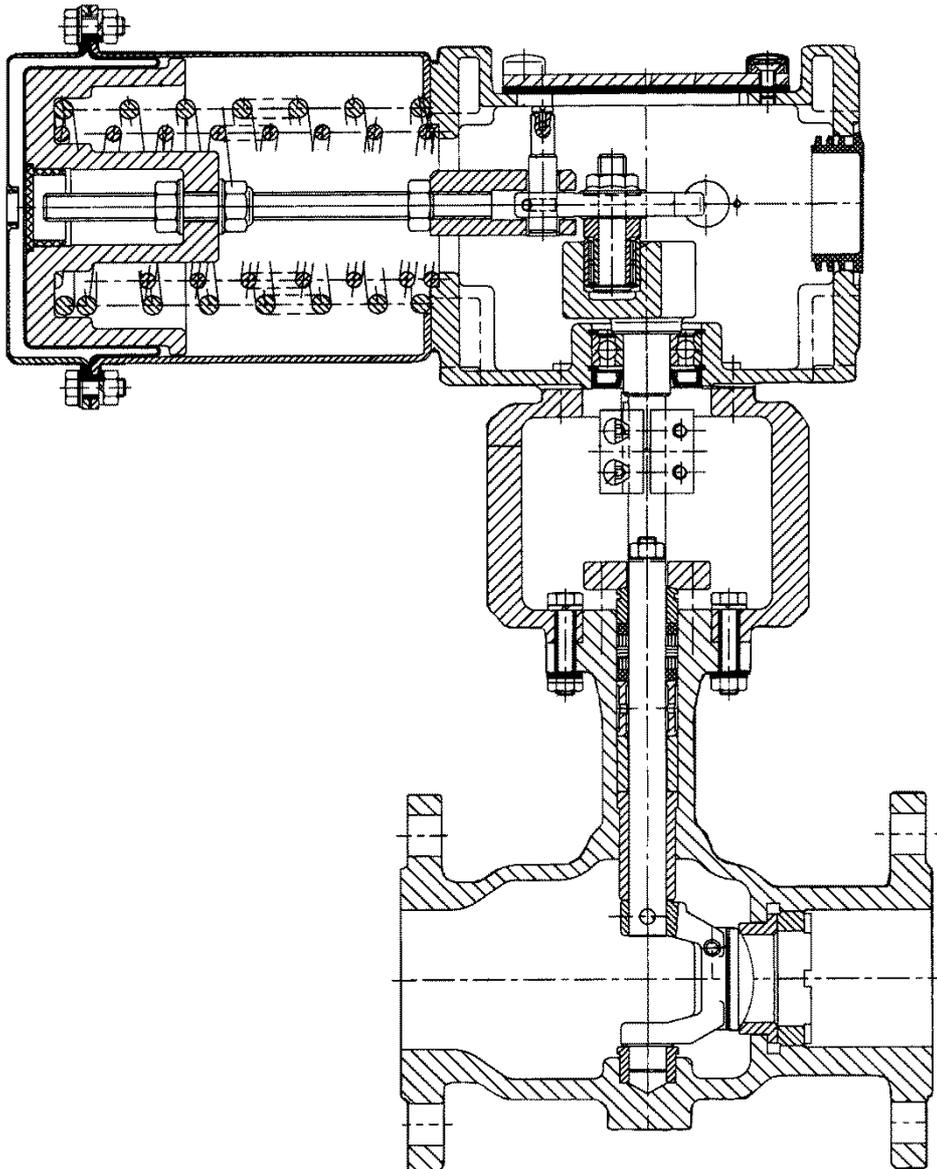


# BR33 Instruction Manual



with rotary actuator BR99-1-NT BR99-2-NT / BR99-3-NT

Contents:	Page
Introduction	2
1. Installation of the control valve	4
2. Commissioning	5
3. Maintenance	5
3.1. Replacing the seat	7
3.2. Dismantling the valve	8
4. Dismantling the actuator generally	10
5. Dismantling rotary actuator BR99-1-NT [120 cm <sup>2</sup> ]	11
5.1. Disassembling built-on accessories	11
5.2. Disassembling the hand-wheel unit	11
5.3. Separating the spring barrel from the actuator casing	12
5.4. Dismantling the actuator casing	12
5.5. Reversing the direction of the actuator	13
5.6. Actuator parts actuator 99-1-NT (120cm <sup>2</sup> )	14
6. Dismantling rotary actuator BR99-2-NT / BR99-3-NT	16
6.1. Disassembling built-on accessories	16
6.2. Disassembling the hand-wheel unit	16
6.3. Separating the spring barrel from the actuator casing	16
6.4. Dismantling the actuator casing	17
6.5. Reversing the direction of the actuator	17
6.6. Actuator parts actuator 99-2-NT / 99-3-NT	18
7. Contacting us	20

 To ensure trouble-free and safe operation of the valve, it is essential to be familiar with the contents of this BR33 Instruction Manual, and also with the general instructions for installation and operation, before installing and operating the valve.

 Failure to observe or comply with these operating instructions will invalidate the manufacturer's guarantee and liability. The manufacturer's general conditions of sales and terms of delivery shall apply unless otherwise stated.

 The valve must be installed and commissioned by qualified staff. Qualified staff is defined as personnel who are familiar with the installation, commissioning and operation of this product and possess the relevant qualifications in their field of activity

**These installation and operating instruction shall apply to:**

- Rotary plug valves Series 33
- Diameter DN 25 – DN 300, DN 1“ – DN 12“
- pressure class PN 10-PN 63, ANSI 150# - ANSI 600#
- with mounted pneumatic or electric rotary actuator
- with or without accessories

Control valves control gases, vapours or liquids and change the flow conditions of a process.

The control valve consists of the body (valve bottom) and actuator which, depending on the control signal, changes the position of the closure member ( plug ) relative to the seat.

