

Series BV

Ball Valve to ASME

with ball, stem and Richter ENVIPACK universal packing, standard port



WARNING

All RICHTER products are designed and manufactured to the highest standards of workmanship and design and, as of the printing of this document, they meet all applicable industry standards.

These valves are available with components of various materials and should be used only as directed in the product catalog. Installation and maintenance must be performed by qualified personnel.

- ◆ **Do not operate the valves beyond the stated pressure and temperature ratings!**
- ◆ **Misuse, improper installation and improper maintenance may result in personal injury and/or property damage!**
- ◆ **Use only valve components consistent with the performance requirements and as directed in these instructions.**

- ◆ **Failure to heed these operating instructions may void the warranty!**
- ◆ **If a valve exhibits any indication of leakage, do not operate! Isolate the valve and either repair or replace the valve.**

Keep for future use!

This operating manual must be strictly observed before transport, installation, operation and maintenance etc. in order to avoid damage to persons or property.

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Relevant documents

◆ Declaration of conformity acc. to the EC Pressure Equipment Directive 97/23/EG		Lever elevation	Sect. 9520-00-3001 Dim. 9520-00-4020
◆ Form for Safety Information Concerning the Contamination QM 0912-16-2001_en		Limit switch IFM	Sect. 9520-00-3005 Dim. 9520-00-4015
◆ For BVP: Operating manual for actuator		Limit switch VDE/VDI	Sect. 9520-00-3006 Dim. 9520-00-4016
◆ Depending on option, relevant drawing:		Spring return unit Kinetrol	9520-00-3004
Double packing bonnet	Sect. 9520-00-3001 Dim. 9520-00-4011	Initiator Turck	Sect. 9520-00-3007 Dim. 9520-00-4017
Extended stem	Sect. 9520-00-3003 Dim. 9520-00-4013	Locking plate	9520-00-3002
Extended stem, round	Sect. 9520-00-3010 Dim. 9520-00-4020	Heating jacket	9520-00-3012

1 Technical data

Manufacturer:

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Designation :

Ball valve with ball, stem and Richter ENVIPACK universal selfadjusting packing, two-piece body.

Series:

- BV** → Design with lever or hand gear
BVP → Design prepared for pneum., hydr. or electric actuator to ISO 5211

Certified to German Clean Air Act (TA Luft)

MSS SP 72 General Service

MSS SP 25 Standard Marketing System

API 598 Valve Inspection and Testing

The tests at Richter fulfils the requirements of API 598 on principle. However this standard contains optional, additional tests.

These tests are not object of the tests at Richter and have to be arranged by order with Richter (e.g. point 3.3: *High Pressure Closure Test*).

Face to face: ASME B16.10, Class 150 column 19

Flange connecting dimensions:

ASME B16.5 Class 150, raised face.

Materials :

Body material:

Ductile cast iron ASTM A395

Lining material: PFA

on request: conductive design

Ball material: PFA, Al₂O₃

Temperature range :

See pressure-temperature diagram in [Section 1.5](#).

Operating pressure:

½" – 6" from vacuum to max.275 psig (19 bar)

Ball valve sizes in inch :

BV, BVP: ½", ¾", 1", 1½", 2", 3", 4" 6"

Installation position :

Arbitrary, with low-cavity ball/stem units or an additional relief bore in the ball/stem units a direction arrow indicates the direction of flow.

See [Sections 6.2](#).

Dimensions and individual parts:

See sectional drawings in [Section 10](#).

Weight, BV, manually operated:

Nom. size	½"	¾"	1"	1½"	2"
ca. kg	3.0	3.2	4.0	6.0	10.0
ca. lbs	12.3	13.2	12.3	26.4	31.9
Nom. size	3"	4"	6"		
ca. kg	15.0	35.0	50.0		
ca. lbs	73.7	110	200		

For weight of actuator, see actuator manufacturer's manual.

Wear parts: Seat rings
 Packing components
 Ball/stem unit

Options :

Richter ENVIPACK double packing

for particularly high safety requirements, self-adjusting.

On request, with monitoring and flushing connection.

Ball/stem unit extension for insulated pipes.

Hand lever extension depending on requirements.

Limit switches

for remote monitoring of hand and remote-activated ball valves.

Lockable hand lever

to prevent unauthorised operation.

Stainless steel heating jacket

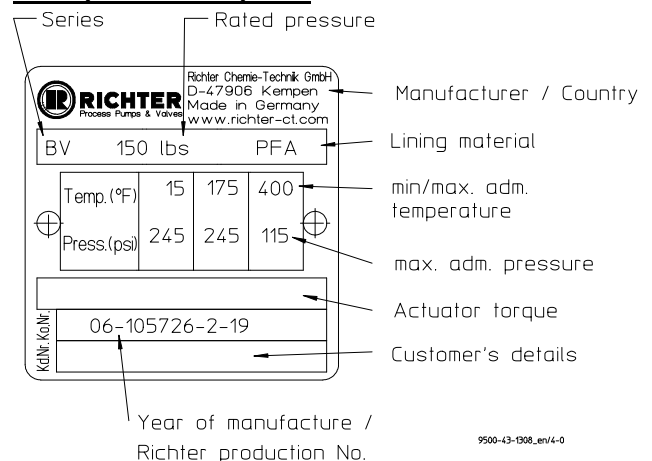
can be retrofitted, suitable for all common heat carriers.

1.1 Name plate, CE and body markings

The stainless steel name plate is firmly riveted to the body.

If the operator attaches his identification, it must be ensured that the valve matches the application in question.

Example of name plate:



9500-43-1908_en/4-0

Body identification :

The shell bears the following information:

- ◆ Nominal size
- ◆ Rated pressure
- ◆ Body material
- ◆ Manufacturer's identification
- ◆ Melt number/Foundry identification
- ◆ Cast date

1.2 Tightening torques

All screws greased, tighten in diametrically opposite sequence!

The tightening torques for pipe screws and body screws mentioned must not be exceeded. For an exception, see **Section 8**, Flange connection valve / pipe is leaking.

