INSTALLATION, OPERATION AND MAINTENANCE MANUAL

DMN WESTINGHOUSE

TYPES

DIVERTER VALVES


PTD

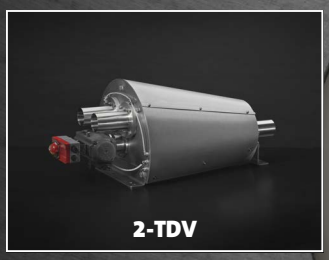

SPTD


SPTDS

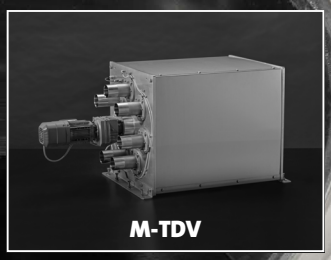

GPD


FDV-F/FDV-P


BTD


2-TDV


3-TDV


M-TDV

1. FOREWORD

DMN-WESTINGHOUSE diverter valves are available in many types and sizes suitable for a specific use or variety of applications. The extensive diverter range comprises of series of plug diverters (dual pipe, single pipe, gravity) and tube diverters (2-14 ports), some of which are also available in USDA Dairy accepted version. For the mineral industry, the BTD ball diverter with its rugged design is very suitable for handling abrasive products.

This Installation, operation and maintenance Manual (IOM-Manual) is written to inform you, as a user, how to work safely with our products!

This manual provides information useful to someone skilled to the level of a technical specialist.

Language: English

Original English Manual

Document number: DV-01-00-ENG, revision: 2.0.1

1.1 RESPONSIBILITIES FOR OWNER AND USER

This product should not be operated or maintained by unauthorised personnel or technical specialists without training!

Read the instructions carefully before installation, operation, repair or maintenance.

Make sure all security recommendations and precautions have been read and understood. Also read the security recommendations of complementary supplier's documents.

The user remains responsible for supervision and compliance with this manual!

As DMN-WESTINGHOUSE we strongly recommend you to:

- Contact DMN-WESTINGHOUSE for urgent questions, refer to chapter **Contact information**.
- Keep the manual in a dry, safe and convenient place for all relevant personnel.
- Keep all security marks on the DMN-WESTINGHOUSE product visible; replace them if necessary.

1.2 HOW TO WORK WITH THIS MANUAL

This manual relates to diverter valves.

Due to the modular design of these diverter valves, different configurations are possible, for example: variations in seals, materials, etc.

To be sure you are getting the right information of your (customised) diverter valve you must consult the sales order confirmation and parts list (refer to chapter **Applicable documents**), both related to the serial number. You can find the serial number on the builder's plate, mounted on the diverter valve in question.

INSTRUCTION

1. Look up serial number from the builder's plate (mounted on the diverter valve).
2. Get corresponding documents 'Sales order confirmation' and 'Parts list' related to the relevant serial number of the diverter valve (refer to chapter **Applicable documents**).
3. Look up the type of diverter valve and its configuration (seals, materials etc.).
4. Consult **Contents** page of the IOM-manual, to identify relevant chapter.
5. Locate required information concerning the type of diverter valve and its configuration as mentioned in the corresponding documents.

Please contact DMN-WESTINGHOUSE if the desired information is not clear or comprehensive!
(Refer to chapter **Contact information**)

1.3 REVISION SERVICE

Future changes to this manual by DMN-WESTINGHOUSE will be updated as required by revisions.

The revision number consists of a three-part code:

Change related to ATEX | Changes in general | Improvements

Change related to ATEX	All changes related to ATEX, no matter how small the change is.
Changes in general	Changes that substantially change the content of the document.
Improvements	Changes that do not substantially change the content of the document.

2. CONTENTS

2.1 TERMS AND DEFINITIONS

The table below explains all terms and definitions in this document.

ATEX (EX)	ATmospheres EXplosibles
CE	Conformité Européenne
EAC	EurAsian Conformity
EC	European Commission
FDA	Food and Drug Administration
IOM-Manual	Installation, Operation and Maintenance Manual
USDA	United States Department of Agriculture

2.2 APPLICABLE DOCUMENTS

The applicable documents are stated on the sales order confirmation. These documents are a part of this IOM-Manual. Without these documents this IOM-Manual is not complete. Always retain these documents together as a set.

3. PREFACE

3.1 INTENDED AND NON-INTENDED USE OF THE PRODUCT

Operation and maintenance of DMN-WESTINGHOUSE products must be carried out in accordance with the instructions given in this manual. Materials to be handled during operation must comply with material specification in the sales order confirmation.

3.2 CHANGES AND MODIFICATIONS

Changes and modifications to DMN-WESTINGHOUSE products may lead to damage to these products and potential injury to personnel. The product may not be changed in any way without written permission of DMN-WESTINGHOUSE. DMN-WESTINGHOUSE is not liable for risks and consequences resulting from unauthorised modifications.

3.3 LIABILITY

DMN-WESTINGHOUSE accepts no liability for unsafe situations, accidents and/or damage resulting from any of the following points:

- Operation, maintenance or repair work by untrained or unauthorised personnel.
- Non intended use of the product.
- Modifications made to the product without written permission of DMN-WESTINGHOUSE.
- Failure to maintain the product in accordance with this manual.

3.4 WARRANTY

The conditions for validity and applicability of the warranty are specified in the general conditions and the sales contract.

4. CONTACT INFORMATION

CONTACT OUR AFTER-SALES DEPARTMENT

If you have any technical questions or encounter issues during installation or maintenance, our after-sales department is here to assist you. Whether you need troubleshooting advice, information about spare parts, or help with warranty claims, we're ready to help.

You can reach our after-sales team or contact one of our offices through the following channels:

DMN-WESTINGHOUSE Headquarters
+31 252 361 820
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In addition to our after-sales support, we also have a Technical Support Page that is regularly updated with the latest guides, troubleshooting tips, and product information. This resource can provide quick solutions and up-to-date technical documentation, **DMN-WESTINGHOUSE technical support - overview (dmnwestinghouse.com)**

Our experienced team is committed to providing you with fast and efficient assistance and ensuring that your service work continues smoothly. Don't hesitate to contact us if you need support - we're here for you.

5. PRODUCT INFORMATION

5.1 IDENTIFICATION

For identification a nameplate is mounted on the diverter valve.

5.1.1 TYPE DESIGNATION

The type designation consists of a five-part code.

	-		-		-		-	
⇓		⇓		⇓		⇓		⇓
Type		Size (inlet)		Execution		Additional		ATEX

For example:	PTD	-	65	-	2	-	-	-	Eq
Type	Dual Pipe Plug Diverter (PTD)								
Size	⌀65 mm or inlet size								
Execution	Aluminium								
Additional	Standard								
ATEX	ATEX Certified Equipment								

For the explanation of the available types, sizes, materials and executions, please refer to the table below.

5.1.1.1 OVERVIEW CODES OF AVAILABLE TYPES, SIZES, MATERIALS AND EXECUTIONS

	-		-		-		-	
⇓ Type		⇓ Size		⇓ Execution		⇓ Additional		⇓ ATEX
		Inlet ⌀(mm)	Code	Description	Code	Description	Code	Description
PTD		40	1	Cast Iron	-	-	-	No EX
SPTD		50	2	Aluminium	STA	Static Seal	Eq	EX-Approval Equipment
SPTDS		65	2HA	Aluminium	DYN	Inflatable Seal		
GPD		80	2SSI	Aluminium				
2-TDV		100	3	Stainless Steel				
3-TDV		125	Dairy	Stainless Steel				
M-TDV		150	A	Pneumatic Actuator				
FDVP		162	E	Electric Actuator				
FDVF		200	H	Hand Operation				
BTD		213						
		250						
		267						
		300						
		318						
		350						
		400						

5.1.2 NAMEPLATE (ATEX CERTIFIED PRODUCTS)

The ATEX certified diverter valve is equipped with a specific nameplate giving additional ATEX information.

5.1.3 ATEX MARKING

The ATEX marking is applied as prescribed by the ATEX 2014/34/EU standard.

ATEX MARKING ON THE PRODUCTS:

II 1/2 D Ex h IIIC T∗ °C ...T∗ °C Da/Db

II 1/2 D Ex h IIIC T∗ °C ...T∗ °C Da/Db
II -/2 G Ex h IIB T∗ ...T∗ -/Gb

*= to fill in the concerning temperature or temperature class

Code/symbol	Description
	Ex Mark for equipment in explosive atmospheres
II	Above ground industry
1/2 D	Internal zone 20 (it can also be used for zone 21, 22)
	External zone 21 (it can also be used for zone 22)
-/2 G	External zone 1 (it can also be used for zone 2)
h	Nonelectrical type of protection constructional safety “c”
	EN-ISO 80079-37:2016
	• Bearing • Seal
IIB	Explosion group of explosive Gas atmosphere
	(a typical gas is ethylene)
IID	Protective system
IIIC	Explosion group of explosive Dust atmosphere
	(suitable for combustible flyings, non-conductive dust and conductive dust)
T∗	The actual maximum surface temperature depends not on the equipment itself, but mainly on operating conditions (temperature of the product) and the marking is T. The relevant information is given in the instructions for use.
Da/Db	Very high (Da) / High (Db) protection level for use in hazardous areas (Dust).
-/Gb	High (Gb) protection level for use in hazardous areas (Gas).

*= concerning temperature or temperature class

5.2 EXPLOSION PROOF DIVERTER VALVES

For the specific version of the diverter valve, please consult the sales order confirmation, and parts list, which are both related to the serial number (refer to chapter **Applicable documents**).

5.2.1 ATEX EXECUTIONS

ATEX certified diverter valves are designed for diverging and/or converging of products, in powder or pellets form, in pneumatic conveying systems in a potentially explosive atmosphere.

5.2.1.1 INGRESS PROTECTION (IP RATING)

The construction of the diverter valve fulfils the ingress protection IP20.
For the inside zone 20 – EPL Da and the outside zone 21 – EPL Db the ingress protection is not necessary.

5.2.1.2 AMBIENT TEMPERATURES

Operate diverter valves at an ambient temperature of -20°C...+60°C.

5.2.1.3 SURFACE & PRODUCT TEMPERATURES

The surface temperature of the diverter valve depends on the temperature of the product to be handled.

Tproduct +20°C
The maximum product temperature for the diverter valves depends upon on the type of diverter.
Maximum product temperature is given on the nameplate and sales order confirmation (refer to chapter **Applicable documents**.)
If the surface temperature is higher than listed on the nameplate, the diverter valve must be stopped immediately!
Exceeding the maximum surface temperature listed on the nameplate is not permitted!
If in doubt, please contact DMN-WESTINGHOUSE!

5.2.1.4 TEMPERATURE AND DUST

The plant operator must ensure that any possible dust accumulation does not exceed a maximum thickness of 5 mm as described in the standard EN-60079-14.

EN 60079-14 ed.4 clause 5.6.3.3.
Up to 5 mm thickness of the dust layer – Maximum temperature of the diverter valve T_{max} which is written on the label of the diverter valve cannot be higher than ($T_{5\ mm}$ – 75°C).
Where $T_{5\ mm}$ is the minimum ignition temperature of 5 mm layer of concrete dust.

There must be no flammable solvents within the dust!

For EPL Ga internally or EPL Gb externally the diverter valves shall be marked with the following temperature classes based on the temperature of the product to be handled:

Product temperature	Resulting temperature class
< 75°C ambient Ta for T5: -20°C...+60°C	T5
75°C < 110°C	T4
110°C < 175°C	T3

5.2.1.5 SELF-IGNITION TEMPERATURE (SIT)

Ball Diverter (BTD)
Maximum product temperature is 80°C
WARNING – SELF-IGNITION OF DUSTS - Self-ignition temperature (SIT) of the product to be handled must be higher than Product temperature +10°C.

5.3 STANDARD, GUIDELINES AND CERTIFICATION (OPTIONAL)

5.3.1 CE

Conformité Européenne

The CE marking is a manufacturer's declaration that the diverter valves meets the safety, health and environment requirements of the applicable EC directives. The diverter valves comply with the 2006/42EG directive and additional directives (if applicable).
The CE certified diverter valves are provided with an: "EC declaration of conformity of the machinery".

5.3.2 ATEX

ATmospheres EXplosions

ATEX compliant diverter valves are suitable for hazardous dust or gaseous environments in accordance with the applicable EC directives. These diverter valves comply with the 2014/34/EU directive. ATEX compliant diverter valves are provided with an ATEX marking on the builder's plate.

5.3.3 EC 1935/2004 | FDA

European Commission 1935/2004 I Food and Drug Administration

Diverter valves compliant with the EC1935/2004 and its supporting regulations EU 10/2011 and EC 2023/2006 are considered safe for food contact. The materials used also comply to FDA regulations regarding food contact. EC 1935/2004 compliant diverter valves are provided with a food safe symbol.

5.3.4 USDA

United States Department of Agriculture

Diverter valves accepted by the USDA (United States Department of Agriculture) are for use in dairy applications. The USDA is the U.S. federal executive department responsible for developing and executing federal laws related to farming, forestry, and food. USDA accepted diverter valve comply with the USDA guidelines and are tested and certified by the USDA.
These USDA accepted diverter valves are certified as "USDA Dairy Accepted".

5.3.5 EAC

EurAsian Conformity

The EAC certification mark indicates that the diverter valves are conform the technical regulations of the Eurasian Customs Union. EAC marked diverter valves comply with the health, safety and environmental protection standards of the EAEU (Eurasian Economic Union).

6. SAFETY

6.1 SAFETY RULES

Always follow the safety rules written by local law and/or defined by owner.

Local safety rules must always be followed in the first place. Please inform your supervisor in case these rules contradict to the safety warnings and signs given in this IOM-manual.

6.2 GENERAL SAFETY INSTRUCTIONS

The safety instructions should be followed when:

- Installing the diverter valve;
- maintaining and repairing the diverter valve.

Management must ensure that:

- Maintenance personnel observe safety instructions, as described in this document;
- any equipment necessary for working according to the safety instructions is made available;
- maintenance personnel possess the necessary skills.

Failure to follow these safety instructions, may result in one or more of the following:

- The safety of the operating or maintenance personnel could be endangered;
- the diverter valve may not function correctly;
- the system which contains the diverter valve may be damaged.

When product specifications necessitate supplementary safety instructions and the wearing of protective clothes, it is obligatory to follow local safety instructions.

INSTRUCTION

Before installation, maintenance and repair work:

- Electrical supply to the solenoid valve must be isolated.
- Electrical supply to the electric actuator/motor gear unit must be isolated.
- Air pressure to pneumatic cylinder/actuator must be isolated.

During installation, maintenance and repair work:

- Perform installation, maintenance and repair work in accordance with the instructions given in this manual.

After installation, maintenance and repair work:

- Re-assemble all safety parts removed during work.
- Check operation function of all re-assembled safety parts.

6.3 WARNINGS & SYMBOLS IN THIS DOCUMENT

Below is an explanation of the symbols that are used in this document to draw the reader's attention to specific situations.

DANGER OF DEATH!
The life of the user is at risk.

DANGER!
There is a risk that the user may be seriously injured and / or the system may be seriously damaged. This warning highlights the resulting risk if the user fails to follow the procedures in this manual carefully.

CAUTION!
The system may be damaged if it is used or operated incorrectly.

ATTENTION!
Warning gives additional information concerning possible problems that may occur.

Important notes on explosion protection!

It is important to read the instruction

6.4 WARNINGS & SYMBOLS ON THE PRODUCT

Meaning: **Food safe** (material used in the product is safe for food contact)
Risk: Production of unhealthy food
Location: Body of the diverter valve

Meaning: **Electrical safety earth**
Risk: Static electricity
Location: Body of the diverter valve

6.5 RISKS FOR PERSONAL INJURY

Risk	Where	When	Precaution	Warning sign
Electrocution	Solenoid valve Electrically operated	During maintenance.	Make sure the solenoid valve is disconnected from the power before any repairs or service	
Trapping hand	Inside the diverter valve.	During maintenance.	Make sure the motor is disconnected from the power before any repairs or service. Wear protective gloves.	
		During storage.	Use cover caps and warning indications at the openings of the diverter valve when it is left unattended.	
Burns	Body diverter valve.	During technical cleaning or maintenance.	Cool down the diverter valve before any repairs or service. Wear protective gloves.	
Inhalation of toxic substances	Inside the diverter valve	(Only when handling harmful substances).	During technical cleaning or maintenance. Wear respiratory protection.	
Hearing damage	Near diverter valve.*	During operation, noise may exceed 80dBA depending on external circumstances.	Wear hearing protection.	

*The noise generated by the different types of diverter valves is insignificant. The noise level can be influenced by the product to be handled (build up) and operating conditions. Any significant noise generation is an indication of product build up, trapped particles or mechanical failure(s).

6.6 ADDITIONAL SAFETY INSTRUCTIONS FOR USE IN POTENTIALLY EXPLOSIVE ATMOSPHERE

The Diverter valves are intended for industrial systems and may only be used in accordance with the information provided in DMN technical documentation and the information listed on the nameplate.

They comply with the applicable standards and regulations and meet the requirements of directive 2014/34/EU .

INSTALLATION, CONNECTION, START-UP, MAINTENANCE AND REPAIR WORK ON THE DIVERTER VALVE MAY ONLY BE PERFORMED BY A QUALIFIED SPECIALIST WHILE TAKING THE FOLLOWING INTO ACCOUNT:

- Instructions given in this manual.
- The warning and information signs on the diverter valve.
- Currently valid national / regional regulations.

  (Explosion protection, Safety, accident prevention)

Always check if there are any potentially explosive atmosphere, oils, acids, gases, vapours, radiation etc. present during installation, connection, start-up, maintenance and repair work.
Explosive concentrations of dust can lead to severe or fatal injuries in connection with hot surfaces, parts under power and moving parts of the diverter valve.

Remove dust deposits when ignition sources (e.g. sparks through grinding) can be created during installation, connection, star-up, maintenance and repair work.

7. STORAGE AND TRANSPORT

ATTENTION!
Keep the product in its original packaging in a dry and clean place during storage!
Report transport damage directly to your carrier and your supplier.

DANGER!
Do not touch the inlet of the diverter valve during or after unpacking!
Use adequate transport and lifting equipment!
Always use lifting eyes to hoist the product!

7.1 ON RECEIPT

Check product on receipt for signs of transport damage. Report any such cases directly to the carrier and your supplier. Take photographs of any damage and store the packaging for inspection.

7.2 STORAGE

If you do not intend to install the product immediately, it is advisable to store it in its original packaging in a dry and clean place.

7.3 UNPACKING

Read any instructions and warning messages that may be attached to the packaging.

Check that your delivery is complete from the packer's receipt. Report any parts that are missing directly to the carrier and your supplier.

7.4 TRANSPORT

If transporting or lifting the product:

- Use adequate transport and lifting equipment!
- Use approved lifting eyes.
- Use the bolt holes of the flange to connect the lifting eyes.

7.5 OUT OF OPERATION

If the product is installed and will not be operated for some time, ensure that it is clean and leave it in a dry state.

8. OPERATION

First read the safety instructions in chapter **Safety** before operating the product.

DANGER!
Operation must only be performed by trained and authorised personnel!
When the diverter is in operation no maintenance and repair work must be carried out!
During operation of the diverter it must not be possible to reach moving parts like the plug, flap or tube!

8.1 FIRST TIME START UP

INSTRUCTION

- Check voltage of electrical parts.
- Check shaft seal and air purge pressure, if applicable.
- Remove plug that is fitted for transportation purposes from the gear box (if applicable).

8.2 CLEANING

For cleaning, refer to chapter **Maintenance**.

8.3 MALFUNCTIONING

In case of malfunctioning during operation, refer to chapter **Maintenance**.

9. MAINTENANCE

First read the safety instructions in chapter **Safety** before operating the product.

ATTENTION!
After maintenance and repair work has been carried out, all safety parts removed during the work should be re-assembled and their operation should be checked.

DANGER!
Operation must only be performed by trained and authorised personnel!
When the diverter is in operation no maintenance and repair work must be carried out!
When carrying out maintenance or repair work, always shut off the power and guard against unexpected incoming power.
When product qualities necessitate supplementary safety instructions and wearing protective clothes, it is obligatory to follow the local safety instructions.

The plant operator must ensure that any possible dust accumulation does not exceed a maximum thickness of 5mm in accordance with EN 60079-14 ed.4 clause 5.6.3.3.

9.1 GENERAL

The interval between overhauls will vary with the product being handled and should be based on total operating time. To a large degree the rate of wear for a particular application would be ascertained by practical experience.

Maintenance apart from planned overhaul should be adequately covered by regular and frequent attention to the seals.

It is recommended that the complete diverter valve is dismantled for cleaning, inspection and overhaul as necessary at regular intervals.

9.2 MAINTENANCE INSTRUCTIONS

9.2.1 BEFORE MAINTENANCE

INSTRUCTION

- Isolate electrical supply to the solenoid valve.
- Isolate air pressure from the pneumatic cylinder.

9.2.2 MAINTENANCE EVERY 6 MONTHS OR AFTER 4,000 OPERATING HOURS

INSTRUCTION

- Check operation of diverter valve.
- Check control pressure and re-adjust, if necessary.
- Check air supply filter and clean, if necessary.

9.2.3 GENERAL MAINTENANCE EVERY 2 YEARS OR AFTER 15,000 OPERATING HOURS

INSTRUCTION

- Remove diverter valve and clean it thoroughly.
- Check sealing.
- Replace damaged or worn parts.
- Check cylinder and replace worn parts, if necessary (if applicable).
- Check operation of solenoid valve replace silencers.
- Check drive/encoder (if applicable).
- Check position switches (if applicable).
- Fit diverter valve.

9.2.4 MAINTENANCE DRIVE

Read and study the operation instructions supplied by the Motor / Gear unit manufacturer.

9.3 CLEANING

CAUTION!
When high-pressure cleaning, pay attention to the ball-bearing. Damaging the sealing of the ball-bearing may cause malfunctioning of the bearing.
Do not use cleaner with solvent; if using a cleaner with solvent is necessary, make sure that solvent cannot reach bearing and sealing.

9.4 LUBRICANTS

Part	Lubricant	Supplier	Application
Bolt O-ring	Cassida	Shell Nederland	General

The drive has a lifetime grease lubrication.

9.5 SPARE PARTS

For a complete overview of spare parts, see spare part list (refer to chapter **Applicable documents**).

9.6 MALFUNCTION

Common disturbances and possible solutions are stated below, if you are not able to solve the problem, please contact our aftersales department (refer to chapter **Contact information**).

In the event of malfunctioning consult the table below to find the solution. If the problem is not addressed in the table, please contact DMN-WESTINGHOUSE (see chapter **Contact information**).

Problem	Cause	Solution
Pipe changeover does not take place	Position controller failure	Check for error output drive OK low or emergency stop. Contact DMN-WESTINGHOUSE
	Diverter dirty	Clean inside of diverter
	Object between moving parts	Remove object
	Drive / encoder failure	Replace drive / encoder
	Reference switch failure	Replace Reference switch
	Compressed air pressure too low	Increase pressure
	Proximity switch faulty	Replace proximity switch
	Pneumatic cylinder faulty	Replace pneumatic cylnder
No voltage	Fuse faulty	Replace fuse
	Break in power supply	Check power supply
Leakage of diverter valve	Damaged sealing	Replace seals
No compressed air pressure at seals / cylinder / actuator	No system pressure	Check compressor unit
	Solenoid valve failure	Replace solenoid valve
	Pressure switch failure	Replace pressure switch
	Air hose faulty	Replace air hose

10. PTD

10.1 GENERAL WORKING PRINCIPLE

The PTD plug diverter is a compact diverter valve with integral actuator, which has been specially designed for rapid pipe changeover between powders and pellets in pneumatic conveying systems.

Pipe changeover is achieved by turning the plug in the body.

The unit is driven by means of an integral pneumatic cylinder actuated by a solenoid valve.

The body and plug are made of aluminium and fitted with stainless steel pipes where product contact occurs.

Sealing is by means of a static seal with silicone/polyurethane rings or inflatable seal with silicone rings located outside the product flow. Indication of pipe changeover is by means of inductive proximity switches or mechanical switches. Connections for all electrical components are in a terminal box.

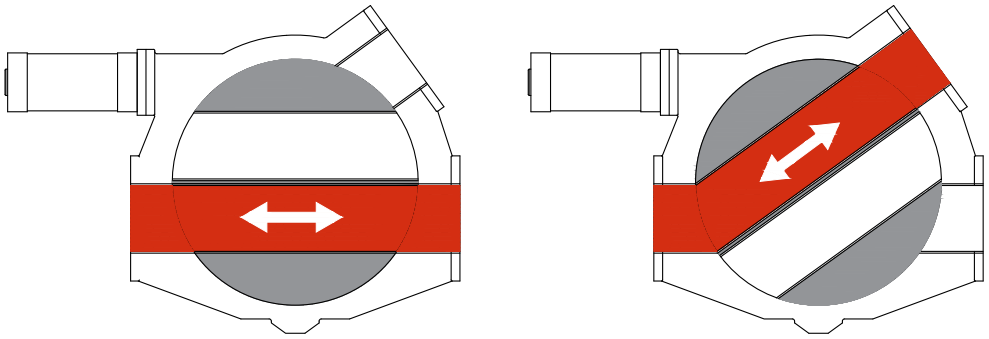


Figure 10.1: Schematic view of a diverter valve (PTD)

10.2 STANDARD EXECUTIONS AND SPECIFICATIONS

PTD plug diverter is a compact valve with integral actuator, designed for rapid pipe changeover between powders and pellets in pneumatic conveying systems.

