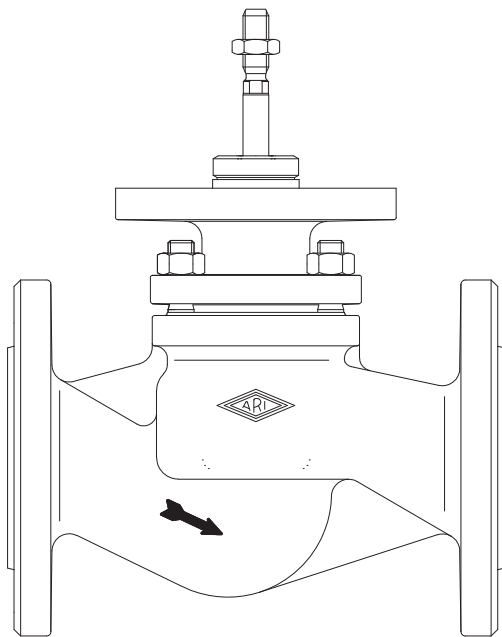


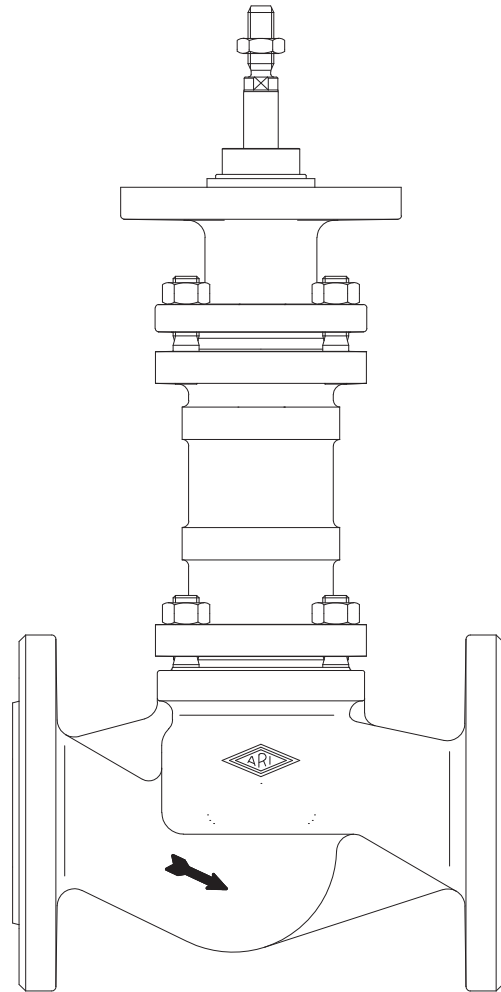


Operating and installation instructions

Straight through control valves - STEVI® 440 / 441, 445 / 446



Series 440, 445



Series 441, 446

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1.0 General information on operating instructions

These operating instructions provide information on mounting and maintaining the valves. Please contact the supplier or the manufacturer in case of problems which cannot be solved by reference to the operating instructions.

They are binding for transport, storage, installation, start-up, operation, maintenance and repair.

The notes and warnings must be observed and adhered to.

- Handling and all other work must be carried out by expert personnel or all activities supervised and checked.

It is the owner's responsibility to define areas of responsibility and competence and to supervise personnel.

- In addition, current regional safety requirements must be applied and observed when taking the valves out of service as well as when maintaining and repairing them.

The manufacturer reserves the right to introduce technical modifications or improvements at any time.

These operating instructions comply with the requirements of EU Directives.

2.0 Notes on possible dangers

2.1 Significance of symbols



Warning of general danger.

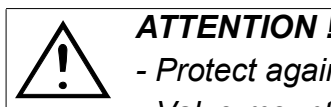
2.2 Explanatory notes on safety information

In these operating and installation instructions dangers, risks and items of safety information are highlighted to attract special attention.

Information marked with the above symbol and "**ATTENTION !**" describe practices, a failure to comply with which can result in serious injury or danger of death for users or third parties or in material damage to the system or the environment. It is vital to comply with these practices and to monitor compliance.

All other information not specifically emphasised such as transport, installation, operating and maintenance instructions as well as technical data (in the operating instructions, product documentation and on the device itself) must also be complied with to the fullest extent in order to avoid faults which in turn can cause serious injury to persons or damage to property.

3.0 Storage and transport



ATTENTION !

- *Protect against external force (like impact, vibration, etc.).*
- *Valve mountings such as actuators, handwheels, hoods must not be used to take external forces, e.g. they are not designed for use as climbing aids or as attachment points for lifting gear.*
- *Suitable materials handling and lifting equipment should be used. See catalog sheet for weights.*

- At -20 °C to +65 °C.

- The paint is a base coat to protect against corrosion during transportation and storage. Do not damage paint protection.

4.0 Description

4.1 Scope of applications

Valves are used for „controlling the flow of liquids, gases and vapours in chemical and other processing plants and for plant engineering“.



ATTENTION !

- Refer to the data sheet for applications, limits on use and possibilities.
- Certain media require or preclude the use of special materials.
- The valves are designed for standard operating conditions. If conditions exceed these requirements, e.g. aggressive or abrasive media, the operator should state the higher requirements when ordering.
- Valves made from grey cast iron are not authorised for use in systems subject to TRD 110.

The information complies to the Pressure Equipment Directive 2014/68/EU.

It is the responsibility of the machine planner to ensure compliance.

The special markings on the valve must be taken into account.

Refer to the catalogue sheet to see which materials are used in standard versions.

Please contact the supplier or the manufacturer if you have any questions.

4.2 Operating principles

The control valves are especially suitable for actuation by pneumatic or electrical actuators.

Four plug types are available to suit the various applications:

- parabolic plug (standard)
- perforated plug
- V-port plug
- pressure balanced plug

The flow through control valves is always against the closing direction.

In the case of control valves with perforated plugs, gases and vapours flow against the closing directions, but liquids flow through in the closing direction. If a pneumatic actuator is to be used on a straight-way valve with a perforated plug with the fluid moving in the closing direction, a higher closing force will be needed. This is to prevent vibration as the plug approaches the closed position.

If the forces generated by the actuators are too low, arrangements should be made to relieve the pressure as far as this is compatible with service conditions.

