BSAT and BSA
Bellows Sealed Stop Valves

Description
A range of sealed, in-line stop valves having twin ply bellows as standard throughout the range. These valves have been designed for use on steam, gas, liquid, condensate and water systems.

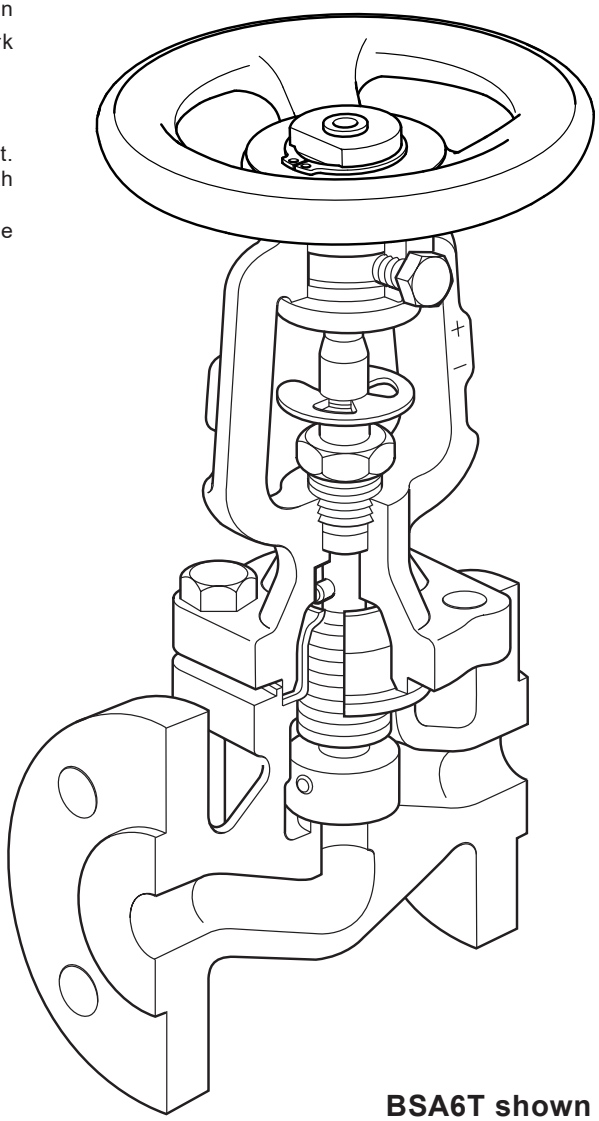
The standard BSAT range comes complete with throttling plug and locking device.

The alternative BSA range has a flat disc.

The Tables on page 2 and 3 clearly display the available sizes, pipeline connections and available options for the standard and alternative ranges.

Standards
The product fully complies with the requirements of the European Pressure Equipment Directive 2014/68/EU and carries the CE mark when so required.

Certification
The BSA1 and BSA1T is available with a manufacturer's Typical Test Report.
The BSA2, BSA2T, BSA3, BSA3T, BSA6T and BSA64T is available with certification to EN 10204 3.1.
Note: All certification/inspection requirements must be stated at the time of order placement.



BSA6T shown

Range and options

Standard BSAT range - complete with throttling plug and locking device

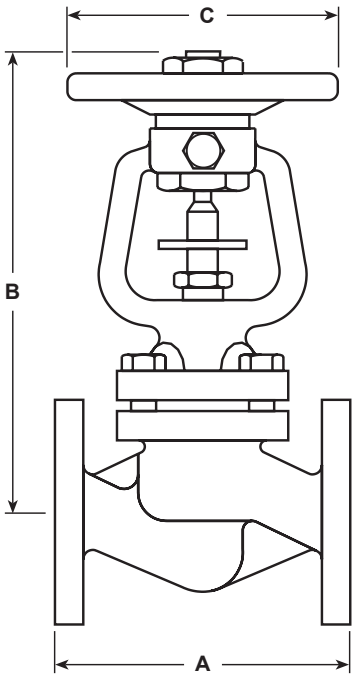
Material		Cast iron		SG iron		Cast steel					Stainless steel	Stainless steel/ cast steel
Model and connections		BSA1T		BSA2T		BSA3T					BSA6T	BSA64T
		PN16	KS 10	PN16	PN25	PN25	PN40	ASME 150	ASME 300	KS 20	PN40	PN40
Sizes	DN15 (½")	•	•	•	•		•	•	•	•	•	•
	DN20 (¾")	•	•	•	•		•	•	•	•	•	•
	DN25 (1")	•	•	•	•		•	•	•	•	•	•
	DN32 (1¼")	•	•	•	•		•				•	•
	DN40 (1½")	•	•	•	•		•	•	•	•	•	•
	DN50 (2")	•	•	•	•		•	•	•	•	•	•
	DN65 (2½")	•	•	•	•		•				•	•
	DN80 (3")	•	•	•	•		•	•	•	•	•	•
	DN100 (4")	•	•	•	•		•	•	•	•	•	•
	DN125 (5")	•	•	•	•		•					
	DN150 (6")	•	•	•	•		•		•	•		
	DN200 (8")	•	•	•	•	•			•	•		
	DN250 (10")				•							
Optional R-PTFE soft seat	DN15 (½")	•	•	•	•		•	•	•	•	•	•
	DN20 (¾")	•	•	•	•		•	•	•	•	•	•
	DN25 (1")	•	•	•	•		•	•	•	•	•	•
	DN32 (1¼")	•	•	•	•						•	•
	DN40 (1½")	•	•	•	•		•	•	•	•	•	•
	DN50 (2")	•	•	•	•		•	•	•	•	•	•
	DN65 (2½")	•	•	•	•						•	•
	DN80 (3")	•	•	•	•		•	•	•	•	•	•
	DN100 (4")	•	•	•	•		•	•	•	•	•	•

Range and options (continued)

Alternative BSA range - complete with flat disc option

Material		Cast iron		SG iron		Cast steel					Stainless steel	Stainless steel/ cast steel
Model and connections		BSA1		BSA2		BSA3						
		PN16	KS 10	PN16	PN25	PN25	PN40	ASME 150	ASME 300	KS 20		
Sizes	DN125 (5")	•	•	•	•		•					
	DN150 (6")	•	•	•	•		•		•	•		
	DN200 (8")	•	•	•	•	•			•	•		
	DN250 (10")				•							
Optional balancing disc	DN125 (5")				•		•					
	DN150 (6")			•	•		•		•	•		
	DN200 (8")	•	•	•	•	•			•	•		
	DN250 (10")				•							

Dimensions/weights
(approximate) in mm (inches) and kg (lbs)



