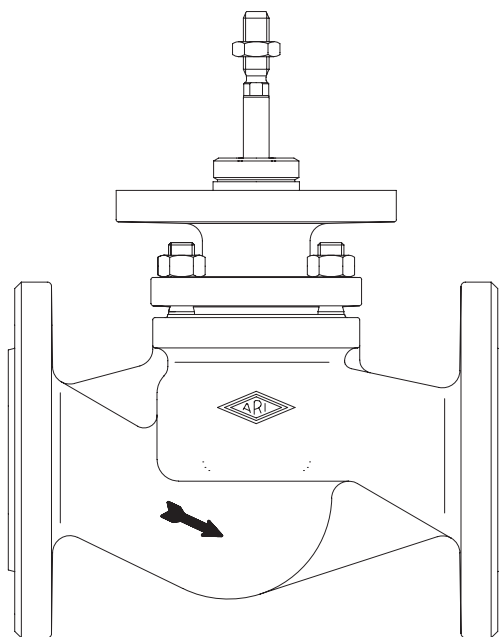
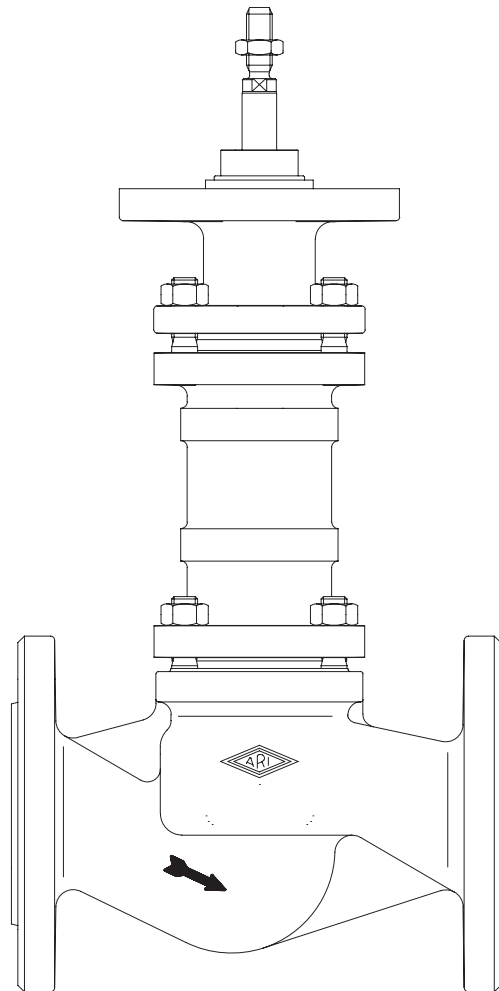


Operating and installation instructions

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



Series 440, 445



Series 441, 446

Contents

1.0 General information on operating instructions	2	7.0 Care and maintenance	12
2.0 Notes on possible dangers	2	7.1 Replacement of stem sealings	12
2.1 Significance of symbols	2	7.1.1 PTFE V-ring unit design	12
2.2 Explanatory notes on safety information	2	7.1.2 Stuffing box packing design	13
3.0 Storage and transport	2	7.1.3 Bellows seal design	14
4.0 Description	3	7.2 Replacement of internal parts	16
4.1 Scope of applications	3	7.2.1 Replacement of plug and stem	16
4.2 Operating principles	3	7.2.2 Replacement of seals of pressure balanced plugs	17
4.3 Diagram	4	7.2.3 Replacement of the seat ring	17
4.3.1 Plug design	7	7.3 Tightening torques	18
4.4 Technical data	8	7.3.1 Tightening torques for hexagon nuts	18
4.5 Marking	8	7.3.2 Tightening torques for seat rings	18
5.0 Installation	9	8.0 Troubleshooting	18
5.1 General notes on installation	9	9.0 Troubleshooting table	19
5.2 Requirements at the place of installation	10	10.0 Dismantling the valve or the top part	20
5.3 Installation instructions concerning actuators	11	11.0 Warranty / Guarantee	20
6.0 Putting the valve into operation	11	12.0 EC declaration of conformity	21

1.0 General information on operating instructions

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

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

The notes and warnings must be observed and adhered to.

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

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

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

The manufacturer reserves the right to introduce technical modifications 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.

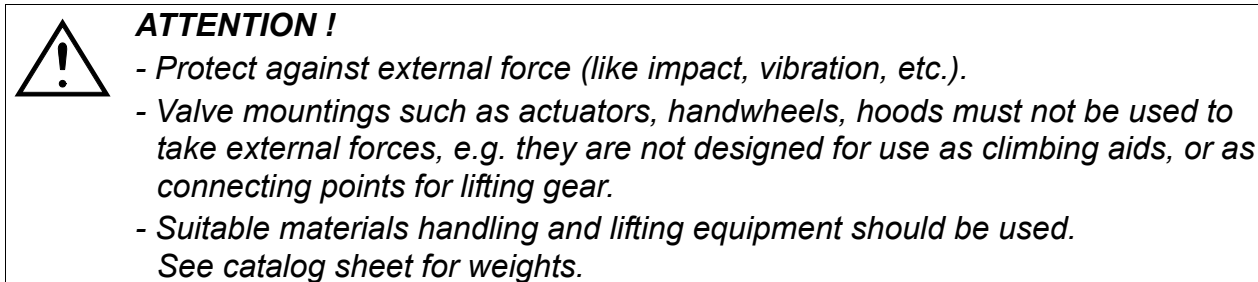
2.2 Explanatory notes on safety information

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



- 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 97/23/EC.

