ARCA VALVES
quality engineered control valves

Operating and maintenance manual
Control valve ECOTROL®
Series 6N/6H DN125/5"-DN400/16"

06.2023 / 1.2

Original instructions

Cover picture background: Freepik.com

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1 General data

This operating manual contains instructions that enable the product to be safely and properly installed, put into operation and maintained.

The target group for this operating manual is exclusively specially trained and authorised technical personnel.

Please contact the manufacturer if you encounter problems that cannot be solved with the aid of this operating manual.

The product is subject to technical changes at any time.

1.1 Validity of the manual

This operating manual applies to the product in the version described in the device pass.

1.2 Contact details

Further information about the product can be obtained from:

Manufacturer's address

ARCA Regler GmbH
Kempener Str. 18
D-47918 Tönisvorst
Tel.: +49 (0) 2156-7709-0
Fax: +49 (0) 2156-7709-55
E-mail: sale@arca-valve.com
www.arca-valve.com

1.3 Other applicable documents

The product can be delivered as part of an actuator and equipped with additional components that are described in their own operating manuals. The instructions as well as the warning and safety information contained therein must also be observed.

Furthermore, the following documents apply in addition to this operating manual.

- Device pass
- Installation drawing

1.4 Place of storage of the manual

The operating manual and all other applicable documents are part of the product. They must be kept in the immediate vicinity of the product and must be accessible to the personnel at all times.

1.5 ARCA ONSITE

Acceptance documents (if ordered) and operating documentation for this product can be downloaded from the ARCA ONSITE portal.

Two options are available here:

1. Scan the **QR Code**[1] on the product. Further entries are not required.

2. Visit the website **https://onsite.arca-valve.com/search** and enter the ARCA order no. and ARCA serial no. The order no. and serial no. can be found in the device pass and in our order confirmation.

Entry example

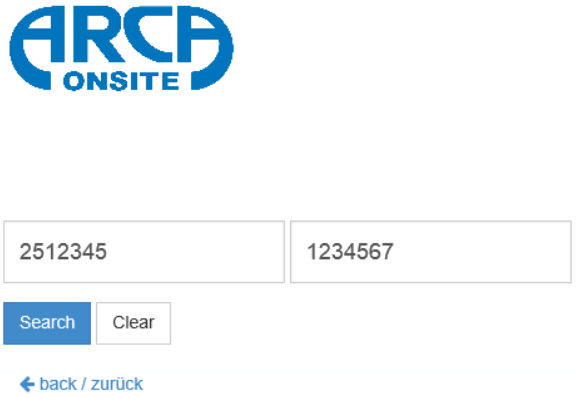


Illustration 1: ARCA ONSITE

[1] **QR Code** is a registered trademark of DENSO WAVE INCORPORATED

2 Safety

2.1 General safety information

The operating manual contains detailed descriptions for the safe installation, commissioning and maintenance of the product.

- Read this operating manual attentively in its entirety in order to familiarise yourself with the product.
- Particular attention must be paid to the information in this chapter.

2.2 Explanation of symbols and notices

Safety and warning instructions are intended to avoid hazards to the life or health of operating or maintenance personnel, and to avoid material damage. It is emphasised through the use of the special terms defined here. Additionally, their location is marked by warning symbols (pictograms). The signal terms used have the following meanings:

⚠ DANGER

means that death, serious injuries and/or considerable damage to property will occur if the corresponding preventive measures are not taken and maintained.

⚠ WARNING

means that death, serious injuries and/or considerable damage to property can occur if the corresponding preventive measures are not taken and maintained.

⚠ CAUTION

means that minor injuries and/or damage to property can occur if the corresponding preventive measures are not taken and maintained.

NOTICE

indicates an important item of information about the product itself or how the product should be handled, to which special attention should be paid.

2.3 Structure of the warning notices

Section-related warning notice

Section-related warning notices refer to the entire chapter, sections or several paragraphs within this operating manual. Section-related warning notices are structured as follows:

⚠ DANGER

Type and source of the danger

Possible consequences of disregard

► Measure to avoid the danger

► Further measures

Embedded warning notice

Embedded warning notices refer to a certain area within a section. They apply to smaller information units than the section-related warning notices. Embedded warning notices are structured as follows:

⚠DANGER! Instructions for avoiding a dangerous situation.

2.4 Intended use

The product complies with laws, regulations and standards valid at the time of delivery.

The product does not pose a danger to people, property or environment if it is used for its intended purpose and the warning notices contained in this operating manual and attached to the product are observed. This applies to the entire lifetime, from the delivery, assembly and operation to the disassembly and disposal.

The following is deemed to be used for the intended purpose:

- Operate the product exclusively in accordance with this operating manual and in accordance with the specification in the order confirmation and the device pass.
- Use exclusively original ARCA spare parts for the maintenance of the product.

⚠ DANGER

Risk of death and serious injuries as well as damage to property and the environment!

Risk of death and serious injuries as well as damage to property and the environment due to hazardous operating media, high and low temperatures, high pressures as well as moving parts.

► The following requirements and conditions must be complied with without fail.

► Observe warning notices.

Maintenance

Ensure or observe the following before performing any maintenance work:

- Depressurise the pipeline.
- Completely empty the pipeline and, in the case of hazardous operating media, thoroughly rinse it using a suitable cleaning fluid.
- Inform yourself about possible hazards that could arise due to residues of the operating medium and take suitable precautions if necessary. (Wear personal protective equipment, etc.).
- If necessary, cool the valve down or heat it up to ambient temperature.

- Disconnect the auxiliary energy supply to the actuator and drive it to its end position.
- Ensure that the system cannot be started up by third parties.
- You are expressly directed to observe the regulations for potentially explosive equipment where necessary.

2.5 Inappropriate use

Inappropriate use is use of the product other than as described is the chapter entitled [2.4] *Intended use*.

In the addition, the following applies:

- Unauthorised modifications to the product can lead to injuries, damage to property and malfunctions. The user alone bears this risk. Warranty and liability claims are excluded.

2.6 Residual risks

There may still be residual risks even if the product is used for its intended purpose.

- Danger of being crushed by unsecured actuators

In case of negligent use of personal protective equipment:

- Danger due to noise resulting in hearing loss
- Thermal hazards (burning, scalding, etc.)
- Danger due to escape of the operating medium

Furthermore, there may be unapparent residual risks despite all precautions taken.

Residual risks can be minimised if the notes on safety and commissioning as well as the operating manual as a whole are observed.

2.7 Qualification of the personnel

The product is exclusively intended for use in plants and installations in which trained technical personnel carry out the necessary work. Technical personnel are persons who are entrusted with the installation, commissioning and operation of this product and who have the appropriate qualifications for their work activities, such as, for example:

- training or instruction in accordance with current technical safety standards in the maintenance and usage of appropriate safety equipment.
- Training in First Aid.
- In the case of systems with explosion protection: training or instruction and authorisation to carry out work on potentially explosive systems.

Repair work may be carried out only by trained and qualified technical personnel.

Work on electrical equipment may be carried out only by trained electricians or persons who have received electrotechnical instruction.

Persons Activity	Instructed persons	Persons with a recognised technical education	Persons with a recognised electrotechnical education	Superiors with relevant skills	ARCA service personnel
Transport	X	X	X	X	X
Installation	X	X	X	X	X
Commissioning		X	X	X	X
Maintenance	X	X	X	X	X
Fault finding		X	X		X
Mechanical troubleshooting		X			X
Electrical troubleshooting			X		X
Repairs		X	X	X	X
Disposal	X	X	X	X	X

2.8 Installation and operation in potentially explosive areas

The control valves of this series were subjected to an ignition hazard assessment according to EN ISO 800-36 Paragraph 5 and have no potential inherent ignition source, even in the event of infrequent malfunctions. Hence, they do not fall under Directive 2014/34/EU.

- The maximum surface temperature of the control valve depends solely on the temperature of the flow of medium. Hence, use the maximum possible temperature of the media flow (defined as “max. design temp.” in the device pass) for the assignment of the temperature class.
- The control valve must be connected to the potential equalization in accordance with EN 60079-14.
- Installation and removal of the control valve and repair work in potentially explosive areas may only take place with the corresponding safety precautions or only with spark-free tools.

2.9 Operator's duty of care

To avoid accidents, malfunctions and environmental impacts, the respective person responsible for the transport, commissioning, operation, maintenance and disposal of the product must ensure the following:

- Observation of all warning and danger notices.
- Regular instruction of personnel on all applicable questions of work safety, the operating manual and in particular the safety instructions that it contains.
- Regulations and work instructions for safe working as well as the corresponding instructions for the conduct of the personnel in case of accidents and fire are to be always kept at the ready and hung up in the plant if necessary.
- Operate the product only if it is in perfect working order.
- Use only spare parts, lubricants and operating resources approved by the manufacturer.

- Observe the specified operating conditions and requirements at the place of installation.
- Provide all necessary devices and the personal protective equipment required for the respective task.
- Refer to the chapter entitled Maintenance for the prescribed maintenance intervals and comply with the corresponding regulations.
- Allow installation, commissioning and maintenance of the product to be carried out only by qualified and trained personnel in accordance with this operating manual.
- Surfaces of the product which may become very hot or very cold due to the operating conditions must be indicated by warning signs and if necessary, insulation should be installed.
- The operator must ensure that the product is used for its intended purpose.
- Before commissioning the product, the operator must carry out a risk assessment and define appropriate inspection and maintenance intervals according to the operating conditions.

2.10 Personal protective equipment

Personal protective equipment must be worn during work to minimize health risks.

- During work, always wear the protective equipment necessary for the respective work.
- Follow instructions for personal protective equipment posted in the work area.

Always wear	
	**Protective clothing** Tight-fitting work clothes with a low tear resistance, with narrow sleeves and without protruding parts. They primarily serve to protect against being caught up by moving machine parts. Do not wear rings, chains or other jewelry.
	**Safety shoes** To protect against heavy falling parts and slipping on smooth floors.

Wear in case of particular environmental conditions	Special protective equipment is necessary in particular environmental conditions. Select it according to the environment.
	**Safety glasses** To protect the eyes against flying parts and splashes of liquids.
	**Helmet** To protect against falling and flying parts and materials.
	**Hearing protection** To protect against hearing damage.
	**Handguard** For protection from hot or cold parts and liquids. To prevent allergic reactions in the event of skin contact.

3 Transport, storage and packaging

3.1 Transport

⚠ WARNING

Tipping or falling load!

Danger of death and danger of damage to property due to load tipping over or falling!

- ► Only suitable and approved means of transport and lifting equipment may be used for transporting the product.
- ► Lifting equipment must generally be attached to the housing of the product, not to attachments.
- ► Allow only instructed persons to select and attach the lifting equipment.
- ► Do not stand under suspended loads.

Transport at a temperature lower than -40 °C or higher than +80 °C is not permissible.

The valve may only be transported in a pressureless and rinsed-out condition.

Particular attention is to be paid to dead spaces (pressure compensation, bellows, etc.) when rinsing the valve.

3.1.1 Lifting the valve with actuator

To safely lift the valve with the attached actuator, please note the following.

