

Series KNA/F, KNAP/F
 KNA-D/F, KNAP-D/F
 KNA-S/F, KNAP-S/F



Ball Valve to ASME
with ball/stem unit or
 Al_2O_3 ball / stem and
Richter ENVIPACK universal packing



Keep for future use!

This operating manual must be strictly observed before transport, installation, operation and maintenance

Subject to change without notice.

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Relevant documents

♦ Declaration of conformity acc. to the EC Pressure Equipment Directive 2014/68/EU		Stem extension, round	Section 9520-00-3010 Dimen. 9520-00-4020
♦ Manufacturer Declaration TA-Luft		Lever elevation	Section 9520-00-3011 Dimen. 9520-00-4021
♦ Manufacturer Declaration SIL		Limit switch IFM	Section 9520-00-3005 Dimen. 9520-00-4015
♦ Form for Safety Information Concerning the Contamination QM 0912-16-2001_en		Spring return unit	Section 9520-00-3004 Dimen. 9520-00-4014
♦ For KNA/F, KNAP-D/F, KNAP-S/F: Operating manual for actuator		Limit switch VDE/VDI	Section 9520-00-3006 Dimen. 9520-00-4016
♦ Depending on option, relevant drawing:		Turck Initiator	Section 9520-00-3007 Dimen. 9520-00-4017
Double packing bonnet,	Section 9520-00-3001 Dimen. 9520-00-4011	Heating jacket	9520-00-3012
Stem extension DN 15-100	Section 9520-00-3009 Dimen. 9520-00-4022	Connection dimension for actuator	Dimen. 9520-00-4018
Stem extension DN 150-200	Section 9520-00-3003 Dimen. 9520-00-4013		

1 Technical data

Manufacturer:

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Internet: <http://www.richter-ct.com>

Designation :

Ball valve with ball/stem unit, Al₂O₃ ball / stem and Richter ENVIPACK self-adjusting universal stuffing box, two-piece body, to ASME.

Series:

- KNA/F** → Version with lockable lever or hand gear
- KNAP/F** → for pneumatic, hydraulic or electric actuator to DIN EN ISO 5211
- KNA-D/F** → KNA/F with thick-walled (5mm) body lining
- KNAP-D/F** → KNAP/F with thick-walled (5mm) body lining
- KNA-S/F** → Design stainless steel with lever, FDA conform wetted materials
- KNAP-S/F** → Design stainless steel prepared for pneumatic, hydraulic or electric actuator to DIN EN ISO 5211

Certified to Clean Air Act (TA Luft)

Strength and tightness (P10, P11) of the pressure-bearing body tested to DIN EN 12266-1.

Gas-tight (P12) in the seat to DIN EN 12266-1, leak rate A

Face to face: ASME B16.10, Class 150
to 6" column 21
8"/6", 8" column 20

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

Materials :

Body material:
KNA/F, KNAP/F, KNA-D/F, KNAP-D/F:
Ductile cast iron EN-JS 1049 / ASTM A395

KNA-S/F, KNAP-S/F:
Stainless steel 1.4408, (CF8M, (316))

Lining material: PFA .../F
On request: antistatic .../F-L

Temperature range :

See pressure-temperature diagram in **Chapter 1.6**.

Operating pressure:

½" – 6" from vacuum to max. 245 psig (17 bar)
8"/6" from vacuum to max. 145 psig (10 bar)
8" from vacuum to max. 190 psig (13 bar)
to ASME B16.42

See pressure-temperature diagram in **Chapter 1.6**.

Ball valve sizes in inch:

KNA/F, KNAP/F, KNA-D/F, KNAP-D/F:
½", ¾", 1", 1½", 2", 3", 4", 6", 8"
8"/6" with reduced bore 6"

KNA-S/F, KNAP-S/F: 1", 1½", 2"

Installation position :

Arbitrary, with low-cavity ball/stem units or an additional relief bore in the ball/stem units, Al₂O₃-ball a direction arrow indicates the direction of flow. See also **section 6.2**.

Weight, ball valve manually operated:

Nominal size	1/2"	3/4"	1"	1 1/2"	2"
ca. kg	5.6	6	5.6	12	14.5
ca. lbs	12.3	13.2	12.3	26.4	31.9
Nominal size	3"	4"	6"	8"/6"	8"
ca. kg	33.5	50	91	125	170
ca. lbs	73.7	110	200	275	275

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

Dimensions and individual parts :

See sectional drawings in **Chapter 10**.

Wear parts :

Seat rings
Packing components
Ball/stem unit
Al₂O₃-ball
Stem

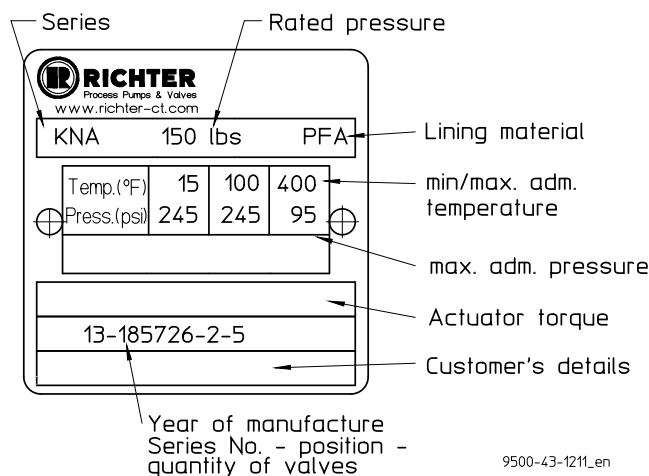
Options :

- ◆ Richter ENVIPACK double packing for particularly high safety requirements, selfadjusting.
On request, monitoring and flushing connection.
- ◆ stem unit extension
- ◆ Hand lever extension
- ◆ Limit switches
for remote monitoring of hand and remote-activated ball valves
- ◆ stainless steel heating jacket
can be retrofitted, suitable for all common heat transfer media.

1.1 Type plate and body markings

The stainless steel name plate is undetachably 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:

No CE marking is permissible for the sizes 1/2" and 3/4"; the name plate therefore has no CE marking.

Body identification:

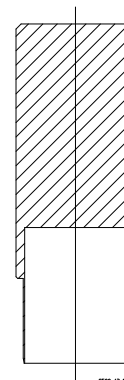
The following are visible on the body according to DIN EN 19 and AD 2000 A4:

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

1.2 Mounting sleeve for ball/stem unit 8"

Nominal size		Article No.
[mm]	[inch]	
200	8"	9599-41-8310

Please contact Richter to order the mounting sleeve.



1.3 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 3", 4", 6", 8"/6" and 8" they are 2 spring gland followers **502**.

Pipe screws

Flange Nominal 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
8"	8 x 3/4"	115	1020

Body screws

Nominal 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	60	531
6"	8 x M20	150	1330
8"/6"	8 x M20	150	1330
8"	12 x M24	175	1549

1.4 Actuating torques

Test medium: water 68 °F (20 °C)

Higher actuating torques may occur with other media.

Stem unit

DN [inch]	Δp in psi				
	≤ 45	85	145	235	max. adm.
	[in-lbs]	[in-lbs]	[in-lbs]	[in-lbs]	[in-lbs]
1/2"	71	71	71	89	620
3/4"	71	71	71	89	620
1"	106	106	106	106	620
1 1/2"	177	177	177	221	1990
2"	221	221	221	266	1990
3"	531	531	575	708	4425
4"	708	708	797	1505	4425
6"	1770	2213	3098	--	19470
8"/6"	1770	2213	3098	--	19913
8"	5310	5310	5310	--	19470

Al₂O₃-ball

DN [inch]	Δp in psi				
	≤ 45	85	145	235	max. adm.
	[in-lbs]	[in-lbs]	[in-lbs]	[in-lbs]	[in-lbs]
1/2"	89	89	89	106	248
3/4"	89	89	89	106	248
1"	106	106	106	106	248
1 1/2"	177	221	266	398	708
2"	221	266	310	443	1062
3"	531	885	1416	1947	2215
4"	708	1151	1770	2478	3098
6"	3098	3983	5310	--	10620
8"/6"	3098	3983	5310	--	10620

1.5 Flow rate value

Nominal size [inch]	Kv100 [m³/h]	Cv [US gpm]
1/2"	17.2	20
3/4"	30.9	36
1"	60	70
1 1/2"	190	221
2"	280	326
3"	587	684
4"	1250	1456
6"	2800	3262
8"/6"	3200	3728
8"	6000	6990

1.6 Pressure-temperature-diagram

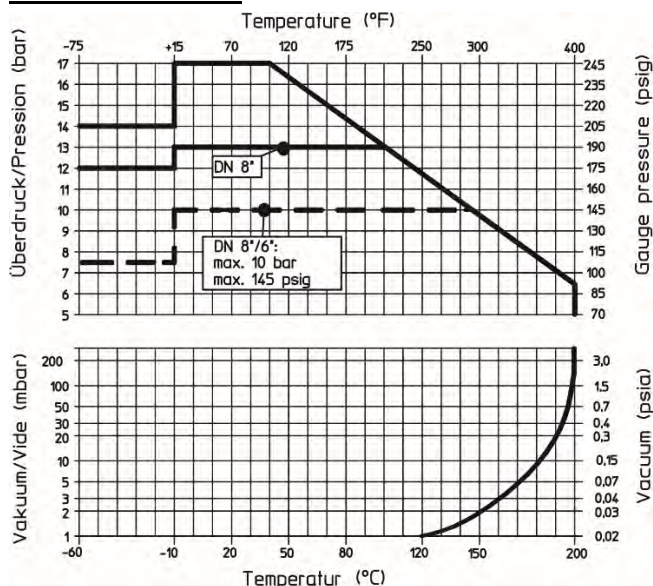
When used in the area of application of ASME, the low temperature of ASTM A395 is limited to -20°F (-29°C).

be observed.