4.3 Diagram

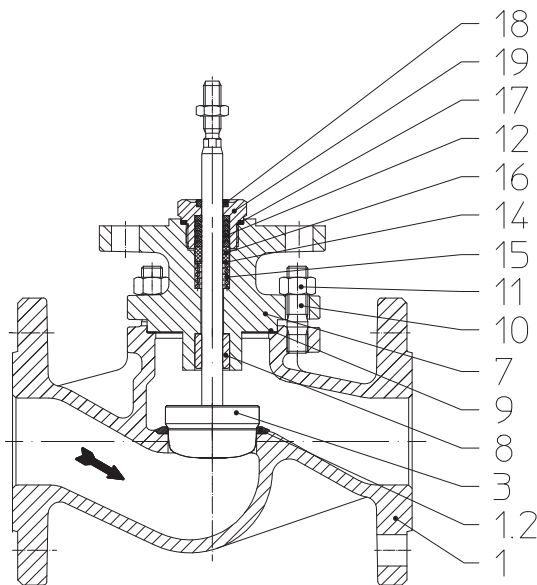


Fig. 1: Series 440 DN15-100

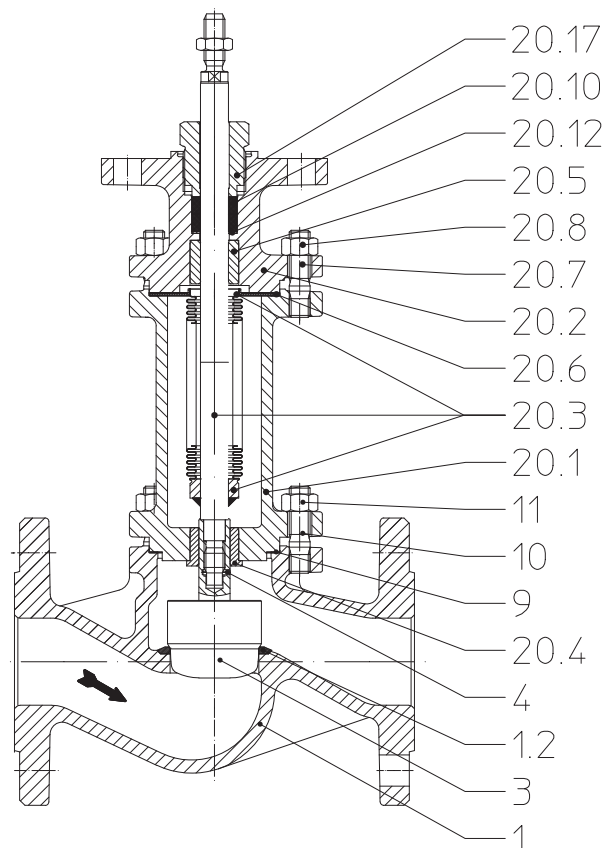


Fig. 2: Series 441 DN15-100

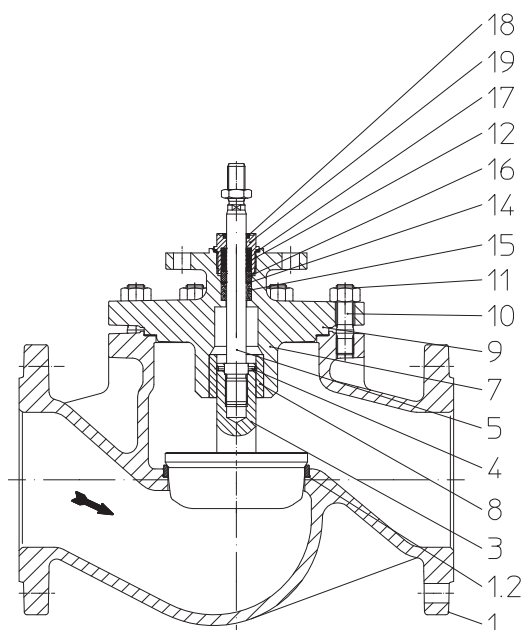


Fig. 3: Series 440 DN125-150

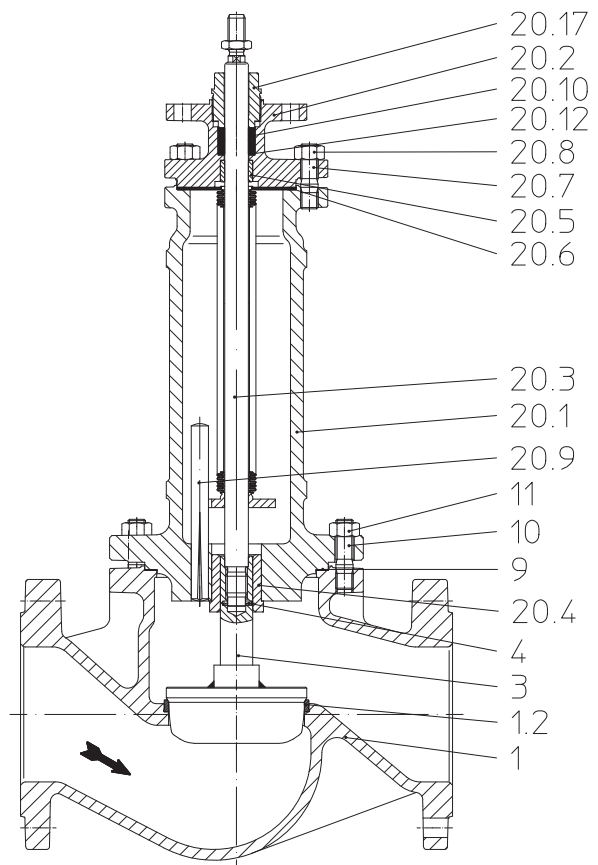


Fig. 4: Series 441 DN125-150

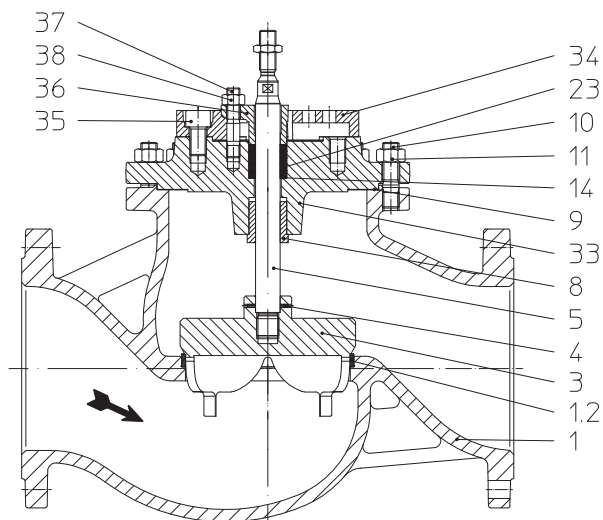


Fig. 5: Series 440 DN200-250

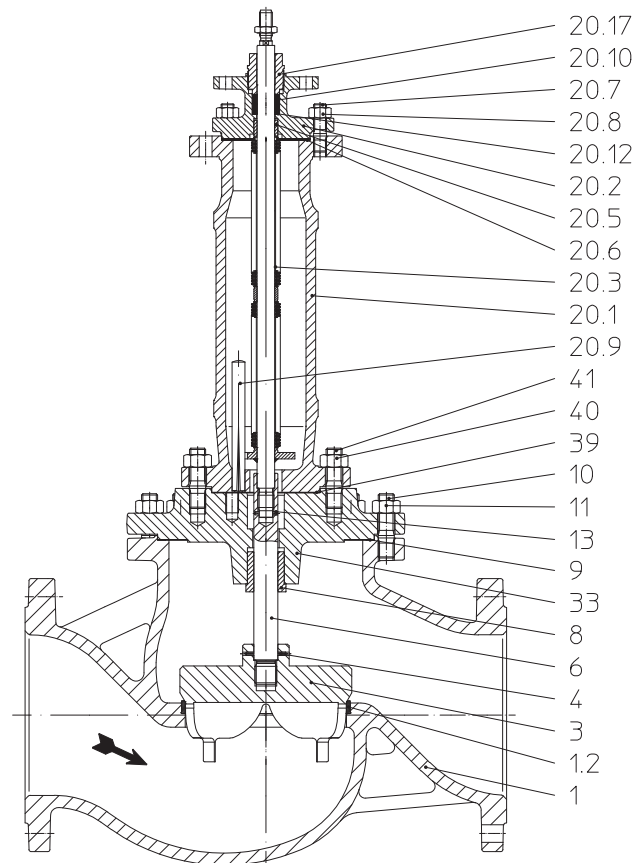


Fig. 6: Series 441 DN200-250

