

Butterfly Valve

**APORIS-DEB02**

**Installation/Operating Manual**



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Installation/Operating Manual APORIS-DEB02

Original operating manual

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## Glossary

### Certificate of decontamination

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

### PN

Nominal pressure; a characteristic upon which standards regarding piping, piping components, valves, etc., are based

## 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, the main operating data and the serial number. The serial number uniquely describes the product and is used as identification in 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 15)

### 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	Description of the valve
General assembly drawing <sup>1)</sup>	Sectional drawing of the valve
Sub-supplier product literature	Operating manuals and other product literature describing accessories and integrated machinery components

For accessories and/or integrated machinery components, observe the relevant manufacturer's product literature.

### 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 agreed to be included in the scope of supply

### 1.6 Key to safety symbols/markings

Table 3: Definition of safety symbols/markings

Symbol	Description
 <b>DANGER</b>	<b>DANGER</b> This signal word indicates a high-risk hazard which, if not avoided, will result in death or serious injury.
 <b>WARNING</b>	<b>WARNING</b> This signal word indicates a medium-risk hazard which, if not avoided, could result in death or serious injury.
 <b>CAUTION</b>	<b>CAUTION</b> This signal word indicates a hazard which, if not avoided, could result in damage to the machine and its functions.
	<b>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
  - 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 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.

### 2.2 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 product literature regarding pressure, 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.
- Hands-on training at the valve and the actuator 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 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 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.
- 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 the actuating element 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.

### 2.8 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

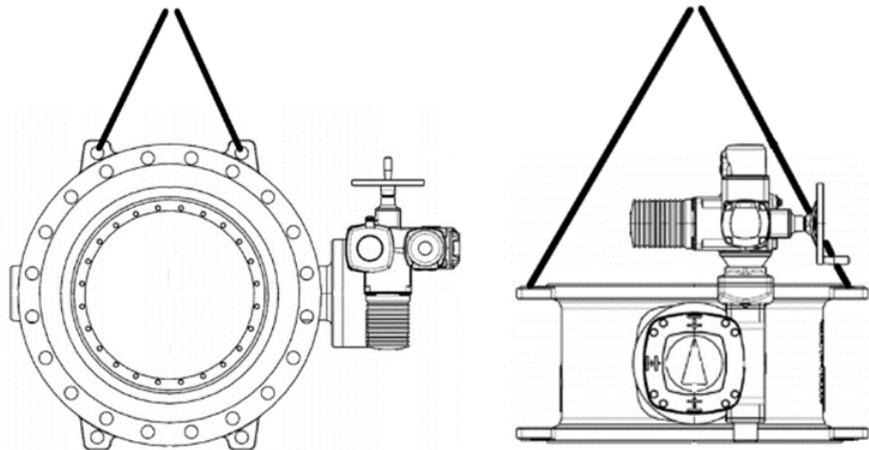
#### 3.1 Checking the condition upon delivery

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

	 <b>DANGER</b>
	<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 or valve disc.</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>

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



**Fig. 1:** Transporting the valve

1. Move the valve disc to the semi-closed position.
2. Suspend the valve from the lifting equipment and transport it.

#### 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:

	<b>CAUTION</b>
	<p><b>Damage due to frost, humidity or dirt</b> Corrosion/contamination of the valve!</p> <ul style="list-style-type: none"> <li>▷ Store the valve in a dry, dust-free and vibration-free, frost-proof room where the atmospheric humidity is as constant as possible.</li> <li>▷ Protect the valve against contamination, e.g. with suitable caps or film.</li> </ul>
	<b>CAUTION</b>
	<p><b>Damage due to excessive valve closure</b> Damage to the seat/disc interface!</p> <ul style="list-style-type: none"> <li>▷ Store the valve with the valve disc at 5° from the closed position.</li> </ul>

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

The temperature at the storage location must be between +5 °C and +50 °C.

Protect the sealing elements (elastomers) from sunlight or UV light from other sources. Observe the DIN 7716 standard for the storage of elastomers.

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 a valve which has already been operated, observe the measures to be taken for shutdown. (⇒ Section 6.3, Page 21)

### 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.

### 3.5 Disposal

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

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

## 4 Valve Description

### 4.1 General description

- Double-offset butterfly valve, epoxy-coated

Valve for shutting off and controlling fluids in irrigation systems, cooling circuits, water treatment and water supply systems.

### 4.2 Product information

#### 4.2.1 EC Machinery Directive 2006/42/EC

The valve meets the fundamental safety requirements as per EC Machinery Directive 2006/42/EC, Annex 1.

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

For information as per chemicals Regulation (EC) No. 1907/2006 (REACH), see <http://www.ksb.com/reach>.

### 4.3 Marking

**Table 4:** General marking

Nominal size	DN ...
Nominal pressure class	PN ...
Manufacturer	KSB
Type series/Model	APORIS-DEB02
Material	.....
Flow direction arrow	→

### 4.4 Design details

#### Design

- Double-flanged body with short face-to-face length to EN 558/14
- Flanged ends to DIN EN 1092-2:
  - PN 10 ≤ DN 2200
  - PN 16 ≤ DN 1800
  - PN 25 ≤ DN 1000
  - PN 40 ≤ DN 1000
- Design to EN 593
- Tested to EN 12266-1
- Marked in accordance with DIN EN 19 (ISO 5209)
- Perfectly tight shut-off in either direction of flow (no leakage visible to the naked eye)
- Valve certified for drinking water applications to WRAS (elastomer and coating)
- Manual actuator (gearbox):
  - PN 10 ≤ DN 1100
  - PN 16 ≤ DN 800
  - PN 25 ≤ DN 700
  - PN 40 ≤ DN 600

Larger nominal sizes standard-equipped with gearbox for mounting an electric actuator.

**Variants**

- Flanges drilled to ASME B16.5 Class 150
- Limit switches
- Pneumatic actuators
- Electric actuators

**4.5 Function**

- Design** The butterfly valve consists of the pressure-retaining parts, i.e. the body, the actuating shaft, the functional unit (shaft, valve disc with elastomer ring), and the actuating element.
- Function** The valve is actuated via handwheel, manual gearbox, electric or pneumatic actuator.
- Sealing** The valve disc and actuating shaft are joined by keys and sealed to atmosphere by O-rings.

**4.6 Scope of supply**

The following items are included in the scope of supply:

- 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.

	<p><b>⚠ WARNING</b></p>
	<p><b>Damage to pressure enclosure or add-on parts</b>                  Leakage from or rupture of the valve                  Valve/add-on parts not functional</p> <ul style="list-style-type: none"> <li>▸ Check the valve for in-transit damage prior to installation.</li> <li>▸ Check any add-on parts for in-transit damage.</li> <li>▸ Do not install damaged valves.</li> </ul>

### 5.2 Installation position

	<p><b>CAUTION</b></p>
	<p><b>Incorrect installation position</b>                  No valve function!</p> <ul style="list-style-type: none"> <li>▸ Valves of nominal sizes <math>\leq</math> DN 600: Install in a horizontal or vertical position.</li> <li>▸ Valves of nominal sizes <math>\geq</math> DN 600: Install in a horizontal position only.</li> </ul>