The bodies have been arranged in logical kits, allowing the user to assemble the highest possible number of variants from a minimum of components to match each individual application. Our range also includes a series of peripheral units such as positioners, boosters, filter reducing stations or solenoid valves. Positioners and solenoid valves can be assembled according to NAMUR recommendations. This manual does not include any instructions for peripheral equipment. However, the relevant instructions are available upon request.

Control valves are generally delivered as tested and assembled units with the actuator fitted. Parts of the body and actuator subject to corrosion are protected by a coat of paint. Unpainted components are greased and the openings of the housings are closed with plugs. High-grade steel parts are delivered without a protective coat of paint ( pickled or blasted ). Careful loading and transport arrangements are required to avoid the product from suffering impact and jolting movements. Do not allow lifting gear to hit or be attached to the valve spindle, travel indicator and peripheral units, if applicable. Promptly touch up any damages to the corrosion protection. Upon arrival on site, store the control valve on a solid base in a closed room. Until its installation, the valve must be protected from the weather, dirt and other potentially deteriorating influences. Do not remove the plugs protecting the flanges and the inside of the control valve until it has arrived at the place of installation.

The pressure, leak and operation tests performed in the factory and the quality management system introduced by the manufacturer ensure that the execution of the control valve complies with the specifications set forth in the contract. The series number and vital valve actuator data are found on the rating plate.

 Before installing the valve, carefully clean the piping.

## 1. Before installation, check the following items:

Please note the mentioned data for min./max. values in pressure and temperature on the CE-plate ! A mismatch may cause considerable damage to the control valve. The manufacturer refuses any responsibility for such damages !

**Does the nominal/operation data on the rating plate match the operational data of the facility.**

*A mismatch may cause considerable damage to the control valve. The manufacturer refuses any responsibility for such damages !*

**At the point of installation, is there enough space to fit and remove the valve?**

*The purification of fully assembled pipes made by flushing or purging, the control valve must be replaced with a matching piece!*

**Was the piping flushed and cleaned prior to the installation**

*Do not allow cleaning agent to penetrate the packing of the stuffing box*

**Was the piping flushed and cleaned prior to the installation?**

*Carefully remove all foreign particles!*

**Vibrations of the piping must be avoided by separate connections at the piping!**

**Does the direction of the flow arrow on the housing coincide with the direction of flow of the medium?**

**Is excessive tension in the installation and operation of the control valve avoided?**

**Corresponds the distance between the pipe ends of the valve length?**

**Is the preferred installation position of the control valve with vertical valve shaft achieved?**

*If all of the above items have been verified, the control valve can be inserted and connected to the piping.*

**If the shaft offset relative to the perpendicular contact customer service department or contract partner!**

**Flange connection:**

Connecting materials ( seals, screws, nuts ) are not included in the scope of delivery !

If a completely installed piping is to be flushed or blown through for cleaning, replace the control valve with a matching piece !

When the control valve is installed in the piping:

- Connect instrument air to the actuator or installed accessories ( applies to pneumatic actuators ).
- Connect according to the wiring diagram in the removable actuator cover or according to manufacturer's actuator documentation ( applies to electrical actuators ).

## 2. COMMISSIONING

Continuously increase load until operation parameters are reached.

*Sudden exposure of the control valve to the full operating pressure and operating temperature may cause stress cracks !*

After the first loading ( trial run) in depressurised and cooled condition, evenly tighten screw connections of sealing components crosswise ( if required )!

The BR33 can not be installed in any fire-safe piping due to not available certificate !

The BR33 is not suitable for unstable medium.

The ambient temperature should not be higher than 80°C. For higher ambient temperature the valve must be isolated to protect the actuator.

## 3. MAINTENANCE:

Measure	Intervall
Standard packing system	Readjustment after 10.000 cycles at standard operation conditions Readjustment after 5.000 cycles at "difficult" operation conditions  Standard stuffing boxes subjected to "difficult" operating conditions -packing exposed to aggressive medium -major temperature change during operation -occurrence of vibrations -unfavourable installation position
Selfadjusting packing system	Maintenance free
Pneumatic actuator	Maintenance free
Electrical actuator	On recommendation of the manufacturer

Control valves are pressure vessels !

Improper opening of the actuator or fitting may result in bodily injury

If a fault or defect occurs which, according to the list of measures below, requires the customer services department or contract partner to be contacted, the manufacturer's guarantee shall be rendered null and void and the manufacturer released from any responsibility unless the customer services department or contract partner is duly notified.

Defect	No.	Possible cause	Remedy
Shaft does not move	1.1	No aux. Energy supply (pneumatic air or electrical power) to actuator and accessories ( solenoid valve, filter reducing station, positioner, limit switch and special accessories )	Pneumatic actuators: check supply line for leaks; check pressure( usually max. 6 bar ) Electrical actuator: check power supply ( connections, circuit breakers, voltage).
	1.2	The fitted accessories do not work	See maintenance and operating instruction of access.
	1.3	the pneumatic actuator is defective	Contract customer service department or contract partner
	1.4	the electrical actuator is defective	See maintenance and operating instructions of actuator manufacture
	1.5	Excessive tightening of the stuffing box packing	Contract customer service department or contract partner
	1.6	Valve trim worn, stuck	Contract customer service department or contract partner
Jolting shaft movement	2.1	damaged shaft or damaged bearing	Contract customer service department or contract partner
	2.2	The actuator not powerful enough	Compare actuator specs on the rating plate with operating specifications of the facility – if incompatible, contract customer service department or contract partner
Shaft travel less than full stroke (0 to 100% stroke)	3.1	Air supply pressure to low	Provide air at the pressure stated on the rating plate
	3.2	Pneumatic actuators: bad hand wheel position	Take hand wheel to limit position
	3.3	Electrical actuator: limit switch wrong adjusted	Readjust Limit switch to actuator manufacturer's specification
	3.4	Bad adjusted or defect Positioner	Readjust positioner switch to actuator manufacturer's positioners specification
	3.5	Foreign particles in valve seat, damaged trim	Contract customer service department or contract partner
Excessive valve seat leakage	4.1	Damaged sealing edges at valve seat area	Contract customer service department or contract partner
	4.2	Foreign particles in seat area	Contract customer service department or contract partner
	4.3	Plug does not close fully	see 3.1 to 3.5
Leakage at the stuffing box	5.1	Packing defecte	Cange packing, install only original parts. Contract customer service department or contract partner
Leaking housing	6.1	Medium or flow related damage	Contract customer service department or contract partner
No limit switch signal	7.1	Power supply to limit switch interrupted	check power supply ( connections, circuit breakers, voltage).
Vibrating positioner	8.1	Defective positioner	See maintenance and operating instructions of positioner manufacture

