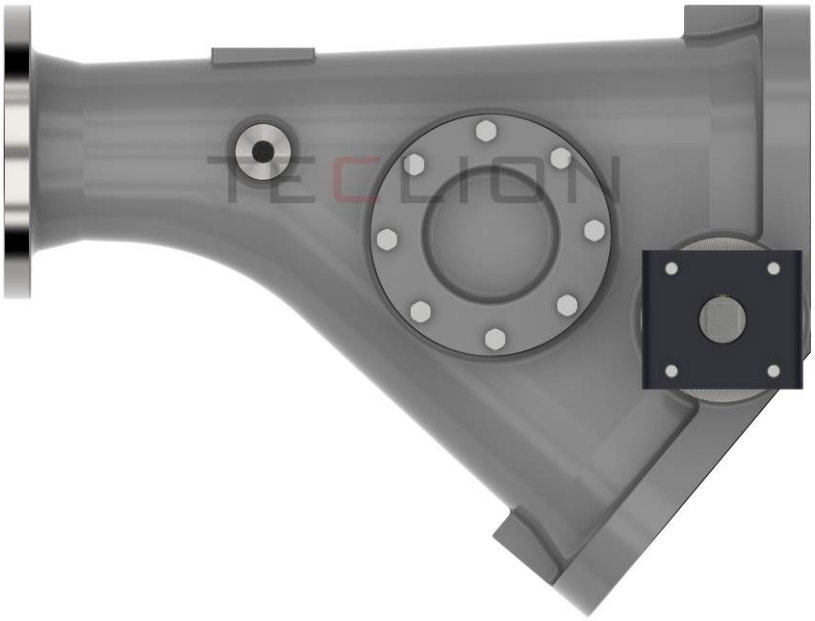
操作手册 Operating Manual

换向阀 Diverter valves

适用型号：摆锤系列 DP

手册编号：MDP2020



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1 General Preface

This operation manual is part of the machine.

The operation manual should facilitate the learning process about t he machine and how to use its intended applications.

The operation manual contains important information about how to operate the machine safely,properly and economically.Reading this inst ruction manual will help to avoid dangers,reduce repair costs and dow ntimes and increase the reliability and lifespan of the machine.

The operation manual must always be available at the operation si te of the machine.

The operation manual must be read and used by every person w ho is charged to carry out work with/on the machine.

Should there be any problems,please contact TECLION.

Some information about the machine is located in the sample.

TECLION does not accept any liability for damage or accidents re sulting from improper use.

2 Intended use

- The diverter valve is exclusively for

  Change flow direction,
  continuous conveting,
  conveying system.

- The diverter valve has been built in accordance with the status of technology and the recognized safety regulations.Nevertheless,the machine's usage may present danger to life or limb of the user o r third parties as well as causing adverse effects to the machine o r other objects.
- Only skilled staff should install,maintain,and repair the Diverter valve. such as:
  - Trained in mechanical major (mechanical engineer, Electrical En gineer) .
  - Understand this operating manual.
- The diverter valves are not suitable for chemically unstable product s or products which are classified as explosive materials.
- The diverter valves may only be operated without bulk goods unde r the outlet.
- The local safety regulations should be adhered to.
- Correct use this machine at calibrated design pressure.
- Diverter valves can be installed and operated in both closed premi ses and the open air as long as the electrical equipment is suitabl e for this.

- The diverter valve is prohibited to use in the area of explosion if it is not clearly marked.
- Accessories for valves in ATEX zones must correspond to the equi pment category re-quired there. If there are different categories bet ween valves and accessories or amongst accessories, the valves must only be used for the lowest designated equip-ment category.
- Diverter valve can and only be used to change flow direction, For this reason, the operating pressure is not the structurally decisive f eature. For this reason, the Pressure Equipment Directive is not ap plicable.

3 Safety instructions

3.1 Symbols

Useful hints and skills。

Hazardous! Possible consequences:slight or minor injuries.

Mechanical hazards! May cause disability or even death。

Explosion hazard!

3.2 Management measures

- Always keep the operating manual at hand at the site of the m achine's operation.
- Observe and instruct in the general legal and specially bindling regulations for the prevention of accidents and environmental pr otection as well as the operating manual.
- The personnel charged with activities on the machine must have read the operating manual and particularly.
- Supplement the operating manual with information including the responsibility and obligation to register for consideration of oper ational particularities.regarding work organization,work sequences, at-work peraonnel.
- Do not allow the debris (such as ropes, plastic bags, parts, etc.) in the valve.Personnel must not leave their long hair losse,wear loose clothes or jewellery,including rings.There is a risk of injury by getting caught or being pulled in.
- Take into account all safety and danger advice displayed on the machine.
- Immediately stop the machine and report the fault to the releva nt person in the case of any safety relevant changes to the ma

-chine or its operating behavious.

- Do not make any changes,attachments or conversions to the m achine,which could impair safety,without the authorization of the supplier.
- Replacement parts must comply with the technical requirements set down by the manufacture.
- Replace hydraulic hose connections within the stated or appropr iate time intervals,even if there are no visible safety defects.
- Maintain the intervals specified or stated in the operating manua l for recurrent checks.
- For carrying out maintenance measures,factory equipment which is suitable for the work is required.
- Observe the fire alarm and fire fighting possibilities.

3.3 Qualification of Personnel,obligations

- Work on/with the machine must only be carried out by authorize d personnel.The legal minimum age must be observed.
- Only use trained personnel.Clearly define the responsibility of the personnel for the operation,preparation,maintenance and repair.
- Ensure that only personnel who have been instructed to work o n the machine are working on it.
- Work on electrical parts of the machine must only be carried ou t by trained electricians.
- Specity the machine driver's responsibility with regards to the le gal traffic regulations as well and make it easier for him to reje ct instructions from a third party which are adverse to safety.
- Only personnel trained to carry out work in gas equipment must work on gas equipment.

