

Balancing and Shut-off Valve

# BOA-Control/BOA-Control IMS

## Operating Manual



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Operating Manual BOA-Control/BOA-Control IMS

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## Glossary

### Certificate of decontamination

A certificate of decontamination is enclosed by the customer when returning the product to the manufacturer to certify that the product has been properly drained to eliminate any environmental and health hazards arising from components in contact with the fluid handled.

### EPDM

Ethylene-propylene-diene rubber

### PED

The 97/23/EC directive, also known as the Pressure Equipment Directive, sets out the requirements to be met by pressure equipment intended to be placed on the market in the European economic area.

### Technical literature

Refer to the product catalogue for the technical literature on our products at [www.ksb.com](http://www.ksb.com).

# 1 General

## 1.1 Principles

This operating manual is supplied as an integral part of the type series and variants indicated on the front cover. The manual describes the proper and safe use of this equipment in all phases of operation.

In the event of damage, immediately contact the KSB sales organisation responsible in order 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 <sup>1)</sup>	Information on Kv and zeta values
General assembly drawing <sup>2)</sup>	Sectional drawing of the valve
Sub-supplier product literature <sup>3)</sup>	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. 2.	Step-by-step instructions
	Note Recommendations and important information on how to handle the product

1) If any

2) If inclusion in the scope of supply has been agreed; otherwise refer to the type series booklet.

3) If inclusion in the scope of supply has been agreed.

## 2 Safety

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



### 2.1 Key to safety symbols/markings

Table 3: Definition of safety symbols/markings

Symbol	Description
 <b>DANGER</b>	<b>DANGER</b> This signal word indicates a high-risk hazard which, if not avoided, will result in death or serious injury.
 <b>WARNING</b>	<b>WARNING</b> This signal word indicates a medium-risk hazard which, if not avoided, could result in death or serious injury.
 <b>CAUTION</b>	<b>CAUTION</b> This signal word indicates a hazard which, if not avoided, could result in damage to the machine and its functions.
	<b>Explosion protection</b> This symbol identifies information about avoiding explosions in potentially explosive atmospheres in accordance with EC Directive 94/9/EC (ATEX).
	<b>General hazard</b> In conjunction with one of the signal words this symbol indicates a hazard which will or could result in death or serious injury.
	<b>Electrical hazard</b> In conjunction with one of the signal words this symbol indicates a hazard involving electrical voltage and identifies information about protection against electrical voltage.
	<b>Machine damage</b> In conjunction with the signal word CAUTION this symbol indicates a hazard for the machine and its functions.

### 2.2 General

This manual contains general installation, operating and maintenance instructions that must be observed to ensure safe valve operation and prevent personal injury and damage to property.

The safety information in all sections of this manual must be complied with.

The operating manual must be read and fully understood by the specialist personnel/operators responsible prior to installation and commissioning.

The contents of this operating manual must be available to the specialist personnel at the site at all times.

Instructions and information attached directly to the valve must always be complied with and kept in a perfectly legible condition at all times. This applies to, for example: flow direction arrow, manufacturer, type designation, nominal pressure, nominal size, year of construction and material.

The operator is responsible for ensuring compliance with all local regulations not taken into account in this manual.

The design, manufacture and the testing of the valves are subject to a QM system to DIN EN ISO 9001 as well as the European Pressure Equipment Directive 97/23/EC. Compliance with these requirements, however, is based on normal, predominantly static loading.

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. Please refer to the relevant sales literature for this information.

This operating manual does not take into account:

- Any eventualities or incidents which may occur during installation performed by the customer, operation and maintenance.
- Local regulations; the operator must ensure that such regulations are strictly observed by all, including the personnel called in for installation.

### 2.3 Intended use

- Only operate valves which are in perfect technical condition.
- Do not operate partially assembled valves.
- The valve must only handle the fluids specified in the product literature.
- Only operate the valve within the permissible operating range specified for pressure and temperature.
- Consult the manufacturer about any other modes of operation not described in the product literature.

#### Prevention of foreseeable misuse

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

### 2.4 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.

Hands-on training at the valve must always be supervised by specialist technical personnel.

### 2.5 Consequences and risks caused by non-compliance with this manual

- Non-compliance with this operating manual 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

### 2.6 Safety awareness

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

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

### 2.7 Safety information for the operator/user

Actuated valves are intended for use in areas which cannot be accessed by unauthorised persons. Operation of these valves in areas which can be accessed by unauthorised persons is only permitted if appropriate protective devices are fitted at the site. This must be ensured by the operator.

- The operator shall fit contact guards for hot, cold and moving parts and check that the guards function properly.
- Do not remove any contact guards during operation.
- Provide the personnel with protective equipment and make sure it is used.
- Contain leakages (e.g. at the stem seal) 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.)

### 2.8 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 authorised by the manufacturer. The use of other parts can invalidate any liability of the manufacturer for resulting damage.
- The operator ensures that maintenance, inspection and installation is 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. (⇒ Section 7.2.1 Page 25)
- Decontaminate valves which handle fluids posing a health hazard.
- As soon as the work has been completed, re-install and/or re-activate any safety-relevant and protective devices. Before returning the product to service, observe all instructions on commissioning.

### 2.9 Unauthorised modes of operation

Never operate the valve outside the limits stated in the data sheet and in this operating manual.

The warranty relating to the operating reliability and safety of the valve supplied is only valid if the valve is used in accordance with its intended use. (⇒ Section 2.3 Page 8)

