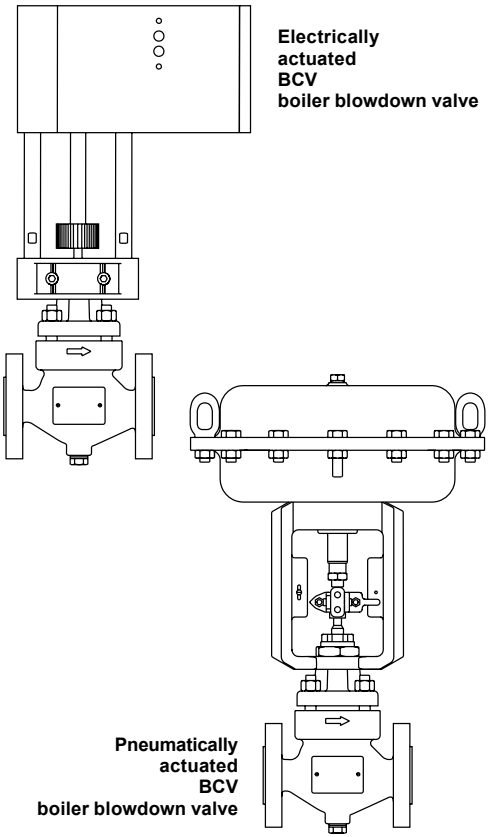
IM-P403-103
AB Issue 2

BCV Blowdown Control Valves DN15 to DN50 (½" to 2")

Installation and Maintenance Instructions



Electrically actuated BCV boiler blowdown valve

Pneumatically actuated BCV boiler blowdown valve

Printed in France

1. Safety information

Safe operation of these products can only be guaranteed if they are properly installed, commissioned, used and maintained by qualified personnel (see Section 1.11 on this document) 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

1. **Your attention is drawn to any National or Regional regulations concerning boiler blowdown. In the UK, guidance is given in HSE Guidance Note PM60.**
2. **When the EL actuator is used it must be electrically isolated before any maintenance is carried out.**

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 below comply with the requirements of the European Pressure Equipment Directive 97/23/EC (PED) and carry the CE mark when so required. Pressure equipment not bearing the CE mark is classified 'Sound Engineering Practice' in accordance with Article 3, Paragraph 3 of the PED.

Note: By law, SEP products cannot be marked with the CE symbol.

BCV blowdown control valves fall within the following PED categories:

Product			Group 1 Gases	Group 2 Gases	Group 1 Liquids	Group 2 Liquids
BCV4	PN40	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32	2	SEP	SEP	SEP
		DN40 - DN50	2	1	SEP	SEP
	PN63 PN100	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32	2	SEP	2	SEP
		DN40 - DN50	2	1	2	SEP
	ASME 300	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32	2	SEP	SEP	SEP
		DN40 - DN50	2	1	2	SEP
	ASME 600	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32	2	SEP	2	SEP
		DN40 - DN50	2	1	2	SEP
	JIS 20K KS 20K	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32	2	SEP	SEP	SEP
		DN40 - DN50	2	1	SEP	SEP

Product			Group 1 Gases	Group 2 Gases	Group 1 Liquids	Group 2 Liquids
BCV6	PN40	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32	2	SEP	SEP	SEP
		DN40 - DN50	2	1	SEP	SEP
	PN63 PN100	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32	2	SEP	2	SEP
		DN40 - DN50	2	1	2	SEP
	ASME 300	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32	1	SEP	SEP	SEP
		DN40	2	1	SEP	SEP
		DN50	2	1	2	SEP
	ASME 600	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32	2	SEP	2	SEP
		DN40 - DN50	2	1	2	SEP
	JIS 20K KS 20K	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32	2	SEP	SEP	SEP
		DN40 - DN50	2	1	SEP	SEP
BCV7	PN25	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32 - DN40	1	SEP	SEP	SEP
		DN50	2	1	SEP	SEP
	ASME 125	DN15 - DN25	SEP	SEP	SEP	SEP
		DN40 - DN50	1	SEP	SEP	SEP
	ASME 250 KS 10	DN15 - DN25	SEP	SEP	SEP	SEP
		DN40 - DN50	2	1	SEP	SEP
BCV8	ASME 600	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32	2	SEP	2	SEP
		DN40 - DN50	2	1	2	SEP
	PN63 PN100	DN15 - DN25	SEP	SEP	SEP	SEP
		DN32	2	SEP	2	SEP
		DN40 - DN50	2	1	2	SEP

i) 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.

ii) Determine the correct installation situation and direction of fluid flow.

iii) **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.**

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

1.2 Access

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

1.3 Lighting

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

1.4 Hazardous liquids or gases in the pipeline

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

1.5 Hazardous environment around the product

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

1.6 The system

Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk?
Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

1.7 Pressure systems

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

1.8 Temperature

Allow time for temperature to normalise after isolation to avoid danger of burns.

1.9 Tools and consumables

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

1.10 Protective clothing

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

1.11 Permits to work

All work must be carried out or be supervised by a suitably competent person. Installation and operating personnel should be trained in the correct use of the product according to the Installation and Maintenance Instructions.
Where a formal 'permit to work' system is in force it must be complied with. Where there is no such system, it is recommended that a responsible person should know what work is going on and, where necessary, arrange to have an assistant whose primary responsibility is safety.
Post 'warning notices' if necessary.

1.12 Handling

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

1.13 Residual hazards

In normal use the external surface of the product may be very hot. If used at the maximum permitted operating conditions the surface temperature of some products may reach temperatures of 580°C (1076°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.

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 o 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.

1.17 CE conformity of actuators

Electrical actuator:	**EMC Directive 2004 / 108 / EC** **EN 61000 6 2** **EN 61000 6 4**	**Low Voltage Directive 2006 / 95 / EC** **EN 60730 1** **EN 60730 2 14** **Over Voltage category III** **Degree of pollution III**
Pneumatic actuator:	**See the Technical Information for the PN9000 series**	

2. General product information and application

2.1 Description and application

Spirax Sarco's BCV blowdown control valves are manufactured using the market proven Spira-trol™ body. These valves have been specifically designed for the blowdown of steam boilers or for other high pressure drop, low flow applications, and are generally used with a blowdown controller as part of an automatic BCV control system.
The valve may also be used for other high pressure drop, low flowrate applications such as boiler feedpump recirculation.

Two versions are available:
- Electrically actuated.
- Pneumatically actuated.

Standards

These products fully comply with the requirements of the European Pressure Equipment Directive 97 / 23 / EC.

Certification

These products are available with material certification to EN 10204 3.1. **Note:** All certification / inspection requirements must be stated at the time of order placement.

Note: For additional product information see Technical Information sheet TI-P403-102.

2.2 Size and pipe connections

½", ¾", 1", 1¼", 1½" and 2"
Screwed BSP or NPT,
Socket weld and
Butt weld.

DN15, DN20, DN25, DN32, DN40 and DN50
Flanged:
EN 1092 PN25, PN40, PN63 and PN100
ASME class 125, 150, 250, 300 and 600
JIS / KS 10K, 20K, 30K and 40K

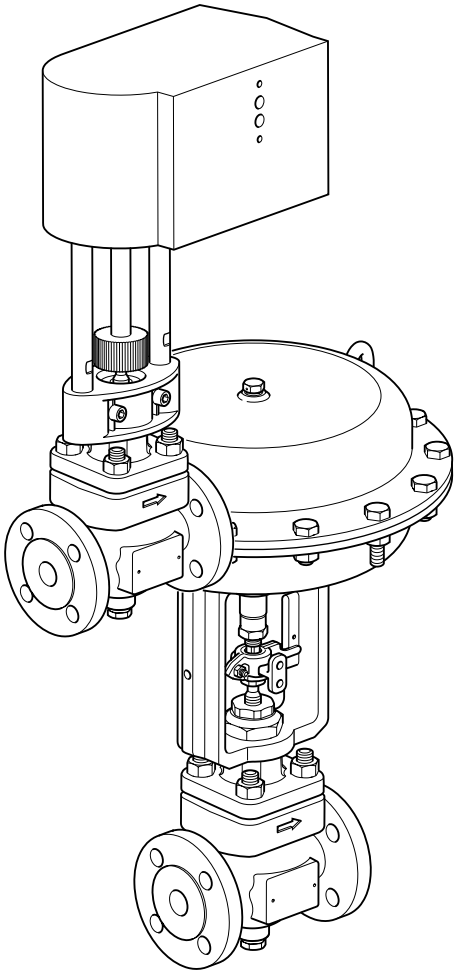


Fig. 1 BCV blowdown control valves

2.3 Available models:

Material	Connections			
	Screwed	Socket weld	Flanged	Butt weld
Carbon steel	**BCV41**	**BCV42**	**BCV43**	**BCV44**
Stainless steel	**BCV61**	**BCV62**	**BCV63**	**BCV64**
SG iron	**BCV71**		**BCV73**	
Alloy steel		**BCV82**	**BCV83**	**BCV84**

BCV blowdown control valves are compatible with the following actuators and positioners:

Version	Actuator	Positioners
Electric	AHL1 series	
Pneumatic	PN9_ _ _ series	PP5 (pneumatic)
		EP5 (electropneumatic)
		ISP5 (intrinsically safe electropneumatic)
		SP200is, SP400 and SP500 (microprocessor based electropneumatic)
		SP300 (digital communications)

3. Technical data

Media	Water

3.1 Actuator technical data

Actuator	**AHL1 Series**
Supply voltage	Standard 24 Vac, Optional card 230 Vac and 100 Vac
Supply frequency	50 to 60 Hz
Power consumption	10 to 18
Actuator speed	2 mm/s, 4 mm/s or 6 mm/s
Actuators thrust maximum	2 kN
Maximum shut-off value	42 bar g

Size		Actuator	Maximum shut-off value
DN15 to DN25	**½" to 1"**	AHL1 series / PN9123E	42 bar g
DN32 to DN50	**1¼" to 2"**	AHL1 series / PN9223E	

Maximum ambient temperature	24 volt version (Connect to class 2 circuit only)	-5°C to +55°C	(23°F to 131°F)
	110 / 230 volt versions	-5°C to +50°C	(23°F to 122°F)