All the protective measures appropriate for the medium in question should be taken prior to assembling the valve. The valve should be rinsed thoroughly. Please note that the disassembly procedure also affects parts of the valve which are wetted by the medium, and that vapours may still be emitted by the body or the packing even though the valve has been well rinsed. All parts that are marked in the list with an (\*) should be examined carefully for wear before they are reinstalled, and if necessary replaced

### 3.1 Replacing the seat:

- 3.1.a) First of all, the threaded retaining ring (8) must be loosened and unscrewed using a seat tool (seat wrenches designed specially for the 33 series are available from PRE-VENT).
- 3.1.b) The valve seat (6) can then be take out. When you carry out work on the valve seat, you must be careful not to damage either the edge or the face. If the valve seat needs to be reworked, you can find the necessary dimensions on the drawing available from PRE-VENT.
- 3.1.c) Seat and retaining ring assembly



#### Attention

When the valve is reinstalled, the seat ring must be centred by placing it on the valve plug (with the valve in the closed position) and screwing it tight with the threaded retaining ring. To do so, insert the seat ring in the valve, adjust the plug to the "valve closed" position and screw the ring tight carefully (by hand). It is a good idea to disassemble the actuator beforehand, and to hold the valve stem in the closed position with your hand, as you will then be able to work more accurately. When the seat ring is "hand-tight", adjust the plug to the open position and tighten the ring firmly.



#### Note:

A suitable sealing paste can be applied to the face of the seat ring to improve the quality of the seal.  
A suitable assembly paste (either copper or nickel-based) should always be used for the threaded retaining ring).

## 3.2 Dismantling the valve:

**3.2.a) Valves DN 25 – 150:** The joint between the bridge and the shaft is formed by a DIN 1 tapered pin. You can separate the bridge from the valve shaft by turning the shaft 90° and then knocking out this pin from seat side.

When you reassemble the valve, it is essential to ensure that the bridge and the valve shaft are correctly positioned before you knock the tapered pin back in again. It is not possible to rotate the valve shaft, and thus the actuator, through 180° simply by turning within this joint.

**3.2.b) Valves DN 200 – 300:** Before you can separate the bridge from the valve shaft, you must turn the shaft 180° so that the plug is on the side of the valve facing away from the seat. You can then knock the tapered pin (20) out carefully from this side using a mandrel. Particular care is essential with ceramic plugs.

When you assemble the valve, you must always knock the tapered pin (20) in from the rear of the bridge. Remember to take account of the key taper of the pin.

**3.2.c)** The shaft (10) is now free. You can pull it out from above by loosening the nuts (29) and removing the gland (15) and the packing box (16).

**3.2.d)** You can now also remove the packing rings, the stuffing box ring (18) and the distance ring (17) (if any) from above.

Make a note of the type of packing and the order of the packing rings to simplify reassembly!

**3.2.e)** The bridge (2) and the plug (4) can be levered out of the plug guide (12) (this also causes the shaft guide (13) to be shifted upwards) and removed through the side of the valve facing away from the seat. You can then remove the shaft guide and take the plug guide (12) out of the valve body.

**3.2.f)** The plug and the plug bridge are only joined together by means of a cylindrical pin (21), which you can remove by knocking it carefully with a mandrel. The plug can easily be reworked by polishing it on a lathe. If any additional reworking is necessary, it is a good idea to use a ball turning attachment; in this case, however, you must make sure that the outside diameter of the seat collar is turned by the same amount as the plug cap (contrary to the reworking drawings).

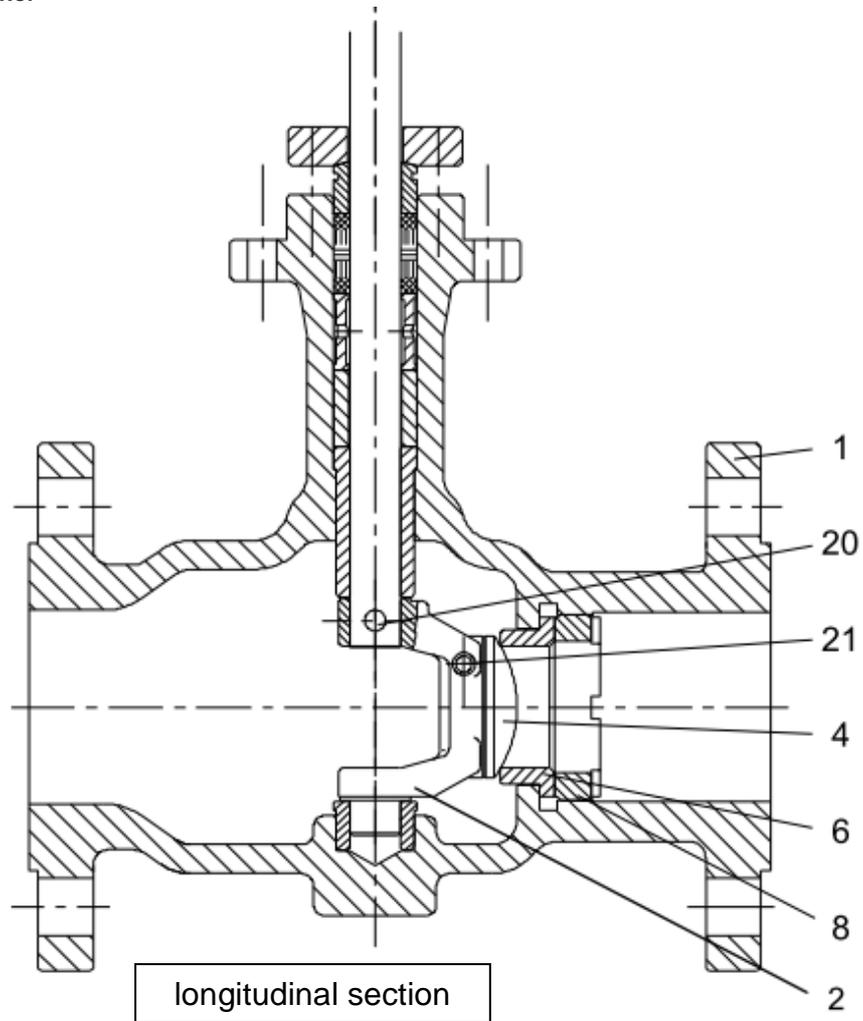
If the plug is reworked excessively, the seat/plug geometry will deviate too much from the ideal (design) geometry; a breakaway torque may develop as a result. It is therefore advisable to install a new seat/plug trim if the old one is severely worn

