

Pressure-independent Control Valve

## BOA-Control PIC

### Operating Manual



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Operating Manual BOA-Control PIC

Original operating manual

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## Glossary

### **EPDM**

Ethylene propylene diene rubber

### **Pressure Equipment (Safety) Regulations 2016 (PER)**

The Pressure Equipment (Safety) Regulations 2016 set out the requirements to be met by pressure equipment intended to be placed on the UK market (except Northern Ireland).

### **Pressure Equipment Directive 2014/68/EU (PED)**

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

## 1 General

### 1.1 Principles

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

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

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

### 1.2 Target group

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

### 1.3 Other applicable documents


**Table 1:** Overview of other applicable documents

Document	Contents
Type series booklet	Description of the valve
Flow characteristics	Information on Kv values and zeta values
General assembly drawing <sup>1)</sup>	Sectional drawing of the valve
Sub-supplier product literature <sup>2)</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





### 1.5 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.

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

<sup>2</sup> If included in agreed scope of supply

Symbol	Description
	<b>CAUTION</b> This signal word indicates a hazard which, if not avoided, could result in damage to the machine and its functions.
	<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 Safety

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

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

### 2.1 General

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

### 2.2 Intended use

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



### 2.2.1 Prevention of foreseeable misuse

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

### 2.3 Personnel qualification and training

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

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

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

### 2.5 Safety awareness

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

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

### 2.6 Safety information for the operator/user

- Actuator-operated valves are intended for use in areas which cannot be accessed by unauthorised persons. Operation of these valves in areas accessible to 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 touch rotating parts.
- Do not remove any protective equipment (e.g. contact guards) during operation.
- Provide the personnel with protective equipment and make sure it is used.
- Contain any leakage of hazardous fluids (e.g. explosive, toxic, hot) so as to avoid any danger to persons and the environment. Adhere to all relevant laws.
- Eliminate all electrical hazards. (In this respect refer to the applicable national safety regulations and/or regulations issued by the local energy supply companies.)

## 2.7 Safety information for maintenance, inspection and installation

- Modifications or alterations of the valve require the manufacturer's prior consent.
- Use only original spare parts or parts/components authorised by the manufacturer. The use of other parts/components can invalidate any liability of the manufacturer for resulting damage.
- The operator ensures that maintenance, inspection and installation are performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual.
- Carry out work on the valve during standstill only.
- The valve body must have cooled down to ambient temperature.
- The pressure in the valve body must have been released and the valve must have been drained.
- When taking the valve out of service always adhere to the procedure described in the manual.
- Decontaminate valves which handle fluids posing a health hazard.
- Protect the valve body and body bonnet/cover from any impacts.
- As soon as the work has been completed, re-install and re-activate any safety-relevant devices and protective devices. Before returning the product to service, observe all instructions on commissioning. (⇒ Section 6.1, Page 26)

## 2.8 Unauthorised modes of operation

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

(⇒ Section 2.2, Page 8)




### 3 Transport/Storage/Disposal

#### 3.1 Checking the condition upon delivery

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

#### 3.2 Transport

The valves are delivered in cardboard boxes.

	<div data-bbox="507 568 683 613"><b>! DANGER</b></div> <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 attach lifting accessories to the handwheel.</li> <li>▷ Observe the information on weights, centre of gravity and fastening points.</li> <li>▷ Observe the applicable local accident prevention regulations.</li> <li>▷ Use suitable, permitted lifting accessories, e.g. self-tightening lifting tongs.</li> <li>▷ For valves with actuators observe the relevant actuator operating manual. Transport aids on the actuator are not suitable for suspending the entire valve/ actuator assembly.</li> </ul>
	<div data-bbox="507 1037 639 1072"><b>CAUTION</b></div> <p><b>Improper transport</b> Damage to the valve!</p> <ul style="list-style-type: none"> <li>▷ Always transport the valve properly and in its original packaging.</li> <li>▷ Protect the valve in its cardboard box from heavy impacts.</li> <li>▷ Do not throw the valve.</li> </ul>
	<div data-bbox="507 1323 639 1359"><b>CAUTION</b></div> <p><b>Improper transport</b> Damage to pressure measurement connection branches or piping! Measuring impossible No valve function!</p> <ul style="list-style-type: none"> <li>▷ Do not use lifting accessories in the area of the pressure measurement connection branches or piping.</li> </ul>

To transport valves with flanged ends from DN 65, suspend them from the lifting tackle as shown.