The following tightening torques are recommended:

Packing screws

Tighten packing gland follower **503** until spring gland follower **502** is in contact without any gap. With §" 4" and 6" they are 2 spring gland follower **502**.

Pipe screws

Flanges nom. size [inch]	Screws [ASME]	Tightening torque	
		[Nm]	[in-lbs]
1/2"	4 x 1/2"	5	45
3/4"	4 x 1/2"	6	55
1"	4 x 1/2"	8	70
1 1/2"	4 x 1/2"	15	135
2"	4 x 5/8"	25	220
3"	4 x 5/8"	45	400
4"	8 x 5/8"	35	310
6"	8 x 3/4"	80	710

Body screws

Nom. size [inch]	Screws [ISO/DIN]	Tightening torque	
		[Nm]	[in-lbs]
1/2"	4 x M12	35	310
3/4"	4 x M12	35	310
1"	4 x M12	35	310
1 1/2"	4 x M16	45	398
2"	4 x M16	45	398
3"	8 x M16	50	442
4"	6 x M20	100	885
6"	8 x M20	100	885

1.3 Breakaway torques

Test medium: water 68 °F (20 °C)

Higher breakaway torques may occur with other media.

PFA ball

DN [inch]	Δp in bar				max. adm. [in-lbs]
	3 [in-lbs]	6 [in-lbs]	10 [in-lbs]	16 [in-lbs]	
1/2"	62	62	62	62	177
3/4"	62	62	62	62	177
1"	89	89	89	89	248
1 1/2"	89	89	89	89	248
2"	146	146	146	166	443
3"	230	239	257	274	1062
4"	664	717	823	929	2213
6"	797	797	885	1505	4425

1 in-lb = 0.112 Nm

Al₂O₃ ball

DN [inch]	Δp in bar				max. adm. [in-lbs]
	3 [in-lbs]	6 [in-lbs]	10 [in-lbs]	16 [in-lbs]	
1/2"	62	62	62	62	177
3/4"	62	62	62	62	177
1"	89	89	89	89	248
1 1/2"	89	89	89	89	248
2"	146	146	146	166	443
3"	398	407	425	443	1062
4"	841	867	956	1062	2213
6"	797	797	885	1505	4425

1 in-lb = 0.112 Nm

1.4 Flow values

Nom. size [inch]	kv100 [m ³ /h]	Cv [US gpm]
1/2"	17	20
3/4"	31	36
1"	41	48
1 1/2"	41	48
2"	159	185
3"	171	200
4"	618	720
6"	670	780

1.5 Pressure-temperature-diagrams

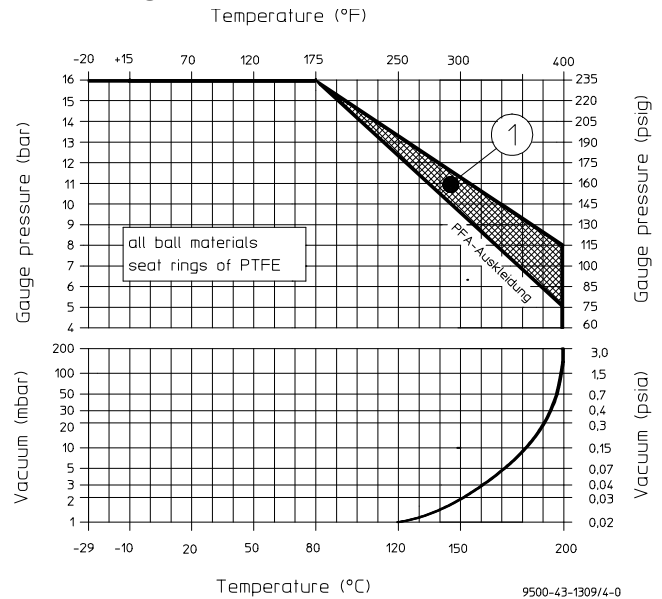
When used in the area of application of ASME, the low temperature of ASTM A395 is limited to -20°F (-29°C).



When used in the minus temperature range, the regulations applicable in the country in question must be observed.

A special material is used for the ball/stem unit for operating limits under 15 °F to - 20 °F. (- 10 °C to - 29 °C).

According to ASME B 16.42



- ① Al₂O₃ ball seat rings of modified PTFE or PTFE-carbon 25%

2 Notes on safety

This operating manual contains fundamental information which is to be observed during installation, operation and maintenance. It must therefore be read before installation and commissioning.

For valves which are used in potentially explosive areas, see **Section 3**.

Installation and operation are to be performed by qualified staff.

The area of responsibility, authority and supervision of the staff must be regulated by the customer.



General hazard symbol!
People may be put at risk.



Safety symbol! The valve and its function may be put at risk if this safety symbol is not observed.

It is imperative to observe warnings and signs attached directly to the ball valve and they are to be kept fully legible.



Failure to heed and follow these notes on safety may cause damages to persons and property!

The manufacturer is not responsible for and hereby disclaims all damages resulting from a failure to observe adequate safety precautions in connection with the operation, maintenance and repair of the valves!

For example, non-observance may involve the following hazards:

- ◆ Failure of important functions of the valve/plant.
- ◆ Risk to people from electric, mechanical and chemical effects.
- ◆ Risk to the environment through leaks of hazardous substances.

2.1 Intended use

Ball valves are on/off valves.

Richter ball valves of the series KNA, KNAP, KNA-S and KNAP-S are pressure containing components in accordance with the Pressure Equipment Directive (PED) for the passage and shut-off of fluids. The valves are suitable for vapours, gases and non-boiling liquids of group 1 according to the PED and have a corrosion-resistant plastic lining.

Solids can lead to increased wear, damage to sealing surfaces or to a reduction in the service life of the valve.

The operator must carefully examine in the event of operating data other than those provided whether the designs of the valve, accessories and materials are suitable for the new application (consult the manufacturer).

Ball valves of the series KNA-S and KNAP-S are preferred for corrosive atmosphere and in clean-room conditions.