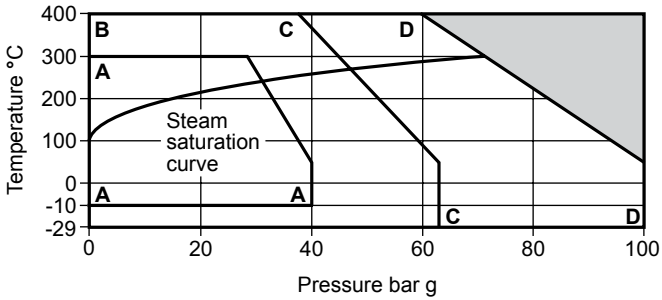
3.2 Pressure / temperature limits

BCV41	Screwed			see **Section 3.3**, page 10
BCV43		Flanged EN 1092		
BCV41	Screwed			see **Section 3.4**, page 11
BCV42	Socket weld			
BCV43		Flanged ASME		
BCV44			Butt weld	
BCV43		Flanged JIS / KS		see **Section 3.5**, page 12
BCV61	Screwed			see **Section 3.6**, page 13
BCV63		Flanged EN 1092		
BCV61	Screwed			see **Section 3.7**, page 14
BCV62	Socket weld			
BCV63		Flanged ASME		
BCV64			Butt weld	
BCV63		Flanged JIS / KS		see **Section 3.8**, page 15
BCV71	Screwed			see **Section 3.9**, page 16
BCV73		Flanged EN 1092		
BCV71	Screwed			see **Section 3.10**, page 17
BCV73		Flanged ASME		
BCV73		Flanged JIS / KS		see **Section 3.11**, page 18
BCV83		Flanged EN 1092		see **Section 3.12**, page 19
BCV82	Socket weld			see **Section 3.13**, page 20
BCV83		Flanged ASME	Butt weld	
BCV84				
BCV83		Flanged JIS / KS		see **Section 3.14**, page 21

3.3 BCV4_ Pressure / temperature limits

BCV41
Screwed BSP

BCV43
Flanged EN 1092



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

A - A Flanged EN 1092 PN40 and Screwed BSP
B - C Flanged EN 1092 PN63
B - D Flanged EN 1092 PN100

Body design conditions:			PN40, PN63 or PN100 JIS/KS 20K, 30K or 40K
PMA	Maximum allowable pressure	PN40	40 bar g @ 50°C
		PN63	63 bar g @ 50°C
		PN100	100 bar g @ 50°C
TMA	Maximum allowable temperature	PN40	300°C @ 27.6 bar g
		PN63	400°C @ 37.5 bar g
		PN100	400°C @ 59.5 bar g
Minimum allowable temperature		PN40	-10°C
		PN63	-29°C
		PN100	-29°C
PMO	Maximum operating pressure for saturated steam service	PN40	31.1 bar g @ 237°C
		PN63	47.0 bar g @ 261°C
		PN100	70.8 bar g @ 287°C
TMO	Maximum operating temperature	PN40	300°C @ 27.6 bar g
		PN63	400°C @ 37.5 bar g
		PN100	400°C @ 59.5 bar g
Minimum operating temperature		PN40	-10°C
		PN63	-29°C
		PN100	-29°C
Designed for a maximum cold hydraulic test pressure of: 1.5 x PMA of the relative end connection of choice			

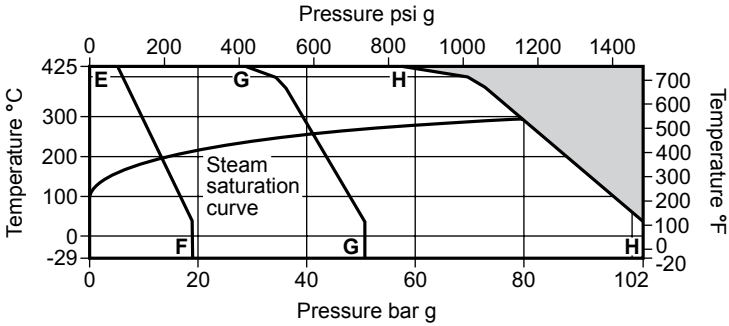
3.4 BCV4_ Pressure / temperature limits

BCV41
Screwed NPT

BCV42
Socket weld

BCV43
Flanged ASME

BCV44
Butt weld



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

E - F Flanged ASME class 150

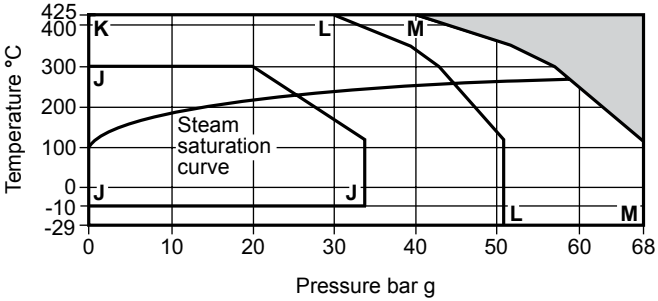
E - G Flanged ASME class 300, Screwed NPT and Socket weld class 3000 (B 16.11)

E - H Flanged ASME class 600, Socket weld class 6000 (B 16.11) and Butt weld

Body design conditions:			PN40, PN63 or PN100 JIS / KS 20K, 30K or 40K	ASME class 150, class 300 or ASME class 600
PMA	Maximum allowable pressure	ASME 150	19.6 bar g @ 38°C	284 psi g @ 100°F
		ASME 300	51.1 bar g @ 38°C	741 psi g @ 100°F
		ASME 600	102.1 bar g @ 38°C	1 480 psi g @ 100°F
TMA	Maximum allowable temperature	ASME 150	425°C @ 5.5 bar g	797°F @ 80 psi g
		ASME 300	425°C @ 28.8 bar g	797°F @ 418 psi g
		ASME 600	425°C @ 57.5 bar g	797°F @ 834 psi g
Minimum allowable temperature		ASME 150	-29°C	-20°F
		ASME 300	-29°C	-20°F
		ASME 600	-29°C	-20°F
PMO	Maximum operating pressure for saturated steam service	ASME 150	13.9 bar g @ 197°C	201 psi g @ 386°F
		ASME 300	41.7 bar g @ 254°C	605 psi g @ 489°F
		ASME 600	80.0 bar g @ 295°C	1 160 psi g @ 563°F
TMO	Maximum operating temperature	ASME 150	425°C @ 5.5 bar g	797°F @ 80 psi g
		ASME 300	425°C @ 28.8 bar g	797°F @ 418 psi g
		ASME 600	425°C @ 57.5 bar g	797°F @ 834 psi g
Minimum operating temperature		ASME 150	-29°C	-20°F
		ASME 300	-29°C	-20°F
		ASME 600	-29°C	-20°F
Designed for a maximum cold hydraulic test pressure of: 1.5 x PMA of the relative end connection of choice				

3.5 BCV4_ Pressure / temperature limits

BCV43
Flanged JIS / KS



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

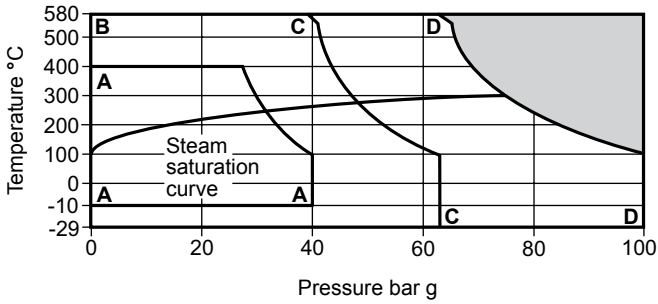
J - J Flanged JIS / KS 20K
K - L Flanged JIS / KS 30K
K - M Flanged JIS / KS 40K

Body design conditions:			PN40, PN63 or PN100
			JIS / KS 20K, 30K or 40K
PMA	Maximum allowable pressure	JIS / KS 20K	34 bar g @ 120°C
		JIS / KS 30K	51 bar g @ 120°C
		JIS / KS 40K	68 bar g @ 120°C
TMA	Maximum allowable temperature	JIS / KS 20K	300°C @ 20 bar g
		JIS / KS 30K	425°C @ 30 bar g
		JIS / KS 40K	425°C @ 40 bar g
Minimum allowable temperature		JIS / KS 20K	-10°C
		JIS / KS 30K	-29°C
		JIS / KS 40K	-29°C
PMO	Maximum operating pressure for saturated steam service	JIS / KS 20K	30.6 bar g @ 236°C
		JIS / KS 30K	44.6 bar g @ 258°C
		JIS / KS 40K	58.5 bar g @ 276°C
TMO	Maximum operating temperature	JIS / KS 20K	300°C @ 20 bar g
		JIS / KS 30K	425°C @ 30 bar g
		JIS / KS 40K	425°C @ 40 bar g
Minimum operating temperature		JIS / KS 20K	-10°C
		JIS / KS 30K	-29°C
		JIS / KS 40K	-29°C
Designed for a maximum cold hydraulic test pressure of: 1.5 x PMA of the relative end connection of choice			

3.6 BCV6_ Pressure / temperature limits

BCV61
Screwed BSP

BCV63
Flanged EN 1092



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

A - A Flanged EN 1092 PN40 and Screwed BSP
B - C Flanged EN 1092 PN63
B - D Flanged EN 1092 PN100

Body design conditions:			PN40, PN63 or PN100 JIS/KS 20K, 30K or 40K
PMA	Maximum allowable pressure	PN40	40 bar g @ 100°C
		PN63	63 bar g @ 100°C
		PN100	100 bar g @ 100°C
TMA	Maximum allowable temperature	PN40	400°C @ 27.4 bar g
		PN63	580°C @ 39.5 bar g
		PN100	580°C @ 62.7 bar g
Minimum allowable temperature		PN40	-10°C
		PN63	-29°C
		PN100	-29°C
PMO	Maximum operating pressure for saturated steam service	PN40	32.2 bar g @ 240°C
		PN63	49.2 bar g @ 264°C
		PN100	75.1 bar g @ 291°C
TMO	Maximum operating temperature	PN40	400°C @ 27.4 bar g
		PN63	580°C @ 39.5 bar g
		PN100	580°C @ 62.7 bar g
Minimum operating temperature		PN40	-10°C
		PN63	-29°C
		PN100	-29°C
Designed for a maximum cold hydraulic test pressure of: 1.5 x PMA of the relative end connection of choice			

