

## Operating instructions

# Plunger valve

Type 7015

for water

with SK-B slider crank gear for setting up an electric actuator or handwheel

Nominal width: DN150 - 300

pressure rating PN10 – 40

Version: Seat ring, slotted cylinder, perforated cylinder

Item no. of the operating instructions: 327217. Version 02,  
21 pages, subject to technical changes and typographical errors.



with handwheel



with electric actuator

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## 1 Intended use

Plunger valves are control valves that are used wherever gate valves and shut-off valves can no longer be used. They are known for their very good control properties and can be adapted to operating conditions. These are sturdy and safe control valves. Their intended use typically encompasses regulating container levels, pressures and flow rates. Another important area of use is the smooth starting and shutdown of pipes in order to minimize pressure surges in the pipes.

The valve was designed according to the operating conditions and operating data given to us in order to achieve the best possible controllability without causing unacceptable vibrations or noise and without causing damage to the pipe system.



Any deviating operating and usage conditions are subject to written confirmation by the manufacturer.

We will not assume any responsibility for any damage caused by or as a result of improper operating conditions, war, violence, accidents, natural disasters or other circumstances.

### Range of application

DN	PN	Allowable operating pressure of the component PFA (bar)	Allowable operating temperature [°C]
150-300	10	10	0-60
150-300	16	16	0-60
150-300	25	25	0-60
150-300	40	40	0-60

## 2 Safety instructions

### 2.1 General safety instructions

The same safety regulations apply for valves as for the piping system in which they are installed. These instructions include additional safety instructions only to be observed for valves.

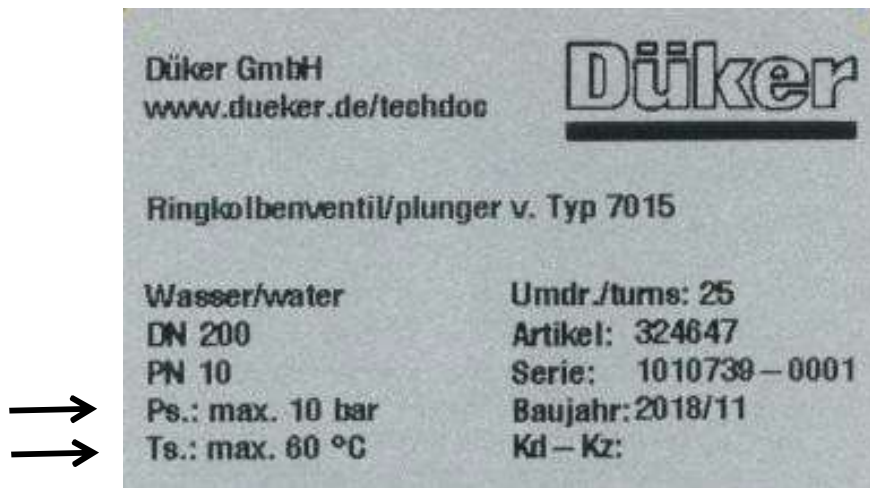
### 2.2 Operator safety instructions

The operator of the valve must ensure that the valve is only used in accordance with the regulations and its intended use. This is not the responsibility of the manufacturer. The valve must only be installed, dismantled, serviced and operated by properly qualified and trained staff. The

operating instructions and the corresponding safety instructions must be read and understood.  
The local accident prevention regulations must be observed.



It is prohibited to use any valve whose allowable operating pressure of the component (“PFA, Ps”) and maximum admissible operating temperature (“Ts”) are insufficient for the operating conditions. The area of use is marked on the valve’s name plate.



Danger of injury exists for work on pipeline components within the permissible operating temperature range at temperatures below 10° C and above 40° C. This is why protective measures are called for in these cases.

Operating media must correspond with the specification of the valve. The manufacturer does not assume any liability for damage resulting from corrosion caused by aggressive media. Neglect of these regulations may result in imminent danger to life and health, and may cause damage to the pipe system.

- The valve must be properly installed in the piping systems observing good engineering practices.
- Inside the piping system, the usual flow velocities (e.g., according to EN 1074-1: 2.5 - 5m/s for liquids) must not be exceeded in permanent operation, unless this has been confirmed in writing by the manufacturer.
- Operating conditions such as vibrations, water impact, erosion, cavitation and large amounts of solid matter in the medium - especially of an abrasive nature – must be clarified with the manufacturer prior to commissioning.
- Arbitrary changes to the product and the supplied add-on parts are not permitted. We refuse to assume any warranty for any subsequent damage resulting from such non-observance.

## 2.3 Special risks



Be sure to depressurize and ensure the safety of the pipe section prior to disassembly, maintenance and repair of the valve. Make sure the pipeline is completely drained before taking out the valve. The energy supply must be switched off. Ensure that the valve cannot be actuated unexpectedly. Any stored energy (pressure oil, pressurized water, compressed air, power stores) must be shut off or discharged.

