

Balancing and Shut-off Valve

BOA-Control SBV

Operating Manual



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Operating Manual BOA-Control SBV

Original operating manual

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Glossary

Pressure Equipment Directive (PED)

The 2014/68/EU Directive sets out the requirements to be met by pressure equipment intended to be placed on the market in the European economic area.

1 General

1.1 Principles

This operating manual is valid for the type series and variants indicated on the front cover.

The operating manual describes the proper and safe use of this equipment in all phases of operation.

In the event of damage, immediately contact your nearest KSB sales organisation responsible to maintain the right to claim under warranty.

1.2 Target group

This operating manual is aimed at the target group of trained and qualified specialist technical personnel.

1.3 Other applicable documents

Table 1: Overview of other applicable documents

Document	Contents
Type series booklet	Description of the valve
Flow characteristics	Information on Kv values and zeta values
General assembly drawing ¹⁾	Sectional drawing of the valve
Sub-supplier product literature ²⁾	Operating manuals and other product literature for the accessories

Observe the relevant manufacturer's product literature for the accessories.

1.4 Symbols

Table 2: Symbols used in this manual

Symbol	Description
✓	Conditions which need to be fulfilled before proceeding with the step-by-step instructions
▷	Safety instructions
⇒	Result of an action
⇨	Cross-references
1.	Step-by-step instructions
2.	
	Note Recommendations and important information on how to handle the product

1.5 Key to safety symbols/markings

Table 3: Definition of safety symbols/markings

Symbol	Description
 DANGER	DANGER This signal word indicates a high-risk hazard which, if not avoided, will result in death or serious injury.
 WARNING	WARNING This signal word indicates a medium-risk hazard which, if not avoided, could result in death or serious injury.

¹ If included in agreed scope of supply; otherwise refer to the type series booklet.

² If included in agreed scope of supply

Symbol	Description
	<p>CAUTION This signal word indicates a hazard which, if not avoided, could result in damage to the machine and its functions.</p>
	<p>General hazard In conjunction with one of the signal words this symbol indicates a hazard which will or could result in death or serious injury.</p>
	<p>Electrical hazard In conjunction with one of the signal words this symbol indicates a hazard involving electrical voltage and identifies information about protection against electrical voltage.</p>
	<p>Machine damage In conjunction with the signal word CAUTION this symbol indicates a hazard for the machine and its functions.</p>



2 Safety

All the information contained in this section refers to hazardous situations.

In addition to the present general safety information the action-related safety information given in the other sections must be observed.

2.1 General

- This operating manual contains general installation, operating and maintenance instructions that must be observed to ensure safe operation of the system and prevent personal injury and damage to property.
- Comply with all the safety instructions given in the individual sections of this operating manual.
- The operating manual must be read and understood by the responsible specialist personnel/operators prior to installation and commissioning.
- The contents of this operating manual must be available to the specialist personnel at the site at all times.
- Information and markings attached directly to the product must always be complied with and kept in a perfectly legible condition at all times. This applies to, for example:
 - Manufacturer
 - Type designation
 - Nominal pressure
 - Nominal size
 - Flow direction arrow
 - Year of construction
 - Valve body material
- The operator is responsible for ensuring compliance with all local regulations not taken into account.
- The design, manufacture and testing of the valve are subject to a QM system to DIN EN ISO 9001 as well as the current regulations and directives for pressure equipment.
- Bear in mind that valves exposed to creep-rupture conditions have a limited service life and have to meet the applicable regulations stipulated in the technical codes.
- In the case of customised special variants, further restrictions may apply with regard to the operating mode and service life. Refer to the relevant sales documentation for applicable limitations.
- The operator is responsible for any eventualities or incidents which may occur during installation performed by the customer, operation and maintenance.

2.2 Intended use

- Only operate valves which are in perfect technical condition.
- Do not operate the valve in partially assembled condition.
- Only use the valve for fluids specified in the product literature. Take the design and material variant into account.
- Only operate the valve within the operating limits described in the other applicable documents.
- The valve's design and rating are based on predominantly static loading in accordance with the codes applied. Consult the manufacturer if the valve is subjected to dynamic loads or any other additional influences.
- Consult the manufacturer about any other modes of operation not described in the product literature.
- Do not use the valve as a foothold.