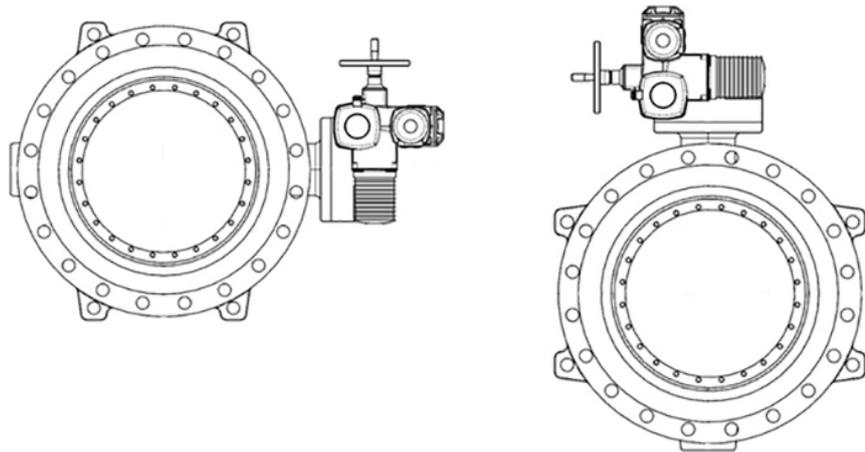


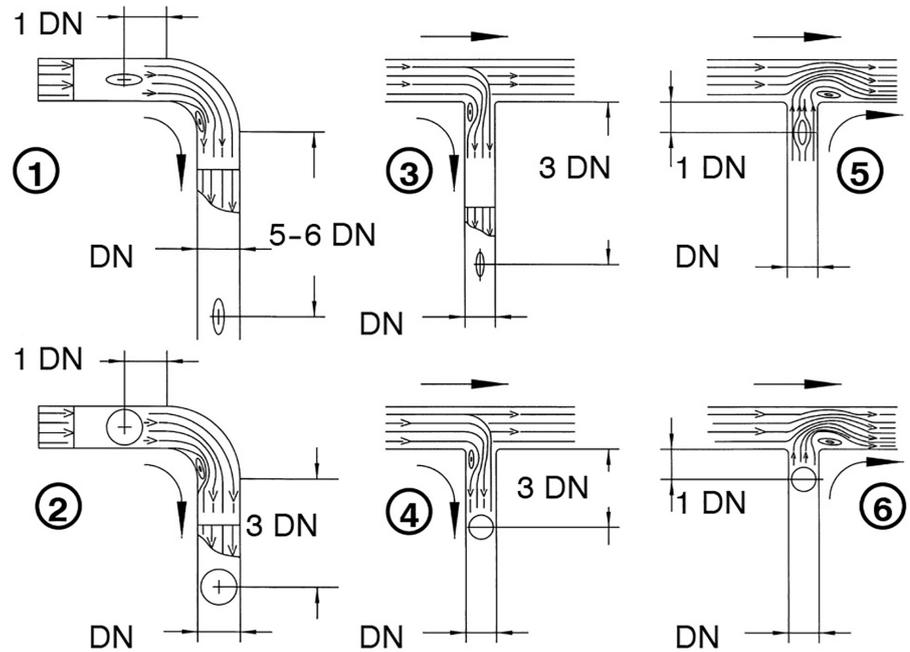
Fig. 2: Horizontal and vertical installation positions

	<p><b>⚠ DANGER</b></p>
	<p><b>Dead-end valve</b>                  High-pressure hazard!                  Risk of burns!</p> <ul style="list-style-type: none"> <li>▸ Protect the valve against unauthorised and/or unintentional opening.</li> </ul>

A valve installed at the end of a pipeline and closed with a blind flange must not be regarded as a dead-end valve.

The valve is bi-directional; the preferential flow direction is indicated by an arrow on the body.

Recommended upstream and downstream stabilisation distances



**Fig. 3:** Recommended minimum distance between the valve and a tee or elbow  
Upstream and downstream stabilisation distances are also required for valves installed on the pump discharge side.

**Installation downstream of control valves, a plunger valve or a flow meter**  
Observe a minimum distance of 10 times the nominal size.

5.3 Preparing the valve

	<b>CAUTION</b>
	<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>

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

	<b>WARNING</b>
	<p><b>Impermissible piping forces</b> 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>

8118.8/01-EN

	<b>CAUTION</b>
	<p><b>Painting pipes and actuator</b> Valve function impaired!</p> <ul style="list-style-type: none"> <li>▸ Protect stem, plastic components and actuator elements prior to applying paint.</li> </ul>

- For any further work (e.g. construction work, cleaning measures) protect the valve and the piping against contamination (e.g. by covering it with a tarpaulin).

**5.4.1 Flange connection**

- Fasteners** Always use all flange bolt holes provided when connecting the valve to the piping.
- Flange connection**
- ✓ The mating flange faces are clean and undamaged.
  - ✓ Verify that the piping is correctly aligned and the flanges are parallel.
  - ✓ The inside diameter of the pipe flanges is within the permissible minimum and maximum diameter limits.
  - ✓ Open and close the valve to check that the valve disc rotates freely.
    1. Move the valve to the open position. Open it as far as possible without the valve disc protruding beyond the body.
    2. Push the pipe flanges as far apart as required to achieve a sufficient clearance between the flange faces.
    3. Insert the valve between the two flanges and centre it with tie bolts.
    4. Tighten the fasteners evenly and crosswise with a suitable tool until contact is established between the body and the piping flanges.
    5. Actuate the valve several times to verify that the valve disc rotates freely.

**5.5 Valves with actuator**

	<b>! WARNING</b>
	<p><b>Impermissible loads resulting from operating conditions, add-on parts and valve-mounted components, e.g. actuators</b> Leakage from or rupture of the valve body!</p> <ul style="list-style-type: none"> <li>▸ Lay the piping in such a way that detrimental thrust forces and bending forces are kept away from the valve body.</li> <li>▸ Additional loads, e.g. traffic, wind or earthquakes are not taken into account for standard variants; these require a separate design.</li> <li>▸ Support the valve including add-on parts and valve-mounted components.</li> </ul>

**Electric actuators**

	<b>! DANGER</b>
	<p><b>Unqualified personnel performing work on valves with actuator</b> Danger of death from electric shock!</p> <ul style="list-style-type: none"> <li>▸ Ensure that connection to the power supply and the process control system is performed by a trained electrician.</li> <li>▸ Observe regulations IEC 60364 and, for explosion-proof models, EN 60079.</li> </ul>

8118.8/01-EN

	 <b>DANGER</b>
	<p><b>Flooding of electrical devices such as actuator, control box, solenoid valve, limit switches, etc.</b>            Danger of death from electric shock!</p> <ul style="list-style-type: none"> <li>▸ Operate electrical devices in flood-proof rooms only.</li> <li>▸ Do not expose electrical connections to any moisture.</li> <li>▸ Voltage and frequency must match the data stated on the name plate.</li> </ul>

	 <b>WARNING</b>
	<p><b>Incorrect connection to the mains</b>            Damage to the mains network, short circuit!</p> <ul style="list-style-type: none"> <li>▸ Observe the technical specifications of the local energy supply companies.</li> </ul>

Mounted actuators are factory-set and ready for operation. Adjust travel stops and torque limit switches to the operating conditions if required.

### 5.6 Insulation

	 <b>WARNING</b>
	<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>

For any insulation fitted on the valve observe the following:

- The valve's function must not be impaired.

## 6 Commissioning/Start-up/Shutdown

### 6.1 Commissioning

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

	<b>! DANGER</b>
	<p><b>All work performed on the actuator and gearbox</b>            Risk of injury!</p> <ul style="list-style-type: none"> <li>▷ Observe the actuator and gearbox operating manuals.</li> </ul>

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

	<b>! DANGER</b>
	<p><b>Risk of pressure surges / water hammer</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>▷ The operator shall provide general safety measures for the system.</li> </ul>

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 shut-off function of the installed valve has been checked by opening and closing it several times.
- The actuator has been connected to the power supply in accordance with the actuator's operating manual.
- The piping has been flushed.
- For valves with electric 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. (⇒ Section 6.2, Page 20)
- The material's chemical resistance and stability under load have been checked.