During longer downtimes of the medium water inside the valve, additional risks occur due to increased germ build-up. During longer water stagnation, the valve and the respective pipeline components should be flushed and disinfected. This is done by moving the valve across the entire stroke in order to thoroughly flush the body.

## 3 Transport and storage



- Valves must be carefully transported and stored. They must be protected against the elements and external damage.
- Seals are light-sensitive: Unpackaged valves may only be exposed to bright daylight or UV light for a very short time. This is why the openings are sealed with protective caps. Valves must be stored in dark rooms in their original package and with the protective caps.
- In the case of storage over an extended period of time, the storage location should be frost-free, cool, dark and free of dust. Alternatively, the valves may also be packed in order to fulfill these conditions.
- The valves are fully powder coated. The coatings are shock-sensitive and must be protected against impact stress.
- The valve must be horizontally positioned on its base.
- Risk of loss of static stability (tipping).
- Attention! During transport, storage and installation, please ensure static stability. If need be, support or affix valve with screws.
- When moving and installing the plunger valve, use the appropriate means of lifting and transporting. Do not use chains. Straps may be fastened on the body and the eye bolts.
- The valve must be suspended on its intended eye bolts.
- The valve should be stored on a pallet or similar.

## 4 Installation into the pipeline

### 4.1 General information



- The sealing surfaces of the flanges are form B to standard EN 1092-2 for counter flanges with smooth sealing surfaces. All other flange types are to be coordinated with the manufacturer. Flange seals conform to the elastomer guideline of the German Federal Environmental Agency (UBA) and the W 270 DVGW guideline for water. Flange seals with steel inserts according to EN 1514 T.1 form IBC are preferably to be used.
- The connections of the piping must be concentric, and with flanges plane parallel to the valve.
- When inserting the valve and the gaskets into a mounted pipe, the gap between the pipe ends must be large enough to ensure that none of the connecting faces and gaskets are damaged. The gap should not be larger than absolutely necessary so as not to create any additional tension inside the pipe during installation.
- The valve must be installed with the power supply disconnected.
- In order to prevent electrochemical corrosion, formation of potentials during installation in stainless steel pipelines must be avoided. In particular, in humid conditions which may lead to condensation on the valve, it is recommended to electrically insulate the flange connection elements.
- The connecting screws must be evenly cross-tightened.
- Unrestricted valve access from all sides for operation and maintenance must be ensured. If the installation work is to take place outside, the valve has to be protected against the elements by the customer on-site.
- Any transmission of pipeline forces to the plunger valve must be avoided.
- If the plunger valve comes with a base plate, this is to serve as a general support and as support for the valve's dead weight. The base must not be fixed and is not to absorb any pipeline forces.
- If in closed position, the slotted cylinder protrudes from the plunger valve's overall length, see measurement "S" (illustration: 10.1, 10.2). When the valve is being removed from the pipeline, it must be fully opened. Attention: Please note.

## 4.2 Installation recommendations:



The plunger valve is mounted into the pipeline in flow direction which is indicated with a cast flow-direction arrow on the housing. In exceptional cases, and upon prior consultation with the manufacturer, the device may also be operated against the direction of the arrow (indirectly) for short periods.

- All installation positions are permissible (horizontal, vertical).

### Pipework upstream and downstream of the plunger valve:

At lower speeds below 1.5m/s, pipeline design upstream of the plunger valve is irrelevant. At speeds exceeding 1.5m/s, if at all possible, avoid installing elbows or T-pieces directly upstream of the plunger valve since this may lead to an irregular flow to the valve. A 3 - 5 x DN minimum distance should be provided for between fitting and plunger valve.

Should an inspection valve be placed upstream of the plunger valve, a minimum clearance of 2 to 3 x DN should be provided for between the butterfly/gate valve and plunger valve in order to rule out any potential damage to the plunger valve caused by the flow pattern.

When the plunger valve is installed as a control valve in a closed pipeline, it is imperative to ensure that the plunger valve leads into a straight outlet section, namely:

- for the version with seat ring: 8 to 10 x DN
- for the version with slotted cylinder: minimum 5 x DN

This means that no fittings such as bends, T-pieces or valves may be located within this section.

This allows the turbulent flow influenced by the plunger valve to abate in the flow profile. If these conditions cannot be met, increased noise and possible cavitation damage to the related components must be expected.

Diffusers on the downstream side should be avoided. Stepwise expansion is preferred instead (low cavitation!).