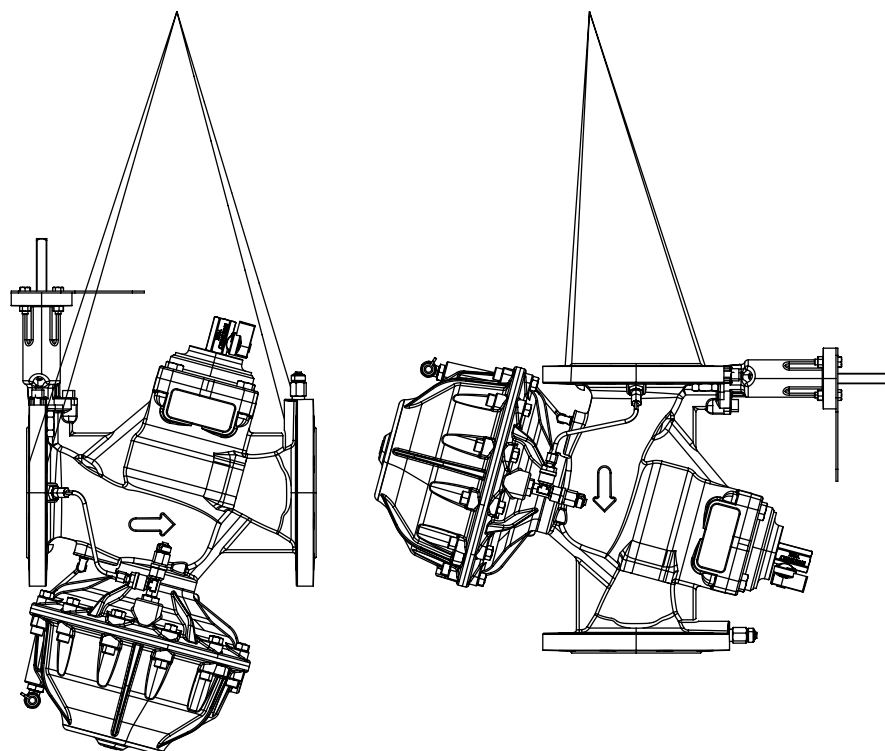



Fig. 1: Transporting the valve

### 3.3 Storage/preservation

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



	CAUTION
	<p><b>Incorrect storage</b> Damage due to dirt, corrosion, humidity and/or frost!</p> <ul style="list-style-type: none"> <li>▷ Close the valve using little force and store in the closed position.</li> <li>▷ Protect valve parts made of EPDM from sunlight or UV light from other sources. Observe the DIN 7716 standard for the storage of elastomers.</li> <li>▷ Store the valve in a frost-proof room where the atmospheric humidity is as constant as possible.</li> <li>▷ Protect the valve from dust during storage, e.g. with suitable caps or foils.</li> <li>▷ Protect the valve from contact with solvents, lubricants, fuels or other chemicals.</li> <li>▷ Store the valve in vibration-free conditions.</li> </ul>

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

### 3.4 Return to supplier

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

### 3.5 Disposal

	<div style="background-color: #f4a460; padding: 5px;"> <b>WARNING</b></div> <p><b>Fluids handled, consumables and supplies which are hot and/or pose a health hazard</b></p> <p>Risk of injury!</p> <p>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 relevant laws.</li> <li>▷ Decontaminate valves used in fluids posing a health hazard.</li> </ul>
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1. Dismantle the valve.  
Collect greases and other lubricants during dismantling.
2. Separate and sort the valve materials, e.g. by:
  - Metals
  - Plastics
  - Electronic waste
  - Greases and other lubricants
3. Dispose of materials in accordance with current regulations or in another controlled manner.

## 4 Description of the Valve

### 4.1 General description

- Valve for the hydraulic balancing of hot-water heating systems, air-conditioning systems and cooling circuits
- Pressure-independent control valve for limiting volume flow rate

### 4.2 Product information

#### 4.2.1 Product information as per Regulation No. 1907/2006 (REACH)

For information as per European chemicals regulation (EC) No. 1907/2006 (REACH) see <https://www.ksb.com/en-global/company/corporate-responsibility/reach>.

#### 4.2.2 Product information as per Pressure Equipment Directive 2014/68/EU (PED)



The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 2014/68/EU (PED) for fluids in Group 2.

#### 4.2.3 Product information as per Pressure Equipment (Safety) Regulations 2016

The valves satisfy the safety requirements of the UK Pressure Equipment (Safety) Regulations 2016 (PER) for fluids in Group 2.

### 4.3 Marking

Table 4: General marking

Description	Marking
Nominal size	DN ...
Nominal pressure class	PN ...
Manufacturer	KSB
Year of construction	20..
Material	.....
Flow direction arrow	→
CE conformity marking	
UKCA conformity marking	
Customer's marking	e.g. plant/system No., etc.

**CE marking** In accordance with the applicable Pressure Equipment Directive PED, Article 4, Paragraph 3, valves up to and including DN 50 must not bear the CE marking.

From DN 65 the valves are CE marked in accordance with the applicable Pressure Equipment Directive.

**UKCA marking** In accordance with the Pressure Equipment (Safety) Regulations 2016 Part 1, para. 8, valves up to and including DN 50 must not bear the UKCA marking.

From DN 65 the valves are UKCA marked in accordance with the Pressure Equipment (Safety) Regulations 2016.

### 4.4 Operating data

Table 5: Characteristic

Feature	Value
Nominal pressure	16/25
Nominal size	10 - 150
Max. permissible pressure [bar]	25 (DN 10-50) 16 DN 65-150

Feature	Value
Min. permissible temperature [°C]	≥ -10
Max. permissible temperature [°C]	≤ +120

#### 4.5 Fluids handled

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

#### 4.6 Design details

##### Design

- Pressure-independent control valve

##### DN 10 - 25

- Straight-way valve with male threaded ends
- Adjusting ring for presetting the flow rate limit
- Prepared for actuator mounting

##### DN 32 - 50

- Straight-way Y-pattern valve with female threaded ends
- Adjusting ring for presetting the flow rate limit
- Prepared for actuator mounting

##### DN 65 - 150

- Straight-way Y-pattern valve with flanged ends
- Prepared for manual gearbox<sup>3)</sup> for presetting the flow rate limit
- Prepared for actuator mounting

#### 4.7 Pressure/temperature ratings

**Table 6:** Test pressure and operating pressure

PN	DN	Shell test	Seat tightness test	Permissible operating pressure <sup>4)</sup>	
		With water			
		Tests P10 and P11 to DIN EN 12266-1	Test P12, leakage rate A to DIN EN 12266-1	-10 to +100 °C	120 °C
		[bar]	[bar]	[bar]	[bar]
25	10-50	37,5	27,5	25	22
16	65-150	24	17,6	16	12

<sup>3</sup> This accessory is mandatory for valve function.