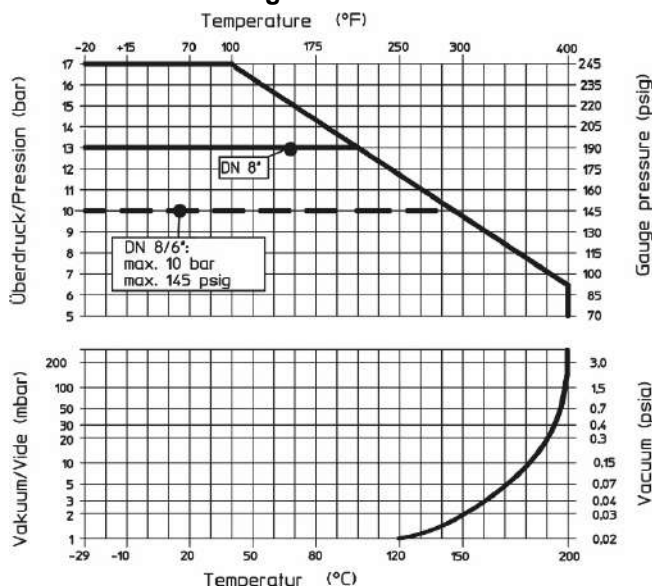


When used in the minus temperature range, the regulations applicable in the country in question must

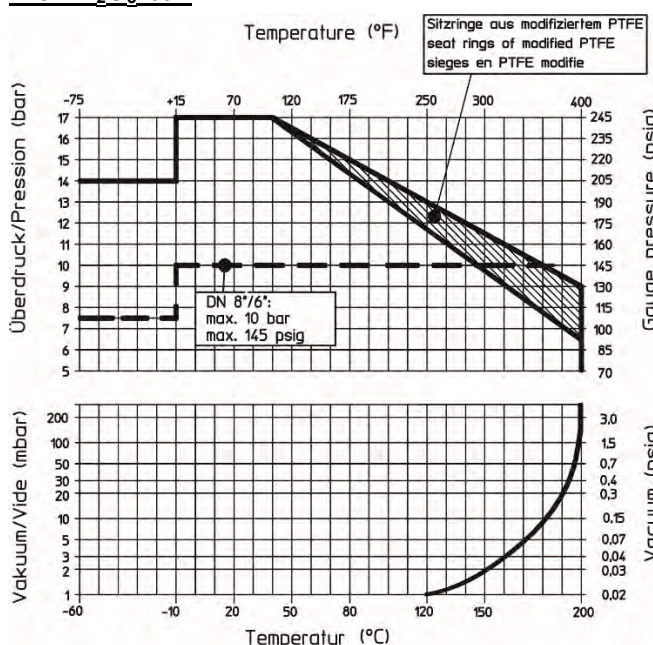
with ball/stem unit



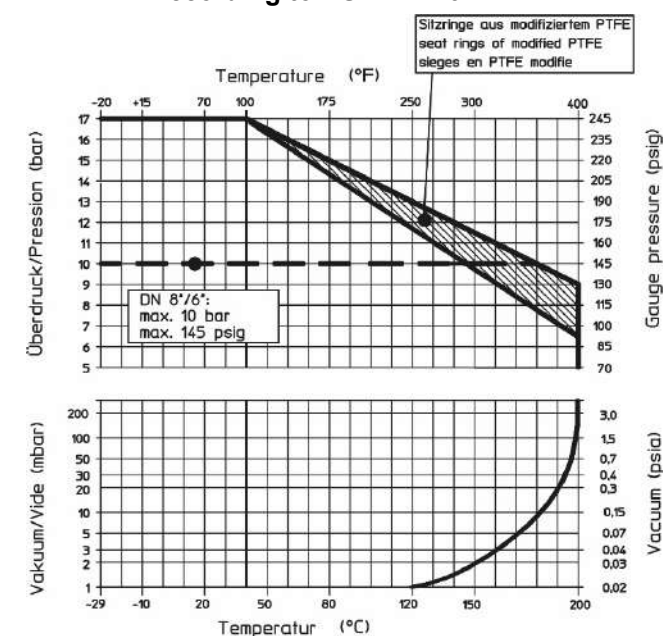
According to ASME B 16.42



with Al₂O₃-ball



According to ASME B 16.42



2 Notes on safety

This operating manual contains fundamental information which is to be observed during installation, operation and maintenance.

It must be read before installation and commissioning!

This operating manual must always be available at the place of use of the valve.

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

Installation, operation and maintenance 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 ball 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.



Non-observance of the notes on safety may result in the loss of any and all claims for damages.

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 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/F and KNAP-S/F are preferred for corrosive atmosphere and in clean-room conditions.

2.2 For the customer / operator

If a valve is used, the operator must ensure 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 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 at the end of a pipe (end valve) must be sealed with a blind flange at the free connection end and appropriately secured against unauthorised activation.

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

2.3 Improper operation

The operational safety of the valve supplied is only guaranteed if it is used properly in accordance with **Section 2.1** of this operating manual.



The operation limits specified on the name plate and in the pressure-temperature diagram must under no circumstances be exceeded.

3 Safety notes for applications in potentially explosive areas based on the Directive 2014/34/ EC (ATEX)

The valves are intended for use in a potentially explosive area and are therefore subject to the conformity assessment procedure of the directive 2014/34/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

Inadmissible modes of 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 and outside the valve.

a) Discharges inside the valve

However, these discharges inside the valve 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.

b) Discharges outside the valve

At the points where the non-conductive lining e.g. protrudes on the sealing surfaces to the outside or gets contact with the atmosphere on the outside, it may lead to discharges from the lining to nearby valves or attachments.

To safely avoid explosion hazards and accidents, therefore, the atmosphere surrounding the valve must not be explosive.

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.
- ♦ For safe and reliable operation, it must be ensured with regular inspection intervals that the unit is properly serviced and kept in a perfect technical condition.
- ♦ 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 different measures e.g. a cable link.

- ♦ 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 Clean Air Act (TA Luft)

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

- ♦ Carry out regular maintenance intervals and check the tightness of the screw connections and tighten as necessary.

5 Transport, storage and disposal



For all transport work, 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 protect the valve against impacts and collisions.

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

Do not damage paint protection.

5.1 Storage

If the valve is not installed immediately after delivery, store them properly.

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

Protect elastomers against UV light.

Generally, a storage period of 10 years do not exceeded.

5.2 Return consignments



Valves which have conveyed aggressive or toxic media rinse and clean before being returned to the manufacturer's works.

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 valves do not install.
- ♦ 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

- ♦ Contamination of or damage to the sealing surfaces is best avoided if the protective caps remain on the flanges until just before installation.

If plastic sealing surfaces, e.g. on mating flanges made of metal or enamel, can be damaged, use PTFE-lined seals with a metal inlay.

These gaskets are available as special accessories in the Richter range.

6.2 Direction of flow and installation position

Installation is independent of the direction of flow.

Any fitting 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 and Al_2O_3 -balls with an additional relief bore.

Fig. 1 ball/stem unit in closed position

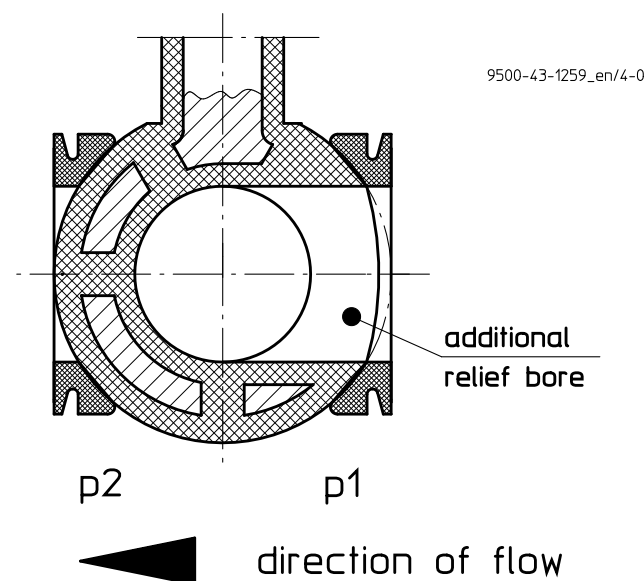
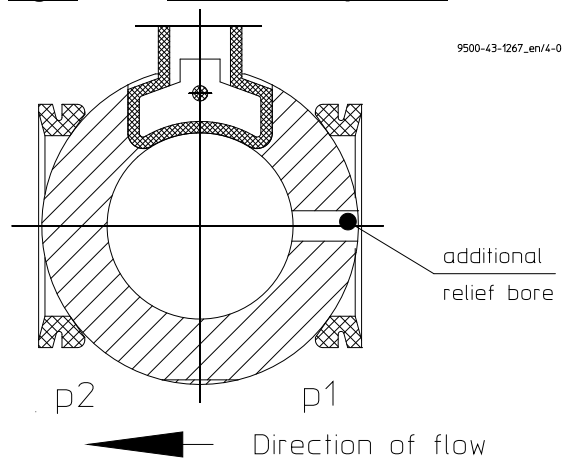


Fig. 2 Al_2O_3 -ball in closed position



6.3 Grounding

The valve must be grounded. This can be achieved in the simplest way via the pipe screws using tooth lock washers. A toothed lock washer is placed underneath each pipe screw per 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.

In other cases earthing is to be secured through other measures, e.g. cable bridges.

The ball/stem unit **201** and stem **202** are grounded using a grounding spring washer **557**.

6.4 Test pressure

The test pressure PT of a valve must not exceed the value of $1.5 \times \text{PS(PN)}$ as per the identification of the valve.

7 Operation

7.1 Initial commissioning

Normally, the valves have been tested for leaks with air or water. Prior to initial operation check cover screws. For tightening torques, see **section 1.3**.



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

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

For tightening torques, see **section 1.3**.

7.2 Improper operation and their consequences

- ♦ 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 or Al_2O_3 -ball and stem could occur.
- ♦ Crystallisation may result in damage to the seat rings or the ball/stem unit or Al_2O_3 -ball/stem. This can be prevented by heating. In extreme cases this may cause blocking.
- ♦ If the ball blocks, do not apply force as the ball/stem unit/stem may break if the max. adm. torque is exceeded.

- ♦ Increased wear occurs in operation with solids contents.
- ♦ Operation 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 the start of maintenance work, clean the valve thoroughly. Medium residue may be in the valve even if it has been properly drained and flushed.

After dismantling, immediately protect the valve flanges against mechanical damage by using flange caps. See also **section 6.1**.



Make sure that a remote-controlled actuator cannot be switched on by accident.

8 Malfunctions

- ♦ Flange connection ball valve/pipe is leaking
Retighten the flange screws to a tightening torque according to **section 1.3**. 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 valve.
- ♦ Flange connection main body/body end piece is leaking
Retighten body screws. See paragraph "Flange connection ball valve/pipe is leaking".
- ♦ Packing is leaking
Retighten packing nuts according to the details in **section 1.3**.
- ♦ Ball valve does not operate
Is the actuator supplied with power?
Is any directional control valve correctly connected?
Is there foreign matter in the valve?