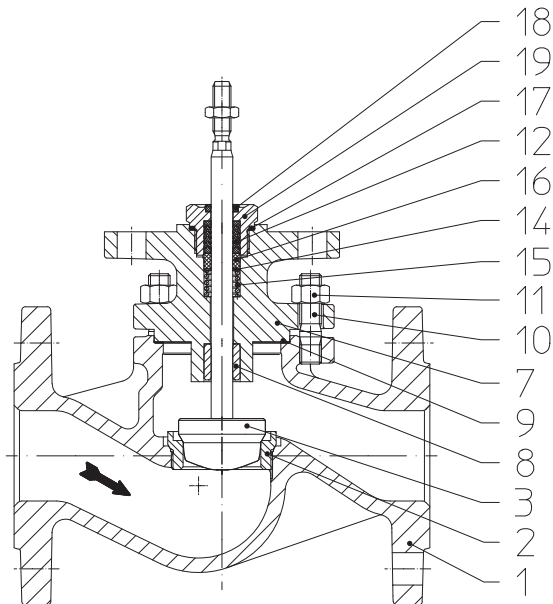


Fig. 7: Series 445 DN15-100
(only stainless steel)

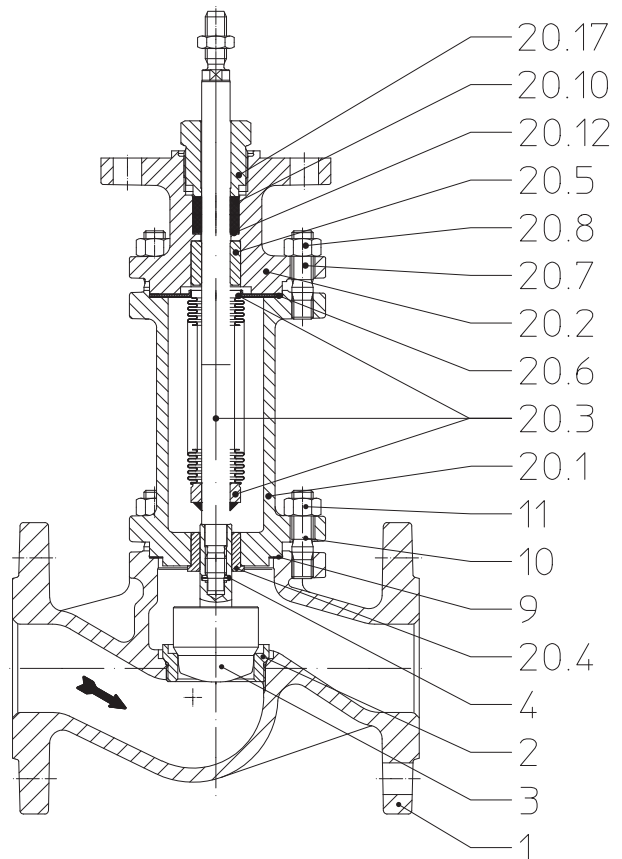


Fig. 8: Series 446 DN15-100
(only stainless steel)

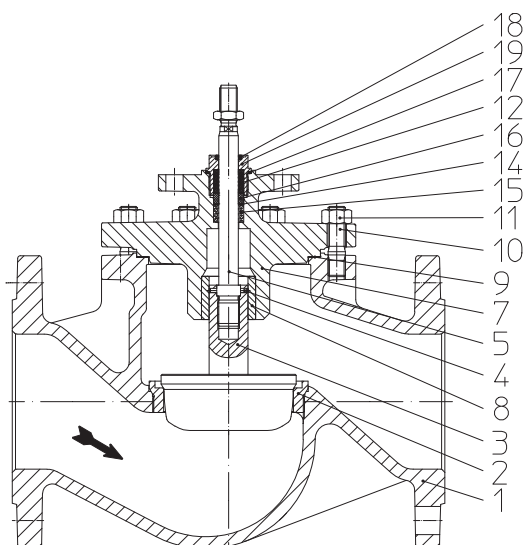


Bild 9: Series 445 DN125-150
(only stainless steel)

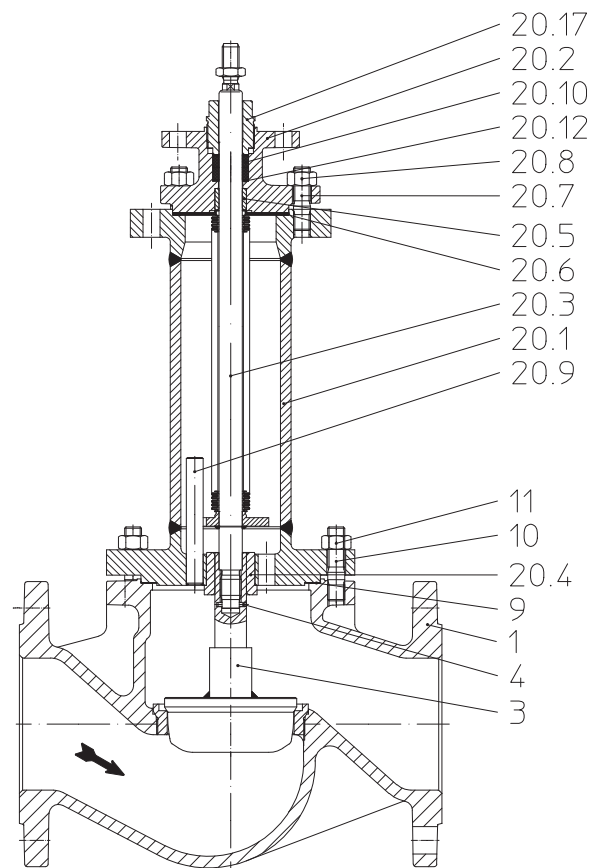


Bild 10: Series 446 DN125-150
(only stainless steel)

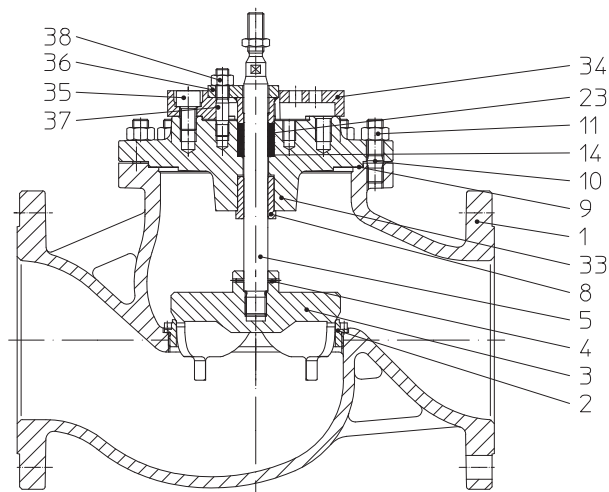


Fig. 11: Series 445 DN200-250 (only stainless steel)