Size	A					B	C	Weight				
	PN	JIS/KS 10K	JIS/KS 20K	ASME 150	ASME 300			BSA1 BSA1T BSA2 BSA2T	BSA3 (DIN)	BSA3 (ASME) ANSI 150	BSA3 ASME 300 JIS/KS 20K	BSA6T BSA64T PN40
DN15 (½")	130 (5.1)	133 (5.2)	152 (5.9)	108 (4.3)	152 (5.9)	205 (8.1)	125 (4.9)	4 (9)	4 (9)	5 (11)	6 (13)	4 (9)
DN20 (¾")	150 (5.9)	153 (6.0)	178 (7.0)	117 (4.6)	178 (7.0)	205 (8.1)	125 (4.9)	4 (9)	5 (11)	6 (13)	7 (15)	5 (11)
DN25 (1")	160 (6.3)	163 (6.4)	200 (7.9)	127 (5.0)	203 (8.0)	217 (8.5)	125 (4.9)	5 (11)	6 (13)	8 (18)	9 (20)	6 (13)
DN32 (1¼")	180 (7.1)	183 (7.2)				217 (8.5)	125 (4.9)	7 (15)	8 (18)			8 (18)
DN40 (1½")	200 (7.9)	203 (8.0)	224 (8.8)	165 (6.5)	229 (9.0)	243 (9.6)	200 (7.9)	10 (22)	11 (24)	10 (22)	11 (24)	11 (24)
DN50 (2")	230 (9.1)	229 (9.0)	259 (10.2)	203 (8.0)	267 (10.5)	243 (9.6)	200 (7.9)	12 (26)	14 (31)	12 (26)	15 (33)	14 (31)
DN65 (2½")	290 (11.4)	293 (11.5)				263 (10.4)	200 (7.9)	16 (35)	19 (42)			19 (42)
DN80 (3")	310 (12.2)	309 (12.1)	304 (12.0)	241 (9.5)	317 (12.5)	287 (11.3)	200 (7.9)	21 (46)	26 (57)	25 (55)	29 (64)	26 (57)
DN100 (4")	350 (13.8)	349 (13.7)	340 (13.4)	292 (11.5)	356 (14.0)	383 (15.0)	315 (12.4)	36 (79)	44 (97)	41 (90)	49 (108)	44 (97)
DN125 (5")	400 (15.7)	395 (15.6)				416 (16.4)	315 (12.4)	52 (115)	64 (141)			
DN150 (6")	480 (18.9)	479 (14.8)	428 (16.9)		445 (17.5)	450 (17.7)	400 (15.7)	75 (165)	88 (194)		94 (207)	
DN200 (8")	600 (23.6)	592 (23.3)	537 (21.1)		559 (22.0)	622 (24.5)	500 (19.7)	145 (320)	180 (397)		193 (425)	
DN250 (10")	730 (28.7)					(763 (30.0)	500 (19.7)	*180 (397)				

*(BSA2T/BSA2 only)

Seat leakage

Disc to seat shut-off conforms to EN 12266-1 Rate A leakage.

Kv values - all options

Size	DN15 (½")	DN20 (¾")	DN25 (1")	DN32 (1¼")	DN40 (1½")	DN50 (2")	DN65 (2½")	DN80 (3")	DN100 (4")	DN125 (5")	DN150 (6")	DN200 (8")	DN250 (10")
Kv	4	7	12	19	30	47	77	120	193	288	410	725	1 145

For conversion:
Cv (UK) = Kv x 0.963
Cv (US) = Kv x 1.156

Note: For Kv values and flow characteristic values of the **BSA1T, BSA2T** and **BSA3T** see the next section 'BSAT flow data'.

BSAT flow data

Size	BSAT valve												
	DN15 (½")	DN20 (¾")	DN25 (1")	DN32 (1¼")	DN40 (1½")	DN50 (2")	DN65 (2½")	DN80 (3")	DN100 (4")	DN125 (5")	DN150 (6")	DN200 (8")	DN250 (10")
Handwheel rotations	**Kv values for given handwheel rotations tested to EN 60534-2-3 Water at 20 °C (68 °F)**												
0	0	0	0	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	21	28	66	110
1	1.7	1.7	2.0	3.7	5.0	5.0	7.0	11.5	14.3	23	30	81	140
1.5	2.7	2.9	2.9	5.0	5.5	6.0	9.2	13.6	24.5	26	33	97	150
2	3.6	4.0	4.6	7.9	7.6	7.2	11.6	16.3	34.1	42	46	111	165
2.5	4.4	5.3	6.4	10.6	11.0	9.7	12.4	18.5	59.6	67	65	149	190
3	5.4	6.6	8.5	13.8	14.7	14.1	13.0	21.1	86.2	94	90	199	225
4			10.6	17.0	22.6	24.4	25.2	24.5	123.0	140	152	302	330
4.5			11.2	18.3	24.4	29.4	32.5	29.0	139.0	181	177	355	451
5			11.9	19.6	27.2	37.0	43.6	39.1	164.1	185	216	403	460
6					28.9	46.2	60.2	61.0	179.0	220	264	455	600
6.5					29.1	47.0	63.0	69.0	186.0	230	288	480	641
6.7					29.3	47.2	64.3	73.0		235	293	487	656
7							65.9	78.0		241	305	495	678
8							71.2	90.0		259	337	507	738
8.5							74.6	92.0			348	522	760
9.5								99.0			369		793
10								101.6					805
10.7													827

To convert Kv to volume flowrate in m³/h:

$\dot{Q} = Kv \times \sqrt{\Delta P}$

Where:

$\dot{Q}$ = Volume flow in cubic m/h

ΔP = Pressure drop in bar

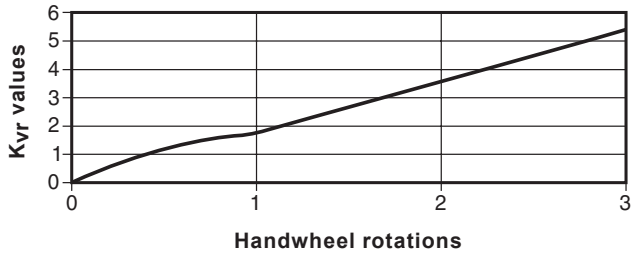
Note: The maximum recommended differential pressure in throttling function:

If the BSAT is used above these quoted figures, increased noise and vibration may be experienced.