2.2 For the customer / operator

When using the valve, it must be ensured that

- ◆ actuators which are retrofitted are adapted to suit the valve
- ◆ hot or cold valve parts are protected by the customer against being touched
- ◆ the ball valve has been properly installed in the pipe system
- ◆ the usual flow rates are not exceeded in continuous operation.



This is not the manufacturer's responsibility.

Loads caused by earthquakes were not allowed for in the design.



Ball valves which are used as end valves must be sealed with a blind flange at the free connection end or appropriately secured against unauthorised activation.

Fire protection to DIN EN ISO 10497 is not possible (plastic lining and plastic components).

2.3 Improper operation

Permitted operation of these valves is limited to the intended purpose, as shown in **Section 2.1** of these operating instructions.



Under no circumstances must the operating parameters specified on the identification plate and in the pressure-temperature diagram be exceeded.

Failure to operate the valves within the operating parameters voids the warranty!

See also improper operation and their consequences in **Section 7.4**.

3 Safety notes for applications in potentially explosive areas based on the Directive 94/9/ EC (ATEX 95)

The valves are intended for use in a potentially explosive area and are therefore subject to the conformity assessment procedure of the directive 94/9/EC (ATEX).

As part of this conformity assessment, an ignition hazard analysis to EN 13463-1 to satisfy the fundamental safety and health requirements was conducted with the following result:

- ◆ **The valves do not have any ignition source of their own and can be operated both manually as well as mechanically/electrically.**
- ◆ **The valves are not covered by the scope of application of the ATEX directive and therefore do not need to be identified accordingly.**
- ◆ **The valves may be used in a potentially explosive area.**

Supplementary notes:

- ◆ **Electric/mechanical actuators must be subjected to their own conformity assessment to ATEX.**

It is imperative to observe the individual points of intended use for application in a potentially explosive area.

3.1 Intended use

Improper operation, even for brief periods, may result in serious damage to the unit.

In connection with explosion protection, potential sources of ignition (overheating, electrostatic and induced charges, mechanical and electric sparks) may result from these improper operation; their occurrence can only be prevented by adhering to the intended use.

Furthermore, reference is made in this connection to the Directive 95/C332/06 (ATEX 118a) which contains the minimum regulations for improving the occupational health and safety of the workers who may be at risk from an explosive atmosphere.

A difference is made between two cases for the use of chargeable liquids (conductivity $< 10^{-8}$ S/m):

1. Chargeable liquid and non-conductive lining

Charges can occur on the lining surface. As a result, this can produce discharges inside the valve. However, these discharges cannot cause ignitions if the valve is completely filled with medium.

If the valve is not completely filled with medium, e.g. during evacuation and filling, the formation of an explosive atmosphere must be prevented, e.g. by superimposing a layer of nitrogen.

It is recommended to wait 1 hour before removing the valve from the plant in order to permit the elimination of static peak charges.

This means that, to safely prevent ignitions, the valve must be completely filled with medium at all times or else a potentially explosive atmosphere must be excluded by superimposing a layer of inert gas.

2. Chargeable liquid and conductive lining



No hazardous charges can occur as charges are discharged direct via the lining and shell (surface resistance $< 10^9$ Ohm, leakage resistance $< 10^6$ Ohm).

Static discharges of non-conductive linings are only produced through the interaction with a non-conductive medium and are therefore the responsibility of the plant operator.

Static discharges are not sources of ignition which stem from the valves themselves!

- The temperature of the medium must not exceed the temperature of the corresponding temperature class or the maximum admissible medium temperature as per the operating manual.
- If the valve is heated (e.g. heating jacket), it must be ensured that the temperature classes prescribed in the Annex are observed.
- To achieve safe and reliable operation, it must be ensured in inspections at regular intervals that the unit is properly serviced and kept in technically perfect order.
- Increased wear to the valve can be expected with the conveyance of liquids containing abrasive constituents. The inspection intervals are to be reduced compared with the usual times.
- Actuators and electric peripherals, such as temperature, pressure and flow sensors etc., must comply with the valid safety requirements and explosion protection provisions.
- The valve must be grounded. This can be achieved in the simplest way via the pipe screws using tooth lock washers. Otherwise grounding must be ensured by other action, e.g. cable bridges.
- Attachments such as actuators, position controllers, limit switches etc. must satisfy the relevant safety regulations as regards explosion protection and, if required, be designed in compliance with ATEX.
- Special attention must be paid to the appropriate safety and explosion protection notes in the respective operating manuals.
- Plastic-lined valves must not be operated with carbon disulphide.

4 Safety note for valves, certified to German Clean Air Act (TA Luft)

On request, this valve can be supplied compliant with the German Clean Air Code.

Certificate / Manufacturer Declaration Validity is dependent on the operating instructions being read and observed.

In particular, servicing must be conducted at regular intervals, and the bolted connections relevant for tightness must be inspected and retightened if necessary.

5 Transport, storage and disposal



It is imperative, for all transport work, to observe generally accepted engineering practice and the accident prevention regulations.



The valve is supplied with flange caps. Do not remove them until just before installation. They protect the plastic surfaces against dirt and mechanical damage.

Handle the goods being transported with care. During transport the valve must be protected against impacts and collisions.

Directly after receipt of the goods, the consignment must be checked for completeness and any in-transit damage.

Do not damage paint protection.

5.1 Storage

If the valve is not installed immediately after delivery, it must be put into proper storage.

It should be stored in a dry, vibration-free and well-ventilated room at as constant a temperature as possible.

Elastomers are to be protected against UV light.

In general, a storage period of 10 years should not be exceeded.

5.2 Return consignments



Valves which have conveyed aggressive or toxic media must be well rinsed and cleaned before being returned to the manufacturer's works.



Observe appropriate safety precautions when cleaning the valves of toxic or aggressive media. Appropriate safety clothing and equipment should be worn at all times when working with toxic media!

It is **imperative** to enclose a **safety information sheet / general safety certificate** on the field of application with the return consignment.

Pre-printed forms are enclosed with the installation and operating manual.

Safety precautions and decontamination measures are to be mentioned.

5.3 Disposal

Parts of the valve may be contaminated with medium which is detrimental to health and the environment and therefore cleaning is not sufficient.