4.3.1 Plug design

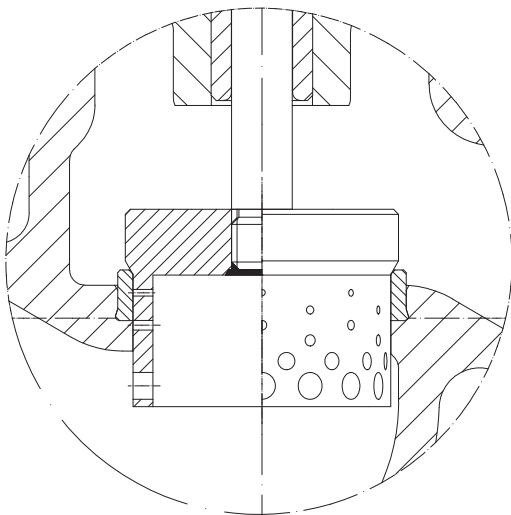


Fig. 12: Design with perforated plug

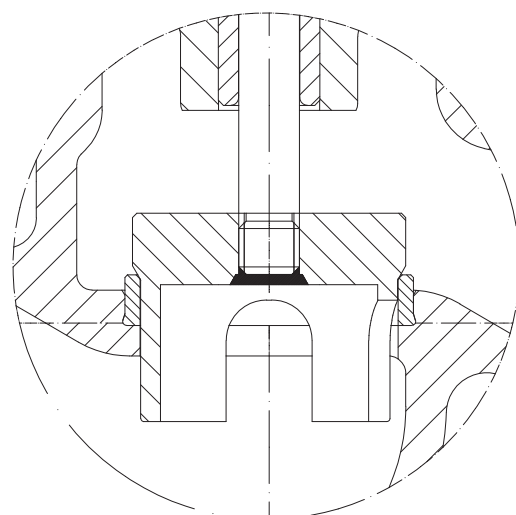


Fig. 13: Design with V-port plug

(Design with pressure balanced plug refer to Fig. 28)

4.4 Technical data

for

- **Principal dimensions**

- **Pressure-temperature-ratings, etc.** refer to data sheet.

4.5 Marking

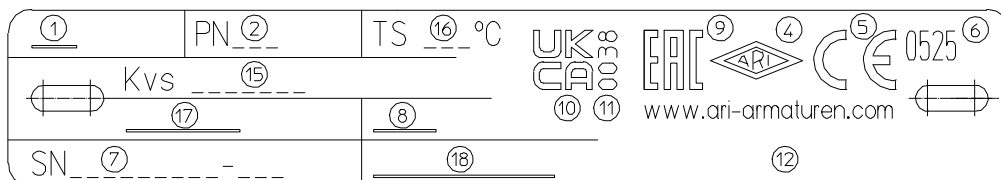


Bild 14

No.	Value
1	Figure / Product
2	Nominal pressure
4	Manufactured by ARI-Armaturen 
5	CE marking 
6	Notified body
7	Serial number
8	Year of manufacture
9	EAC marking 
10	UKCA marking 
11	Notified body
12	Marking at approval
15	Kvs-value / Cv- value
16	Permissible maximum temperature
17	Stem sealing • V-Ring = <i>PTFE-V-ring unit</i> • PTFE = <i>PTFE packing</i> • PTFE FDA = <i>PTFE FDA packing</i> • PTFE-seal FDA = <i>PTFE gasket set FDA</i> • Graphit = <i>pure graphite-packing</i> • Graphit 99,85% = <i>pure graphite 99,85%-packing</i> • EPDM = <i>EPDM sealing</i> • EPDM FDA = <i>EPDM FDA sealing</i> • NBR = <i>NBR sealing</i> • H-NBR = <i>H-NBR sealing</i> • bellows seal = <i>Stainless steel bellows</i>
18	Customized text

Address of manufacturer: refer to item 11.0 Warranty / Guarantee

According to the Pressure Equipment Directive table 6, annex II, valves without safety function are only allowed to bear the CE-marking DN32 onwards.

5.0 Installation

5.1 General notes on installation

The following items should be taken into account besides the general principles governing installation work:



ATTENTION !

- Remove flange covers if present.
- The interior of valve and pipeline must be free from foreign particles.
- Note installation position with reference to flow, see mark on valve.
- Steam line systems should be designed to prevent water accumulation.
- Lay pipelines so that damaging transverse, bending and torsional forces are avoided.
- Protect valves from dirt during construction work.
- Connection flanges must mate exactly.
- Connecting bolts for pipe flanges should be mounted preferably from the counter flange side (hexagon nuts from the valve side).
At DN15-32: If valves should be mounted directly to valves, the upper flange connecting bolts should be preferably executed with studs and hexagon nuts on both sides.
- Valve mountings such as actuators, handwheels, hoods must not be used to take external forces, e.g. they are not designed for use as climbing aids, or as connecting points for lifting gear.
- Suitable materials handling and lifting equipment should be used.
Refer to data sheet for weights.
- Keep the thread and shaft of the stem free from paint.
- Centre gaskets between the flanges.
- Strainers or filters should be installed before the valves.

- Planners / construction companies or operators are responsible for positioning and installing products.
- The valves are designed for application, not influenced from weather.
- For application outside or in adverse environments like corrosion-promoting conditions (sea water, chemical vapours, etc.), special constructions or protective measures are recommended.

5.2 Requirements at the place of installation

The place of installation should be easily accessible and provide ample space for maintenance and removing the actuator. Stop valves should be installed before and after the control valve to enable maintenance working without draining the piping system. The valve should preferably installed vertically with the actuator at the top. Inclined or horizontal installation without supports is permissible only with light actuators.

For this installation position, the two distance columns (or joke) have to be above each other in the vertical plane.

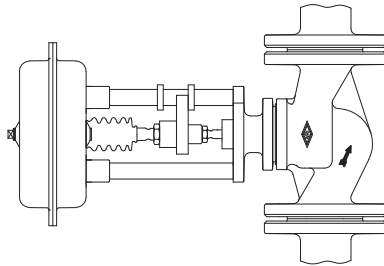


Fig. 15: Pipeline vertically

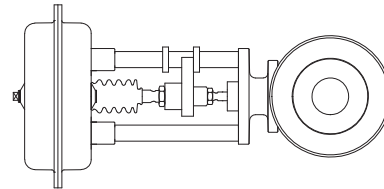


Fig. 16: Pipeline horizontally

Permissible actuator weights for valves with unsupported horizontal stems:

20 kg for DN 15 - 32	55 kg for DN125v-150v (only series 445/446)
25 kg for DN 40 - 65	
35 kg for DN 80-100	55 kg for DN200-250
40 kg for DN125-150	

The pipes must be lagged to protect the actuators from excessive heat. Sufficient space must be left for the maintenance of the stem packing.

To ensure that the control valves function correctly, the pipe run should be straight for at least 2 x n.d. upstream and 6 x n.d. downstream of the valve.

5.3 Installation instructions concerning actuators

Normally, control valves are supplied complete with actuator fitted.

It is not permitted to mantle / dismantle actuators with valves operating and service conditions (temperature and pressure). The actuators must be assemble as describe in the operating instructions during conversion and maintenance. The actuators will be dismantled or assembled incl. adapter flange (pos. 34). The cylinder screws (pos. 35) need to be loosen or tighten for it.