2.2.1 Prevention of foreseeable misuse

- Never exceed the permissible application and operating limits specified in the data sheet or product literature regarding temperature, etc.
- Observe all safety information and instructions in this manual.

2.3 Personnel qualification and training

- All personnel involved must be fully qualified to transport, install, operate, maintain and inspect the product this manual refers to and be fully aware of the interaction between the valve and the system.
- The responsibilities, competence and supervision of all personnel involved in transport, installation, operation, maintenance and inspection must be clearly defined by the operator.
- Deficits in knowledge must be rectified by means of training and instruction provided by sufficiently trained specialist personnel. If required, the operator can commission the manufacturer/supplier to train the personnel.
- Training on the valve must always be supervised by specialist technical personnel.

2.4 Consequences and risks caused by non-compliance with this manual

- Non-compliance with these operating instructions will lead to forfeiture of warranty cover and of any and all rights to claims for damages.
- Non-compliance can, for example, have the following consequences:
 - Hazards to persons due to electrical, thermal, mechanical and chemical effects and explosions
 - Failure of important product functions
 - Failure of prescribed maintenance and servicing practices
 - Hazard to the environment due to leakage of hazardous substances

2.5 Safety awareness

In addition to the safety information contained in this operating manual and the intended use, the following safety regulations shall be complied with:

- Accident prevention, health regulations and safety regulations
- Explosion protection regulations
- Safety regulations for handling hazardous substances
- Applicable standards, directives and laws

2.6 Safety information for the operator/user

- Fit protective equipment (e.g. contact guards) supplied by the operator for hot, cold or moving parts, and check that the equipment functions properly.
- Do not remove any protective equipment (e.g. contact guards) during operation.
- Provide the personnel with protective equipment and make sure it is used.
- Contain any leakage of hazardous fluids (e.g. explosive, toxic, hot) so as to avoid any danger to persons and the environment. Adhere to all relevant laws.
- Eliminate all electrical hazards. (In this respect refer to the applicable national safety regulations and/or regulations issued by the local energy supply companies.)

2.7 Safety information for maintenance, inspection and installation

- Modifications or alterations of the valve require the manufacturer's prior consent.
- Use only original spare parts or parts/components authorised by the manufacturer. The use of other parts/components can invalidate any liability of the manufacturer for resulting damage.
- The operator ensures that maintenance, inspection and installation are performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual.
- Carry out work on the valve during standstill only.
- The valve body must have cooled down to ambient temperature.
- The pressure in the valve body must have been released and the valve must have been drained.
- When taking the valve out of service always adhere to the procedure described in the manual.
- Decontaminate valves which handle fluids posing a health hazard.
- Protect the valve body and body bonnet/cover from any impacts.
- As soon as the work has been completed, re-install and re-activate any safety-relevant devices and protective devices. Before returning the product to service, observe all instructions on commissioning. (⇒ Section 6.1, Page 19)

2.8 Unauthorised modes of operation

- The valve is operated outside the limits stated in the operating manual.
- The valve is not operated in accordance with the intended use.

(⇒ Section 2.2, Page 8)

3 Transport/Storage/Disposal

3.1 Checking the condition upon delivery

1. On transfer of goods, check each packaging unit for damage.
2. In the event of in-transit damage, assess the exact damage, document it and notify KSB or the supplying dealer and the insurer about the damage in writing immediately.

3.2 Transport

The valves are delivered in cardboard boxes, with the valve disc in the closed position.

	CAUTION
	<p>Improper transport Damage to the valve!</p> <ul style="list-style-type: none"> ▷ Always transport the valve properly and in its original packaging. ▷ Protect the valve in its cardboard box from heavy impacts. ▷ Do not throw the valve.