Risk of personal injury or damage to the environment due to the medium!

- ◆ Wear protective clothing when work is performed on the valve.
- ◆ Prior to the disposal of the valve:
 - Collect any medium, etc. which has escaped and dispose of it in accordance with the local regulations.
 - Neutralise any medium residues in the valve.
- ◆ Separate valve materials (plastics, metals, etc.) and dispose of them in accordance with the local regulations.

6 Installation

- ◆ Examine valve for in-transit damage, damaged ball valves must not be installed.
- ◆ Before installation the valve and the connecting pipe must be carefully cleaned to remove any dirt, especially hard foreign matter.
- ◆ During installation, pay attention to the correct tightening torque, aligned pipes and tension-free assembly.



Ensure that a remotely actuated actuator cannot be accidentally switched on.

6.1 Flange caps and gaskets

Leave protective caps on the flanges until just prior to installation.

Where there is a particularly high risk of damage to the plastic sealing surfaces, e.g. if the mating flanges are made of metal or enamel, PTFE-lined gaskets with a metal inlay should be used. These gaskets are available as special accessories in the Richter range.

6.3 Grounding

The valve must be grounded. The simplest solution is to use tooth lock washers which are placed under one pipe bolt of each flange.

At the customer's request a setscrew M6 with a hex. nut and washer will be provided at each flange as an additional grounding connection.

Otherwise grounding must be ensured by different measures e.g. a cable link.

The ball/stem unit **201** is grounded using a grounding spring washer **557**.

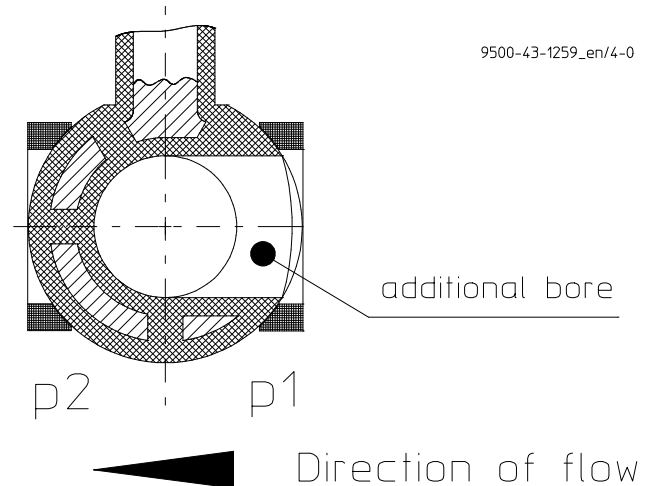
6.2 Direction of flow and installation position

Installation is independent of the direction of flow.

Any installation position can be chosen.

Otherwise, it is marked by a direction arrow on the ball valve, in the case of cavity-free ball/stem units or ball/stem units with an additional relief bore.

Fig. 1 (closed position)



6.4 Test pressure

The test pressure PT of an **open valve** must not exceed the value of $1.5 \times PS(PN)$ as per the identification of the valve.

7 Operation

7.1 Initial commissioning

Normally, the ball valves have been tested for leaks with air or water. Prior to initial operation check body bolting. For torques see [Section 1.2](#).



Unless otherwise agreed, there could be residual amounts of water in the flow section of the ball valve; this could result in a possible reaction with the medium.

To prevent leaks, all connection screws should be retightened after the initial loading of the valve with operating pressure and operating temperature.

For torques see [Section 1.2](#).

7.2 Improper operation and their consequences

- ◆ Under no circumstances must the operating parameters specified on the identification plate be exceeded.
- ◆ **Failure to operate the valves within the operating parameters voids the warranty!**
- ◆ The ball valve is an on/off valve and shall not be operated in an intermediate position.
- ◆ Damage to the seat rings or the ball/stem unit could occur.
- ◆ Crystallisation may result in damage to the seat rings or ball/stem unit. This can be prevented by heating.

8 Malfunctions

- ◆ Flange connection ball valve/pipe is leaking
Retighten the flange screws to a tightening torque according to [Section 1.2](#). If this does not remedy the leak, the recommended torques may be exceeded by 10%.
If this also fails to stop the leak, dismantle and inspect the ball valve.
- ◆ Flange connection main body/body end piece is leaking
Retighten body screws. See paragraph "Flange connection valve/pipe is leaking".
- ◆ Packing is leaking
Retighten packing nuts according to the details in [Section 1.2](#).
- ◆ Ball valve does not operate
Is the actuator being supplied with power?
Is any directional control valve connected correctly?
Is there any foreign matter in the valve?

- ◆ In extreme cases this may cause blocking.
- ◆ If the ball blocks, do not apply force as the ball/stem unit may break if the max. adm. torque is exceeded.
- ◆ Operation with solids leads to increased wear.
- ◆ Operating during cavitation leads to increased wear.
- ◆ Non-observance of the pressure-temperature diagram can lead to damage.
- ◆ Do not subject the lever to heavy loads; the lever or ball valve may be damaged.
- ◆ Do not use a lever extension as otherwise there is a risk of damage.

7.3 Shutdown

The local regulations are to be observed when dismantling the valve.

Prior to undoing the flange connection ensure, that the plant is depressurised and emptied.



Prior to starting any repair work, the valve is to be thoroughly cleaned. Even if the valve has been properly emptied and rinsed, residual medium may still be found in the valve,

After dismantling, immediately protect the valve flanges against mechanical damage with flange caps.

See also [Section 6.1](#).

- ◆ The ball no longer closes completely

Is the stem deformed?

Is the coupling worn?

With a worm gear or actuator, check whether the end stops can be re-adjusted. The operating manuals of the gear and actuator manufacturers contain accurate instructions.



Never apply force to the lever or use an extension.

1. Try to get the ball valve working again by moving the lever to and fro.
2. Remove the lever stop and try to switch against the normal direction of rotation.
3. If actuation is not possible with the max. admissible breakaway torque as per [Section 1.3](#), dismantle ball valve and inspect individual components.