#### 6.1.2 Actuation/operation

	<b>CAUTION</b>
	<p><b>Impermissible system parameters</b>            Excessive wear and/or damage to the valve by vibration and cavitation!</p> <ul style="list-style-type: none"> <li>▷ Change the system parameters.</li> <li>▷ Consult KSB if special solutions need to be selected.</li> </ul>

##### 6.1.2.1 Actuating element – handwheel

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

### 6.1.2.2 Locking device

	<b>NOTE</b>
	Do not attempt to operate the valve when the locking device is engaged.

The locking device serves to lock the valve disc in either fully open or fully closed position.

The locking device is fitted on the body in place of the bottom cover.

### 6.1.3 Functional test

The following functions must be checked:

1. Check the shut-off function of the installed valve prior to commissioning/start-up by opening and closing the valve several times.

## 6.2 Operating limits

### 6.2.1 Pressure/temperature ratings

**Table 5:** Permissible operating pressures [bar]

PN	DN	[°C]
		80
10	100-2200	10,0
16	100-1800	16,0
25	100-1000	25,0
40	100-1000	40

### 6.2.2 Flow velocity

**Table 6:** Permissible flow velocity with the valve fully open

PN	[m/s]
10	3,0
16	4,0
25	5,0
40	6,0

### 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.

##### 6.3.1.1 Valve with handwheel

1. Close the valve by turning the handwheel in clockwise direction.

### 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 20) .

In addition, carry out all servicing/maintenance operations before returning the valve to service. (⇒ Section 7, Page 22)

## 7 Servicing/Maintenance

### 7.1 Safety regulations

	<b>DANGER</b>
	<p><b>Valve under pressure</b>            Risk of injury!            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 there is fluid leakage, depressurise the valve.</li> <li>▷ Allow the valve to cool down until the temperature of the fluid in all the valve's chambers is lower than the fluid's vaporisation temperature.</li> </ul>

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

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

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

	<b>NOTE</b>
	<p>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 "<a href="http://www.ksb.com/contact">www.ksb.com/contact</a>" on the Internet.</p>

Never use force when dismantling and reassembling the valve.

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

### 7.2 Servicing/Inspection

#### 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
- Replacing the valve disc sealing element in good time. Replace the O-ring and the gasket.

### 7.2.2 Inspection work

#### 7.2.2.1 Lubrication

	<b>NOTE</b>
	Use only lubricants that are suitable for drinking water applications. Observe the national and/or local applicable regulations.

1. Clean any dirty components.
2. Re-lubricate the valve disc sealing element, O-ring and gasket whenever they have been replaced.

### 7.2.3 Dismantling the valve

#### 7.2.3.1 General information/Safety regulations

	<b>⚠ WARNING</b>
	<b>Hot surface</b> Risk of injury! ▷ Allow the valve to cool down to ambient temperature.

	<b>⚠ WARNING</b>
	<b>Unqualified personnel performing work on the valve</b> Risk of injury! ▷ Always have repair work and maintenance work performed by specially trained, qualified personnel.

Always observe the safety instructions and information. (⇒ Section 7, Page 22)  
 In the event of damage you can always contact KSB Service.

#### 7.2.3.2 Preparing the valve

1. Interrupt energy supply and make sure it cannot be switched on again unintentionally.
2. Depressurise and drain the valve.
3. Remove any protective covers from valves with actuators.
4. Shut down the actuators as specified in the actuator's operating manual.

#### 7.2.3.3 Dismantling the piping

- ✓ The notes and steps stated in (⇒ Section 7.2.3.1, Page 23) to (⇒ Section 7.2.3.2, Page 23) have been observed or carried out.
  - ✓ The electric actuator has been de-energised and secured against unintentional start-up.
1. Open the valve disc to an angle of 10°.
  2. Undo the fasteners.
  3. Hold the two pipe flanges apart so that the liner will not be damaged.
  4. Remove the valve/actuator assembly from the piping and place it on a clean and level assembly surface.

**7.2.3.4 Removing the actuator**

- ✓ The valve/actuator assembly has been removed from the piping.
  1. Mark the actuator's alignment on the valve.
  2. Undo the fasteners.
  3. Using suitable lifting equipment, lift the actuator off the valve and place it on a clean and level assembly surface.

**7.2.3.5 Removing the valve disc sealing element**

- ✓ The valve is accessible.
- ✓ The valve has been disconnected from the piping on one side at least.
  1. Fully open valve disc 2.
  2. Loosen retaining ring 3.
  3. Undo bolts/screws 17.
  4. Remove sealing element 11 and retaining ring 3 and clean them.
  5. Clean the valve disc and the seal chamber.
  6. Remove any contamination.

**7.2.3.6 Removing the O-rings**

- ✓ The notes and steps stated in (⇒ Section 7.2.3.1, Page 23) to (⇒ Section 7.2.3.2, Page 23) have been observed or carried out.
  1. Fully close valve disc 2.
  2. Pull the gearbox off shaft 4.
  3. Pull the coupling and bonnet 9 off shaft 4.
  4. Remove O-rings 16.

**7.2.4 Assembling the valve**

**7.2.4.1 General information/Safety regulations**

	<b>CAUTION</b>
	<p><b>Improper reassembly</b> Damage to the valve!</p> <ul style="list-style-type: none"> <li>▷ Reassemble the valve in accordance with the general rules of sound engineering practice.</li> <li>▷ Use original spare parts only.</li> </ul>

**Tightening torques** Use an appropriate tool to tighten the fasteners crosswise.

**7.2.4.2 Mounting the actuator**

- ✓ All dismantled parts have been cleaned and checked for wear.
- ✓ Any damaged or worn parts have been replaced by original spare parts.
- ✓ The sealing surfaces have been cleaned.
  1. Apply sealant to the sealing surface between the valve's top flange and the actuator.
  2. Using suitable lifting equipment, lift the actuator onto the valve.
  3. Fit the fasteners.

**7.2.4.3 Fitting the valve disc sealing element**

- ✓ The seal chamber has been cleaned.
- ✓ All dismantled parts have been cleaned and checked for wear.
- ✓ Any damaged or worn parts have been replaced by original spare parts.
  1. Apply grease to new valve disc sealing element 11 and place it into the body.
  2. Fit retaining ring 3.
  3. Insert and tighten screws/bolts. (⇒ Section 7.2.5, Page 25)

**7.2.4.4 Fitting the O-rings**

- ✓ The seal chamber has been cleaned.
- ✓ Any damaged or worn parts have been replaced by original spare parts.
  1. Grease and insert O-rings 16.
  2. Mount the coupling and bonnet 9 onto shaft 4.
  3. Mount the gearbox on shaft 4.
  4. Check the position of the valve disc and the position indicator.
  5. Mount the actuator.

