

Knife Gate Valve

# HERA-BHT / HERA-SH / HERA-BDS

## Operating Manual



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Operating Manual HERA-BHT / HERA-SH / HERA-BDS

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## Glossary

### **PED**

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

### **Technical literature**

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

# 1 General

## 1.1 Principles

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

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

## 1.2 Target group

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

## 1.3 Other applicable documents

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

Document	Contents
Type series booklet	Description of the valve
Flow characteristics <sup>1)</sup>	Information on Kv and zeta values
General assembly drawing <sup>2)</sup>	Sectional drawing of the valve
Sub-supplier product literature <sup>3)</sup>	Operating manuals and other product literature for the accessories

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

## 1.4 Symbols

**Table 2:** Symbols used in this manual

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

1) If any

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

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

## 2 Safety

### 2.1 Key to safety symbols/markings

**Table 3:** Definition of safety symbols/markings

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

### 2.2 General

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

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

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

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

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

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

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

Valves exposed to creep-rupture conditions have a limited service life and have to meet the applicable regulations stipulated in the technical codes.

In the case of customised special variants, further restrictions may apply with regard to the operating mode and service life. Please refer to the relevant sales literature for this information.

This operating manual does not take into account:

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

### **2.3 Intended use**

- Only operate valves which are in perfect technical condition.
- Do not operate partially assembled valves.
- The valve must only be used for fluids specified in the product literature.
- Only operate the valve within the permissible operating range specified for pressure and temperature.
- 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.

#### **2.3.1 Prevention of foreseeable misuse**

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

### **2.4 Personnel qualification and training**

All personnel involved must be fully qualified to transport, install, operate, maintain and inspect the product this manual refers to and be fully aware of the interaction between the valve and the system.

The responsibilities, competence and supervision of all personnel involved in transport, installation, operation, maintenance and inspection must be clearly defined by the operator.

Deficits in knowledge must be rectified by means of training and instruction provided by sufficiently trained specialist personnel. If required, the operator can commission the manufacturer/supplier to train the personnel.

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

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

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

### 2.6 Safety awareness

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

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

### 2.7 Safety information for the operator/user

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.

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

### 2.8 Safety information for maintenance, inspection and installation

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

### 2.9 Unauthorised modes of operation

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

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

(⇒ Section 2.3, Page 7)

Shut-off valves are not suitable for regulating volume flow.

Gate valves are used in such a way that they are either fully open or fully closed. An intermediate position (throttling function) is not permitted.

### 3 Transport/Temporary Storage/Disposal

#### 3.1 Checking the condition upon delivery

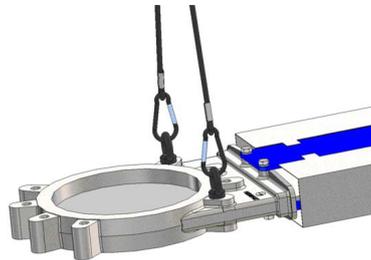
1. On transfer of goods, check each packaging unit for damage.
2. In the event of in-transit damage, assess the exact damage, document it and notify or the supplying dealer (as applicable) and the insurer about the damage in writing immediately.

#### 3.2 Transport

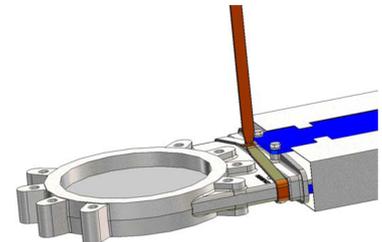
Always close the valve manually before transporting it. The valve is delivered ready for operation and its line connection ports may still be closed with caps, if applicable. Original spare parts are only ready for operation following assembly/installation and subsequent shell and leak testing of the valve.

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

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



Lifting with eyebolts



Lifting with lifting straps

#### 3.3 Storage/preservation

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

	<p><b>CAUTION</b></p>
	<p><b>Incorrect storage</b>            Damage to the valve due to dirt, corrosion, humidity and/or frost!</p> <ul style="list-style-type: none"> <li>▷ Store the valve in a dust- and vibration-free, frost-proof room where the atmospheric humidity is as constant as possible (use suitable caps or film for protection).</li> <li>▷ Close the valve using little force and store in the closed position.</li> <li>▷ Protect the valve from contact with solvents, lubricants, fuels or other chemicals.</li> <li>▷ For rust protection, pack the valve in plastic bags and/or apply a rust preventative oil recommended by the manufacturer if necessary.</li> </ul>

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

	<b>NOTE</b>
	For actuated valves, also observe the actuator's operating manual.

### 3.4 Return to supplier

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

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

### 3.5 Disposal

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

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

## 4 Valve Description

### 4.1 General description

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

### 4.2 Marking

**Table 4:** General marking

Nominal size	DN ...
Nominal pressure class or max. permissible pressure/temperature	PN ... / ... bar / ... °C
Manufacturer	KSB
Type series/model or order number	HERA...
Year of construction	20..
Material	.....
Flow direction arrow (if applicable)	→
Traceability of the material	.....
CE markingPED	<b>CE</b>

The CE marking on the valve indicates that it is in conformity with the European Pressure Equipment Directive 97/23/EC.

Fluids in Groups 1 and 2

Class	PN	DN										
		≤25	32	40	50	65	80	100	125	150	≥200	
150	10	<del>CE</del>	<b>CE</b>									
	16											
≥300	25											
	≥40											

**Fluid groups** Group 1 comprises fluids defined as

- Explosive
- Extremely flammable
- Highly flammable
- Flammable: The maximum allowable temperature is above flashpoint
- Very toxic
- Toxic
- Oxidising

Group 2 comprises all other fluids not referred to in Group 1.

### 4.3 Knife Gate Valves

#### 4.3.1 Uni-directional knife gate valve

##### 4.3.1.1 HERA-SH



##### 4.3.1.1.1 Operating data

**Table 5:** Operating properties

Characteristic	Value
Nominal pressure	PN 10/16, Class 150
Nominal size	DN 50-1000
Max. permissible pressure	10,3 bar
Max. permissible temperature	180 °C

##### 4.3.1.1.2 Fluids handled

- Pulp
- Waste water
- Corrosive fluids
- Syrup
- Service water
- Other fluids on request.