3.4 Safety Advice for Operation phases

- Make sure,there is no foreign material lefe inside the conveying systerm.
- Prior to installation of the diverter valve on site,new conveying systems leading to and from the diverter valve,have to be cleaned and rinsed properly.
- If during maintenance or repair of the Divertervalve the internal components of the conveying system are altered or repaired, etc.,then the above mentioned cleaning procedure must also be carried out.
- On site, the Diverter valve should be installed such that assembly is stress free (force and torque free).
- When putting the diverter valve into operation it is recommended,to

carry out the test run without bulk material.

3.5 Advice on specific type of danger

3.5.1 Electrical Energy

- Only use original fuses with specified current! In case of faults in the electrical energy supply, immediately switch off the machine/system.
- Work on the electrical systems or resources must only be carried out by trained electricians or by instructed personnel who are under the leadership and supervision of a trained electrician in accordance with the electro-technical regulations!
- Machines and accessories, on which inspection, maintenance and repair work is being carried out, must be disconnected - if specified. Firstly check that the disconnected parts are free of voltage, then earth and short-circuit, and isolate neighbouring parts which are still connected to the energy supply!
- The electrical equipment of a machine/system must be regularly examined/inspected. Faults, such as loose connections and burnt cables, must be immediately replaced.
- If work is necessary on live parts, call in a second person who can press the emergency stop or the main switch with shunt tripping in the case of an emergency. Secure the work area with a red and white safety chain and a warning sign. Only use isolated tools!
- During works on high-voltage components after disconnecting the voltage, connect the supply cable to the earth and short circuit the components, e.g. condensers, with an earthing rod.

3.5.2 Gas,Dust,Stream

- The components are sealed on the outside with sealing systems. However, it cannot be com-pletely guaranteed that no gas will escape. When using components in the area of explosive gases, particular observation must be given to this.
- Welding, firing and grinding works on the machine must only be carried out if this is expressively authorised. E.g. a risk of fire and explosion can exist!
- When nitrogen is used to convey the materimals,make sure there is no leakage surround the valves.

3.5.3 Noise

- Depending on the operating conditions, during operation of the machine/system, high sound pressure levels can occur. The system operator must either provide the area with relevant indicators or with relevant noise protection measures.。
- Wear prescribed personal hearing protection.

3.5.4 Else

- When handling oils, fats and other chemical substances, pay attention to the safety regulations in application for the product!
- Depending on the operating conditions, during operation of the machine/system, high surface temperature levels can occur. If necessary, protection against contact or a thermal insulation must be provided by the system operator.

4 Transportation and storage

4.1 Packaging

Unless otherwise agreed in the contract, it should accord with GB/T13384-2008 <general technical conditions of mechanical and electrical products packaging>

When machines are delivered, they should be checked whether the packing is complete and whether the internal equipment is in good condition.

Return to manufacture maintenance equipment, it should also be packaged in accordance with the above standards。

NOTE

Only fasten the machine at the designated fastening points on the casing. If the ma-chine has no fastening points, it should be fastened to the flanges in principle.

4.2 Packet disassembly

The package can not avoid the impact of human and environmental factors, it need equipment supervision and guidance, to avoid damage to the equipment parts in the process of dismantling.

Notice the sign on the packing box.

4.3 Storage

To maintain faultless quality and functional ability, the following measures must be carried out:

- Protect machine completely against dirt and moisture.
- Store machine between +5 and +40 °C.
- Protect all bare components against corrosion with protec-tive oil or protective lacquer.
- For machines with motors, pay attention to the regulations of the gearmotor manufacturer.
- For machines with compressed air operation, switch the cylinder and valves several times with preservation oil in the compressed air, vent and close the connections.
- If the machine is stored in the open air, it must stand on a wood foundation.

NOTE

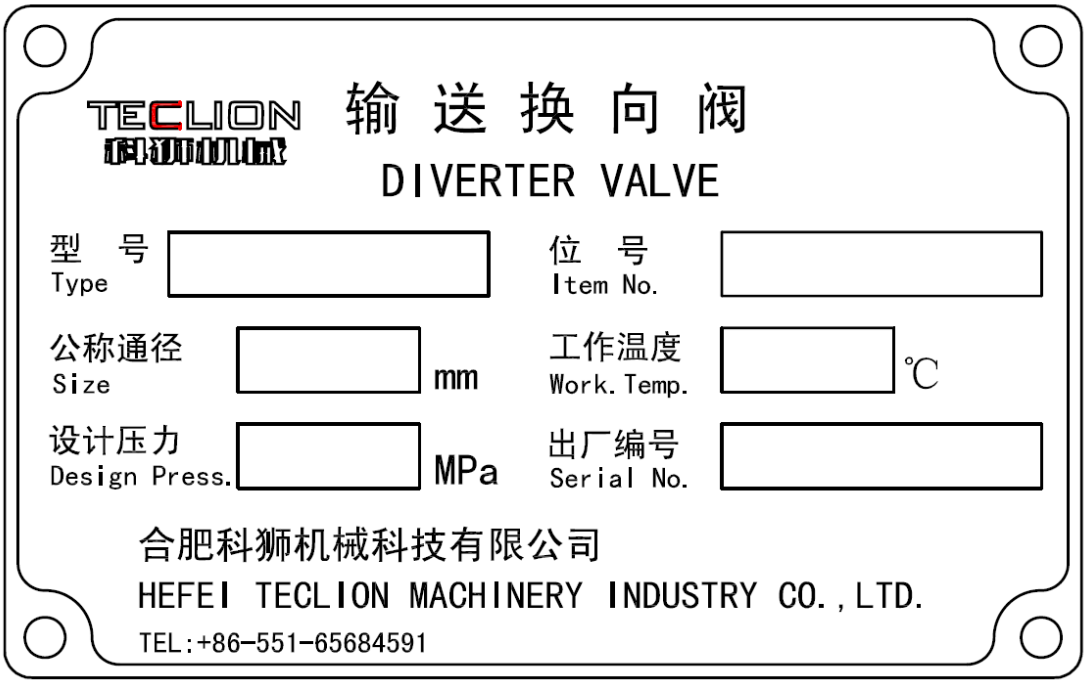
The valve is forbidden to be placed on the base of soft, too narrow to prevent the dumping. When necessary, the equipment needs to support more points, to ensure that it is firmly placed.