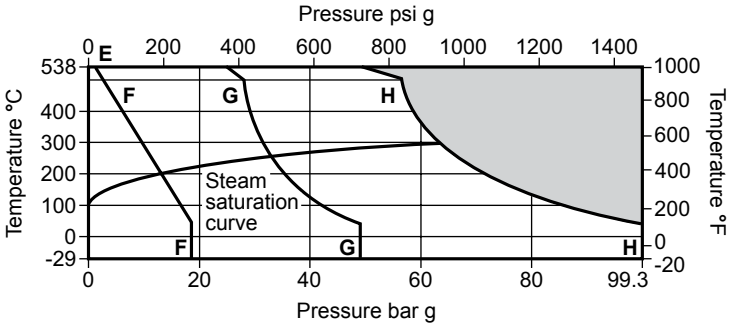
3.7 BCV6_ Pressure / temperature limits

BCV61
Screwed NPT

BCV62
Socket weld

BCV63
Flanged ASME

BCV64
Butt weld



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

E - F Flanged ASME class 150

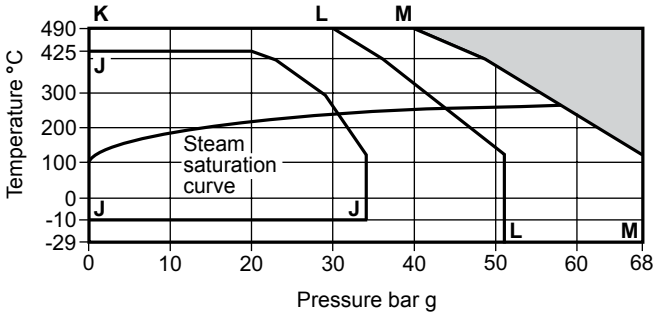
E - G Flanged ASME class 300, Screwed NPT and Socket weld class 3000 (B 16.11)

E - H Flanged ASME class 600, Socket weld and Butt weld class 6000 (B 16.11)

Body design conditions:			PN40, PN63 or PN100 JIS/KS 20K, 30K or 40K	ASME class 150, class 300 or ASME class 600
PMA	Maximum allowable pressure	ASME 150	19.0 bar g @ 38°C	275 psi g @ 100°F
		ASME 300	49.6 bar g @ 38°C	719 psi g @ 100°F
		ASME 600	99.3 bar g @ 38°C	1 440 psi g @ 100°F
TMA	Maximum allowable temperature	ASME 150	538°C @ 1.4 bar g	1 000°F @ 20 psi g
		ASME 300	538°C @ 25.2 bar g	1 000°F @ 365 psi g
		ASME 600	538°C @ 50.0 bar g	1 000°F @ 725 psi g
Minimum allowable temperature		ASME 150	-29°C	-20°F
		ASME 300	-29°C	-20°F
		ASME 600	-29°C	-20°F
PMO	Maximum operating pressure for saturated steam service	ASME 150	13.8 bar g @ 197°C	200 psi g @ 386°F
		ASME 300	33.8 bar g @ 242°C	490 psi g @ 467°F
		ASME 600	64.6 bar g @ 281°C	937 psi g @ 538°F
TMO	Maximum operating temperature	ASME 150	538°C @ 1.4 bar g	1 000°F @ 20 psi g
		ASME 300	538°C @ 25.2 bar g	1 000°F @ 365 psi g
		ASME 600	538°C @ 50.0 bar g	1 000°F @ 725 psi g
Minimum operating temperature		ASME 150	-29°C	-20°F
		ASME 300	-29°C	-20°F
		ASME 600	-29°C	-20°F
Designed for a maximum cold hydraulic test pressure of: 1.5 x PMA of the relative end connection of choice				

3.8 BCV6_ Pressure / temperature limits

BCV63
Flanged JIS / KS



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

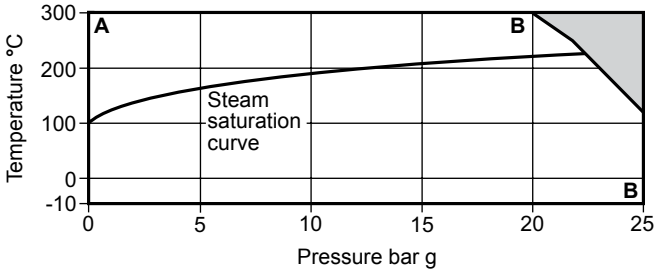
J - J Flanged JIS / KS 20K
K - L Flanged JIS / KS 30K
K - M Flanged JIS / KS 40K

Body design conditions:			PN40, PN63 or PN100
			JIS / KS 20K, 30K or 40K
PMA	Maximum allowable pressure	JIS / KS 20K	34 bar g @ 120°C
		JIS / KS 30K	51 bar g @ 120°C
		JIS / KS 40K	68 bar g @ 120°C
TMA	Maximum allowable temperature	JIS / KS 20K	425°C @ 20 bar g
		JIS / KS 30K	490°C @ 30 bar g
		JIS / KS 40K	490°C @ 40 bar g
Minimum allowable temperature		JIS / KS 20K	-10°C
		JIS / KS 30K	-29°C
		JIS / KS 40K	-29°C
PMO	Maximum operating pressure for saturated steam service	JIS / KS 20K	30.6 bar g @ 236°C
		JIS / KS 30K	44.6 bar g @ 258°C
		JIS / KS 40K	58.5 bar g @ 276°C
TMO	Maximum operating temperature	JIS / KS 20K	425°C @ 20 bar g
		JIS / KS 30K	490°C @ 30 bar g
		JIS / KS 40K	490°C @ 40 bar g
Minimum operating temperature		JIS / KS 20K	-10°C
		JIS / KS 30K	-29°C
		JIS / KS 40K	-29°C
Designed for a maximum cold hydraulic test pressure of: 1.5 x PMA of the relative end connection of choice			

3.9 BCV7_ Pressure / temperature limits

BCV71
Screwed BSP

BCV73
Flanged EN 1092



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

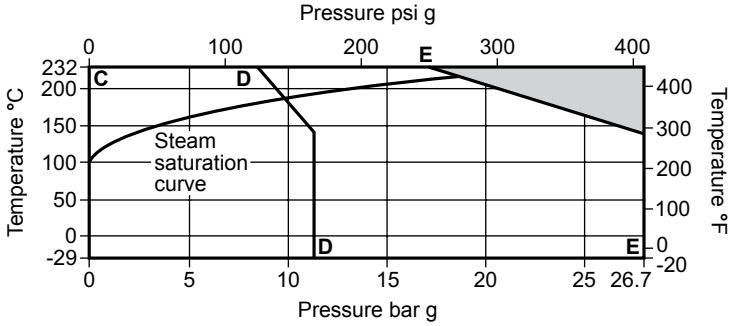
A - B Flanged EN 1092 PN25 and Screwed BSP

Body design conditions:			PN25
			JIS / KS 10K
PMA	Maximum allowable pressure	PN25	25.0 bar g @ 120°C
TMA	Maximum allowable temperature	PN25	300°C @ 20 bar g
Minimum allowable temperature		PN25	-10°C
PMO	Maximum operating pressure for saturated steam service	PN25	22.5 bar g @ 220°C
TMO	Maximum operating temperature	PN25	300°C @ 20.0 bar g
Minimum operating temperature		PN25	-10°C
Designed for a maximum cold hydraulic test pressure of: 1.5 x PMA of the relative end connection of choice			

3.10 BCV7_ Pressure / temperature limits

BCV71
Screwed NPT

BCV73
Flanged ASME



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

C - D Flanged ASME class 125

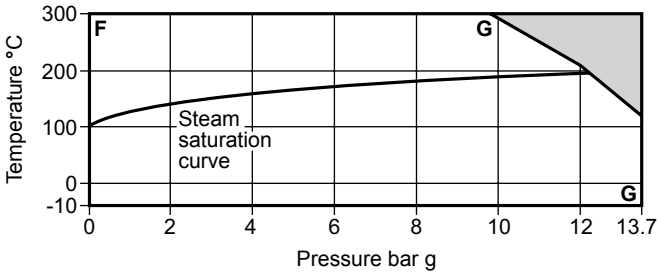
C - E Flanged ASME class 250 and Screwed NPT

Body design conditions:			PN25 JIS / KS 10K	ASME class 125 or ASME class 250
PMA	Maximum allowable pressure	ASME 125	11.5 bar g @ 140°C	166 psi g @ 284°F
		ASME 250	26.7 bar g @ 140°C	387 psi g @ 284°F
TMA	Maximum allowable temperature	ASME 125	232°C @ 8.6 bar g	449°F @ 125 psi g
		ASME 250	232°C @ 17.2 bar g	449°F @ 249 psi g
Minimum allowable temperature		ASME 125	-29°C	-20°F
		ASME 250	-29°C	-20°F
PMO	Maximum operating pressure for saturated steam service	ASME 125	10.0 bar g @ 184°C	145 psi g @ 363°F
		ASME 250	18.0 bar g @ 209°C	261 psi g @ 408°F
TMO	Maximum operating temperature	ASME 125	232°C @ 8.6 bar g	449°F @ 125 psi g
		ASME 250	232°C @ 17.2 bar g	449°F @ 249 psi g
Minimum operating temperature		ASME 125	-29°C	-20°F
		ASME 250	-29°C	-20°F

Designed for a maximum cold hydraulic test pressure of: 1.5 x PMA of the relative end connection of choice

3.11 BCV7_ Pressure / temperature limits

BCV73
Flanged JIS / KS



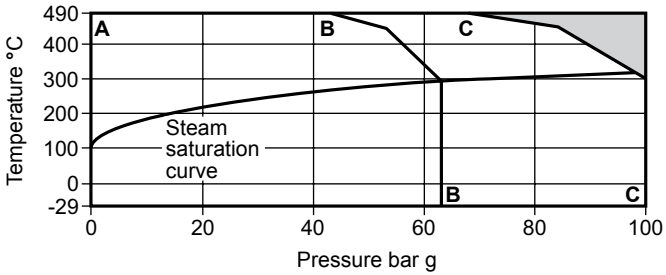
The product **must not** be used in this region.