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

ARI 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

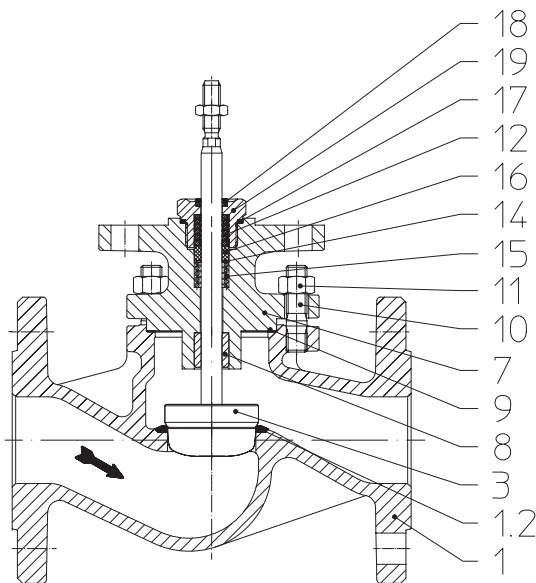


Fig. 1: Series 440 DN15-100

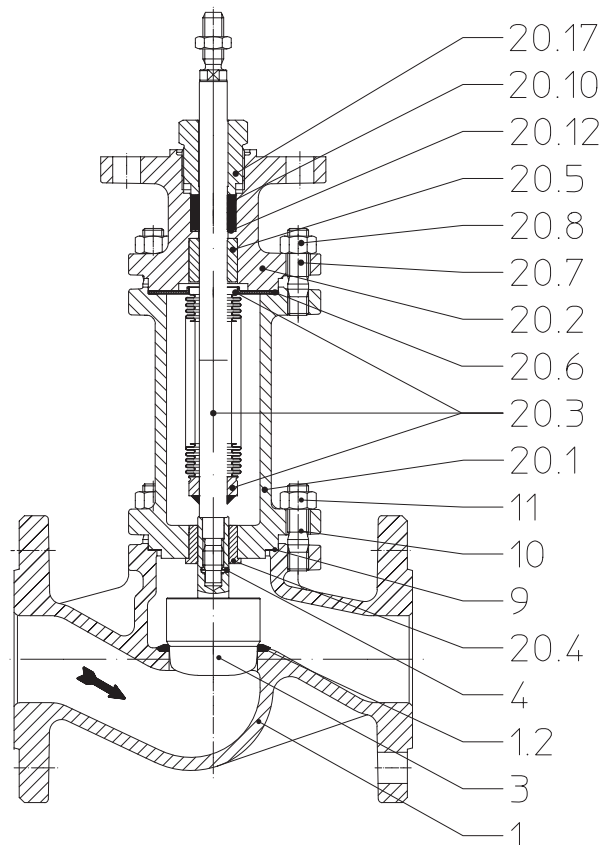


Fig. 2: Series 441 DN15-100

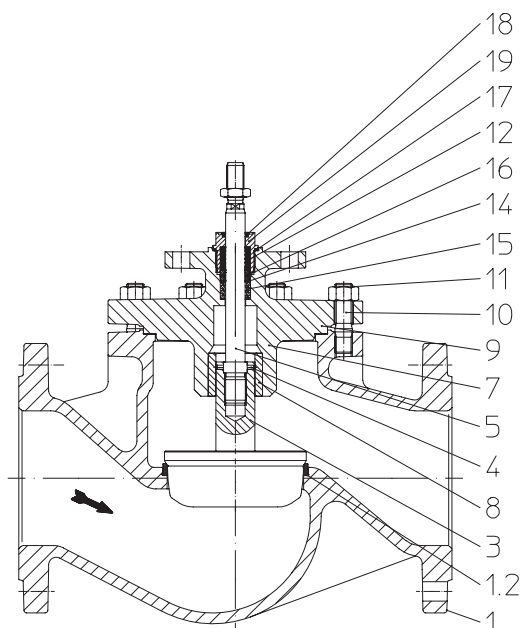


Fig. 3: Series 440 DN125-150

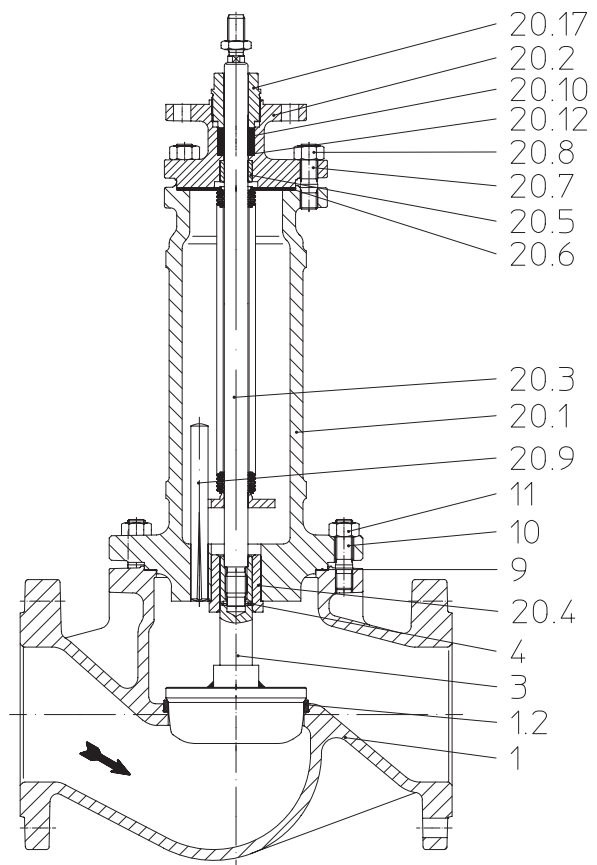


