.0	11.5	14.3
1.5	2.7	2.9	2.9	5.0	5.5	6.0	9.2	13.6	24.5
2	3.6	4.0	4.6	7.9	7.6	7.2	11.6	16.3	34.1
2.5	4.4	5.3	6.4	10.6	11.0	9.7	12.4	18.5	59.6
3	5.4	6.6	8.5	13.8	14.7	14.1	13.0	21.1	86.2
4			10.6	17.0	22.6	24.4	25.2	24.5	123.0
4.5			11.2	18.3	24.4	29.4	32.5	29.0	139.0
5			11.9	19.6	27.2	37.0	43.6	39.1	164.1
6					28.9	46.2	60.2	61.0	179.0
6.5					29.1	47.0	63.0	69.0	186.0
6.7					29.3	47.2	64.3	73.0	
7							65.9	78.0	
8							71.2	90.0	
8.5							74.6	92.0	
9.5								99.0	
10								101.6	

**Stroke limiter for throttling versions**

The handwheel nut on the BSA6T and BSA64T has a threaded hole for the provision of a stroke limiter. Customer to supply standard nuts and bolts as indicated in the table below:

Size	Hexagon bolt
DN15 - DN80	M8 x 50 mm
DN100	M12 x 75 mm
<b>Note:</b> The maximum permissible differential pressure in throttling function:	
DN15 - DN80	2.0 bar
DN100	1.5 bar

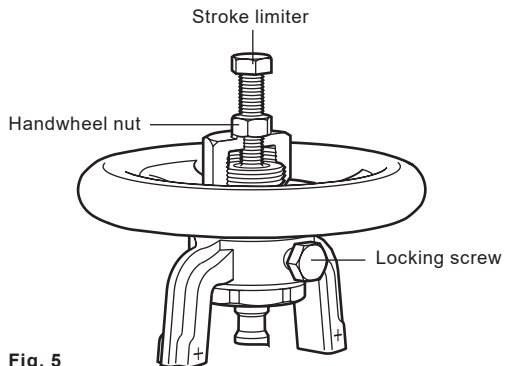


Fig. 5

# 6. Maintenance

## Safety note:

Before actioning any maintenance programme observe the data in Section 1 - 'Safety information'.

**Note:** A grease nipple has been provided to enable simple lubrication of the stem and bonnet bush. It is recommended that lubrication is undertaken periodically.

All the internals of the bellows sealed valve can be replaced (See Section 7, Spare parts).

## Warning

The body/bonnet collar gaskets (10a and 10b) contain a thin stainless steel support ring which may cause physical injury if they are not handled and disposed of carefully.

## 6.1

Before undertaking any maintenance on the valve, ensure that any pressure is isolated and safely vented to atmospheric pressure. The valve should then be allowed to cool. When reassembling, ensure that all joint faces are clean.

## 6.2 How to fit the body/bonnet gaskets

This can be carried out whilst the valve is connected in the pipeline. Remove the valve bonnet (2) from the body (1) by unscrewing bonnet studs/nuts (9). The body gasket (10b) is now visible and can quickly be replaced. Ensure the gasket face in the body (1) is clean before fitting a replacement. To replace the second gasket (10a) which is situated between the bonnet (2) and the stainless steel bellows support collar, firstly remove the clip-on position indicator, remove the locking screw (BSAT versions only). Rotate the handwheel (7) in a clockwise direction. This pushes the main stem (6) downwards and creates a gap between the bellows support collar and the bonnet (2). If the support collar remains attached to the bonnet (2), gently prise the collar away from the bonnet being careful not to damage the collar.

Do not allow the bellows to stretch as this can reduce the bellows life.