3.3 Storage/preservation

If commissioning is to take place some time after delivery, we recommend that the following measures be taken for storage:

	CAUTION
	<p>Incorrect storage Damage due to dirt, corrosion, humidity and/or frost!</p> <ul style="list-style-type: none"> ▷ Close the valve using little force and store in the closed position. ▷ Store the valve in a frost-proof room where the atmospheric humidity is as constant as possible. ▷ Protect the valve from dust during storage, e.g. with suitable caps or foils. ▷ Protect the valve from contact with solvents, lubricants, fuels or other chemicals. ▷ Store the valve in vibration-free conditions.

If properly stored indoors, the equipment is protected for a maximum of 12 months.

3.4 Return to supplier

1. Drain the valve as described in the manual.
2. Flush and clean the valve.
3. If the valve has handled fluids whose residues could lead to corrosion damage in the presence of atmospheric humidity or could ignite upon contact with oxygen also neutralise the valve and blow through with anhydrous inert gas to ensure drying.

3.5 Disposal

	 WARNING
	<p>Fluids handled, consumables and supplies which are hot and/or pose a health hazard</p> <p>Risk of injury! Hazard to persons and the environment!</p> <ul style="list-style-type: none">▷ Collect and properly dispose of flushing fluid and any residues of the fluid handled.▷ Wear safety clothing and a protective mask if required.▷ Observe all relevant laws.▷ Decontaminate valves used in fluids posing a health hazard.

1. Dismantle the valve.
Collect greases and other lubricants during dismantling.
2. Separate and sort the valve materials, e.g. by:
 - Metals
 - Plastics
 - Electronic waste
 - Greases and other lubricants
3. Dispose of materials in accordance with current regulations or in another controlled manner.

4 Description of the Valve

4.1 General description

- Valve for the hydraulic balancing of hot-water heating systems, air-conditioning systems and cooling circuits

4.2 Marking

Table 4: General marking

Description	Marking
Nominal size	DN ...
Nominal pressure class	PN ...
Manufacturer	KSB
Year of construction	20..
Material
Flow direction arrow	→

In accordance with the applicable Pressure Equipment Directive (PED), Article 4, Paragraph 3, the valves must not bear the CE marking.

4.3 Operating data

Table 5: Operating properties

Characteristic	Value
Nominal pressure	25
Nominal size	15 - 50
Max. permissible pressure [bar]	25
Min. permissible temperature [°C]	≥ -10
Max. permissible temperature [°C]	≤ +120

4.4 Fluids handled

- Water
- Water/glycol mixtures (glycol content ≤ 50 %)
- Other fluids on request.

4.5 Design details

Design

- Static balancing valve
- Straight-way Y-pattern valve with female threaded ends
- Non-rising handwheel
- Rotating stem
- Adjustable travel stop
- Fixed measuring orifice
- Two self-sealing pressure measurement connection branches with cap for direct pressure and flow measurement
- Digital position indicator with 40 settings and indication of full rotations and one-tenth of a rotation, can be read from all angles

Volume flow rate measurement

- A differential pressure gauge is required for measuring volume flow rate and temperature.³⁾

4.6 Pressure/temperature ratings

Table 6: Test pressure and operating pressure

PN	DN	Shell test		Seat tightness test		Permissible operating pressure ⁴⁾	
		With water				-10°C to +100°C	120 °C
		Tests P10 and P11 to DIN EN 12266-1		Test P12, leakage rate A to DIN EN 12266-1			
		[bar]		[bar]		[bar]	[bar]
25	15-50	37,5		27,5		25	21