- ♦ 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 from.
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 actuating torque as per **section 1.4**, dismantle ball valve and inspect individual components.

9 Maintenance

- ♦ All repair work is to be performed by qualified personnel using the appropriate tools.
- ♦ 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 tightening torques, see **section 1.3**.

9.1 Dismantling ball valve with ball/stem unit

9.1.1 Ball valve with lever

- ♦ Remove lever **203**.
- ♦ Take out grounding spring washer **557**.
- ♦ Dismantle packing gland follower **503** and spring gland follower **502**.
- ♦ The thrust ring **405/1**, packing bellows **403** and retaining washer **526** (not in 6" 8"/6" and 8") are one unit and it is levered out using 2 screwdrivers.
- ♦ Undo screw connection body end piece **102** / main body **101**.
- ♦ Remove body end piece **102**.
- ♦ Remove ball/stem unit **201** in closed position. Make sure that you do not damage the body lining.
- ♦ Remove seat rings **401**.

9.1.2 Packing bellows

- ♦ Remove retaining washer **526**.
- ♦ Separate thrust ring **405/1** and packing bellows **403** by pushing them apart.

9.1.3 Ball valve with actuator

- ♦ Remove actuator **850** and coupling **804**.
- ♦ Dismantle packing gland follower **503** and spring gland follower **502**.
- ♦ Remove bracket **510**.
- ♦ Further dismantling is performed as described in **Section 9.1.1** and **9.1.2**.

9.2 Assembly

- ♦ Prior to assembly all parts are to be cleaned and the plastic-lined parts checked for damage.
- ♦ Insert seat rings **401** in the main body **101** and body end piece **102**.
- ♦ Mount ball/stem unit **201** in closed position. Make sure that you do not damage the body lining.
An additional bore in the ball/stem unit, e.g. for cavity-free, must lie on the p1 side in the closed position. See also **section 6.2**.
- ♦ Mount body end piece **102**. Tighten the greased housing screws cross over with a tightening torque according to **section 1.3**.

9.2.1 Packing bellows

- ♦ Press thrust ring **405/1** into packing bellows **403**.
- ♦ Install retaining washer **526** (not in 6", 8"/6" and 8").
- ♦ Press unit into main body **101**.
- ♦ Press in grounding spring washer **557**.

9.2.2 Ball valve with lever

- ♦ Mount lever stop **577**, spring gland follower **502** (at 3", 4", 6", 8"/6" and 8" are 2 spring gland followers) and packing gland follower **503**. Tighten packing nuts until there is no gap between packing gland follower and spring gland follower. See **Chapter 1.3** and **10.2**.
- ♦ Seal any tapped bores still open with plugs.
- ♦ Mount lever **203**.

9.2.3 Ball valve with actuator

- ♦ Mount spring gland follower **502** (at 3", 4", 6", 8"/6" and 8" are 2 spring gland followers) and packing gland follower **503**. Tighten packing nuts until there is no gap between packing gland follower and spring gland follower.
See **Section 1.3** and **10.3**.
- ♦ Mount bracket **510** with the opening at right angles to the direction of flow. See sectional drawing in **Chapter 10.3** and **10.7**.
- ♦ Mount coupling **804** and actuator **850**. Observe the actuator position in accordance with the actuator operating manual.
- ♦ Observe the ball/stem position in accordance with the position of the actuator.

9.3 Dismantling ball valve with ball and stem

It is possible with a ball valve with ball and stem to replace the seat rings and ball without dismantling the entire ball valve.

It is equally possible to remove the packing gland follower, spring gland follower and packing insert without dismantling the body.

The entire ball valve must merely be taken apart to remove the stem.

For sectional drawings, see [section 10](#).

9.3.1 Ball and seat rings

- ♦ Move ball **200** into the 'closed' position.
- ♦ Undo body nuts and bolts.
- ♦ Remove body end piece **102**.
- ♦ Remove ball **200** from the main body **101** by swivelling it.
- ♦ Remove seat rings **401** from the main body **101** and body end piece **102** and replace.

9.3.2 Packing bellows

- ♦ Remove lever **203**.
- ♦ Dismantle packing gland follower **503** and spring gland follower **502**.
- ♦ Take out grounding spring washer **557**.
- ♦ The thrust ring **405/1**, packing bellows **403** and retaining washer **526** (not in 6" and 8"/6") are one unit and it is levered out using 2 screwdrivers.
- ♦ Remove retaining washer **526**.
- ♦ Separate thrust ring **405/1** and packing bellows **403** by pushing them apart.

9.3.3 Ball valve with actuator

- ♦ Remove actuator **850** and coupling **804**.
- ♦ Dismantle packing gland follower **503** and spring gland follower **502**.
- ♦ Remove bracket **510**.
- ♦ Further dismantling is performed as described in [Chapter 9.3.1](#).

9.3.4 Stem

- ♦ Dismantling as described in [section 9.3.1](#) to [9.3.2](#).
- ♦ Undo screw connection body end piece **102** / main body **101**.
- ♦ Remove body end piece **102**.
- ♦ Remove ball **200** and stem **202** in closed position. Make sure that you do not damage the body lining.
- ♦ Swivel ball **200** from stem **202**.

9.4 Assembly

- ♦ Prior to assembly all parts are to be cleaned and the plastic-lined parts checked for damage.
- ♦ Insert seat rings **401** in the main body **101** and body end piece **102**.
- ♦ Insert stem **202** from inside into the main body **101**. In the case of 6" and 8"/6" with an additional disc **550/1**.
- ♦ Move stem **202** into the 'closed' position.
- ♦ Swivel ball **200** into the stem **202**. Any pressure relief or drain bore must lie on the p1 side in the "off" position. See also [section 6.2](#).
- ♦ Mount body end piece **102**. Tighten the greased housing screws cross over with a tightening torque according to [section 1.3](#).

9.4.1 Packing bellows

- ♦ Press thrust ring **405/1** into packing bellows **403**.
- ♦ Install retaining washer **526** (not in 6" and 8"/6").
- ♦ Press unit into main body **101**.
- ♦ Press in grounding spring washer **557**.

9.4.2 Ball valve with lever

- ♦ Mount lever stop **577**, spring gland follower **502** (in 3", 4", 6" and 8"/6" they are 2 spring gland followers) and packing gland follower **503**. Tighten packing nuts until there is no gap between packing gland follower and spring gland follower. See [Section 1.3](#) and [10.4](#).
- ♦ Seal any tapped bores still open with plugs.
- ♦ Mount lever **203**.

9.4.3 Ball valve with actuator

- ♦ Mount spring gland follower **502** (in 3", 4", 6" and 8"/6" they are 2 spring gland followers) and packing gland follower **503**. Tighten packing nuts until there is no gap between packing gland follower and spring gland follower. See **Section 1.3** and **10.5**.
- ♦ Mount bracket **510** with the opening at right angles to the direction of flow.
- ♦ Mount coupling **804** and actuator **850**. Observe the actuator position in accordance with the actuator operating manual.
- ♦ Make sure that the position of the ball valve with ball and stem, and the position of the actuator are aligned.

9.5 Conversion from lever to actuator

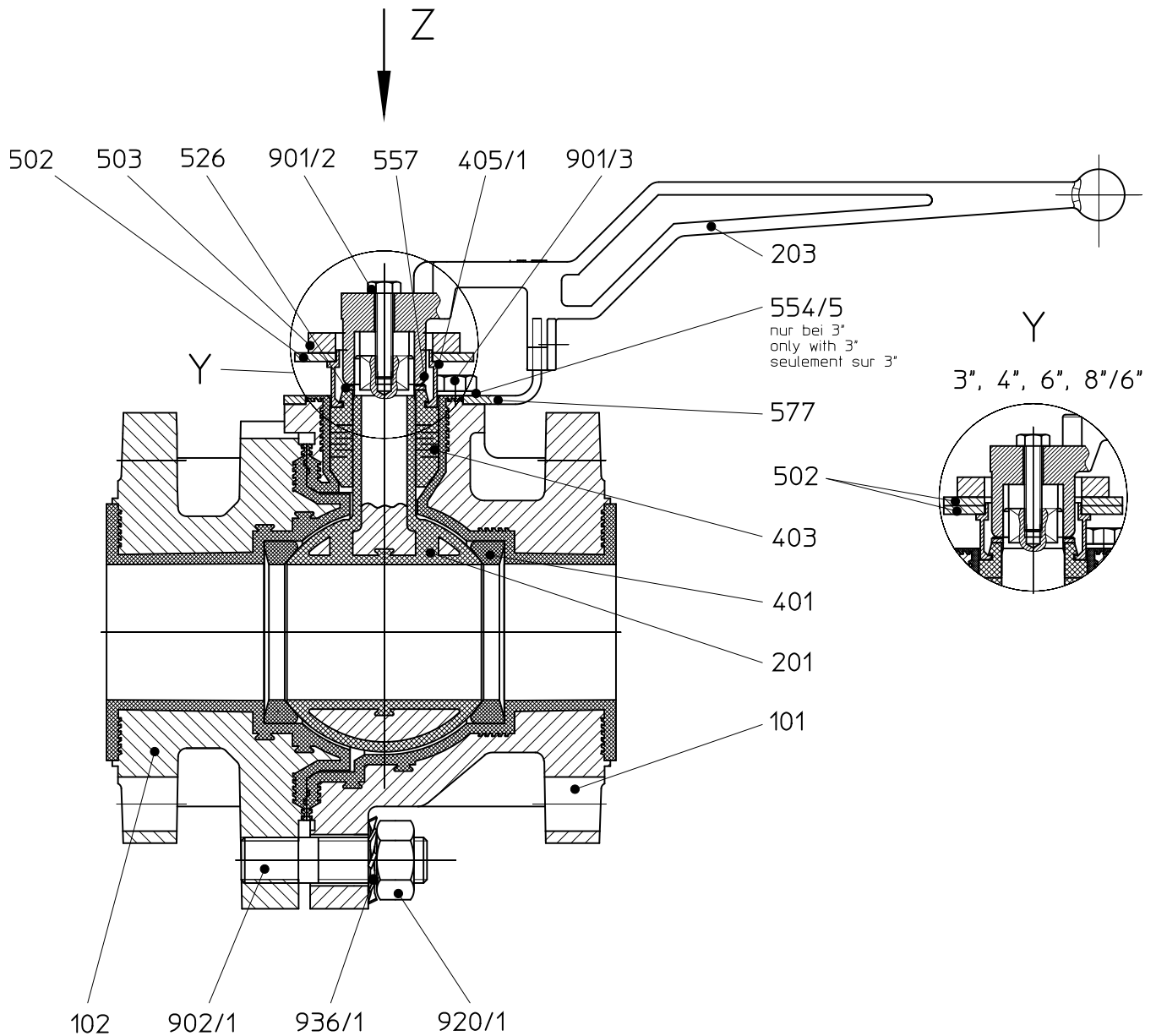
- ♦ Select the actuator in accordance with the instructions of the actuator manufacturer.
- ♦ Remove lever **203**.
- ♦ Remove lever stop **577** and plug.
- ♦ Check the fits of the coupling **804**, bracket **510** and actuator **850**.
- ♦ Mount bracket **510** with the opening at right angles to the direction of flow. See sectional drawing in **Chapter 10**.
- ♦ Mount coupling **804** and actuator **850**. Observe the actuator position in accordance with the actuator operating manual.
- ♦ Connecting dimensions see drawing 9520-00-4018.