<sup>4</sup> Static load

## 4.8 Materials

DN 10 - 25

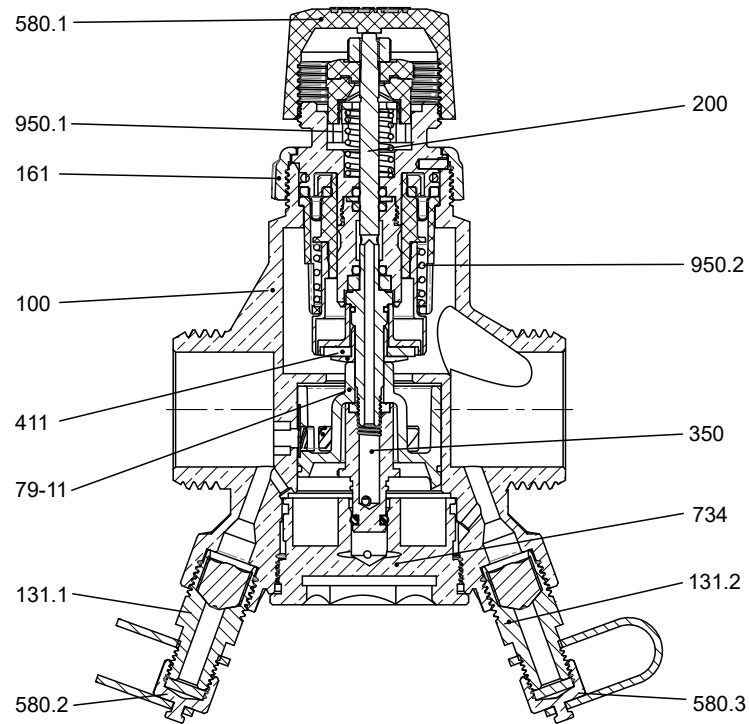


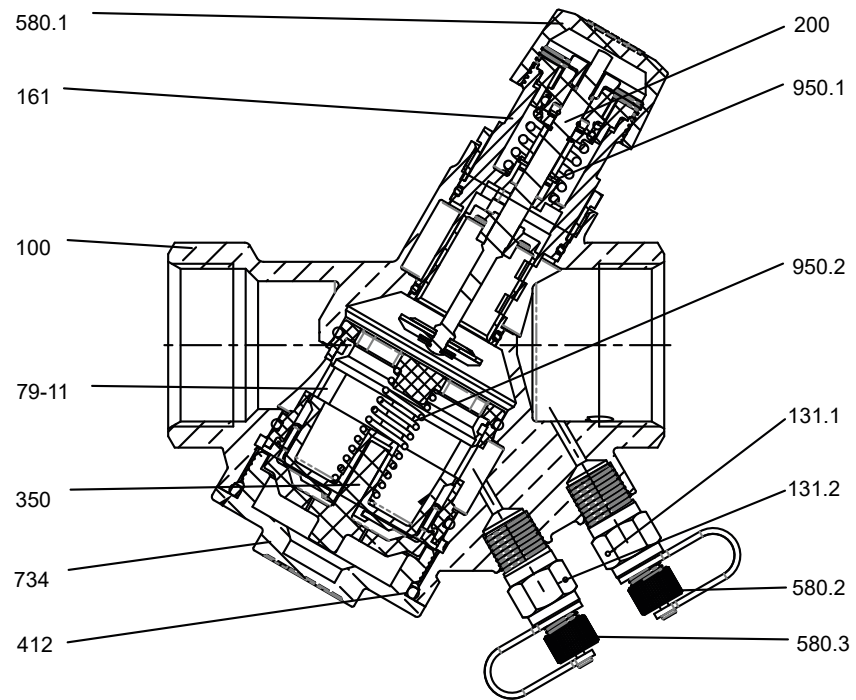
Fig. 2: Sectional drawing DN 10 - 25

Table 7: Overview of available materials DN 10 - 25

Part No.	Description	Material	Note
100	Body	CW602N	-
131.1/2	Pressure measurement connection branch	CW617N	-
161	Body bonnet	CW602N	-
200	Stem	CW617N	-
350	Valve disc	CW617N	-
411	Joint ring	EPDM 70SH	-
580.1	Cap	Nylon 6	-
580.2/3	Cap	CW617N	Red (580.2), blue (580.3)
734	Screwed union	CW617N	-
79-11	Flow controller	PSU	-
950.1/2	Spring	AISI302	-



### DN 32 - 50



**Fig. 3:** Sectional drawing DN 32 - 50

**Table 8:** Overview of available materials DN 32 - 50

Part No.	Description	Material	Note
100	Body	CW602N	-
131.1/2	Pressure measurement connection branch	CW617N	-
161	Body bonnet	CW602N	-
200	Stem	CW617N	-
350	Valve disc	CW617N	-
412	O-ring	EPDM 70	-
580.1	Cap	Nylon 6	-
580.2/3	Cap	CW617N	Red (580.2), blue (580.3)
734	Screwed union	CW617N	-
79-11	Flow controller	PSU	-
950.1/2	Spring	AISI302	-