### 3 General safety regulations

	<p><b>⚠ DANGER</b></p> <p><b>Handling actuated valves</b>          Danger to life!</p> <ul style="list-style-type: none"> <li>▷ If the valves are fitted with actuators, ensure that the actuator's operating manual is also observed.</li> </ul>
	<p><b>⚠ DANGER</b></p> <p><b>Surge pressure/water hammer potentially occurring at high temperatures</b>          Danger to life caused by burns and scalds!</p> <ul style="list-style-type: none"> <li>▷ The max. permissible valve pressure must not be exceeded (⇒ Section 5 Page 14) .</li> <li>▷ Use valves made of nodular cast iron or steel.</li> <li>▷ Operator shall provide general safety measures for the system.</li> </ul>
	<p><b>⚠ WARNING</b></p> <p><b>Fluids, consumables and supplies which are hot and/or pose a health hazard</b>          Hazard to persons and the environment!</p> <ul style="list-style-type: none"> <li>▷ Collect and properly dispose of flushing fluid and any residues of the fluid handled.</li> <li>▷ Wear safety clothing and a protective mask, if required.</li> <li>▷ Observe all legal regulations on the disposal of fluids posing a health hazard.</li> </ul>
	<p><b>⚠ WARNING</b></p> <p><b>Cold/hot piping and/or valve</b>          Risk of thermal injury!</p> <ul style="list-style-type: none"> <li>▷ Insulate the valve.</li> <li>▷ Attach warning signs.</li> </ul>
	<p><b>⚠ WARNING</b></p> <p><b>Impermissible piping forces</b>          Leakage from or rupture of the valve body!</p> <ul style="list-style-type: none"> <li>▷ Connect the piping without transmitting any stresses or strains.</li> </ul>
	<p><b>⚠ WARNING</b></p> <p><b>Unqualified personnel performing work on the valve</b>          Risk of injury!</p> <ul style="list-style-type: none"> <li>▷ Always have repair and maintenance work performed by specially trained, qualified personnel.</li> </ul>
	<p><b>CAUTION</b></p> <p><b>Condensation water forming in air-conditioning, cooling and refrigerating systems</b>          Ice forming!          Actuating element blockage!          Damage due to corrosion!</p> <ul style="list-style-type: none"> <li>▷ Insulate the valve to prevent diffusion.</li> </ul>

	<p style="background-color: yellow; margin: 0;"><b>CAUTION</b></p> <p><b>Improper installation</b> Damage to the valve!</p> <ul style="list-style-type: none"> <li>▷ Remove the caps prior to installation.</li> <li>▷ Clean the mating flange faces.</li> <li>▷ Protect the body and bonnet/cover from any impacts.</li> </ul>
	<p style="background-color: yellow; margin: 0;"><b>CAUTION</b></p> <p><b>Outdoor installation</b> Damage due to corrosion!</p> <ul style="list-style-type: none"> <li>▷ Protect the valve appropriately against moisture.</li> </ul>
	<p style="background-color: yellow; margin: 0;"><b>CAUTION</b></p> <p><b>Painting of pipes</b> Impairment of the valve's function and loss of information!</p> <ul style="list-style-type: none"> <li>▷ Protect stem and plastic components prior to applying paint.</li> <li>▷ Protect printed name plates prior to applying paint.</li> </ul>
	<p style="background-color: yellow; margin: 0;"><b>CAUTION</b></p> <p><b>Impermissible load</b> Damage to the actuating element!</p> <ul style="list-style-type: none"> <li>▷ Do not use the valve as a foothold.</li> </ul>
	<p style="background-color: yellow; margin: 0;"><b>CAUTION</b></p> <p><b>Improper reassembly</b> Damage to the valve!</p> <ul style="list-style-type: none"> <li>▷ Reassemble the valve in accordance with the general rules of sound engineering practice.</li> <li>▷ Use original spare parts only.</li> </ul>

## 4 Transport/Temporary Storage/Disposal

### 4.1 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 (as applicable) and the insurer about the damage in writing immediately.

### 4.2 Transport

The valves are delivered with the valve disc in the closed position. BOA-Control IMS valve sizes up to and including DN 50 are packaged in cardboard boxes. The line connection ports of BOA-Control IMS size DN 65 and above are closed with caps. The valves are supplied ready for operation. Original spare parts are only ready for operation following assembly/installation and subsequent shell and leak testing of the valve.

	<p><b>⚠ DANGER</b></p> <p><b>The valve could slip out of the suspension arrangement</b> Danger to life from falling parts!</p> <ul style="list-style-type: none"> <li>▷ Only transport the valve in the specified position.</li> <li>▷ Never suspend the valve from its handwheel.</li> <li>▷ Pay attention to the weight data and the centre of gravity.</li> <li>▷ Observe the applicable local accident prevention regulations.</li> <li>▷ Use suitable, permitted lifting accessories.</li> <li>▷ Transport devices (if any) on the actuator may not be suitable for being attached to a suspension arrangement in order to transport the valve/actuator assembly. Refer to the actuator operating manual for the permissible loads.</li> </ul>
	<p><b>CAUTION</b></p> <p><b>Damage to the sensors</b> Measuring impossible</p> <ul style="list-style-type: none"> <li>▷ Do not use lifting accessories in the area of the sensors, the cables and the measurement bosses.</li> </ul>

To transport the valve, suspend it from the lifting tackle as illustrated.

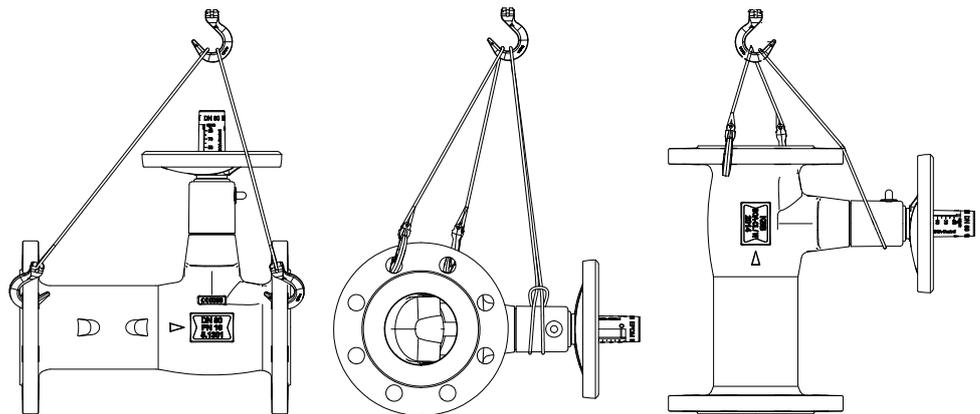


Fig. 1: Transporting the valve

### 4.3 Storage/preservation

If properly stored indoors, the equipment is protected for a maximum of 12 months. This allows commissioning to take place some time after delivery. We recommend that the following measures be taken:

- Store the valve in a dust-free and vibration-free, frost-proof room where the atmospheric humidity is as constant as possible (use suitable caps or film for protection).
- Protect EPDM-encapsulated valve discs from sunlight or UV light from other sources. Observe the DIN 7716 standard for the storage of elastomers.
- Close the valve using little force and store in the closed position.
- Protect the valve from contact with solvents, lubricants, fuels or other chemicals.