4.4 Scope of supplies

After receipt of delivery, check that the machine is complete and / or that all the individual components are present on the basis of the shipping documents.
The deliverer must be informed in writing of their liability in the case of any transport damage.

5 Technical Information

5.1 Nameplate

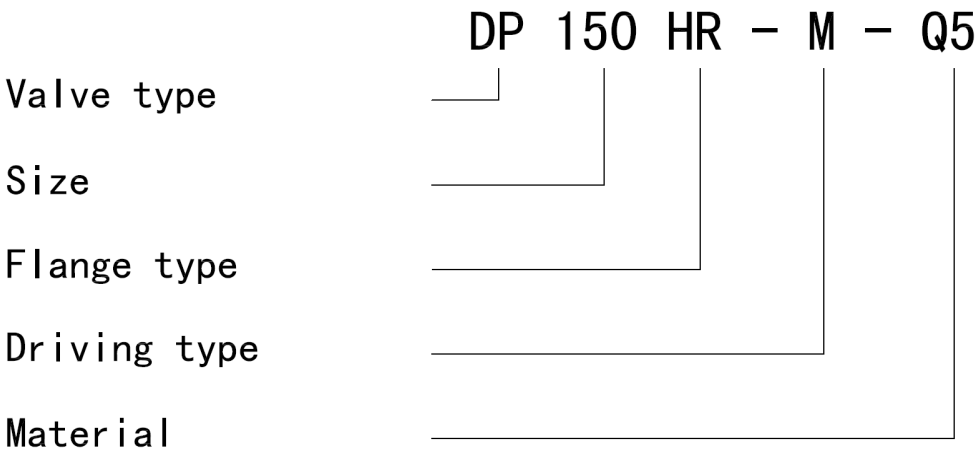


After your valve has been delivered, enter the information printed on the nameplate of your valve in the figure opposite. If the nameplate falls off, please fix it.

5.2 Model Description

NOTE

You can make inquiries of TECLION about Details of the model description, other information.



5.3 Field of Applocation and Intended Use

Diverter valves: DK,DT,DV,DBK,DP,DM,DW
For pneumatic conveying

Diverter valves: DDV
For gravity flow

NOTE

Else materials,such as fibrous, cohesive products,adhesive and sticky products,ask TECLION.

5.4 Operating Information

Diverter valves	DK,DT,DV ,DW,DM	DBK,DP	DDV
Design	Normal	Normal	Normal
Perm.differential pressure MPa	0.15	0.6	ATM
Perm.tem. of the valve without accessories ℃	Normal type: -10~150 Special type: -40~500		

Note

Operating temperature is stated in the nameplate

Note

If there are other special requirements, such as higher pressure, higher temperature, etc., please consult TECLION.

5.5 Noise

It is not possible to provide information about the noise development of the valve, integrated in the system, subject to the operating conditions of the system (e.g. bulk goods, work pressure). During operation, noise may occur due to decompression of gas and product-related running noise.
If necessary, suitable measures should be carried out to reduce the sound.

Note

When you hear sharp noise around the valve,you must cut off the electricity supply to prevent more damage

5.6 Escaping gas and air consumption

5.6.1 Escaping gas

Please contact the manufacture.

5.6.2 Air Consumption

Please contact the manufacture.

5.7 Material variations

Code	Material
S	Case: CF8,Rotor: 304SS
SL	Case: CF3,Rotor: 304L
SS	Case: CF8M,Rotor: 316SS
SSL	Case: CF3M, Rotor: 316L
C	Case: WCB,Rotor: C.S.
CS	Case: WCB,Rotor: 304SS
Q5	Case: QT500,Rotor: QT500
Q4	Case: QT400,Rotor: QT400

5.8 Weight information

Please refer to product samples.

5.9 Operation instructions

The TECLION ball type diverter has been specially designed to converge or diverge abrasive products in pneumatic conveying systems.

The diverter is also suitable for systems having relatively high pressures and temperatures

The design of the diverter ensures that the higher the positive pressure, the tighter the seal. This is the result of the ball and seal being pushed firmly into its seating.
Seals can be replaced with the valve in place by removing the two side covers.