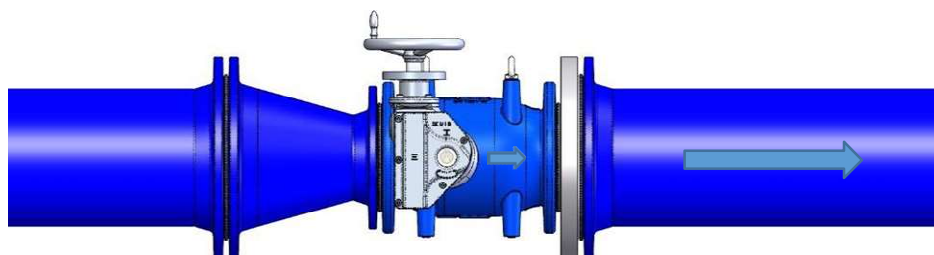


Illustration 4.2

### 4.3 Work steps

- Thoroughly flush newly installed pipe systems to clear out all foreign matter prior to use.
- Transport the valve to the point of installation in its protective packaging.
- The protective caps must be removed from the pipe connections prior to installation.
- Check valve for transportation damage.
- Check coating for damage.
- Do not install damaged valves.
- The coating may be mended with a repair kit if needed.
- It needs to be ensured that nominal pressure and connection dimensions of the valves meet the operating conditions. Refer to labelling.
- Remove dirt and foreign matter from valves and pipelines before installation.
- A functional test must be carried out and the valve opened fully prior to installation!
- Turn handwheel clockwise: valve closes.
- Turn handwheel counter-clockwise: valve opens.



**Do not reach into the interior and do not touch the slotted cylinder during opening and closing! Danger of crushing fingers and hand!**

- Please note direction when installing. See flow direction arrow  $\rightleftarrows$  on body.

### 4.4 Pressure test of pipe section and valve



**Observe DVGW publication W 400-2 (construction and testing of water distribution systems).**

#### Pressure test according to EN 12266

DN	PN	Test pressure housing with water (bar) Valve: fully opened	Test pressure seat with water (bar) Valve: fully closed	Leakage rate
150-300	10	15	11	A
150-300	16	24	17.6	A
150-300	25	37.5	27.5	A
150-300	40	60	44	A



## 5 Item Description

### 5.1 Function

The plunger valve one-piece body comes in a compact design with an inner body which accommodates the piston guide and the piston. The pressure-balanced control piston is mounted on long metallic guide rails inside the body which are resistant to build-up. Eight guide rails made of high-strength stainless steel ensure a secure hold of the piston in each position. A sturdy slider crank drive moves the piston along the pipe axis and continuously reduces or increases the flow cross-section.

The wide profile gasket is clamped onto the control piston and can be easily replaced. It is located so as to be wear and flow-protected. When the plunger valve is closed, the housing O-ring and the profile gasket will be compacted just shortly prior to closing and ensure a tight seal.

Advantages at a glance:

- Using the slider crank to move the piston gives the best possible control range and extremely soft closing, additionally supported by the Düker slider crank gear box.
- Secure main sealing through robust profile sealing ring on the piston and O-ring inside the body, cleverly positioned against unnecessary wear.
- Hygienically safe through specific flushing of the piston and safe shaft seal.
- Long life thanks to sturdy and carefully placed guide rails. Instead, wear is directed to the rotatable and easily replaceable piston.
- No cavitation damage to valve and pipe. Cavitation is safely directed to the middle of the pipe.
- Optionally and based on operating conditions, also available with slotted or perforated cylinder.

The plunger valve adjustment to the operating conditions on-site is crucial for its safe functioning. We will gladly advise you on which size and version best fits your needs.

With an increased cavitation potential it is imperative to protect the pipeline downstream from the valve from damage. Cavitation - the formation and implosion-like dissolution of gas bubbles under certain pressure conditions - cannot entirely be ruled out. But it may be redirected through the intelligent use of slotted or perforated cylinders. This will allow cavitation to dissipate in the middle of the pipe or within the cylinder without causing any damage. Pipe walls will not be damaged and noise pollution will be minimized.



Seat ring



slotted cylinder



perforated cylinder

Plunger valves are not designed according to nominal pipe diameter but rather to the operating data at hand. In most cases, this results in a reduced nominal diameter for achieving optimum control conditions (see illustration 1).

## 5.2 Area of use

Düker plunger valves may be used as:

- Tank feed valve
- Volume control valve
- Pressure control valve
- Turbine startup valve
- Turbine bypass valve
- Pump startup valve
- Charging, flushing and discharging valve
- Bottom outlet valve
- Control valve inside a pump test bench

## 6 Drives

### 6.1 General description

The plunger valve drive (slider crank gear with handwheel or electric actuator) is designed for flow rates according to EN 1074-1 (valves for water supply - Fitness for purpose requirements and appropriate verification tests). Conditions differing from these must be mentioned and will be considered when designing the valve.

The setting of the end stops "OPEN" and "CLOSE" inside the transmission must not be altered without the manufacturer's consent.