9 Maintenance

- ◆ All repair work is to be performed by qualified personnel using the appropriate tools. Generally recognised practice in mechanical engineering is to be observed.
- ◆ For the arrangement, designation and item numbers of all parts of the valve, see [Section 10](#).
- ◆ Spare parts are to be ordered with all the details in acc. with the valve identification.
- ◆ Only original spare parts may be installed.
- ◆ To prevent leaks, a regular check of the connection screws should be made in line with the operating requirements.
For torques see [Section 1.2](#).

9.1 Dismantling

9.1.1 BV with lever

- Remove body end piece **102**.
- Remove body end piece.
- Remove seat ring.
- Set ball in closed position and remove it by lifting and turning.
- Remove the second seat ring.
- Remove lever.
- Remove stuffing box nut.
- Loosen the antistatic clip and remove cup spring assembly.
- Drive stem downwards with a plastic tip hammer.
- Remove thrust ring **405**, ring **529/2** of PTFE-Carbon, when available, and packing rings **402**.

9.1.3 BV with actuator

- Remove actuator.
- Remove coupling together with pressure spring.
- Remove hexagon head screws **900/2**.
- Remove distance bushings **530**, when available.
- Remove bracket by turning and lifting.

Further dismantling is performed as described in [Section 9.1.1](#).

9.2 Assembly

- When cleaning stem and lining of the main body notice especially the pre-sealing surfaces.
They are marked with "X" in [Section 9.7](#).
- Only with DN 1" and DN 1½":
Mount ring **529/1** of PTFE
- Insert stem from below into the main body.
- Mount 3, 4, or 5 prepressed packing rings **402**.
- The whole stuffing box room must be filled up.
It is marked with "P" in [Section 9.7](#).
- Attention :** Offset overlapping from ring to ring by 90°.
- With DN 1" to DN 6":
Add ring **529/2** of PTFE-Carbon only if it is necessary for the observance of the length of the stuffing box room.
- Add thrust ring **405** and the complete mounted cup spring assembly.
- Set the anti-static clip of the cup spring cage in the right position.
- Screw in hexagon head screw **900/1** provisionally.
- Screw hexagon thin nut **904/3** on the stem and tighten it with a torque according to [Section 9.5](#). In doing so, hold stem with lever or a suitable tool.
- Insert seat ring into main body. Look out to the right position.
- Turn stem in closed position.
- Mount ball in closed position. An additional borehole in ball, eg for pressure relief, has to lie on the p1-side.
- Add next seat ring.
- Assemble body end piece. Tighten the greased body nuts crosswise with the appropriate torque as listed in [Section 9.5](#).

9.2.2 BV with lever

- Remove provisionally tightened hexagon head screw **900/1** again.
- Add 1, 2 or 3 distance bushings **530**, so that the antistatic clip is horizontal or with a declivity towards the distance bushings. Tighten hexagon head screw **900/1** again.
- Screw in headless screw **914/1** as lever stop. With DN 3", DN 4" and DN 6" together with a hexagon thin nut as locknut.
- Close tapped holes still open with sealing caps.
- Assemble lever.

9.2.3 BVP with actuator

- Remove provisionally tightened hexagon head screw **900/1** again.
- Put bracket with one of the two recesses above the antistatic clip of the cup spring assembly. Then let it down and turn it into the right position.
Attention : The opening of the bracket must be cross to the axis of the pipeline.
- When necessary put 1 or 2 distance bushings **530** between bracket and antistatic clip. The antistatic clip must be horizontal or with a declivity towards the distance bushings.
- Screw in the 4 hexagon head screws **900/1**.
- Put pressure spring on coupling. The bend of the pressure spring shall lie on the collar of the coupling.
- Put coupling on stem.
Attention : The stuffing box nut must be locked up by the coupling.
- Assemble actuator. In doing so, look out that the position of ball and stem is in accordance with the position of the actuator.
eg : With an actuator of type "Spring to close" the ball must be in closed position.
The operating instructions of the manufacturer of the actuator are also to be observed.

9.3 Conversion from lever to actuator

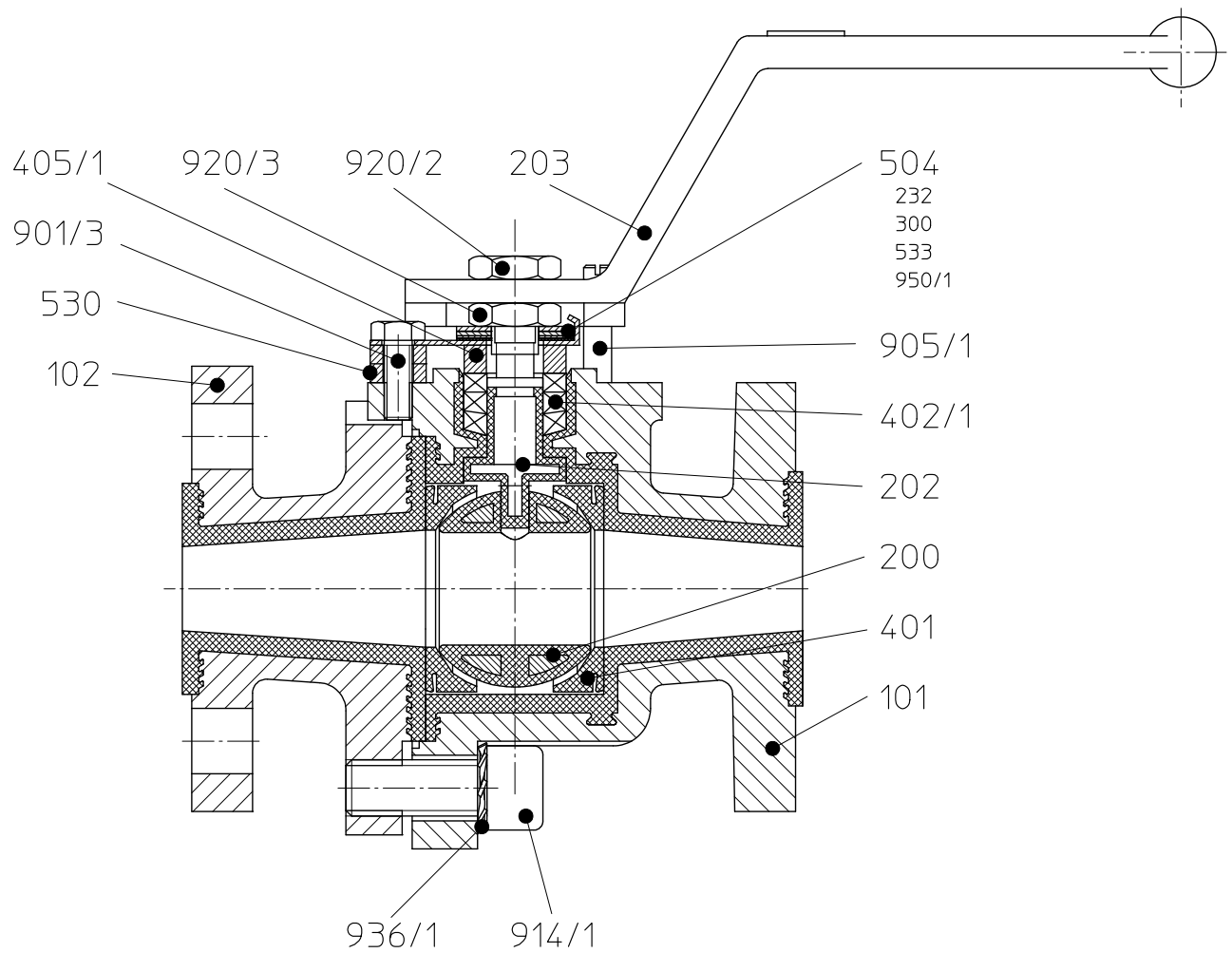
- Remove lever, lever stop and caps **207**.
- Remove hexagon head screw **900/1** and distance bushings **530**.
- Check the fits of coupling, bracket and actuator.
- On this occasion the **NAMUR-Recommendation NE 14** can give important information on the connection of actuators to valves.
The remaining assembly is carried out as described in **Section 7.4.2.**

