

Control Valve

BOA-CVE C/CS/W/IMS/EKB/ IMS EKB

Operating Manual



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Operating Manual BOA-CVE C/CS/W/IMS/EKB/IMS EKB

Original operating manual

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Contents

	Glossary	5
1	General.....	6
1.1	Principles	6
1.2	Installation of partly completed machinery.....	6
1.3	Target group.....	6
1.4	Other applicable documents.....	6
1.5	Symbols	6
2	Safety	7
2.1	Key to safety symbols/markings.....	7
2.2	General.....	7
2.3	Intended use	8
2.3.1	Prevention of foreseeable misuse.....	8
2.4	Personnel qualification and training.....	8
2.5	Consequences and risks caused by non-compliance with this manual	8
2.6	Safety awareness	9
2.7	Safety information for the operator/user	9
2.8	Safety information for maintenance, inspection and installation	9
2.9	Unauthorised modes of operation	10
3	Transport/Temporary Storage/Disposal.....	11
3.1	Checking the condition upon delivery	11
3.2	Transport.....	11
3.3	Storage/preservation	12
3.4	Return to supplier.....	13
3.5	Disposal	13
4	Valve Description	14
4.1	General description	14
4.2	Marking.....	14
4.3	Name plate.....	14
4.4	Design details.....	15
4.5	Function	16
4.6	Scope of supply.....	16
4.7	Noise characteristic.....	16
5	Installation at Site	17
5.1	General information/Safety regulations	17
5.2	Installation position.....	17
5.3	Preparing the valve	18
5.4	Piping	19
5.4.1	Flange connection.....	19
5.4.2	Bolt lengths for flange connections	19
5.5	Insulation	21
6	Commissioning/Start-up/Shutdown.....	22
6.1	Commissioning/start-up	22
6.1.1	Prerequisites for commissioning/start-up	22
6.1.2	Actuation.....	22
6.2	Operating limits.....	23
6.2.1	Ambient temperature.....	23
6.2.2	Pressure/temperature ratings.....	23
6.3	Shutdown.....	23
6.3.1	Measures to be taken for shutdown	23
6.4	Returning to service	23

7	Servicing/Maintenance	24
7.1	Safety regulations.....	24
7.2	Maintenance/inspection.....	24
7.2.1	Supervision of operation	25
7.2.2	Inspection work.....	25
7.2.3	Valves with actuator	25
8	Trouble-shooting.....	26
9	Related Documents	27
9.1	General assembly drawing with list of components	27
9.2	Dimensions and weights	29
9.2.1	Dimensions and weights of BOA-CVE CS.....	30
9.2.2	Dimensions and weights of BOA-CVE C/EKB.....	32
9.2.3	Dimensions and weights of BOA-CVE W/IMS/IMS EKB	33
10	EU Declaration of Conformity	34
10.1	EU Declaration of Conformity for BOA-CVE C/CS/W/IMS/EKB/IMS EKB.....	34
	Index	35

Glossary

EPDM

Ethylene-propylene-diene rubber

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.

The name plate indicates the type series and size, the main operating data, the order number and the order item number. The order number and order item number uniquely identify the valve and serve as identification for all further business processes.

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

1.2 Installation of partly completed machinery

To install partly completed machinery supplied by KSB refer to the sub-sections under Installation at Site. (⇒ Section 5, Page 17)

1.3 Target group

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

1.4 Other applicable documents


Table 1: Overview of other applicable documents

Document	Contents
Type series booklet	Valve description
Operating manual 0570.8	Description of the proper and safe use of straight-way valve types BOA-Compact, BOA-SuperCompact, BOA-Compact EKB and BOA-W
Operating manual 0570.88	Description of the proper and safe use of straight-way valve type BOA-Control IMS
Flow characteristics ¹⁾	Information on Kv values and zeta values
Sub-supplier product literature ²⁾	Operating manuals and other product literature for the accessories

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

1.5 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.










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 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.
 CAUTION	CAUTION This signal word indicates a hazard which, if not avoided, could result in damage to the machine and its functions.
	Explosion protection This symbol identifies information about avoiding explosions in potentially explosive atmospheres in accordance with EU Directive 2014/34/EU (ATEX).
	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.
	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.
	Machine damage In conjunction with the signal word CAUTION this symbol indicates a hazard for the machine and its functions.

2.2 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:
 - Flow direction arrow
 - Name plate
 - 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 European Pressure Equipment Directive.

- 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 ensuring compliance with all local regulations not taken into account.
- The operator is responsible for any eventualities or incidents which may occur during installation performed by the customer, operation and maintenance.

2.3 Intended use

- Only operate valves and actuators which are in perfect technical condition.
- Do not operate partially assembled valves or actuators.
- 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.
- Only operate the actuator within the permissible ambient temperature limits.
- Consult the manufacturer about any other modes of operation not described in the product literature.
- Do not use the valve or actuator as a foothold.

2.3.1 Prevention of foreseeable misuse

- Never exceed the permissible application and operating limits specified in the product literature regarding pressure, temperature, etc.
- Observe all safety information and instructions in this 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 and the actuator must always be supervised by specialist technical personnel.

2.5 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

2.6 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

2.7 Safety information for the operator/user

Actuator-operated 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.

- 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.)

2.8 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/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.
- Only carry out work on the valve during standstill of the entire system.
- 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 6.3.1, Page 23)
- The actuator must be disconnected from the external source of energy.
- 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.

2.9 Unauthorised modes of operation

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




The warranty relating to the operating reliability and safety of the control valve supplied is only valid if the control valve is used in accordance with its intended use .

3 Transport/Temporary 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

	<div style="background-color: #e67e22; color: white; padding: 5px;">! DANGER</div> <p>The valve/actuator unit could slip out of the suspension arrangement. Danger to life from falling parts!</p> <ul style="list-style-type: none"> ▷ Only transport the valve/actuator unit in the specified position. ▷ Never attach lifting accessories to the actuator. ▷ Observe the information on weights, centre of gravity and fastening points. ▷ Observe the applicable local accident prevention regulations. ▷ Use suitable, permitted lifting accessories, e.g. self-tightening lifting tongs.
	<div style="background-color: #f1c40f; padding: 5px;">CAUTION</div> <p>Improper transport of models with electrostatic plastic coating Damage to the electrostatic plastic coating</p> <ul style="list-style-type: none"> ▷ Do not remove the flange caps for transport. ▷ Avoid contact with sharp objects and edges.
	<div style="background-color: #f1c40f; padding: 5px;">CAUTION</div> <p>Damage to the sensors Measuring impossible</p> <ul style="list-style-type: none"> ▷ Do not use lifting accessories in the area of the sensors, the cables and the sensor bosses.