**Failure to observe these regulations may result in imminent danger to life and health, and may cause damage to the pipe system.**

Should drives that are powered by external energy (electric, pneumatic, hydraulic) be dismantled from the valve, the safety instructions from chapter 2 must be observed and all external energy switched off.

## 6.2 Slider crank gear

Düker slider crank gears have been tried and tested for decades and been optimally matched to the Düker plunger valve characteristic curve. The sturdy Düker slider crank gear transfers the stem's rotary movement into a swivel movement of the valve shaft. While the rotational speed remains constant, the closing speed decreases continuously, facilitating a gentle closing of the slider crank gear. This allows pressure surges to be effectively reduced or eliminated altogether.

The slider crank gear is self-locking and closes clockwise.

The gearbox is enclosed watertight and complies with protection class IP68.

The mechanical position indicator (OPEN/CLOSE) is directly connected with the drive power shaft on the gearbox cover under acrylic glass.

Depending on customer preference, our gear units are equipped with various drives:

- Handwheel with ball knob
- Electric actuator



## 6.3 Plunger valve with electric actuator

The electric drive is mounted on the inlet flange of the slider crank gear. The valve will be shut off

- path-dependent in open position (limit switch)
- path-dependent in closed position (limit switch)

The switching points of the limit switches are factory-set. The torque switches merely serve as overload protection in intermediate position.

### 6.3.1 Readjustment of limit switches

If the valve is retrofitted with electric drive or if an electric drive is rebuilt on the gearbox following maintenance, the limit switches must be readjusted. The operating instructions of the electric actuator manufacturer must be observed.



**The relevant safety regulations of German VDI / VDE and the instructions of the electric actuator manufacturer must be observed.**

- 1) Manually turn the valve to fully open position against limit stop.
- 2) Turn back one stem revolution on the gearbox. Please refer to the operating instructions of the respective manufacturer regarding the handwheel reduction of the electric actuator.

- 3) Set the limit switch to "OPEN" according to the operating instructions of the electric rotary drive.
- 4) Manually turn the valve to closed position against limit stop in the gearbox.
- 5) Turn back one spindle rotation.
- 6) Set the limit switch "CLOSE" according to the operating instructions of the electric rotary drive.

The limit switches for the OPEN and CLOSE direction interrupt the control circuit on reaching the end position and switch off the electric actuator.

### 6.3.2 Adjustment of torque switches

The torque switches for OPEN and CLOSE direction serve as overload protection across the entire actuating distance. When they reach the set torque, they interrupt the control circuit.

### 6.3.3 Actuating torques

The torques referred to in the table are the maximum permissible torques [in Nm] on the gear spindle during full differential pressure with a calculated safety factor of 1.5.

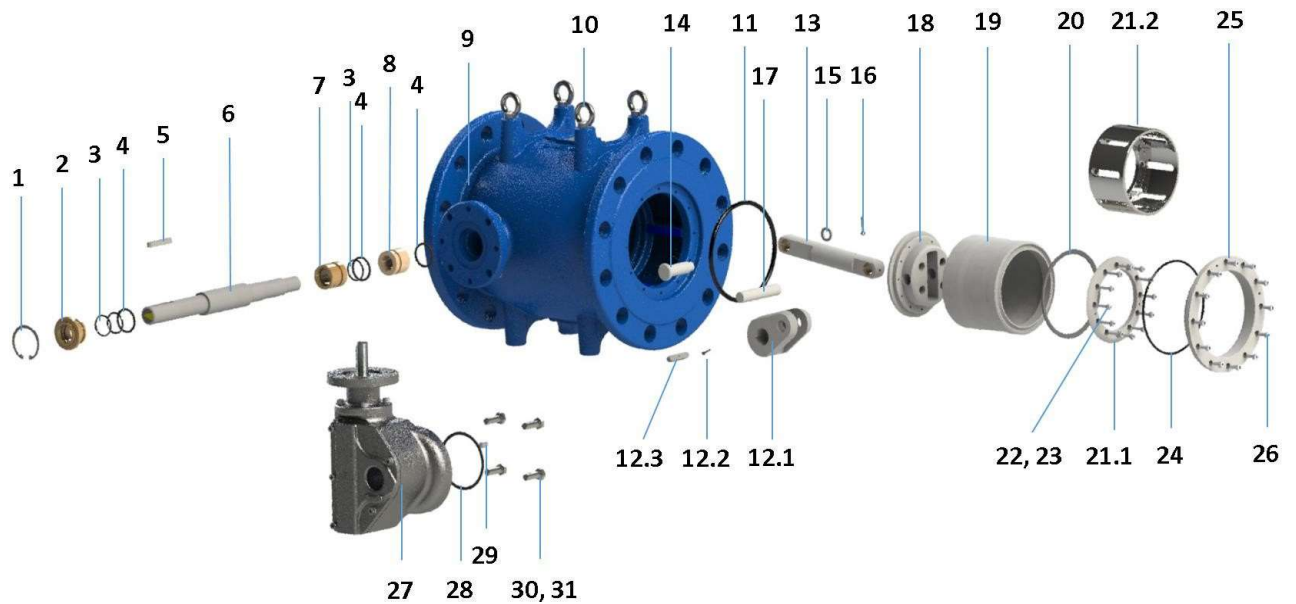
DN	150	200	300
PN 10 - 16 Max. Actuating moment (Nm) on gear spindle in CLOSE/OPEN direction	10/15	10/15	30/35
PN 25-40 Max. Actuating moment (Nm) on gear spindle in CLOSE/OPEN direction	10/15	10/15	40/45
Turns per stroke	approx. 25	approx. 25	approx. 30