10 Drawings

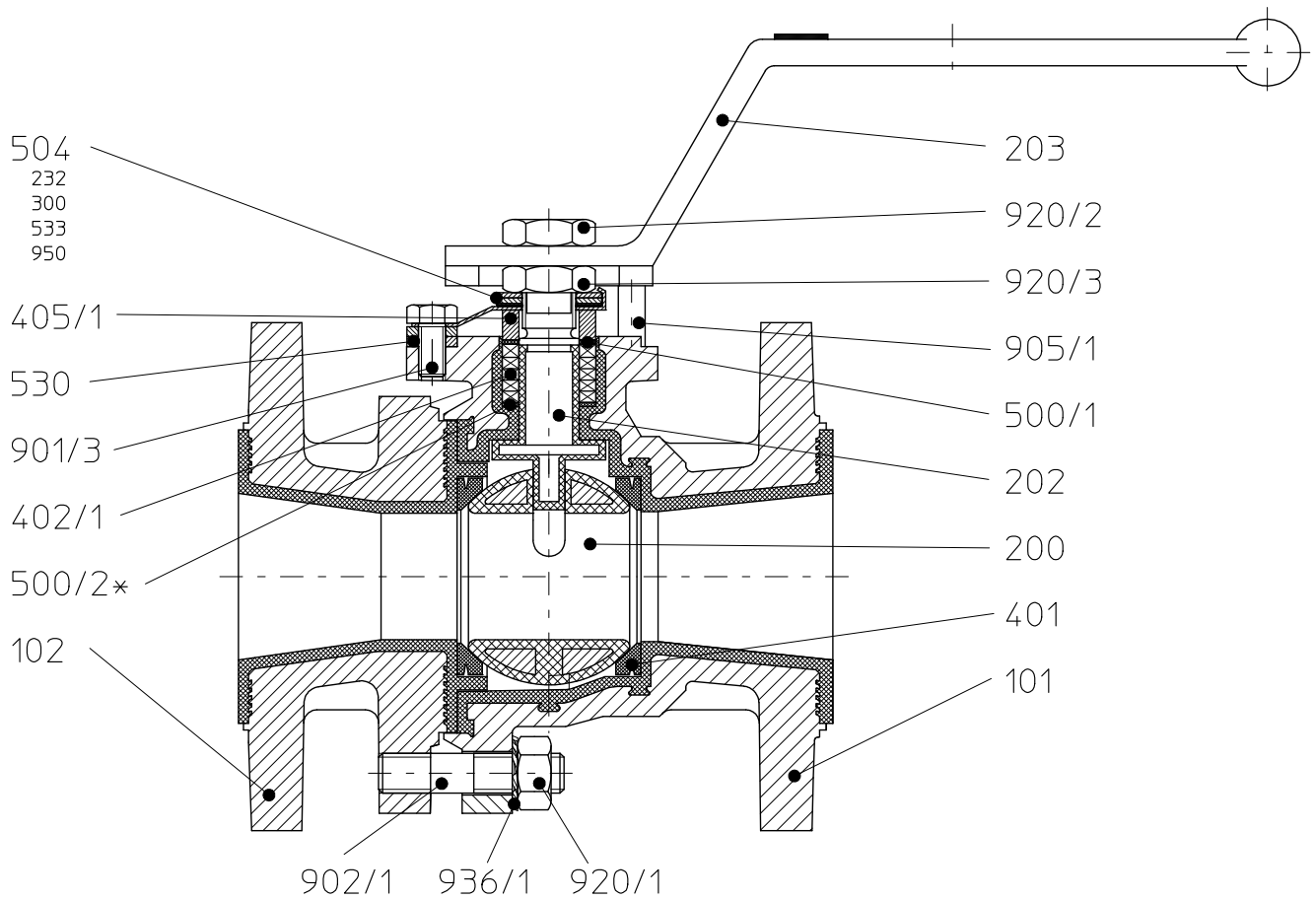
10.1 Legend

101	main body	509/x	grooved nut (3" and 6")
102	body end piece	530	distance bushing
200	ball	901/3	hex. screw
202	stem	902/1	stud screw
203	lever	905/1	headless screw
401	seat ring	914/1	hex. socket screw (½" and ¾")
402/1	packing ring	920/x	hex. nut
405/1	thrust ring	936/1	toothed lock washer
500	ring (3" and 6")		
504	cup spring cage		
includes			
232	support disc		
300	plain bearing		
533	profiled sheet		
950/1	cup spring		