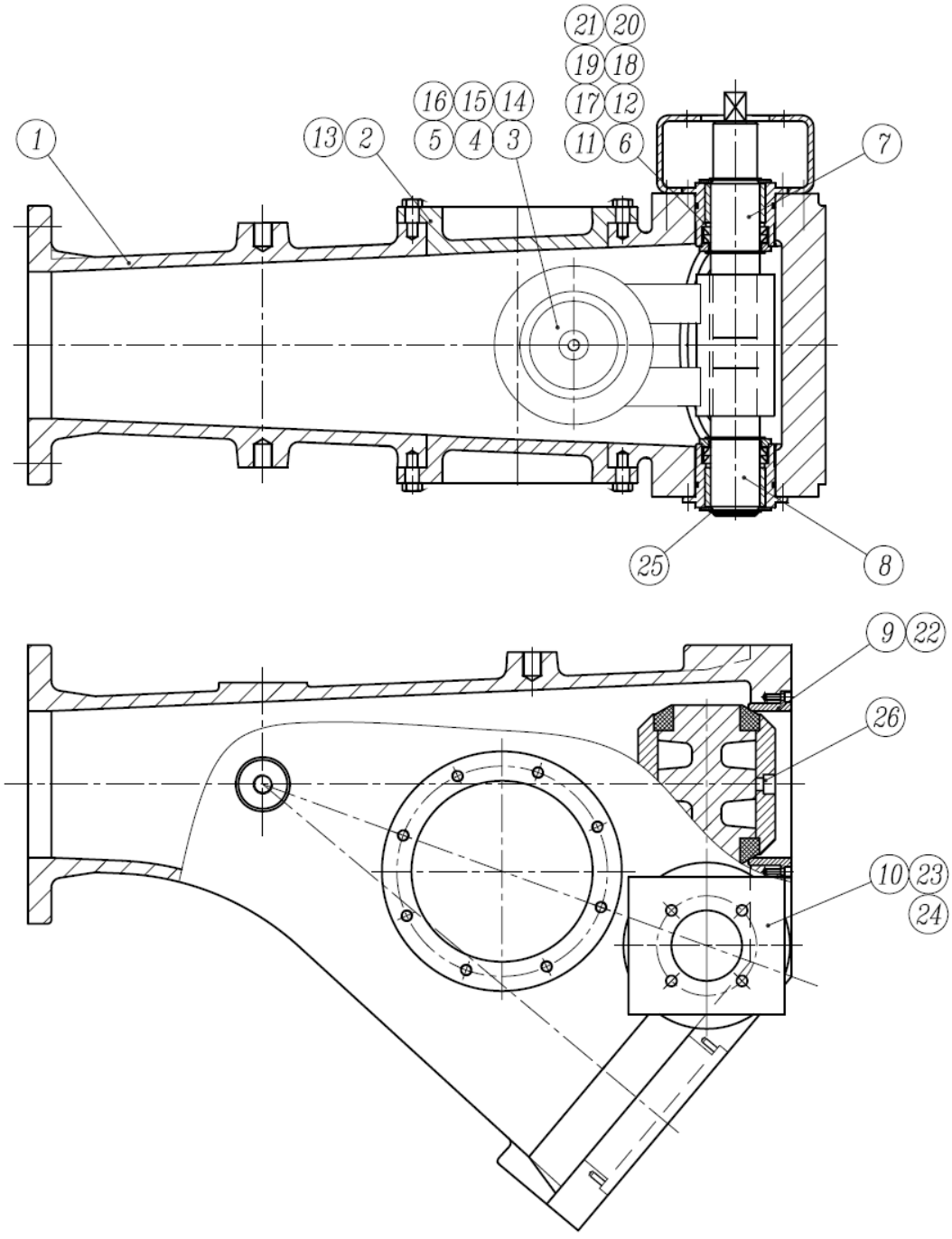
The diverter can be used for both diverting and converging. When diverting the product itself provides the wear surface. When converging the impact area of the product on the diverter has been considerably strengthened.

The valve is operated by using a double acting pneumatic actuator, with a 5/2 double acting solenoid and position confirmation switches.

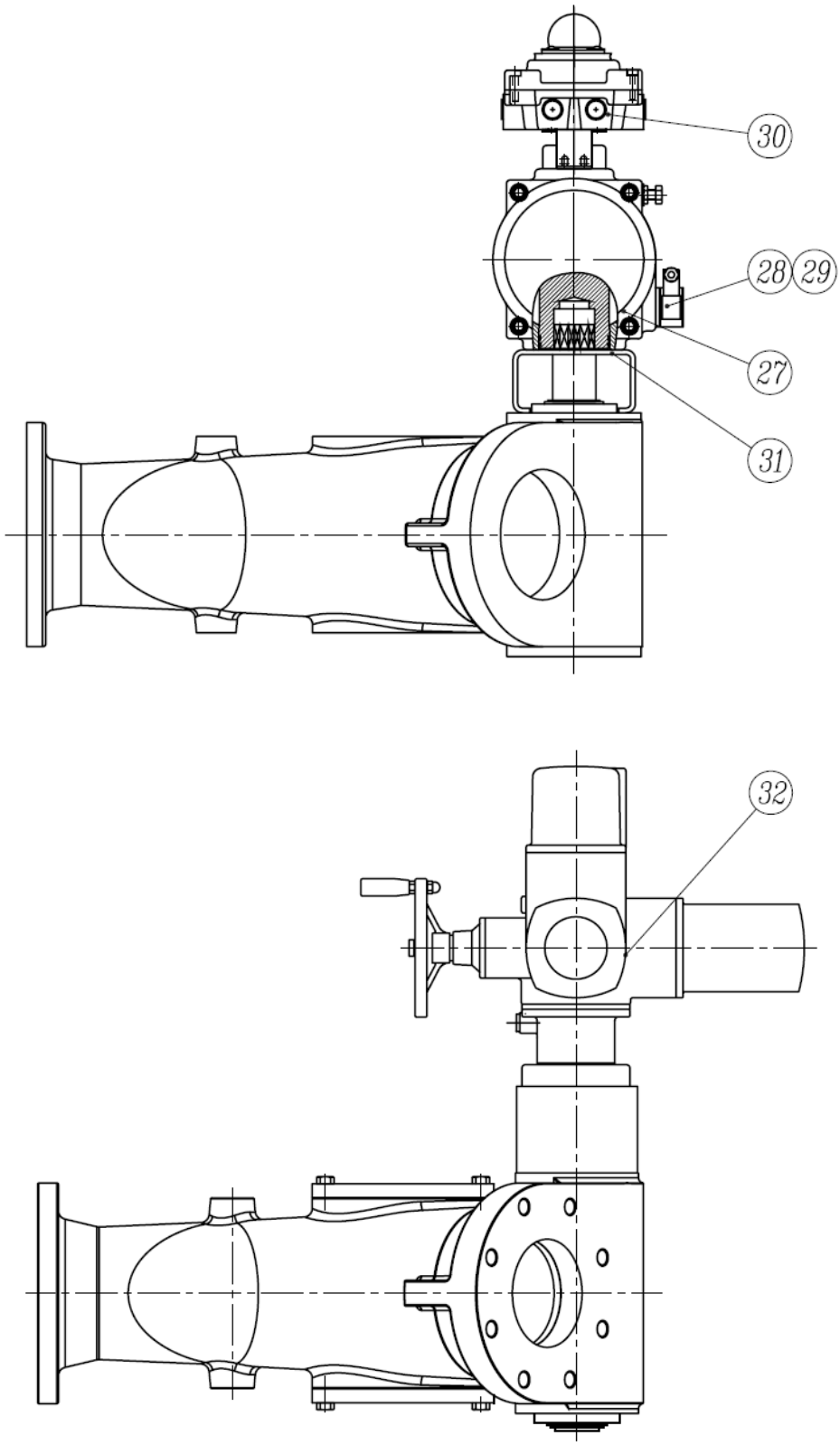
The permissible operating conditions indicated in section 3.0 must be observed. Failure to do so and/or improper use and the resulting risks and damage are the responsibility of the user.