**7.2.5 Tightening torques**

**Table 7:** Tightening torques of bolts/screws for valve disc sealing element [Nm]

Thread size	Tightening torque
M6	5
M8	10
M10	20
M12	32
M16	80

**Table 8:** Tightening torques of bonnet/cover bolts [Nm]

Thread size	Tightening torque
M6	4
M8	8
M10	15
M12	28

## 8 Trouble-shooting

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

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

**Table 9:** Trouble-shooting

Problem	Possible cause	Remedy
Valve noise	Unfavourable installation position causing unfavourable flow around or inside the valve (e.g. insufficient distance from a downstream elbow, etc.)	Change installation position.
	Valve operated beyond its design limits	Check design data and/or operating data; change flow resistance of valve.
Valve cannot be actuated.	Foreign matter jammed in the seat area	Flush valve, dismantle, if necessary, and remove foreign matter.
	Gearbox is blocked.	Deblock.
	Electric actuator is not connected.	Make electrical connection.
	Unfavourable flow conditions and restricted movement	Change installation position.
Leakage at the seat/disc interface	Valve not fully closed	Fully close the valve.
	Sealing element damaged or worn	Replace the sealing element.
Cavitation inside the valve	Valve operated beyond its design limits	Valve unsuitable; replace with suitable valve or change operating conditions.
	Operating data changed	
Leakage at the body	Defective sealing elements	Replace sealing elements.
	High external forces	Replace body; check for water hammer.
High actuating forces	Deposits at valve seat	Flush valve, dismantle, if necessary, and clean seat area.
	Dry piping environment, i.e. valve is not in contact with fluid handled.	Verify contact with fluid handled.

## 9 Related Documents

### 9.1 General assembly drawing with list of components

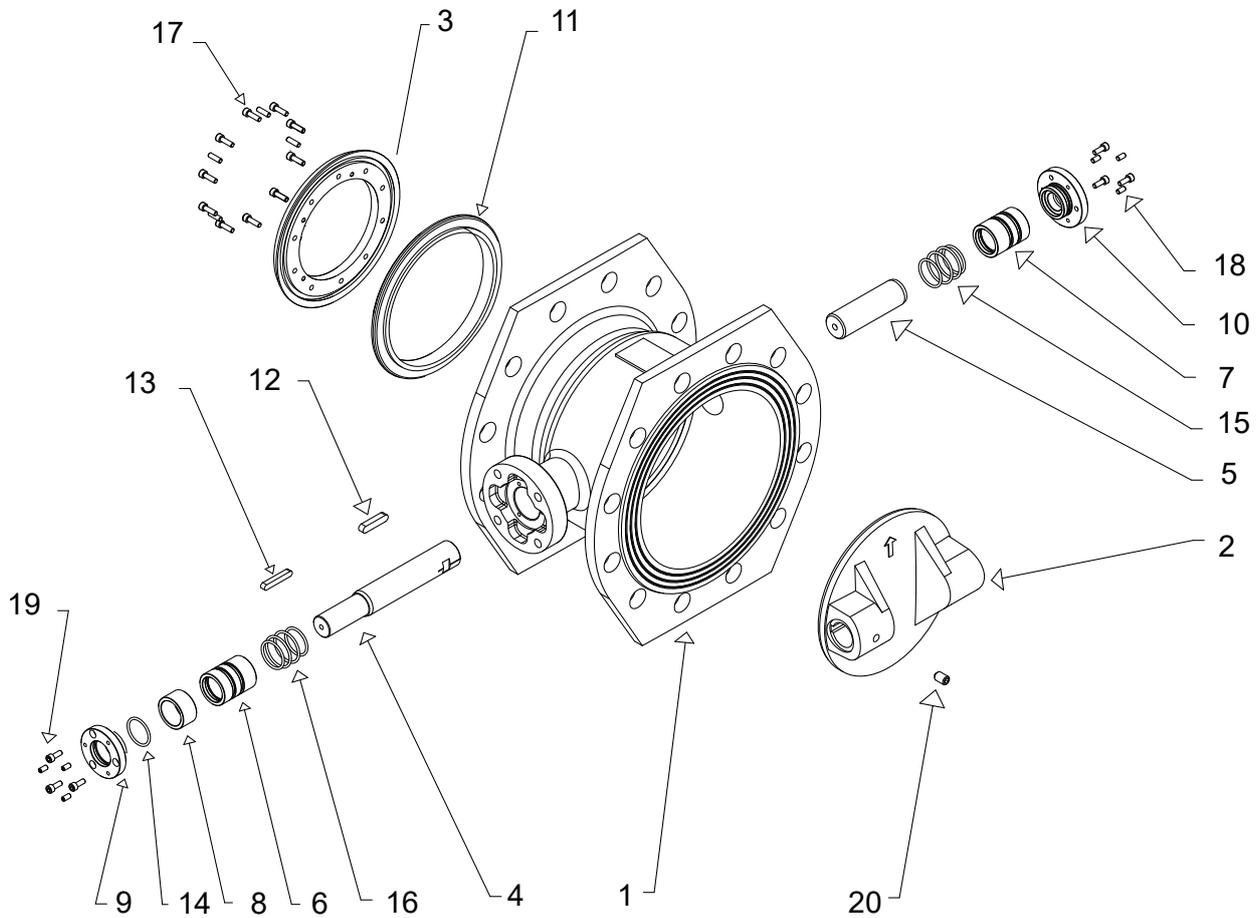


Fig. 4: Exploded view

Table 10: Overview of available materials

Part No.	Description	Material	Material number	Note
1	Body	EN-GJS-400-15	EN-JS1030	Epoxy-coated
2	Valve disc	EN-GJS-400-15	EN-JS1030	Epoxy-coated
3	Retaining ring	AISI 304	-	-
4	Shaft	AISI 304	-	-
5	Shaft	AISI 304	-	-
6	Bearing	Polyoxymethylene	-	-
7	Bearing	Polyoxymethylene	-	-
8	Middle bearing	Polyoxymethylene	-	-
9	Bonnet	EN-GJS-400-15	EN-JS1030	Epoxy-coated
10	Cover	EN-GJS-400-15	EN-JS1030	Epoxy-coated
11	Sealing element	EPDM	-	-
1-A	Body seat	AISI 309L	-	-
12	Key	Ck 45	-	-
13	Key	Ck 45	-	-
14	Ring	Ck 60	-	-
15	O-ring	EPDM	-	-
16	O-ring	EPDM	-	-

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Part No.	Description	Material	Material number	Note
17	Screws, bolts and nuts	A2	-	-
18	Screws, bolts and nuts	A2	-	-
19	Screws, bolts and nuts	A2	-	-
20	Screws, bolts and nuts	A2	-	-