NOTICE! Attachment points on actuators (lifting eyes, ring bolts etc.) are designed solely for transporting the actuator. Under no circumstances should these attachment points be used for lifting when the actuator is coupled to a valve.

- Use load hook with safety latch to prevent the lifting gear from slipping.
- Use lifting gear with the same length to lift the valve vertically.
- In the case of valves with welded ends, the lifting gear must be secured against slipping off the housing by connecting them to each other.
- Depending on the actuator type and valve size, the actuator may need securing against overturning with an extra hoist between the load hook and the actuator. Please make sure that this additional lifting gear is not subjected to any load, but rather only safeguards the vertical lifting motion.

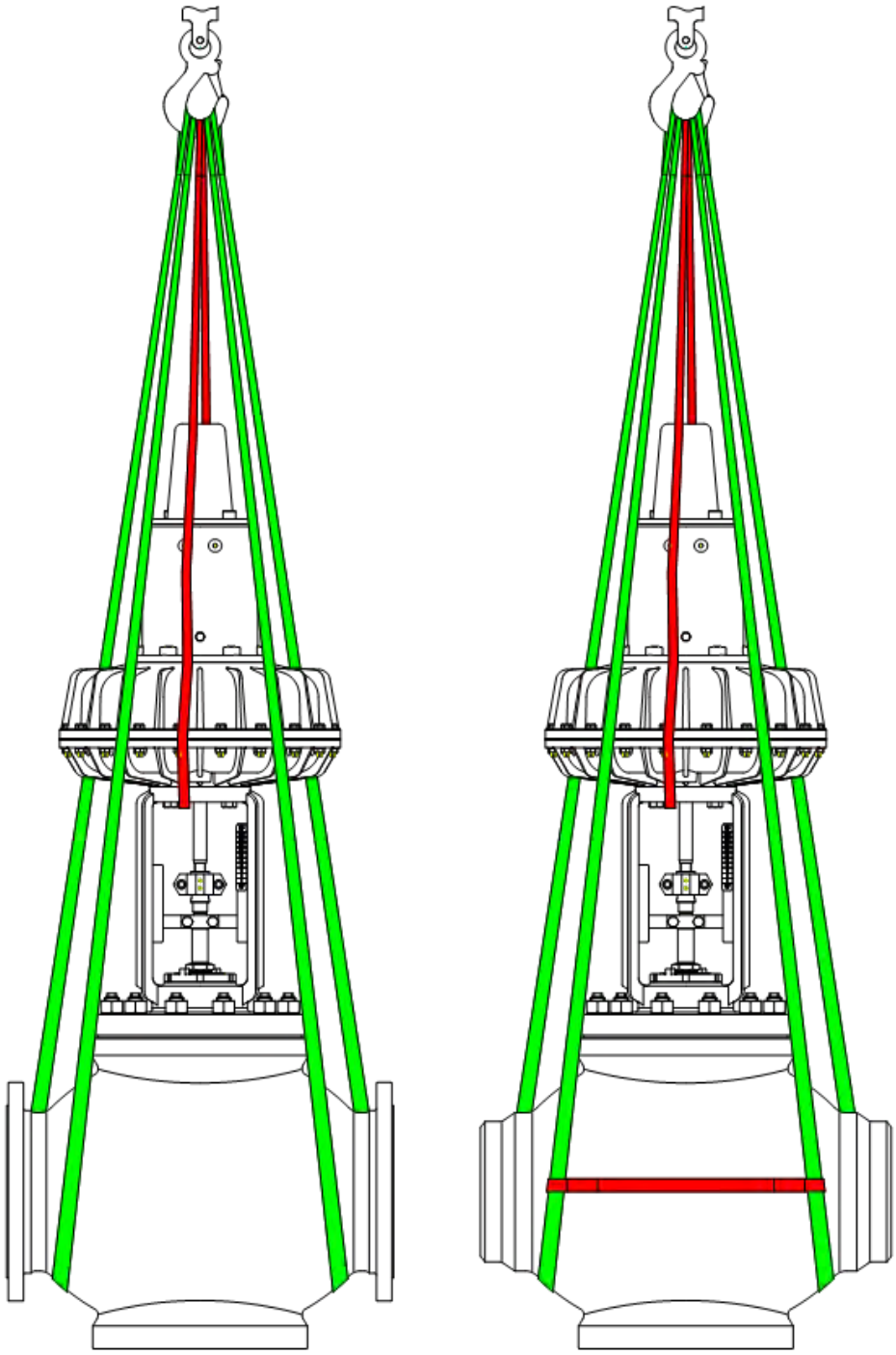


Illustration 2: Lifting points

3.2 Storage

NOTICE

Improper storage!

There is a danger of the product and in particular the attached electronic accessories no longer functioning if stored improperly.

- ► Storage at a temperature lower than -40 °C or higher than +80 °C is not permissible.
- ► It must be stored in roofed-over storage places and that are weather-proof.

To protect against contamination and to protect the sealing surfaces, openings such as nozzles, flanges, etc. must be sealed using suitable means. These should be removed by technical personnel at the place of installation.

3.3 Packaging

The product is packed in a PE film inside the outer packaging (card-board box, wooden crate, pallet, lattice box).

If the packaging, in particular the PE film, has been opened, the product must be stored immediately in a heated room.

The product must be packed in weatherproof or seaworthy packaging for transport by ship, airplane, rail or truck.

4 Nameplate

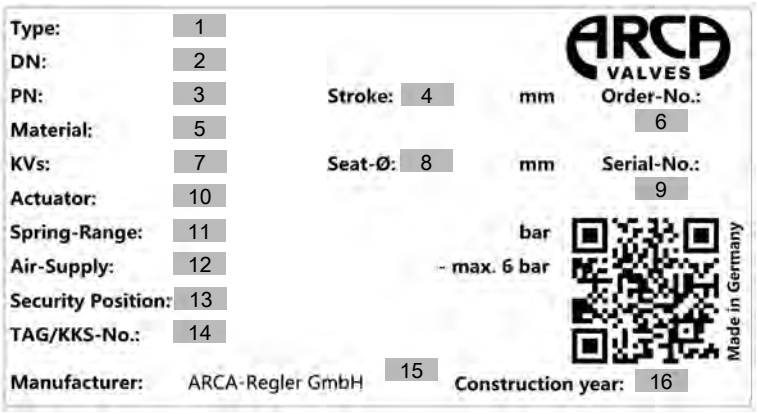


Illustration 3: Nameplate

1	Type designation valve
2	Nominal size
3	Nominal pressure
4	Valve stroke
5	Material of housing / trim
6	ARCA order number
7	Flow coefficient, characteristic curve
8	Seat diameter
9	Serial number
10	Actuator type code
11	Actuation pressure range
12	Max. actuation pressure
13	Valve safety position
14	Marking
15	Conformity mark
16	Year of manufacture

Place of installation

The nameplate is attached to the actuator yoke or the actuator head.

Serial no.

The serial no. of the valve is stamped on the neck flange of the housing. If it differs from the nameplate, the serial no. on the housing is binding.

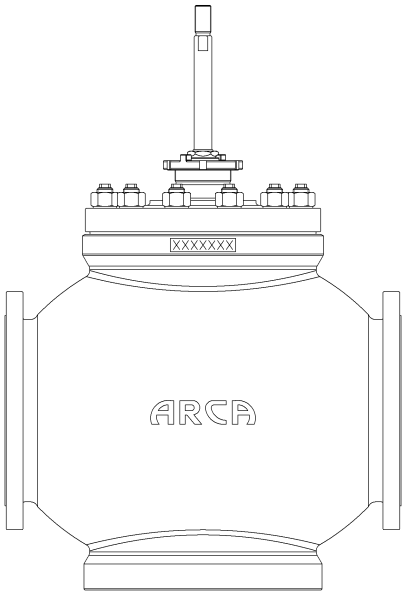


Illustration 4: Serial no.

5 Type key

Series	
6N/6H-	

Bonnet (..X)	
--1	Standard
--2	Double stuffing box
--3	Cooling fins
--4	Bellows
--5	Extension (insulating column)
--7	Standard balanced
--8	Cooling fins balanced
--9	Special design in acc. with order

Trim (…-XX)	
P1 – P5	Parabolic plug (1 - 5 step)
L1 – L4	Perforated plug (1 - 4 step)
K1	Piston plug (1 step)
S	On/off plug
LN – LN2	Retainer (low-noise, single, double)
LK1 – LK4	Low noise cage (single to quadruple)
SLK1 – SLK3	Seat low noise cage (single to triple)
LS1 – LS4	Perforated disc, welded in (single to quadruple)
SS	Dirt strainer
BG	Additional lower stem guide in the seat

Example of type designation

6N3-P1-LN

Control valve ECOTROL 6N – cooling fins – bonnet – 1 step parabolic plug – low-noise retainer

6 Sectional drawings

Some versions of the valve are illustrated below. Further versions are possible by combining the different components.

Drawing details

X see [10.3] *Stem sealing*

Y see [11.11] *Retainer & seat*

Z see [11.10] *Balancing sealing*

6.1 Parts list

Item		Name
1		Housing
2		Bonnet
6		Intermediate flange
20	*	Seat
26	*	Plug (compl.)
50	*	Stem
51	*	Clamping sleeve
56	*	Shaft
57	*	Hex nut
59	*	Lock washer
60		Cylinder tube
65		Guide bush
74	*	Notched pin
80	*	Bolt / threaded bolt
81	*	Nut
90	*	Bolt / threaded bolt
91	*	Nut
110		Low noise cage
117	*	Wiper ring
140	*	Gasket
142	*	Bellows unit
143	*	Gasket
144	*	Gasket
150		Slotted nut
152		Stuffing box screw
154	*	Base ring
156	*	Seal set
164	*	Plain bearing
166	*	O-ring
168	*	Gasket
169		Sleeve
170		Stuffing box gland
172	*	Screw
173	*	Spring lock washer

Item		Name
177	*	Piston ring
180	*	Sealing element
181		Clamping ring
182		Retainer
183	*	O-ring
184	*	Sealing element
185		Lower guide
186	*	Plain bearing
198	*	Sealing element
199	*	Support ring
356	*	Sealing element
523		Disc
	*	recommended spare part / wearing part

6.2 6N/6H1-P1

Standard bonnet DEK1 with parabolic plug P1.