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

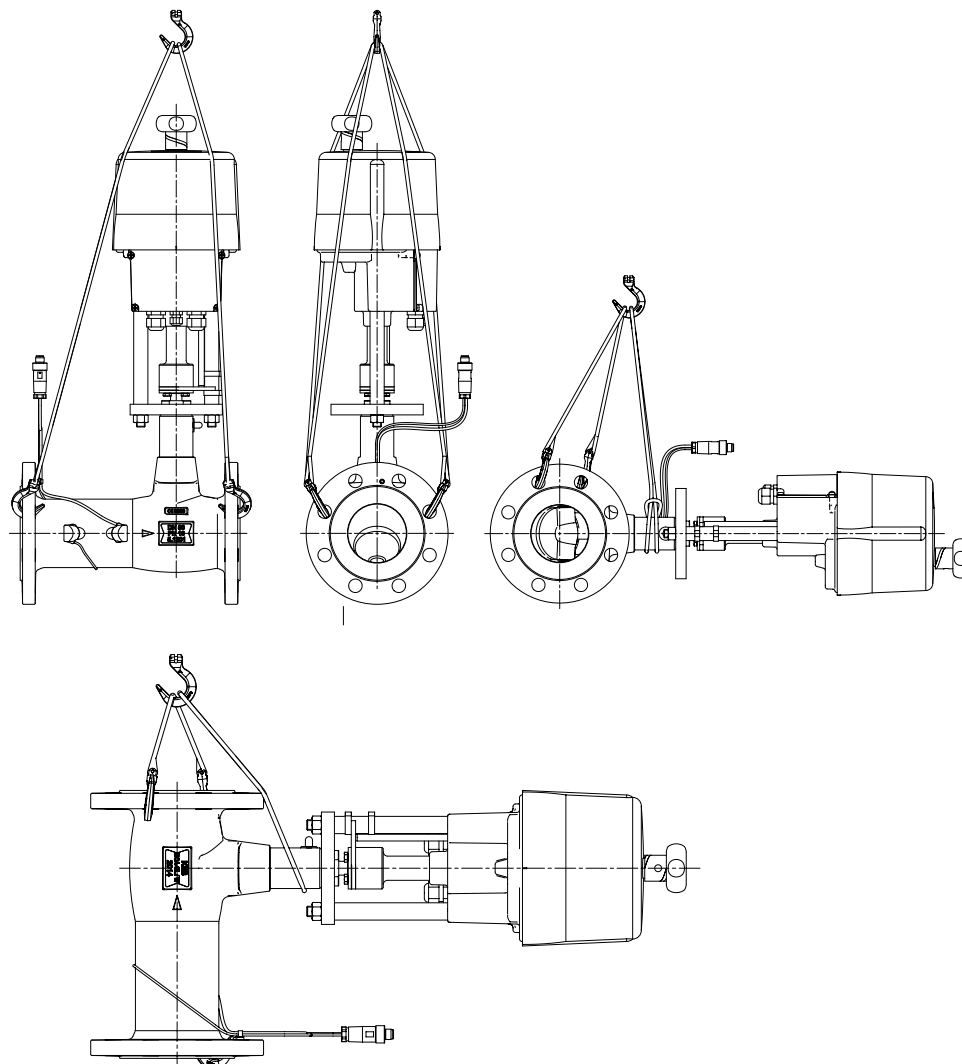




Fig. 1: Transporting the control valve

3.3 Storage/preservation

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

	<p>CAUTION</p> <p>Damage due to frost, humidity or dirt Corrosion/contamination of the valve!</p> <ul style="list-style-type: none"> ▷ Store the valve in a dry, dust-free and vibration-free, frost-proof room where the atmospheric humidity is as constant as possible. ▷ Protect the valve against contamination, e.g. with suitable caps or film.
	<p>CAUTION</p> <p>Damage due to excessive valve closing force Damage to the seat/disc interface!</p> <ul style="list-style-type: none"> ▷ Store the valve in the closed position. ▷ For soft-seated valves, ensure that the valve is closed using little force only. This will prevent premature cold flow (compression set) of the thermoplastic material.

Storage and/or temporary storage of the valves must ensure that even after a prolonged period of storage the valves' function is not impaired.

Protect EPDM-encapsulated valve discs from sunlight or UV light from other sources. Observe the DIN 7716 standard for the storage of elastomers.

Protect control valves from contact with solvents, lubricants, fuels or other chemicals.

The temperature in the storage room must not exceed +40 °C.

Cover the actuators to protect them from dust and dirt, and protect them from mechanical damage.

If properly stored indoors, the equipment is protected for a maximum of 12 months. New valves are supplied by our factory duly prepared for storage.



For storing valves which have already been operated, observe the measures to be taken for shutdown. (⇒ Section 6.3, Page 23)

3.4 Return to supplier

1. Drain the valve as described in the manual.
2. Flush and clean the valve, particularly if it has been used for handling noxious, explosive, hot or other hazardous fluids.
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.

	NOTE
If required, a blank certificate of decontamination can be downloaded from the following web site: www.ksb.com/certificate_of_decontamination	

3.5 Disposal

	 WARNING
Fluids handled, consumables and supplies which are hot or pose a health hazard	
Hazard to persons and the environment!	
<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 legal regulations on the disposal of 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 local regulations or in another controlled manner.

4 Valve Description


4.1 General description

- Control valve with electric actuator

Valve for controlling and shutting off fluids in hot-water heating systems up to 120 °C, ventilation systems, air-conditioning systems, water supply systems and drinking water supply. Not suitable for fluids containing mineral oils, steam or fluids liable to attack EPDM and uncoated cast iron.

4.2 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
CE marking	
Identification number of the notified body	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 current European Pressure Equipment Directive (PED) 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: Fluids in Group 2

4.3 Name plate

The main control valve data is given on the name plate fitted on the actuator housing.

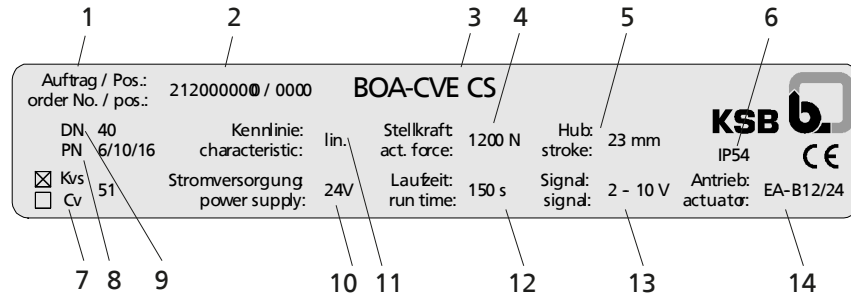


Fig. 3: Name plate example for BOA-CVE CS

1	Order number	2	Order item number
3	Product name	4	Actuating force [N]
5	Actuator stroke	6	Enclosure
7	Kvs value	8	Nominal pressure class
9	Nominal size (DN)	10	Power supply
11	Characteristic curve	12	Runtime
13	Actuating signal	14	Actuator size

4.4 Design details

Design

Control valve:

- Straight-way valves PN 6 to 16 for flange connections to DIN EN 1092-2 in short or DN face-to-face length
- BOA-CVE IMS and BOA-CVE IMS EKB with sensors for measuring flow rate and temperature
- Kvs values: 3 to 700 m³/h
- Rangeability 100:1
- EPDM-encapsulated control valve plug
- Maintenance-free stem seal with EPDM profile ring
- Marked in accordance with DIN EN 19 (ISO 5209)
- The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 2014/68/EU (PED) for fluids in Group 2.