Changes to the factory setting of the torque switches on the electric actuator are subject to consultation with the manufacturer.

## 7 Drawing and parts list

### 7.1 Exploded view



### 7.2 Parts list

Item :	Designation	Material		Spare parts
1	Circlip	Spring steel		X
2	Flange bushing	Bronze (UBA)		
3	O-rings	NBR (UBA, W270)		X
4	O-rings	NBR (UBA, W270)		X
5	Parallel key	Steel		
6	Drive shaft	stainless steel	1.4057	
7	Bearing bush A	Bronze (UBA)		
8	Bearing bush B	Bronze (UBA)		
9	Body 7015	Ductile cast iron	EN-GJS 500-14	
10	Eye bolts	Galvanized steel		
11	Body O-rings/Body X-rings	NBR (UBA, W270)		X
12.1	Gear crank	stainless steel	1.4057	

12.2	Parallel key	stainless steel		
12.3	Cylinder head screw	A4		
13	Push rod with bushing	stainless steel /Bronze (UBA)	1.4057	
14	Bolt	stainless steel	1.4057	
15	Disc	A2		X
16	Splint pin	A2		X
17	Bolt	stainless steel	1.4057	
18	Piston bearing	stainless steel	1.4301	
19	Piston	stainless steel	1.4301	
20	Profile seal	EPDM (UBA, W270)		X
21.1	Clamping ring	stainless steel	1.4301	
21,2	Slotted cylinder	stainless steel	1.4301	
22	Lock washer	A4		X
23	Cylinder head screws	A4		X
24	O-ring	NBR (UBA, W270)		X
25	Seat ring	stainless steel	1.4301	
26	Cylinder head screws	A4		X
27	Slider crank gear set for handwheel and electric actuator			
28	O-ring	NBR		X
29	Cylindrical pin	A2		
30	Washers	A2		
31	Hexagon bolts	A2		
32	Maintenance kit W1 includes: Item: 1, 3, 4, 11, 15, 16, 20, 22, 23, 24, 26, 28			W1

This parts list contains standard materials. They may vary from this list depending on the medium being used.

## 8 Maintenance

### 8.1 General safety instructions



- In the event of inspection or maintenance work, protective devices may only be removed once the pipe section in which the valve was installed has been locked and depressurized.
- Prior to beginning maintenance work, all pressurized pipes must be depressurized and secured against unintentional reactivation!
- Upon completion of the maintenance work and prior to commissioning, all connections and joints must be checked for tightness and firm seating.
- Without the gearbox, the plunger valve is not self-locking. The actuator and/or the gearbox may only be dismantled if the pipe section has been depressurized.
- To ensure function and compliance with drinking water hygiene requirements, only original Düker spare parts may be used.  
Refer to section 7.2 for available spare parts.

### 8.2 Inspection and maintenance intervals

The seal, operability and corrosion protection of the valve should be inspected at least once a year (DVGW publication W 392-2 and 400-3-B1).

Under extreme operating conditions (large pressure differences, tainted water), these inspection intervals must be shortened.

### 8.3 Maintenance and inspection

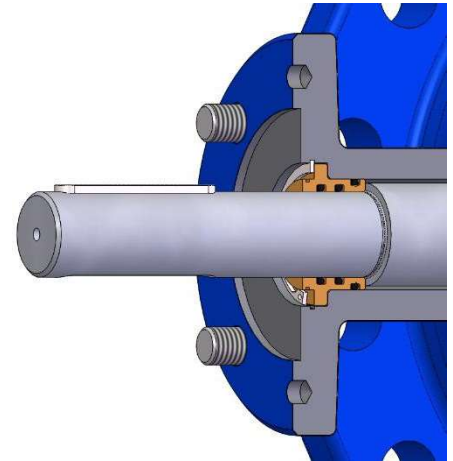
Düker plunger valves are equipped with maintenance-free plain bearings. Stem and gear bearings of the slider crank gear are provided with long-term lubrication. We recommend to move the valve at frequent intervals (several times a year) across the total travel of the piston (OPEN-CLOSE) in order to prevent medium-induced deposits on the sliding surfaces of the piston or the guide rails. Maintenance and inspection ought to be performed according to the table.