Part names:

**Pos. 4** Plug

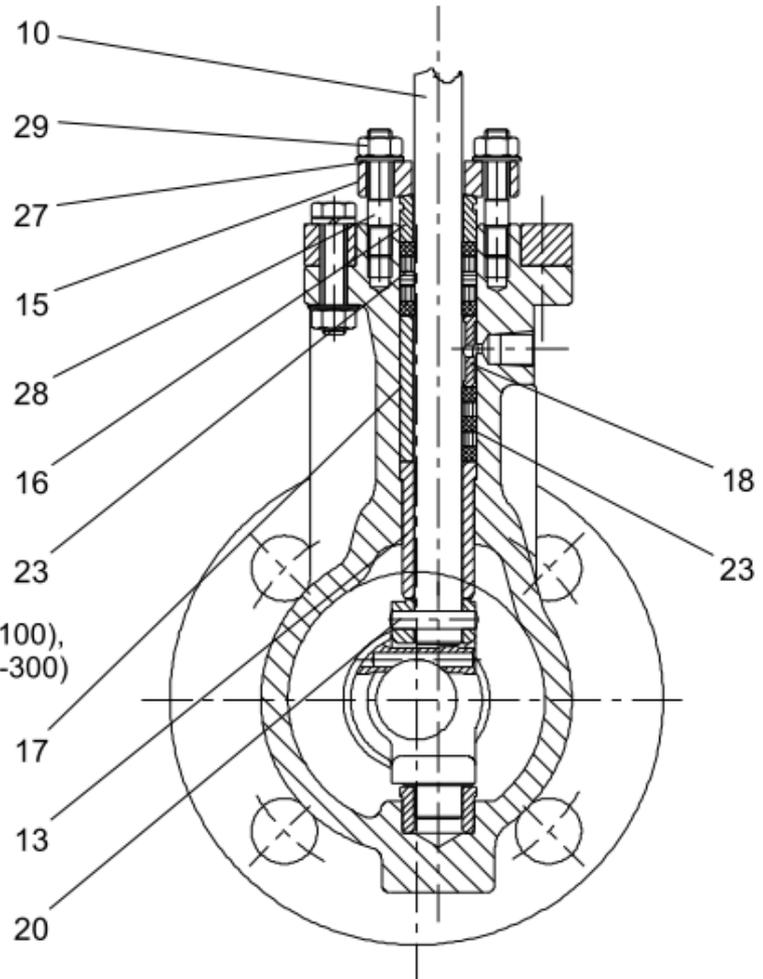
**Pos. 6** Seat

**Pos. 8** Seat retainer



**|** = recommended Spare Parts

Pos. 1	Valve body
Pos. 2	Arc
Pos. 4	Plug
Pos. 6	Seat ring
Pos. 8	Seat retainer
Pos. 10	Shaft
Pos. 12	Plug bearing
Pos. 13	Shaft bearing
Pos. 15	Packing boy gland
Pos. 16	Packing box ring
Pos. 17	Distance ring
Pos. 18	Packing box ring
Pos. 20	Conical pin (DN 25-100), Wedge pin (DN 200-300)
Pos. 21	Pin
Pos. 23	Packing
Pos. 27	Spring washer
Pos. 28	Packing bolt
Pos. 29	Packing box nuts



 = recommended spare part

#### 4. Dismantling the actuator generally :

 The compressed air supply must be interrupted before the actuator is disassembled. All parts that are marked in the list as recommended spare parts should be examined carefully for wear before they are reinstalled, and if necessary replaced!

#### SEPARATING THE ACTUATOR AND VALVE UNITS

First of all, the nuts and bolts that join the valve body to the actuator yoke must be loosened. You can then disassemble the lock by removing the four fillister-head screws and pulling the featherkey off of the valve shaft and the sliding block. The actuator unit can now be lifted off of the valve.

 The actuator should be pretensioned against the spring bias by means of the stop screw (35) before it is assembled on the valve. Once the actuator has been completely assembled on the valve, the screw must then be unscrewed again until the leakage is within the stipulated tolerance. The stop screw must be locked in this position.

## DISMANTLING THE ACTUATOR UNIT

a) Any positioners, position repeaters, solenoid valves, etc. that have been mounted should be removed before the valve is disassembled.

b) Now remove the front panel (14). To do so, lever off the caps (45) over the fixing screws (47) using a sharp knife. After you have loosened the slotted screws below them, you can remove the front panel.