Actuators (technical data refers to basic configuration):

- Configurable, microprocessor-controlled actuators
Power supply: 24 V AC/DC
Position setpoint: 2 - 10 V DC
Actual-position feedback value: 2 - 10 V DC
Control valve characteristic: linear
Leakage rate 0.05 % of Kvs
Limit switching force-dependent in closing direction and stroke-dependent in opening direction
- 3-point actuators
Power supply: 230 V AC
Actual-position feedback: 2 limit switches
Leakage rate A to DIN EN 12266-1, drop-tight
Stopping via limit switches in closing direction and opening direction
- Actuating time and actuating speed can be freely selected as a function of actuator type and K_v value.
- Operating data stored in permanent memory
- After a power failure, operation is resumed in accordance with the operating data.

Variants

- Actuator configured to match the order specification
- Integrated process controller
- Power back-up unit
- Heating of the motor space
- Other supply voltages on request

4.5 Function

Design The control valve consists of a single-piece bonnetless pressure-retaining body 100, the functional unit (stem 200 and valve disc 350) and the actuating element (actuator). Stem 200 runs in special plastic bearings. This ensures that the movement of stem 200 cannot be impaired by corrosion products. A seal ring at the valve/ actuator interface prevents any ingress of dirt.

Function It is operated by an electric actuating element (actuator).

Sealing The stem seal is maintenance-free and does not require re-tightening.

4.6 Scope of supply

The following items are included in the scope of supply:

- Control valve
- Valve operating manual
- Actuator operating manual



4.7 Noise characteristic

When operated within the operating conditions documented in the order confirmation and/or characteristic curves booklets, the valve will not exceed a sound pressure level of 80 dB in acc. with IEC 60534-8-4. Unfavourable piping layouts or off-design operating conditions may give rise to physical phenomena like cavitation, resulting in significantly higher sound pressure levels.



5 Installation at Site

5.1 General information/Safety regulations

The consultant, construction company or operator are responsible for positioning and installing the valves. Planning errors and installation errors may impair the reliable function of the valves and pose a substantial safety hazard.

	<div data-bbox="507 414 702 459">WARNING</div> <div data-bbox="496 477 1024 506">Damage to pressure enclosure or add-on parts</div> <div data-bbox="496 512 917 542">Leakage from or rupture of the valve</div> <div data-bbox="496 548 877 577">Valve/add-on parts not functional</div> <div data-bbox="518 589 1197 696"> <ul style="list-style-type: none"> ▸ Check the valve for in-transit damage prior to installation. ▸ Check any add-on parts for in-transit damage. ▸ Do not install damaged valves. </div>
	<div data-bbox="507 741 638 772">CAUTION</div> <div data-bbox="496 799 1043 828">Welding in close proximity to soft-seated valves</div> <div data-bbox="496 835 884 864">Damage to the seat/disc interface!</div> <div data-bbox="518 875 1399 934"> <ul style="list-style-type: none"> ▸ Ensure that the valve is not heated beyond the specified temperature limits. (⇒ Section 6.2, Page 23) </div>

5.2 Installation position

	<div data-bbox="507 1048 702 1093">WARNING</div> <div data-bbox="496 1111 1177 1140">Installation of the valve with the stem pointing downwards</div> <div data-bbox="496 1146 740 1176">Damage to the valve!</div> <div data-bbox="518 1187 1251 1254"> <ul style="list-style-type: none"> ▸ Install the valve with the stem pointing upwards or to the side. ▸ Observe the permissible installation position. </div>
	<div data-bbox="507 1299 638 1330">CAUTION</div> <div data-bbox="496 1357 809 1386">Wrong installation position</div> <div data-bbox="496 1393 777 1422">Valve function impaired!</div> <div data-bbox="518 1433 1410 1491"> <ul style="list-style-type: none"> ▸ Always observe the valve's operating manual and the permissible installation position. </div>