Figure 10.2: PTD

Pressure	Static -0.5...+3 bar
	Inflatable up to +6 bar
Product temp °C	Standard -20°C...+80°C (Optional up to +120°C)
Ambient temp °C	-20°C...+60°C
	ATEX -20°C...+40°C
Material of construction	Aluminium body-plug-cover
	Stainless steel inserts
Flange hole pattern	DIN PN 10 / ANSI 150 lbs
Seal	Static: silicone / polyurethane
	Inflatable: silicone
ATEX 2014/34/EU	1D/2GD Equipment

Sizes PTD						
50	65	80	100	125	150	200

10.2.1 STATIC SEAL (WITH OR WITHOUT JUNCTION BOX)

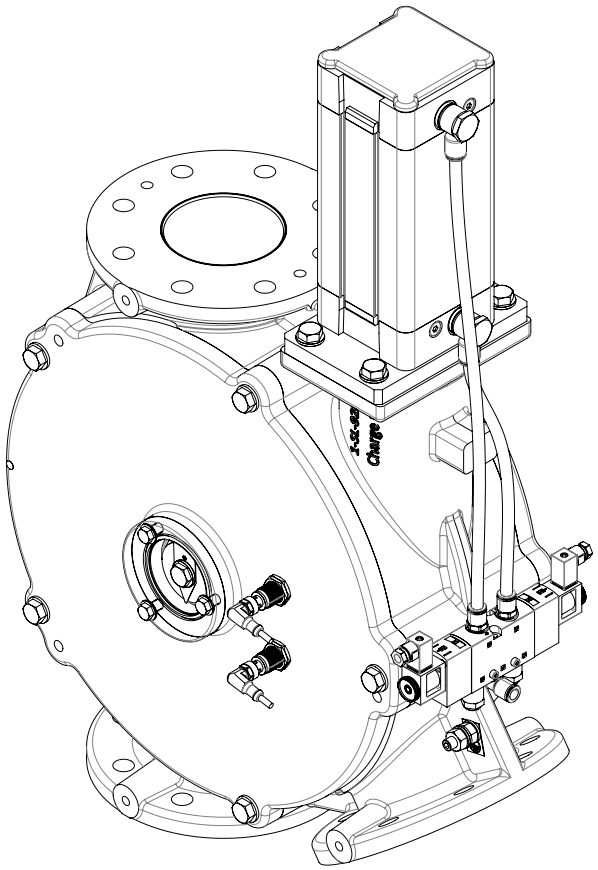


Figure 10.3: Static without junction box (PTD)

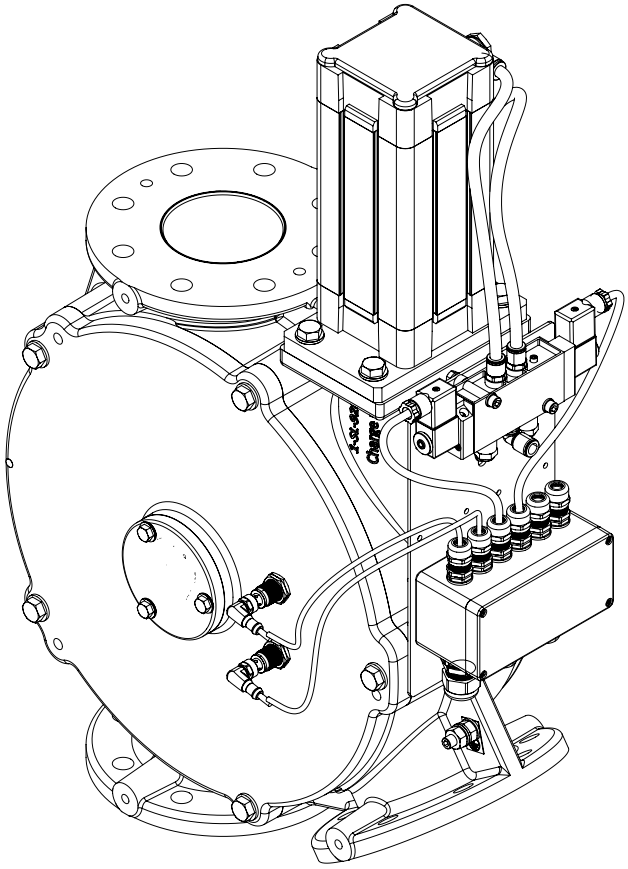


Figure 10.4: Static with junction box (PTD)

10.2.2 INFLATABLE SEAL

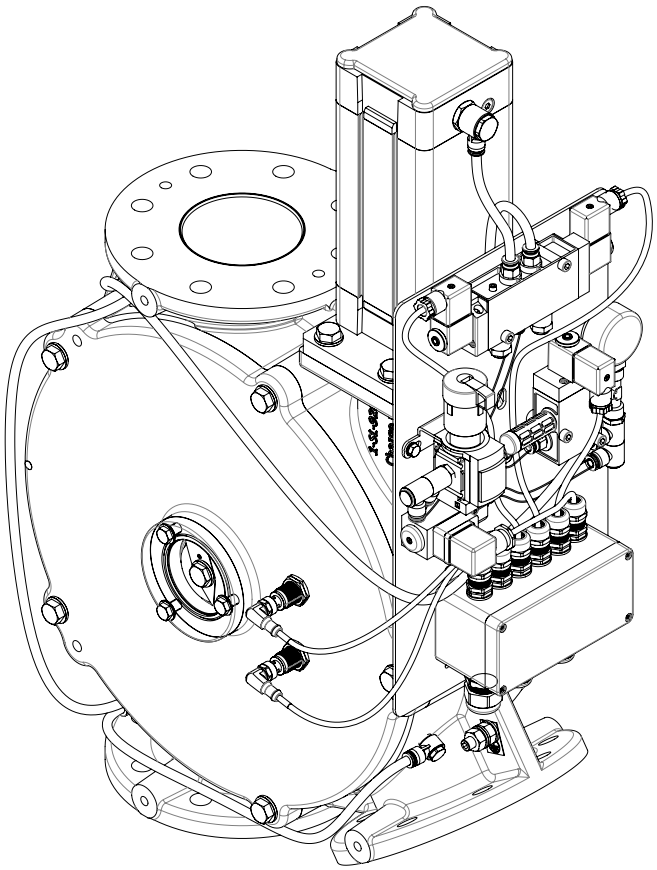


Figure 10.5: Inflatable with junction box (PTD)

10.3 INSTALLATION, COMMISSIONING AND MAINTENANCE

First read the safety instructions in chapter **Safety** before installing the product.

DANGER OF DEATH!
Electrical connection
Make sure that appropriate power supplies are utilised during operation and that in the case of plant or component failure, the diverter valve is isolated from external power sources. Failure to comply may lead to serious or fatal injury, and/or critical product damage.

DANGER!
Installation must only be performed by trained and authorised personnel!
Do not touch the inlet of the diverter valve during or after unpacking!
Do not alter, remove or paint the type specification plates of the diverter, drive unit or fitted switches!
When carrying out installation work, always shut off the power and isolate from all other potential power sources.
When product qualities necessitate supplementary safety instructions and the wearing of protective clothes, it is obligatory to follow local safety instructions.

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

10.3.1 BEFORE INSTALLING

INSTRUCTION

- Remove packaging and delivery protection material from diverter valve.
- Check for any damage; if damaged contact your carrier and supplier.
- Check if diverter valve interior is free from foreign material.

10.3.2 PTD: INSTALLING THE PLUG DIVERTER VALVE INTO THE SYSTEM

DANGER!
Do not turn plug by hand or switch position.
Danger to fingers and hands.
During operation or testing of the plug diverter, pipe connections must not be open or unprotected.
Pipe changeover must only be carried out when the product pipes are not pressurised and do not contain product!
Diverter valves must not be put into service until the equipment into which they have been incorporated has been declared in conformity with the Machinery Directive.

CAUTION!
Solenoid exhaust air regulators are set at the factory.
Changing these settings can cause malfunction or damage to the diverter.

ATTENTION!
Check voltage of individual components as these vary according to customer specification.
The solenoid valve must be connected to correct power supply and a compressed air supply of at least 4 bar.

INSTRUCTION

- Install plug diverter using tapped holes in the body.
- Attach product pipes and ensure that plug diverter is adequately supported and secured.
- Connect the position switches to the user's control system.
- Connect all cables as per terminal wiring diagram and earth connection.
- Check compressed air pressure

- Check if the solenoid valve auxiliary manual operation is in “0” position.

ATTENTION!
Inflatable seal execution
Factory setting 4,5 bar.
Difference between conveying pressure and pressure on the seals must be min. 1 bar.
The max. pressure for the seals is 6-7 bar.

CAUTION!
After installation test run the diverter valve.

10.3.3 INSTALLING THE DIVERTER VALVE IN A POTENTIALLY EXPLOSIVE ATMOSPHERE

Follow up the following important notes in addition to the regular product information and safety and installation instructions.

Read following chapters carefully in addition to the regular product-, safety- and installation information, before installing the product:
- **Explosion proof diverter valves** (chapter **5.2**)
- **Additional safety instructions for use in potentially explosive atmosphere** (chapter **6.6**)
- “Installing the diverter valve in a potentially explosive atmosphere” (this chapter)

Check if information on the nameplate of the diverter valve corresponds to the potentially explosive on-site atmosphere.
Pay specific attention to:
- Equipment group
- Equipment category
- Dust- or Gas area
- Temperature class
- Maximum surface temperature

Check if there are any potentially explosive atmosphere, oils, acids, gases, vapours, radiation etc. present during installation.
Always ground the diverter valve, use the flange connection bolts, or the optional earth-stud on end cover or motor base plate.
Check that the electrical leakage resistance is less than 10^6 Ω.
The maximum velocity during position switch of diverter is not higher than 1 m/s and the maximum power of the drive used on the diverter is not higher than 4kW
To avoid build-up of electrostatic charges avoid charging mechanisms on the surfaces stronger than manual rubbing.
Non-metallic coatings or paints used on the diverter must have a layer thickness <2 mm.
Ensure that no foreign objects are conveyed through the diverter.
Precautions must be taken by the user to avoid this.

Check that the electrical leakage resistance is less than 10^6 Ω between pipe and Body.

DIVERTER VALVE EXTERNAL NO ZONE
- No external explosive atmosphere is permitted
- No dust layers are permitted

10.3.3.1 DRIVE

According to the ATEX directive the maximum velocity must not be higher than 1 m/s and the maximum power of the motor gear unit is not higher than 4kW.
Explosive gas mixtures or concentrations of dust can lead to severe or fatal injuries in connection with hot surfaces, parts under power and moving parts on the gear unit / geared motor.
Installation, connection, start-up, maintenance and repair work on the gear unit / geared motor may only be performed by a qualified specialist while taking the following into account:
- These instructions
- The warning and information signs on the gear unit / geared motor
- Currently valid national / regional regulations
  (Explosion protection, Safety, accident prevention)

CAUTION!
After installation test run the diverter valve.

10.3.3.2 ACCESSORIES (IF FITTED)

Only use;

- solenoid valve
- proximity switch
- pressure switch
- terminal box
- electrical actuator
- etc.

that are CE marked and with an ATEX-approval, equal or higher than the ATEX-approval mentioned on the diverter valve.

Please study the operation instructions supplied by the manufacturer.

Check if the information on the nameplate of electrical accessories such as;

- solenoid valve
- proximity switch
- pressure switch
- terminal box
- electrical actuator
- etc.

corresponds to the potentially explosive on-site atmosphere.

Pay specific attention to:

- Equipment group
- Equipment category
- Dust- Gas area
- Temperature class
- Maximum surface temperature

PLEASE STUDY THE OPERATION INSTRUCTIONS SUPPLIED BY THE MANUFACTURER.

10.3.4 CONNECTION DIAGRAMS

Read following chapters carefully in addition to the regular product- and safety information, before installing the product:

- **Installation, commissioning and maintenance** (chapter **10.3**).
- **PTD: Installing the plug diverter valve into the system** (chapter **10.3.2**).

The PTD plug diverter is equipped as standard with a pneumatic cylinder, electrically operated 5/2 solenoid-solenoid valve, inductive proximity switches and terminal box.

WIRING & PNEUMATIC DEFINITIONS

S1	STRAIGHT POSITION
S2	DIVERT POSITION
SP-S1	Inductive sensor STRAIGHT POSITION
SP-S2	Inductive sensor DIVERT POSITION
VA-S1	Coil solenoid valve STRAIGHT POSITION
VA-S2	Coil solenoid valve DIVERT POSITION
VS	Coil solenoid valve INFLATABLE SEAL
PS	Pressure switch INFLATABLE SEAL

DOUBLE ACTING PNEUMATIC CYLINDER (ISO 15552)

Medium:	Air filtration lubricated or not up to 10 bar
Temperature range:	-20°C...+80°C
Working pressure:	5-10 bar
Hose:	⌀8-10 mm

PTD Size	50	65	80	100	125	150	200
Air consumptionat 6 bar in Ltr./stroke	2,1	4,95	5,5	6,35	11,6	13,75	28,2

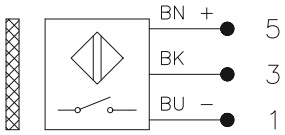
Table 10.1: Air consumption

POSITION SENSOR

- Inductive proximity sensor

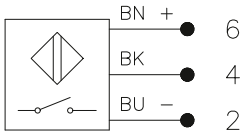
A STANDARD

SP–S1



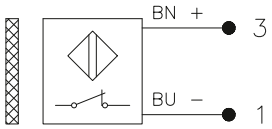
DC sensor
Nominal voltage — 10...30 V DC
Normally open pnp
Ambient temperature — -25°C...+70°C
3-wire

SP–S2



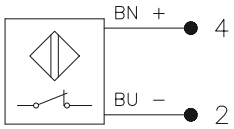
B

SP–S1



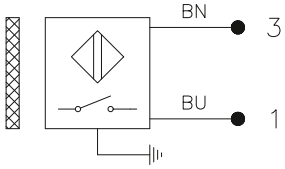
Namur DIN 19234 sensor
Nominal voltage — 8 V DC
Ambient temperature — -25°C...+100°C
2-wire

SP–S2



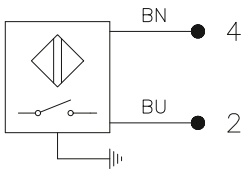
C

SP–S1



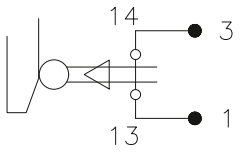
AC sensor
Nominal voltage — 20...250 V AC 45...65 Hz
Normally open
Ambient temperature — -25°C...+70°C
2-wire

SP–S2



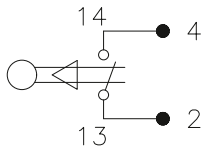
D

SP–S1



Mechanical switch

SP–S2



10.3.4.1 PNEUMATIC CONNECTION (STATIC SEAL)

STATIC SEAL EXECUTION

- Solenoid valve 5/2 bistable execution with manual control.

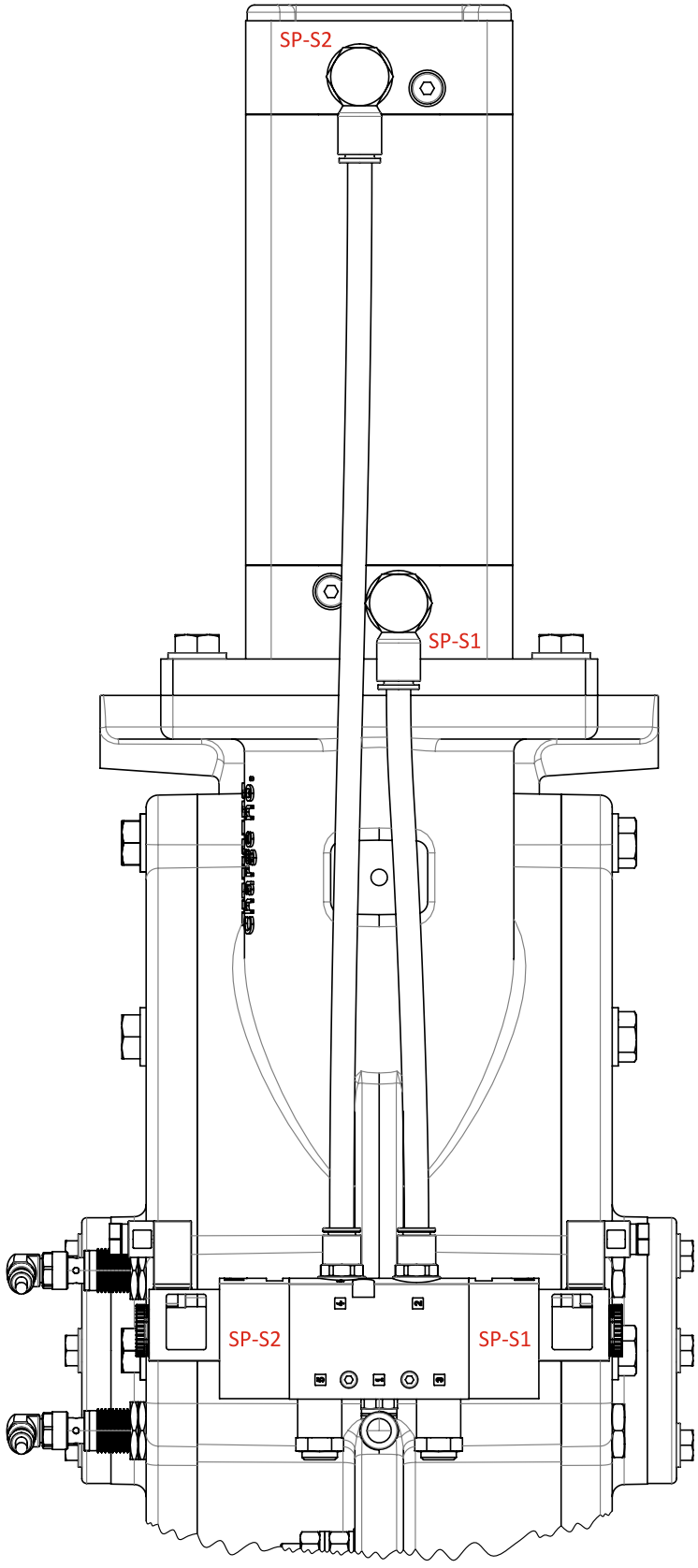


Figure 10.6: Solenoid valve port definition (PTD)

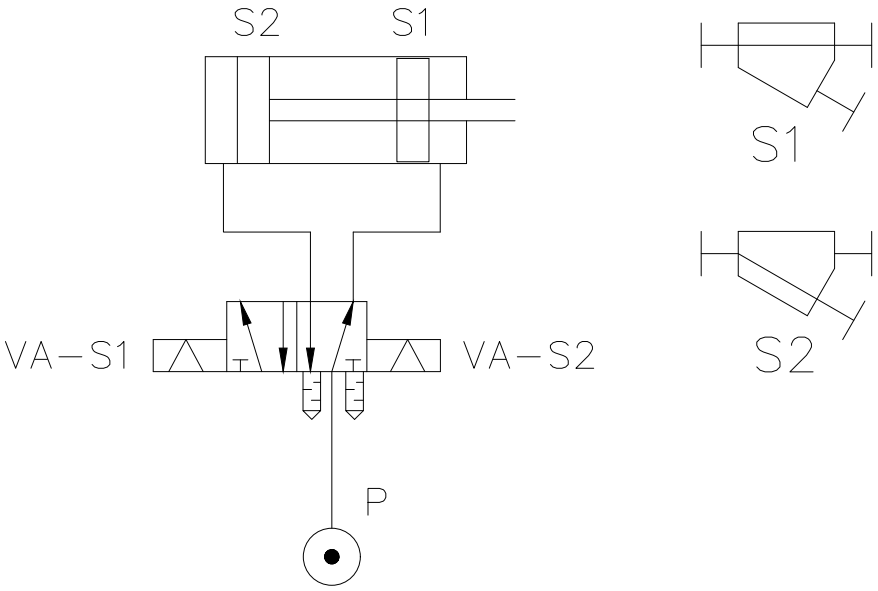


Figure 10.7: Pneumatic connection static seal (PTD)

10.3.4.2 WIRING CONNECTION (STATIC SEAL)

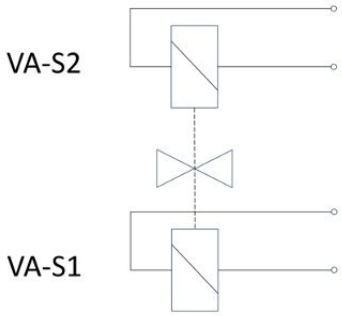


Figure 10.8: Wiring solenoid valve coils (PTD)

10.3.4.3 TERMINAL BOX CONNECTION (STATIC SEAL)

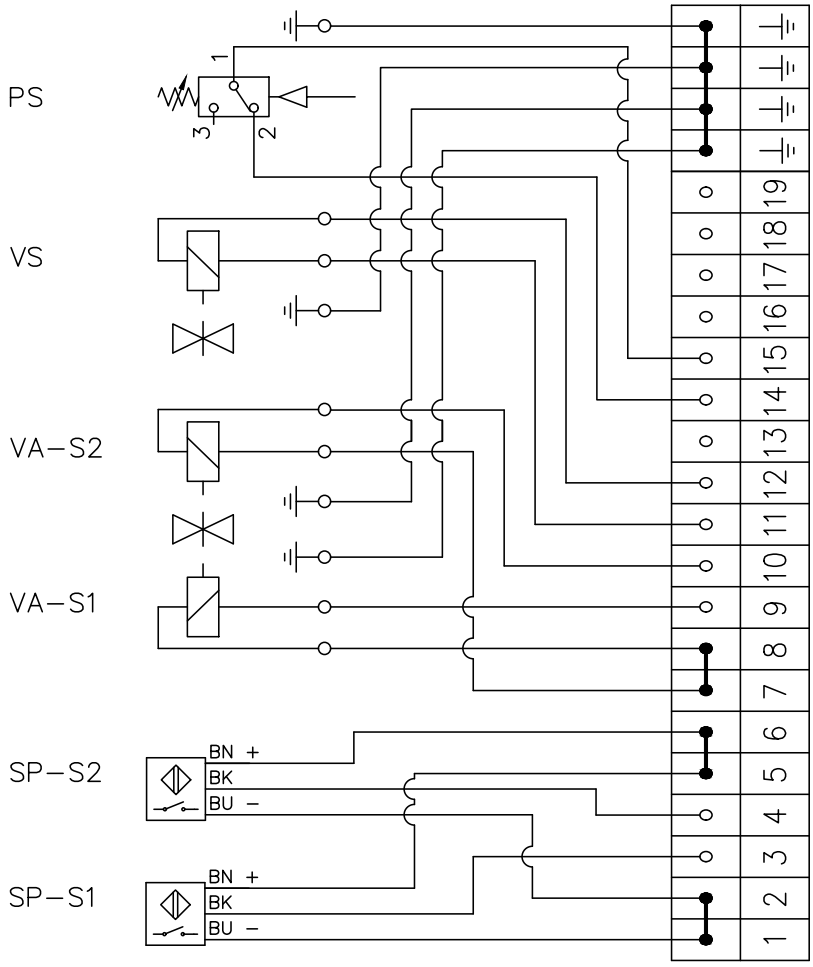


Figure 10.9: Terminal box static seal wiring diagram (PTD)

10.3.4.4 TERMINAL BOX CONNECTION NAMUR (STATIC SEAL)

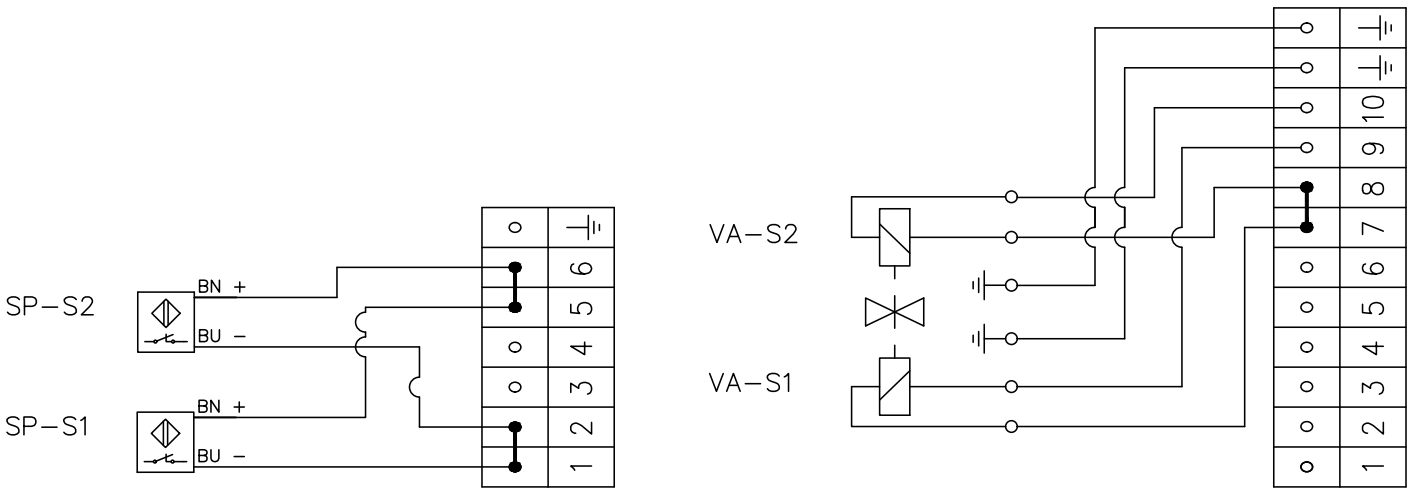


Figure 10.10: Terminal box NAMUR static seal wiring diagram (PTD)