## DN 65 - 150

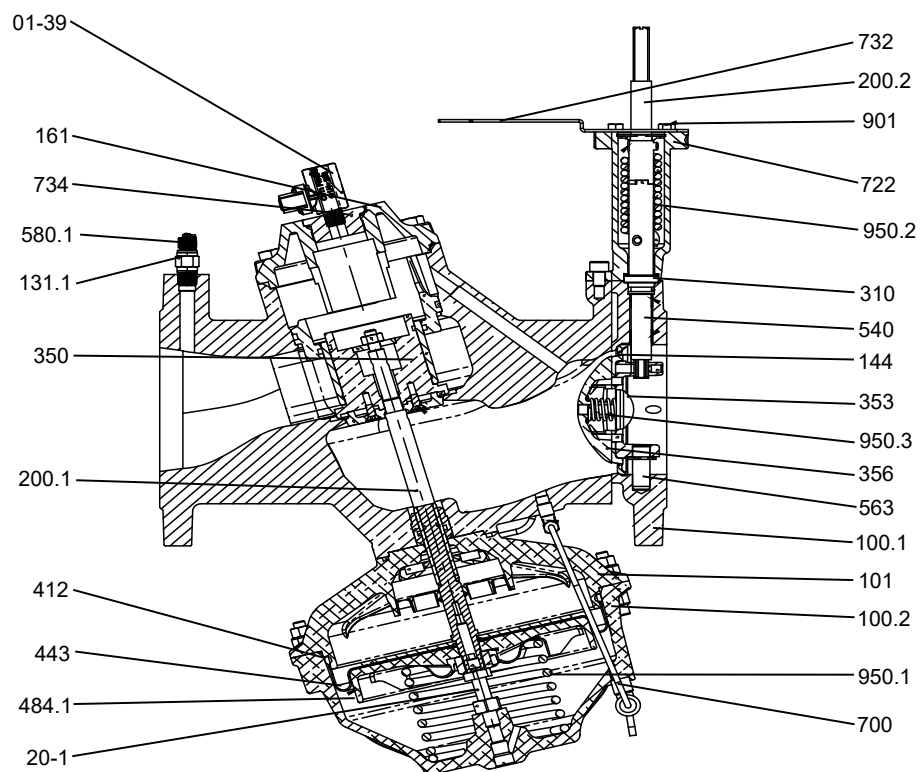


Fig. 4: Sectional drawing DN 65 - 150

Table 9: Overview of available materials DN 65 - 150

Part No.	Description	Material	Note
01-39	Ball valve	Brass	-
20-1	Adjusting stem	CW617N	-
100.1	Body (valve)	EN-GL-250 (5.1301)	Epoxy coating
100.2	Housing (actuator)	G-AlSi4.5MnMg	Epoxy coating
101	Lower housing section (actuator)	G-AlSi4.5MnMg	Epoxy coating
131.1/2 <sup>5)</sup>	Pressure measurement connection branch	Brass	-
144	Seat	CW617N	-
161	Body bonnet	EN-GL-250 (5.1301)	Epoxy coating
200.1/2	Stem	CW617N	-
310	Plain bearing	PTFE	-
350	Valve disc	CW617N	-
353	Balanced plug	CW617N	-
356	Control valve plug	CW617N	-
412	O-ring	EPDM	-
443	Diaphragm	EPDM	-
484.1	Spring plate	G-AlSi4.5MnMg	Epoxy coating
540	Bush	PTFE-coated stainless steel	-
563	Pin	CW617N	-
580.1/2 <sup>5)</sup>	Cap	CW617N	Red (580.1), blue (580.2)
700	Piping (capillary tube)	Copper	-

<sup>5</sup> Not shown in sectional drawing

Part No.	Description	Material	Note
722	Top flange	G-AlSi4.5MnMg	-
732	Holder (actuator)	AISI304	-
734	Screwed union	CW617N	-
901	Hexagon head bolt	Stainless steel A2	-
950.1/.3	Spring	AISI302	-
950.2	Spring	Steel 2FD	-

#### 4.9 Function

**Design** The valves basically consist of body 100, body bonnet 161 and the functional unit. Nominal sizes DN 10 - 25 have male threaded ends and nominal sizes DN 32 - 50 have female threaded ends to ISO 288. From DN 65, the valves have flanged line connections.

**Function** The valves maintain a constant volume flow rate as defined by the presetting, irrespective of fluctuating pressures in the system. This function is achieved by means of an integral fluid-controlled actuator which moves the functional unit. The valve is provided with a shut-off function.

The flow rate can be measured at the two pressure measurement connection branches 131.1/.2 in conjunction with a differential pressure gauge.

#### 4.10 Scope of supply

The following items are included in the scope of supply:

- Valve

Valves from DN 65 require an actuator or manual gearbox to be fully functional.

#### 4.11 Dimensions and weights

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

## 5 Installation at Site


### 5.1 General information/Safety regulations

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

The valves are supplied ready for operation.

### 5.2 Installation position

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

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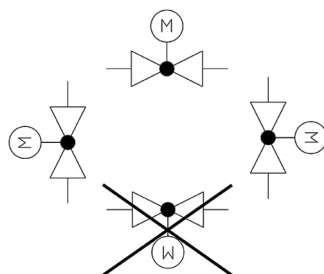





Fig. 5: Installation positions


The valves can be installed in supply lines as well as return lines, and in any position. Valves combined with an actuator must not be installed with the actuator pointing downwards.


### 5.3 Piping


	<p><b>! WARNING</b></p> <p><b>Impermissible piping forces</b></p> <p>Leakage from or rupture of the valve body!</p> <ul style="list-style-type: none"> <li>▷ Connect the pipes to the valve without transmitting any stresses or strains.</li> <li>▷ Take structural measures to prevent any piping forces from being transmitted to the valve.</li> <li>▷ Avoid mechanical loads beyond normal levels, e.g. piping forces, moments and vibrations.</li> </ul>
	<p><b>CAUTION</b></p> <p><b>Welding in close proximity to soft-seated valves</b></p> <p>Damage to the seat/disc interface!</p> <ul style="list-style-type: none"> <li>▷ Ensure that the valve is not heated beyond the specified temperature limits. (⇒ Section 4.4, Page 14)</li> </ul>

	CAUTION
	<p><b>Painting of the piping</b> Valve function impaired! Loss of important information provided on the valve!</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>

#### 5.4 Installing the valve

	CAUTION
	<p><b>Improper installation</b> Damage to the valve!</p> <ul style="list-style-type: none"> <li>▸ Protect the body and body bonnet from any impacts.</li> </ul>


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

	CAUTION
	<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, piping and connections (especially of new installations).
2. Check that the inside of the valve is free from any foreign objects. Remove any foreign objects.
3. If required, install a strainer in the piping.

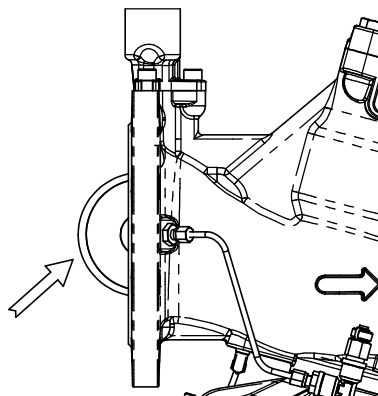
#### Threaded connection (DN 10 - 50)

The valves have male threaded ends (DN 10 - 25) or female threaded ends (DN 32 - 50) to ISO 228 for installation in the piping.