##### 4.3.1.1.3 Design details

###### Design

- Designed and tested to MSS SP-81
- Pressure/temperature ratings to MSS SP-81
- Single-piece body
- Full-lug body
- Stem sealed by gland packing
- Rising stem
- Outside screw
- Non-rising handwheel
- Uni-directional
- Pillar yoke
- Suitable for mounting electric actuators and gearboxes to DIN ISO 5210
- The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 97/23/EC (PED) for fluids in Group 2.
- The valves can be used in potentially explosive atmospheres, Group II, category 2 (zones 1+21) and category 3 (zones 2+22) to ATEX 94/9/EC.

**Variants**

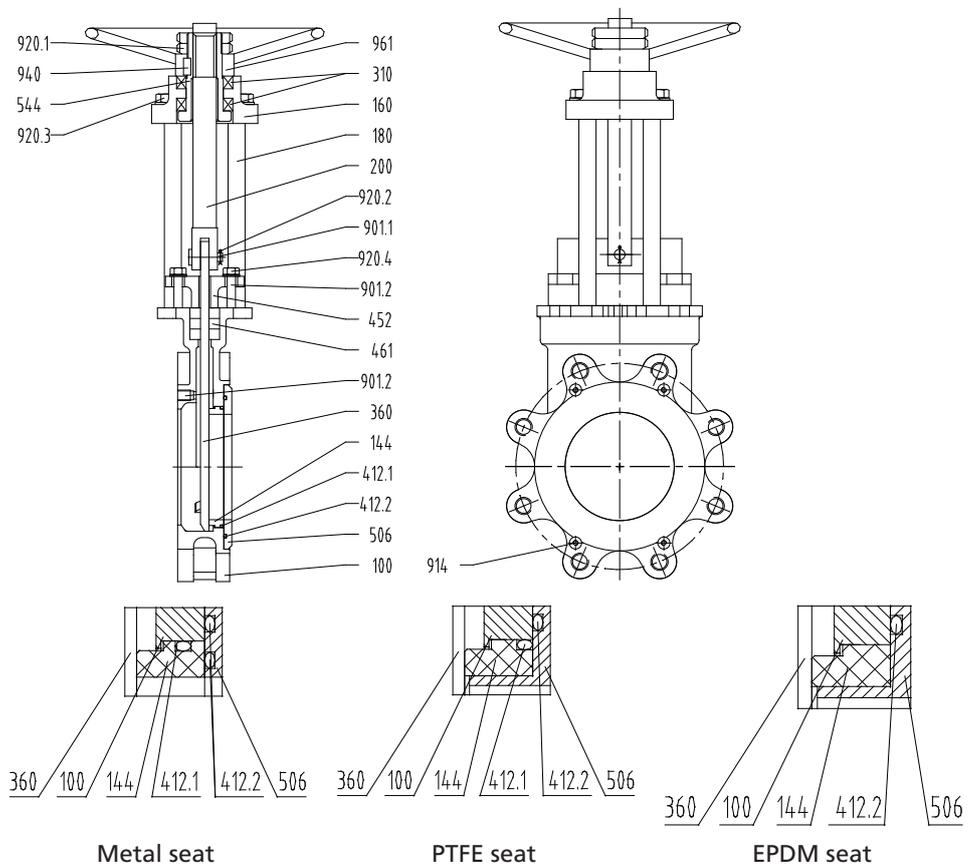
- Body made of nodular cast iron (wafer-type body only)
- Wafer-type body
- Non-rising stem
- Graphite gland packing for high temperatures
- Mounting of electric and pneumatic actuators
- Mounting of gearboxes
- Other material variants
- Larger nominal sizes and other variants on request

**4.3.1.1.4 Pressure/temperature ratings**

**Table 6: Test and operating pressures**

Nominal pressure	Nominal size	Shell test <sup>4)</sup>	Leak test (seat) <sup>4)</sup>	Permissible operating pressures
		with water		
PN	DN	[bar]	[bar]	[bar]
10	50-600	15	2,8	10,3
	700-1000	15	2,8	6,9
16	50-600	24	2,8	10,3
	700-1000	24	2,8	6,9
Class 150	50-600	30	2,8	10,3
	700-1000	30	2,8	6,9

**4.3.1.1.5 Materials**



4) Test procedure to MSS SP-81

Table 7: Parts list

Part No.	Description	Material	Note
100	Body	ASTM A 216 WCB	
		ASTM A 351 CF8	
		ASTM A 351 CF8M	
144	Seat	ASTM A 182 F304	Hard chromium plated for metal-seated design
		ASTM A 182 F316	Hard chromium plated for metal-seated design
		EPDM	-20 °C to +120 °C
		PTFE	-20 °C to +150 °C
160	Bonnet	Aluminium alloy	
180	Pillar	ASTM A 182 F304	Body made of A 351 CF8(M)
		C45 + Cr	Body made of A 216 WCB
200	Stem	ASTM A 182 F304	
310	Plain bearing	GCr6	
360	Blade	ASTM A 182 F304	Hard chromium plated for metal-seated design
		ASTM A 182 F316	Hard chromium plated for metal-seated design
		ASTM A 276 410	Hard chromium plated
412.1	O-ring	NBR	Standard: -20 °C to +100 °C
		Viton	Variant: -20 °C to +180 °C
412.2	O-ring	NBR	Standard: -20 °C to +100 °C
		Viton	Variant: -20 °C to +180 °C
452	Gland follower	ASTM A 216 WCB	
		ASTM A 351 CF8	
		ASTM A 351 CF8M	
461	Gland packing	PTFE	
		Graphite	Variant, for temp. from 150 °C
506	Retaining ring	ASTM A 216 WCB	
		ASTM A 182 F304	
		ASTM A 182 F316	
544	Threaded bush	H59	
901.1	Bolt	ASTM A 276 304	
901.2	Bolt	ASTM A 182 F304	
914	Hexagon socket head cap screw	ASTM A 182 F304	
920.1	Nut	ASTM A 182 F304	
920.2	Split pin	ASTM A 182 F304	
920.3	Nut	ASTM A 182 F304	
920.4	Nut	ASTM A 182 F304	
940	Key	C45	
961	Handwheel	D-2	

#### 4.3.1.1.6 Function

HERA-SH knife gate valves consist of a single-piece body (100), four pillars (180) and the functional unit.