F - G Flanged JIS / KS 10K

Body design conditions:			PN25
			JIS / KS 10K
PMA	Maximum allowable pressure	JIS / KS 10K	13.7 bar g @ 120°C
TMA	Maximum allowable temperature	JIS / KS 10K	300°C @ 9.8 bar g
Minimum allowable temperature		JIS / KS 10K	-10°C
PMO	Maximum operating pressure for saturated steam service	JIS / KS 10K	12.3 bar g @ 191°C
TMO	Maximum operating temperature	JIS / KS 10K	300°C @ 9.8 bar g
Minimum operating temperature		JIS / KS 10K	-10°C
Designed for a maximum cold hydraulic test pressure of: 1.5 x PMA of the relative end connection of choice			

3.12 BCV8_ Pressure / temperature limits

BCV83
Flanged EN 1092



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

A - B Flanged EN 1092 PN63
A - C Flanged EN 1092 PN100

Body design conditions:			PN63 or PN100
			JIS/KS 30K or 40K
PMA	Maximum allowable pressure	PN63	63 bar g @ 300°C
		PN100	100 bar g @ 300°C
TMA	Maximum allowable temperature	PN63	490°C @ 42.8 bar g
		PN100	490°C @ 68.0 bar g
Minimum allowable temperature		PN63	-29°C
		PN100	-29°C
PMO	Maximum operating pressure for saturated steam service	PN63	63.0 bar g @ 280°C
		PN100	99.0 bar g @ 310°C
TMO	Maximum operating temperature	PN63	490°C @ 42.8 bar g
		PN100	490°C @ 68.0 bar g
Minimum operating temperature		PN63	-29°C
		PN100	-29°C

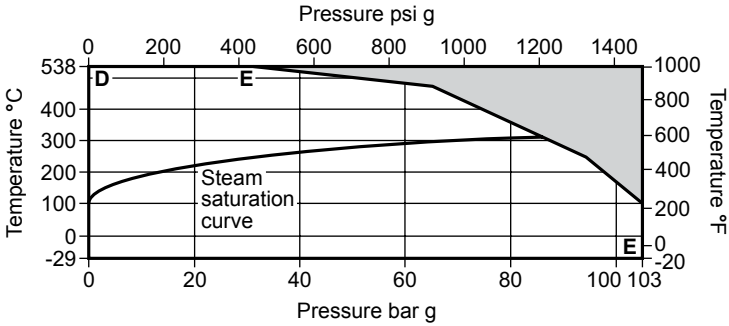
Designed for a maximum cold hydraulic test pressure of: 1.5 x PMA of the relative end connection of choice

3.13 BCV8_ Pressure / temperature limits

BCV82
Socket weld

BCV83
Flanged ASME

BCV84
Butt weld



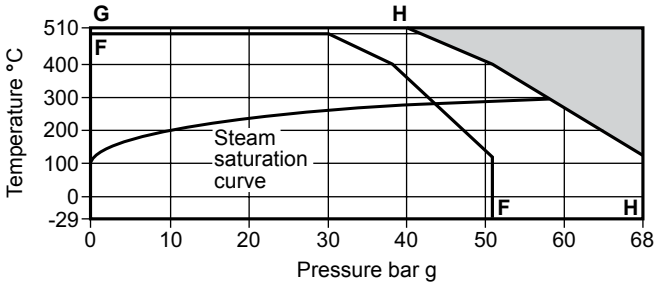
The product **must not** be used in this region.

D - E Flanged ASME class 600, socket weld and butt weld

Body design conditions:			PN63 or PN100 / JIS / KS 30K or 40K	ASME class 600
PMA	Maximum allowable pressure	ASME 600	103.4 bar g @ 50°C	1 500 psi g @ 122°F
TMA	Maximum allowable temperature	ASME 600	538°C @ 29.8 bar g	1 000°F @ 432 psi g
Minimum allowable temperature		ASME 600	-29°C	-20°F
PMO	Maximum operating pressure for saturated steam service	ASME 600	85.7 bar g @ 300°C	1 243 psi g @ 572°F
TMO	Maximum operating temperature	ASME 600	538°C @ 29.8 bar g	1 000°F @ 432 psi g
Minimum operating temperature		ASME 600	-29°C	-20°F
Designed for a maximum cold hydraulic test pressure of: 1.5 x PMA of the relative end connection of choice				

3.14 BCV8_ Pressure / temperature limits

BCV83
Flanged JIS / KS



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

F - F Flanged JIS / KS 30K
G - H Flanged JIS / KS 40K

Body design conditions:			PN63 or PN100
			JIS / KS 30K or 40K
PMA	Maximum allowable pressure	JIS / KS 30K	51 bar g @ 120°C
		JIS / KS 40K	68 bar g @ 120°C
TMA	Maximum allowable temperature	JIS / KS 30K	490°C @ 30.0 bar g
		JIS / KS 40K	510°C @ 40.0 bar g
Minimum allowable temperature		JIS / KS 30K	-29°C
		JIS / KS 40K	-29°C
PMO	Maximum operating pressure for saturated steam service	JIS / KS 30K	44.6 bar g @ 257°C
		JIS / KS 40K	58.6 bar g @ 274°C
TMO	Maximum operating temperature	JIS / KS 30K	490°C @ 30.0 bar g
		JIS / KS 40K	510°C @ 40.0 bar g
Minimum operating temperature		JIS / KS 30K	-29°C
		JIS / KS 40K	-29°C

Designed for a maximum cold hydraulic test pressure of: 1.5 x PMA of the relative end connection of choice

4. Installation and dimensions

Note: Before actioning any installation observe the 'Safety information' in Section 1. For unit sizes see Figures 5 and 6 on pages 24 and 25.

The actuator should be protected from excessive heat.
Actuator sealing is to IP54. Additional protection is recommended for outdoor installation. The valve may be installed in horizontal or vertical lines with flow in the direction of the arrow. Do not install with the actuator below the valve. For boiler blowdown applications the ideal take-off point for the blowdown is from a boiler side connection (see Figures 2 and 3), to reduce the possibility of scale entering the blowdown valve. If the bottom connection has to be used, make a 'T' connection upstream of the main bottom blowdown valve as shown in Figure 4.
We recommend that where possible the 'T' is taken off the top of the blowdown line to reduce any problems of scale.
The ¼" BSP plug may be removed and the connection used for boiler water sampling. A sample cooler is recommended.
Fit a stop valve between the boiler and the BCV blowdown control valve. A check valve is recommended downstream of the BCV. **For single boiler installations** the blowdown may discharge into the main blowdown line downstream of the main blowdown valve. In the UK, regulations for multi-boiler installations require the automatic blowdown lines to be separate from the main blowdown lines. For further information see Health and Safety Executive Guidance Note PM60.

Note: When installing with an S11 chamber, use M12 bolts for PN16, PN25, PN40 and ASME 300 flanged connections.