10 Drawings**10.1 Legend**

101	main body	557	grounding spring washer
102	body end piece	577	lever stop
200	ball	804	coupling
201	ball/stem unit	includes:	
202	stem	500	Ring (Option)
203	lever lockable	952	pressure spring
401	seat ring	980/1	round head grooved pin
403	packing bellows	850	actuator
405	thrust ring	857	gear (8")
502	spring gland follower	901/x	hex. screw
503	spring gland follower	902/1	stud screw
510	bracket	904/1	setscrew
526	retaining washer (1/2", 3/4", 1", 1 1/2", 2", 3", 4")	914/2	hex socket screw (F07) (2")
550/1	disc (6", 8"/6")	918/1	threaded rod (6", 8"/6", 8")
554/1	washer	920/x	hex. nut
554/5	washer (3")	936/1	toothed lock washer
		967/1	padlock (not included)

10.2 Sectional drawing ball valve

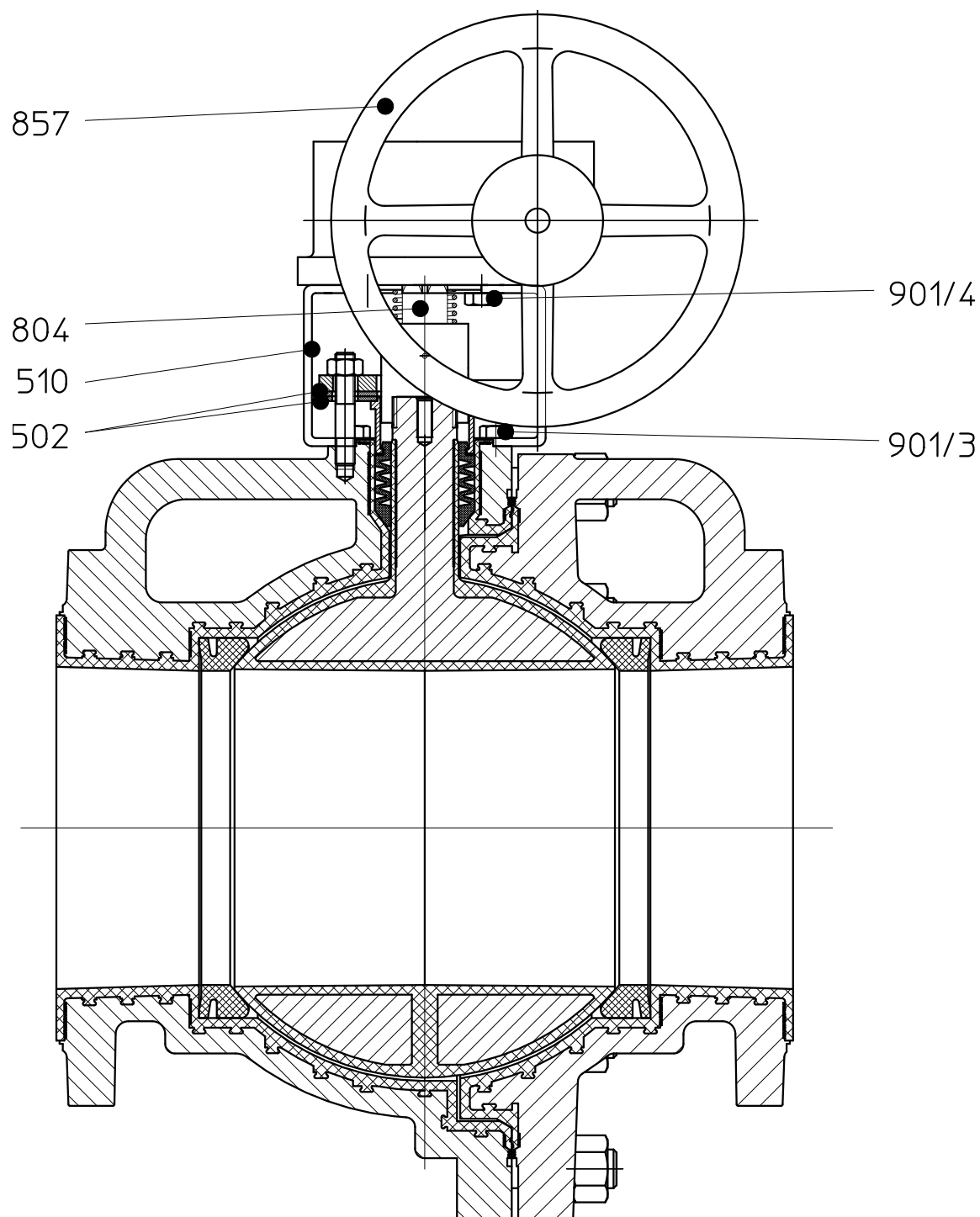
10.2.1 Ball valve with ball/stem unit and lever $\frac{1}{2}$ " – 8"/6"



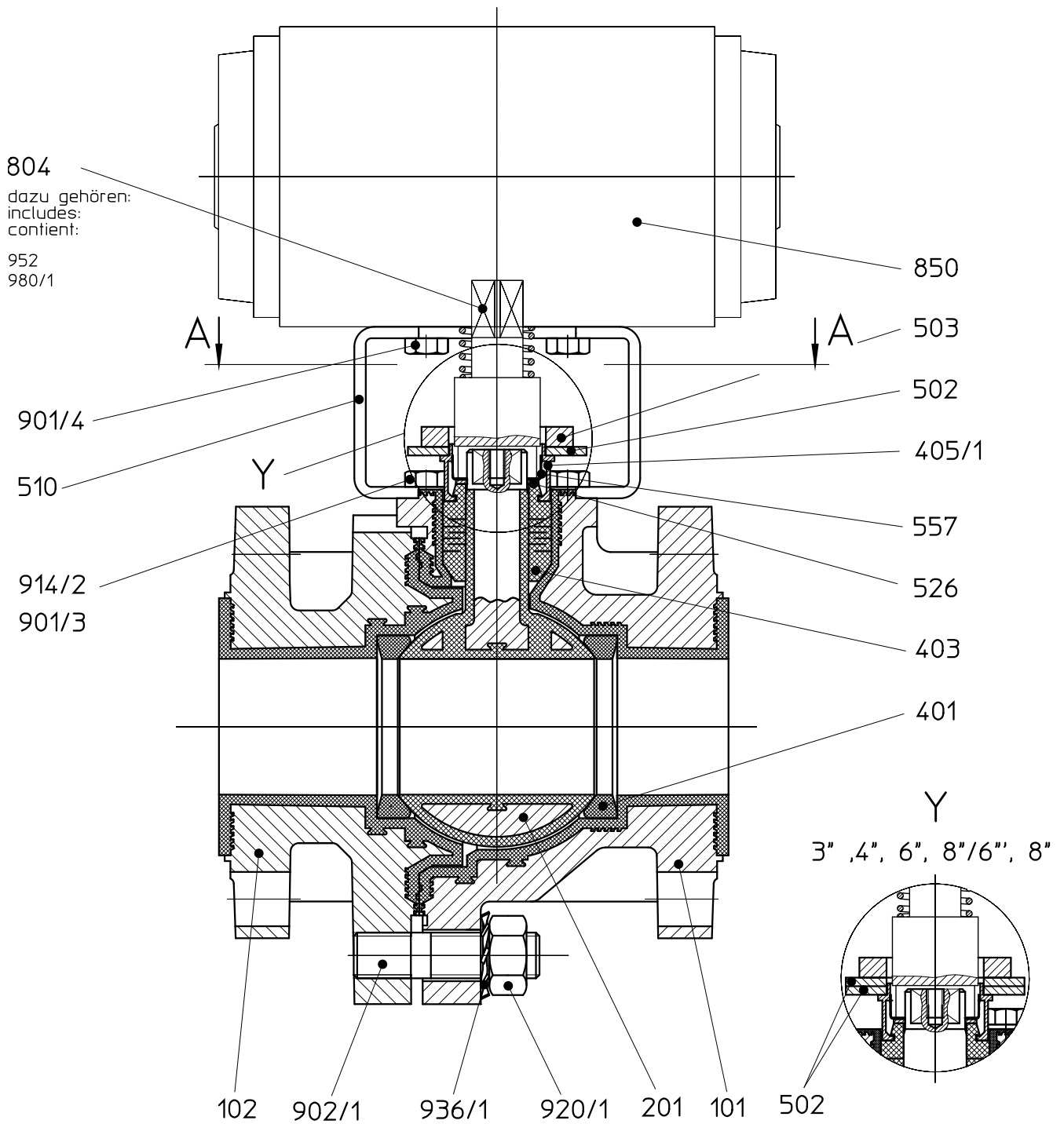
9520-00-3120/4-0

Holes of the flange- and housing screws view displaced by 45°.