### 4.4 Return to supplier

1. Drain the valve as described in the manual.
2. Always flush and clean the valve, particularly if it has been used for handling noxious, explosive, hot or other hazardous fluids.
3. If the fluids handled by the system leave residues which might lead to corrosion damage when coming into contact with atmospheric humidity, or which might ignite when coming into contact with oxygen, the valve must also be neutralised and blown through with anhydrous inert gas for drying purposes.
4. When returning valves used for handling Fluids in Group 1 always complete and enclose a certificate of decontamination. Always indicate any safety and decontamination measures taken. (⇒ Section 11 Page 31)

	<b>NOTE</b>
	<p>If required, a blank certificate of decontamination can be downloaded from the KSB web site at: <a href="http://www.ksb.com/certificate_of_decontamination">www.ksb.com/certificate_of_decontamination</a></p>

### 4.5 Disposal

	<b>⚠ WARNING</b>
	<p><b>Fluids, consumables and supplies which are hot and/or pose a health hazard</b> Hazard to persons and the environment!</p> <ul style="list-style-type: none"> <li>▶ Collect and properly dispose of flushing fluid and any residues of the fluid handled.</li> <li>▶ Wear safety clothing and a protective mask, if required.</li> <li>▶ Observe all legal regulations on the disposal of fluids posing a health hazard.</li> </ul>

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.

## 5 Valve Description

### 5.1 General description

The sectional drawings below provide examples of the general design/configuration of the valve. For additional and more detailed information, refer to the respective type series booklet.

### 5.2 Marking

**Table 4:** General marking

Nominal size	DN ...
Nominal pressure class	PN ...
Manufacturer	KSB
Type series/Model	BOA-...
Year of construction	20..
Material	.....
Flow direction arrow	→
Traceability of the material (from category II PED 97/23/EC)	.....
CE marking (from category I PED 97/23/EC)	<b>CE</b>
Identification number of the notified body (from category I PED 97/23/EC according to module H)	0036
Customer's marking	e.g. plant/system No., etc.
Factory marking	Inspector's stamp mark on the flange following the successful final inspection and testing of the valve

In accordance with the Pressure Equipment Directive 97/23/EC, the valves are marked as shown in the following table:

Fluids in Group 2

PN	DN								
	≤32	40	50	65	80	100	125	150	≥200
6									
10									
16									
25									
≥40									

**Fig. 2:** BOA-Control/BOA-Control IMS

### 5.3 Control and Measurement Valves

#### 5.3.1 BOA-Control/BOA-Control IMS



**5.3.1.1 Operating data**
**Table 5:** Operating properties

Characteristic	Value
Nominal pressure	PN 16
Nominal size	DN 15 - 350 <sup>4)</sup>
Max. permissible pressure	16 bar
Min. permissible temperature	-10 °C
Max. permissible temperature	+120 °C

**5.3.1.2 Fluids handled**

- Hot water for heating systems, with or without glycol (max. 60 %)
- Cold water for air-conditioning systems, with or without glycol (max. 60 %)
- The fluid handled should meet the requirements to VdTÜV/AGFW TCh 1466 or VDI 2035.
- Fluids containing gas or air can only be measured with ultrasound technology to a limited extent. Proper venting of the systems is therefore essential.
- Not suitable for fluids containing mineral oils, steam or fluids liable to attack EPDM and cast iron.

**5.3.1.3 Design details**
**Design**

Valve:

Valves to type series booklet 7128.1

- BOA-Control IMS complete with sensors for measuring flow rate and temperature
- BOA-Control prepared for attaching sensors for measuring flow rate and temperature
- Straight-way globe valve with slanted seat
- Non-rotating stem with protected, external thread
- Non-rising handwheel
- Locking device, travel stop, position indicator (in %), throttling plug and insulating cap with anti-condensation feature as standard
- Compact, EPDM-encapsulated throttling plug as soft main and back seat
- Maintenance-free stem seal with EPDM profile ring
- Face-to-face length to DIN EN 558-1 Series 1
- Exterior coating: blue RAL 5002
- The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 97/23/EC (PED) for fluids in Group 2.

Measuring computer:

- Measuring flow rate and temperature requires the use of a measuring computer.
- Mobile short-term measurement with battery-powered BOATRONIC MS
- Permanent measurement set-up with BOATRONIC MS-420 (24 V DC power supply)

**Variants**

- Lead-sealable cap (prevents unauthorised actuation) as assembly set
- Control valve with electric actuator (DN 15 to 200)

<sup>4)</sup> DN 250-350: type BOA-H

5.3.1.4 Pressure/temperature ratings

Table 6: Test and operating pressures

Nominal pressure	Nominal size	Materials	Shell test	Leak test (seat)	Permissible operating pressures <sup>5)</sup>
			With water to DIN EN 12266-1		
PN	DN		P10, P11 [bar]	P12, leakage rate A [bar]	-10 to +120 °C [bar]
16	15-300	EN-GJL-250	24	17,6	16
	350	EN-GJS-400-18-LT			

Valves from DN 250 can only be used for shut-off duties up to the differential pressures indicated below, even when handwheel levers are used!

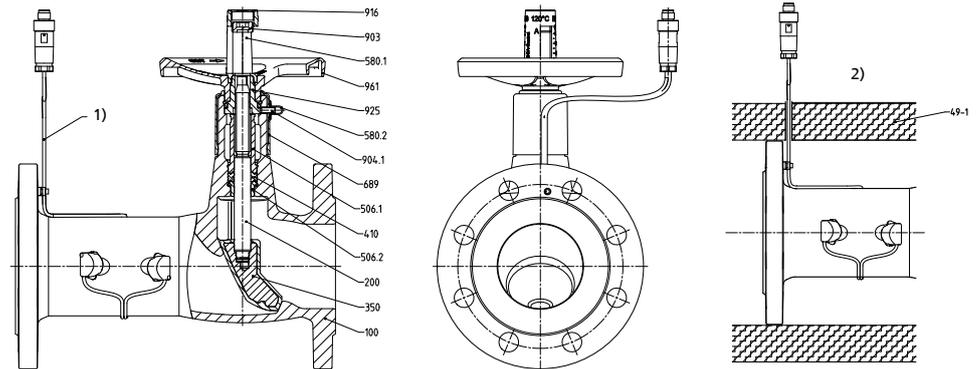
Table 7: Permissible differential pressures