10.3.4.5 PNEUMATIC CONNECTION (INFLATABLE SEAL)

INFLATABLE SEAL EXECUTION

- Solenoid valve 5/2 bistable execution with manual control
- Solenoid valve 3/2 Monostable execution with manual control
- Pressure switch
- Pressure gauge

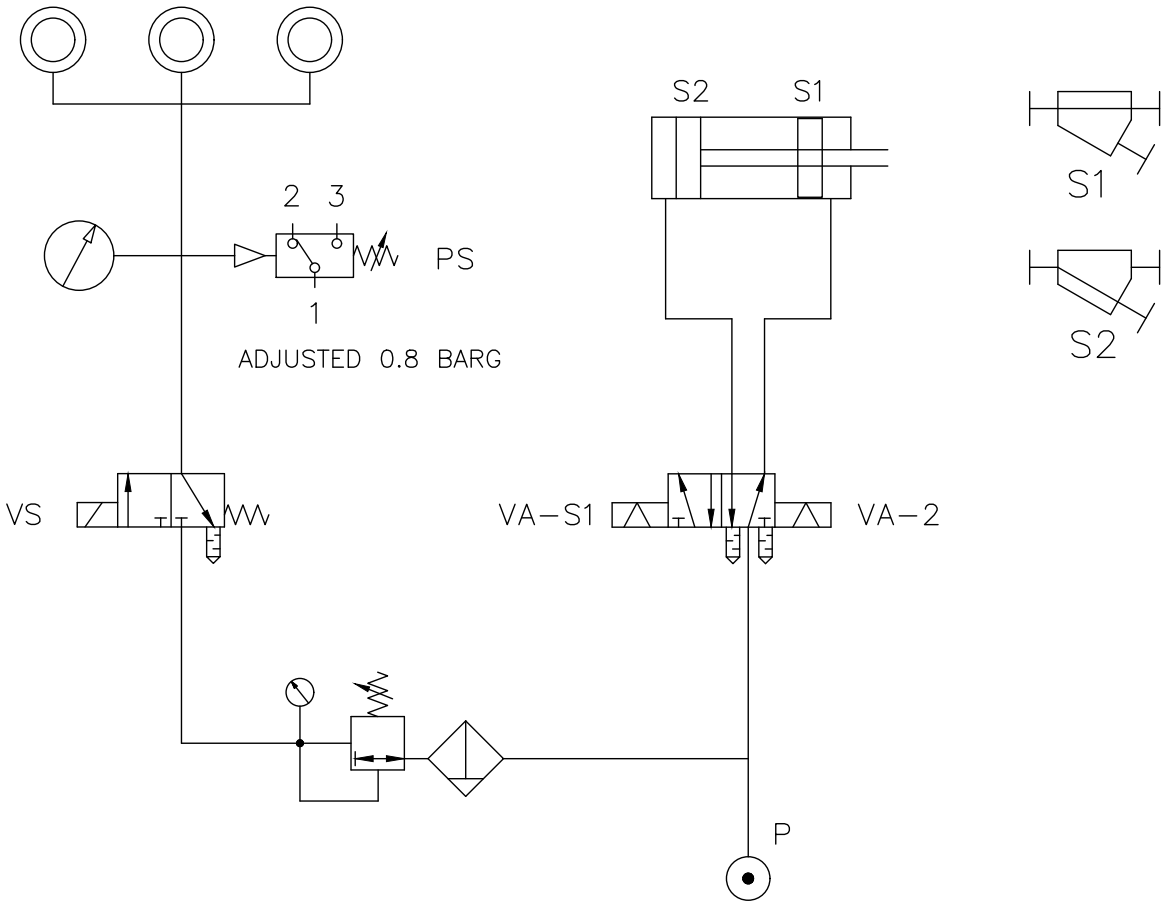


Figure 10.11: Pneumatic connection PTD inflatable seal

10.3.4.6 TERMINAL BOX CONNECTION (INFLATABLE SEAL)

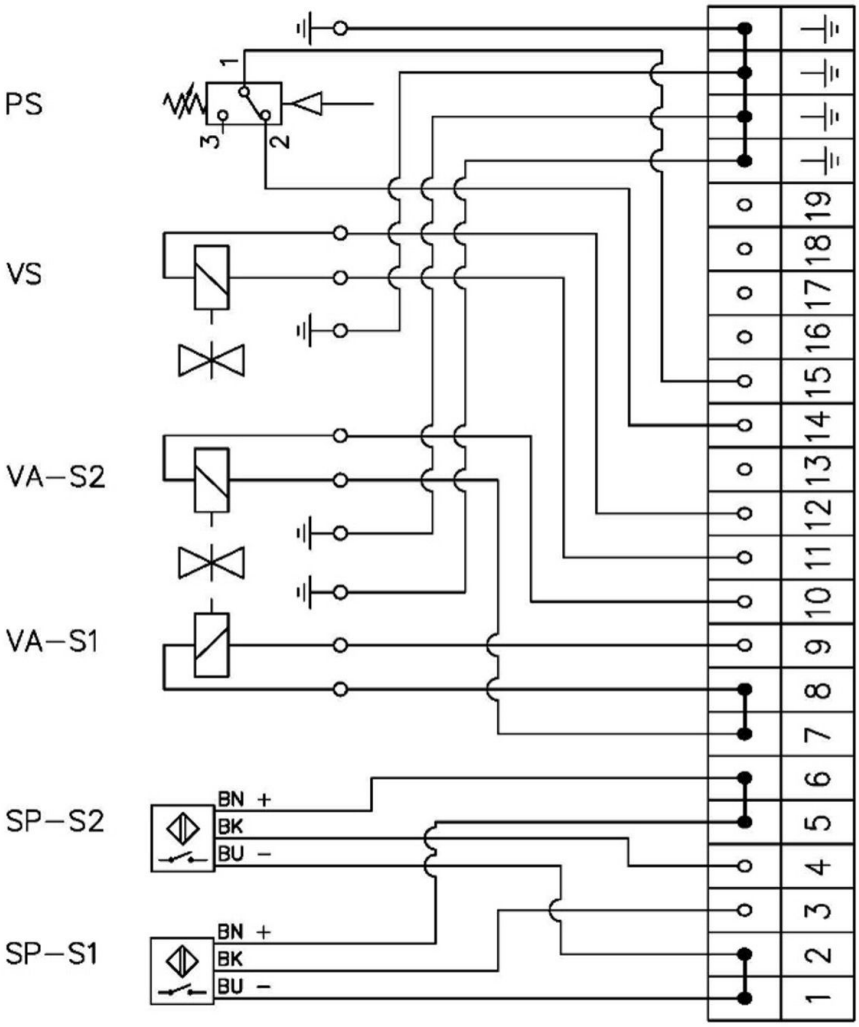


Figure 10.12: Terminal box PTD inflatable seal wiring diagram

10.3.4.7 TERMINAL BOX CONNECTION NAMUR (INFLATABLE SEAL)

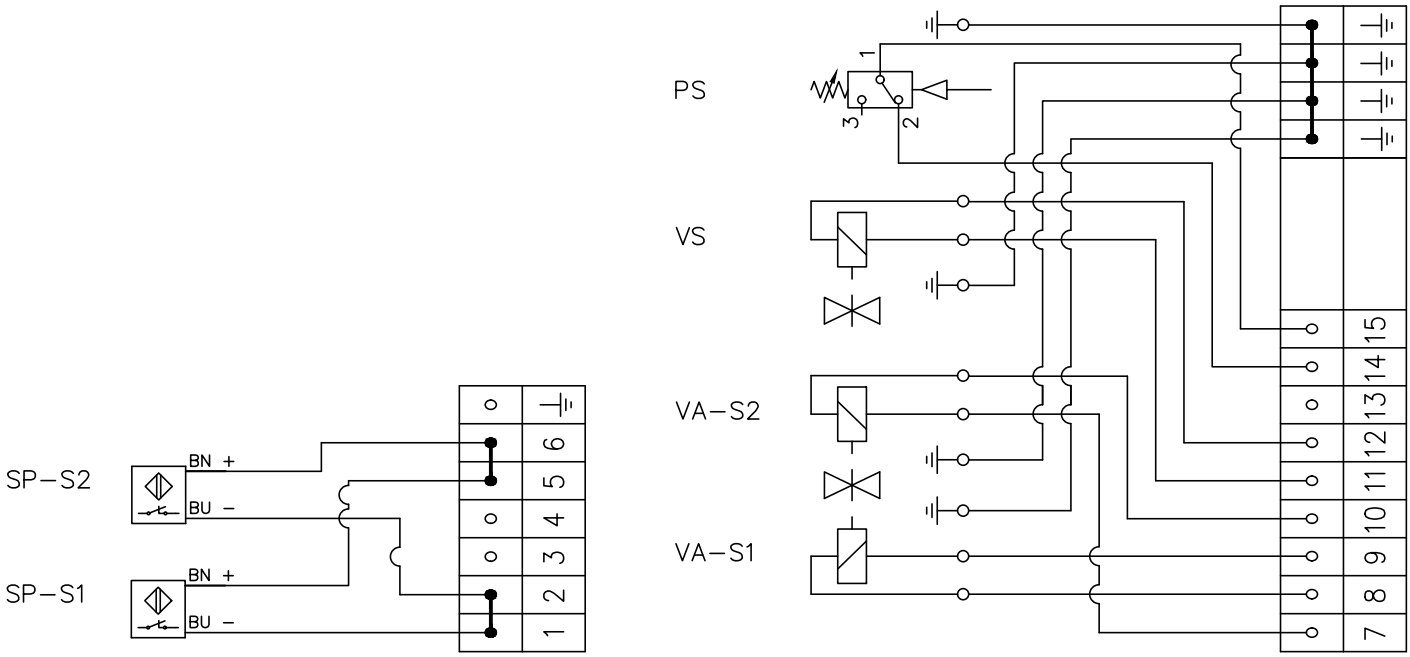


Figure 10.13: Terminal box NAMUR PTD inflatable seal wiring diagram

10.3.4.8 FLOW DIAGRAM (INFLATABLE SEAL)

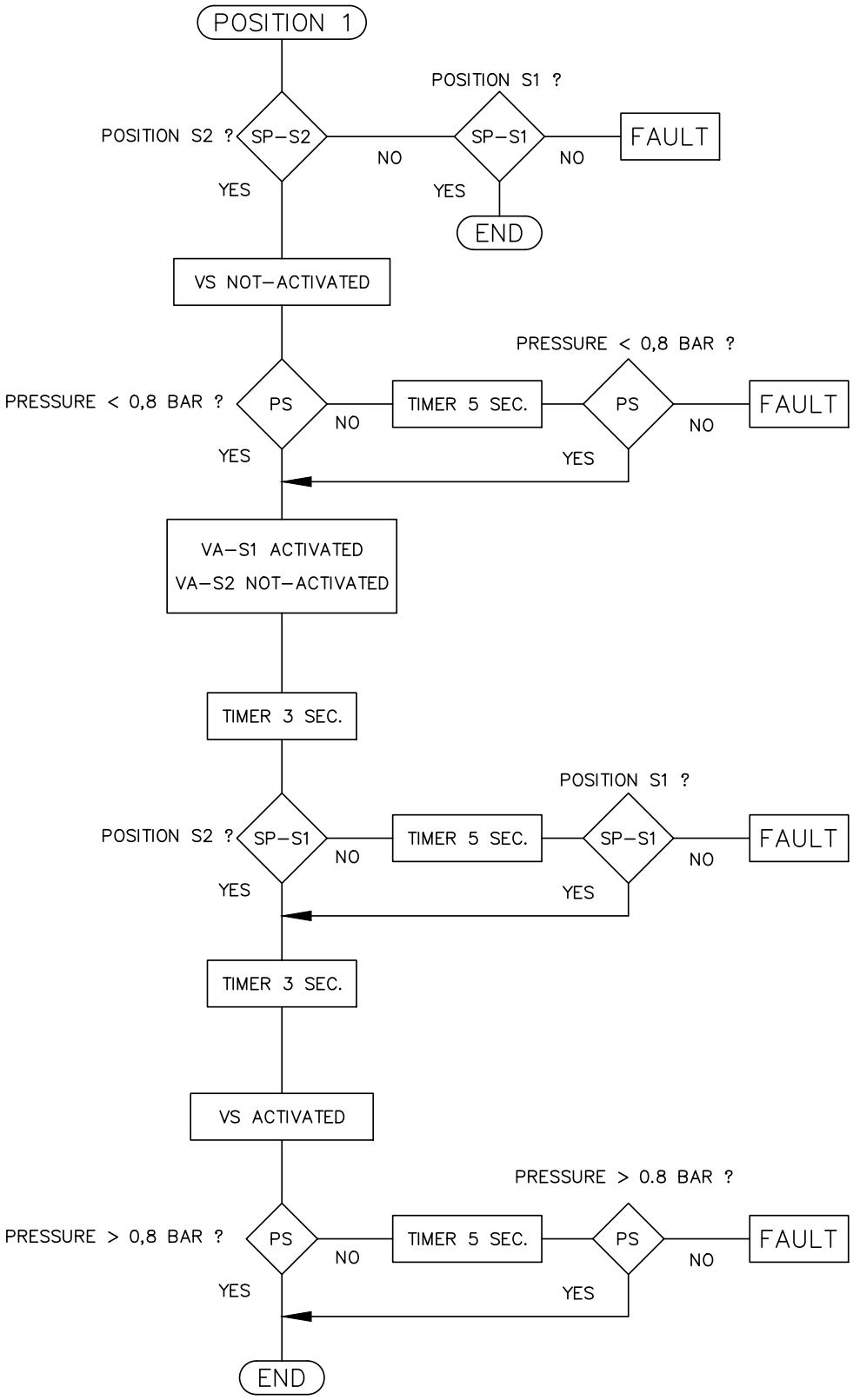


Figure 10.14: Flow diagram PTD inflatable seal

10.4 DISMANTLING, ASSEMBLING AND ADJUSTING

DMN-WESTINGHOUSE diverter valves are manufactured with great care. To reduce air leakage, internal running clearances are kept extremely small during manufacture and assembly of the diverter valve.

First read the safety instructions in chapter **Safety** before dismantling, assembling and adjusting the product.

ATTENTION!
Dismantling, assembling and adjusting must only be performed by trained and authorised personnel!

DANGER!
When carrying out repair work, always shut off the power and set secure against unexpected incoming power.

CAUTION!
- Do not use heavy tools;
- avoid damages such as scratches and burrs etc.;
- clean all components thoroughly.

10.4.1 BEFORE DISMANTLING

INSTRUCTION

- Turn off power supply and/or remove fuses.
- Disconnect electric wiring from solenoid valve and Actuator position switches.
- Close compressed air supply.
- Remove air hoses.

10.4.2 MAINTENANCE

10.4.2.1 DISMANTLING

DANGER!
Before disassembly of the diverter valve, switch the plug several times from position, to remove the eventual overpressure between body and plug!

10.4.2.2 DISASSEMBLY

INSTRUCTION

- Disconnect electric wiring from solenoid valve.
- Remove position sensors (cables).
- Remove supply pressure from solenoid valve.
- Remove bolts (63) from bearing covers (6&7) from both sides.

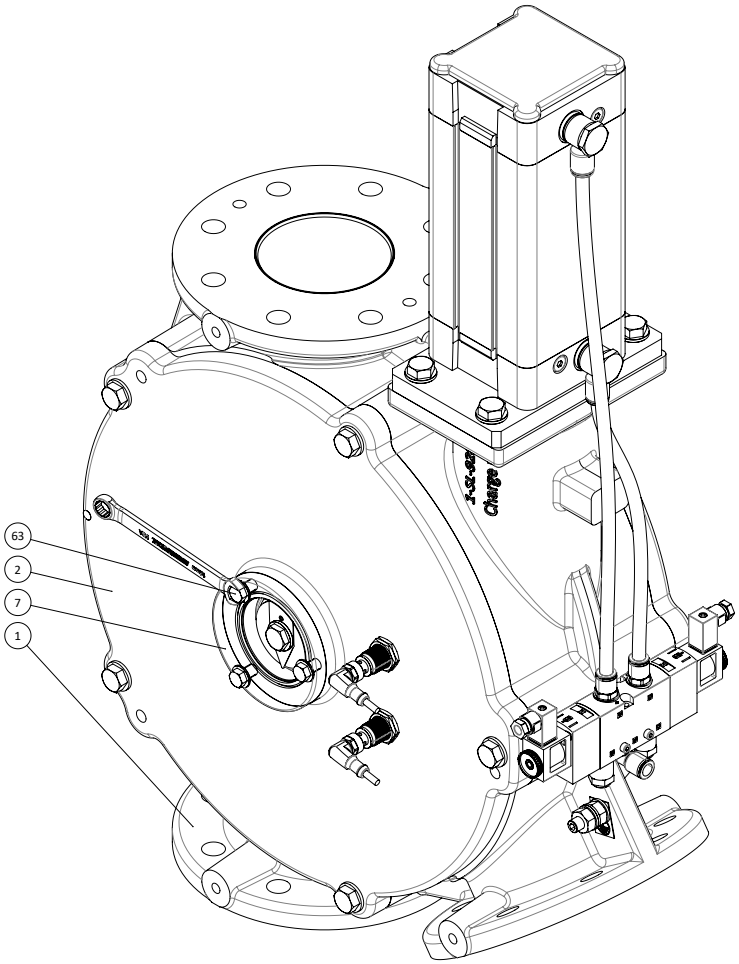


Figure 10.15: Bearing cover removal (PTD)

- Remove arrow assembly (15) on both sides.

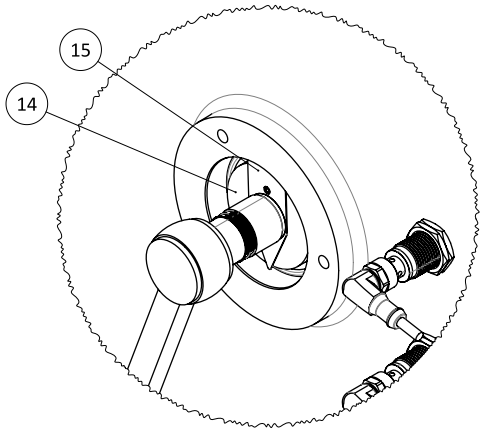


Figure 10.16: Ratchet removing arrow assembly (PTD)

- Remove end cover bolts (56) from end cover (2).

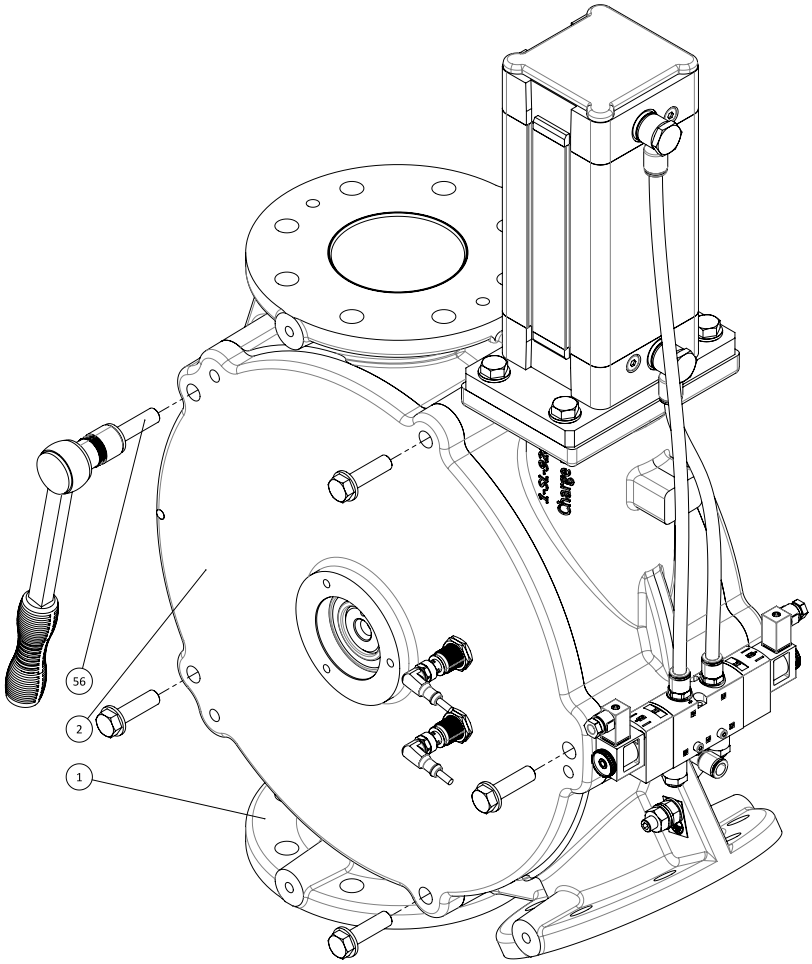


Figure 10.17: End cover bolts removed (PTD)

- Press end cover from body (1) by means of three press-out holes (Q2), using the bolts just removed.

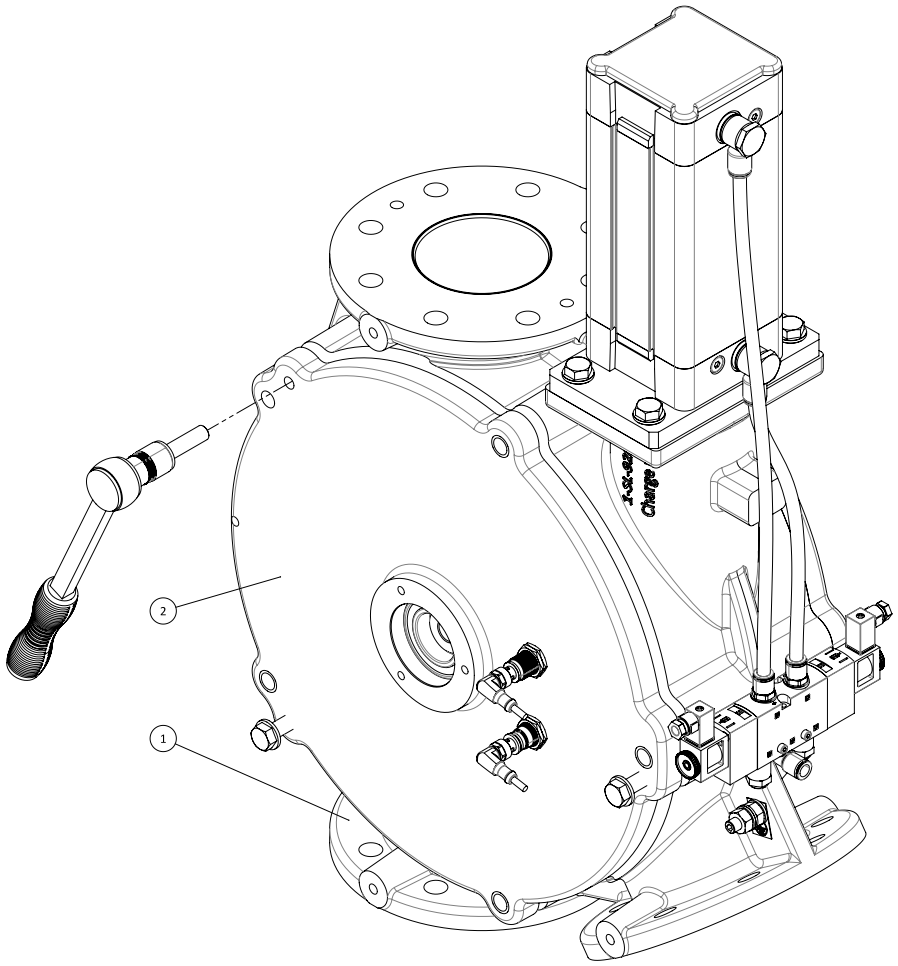


Figure 10.18: End cover bolts removed (to be used as push off bolts) (PTD)

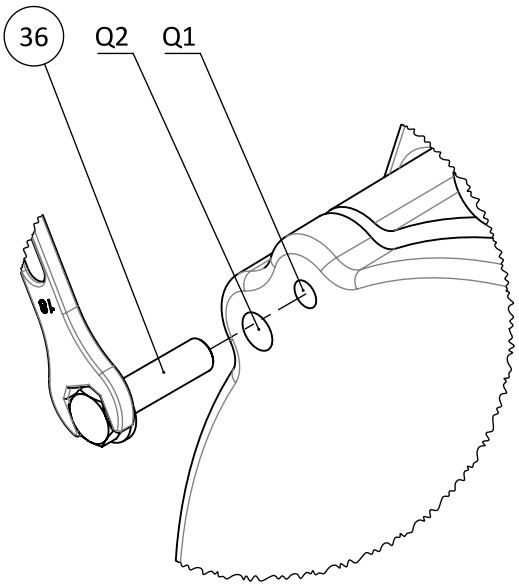


Figure 10.19: Inserting push-off bolts (PTD)

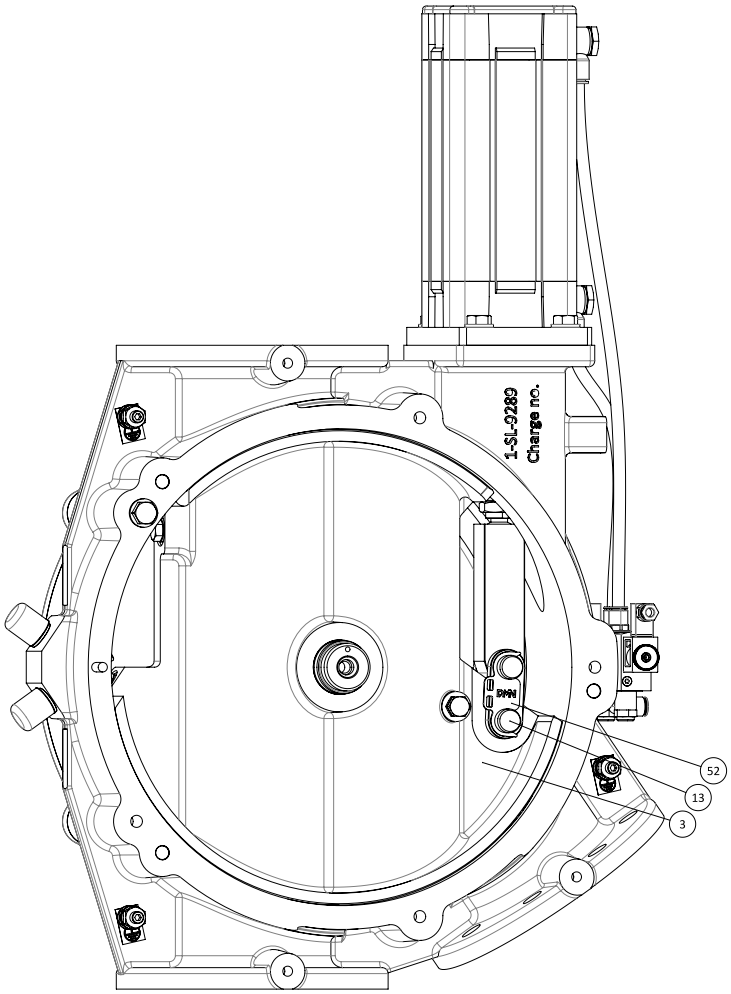


Figure 10.20: End cover removed, lock plate visible (PTD)

- Remove the lock plate (52) from dowel pin (13) with a screwdriver.