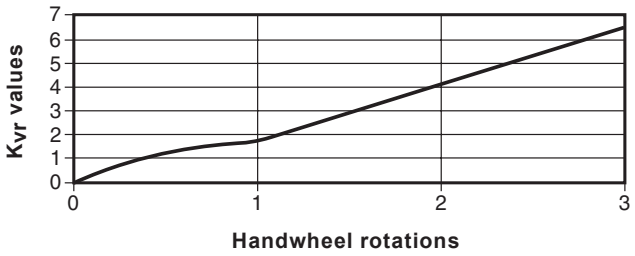
DN15 - DN80	2.0 bar (29 psi)
DN100 - DN125	1.5 bar (22 psi)
DN150	1.0 bar (15 psi)
DN200 - DN250	0.8 bar (12 psi)

The following graphs show handwheel rotation and flow characteristic with water at 20 °C (68 °F):

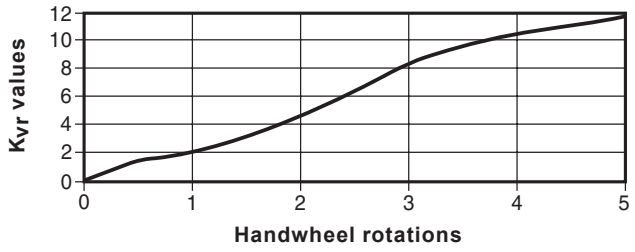
BSAT - DN15 (½")



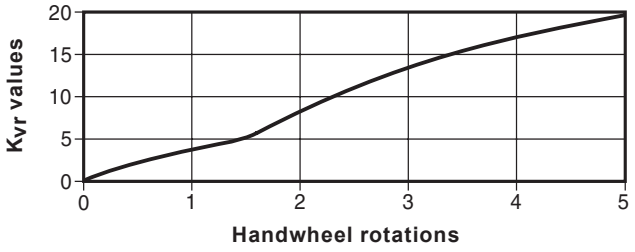
BSAT - DN20 (¾")



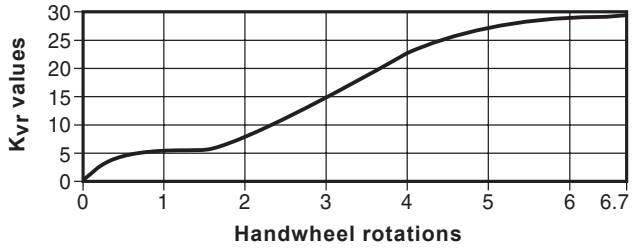
BSAT - DN25 (1")



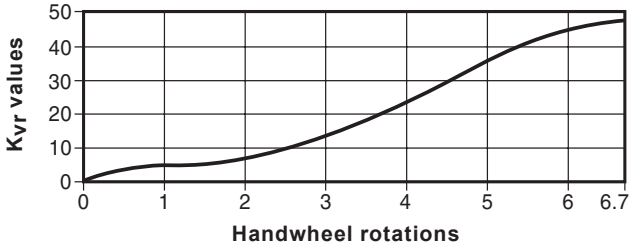
BSAT - DN32 (1¼")



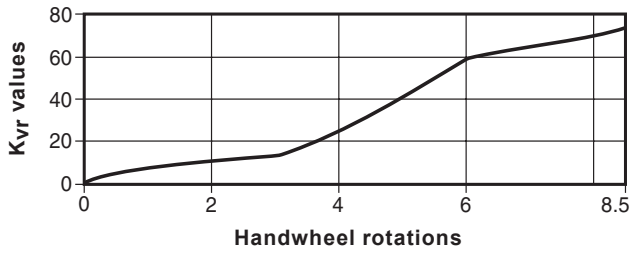
BSAT - DN40 (1½")



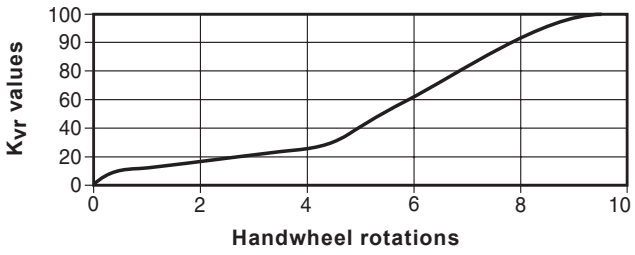
BSAT - DN50 (2")



BSAT - DN65 (2½")



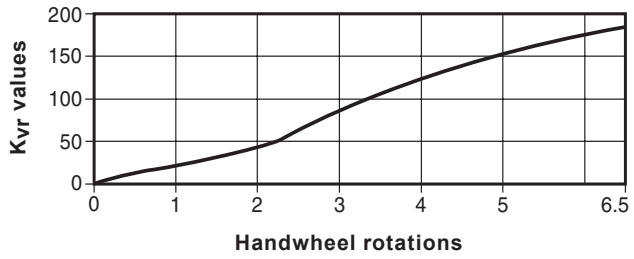
BSAT - DN80 (3")



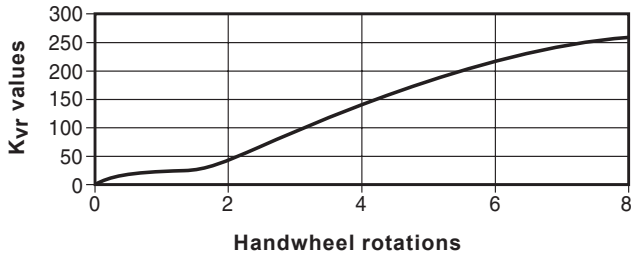
Handwheel rotation and flow characteristics continued on next page

Handwheel rotation and flow characteristics (continued)

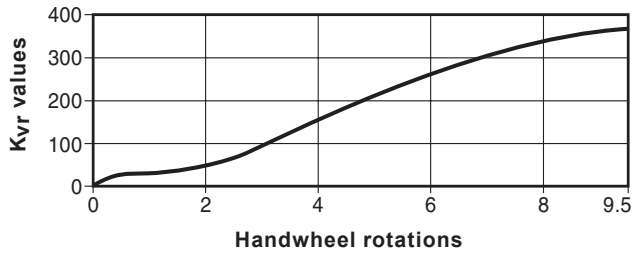
BSAT - DN100 (4")



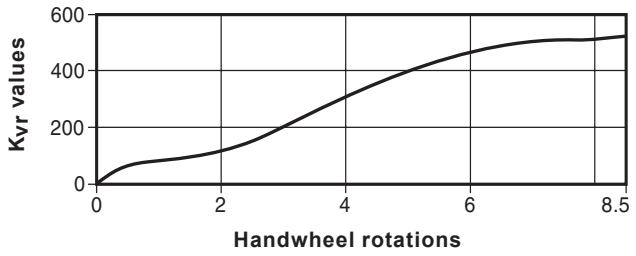
BSAT - DN125 (5")



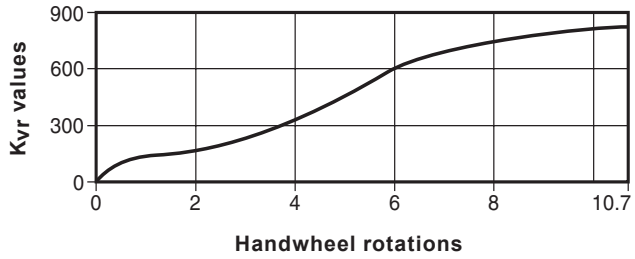
BSAT - DN150 (6")



BSAT - DN200 (8")

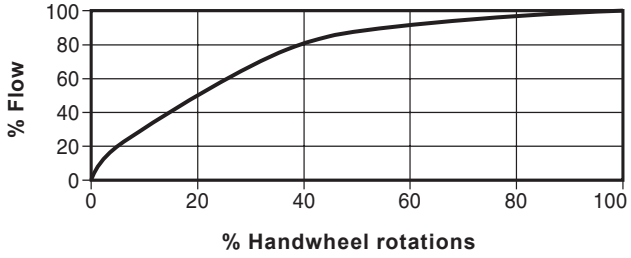


BSAT - DN250 (10")