4.7 Materials

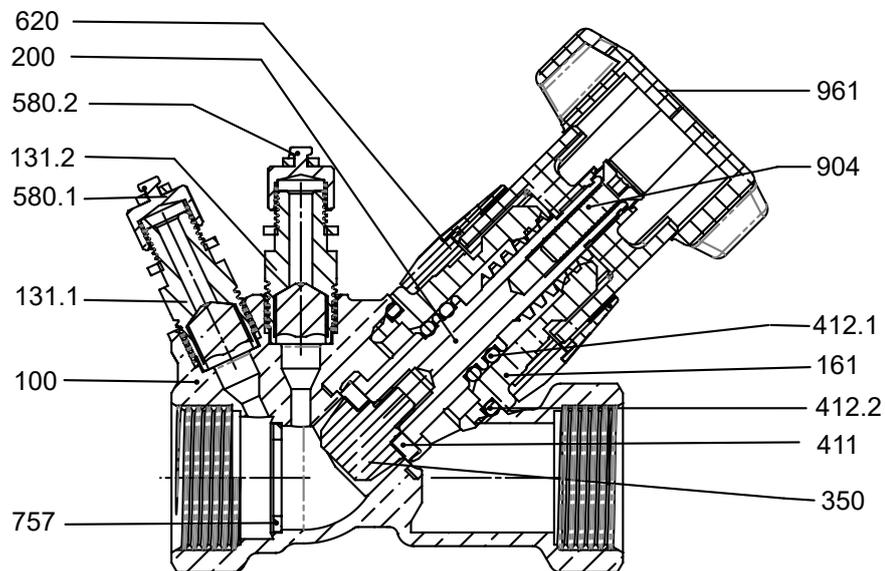


Fig. 1: Sectional drawing

Table 7: Overview of available materials

Part No.	Description	Material	Note
100	Body	CW602N	-
131.1/2	Pressure measurement connection branch	CW617N	-
161	Body bonnet	CW602N	-
200	Stem	CW602N	-
350	Valve disc	CW602N	-
411	Joint ring	EPDM 70	-
412.1/2	O-ring	EPDM 70	-
580.1/2	Cap	CW617N	Red (580.1), blue (580.2)
620	Position indicator	Glass fibre reinforced plastics	-
757	Throttling element (measuring orifice)	CW602N	-

³ A measuring kit can be hired on request.

⁴ Static load

Part No.	Description	Material	Note
904	Grub screw (travel stop)	Steel	-
961	Handwheel	Glass fibre reinforced plastics	-

4.8 Function

Design The valves consist of a two-piece body 100 with threaded ends. The valves are provided with an elastomer stem seal. The functional unit consists of valve disc 350, stem 200 and handwheel 961.

Function The valves are equipped with two pressure measurement connection branches 131.1/2 for measuring the flow rate. By combining the valve with a differential pressure gauge, system-specific flow rates can be measured. Valve travel in opening direction can be limited by setting travel stop 904 at the handwheel, so that the valve cannot be opened beyond this position.

Depending on the flow rate to be set, the valves are opened or set to the required valve plug position. As the valves are fitted with throttling plugs as standard, they are suitable for both on/off and control duties.

Sealing The passage of stem 200 through body 100 is sealed by O-ring 412.1.

4.9 Scope of supply

The following items are included in the scope of supply:

- Valve

4.10 Dimensions and weights

For dimensions and weights please refer to the type series booklet.

5 Installation at Site

5.1 General information/Safety regulations

Responsibility for positioning and installing the valve lies with the consultant, the engineering contractor or the operator. Planning errors and installation errors can prevent the reliable function of the valves and pose a substantial safety hazard.

The valves are supplied ready for operation.

5.2 Installation position

Non-compliance with the following installation instructions may result in failure of the measuring function!

	CAUTION
	<p>Flow in opposite direction of flow direction arrow</p> <p>No measurement possible!</p> <ul style="list-style-type: none"> ▷ Flow through the valves must be in the direction indicated by the flow direction arrow cast on the valve body.

The valves can be installed in supply lines and return lines. If the fluid handled is clean, the valve can be installed in any position in the system. If the fluid handled contains particles, the valve must not be installed with the handwheel pointing downwards.

For optimum measuring results, a minimum stabilisation distance of 5x DN must be maintained upstream of the valve (10x DN downstream of a pump) and a minimum stabilisation distance of 2x DN must be maintained downstream of the valve.

For adjusting the volume flow rate, a measuring kit can be hired on request.

5.3 Preparing the valve

	CAUTION
	<p>Outdoor installation</p> <p>Damage due to corrosion!</p> <ul style="list-style-type: none"> ▷ Provide weather-proof protection to protect the valve against moisture.