Fig. 4: Series 441 DN125-150

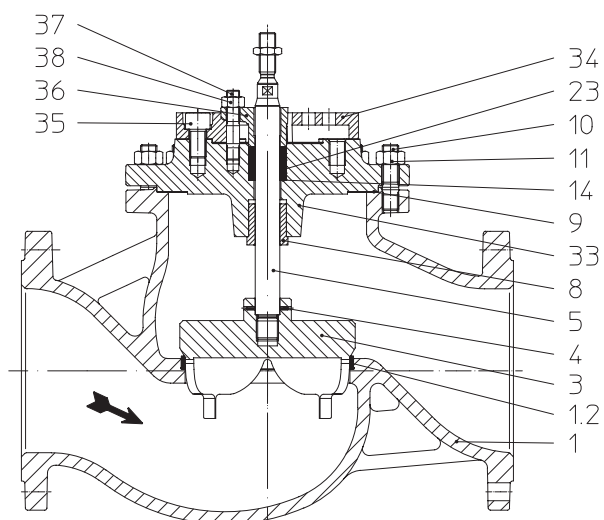


Fig. 5: Series 440 DN200-250

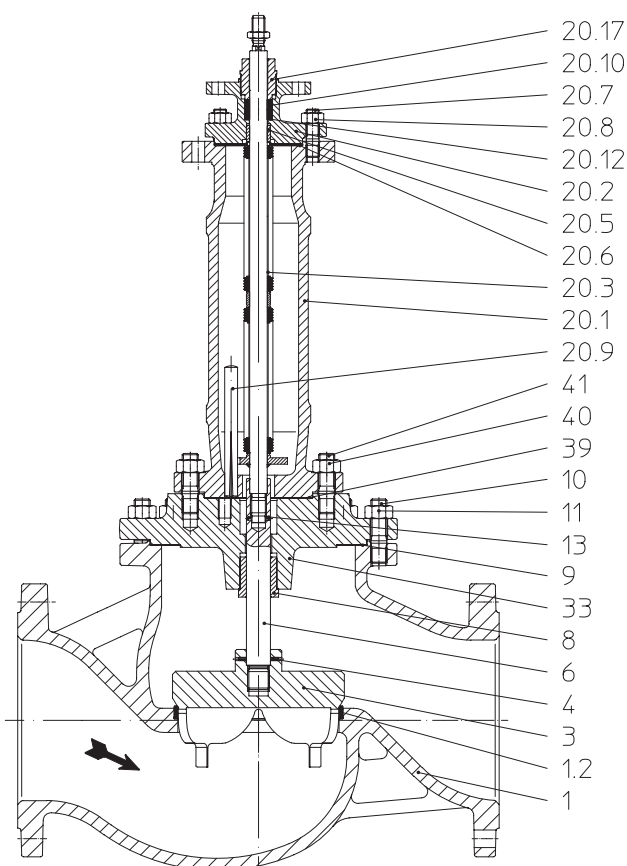


Fig. 6: Series 441 DN200-250

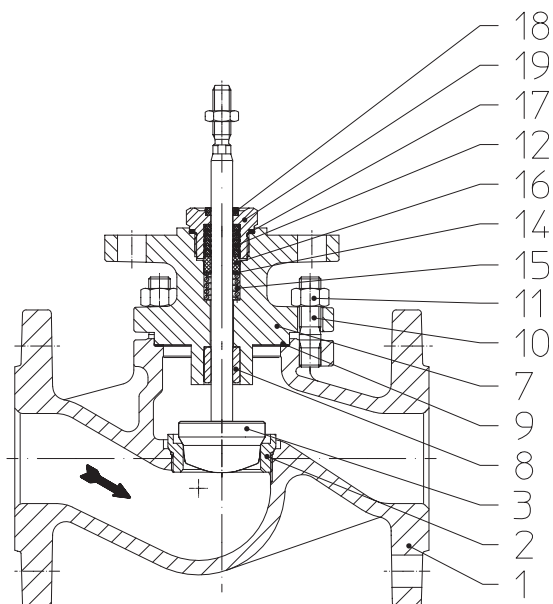


Fig. 7: Series 445 DN15-100
(only stainless steel)

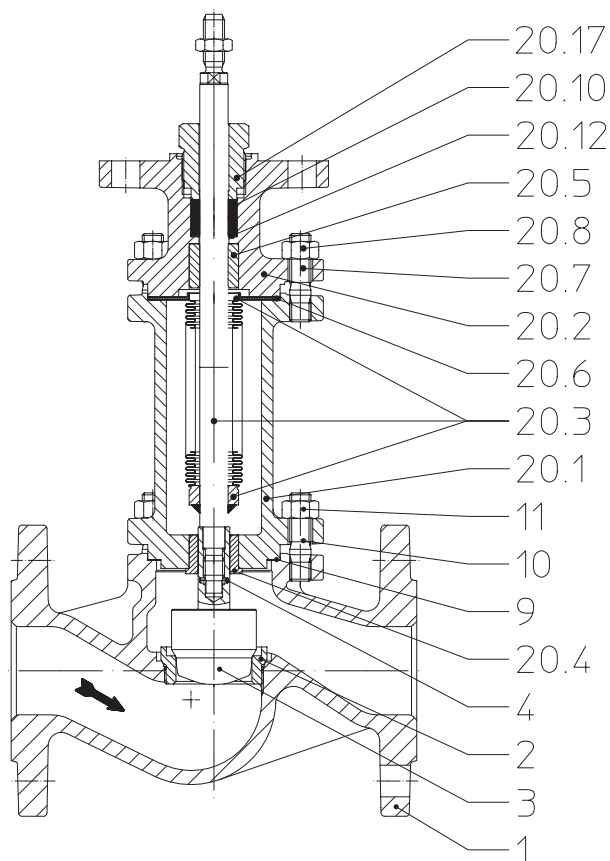


Fig. 8: Series 446 DN15-100
(only stainless steel)