10.2.2 Ball valve with ball/stem unit and worm gear 8"

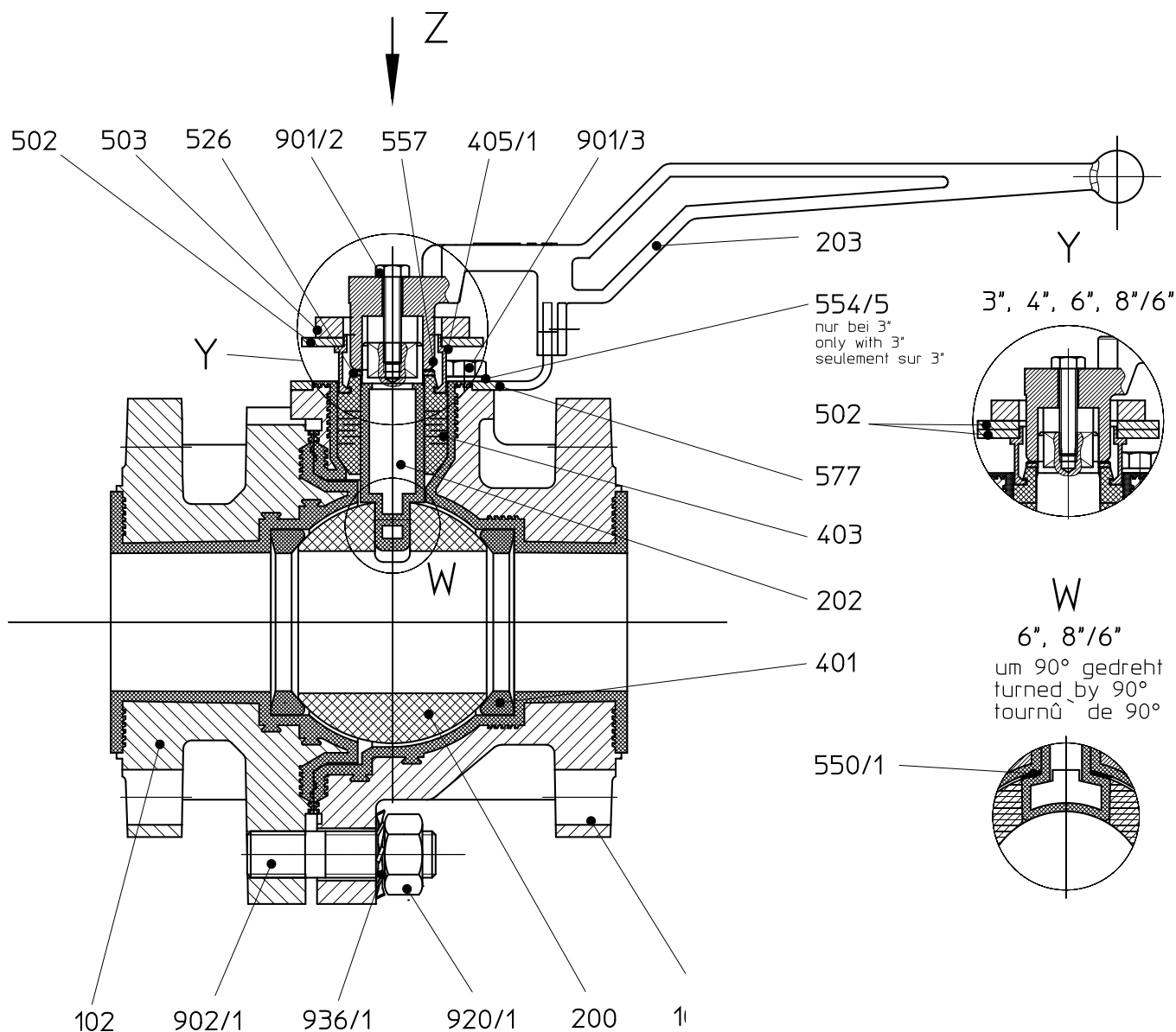


10.2.3 Ball valve with ball/stem unit and actuator



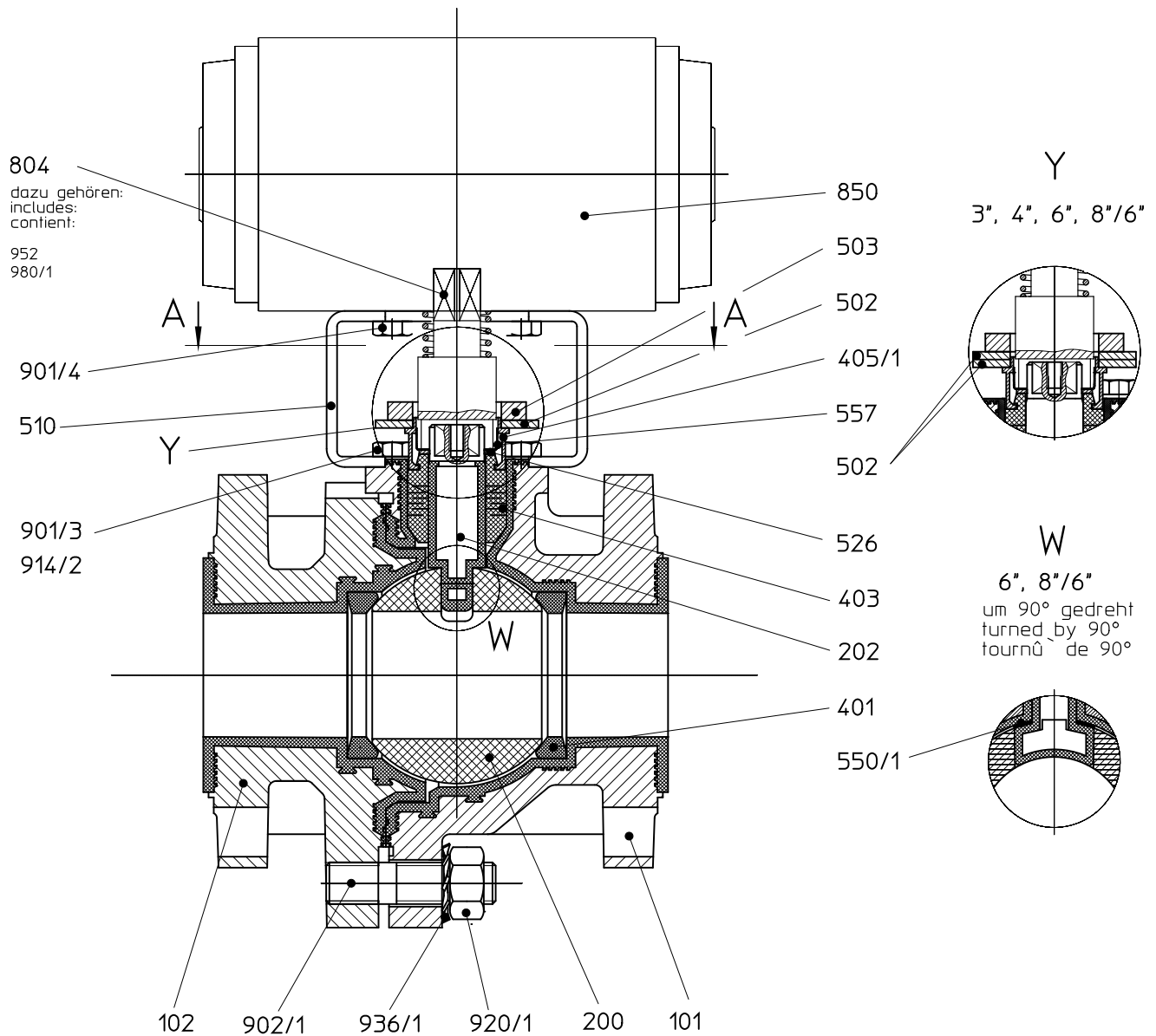
Holes of the flange- and housing screws view displaced by 45°.

10.2.4 Ball valve with ball, stem and lever

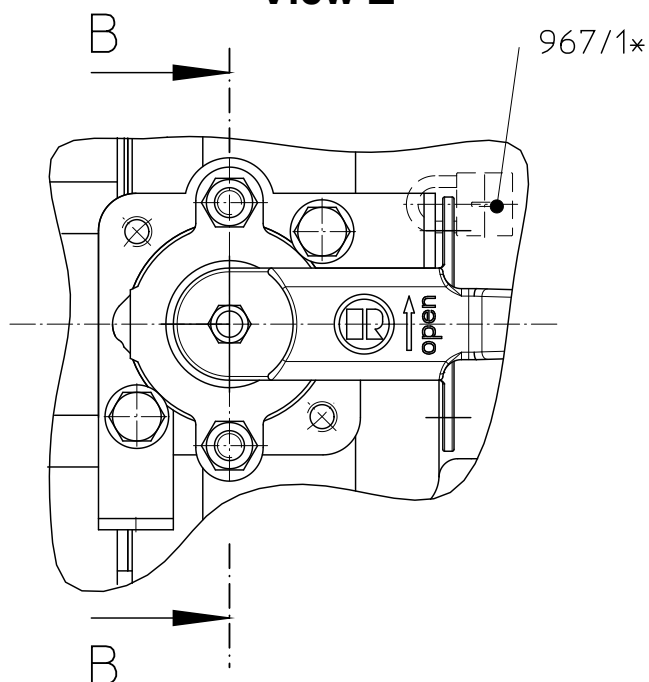
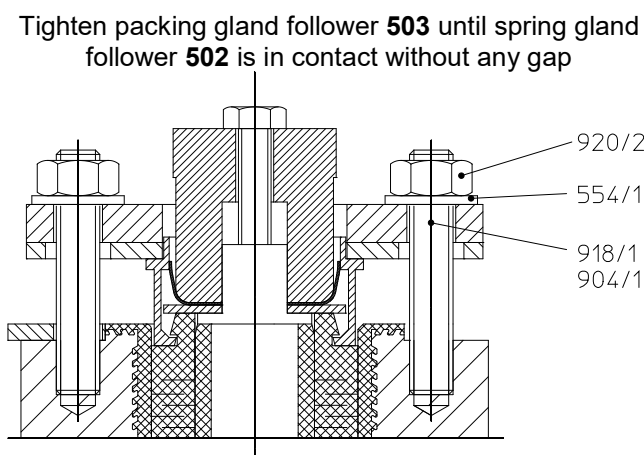
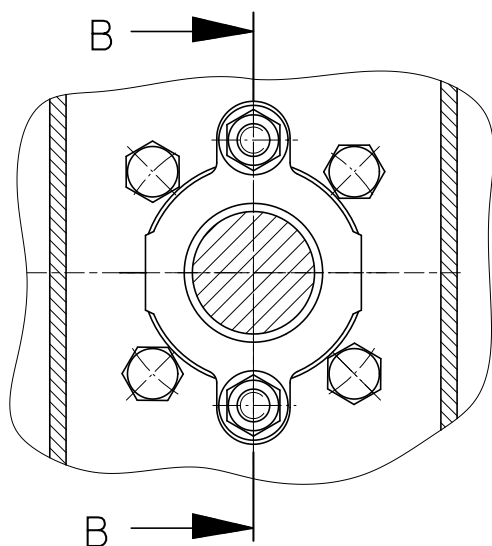


Holes of the flange- and housing screws view displaced by 45°.