During assembly work, the plug is not be turned on its seating at closing pressure.



ATTENTION !

Care must be taken with the bellow type valves when actuators are mounted or removed. (Hold the valve-stem against turning with an open-end wrench!)

When retrofitting actuators, the maximum permissible force for valve actuation must be taken into account:

Series 440 / 445	Series 441 / 446
12kN for DN 15- 50	18kN for DN 15-100
29kN for DN 65-100	37kN for DN 125-150
40kN for DN125-150	37 kN for DN200-250
59 kN for DN125v-150v (only BR445/446)	(only BR441)
59 kN for DN200-250	

6.0 Putting the valve into operation



ATTENTION !

- *Before putting the valve into operation, check the material, pressure, temperature and direction of flow.*
 - *Regional safety instructions must be adhered to.*
 - *Residues in piping and valves (dirt, weld beads, etc.) inevitably lead to leakage and / or damage.*
 - *Touching the valve when it is operating at high (> 50 °C) or low (< 0 °C) media temperatures can cause injury.*
- Affix a warning notice or provide protective insulation as appropriate.*

Before putting a new plant into operation or restarting a plant after repairs or modification, always make sure that:

- *All work has been completed correctly.*
- *The valve is in the correct position for its function.*
- *Safety devices have been attached.*

7.0 Care and maintenance

Maintenance and maintenance intervals have to be defined by the operator according to the service conditions.

7.1 Replacement of stem sealings

7.1.1 PTFE V-ring unit design

PTFE V-ring unit (pos. 12) consisting of:

- 1 backing ring
- 4 sealing rings
- 1 cover ring

Owing to the installed compression spring (pos. 15), this stem packing is self-adjusting. If the stem starts leaking, the ring pack is worn out and must be replaced.

Replacement of PTFE V-ring units:



ATTENTION !

Refer to item 10.0 and 11.0 before dismantling the valve.

- Remove actuator.
(Refer to operating instructions for actuator!)
- When replacing PTFE V-ring unit (pos. 12), make sure that the parts are installed in the correct order and positions (refer to Fig. 17).
- Gasket (pos. 17) must be replaced.

Damaged stems must also be replaced (refer to item 7.2 for instructions) since a new ring pack will soon start leaking again if the stem is damaged.

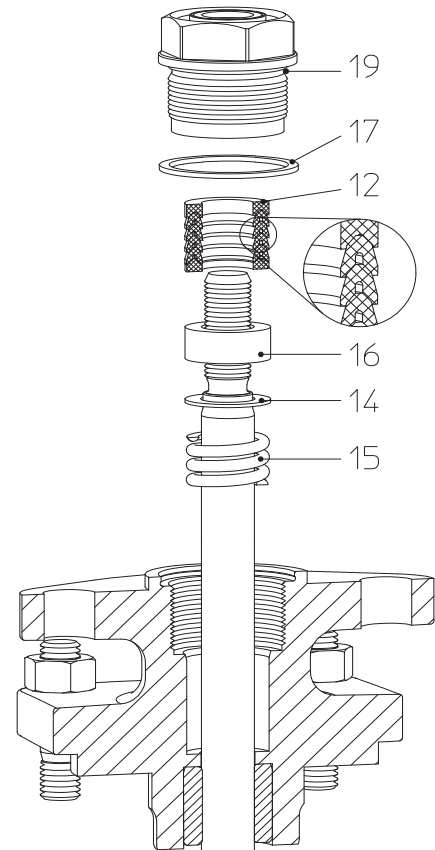


Fig. 17:
V-ring unit DN15-150

7.1.2 EPDM sealing design

This sealing system can be used for water and steam up to an operating temperature of 180°C. Owing to the elastomer material, the sealing rings are self-sealing and therefore maintenance free. If the stem starts leaking, the seal is worn out and must be replaced.

Replacement of EPDM sealing rings:



ATTENTION !

Before dismantling the valve, refer to sections 10.0 and 11.0.

DN 15-150:

- Remove actuator (refer to operating instructions for actuator!).
- To replace the sealing elements, you must replace the complete screw joint including the integral seals (pos. 120).
- Sealing ring (pos. 17) must be replaced.

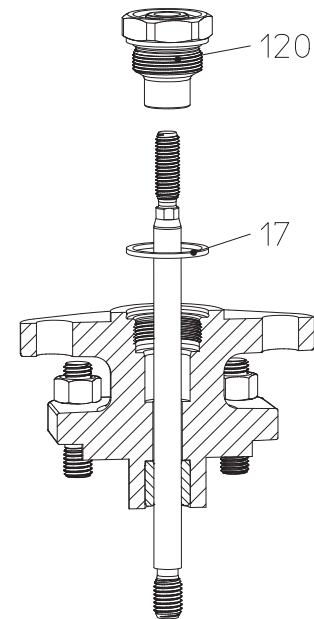


Fig. 18: EPDM sealing
DN15 - DN150

DN125v, DN150v, DN200, DN250:

- Remove actuator together with universal adapter flange (Pos. 34) by loosening socket screws (pos. 35) refer to operating instructions for actuator!).
- Loosen nuts (pos. 38).
- Remove upper part (pos. 36).
- To replace the sealing elements, you must replace the complete stem seal (pos. 120) including the integral seals.

Damaged stems must also be replaced (for a description, refer to section 7.2), because a new ring pack will soon start leaking again if the stem is damaged.

Assemble in reverse order.

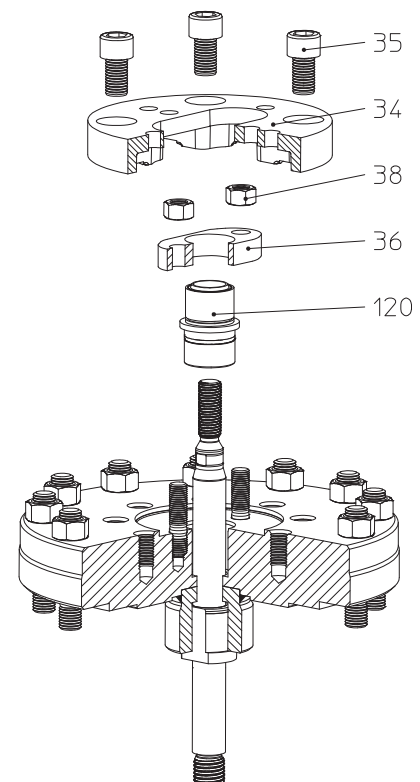


Fig. 19: EPDM sealing
DN125, DN150v,
DN200, DN250

7.1.3 Stuffing box packing design

- The stuffing box packing (pos. 23) requires maintenance.
- If leaks develop, immediately tighten the screw joint (pos. 25) gradually until the packing (pos. 23) stops leaking.
- The service life of stuffing box packings (pos. 23) can be increased by checking regularly leakage.
- If leaks can no longer be stopped by tightening the screw joint (pos. 25), a new packing ring (pos. 23) must be inserted into the gland.

Replacement of stuffing box packings:



ATTENTION !

Refer to item 10.0 and 11.0 before dismantling the valve.

- Remove actuator. (Refer to operating instructions for actuator!)
- Insert new packing ring as shown in Fig. 20 - Fig. 22.