By continually rotating the handwheel (7) in a clockwise direction, the stem (6) can be unscrewed from the bonnet bush. When the stem (6) is disconnected from the bonnet bush, unscrew the gland nut (unbolt the gland flange if fitted) and remove both this and the gland washer (or gland follower if fitted). Keep these parts safe as they are not supplied as spares. The stem/bellows assembly (6, 5) can now be withdrawn out of the bonnet (2). The second bellows collar gasket (10a) can now be replaced ensuring both the bellows support collar surface and bonnet surface are clean and the gasket is accurately located. Before the stem/bellows assembly (6, 5) is reassembled into the bonnet (2), the stem packing ring (8) should be replaced (see Section 6.3).

## 6.3 How to fit the stem packing

By following through Section 6.2 it is now possible to replace the stem packing ring (8). Two of these rings are provided in the spares kit but only one is required. Ensure all of the old stem packing material is removed from the bonnet cavity and all locating surfaces are clean. Valve assembly is the opposite to removal - remembering to fit a bellows collar gasket between the collar and the valve bonnet. Ensure the solid stem pin (which is pressed into the stem) is aligned with the slot inside the bonnet. Before screwing the end of the stem into the bonnet bush remember to fit a new stem packing ring (8), the original gland washer (or gland follower) and gland nut (or gland flange) over the stem. Do not allow the stem thread to damage the inner surface of the gland packing ring. Carefully slide the new packing ring down the stem into the cavity and slide the original gland washer (or gland follower if fitted) on top of the packing ring. Remember to tighten the gland packing ring after the valve has been fully assembled.