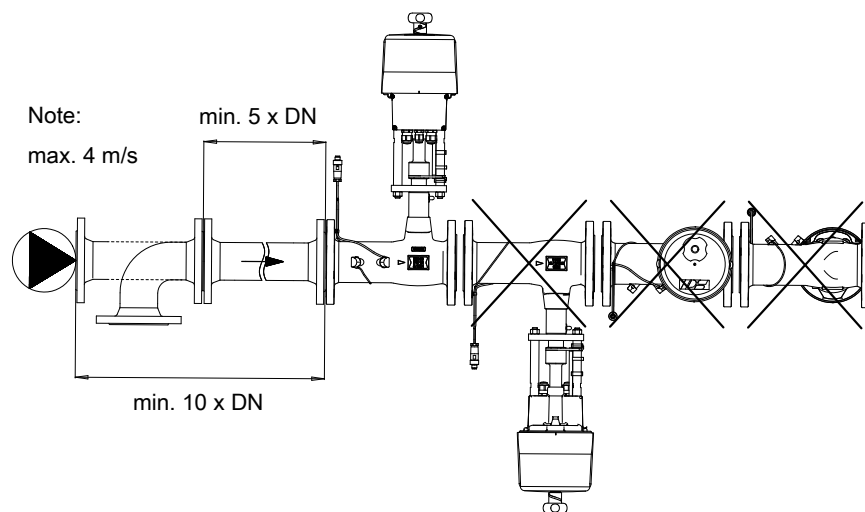


Fig. 4: Installation position of BOA-CVE IMS and BOA-CVE IMS EKB

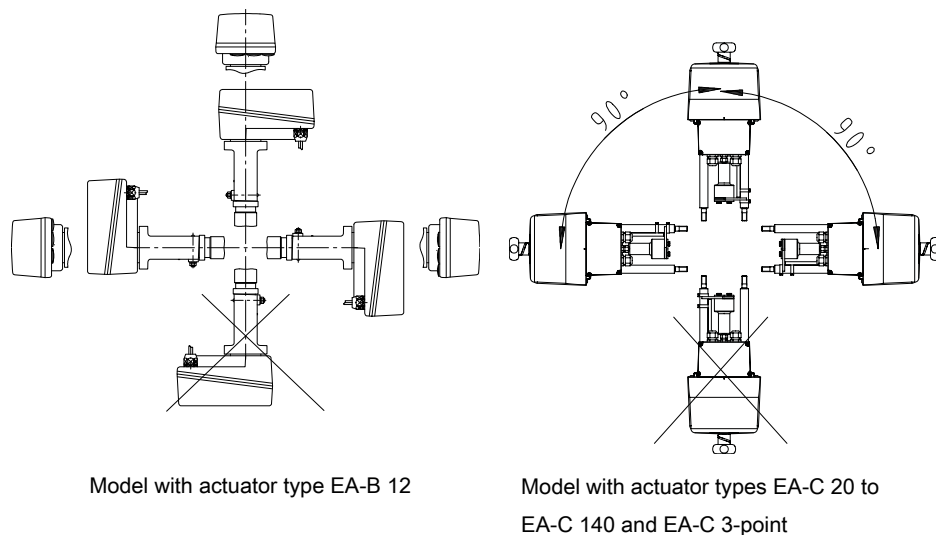





Fig. 5: Installation position depending on actuator type
Install the actuator with sufficient clearance for removal.

5.3 Preparing the valve

	CAUTION
	<p>Outdoor installation Damage due to corrosion!</p> <p>► Provide weather-proof protection to protect the valve against moisture.</p>


1. Thoroughly clean, flush and blow through all vessels, piping and connections.
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.

5.4 Piping

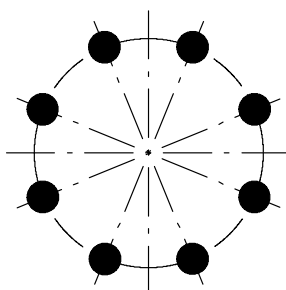
	<div style="background-color: #f4a460; padding: 5px;">⚠ WARNING</div> <p>Impermissible piping forces Leakage from or rupture of the valve body!</p> <ul style="list-style-type: none"> ▷ Connect the pipes to the valve without transmitting any stresses or strains. ▷ Take constructional measures to prevent any piping forces from being transmitted to the valve.
	<div style="background-color: #f4d03f; padding: 5px;">CAUTION</div> <p>Painting pipes and actuator Valve function impaired!</p> <ul style="list-style-type: none"> ▷ Protect stem, plastic components and actuator elements prior to applying paint.

5.4.1 Flange connection

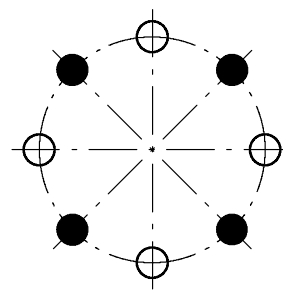
Fasteners Only use fasteners (e.g. to DIN EN 1515-4) and flange gaskets (e.g. to DIN EN 1514) made of materials approved for the respective nominal valve size. Always use all flange bolt holes provided when connecting the valve to the pipe.

	<div style="background-color: #2980b9; color: white; padding: 5px;">NOTE</div> <p>Exception: DN 65 PN 16 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>
--	---

Flange connection



DN 65 PN 10/16 (steel/steel):
DIN EN 1092-1 with DIN EN 1092-1:
Bolts through 8 holes



DN 65 PN 10/16 (steel/cast iron):
DIN EN 1092-1 with DIN EN 1092-2:
Bolt hole circle to DIN EN 1092-1 turned through 22.5°, bolts through 4 holes, 4 holes free

Fig. 6: Flange connections

- ✓ The mating flange faces are clean and undamaged.
- 1. Use an appropriate tool to evenly tighten the fasteners crosswise.

5.4.2 Bolt lengths for flange connections

Connecting elements are needed to install a valve in a pipeline. These are bolts and nuts. For BOA-SuperCompact fully threaded studs with nuts can also be used.

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 Pressure Equipment Directive (PED).

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.

Table 5: Bolt sizes and bolt lengths to DIN EN 1092-2 PN 6

DN	BOA-SuperCompact ³⁾ 5.1301 ⁴⁾	BOA-Compact ⁵⁾ 5.1301 ⁴⁾	BOA-W 5.1301 ⁴⁾
15	-	4x M10 x 35	4x M10 x 35
20	4x M10 x 80	4x M10 x 40	4x M10 x 40
25	4x M10 x 80	4x M10 x 40	4x M10 x 40
32	4x M12 x 90	4x M12 x 45	4x M12 x 45
40	4x M12 x 100	4x M12 x 45	4x M12 x 45
50	4x M12 x 110	4x M12 x 45	4x M12 x 45
65	4x M12 x 120	4x M12 x 45	4x M12 x 45
80	4x M16 x 150	4x M16 x 55	4x M16 x 55
100	4x M16 x 180	4x M16 x 55	4x M16 x 55
125	8x M16 x 200	8x M16 x 60	8x M16 x 60
150	8x M16 x 220	8x M16 x 60	8x M16 x 60
200	8x M16 x 70	8x M16 x 70	8x M16 x 70

Table 6: Bolt sizes and bolt lengths to DIN EN 1092-2 PN 10

DN	BOA-SuperCompact 5.1301 ⁴⁾	BOA-Compact EKB 5.1301 ⁴⁾
15	-	4x M12 x 45
20	4x M12 x 90	4x M12 x 50
25	4x M12 x 90	4x M12 x 50
32	4x M16 x 100	4x M16 x 55
40	4x M16 x 110	4x M16 x 55
50	4x M16 x 120	4x M16 x 55
65	4x M16 x 140	4x M16 x 55
80	8x M16 x 160	8x M16 x 60
100	8x M16 x 180	8x M16 x 65
125	8x M16 x 200	8x M16 x 65
150	8x M20 x 240	8x M20 x 70
200	8x M20 x 80	8x M20 x 75

Table 7: Bolt sizes and bolt lengths to DIN EN 1092-2 PN 16

DN	BOA-SuperCompact ³⁾ 5.1301 ⁴⁾	BOA-Compact ⁵⁾ 5.1301 ⁴⁾	BOA-W 5.1301 ⁴⁾
15	-	4x M12 x 45	4x M12 x 45
20	4x M12 x 90	4x M12 x 50	4x M12 x 50
25	4x M12 x 90	4x M12 x 50	4x M12 x 50
32	4x M16 x 100	4x M16 x 55	4x M16 x 55
40	4x M16 x 110	4x M16 x 55	4x M16 x 55
50	4x M16 x 120	4x M16 x 55	4x M16 x 55
65	4x M16 x 140	4x M16 x 55	4x M16 x 55
80	8x M16 x 160	8x M16 x 60	8x M16 x 60

3) Refer to type series booklet 7113.1 for further connection options

4) EN-GJL-250 (JL1040)



5) Also for BOA-Compact EKB and BOA-Control IMS

DN	BOA-SuperCompact ³⁾ 5.1301 ⁴⁾	BOA-Compact ⁵⁾ 5.1301 ⁴⁾	BOA-W 5.1301 ⁴⁾
100	8x M16 x 180	8x M16 x 65	8x M16 x 65
125	8x M16 x 200	8x M16 x 65	8x M16 x 65
150	8x M20 x 240	8x M20 x 70	8x M20 x 70
200	12x M20 x 80	12x M20 x 75	12x M20 x 75

Table 8: Bolt sizes and bolt lengths to DIN EN 1092-2 PN 10/16

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 ⁶⁾

5.5 Insulation

	<p>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>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.