## 9.2 Dimensions and weights

### 9.2.1 Dimensions and weights PN 10, DN 100 - 1100

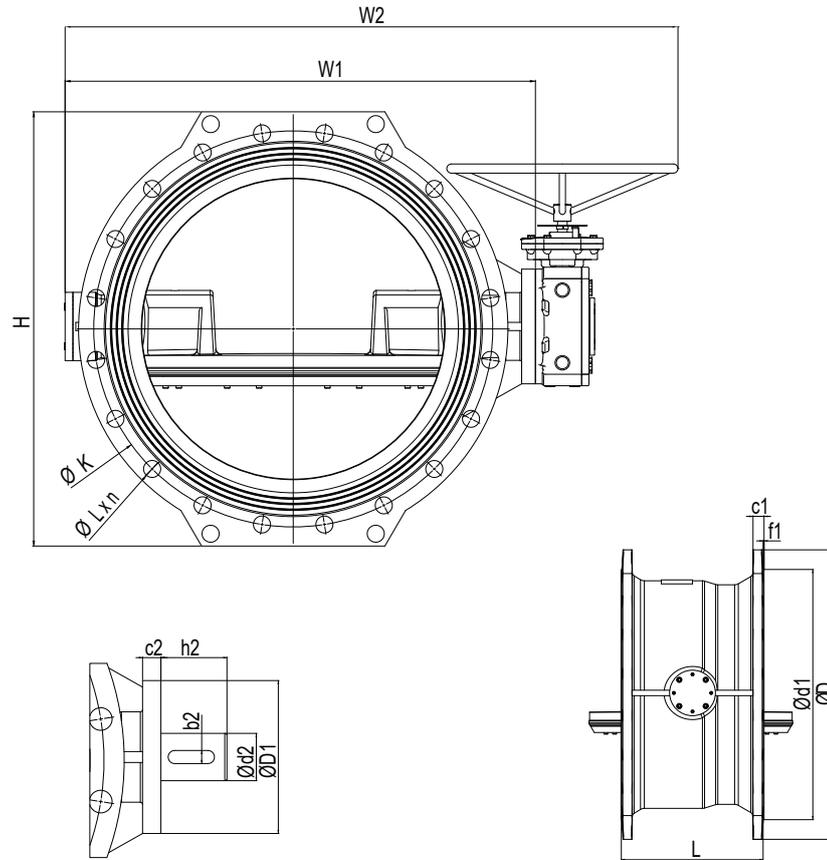


Fig. 5: Sectional drawing PN 10 DN 100 - 1100

Table 11: Dimensions and weights

PN	DN	b2	C1	D	Ød1	Ød2	f1	H	h2	K	L	Øl x n	W1	W2	Top flange <sup>2)</sup>	[kg]
		[mm]	[mm]	[mm]	[mm]	[mm]										
10	100	5	19,0	220	156	14	3	225	57	180	190	19 x 8	240	410	F10	14,7
	125	6	19,0	250	184	18	3	260	57	210	200	19 x 8	265	435	F10	19,1
	150	6	19,0	285	211	18	3	290	57	240	210	23 x 8	296	466	F10	23,4
	200	6	20,0	340	266	28	4	350	57	295	230	23 x 8	346	516	F10	36,8
	250	8	22,0	400	319	28	4	400	57	350	250	23 x 12	418	588	F10	52,4
	300	8	24,5	455	370	34	4	450	68	400	270	23 x 12	515,5	685,5	F14/F10	78,8
	350	10	24,5	505	429	43	4	510	64,5	460	290	23 x 16	552,5	772,5	F14	99,1
	400	12	24,5	565	480	45	4	570	75	515	310	28 x 16	592,5	837,5	F16	130,0
	450	14	25,5	615	530	50	4	625	75	565	330	28 x 20	670	940	F16	170,0
	500	14	26,5	670	582	55	4	674	75	620	350	28 x 20	714	984	F16	207,0
	600	16	30,0	780	682	65	5	795	80	725	390	31 x 20	855	1175	F16	294,0
	700	18	32,5	895	794	75	5	930	115	840	430	31 x 24	1101	1471	F25	432,0
	800	20	35,0	1015	901	80	5	1040	115	950	470	34 x 24	1193	1563	F25	607,0
	900	22	37,5	1115	1001	90	5	1140	142	1050	510	34 x 28	1218	1588	F25	867,0
1000	25	40,0	1230	1112	105	5	1264	142	1160	550	37 x 28	1404	1774	F30	1012,0	
1100	28	42,5	1340	1218	120	5	1360	130	1270	590	37 x 32	1518	1888	F30	1323,0	

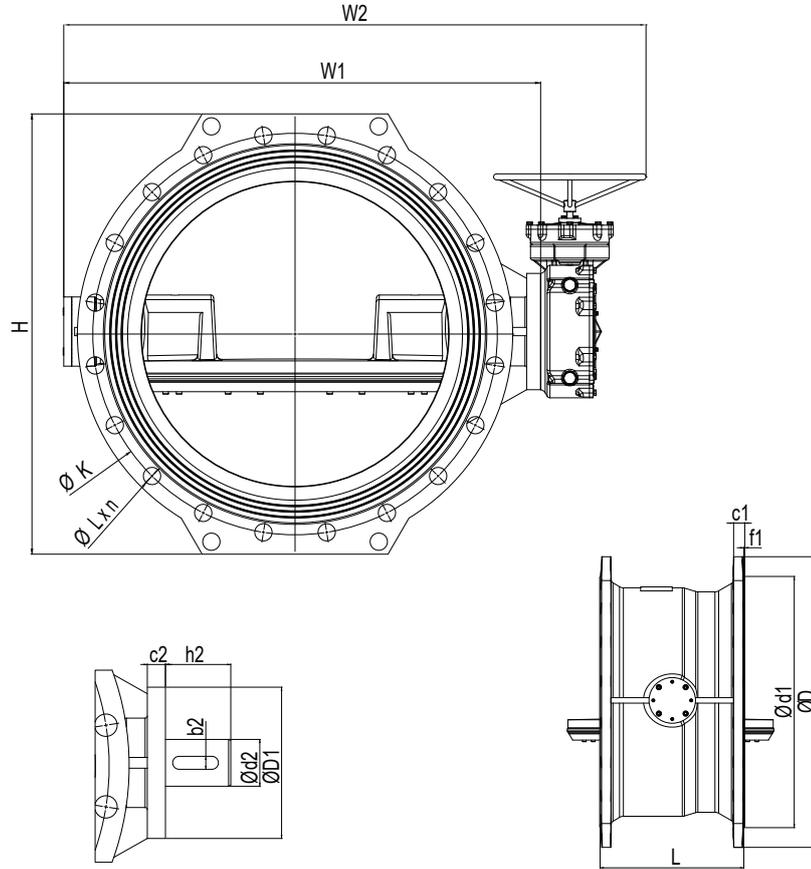
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2) ISO 5211

**Mating dimensions as per standard**

Face-to-face lengths: EN 558-1/14  
 Flanges: DIN EN 1092

**9.2.2 Dimensions and weights PN 10, DN 1200 - 2200**



**Fig. 6:** Sectional drawing PN 10 DN 1200 - 2200

**Table 12:** Dimensions and weights

PN	DN	b2	C1	D	Ød1	Ød2	f1	H	h2	K	L	Øl x n	W1	W2	Top flange <sup>3)</sup>	[kg]
		[mm]	[mm]	[mm]	[mm]											
10	1200	32	45	1455	1328	120	5	1465	160	1380	630	41 x 32	1604	1851	F30	1630
	1300	32	46	1585	1440	130	5	1575	190	1490	670	41 x 32	1733	1992	F40	1996
	1400	40	46	1675	1530	160	5	1705	190	1590	710	44 x 36	1798	2132	F40	2557
	1500	40	47,5	1785	1640	160	5	1795	224	1700	750	44 x 36	2025	2417	F40	2615
	1600	40	49	1915	1750	160	5	1940	238	1820	790	50 x 40	2202	2595	F48	3460
	1800	45	52	2115	1950	180	5	2125	234	2020	870	50 x 44	2365	2758	F48	4165
	2000	50	55	2325	2150	205	5	2335	265	2230	950	50 x 48	2571	2998	F48	4915
	2200	56	65	2550	2370	240	5	2560	265	2440	1030	56 x 52	2760	3187	F48	8242