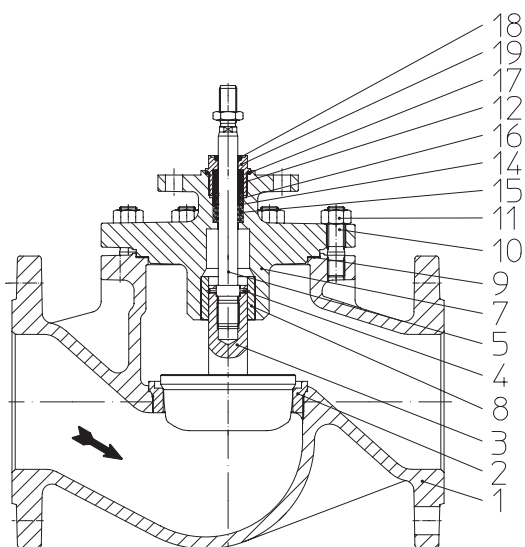


Bild 9: Series 445 DN125-150
(only stainless steel)

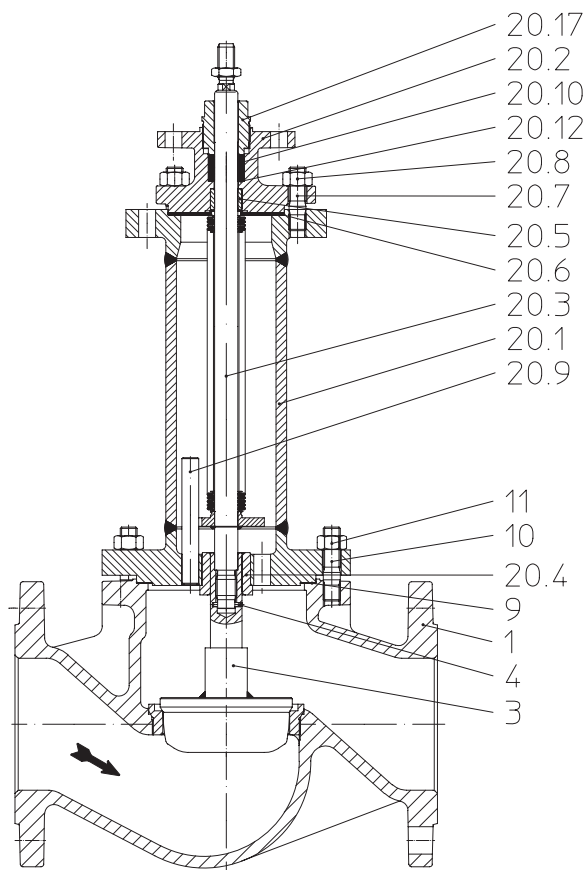


Bild 10: Series 446 DN125-150
(only stainless steel)

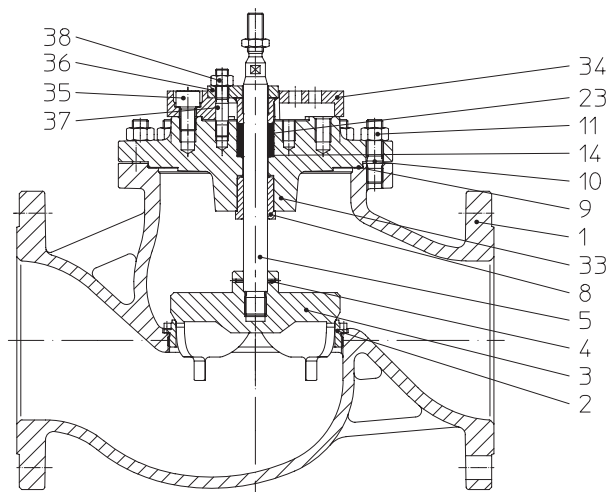


Fig. 11: Series 445 DN200-250 (only stainless steel)

4.3.1 Plug design

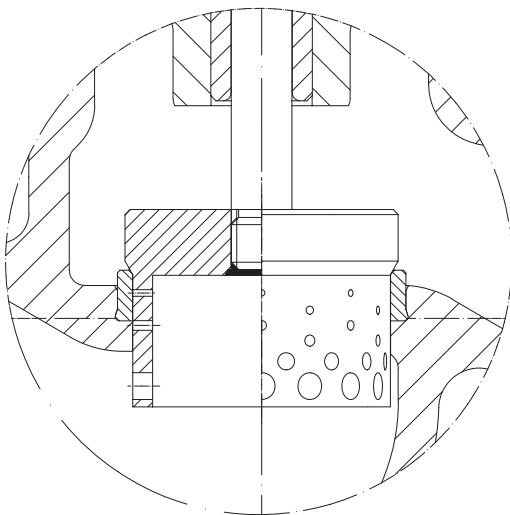


Fig. 12: Design with perforated plug

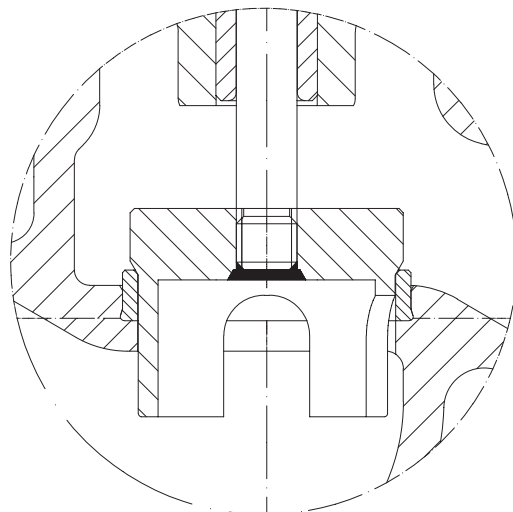


Fig. 13: Design with V-port plug

(Design with pressure balanced plug refer to Fig. 27)