The functional unit mainly consists of the blade (360), the stem (200), the seat (144) and the actuating element, i.e. the handwheel (961) or actuator.

The blade (360) passage in the body (100) is sealed to atmosphere by a gland packing (461), which is tightened via the gland follower (452) by means of two nuts (920.4).

### 4.3.2 Bi-directional Knife Gate Valve

#### 4.3.2.1 HERA-BDS



##### 4.3.2.1.1 Operating data

**Table 8:** Operating properties

Characteristic	Value
Nominal pressure	PN 10/16, Class 150
Nominal size	DN 50-600
Max. permissible pressure	10 bar
Max. permissible temperature	120 °C

##### 4.3.2.1.2 Fluids handled

- Slurry
- Abrasive fluids
- Pulp
- Waste water
- Service water
- Other fluids on request.

##### 4.3.2.1.3 Design details

###### Design

- Design to ASME B16.34 and MSS SP-81
- Pressure/temperature ratings to MSS SP-81
- Full-lug body
- Wafer-type body
- Bi-directional seal
- Rising stem
- Non-rising handwheel
- Resilient lining
- The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 97/23/EC (PED) for fluids in Group 2.

**Variants**

- Non-rising stem
- Graphite gland packing for high temperatures
- Locking device
- Protection plate
- Mounting of electric and pneumatic actuators
- Mounting of gearboxes
- Other material variants
- Larger nominal sizes up to DN 900

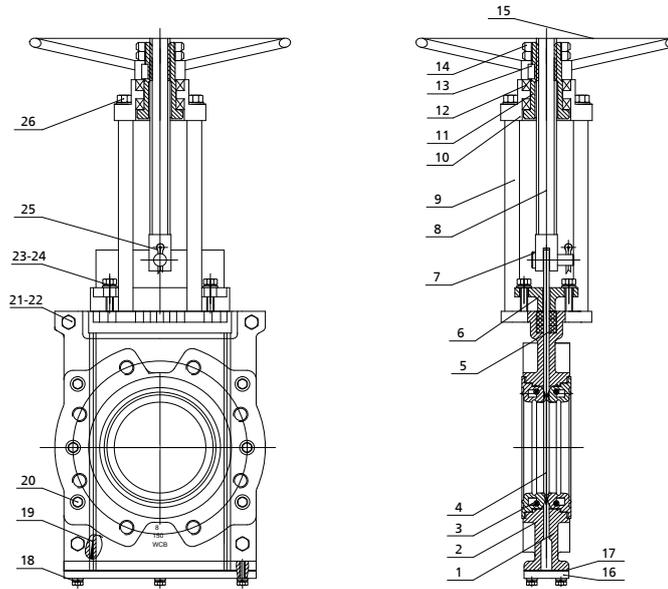
**4.3.2.1.4 Pressure/temperature ratings**

**Table 9: Test and operating pressures**

Nominal pressure	Nominal size	Shell test <sup>5)6)</sup>	Leak test (seat) <sup>5)</sup>	Permissible operating pressures
		with water		
PN	DN	[bar]	[bar]	[bar]
10	50-600	15	2,8	10,3
16	50-600	24	2,8	10,3
Class 150	50-600	30	2,8	10,3

**4.3.2.1.5 Materials**

**4.3.2.1.5.1 HERA-BDS with handwheel**



**Table 10: Parts list**

Part No.	Description	Material	Note
1	Upper body section	ASTM A 216 WCB	
		ASTM A 351 CF8	
		ASTM A 351 CF8M	
2	Lower body section	ASTM A 216 WCB	
		ASTM A 351 CF8	
		ASTM A 351 CF8M	

5) Test procedure to MSS SP-81  
 6) Test medium at 0 °C to 66 °C

Part No.	Description	Material	Note
3	Seat	EPDM	
		NBR	
		Rubber	
4	Blade	ASTM A 182 F304	Hard chromium plated
		ASTM A 182 F316	Hard chromium plated
		ASTM A 276 410	Material available for model with metal (hard chromium plated) seat only
5	Packing ring	PTFE	
6	Gland follower	ASTM A 216 WCB	
		ASTM A 351 CF8	
		ASTM A 351 CF8M	
7	Pin	ASTM A 182 F304	
8	Stem	ASTM A 182 F304	
9	Pillar	ASTM A 182 F304	Body made of A 351 CF8(M)
		C45 + Cr	Body made of A 216 WCB
10	Bonnet	ASTM A 216 WCB	
		ZL102	
11	Nut	H59	
12	Plain bearing	GCr6	
13	Key	45#	
14	Slotted round nut	45#	Electroless nickel-plated
15	Handwheel	Nodular cast iron	
16	Bottom	ASTM A 216 WCB	
		ASTM A 351 CF8	
		ASTM A 351 CF8M	
17	Gasket	NBR	
18	Hexagon head bolt	ASTM A 182 F304	
19	Sealing cord	NBR	
20	Hexagon socket head cap screw	ASTM A 182 F304	
21	Hexagon head bolt	ASTM A 182 F304	
22	Hexagon nut	ASTM A 182 F304	
23	Stud	ASTM A 182 F304	
24	Hexagon nut	ASTM A 182 F304	
25	Split pin	Stainless steel	
26	Hexagon nut	ASTM A 182 F304	