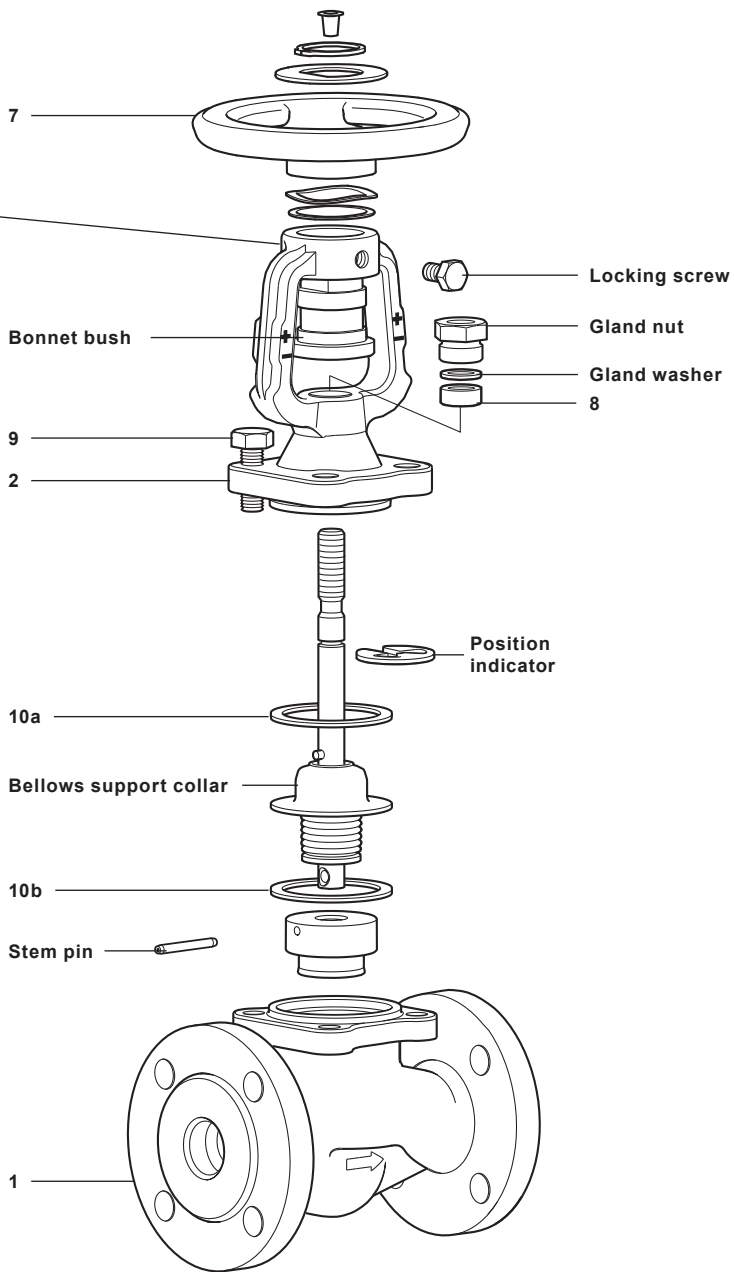


Fig. 6

BSA6T and BSA64T Stainless Steel Bellows Sealed Stop Valves

## 6.4 How to fit the stem and bellows assembly

By following through Section 6.2 it is now possible to fit a new stem/bellows assembly (6, 5). Fitting this is opposite to removal - remembering to fit a bellows collar gasket (10a) between the bellows support collar and valve bonnet (2). Ensure the bellows collar gasket (10a) is accurately located. Before fitting the new stem/bellows assembly (6, 5) into the bonnet (2), apply a small amount of lubricating compound such as Gulf Sovereign LC grease to the end of the stem pin (which is pressed into the stem). Ensure the stem pin is aligned with the slot inside the bonnet. Carefully slide the stem up through the bonnet. Before screwing the end of the stem into the bonnet bush remember to fit a new stem packing ring (8) (see Section 6.3), the original gland washer (or gland follower) and gland nut (or gland flange) over the stem (6). Do not allow the stem thread to damage the inner surface of the gland packing ring. Carefully slide the new packing ring down the stem into the cavity and slide the original gland washer (or gland follower if fitted) on top of the packing ring (8). Remember to tighten the gland packing ring after the valve has been fully assembled.

## 6.5 How to fit the disc


By following through Section 6.2 it is now possible to replace the valve's disc. To replace the disc (4) simply remove the old stem pin and replace the disc (4). Attach the new disc with the new stem pin (supplied).

## 6.6 Final assembly

Ensure the bellows support collar and gaskets (10a, 10b) are accurately aligned with the bonnet (2) before final assembly into the body (1).

Tighten the bonnet bolts/nuts (9) evenly to the recommended tightening torque (See Table 1).

**Table 1 Recommended bonnet tightening torques**

Size	 mm	N m (lbf ft)
DN15 - DN32	17 A/ F	35 - 40 (26 - 29)
DN40 - DN65	19 A/ F	55 - 60 (40 - 44)
DN80 - DN100	24 A/ F	130 - 140 (95 - 103)