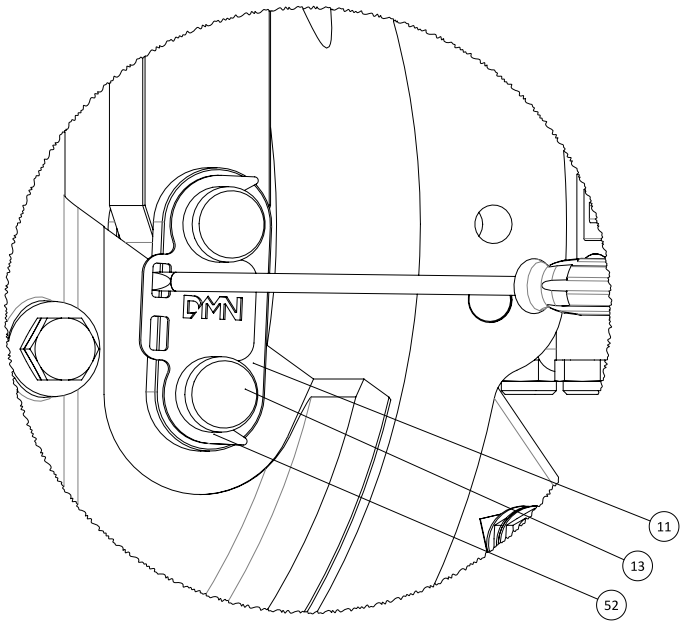


Figure 10.21: Screwdriver lock plate removal (PTD)

- Slide the link (11) off the dowel pin (13) and push the remaining dowel pin assembly towards the other end cover (2).

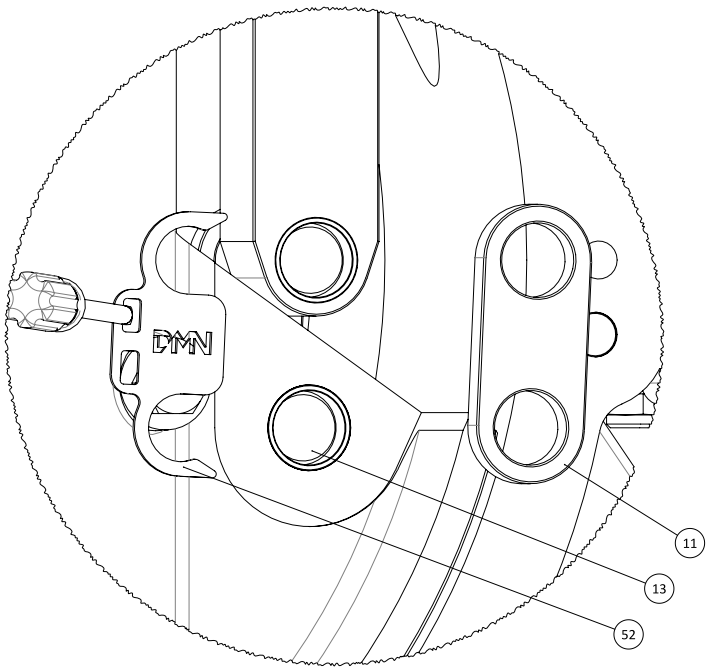


Figure 10.22: Screwdriver lock plate and link removal (PTD)

- The end cover can be used to remove the plug (3)
- Install the end cover onto the plug with the arrow assembly
- Install the push-off bolts (56), align the end cover with the positioning pin (58) and intermittently turn the bolts keeping the cover parallel to the body
- Use additional material (shims, blocks, etc.) underneath the bolt tips – if necessary – to completely remove the plug

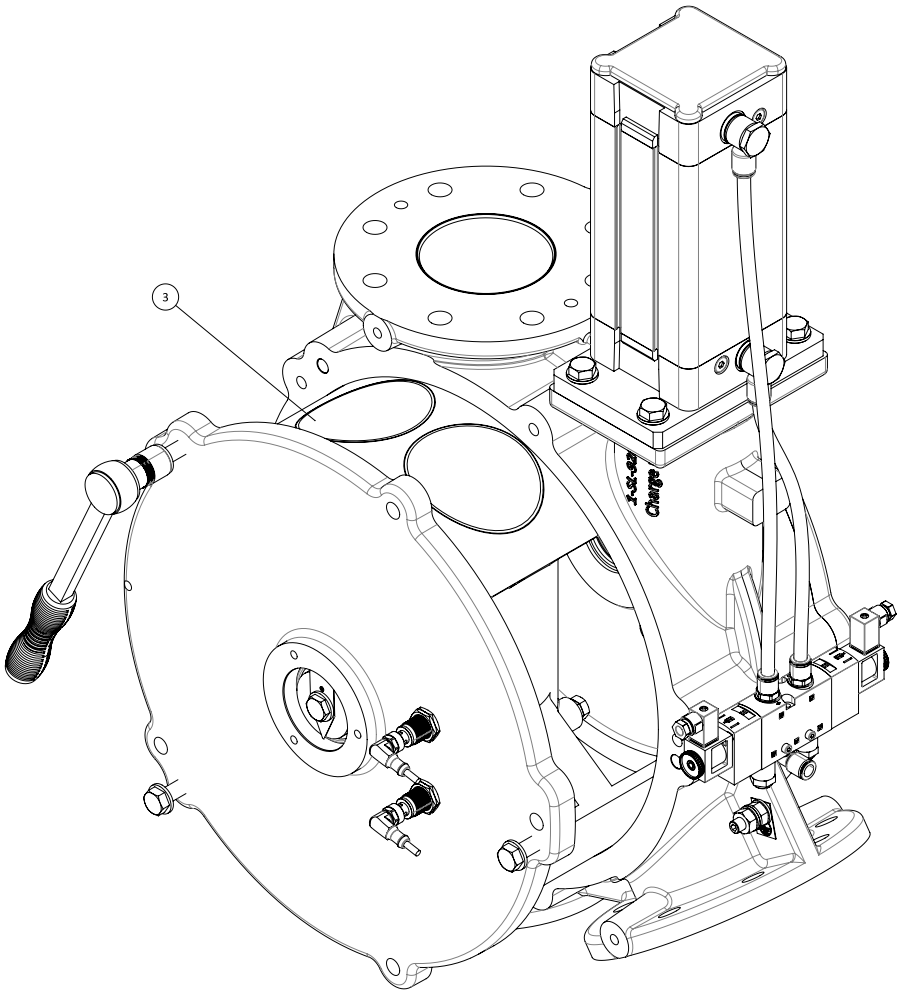


Figure 10.23: End cover and plug removed (PTD)

CAUTION!
Support the plug to keep it in line with the bore to avoid possible damage to the plug and/or the bore of the body. Position the plug on a stable surface as to not damage the plug.

- Check seal (4) for damage and replace if necessary (see chapter **10.4.2.4** & **10.4.2.5**).
- Check lip seals (9), bearings (8) and O-rings (53 & 59) for damage and, if necessary, replace (see chapter **10.4.2.6**).
- Clean body, plug and end cover and check for damage.

10.4.2.3 RE-ASSEMBLY

INSTRUCTION

After cleaning and checking or replacement of parts, the diverter valve can be re-assembled as follows:

- Align the plug with the dowel pin (13) of the pin assembly
- Place plug (3) in body and press against end cover (2)
- Fit the link (11) and lock plate (52). The slots of the lock plate must be directed towards the center of the PTD

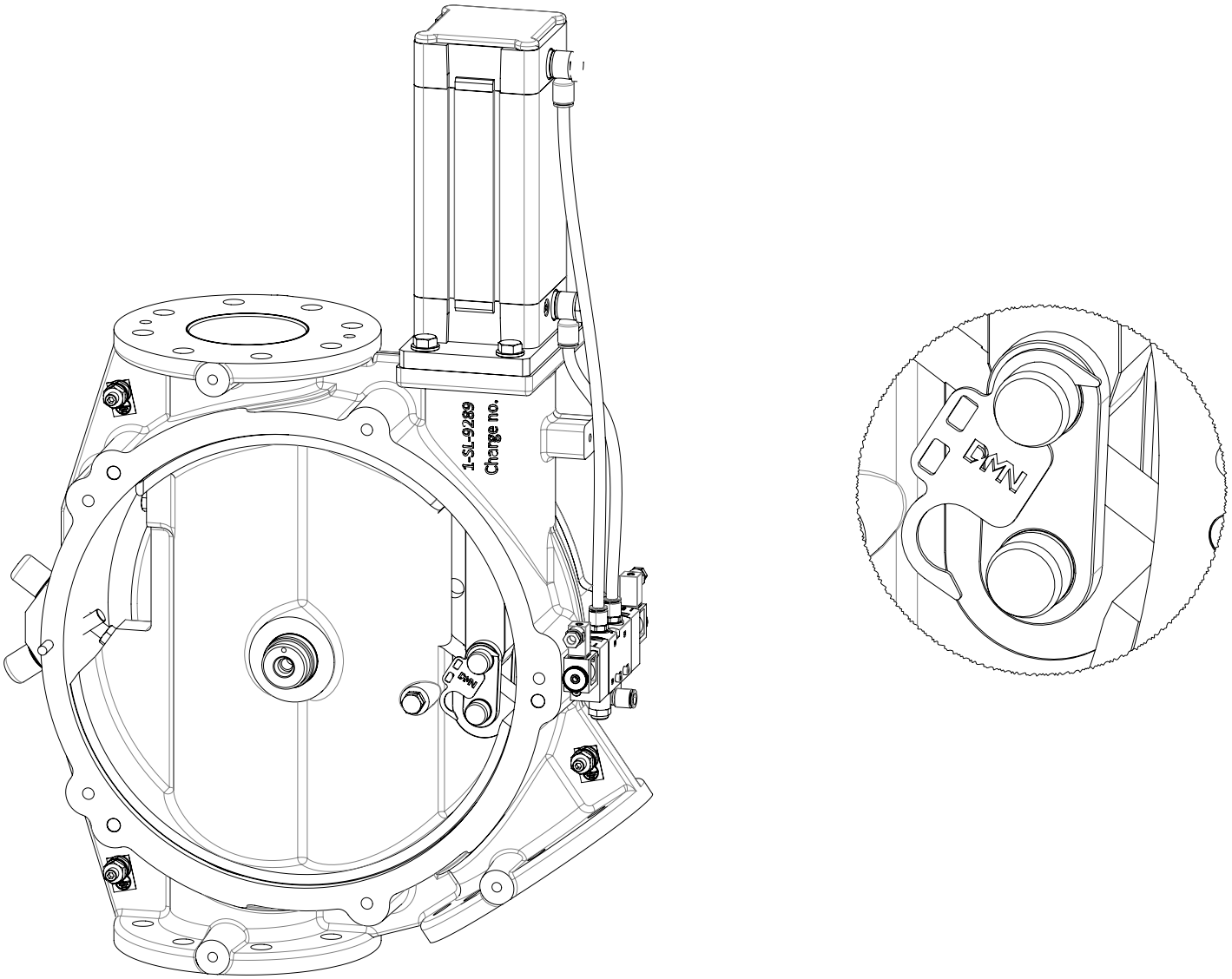


Figure 10.24: Lock plate re-assembly (PTD)

- Fit end cover (2)
- Fit fixing ring (14) and bearing cover (6&7) on both sides
- Connect electrical wiring and attach air hose

ATTENTION!
After assembly test run the diverter valve.

10.4.2.4 REPLACING SEALS - STATIC SEAL

- Follow the instructions for disassembly; chapter **10.4.2.2**

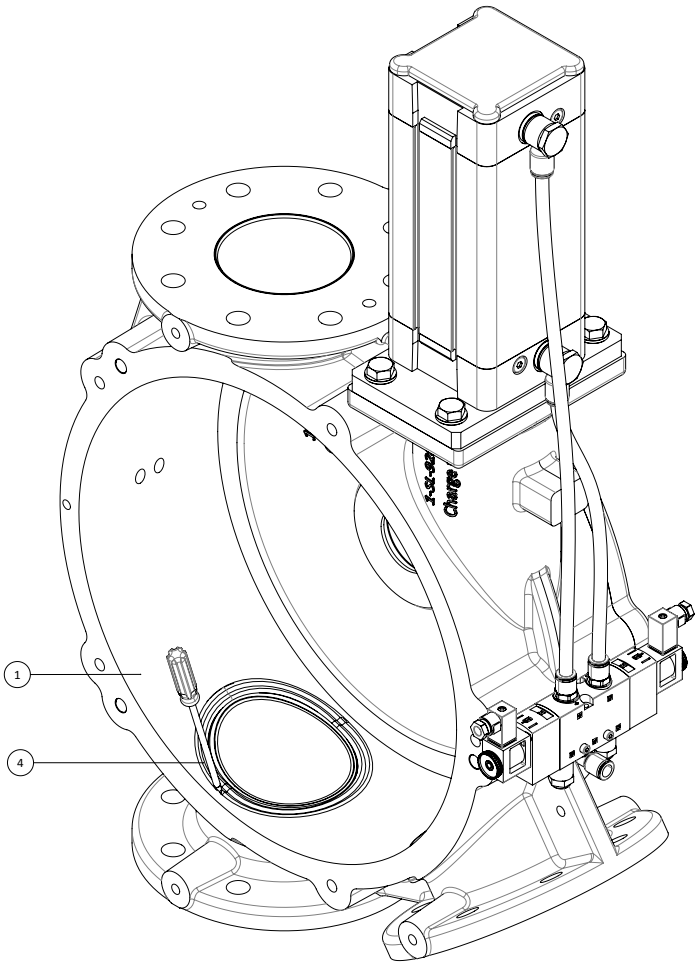


Figure 10.25: Belly seal removal (PTD)

- Remove old seals [3x] (4)
- Carefully clean seal groove
- Apply food-safe grease in the groove, for example: Cassida RLS2
- Fit seal in groove

10.4.2.5 REPLACING SEALS - INFLATABLE SEAL

- Follow the instructions for disassembly; chapter **10.4.2.2**
- Remove old seals [3x] (4).

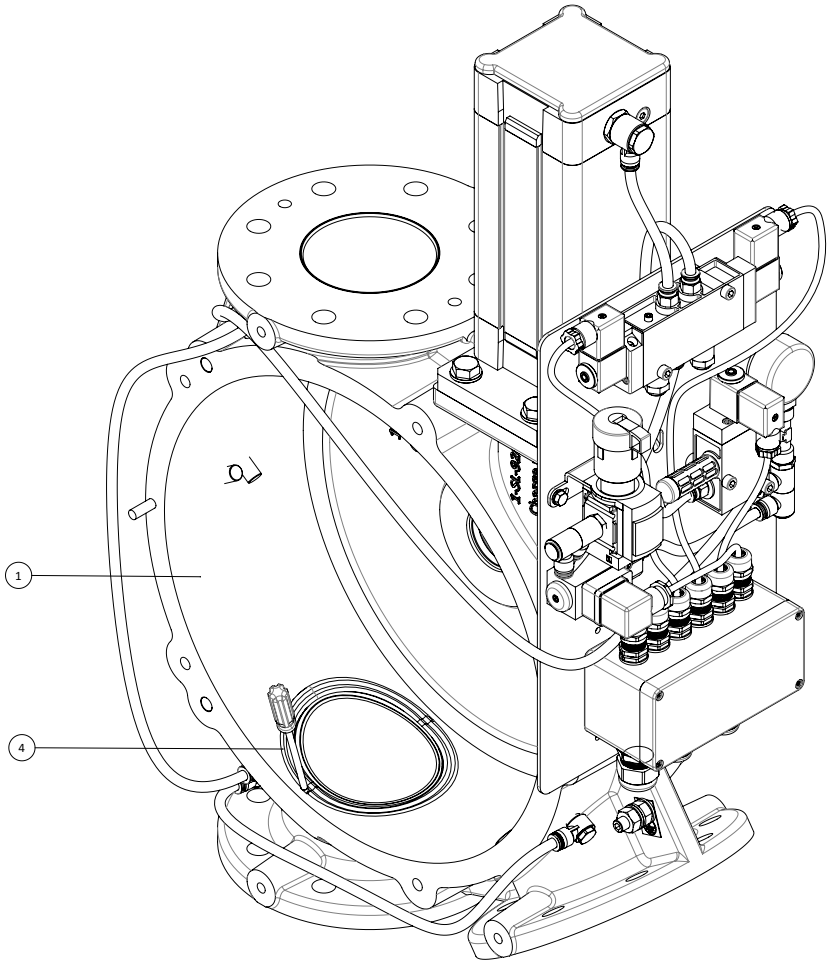


Figure 10.26: Belly seal removal (PTD inflatable seal)

- Carefully clean seal groove

- Fit seal with the nipple in groove. Make sure the nipple is seated in the dedicated hole in the body

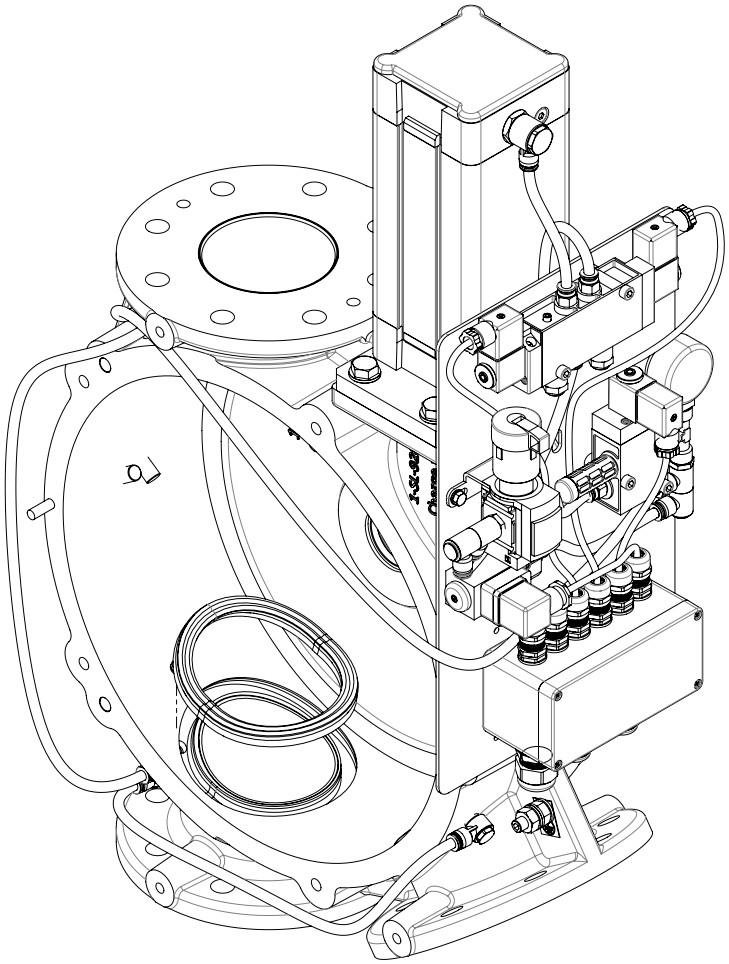


Figure 10.27: Inflatable seal being inserted into PTD body

10.4.2.6 REPLACING LIP SEALS/BEARINGS/O-RINGS

A. LIP SEAL AND BEARING

- Follow the instructions for disassembly; chapter **10.4.2.2**
- Remove the bearing from the cover
- Remove the lip seal from the cover
- Clean the bearing seats and the lip seal housing
- Install a new lip seal; place the seal – with the open side towards the plug – into the pocket and make sure to apply even pressure over the lip seal during installation
- Place the bearing

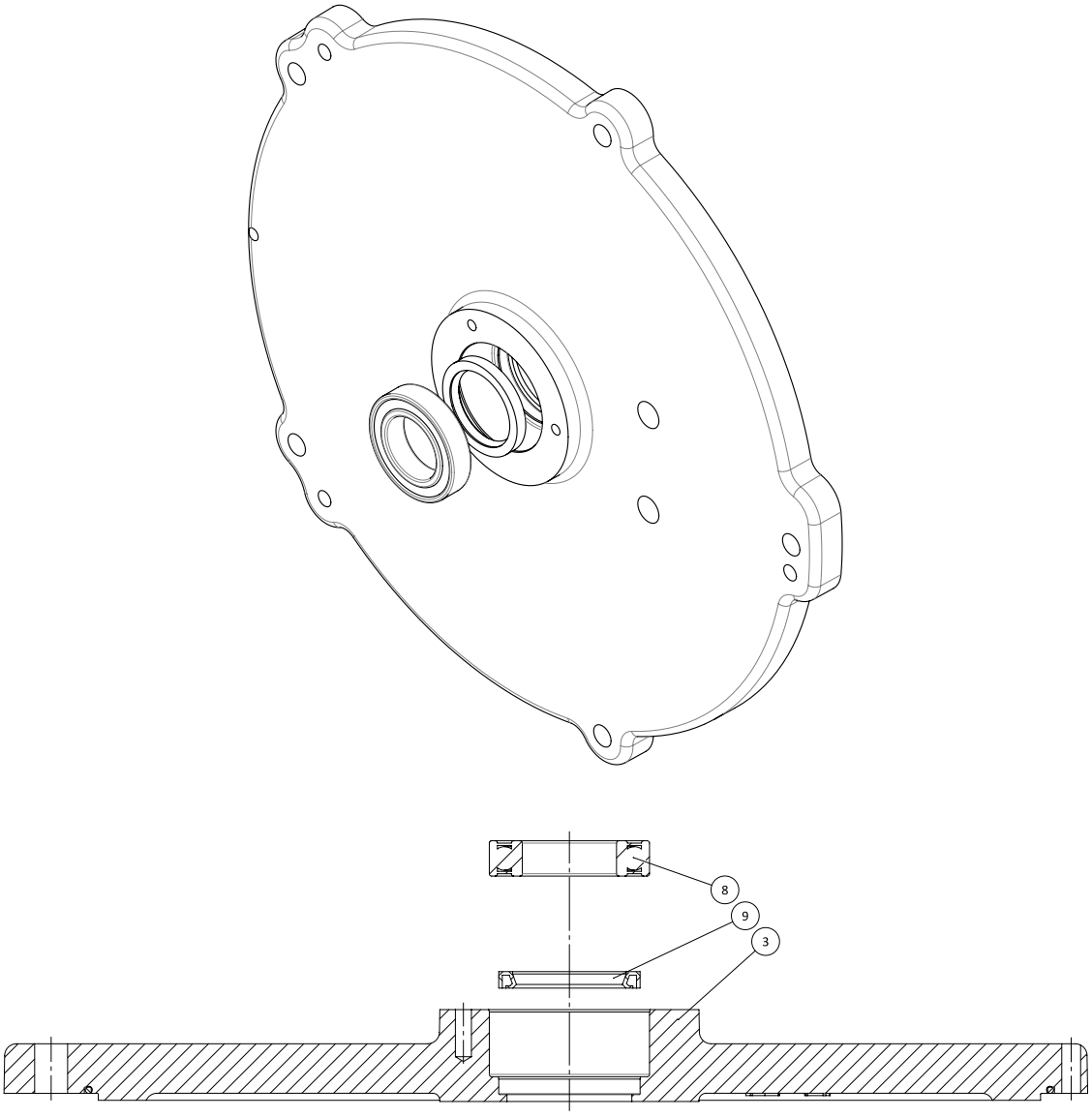


Figure 10.28: Lip seal installation (PTD)

B. O-RING

- Follow the disassembly instructions for removing the cover from the body; chapter **10.4.2.2**
- Remove the O-ring from the cover
- Clean the groove
- Install the O-ring by applying gentle pressure on the O-ring over the entire circumference. Make sure the O-ring does not get damaged by the edges of the groove.