PN	DN	Δp in bar
16	250	9
	300/350	6

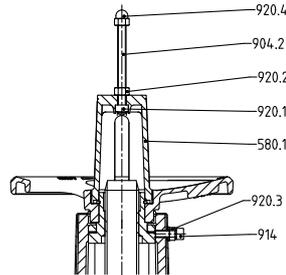
5.3.1.5 Materials

5.3.1.5.1 BOA-Control/BOA-Control IMS, type BOA-CL, DN 15-200

DN 15-150



DN 200



1)	Sensor set	2)	Insulation
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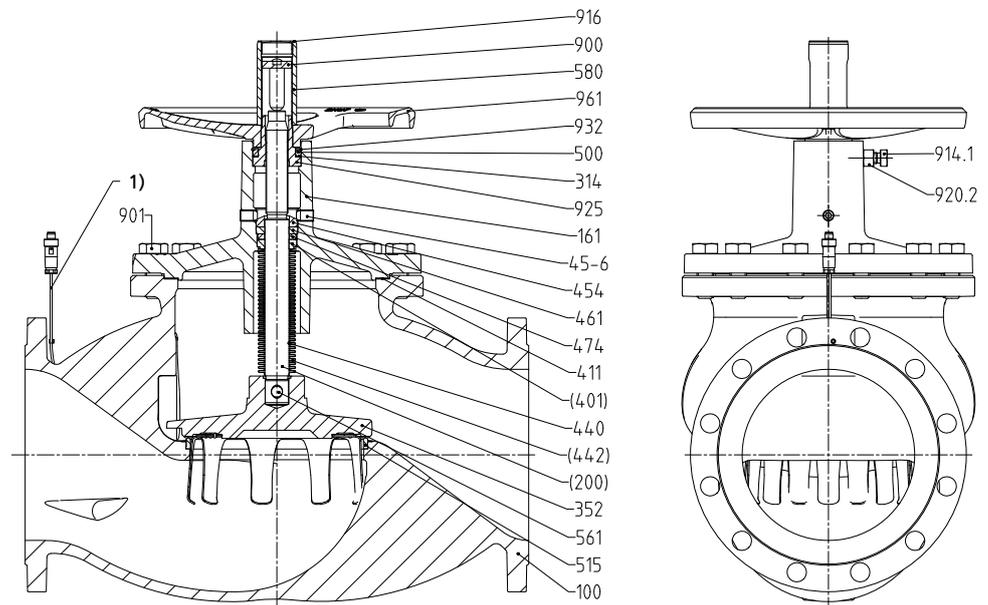
Table 8: Parts list

Part No.	Description	Material	Note
49-1	Insulation shell		Accessory
100	Body	EN-GJL-250 (5.1301)	
200	Stem	Stainless steel, min. 13 % chrome (Cr)	

<sup>5)</sup> Static load

Part No.	Description	Material	Note
350	Valve disc	Cast iron/EPDM	
410	Profile seal	Elastomer EPDM	
506.1	Retaining ring, long	Plastic	
		Galvanised steel	DN 200
506.2	Retaining ring, short	Plastic	
		Galvanised steel	DN 200
580.1	Cap with travel scale	Plastic, glass-fibre reinforced, impact-resistant	
580.2	Protective cap	Plastic	
689	Insulation cap	Plastic	
903	Travel stop	Galvanised steel	
904.1	Locking device	Galvanised steel	
904.2	Travel stop	Galvanised steel	
914	Hexagon socket head cap screw	Galvanised steel	
916	Plug	Plastic	
920.1	Hexagon nut	Galvanised steel	
920.2	Hexagon nut	Galvanised steel	
920.3	Hexagon nut	Galvanised steel	
920.4	Hexagon nut	Galvanised steel	
925	Stem nut	Galvanised steel	
961	Handwheel	Plastic, glass-fibre reinforced, impact-resistant	DN 15-50
		Aluminium, die-cast	DN 65-150
		Grey cast iron	DN 200
	Sensor set	Plastic with ceramics	BOA-Control IMS only

5.3.1.5.2 BOA-Control IMS, type BOA-H, DN 250-350



1)	Sensor set
----	------------

Table 9: Parts list

Part No.	Description	DN	Material	Material number
49-1	Insulation shell			Accessory
100	Body	250-300	EN-GJL-250	5.1301
		350	EN-GJS-400-18-LT	5.3106
161	Body bonnet	250-300	EN-GJL-250	5.1301

Part No.	Description	DN	Material	Material number
		350	EN-GJS-400-18-LT	5.3106
314	Thrust bearing		Stainless steel/PTFE	
352	Throttling plug		C22+N--NP	
411	Joint ring		CrNiSt/graphite	
440	Bellows set consisting of:			
	200	Stem	Stainless steel (min. 13% Cr)	
	401	Weld ring	Stainless steel	
	442	Bellows	X 6 CrNiTi 18 10	1.4541
454	Stuffing box ring		Stainless steel	
45-6	Stuffing box screw		Galvanised steel	
461	Gland packing		Pure graphite	
474	Thrust ring		Stainless steel	
500	Ring		Galvanised steel	
515	Seat ring		Stainless steel	
561	Grooved pin		Steel	
580	Cap		Galvanised steel	
900	Screw		Galvanised steel	
901	Hexagon head bolt		8.8 on EN-GJL-250 variant	
902	Stud		CK 35 V on EN-GJS-400-18-LT variant	
914	Hexagon socket head cap screw		Galvanised steel	
914.1	Hexagon socket head cap screw		Galvanised steel	
916	Plug		Plastic	
920.1	Hexagon nut		C 35 on EN-GJS-400-18-LT variant	
920.2	Hexagon nut		Galvanised steel	
925	Stem nut		Coated steel	
932	Circlip		Spring steel	
961	Handwheel		Grey cast iron	5.1300
	Sensor set		Plastic with ceramics	

### 5.3.1.6 Function

#### BOA-Control IMS

BOA-Control IMS balancing valves are equipped with a set of sensors for measuring flow rate and temperature. The permanently attached set of sensors can be connected to a measuring computer (BOATRONIC MS or BOATRONIC MS-420) which processes the measured values and displays the specific system flow rates; the required operating data are set by appropriate adjustment of the valve plug position (at the handwheel). The balancing valve setting can be secured by the locking device mounted to the body. Prior to the first measurement, the data of the fluid handled must be entered in the measuring computer.