Inspection/testing for	Maintenance/complementary measures	Cycle
Damage and corrosion on the valve body	Cleaning Touch-up corrosion protection	annually
Water leakage on housing and flange connections	Sealing	annually
Water-tight sealing at zero flow	replace seal kit, if applicable	annually
Mobility of handwheel and gearbox (easy operation)	Complete opening and closing, repeat in the event of stiffness	several times a year
Ease of movement of plunger valve		
Check function of the electric actuator	Reviewing the adjustment calculation Checking the function chain: Valve, gearbox, electric actuator	annually

## 8.4 Inspection and replacing parts

### 8.4.1 Replacing the profile sealing (20)

- 1) Loosen the cylinder head screws (23) on the clamping ring (21.1), or the slotted cylinder (21.2). Remove screws with circlips (22).
- 2) Pull clamping ring (21.1) or slotted cylinder (21.2) (depending on the version) off the piston (19) (if necessary, the existing threaded holes may be used to push it off).
- 3) Remove the profile sealing (20)
- 4) Clean the groove of the profile sealing.
- 5) Insert new profile sealing (20) in the intended recess on the piston (19).
- 6) Slide the clamping ring (21.1), or the slotted cylinder (21.2). onto the piston (19).
- 7) Tighten cylinder screws (23) with circlips (22) at the specified torque (section: 8.4.4). 8.4.4).



### 8.4.2 Replacing the exterior drive shaft O-rings (3.4)

#### Disassembly:

- 1) Remove the slider crank gear (27) from the valve.
- 2) Remove feather key (5) from the drive shaft (6)
- 3) Remove circlips (1).
- 4) Pull down the flange bushing (2) from the drive shaft (6) with the help of two screwdrivers (there is a groove in the flange bushing to insert the screwdrivers).

#### Replacing the O-rings:

- 5) Remove the O-rings (3) and (4) from the flange bushing grooves (2).
- 6) Clean O-ring grooves.
- 7) Grease new O-rings (3) and (4) with the appropriate grease 1.
- 8) Insert new O-rings into the flange bushing grooves.

#### Assembly:

- 9) Grease the flange bushing (2) on the inner tread and front surfaces.
- 10) Slide the flange bushing (2) on the drive shaft into the clearance; while making sure that the O-rings remain intact.
- 11) Install circlips (1).
- 12) Insert feather key (5)
- 13) Mount the gearbox to the valve.



### 8.4.3 Replacing the entire maintenance kit (32)

#### Disassembly:

- 1) Place the plunger valve on the inlet-side flange.
- 2) Move valve to "Open" position.
- 3) Remove the slider crank gear (27) from the valve.
- 4) Remove feather key (5) from the drive shaft (6).
- 5) Remove circlips (1).
- 6) Pull out drive shaft (6) and flange bushing (2) using a sliding hammer.
- 7) Release cylinder head screws (26) on the seat ring (25).
- 8) Take out seat ring (25) with O-ring (24) (if necessary, the existing threaded holes may be used for pushing off).
- 9) Pull out piston (19) together with the push rod (13) and gear crank (12.1) from the body (9). A suitable lifting device (crane) can be used (beforehand: screw the appropriate eye bolt into the threaded hole of the push rod).
- 10) Using a suitable pin, carefully press the bearing bushing A (7) out of the shaft bore in the housing into the piston interior.

#### Replacing the O-rings:

- 11) Remove all O-rings from the grooves of the dismantled components.
- 12) Clean O-ring grooves.
- 13) Grease new O-rings with the appropriate grease 1.
- 14) Insert new O-rings into the grooves of the dismantled

components. Replacing the profile sealing (20):

- 15) See section 8.4.1

#### Assembly:

- 16) Apply a small amount of grease to the chamber on the piston so that the body O-ring (11) is not damaged when the piston is retracted.
- 17) Insert piston (19) with push rod (13) and gear crank (12.1) into the body until the bore of the gear crank is aligned with the drive shaft bore (gear crank hangs loosely in the piston interior).
- 18) Grease the inner running surface of bearing bush A (7).
- 19) Push the bearing bush A (7) onto the drive shaft (6) (O-rings must not be damaged).
- 20) Grease the drive shaft (6) in the area of the inner feather keyway. (Grease<sub>1</sub>)
- 21) Push the drive shaft (6) into the shaft bore of the gear crank (12.1) as far as it will go. Make sure that the feather keyway of the drive shaft is flush with the feather key in the drive crank (12.1).
- 22) Push the flange bushing (2) onto the drive shaft (6); make sure that the shaft seal is not damaged.
- 23) Insert the circlip (1) into the groove of the body.
- 24) Check direction of rotation: Drive shaft turns right -> piston closes!
- 25) Slowly move piston (19) to end position "open".
- 26) Install the seat ring (25) with the new O-ring (24) into the body (9).
- 27) Tighten the cylinder head screws (26) with removable locking material and tighten with the specified torque (see section: 8.4.4).
- 28) Move the piston in open and close direction by manually turning the drive shaft (function test).
- 29) Mount gearbox.