4.4 Technical data

for

- **Principal dimensions**

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

4.5 Marking

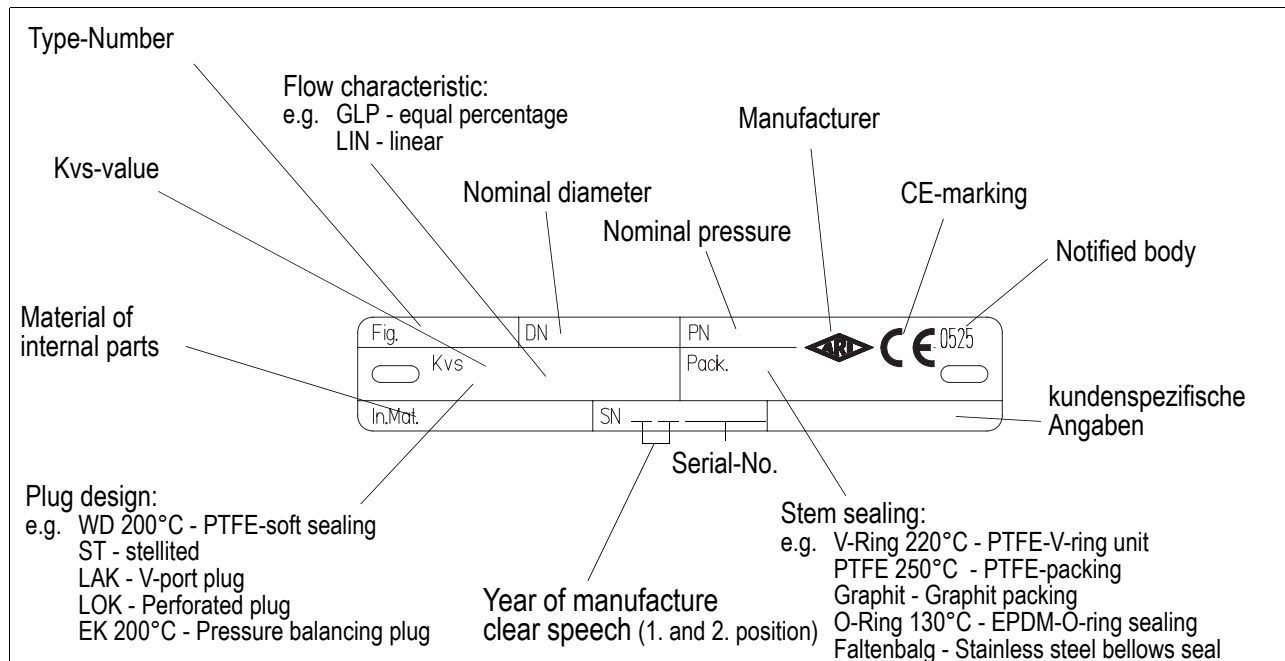


Fig. 14: DIN

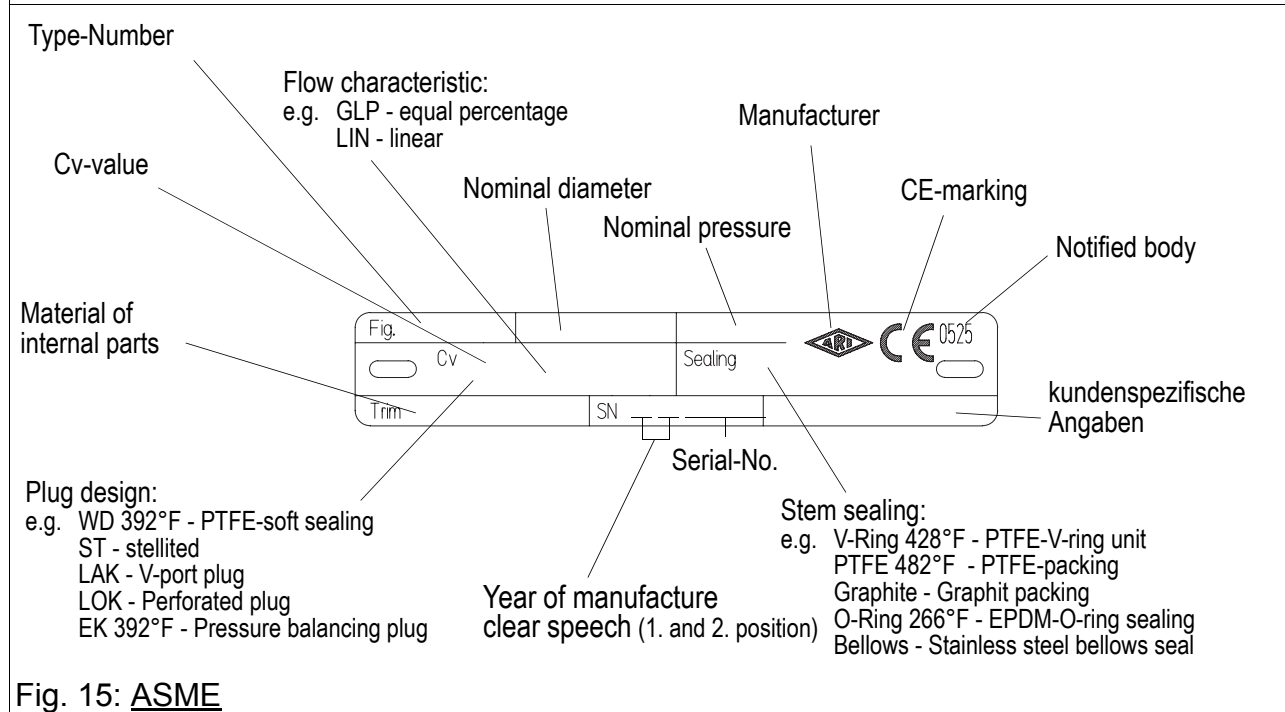


Fig. 15: ASME

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.

Valves with safety function are:

Type 440 DP-G / 441 DP-G and

Type 440 / 440-D with FR2.1 and Ü-sign

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.