BOA-Control IMS DN 15 to 200 valves have single-piece bodies (100) with flanged ends without separate bonnets. The valves are provided with an elastomer stem seal. The functional unit consists of the valve disc (350), the stem (200) and the handwheel (961). The stem (200) passage is sealed by a profile ring (412). The stem seal is maintenance-free and does not require re-tightening. The set of sensors is permanently glued to the measurement bosses on the valve body.

BOA-Control IMS DN 250 to 350 valves consist of the pressure-retaining parts, i.e. body (100) and bonnet (161), and the functional unit. The functional unit consists of the stem (200), the throttling plug (350), the bellows (442) and the handwheel (961). Body (100) and bonnet (161) are connected by means of hexagon head bolts (901) and hexagon nuts (920) (for EN-GJL-250) or by means of studs (902) (for DN 350 EN-GJS-400-18-LT) and sealed to atmosphere by the joint ring (411). The stem (200) passage is sealed by means of the bellows (442) in accordance with TA-Luft [German Technical Guidelines on Air Quality Control]. The back-up gland packing (461) is tightened by means of two stuffing box screws (45-6) at the stuffing box ring (454).

The seating faces of the body (100) and/or the throttling plug (350) are made of stainless steel materials as standard. The set of sensors is permanently glued to the measurement bosses on the valve body.

#### BOA-Control

BOA-Control balancing valves are equipped with two measurement bosses in preparation for flow rate and temperature measurement. Using a set of sensors and connecting them to the appropriate BOATRONIC MS measuring computer enables

the user to display the specific system flow rates and to set the required operating data by appropriately adjusting the valve plug position (at the handwheel). The balancing valve setting can be secured by the locking device mounted to the body. Prior to the first measurement, the data of the fluid handled must be entered in the measuring computer.

BOA-Control DN 15 to 200 valves have single-piece bodies (100) with flanged ends without separate bonnets. The valves are provided with an elastomer stem seal. The functional unit consists of the valve disc (350), the stem (200) and the handwheel (961). The stem (200) passage is sealed by a profile ring (412). The stem seal is maintenance-free and does not require re-tightening. BOA-Control is equipped with two measurement bosses on the valve body in preparation for measuring.

### 5.4 Scope of supply

- BOA-Control or
- BOA-Control IMS incl. mounted sensors
- Operating manual for each packaging unit



**BOA-Control**



**BOA-Control IMS**

### 5.5 Dimensions and weights

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

## 6 Installation at Site

### 6.1 General information/Safety regulations

Responsibility for positioning and installing the valve lies with the consultant, construction company or operator/user. Planning and installation errors may impair the reliable function of the valve and pose a substantial safety hazard.

	<b>NOTE</b>
	<p>For greater ease of handling, magnets are fitted in the transducers of the sensor equipment. Direct contact with storage media or other electrical devices sensitive to magnetic fields should be avoided.</p>

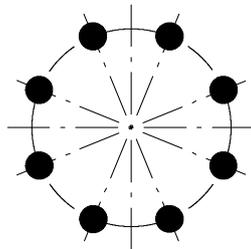
### 6.2 Installation

	<b>CAUTION</b>
	<p><b>Welding in close proximity to soft-seated valves</b> Damage to the seat/disc interface!</p> <ul style="list-style-type: none"> <li>▸ Ensure that the valve is not heated beyond the temperature limits specified in the type series booklet.</li> </ul>

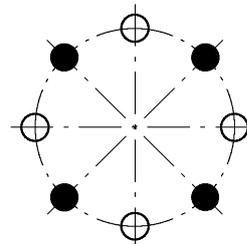
Only use fasteners (e.g. to DIN EN 1515-4) and flange gaskets (e.g. to DIN EN 1514) made of materials approved for the respective valve size. Always use all flange bolt holes provided when connecting the valve to the piping. For details on flange connections refer to the type series booklet and (⇒ Section 8.2.6 Page 28) .

	<b>NOTE</b>
	<p><b>Exception: DN 65 PN 16</b> When using steel flanges to DIN EN 1092-1 in conjunction with cast iron valves with flanges machined to DIN EN 1092-2, ensure that for nominal size DN 65 classed PN 16 the mating flanges are fitted offset by 22.5°.</p>

**Table 10: Valve bolting DN 65 PN 16**



**DN 65 PN 16 (steel/steel):**  
DIN EN 1092-1 with DIN EN 1092-1:  
bolts through 8 holes



**DN 65 PN 16 (steel/cast iron):**  
DIN EN 1092-1 with DIN EN 1092-2: bolt  
hole circle to DIN EN 1092-1 rotated by  
22.5°, bolts through 4 holes, 4 holes  
free

	<b>NOTE</b>
	<p>For the valves to reach the documented Kv values, the flow direction must correspond to the flow direction arrow.</p>

	<b>NOTE</b>
	<p>Any flange caps on the line connection ports must be removed prior to installation.</p>

### 6.3 BOA-Control/BOA-Control IMS

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

	<b>CAUTION</b>
	<p><b>Welding work in the area of the pipe flanges</b> Thermal damage to valve disc and sensors!</p> <p>▷ Remove the valve before carrying out welding work.</p>
	<b>CAUTION</b>
	<p><b>Flow in opposite direction of flow direction arrow</b> Measuring impossible!</p> <p>▷ To enable measurement, the flow direction through BOA-Control/BOA-Control IMS valves must correspond to the direction indicated by the flow direction arrow.</p>

For the shut-off function, an alternating direction of flow is permissible for BOA-Control/BOA-Control IMS valves up to DN 200.

Valves from DN 250 can only be used for shut-off duties up to the differential pressures indicated below, even when handwheel levers are used!