## 5. Dismantling rotary actuator BR99-1-NT [120 cm<sup>2</sup>]

### 5.1 Disassembling built-on accessories:

If a limit switch unit is installed, it need only be loosened by unscrewing the two hexagon socket screws and then removed along with the cable terminals

### 5.2 Disassembling the hand-wheel unit

**5.2.a)** To dismantle the hand-wheel unit, you must first loosen the clamping lever (103) that locks it in position.

**5.2.b)** You can then turn the hand-wheel (101) counter clockwise until you feel a resistance.

**5.2.c)** If you continue unscrewing the hand-wheel, you will reach a washer (151), which you must lever out with a screwdriver in order to disassemble the hand-wheel spindle (150).

**5.2.d)** The disk wheel (101) is fitted onto the hand-wheel spindle and can be lifted off if the countersunk bolt (102) is removed.

### 5.3 Separating the spring barrel from the actuator casing

#### Attention!!!!

The stop screw (35) must sit closely on the spring side. It is essential to maintain the correct order. The diaphragm casing (5) must never be separated if the threaded rod is not joined to the fork head (21) and the actuator lever (2)

#### risk of accidents due to the spring bias!

**5.3.a)** After the bolts have been loosened, the diaphragm casing (5) and the diaphragm itself (15) can be removed. The sealing plug which is now visible can be levered out with a fine screwdriver, and the nut underneath it (36) loosened with a socket wrench in order to unload the actuator spring. Hold the diaphragm disk (4) with your hand as you do so, as there might be a (very slight) residual bias when the spring is disassembled.

When you install the diaphragm, make sure that the gummed side rests against the pressure side, in other words the fabric side of the diaphragm must be facing the diaphragm disk. If you install the diaphragm incorrectly, the diaphragm will fail after only a short time in operation.

**5.3.b)** You can now remove the diaphragm disk and the spring (12), and separate the spring barrel from the actuator casing. To disassemble the eyebolt, remove the grub screw (27) and pull the stroke indicator (19) up out of the actuator lever (2) using suitable pliers. When you reassemble the actuator subsequently, you must not forget the two PVC thrust rings, or corrosion may occur.

### 5.4 Dismantling the actuator casing

**5.4.a)** First of all, you should remove the stop screws (35) and the locking nuts (36)..

**5.4.b)** You must then remove the sealing plugs (63 and 65) before you can disassemble the bearing bolt. The bearing bolt (10) can be loosened by removing the top retaining ring, the shim ring (48) and the setscrew (50), and then pressed out. When you reassemble the casing, you must not forget the flange sleeves, which are vital for operation of the actuator.

**5.4.c)** The actuator lever (2) can now be removed from the casing, together with the adjustment bolt (8) and the needle bearing (58). Since the actuator function (direction of rotation of the valve) is controlled by the position of the lever, you must either make a note of the position of the adjustment bolt before you replace the needle bearing or mark it to simplify reassembly.

**5.4.d)** Finally, you can lift the sliding block (3) out of the actuator casing and remove the radial shaft seal (55) carefully with a screwdriver. The bearing (54) can then be knocked out from the inside.

When you assemble the actuator, you must protect the surface of the bearing bore against corrosion with a small amount of grease..

## 5.5 Reversing the direction of the actuator

To reverse the direction of the actuator (from "air opens" to "air closes" or vice versa):

**5.5.a)** Disassemble the spring barrel as described in 5.3

**5.5.b)** Remove the plugs (60 and 61) and refit them again on the opposite side.

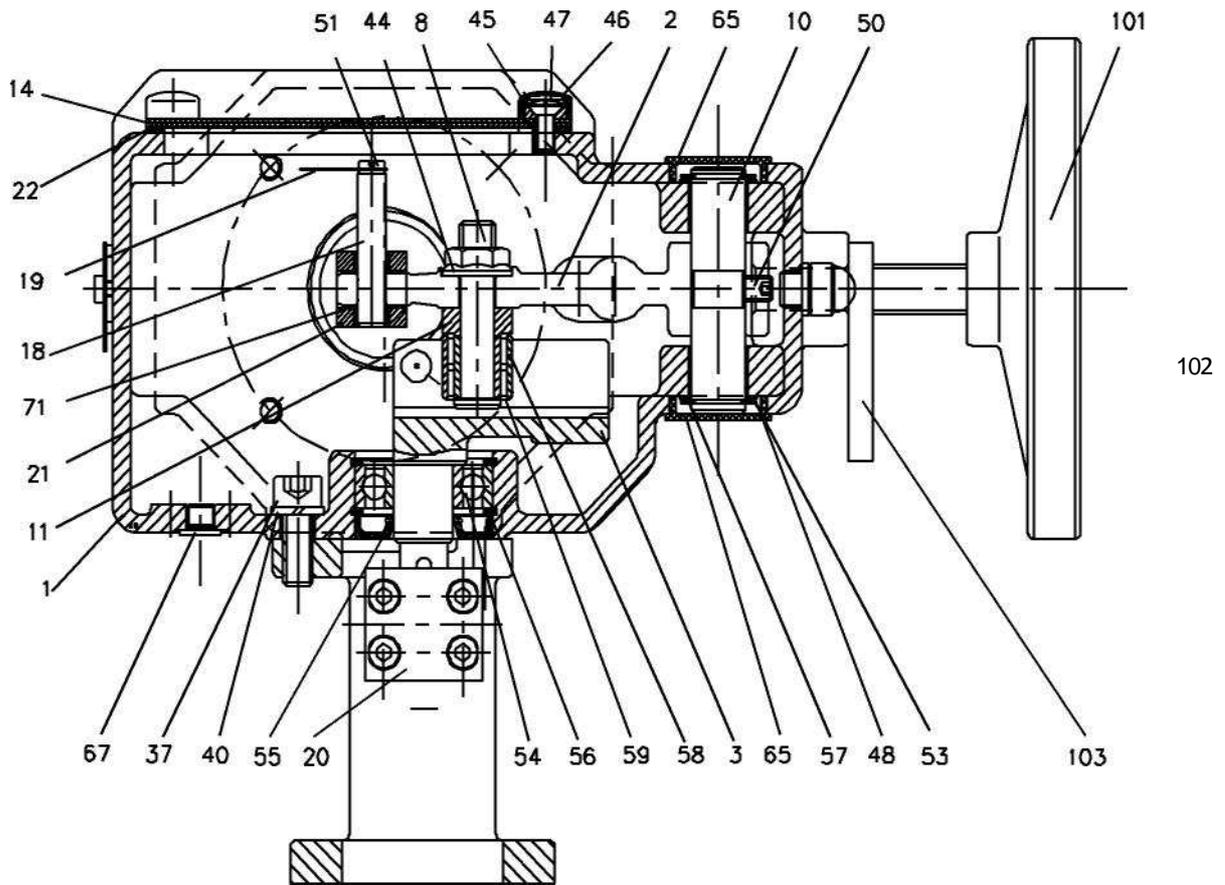
**5.5.c)** Insert the threaded rod (16) again on the free side of the actuator and lock it with the indicator pin (49). Then screw in and tighten the setscrew (49).