10.4.2.7 RELOCATE POSITION SENSOR

The position sensors can be mounted in either cover. To exchange the sensors with the plugs in the other cover, proceed as follows:

A. MOULDED CABLE CONNECTOR

- Disconnect wiring position sensors in terminal box.
- Loosen cable glands.
- Remove wiring position sensors.

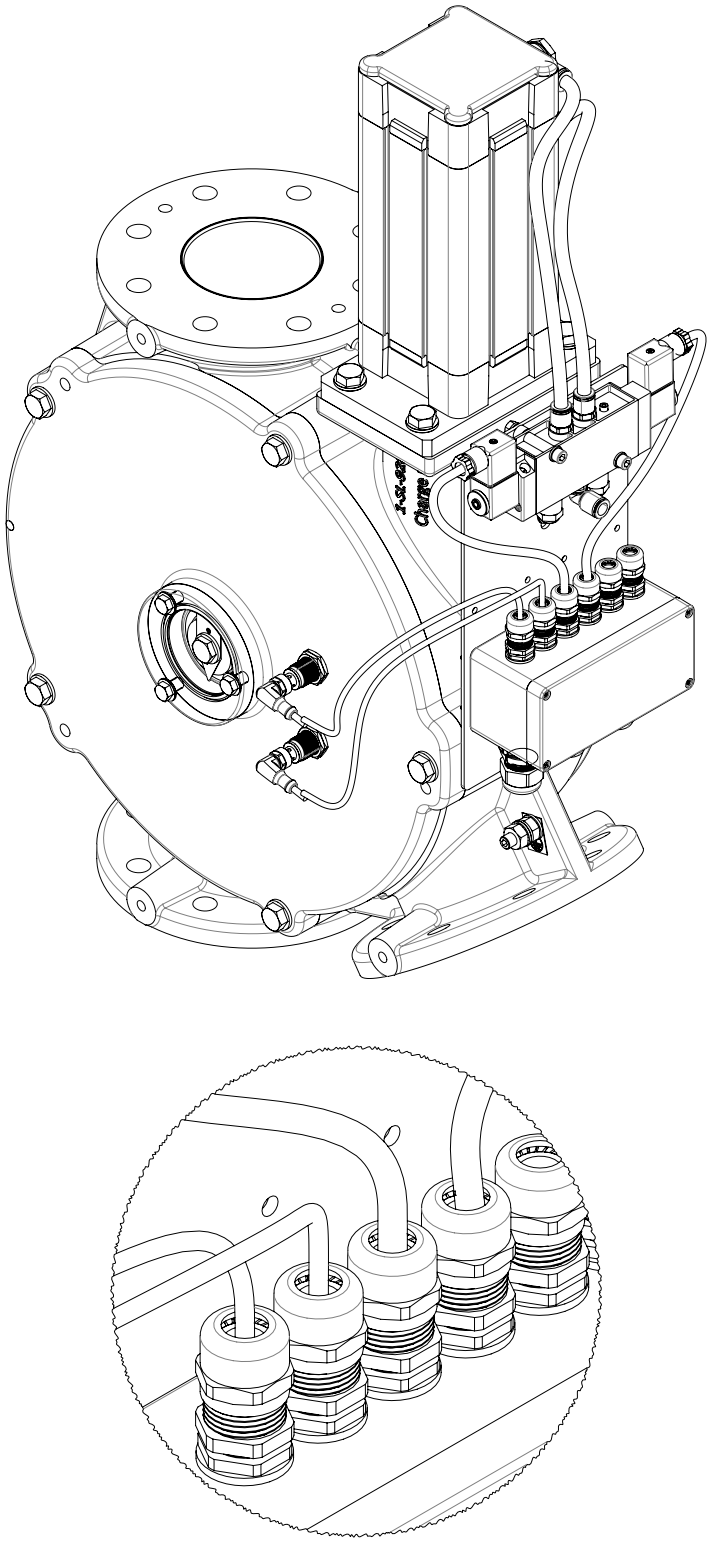


Figure 10.29: Disconnect the cables from inside the junction box (PTD)

B. M12 CABLE CONNECTOR

- Remove the M12 cable connector (34)

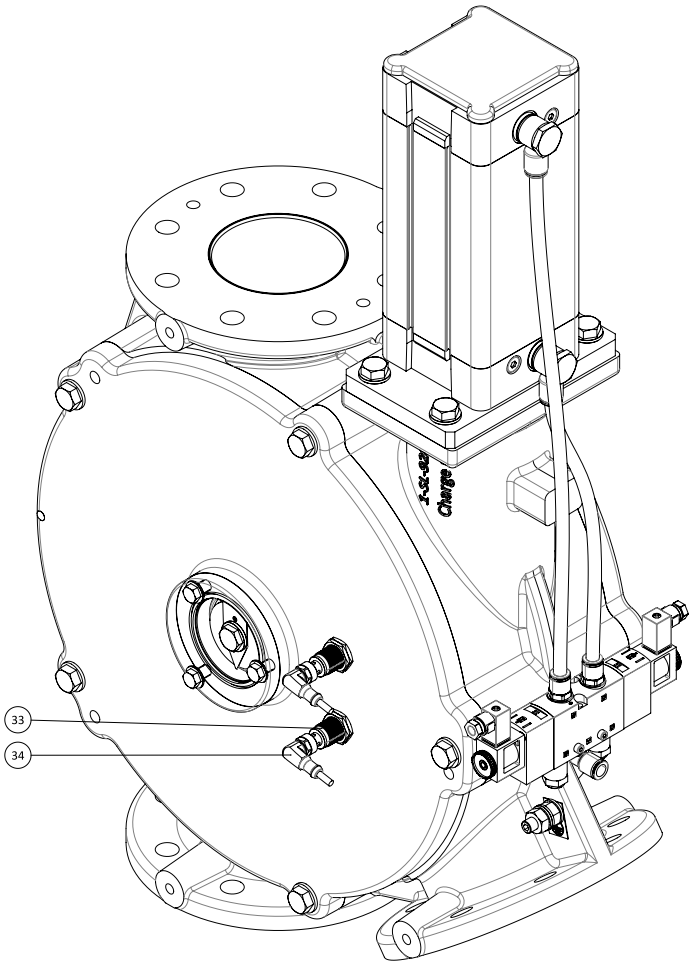


Figure 10.30: Remove the socket and sensor from the end cover (PTD)

REMOVE PLUGS

- Loosen and remove plugs.
- Remove all silicone remains from plugs.

REMOVE POSITION SENSOR

- Loosen counter nuts position sensors.
- Unscrew and remove position sensors.

INSTALL PLUGS

- Put silicone around plugs.

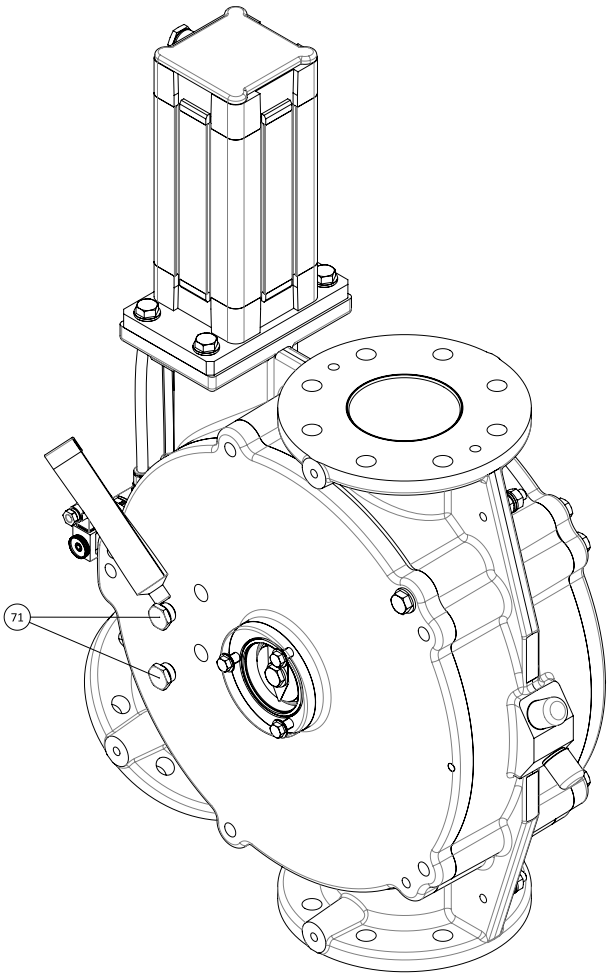


Figure 10.31: Glue application plugs (PTD)

- Screw in the plugs to the desired side and tighten.

INSTALL POSITION SENSOR

- Place silicone on sensor thread.

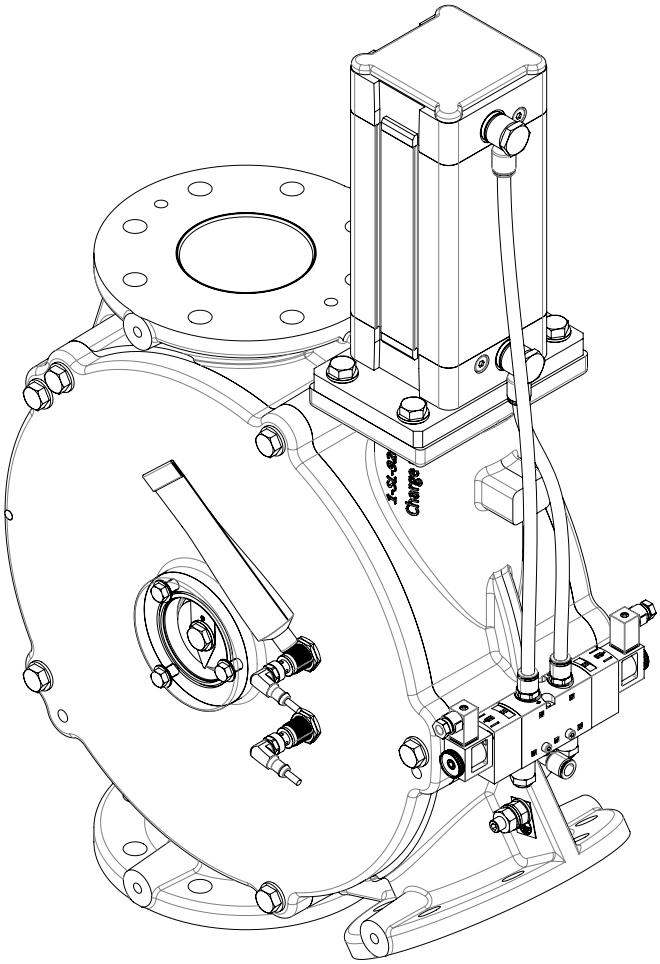


Figure 10.32: Glue application sensors (PTD)

- Put position sensor of diverter valve in same position as position sensor target inside diverter valve.
- Screw in sensor till there is a smooth touching to target inside the diverter valve.
- Screw sensor two rotations back (2mm operating distance).
- Install counter nut and tighten.
- Switch position plug
- Install second sensor as described above.

CONNECTION OF POSITION SENSOR

A. MOULDED CABLE CONNECTOR

- Guide wiring position sensors through cable glands.
- Connect position sensors according to wiring diagram.
- Fasten cable glands.

B. M12 CABLE CONNECTOR

- Tighten the M12 cable connector according to the supplier specifications (see IFM Operating instructions (Ex related part) M12 connector)

10.4.3 SPARE PART LIST

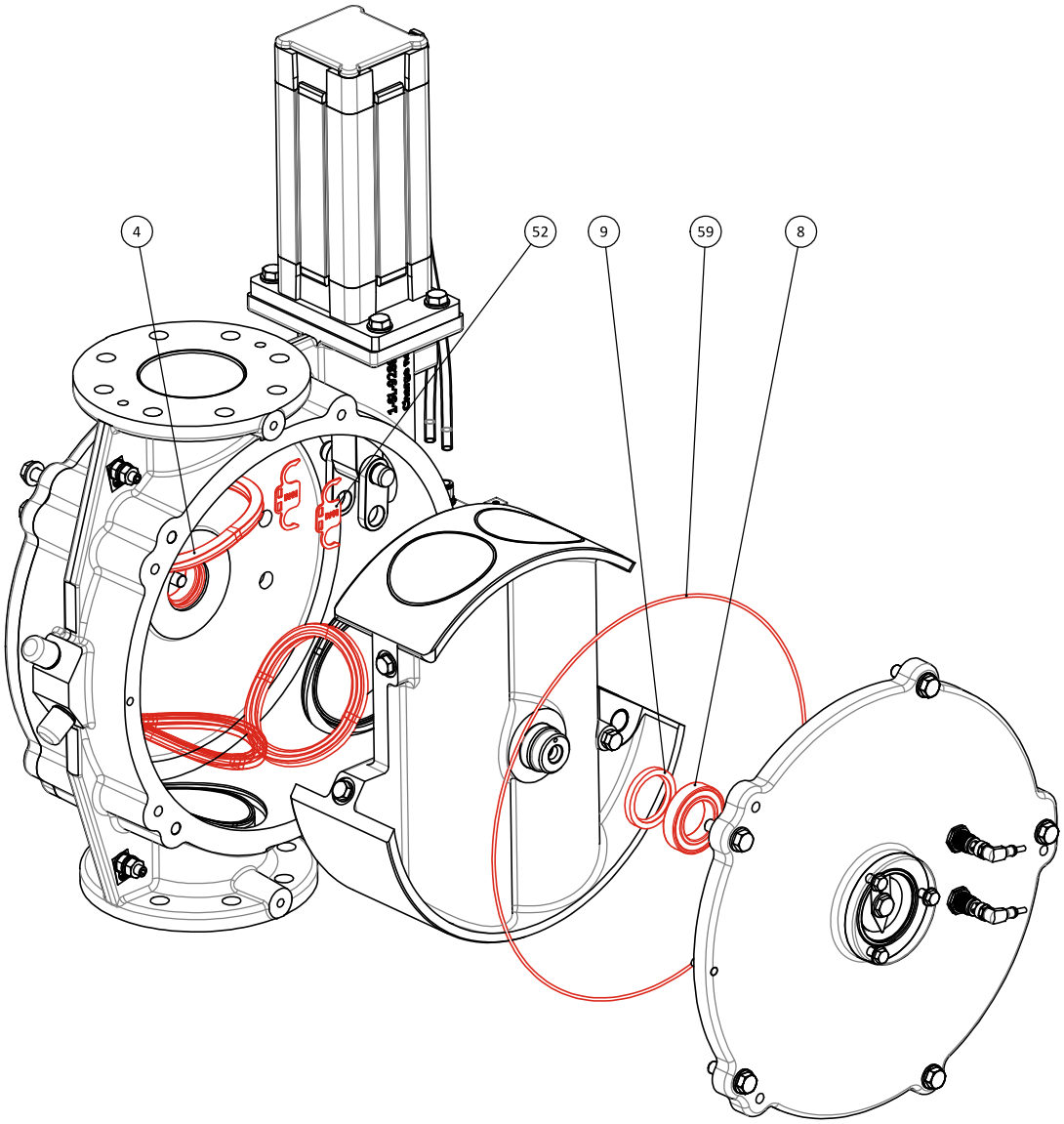


Figure 10.33: Spare parts (PTD)

4 Seals 3x
8 Bearing 2x
9 Lip seals 2x
52 Lock plates 2x
59 O-ring end cover 2x

11. SPTD

11.1 GENERAL WORKING PRINCIPLE

The SPTD plug diverter is a compact diverter valve with integral actuator, which has been specially designed for rapid pipe changeover between powders and pellets in pneumatic conveying systems.

Pipe changeover is achieved by turning the plug in the body.

The unit is driven by means of a pneumatic actuator actuated by a solenoid valve.

The body and plug are made of aluminium and can be supplied with stainless steel pipes where product contact occurs.

Optionally the product contact parts can be anodized aluminium.

Sealing is by means of a static seal or inflatable seal with silicone rings located outside the product flow. Indication of pipe changeover is by means of inductive proximity switches or mechanical switches.

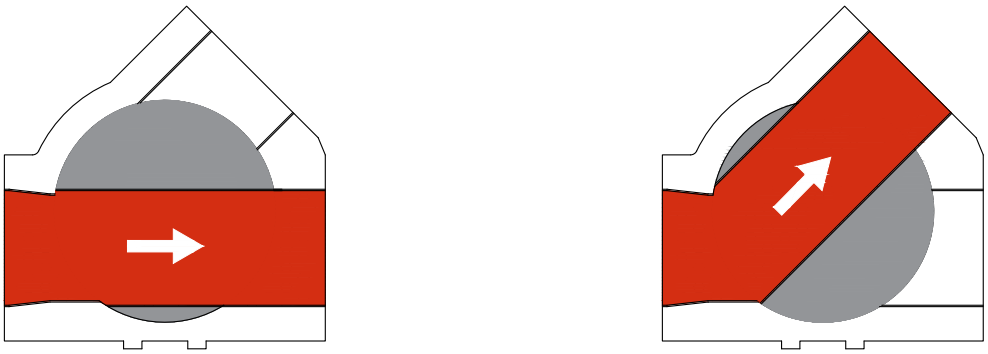


Figure 11.1: Schematic view of a diverter valve (SPTD)

11.2 STANDARD EXECUTIONS AND SPECIFICATIONS

SPTD plug diverter is a compact diverter valve with integral actuator for rapid pipe changeover between powders and pellets in pneumatic conveying systems (diverging).

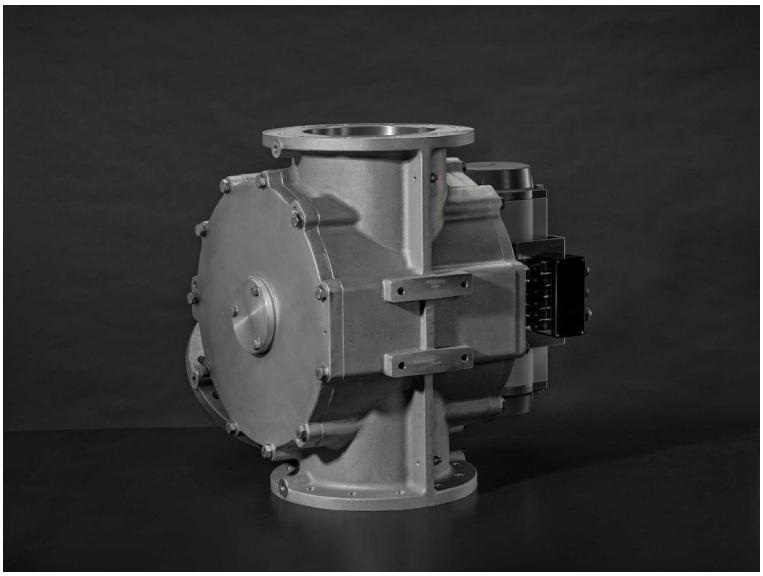


Figure 11.2: SPTD

Pressure	Static -0.5...+3 bar
	Inflatable up to +6 bar
Product temp °C	Standard -20°C...+80°C (Optional up to +120°C)
Ambient temp °C	Standard -20°C...+60°C
	ATEX -20°C...+40°C
Material of construction	Aluminium body-plug-cover
	Stainless steel inserts
Flange hole pattern	DIN PN 10 / ANSI 150 lbs
Seal	Static: silicone
	Inflatable: silicone
ATEX 2014/34/EU	1D/2GD Equipment
Remark	Diverging only

Sizes SPTD

150	162	200	213	250	267	300	318	350	400

11.3 INSTALLATION, COMMISSIONING AND MAINTENANCE

First read the safety instructions in chapter **Safety** before installing the product.

DANGER OF DEATH!
Electrical connection
Make sure that appropriate power supplies are utilised during operation and that in the case of plant or component failure, the diverter valve is isolated from external power sources. Failure to comply may lead to serious or fatal injury, and/or critical product damage.

DANGER!
Installation must only be performed by trained and authorised personnel!
Do not touch the inlet of the diverter valve during or after unpacking!
Do not alter, remove or paint the type specification plates of the diverter, drive unit or fitted switches!
When carrying out installation work, always shut off the power and isolate from all other potential power sources.
When product qualities necessitate supplementary safety instructions and the wearing of protective clothes, it is obligatory to follow local safety instructions.

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

11.3.1 BEFORE INSTALLING

INSTRUCTION

- Remove packaging and delivery protection material from diverter valve.
- Check for any damage; if damaged contact your carrier and supplier.
- Check if diverter valve interior is free from foreign material.

11.3.2 SPTD: INSTALLING THE PLUG DIVERTER VALVE INTO THE SYSTEM

DANGER!
Do not turn plug by hand or switch position.
Danger to fingers and hands.
During operation or testing of the plug diverter, pipe connections must not be open or unprotected.
Pipe changeover must only be carried out when the product pipes are not pressurised and do not contain product!
Diverter valves must not be put into service until the equipment into which they have been incorporated has been declared in conformity with the Machinery Directive.

CAUTION!
Solenoid exhaust air regulators are set at the factory.
Changing these settings can cause malfunction or damage to the diverter.

ATTENTION!
Check voltage of individual components as these vary according to customer specification.
The solenoid valve must be connected to correct power supply and a compressed air supply of at least 4 bar.

INSTRUCTION

- Install plug diverter using tapped holes in the body.
- Attach product pipes and ensure that plug diverter is adequately supported and secured.
- Connect the position switches to the user's control system.
- Connect all cables as per terminal wiring diagram and earth connection.
- Check compressed air pressure
- Check if the solenoid valve auxiliary manual operation is in "0" position.

ATTENTION!
Inflatable seal execution
Factory setting 4,5 bar.
Difference between conveying pressure and pressure on the seals must be min. 1 bar.
The max. pressure for the seals is 6-7 bar.

CAUTION!
After installation test run the diverter valve.

11.3.3 INSTALLING THE DIVERTER VALVE IN A POTENTIALLY EXPLOSIVE ATMOSPHERE

Follow up the following important notes in addition to the regular product information and safety and installation instructions.

Read following chapters carefully in addition to the regular product-, safety- and installation information, before installing the product:

- **Explosion proof diverter valves** (chapter **5.2**)
- **Additional safety instructions for use in potentially explosive atmosphere** (chapter **6.6**)
- "Installing the diverter valve in a potentially explosive atmosphere" (this chapter)

Check if information on the nameplate of the diverter valve corresponds to the potentially explosive on-site atmosphere.
Pay specific attention to:

- Equipment group
- Equipment category
- Dust- or Gas area
- Temperature class
- Maximum surface temperature

Check if there are any potentially explosive atmosphere, oils, acids, gases, vapours, radiation etc. present during installation.
Always ground the diverter valve, use the flange connection bolts, or the optional earth-stud on end cover or motor base plate.
Check that the electrical leakage resistance is less than 10^6 Ω.
The maximum velocity during position switch of diverter is not higher than 1 m/s and the maximum power of the drive used on the diverter is not higher than 4kW
To avoid build-up of electrostatic charges avoid charging mechanisms on the surfaces stronger than manual rubbing.
Non-metallic coatings or paints used on the diverter must have a layer thickness <2 mm.
Ensure that no foreign objects are conveyed through the diverter.
Precautions must be taken by the user to avoid this.

PLUG DIVERTER VALVES

Ensure that no iron oxide and/or rusty particles can be deposited on the inner surface of plug and on the surface of the diverter valve.

Check that the electrical leakage resistance is less than 10^6 Ω between pipe and Body.

DIVERTER VALVE EXTERNAL NO ZONE

- No external explosive atmosphere is permitted
- No dust layers are permitted

11.3.3.1 DRIVE

According to the ATEX directive the maximum velocity must not be higher than 1 m/s and the maximum power of the motor gear unit is not higher than 4kW.
Explosive gas mixtures or concentrations of dust can lead to severe or fatal injuries in connection with hot surfaces, parts under power and moving parts on the gear unit / geared motor.
Installation, connection, start-up, maintenance and repair work on the gear unit / geared motor may only be performed by a qualified specialist while taking the following into account:

- These instructions
- The warning and information signs on the gear unit / geared motor
- Currently valid national / regional regulations
  (Explosion protection, Safety, accident prevention)

CAUTION!
After installation test run the diverter valve.