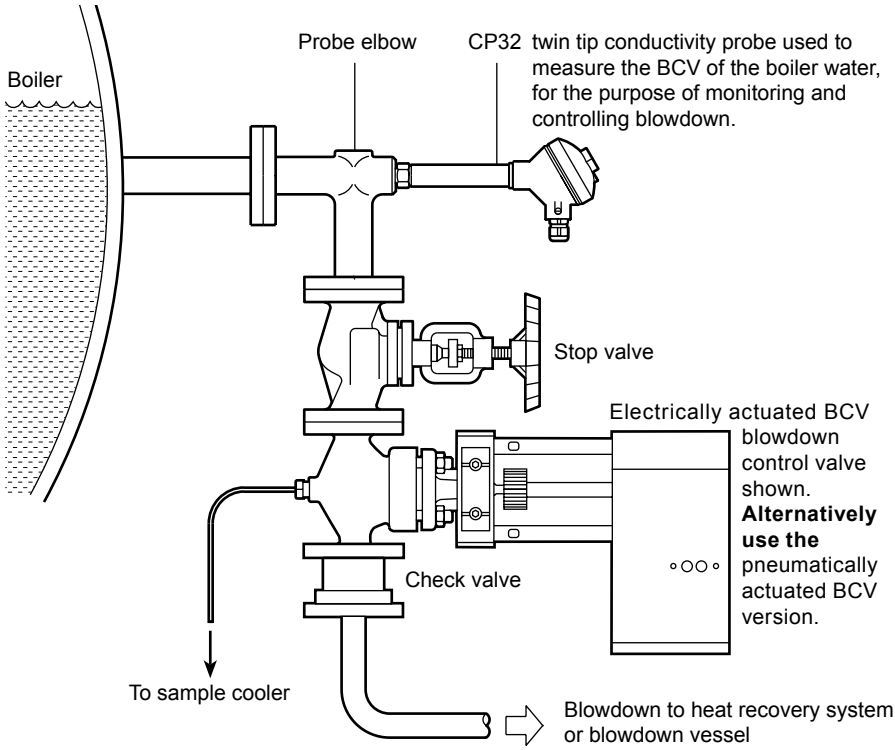


Fig. 2 Installation on a probe elbow

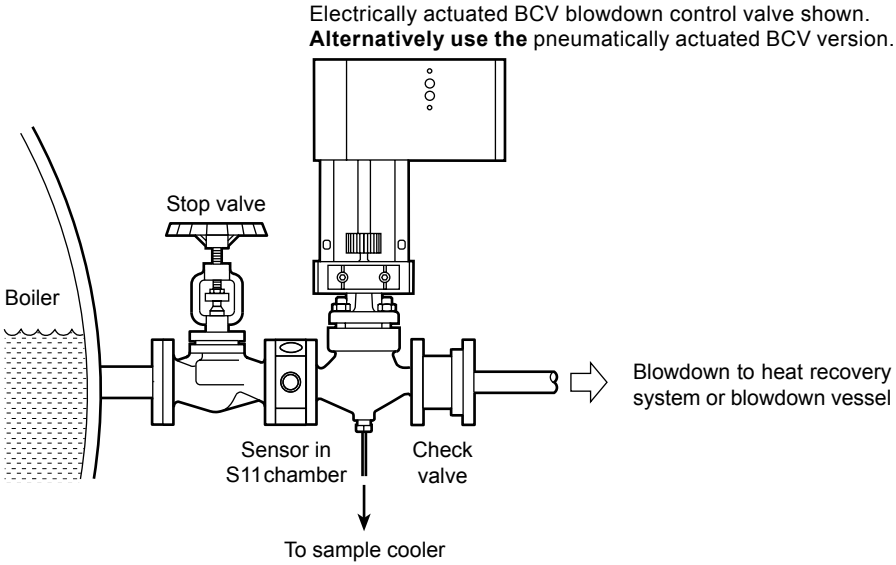


Fig. 3 Installation on a boiler side connection

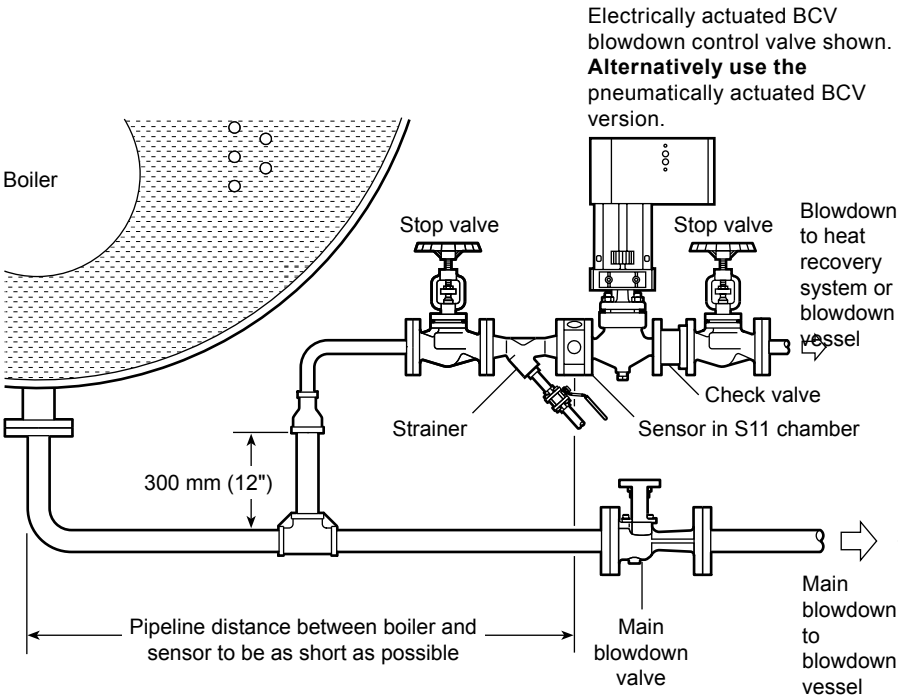


Fig. 4 Installation on a boiler with no suitable side connection

Electric actuation - Dimensions / weights (approximate) in mm and kg

Size	A					B		C	D		Weight	
	ASME 125	ASME 300	ASME 600	PN40	PN100	ASME 125 ASME 300 PN40	ASME 600 PN100		ASME 125 ASME 300 PN40	ASME 600 PN100	ASME 125 ASME 300 PN40	ASME 600 PN100
DN15	-	190.5	203	130	210	392	422	230	42.5	49.5	12	16
DN20	-	190.5	206	150	230	392	422	230	57.0	49.5	12.8	18
DN25	184	197	210	160	230	392	422	230	54.5	56.5	13	19
DN32	-	-	251	180	260	421	449	230	65.5	71.5	19.5	25
DN40	222	235	251	200	260	421	449	230	76.5	71.5	20	28
DN50	254	267	286	230	300	416	449	230	84.5	85.5	23	33

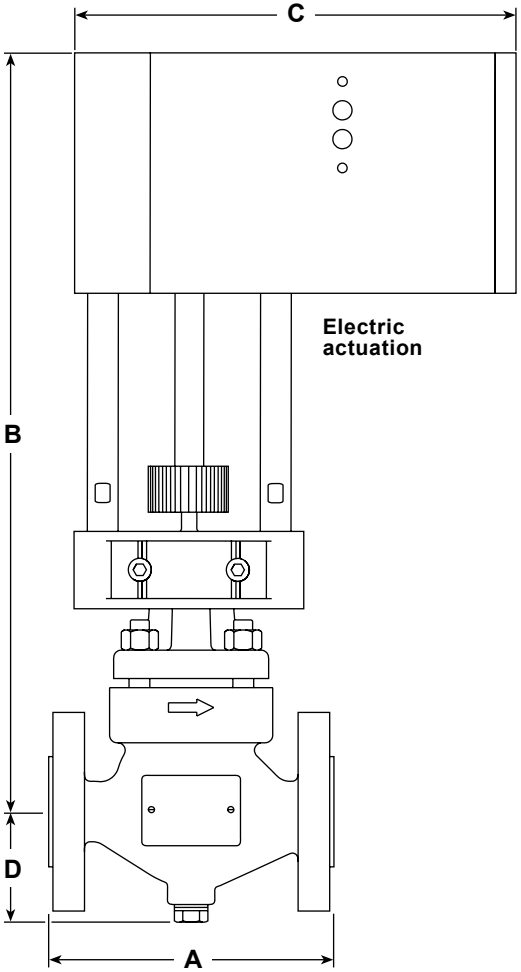


Fig. 5

Pneumatic actuation - Dimensions / weights (approx.) in mm and kg

Size	B1		C1	Weight	
	ASME 125 ASME 300 PN40	ASME 600 PN100		ASME 125 ASME 300 PN40	ASME 600 PN100
DN15	378	408	170	12	16
DN20	378	408	170	12.8	18
DN25	378	408	170	13	19
DN32	432	460	300	30.5	36
DN40	432	460	300	31	39
DN50	427	460	300	34	44

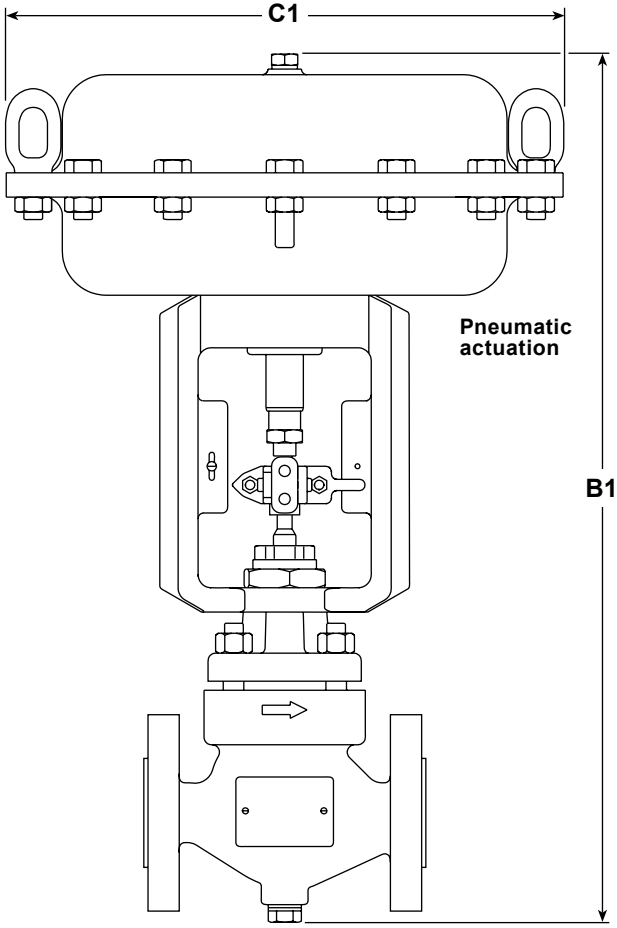


Fig. 6

5. AHL1
Actuator with spring return

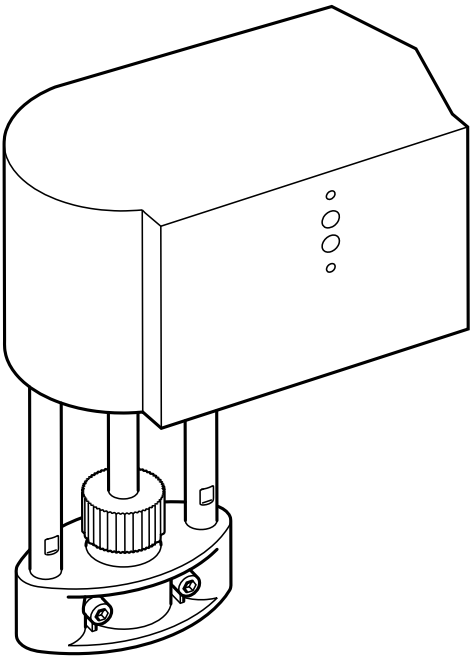


Fig. 7
AHL1 actuator

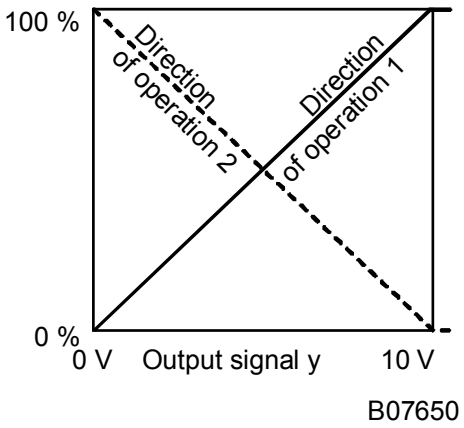


Fig. 8

Type	Running time		Pushing Force	Stroke	Weight
	Motor s / mm	Spring s	N	mm	kg
AHL1 Series	2 / 4 / 6	15...30	2000	0...40	5.6
Voltage supply with accessories		24 V	± 20%, 50...60 Hz		
		24 V	± 15%		
		230 V	± 15%		
Power consumption		7.5 W	20 VA		
Stroke		8…49 mm			
Number of spring returns		> 40.000			
Response time for 3-point		200 ms			
Maximum temperature of medium		130°C			
Permitted ambient temperature		–10...55(60)°C			
Permitted ambient humidity		< 95% rh without condensation			
Degree of protection		IP66 (EN 60529)			
Protection class		III (IEC 60730)			
Switches		Switching capacity	Maximum 250 V Minimum current 250 mA at 12 V		

Operation

After a new start, or after a start following activation of the reset (terminal 21), up to 45 seconds of waiting time will pass before the drive is available again.