**5.5.d)** The spring barrel is joined to the actuator casing by means of bolts and washers (33 and 34). The next step is to slide the spring (12), the diaphragm casing (4) and the shim (43) over the threaded rod and tighten them with the hexagon nut (41).

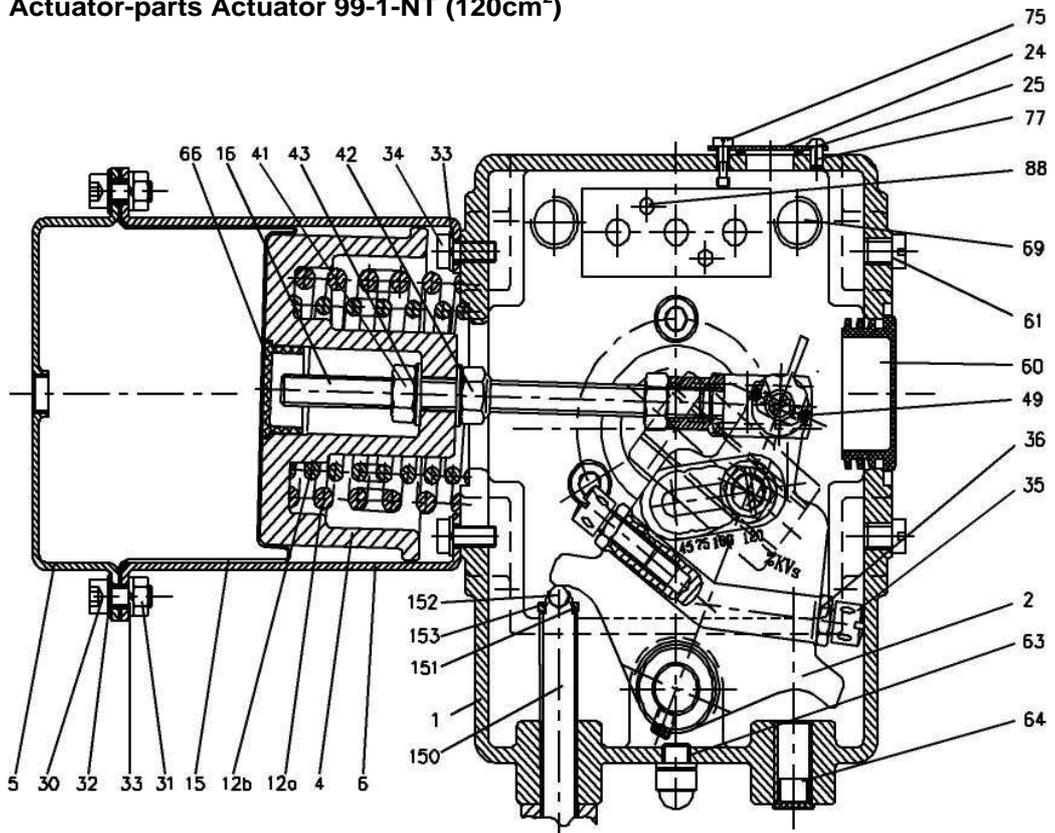
**5.5.e)** Then fit the plug (66) into the diaphragm disk and slide the diaphragm (15) onto the disk, fabric side first (see page 3). Fit the diaphragm casing (5) onto the spring barrel and tighten it by means of nuts and bolts (30 to 33).

**5.5.f)** If a positioner is installed, convert the pickoff lever to the "linear" cam (for "air closes" action) as described in section 5 (page 4) of the enclosed "Positioner Module" operating instructions and set the positioner in accordance with section 3.

**5.5.g)** Finally, tighten the stroke indicator (19) on the indicator pin (18) again with the countersunk screw (51), and fasten the front panel (14) onto the actuator with the screws (45 and 46).



5.6 Actuator-parts Actuator 99-1-NT (120cm<sup>2</sup>)



Pos.1	Act.Housing	GG-25
Pos.2	Primary Lever	GGG-40
Pos.3	Secondary Lever	1.4540
Pos.4	Diaphragm Plate	POM-Natur
Pos.5	Diaphragm Housing	St 37.2
Pos.6	Spring Housing	St 37.2
Pos.8	Regulater adjusting srew	1.4021
Pos.10	Main Shaft	1.4021
Pos.12	Spring	Springsteel
<b>Pos.15</b>	Diaphragm	NBR
Pos.16	Threaded rod	8.8
Pos.18	Main Shaft	A2
Pos.20c	Featherkey	1.4021
Pos.35	Locking screw	St /verz.
<b>Pos.58</b>	Needle bearing	St

**█** = recommended spare parts

## 6. Dismantling rotary actuator BR99-2-NT / BR99-3-NT [240 cm<sup>2</sup>] / [779 cm<sup>2</sup>]

### 6.1 Disassembling built-on accessories

If a limit switch unit is installed, it need only be loosened by unscrewing the two hexagon socket screws and then removed along with the cable terminals

### 6.2 Disassembling the hand-wheel unit

**6.2.a)** First of all, unload the hand-wheel unit by loosening the locking screw (117) (star-grip screw) a few turns and then turning the hand-wheel (116) full counter clockwise until you feel a resistance.