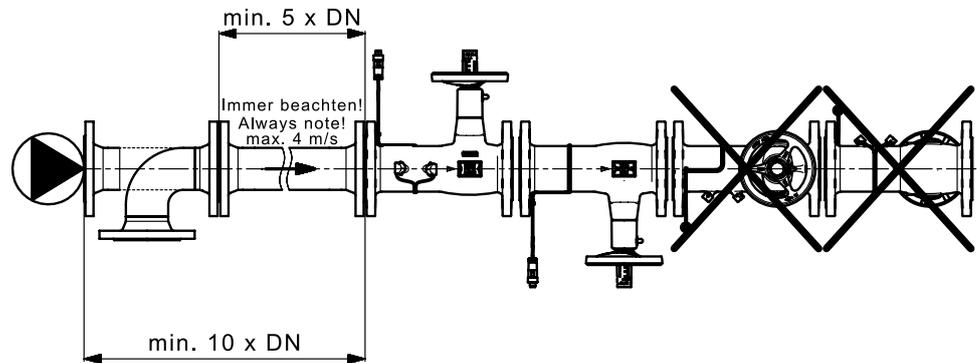
**Table 11:** Permissible differential pressures

PN	DN	$\Delta p$ in bar
16	250	9
	300/350	6

#### Installation position and upstream/downstream stabilisation distances

Im Sensorbereich sind  
Schweißarbeiten an der Rohrleitung nicht zulässig.

Benötigte Mindesteinlaufstrecke 5 x DN.  
Nähere Informationen siehe Baureihenheft BOA-Control IMS.



Minimum upstream stabilisation distance have to be 5 x DN.  
For more details see Type series booklet BOA-Control IMS.

Welding procedures near by sensors are not allowed.

1)	Sensor in front, handwheel on top.	2)	Sensor in back, handwheel below.	3)	Sensor below, handwheel in front. <b>Arrangement is not allowed.</b>	4)	Sensor on top, handwheel in back. <b>Arrangement is not allowed.</b>
----	------------------------------------	----	----------------------------------	----	-------------------------------------------------------------------------	----	-------------------------------------------------------------------------

Vertical installation: For installation in vertical piping, no restrictions apply with regard to the installation position of the valves.

Horizontal installation: Installation with the valve stem in horizontal position is not allowed, to prevent air bubbles or deposits in the measuring plane.

Valves of DN 250-350 should not be installed with the stem pointing downwards to prevent dirt deposits between the folds of the bellows which might cause valve failure.

For optimum measuring accuracy, the following straight, minimum upstream stabilisation distances free from any sources of potential interference must be provided, irrespective of the installation position:

- At least 5 x DN between BOA-Control/BOA-Control IMS and single sources of interference such as single 90° bends or open shut-off valves
- At least 10 x DN between BOA-Control/BOA-Control IMS and turbulence-producing elements such as pumps or control valves

Installation in return line is recommended.

Any sources of potential interference in the upstream stabilisation area (such as, for example, immersion sensors or non-standardised sealing elements) must be avoided.

Any sources of interference must be assessed in accordance with EN ISO 5167-1, section 7.3 (previously DIN 1952, section 6).

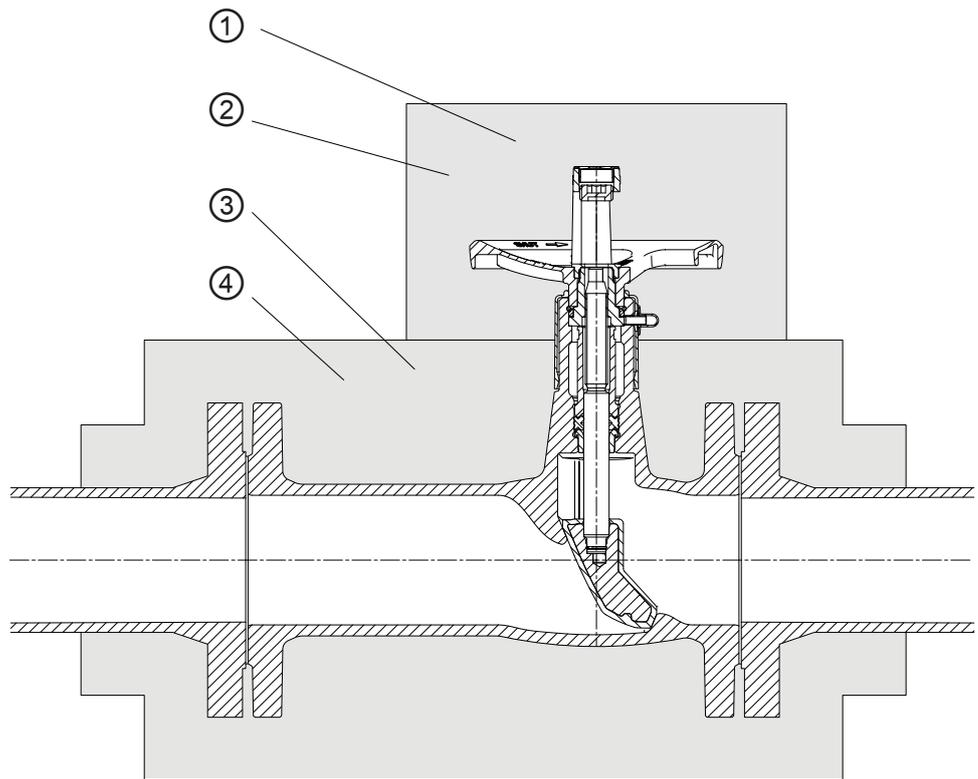
A downstream stabilisation distance is not required!

	<b>NOTE</b>
	<p>The length of the cables connecting the sensors to BOATRONIC must <b>not</b> be changed.</p>

#### 6.4 Insulation

For handling hot fluids, the valve should be insulated in accordance with the German energy-saving regulations.

	<b>CAUTION</b>
	<p><b>Condensation water forming in air-conditioning, cooling and refrigerating systems</b>          Ice forming!          Actuating element blockage!          Damage due to corrosion!</p> <p>▷ Insulate the valve to prevent diffusion.</p>



**Fig. 3: Proper diffusion-tight insulation (schematic)**

①	Proper diffusion-tight insulation of the complete valve including handwheel	②	Removable cap
③	Proper diffusion-tight insulation of the valve	④	Insulation material

### 6.5 Measuring computer

	<b>CAUTION</b>
	<p><b>Incorrect operation of the measuring computer</b> Incorrect readings and setting of valve!</p> <ul style="list-style-type: none"> <li>▸ Read and observe the operating manuals of the measuring computers before using the measuring computers.</li> </ul>

Setting and operation of BOA-Control/BOA-Control IMS balancing valves require the use of measuring computers, as otherwise the valve cannot perform all of its functions. Without a measuring computer, the scaled travel indicator only allows a preliminary setting on the basis of the characteristic curves.