The run time of the drive can be set according to the specific requirements, using switches S1 and S2.

The external hand crank allows you to adjust the position manually. When the hand crank is folded out, the motor is switched off. After the hand crank is folded back, the spring function is active again and the setpoint position is adopted again (without initialisation). If the hand crank is unfolded, the drive stays in this position.

Initialisation and feedback signal

The drive initialises itself automatically, the drive moves to the lower limit stop on the valve, thus enabling automatic connection with the valve spindle. Then it moves to the upper limit stop, and the value is recorded and saved with the help of a path measurement system. To trigger an initialisation, fold the hand crank out and back in again twice within 4 seconds. Both the LEDs will then flash red.

Spring return

If the voltage supply fails or is switched off, or if a monitoring contact (terminal 21) responds, the brushless dc motor releases the gear and the drive is moved into the respective end position (de-pending on the design version) by the pre-tensioned spring. As this happens, the control function of the drive is disabled for 45 seconds (both LEDs flash green) so that the end position can be reached in every case. The reset speed is controlled with the help of the motor so that there are no pressure surges in the line. The brushless dc motor has three functions: as a magnet to hold the position, as a brake (by acting as a generator) and as a motor for the control function. After a spring return function, the drive does not re-initialise itself.

LED display

The display consists of two dual-colour LEDs (red / green):

No	LED lit:	No power supply (terminal 21)
Both	LEDs flashing red:	Initialisation procedure
	LEDs lit green:	Waiting time after switching on or after spring return
	LEDs are flashing red and green:	Drive is in manual mode
Upper	LED lit red:	Upper limit stop or 'CLOSED' position reached
	LED flashing green:	Drive running, moving towards 'CLOSED' position
	LED lit green:	Drive stationary, last direction of running 'CLOSED'
Lower	LED lit red:	Lower limit stop or 'OPEN' position reached
	LED flashing green:	Drive running, moving towards 'OPEN' position
	LED lit green:	Drive stationary, last direction of running 'OPEN'

Additional technical information

The yellow housing, comprising the front section, rear section and connection cover, only serves the purpose of a cover. The crank for manual adjustment is located on the front. The dc motor, the control electronics, the supporting components and the maintenance-free gear are accommodated in the housing.

Note on ambient temperatures: If the medium temperature in the valve is up to 110°C, the ambient temperature may reach 60°C. For medium temperatures above 110°C, the ambient temperature must not exceed 55°C.

Warnings:

- If the temperature of the medium in the valve is high, the drive columns and the shaft may also reach high temperatures.
- Drives with safety functions must be regularly checked to see that they are in working order (trial run).
- If a failure of the final control element could cause damage, additional protective precautions must be taken.
- It is forbidden to dismantle the springs in the device due to the high risk of injuries.

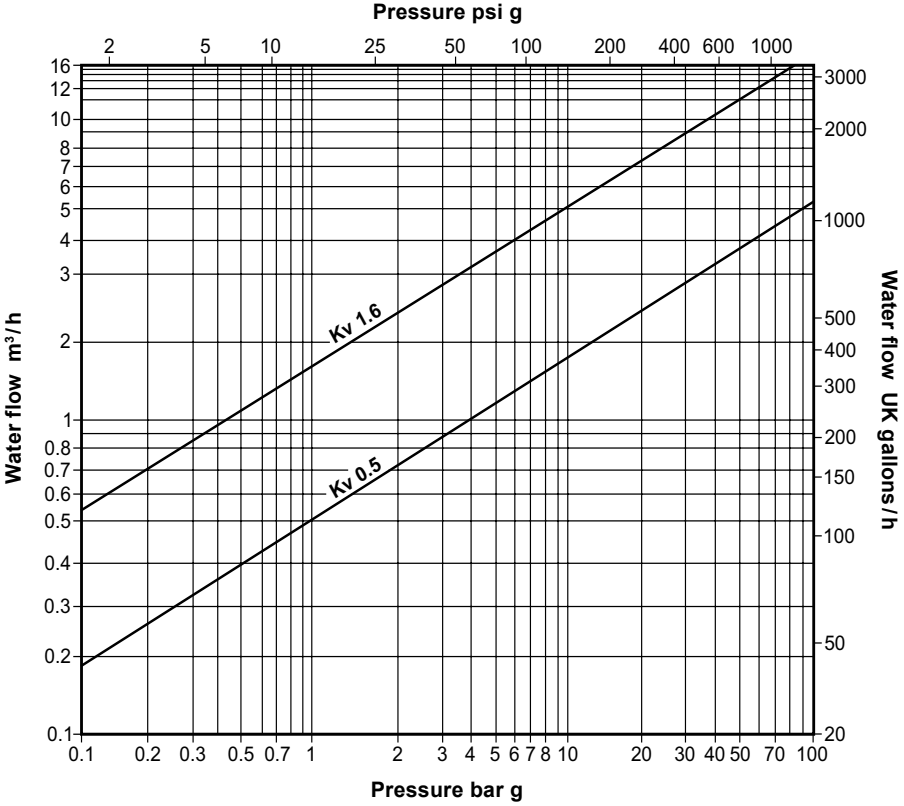
6. Flow setting

Table 1 Blowdown valve capacities

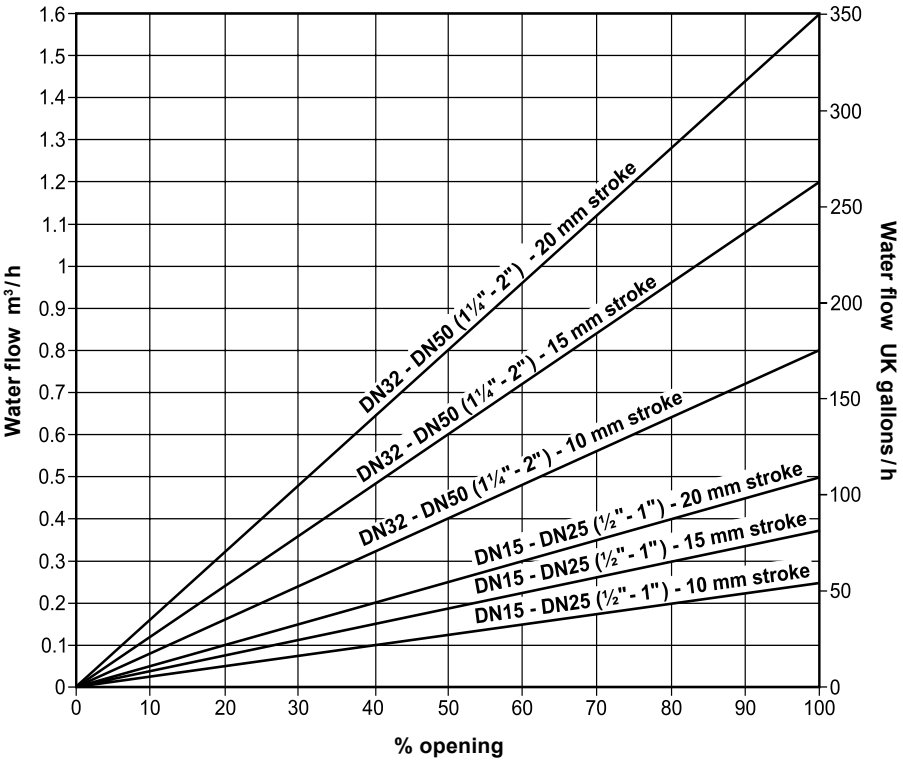
Valve size	DN15	DN20	DN25	DN32	DN40	DN50
K_{VS} value	0.5	0.5	0.5	1.6	1.6	1.6

For conversion: C_V (UK) = K_V x 0.963 C_V (US) = K_V x 1.156

K_{VS} chart



Capacities


Water flow m³/h
Water flow UK gallons/h
% opening
DN32 - DN50 (1¼" - 2") - 20 mm stroke
DN32 - DN50 (1¼" - 2") - 15 mm stroke
DN32 - DN50 (1¼" - 2") - 10 mm stroke
DN15 - DN25 (½" - 1") - 20 mm stroke
DN15 - DN25 (½" - 1") - 15 mm stroke
DN15 - DN25 (½" - 1") - 10 mm stroke
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
1.6
0
50
100
150
200
250
300
350
0
10
20
30
40
50
60
70
80
90
100

Flow for stroke 20 mm

K_V	Differential pressure (bar)	Hot water flow (m^3/h)	Differential pressure (bar)	Hot water flow (m^3/h)	Valve size
0.5	0	0.0	0	0.0	**DN15** to **DN25**
	0.5	0.4	50	3.5	
	1	0.5	60	3.9	
	10	1.6	70	4.2	
	20	2.2	80	4.5	
	30	2.7	90	4.7	
	40	3.2	100	5.0	
1.6	0	0.0	0	0.0	**DN32** to **DN50**
	0.5	1.1	50	11.3	
	1	1.6	60	12.4	
	10	5.1	70	13.4	
	20	7.2	80	14.3	
	30	8.8	90	15.2	
	40	10.1	100	16.0	

Flow for stroke 15 mm

K_V	Differential pressure (bar)	Hot water flow (m^3/h)	Differential pressure (bar)	Hot water flow (m^3/h)	Valve size
0.375	0	0.0	0	0.0	**DN15** to **DN25**
	0.5	0.3	50	2.7	
	1	0.4	60	2.9	
	10	1.2	70	3.1	
	20	1.7	80	3.4	
	30	2.1	90	3.6	
	40	2.4	100	3.8	
1.200	0	0.0	0	0.0	**DN32** to **DN50**
	0.5	0.8	50	8.5	
	1	1.2	60	9.3	
	10	3.8	70	10.0	
	20	5.4	80	10.7	
	30	6.6	90	11.4	
	40	7.6	100	12.0	

Flow for stroke 10 mm

K_V	Differential pressure (bar)	Hot water flow (m^3/h)	Differential pressure (bar)	Hot water flow (m^3/h)	Valve size
0.25	0	0.0	0	0.0	**DN15** to **DN25**
	0.5	0.2	50	1.8	
	1	0.3	60	1.9	
	10	0.8	70	2.1	
	20	1.1	80	2.2	
	30	1.4	90	2.4	
	40	1.6	100	2.5	
0.80	0	0.0	0	0.0	**DN32** to **DN50**
	0.5	0.6	50	5.7	
	1	0.8	60	6.2	
	10	2.5	70	6.7	
	20	3.6	80	7.2	
	30	4.4	90	7.6	
	40	5.1	100	8.0	

7. Rotating the actuator

The actuator may be rotated on the valve body so that the terminal cover points are in the most convenient direction.