	CAUTION
	<p>Welding beads, scale and other impurities in the piping</p> <p>Damage to the valve!</p> <ul style="list-style-type: none"> ▷ Remove any impurities from the piping. ▷ If necessary, install a strainer.

1. Thoroughly clean, flush and blow through all vessels, piping and connections (especially of new installations).
2. Check that the inside of the valve is free from any foreign objects. Remove any foreign objects.
3. If required, install a strainer in the piping.

5.4 Piping

	<p>⚠ WARNING</p> <p>Impermissible piping forces Leakage from or rupture of the valve body!</p> <ul style="list-style-type: none"> ▷ Connect the pipes to the valve without transmitting any stresses or strains. ▷ Take structural measures to prevent any piping forces from being transmitted to the valve. ▷ Avoid mechanical loads beyond normal levels, e.g. piping forces, moments and vibrations.
	<p>CAUTION</p> <p>Welding in close proximity to soft-seated valves Damage to the seat/disc interface!</p> <ul style="list-style-type: none"> ▷ Ensure that the valve is not heated beyond the specified temperature limits. (⇒ Section 4.3, Page 13)
	<p>CAUTION</p> <p>Painting of the piping Valve function impaired! Loss of important information provided on the valve!</p> <ul style="list-style-type: none"> ▷ Protect stem and plastic components prior to applying paint. ▷ Protect printed name plates prior to applying paint.

5.5 Installing the valve

	<p>CAUTION</p> <p>Improper installation Damage to the valve!</p> <ul style="list-style-type: none"> ▷ Protect the body and body bonnet/cover from any impacts.
	<p>CAUTION</p> <p>Tightening the threaded connection with an unsuitable tool Damage to the valve! Leakage at the valve body! Leakage of fluid!</p> <ul style="list-style-type: none"> ▷ Tighten the threaded connection with an open-ended spanner only.

The valves have female threaded ends to ISO 228 for installation in the piping.

✓ The thread is free of dirt.

1. During installation, make sure there is not dirt on the thread.
2. Apply sealing material to the pipe threads only, not to the valve threads.
3. Tighten the threaded connection with an open-ended spanner.

5.6 Insulation

If the valve is used for handling hot fluids, insulate it in accordance with the German energy-saving regulations.

	<p style="background-color: #f4a460; padding: 2px;">⚠ WARNING</p> <p>Cold/hot piping and/or valve Risk of thermal injury!</p> <ul style="list-style-type: none"> ▸ Insulate the valve. ▸ Fit warning signs.
	<p style="background-color: #fff9c4; padding: 2px;">CAUTION</p> <p>Condensation forming in air-conditioning systems, cooling systems and refrigerating systems Ice forming! Actuating element blockage! Damage due to corrosion!</p> <ul style="list-style-type: none"> ▸ Insulate the valve to prevent diffusion.

5.7 Measuring computer

	<p style="background-color: #fff9c4; padding: 2px;">CAUTION</p> <p>Incorrect operation of the measuring computer Incorrect readings and setting of valve!</p> <ul style="list-style-type: none"> ▸ Observe the relevant operating manual of the measuring computer.
---	---

A differential pressure gauge is required for measuring the volume flow rate. It allows the presetting to be checked and adjusted during the hydraulic balancing procedure if necessary.

For adjusting the volume flow rate, a measuring kit can be hired on request.

6 Commissioning/Start-up/Shutdown

6.1 Commissioning/Start-up

6.1.1 Prerequisites for commissioning/start-up

Before commissioning/start-up of the valve, ensure that the following requirements are met:

- The material, pressure data and temperature data of the valve are compatible with the operating conditions of the piping.
- The material's chemical resistance and stability under load have been checked.

Functional testing prior to commissioning/start-up

Check the shut-off function of the installed valve by opening and closing it several times.

6.1.2 Operating the valve

	CAUTION
	<p>Using tools to actuate the valve Damage to the valve as a result of excessive forces!</p> <ul style="list-style-type: none"> ▸ Only actuate handwheel-operated valves by hand.