5.10 Assembly

5.10.1 DP type



5.10.1 Sectional view



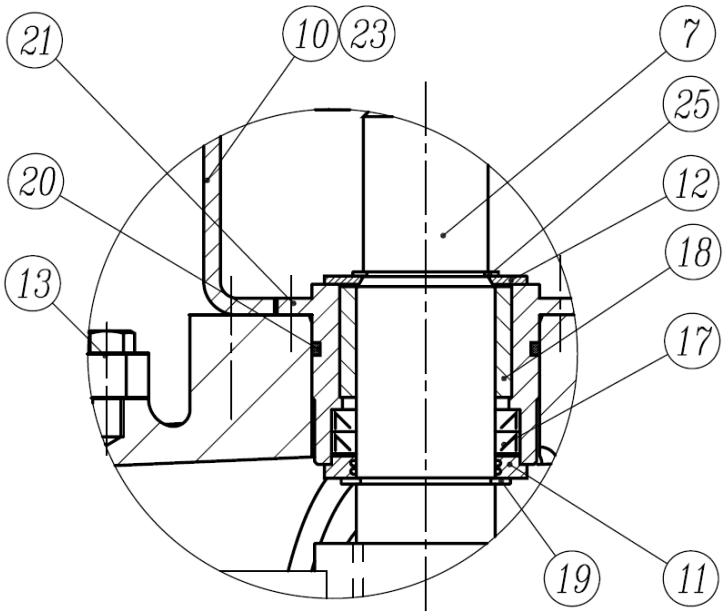
5.10.1 Sectional view

5.10.2 Part List,Spare Parts List

Spare part numbers are highlighted in the box.
With ★ belongs to non standard configuration, selectable.

1	Body
2	Inspection cover
3	Rotor
4	Seal-holder
5	Seal
6	Bush
7	Shaft
8	Shaft
9	Flange with wear insert
10	Actuator bracket
11	Inner distance piece
12	Inner distance piece
13	Bolt GB/T5783-2000
14	Bolt GB/T70.1-2000
15	Key GB/T1096-1979
16	Key GB/T1096-1979
17	Lip seal GB 13871-1992
18	Self-lubricating bearing
19	Retainer ring internal
20	O ring GB/T3452.1-1992
21	Bolt GB/T5783-2000
22	Bolt GB/T70.1-2000
23	Bolt GB/T5783-2000
24	Washer GB/T93-1987
25	Retainer ring internal
26	Washer GB/T93-1987
27	Cylinder ★
28	Solinoid valve★
29	Filter regulator★
30	Box & insided limit switch★
31	Bolt GB/T5783-2000
32	Motor drive★

5.10.3 Shft seal



5.10.3 Sectional view

6 General disassembly and assembly

6.1 Install to the pipeline

6.1.1 Required tools / auxiliary materials

- Wrench set
- Lifting equipment
- Screwdriver set
- Fastener, gasket （contact TECLION if need）
- All accessories do not belong to scope of supply.

6.1.2 Prerequisites for installation

NOTE

Wrong installation may damage the valve ,gear box,motor. Read carefully the instructions of this section.

NOTE

The valve belongs to heavy equipment.You should be careful when installing.

NOTE

When lift the equipment,you must not put the force point to the valve's weakposition,such as Actuator bracket etc.

Check the following requirement:

- The valve is not be damaged.power test if need.
- The valve's flange is in accordance with the pipe flange.
- Enough installation space.
- Pipes have been cleaned.
- There must be no harmful oil, acid, harmful gas, steam, radioactive environment and so on.
- Check the power voltage of the electrical equipment's nameplate.
- Pipes have been grounded.
- Keep the flange cleaning before join together.

6.1.3 Installation of the diverter valve

NOTE

Do not rotate ball.

Danger to fingers and hands.

NOTE

Remove all packing material and preservation.
Check for transport damage

NOTE

When fitting the ball type diverter valve make sure that it is not subject to uneven loads as a result of external stresses or vibration.

Any stress imposed on the diverter by misalignment of connecting pipework may result in its incorrect operation and the danger of imperfect sealing.
For this reason, it may be advisable, under certain conditions, to insert FLEXIBLE JOINTS between the diverter valve and its mating pipes in order to isolate the former from the latter.
This requirement is ESSENTIAL on conveying lines of a certain length, in the presence of high temperatures, and where any stress due to pipe misalignment may cause deformation to the diverter.
Consequently it is essential to attach the DP to a fixed anchor point using the tapped holes in the diverter body if at all possible. If the system arrangement does not permit this, use fixed anchor points as close to the DP as possible.