#### 8.4.4 Screw tightening torques

Tightening torques (Nm)			
Nominal diameter DN	150	200	300
Cylinder head screws (23) on clamping ring / slotted cylinder	5,5	5,5	5,5
Cylinder head screws (26) on seat ring	4	4	10

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**We recommend:**

- 1 Grease with drinking water approval: e.g.: Klübersynth VR 69-252 N, Klüber Lubrication, Munich, Germany
  - 2 Screw lock medium strength with drinking water approval: e.g.: WEICONLOCK® AN 302-43, WEICON, Muenster, Germany
-

## 9 Faults, causes and remedies

Malfunction	Cause	Remedial action
Valve makes a noise	Unfavorable installation situation	See section 4.2. Conversion according to the installation recommendations, if possible.
	Cavitation reaches inadmissibly high values	Have Düker check design and operating data.
Valve cannot be closed	Electric actuator has no power	Check power supply
	Foreign body is trapped between piston and seat.	Open and flush valve. If this is not sufficient, remove pipe on the outlet side and remove any foreign bodies.
Valve cannot be opened	Electric actuator has no power	Check power supply
	Foreign body is trapped in the slotted cylinder	Remove and clean valve
Valve is leaking	Foreign body is trapped	see above
	Valve not completely closed	Check end position setting
	Profile sealing and/or housing O-ring damaged	Replace gaskets
Desired flow rate is not achieved	Valve not yet fully opened	Check valve position
	The inlet pressure drops more than expected when the valve is being opened.	Check pipe for trapped air. Have Düker check design and operating data.
	The control insert is not correctly adapted to the available operating data.	Have Düker check design and operating data.
Flow rate is too high	Valve is opened too wide	Close valve further
	The control insert is not correctly adapted to the available operating data.	Have Düker check design and operating data.
Valve is cavitating in an inadmissible manner	Valve operates outside the design limits	Have Düker check design and operating data.