Viewed from above, the valve is closed by turning the handwheel in clockwise direction, and opened by turning the handwheel in anti-clockwise direction. The relevant symbols are shown on the top of the handwheel.

The moving part of the scale at the handwheel indicates the number of full turns. The fixed part of the scale indicates tenths of a full turn. The valve is fully open in position 4.0 and fully closed in position 0.0.

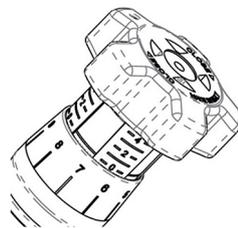


Fig. 2: Position indicator at the handwheel

	CAUTION
	<p>Excessively long idle periods Damage to the valve!</p> <ul style="list-style-type: none"> ▸ Check the function by opening and closing the valve at least once or twice a year.

6.1.3 Taking measurements

The volume flow rate can be indicated by combining the valve with a differential pressure gauge. As the valve is equipped with a fixed orifice plate, the current valve position does not need to be entered. Changes in volume flow rate caused by the handwheel being turned are displayed directly on the screen of the measuring computer.

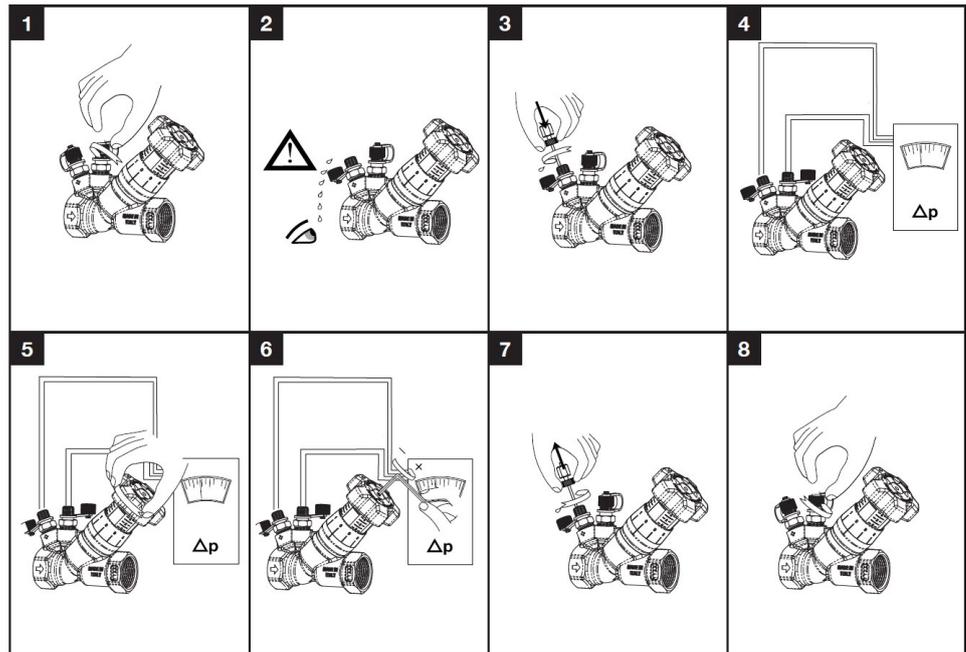


Fig. 3: Illustrated instructions for taking measurements

Table 8: Kvs values, measuring orifice

Nominal size	Value
DN15	2,3
DN20	5,3
DN25	9,2
DN32	19,0
DN40	22,1
DN 50	42,3

1. Open pressure measurement connection branches 131.1/2 by turning caps 580.1/2 in anti-clockwise direction.
2. Watch out for any fluid escaping when working overhead.
3. Insert the measuring probes carefully by pushing down and turning them in clockwise direction.
4. Select the valve type series, nominal size and fluid handled in the measuring computer.
 - ⇒ The measuring computer indicates the differential pressure and volume flow rate.
5. Adjust the valve position by turning handwheel 961 until the required volume flow rate is set. Owing to the system's inertia, the volume flow rate may fluctuate slightly after the handwheel has been actuated. Wait for the value to stabilise.
6. After the required volume flow rate has been reached, set travel stop 904 with an Allen key (WAF 3).
7. Remove the measuring probes carefully by pulling and turning them in anti-clockwise direction.
8. Screw on caps 580.1/2 in clockwise direction and tighten them hand-tight.