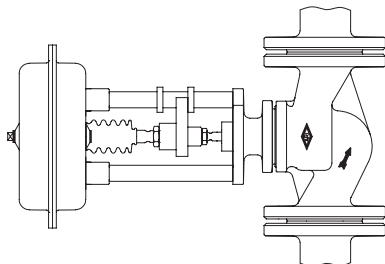


Fig. 16: Pipeline vertically

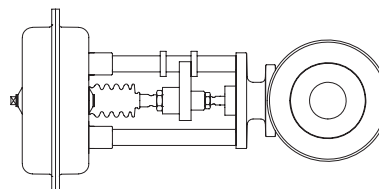


Fig. 17: Pipeline horizontally

Permissible actuator weights for valves with unsupported horizontal stems:

20 kg for DN 15 - 32	55 kg for DN125v-150v
25 kg for DN 40 - 65	(only series 445/446)
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 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.
- Touching the valve when it is operating at high ($> 50\text{ }^{\circ}\text{C}$) or low ($< 0\text{ }^{\circ}\text{C}$) media temperatures can cause injury.

Affix warning notice or protective insulation as appropriate!

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

- All works has been completed!
- 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. 18).
- 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.

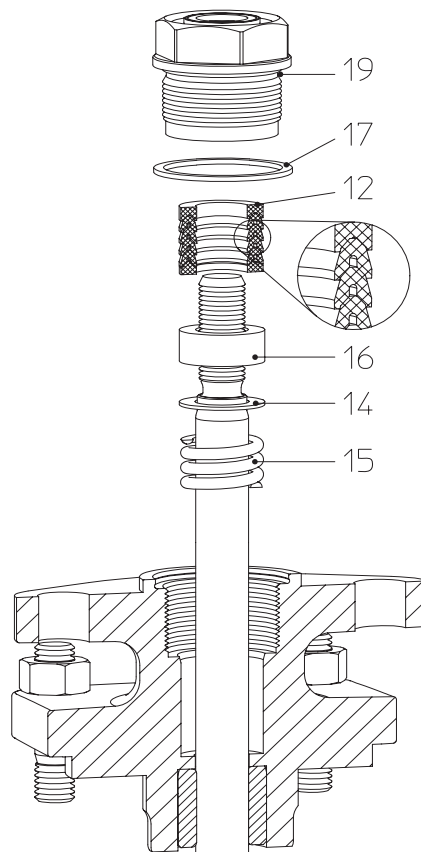


Fig. 18:
V-ring unit DN15-150

7.1.2 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. 19 - Fig. 21.

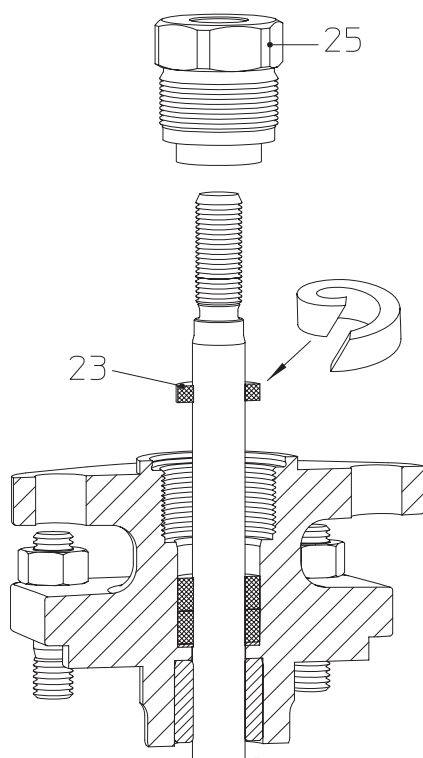


Fig. 19: Stuffing box packing
DN15-150

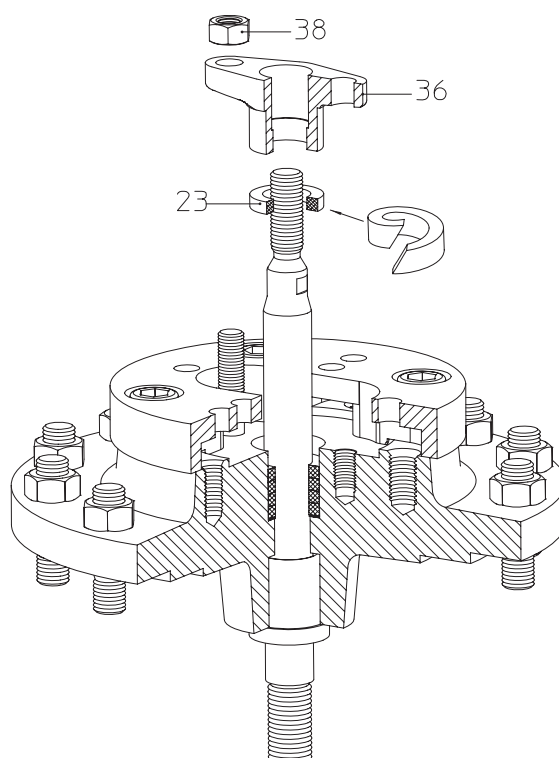


Fig. 20: Stuffing box packing
DN125v-150v / DN200-250

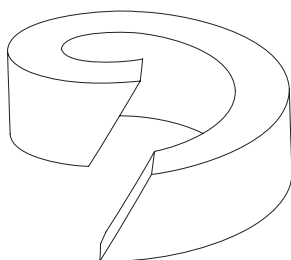


Fig. 21: Split packing ring

If a split packing ring is used, cut with a chamfer as shown in Fig. 21.

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.

7.1.3 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).