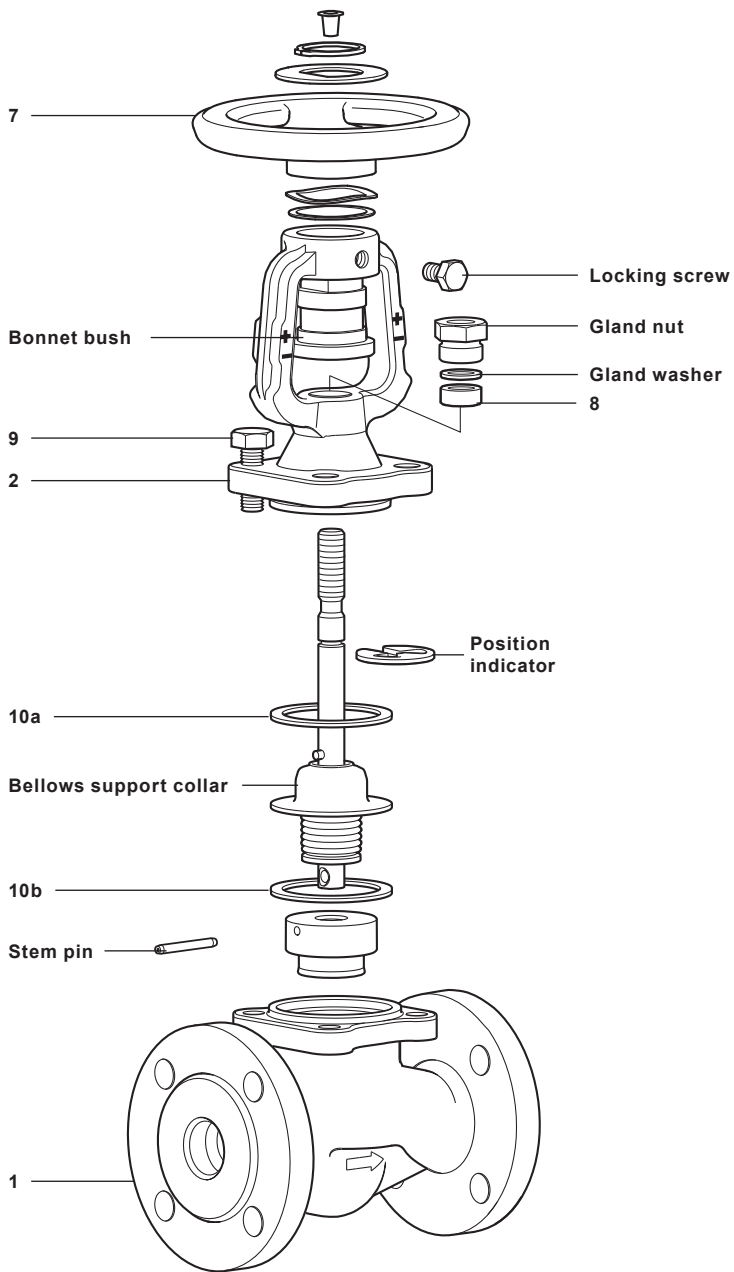


Fig. 7

BSA6T and BSA64T Stainless Steel Bellows Sealed Stop Valves

## 6.7 How to replace the handwheel

Across the size range there are three hand wheel retention methods

	<b>DN15 - DN32</b>	have a 'D' drive hand wheel retained by a 'D' washer and circlip.
<b>Sizes</b>	<b>DN40 - DN80</b>	have a 'D' drive hand wheel retained by a top nut.
	<b>DN100</b>	have a screwed hand wheel retained by a top nut.

### Sizes DN15-DN32.

- To remove the handwheel, remove circlip using circlip pliers.
- Lift of the 'D' washer.
- The handwheel can then be lifted off.
- To refit the handwheel in the reverse of the procedure above.

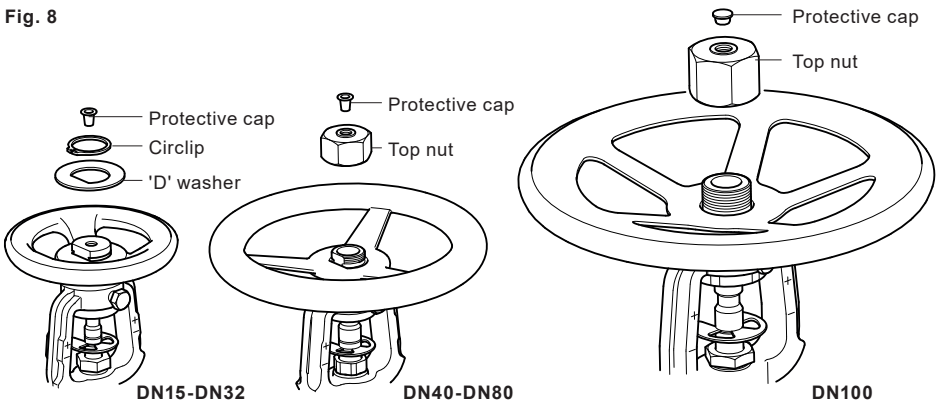
### Sizes DN40 to DN80.

- To remove the handwheel unscrew the main handwheel nut in a **clockwise** direction.  
**Note:** The thread in the handwheel nut is left handed, so it must be unscrewed in a clockwise direction. The handwheel can then be lifted off.
- To refit the handwheel in the reverse of the procedure above.
- Remember to tighten the handwheel nut to 40 N m (29 lbf ft) in an **anticlockwise** direction.