	CAUTION
	<p><b>Tightening the threaded connection with an unsuitable tool</b> Damage to the valve! Leakage at the valve body! Leakage of fluid!</p> <ul style="list-style-type: none"> <li>▸ Tighten the threaded connection with an open-ended spanner only.</li> </ul>

- ✓ The thread is free of dirt.
1. Always apply sealing material to the male thread of the threaded connection only.
  2. Tighten the threaded connection with an open-ended spanner.

### Flanged connection (DN 65 - 150)



**Fig. 6:** Flanged-end valve in open position

When installing valves with nominal size DN 65 and above, make sure that the valve is fully closed on the valve inlet side. A partially open position will affect the valve's face-to-face length and interfere with the installation process. In addition, unintentional shocks or impacts may damage the shut-off element.

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. For details on flange connections refer to the type series booklet and (⇒ Table 10) .

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

DN	Quantity	Thread size	Bolt length
			[mm]
65	4	M16	55
80	8	M16	60
100	8	M16	65
125	8	M16	65
150	8	M20	70

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

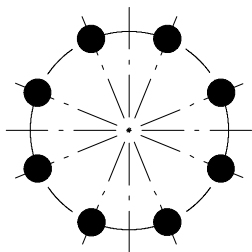


#### NOTE

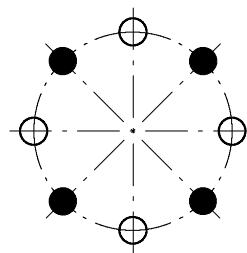
##### Exception: DN 65 PN 16

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°.

**Table 11: 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

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

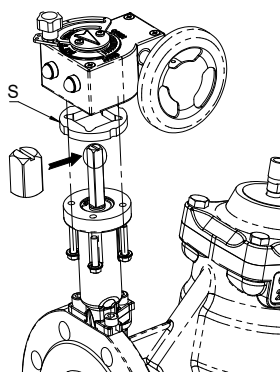
### 5.5 Mounting a manual gearbox or actuator



#### NOTE

Valves up to DN 50 are supplied in fully functional condition. They can optionally be fitted with an actuator. Valves from DN 65 require a manual gearbox or actuator to function.

#### Mounting a manual gearbox



**Fig. 7: Mounting a manual gearbox**

Depending on the nominal size, a spacer (S)<sup>6</sup> is required between the manual gearbox and the top flange.

- ✓ The valve is closed.
- ✓ The manual gearbox is closed, i.e. the pointer indicates SHUT.
- 1. Fit the manual gearbox with the screws supplied, tightening the screws crosswise.

#### Mounting the actuator

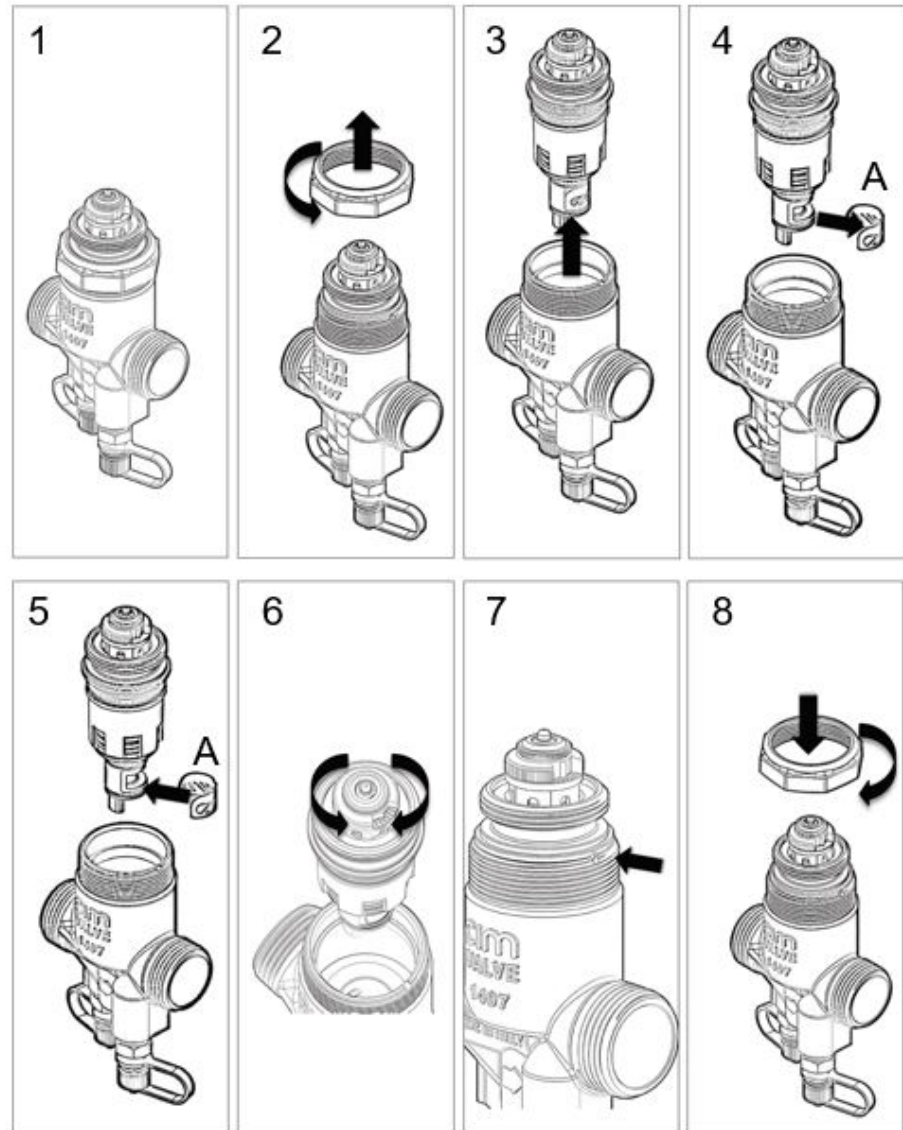
Mount the actuator as described in the actuator's operating manual.

<sup>6</sup> The spacer required for the individual nominal sizes is included in the scope of supply.