4.3.2.1.5.2 HERA-BDS with pneumatic actuator

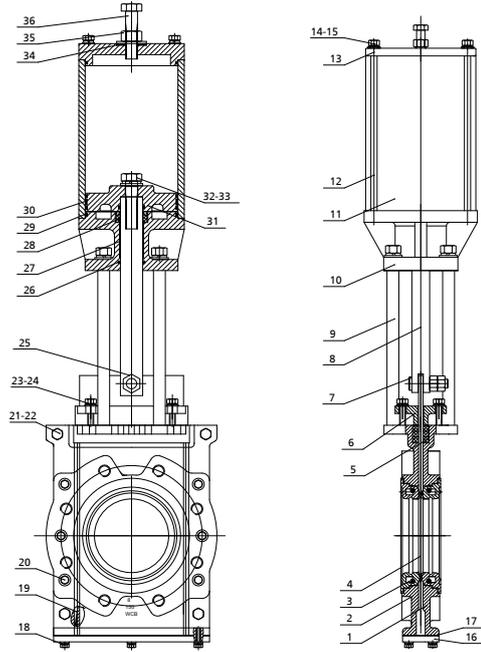


Table 11: Parts list

Part No.	Description	Material	Note
1	Upper body section	ASTM A 216 WCB	
		ASTM A 351 CF8	
		ASTM A 351 CF8M	
2	Lower body section	ASTM A 216 WCB	
		ASTM A 351 CF8	
		ASTM A 351 CF8M	
3	Seat	EPDM	
		NBR	
		Rubber	
4	Blade	ASTM A 182 F304	Hard chromium plated
		ASTM A 182 F316	Hard chromium plated
		ASTM A 276 410	Material available for model with metal (hard chromium plated) seat only
5	Packing ring	PTFE	
6	Gland follower	ASTM A 216 WCB	
		ASTM A 351 CF8	
		ASTM A 351 CF8M	
7	Pin	ASTM A 182 F304	
8	Cylinder rod	45#	Hard chromium plated
9	Pillar	ASTM A 182 F304	Body made of A 351 CF8(M)
		C45 + Cr	Body made of A 216 WCB
10	Bottom end cap	Q 235	
		ZL102	
11	Cylinder	Q 235	Aluminium alloy
12	Tie bolt	Q 235	Galvanised
13	Top end cap	Q 235	
		ZL102	
14	Hexagon nut	ASTM A 182 F304	
15	Spring washer	65Mn	

Part No.	Description	Material	Note
16	Bottom	ASTM A 216 WCB	
		ASTM A 351 CF8	
		ASTM A 351 CF8M	
17	Gasket	NBR	
18	Hexagon head bolt	ASTM A 182 F304	
19	Sealing cord	NBR	
20	Hexagon socket head cap screw	ASTM A 182 F304	
21	Hexagon head bolt	ASTM A 182 F304	
22	Hexagon nut	ASTM A 182 F304	
23	Stud	ASTM A 182 F304	
24	Hexagon nut	ASTM A 182 F304	
25	Hexagon nut	ASTM A 182 F304	
26	O-ring	NBR	
27	Boundary-lubricated bearing	Composite	
28	Y-ring	Polyurethane	
29	O-ring	NBR	
30	Guide ring	PTFE	
31	Piston	ZL102	
		Q 235	
32	Hexagon head bolt	45#	
33	Spring washer	65Mn	
34	Gasket	PTFE	
35	Hexagon nut	ASTM A 182 F304	
36	Adjusting screw	ASTM A 182 F304	

#### 4.3.2.1.6 Function

HERA-BDS knife gate valves consist of a two-piece body (1, 2), four pillars (9) and the functional unit. The functional unit mainly consists of the blade (4), the stem (8), the seat (3) and the actuating element (handwheel (15) or actuator).

The blade (4) passage in the body (1, 2) is sealed to atmosphere by a gland packing (5), which is tightened via the gland follower (6) by means of studs (23) and nuts (24).

In fully open position, the blade (4) is fully retracted from the flow path and the two seats are pressed together tightly, resulting in a hydraulically favourable flow passage that prevents solid ingress and deposits, which would lead to increased friction as the blade (4) slides between the two body halves.

As the valve closes, the knife end of the blade (4) slowly slides between the two body seats. When the valve is fully closed, the blade rests fully against the seats, giving bubble-tight shut-off in both directions.

#### 4.3.2.2 HERA-BHT



#### 4.3.2.2.1 Operating data

**Table 12:** Operating properties

Characteristic	Value
Nominal pressure	PN 10/16, Class 150
Nominal size	DN 80-600
Max. permissible pressure	10,3 bar
Max. permissible temperature	100 °C

#### 4.3.2.2.2 Fluids handled

- Slurry
- High-density fluids
- Solids-laden fertiliser fluids
- Pulp
- Digested sludge
- Raw sludge
- Activated sludge
- Waste water
- Service water
- Other fluids on request.

#### 4.3.2.2.3 Design details

##### Design

- Design to ASME B16.34 and MSS SP-81
- Semi-lug body
- Two-piece body with integrated flange seal
- Rising stem
- Non-rising handwheel
- Welded steel plate construction (DN 450-600)
- Bi-directional and soft-seated
- Through-going blade with excellent flow characteristic
- Robust yoke for actuator mounting as a standard
- The valves satisfy the safety requirements of Annex I of the European Pressure Equipment Directive 97/23/EC (PED) for fluids in Group 2.
- The valves can be used in potentially explosive atmospheres, Group II, category 2 (zones 1+21) and category 3 (zones 2+22) to ATEX 94/9/EC.