**6.2.b)** Once the bolts (107) that secure the flange (101) to the actuator casing (1) have been unscrewed, the complete hand-wheel unit can be removed from the casing.

**6.2.c)** You must first remove the retaining ring (107) from the adjusting bolt (102), before you can dismantle the hand-wheel unit

**6.2.d)** If you now continue turning the hand-wheel counterclockwise, the adjusting bolt (102) will be screwed out of the guide nut (108), and you can pull it out of the flange together with the hand-wheel.

**6.2.e)** The hand-wheel is merely fitted onto the adjusting bolt and locked in position by a featherkey.

**6.2.f)** Before you reassemble the hand-wheel unit, you should examine all the bushes and thrust rings for wear and replace them if necessary. Be particularly careful not to forget the thrust rings (115 and 110) during the assembly procedure, as they affect the operation of the hand-wheel unit.

### 6.3 Separating the spring barrel from the actuator casing

#### Attention!!!

It is essential to maintain the correct order. The diaphragm casing (5) must never be loosened if the eyebolt is not joined to the lever.

**risk of accidents due to the spring bias!!!!!!!!!!!!!!**

**6.3.a)** After the bolts have been loosened, the diaphragm casing (5) and the diaphragm itself (15) can be removed. The sealing plug which is now visible can be levered out with a fine screwdriver, and the nut underneath it (36) loosened with a socket wrench in order to unload the actuator spring. Hold the diaphragm disk (4) with your hand as you do so, as there might be a (very slight) residual bias when the spring is disassembled.

When you install the diaphragm, make sure that the gummed side rests against the pressure side, in other words the fabric side of the diaphragm must be facing the diaphragm disk. If you install the diaphragm incorrectly, the positioner will fail after only a short time in operation.

**6.3.b)** You can now remove the diaphragm disk and the spring (12), and separate the spring barrel from the actuator casing. To disassemble the eyebolt, remove the grub screw (27) and pull the stoke indicator pin (18) up out of the actuator lever using suitable pliers. When you reassemble the actuator subsequently, you must not forget the two PVC thrust rings, or corrosion may occur.

## 6.4 Dismantling the actuator casing

- 6.4.a)** First of all, you should remove the cap nuts (64), together with the stop screws (35) and the locking nuts underneath them.
- 6.4.b)** Now loosen the adjusting nut (41).
- 6.4.c)** You must then remove the sealing plug (63) and the setscrew (65) before you can disassemble the bearing bolt. The bearing bolt (10) can be loosened by removing the retaining ring (57) and the setscrew (50), and then pressed out. When you reassemble the casing, you must not forget the thrust rings, which are vital for operation of the actuator.
- 6.4.d)** The actuator lever (2) can now be removed from the casing, together with the adjustment bolt (8) and the needle bearing (58). Since the actuator function (direction of rotation of the valve) is controlled by the position of the lever, you should mark this position on the lever to simplify reassembly.
- 6.4.e)** Finally, after you have removed the Seeger circlip (56), you can lift the sliding block and the ball bearing out of the actuator casing along with the radial shaft seal (55).

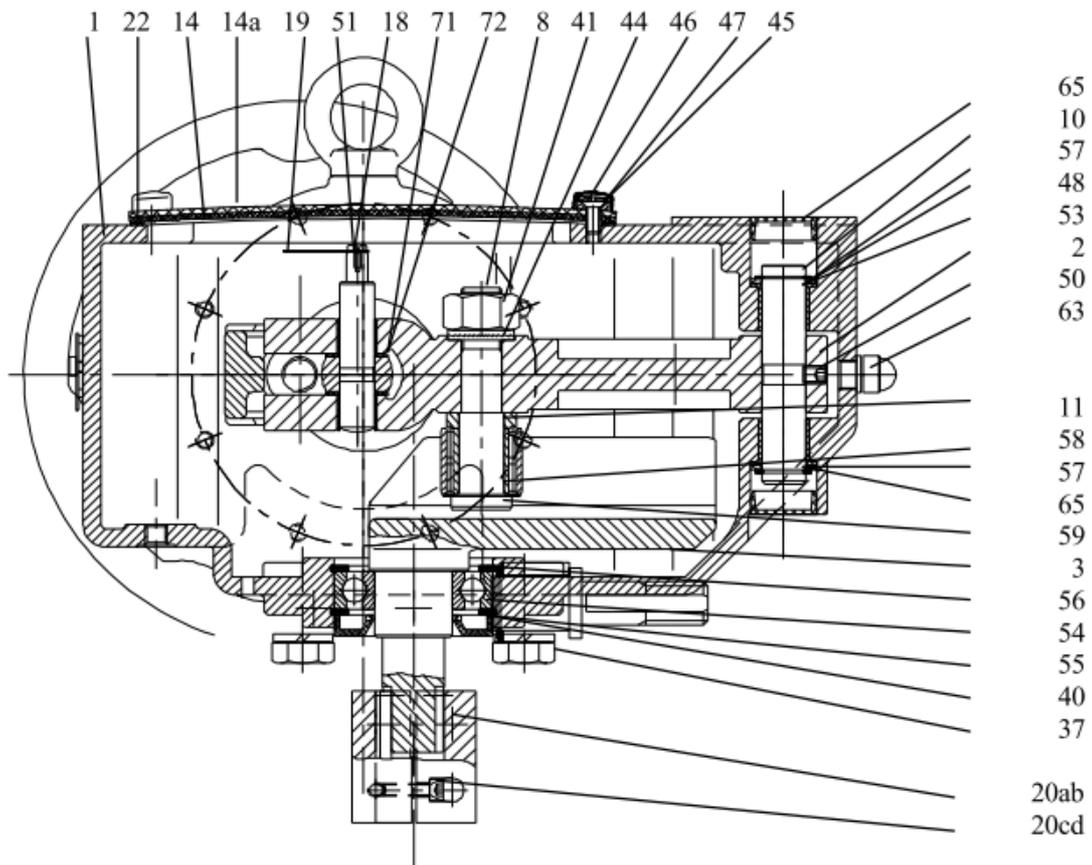
The fit between the ball bearing and the actuator casing is a push fit. This ensures that no axial forces, which might result in excessive hysteresis, are able to act on the valve shaft when the actuator is assembled. It is important to make sure that the radial shaft seal is pressed flush into the actuator casing, and that the sliding block and the ball bearing can be moved inside the casing bore. The surface of the bearing bore should be protected against corrosion with a small amount of grease.