**Mating dimensions as per standard**

Face-to-face lengths: EN 558-1/14  
 Flanges: DIN EN 1092

3) ISO 5211

9.2.3 Dimensions and weights PN 16, DN 100 - 800

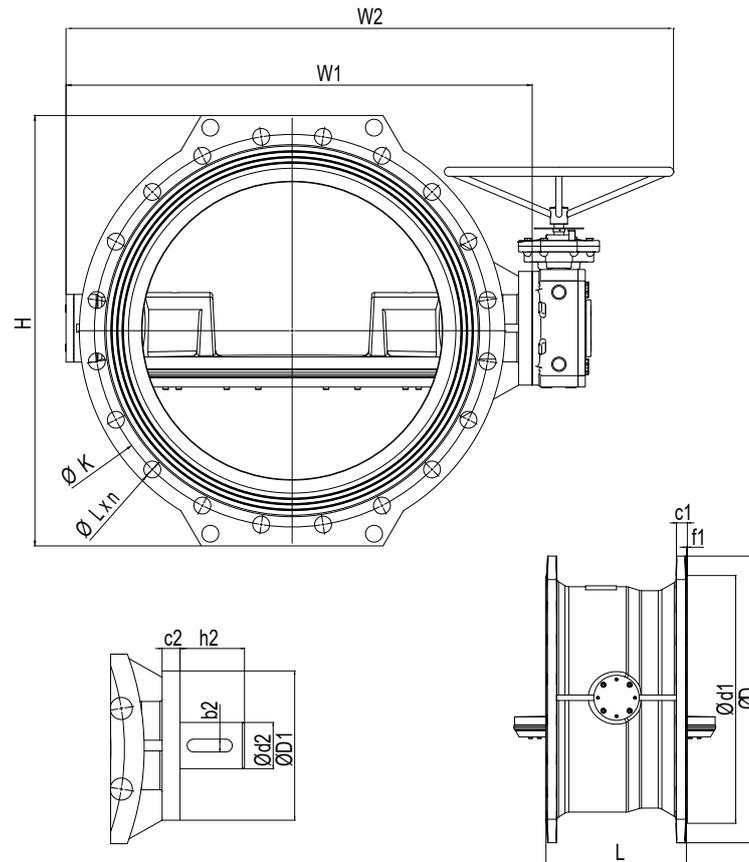


Fig. 7: Sectional drawing PN 16 DN 100 - 800

Table 13: Dimensions and weights

PN	DN	b2	C1	D	Ød1	Ød2	f1	H	h2	K	L	Øl x n	W1	W2	Top flange <sup>4)</sup>	[kg]
		[mm]	[mm]	[mm]	[mm]	[mm]										
16	100	5	19,0	220	156	14	3	225	57	180	190	19 x 8	240	410	F10	14,7
	125	6	19,0	250	184	18	3	260	57	210	200	19 x 8	265	435	F10	19,1
	150	6	19,0	285	211	18	3	290	57	240	210	23 x 8	296	466	F10	23,4
	200	8	20,0	340	266	28	4	350	57	295	230	23 x 12	346	516	F10	36,2
	250	8	22,0	405	319	30	4	400	61,5	355	250	28 x 12	418	588	F10	53,0
	300	10	24,5	460	370	34	4	450	64,5	410	270	28 x 12	515,5	735,5	F14/F10	82,0
	350	12	26,5	520	429	43	4	510	64,5	470	290	28 x 16	552,5	797,5	F14	105,0
	400	14	28,0	580	480	45	4	570	75	525	310	31 x 16	592,5	862,5	F16	141,0
	450	14	30,0	640	548	50	4	625	75	585	330	31 x 20	670	990	F16	195,0
	500	16	31,5	715	609	55	4	718	80	650	350	34 x 20	714	1067,5	F16	243,0
	600	18	36,0	840	720	65	5	795	80	770	390	37 x 20	855	1225	F16	353,0
	700	20	39,5	910	794	75	5	930	119	840	430	37 x 24	1101	1471	F25	537,0
800	22	43,0	1025	901	80	5	1055	119	950	470	41 x 24	1128	1498	F25	725,0	

Mating dimensions as per standard

Face-to-face lengths: EN 558-1/14  
 Flanges: DIN EN 1092

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4) ISO 5211

9.2.4 Dimensions and weights PN 16, DN 900 - 1800

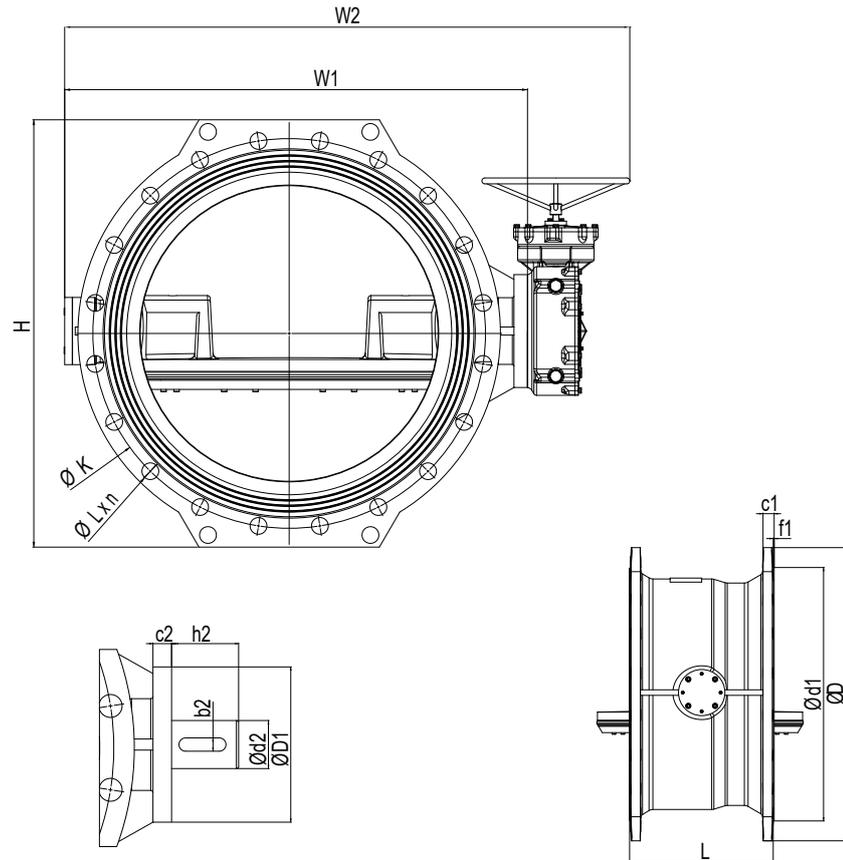


Fig. 8: Sectional drawing PN 16 DN 900 - 1800

Table 14: Dimensions and weights

PN	DN	b2	C1	D	Ød1	Ød2	f1	H	h2	K	L	Øl x n	W1	W2	Top flange <sup>5)</sup>	[kg]
		[mm]	[mm]	[mm]	[mm]											
16	900	22	46,5	1125	1001	90	5	1160	142	1050	510	41 x 28	1283,5	1723,5	F25	1015
	1000	25	50	1255	1112	105	5	1289	142	1170	550	44 x 28	1450	1890	F30	1395
	1100	28	53,5	1355	1218	120	5	1360	130	1270	590	44 x 32	1515	1955	F30	1404
	1200	32	57	1485	1328	120	5	1495	160	1390	630	50 x 32	1603	2143	F40	1784
	1300	32	57	1585	1430	130	5	1585	190	1490	670	50 x 32	1733	2273	F40	2130
	1400	40	60	1685	1530	160	5	1700	190	1590	710	50 x 36	1798	2338	0F	2715
	1500	40	62,5	1820	1640	160	5	1830	224	1710	750	57 x 36	2025	2565	F40	3240
	1600	40	65	1930	1750	160	5	1940	238	1820	790	57 x 40	2202	2742	F48	3921
	1800	45	70	2130	1950	180	5	2140	234	2020	870	57 x 44	2334	2878	F48	5354