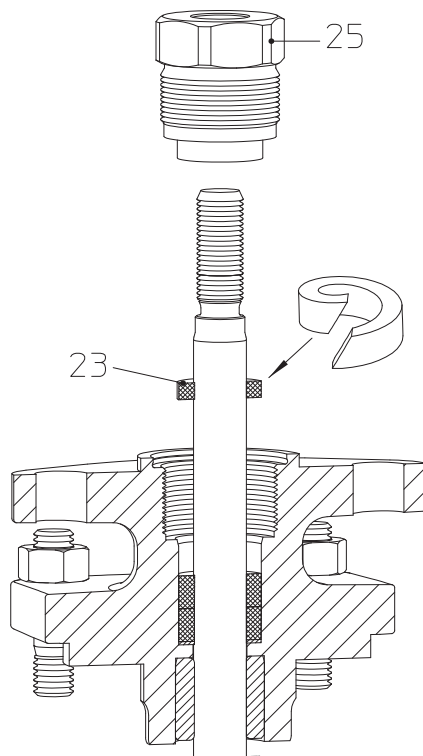


Fig. 20: Stuffing box packing
DN15-150

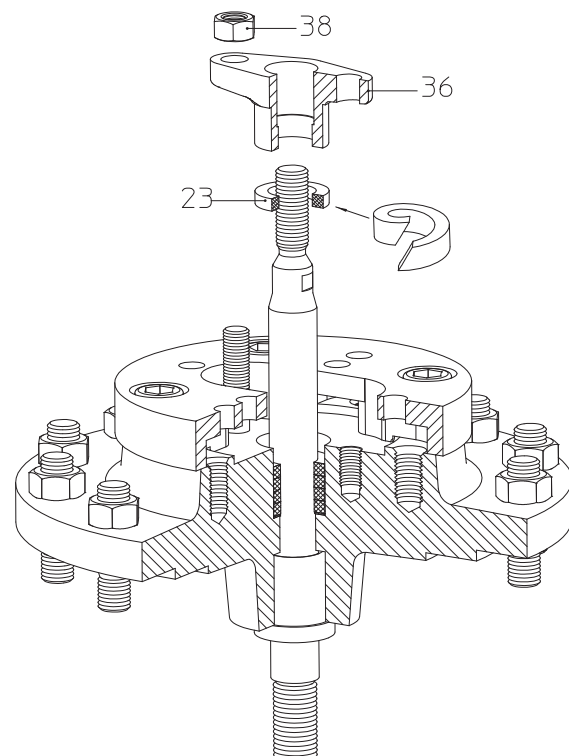


Fig. 21: Stuffing box packing
DN125v-150v / DN200-250

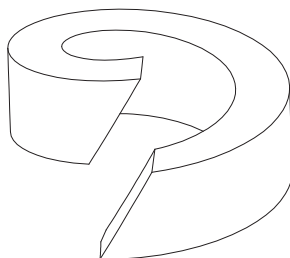


Fig. 22: Split packing ring

If a split packing ring is used, cut with a chamfer as shown in Fig. 22.

Damaged stems must also be replaced (refer to item 7.2 for instructions) since a new ring pack will soon start leaking again if the stem is damaged.

7.1.4 Bellows seal design

If the stem leaks, the bellows seal (pos. 20.3) is defective. The leak can initially be stopped by tightening the screw joint (pos. 20.17).

Stem and bellows (pos. 20.3) can only be replaced together.

Replacement of bellows seals:



ATTENTION !

Refer to item 10.0 and 11.0 before dismantling the valve.

- Remove actuator.
(Refer to operating instructions for actuator!)

DN15-150:

- Loose nuts (pos. 11).
- Detach bellows assembly (pos. 20).
- Slacken screw joint (pos. 20.17) by about one turn.
- Press stem/bellows unit (pos. 20.3) down.
- Drive pin (pos. 4) out with a drift.
- Unscrew plug (pos. 3).
- Loose nuts (pos. 20.8).
- Detach mounting bonnet (pos. 20.2).
- Extract stem/bellows unit (pos. 20.3) from the bellows housing (pos. 20.1).
- Bolt new parts together and drill them.
- Replace 2 gaskets (pos. 20.6) and 1 gasket (pos. 9).
- Assemble in reverse order.
- Secure with nuts (pos. 10 u. 20.8) and tighten them crosswise.
(For tightening torques refer to item 7.3.1)
- Tighten screw joint (pos. 20.17) gradually up to tightness of the stuffing box packing (pos. 20.10).

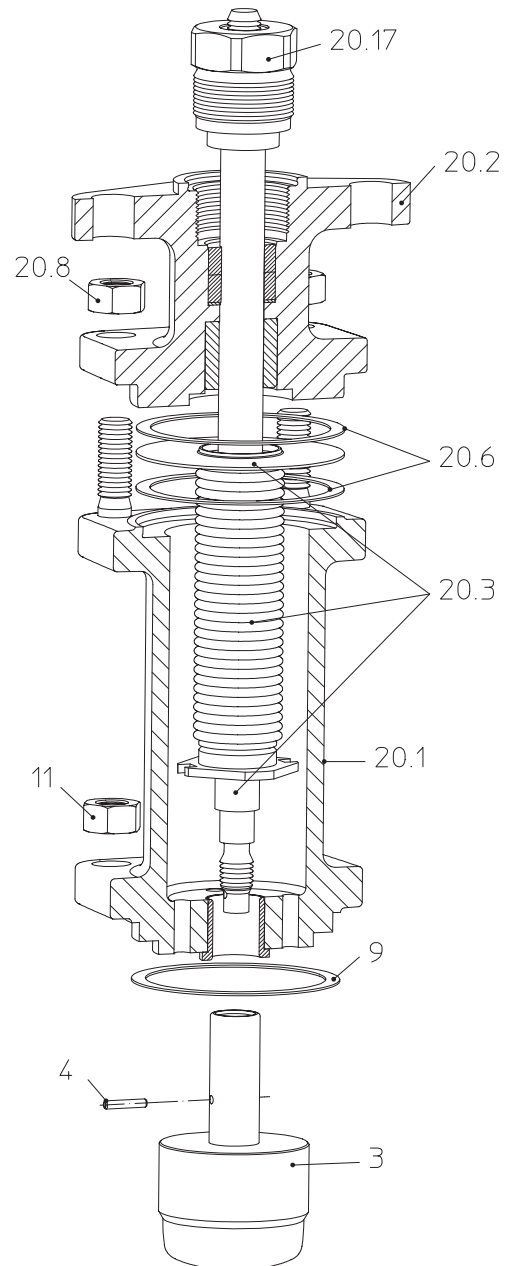


Fig. 23: Series 441/446

DN200-250:

- Loose nuts (pos. 11).
- Detach bellows assembly (pos. 20) incl. stuffing box housing (pos. 33).
- Slacken sleeve nut (pos. 20.16) by about one turn.
- Loose nuts (pos. 40).
- Lift bellows housing (pos. 20.1)
- Drive spring pin (pos. 13) out with a drift.
- Unscrew stem extension (pos. 6) with plug.
- Loose nuts (pos. 20.8).
- Detach stuffing box housing (pos. 20.13)
- Extract stem/bellows-unit (pos. 20.3) from the bellows housing (pos. 20.1).
- Bolt new parts together and drill them.
- Replace 2 gaskets (pos. 20.6), 1 gasket (pos. 9) and 1 gasket (pos. 39).
- Assemble in reverse order.