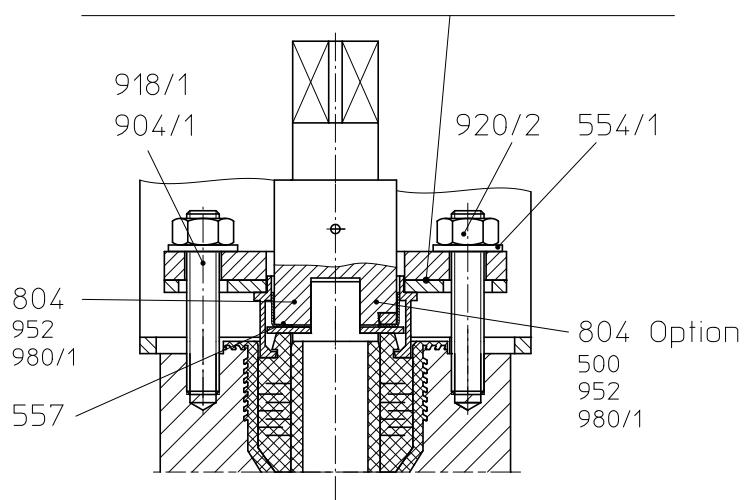
10.2.5 Ball valve with ball, stem and actuator



Holes of the flange- and housing screws view displaced by 45°.

10.3 View and section ball valve with lever**View Z****Section B – B****10.4 Sections ball valve with actuator****Section A – A****Section B – B**

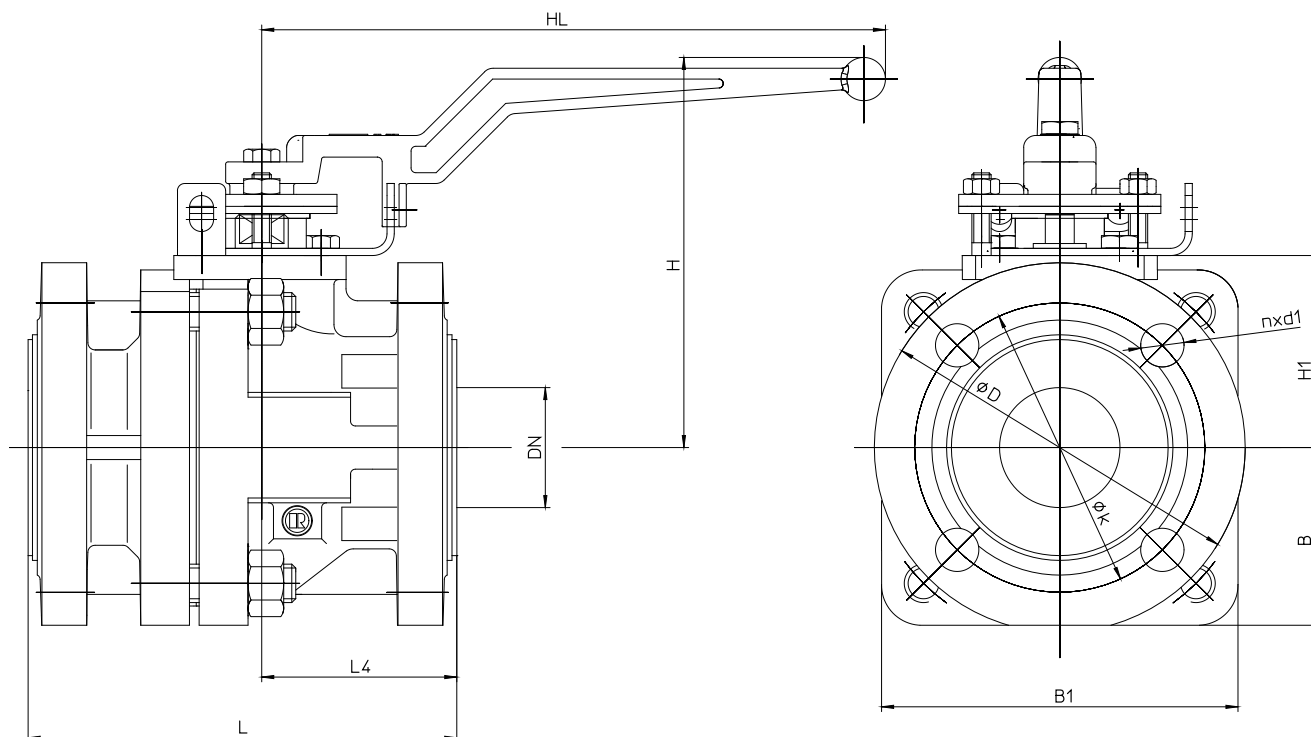
Tighten packing gland follower **503** until spring gland follower **502** is in contact without any gap



9500-43-1280_de/4-0

10.5 Dimensional drawing ball valve

10.5.1 Ball valve with lever 1/2" – 8"/6"



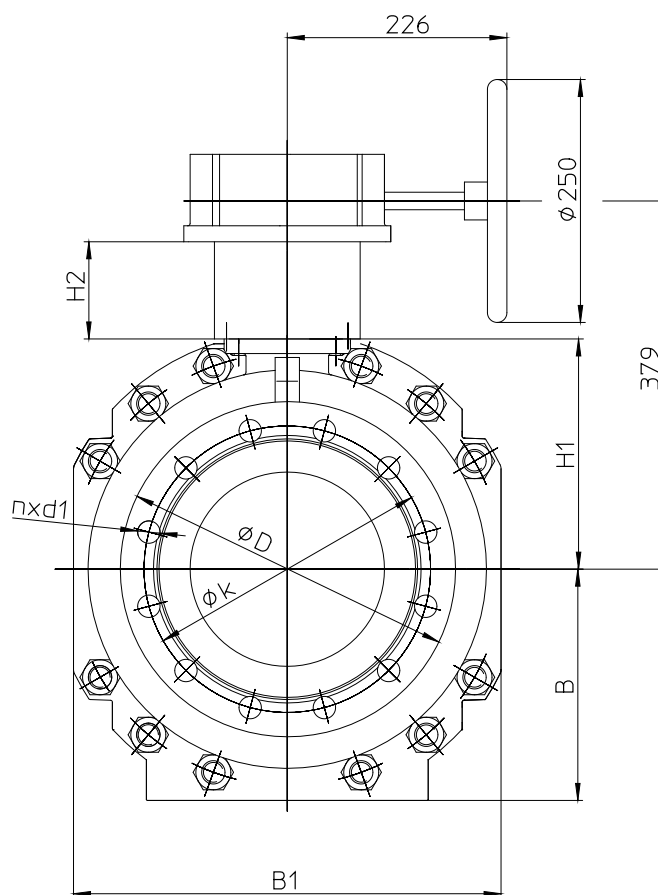
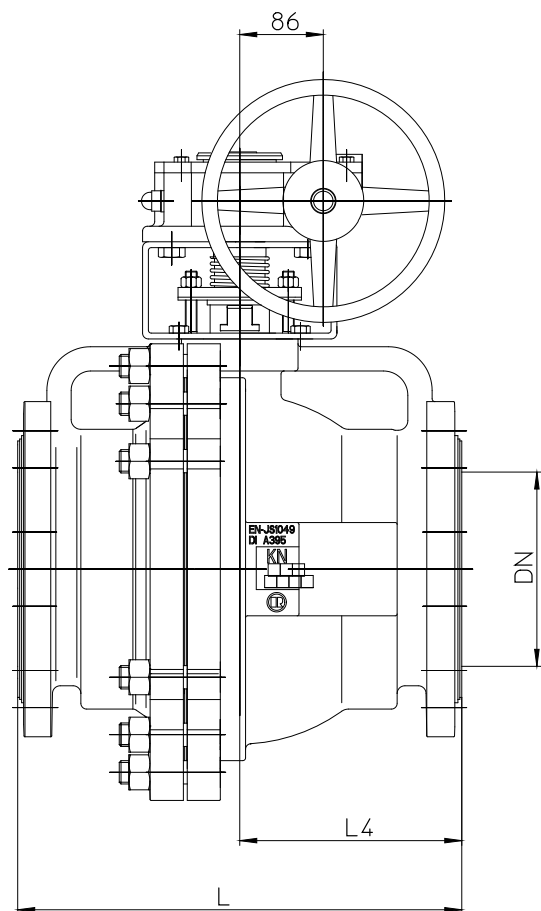
KNA /F		x	x	x	x	x	x	x	x	x	x
KNA-S/F				x	x	x					
KNA-D/F				x	x	x	x	x	x		
DN		1/2"	3/4"	1"	1 1/2"	2"	3"	4"	6"	8"/6" ¹⁾	8"
L	inch	5.12	5.91	5.0	6.5	7.0	8.0	9.0	10.5	18.0	
	mm	130	150	127	165	178	203	229	267	457	
L4	inch	2.32		2.2	2.95	3.18	3.7	4.21	5.12	8.79	9.0
	mm	59		56	75	81	94	107	130	223.5	228.5
HL	inch	7.05			10.2		16.1		20.17		---
	mm	179			259		410		512.5		---
H	inch	4.94			6.29	6.39	8.09	8.72	11.18		---
	mm	125.5			159.5	162.5	205.5	221.5	284		---
H1	inch	1.97			3.03	3.14	4.64	5.27	7.24		9.33
	mm	50			77	80	118	134	184		237
B	inch	2.05			2.7	2.9	4.4	5.1	7.08		9.37
	mm	52			69	74	112	130	180		238
B1	inch	4.29			5.43	5.82	9.44	11.81	14.96		17.32
	mm	109			138	148	240	300	380		440
Ø port	inch	0.59	0.79	0.96	1.50	1.87	3.07	3.78	5.71	5.71	7.68
	mm	15	20	24.5	38	37.5	78	96	145	145	195

¹⁾ DN 8"/6" with reduced bore 6"

6", 8"/6": At $\Delta p > \text{approx. 2 bar}$ a worm gear is recommended instead of hand lever.