Typical standard flat disc

for the BSA1, BSA2 and BSA3



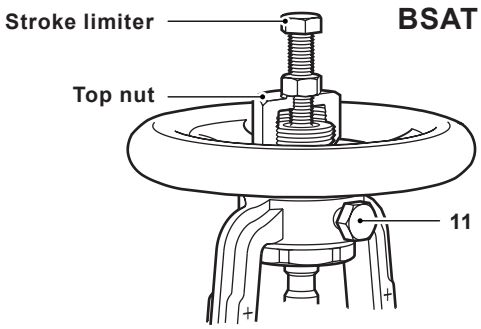
Materials for the BSA1T, BSA2T, BSA3T and BSA1, BSA2, BSA3

No.	Part			BSA1T and BSA1	BSA2T and BSA2	BSA3T and BSA3 DIN	BSA3T and BSA3 ANSI
1	Body			Cast iron EN-GJL-250 (5.1301)	SG iron EN-GJS-400-18-LT (5.3103)	Cast steel 1.0619+N (GSC 25N)	Cast steel ASTM A 216 WCB
2	Bonnet			SG iron EN-GJS-400-18-LT (5.3103)		Steel (DN15 - DN80) DIN 17243 C 22.8	Forged steel (DN15- DN80) ASTM A 105
						Steel (DN100 - DN200) 1.0619+N (GSC 25N)	Cast steel (DN100- DN200) ASTM A 216 WCB
3	Seat			Stainless steel AISI 420			
4	Disc	Metal		Stainless steel DIN 17440 X30 Cr13			
		Soft seat	Disc	Stainless steel DIN 17440 X30 Cr13			
			Insert	R-PTFE 25% carbon filled			
5	Bellows			Stainless steel WS 1.4571 EN10028-7 X6 CrNiMTi 17-12-2			
6	Stem			Stainless steel AISI 420			
7	Handwheel			Pressed steel BS 1449 CR4			
8	Stem packing			Graphite			
	Bonnet studs				Steel DIN 17420 24 Cr Mo 5		Steel ASTM A 193 B7
9	Bonnet nuts				Steel DIN 17420 Ck 35		Steel ASTM A 192 2 H
	Bonnet bolts			Steel DIN 931 Gr. 5.6			
10	Body/bonnet gasket			Graphite laminated with stainless steel insert			
11	Locking screw	DN15 (½") - DN80 (3")		Steel M8 x 14 mm BS 3692 Gr. 8.8			
		DN100 (4") - DN150 (6")		Steel M8 x 20 mm BS 3692 Gr. 8.8			
		DN200 (8") - DN250 (10")		Steel M12 x 20 mm BS 3692 Gr. 8.8			
12	'D' washer			Mild steel			
13	Circlip			Mild steel			
14	Protective cap			Plastic			
15	Top nut			Steel			

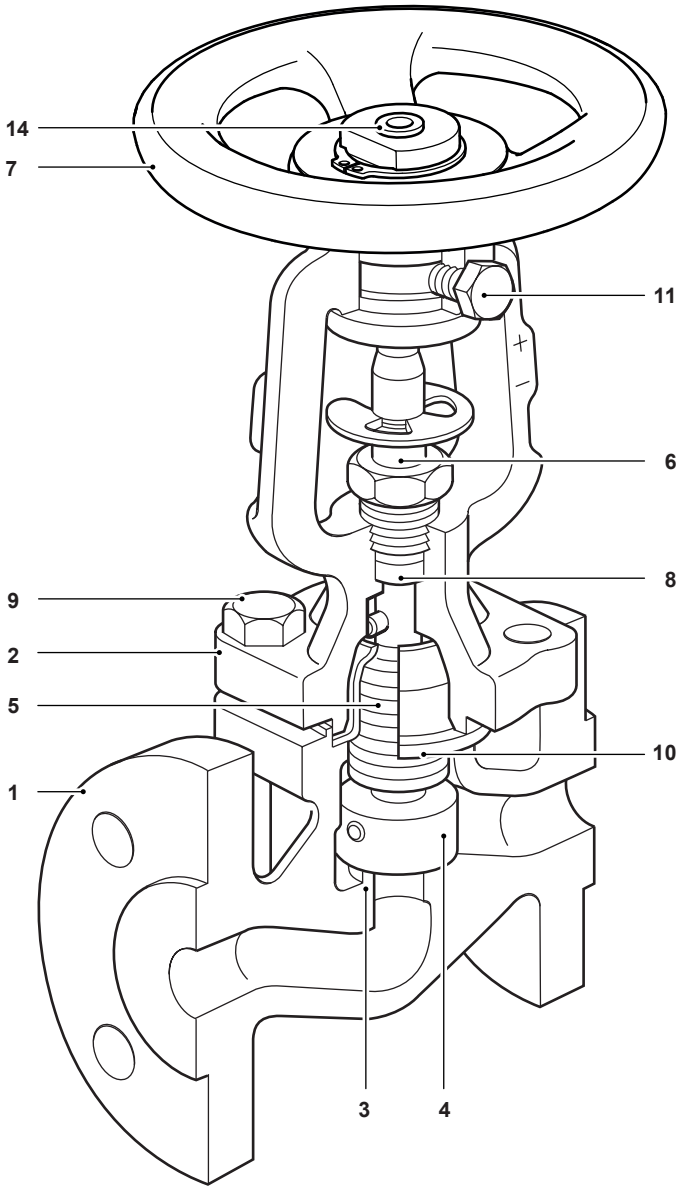
Stroke limiter for throttling versions

The handwheel nut on the **BSA1T, BSA2T and BSA3T** has a threaded hole for provision of a stroke limiter.
Customer to supply standard nuts and bolts as indicated in the table below.

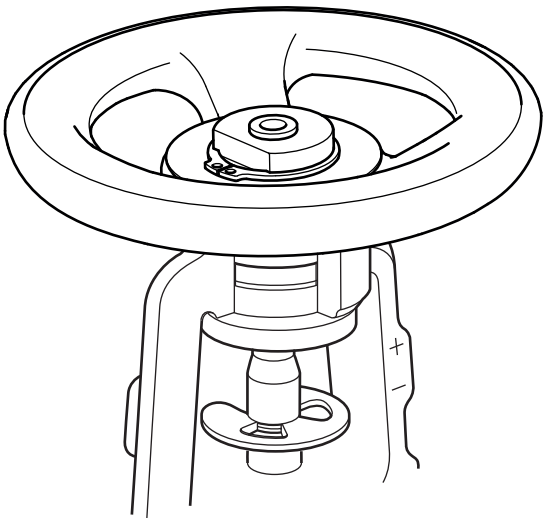
Size	Hexagon bolt
DN15 (½") - DN80 (3")	M8 x 50 mm
DN100 (4") - DN150 (6")	M12 x 75 mm
DN200 (8") - DN250 (10")	M12 x 100 mm