NOTE

Fitting bolts into the blind holes.The bolts when tightened must not touch the base of the blind hole.

- Verify that the ball can move without any effort.
- Position the diverter valve and firmly anchor it to the structure.
- Connect pipes by inserting proper flexble gasket between flanges.
- Carry out a further verification so that the ball may be operated without any effort in order to make sure that there was no deformation during handling and assembly and that no foreign objects have entered the diverter.
- See MANUAL OPERATION on page 17.
- Carry out all necessary electric and pneumatic connections using the diagram supplied with the system.
- Working pressure at the pneumatic actuator:4-7bar.

NOTE

The diverter valve must NOT be operated when product is flowing through the valve as the seals may otherwise be damaged with a resultant risk of possible leakage.
It is preferable that the conveying air be left turned on.

MANUAL EMERGENCY OPERATION

In the event of an emergency due to the loss of power and air supplies, the DP diverter may be operated by hand as indicated below:

- Remove any protection plugs on the solenoid valve inlet and discharge outlets or disconnect pneumatic supply.
- operate with a suitable bolt on shaft(none drive) .
- after this operation,extract the bolt.
- Reconnect compressed air.

Note

The diverter shall be protected by proper insulation or barriers in case it operates at temperatures＞40℃。

Installation sequence

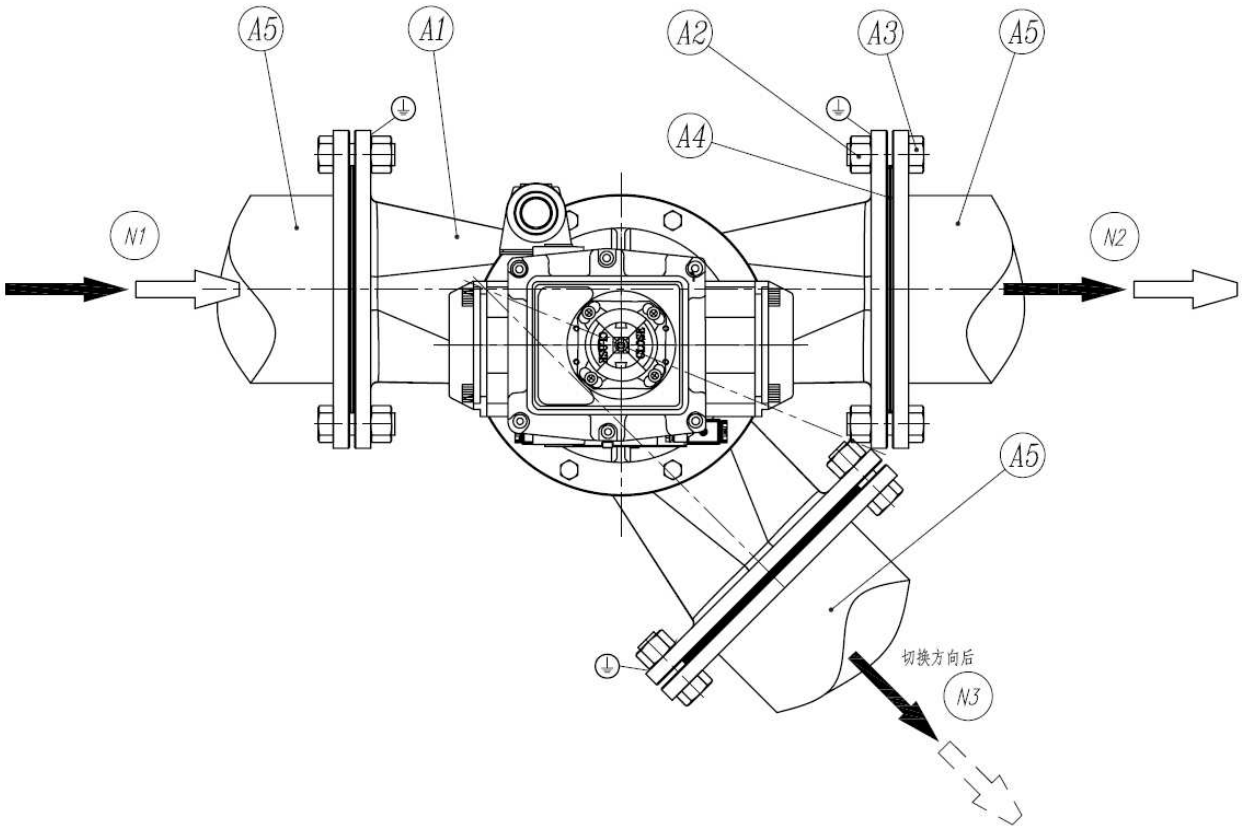
- Connect product pipes
- Connect compressed air to valve
- Verify pneumatic actuator control pressure.
- Connect solenoid valve and position switches
- Carry out some manual operations in order to verify electric responses and check pneumatic connections
- Check that all accessories are properly assembled and locked.
- Adjust the exhaust flow regulator on the solenoid valves in order to optimise the ball's speed of rotation
- Check the operation of the ball type diverter

After the installation sequence has been carried out, the control system and operation of the valve should be checked for correct operation before product is allowed to flow.
The noise of the operating diverter is lower than 70 dBA at 1 m distance.

6.1.4 Connection diagram for the ball type diverter valve

The ball type diverter valve iws equipped as standard with:Pneumatic torque actuator,electrically operated 5/2 double solenoid valve,micro switches and junction box.