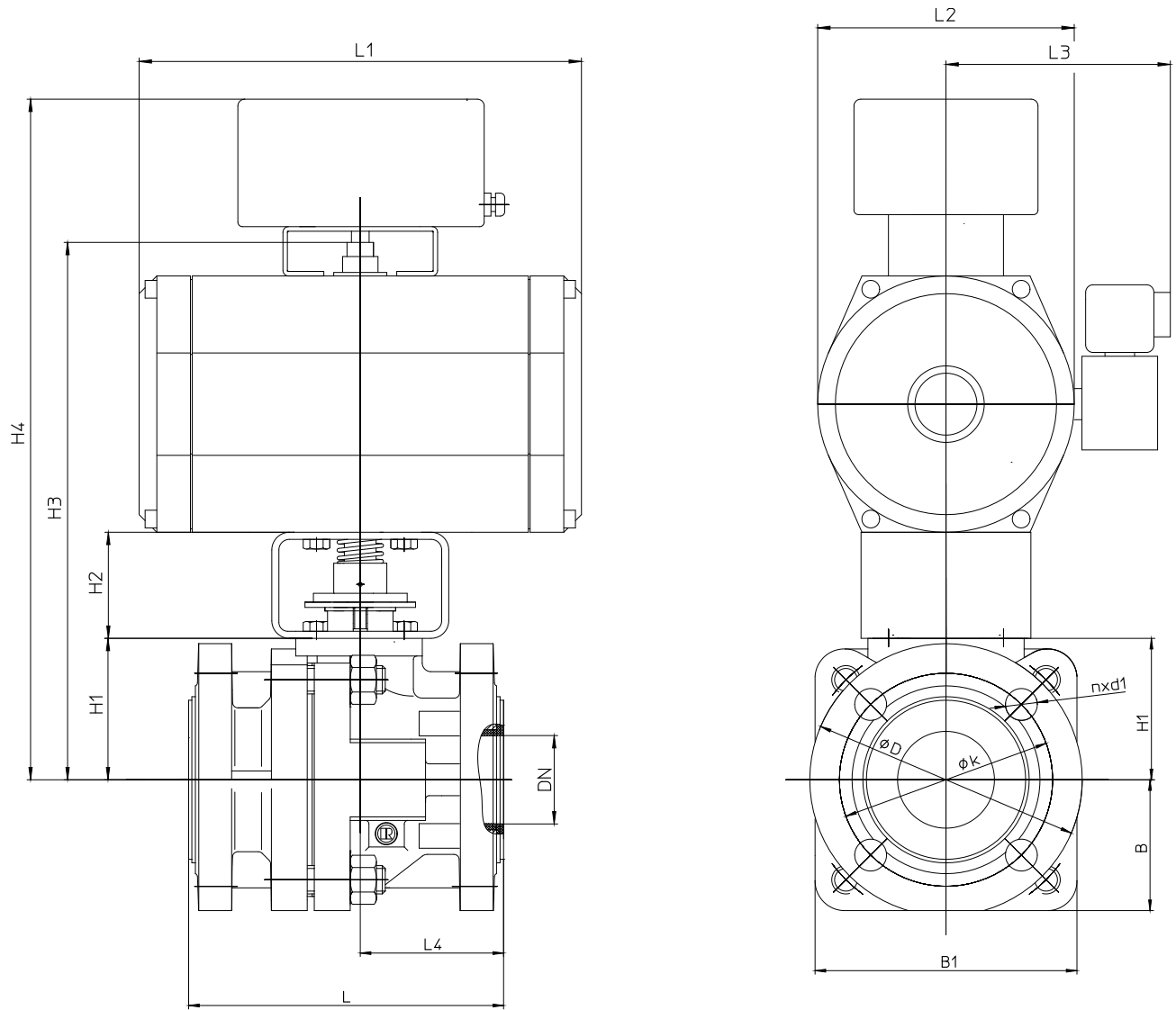
8" Only with worm gear

10.5.2 Ball valve with gear 8"



9520-00-4120_B2

10.5.3 Ball valve with actuator



Dimensions H3, H4, L1, L2 and L3 vary depending on the actuator manufacturer

KNAP/F		x	x	x	x	x	x	x	x	x	
KNAP-S/F				x	x	x					
KNAP-D/F				x	x	x	x	x	x	x	
DN		½"	¾"	1"	1½"	2"	3"	4"	6"	8"/6“ ¹⁾	8“
H1	inch	1.97			3.03	3.15	4.65	5.28	7.24		9.33
	mm	50			77	80	118	134	184		237
H2	inch	2.36			2.36 ²⁾		3.15		3.94		
	mm	60			60 ²⁾		80		100		
L	inch	5.12	5.91	5.0	6.5	7.0	7.99	9.01	10.5	18.0	
	mm	130	150	127	165	178	203	229	267	457	
L ₄	inch	2.32	2.32	2.2	3.0	3.18	3.7	4.21	5.12	8.79	9.0
	mm	59	59	56	76	81	94	107	130	223.5	228.5
B	inch	2.05			2.7	2.9	4.4	5.1	7.08		9.37
	mm	52			69	74	112	130	180		238
B1	inch	4.29			5.43	5.82	9.44	11.81	14.96		17.32
	mm	109			138	148	240	300	380		440
Ø port	inch	0.59	0.79	0.96	1.50	1.87	3.07	3.78	5.71	5.71	7.68
	mm	15	20	24.5	38	37.5	78	96	145	145	195
Connecting dimen. acc. to ISO 5211		F05			F07		F10		F12		

¹⁾ DN 8" with reduced bore 6"

²⁾ H2 = 3.15" (80mm) if F10 or F12 on the actuator side

10.5.4 Flange connection dimensions

DN	ASME B16.5 Class 150 raised face					
	ØD		Øk		n x d1	
	inch	mm	inch	mm	inch	mm
½")	3.5 ¹⁾	89 ¹⁾	2.38	60.5	4x⅝"	4x16
¾")	3.87 ¹⁾	98.5 ¹⁾	2,755	70	4x⅝"	4x16
1"	4.25	108	3,125	79.5	4x⅝"	4x16
1½"	5.0	127	3,875	98.5	4x⅝"	4x16
2"	6.0	152.5	4.75	120.5	4x¾"	4x19
3"	7.5	190.5	6.0	152.5	4x¾"	8x19
4"	9.0	229	7.5	190.5	8x¾"	8x19
6"	11.0	279.5	9.5	241.5	8x⅞"	8x22.5
8"/6"	13.38 ¹⁾	340 ¹⁾	11.75	298.5	8x⅞"	8x22.5
8"	13.50 ¹⁾	343 ¹⁾	11.75	298.5	8x⅞"	8x22.5

¹⁾ not to ASME



Konformitätserklärung nach EN ISO/IEC 17050
Declaration of Conformity according to EN ISO/IEC 17050

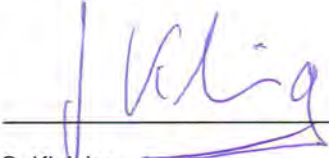
Produkt <i>Product</i>	Kunststoffausgekleidete Dreharmaturen <i>Plastic lined quarter turn valves</i>		
Bauart <i>Design</i>	Kugelhahn, Regel-Kugelhahn, Kompakt-Kugelhahn, Bodenablass-Kugelhahn, Absperr- und Regelklappe <i>Ball valve, control ball valve, sandwich ball valve, bottom drain ball valve, shut-off and control butterfly valve</i>		
Baureihe <i>Serie</i>	KN..., KNA..., BVA..., KNR..., KNAR..., KH..., KK..., KK-FU..., KA-N..., NKL..., NKS...		
Nennweite <i>Size</i>	DN 15 bis DN 400, ½" bis 16" <i>DN 15 to DN 400, ½" to 16"</i>		
Seriennummer <i>Series number</i>	ab/from 19.07.2016		
EU-Richtlinie <i>EU-Directive</i>	2014/68/EU Druckgeräterichtlinie 2014/68/EU <i>Pressure Equipment</i>	2006/42/EG ²⁾ 2006/42/EC ²⁾	Maschinenrichtlinie <i>Directive Machinery</i>
Angewandte Technische Spezifikation <i>Applied Technical Specification</i>	DIN EN ISO 12100 AD 2000		
Überwachungsverfahren <i>Surveillance Procedure</i>	2014/68/EU Zertifizierungsstelle für Druckgeräte der TÜV Nord Systems GmbH & Co. KG Große Bahnstraße 31 D-22525 Hamburg Notified Body 0045		
Konformitätsbewertungsverfahren 2014/68/EU <i>Conformity assessment procedure 2014/68/EU</i>	Modul H Zertifikats Nr. 07/202/1411/Z/0091/16/D		
Kennzeichnung <i>Marking</i>	2014/68/EU ¹⁾ ≥ DN 32, ≥ 1"	CE 0045	
	2006/42/EG ²⁾ 2006/42/EC ²⁾	CE	

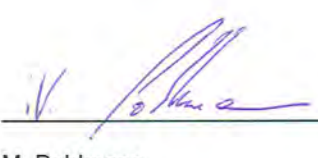
Das Unternehmen Richter Chemie-Technik GmbH bescheinigt hiermit, dass die o.a. Baureihen die grundsätzlichen Anforderungen der aufgeführten Richtlinien und Normen erfüllen.
Richter Chemie-Technik GmbH confirms that the basic requirements of the above specified directives and standards have been fulfilled.

¹⁾ Für nicht aufgeführte Nennweiten ist eine Kennzeichnung nicht zulässig.
For sizes not listed a marking is not permitted.