For any insulation fitted on the valve observe the following:

- The valve's function must not be impaired.


6) PN 16 only

6 Commissioning/Start-up/Shutdown

6.1 Commissioning/start-up

	<p>CAUTION</p> <p>Welding beads, scale and other impurities in the piping Damage to the valve!</p> <ul style="list-style-type: none"> ▷ Remove any impurities from the piping, e.g. by flushing the pipe with the valve in fully open position. ▷ If necessary, install a strainer.
	<p>! DANGER</p> <p>All work performed on the actuator: Risk of injury!</p> <ul style="list-style-type: none"> ▷ Observe the actuator's operating manual.

6.1.1 Prerequisites for commissioning/start-up


	<p>! DANGER</p> <p>Surge pressure/water hammer potentially occurring at high temperatures Danger to life caused by burns or scalds!</p> <ul style="list-style-type: none"> ▷ Do not exceed the valve's maximum permissible pressure. ▷ Use valves made of nodular cast iron or steel. ▷ The operator shall provide general safety measures for the system.
--	---


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

- The valve has been connected to the piping at both ends.
- The actuator has been connected to the power supply in accordance with the operating manual for electric actuators.
- The piping has been flushed.
- For valves with electric actuators or pneumatic actuators travel limits have been set.
- 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.

6.1.2 Actuation

The valve is operated by an electric actuator.

	<p>! WARNING</p> <p>Improper handling of electric actuator Crushing of fingers! Damage to the actuator or the valve!</p> <ul style="list-style-type: none"> ▷ Never touch the rotating components. ▷ Ensure that any objects and parts of the body are removed from the actuator coupling area prior to starting the actuator.
---	--

	<div style="background-color: #FFD700; padding: 5px;">CAUTION</div> <p>Impermissible system parameters</p> <p>Excessive wear and/or damage to the valve by vibration and cavitation!</p> <ul style="list-style-type: none"> ▷ Change the system parameters. ▷ Consult KSB if special solutions need to be selected.
---	---

6.2 Operating limits

6.2.1 Ambient temperature

Observe the following parameters and values during operation:

Table 9: Permissible ambient temperatures

Ambient condition	Value
Ambient temperature	-10 °C to +60 °C
Humidity	5 % to 95 % rH

6.2.2 Pressure/temperature ratings

Table 10: Test pressure and operating pressure

Nominal pressure	Nominal size	Shell test	Leak test (seat)	Permissible operating pressure ⁷⁾
		With water to DIN EN 12266-1		
		P10, P11	P12, leakage rate A	-10 to +120 °C ⁸⁾
PN	DN	[bar]	[bar]	[bar]
6	15 - 200	9	6,6	6
16 ⁹⁾	15 - 200	24	17,6	16

6.3 Shutdown

6.3.1 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.

6.4 Returning to service

For returning the equipment to service, observe the sections on commissioning/start-up and the operating limits (⇒ Section 6.2, Page 23) .

In addition, carry out all servicing/maintenance operations before returning the valve to service. (⇒ Section 7, Page 24)


7) Static load

8) BOA-CVE IMS EKB up to 40 °C, BOA-CVE EKB up to 80 °C


9) EKB variants also available in PN 10

7 Servicing/Maintenance


7.1 Safety regulations

	⚠ DANGER
	<p>Valve under pressure Risk of injury! Leakage of hot and/or toxic fluids! Risk of burns!</p> <ul style="list-style-type: none"> ▷ The valve and its surrounding system must be depressurised prior to any maintenance work and installation work. ▷ If the bellows are defective and 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 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. ▷ Never vent the valve by removing the bonnet/cover bolting or gland packing. ▷ Use appropriate spare parts and tools, even in emergencies.

The operator ensures that maintenance, inspection and installation are performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual.

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

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.

	NOTE Before removing the valve from the piping, ensure that the pipe has been taken out of service and released for repair/maintenance work.
---	--

	NOTE All maintenance work, service work 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 " www.ksb.com/contact " on the Internet.
---	--

Never use force when dismantling and reassembling the valve.

Original spare parts are only ready for operation following assembly/installation and subsequent shell and leak testing of the valve.

7.2 Maintenance/inspection

The valve has been designed to be largely maintenance-free.

The materials of the sliding parts have been selected to ensure minimum wear.

7.2.1 Supervision of operation

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






- Checking the function by actuating the valve at least twice a year

7.2.2 Inspection work



7.2.2.1 Checking the valve

- Visual inspection of the general external condition of the valve
- Check the valve for leakage.

7.2.3 Valves with actuator

	<div data-bbox="507 622 683 667"> DANGER</div> <div data-bbox="496 683 1228 712">Unqualified personnel performing work on valves with actuator</div> <div data-bbox="496 719 914 748">Danger of death from electric shock!</div> <div data-bbox="517 759 1433 860"> <ul style="list-style-type: none"> ▷ Ensure that the connection to the power supply and the process control system is performed by a trained electrician. ▷ Observe regulations IEC 60364 and, for explosion-proof models, EN 60079. </div>
	<div data-bbox="507 900 703 945"> WARNING</div> <div data-bbox="496 960 1120 990">Work on the electric actuator by unqualified personnel</div> <div data-bbox="496 996 654 1025">Risk of injury!</div> <div data-bbox="517 1037 1380 1095"> <ul style="list-style-type: none"> ▷ Always have repair and maintenance work performed by specially trained, qualified personnel. </div>
	<div data-bbox="507 1137 587 1182">NOTE</div> <div data-bbox="496 1196 1428 1252">If the valves are fitted with actuators, ensure that the actuator's operating manual is also observed.</div>

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.