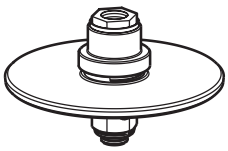


BSAT



BSA





DN150 (6") shown

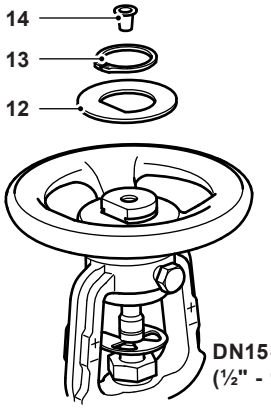
Optional balancing disc assembly

Used above	25 bar (363 psi) ΔP	DN125	5"
	17 bar (247 psi) ΔP	DN150	6"
	10 bar (145 psi) ΔP	DN200	8"
	6 bar (87 psi) ΔP	DN250	10"(BSA2 only)

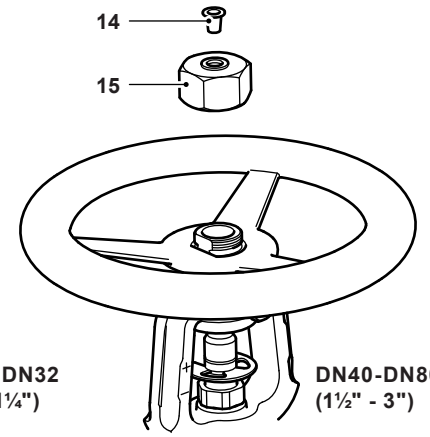
Optional soft sealing disc

Across the size range there are three hand wheel retention methods

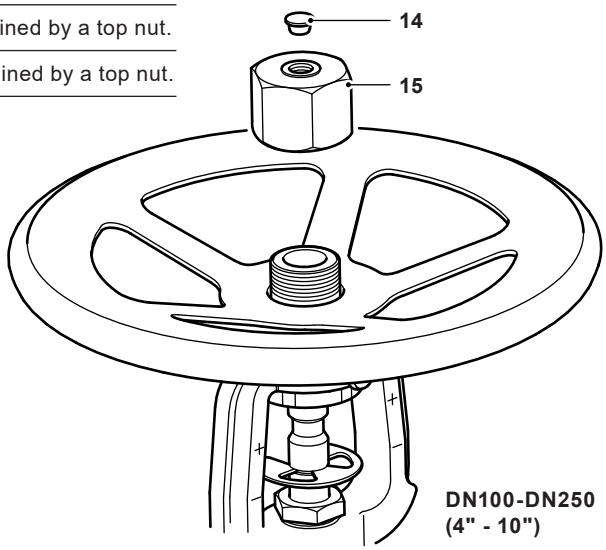
Sizes	**DN15 (½") - DN32 (1¼")**	have a 'D' drive hand wheel retained by a 'D' washer and circlip.
	DN40 (1½") - DN80 (3")	have a 'D' drive hand wheel retained by a top nut.
	DN100 (4") - DN250 (10")	have a screwed hand wheel retained by a top nut.



DN15-DN32 (½" - 1¼")



DN40-DN80 (1½" - 3")



DN100-DN250 (4" - 10")

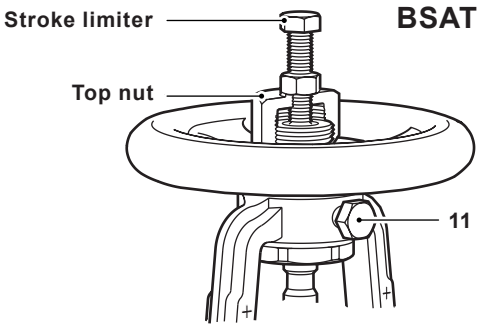
Materials for the BSA6T and BSA64T

No.	Part		BSA6T	BSA64T
1	Body		Stainless steel EN 10213 1.4408 or ASTM A351 CF8M	Stainless steel EN 10213 1.4408 or ASTM A351 CF8M
2	Bonnet		Stainless steel EN 10213 1.4581	Carbon steel DN15 - DN80 DIN 117243 C22.8 Carbon steel DN100 10619+N (GSC 25N)
3	Seat		Stainless steel EN 10213 1.4408 or ASTM A351 CF8M	
4	Disc	DN15 (½") - DN40 (1½")	Stainless steel EN 10088 1.4571	
		DN50 (2") - DN100 (4")	Stainless steel EN 100222 1.4571	
5	Bellows		Stainless steel DIN 17440 1.4571	
6	Stem		Stainless steel EN 10088 1.4571	
7	Handwheel		Pressed steel BS 1449 CR4	
8	Stem packing		Graphite	
9	Bonnet studs		Stainless steel A4-70	
	Bonnet nuts		Stainless steel A4	
10	Body/bonnet gasket		Graphite laminated with stainless steel insert	
11	Locking screw	DN15 (½") - DN80 (3")	Steel M8 x 14 mm A2-70	
		DN100 (4")	Steel M8 x 20 mm A2-70	

Stroke limiter for throttling versions

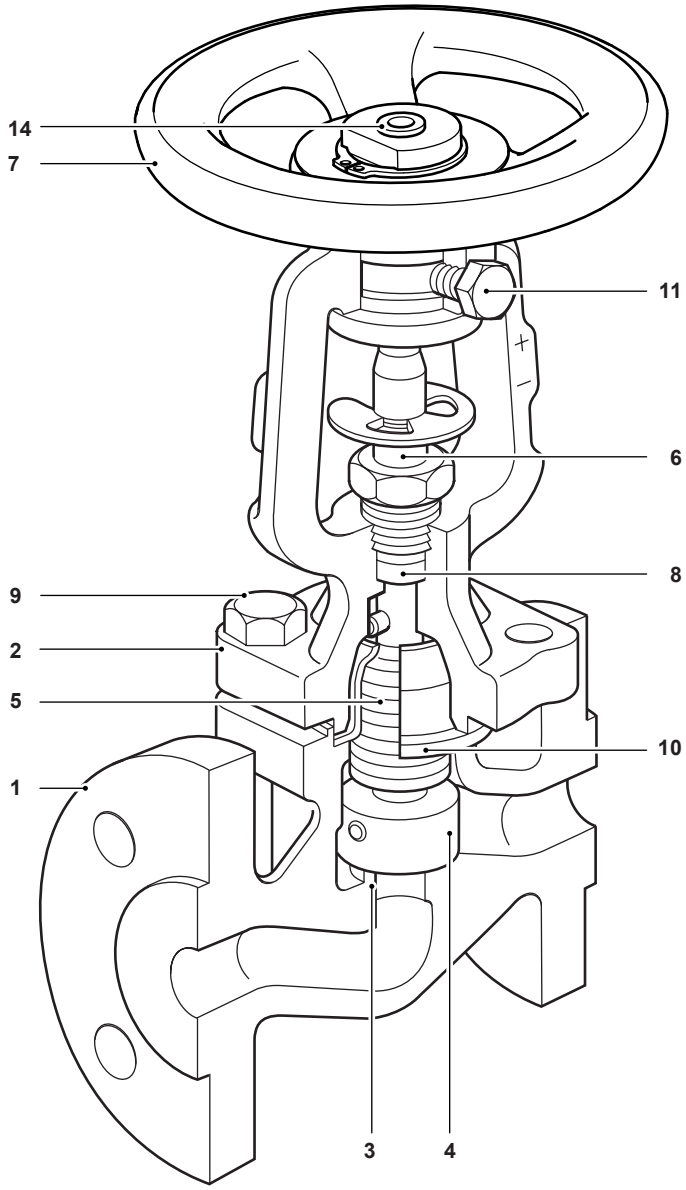
The handwheel nut on the **BSA6T and BSA64T** has a threaded hole for provision of a stroke limiter. Customer to supply standard nuts and bolts as indicated in the table below.