## 10 Main dimensions and weight

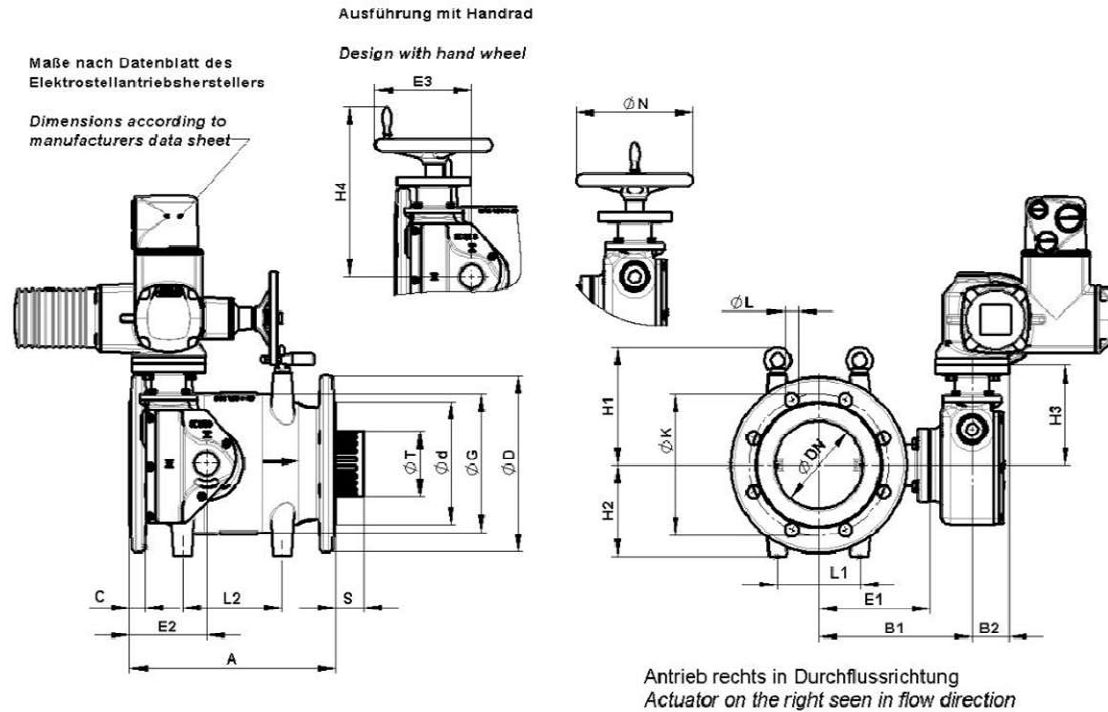


Illustration 10.1: Actuation to the right

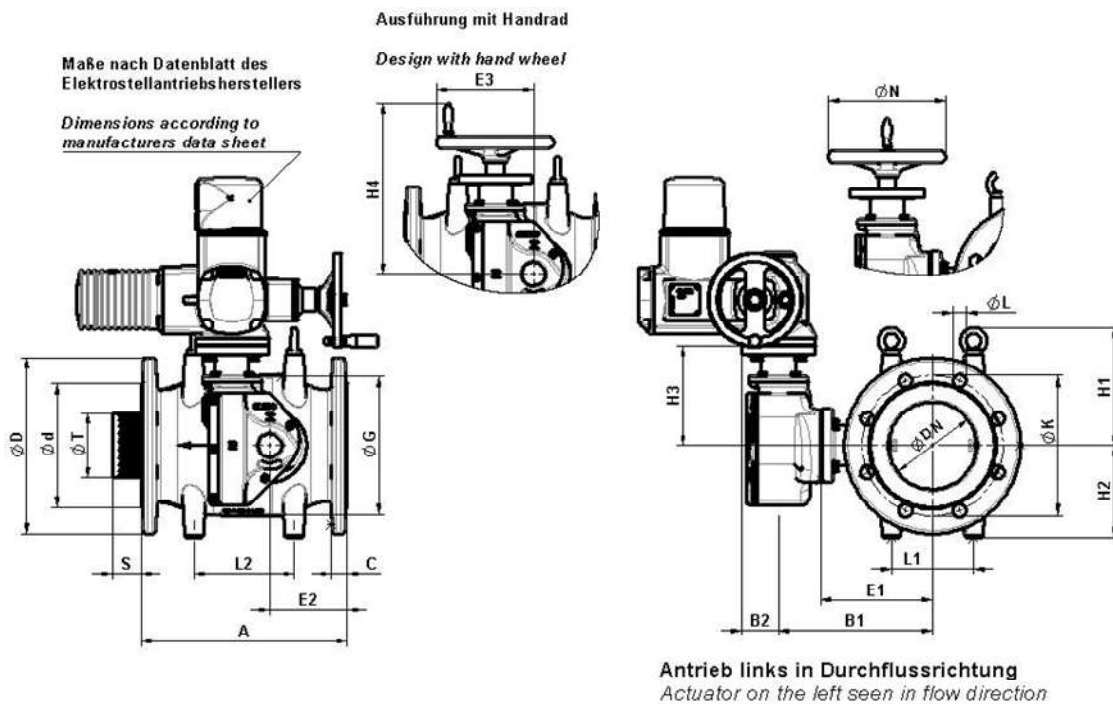


Illustration 10.2: Actuation to the left

DN	PN	Ø D	Ø d	Ø K	Ø L	n	C	f	A	B1	B2	E1	E2	Ø G	H1	H2	H3	L1	L2	H4	E3	Ø N	S*	Ø T*	Weight ** kg
150	10	See PN16																							
150	16	300	211	240	23	8	26	3	350	262	62.5	190	131	236	201	156	170	140	170	291	165	200	50	112	70
150	25	See PN40																							
150	40	300	211	250	28	8	26	3	350	262	62.5	190	131	236	201	156	170	140	170	291	165	200	50	112	70
200	10	340	266	295	23	8	20	3	400	292	62.5	220	140	309	242	197	170	140	170	291	165	200	59	149	107
200	16	340	266	295	23	12	20	3	400	292	62.5	220	140	309	242	197	170	140	170	291	165	200	59	149	107
200	25	360	274	310	28	12	22	3	400	292	62.5	220	140	309	242	197	170	140	170	291	165	200	59	149	111
200	40	375	284	320	31	12	33	3	400	292	62.5	220	140	309	242	197	170	140	170	291	165	200	59	149	121
300	10	455	370	400	23	12	24.5	4	500	421	85	321	150	453	313	268	228	180	200	379	257	315	76	223	248
300	16	455	370	410	28	12	24.5	4	500	421	85	321	150	453	313	268	228	180	200	379	257	315	76	223	248
300	25	485	389	430	31	16	27.5	4	500	421	85	321	150	453	313	268	228	180	200	379	257	315	76	223	258
300	40	515	409	450	34	16	39.5	4	500	421	85	321	150	453	313	268	228	180	200	379	257	315	76	223	288

DN 250, 350 and 400 in preparation.

\* version with slotted cylinder in closed position

\*\* weight indication without electric actuator

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