11.3.3.2 ACCESSORIES (IF FITTED)

Only use;

- solenoid valve
- proximity switch
- pressure switch
- terminal box
- electrical actuator
- etc.

that are CE marked and with an ATEX-approval, equal or higher than the ATEX-approval mentioned on the diverter valve.
Please study the operation instructions supplied by the manufacturer.
Check if the information on the nameplate of electrical accessories such as;

- solenoid valve
- proximity switch
- pressure switch
- terminal box
- electrical actuator
- etc.

corresponds to the potentially explosive on-site atmosphere.
Pay specific attention to:

- Equipment group
- Equipment category
- Dust- Gas area
- Temperature class
- Maximum surface temperature

PLEASE STUDY THE OPERATION INSTRUCTIONS SUPPLIED BY THE MANUFACTURER.

11.3.4 CONNECTION DIAGRAMS

Read following chapters carefully in addition to the regular product- and safety information, before installing the product:

- **Installation, commissioning and maintenance** (chapter **11.3**).
- **SPTD: Installing the plug diverter valve into the system** (chapter **11.3.2**).

The SPTD plug diverter is equipped as standard with a pneumatic actuator, electrically operated 5/2 bistable valve, inductive proximity switches and terminal box.

DOUBLE ACTING PNEUMATIC ACTUATOR

Airtorque	DR00XXXUF05F0717AZ
Medium:	air filtration lubricated or not up to 10 bar
Temperature range:	-40°C...+80°C
Working pressure:	6 bar
Hose:	⌀8 mm

Air consumption:

SPTD size	150	200	250	300	350	400
Air consumption at 6 bar Ltr./stroke	2.3	4.7	9	9	14.7	14.7

ACTUATOR

Solenoid valve 5/2 NAMUR bistable execution with manual control.

FOR INFLATABLE SEAL EXECUTION

Solenoid valve 3/2 Monostable execution with manual control.

Pressure switch

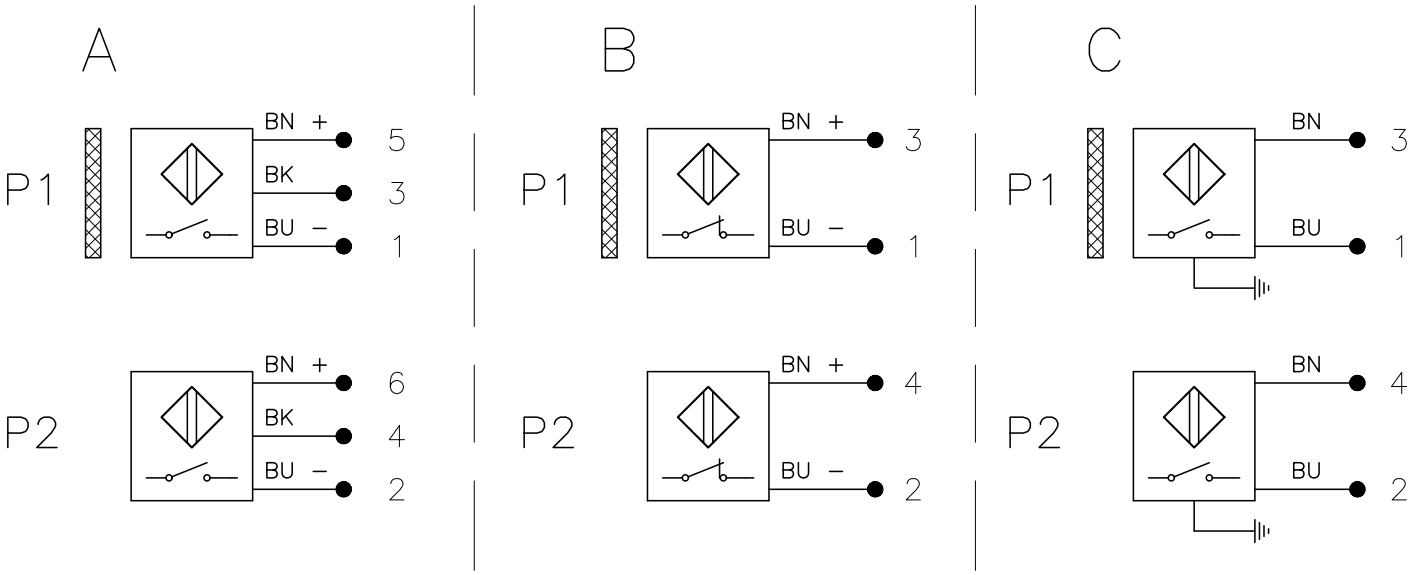


Figure 11.3: Position switches (SPTD)

Type A standard	DC sensor	
	Nominal voltage	10...30 V DC
		Normally open pnp
	Ambient temperature	-25°C...+70°C
	3-wire	
Type B optional	Namur DIN 19234 sensor	
	Nominal voltage	8 V DC
	Ambient temperature	-25°C...+100°C
	2-wire	
Type C optional	AC sensor	
	Nominal voltage	20...250 V AC 45...65 Hz
		Normally open
	Ambient temperature	-25°C...+70°C
	2-wire	

11.3.4.1 PNEUMATIC CONNECTION (STATIC SEAL)

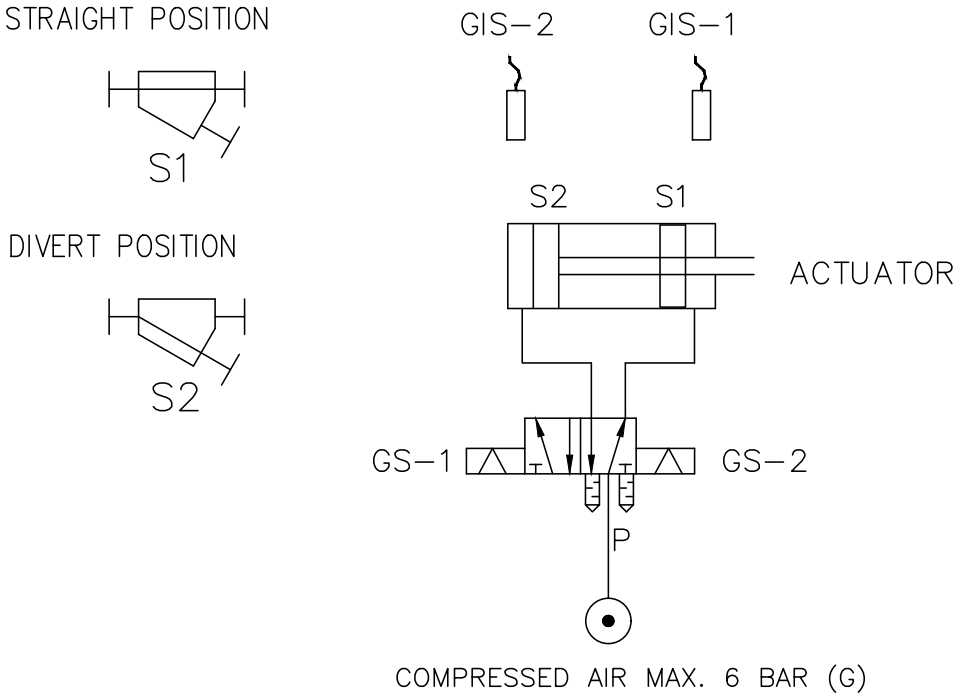


Figure 11.4: Pneumatic connection SPTD static seal

11.3.4.2 TERMINAL BOX CONNECTION (STATIC SEAL)

Rose:	Type 02.081606
Terminal strip:	AKZ 2.5
Material:	Polyester
Protection:	IP65
Cable gland:	4x Pg 9 / 1x Pg 16

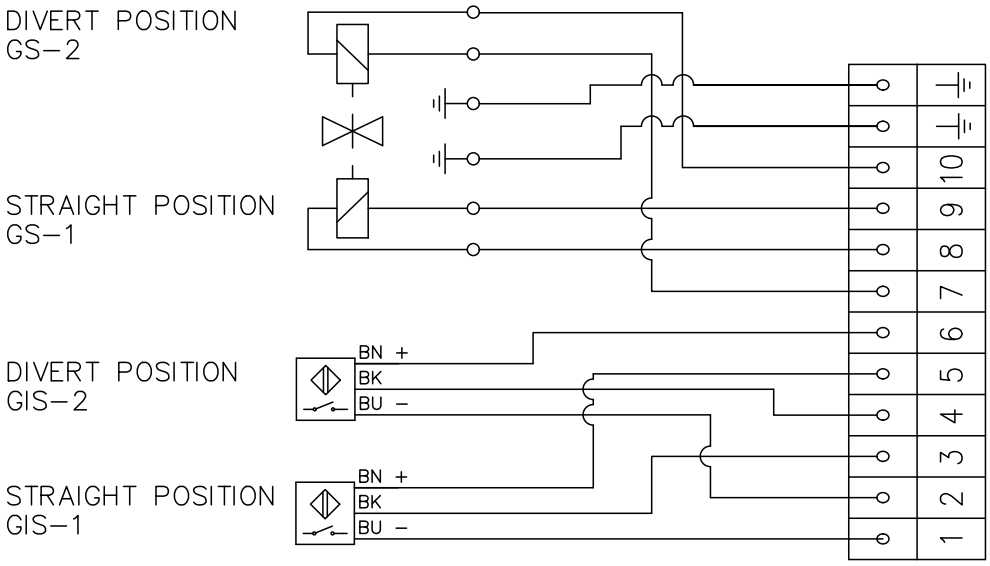


Figure 11.5: Terminal box SPTD static seal wiring diagram

11.3.4.3 PNEUMATIC CONNECTION (INFLATABLE SEAL)

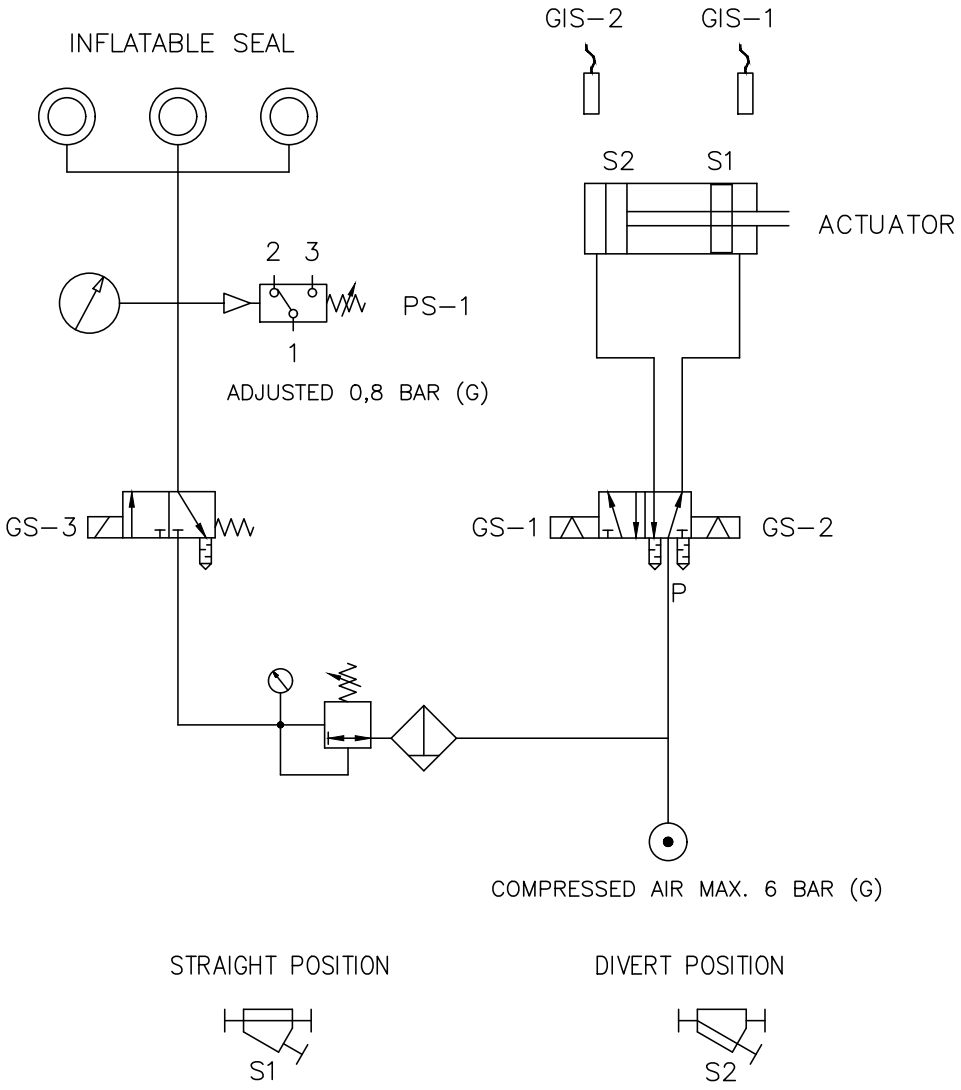


Figure 11.6: Pneumatic connection SPTD inflatable seal

11.3.4.4 TERMINAL BOX CONNECTION SPTD INFLATABLE SEAL

Rose:	Type 02.081606
Terminal strip:	AKZ 2.5
Material:	Polyester
Protection:	IP65
Cable gland:	6x Pg 9 / 2x Pg 13.5 / 1xPg 16

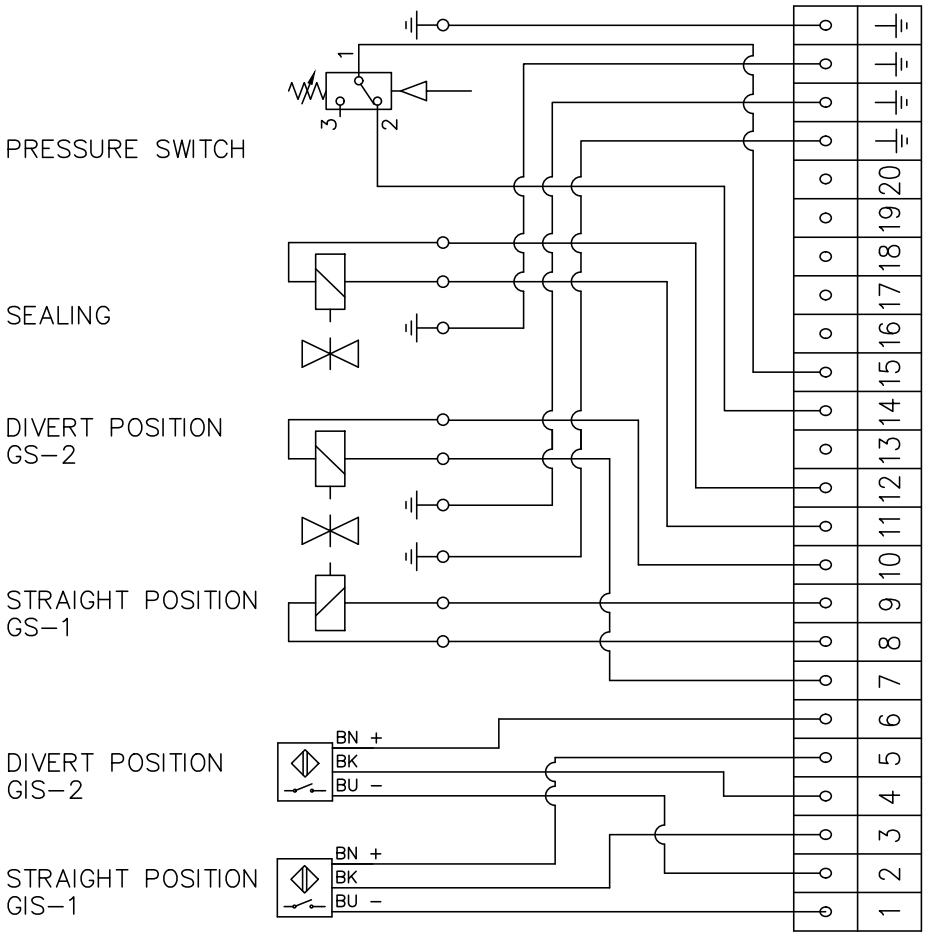


Figure 11.7: Terminal box SPTD inflatable seal wiring diagram

11.3.4.5 FLOW DIAGRAM INFLATABLE SEAL

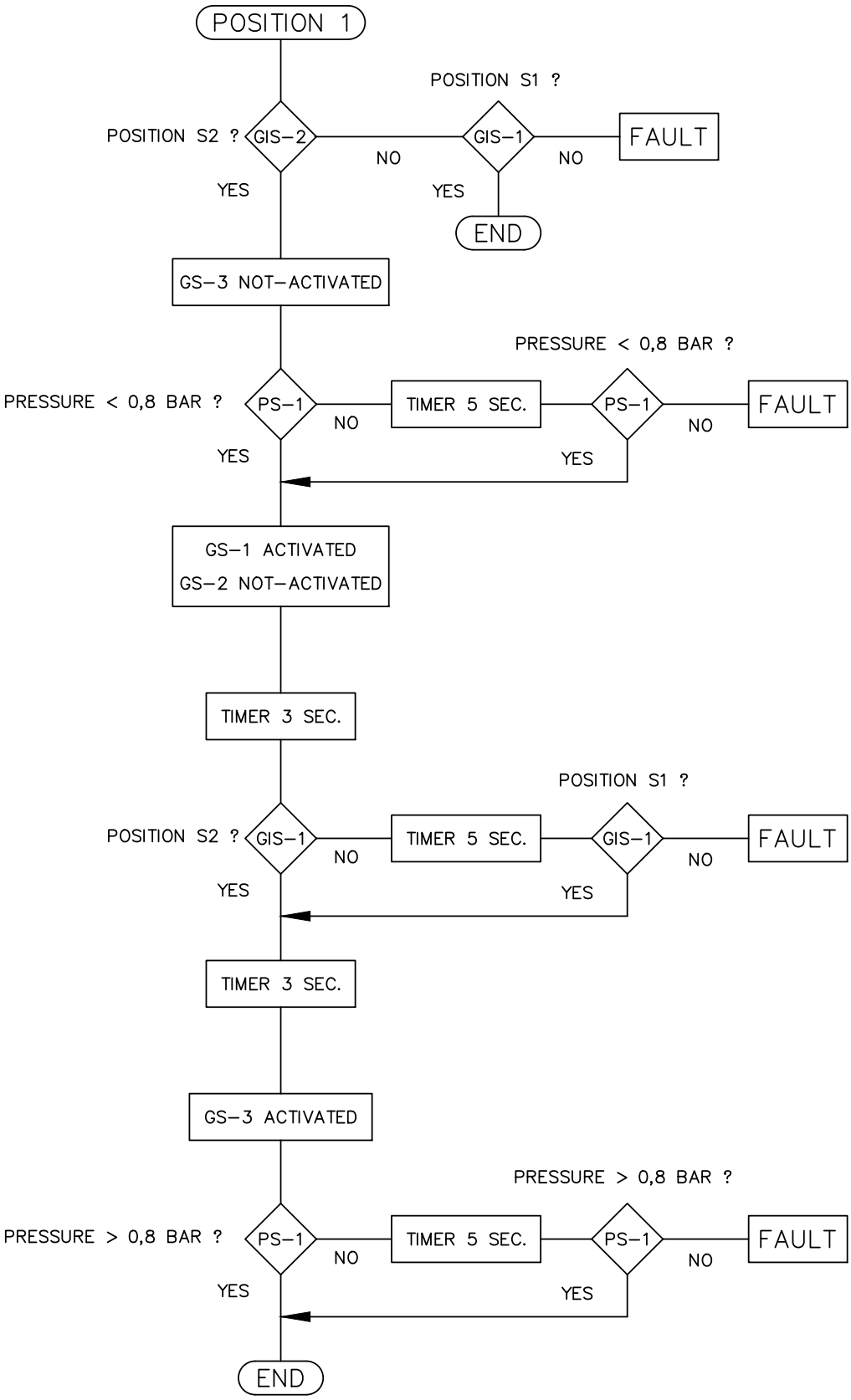


Figure 11.8: Flow diagram inflatable seal (SPTD)

11.4 DISMANTLING, ASSEMBLING AND ADJUSTING

DMN-WESTINGHOUSE diverter valves are manufactured with great care. To reduce air leakage, internal running clearances are kept extremely small during manufacture and assembly of the diverter valve.

First read the safety instructions in chapter **Safety** before dismantling, assembling and adjusting the product.

ATTENTION!
Dismantling, assembling and adjusting must only be performed by trained and authorised personnel!

DANGER!
When carrying out repair work, always shut off the power and set secure against unexpected incoming power.

CAUTION!
- Do not use heavy tools;
- avoid damages such as scratches and burrs etc.;
- clean all components thoroughly.

11.4.1 BEFORE DISMANTLING

INSTRUCTION

- Turn off power supply and/or remove fuses.
- Disconnect electric wiring from solenoid valve and Actuator position switches.
- Close compressed air supply.
- Remove air hoses.

11.4.2 GENERAL ASSEMBLY & PART LIST

11.4.2.1 GENERAL ASSEMBLY STATIC SEAL

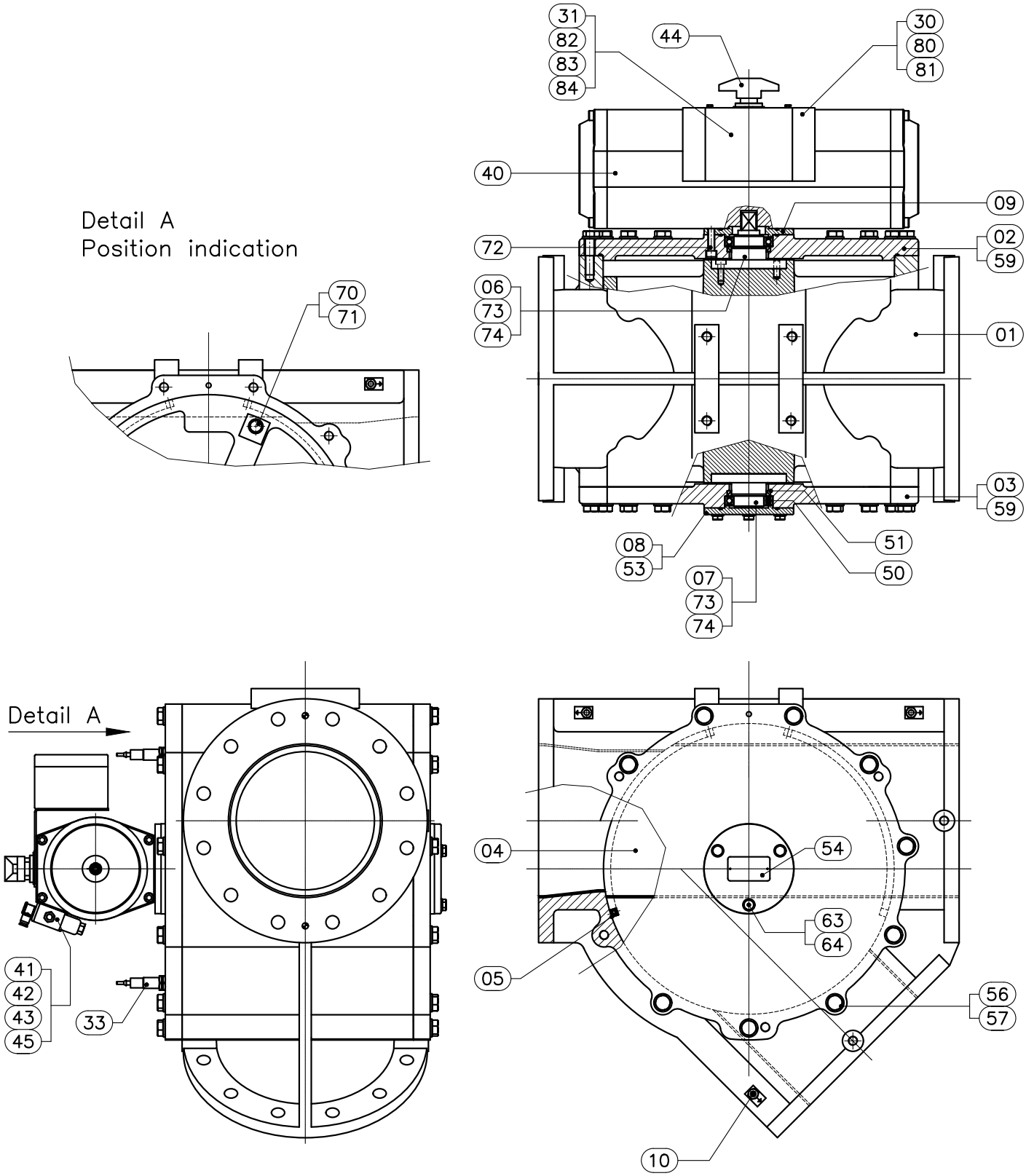


Figure 11.9: General assembly SPTD (Static Seal)

11.4.2.2 PART LIST STATIC SEAL

01 Body
02 End cover
03 End cover
04 Plug
05 Seal
06 Shaft drive
07 Shaft
08 Bearing cover
09 Adaptor ring
10 Earth set
30 Mounting plate
31 Terminal box
33 Proximity switch
40 Actuator
41 Solenoid valve
42 Coil
43 Connector
45 Tube connector
50 Ball bearing
51 Lip seal
53 O-ring
54 Nameplate
56 Bolt
57 Washer
58 Dowel pin
59 O-ring
63 Bolt
64 Washer
70 Bolt
71 Nut
72 Cylinder screw
73 Cylinder screw
74 Dowel pin
80 Bolt
81 Washer
82 Cylinder screw
83 Nut
84 Washer