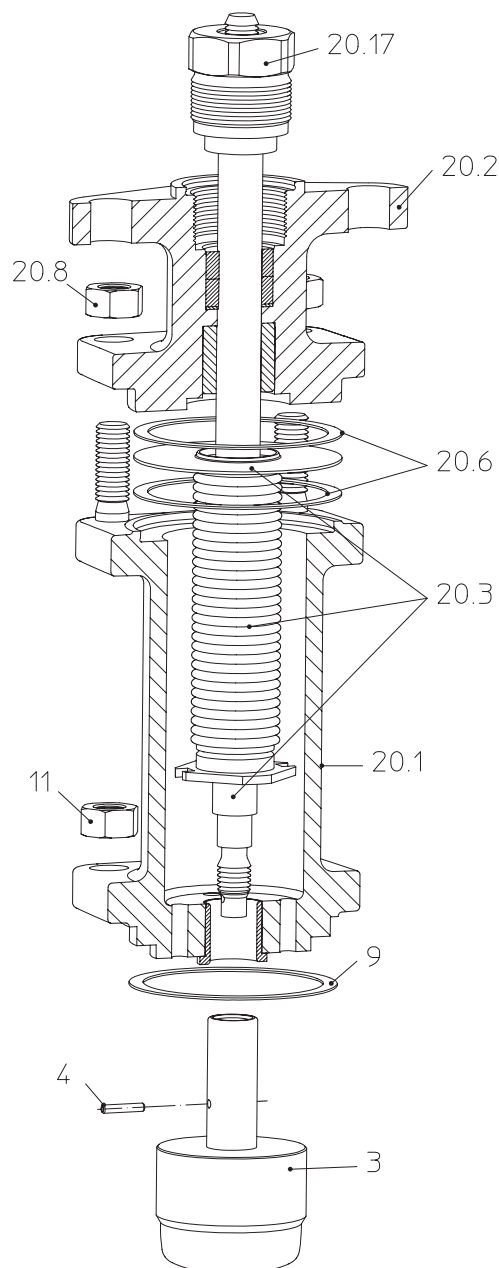


Fig. 22: Series 441/446

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. 25) 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).

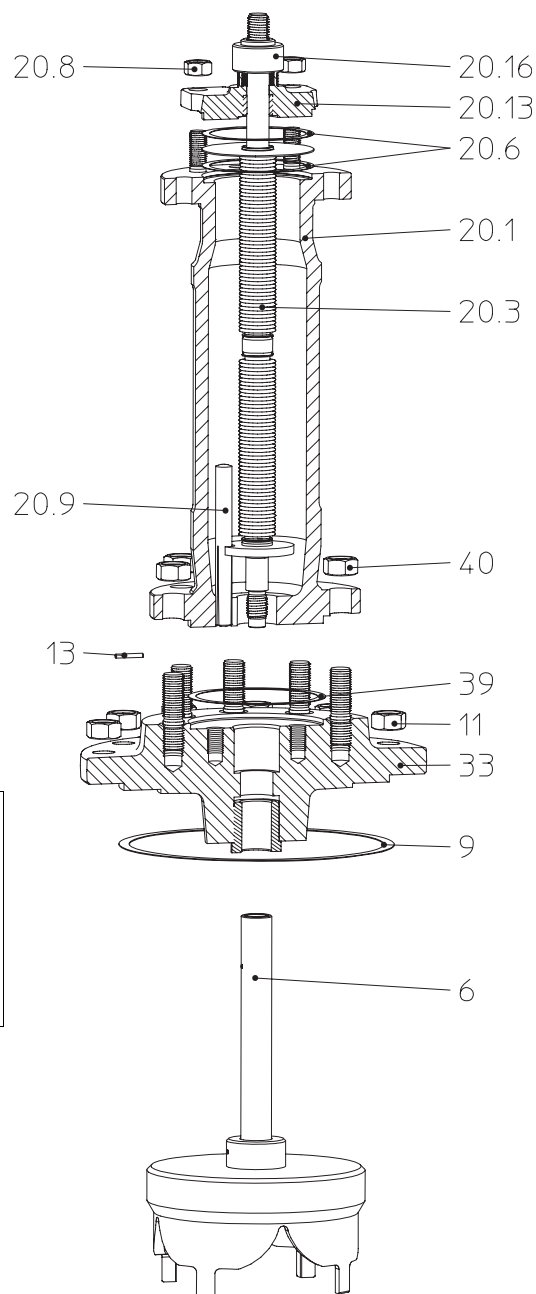


Fig. 23: Series 441 DN200-250

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.)