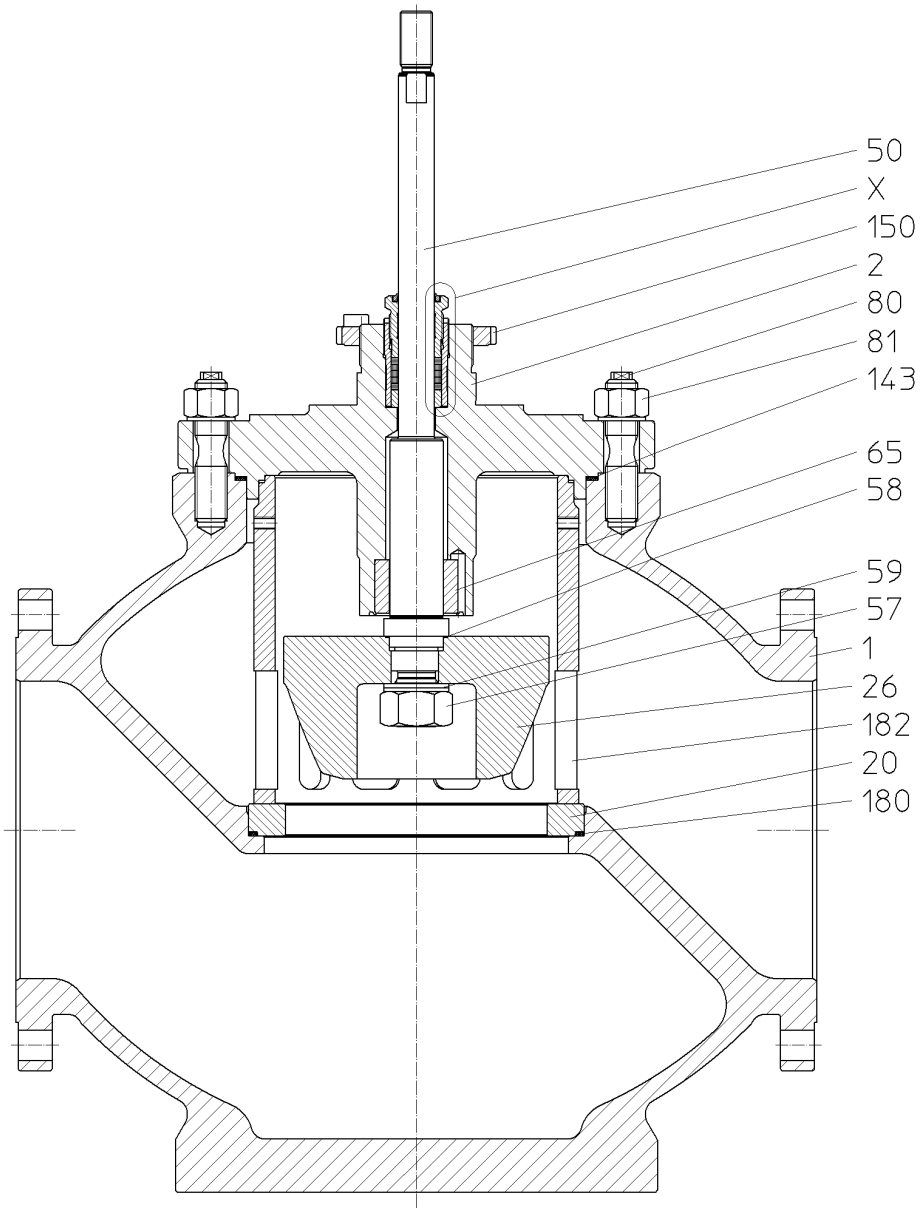


Illustration 5: 6N/6H1-P1

6.3 6N/6H1-P1

Standard bonnet DEK1 with parabolic plug P1 and soft seal. See also [11.11] *Version with soft seal – Detail Y*.

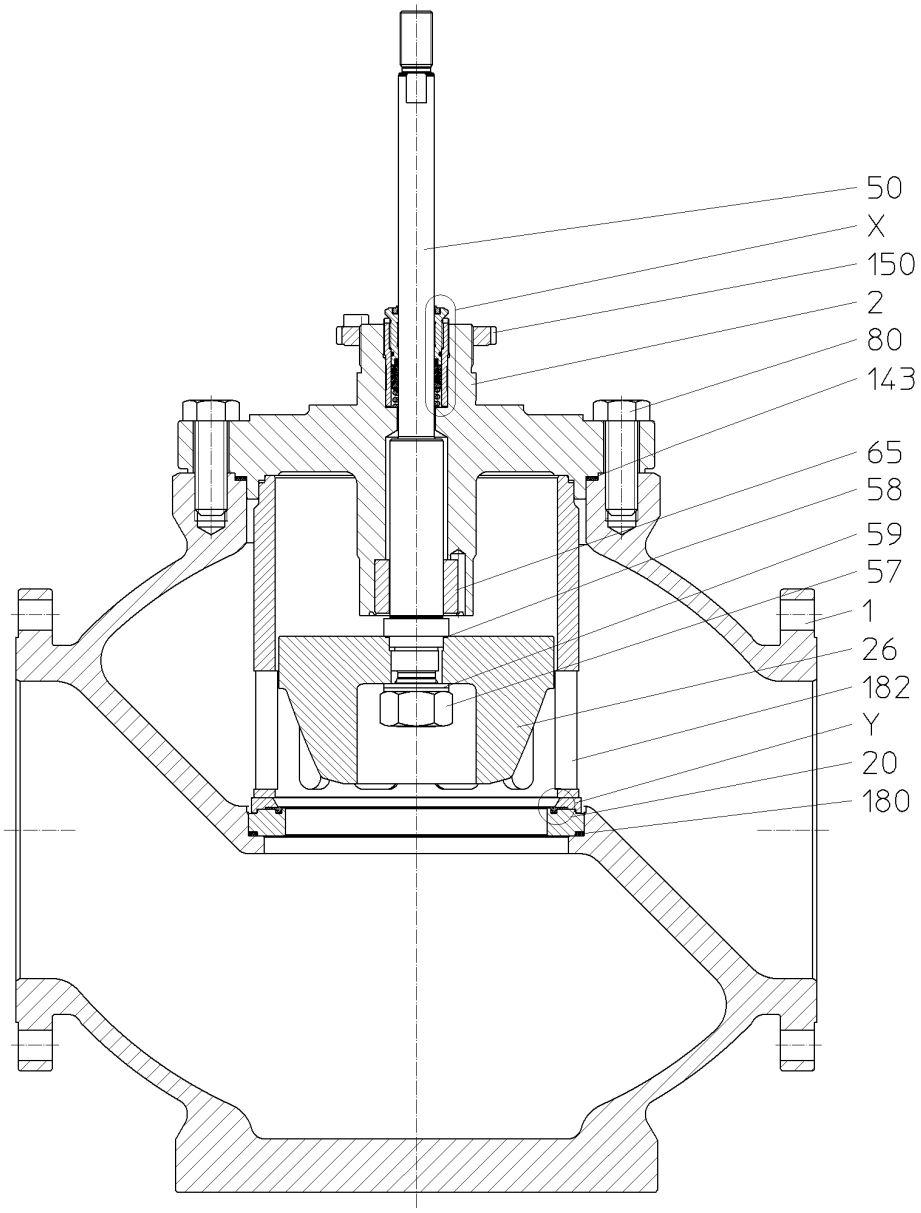


Illustration 6: 6N/6H1-P1

6.4 6N/6H1-L1-LK1

Standard bonnet DEK1 with perforated plug L1 and low noise cage LK1.

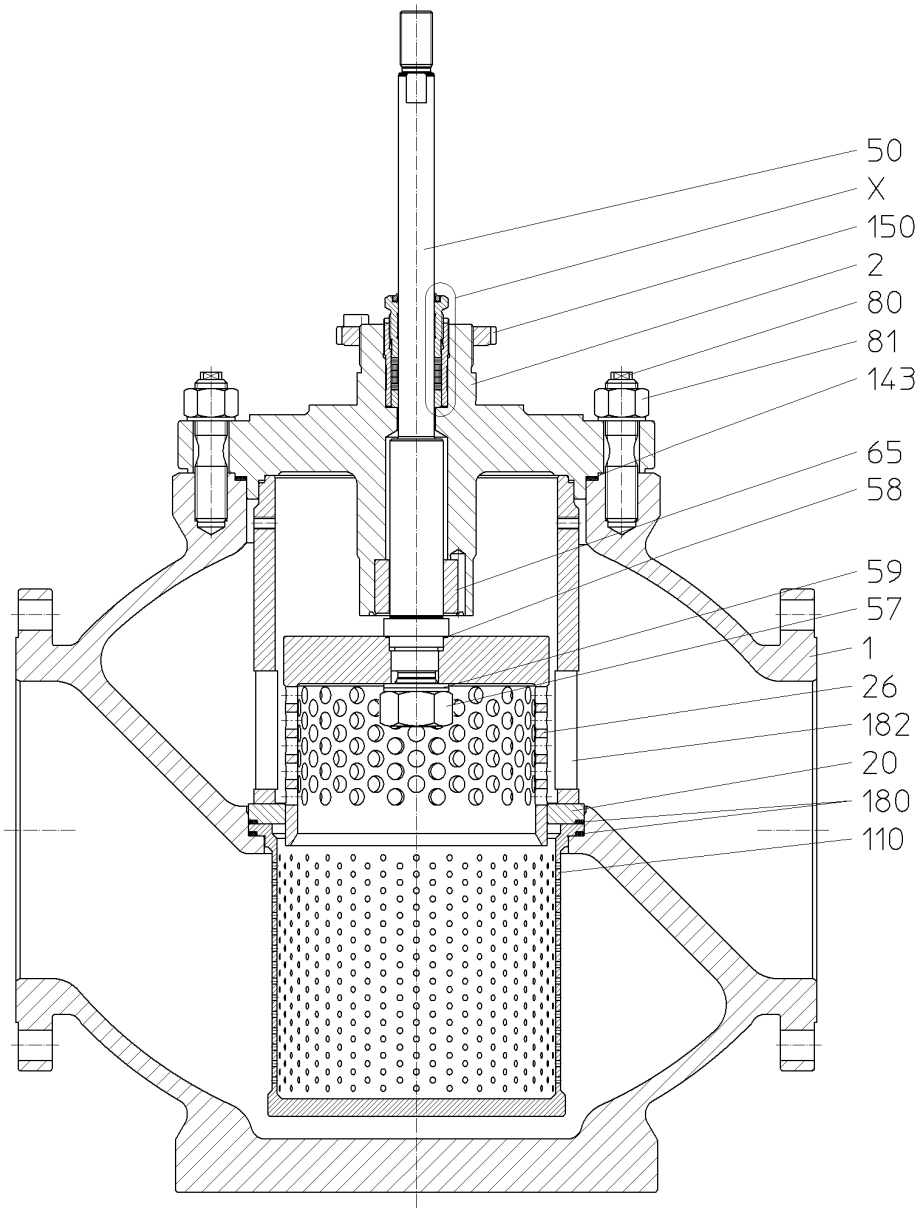


Illustration 7: 6N/6H1-L1-LK1

6.5 6N/6H1-P1-BG

Standard bonnet DEK1 with parabolic plug P1 and lower guide BG.