##### Variants

- Double-acting pneumatic actuators
- Electric actuators
- Locking device
- Stem extension
- Stem protecting tube
- Position indicator
- Chain wheel
- Mechanical limit switch
- Larger nominal sizes and other variants on request

4.3.2.2.4 Pressure/temperature ratings

Table 13: Test and operating pressures

Nominal pressure	Nominal size	Shell test <sup>7)</sup>	Leak test (seat) <sup>7)</sup>	Permissible operating pressures
		with water		
PN	DN	[bar]	[bar]	[bar]
10	80-600	15	2,8	10,3
16	80-600	24	2,8	10,3
Class 150	80-600	30	2,8	10,3

4.3.2.2.5 Materials

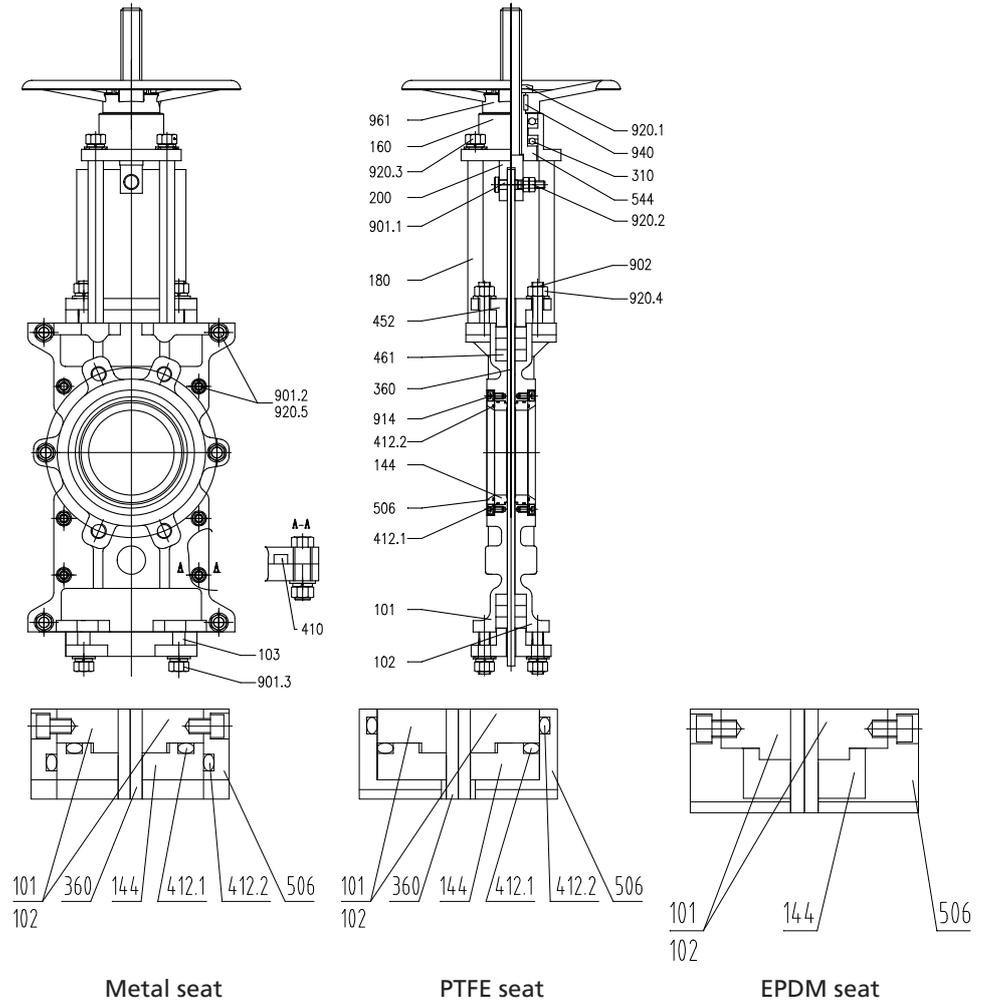


Table 14: Parts list

Part No.	Description	Material	Note
101	Lower body section	ASTM A 216 WCB	
		ASTM A 351 CF8	
		ASTM A 351 CF8M	
102	Upper body section	ASTM A 216 WCB	
		ASTM A 351 CF8	
		ASTM A 351 CF8M	
103	Bottom plate	ASTM A 216 WCB	
		ASTM A 351 CF8	

7) Test procedure to MSS SP-81

Part No.	Description	Material	Note
103	Bottom plate	ASTM A 351 CF8M	
144	Seat	ASTM A 182 F304 + HCr	For metal-seated design
		ASTM A 182 F316 + HCr	For metal-seated design
		EPDM	-20 °C to +120 °C
		PTFE	-20 °C to +150 °C
160	Bonnet	Aluminium alloy	
180	Pillar	ASTM A 182 F304	For body made of A 351 CF8(M)
		C45 + Cr	For body made of A 216 WCB
200	Stem	ASTM A 182 F304	
310	Plain bearing	GCr6	
360	Blade	ASTM A 182 F304	For soft-seated design
		ASTM A 182 F304 + HCr	For metal-seated design
		ASTM A 182 F316	For soft-seated design
		ASTM A 182 F316 + HCr	For metal-seated design
		ASTM A 276 410 + HCr	For soft-seated and metal-seated designs
410	Sealing element	NBR	-20 °C to +100 °C
412.1	O-ring	NBR	-20 °C to +100 °C
		Viton	-20 °C to +180 °C
412.2	O-ring	NBR	-20 °C to +100 °C
		Viton	-20 °C to +180 °C
452	Gland follower	ASTM A 216 WCB	
		ASTM A 351 CF8	
		ASTM A 351 CF8M	
461	Gland packing	PTFE	
506	Retaining ring	ASTM A 216 WCB	
		ASTM A 351 CF8	
		ASTM A 351 CF8M	
544	Threaded bush	H59	
901.1	Bolt	ASTM A 182 F304	
901.2	Bolt	ASTM A 182 F304	
901.3	Bolt	ASTM A 182 F304	
914	Hexagon socket head cap screw	ASTM A 182 F304	
920.1	Nut	ASTM A 182 F304	
920.2	Nut	ASTM A 182 F304	
920.3	Nut	ASTM A 182 F304	
940	Key	C45	
961	Handwheel	D-2	

#### 4.3.2.2.6 Function

HERA-BHT knife gate valves consist of a two-piece body (101/102), four pillars (180) and the functional unit.

The functional unit mainly consists of the blade (360), the stem (200), the seat (144) and the actuating element, i.e. the handwheel (961) or actuator.

The blade (360) passage in the body (101/102) is sealed to atmosphere by a gland packing (461), which is tightened via the gland follower (452) by means of two nuts (902).

#### **4.4 Scope of supply**

- Valve
- Operating manual for each packaging unit

#### **4.5 Dimensions and weights**

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

## 5 Installation at Site

### 5.1 General information/Safety regulations

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

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

The product must be installed in the system properly and in compliance with the parameters defined in the operating manual. The piping must be made of conductive material.