### 5.6 Flushing the valve

Flushing the piping prior to commissioning is recommended to prevent dirt particles from the installation process from clogging system components or impairing their function. Fully opening the valves is usually sufficient to allow maximum throughflow. An additional step is required to enable flushing of nominal sizes DN 10 - 25.

DN 10 - 25



**Fig. 8:** Flushing the valve (DN 10 - 25)



1. Remove cap 580.1 or the actuator.
2. Remove body bonnet 161 with an open-ended spanner, turning the spanner in anti-clockwise direction.
3. Pull out the trim.
4. Remove the throttling orifice (A).
  - ⇒ Reassemble the valve in reverse order. Screw on the body bonnet in clockwise direction and tighten it to 15 Nm. The piping can now be flushed. After flushing the piping repeat steps 1 to 3.
5. Fit throttling orifice (A) again.
6. Set the presetting for the required volume flow rate.




7. Insert the trim into the valve body again.
8. Screw on the body bonnet in clockwise direction and tighten it to 15 Nm.

### 5.7 Insulation

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

	<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>▷ Fit warning signs.</li> </ul>
	<p><b>CAUTION</b></p> <p><b>Condensation forming in air-conditioning systems, cooling systems 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>

### 5.8 Measuring computer

	<p><b>CAUTION</b></p> <p><b>Incorrect operation of the measuring computer</b> Incorrect readings and setting of valve!</p> <ul style="list-style-type: none"> <li>▷ Observe the relevant operating manual of the measuring computer.</li> </ul>
---	---

The flow rate can be measured at the two pressure measurement connection branches of the valve in conjunction with a differential pressure gauge. For measuring the volume flow rate, a measuring kit can be hired on request.



## 6 Commissioning/Start-up/Shutdown

### 6.1 Commissioning/Start-up

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

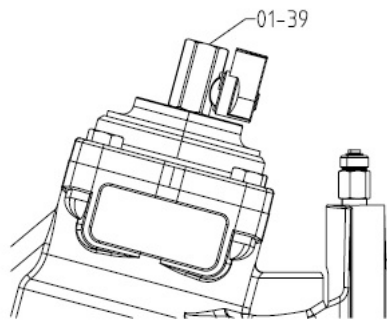
Before commissioning/start-up of the valve, ensure that the following requirements are met:

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

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

#### 6.1.2 Venting the valve (DN 65 - 150)

After the system has been filled, air pockets will frequently form in the upper body section of valves installed in horizontal pipes.

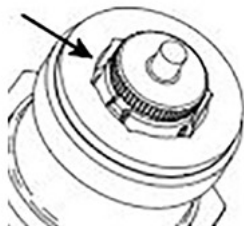


**Fig. 9: Venting the valve**

1. Vent the valve by opening ball valve 01-39 carefully until a steady flow of fluid handled escapes.  
 Collect the fluid handled by suitable means.
2. Fully close ball valve 01-39 again.


### 6.1.3 Setting the volume flow rate

DN 10 - 50

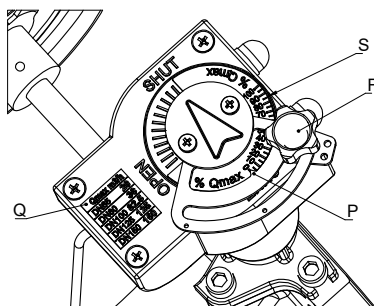


**Fig. 10:** Adjusting ring for presetting the volume flow rate

1. Turn the blue plastic cap 580.1 anti-clockwise to remove it from the bonnet.
2. Loosen the locking device (locknut) by approx. one full turn.
3. Turn the adjusting ring until the required value is set. Do not exceed the operating range (1-5). For the relationship between the volume flow rate and the values shown on the adjusting ring refer to (⇒ Table 12) .
4. Tighten the locking device to prevent the preset value being changed inadvertently.
5. Fit the blue plastic cap 580.1 again to prevent contamination.
6. Turn the blue plastic cap 580.1 clockwise until it lightly touches the stem end.

	<p style="background-color: yellow; margin: 0;"><b>CAUTION</b></p> <p><b>Unintentional closing of valve when setting the volume flow rate</b></p> <p>No throughflow!</p> <ul style="list-style-type: none"> <li>▷ When fitting the blue plastic cap only turn it until it lightly touches the stem end.</li> <li>▷ Do not tighten the blue plastic cap up to the stop.</li> </ul>
---	---

DN 65 - 150



**Fig. 11:** Setting the volume flow rate DN 65 - 150

Markings are provided on the manual gearbox to simplify presetting the required volume flow rate. The maximum volume flow rate  $Q_{max}$  per nominal size in  $m^3/h$  is indicated in a table (Q) and as a percentage on the rotating disc (S).

1. Check the locking device. Loosing it, if necessary, by turning the knurled thumb screw (F).
2. Set the required volume flow rate by turning the handwheel on the manual gearbox. Turn the indication until the arrow (P) points at the required percentage on the disc (S). For presettings in percent refer to (⇒ Table 13) .
3. Activate the locking device by turning the knurled thumb screw (F).