BOA-Control IMS can be set and adjusted by means of the BOATRONIC MS or BOATRONIC MS-420 measuring computers. The length of the connection cable to the sensor must not be changed in this case.

BOA-Control can only be set and adjusted by means of the BOATRONIC MS measuring computer. The length of the connection cable to the sensor must not be changed in this case.

The valves of the BOA-Control/BOA-Control IMS series can be used as shut-off valves. They will then perform the functions of shutting and sealing off like any standard shut-off valve. No particular measures with regard to sensors or measuring taps need to be taken for this purpose.

## 7 Commissioning/Start-up/Shutdown

### 7.1 Commissioning/start-up

#### 7.1.1 Prerequisites for commissioning/start-up

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

- The material, pressure and temperature data shown on the valve is in compliance with the operating conditions of the piping. (⇒ Section 5 Page 14)
- The material's chemical resistance and stability under load have been checked.

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

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

	<b>⚠ DANGER</b>
	<p><b>Surge pressure/water hammer potentially occurring at high temperatures</b> Danger to life caused by burns and scalds!</p> <ul style="list-style-type: none"> <li>▷ The max. permissible valve pressure must not be exceeded (⇒ Section 5 Page 14) .</li> <li>▷ Use valves made of nodular cast iron or steel.</li> <li>▷ Operator shall provide general safety measures for the system.</li> </ul>

#### Functional testing prior to commissioning/start-up

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

#### 7.1.2 Valve actuation

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

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

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

	<b>CAUTION</b>
	<p><b>Use of levers</b> Damage to the valve as a result of excessive forces!</p> <ul style="list-style-type: none"> <li>▷ Only actuate handwheel-operated valves by hand.</li> <li>▷ Levers may only be used in exceptional cases and in compliance with the following tables.</li> <li>▷ Do not use levers in the area of the position indicator.</li> </ul>

**Permissible torque limits for levers**

As the valve can be damaged by applying excessive force, it is not allowed to use levers to move the handwheels of nominal valve sizes up to and including DN 125. On all nominal sizes greater than DN 125, suitable levers may be used up to the following torque limits:

**Table 12: BOA-Control/BOA-Control IMS**

DN	150	200	250	300	350
M <sub>t</sub> [Nm]	120	140	200	200	200
Hex. head WAF	36	65	46	46	46

Torque wrenches with hexagon socket shall preferably be used, which are placed over the hexagon stem nut (925) after the handwheel has been removed.

**7.2 Shutdown**

**7.2.1 Measures to be taken for shutdown**

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.

## 8 Servicing/Maintenance

### 8.1 Safety regulations

	<p><b>⚠ WARNING</b></p>
	<p><b>Fluids, consumables and supplies which are hot and/or pose a health hazard</b> Risk of injury!</p> <ul style="list-style-type: none"> <li>▷ Observe all relevant laws.</li> <li>▷ When draining the fluid take appropriate measures to protect persons and the environment.</li> <li>▷ Decontaminate valves used for handling fluids posing a health hazard.</li> </ul>

	<p><b>⚠ WARNING</b></p>
	<p><b>Valve under pressure</b> High-pressure hazard! Leakage of hot and/or toxic fluids! Risk of burns!</p> <ul style="list-style-type: none"> <li>▷ Never open the valve while it is pressurised.</li> <li>▷ Ensure the valve is depressurised before undoing the flange bolting.</li> <li>▷ Ensure the valve is depressurised before undoing the bonnet/cover bolting (901).</li> <li>▷ If the bellows are defective or fluid escapes, ensure the valve is depressurised.</li> <li>▷ Ensure the valve is depressurised before removing any drain, opening or vent plugs.</li> <li>▷ Ensure the valve is depressurised before removing it from the pipeline or before maintenance work.</li> <li>▷ Allow the valve to cool down so that the temperature is below the fluid's vaporisation temperature in all areas in contact with the fluid in order to effectively prevent any risk of scalding.</li> </ul>

Before removing the valve from the piping, ensure that the pipe has been taken out of service 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.

	<p><b>NOTE</b></p>
	<p>All maintenance, service and installation work can be carried out by KSB Service or authorised workshops. For contact details please refer to the enclosed "Addresses" booklet or visit "<a href="http://www.ksb.com/contact">www.ksb.com/contact</a>" on the Internet.</p>

Never use force when dismantling and reassembling the valve.

### 8.2 Maintenance

This valve has been designed to be largely maintenance-free. The materials of the sliding parts have been selected for minimum wear.

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

	<p><b>NOTE</b></p>
	<p>The user is responsible for defining appropriate intervals for checks and maintenance, depending on the application of the valve.</p>

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
- Lubricating the moving parts such as stem (200) and stem nut (925) using standardised lubricants to DIN 51825
- Re-tightening or replacing the bonnet/cover gasket (411) in a timely manner

**8.2.1 (Re-)tightening the bonnet/cover bolting**

Replacing bonnets or bonnet gaskets is possible and permitted on BOA-Control IMS nominal valve sizes 250 to 350.

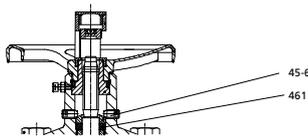
After maintenance or repair work has been completed, all bolting in the bonnet/cover area must be re-tightened so as to restore full functionality of the valve.

	<b>⚠ WARNING</b>
	<p><b>Failure to test overhauled valves</b> Hazard to persons and the environment!</p> <ul style="list-style-type: none"> <li>▸ After reassembly and prior to commissioning/start-up, the valves must be subjected to shell and leak testing to DIN EN 12266-1.</li> </ul>
	<b>NOTE</b>
	<p>Do not apply additional sealing agents to asbestos-free gaskets. In the case of valves with anti-adhesive coatings, only use agents explicitly recommended by the sealing element manufacturer.</p>

**8.2.2 (Re-)tightening the back-up gland packing**

BOA-Control IMS valves of nominal sizes 250 to 350 are delivered with the back-up gland packing not tightened to its full sealing performance.