Valves that are defective or worn must never be operated in potentially explosive atmospheres. The operator will be responsible for any impermissible operation of the product.

Equipotential bonding must be provided between the metal body parts and the piping.

Bolts/screws and studs must be properly fastened.

	<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 or unintentional opening.</li> </ul>
	<p><b>⚠ WARNING</b></p> <p><b>Cold/hot piping and/or valve</b> Risk of thermal injury!</p> <ul style="list-style-type: none"> <li>▷ Insulate the valve.</li> <li>▷ Attach warning signs.</li> </ul>
	<p><b>⚠ WARNING</b></p> <p><b>Exposed rotating parts</b> Risk of injury!</p> <ul style="list-style-type: none"> <li>▷ Do not touch rotating parts.</li> <li>▷ When the equipment is in operation, perform any work with utmost caution.</li> <li>▷ Take suitable precautions, e.g. provide safety covers.</li> </ul>
	<p><b>⚠ WARNING</b></p> <p><b>Impermissible loads resulting from operating conditions and/or valve-mounted components, e.g. actuators</b> Leakage from or rupture of the valve body!</p> <ul style="list-style-type: none"> <li>▷ Provide adequate support.</li> <li>▷ Additional loads, e.g. traffic, wind or earthquakes are not taken into account for standard variants; these require a separate design.</li> </ul>

	<p style="background-color: #FFD700; padding: 5px;"><b>CAUTION</b></p> <p><b>Improper installation</b> Damage to the valve!</p> <ul style="list-style-type: none"> <li>▷ Remove the caps prior to installation.</li> <li>▷ Clean the mating flange faces.</li> <li>▷ Protect the body and bonnet/cover from any impacts.</li> </ul>
	<p style="background-color: #FFD700; padding: 5px;"><b>CAUTION</b></p> <p><b>Outdoor installation</b> Damage due to corrosion!</p> <ul style="list-style-type: none"> <li>▷ Protect the valve appropriately against moisture.</li> </ul>
	<p style="background-color: #FFD700; padding: 5px;"><b>CAUTION</b></p> <p><b>Painting of pipes</b> Impairment of the valve's function and loss of information!</p> <ul style="list-style-type: none"> <li>▷ Protect stem and plastic components prior to applying paint.</li> <li>▷ Protect printed name plates prior to applying paint.</li> </ul>
	<p style="background-color: #FFD700; padding: 5px;"><b>CAUTION</b></p> <p><b>Impermissible load</b> Damage to the actuating element!</p> <ul style="list-style-type: none"> <li>▷ Do not use the valve as a foothold.</li> </ul>
	<p style="background-color: #FFD700; padding: 5px;"><b>CAUTION</b></p> <p><b>Hot cleaning fluid</b> Damage to rubber, NBR or EPDM material of the body seat!</p> <ul style="list-style-type: none"> <li>▷ When cleaning the valve with a hot fluid, observe the valve's temperature limits indicated in the type series booklet.</li> </ul>
	<p style="background-color: #0070C0; color: white; padding: 5px;"><b>NOTE</b></p> <p>The mating flange faces must be clean and undamaged and the gaskets on the mating flanges must be properly centred.</p>
	<p style="background-color: #0070C0; color: white; padding: 5px;"><b>NOTE</b></p> <p>Use an appropriate tool to evenly tighten the bolts crosswise, applying the permissible torques.</p>

### 5.2 Installation position

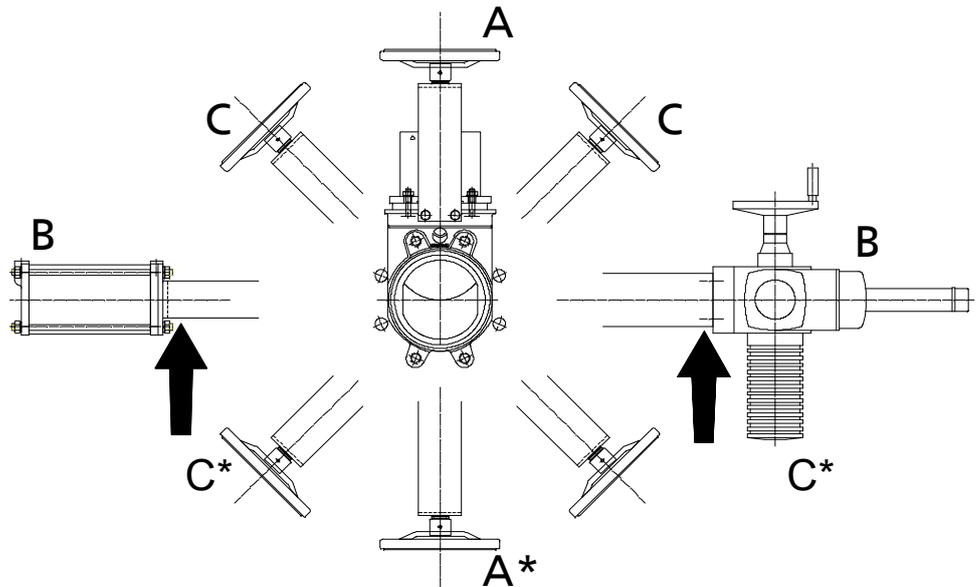
HERA-BDS and HERA-BHT provide bi-directional shut-off and can, therefore, be installed in either direction, independently from the direction of fluid flow.

HERA-SH is uni-directional. The flow direction as indicated by the flow direction arrow must be complied with.

A vertical stem position (handwheel or actuator on top) is recommended for knife gate valves installed in horizontal pipes; see position "A" as illustrated below. The valve can basically be installed in any position.

Valves with nominal sizes greater than DN 300 or equipped with heavy actuators must be adequately supported when installed in horizontal pipes with the valve stem in a horizontal or inclined position (see positions "B" and "C" below).

Valves installed in vertical pipes must be adequately supported.



### 5.3 Installation in the piping

Before installing the valve, verify that the upstream and downstream mating pipes have been cleaned and line up on the same axis. The weight of the valve must not exceed the load-carrying capacity of the piping; provide suitable supports if necessary.