Size	Hexagon bolt
DN15 (½") - DN80 (3")	M8 x 50 mm
DN100 (4")	M12 x 75 mm



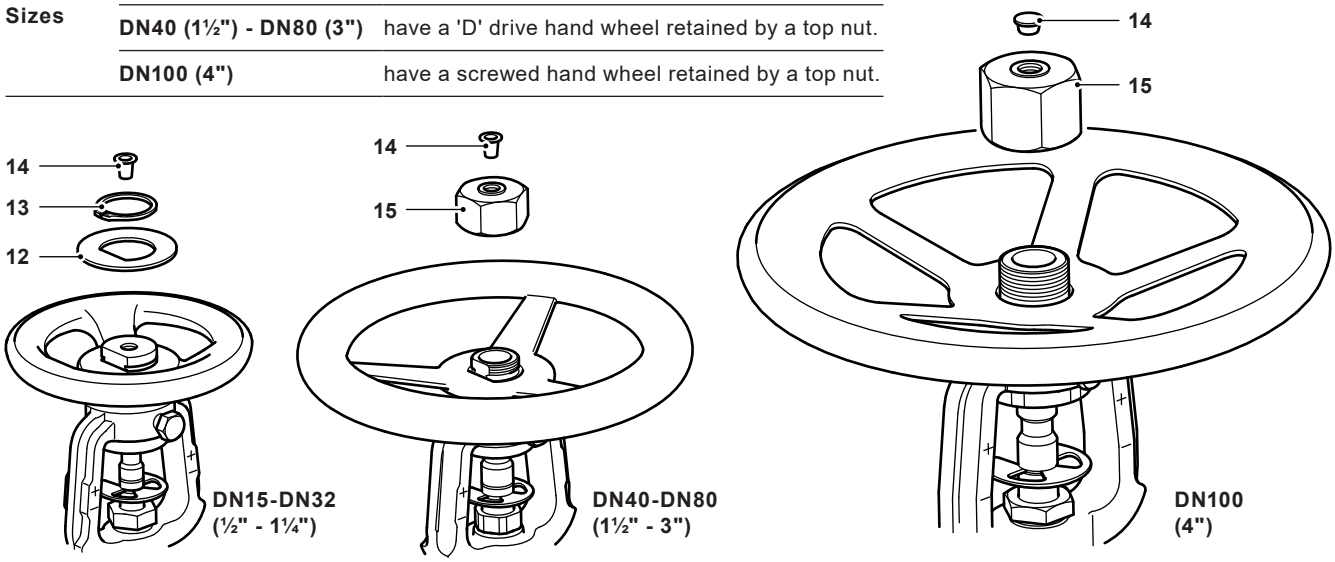
BSAT

DN15-DN32 shown (½"-1¼")



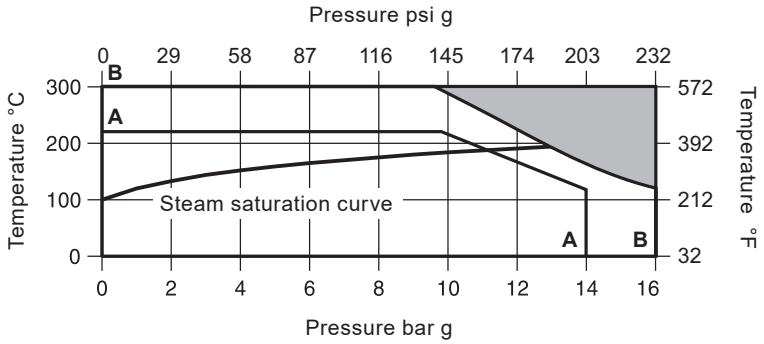
Across the size range there are three hand wheel retention methods

Sizes	**DN15 (½") - DN32 (1¼")**	have a 'D' drive hand wheel retained by a 'D' washer and circlip.
	DN40 (1½") - DN80 (3")	have a 'D' drive hand wheel retained by a top nut.
	DN100 (4")	have a screwed hand wheel retained by a top nut.



Product limitations

BSA1T and BSA1



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

A - B Flanged JIS/KS 10K

A - C Flanged PN16

Note: ΔPMX Maximum differential pressure is limited to the PMO.

Body design conditions			PN16	JIS/KS 10K
PMA	Maximum allowable pressure		16 bar g (232 psi g)	14 bar g (203 psi g)
TMA	Maximum allowable temperature		300 °C (572 °F)	220 °C (428 °F)
PMO	Maximum operating pressure for saturated steam service		12.9 bar g (187 psi g)	11 bar g (160 psi g)
TMO	Maximum operating temperature	Soft seat	230 °C (446 °F)	220 °C (428 °F)
		Metal seat	300 °C (572 °F)	220 °C (428 °F)
Minimum operating temperature			-10 °C (14 °F)	-10 °C (14 °F)
Designed for a maximum cold hydraulic test pressure of:			24 bar g (348 psi g)	20 bar g (290 psi g)

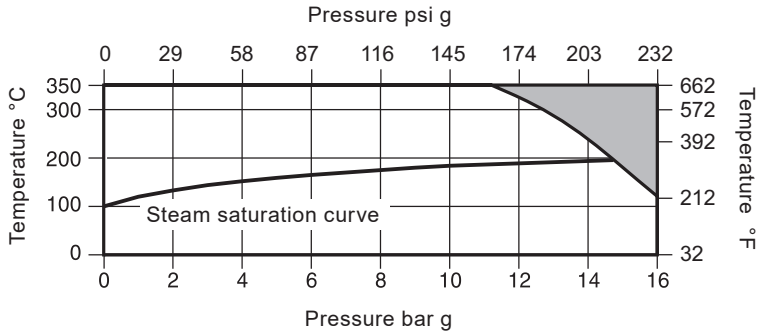
Maximum permissible differential pressure in throttling function:

DN15 - DN80 (½" - 3")	2.0 bar (29 psi)
DN100 - DN125 (4" - 5")	1.5 bar (22 psi)
DN150 (6")	1.0 bar (15 psi)
DN200 - DN250 (8" - 10")	0.8 bar (12 psi)