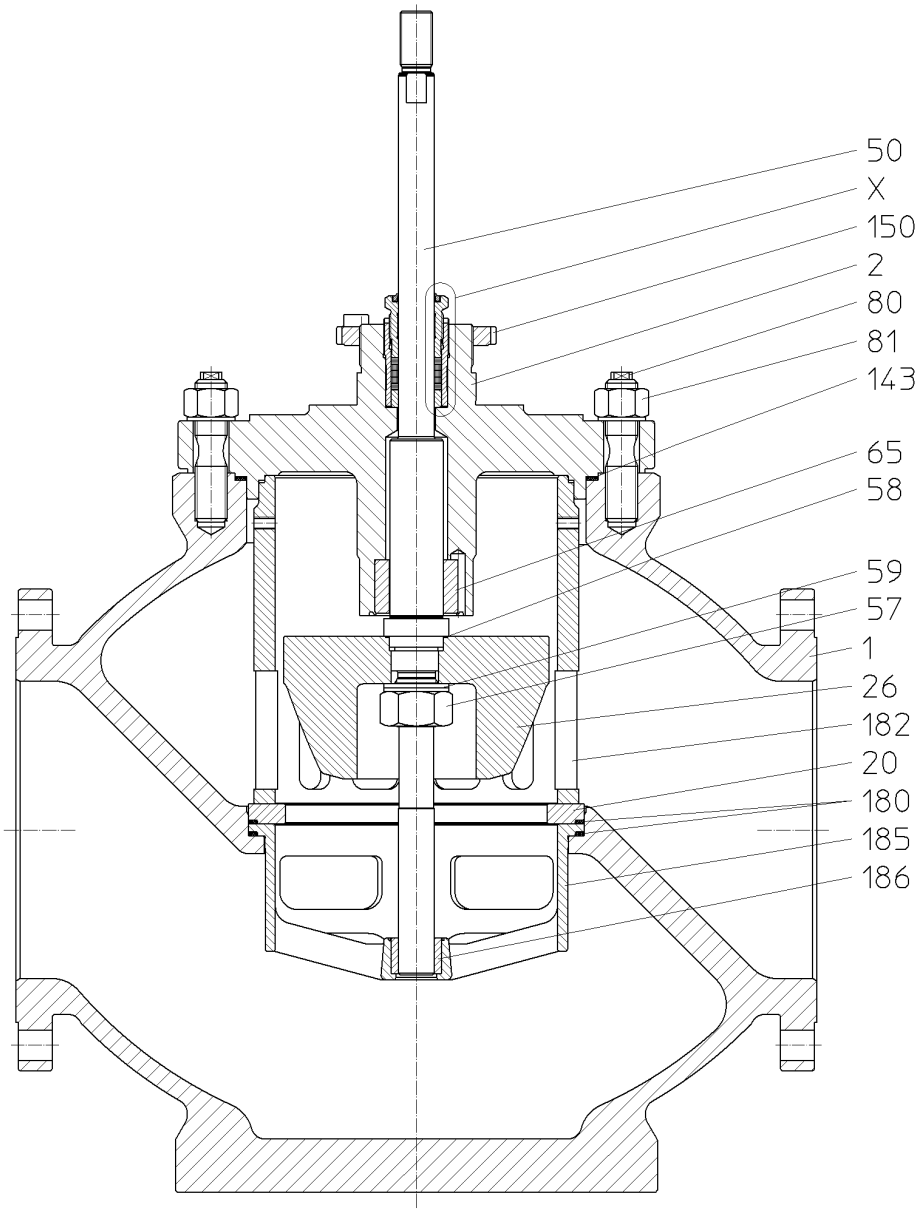


Illustration 8: 6N/6H1-P1-BG

6.6 6N/6H3-L1

Bonnet with cooling fins DEK3 and perforated plug L1.

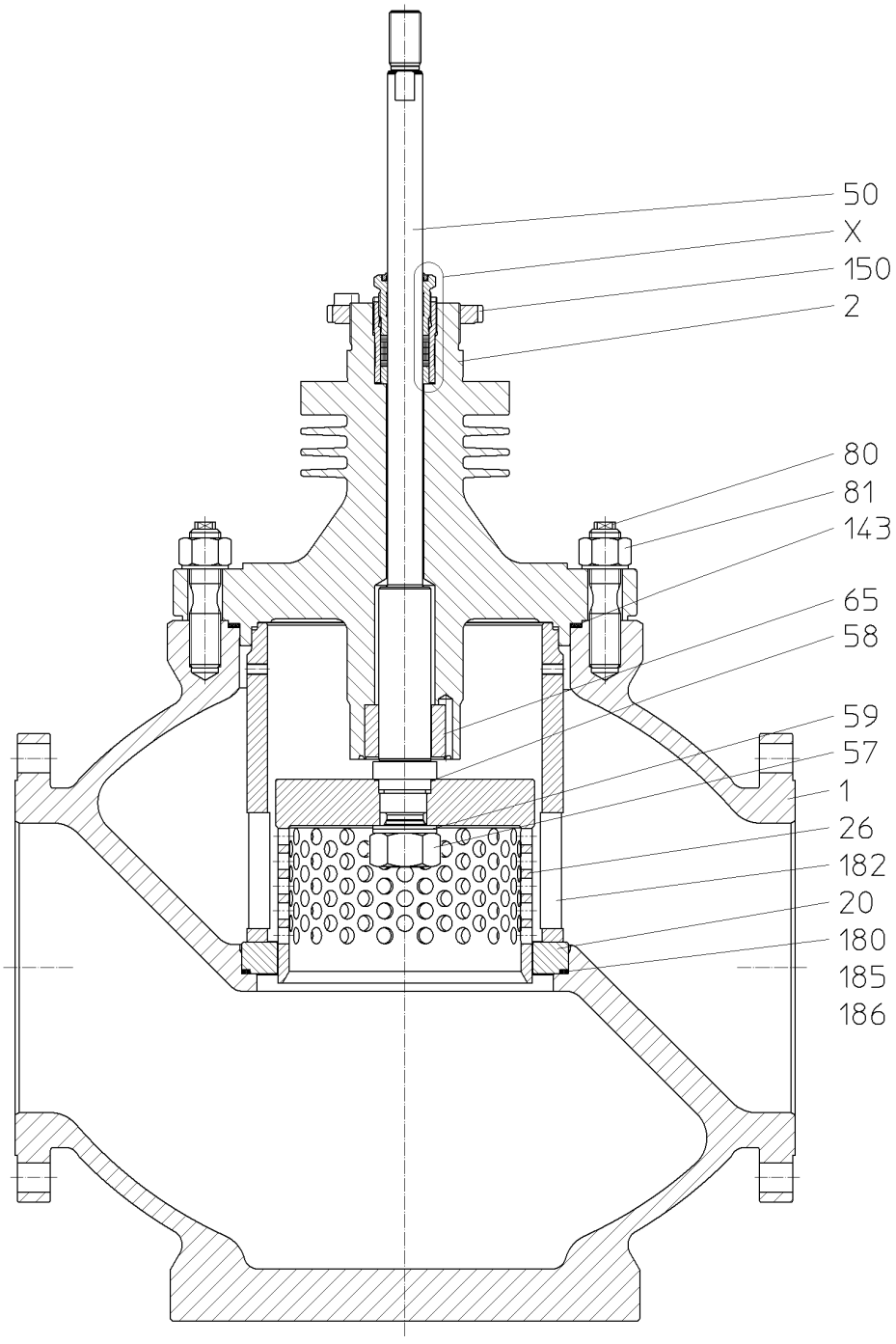


Illustration 9: 6N/6H3-L1

6.7 6N/6H4-P1

Bonnet with bellows DEK4 and parabolic plug P1.

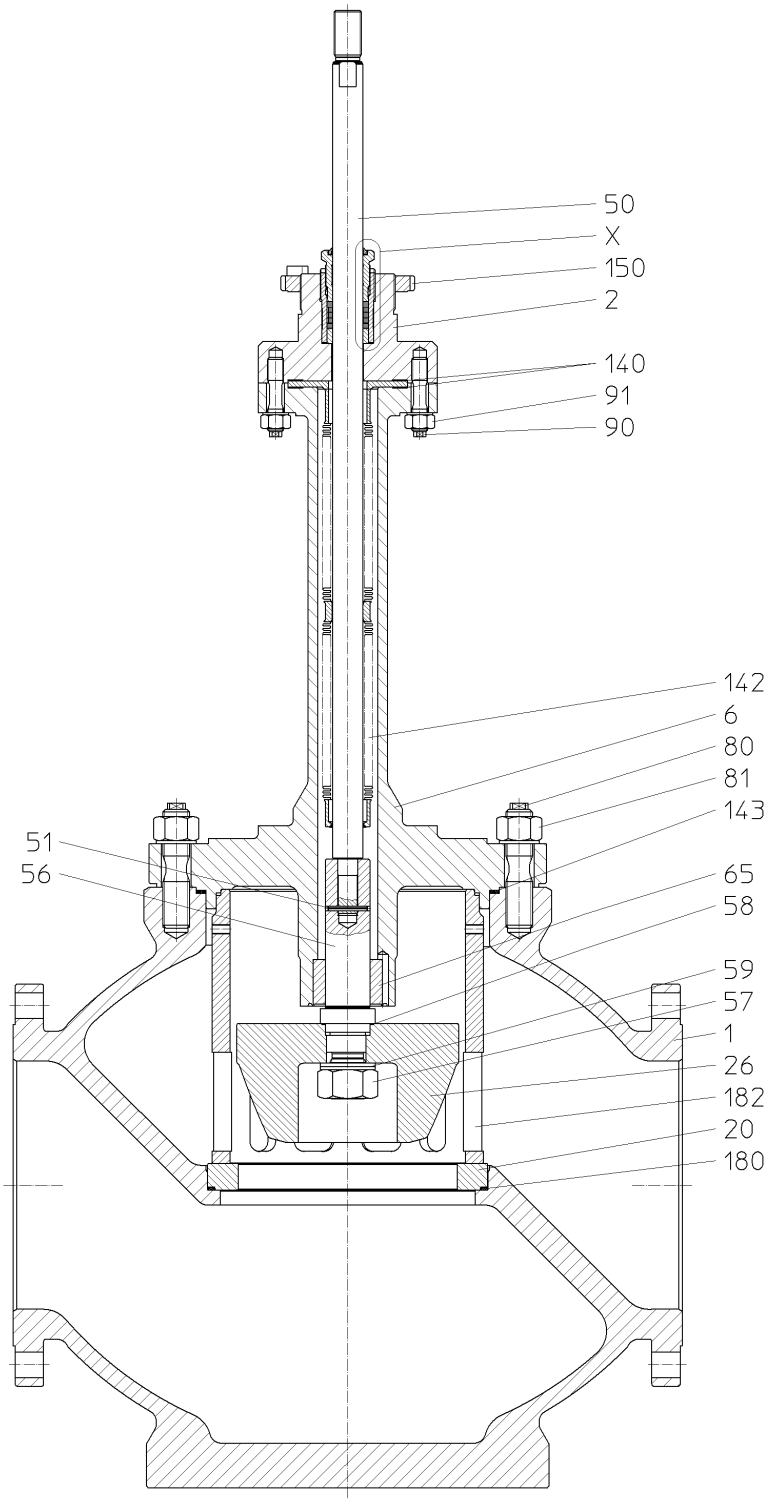


Illustration 10: 6N/6H4-P1

6.8 6N/6H5-P1 to -50 °C

Bonnet with insulating column DEK5 and parabolic plug P1.