## 6.1.3.1 Presettings

Table 12: Presettings for valve with threaded ends DN 10 - DN 50

DN	Selection parameters	Presettings for adjusting ring																				
		1	1,2	1,4	1,6	1,8	2	2,2	2,4	2,6	2,8	3	3,2	3,4	3,6	3,8	4	4,2	4,4	4,6	4,8	5
10 LF	Q [l/s]	0,012	0,013	0,015	0,018	0,02	0,022	0,024	0,025	0,026	0,027	0,027	0,028	0,029	0,03	0,031	0,033	0,035	0,037	0,039	0,04	0,042
	Min Δp [kPa]	15	15	15	15	15	15	15	15	15	15	16	16	16	16	16	16	16	16	16	16	16
	Kvs	0,11	0,12	0,14	0,16	0,18	0,2	0,22	0,23	0,24	0,24	0,25	0,25	0,26	0,27	0,28	0,3	0,31	0,33	0,35	0,36	0,37
10 HF	Q [l/s]	0,024	0,028	0,034	0,04	0,048	0,054	0,06	0,064	0,066	0,071	0,072	0,074	0,078	0,078	0,08	0,082	0,083	0,083	0,084	0,087	0,097
	Min Δp [kPa]	13	13	13,5	13,5	14	14	14	14	14,5	14,5	14,5	14,5	15	15	15	15	15,5	15,5	15,5	16	16,5
	Kvs	0,24	0,28	0,33	0,39	0,46	0,52	0,58	0,62	0,62	0,67	0,68	0,7	0,72	0,73	0,74	0,76	0,76	0,76	0,77	0,78	0,86
15 LF	Q [l/s]	0,024	0,028	0,034	0,04	0,048	0,054	0,06	0,064	0,066	0,071	0,072	0,074	0,078	0,078	0,08	0,082	0,083	0,083	0,084	0,087	0,097
	Min Δp [kPa]	13	13	13,5	13,5	14	14	14	14	14,5	14,5	14,5	14,5	15	15	15	15	15,5	15,5	15,5	16	16,5
	Kvs	0,24	0,28	0,33	0,39	0,46	0,52	0,58	0,62	0,62	0,67	0,68	0,7	0,72	0,73	0,74	0,76	0,76	0,76	0,77	0,78	0,86
15 HF	Q [l/s]	0,027	0,031	0,037	0,043	0,05	0,053	0,058	0,065	0,065	0,072	0,072	0,073	0,075	0,079	0,088	0,095	0,114	0,122	0,127	0,132	0,134
	Min Δp [kPa]	12,5	12,5	12,5	13	13	13	13	13,5	13,5	14	14	14	15	16	17	17,5	18	18,5	19	19,5	19,5
	Kvs	0,27	0,32	0,38	0,43	0,5	0,53	0,58	0,64	0,64	0,69	0,7	0,7	0,7	0,71	0,77	0,82	0,96	1,02	1,05	1,08	1,09
20	Q [l/s]	0,042	0,056	0,068	0,072	0,076	0,088	0,097	0,103	0,106	0,108	0,118	0,127	0,132	0,139	0,151	0,164	0,169	0,192	0,226	0,246	0,25
	Min Δp [kPa]	18	18	18,5	18,5	19	19	19	19	19	19	19	20	20	21	21	23	23	24	25	26	26
	Kvs	0,35	0,47	0,57	0,6	0,63	0,72	0,8	0,85	0,87	0,89	0,98	1,02	1,06	1,1	1,19	1,23	1,27	1,41	1,62	1,74	1,77
25	Q [l/s]	0,076	0,098	0,111	0,119	0,136	0,164	0,179	0,194	0,206	0,214	0,245	0,256	0,264	0,291	0,322	0,333	0,35	0,374	0,389	0,428	0,447
	Min Δp [kPa]	18	18	19	19	20	20	21	22	23	24	25	25	26	26	27	27	28	31	32	35	37
	Kvs	0,64	0,83	0,92	0,98	1,1	1,32	1,41	1,49	1,54	1,57	1,76	1,84	1,86	2,05	2,23	2,31	2,38	2,42	2,47	2,6	2,65
32	Q [l/s]	0,129	0,192	0,256	0,319	0,382	0,444	0,504	0,562	0,617	0,668	0,715	0,757	0,794	0,825	0,849	-	-	-	-	-	-
	Min Δp [kPa]	14,5	14,5	14,5	16	16	16	16	17	17	17	17	18	18	18	18	-	-	-	-	-	-
	Kvs	1,22	1,82	2,42	2,87	3,44	4	4,54	4,91	5,39	5,83	6,24	6,42	6,74	7	7,2	-	-	-	-	-	-
40	Q [l/s]	0,562	0,785	0,983	1,161	1,322	1,466	1,595	1,705	1,797	1,869	1,921	1,954	1,969	1,974	1,974	-	-	-	-	-	-
	Min Δp [kPa]	16	16,5	16,5	18	18	20	20	22	22,5	24	25	26	26	26	26	-	-	-	-	-	-
	Kvs	5,06	6,96	8,71	9,85	11,22	11,8	12,84	13,09	13,64	13,73	13,8	13,8	13,9	13,94	13,94	-	-	-	-	-	-
50	Q [l/s]	0,612	0,924	1,205	1,449	1,657	1,827	1,946	2,072	2,157	2,225	2,279	2,323	2,357	2,38	2,385	-	-	-	-	-	-
	Min Δp [kPa]	19	22	22	25	25	28	28	29	29	30	30	31	32	32	32	-	-	-	-	-	-
	Kvs	5,05	7,09	9,25	10,43	11,93	12,43	13,36	13,85	14,42	14,62	14,98	15	15	15,15	15,18	-	-	-	-	-	-