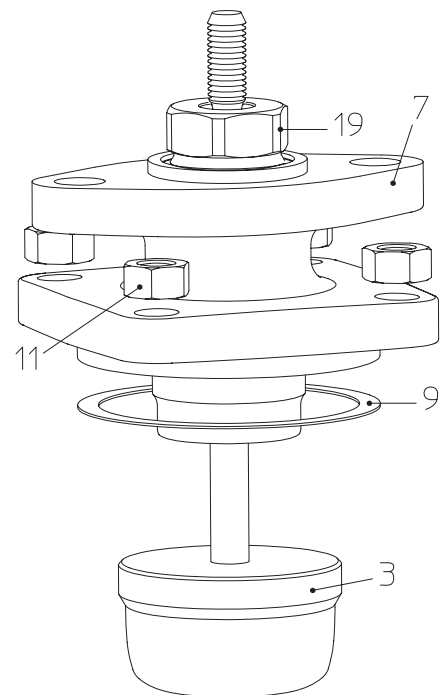


Fig. 24: Series 440 / 445
DN15-100

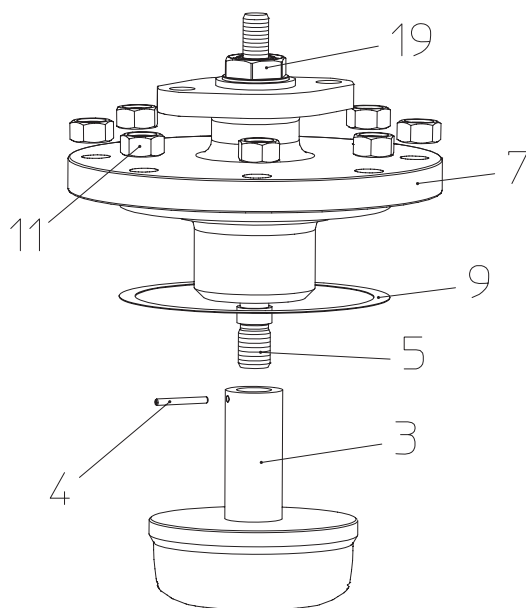


Fig. 25: Series 440 / 445 DN125-150

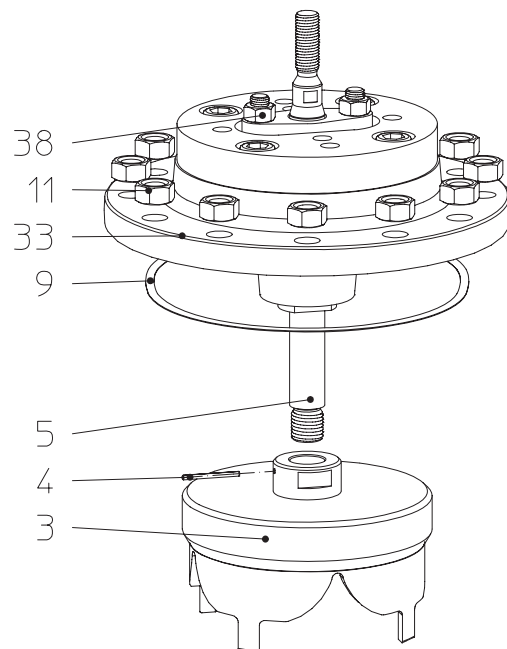


Fig. 26: Series 440 / 445 DN200-250

Series 441/446:

For replacement of plug and stem with bellows sealing (Series 441/446) refer to item 7.1.3.

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. 27).
- 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.)

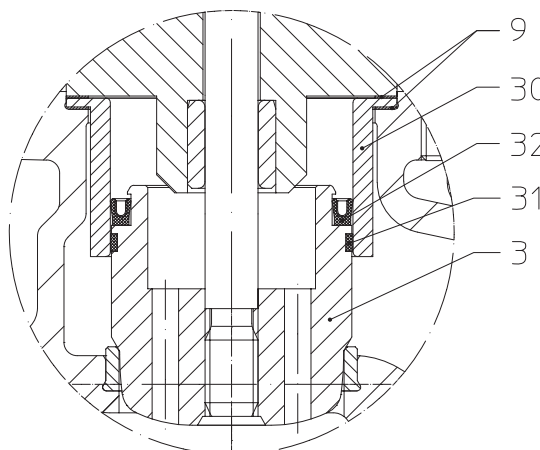


Fig. 27: Pressure balanced plug

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	=	15 - 30 Nm
M 12	=	35 - 50 Nm
M 16	=	80 - 120 Nm
M 20	=	150 - 200 Nm
M 24	=	340 - 410 Nm

7.3.2 Tightening torques for seat rings

DN 15/ 20	=	140 Nm
DN 25/ 32	=	205 Nm
DN 40	=	305 Nm
DN 50	=	460 Nm
DN 65	=	720 Nm
DN 80	=	980 Nm
DN100	=	1550 Nm
DN125	=	1700 Nm
DN150	=	2000 Nm
DN200	=	3300 Nm
DN250	=	3850 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 eliminated 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 7.1.2.
	Bellows defective in valves with bellows seal.	Replace bellows unit; refer to item 7.1.3
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 damaged 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 pipe 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, datasheets 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.



Technology for the Future.

GERMAN QUALITY VALVES

ARI-Armaturen Albert Richter GmbH & Co. KG, D-33756 Schloß Holte-Stukenbrock

Telephone (+49 5207) 994-0 Telefax (+49 5207) 994-158 or 159

Internet: <http://www.ari-armaturen.com> E-mail: info.vertrieb@ari-armaturen.com

12.0 EC declaration of conformity

**ARI-Armaturen Albert Richter GmbH & Co. KG,
Mergelheide 56-60, D-33756 Schloß Holte-Stukenbrock**

EC declaration of conformity

as defined by

the Pressure Equipment Directive 97/23/EC

Herewith we declare,

that according to the above mentioned Pressure Equipment Directive (PED) the below listed products comply and have been approved according to table 6, annex II, module H or module H1 (with safety function: also EC type test according to module B+D) through Lloyd's Register Quality Assurance GmbH (BS-No. 0525), Am Sandtorkai 41, D-20457 Hamburg.

Module H, Certificate-No: 50003/1

Straight through stop and control valves

Type 405, 460, 440, 441, 445, 446, 470, 471, 422, 462, 425, 426, 480

Applied standard:

DIN EN 60534 part 1

VDI/VDE 3844 sheet 1

DIN 3840

AD 2000 leaflet A4

- Cast iron with spheroidal graphite
- Cast steel
- Forged steel

Module H1, Certificate-No: 50003/2

Straight through control valves with safety function

Type 440, 441

Applied standard:

DIN EN 60534 part 1

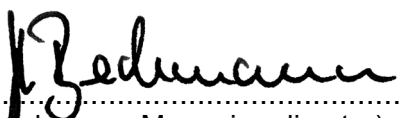
VDI/VDE 3844 sheet 1

DIN 3840

AD 2000 leaflet A4

- Cast iron with spheroidal graphite
- Cast steel
- Forged steel

Schloß Holte-Stukenbrock, 11.01.2010


.....
(Brechmann, Managing director)