11.4.2.3 GENERAL ASSEMBLY INFLATABLE SEAL

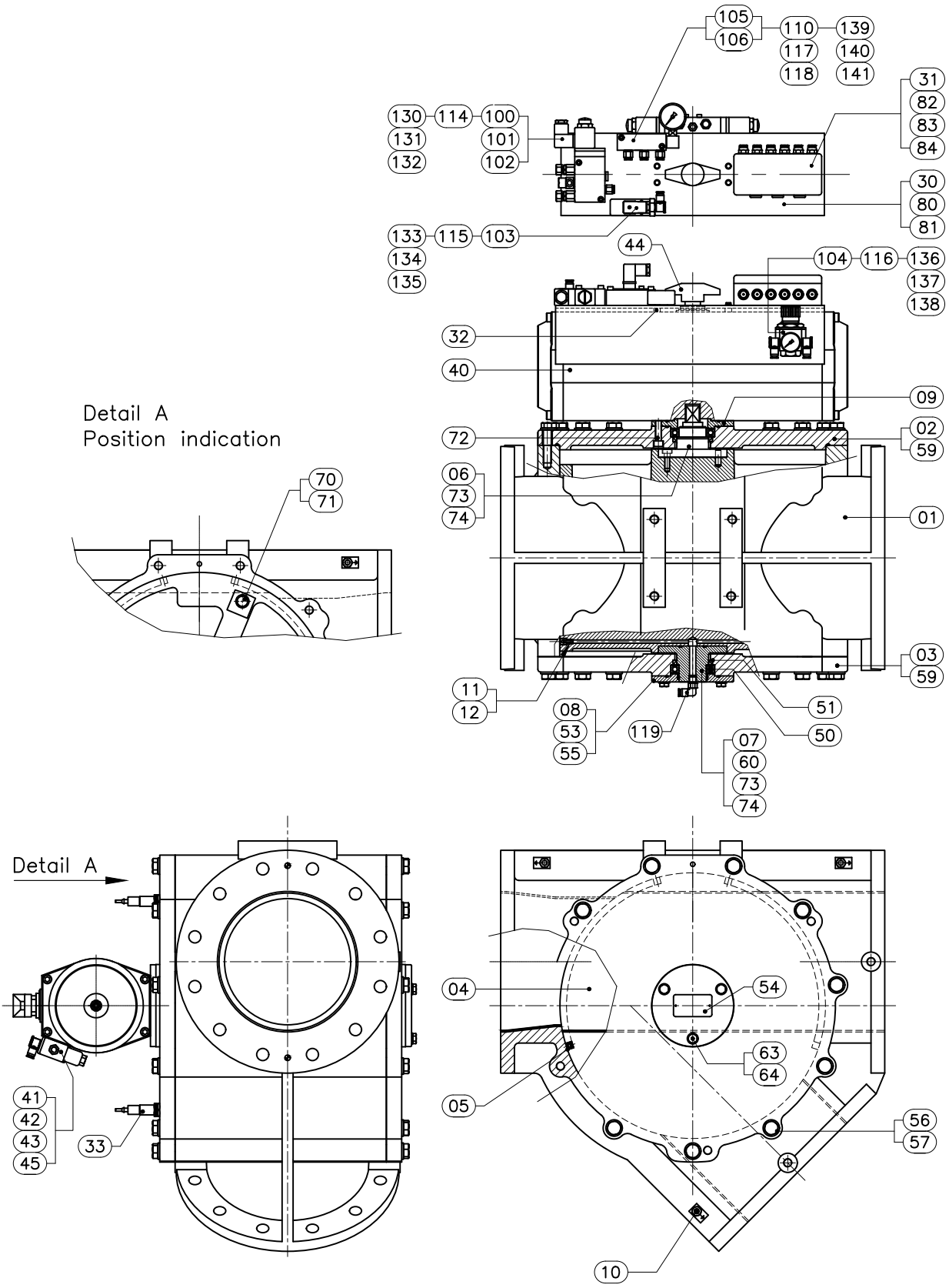


Figure 11.10: General assembly SPTD (Inflatable Seal)

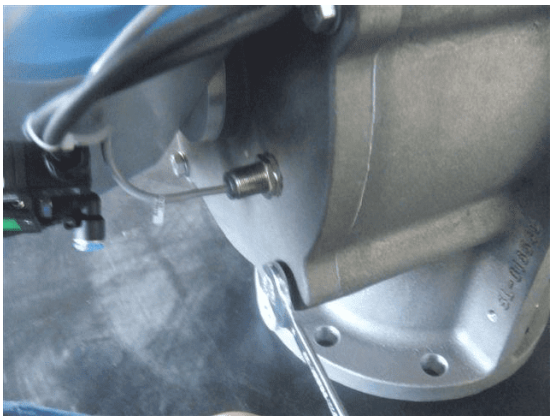
11.4.2.4 PART LIST INFLATABLE SEAL

01 Body
02 End cover
03 End cover
04 Plug
05 Seal
06 Shaft drive
07 Shaft
08 Bearing cover
09 Adaptor ring
10 Earth set
11 Nipple
12 O-ring
30 Mounting plate
31 Terminal box
33 Proximity switch
40 Actuator
41 Solenoid valve
42 Coil
43 Connector
44 Position indicator
45 Tube connector
50 Ball bearing
51 Lip seal
53 O-ring
54 Nameplate
56 Bolt
57 Washer
58 Dowel pin
59 O-ring
60 O-ring
63 Bolt
64 Washer
70 Bolt
71 Nut
72 Cylinder screw
73 Cylinder screw
74 Dowel pin
80 Bolt
81 Washer
82 Cylinder screw
83 Nut
84 Washer
100 Solenoid valve
101 Coil
102 Connector
103 Pressure switch
104 Regulator
105 Pressure gauge
106 Manifold
110 Nipple
111 Tube connector
112 Tube connector
113 Tube connector
114 Tube connector
115 Tube connector
116 Tube connector
117 Tube connector
118 Tube connector
119 Tube connector
130 Bolt
131 Nut
132 Washer
133 Cylinder screw
134 Nut
135 Washer
136 Cylinder screw
137 Washer
139 Cylinder screw
140 Nut
141 Washer

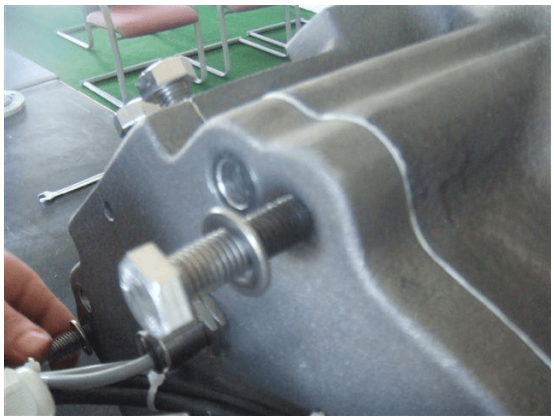
11.4.3 DISMANTLING

DISMANTLING - DRIVE SIDE

Remove end cover fixing bolts (56).

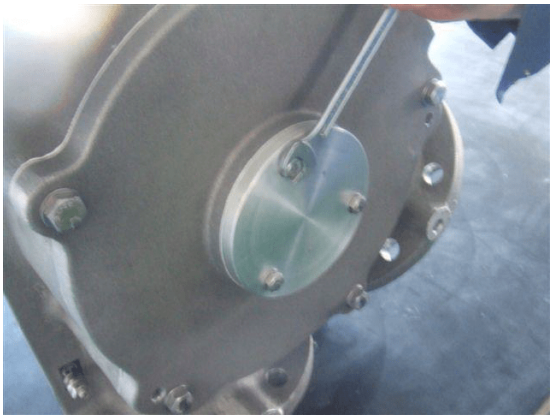


Fit three of these bolts in the tapped jacking holes in the end cover (02) and remove.



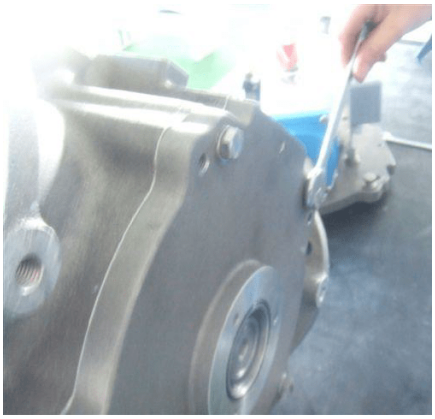
DISMANTLING - NON DRIVE SIDE

Remove end cover fixing bolts (56).

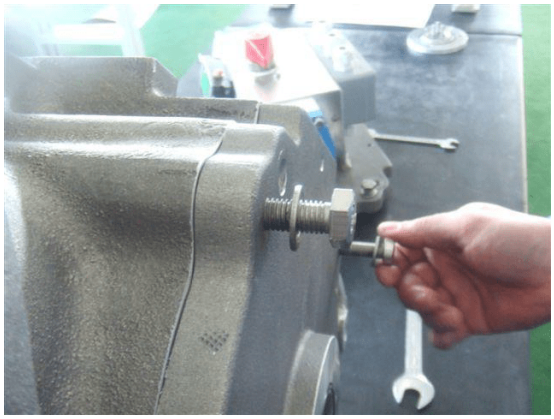


Fit three of these bolts in the tapped jacking holes in the end cover (02) and remove.

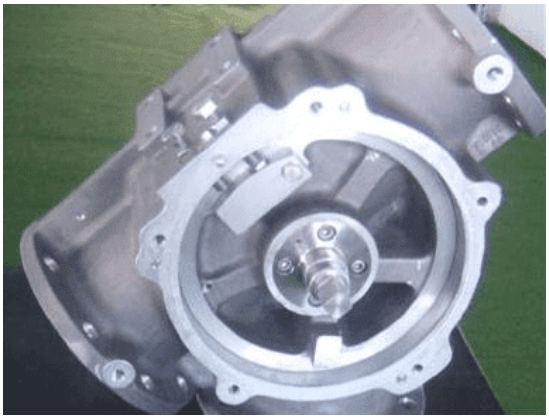
Remove end cover fixing bolts (56).



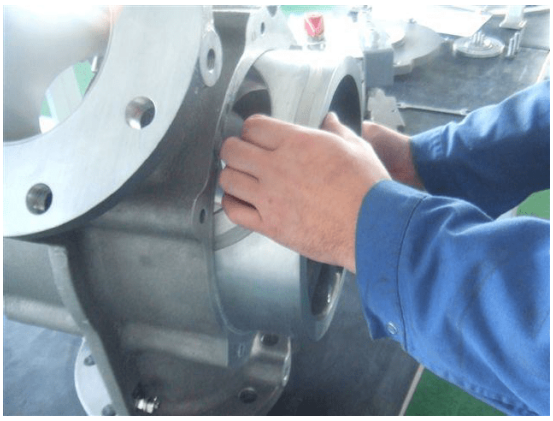
Fit three of these bolts in the tapped jacking holes in the end cover (03) and remove.



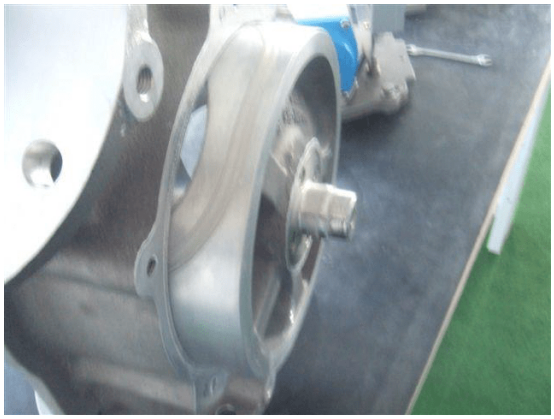
Make a marking line of the position of the plug so that the plug is put back in the correct position.



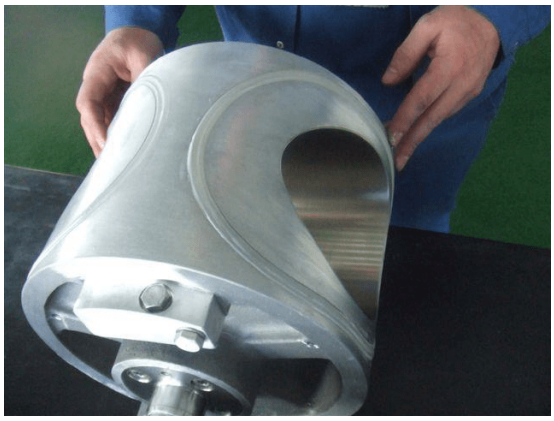
Remove plug (04).



Push the plug out from drive side



Check seal (05) for damage and replace, if necessary.



ATTENTION!
Support the plug to keep it in line with the bore to avoid possible damage to the plug and/or the bore of the body.

- Check lip seals (51) and O-rings end cover (59) for damage and replace, if necessary.
- Clean body, plug and end cover and check for damage.

CHANGING THE SEAL

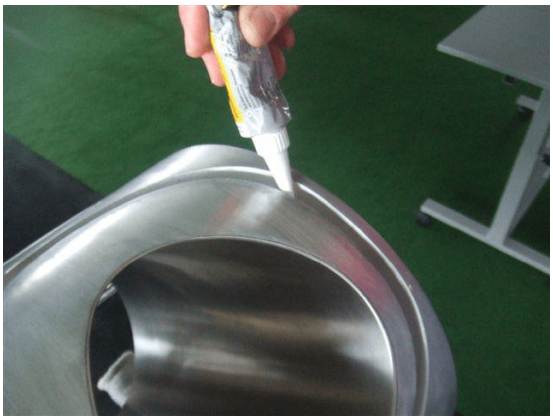
Remove the 2 seals (05).

After the seals are removed clean the groove.

Put a very thin layer silicone glue at the bottom of the seal groove.

INFLATABLE SEAL EXECUTION

Put a very thin layer silicone glue at the bottom of the seal groove and nipple.



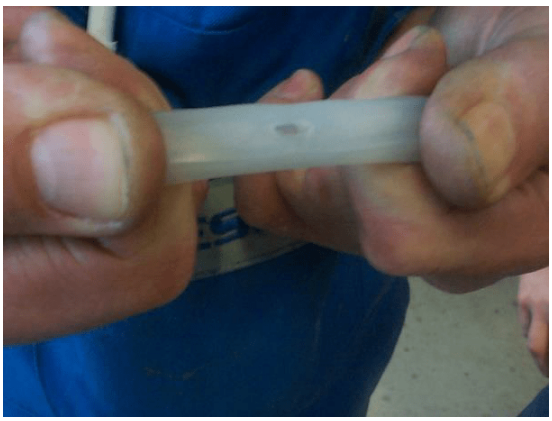
Fit the seal in the seal groove.

Please allow the silicone glue to dry up.

- The seal must rise 0,7 – 1mm above plug diameter.

INFLATABLE SEAL EXECUTION

- Stretch the sealing at the hole 3 mm.
- Push the seal with the hole over the nipple.



ATTENTION!

Make sure that there is no silicone glue in the nipple hole.

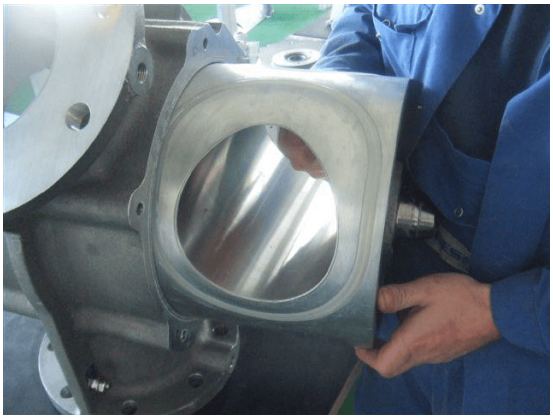
- Fit the seal in the seal groove.
- Please allow the silicone glue to dry up.

ATTENTION!
STATIC SEAL
After assembly let the glue dry for 3 hours.
INFLATABLE SEAL
After assembly let the glue dry for 8 hours.

11.4.4 RE-ASSEMBLY

After cleaning and checking or replacement of parts, the diverter valve can be re-assembled as follows:

Place plug (04) in body and check position is correct.
Push plug further in body.
Make sure that seals are not protruding out of the seal groove which could result in damaging the seal.



Fit end cover (03) with bolts (56) and washers (57).

Before assembly the jack screws (56) must be removed from both end covers.

Fit end cover drive side (02) with bolt (56) and washers (57).

Fit bearing cover (08) with bolt (63) and washers (64).
Note:
On inflatable execution fit the tube connector (119). Connect electrical wiring in accordance with the connection diagram and attach air hoses (see 2.4.2).

ATTENTION!
After assembly test run the diverter valve.

12. SPTDS

12.1 GENERAL WORKING PRINCIPLE

The SPTDS plug diverter is a compact diverter valve with integral actuator, which has been specially designed for rapid pipe changeover between powders and pellets in pneumatic conveying systems.

Pipe changeover is achieved by turning the plug in the body.

The unit is driven by means of a pneumatic actuator actuated by a solenoid valve.

The body and plug are made of aluminium and can be supplied with stainless steel pipes where product contact occurs.

Optionally the product contact parts can be anodized aluminium.

Sealing is by means of a static seal with silicone rings located outside the product flow. Indication of pipe changeover is by means of a switch box with micro switches or inductive sensors.

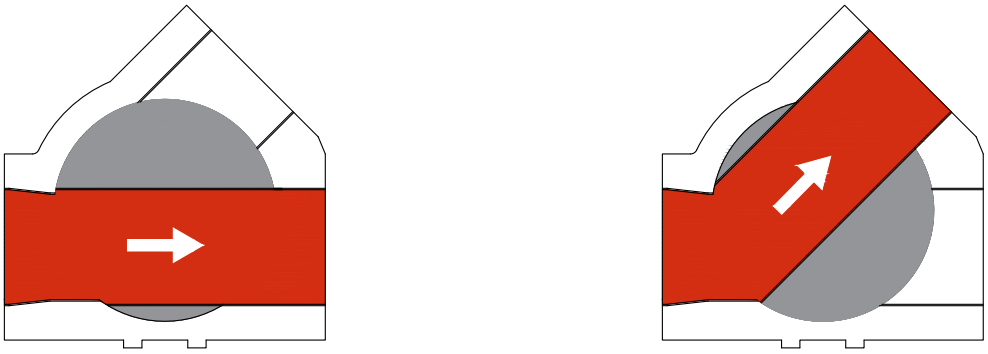


Figure 12.1: Schematic view of a diverter valve (SPTDS)

12.2 STANDARD EXECUTIONS AND SPECIFICATIONS

SPTDS plug diverter is a compact diverter valve with integral actuator for rapid pipe changeover between powders and pellets in pneumatic conveying systems (diverging).

Figure 12.2: SPTDS

Pressure	Static -0.5...+1 bar
Product temp °C	Standard -20°C...+80°C
Ambient temp °C	Standard -20°C...+40°C
Material of construction	Aluminium body-plug-cover
	Option Hard anodised, stainless steel inserts
Flange drilled to	Round: to drawing
Seal	Static: silicone
ATEX 2014/34/EU	1D/2GD Equipment
Remark	Diverging only

Sizes SPTDS

50	65	80	100	125

12.3 INSTALLATION, COMMISSIONING AND MAINTENANCE

First read the safety instructions in chapter **Safety** before installing the product.

DANGER OF DEATH!
Electrical connection
Make sure that appropriate power supplies are utilised during operation and that in the case of plant or component failure, the diverter valve is isolated from external power sources. Failure to comply may lead to serious or fatal injury, and/or critical product damage.

DANGER!
Installation must only be performed by trained and authorised personnel!
Do not touch the inlet of the diverter valve during or after unpacking!
Do not alter, remove or paint the type specification plates of the diverter, drive unit or fitted switches!
When carrying out installation work, always shut off the power and isolate from all other potential power sources.
When product qualities necessitate supplementary safety instructions and the wearing of protective clothes, it is obligatory to follow local safety instructions.

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

12.3.1 BEFORE INSTALLING

INSTRUCTION

- Remove packaging and delivery protection material from diverter valve.
- Check for any damage; if damaged contact your carrier and supplier.
- Check if diverter valve interior is free from foreign material.

12.3.2 SPTDS: INSTALLING THE PLUG DIVERTER VALVE INTO THE SYSTEM

DANGER!
Do not turn plug by hand or switch position.
Danger to fingers and hands.
During operation or testing of the plug diverter, pipe connections must not be open or unprotected.
Pipe changeover must only be carried out when the product pipes are not pressurised and do not contain product!
Diverter valves must not be put into service until the equipment into which they have been incorporated has been declared in conformity with the Machinery Directive.

CAUTION!
Solenoid exhaust air regulators are set at the factory.
Changing these settings can cause malfunction or damage to the diverter.

ATTENTION!
Check voltage of individual components as these vary according to customer specification.
The solenoid valve must be connected to correct power supply and a compressed air supply of at least 4 bar.

INSTRUCTION

- Install plug diverter using tapped holes in the body.
- Attach product pipes and ensure that plug diverter is adequately supported and secured.
- Connect the position switches to the user's control system.
- Connect all cables as per terminal wiring diagram and earth connection.
- Check compressed air pressure
- Check if the solenoid valve auxiliary manual operation is in "0" position.

CAUTION!
After installation test run the diverter valve.

12.3.3 INSTALLING THE DIVERTER VALVE IN A POTENTIALLY EXPLOSIVE ATMOSPHERE

Follow up the following important notes in addition to the regular product information and safety and installation instructions.

Read following chapters carefully in addition to the regular product-, safety- and installation information, before installing the product:

- **Explosion proof diverter valves** (chapter **5.2**)
- **Additional safety instructions for use in potentially explosive atmosphere** (chapter **6.6**)
- "Installing the diverter valve in a potentially explosive atmosphere" (this chapter)

Check if information on the nameplate of the diverter valve corresponds to the potentially explosive on-site atmosphere.
Pay specific attention to:

- Equipment group
- Equipment category
- Dust- or Gas area
- Temperature class
- Maximum surface temperature

Check if there are any potentially explosive atmosphere, oils, acids, gases, vapours, radiation etc. present during installation.
Always ground the diverter valve, use the flange connection bolts, or the optional earth-stud on end cover or motor base plate.
Check that the electrical leakage resistance is less than 10^6 Ω.
The maximum velocity during position switch of diverter is not higher than 1 m/s and the maximum power of the drive used on the diverter is not higher than 4kW
To avoid build-up of electrostatic charges avoid charging mechanisms on the surfaces stronger than manual rubbing.
Non-metallic coatings or paints used on the diverter must have a layer thickness <2 mm.
Ensure that no foreign objects are conveyed through the diverter.
Precautions must be taken by the user to avoid this.

PLUG DIVERTER VALVES

Ensure that no iron oxide and/or rusty particles can be deposited on the inner surface of plug and on the surface of the diverter valve.

Check that the electrical leakage resistance is less than 10^6 Ω between pipe and Body.

DIVERTER VALVE EXTERNAL NO ZONE

- No external explosive atmosphere is permitted
- No dust layers are permitted

12.3.3.1 DRIVE

According to the ATEX directive the maximum velocity must not be higher than 1 m/s and the maximum power of the motor gear unit is not higher than 4kW.
Explosive gas mixtures or concentrations of dust can lead to severe or fatal injuries in connection with hot surfaces, parts under power and moving parts on the gear unit / geared motor.
Installation, connection, start-up, maintenance and repair work on the gear unit / geared motor may only be performed by a qualified specialist while taking the following into account:

- These instructions
- The warning and information signs on the gear unit / geared motor
- Currently valid national / regional regulations
  (Explosion protection, Safety, accident prevention)

CAUTION!
After installation test run the diverter valve.

12.3.3.2 ACCESSORIES (IF FITTED)

Only use;
- solenoid valve
- proximity switch
- pressure switch
- terminal box
- electrical actuator
- etc.

that are CE marked and with an ATEX-approval, equal or higher than the ATEX-approval mentioned on the diverter valve.
Please study the operation instructions supplied by the manufacturer.
Check if the information on the nameplate of electrical accessories such as;

- solenoid valve
- proximity switch
- pressure switch
- terminal box
- electrical actuator
- etc.

corresponds to the potentially explosive on-site atmosphere.
Pay specific attention to:
- Equipment group
- Equipment category
- Dust- Gas area
- Temperature class
- Maximum surface temperature

PLEASE STUDY THE OPERATION INSTRUCTIONS SUPPLIED BY THE MANUFACTURER.

12.3.4 CONNECTION DIAGRAMS

Read following chapters carefully in addition to the regular product- and safety information, before installing the product:
- **Installation, commissioning and maintenance**, (chapter **12.3**).
- **SPTDS: Installing the plug diverter valve into the system**, (chapter **12.3.2**).

The SPTDS plug diverter is equipped as standard with a pneumatic actuator, electrically operated 5/2 bistable valve and switchbox.