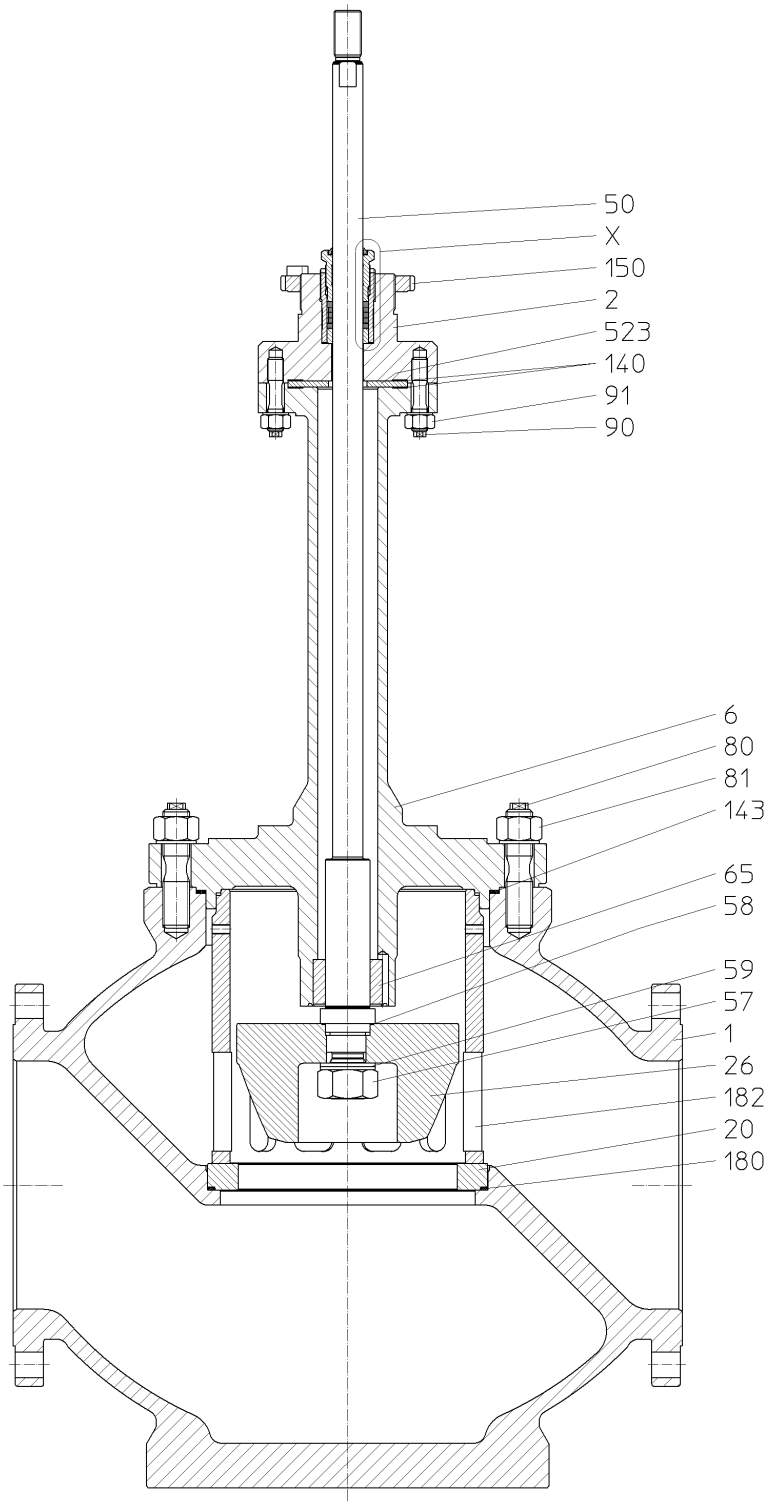


Illustration 11: 6N/6H5-P1

6.9 6N/6H7-P1

Bonnet with balancing system DEK7 and parabolic plug P1. See also [11.10] *Balancing seal - Detail Z (version with balancing system)*

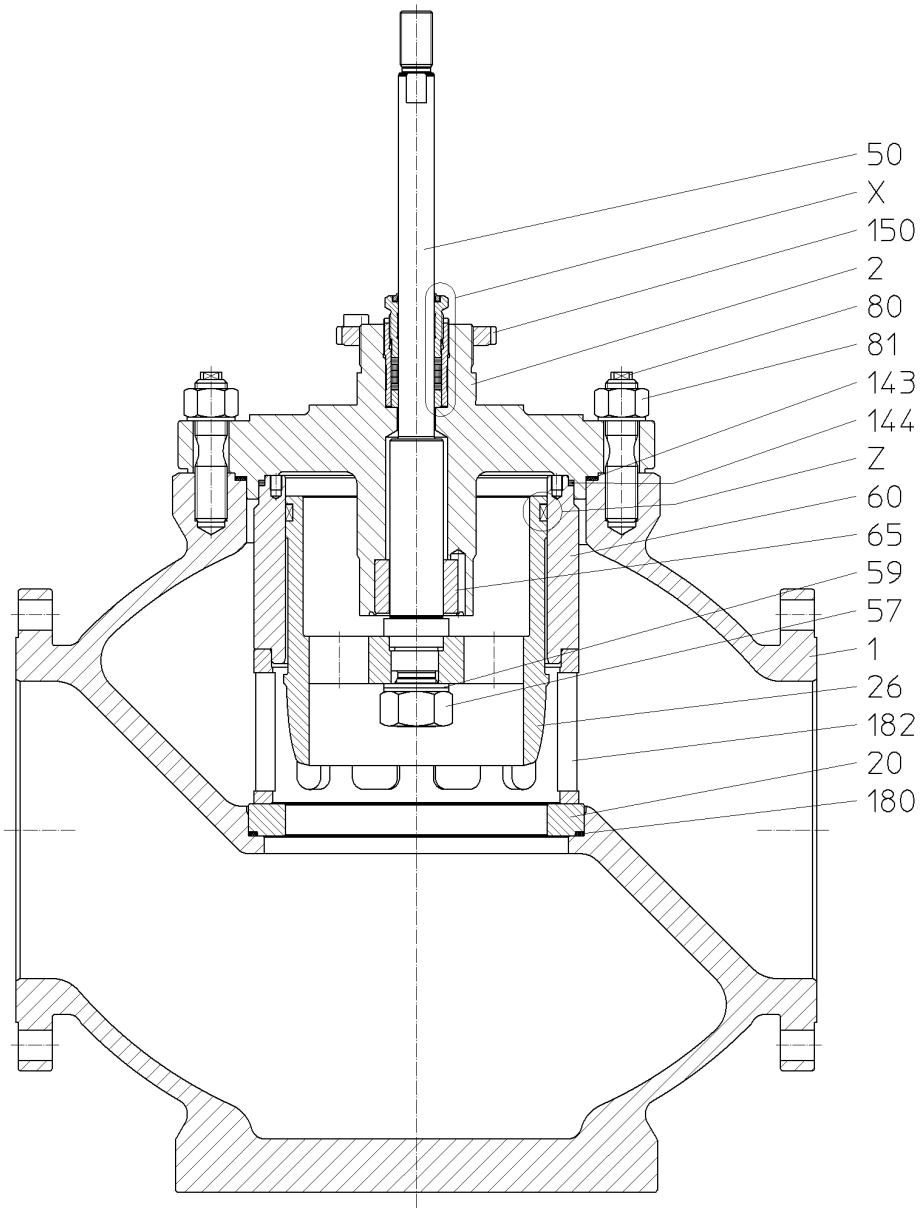


Illustration 12: 6N/6H7-P1

6.10 6N/6H4/7-L2-LN

Bonnet with bellows and balancing system DEK4/7, perforated plug L2 and retainer LN. See also [11.10] *Balancing seal - Detail Z (version with balancing system)*

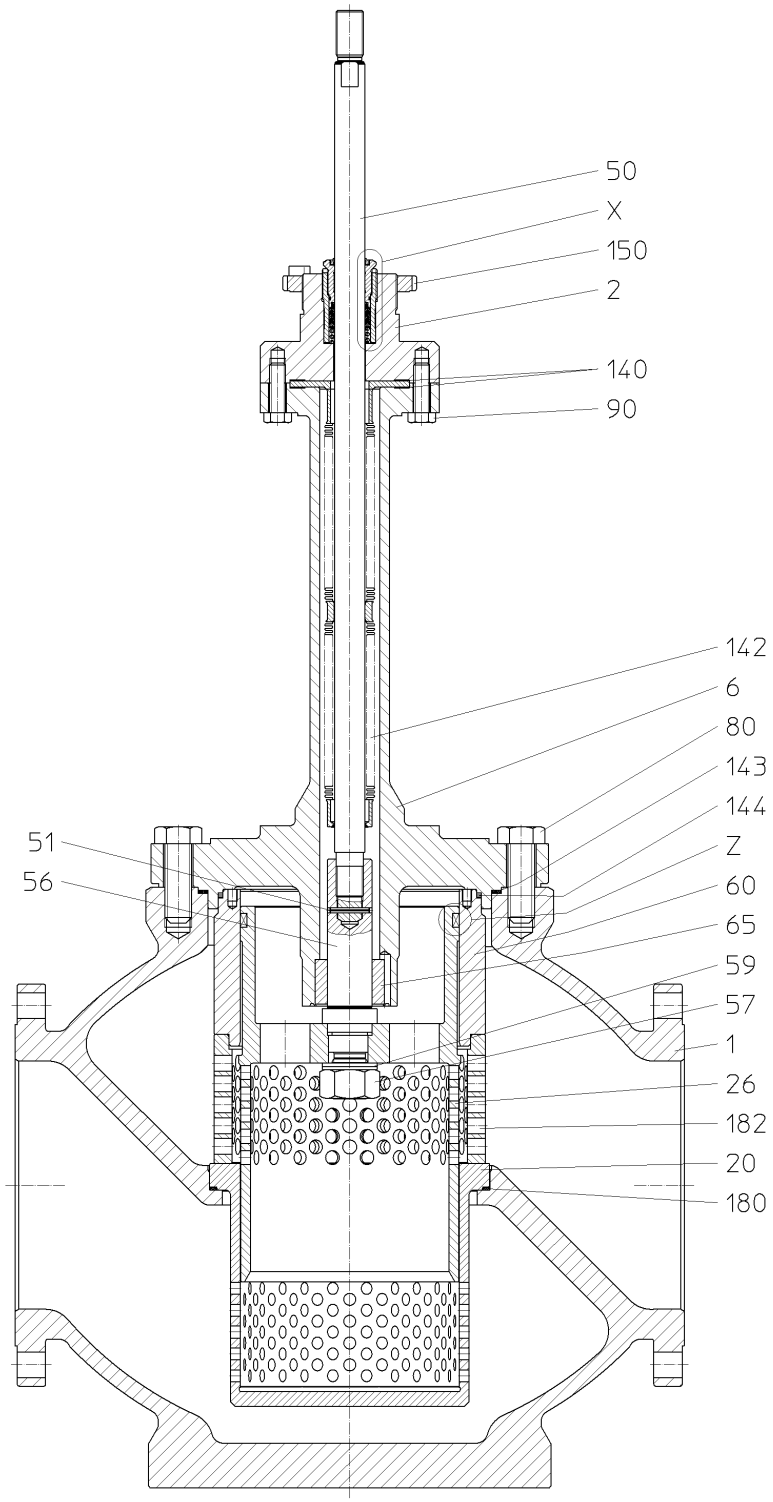


Illustration 13: 6N/6H4/7-L2-LN

7 Functional description

Valves from this series are usually used as actuators within the meaning of DIN IEC 60050-351.