**Table 13:** Presettings for valve with flanged ends DN 65 - DN 150

DN	Selection parameters	Presettings for manual gearbox/actuator										
		10 %	15 %	20 %	30 %	40 %	50 %	60 %	70 %	80 %	90 %	100 %
		Valve opening angle										
		9 °	13,5 °	18 °	27 °	36 °	45 °	54 °	63 °	72 °	81 °	90 °
65	Q [m³/h]	-	4,4	6,2	8,6	11,6	14,9	17,4	20,2	22,3	24,0	26,0
	Q [l/s]	-	1,222	1,722	2,389	3,222	4,139	4,833	5,611	6,194	6,667	7,222
	Min Δp [kPa]	-	30	30	30	30	30	30	50	50	50	50
	Kvs	-	9,7	13,7	19,2	25,9	34,7	42,6	48,8	54,7	61,2	66,3
80	Q [m³/h]	-	4,7	7,6	11,4	15,2	19,0	23,0	26,6	30,4	32,7	36,0
	Q [l/s]	-	1,306	2,111	3,167	4,222	5,278	6,389	7,389	8,444	9,083	10,000
	Min Δp [kPa]	-	30	30	30	30	30	30	30	50	50	50
	Kvs	-	10,7	17,3	26,6	36,7	45,9	57,8	68,6	78,8	89,2	96,6
100	Q [m³/h]	-	11,4	15,8	23,2	30,7	38,2	47,9	58,3	68,3	75,2	82,5
	Q [l/s]	-	3,167	4,389	6,444	8,528	10,611	13,305	16,194	18,972	20,889	22,917
	Min Δp [kPa]	30	30	30	30	30	30	30	50	50	70	70
	Kvs	-	26,4	37,4	57,9	79,3	102,4	136,1	171,8	215,6	244,1	278,0
125	Q [m³/h]	-	13,1	19,9	31,7	43,3	55,0	70,6	83,3	100,0	112,5	125,0
	Q [l/s]	-	3,639	5,528	8,806	12,028	15,278	19,611	23,139	27,778	31,250	34,722
	Min Δp [kPa]	30	30	30	30	30	30	30	50	60	70	70
	Kvs	-	26,5	41,1	67,3	94,5	127,1	166,0	203,8	259,6	300,2	332,1
150	Q [m³/h]	-	19,0	26,8	44,7	63,9	78,6	94,2	113,3	132,1	148,9	160
	Q [l/s]	-	5,278	7,444	12,417	17,75	21,833	26,167	31,472	36,694	41,361	44,444
	Min Δp [kPa]	30	30	30	30	30	30	30	50	60	70	70
	Kvs	-	38,1	55,2	96,7	142,6	189,2	231,3	275,1	335,6	386,7	427,5

**Table 14:** Key

Symbol	Description
min Δ p	Minimum differential pressure required to ensure valve function
Q	Volume flow rate

#### 6.1.4 Closing the valve

The valve is provided with a shut-off function.

##### DN 10 - 50

1. Turn the blue plastic cap 580.1 clockwise up to the stop.



##### DN 65 - 150

1. Turn the handwheel on the manual gearbox until the valve is closed.

The valve can also be closed by the actuator, if fitted.

### 6.2 Shutdown

#### 6.2.1 Measures to be taken for shutdown





	<div style="background-color: #f4a460; padding: 5px;"><b>⚠ WARNING</b></div> <p><b>Fluids handled, consumables and supplies which are hot and/or pose a health hazard</b></p> <p>Risk of injury!</p> <p>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 relevant laws.</li> <li>▷ Decontaminate valves used in fluids posing a health hazard.</li> </ul>
	<div style="background-color: #ffcc00; padding: 5px;"><b>CAUTION</b></div> <p><b>Excessively long idle periods</b></p> <p>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>

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

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

## 7 Servicing/Maintenance


### 7.1 Safety regulations

	<div style="background-color: #f4a460; padding: 5px;"> <b>DANGER</b></div> <p><b>Pre-loaded springs, stored forces</b>            Danger to life!</p> <ul style="list-style-type: none"> <li>▷ Never undo the bolts/screws of the integrated fluid-controlled actuator.</li> </ul>
	<div style="background-color: #f4a460; padding: 5px;"> <b>DANGER</b></div> <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>▷ Depressurise the valve and its surrounding system prior to any maintenance work and installation work.</li> <li>▷ If the bellows are defective or fluid escapes, depressurise the valve.</li> <li>▷ Ensure the valve is depressurised before removing any drain plugs, opening plugs or vent plugs.</li> <li>▷ Allow the valve to cool down until the temperature of the fluid in all valve areas in contact with the fluid is lower than the fluid's vaporisation temperature.</li> <li>▷ Never vent the valve by removing the bonnet bolting or gland packing.</li> <li>▷ Use original spare parts and appropriate tools, even in emergencies.</li> </ul>

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

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

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

	<div style="background-color: #0070c0; color: white; padding: 5px;"><b>NOTE</b></div> <p>All maintenance, service and installation work can be carried out by KSB Service or authorised workshops. Find your contact on the Internet at "<a href="http://www.ksb.com/contact">www.ksb.com/contact</a>".</p>
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Never use force when removing and installing the valve.

### 7.2 Maintenance



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

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

#### 7.2.1 Valves with actuator

	<div style="background-color: #0070c0; color: white; padding: 5px;"><b>NOTE</b></div> <p>If the valves are fitted with actuators, ensure that the actuator's operating manual is also observed.</p>
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## 8 Trouble-shooting

	 <b>WARNING</b>
	<p><b>Improper remedial work on the valve</b></p> <p>Risk of injury!</p> <ul style="list-style-type: none"><li>▸ 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.</li></ul>

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

**Table 15:** Trouble-shooting

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



## 9 EU Declaration of Conformity

### 9.1 EU Declaration of Conformity for BOA-Control PIC

Herewith we,

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

declare that **the product:**

**BOA-Control PIC** PN 16/25 DN 10-150

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

**Applied harmonised European standards:**

EN 12266-1

DIN EN 12516

**Suitable for:**

Fluids in Group 2

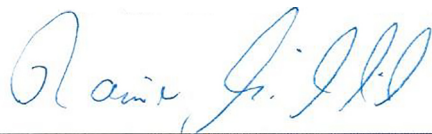
**Conformity assessment procedure:**

Module A

Valves  $\leq$  DN 50 comply with Article 4, Section 3, of the Pressure Equipment Directive 2014/68/EU. 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, 19 October 2022



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Rainer Michalik  
Head of Integrated Management Systems



---

Marco Kroth  
Head of BU GGC Product Development

## 10 UK Declaration of Conformity

### 10.1 UK Declaration of Conformity for BOA-Control PIC

Herewith we,

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

declare that **the product:**

**BOA-Control PIC**

PN 16/25

DN 10-150

satisfies the safety requirements of the Pressure Equipment (Safety) Regulations 2016.

**Applied harmonised European standards:**

EN 12266-1

DIN EN 12516

**Suitable for:**

Fluids in Group 2


**Conformity assessment procedure:**

Module A

Valves  $\leq$  DN 50 comply with the Pressure Equipment (Safety) Regulations 2016 Part 1, para. 8. They must bear neither the UKCA marking nor the identification number of a UK-approved body.

The EU Declaration of Conformity was issued in/on:

Frankenthal, 19 October 2022



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