The inside of the valve must be checked for dirt/contamination, especially the seat area.

The mating flange faces must be clean and undamaged.

Check the marking on the valve and make sure the valve is ready for installation. Check the correct function of the valve by fully opening and closing it several times.

Support the valve body in a centred position between the mating flanges, then fasten it to the flanges, starting with the bottom flange bolt holes and continuing upward.

Use suitable tools to tighten the bolts evenly and crosswise to the permissible torques .

After installing the valve in the piping, verify that the flanges and the electrical and/or pneumatic connections have been securely fastened.

Using the actuator, run the valve several times to its fully open and fully closed positions to verify that it functions properly.

### 5.4 Valves with actuator

Install valves with transmission gear and/or actuators with the stem in the vertical position. If this requirement cannot be met, adequately support the actuator on site or consult KSB.

Mounted actuators are factory-set and ready for operation. Changes to these settings, e.g. changes to the set switching points of the limit positions, may impair the valve's function and result in damage to the actuator, valve or the system.

	<p><b>⚠ DANGER</b></p>
	<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 the 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>

	 <b>DANGER</b>
	<p><b>Work on valves with energy storage, e.g. spring mechanisms or compressed air storage</b></p> <p>Danger to life resulting from incorrect assembly</p> <ul style="list-style-type: none"> <li>▷ Ensure that work on the actuator is performed by qualified specialist personnel.</li> <li>▷ Mount/remove the actuator in accordance with the operating manual.</li> </ul>

	<b>NOTE</b>
	<p>If the valves are fitted with actuators, ensure that the actuator's operating manual is also observed.</p>

On valves with electric, pneumatic or hydraulic actuators, the actuator strokes/forces must be limited.

**Electric actuators** Electric actuators are ready for operation and wired as follows:

- Valve "CLOSED": travel-dependent
- Valve "OPEN": travel-dependent

The wiring diagrams are located in the terminal boxes.

**Pneumatic/hydraulic actuators** For pneumatic or hydraulic actuators, the control pressures specified in the order confirmation must be observed. Non-observance may damage the actuator.

If required, consult the manufacturer for closing and opening torques or actuating forces.

### 5.5 Insulation

	<b>NOTE</b>
	<p>Any insulation fitted on the valve must not impair the valve's function. The sealing areas at the cover/bonnet joint and at the stem passage (gland packing) must be directly accessible and visible.</p>

## 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 and temperature data on the valve complies with the operating conditions of the piping. (⇒ Section 4, Page 11) .
- The material's chemical resistance and stability under load have been checked.

The nominal pressure classes only apply at room temperature. For values for higher temperatures, refer to the pressure/temperature ratings tables.

(⇒ Section 4, Page 11) . Using the valve in conditions deviating from those specified will lead to overload which the valves cannot withstand.

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

	<p><b>! DANGER</b></p>
	<p><b>Surge pressure/water hammer potentially occurring at high temperatures</b>            Danger to life caused by burns and scalds!</p> <ul style="list-style-type: none"> <li>▷ The maximum permissible pressure of the valve must not be exceeded. (⇒ Section 4, Page 11) .</li> <li>▷ Use valves made of nodular cast iron or steel.</li> <li>▷ Operator shall provide general safety measures for the system.</li> </ul>
	<p><b>CAUTION</b></p>
	<p><b>Aggressive flushing and pickling agents</b>            Damage to the valve!</p> <ul style="list-style-type: none"> <li>▷ Match the cleaning operation mode and duration of flushing and pickling to the body and seal materials used.</li> <li>▷ Responsibility for the compatibility of the pickling media used and the pickling procedure itself lies with the pickling company.</li> </ul>

If leakage of the fluid handled to atmosphere could entail the risk of an explosion, valve tightness must be checked regularly or following any malfunction by the operator.

The operator is responsible for any rise in temperature resulting from the temperature of the fluid handled.

Any dust or dirt deposits on the valve surfaces must be prevented. In dust-laden atmospheres the operator is responsible for removing the dust regularly.

Mechanical loads beyond normal levels, e.g. piping forces, moments and vibrations, must be avoided.

**Functional check** 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 it several times.
2. Check the gland packing (461) for leakage when it is subjected to full operating pressure and temperature for the first time.

3. If the gland follower (452) has loosened, re-tighten the nuts (920) evenly and alternately (crosswise). There must be no metal-to-metal contact between the gland follower and the body.
4. To avoid stress or distortion, open the valve by approx. two full counter-clockwise handwheel turns.
5. If the bonnet/cover bolting (902.1/904/920.1) has loosened, evenly re-tighten it crosswise.

If the gland bolts are tightened excessively, the forces required to actuate the valve will increase accordingly, resulting in excessive compression of the gland packing and impaired valve function.

**Table 15:** Maximum tightening torques of gland bolts

DN	Tightening torque [Nm]
50 - 100	20
125 - 200	30
250 - 1000	35

**Valves with actuator** On valves with electric, pneumatic or hydraulic actuators, the actuator strokes/forces must be limited.

	<b>NOTE</b>
	If the valves are fitted with actuators, ensure that the actuator's operating manual is also observed.

If required, consult the manufacturer for closing and opening torques or actuating forces.

#### Pneumatic actuators

The valves are usually supplied with a double-acting cylinder. Single-acting cylinders are available on request. In either case, the supply pressure should range between 3.5 and 10 kg/cm<sup>2</sup>. For a maximum service life of the cylinder it must be supplied with completely dry, filtered and oiled compressed air. After the cylinder has been installed in the pipe, actuate it three or four times before taking it into service.

#### 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 the 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>

	<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>

1. Check the available mains voltage against the data on the name plate of the actuator.
2. Select an appropriate start-up method.

The wiring diagrams are located in the terminal boxes.