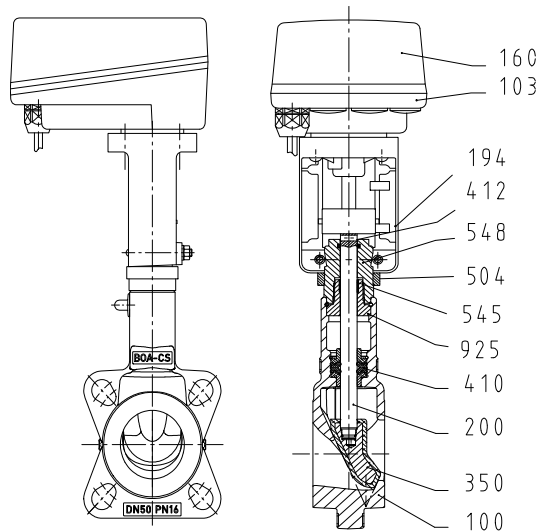
If problems occur that are not described in the following table, consultation with the KSB service is required.

Table 11: Trouble-shooting

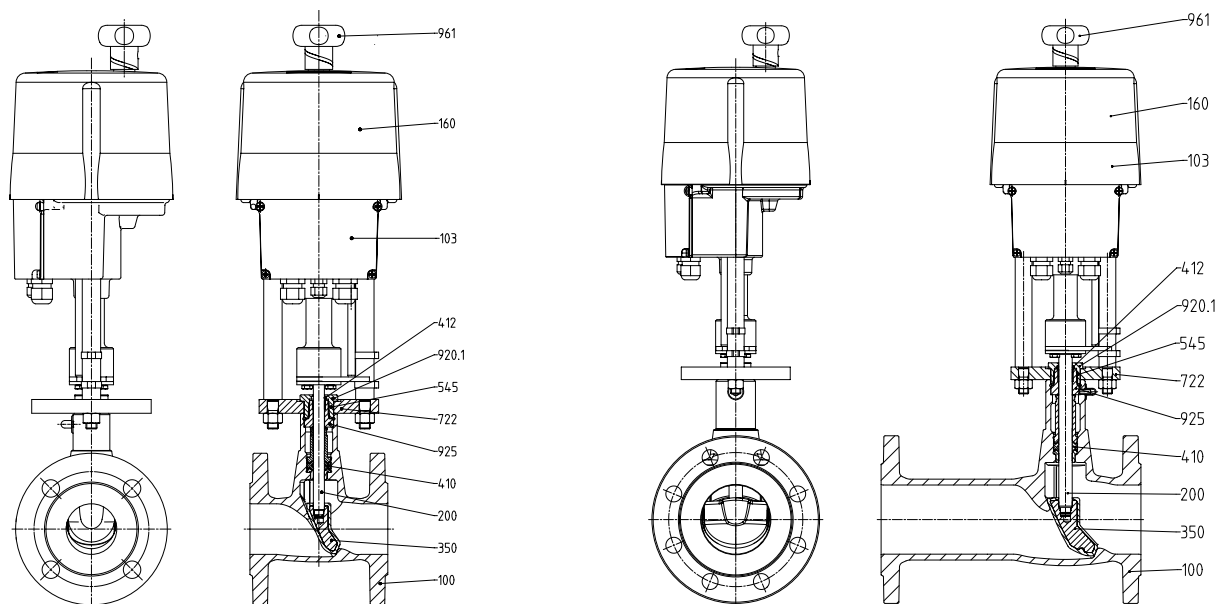
Problem	Remedy
Leakage at the seat/disc interface	Rework not possible. Replace valve.
Actuator malfunction	Refer to actuator operating manual.

9 Related Documents

9.1 General assembly drawing with list of components



DN 15 - 50 with actuator type EA-B 12



DN 32 - 200 with actuator type EA-C....

Fig. 7: Sectional drawings of control valve with electric actuator

Table 12: Parts list

Part No.	Description	Material
100	Body	EN-GJL-250 (5.1301) ¹⁰⁾
103	Actuator housing	Aluminium
160	Actuator cover	Plastic/Aluminium
194	Bracket	Aluminium
200	Stem	Stainless steel, min. 13 % chrome (Cr)
350	Control valve disc	Grey cast iron/EPDM ¹¹⁾

10) EKB variant with internal and external electrostatic plastic coating, as per KTW recommendation (5.1301)

11) EKB variant as per KTW recommendation

Part No.	Description	Material
410	Profile seal ¹¹⁾	Elastomer EPDM ¹¹⁾
412	O-ring	Elastomer NBR
504	Spacer ring	Galvanised steel
545	Bearing bush	Steel/PTFE
548	Actuating bush	Galvanised steel
722	Top flange	Steel
920.1	Union nut	Galvanised steel
925	Stem nut	Galvanised steel
961	Emergency handwheel	Plastic