The valve serves to reduce the pressure and quantity of a flow of medium through the plug.

The flow of medium through the seat (20) is regulated by the position of the plug (26). The plug (26) is adjusted with the aid of an attached actuator, which acts on the Stem (50) connected to the plug (26).

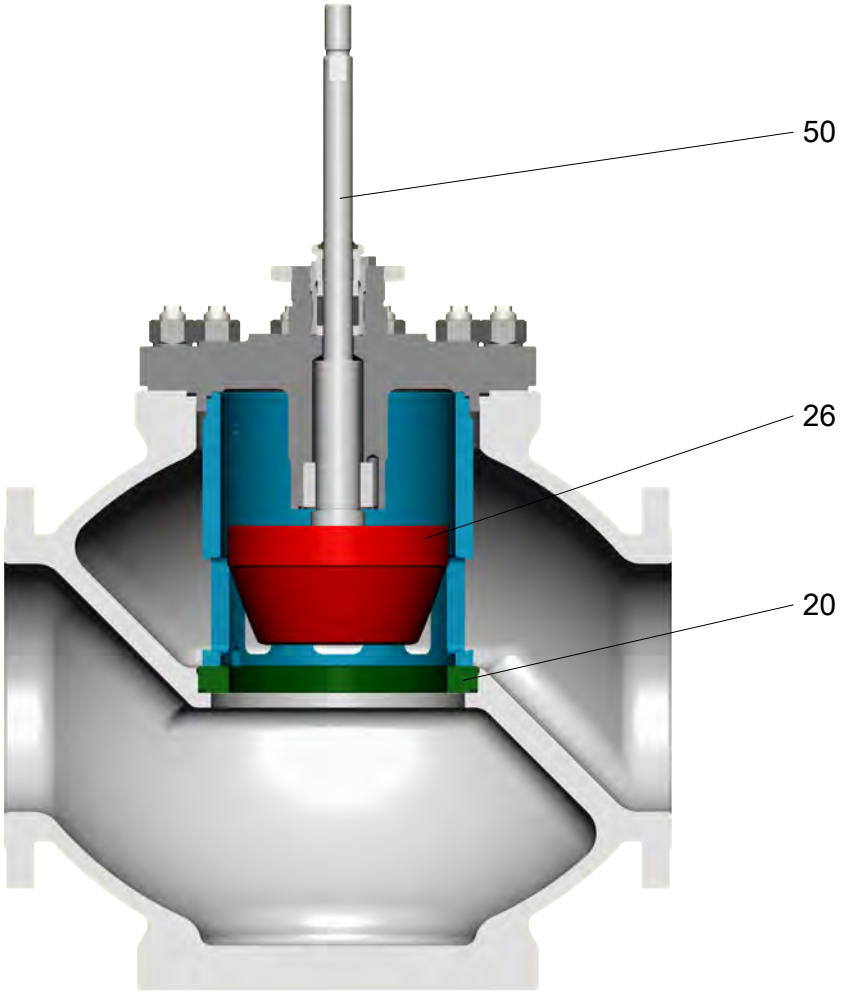


Illustration 14: Sectional drawing

8 Fitting

Place of installation

The valve should be easily accessible from at least one side.

Include a catwalk or similar in the planning in case of greater heights.

An electric crane or block and tackle should be provided, depending on the weight.

Valve with flanges

After removal of the protective caps from the inlet and outlet sealing surfaces, valves with flanges are installed in the pipeline using gaskets and bolts provided by the customer. Following the installation, check the flange connection and the surface coating, in particular the area around the contact surfaces of the flange joints. Damage to the coating caused by transport or installation in the pipeline is to be treated with a suitable coating system in order to restore the factory corrosion protection.

Valve with welded ends

Valves with welded ends are welded into the pipeline. Following the installation, check the welded connection and the surface coating. Damage to the coating caused by transport or installation in the pipeline is to be treated with a suitable coating system in order to restore the factory corrosion protection.

Please note:

⚠ CAUTION

Mounting position

- ► Pipeline horizontal
- ► Actuator above the valve
- ► Pay attention to the flow direction arrows on the housing connections

In case of a different mounting position, special measures need to be taken to support the weight of the actuator!

Forces from the pipeline must not be transmitted to the valve.

A straight section of pipeline with a length of at least 10x the nominal size of the pipeline must be provided for in front of and behind the valve.

Built-in parts and branches are not permitted.

A bypass line is recommended with shut-off valves before and after the valve.

It recommended to install a dirt trap / filter before the valve.

NOTICE! Following the installation of the valve, check that the installation conditions mentioned have been met.

Attachment of an actuator

The valve enables the attachment of different actuators. Various mounting kits and couplings are available for this.

The actuator must be mounted according to the actuator manufacturer's operating manual. The maximum permissible actuating forces must be observed.

DN	Stem thread	Max. actuating force [kN]
125 - 200 → 5“ - 8“	M18x1.5	41
250 - 400 → 10“ - 16“	M27x2	94

⚠ CAUTION

The following must additionally be observed when constructing an electric or hydraulic actuator:

- ► Switch-off in the closing direction via torque switch
- ► Switch-off in the opening direction via displacement switch

9 Commissioning / Decommissioning

Before the initial commissioning

In order to avoid damage to the trim due to possible existing contamination in the piping network, the piping network must be cleaned by rinsing and if necessary pickling.

The following procedures are recommended:

Rinsing with rinsing set

A rinsing set and rinsing flange(s) is mounted in place of the trim.

- Completely dismantle the valve so that only the housing remains in the pipeline
- Mount the rinsing set in place of the seat (to be ordered separately)
- Mount the rinsing flange(s) (to be ordered separately)
- Rinse and if necessary pickle
- Dismount the rinsing set and the rinsing flange(s)
- Clean the valve and replace the seal(s)
- Mount the trim and completely reassemble the valve

Rinsing with spacer

A spacer is installed in the pipeline in place of the valve

- Remove the valve from the pipeline (flange-mounted valves only)
- Install the spacer in the pipeline
- Rinse and if necessary pickle
- Remove the spacer from the pipeline again
- Replace the seals
- Install the valve in the pipeline again

Commissioning

- Pay attention to the chapter entitled [2] *Safety*
- Avoid thermal shocks
  - Bring the valve slowly up to operating temperature

    At a temperature difference of 300 K or more, the speed of temperature change must be restricted to max. 2 K/min.
- Check the flange connections for leaks
  - Tighten the bolted connections diagonally. Refer to the chapter entitled [12] *Torque tables* for the tightening torques
- Check the stem sealing for leaks
  - See the chapter entitled [10.3] *Stem seal – Detail X* for this

Decommissioning

We recommend the following procedure for taking the valve out of service:

The valve remains installed

In case of lengthy standstills, the valve and the pipeline must be emptied and rinsed, depending on the operating medium.

The valve is removed

- Pay attention to the chapter entitled [2] *Safety*
- Remove the valve from the pipeline
- Treat the interior of the housing with a suitable preservative and seal the openings with suitable caps

- To protect against corrosion, treat all unpainted parts and surfaces made of materials that are not rustproof with a suitable preservative

Recommissioning

NOTICE! All seals must be replaced if the valve has been out of service for more than one year.

- Mount the valve in accordance with the chapter entitled Fitting
- Carry out the work according to the chapter entitled [10.1] *Care*
- Commission the valve according to the chapter entitled [9] *Commissioning*

10 Maintenance

10.1 Care

- Clean the stem (50) if necessary
  - Clean the stem (50) of adhering dirt using a soft cloth

    NOTICE! Never use sandpaper, since this will damage the surface of the stem and reduce the lifetime of the stem sealing.

10.2 Maintenance

The valve is for the most part maintenance-free.

Nevertheless, the flange connections and the stuffing box seal must be checked regularly for leaks. If necessary the work is to be carried out in accordance with the chapter entitled [9] *Commissioning*. Depending on the operating conditions of the valve, the operator is responsible for defining appropriate checking and maintenance intervals.

10.3 Stem seal – Detail X

NOTICE

In general we wish to point out that all types of stuffing box seals are subject to wear due to the respective operating conditions and must be inspected and if necessary replaced at regular intervals.

Stuffing box seal with V-collar

The stuffing box seal with V-collar is not adjustable. In case of leaks the entire seal set must be exchanged.

Stuffing box seal with packing rings

The stuffing box seal with packing rings is adjustable. The stuffing box screw (152) can be tightened if the stuffing box seal should leak.

The stuffing box screw should only be tightened to the extent that the force of the actuator still allows jerk-free movement of the stem (50).

If the stuffing box screw (152) is tightened too much and the stem (50) jams or jerks, the stuffing box screw (152) must be loosened again until jerk-free operation is possible. Nevertheless, the sealing integrity must still be guaranteed.

Packing rings can be added if no further tightening of the stuffing box screw (152) is possible. See section entitled **Addition of packing rings**.

Stuffing box seal with shaped ring

The stuffing box seal with shaped ring is not adjustable. In case of leaks the entire seal set must be exchanged.

Addition of packing rings

Split packing rings can be temporarily added.

However, an exchange of the complete stuffing box seal should take place as soon as possible.

- Pay attention to the chapter entitled [2] *Safety*
- **⚠WARNING!** Drive the actuator to the upper end position and secure it
- Unscrew and remove the stuffing box screw (152)

- Carry out the work according to the chapter entitled [10.1] *Care*
- Insert a split packing ring
- Fit the stuffing box screw (152)
- Commission the valve according to the chapter entitled [9] *Commissioning*

Stuffing box chamber sleeve

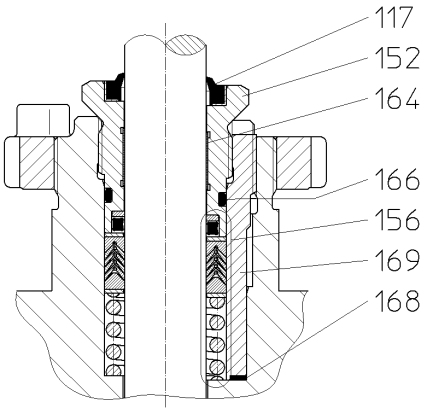
In order to prevent corrosion of the stuffing box chamber, a sleeve (169) made of stainless steel is inserted in the case of bonnets made of materials that are not rustproof.