### 6.1.2 Actuation

#### Handwheel

	<p><b>NOTE</b></p> <p>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 shown on the top of the handwheel.</p>
	<p><b>CAUTION</b></p> <p><b>Excessively long idle periods</b> Damage to the valve!</p> <ul style="list-style-type: none"> <li>▷ Check the function by opening and closing the valve at least once or twice a year.</li> </ul>
	<p><b>CAUTION</b></p> <p><b>Use of levers</b> Damage to the valve as a result of excessive forces!</p> <ul style="list-style-type: none"> <li>▷ Only actuate handwheel-operated valves by hand.</li> <li>▷ Levers may only be used in exceptional cases and in compliance with the following tables.</li> <li>▷ Do not use levers in the area of the position indicator.</li> </ul>

#### Quick-action lever

If the valve is to be actuated by means of the quick-action lever, you first need to unlock the locking device in the upper part of the yoke (166). Then move the quick-action lever in opening or closing direction as required and lock in position with the locking device.

### 6.2 Shutdown

#### 6.2.1 Measures to be taken for shutdown

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

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

## 7 Servicing/Maintenance

### 7.1 Safety regulations

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

Sparking must be avoided and suitable tools must be used.

Product wear must be taken into account. After every intervention, e.g. after removing the valve from the pipe or repairing it, the operator must carry out the tests required, particularly leak testing and checking the throughflow (e.g. testing to EN 12266-2).

Maintenance work must be performed by qualified personnel who are trained in performing work in potentially explosive atmospheres.

Use original spare parts only. Any modification of the product is prohibited.

	<div style="background-color: #e67e22; color: white; 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>▷ Never open the valve while it is pressurised.</li> <li>▷ Ensure the valve is depressurised before undoing the flange bolting.</li> <li>▷ Ensure the valve is depressurised before undoing the gland follower (452).</li> <li>▷ Ensure the valve is depressurised before removing any drain, opening or vent plugs.</li> <li>▷ Ensure the valve is depressurised before removing an actuator bolted directly to the yoke head.</li> <li>▷ Ensure the valve is depressurised before removing it from the pipeline or before maintenance work.</li> <li>▷ Allow the valve to cool down so that the temperature is below the fluid's vaporisation temperature in all areas in contact with the fluid in order to effectively prevent any risk of scalding.</li> <li>▷ Never vent the valve by loosening the gland packing.</li> <li>▷ Use appropriate spare parts and tools, even in emergencies.</li> </ul>
	<div style="background-color: #f1c40f; color: white; padding: 5px;"><b>! WARNING</b></div> <p><b>Fluids, consumables and supplies which are hot and/or pose a health hazard</b> Risk of injury!</p> <ul style="list-style-type: none"> <li>▷ Observe all relevant laws.</li> <li>▷ When draining the fluid take appropriate measures to protect persons and the environment.</li> <li>▷ Decontaminate valves used for handling fluids posing a health hazard.</li> </ul>
	<div style="background-color: #2980b9; color: white; padding: 5px;"><b>NOTE</b></div> <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>

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

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

Never use force when dismantling and reassembling the valve.

### 7.2 Maintenance

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

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

	<b>NOTE</b>
	If several valves are serviced at the same time, take appropriate measures to prevent the dismantled parts from getting mixed up.

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

- Checking the function by opening and closing the valve at least once or twice a year
- Lubricating the stem approximately every 30 days. Use a calcium grease which is not water-soluble, with a low ash content and excellent adhesion.
- Adding or replacing packing rings in the gland packing (461) in time
- Replacing the seats and O-rings in time

The service life of the sealing elements depends on the operating conditions of the valve, such as pressure, temperature, abrasion, chemicals in the environment and number of cycles.

Use a cleaning agent which is compatible with the valve materials and the fluid handled.

Clean non-metallic parts with clean water or alcohol. Do not leave the parts to soak for an extended period of time but take them out of the cleaning bath directly after cleaning.

Dismantled parts can be soaked for a short period. Components that remain fitted on the valve can be cleaned with a cleaning agent and a smooth cloth which does not leave any fibres on the component surfaces. Completely remove any oil, dust and grease.

Leave all parts to dry completely before reassembly. Proceed to reassemble the valve without undue delay to avoid rusting and prevent dirt from accumulating again.

#### Valve reassembly

Valve reassembly shall be effected in reverse order to dismantling.

To maintain functional reliability, new gland packings must be fitted whenever the valve is reassembled.

After reassembly and prior to commissioning/start-up, the valves must be subjected to shell and leak testing as stipulated in MSS SP-81.

## 8 Trouble-shooting

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

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

**Table 16:** Trouble-shooting

Problem	Possible cause	Remedy
Jerky blade movement during valve travel	Crystallised fluid on seat and blade	Remove fluid from seat and blade.
	Blade and seat damaged	Replace blade and seat.
	Fluid trapped inside body	Remove fluid from body.
Leakage at seat/disc interface	Seat worn	Replace seat.
	Blade worn	Replace blade.
Leakage at gland packing	Gland bolts loose	Re-tighten gland bolts.
	Aged gland packing	Replace gland packing.
Actuator does not open or close the valve.	Air leakage at actuator due to aged O-ring on piston	Replace O-ring on piston.
	Air leakage in entire actuator due to aged O-ring in end cap	Replace O-ring in end cap.

**9 EU Declaration of Conformity for HERA-BDS, HERA-BHT,  
HERA-SH**

Hereby we,

**KSB Valves (Changzhou) Co., Ltd.**  
No. 68 Huanbao Four Road,  
Environment Protection Industrial Park,  
Xinbei District, Changzhou City, Jiangsu Province  
P. R. China

declare that **the product:****Knife gate valves**

HERA-BDS	PN 10/16, Class 150	DN 50 - 600
HERA-BHT	PN 10/16, Class 150	DN 80 - 600
HERA-SH	PN 10/16, Class 150	DN 50 - 1000

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

**Suitable for:**

Gases/Liquids in Group 2

**Conformity assessment procedure:**

Module H

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

HPi Verification Services Ltd.  
The Manor House  
Howbery Park, Wallingford  
OX10 8BA, United Kingdom

**Identification number of the notified body:**

1521

The EU Declaration of Conformity was issued in/on:

Changzhou, 7 September 2016



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Jason Ji

Head of Quality Management

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