6.1.5 Typical installation diagram



A-1 Typical installation diagram

Symbol description

A1	Diverter valve		
A2	Nut	N1	Inlet
A3	Bolt	N2	outlet
A4	Sealing gasket	N3	outlet
A5	Pipe line		

Static Grounding material direction gas direction

6.1.6 Installation instructions

- N2 is connected to the flowing inlet.
- N3 is connected to the folwing outlet..
- N4 is connected to the folwing outlet.

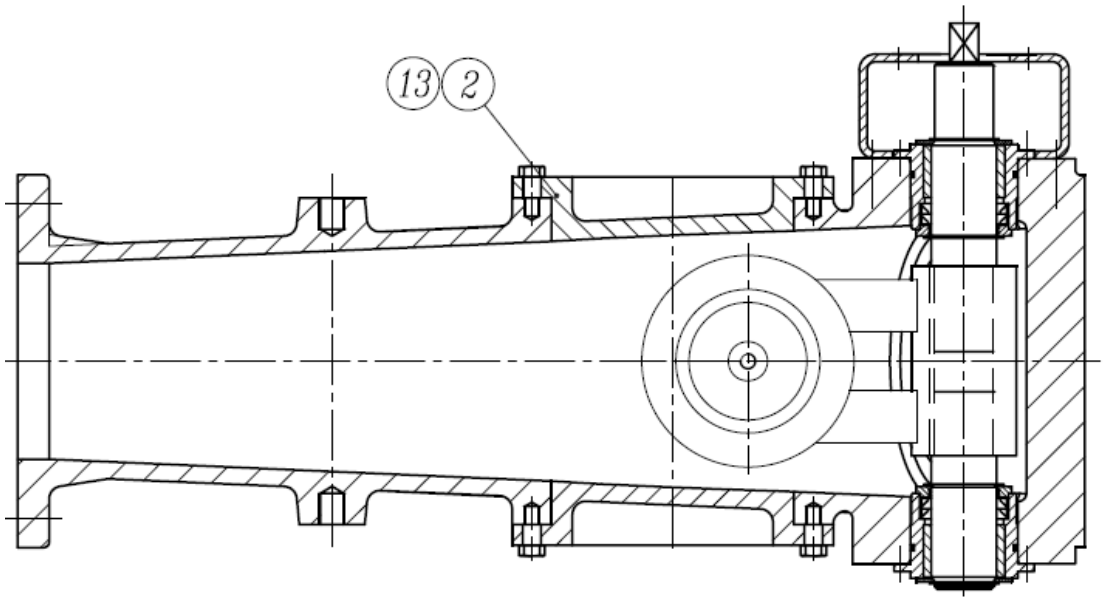
NOTE

Static grounding is strictly necessary .

6.2 Disassemble the valve on the line

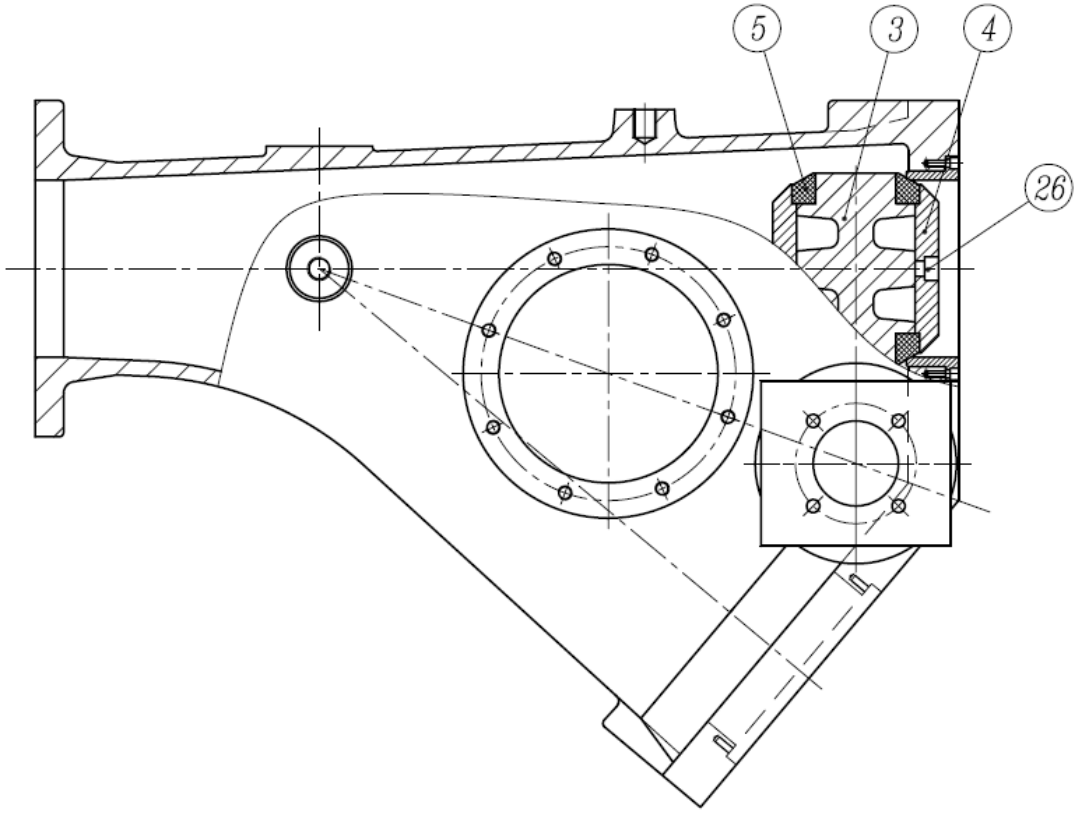
- The required tools are same to 6.1.1.
- Remove the bolts A3 and nuts A2.
- Remove the other fastener.
- Remove all the junction cable.