### Sizes DN100.

- To remove the handwheel unscrew the main handwheel nut in a **clockwise** direction.  
**Note:** The thread in the handwheel nut is left handed, so it must be unscrewed in a clockwise direction.
- Place a suitable spanner (a detailed drawing is available from Spirax Sarco) across the flats of the bonnet bush and unscrew the handwheel in the normal way.  
**Note:** the handwheel maybe firmly secured on the bonnet bush.
- Refitting the handwheel is the opposite to removal.
- Apply Loctite 638 to the threads of the handwheel boss and tighten to 50 N m (36 lbf ft).
- Remember to tighten the handwheel nut to 40 N m (29 lbf ft) in an **anticlockwise** direction.

Fig. 8



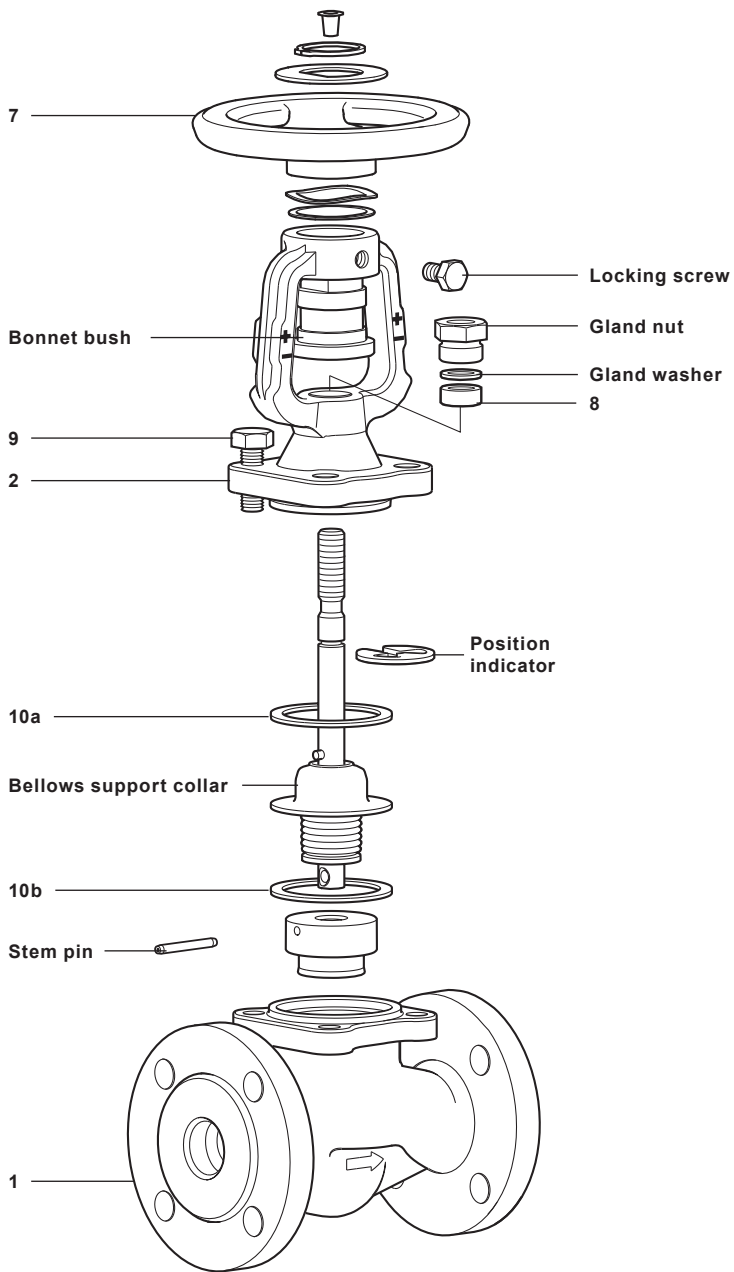


Fig. 9

BSA6T and BSA64T Stainless Steel Bellows Sealed Stop Valves

## 7. Spare parts

The spare parts available are shown in heavy outline. Parts drawn in a grey line are not supplied as spares.