ATTENTION at DN125-150!

- Ensure that the torsion lock is correctly positioned when inserting new stem/bellows unit. Introduce the grooved pin (pos. 20.9) into the torsion lock groove. Make sure it runs smoothly!

- Secure with nuts (pos. 11, 20.8 and 40) and tighten them crosswise.
(For tightening torques refer to item 7.3)
- Tighten sleeve nut (pos. 20.16) gradually up to tightness of the stuffing box packing (pos. 20.10).

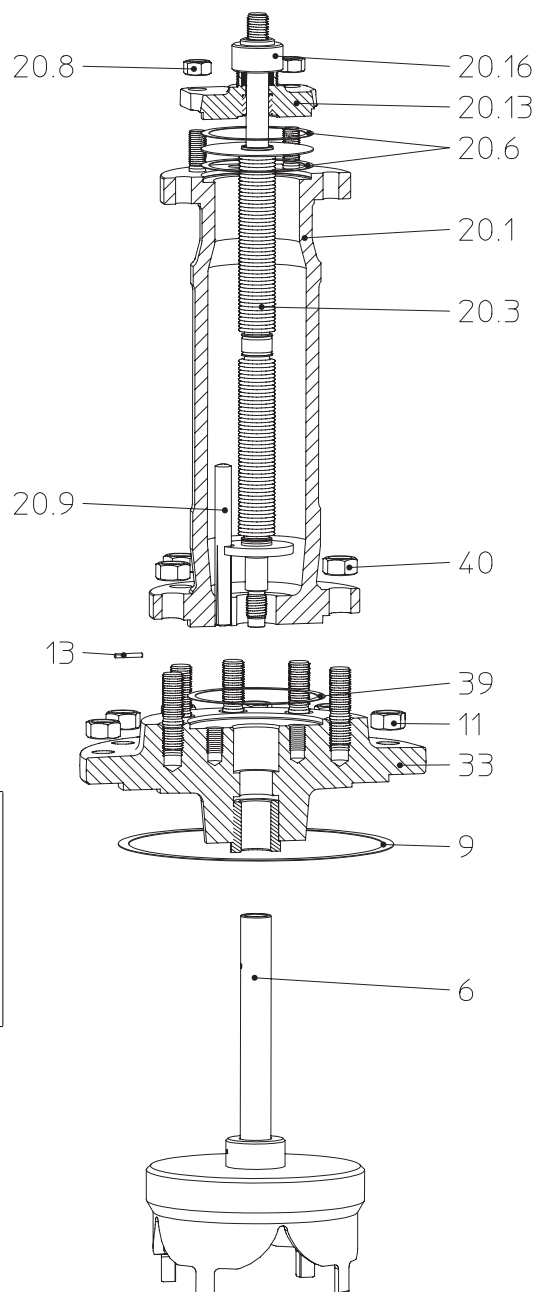


Fig. 24: Series 441 DN200-250

7.2 Replacement of internal parts

7.2.1 Replacement of plug and stem



ATTENTION !

Refer to item 10.0 and 11.0 before dismantling the valve.

- Remove actuator.
(Refer to operating instructions for actuator!)

Series 440/445:

- Loose nuts (pos. 11).
- Detach mounting bonnet (pos. 7).
- Slacken screw joint (pos. 19 or 25) by about 1 turn.
- DN200-250: Slacken nuts (Pos. 38) by about 2-3 turns.
- DN15-100: Extract plug/stem assembly (pos. 3).
- DN125-250: Extract plug (pos. 3) and stem (pos. 5).
- DN125-250: Drive pin (pos. 4) out with a drift.
- DN125-250: Unscrew plug (pos. 3).
- DN125-250: Bolt new parts together, drill and pin them.
- Replace gasket (pos. 9).
- Assemble in reverse order.
- Secure with nuts (pos. 11) and tighten them crosswise.
(For tightening torques refer to item 7.3.1.)

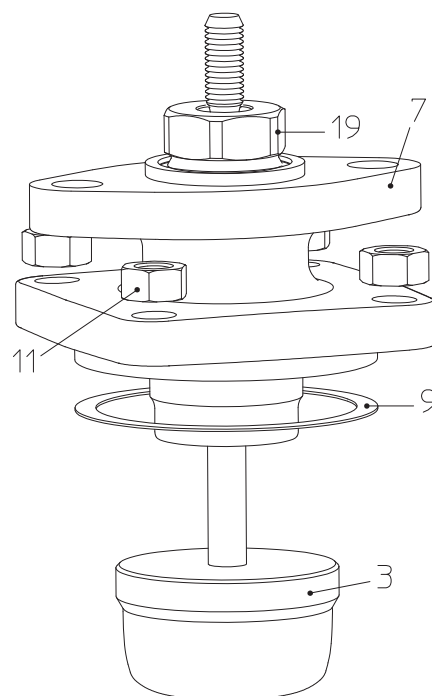


Fig. 25: Series 440 / 445
DN15-100

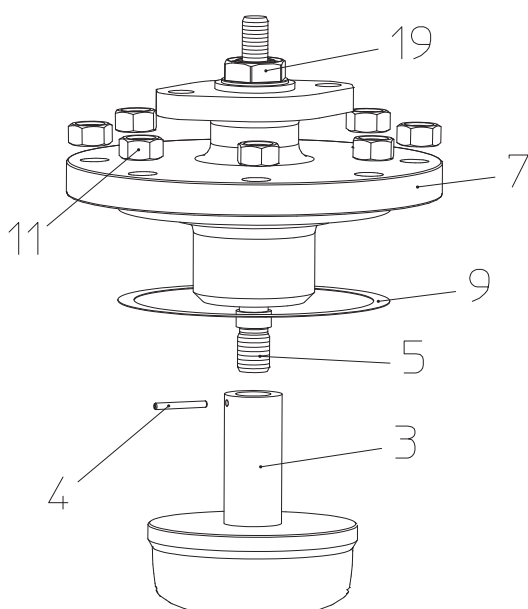


Fig. 26: Series 440 / 445 DN125-150

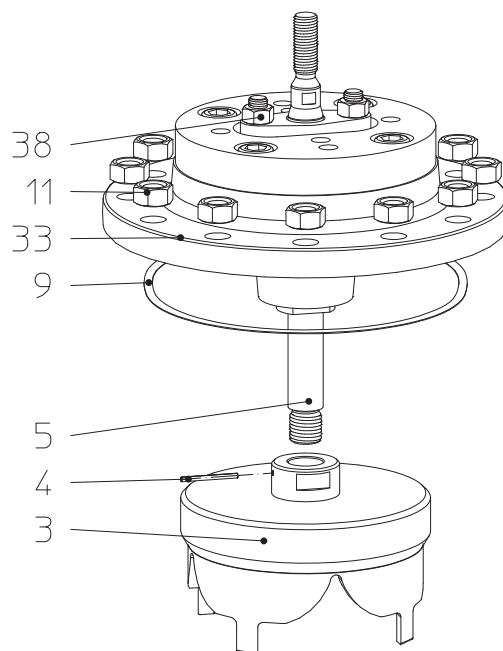


Fig. 27: Series 440 / 445 DN200-250

Series 441/446:

For replacement of plug and stem with bellows sealing (Series 441/446) refer to item 7.1.4.