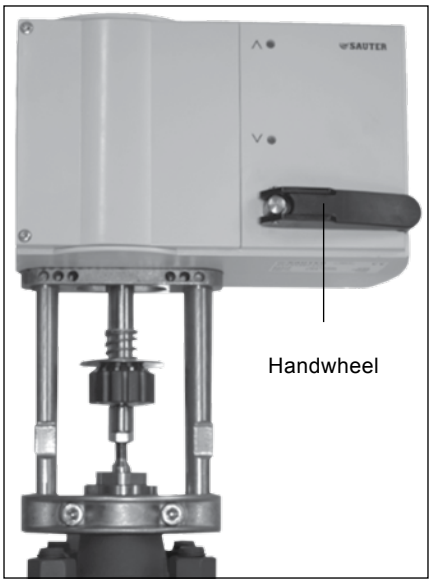


Fig. 9

8. Wiring

All wiring materials and methods shall comply with relevant EN and IEC standards where applicable. For installations in the US and Canada, the controller and valve must be wired in accordance to the Local and National Electrical code (NEC) or the Canadian Electrical Code (CEC).
Check the actuator label to ensure the operating voltage is correct for the mains supply.

Suitable ac voltages are:

230 V version (additional card)	195 V - 265 V
110 V version (additional card)	96 V - 127 V
24 V version	19.3 V - 28 V
Frequency	50 - 60 Hz
Maximum power consumption	

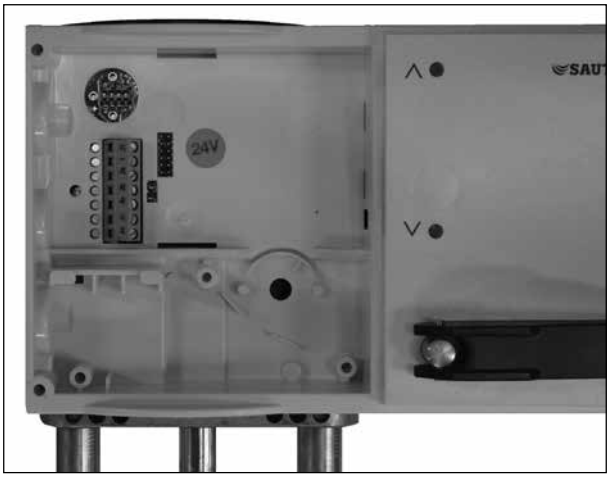
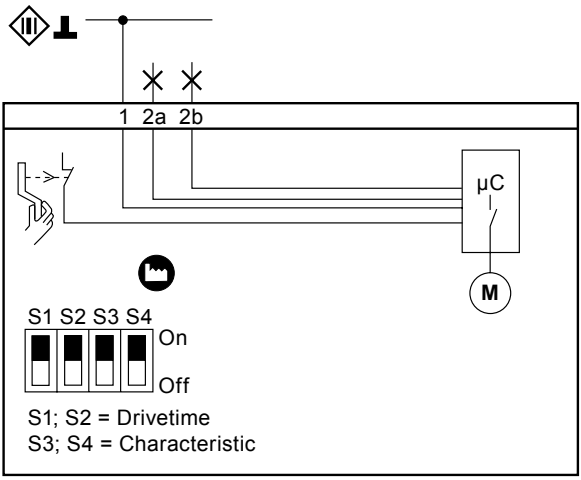
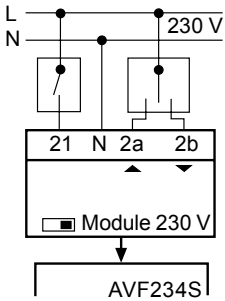


Fig. 10

Fig. 11





2a Valve opening
2b Valve closing

Fig. 12

Limit switches configuration

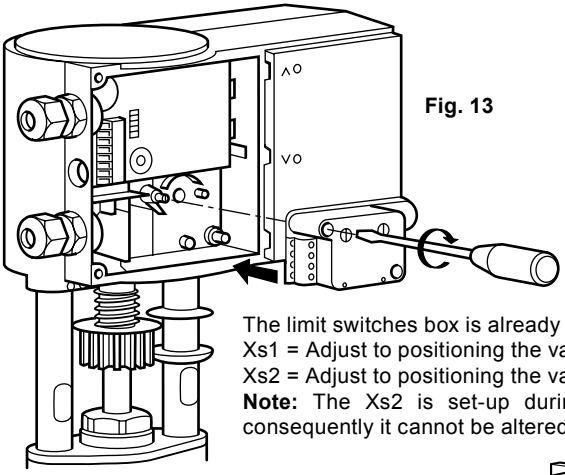


Fig. 13

The limit switches box is already installed in the actuator cover.
Xs1 = Adjust to positioning the valve opening
Xs2 = Adjust to positioning the valve closing
Note: The Xs2 is set-up during the coupling with the valve consequently it cannot be altered.

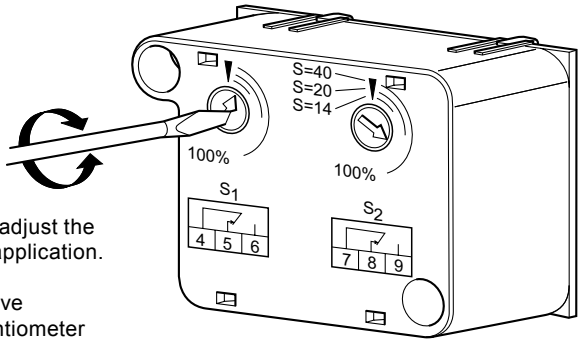


Fig. 14

Turn the potentiometers Xs1 to adjust the stroke to the optimum for your application.
1. Set the potentiometer
2. Measure the stroke of the valve
3. Adjust the set-up of the potentiometer

9. Pneumatic actuator stroke adjustment

The valve is supplied with a low flowrate setting of 10 mm (⅜") stroke.

To increase the stroke to 15mm (⅝") or 20 mm (¾"):

- Isolate the valve from the boiler pressure and energise the solenoid valve so that the air supply can be manually controlled by the regulator.
- Apply just enough air pressure to open the valve fully (see Figure 15).

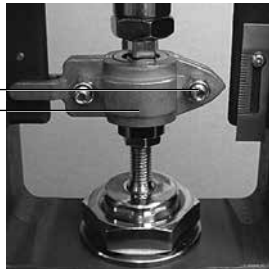


Fig. 15

- Remove the clamp nuts and screws (**26** and **27**), and the clamp front and rear (**13** and **14**).
- Turn off the air supply and allow the actuator to retract fully (see Figure 15).

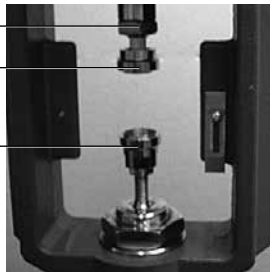


Fig. 16

- Loosen the actuator lock-nut (**25**), and screw the connector (**10**) fully into the spindle.
- Loosen the nut locking the valve stem to the adaptor (**11**).
- Position the adaptor so that only 8 mm of the valve stem thread is engaged (see Figures **17** and **18**).

Fig. 17
Correct - 8 mm thread engagement

Caution
The valve stem must not protrude beyond the surface of the adaptor, otherwise the clamp will not fit corectly and may be damaged (see Figure 18).

Fig. 18
Incorrect - thread protruding above the adaptor

- Pull the valve stem upwards to fully close the valve.
- Measuring from the top of the stuffing box, mark the new stroke required on the valve stem - 15 mm or 20 mm (Figure 19)

Fig. 19

- Push the valve stem down so that the mark lines up with the stuffing box (Figure 20).

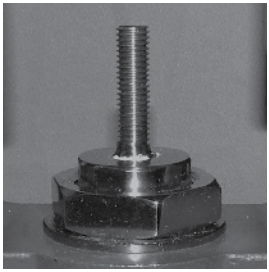


Fig. 20

- Apply air pressure to allow the actuator to descend fully.
- Unscrew the actuator connector until it just contacts the valve stem adaptor without opening the valve (Figure 21).
- Tighten adaptor and actuator lock-nuts.
- Refit the clamp, and its nuts and screws.

Fig. 21

Please note:
It may be necessary to make final adjustments to the actuator connector and the valve adaptor to ensure the clamp anti-rotation lugs engage with the yoke, and that the pointer is still on the scale.

10. Maintenance

Note: Before actioning any maintenance, 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 characterisitic 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.

10.1 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 10 '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 2 Recommended tightening torques - Control valve sizes DN15 to DN50

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

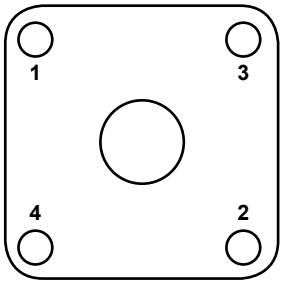


Fig. 22
Bonnet tightening sequence

10.2 Removal of valve bonnet

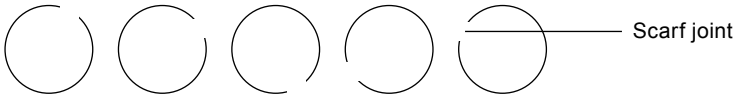
Note: This procedure is necessary before carrying out any of the maintenance procedures detailed below:

- 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.