	<b>⚠ DANGER</b>
	<p><b>Bellows failure</b> Leakage of hot and/or toxic fluids! Risk of burns!</p> <ul style="list-style-type: none"> <li>▸ Tighten the stuffing box screws (45-6) until no leakage can be seen.</li> </ul>



**Fig. 4:** Sectional drawing of BOA-Control IMS DN 250-350

**Table 13:** Stuffing box screws to DIN 913

DN	Thread	Hexagon socket
250-350	M 16	WAF 8

The valve should be replaced as quickly as possible to ensure proper functioning!

**8.2.3 Dismantling electric, pneumatic and hydraulic actuators**

	<b>⚠ DANGER</b>
	<p><b>Removing/dismantling the actuators</b> Risk of injury!</p> <ul style="list-style-type: none"> <li>▸ Observe the actuator's operating manual.</li> </ul>

**8.2.4 Valve reassembly**

Valve reassembly must be effected in reverse order to dismantling.



**NOTE**

To maintain functional reliability, new sealing elements must be used when the valve is reassembled.

**8.2.5 Tightening torques**

**8.2.5.1 Tightening torques for bonnet/cover bolting**

Use a torque wrench to tighten the bolted connections (902/920 or 901) between the bonnet/cover and the body.

**Table 14:** Bolt tightening torques for BOA-Control IMS [Nm]

Nominal pressure PN	Material number	Nominal size		
		250	300	350
16	5.1301 <sup>6)</sup>	260	260	-
16	5.3103 <sup>7)</sup>	290	290	290

**8.2.6 Bolt lengths for flange connections**

Connecting elements are needed to install a valve in a pipeline. These are bolts and nuts.

The bolts and nuts must be selected in accordance with DIN EN 1515-4 "Flanges and their joints, Part 4, Selection of bolting". In order to ensure the correct installation of the valve, the bolts and nuts must be made of the materials defined by this standard as a function of pressure and temperature for use within the scope of the Pressure Equipment Directive 97/23/EC.

The bolt lengths are specified without considering tolerances; they refer to the installation of a valve in a pipe with a standardised steel mating flange to DIN EN 1092-1.

The number of bolts, their thread size and length are specified for the respective valve series and nominal pressures. This data can also be obtained via KSB's flange selector (reference No. 0570.3).

**Table 15:** Bolt sizes and lengths to DIN EN 1092-2 PN 16

DN	BOA-Control/BOA-Control IMS
15	4x M12 x 45
20	4x M12 x 50
25	4x M12 x 50
32	4x M16 x 55
40	4x M16 x 55
50	4x M16 x 55
65	4x M16 x 55
80	8x M16 x 60
100	8x M16 x 65
125	8x M16 x 65
150	8x M20 x 70
200	12x M20 x 75
250	12x M24 x 85
300	12x M24 x 85
350	16x M24 x 95

<sup>6)</sup> EN-GJL-250 (JL1040)

<sup>7)</sup> EN-GJS-400-18-LT (JS1025)

## 9 Trouble-shooting

	<b>⚠ WARNING</b>
	<p><b>Improper remedial work on the valve</b> Risk of injury!</p> <p>▸ For any work performed in order to remedy faults on the valve observe the relevant information given in this operating manual or the product literature provided by the accessories manufacturers.</p>

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

**Table 16:** Trouble-shooting

Problem	Possible cause	Remedy
Leakage at the seat/disc interface of BOA-Control/BOA-Control IMS DN 15 to 200		Rework not possible. Replace valve.
Leakage at the seat/disc interface of BOA-Control/BOA-Control IMS DN 250 to 350		<ol style="list-style-type: none"> <li>1. Dismantle the bonnet/cover bolting (902/920/901).</li> <li>2. Rework the seating faces of valve disc and body using a suitable re-seating tool.</li> <li>3. Continue re-seating until the seating faces exhibit a consistently smooth and even ring.</li> </ol>
Leakage at the bonnet gasket of BOA-Control/BOA-Control IMS DN 250 to 350	Unevenly tightened bonnet/cover bolts	<ol style="list-style-type: none"> <li>1. Undo the bonnet/cover bolting (902/920 or 901).</li> <li>2. Replace the joint ring (411).</li> <li>3. Re-tighten the bonnet/cover bolting (902/920 or 901) as specified in the manual.</li> </ol>
	Defective bonnet/cover gasket	<ol style="list-style-type: none"> <li>1. Dismantle the bonnet/cover bolting (902/920/901).</li> <li>2. Clean sealing surfaces.</li> <li>3. Replace the joint ring (411).</li> </ol>
Leakage at the stem seal of BOA-Control/BOA-Control IMS DN 15 to 200		Rework not possible. Replace valve.
Leakage at the stem seal of BOA-Control/BOA-Control IMS DN 250 to 350		<ol style="list-style-type: none"> <li>1. Tighten the stuffing box screws (45-6) firmly to prevent leakage.</li> <li>2. Replace the complete upper valve section immediately.</li> </ol>

## 10 EC Declaration of Conformity

### 10.1 EC Declaration of Conformity BOA-Control/BOA-Control IMS

Herewith we,

**KSB Aktiengesellschaft**  
**Johann-Klein-Straße 9**  
**67227 Frankenthal (Germany)**

declare that **the product:**

<b>BOA-Control</b>	PN 16	DN 15-200
<b>BOA-Control IMS</b>	PN 16	DN 15-350

satisfies the safety requirements laid down in the Pressure Equipment Directive 97/23/EC (PED).

**Applied harmonised European standards:**

EN 19, EN 12516-3, EN 12266-1, EN 13789, EN 1092-2

**Other standards/codes:**

DIN 3840

**Suitable for:**

Fluids in Group 2

**Conformity assessment procedure:**

Module H

**Name and address of the notified body responsible for approval and surveillance:**

TÜV SÜD Industrie Service GmbH  
Dudenstraße 28  
68167 Mannheim (Germany)

**Notified body identification No.:**

0036

Valves  $\leq$  DN 50 (PN 16),  $\leq$  DN 100 (PN 10) and  $\leq$  DN 150 (PN 6) fall under Article 3, Section 3, of the Pressure Equipment Directive 97/23/EC. They must bear neither the CE marking nor the identification number of a notified body.

Wolfgang Glaub  
Vice President Integrated Management KSB AG

Dieter Hanewald  
Head of Development, Low-pressure Valves

This document has been prepared electronically and is valid without signature.



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