See also

- Care [▸ 35]
- Commissioning / Decommissioning [▸ 33]
- Safety [▸ 7]

10.3.1 V-collars

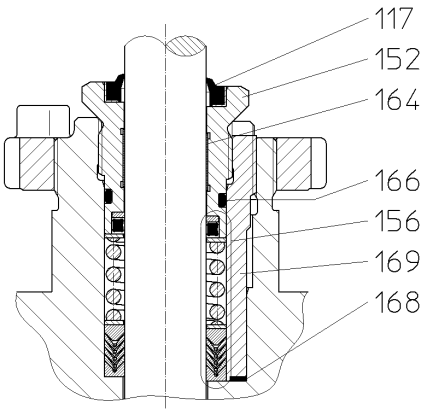
V-collars



117	*	Wiper ring
152		Stuffing box screw
156	*	Seal set
164	*	Plain bearing
166	*	O-ring
168	*	Gasket
169		Sleeve
	*	recommended spare part / wearing part

Illustration 15: V-collars

V-collars vacuum operation

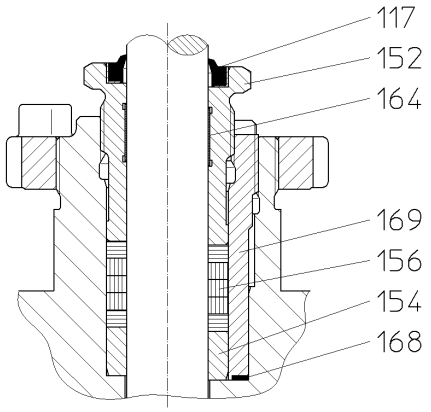


117	*	Wiper ring
152		Stuffing box screw
156	*	Seal set
164	*	Plain bearing
166	*	O-ring
168	*	Gasket
169		Sleeve
	*	recommended spare part / wearing part

Illustration 16: V-collars vacuum operation

10.3.2 Packing rings

Packing rings

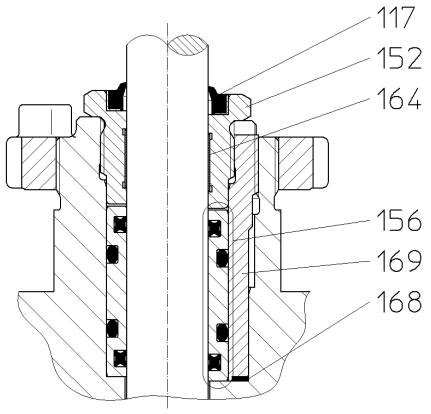


117	*	Wiper ring
152		Stuffing box screw
154	*	Base ring
156	*	Seal set
164	*	Plain bearing
168	*	Gasket
169		Sleeve
	*	recommended spare part / wearing part

Illustration 17: Packing rings

10.3.3 Shaped ring

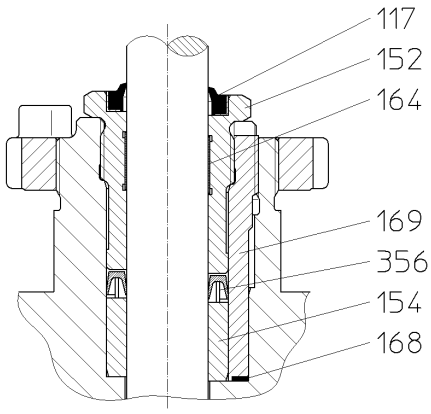
Double quad ring



117	*	Wiper ring
152		Stuffing box screw
156	*	Seal set
164	*	Plain bearing
168	*	Gasket
169		Sleeve
	*	recommended spare part / wearing part

Illustration 18: Double quad ring

Variseal ring



117	*	Wiper ring
152		Stuffing box screw
154	*	Base ring
164	*	Plain bearing
168	*	Gasket
169		Sleeve
356	*	Sealing element
	*	recommended spare part / wearing part

Illustration 19: Variseal ring

11 Disassembly / assembly of the valve

⚠ WARNING

Disregarding the safety instructions

Risk of injury!

► Observe the notes in the chapter entitled [2] *Safety*

11.1 Procedure

- Disassembly of the valve.
  - Dismounted parts are to be secured carefully against falling down (risk of injury or damage).
- Clean all components.
- Assembly in the reverse order using the new components.
  - Seals and packings are generally to be replaced.
  - Insert any existing dynamically loaded O-rings and shaped rings using a suitable lubricant, provided that the process conditions allow.
  - Refer to the chapter entitled [12] *Torque tables* for the tightening torques of bolted connections.
  - Following assembly, the plug must be moved to the upper and lower end positions by hand or using auxiliary energy. The plug may neither jerk nor scrape when doing this.
  - If necessary the bonnet connections must be loosened, the components re-aligned to one another and the connections tightened again.
  - Then commission the valve according to the chapter entitled [9] *Commissioning*.

11.2 Actuator

- **⚠WARNING!** Drive the actuator to the central stroke position and secure it.
- Decouple and remove the actuator.
  - Follow the actuator manufacturer's mounting instructions!

11.3 Bonnet

Standard/cooling fins/ insulating column versions down to -196 °C

- Unscrew the stuffing box screw (152)
  - Refer also to the chapter entitled [10.3] *Stem sealing – Detail X* for this
- Release the bolted connection between the housing (1) and the bonnet (2)
- Lift off the bonnet (2)

  ⚠CAUTION! The plug (26) may be lifted off with the bonnet (2)
  - Pull the plug (26) out of the bonnet (2)
  - Do not bend the stem (50)

Bellows/insulating column versions down to -50 °C

- Unscrew the stuffing box screw (152)
  - Refer also to the chapter entitled [10.3] *Stem sealing – Detail X* for this
- Release the bolted connection between the bonnet (2) and the intermediate flange (6)
- Lift off the bonnet (2)

⚠CAUTION! Do not bend the stem (50)!

11.4 Stem sealing

V-collars

- Remove the seal set (156) consisting of V-collar, support disc and spring
  - Refer also to the chapter entitled [10.3] *Stem sealing – Detail X* for this

Packing rings

- Remove the sealing set (156) and the base ring (154)
  - Refer also to the chapter entitled [10.3] *Stem sealing – Detail X* for this

Double quad ring

- Seal set (156)
  - Refer also to the chapter entitled [10.3] *Stem sealing – Detail X* for this

Variseal ring

- Remove the sealing element (356) and the base ring (154)
  - Refer also to the chapter entitled [10.3] *Stem sealing – Detail X* for this

11.5 Plain bearing

- Remove the plain bearing (164) from the stuffing box screw (152)

NOTICE! Observe the following when mounting the plain bearing (164):

  - Coated side towards the stem (50)
  - Fabric side towards the stuffing box screw (152)

11.6 Intermediate flange (version with bellows)

- Release the bolted connection between the housing (1) and the intermediate flange (6)
- Lift off the intermediate flange (6) with bellows (142) and plug (26)

NOTICE! For version with balancing system, also lift cylinder tube (60)

⚠CAUTION! Observe the following during the lifting:

  - Do not bend or damage the stem (50)!
  - The lifting device must be fastened to the stem thread to prevent overstretching the bellows (142)!

11.7 Cylinder tube (version with balancing system)

Standard

- Pull out the cylinder tube (60)
  - Depending on the size and version, use a mounting thread and if necessary lifting equipment

Version with bellows

The cylinder tube (60) can be taken off only after disassembly of the plug (26). Refer to the chapter entitled [11.8] *Plug* → version with bellows for this.

11.8 Plug

Depending on the version the plug (26) has already been dismantled.

Standard

- Pull the plug (26) with the stem (50) out of the housing (1)

Version with bellows

- Unscrew and remove the hex nut (57) and replace it
- Remove and replace the lock washer (59)
- Pull the plug (26) from the shaft (56)

  ⚠CAUTION! The bellows unit (142) must not be excessively stretched!

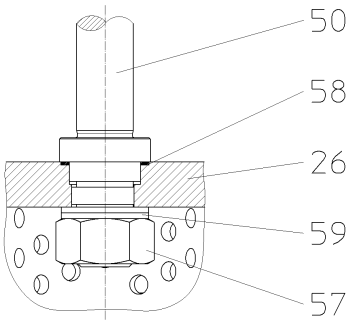
  Refer also to the chapter entitled [11.9] *Stem* → version with bellows for this.

11.9 Stem

Standard

The stem (50) can be exchanged.

- Unscrew and remove the hex nut (57) and replace it
- Remove and replace the lock washer (59)
- Pull the stem (50) out of the plug (26)



26	*	Plug (compl.)
50	*	Stem
57	*	Hex nut
58	*	Gasket
59	*	Lock washer
	*	recommended spare part / wearing part

Illustration 20: Plug/stem fastening – standard

Example illustration with perforated plug

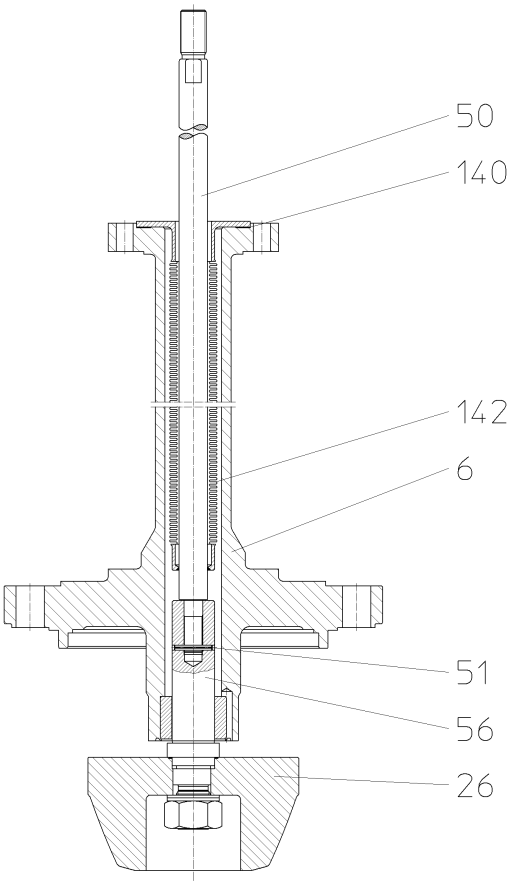
Version with bellows

The stem can only be exchanged complete with bellows unit (142).

- Remove the clamping sleeve (51)
  - To do this, compress the bellows unit (142) with the help of the stem (50)
- Unscrew the plug (26) with the shaft (56)

⚠CAUTION! The bellows unit (142) must not be subjected to twisting forces!

- Replace the seal (140)
- Insert the new stem (50) with bellows unit (142) into the intermediate flange (6), screw on the plug (26) with shaft (56) and drill
- Drive in the clamping sleeve (51)



6		Intermediate flange
26	*	Plug (compl.)
50	*	Stem
51	*	Clamping sleeve
56	*	Shaft
140	*	Gasket
142	*	Bellows unit
	*	recommended spare part / wearing part

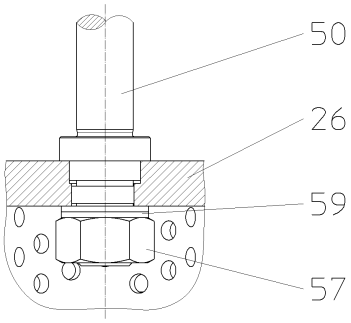
Illustration 21: Plug/stem fastening - bellows

Example illustration with parabolic plug

Version with balancing system

The stem (50) can be exchanged.