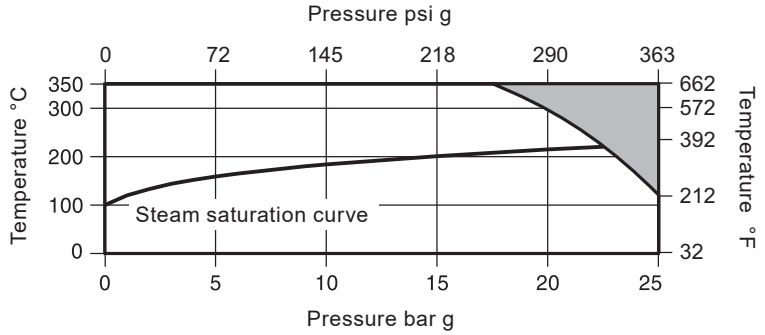
Product limitations (continued)

BSA2T and BSA2

PN16



PN25, DN200 (8")



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

Note: ΔPMX Maximum differential pressure is limited to the PMO.

Body design conditions			PN16	PN25, DN200 (8")
PMA	Maximum allowable pressure		16 bar g (232 psi g)	25 bar g (363 psi g)
TMA	Maximum allowable temperature		350 °C (662 °F)	350 °C (662 °F)
PMO	Maximum operating pressure for saturated steam service		14.7 bar g (213 psi g)	22.3 bar g (323 psi g)
TMO	Maximum operating temperature	Soft seat	230 °C (446 °F)	230 °C (446 °F)
		Metal seat	350 °C (662 °F)	350 °C (662 °F)
Minimum operating temperature			-10 °C (14 °F)	-10 °C (14 °F)
Designed for a maximum cold hydraulic test pressure of:			24 bar g (348 psi g)	38 bar g (551 psi g)

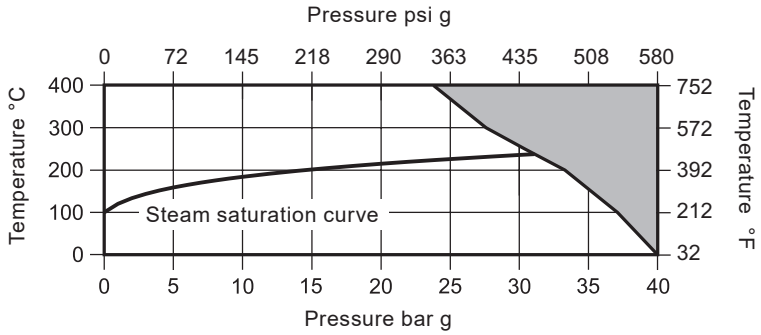
Maximum permissible differential pressure in throttling function:

DN15 - DN80 (½" - 3")	2.0 bar (29 psi)
DN100 - DN125 (4" - 5")	1.5 bar (22 psi)
DN150 (6")	1.0 bar (15 psi)
DN200 - DN250 (8" - 10")	0.8 bar (12 psi)

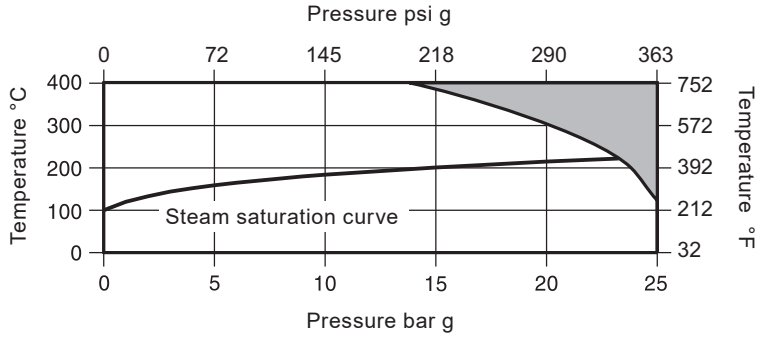
Product limitations (continued)

BSA3T and BSA3 (DIN)

PN25, DN200 (8")



PN40, DN15 - DN150 (½" - 6")



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

Note: ΔPMX Maximum differential pressure is limited to the PMO.

Body design conditions			PN25, DN200 (8")	PN40, DN15 - DN150 (½" - 6")
PMA	Maximum allowable pressure		25 bar g (363 psi g)	40 bar g (580 psi g)
TMA	Maximum allowable temperature		400 °C (752 °F)	400 °C (752 °F)
PMO	Maximum operating pressure for saturated steam service		23.2 bar g (336 psi g)	* 30.4 bar g (441 psi g)
TMO	Maximum operating temperature	Soft seat	230 °C (446 °F)	230 °C (446 °F)
		Metal seat	400 °C (752 °F)	400 °C (752 °F)
Minimum operating temperature			-10 °C (14 °F)	-10 °C (14 °F)
Product is safe for use under full vacuum conditions				
Designed for a maximum cold hydraulic test pressure of:			38 bar g (551 psi g)	60 bar g (870 psi g)

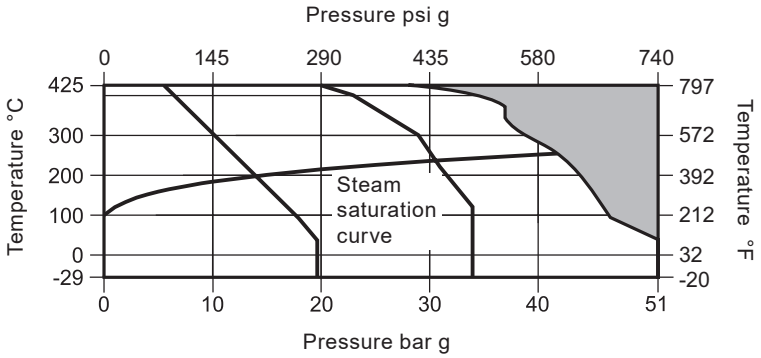
* Maximum operating pressure is limited to 27 bar g (392 psi g) for the soft seat version only

Maximum permissible differential pressure in throttling function:

DN15 - DN80 (½" - 3")	2.0 bar (29 psi)
DN100 - DN125 (4" - 5")	1.5 bar (22 psi)
DN150 (6")	1.0 bar (15 psi)
DN200 - DN250 (8" - 10")	0.8 bar (12 psi)

Product limitations (continued)

BSA3T and BSA3 (ASME)



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

C - D Flanged ASME 150

C - E Flanged JIS/KS 20K

C - F Flanged ASME 300

Note: ΔPMX Maximum differential pressure is limited to the PMO.