10.3 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 23. **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°.

Fig. 23



- 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 10.5.

10.4 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.

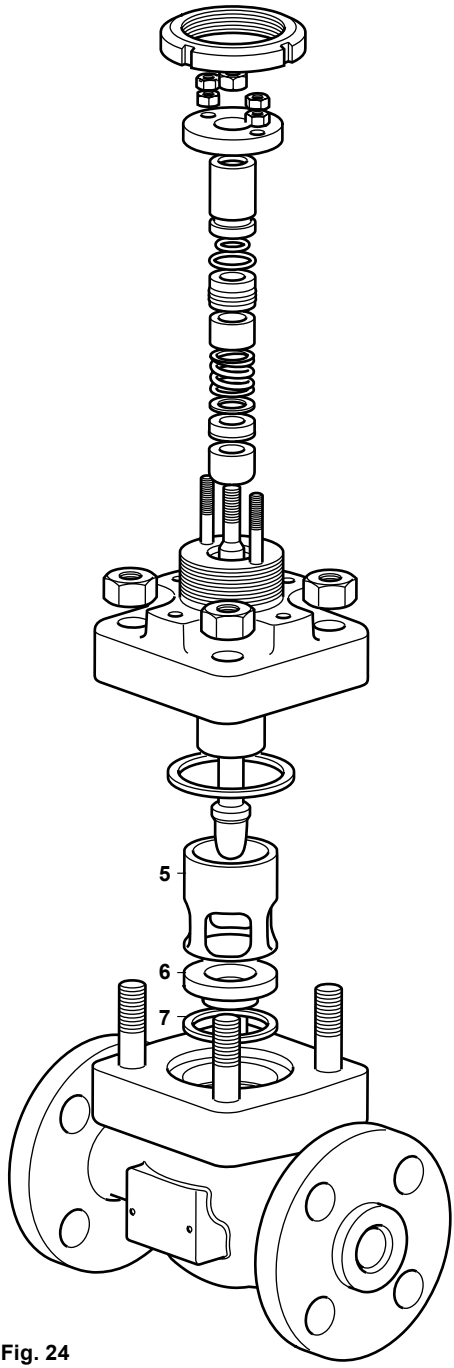


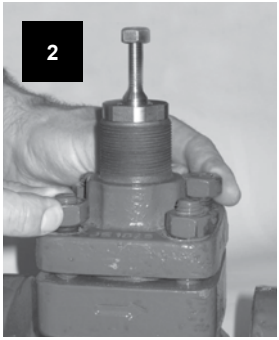
Fig. 24

10.5 Refitting the bonnet

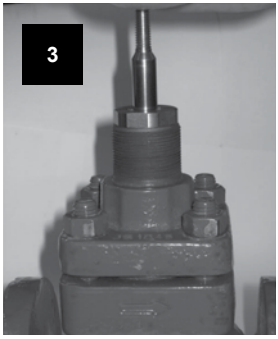
Caution: The following must be carefully followed to enable the correct reassembly of the control valve, and the subsequent test that is required to ensure that the plug moves freely inside the valve seat:

- 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:

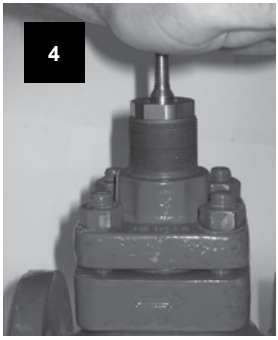
Fit bonnet nuts.



Finger tighten opposing bonnet nuts or bolts evenly in pairs.

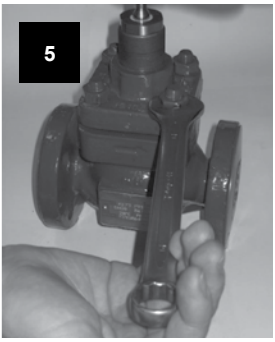


Raise the stem to the highest position.

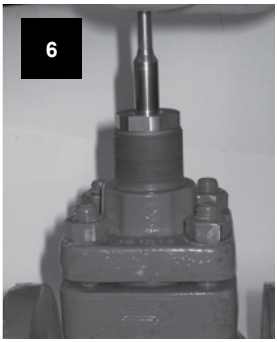


Firmly and briskly push the stem fully down.

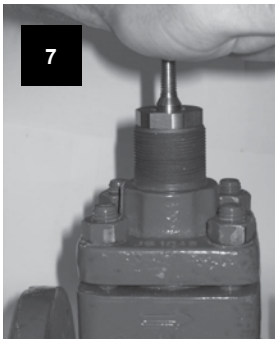
Repeat Steps 1 to 4 finger tightening bonnet nuts or bolts individually until tight.



Using a torque wrench lightly and evenly tighten each bolt or nut by 45°, following the sequence illustrated in Figure 22, page 38.



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 2, page 38).
- 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.
- 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.

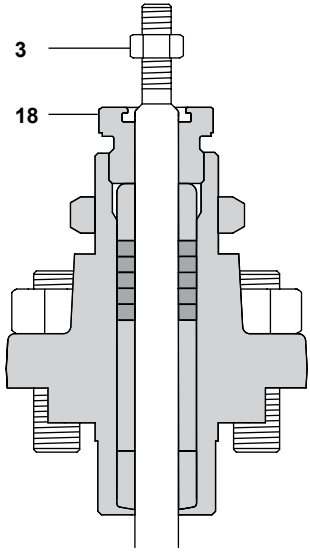


Fig. 25

11. Spare parts

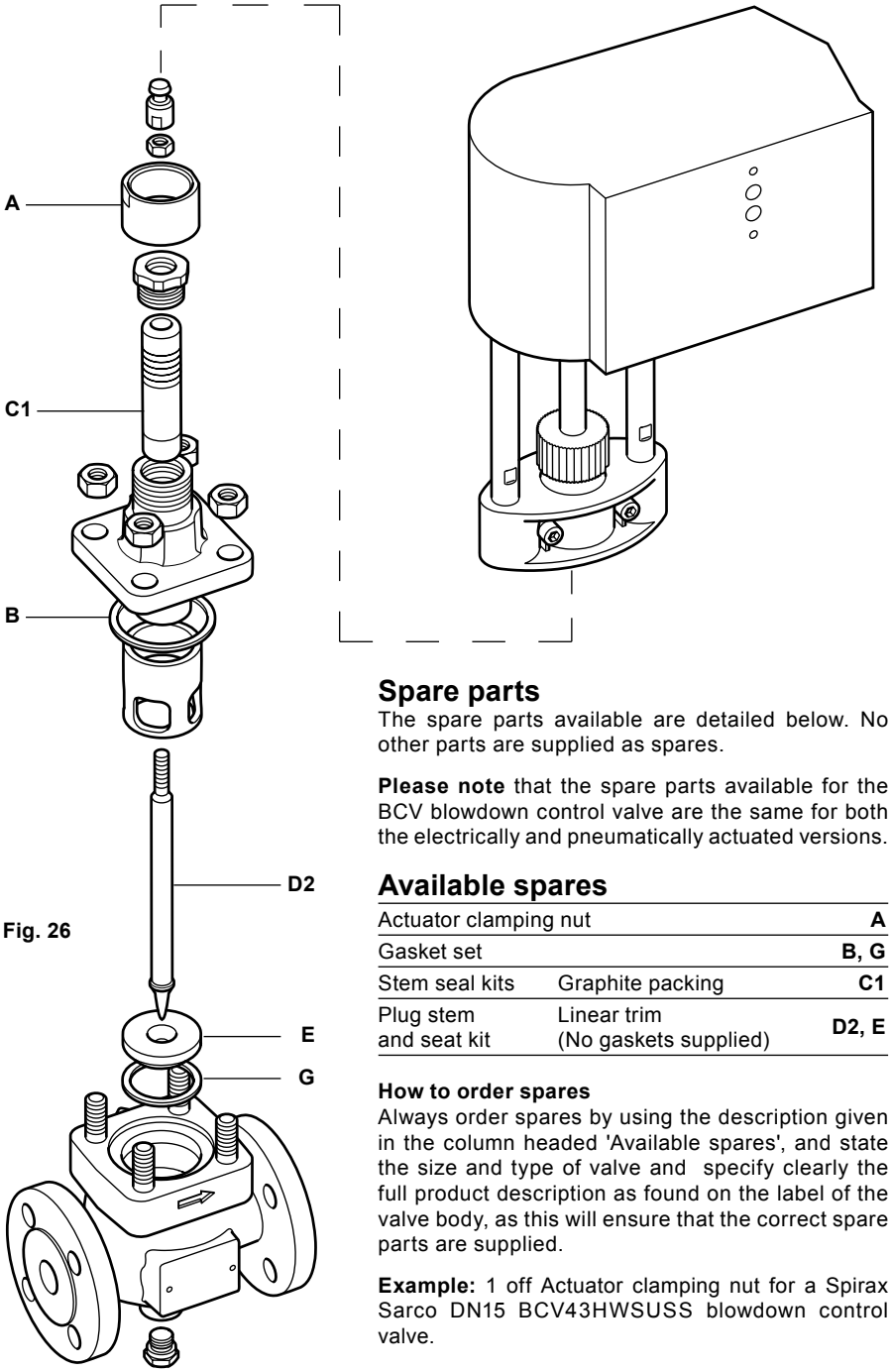


Fig. 26

Spare parts

The spare parts available are detailed below. No other parts are supplied as spares.

Please note that the spare parts available for the BCV blowdown control valve are the same for both the electrically and pneumatically actuated versions.

Available spares

Actuator clamping nut		**A**
Gasket set		**B, G**
Stem seal kits	Graphite packing	**C1**
Plug stem and seat kit	Linear trim (No gaskets supplied)	**D2, E**

How to order spares

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

Example: 1 off Actuator clamping nut for a Spirax Sarco DN15 BCV43HWSUSS blowdown control valve.