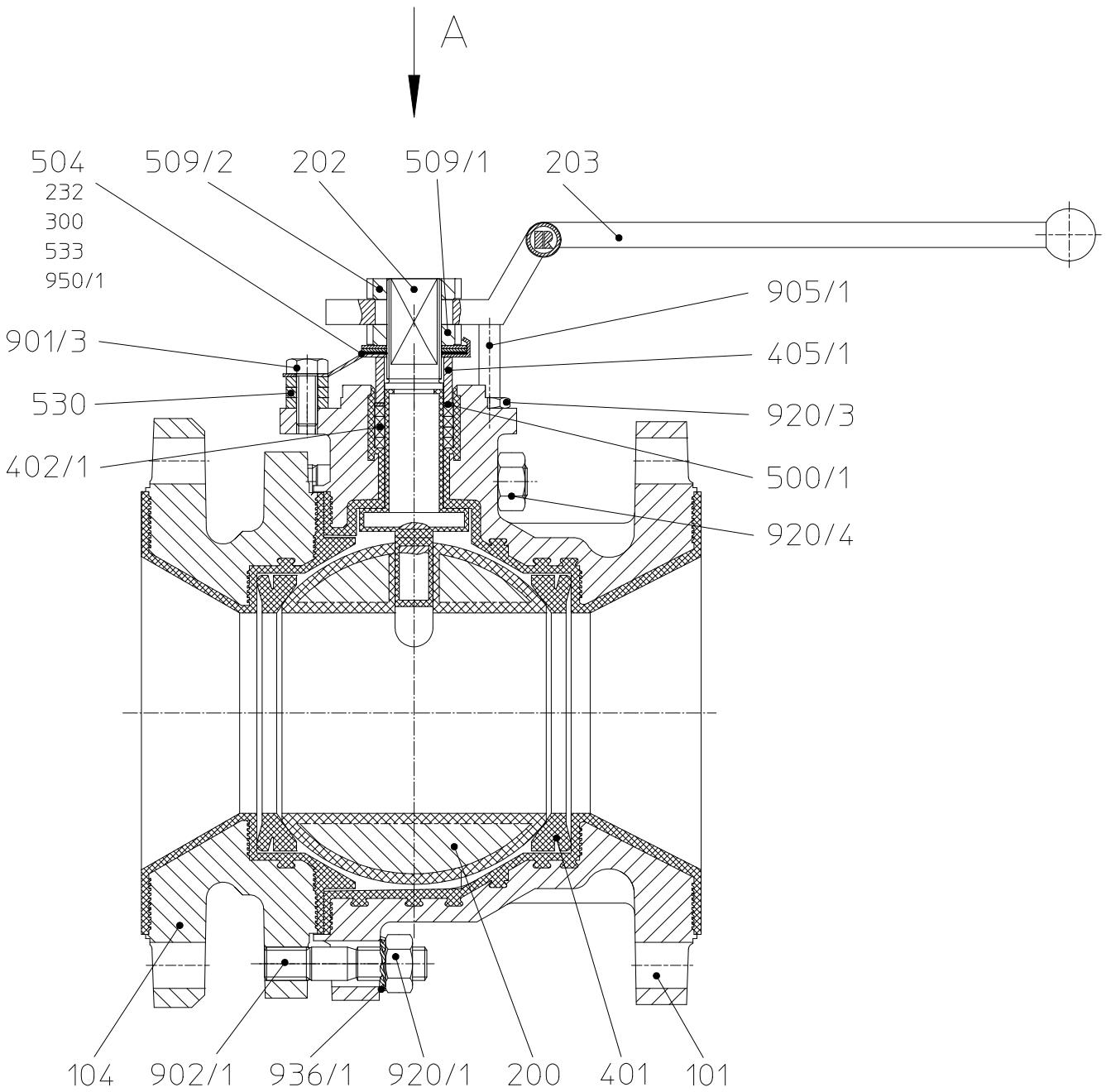
10.2 Sectional drawing BV 1/2" and 3/4" with lever



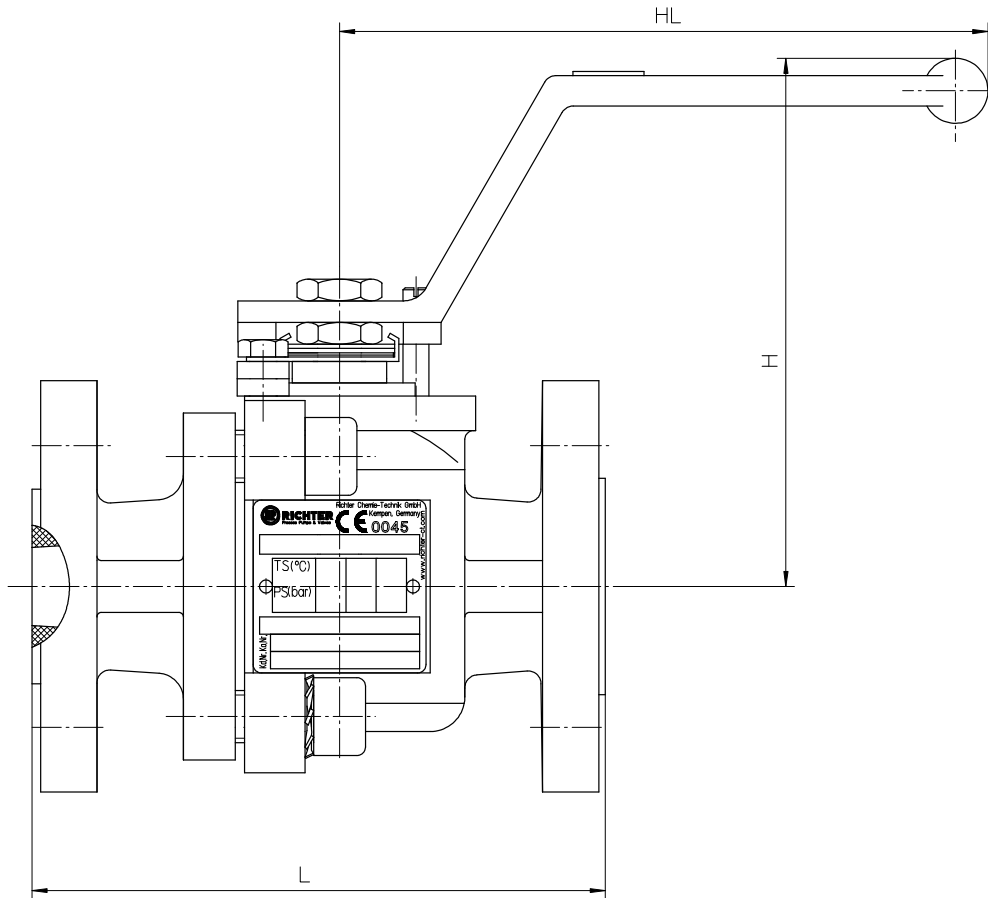
10.3 Sectional drawing BV 1" to 3" with lever