9.2 Dimensions and weights

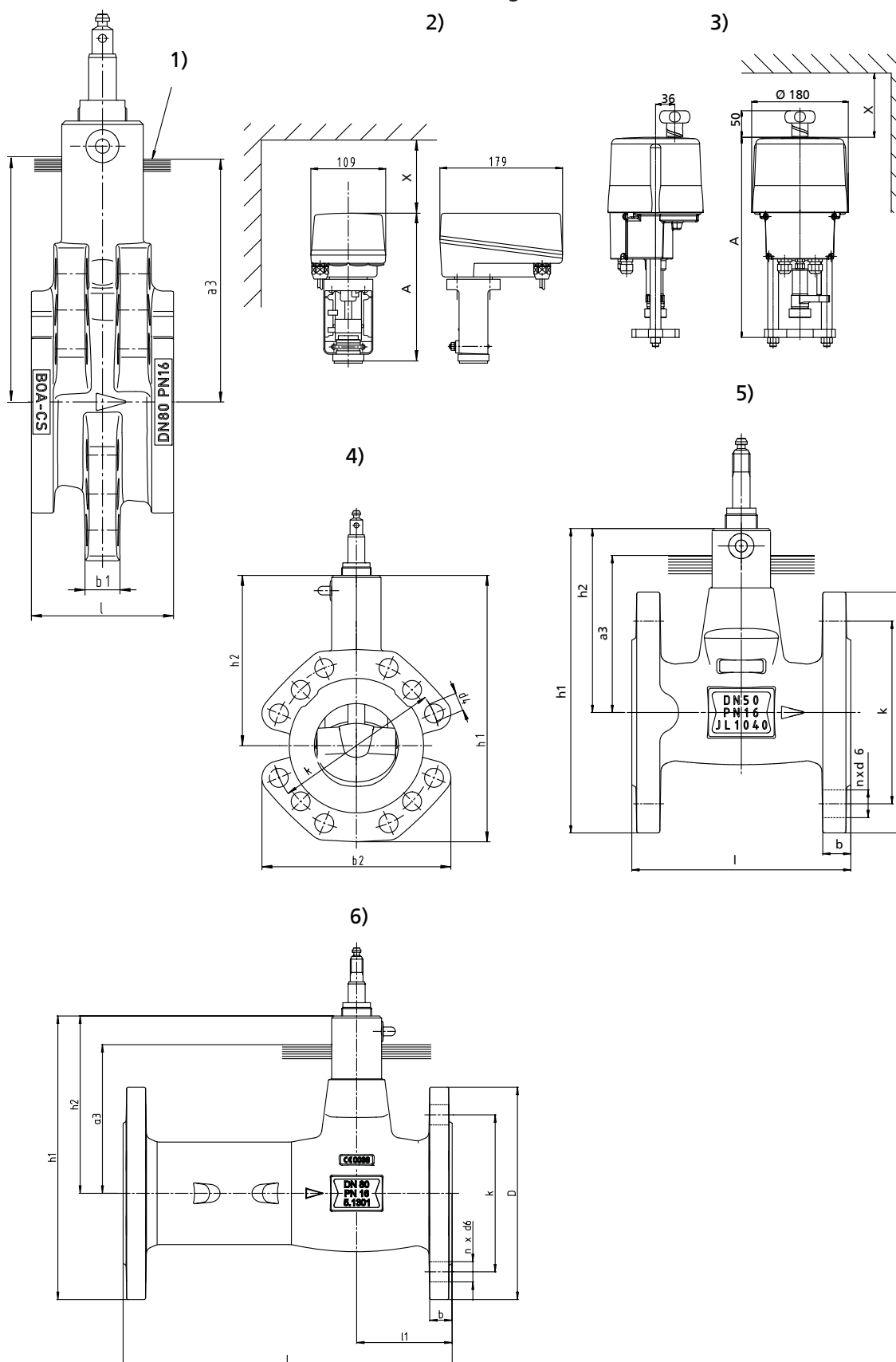


Fig. 8: Valve and actuator dimensions

1)	Insulation boundary in acc. with German energy-saving regulations	2)	EA-B 12	3)	EA-C 20, EA-C 40, EA-C 80, EA-C 140
4)	BOA-CVE CS	5)	BOA-CVE C / BOA-CVE EKB	6)	BOA-CVE W / BOA-CVE IMS / BOA-CVE IMS EKB

9.2.1 Dimensions and weights of BOA-CVE CS

Table 13: BOA-CVE CS control valve

PN	DN	a ₃ [mm]	b ₁ [mm]	b ₂ [mm]	h ₁ [mm]	h ₂ [mm]	l [mm]	k [mm]	n x d ₄ [mm]	[kg]
6	20 ¹²⁾	72,5	13	85	129	87	25	65	4 x 11	0,75
	25 ¹²⁾	72,5	13	85	129	87	25	75	4 x 11	0,75
	32	85	16	103	163	112	32	90	4 x 14	1,5
	40	95	16	110	167	112	40	100	4 x 14	2,0
	50	107,5	20	120	186	126	50	110	4 x 14	3,0
	65	125	24	135	233	166	65	130	4 x 14	5,0
	80	140	20	180	253	162	80	150	4 x 18	7,5
	100	160	20	203	303	200	100	170	4 x 18	10,5
	125	175	23	230	365	248	125	200	8 x 18	15,0
	150	192,5	23	266	397	262	150	225	8 x 18	21,0
	200	220	30	340	575	405	230	280	8 x 19	67,0
10	20 ¹²⁾	72,5	13	85	129	87	25	75	4 x 14	0,75
	25 ¹²⁾	72,5	13	85	129	87	25	85	4 x 14	0,75
	32	85	16	103	163	112	32	100	4 x 18	1,5
	40	95	16	110	167	112	40	110	4 x 18	2,0
	50	107,5	20	120	186	126	50	125	4 x 18	3,0
	65	125	24	135	233	166	65	145	4 x 18	5,0
	80	140	20	180	253	162	80	160	8 x 18	7,5
	100	160	20	203	303	200	100	180	8 x 18	10,5
	125	175	23	230	365	248	125	210	8 x 18	15,0
	150	192,5	23	266	397	262	150	240	8 x 22	21,0
16	20 ¹²⁾	72,5	13	85	129	87	25	75	4 x 14	0,75
	25 ¹²⁾	72,5	13	85	129	87	25	85	4 x 14	0,75
	32	85	16	103	163	112	32	100	4 x 18	1,5
	40	95	16	110	167	112	40	110	4 x 18	2,0
	50	107,5	20	120	186	126	50	125	4 x 18	3,0
	65	125	24	135	233	166	65	145	4 x 18	5,0
	80	140	20	180	253	162	80	160	8 x 18	7,5
	100	160	20	203	303	200	100	180	8 x 18	10,5
	125	175	23	230	365	248	125	210	8 x 18	15,0
	150	192,5	23	266	397	262	150	240	8 x 22	21,0
	200	220	30	340	575	405	230	295	12 x 23	67,0

12) Single valve size: DN 20/25

Table 14: Electric actuator types EA-B 12, EA-C 20 to EA-C 140

Actuator	Actuating force	A	X	Continuous- action 24 V AC	Continuous- action 230 V AC	3-point 230 V AC
	[N]	[mm]	[mm]	[kg]	[kg]	[kg]
EA-B 12	1200	215	150	1,5	-	-
EA-C 20	2000	425	120	6,0	7,0	7,0
EA-C 40	4500	425	120	6,0	7,0	7,0
EA-C 80	8000	455	120	9,0	10,0	10,0
EA-C 140	12000	520	120	10,0	10,0	10,0

Mating dimensions as per standard

Face-to-face length: DN 25-150: DIN EN 558/94

DN 200: DIN EN 558/14

Flange facing: DIN EN 1092-2, type A

9.2.2 Dimensions and weights of BOA-CVE C/EKB

Table 15: BOA-CVE C/EKB control valve

PN	DN					Flange					
		a ₃	h ₁	h ₂	l	b	d ₆	D	k	n	
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	
6	15	50	139	99	115	12	11	80	55	4	1,7
	20	55	144	99	120	14	11	90	65	4	2,1
	25	65	149	99	125	14	11	100	75	4	2,3
	32	75	175	115	130	16	14	120	90	4	3,8
	40	85	180	115	140	16	14	130	100	4	4,3
	50	95	196	126	150	16	14	140	110	4	4,9
	65	112,5	246	166	170	16	14	160	130	4	7,7
	80	135	262	167	180	18	19	190	150	4	10,9
	100	155	314	209	190	18	19	210	170	4	14,7
	125	170	368	248	200	20	19	240	200	8	21,0
	150	182,5	394	261,5	210	20	19	265	225	8	26,5
	200	220	575	405	230	30	19	340	280	8	71,0
16	15	57,5	146,5	99	115	14	14	95	65	4	2,3
	20	62,5	151,5	99	120	16	14	105	75	4	2,7
	25	72,5	156,5	99	125	14	14	115	85	4	3,0
	32	85	185	115	130	18	19	140	100	4	4,8
	40	95	190	115	140	18	19	150	110	4	5,5
	50	107,5	208,5	126	150	20	19	165	125	4	6,9
	65	125	258,5	166	170	20	19	185	145	4	10,0
	80	140	267	167	180	22	19	200	160	8	12,5
	100	160	319	209	190	24	19	220	180	8	17,1
	125	175	373	248	200	26	19	250	210	8	26,5
	150	192,5	404	261,5	210	26	23	285	240	8	31,0
	200	220	575	405	230	30	23	340	295	12	71,0