6.3 Replacement of seals



6.3.1 Sectional view

- Unscrew and remove screws ⑬
- Remove inspection cover ②
- Clean sealant between cover② and body①



6.3.2 Sectional view

- Remove screw ㉖
- Remove seal-holder④ and seal⑤ on one side of the ball.
- Clean seal seats and the inside of the diverter in the aera where seals are,and insert a new seal.
- Re-assemble seal-holder④ and screw㉖.
- Manually operate valve to relocate ball to other outlet.
- Repeat above operations for seal on opposite side of ball.
- Check seating of both seals.
- Re-cover sealant between cover② and body①
- Re-assemble inspection covers②,screw⑬.

NOTE

After re-assembly,carry out the function tests to ensure correct operation of the valve.

7 Commissioning

7.1 Preparatory Measures

The first commissioning has a strong influence on the optimal working of the valve.

- the diverter valve and accessories are checked (for possible transportation damage, errors during assembly),
- additional advice about the operation of the diverter valve (the system), the maintenance and the corrective maintenance will be provided.
- the operating personnel are briefed,
- the system is checked, depending on the contract agree-ment, and the optimal settings determined.
- Install the diverter valve in accordance with the "Assembly" chapter.
- Check that all screwed connections are tight.
- Check the electrical connection of the electrical device.
- Inspection of the earthing connections.

7.2 Run Test without Product

- Check the Solinoid valve
- Check rotational direction.
- Check limit switch.
- Pay attention for abnormal noises.

7.3 Run Test with Product

After the empty-run test has been successfully completed, the valve can be integrated into the machine and the test-run with product feeding can be carried out.

- After the first 24 operating hours, check that all screwed connections are tight and, if necessary, retighten. Tightening torques for screwed connections.

7.4 Safety instructions

NOTE

Don’t put your hands into the running diverter valve.

NOTE

The valve must only be put into operation in a closed system.

8 Normal Operation

8.1 Normal Operation

Normal operation of the diverter valve should as follow indicators:

- Smooth flowing
- No abnormal sound.
- No blockage.
- No abnormal heat.

NOTE

You should check all the materials under the outlet of the diverter valve have been completely conveyed. Otherwise the rotor may be stucked.

8.2 Faults, possible Causes and corrective Measures

The following faults are only examples. The corrective measures described are not the only solutions to the faults.

Fault	Possible Causes	Corrective Measure
The solenoid valve is not working	● Check supply voltage ● Check that the electrical connection is correct ● Check that coils are not burnt	
The diverter is not diverting or not completing its stroke	● Solenoid valve discharge ports dirty or blocked ● Insufficient compressed control air pressure ● Check system logic	● Clean,adjust or replace them ● Check line pressure ● The diverter should only operate when there is no product in the line.Check and clean diverter internally with attention to the seal⑤.
Loud squealing and whistling sound	● Bulk goods inclining to compact and build up	● Discussion with TECLION required!
There is product leakage on the closed leg	● Check seals⑤. ● Wear ring ⑨ inserted into the outlets have worn out ● Scalings are formed in the sealing aera such as to prevent seals ⑤ from working properly.	● Replace seals if worn ● Replace the wear rings,taking care to smear a thin and even silicone film onto machined parts in order to ensure maximum tightness. ● Thoroughly clean seal seats,in order to avoid scalings,when conveying difficult products,it is advisable to prevent product deposits.For this reason immediately after a conveying phase, it is advisable to carry out a complete ball diversion with air in the line, so as to clean the inside of the diverter before the product can form scalings.

There is no diverter position signalling on the panel	● Check operation of limit switch	● Adjust or replace as appropriate
There is product leakage from seals on the shaft	● Check lipseals	● Replace if necessary
The pneumatic actuator is losing power	● Worn-out inner seals	● Replace inner parts or the whole actuator

Please contact our customer services for faults which you are unable to rectify yourself using our table.

8.3 Measures before and after a long Period of Shutdown of the Valves up to a max. 3 months

8.3.1 Before long Period of Shutdown

- Run the valve until it is empty and clean it.
- Carry out conservation measures in accordance with chapter "Transportation and Storage".

8.3.2 After long Period of Shutdown

- Remove any clinging dust and conservation agents from the valve.
- Make sure that the inside of the valve is free from foreign bodies.
- Put valve into operation in accordance with chapter "Commissioning".

9 Maintenance

9.1 Advice

- During maintenance and inspection works, pay attention to the safety advice.
- Operating faults, which have been caused by insufficient or improper maintenance, can cause very high repair costs and long downtimes for the valves. Regularly maintenance is therefore indispensable.
- The operating safety and lifespan of the valve depend on proper maintenance, as well as various other factors.
- Always remove deposits of dust and dirt or product. Cleanliness of the machine increases the operating safety.
- Our specialists are always happy to help you with advice.

9.2 Inspection and Maintenance Works

The following inspection and maintenance works must be carried out in regular time intervals, de-pending on the operating conditions:

- Inspect valve for any externally visible faults and peculiarities, e.g. check abnormal running noises, product outlet to discharge outlet …
- Check that all screwed connections are tight.
- Check that connection flanges are tight and sealed.
- Inspection and maintenance works on cylinder or gearmotor Manufacturer Information.
- Regularly cleaning of the casing surface of dust deposits.

9.3 Grease

- The bearing is made of strong cast bronze based metal with special solid lubricants embedded.The base metal withstands high load and the solid lubricants provide for self-lubrication.The bearing shows excellent performance without pre-lubrication under conditions of extreme high/lower temperature with low speed.
- After running about 2500 hours,you should check the bearing.In cases where the product being handled is liable to clog or scale,check that the valve sealing and operation has not been adversely effected.