7.2.2 Replacement of seals of pressure balanced plugs



ATTENTION !

Refer to item 10.0 and 11.0 before dismantling the valve.

- Remove actuator.
(Refer to operating instructions for actuator!)
- Remove plug as described in item 7.2.
- Prise worn piston seal (pos. 32) out of groove in plug with suitable tool (e.g. screwdriver).
- Insert new piston seal (pos. 32), taking care that it is in the correct position (refer to Fig. 28).
- Replace guide ring (pos. 31).
- Clean sliding surface of guide bush (pos. 30); smooth with fine abrasive if necessary.
- Replace 2 gaskets (pos. 9).
- Assemble in reverse order.
- Secure with nuts (pos. 11) and tighten them crosswise.
(For tightening torques refer to item 7.3.1.)

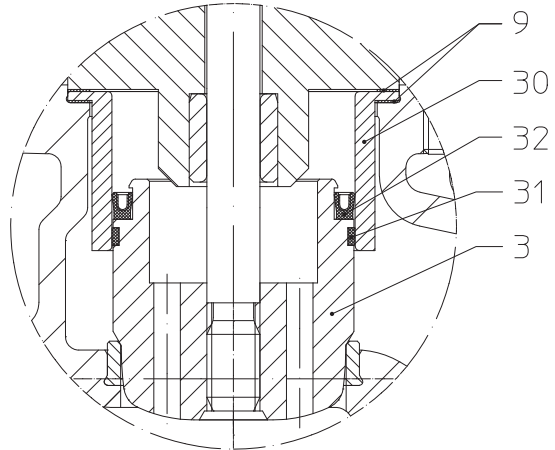


Fig. 28: Pressure balanced plug

7.2.3 Replacement of the seat ring

Only with control valves series 445 / 446 the seat ring is screwed in.



ATTENTION !

Refer to item 10.0 and 11.0 before dismantling the valve.

- Remove actuator. (Refer to operating instruction for actuator!)
- Loose nuts (pos. 11).
- Detach valve top part.
- Unscrew seat ring (pos. 2) with a special wrench (can be obtained from the manufacturer).
- Clean thread and seat ring taper in body (pos. 1).
- Replace respectively recondition and clean seat ring (pos. 2).
- Apply sealing taper (body / seat ring) with suitable lubricant (e.g. Eppl 37).
- Install seat ring (pos. 2). (For tightening torques refer to item 7.3.2.)
- Replace gasket (pos. 9).
- Assemble valve top part.
- Secure with nuts (pos. 11) and tighten them crosswise.
(For tightening torques refer to item 7.3.1.)

7.3 Tightening torques

7.3.1 Tightening torques for hexagon nuts

M 10	=	25 - 28 Nm
M 12	=	45 - 48 Nm
M 16	=	110 - 120 Nm
M 20	=	190 - 210 Nm
M 24	=	340 - 370 Nm

7.3.2 Tightening torques for seat rings

DN 15/ 20	=	70 Nm
DN 25/ 32	=	100 Nm
DN 40	=	130 Nm
DN 50	=	160 Nm
DN 65	=	330 Nm
DN 80	=	400 Nm
DN100	=	500 Nm
DN125	=	1000 Nm
DN125v (M20)	=	1400 Nm
DN125vv (M27)	=	2600 Nm
DN150	=	1200Nm
DN150v (M20)	=	1600 Nm
DN150vv (M27)	=	3000Nm
DN200	=	3800 Nm
DN250	=	4000 Nm

! Refer to operating instructions for actuator concerned for installing actuators !

8.0 Troubleshooting

In the event of malfunction or faulty operating performance check that the installation and adjustment work has been carried out and completed in accordance with these Operating Instructions.



ATTENTION !

- It is essential that the safety regulations are observed when identifying faults.

If malfunctions cannot be eliminate with the help of the following table
“**9.0 Troubleshooting table**”, the supplier or manufacturer should be consulted.

9.0 Troubleshooting table



ATTENTION !

- read item 10.0 and 11.0 prior to dismantling and repair work!
- read item 6.0 before restarting the plant !

Fault	Possible cause	Corrective measures
No flow	Valve closed.	Open valve (using actuator).
	Flange covers not removed.	Remove flange covers.
Little flow	Valve not sufficiently open.	Open valve (using actuator).
	Dirt sieve clogged.	Clean / replace sieve.
	Piping system clogged.	Check piping system.
	Kvs value of valve unsuitable.	Fit valve with higher Kvs value.
Valve stem moves in jerks.	Stuffing box sealing too tight (for valves with graphite packings).	Slacken screw joint (pos. 25/20.17) slightly. Valve must not start leaking!
	Valve plug slightly seized owing to solid dirt particles.	Clean internals, smooth rough spots.
Valve stem or plug cannot be moved.	Seating and plug clogged with dirt; especially with V-port and perforated plugs.	Clean seating and plug with suitable solvent.
	Valve plug seized in seating or guide owing to deposits or dirt in medium.	Replace plug and seating; use parts made from different material if necessary.
Valve stem leaking.	PTFE V-ring unit damaged or worn.	Replace ring pack (pos. 12); refer to item 7.1.1
	Stuffing box gland too slack in valves with stuffing box packings.	Tighten screw joint (pos. 25); refer to item 7.1.3.
	Bellows defective in valves with bellows seal.	Replace bellows unit; refer to item 7.1.4
Leakage too high when valve is closed.	Sealing surfaces of plug eroded or worn.	Replace plug; refer to item 7.2.1.
	Sealing edge of seating damages or worn.	Replace seating (only at Series 445/446); refer to item 7.2.3, fit strainer if necessary.
	Piston sealing ring worn (pressure-relieved valves).	Replace sealing ring; refer to item 7.2.2
	Seating and/or plug dirty.	Clean internals of valve; fit dirt sieve if necessary.
	Pneumatic actuator not completely vented; spring force not fully effective.	Vent actuator air chamber completely.
	Actuator not powerful enough.	Install more powerful actuator. Check service data.



10.0 Dismantling the valve or the top part



ATTENTION !

The following points must be observed:

- *Pressureless piping system.*
- *Medium must be cool.*
- *Plant must be drained.*
- *Purge piping systems in case of caustic, inflammable, aggressive or toxic media.*

11.0 Warranty / Guarantee

The extent and period of warranty cover are specified in the "Standard Terms and Conditions of Albert Richter GmbH & Co. KG" valid at the time of delivery or, by way of departure, in the contract of sale itself.

We guarantee freedom of faults in compliance with state-of-the-art technology and the confirmed application.

No warranty claims can be made for any damage caused as the result of incorrect handling or disregard of operating and installation instructions, technical data sheets and relevant regulations.

This warranty also does not cover any damage which occurs during operation under conditions deviating from those laid down by specifications or other agreements.

Justified complaints will be eliminated by repair carried out by us or by a specialist appointed by us.

No claims will be accepted beyond the scope of this warranty. The right to replacement delivery is excluded.

The warranty shall not cover maintenance work, installation of external parts, design modifications or natural wear.

Any damage incurred during transport should not be reported to us but rather to the competent cargo-handling depot, the railway company or carrier company immediately or else claims for replacements from these companies will be invalidated.

Importer to UK and responsible for compilation of the documentation:

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