6.1.4 Setting the travel stop

The valves are equipped with a travel stop 904 for setting a maximum flow rate limit. The travel stop is not activated at the time of supply.

1. After the required volume flow rate has been reached, set travel stop 904 with an Allen key (WAF 3).

The valve can still be closed.

6.2 Shutdown

6.2.1 Measures to be taken for shutdown

	<div style="background-color: #f4a460; padding: 5px;">! WARNING</div> <p>Fluids handled, consumables and supplies which are hot and/or pose a health hazard</p> <p>Risk of injury! Hazard to persons and the environment!</p> <ul style="list-style-type: none"> ▸ Collect and properly dispose of flushing fluid and any residues of the fluid handled. ▸ Wear safety clothing and a protective mask if required. ▸ Observe all relevant laws. ▸ Decontaminate valves used in fluids posing a health hazard.
	<div style="background-color: #f4d03f; padding: 5px;">CAUTION</div> <p>Excessively long idle periods</p> <p>Damage to the valve!</p> <ul style="list-style-type: none"> ▸ Check the function by opening and closing the valve at least once or twice a year.

During prolonged shutdown periods, ensure that the following conditions are met:

1. Drain fluids which change their physical condition due to changes in concentration, polymerisation, crystallisation, solidification, etc. from the piping.
2. If required, flush the piping with the valves fully opened.

7 Servicing/Maintenance

7.1 Safety regulations

	 DANGER
	<p>Valve under pressure High-pressure hazard! Leakage of hot and/or toxic fluids! Risk of burns!</p> <ul style="list-style-type: none"> ▷ Depressurise the valve and its surrounding system prior to any maintenance work and installation work. ▷ If the bellows are defective or fluid escapes, depressurise the valve. ▷ Ensure the valve is depressurised before removing any drain plugs, opening plugs or vent plugs. ▷ Allow the valve to cool down until the temperature of the fluid in all valve areas in contact with the fluid is lower than the fluid's vaporisation temperature. ▷ Never vent the valve by removing the bonnet bolting or gland packing. ▷ Use original spare parts and appropriate tools, even in emergencies.

Before removing the valve, ensure that the pipe has been shut off and released for repair/maintenance work.

A regular maintenance schedule will help avoid expensive repairs and contribute to trouble-free, reliable operation of the valve with a minimum of servicing/maintenance expenditure and work.

The user is responsible for defining appropriate intervals for checks and maintenance, depending on the application of the valve.

	NOTE
	<p>All maintenance work, service work and installation work can be carried out by KSB Service or authorised workshops. Find your contact in the attached Addresses booklet or visit https://www.ksb.com/en-global/contact.</p>

Never use force when removing and installing the valve.

7.2 Maintenance

The valve has been designed to be largely maintenance-free. The materials of the sliding parts have been selected to ensure minimum wear. The stem seal is maintenance-free and does not require re-tightening.

All elastomers are organic substances and as such subject to natural ageing. Continuous operation at high operating temperatures may reduce their service lives.

The service life can be extended by taking the following measures:

- Checking the function by opening and closing the valve at least once or twice a year

8 Trouble-shooting

	 WARNING
	<p>Improper remedial work on the valve</p> <p>Risk of injury!</p> <ul style="list-style-type: none"> ▸ For any work performed in order to remedy faults on the valve observe the relevant information given in this operating manual and/or the product literature provided by the accessories manufacturers.

If problems occur that are not described in the following table, consultation with the KSB service is required.

Table 9: Trouble-shooting

Problem	Remedy
Leakage at the seat/disc interface	Rework not possible. Replace valve.
Leakage at the stem seal	Rework not possible. Replace valve.
Leakage at the pressure measurement connection branches	Contact KSB, spare parts available

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