Body design conditions			ASME 150	ASME 300	JIS/KS 20K
PMA	Maximum allowable pressure		19.6 bar g (284 psi g)	51 bar g (740 psi g)	34 bar g (493 psi g)
TMA	Maximum allowable temperature		425 °C (797 °F)	425 °C (797 °F)	425 °C (797 °F)
PMO	Maximum operating pressure for saturated steam service		14 bar g (203 psi g)	*41.6 bar g (603 psi g)	*30.7 bar g (445 psi g)
TMO	Maximum operating temperature	Soft seat	230 °C (446 °F)	230 °C (446 °F)	230 °C (446 °F)
		Metal seat	425 °C (797 °F)	425 °C (797 °F)	425 °C (797 °F)
Minimum operating temperature			-29 °C (-20 °F)	-29 °C (-20 °F)	0 °C (32 °F)
Product is safe for use under full vacuum conditions					
Designed for a maximum cold hydraulic test pressure of:			31 bar g (450 psi g)	77 bar g (1117 psi g)	50 bar g (725 psi g)

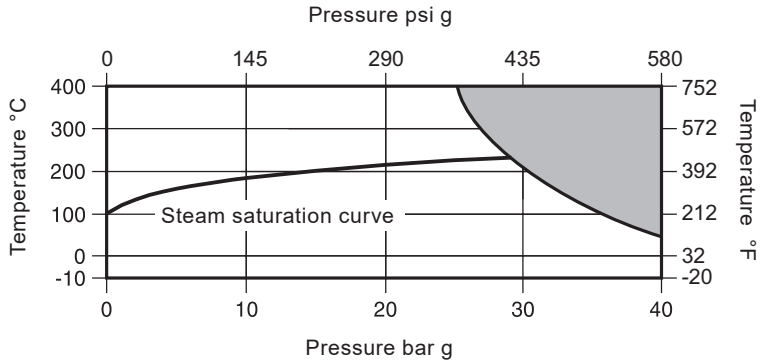
* Maximum operating pressure is limited to 27 bar g (391 psi g)for the soft seat version only

Maximum permissible differential pressure in throttling function:

DN15 - DN80 (½" - 3")	2.0 bar (29 psi)
DN100 - DN125 (4" - 5")	1.5 bar (22 psi)
DN150 (6")	1.0 bar (15 psi)
DN200 - DN250 (8" - 10")	0.8 bar (12 psi)

Product limitations (continued)

BSA6T and BSA64



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

Note: ΔPMX Maximum differential pressure is limited to the PMO.

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 @ 363 psi g)
Minimum allowable temperature				-10 °C (14 °F)
PMO	Maximum operating pressure for saturated steam service	Metal seat		29.8 bar g @ 236 °C (432 psi g @ 457 °F)
		Soft seat		27.0 bar g @ 230 °C (391 psi g @ 446 °F)
TMO	Maximum operating temperature	Metal seat		400 °C @ 25.6 bar g (752 °F @ 371 psi g)
		Soft seat		230 °C @ 27.0 bar g (446 °F @ 391 psi g)
Minimum operating temperature				-10 °C (14 °F)
ΔPMX	Maximum differential pressure	On/off function		Limited to the PMO
		Throttling function	DN15 - DN80 (½" - 3")	2 bar (29 psi)
			DN100 (4")	1.5 bar (22 psi)
Designed for a maximum cold hydraulic test pressure of:				60 bar g (870 psi)

Maximum permissible differential pressure in throttling function:

DN15 - DN80 (½" - 3")	2.0 bar (29 psi)
DN100 (4")	1.5 bar (22 psi)

Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions (IM-P137-02) supplied with the product.

Installation note

Install in the direction of flow given by the arrow on the body with the handwheel in a suitable position.

Disposal

These products are recyclable. No ecological hazard is anticipated with the disposal of these products, providing due care is taken.

How to order

Example: 1 off DN25 Spirax Sarco type BSA2T bellows sealed stop valve, flanged PN16 or PN25.

Note: Should the differential pressure exceed those listed against the respective sizes in the table opposite, then please ensure balancing discs are specified for use in the valves (see page 9).

Size	DN125 (5")	DN150 (6")	DN200 (8")	DN250 (10")
ΔP in bar (psi)	25 (363)	17 (247)	10 (145)	6 (87)

Spare parts

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

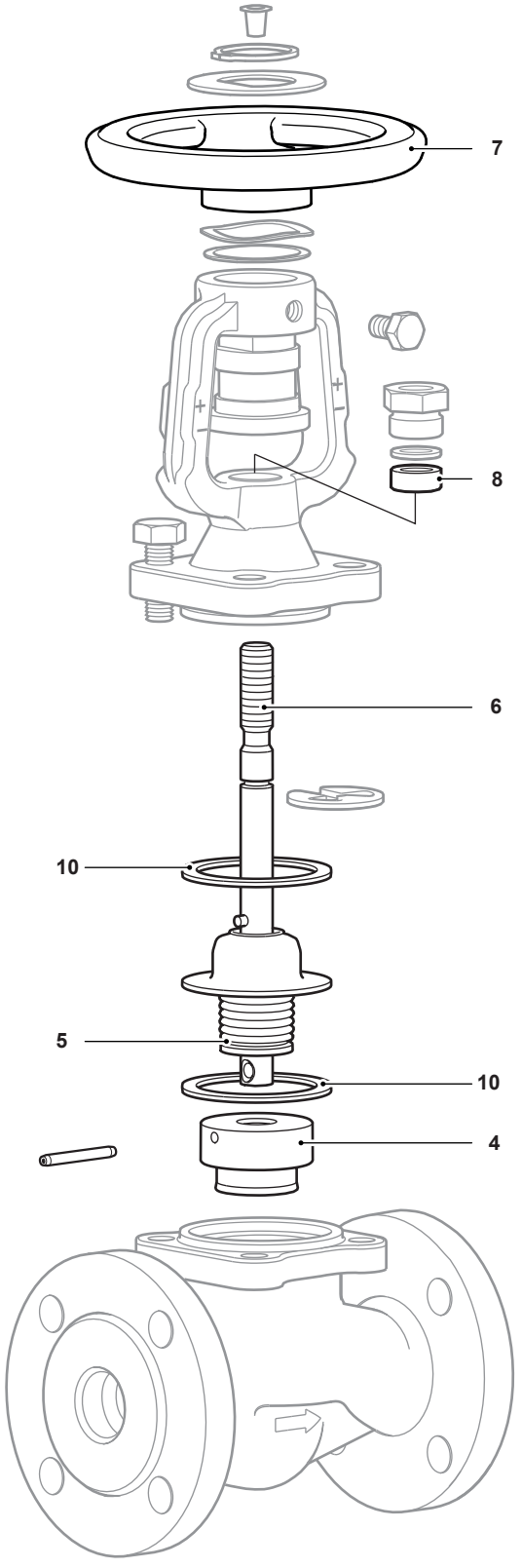
Available spares

Body/bonnet gasket and stem packing	**10, 8 (2 off)**
Stem and bellows assembly (state if BSAT or BSA)	**5, 6, 8, 10**
Disc (and optional disc where fitted) - state full description of the valve	**4, 8, 10**
Handwheel	**7**

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 (10), (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 DN15 Spirax Sarco BSA2T PN16 bellows sealed stop valve.



DN15 - DN32 (½" - 1¼") shown