Mating dimensions as per standard

Face-to-face lengths: EN 558-1/14

Flanges: DIN EN 1092

5) ISO 5211

9.2.5 Dimensions and weights PN 25, DN 100 - 700

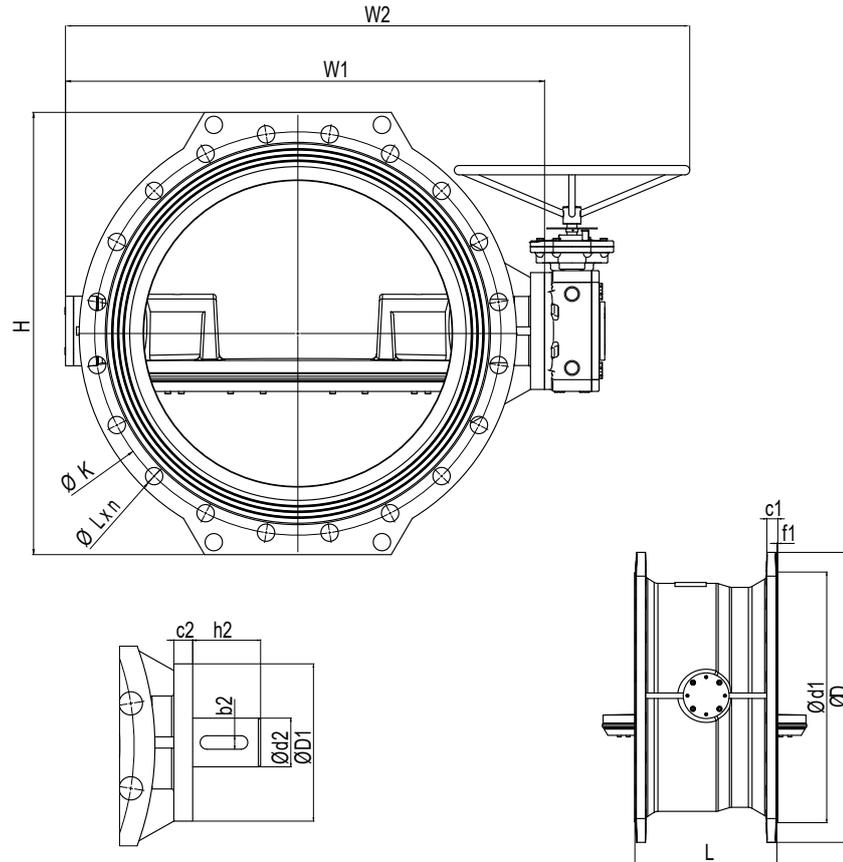


Fig. 9: Sectional drawing PN 25 DN 100 - 700

Table 15: Dimensions and weights

PN	DN	b2	C1	D	Ød1	Ød2	f1	H	h2	K	L	Øl x n	W1	W2	Top flange <sup>6)</sup>	[kg]
		[mm]	[mm]	[mm]	[mm]											
25	100	5	19,0	235	156	14	3	225	57	190	190	23 x 8	240	410	F10	15,7
	125	6	19,0	270	184	18	3	2620	57	220	200	28 x 8	265	435	F10	20,0
	150	6	20,0	300	211	18	3	290	57	250	210	28 x 8	296	466	F10	25,5
	200	8	22,0	360	274	28	4	350	57	310	230	28 x 12	356	576	F10	39,3
	250	8	24,5	425	330	30	4	400	75	370	250	31 x 12	418	663	F10	60,0
	300	12	27,5	485	389	40	4	512	85	430	270	31 x 16	512,5	782,5	F14	101,0
	350	14	30,0	555	448	50	4	575	105	490	290	34 x 16	580	900	F16	158,0
	400	14	32,0	620	503	50	4	630	105	550	310	37 x 16	650	970	F16	185,0
	450	16	34,5	670	548	55	4	674	105	600	330	37 x 20	685	1055	F16	223,0
	500	18	36,5	730	609	60	4	735	109	660	350	37 x 20	883	1253	F25/F16	297,0
	600	22	42,0	845	720	80	5	861	130	770	390	41 x 20	884	1254	F25	421,0
	700	25	46,5	960	820	90	5	970	130	875	430	44 x 24	1008	1378	F25	639,0

Mating dimensions as per standard

Face-to-face lengths: EN 558-1/14  
 Flanges: DIN EN 1092

8118.8/01-EN

6) ISO 5211

9.2.6 Dimensions and weights PN 25, DN 800 - 1000

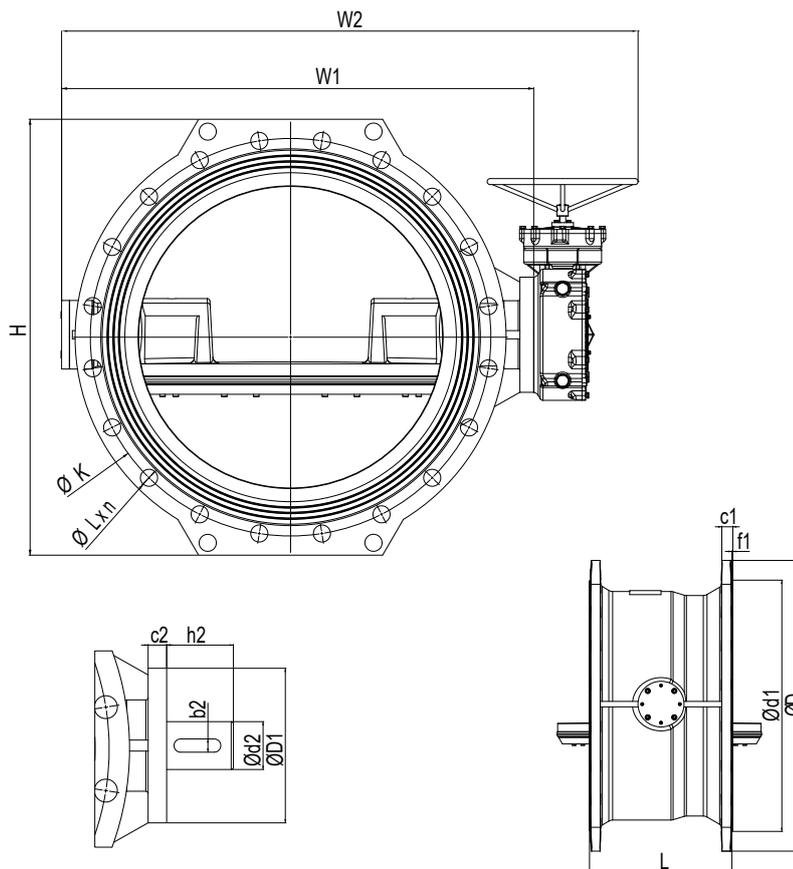


Fig. 10: Sectional drawing PN 25 DN 700 - 1000

Table 16: Dimensions and weights

PN	DN	b2	C1	D	Ød1	Ød2	f1	H	h2	K	L	Øl x n	W1	W2	Top flange <sup>7)</sup>	[kg]
		[mm]	[mm]	[mm]	[mm]											
25	800	28	51	1085	928	96	5	1105	160	990	470	50 x 24	1143	1583	F30	936,0
	900	32	55,5	1185	1028	130	5	1205	170	1090	510	50 x 28	1327	1767	F30	1334,0
	1000	36	60	1320	1140	150	5	1352	220	1210	550	57 x 28	1499	2323	F40	1871,0