Table 16: Electric actuator types EA-B 12, EA-C 20 to EA-C 140

Actuator	Actuating force	A	X	Continuous- action 24 V AC	Continuous- action 230 V AC	3-point 230 V AC
	[N]	[mm]	[mm]	[kg]	[kg]	[kg]
EA-B 12	1200	215	150	1,5	-	-
EA-C 20	2000	425	120	6,0	7,0	7,0
EA-C 40	4500	425	120	6,0	7,0	7,0
EA-C 80	8000	455	120	9,0	10,0	10,0
EA-C 140	12000	520	120	10,0	10,0	10,0

Mating dimensions as per standard

Face-to-face lengths: DIN EN 558/14, ISO 5752/14
 Flanges: DIN EN 1092-2, flange type 21
 Flange facing: DIN EN 1092-2, type B

9.2.3 Dimensions and weights of BOA-CVE W/IMS/IMS EKB

Table 17: BOA-CVE W/IMS/IMS EKB control valve

PN	DN							Flange				
		a ₃	h ₁	h ₂	l	l ₁	b	D	k	n x d ₆		
		[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[kg]
6	15	50	129	89	130	42,5	12	80	55	4 x 11	1,5	
	16	55	134	89	150	48	14	90	65	4 x 11	2,0	
	25	65	149	99	160	54,5	14	100	75	4 x 11	2,6	
	32	75	175	115	180	65	16	120	90	4 x 14	4,1	
	40	85	180	115	200	70	16	130	100	4 x 14	4,8	
	50	95	196	126	230	75	16	140	110	4 x 14	5,7	
	65	112,5	246	166	290	85	16	160	130	4 x 14	9,3	
	80	135	262	167	310	90	18	190	150	4 x 19	12,9	
	100	155	313,5	208,5	350	95	18	210	170	4 x 19	18,4	
	125	170	368	248	400	125	20	240	200	8 x 19	26,1	
	150	182,5	394	261,5	480	150	20	265	225	8 x 19	36,0	
	200	220	565	405	600	180,5	22	320	280	8 x 19	82,7	
16	15	57,5	136,5	89	130	42,5	14	95	65	4 x 14	1,9	
	20	62,5	141,5	89	150	48	16	105	75	4 x 14	2,4	
	25	72,5	156,5	99	160	54,5	16	115	85	4 x 14	3,1	
	32	85	185	115	180	65	18	140	100	4 x 19	5,0	
	40	95	190	115	200	70	18	150	110	4 x 19	5,8	
	50	107,5	208,5	126	230	75	20	165	125	4 x 19	7,6	
	65	125	258,5	166	290	85	20	185	145	4 x 19	11,5	
	80	140	267	167	310	90	22	200	160	8 x 19	14,5	
	100	160	318,5	208,5	350	95	24	220	180	8 x 19	20,7	
	125	175	373	248	400	125	26	250	210	8 x 19	31,7	
	150	192,5	404	261,5	480	150	26	285	240	8 x 23	41,6	
	200	220	575	405	600	180,5	30	340	295	12 x 23	90,7	

Table 18: Electric actuator types EA-B 12, EA-C 20 to EA-C 140

Actuator	Actuating force	A	X	Continuous- action 24 V AC	Continuous- action 230 V AC	3-point 230 V AC
	[N]	[mm]	[mm]	[kg]	[kg]	[kg]
EA-B 12	1200	215	150	1,5	-	-
EA-C 20	2000	425	120	6,0	7,0	7,0
EA-C 40	4500	425	120	6,0	7,0	7,0
EA-C 80	8000	455	120	9,0	10,0	10,0
EA-C 140	12000	520	120	10,0	10,0	10,0

Mating dimensions as per standard

Face-to-face lengths: DIN EN 558/1, ISO 5752/1
 Flanges: DIN EN 1092-2, flange type 21
 Flange facing: DIN EN 1092-2, type B

10 EU Declaration of Conformity

10.1 EU Declaration of Conformity for BOA-CVE C/CS/W/IMS/EKB/IMS EKB

Herewith we,

KSB SE & Co. KGaA
Johann-Klein-Straße 9
67227 Frankenthal (Germany)

declare that **the product:**

BOA-CVE C	PN 6, 16	DN 15-200
BOA-CVE CS	PN 6/10/16	DN 20-200
BOA-CVE W	PN 6, 16	DN 15-200
BOA-CVE IMS	PN 16	DN 15-200
BOA-CVE EKB	PN 10/16	DN 15-200
BOA-CVE IMS EKB	PN 16	DN 15-200

satisfies the safety requirements laid down in the Pressure Equipment Directive 2014/68/EU.

Applied harmonised European standards:

Globe valves 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
 Westendstraße 199
 80686 München (Germany)

Identification number of the notified body:

0036

Other applicable directives:

Electromagnetic compatibility: Directive 2014/30/EU

Low-voltage Directive: Directive 2014/35/EU

Valves \leq DN 50 (PN 16), \leq DN 100 (PN 10) and \leq DN 150 (PN 6) comply with the Pressure Equipment Directive 2014/68/EU, Article 4, Section 3. They must bear neither the CE marking nor the identification number of a notified body.

The EU Declaration of Conformity was issued in/on:

Frankenthal, 5 February 2019



Wolfgang Glaub
 Vice President Integrated Management Germany



Dieter Hanewald
 Head of Development, Low-pressure Valves

Index

C

CE marking 14
Commissioning/start-up 22

D

Design 15
Design details
 Actuator 16
 Control valve 15
Disposal 13

E

Event of damage 6

F

Faults
 Causes and remedies 26
Function 16

I

Intended use 8

K

Key to safety symbols/markings 7

M

Maintenance 24
Marking 14
Materials 27

O

Operating limits 8
Order number 6
Other applicable documents 6

P

Partly completed machinery 6
Piping 19
Preservation 13
Pressure/temperature ratings 23

R

Return to supplier 13
Returning to service 23

S

Safety 7
Safety awareness 9
Scope of supply 16
Shutdown 23
Storage 13

T

Transport 12

W

Warnings 7
Warranty claims 6



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