10.4 Sectional drawing BV 4" to 6" with lever



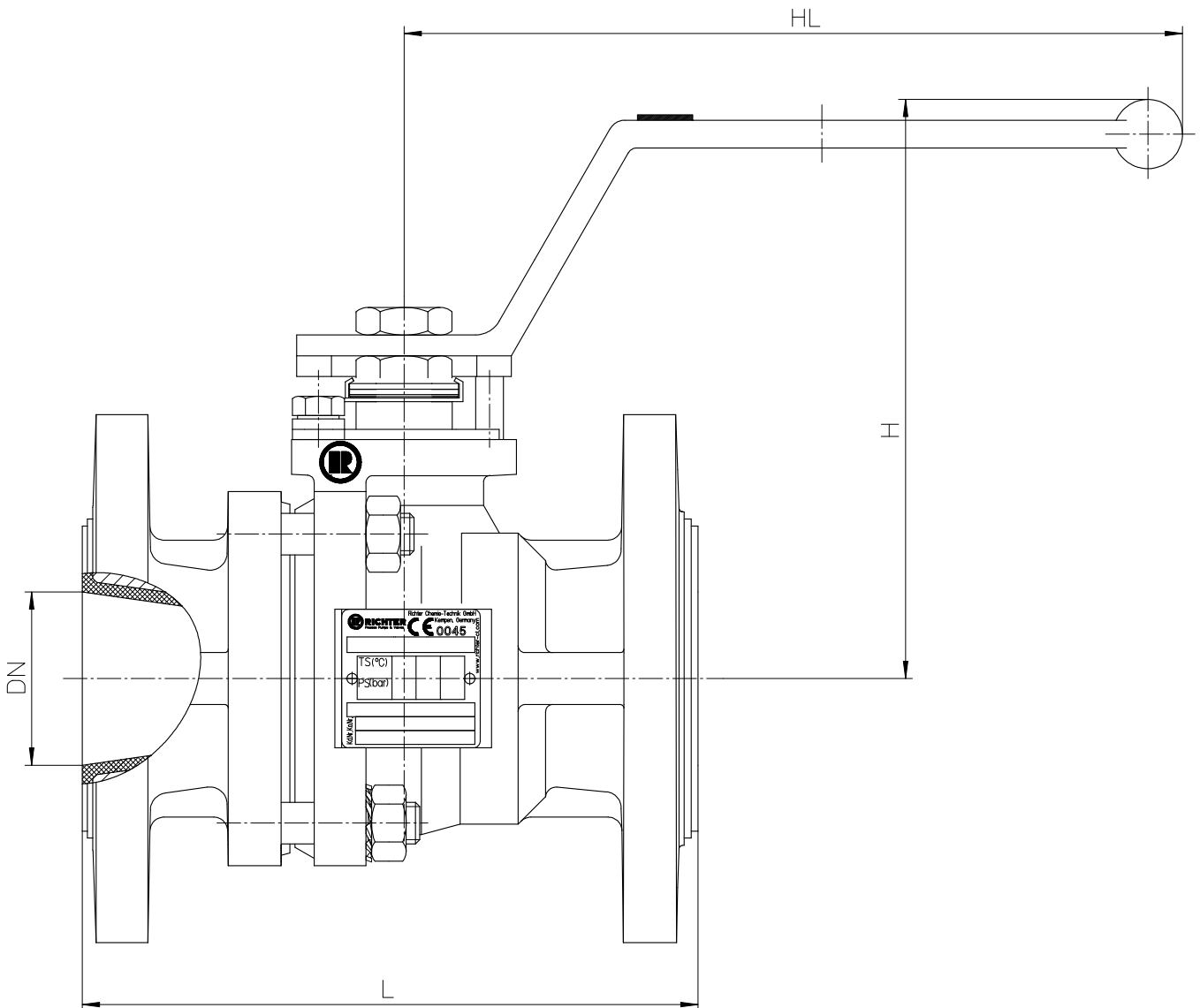
10.5 Dimensional drawing BV 1/2" and 3/4"



DN	15	1/2"	20	3/4"
	[mm]	[inch]	[mm]	[inch]
L	130	5.118	150	5.905
H	120	4.724	120	4.724
HL	143	5.629	143	5.629

Flange connecting dimensions
ASME B16.5 Class 150, raised face

10.6 Dimensional drawing BV 1" to 3"



DN	25	1"	40	1 1/2"	50	2"	80	3"
	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
L	130	5.118	150	5.905	178	7.007	203	7.992
H	120	4.724	120	4.724	165	6.496	170	6.692
HL	143	5.629	143	5.629	225	8.858	225	8.858

Flange connecting dimensions
ASME B16.5 Class 150, raised face