²⁾ Alle Armaturen, mit Ausnahme der Armaturen mit Handbetätigung.
For all valves, with exceptions to valves with hand operation

Kempen, 04.07.2017


G. Kleinig
Leiter Forschung & Entwicklung
Manager Research & Development


M. Pohlmann
Leiter Qualitätsmanagement
Quality Manager

Herstellererklärung ATEX
Richtlinie 2014/34/EU
Manufacturer's Declaration ATEX
Directive 2014/34/EU

Alle Richter Armaturen inkl. Absperr-, Regel- und Sicherheitsventile
All Richter Valves incl. Shut-off, Control and Safety Valves

Die oben bezeichneten Armaturen wurden einer Risikoanalyse nach der Richtlinie 2014/34/EU mit folgendem Ergebnis unterzogen:

The valves specified above underwent a risk analysis according to Directive 2014/34/EU with the following result:

- **Richter Armaturen besitzen keine eigenen potentiellen Zündquellen. Die Armaturen können sowohl manuell als auch mechanisch/elektrisch angetrieben werden.**
Die Armaturen fallen nicht in den Anwendungsbereich der ATEX-Richtlinie 2014/34/EU und dürfen deshalb auch nicht danach gekennzeichnet werden.
Richter valves do not have their own potential sources of ignition. The valves can be actuated manually as well as mechanically/electrically.
ATEX Directive 2014/34/EU is not applicable to these valves. Therefore, it is not allowed to mark the valves according to that Directive.
- **Die Armaturen dürfen in explosionsgefährdeten Bereichen eingesetzt werden.**
The valves can be used in potentially explosive atmospheres.
- **Dennoch müssen für den Armatureneinsatz in explosionsgefährdeten Bereichen Sicherheitshinweise bzgl. des Explosionsschutzes beachtet werden. Richter hat hierzu die Betriebsanleitungen um den Zusatz „Sicherheitshinweise für den Einsatz in explosionsgefährdeten Bereichen in Anlehnung an die Richtlinie 2014/34/EU“ erweitert.**
However, when using the valves in potentially explosive atmospheres, specific safety notes on explosion protection must be observed. Here, Richter has extended their operating manuals to include the supplement „Safety notes for applications in potentially explosive atmospheres based on Directive 2014/34/EU“.

Ergänzender Hinweis: *Supplementary note:*

- **Elektrische/mechanische Antriebe müssen einer eigenen Konformitätsbewertung nach ATEX unterzogen werden.**
Electrical/mechanical actuators must undergo a separate conformity assessment.

Kempen, 20.04.2016

Richter Chemie-Technik GmbH


M. Böhm

Leiter Qualitätsmanagement
Quality Manager

Herstellererklärung / *Manufacturer's Declaration*

TA-Luft / *German Clean Air Act (TA-Luft)*

Richter Kugelhahn / *Richter Ball Valve*

Hiermit erklären wir, dass die Kugelhähne der Baureihen
Hereby we declare, that the ball valves of the series

KN, KNR, KNA, KNAR, KNB, KNBR, KNA-S; BVA, KK, KK/FU, KH; KA-N

die Anforderung bezüglich der Gleichwertigkeit gemäß Ziffer 5.2.6.4 der Technischen Anleitung-Luft (TA-Luft vom 01.10.2002 / VDI 2440 Ziffer 3.3.1.3) erfüllen.

Grundlage sind die "Prüfgrundsätze für den Eignungsnachweis von Spindelabdichtungen in Armaturen als gleichwertig nach TA-Luft" des TÜV Süddeutschland Bau und Betrieb GmbH vom 22.09.1992.

Zusätzlich beinhaltet die Herstellererklärung den Eignungsnachweis einer Spindelabdichtung und einer inneren Flanschverbindung gemäß VDI 2440 hinsichtlich Dichtheit bzw. der Einhaltung der spezifischen Leckagerate nach TA-Luft $\lambda \leq 10^{-4} \frac{\text{mbar} \cdot \text{l}}{\text{s} \cdot \text{m}}$ und einer erweiterten Prüfung unter Betriebsbedingungen.

Voraussetzung für die Gültigkeit der Herstellererklärung ist das Beachten und Einhalten der Betriebsanleitung.

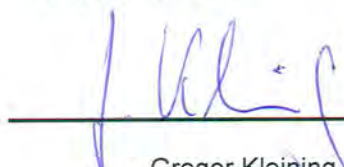
meets the requirement relating to the equivalence according to Section 5.2.6.4 of the German Clean Air Act (Clean Air Act dated 01.10.2002 / VDI 2440 Section 3.3.1.3).

The basics are the "Testing principles for the suitability verification of stem seals in valves as being equivalent in accordance to the German Clean Air Act of the TÜV Süddeutschland Bau und Betrieb GmbH dated 22 September 1992.

Additionally, the manufacture's declaration contains the suitability verification of a stem seal and internal flange connection in accordance to VDI 2440 with regard to tightness and the observance of the specific leakage rate according to the German Clean Air Act $\lambda \leq 10^{-4} \frac{\text{mbar} \cdot \text{l}}{\text{s} \cdot \text{m}}$ and an extended test under the above-mentioned operating conditions.

Manufacturer's declaration validity is dependent on the operating instructions being read and observed.

Kempen, 18.10.2017



Gregor Kleining
Leiter Forschung & Entwicklung
Manager Research & Development



Michael Pohlmann
Leiter Qualitätsmanagement
Quality Manager

Kempen, 27.01.2011

SIL

Declaration by the Manufacturer

Functional Safety according to IEC 61508

We declare, that the devices

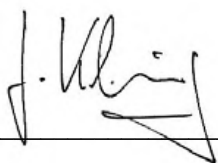
KN, KNR, KNA, KNAR, KNP, KNRP, KNAP, KNARP

are suitable for use in a safety related application, if the safety instructions and the following parameters are observed:

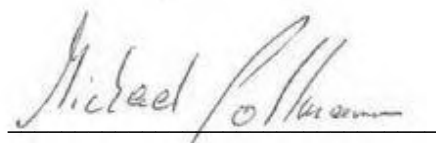
Device Type:	A
Proof Test Interval:	≤ 1 year
HFT:	0 (single channel usage)
λ_{SU}:	129 FIT
λ_{SD}:	14 FIT
λ_{DU}:	108 FIT
λ_{DD}:	36 FIT
SFF:	62,5 %
PFD_{Avg}:	$4,73 \cdot 10^{-4}$ (for $T_{Proof} = 1$ year)
MTBF:	398 years

Safety Integrity Level: **SIL 2**

The specified values are valid only for the valve. Accessories such as an actuator, solenoid valves, limit switches etc. are not included.



G. Kleining
Leiter Forschung & Entwicklung
Manager Research & Development



M. Pohlmann
Leiter Qualitätsmanagement
Quality Manager

Safety Information / Declaration of No Objection Concerning the Contamination of Richter-Pumps, -Valves and Components

1 SCOPE AND PURPOSE

Each entrepreneur (operator) carries the responsibility for the health and safety of his employees. This extends also to the personnel, who implements repairs with the operator or with the contractor.

Enclosed declaration is for the information of the contractor concerning the possible contamination of the pumps, valves and component sent in for repair. On the basis of this information for the contractor is it possible to meet the necessary preventive action during the execution of the repair.

Note: The same regulations apply to repairs **on-site**.

2 PREPARATION OF DISPATCH

Before the dispatch of the aggregates the operator must fill in the following declaration completely and attach it to the shipping documents. The shipping instructions indicated in the respective manual are to be considered, for example:

- Discharge of operational liquids
- remove filter inserts
- lock all openings hermetically
- proper packing
- Dispatch in suitable transport container
- Declaration of the contamination fixed **outside!!** on the packing

Every aggregate has to have it's own declaration.

Contractor/dep./institute :		Reason for transmitting ☒ Please mark the applicable	
Street :		Repair: ☐ subject to fee ☐ Warranty	
Postcode, city :		Austausch: ☐ subject to fee ☐ Warranty ☐ Exchange/ Replacement already initiated/received	
Contact person :		Return: ☐ Leasing ☐ Loan ☐ for credit note	
Phone : Fax :			
End user :			

A. Details of Richter-product: Classification: _____ Article number: _____ Serial number: _____	Failure description: _____ _____ _____ _____
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B. Condition of the Richter-product:	no ¹⁾	yes	no	Contamination :	no ¹⁾	yes
Was it in operation ?	☐	☐	☒	toxic	☐	☐
Drained (product/operating supply item) ?	☒	☐	☐	caustic	☐	☐
All openings hermetically locked!	☒	☐	☐	flammable	☐	☐
Cleaned ?	☒	☐	☐	explosive ²⁾	☐	☐
If yes, with which cleaning agent:				mikrobiological ²⁾	☐	☐
and with which cleaning method:				radioactive ³⁾	☐	☐
¹⁾ if "no", then forward to D.				other pollutant	☐	☐

²⁾ Aggregates, which are contaminated with microbiological or explosive substances, are only accepted with documented evidence of an approved cleaning.
³⁾ Aggregates, which are contaminated with radioactive substances, are not accepted in principle.

C. Details of the discharged materials (must be filled out imperatively)										
1. With which materials did the aggregate come into contact ? Trade name and/or chemical designation of operational funds and discharged materials, material properties, e.g. as per safety data sheet (e.g. toxic, inflammable, caustic)										
<table style="width: 100%;"> <tr> <td style="width: 40%;">X Trade name:</td> <td>Chemical designation:</td> </tr> <tr><td>a)</td><td></td></tr> <tr><td>b)</td><td></td></tr> <tr><td>c)</td><td></td></tr> <tr><td>d)</td><td></td></tr> </table>	X Trade name:	Chemical designation:	a)		b)		c)		d)	
X Trade name:	Chemical designation:									
a)										
b)										
c)										
d)										

2. Are the materials specified above harmful to health ? 3. Dangerous decomposition products during thermal load ? If yes, which ones?	no	yes	
	☐	☐	
	☐	☐	

QM-Nr.: 0912-16-2001 de/4-07

08.01.2015

Declaration of no objection

Dear Sirs,

The compliance with laws for the industrial safety obligates all commercial enterprises to protect their employees and/or humans and environment against harmful effects while handling dangerous materials. The laws are such as: the Health and Safety at Work Act (ArbStättV), the Ordinance on Harzadous Substances (GefStoffV, BIOSTOFFV), the procedures for the prevention of accidents as well as regulations to environmental protection, e.g. the Waste Management Law (AbfG) and the Water Resources Act (WHG)

An inspection/repair of Richter products and parts will only take place, if the attached explanation is filled out correctly and completely by authorized and qualified technical personnel and is available.

In principle, radioactively loaded devices sent in, are not accepted.

Despite careful draining and cleaning of the devices, safety precautions should be necessary however, the essential information must be given.

The enclosed declaration of no objection is part of the inspection/repair order. Even if this certificate is available, we reserve the right to reject the acceptance of this order for other reasons.

Best regards
RICHTER CHEMIE-TECHNIK GMBH



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9520-080-en

Richter = TM Richter Chemie-Technik GmbH; IDEX = TM IDEX Corporation