## 6.5 Reversing the direction of the actuator

To reverse the direction of the actuator (from "air opens" to "air closes" or vice versa):

- 6.5.a)** Der Blinddeckel bzw. eine evtl. vorhandene Handverstellung zu entfernen.
- 6.5.b)** Das Federgehäuse nach Punkt III zu demontieren und auf der entgegengesetzten Seite wieder zu montieren.
- 6.5.c)** Die Handverstellung bzw. der Blinddeckel auf den nunmehr freien Flansch des Antriebsgehäuses zu befestigen.

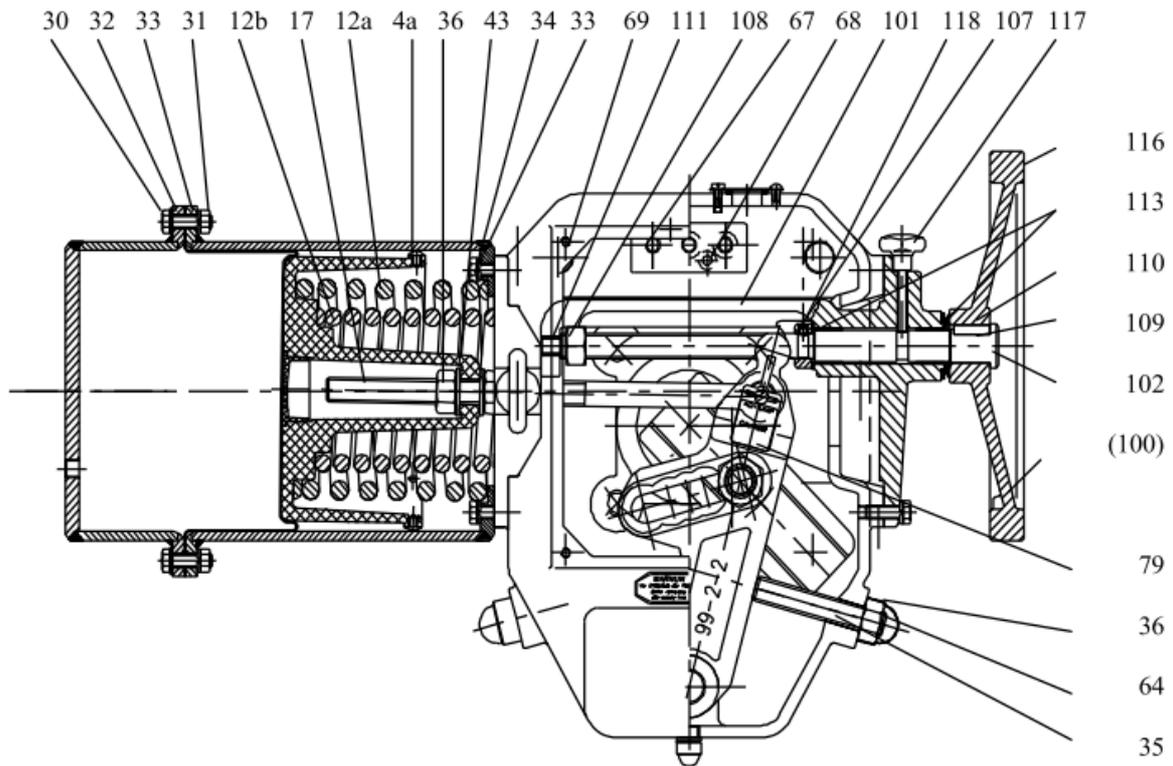
### 6.6 Actuator parts actuator 99-2-NT / 99-3-NT



#### List of actuator parts

- Pos. 1 Act.Housing
- Pos. 2 Primary Lever
- Pos. 3 Secondary Lever
- Pos. 4 Diaphragm Plate
- Pos. 5 Diaphragm Housing
- Pos. 6 Spring Housing
- Pos. 8 Regulator Adjusting
- Pos.10 Main Shaft
- Pos.12 Spring
- Pos.15 Diaphragm
- Pos.18 Main Shaft
- Pos.22 Front panel

**I I** = recommended spare part



- Pos. 45 Cap
- Pos. 55 Radial shaft seal
- Pos. 56 Circlip
- Pos. 57 Retaining ring
- Pos. 58 Needle bearing
- Pos. 63 Sealing plug
- Pos. 64 Cap nuts
- Pos. 65 Setscrew
- Pos.101 Flange
- Pos.102 Adjusting bolt
- Pos.107 Retaining ring
- Pos.108 Guid nut
- Pos.110 Thrustrings
- Pos.116 Handwheel
- Pos.117 Locking srew

**I** = recommended spare part

## 9. Contacting us

Details / specific information (Operating instructions with spare parts lists) are available for download on our website.

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