- Unscrew and remove the hex nut (57) and replace it
- Take off and replace lock washer (59)
- Pull the stem (50) out of the plug (26)



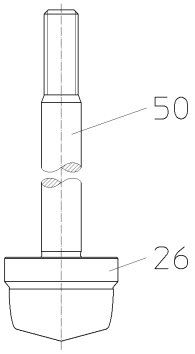
26	*	Plug (compl.)
50	*	Stem
57	*	Hex nut
59	*	Lock washer
	*	recommended spare part / wearing part

Illustration 22: Plug/stem fastening – balancing system

Example illustration with perforated plug

Single-piece up to seat Ø 100 mm

The stem (50) can only be exchanged complete with the plug (26).



26	*	Plug (compl.)
50	*	Stem
	*	recommended spare part / wearing part

Illustration 23: Plug/stem fastening – standard

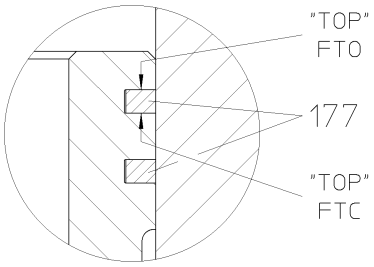
Example illustration with parabolic plug

11.10 Balancing seal - Detail Z (version with balancing system)

Piston rings

- Dismount the piston rings (177) using a piston ring expander

  NOTICE! During assembly, the piston rings must be positioned in accordance with the embossed marking "TOP" in relation to the respective flow direction (FTO / FTC). The piston ring joints must be arranged with an offset of 180 degrees to one another.

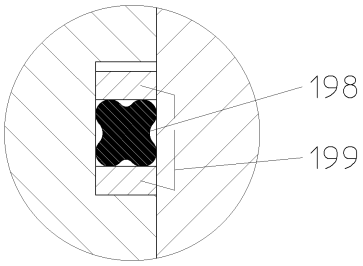


177	*	Piston ring
	*	recommended spare part / wearing part

Illustration 24: Balancing seal piston rings – Detail Z

Quad ring

- Exchange the sealing element (198) and support rings (199)



198	*	Sealing element
199	*	Support ring
	*	recommended spare part / wearing part

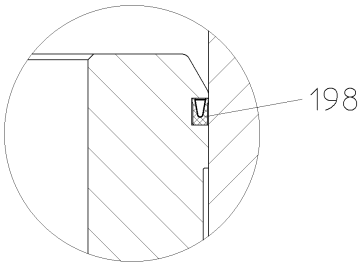
Illustration 25: Balancing seal quad ring – Detail Z

Variseal ring

- Replace sealing element (198)
  - Observe the flow direction (FTO / FTC)

NOTICE! Warm up the sealing element in a water bath before assembly. The expanded sealing element must be calibrated after assembly. The cylinder tube (60) can be used as a calibration sleeve for this purpose.

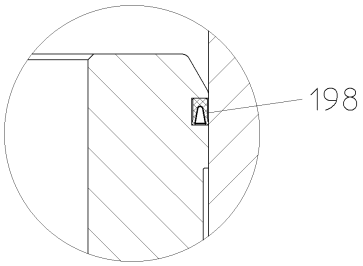
FTO



198	*	Sealing element
	*	recommended spare part / wearing part

Illustration 26: Balancing seal Variseal ring FTO – Detail Z

FTC



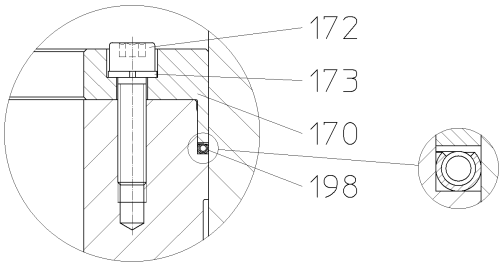
198	*	Sealing element
	*	recommended spare part / wearing part

Illustration 27: Balancing seal Variseal ring FTC – Detail Z

C ring

- Unscrew the screws (172) of the stuffing box gland (170)
- Remove the stuffing box gland (170)
- Replace sealing element (198)
  - Observe the flow direction (FTO / FTC)

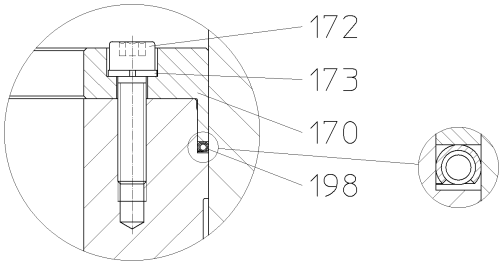
FTO



170		Stuffing box gland
172	*	Screw
173	*	Spring lock washer
198	*	Sealing element
	*	recommended spare part / wearing part

Illustration 28: Balancing seal C ring FTO – Detail Z

FTC



170		Stuffing box gland
172	*	Screw
173	*	Spring lock washer
198	*	Sealing element
	*	recommended spare part / wearing part

Illustration 29: Balancing seal C ring FTC – Detail Z

11.11 Retainer & seat

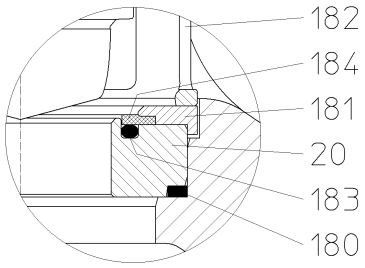
Standard

- Take the retainer (182) and seat (20) out of the housing (1)
- Exchange sealing element (180)

Version with soft seal – Detail Y

Flat gasket & O-ring

- Take the retainer (182), clamping ring (181) and complete seat (20, 183, 184) out of the housing (1)
- Replace the sealing element (184) and O-ring (183)
- Exchange sealing element (180)



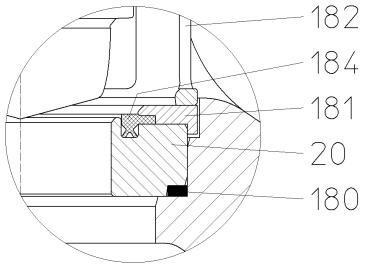
20	*	Seat
180	*	Sealing element
181		Clamping ring
182		Retainer
183	*	O-ring
184	*	Sealing element
	*	recommended spare part / wearing part

Illustration 30: Soft seal, flat gasket & O-ring – Detail Y

Example illustration with parabolic plug

Trapezoidal ring

- Take the retainer (182), clamping ring (181) and complete seat (20, 184) out of the housing (1)
- Exchange sealing element (184)
- Exchange sealing element (180)



20	*	Seat
180	*	Sealing element
181		Clamping ring
182		Retainer
184	*	Sealing element
	*	recommended spare part / wearing part

Illustration 31: Soft seal, trapezoidal ring – Detail Y

Example illustration with parabolic plug

12 Torque tables - bolted connections

12.1 Screws according to DIN EN ISO 4017/4014, DIN 939

Thread	Torque [Nm/lbf ft]
	A2-70
M16	120/90
M20	230/170
M24	390/290

12.2 Screws according to DIN 2510

Thread	Torque [Nm/lbf ft]			
	A2-70	**1.7218**	**1.4923**	**1.4913**
M12	35/26	35/26	45/33	60/44
M16	90/66	85/63	120/90	150/110
M20	170/125	160/120	220/160	280/210
M24	280/210	280/210	380/280	470/350
M27	410/300	400/300	550/410	690/510
M30	580/430	570/420	780/580	970/720
M33	770/570	760/560	1000/740	1300/960
M36	990/730	960/710	1300/960	1600/1180

12.3 Screws according to ASME B16.5

Thread	Torque [Nm/lbf ft]		
	A193B7	**A193B8**	**A193B7M**
½“-UNC	100/75	50/35	75/55
⅝“-UNC	185/135	90/66	140/100
¾“-UNC	325/240	155/110	250/180
⅞“-UNC	520/380	250/180	400/300
1“-UNC	780/580	370/270	600/440
1⅛“-UNC	1100/800	520/380	840/620
1⅛“-8UN	1120/825	535/400	855/630
1¼“-UNC	1520/1120	730/540	1160/860
1¼“-8UN	1550/1145	740/545	1200/890
1⅜“-UNC	2000/1500	950/700	1500/1100
1⅜“-8UN	2075/1530	990/730	1580/1165

12.4 Hex nut (57)

Thread	Torque [Nm/lbf ft]	
	Plug material	
	1.4571, 1.4301, 1.4404, 1.4306	All other plug materials
M20x1.5	300/220	350/260
M24x1.5	500/370	600/440

Thread	Torque [Nm/lbf ft]	
M36x3	1500/1110	2000/1480
M48x2	3600/2660	4000/2950

13 Fault removal

⚠ WARNING

Improper troubleshooting work on the valve

Risk of injury!

► For all troubleshooting work on the valve, observe the corresponding notes in this operating manual or in the operating manuals for the additionally installed components.

Please contact the manufacturer if problems occur that are not described in this table.

Fault	Possible causes	Action
No flow	Valve closed	Open the valve by means of the actuator
	Flange covers (transport protection) have not been removed	Remove flange covers
Inadequate flow	Valve not opened sufficiently	Open the valve by means of the actuator
	Blockage in the piping system	Check the pipeline
	Incorrect valve or incorrect Kvs value selected	Use valve with correct Kvs value
Stem moves jerkily	Stuffing box screw overtightened (in case of valves with adjustable stem sealing)	Slacken off the stuffing box screw a little Sealing integrity must be maintained
Stem or plug doesn't move	Stuffing box screw overtightened (in case of valves with adjustable stem sealing)	Slacken off the stuffing box screw a little Sealing integrity must be maintained
	Seat and plug very dirty	Clean seat and plug
	Due to contamination in the medium, the stem or plug has eaten into its guide	Replace the stem, plug and guides
Stem seal is leaking	Stuffing box seal damaged or worn	Replace sealing element
	Stuffing box pretension too low (in case of valves with adjustable stem seal)	Tighten the stuffing box screw
Leakage rate too high in the closed state	Sealing edges on the plug and/or seat damaged	Rework or replace plug and/or seat
	Dirt/foreign bodies in the valve	Clean the interior of the valve, fit a dirt trap if necessary
	Balancing seal worn in balanced valves	Replace sealing element
	Closing force of the actuator too low	Use a more powerful actuator, Check the operating data

14 Disposal and recycling

⚠ WARNING

Operating media and auxiliary materials that are hazardous to health

Danger to people and the environment!

► Wear suitable protective equipment

► If applicable, collect and dispose of rinsing medium or residual medium. Particular attention is to be paid to dead spaces (pressure compensation, bellows, etc.)

► Observe the legal regulations for the disposal of media that are hazardous to health

ARCA products are modularly constructed and can be sorted by material into the following components.

- Electronic components
- Metals
- Plastics
- Greases and oils
- Packaging material

The general rules are:

- greases and oils are usually water pollutants and must not be allowed to escape into the environment
- Dispose of dismantled materials properly or recycle the separate materials
- Observe national disposal regulations

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