Mating dimensions as per standard

Face-to-face lengths: EN 558-1/14

Flanges: DIN EN 1092

7) ISO 5211

9.2.7 Dimensions and weights PN 40, DN 100 - 600

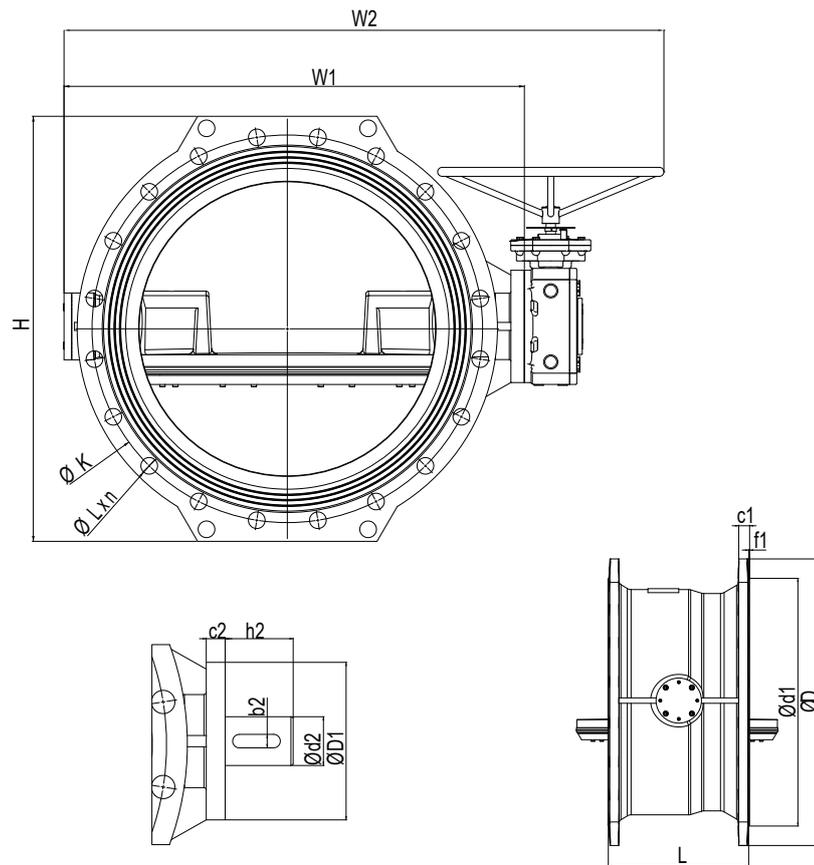


Fig. 11: Sectional drawing PN 40 DN 100 - 600

Table 17: Dimensions and weights

PN	DN	b2	C1	D	Ød1	Ød2	f1	H	h2	K	L	Øl x n	W1	W2	Top flange <sup>8)</sup>	[kg]
		[mm]	[mm]	[mm]	[mm]	[mm]										
40	100	5	19,0	235	156	14	3	225	57	190	190	23 x 8	240	410	F10	15,7
	125	6	23,5	270	184	18	3	260	57	220	200	28 x 8	265	435	F10	23,0
	150	6	26,0	300	211	18	3	295	57	250	210	28 x 8	305	475	F10	31,5
	200	8	30,0	375	284	28	4	385	61	320	230	31 x 12	377,5	597,5	F10	54,0
	250	8	34,5	450	345	30	4	460	85	385	250	34 x 12	470	740	F14	104,0
	300	12	39,5	515	409	40	4	512	105	450	270	34 x 16	521,5	832,5	F14	132,0
	350	14	44,0	580	465	50	4	580	105	510	290	37 x 16	657	1027	F16	193,0
	400	14	48,0	660	535	50	4	670	105	585	310	41 x 16	710	1080	F16	263,0
	450	16	49,0	685	560	55	4	741	125	610	330	41 x 20	735,4	1105,4	F16	267,0
	500	18	52,0	755	615	60	4	761	125	670	350	44 x 20	774	1144	F25/F16	371,0
600	22	58,0	890	735	80	5	912	140	795	390	50 x 20	945	1315	F30	544,0	

Mating dimensions as per standard

Face-to-face lengths: EN 558-1/14

Flanges: DIN EN 1092

8118.8/01-EN

8) ISO 5211

9.2.8 Dimensions and weights PN 40, DN 700 - 1000

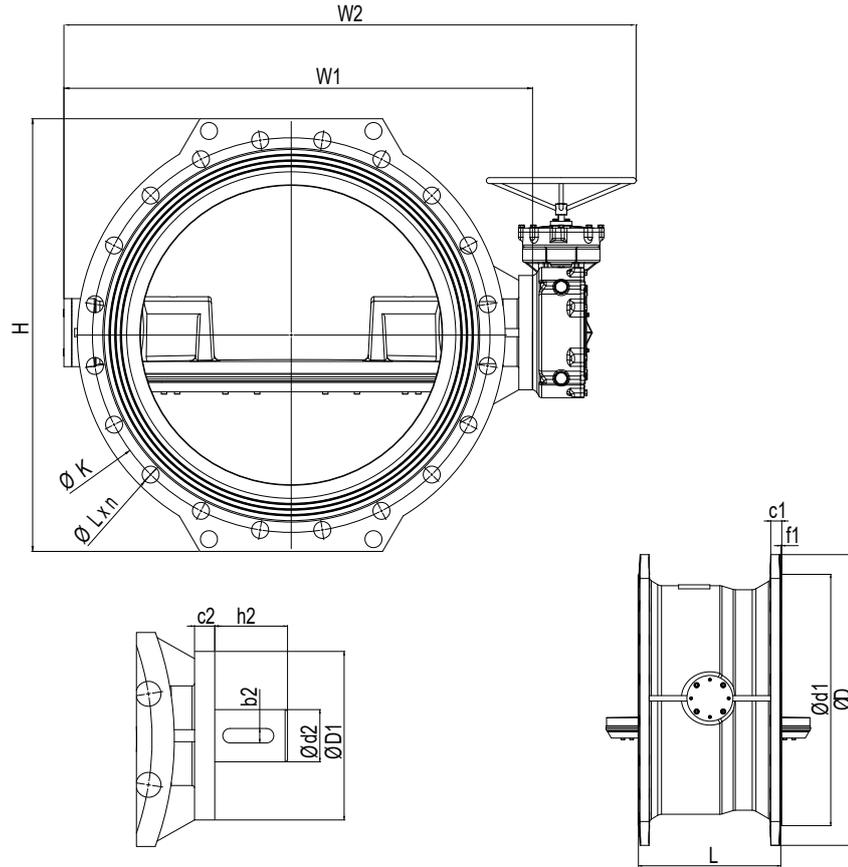


Fig. 12: Sectional drawing PN 40 DN 700 - 1000

Table 18: Dimensions and weights

PN	DN	b2	C1	D	Ød1	Ød2	f1	H	h2	K	L	Øl x n	W1	W2	Top flange <sup>9)</sup>	[kg]
		[mm]	[mm]	[mm]	[mm]											
40	700	28	64	995	840	108	5	1001	160	900	430	48 x 24	1009	1449	F30	767,0
	800	32	65	1140	960	112	5	1160	215	1030	470	57 x 24	1220	1710	F30/F40	1157,0
	900	40	70	1250	1070	160	5	1270	220	1140	510	57 x 28	1400	1940	F40	1757,0
	1000	45	75	1360	1180	175	5	1360	220	1250	550	57 x 28	1576	2116	F40	2265,0

Mating dimensions as per standard

Face-to-face lengths: EN 558-1/14  
 Flanges: DIN EN 1092

9) ISO 5211



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**KSB SE & Co. KGaA**

Johann-Klein-Straße 9 • 67227 Frankenthal (Germany)

Tel. +49 6233 86-0

[www.ksb.com](http://www.ksb.com)

**KSB Italia S.p.A.**

Via Massimo D'Azeglio, 32

20863 Concorezzo MB

Tel. +39 039 6048-000 – Fax +39 039 6048-097

[www.ksb.com](http://www.ksb.com)

**Centri Service**

Concorezzo MB • Via Massimo D'Azeglio, 32

Tel. +39 039 6048-000 • Fax +39 039 6048-882

Scorzè VE • Via Guido Rossa, 12/A

Tel. +39 041 5840917 • Fax +39 041 5840918