### Available spares

Body/ bonnet gasket and stem packing	<b>10a, 10b, 8 (2 off)</b>
Stem and bellows assembly	<b>6, 5</b>
Disc (state: soft sealing disc, where fitted)	<b>4</b>
Handwheel	<b>7</b>

### How to order spares

Please note: for customer convenience spares are supplied in kits to ensure all the appropriate replacement parts are supplied to carry out a specific maintenance task. e.g. when a stem/bellows assembly is ordered, parts **(10a and 10b)**, **(8)** and **(6, 5)** will be included in the kit.

Always order spares by using the description given in 'Available spares' and state the size and type of stop valve.

**Example:** 1 - Body/bonnet gasket and stem packing for a Spirax Sarco DN15 BSA6T PN40 bellows sealed stop valve

**Note: The gaskets (10a and 10b) contain sharp metal reinforcement, please handle with care.**



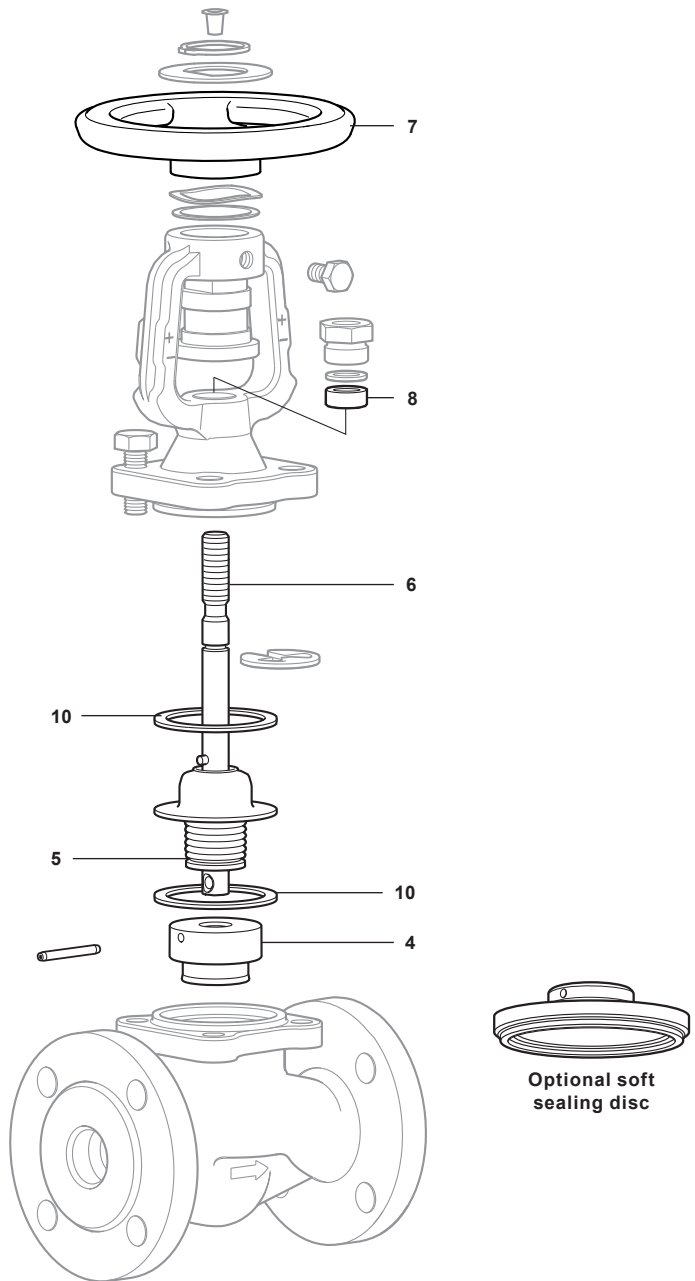


Fig. 10

BSA6T and BSA64T Stainless Steel Bellows Sealed Stop Valves