DOUBLE ACTING PNEUMATIC ACTUATOR

Airtorque:	DR00XXXUF05F0717AZ
Medium:	air filtration lubricated or not up to 10 bar
Temperature range:	-40°C...+80°C
Working pressure:	6 bar
Hose:	⌀8 mm

SOLENOID VALVE 5/2 NAMUR BISTABLE EXECUTION WITH MANUAL CONTROL. POSITION INDICATOR

Rotech Switch control:	ACR3ASTAZ10 Electromechanical switches
Material:	Aluminium housing
Protection:	IP65
Cable gland:	M20x1.5; clamp range 8-13mm
Standard voltage:	230V AC 4A – 24V DC 16A
Temperature range:	-25°C...+85°C

Rotech Switch control:	APFN412EASEAZ10
Inductive proximity switch:	P&F NBN4-12GM50-E2i 3 wires PNP NO
Material:	Aluminium housing
Protection:	IP65
Cable gland:	M20x1.5; clamp range 8-13mm
Standard voltage:	10-30V DC 0...200mA
Temperature range:	-25°C...+70°C

Rotech Switch control:	APF2V3NASTAZ10B
Inductive proximity switch:	P&F NJ2-V3-N 2GD Namur NC II2G Ex e ia IIC T6 Gb II2D Ex tb IIIC T80°C Db
Material:	Aluminium housing
Protection:	IP65
Cable gland:	M20x1.5; clamp range 5,5-13mm
Standard voltage:	8,2V DC ≥ 3mA inactive - ≤ 1mA active
Temperature range:	-25°C...+85°C

Rotech Switch control:	ACR1ASEAZ10 Electromechanical switches 2GD II2G Ex ed IIC T6 Gb II2D Ex tb IIIC T80°C Db
Material:	Aluminium housing
Protection:	IP67
Cable gland:	M20x1.5; clamp range 5,5-13mm
Standard voltage:	230V AC 4A max
Temperature range:	-25°C...+60°C

ATTENTION!
Please study the operation instructions switchbox manufacturer.

Prior to delivery, the position indication is set for the angle required for the Pneumatic torque actuator.

If adjusting of the cams is necessary, and for instructions for electrical connection, please read the mounting and adjusting instructions Switch control.

12.3.4.1 PNEUMATIC CONNECTION (STATIC SEAL)

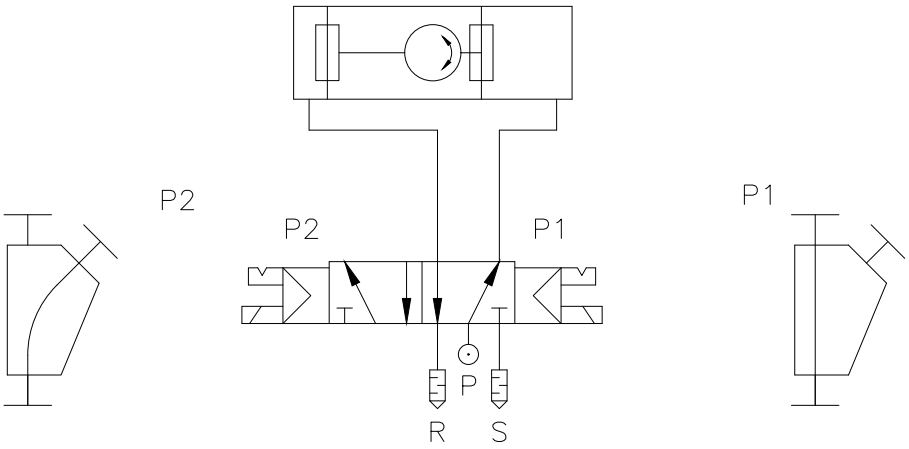


Figure 12.3: Pneumatic SPTDS static seal

12.4 DISMANTLING, ASSEMBLING AND ADJUSTING

DMN-WESTINGHOUSE diverter valves are manufactured with great care. To reduce air leakage, internal running clearances are kept extremely small during manufacture and assembly of the diverter valve.

First read the safety instructions in chapter **Safety** before dismantling, assembling and adjusting the product.

ATTENTION!
Dismantling, assembling and adjusting must only be performed by trained and authorised personnel!

DANGER!
When carrying out repair work, always shut off the power and set secure against unexpected incoming power.

CAUTION!
- Do not use heavy tools;
- avoid damages such as scratches and burrs etc.;
- clean all components thoroughly.

12.4.1 BEFORE DISMANTLING

INSTRUCTION

- Turn off power supply and/or remove fuses.
- Disconnect electric wiring from solenoid valve and Actuator position switches.
- Close compressed air supply.
- Remove air hoses.

12.4.2 GENERAL ASSEMBLY & PART LIST

12.4.2.1 GENERAL ASSEMBLY STATIC SEAL

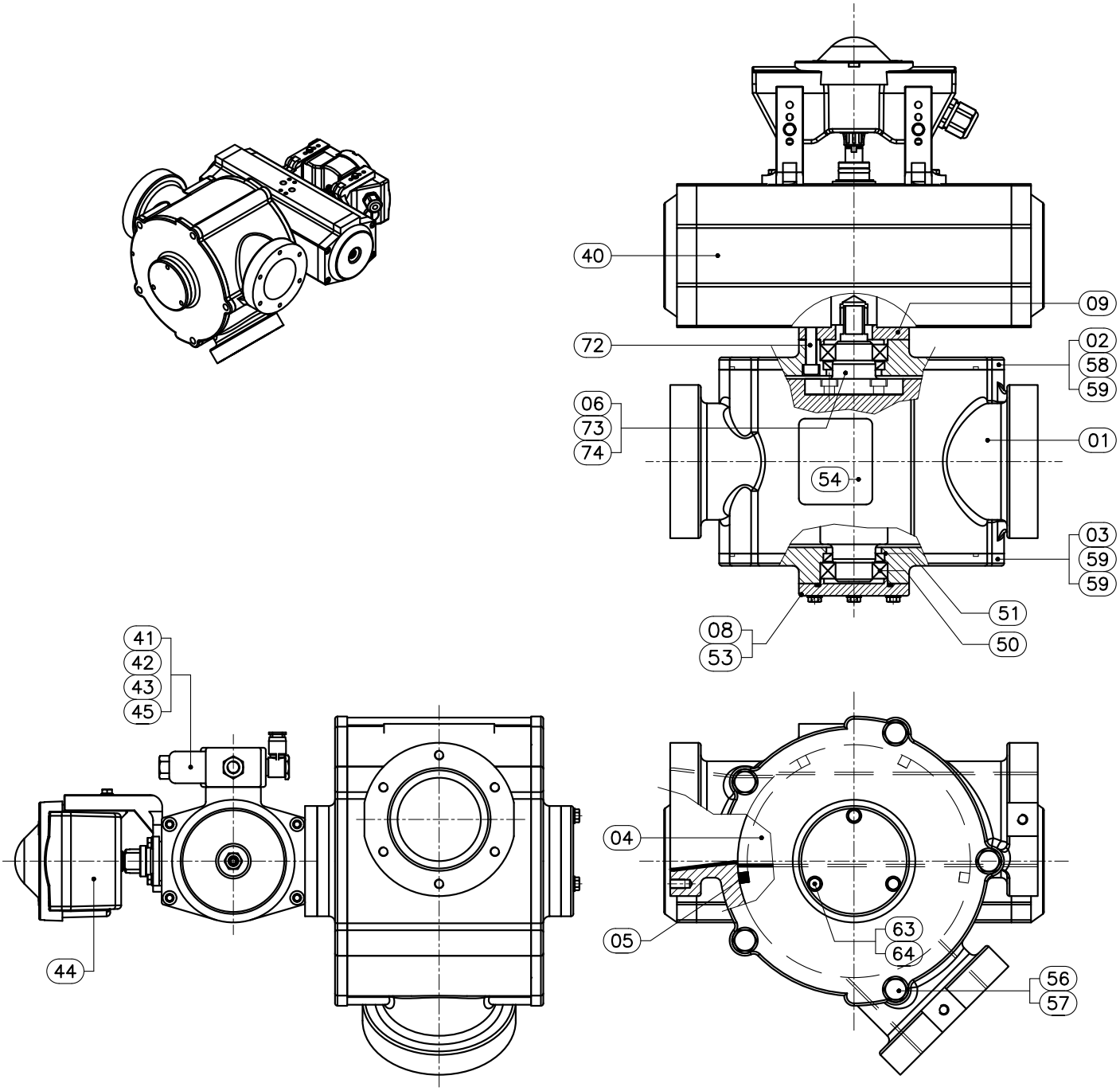


Figure 12.4: General assembly SPTDS (Static Seal)

12.4.2.2 PART LIST STATIC SEAL

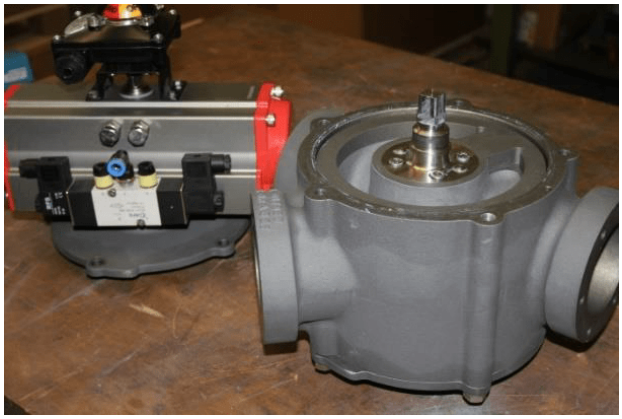
01 Body
02 End cover
03 End cover
04 Plug
05 Seal
06 Shaft drive
08 Bearing cover
09 Adaptor ring
40 Actuator
41 Solenoid valve
42 Coil
43 Connector
44 Position indicator
45 Tube connector
50 Ball bearing
51 Lip seal
53 O-ring
54 Nameplate
56 Bolt
57 Washer
58 Dowel pin
59 O-ring
63 Bolt
64 Washer
72 Cylinder screw
73 Cylinder screw
74 Dowel pin

12.4.3 DISMANTLING

DISMANTLING - DRIVE SIDE

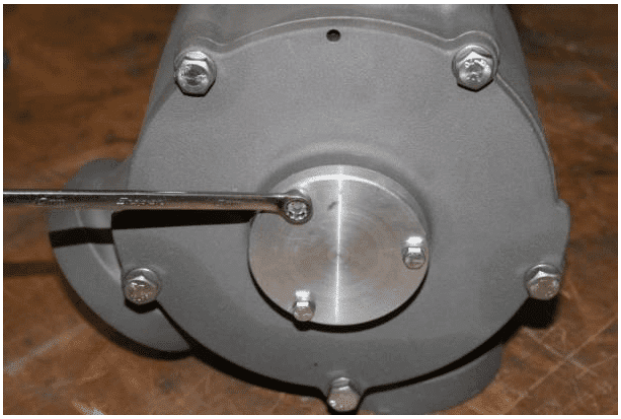
Remove end cover fixing bolts (56).

Remove the end cover (02).

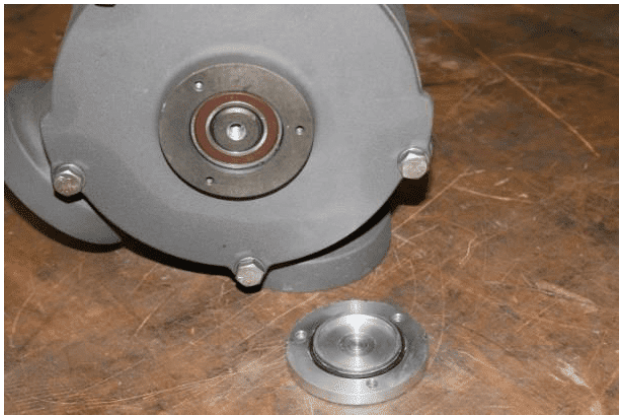


DISMANTLING - NON DRIVE SIDE

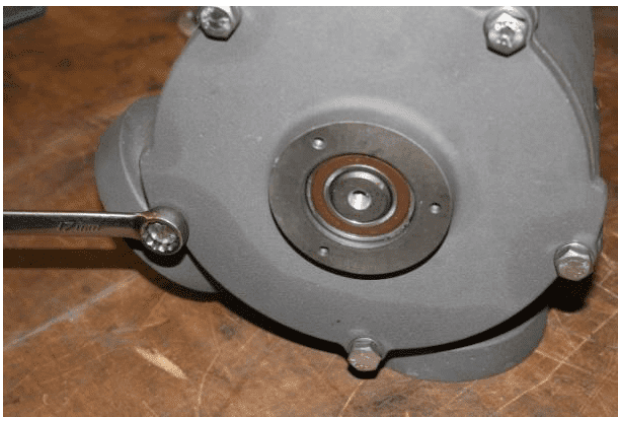
Remove bolts (63) and washer (64).



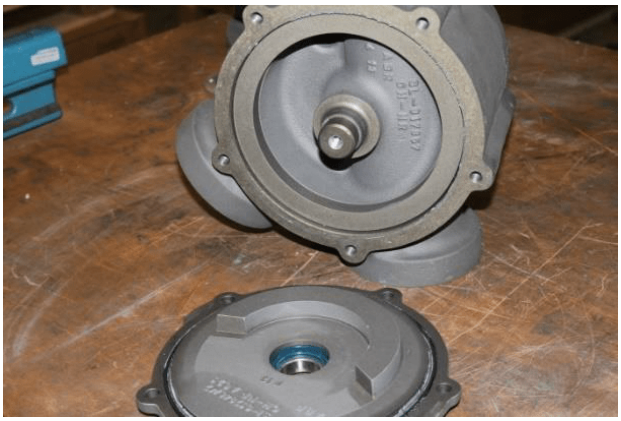
Remove bearing cover (08).



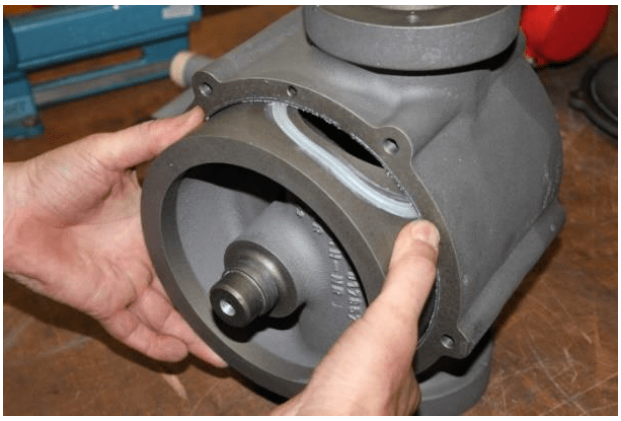
Remove end cover fixing bolts (56).



Make a marking line of the position of the plug so that the plug is put back in the correct position.

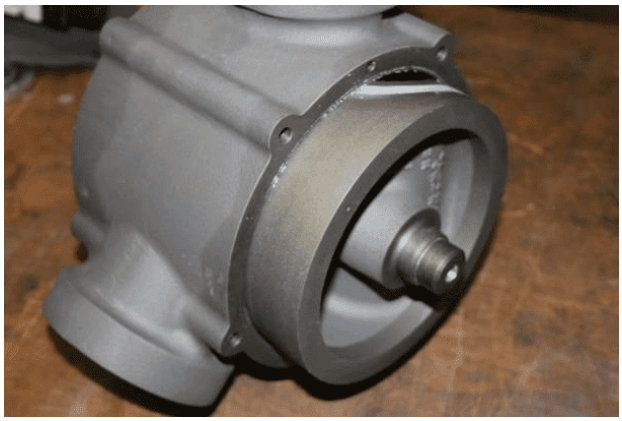


Remove plug (04).



Remove the end cover (03).

Push the plug out from drive side.



Check seal (05) for damage and replace, if necessary.

ATTENTION!
Support the plug to keep it in line with the bore to avoid possible damage to the plug and/or the bore of the body.

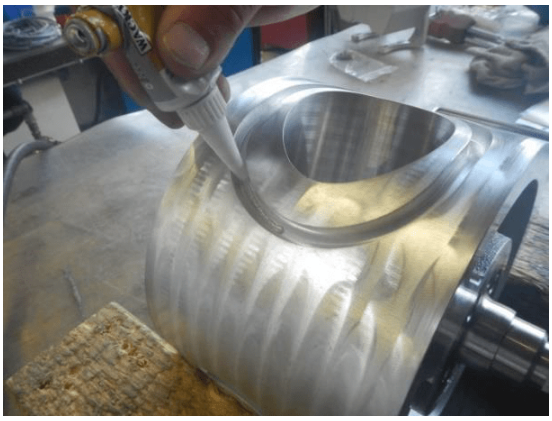
- Check lip seals (51) and O-rings end cover (59) for damage and replace, if necessary.
- Clean body, plug and end cover and check for damage.

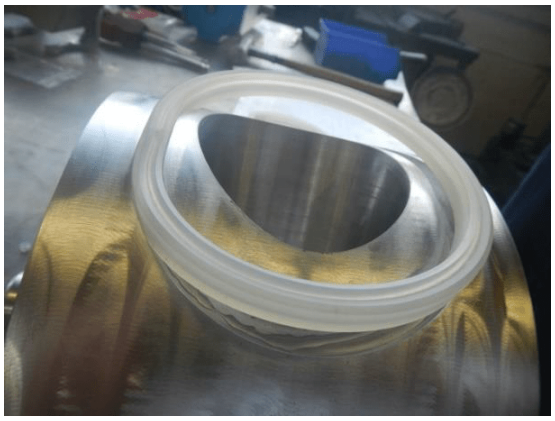
12.4.3.1 CHANGING THE SEAL

Remove the 2 seals (05).

After the seals are removed clean the groove.

Put a very thin layer of silicone glue at the bottom of the seal groove.





The seal must rise 0,7 – 1 mm above plug diameter

Fit the seal in the seal groove.
Please allow the silicone glue to dry.

ATTENTION!
STATIC SEAL
After assembly let the glue dry for 3 hours

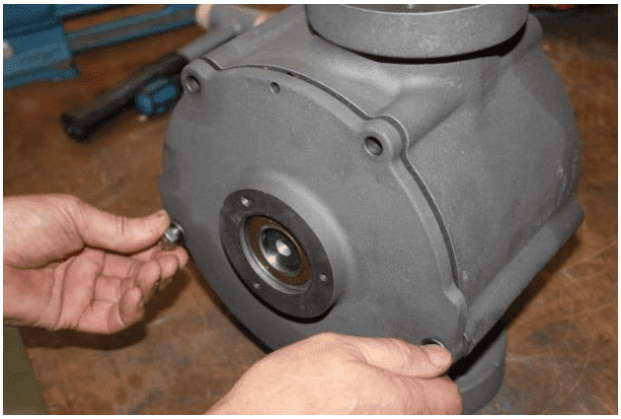
12.4.4 RE-ASSEMBLY

After cleaning and checking or replacement of parts, the diverter valve can be re-assembled as follows:

Place plug (04) in body and check position is correct.

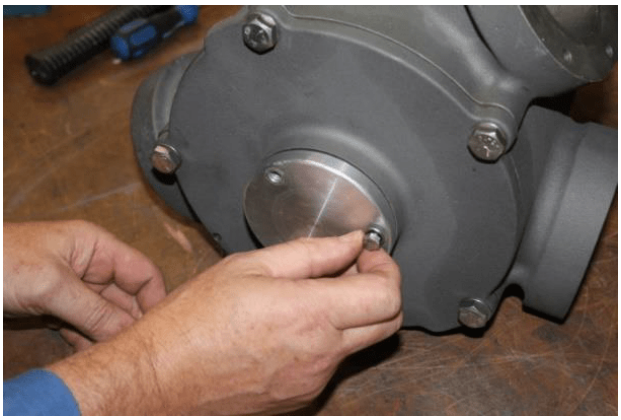
- Push plug further in body.
- Make sure that seals are not protruding out of the seal groove which could result in damaging the seal.

Fit end cover (03) with bolts (56) and washers (57).

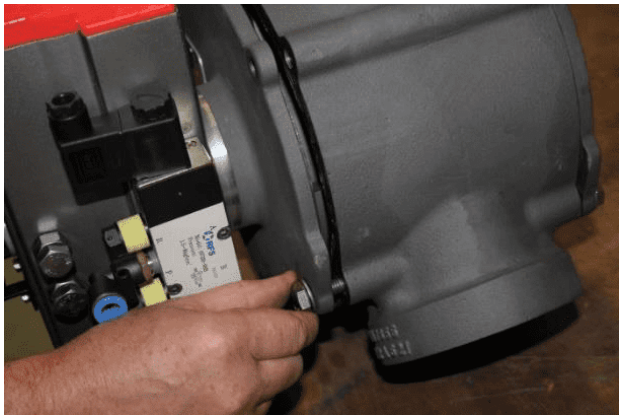


Fit bearing cover (08) with bolt (63) and washers (64).

- Connect electrical wiring in accordance with the connection diagram and fit air hose.



Fit end cover drive side (02) with bolt (56) and washers (57).



ATTENTION!
After assembly test run the diverter valve.

13. GPD

13.1 GENERAL WORKING PRINCIPLE

The GPD plug diverter has been specially designed to re-route powders and pellets in gravity systems.

Pipe changeover is achieved by turning the plug in the body. The unit is driven by means of a pneumatic torque actuator actuated by a solenoid valve.

The gravity plug diverter valve is cast and may be of aluminium, iron or stainless steel.

The internal seal is metal to metal, shaft sealing is by means of lip seals.

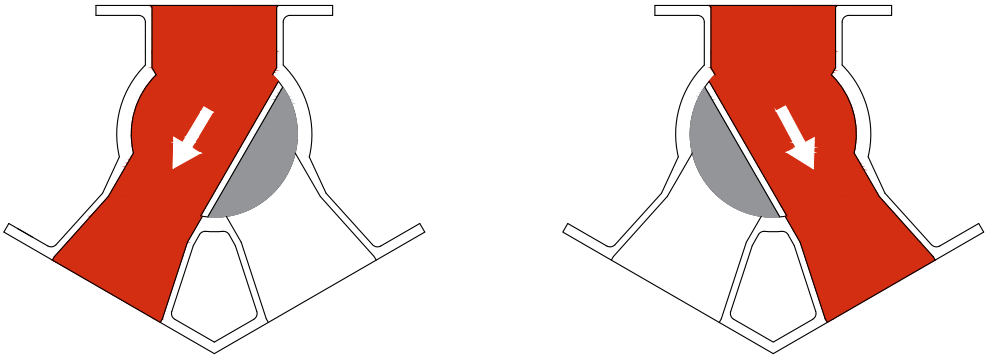


Figure 13.1: Schematic view of a diverter valve (GPD)

13.2 STANDARD EXECUTIONS AND SPECIFICATIONS

GPD plug diverter has been specially designed to re-route powders and pellets in gravity systems.

Figure 13.2: GPD

Pressure	No pressure
Product temp °C	Standard -20°C...+80°C
Ambient temp °C	Standard -20°C...+40°C
Material of construction	Body cover: Cast iron / Aluminium / Stainless steel 316
	Plug: Mild steel / Hardox / Stainless steel 316L
Flange hole pattern	DIN PN 10 / ANSI 150 lbs
Seal	No seal
ATEX 2014/34/EU	1D/2GD Equipment

Sizes GPD			
150	200	250	300

13.3 INSTALLATION, COMMISSIONING AND MAINTENANCE

First read the safety instructions in chapter **Safety** before installing the product.

DANGER OF DEATH!
Electrical connection
Make sure that appropriate power supplies are utilised during operation and that in the case of plant or component failure, the diverter valve is isolated from external power sources. Failure to comply may lead to serious or fatal injury, and/or critical product damage.

DANGER!
Installation must only be performed by trained and authorised personnel!
Do not touch the inlet of the diverter valve during or after unpacking!
Do not alter, remove or paint the type specification plates of the diverter, drive unit or fitted switches!
When carrying out installation work, always shut off the power and isolate from all other potential power sources.
When product qualities necessitate supplementary safety instructions and the wearing of protective clothes, it is obligatory to follow local safety instructions.

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

13.3.1 BEFORE INSTALLING

INSTRUCTION

- Remove packaging and delivery protection material from diverter valve.
- Check for any damage; if damaged contact your carrier and supplier.
- Check if diverter valve interior is free from foreign material.

13.3.2 GPD: INSTALLING THE PLUG DIVERTER VALVE INTO THE SYSTEM

DANGER!
Do not turn plug by hand or switch position.
Danger to fingers and hands.
During operation or testing of the plug diverter, pipe connections must not be open or unprotected.
GPD can be switched during product flow.
Diverter valves must not be put into service until the equipment into which they have been incorporated has been declared in conformity with the Machinery Directive.

CAUTION!
Solenoid exhaust air regulators are set at the factory.
Changing these settings can cause malfunction or damage to the diverter.

ATTENTION!
Check voltage of individual components as these vary according to customer specification.
The solenoid valve must be connected to correct power supply and a compressed air supply of at least 4 bar.

INSTRUCTION

- Install plug diverter using tapped holes in the body.
- Attach product pipes and ensure that plug diverter is adequately supported and secured.
- Connect the position switches to the user's control system.
- Connect all cables as per terminal wiring diagram and earth connection.
- Check compressed air pressure
- Check if the solenoid valve auxiliary manual operation is in "0" position.

CAUTION!
After installation test run the diverter valve.

13.3.3 INSTALLING THE DIVERTER VALVE IN A POTENTIALLY EXPLOSIVE ATMOSPHERE

Follow up the following important notes in addition to the regular product information and safety and installation instructions.

Read following chapters carefully in addition to the regular product-, safety- and installation information, before installing the product:

- **Explosion proof diverter valves** (chapter **5.2**)
- **Additional safety instructions for use in potentially explosive atmosphere** (chapter **6.6**)
- "Installing the diverter valve in a potentially explosive atmosphere" (this chapter)

Check if information on the nameplate of the diverter valve corresponds to the potentially explosive on-site atmosphere.
Pay specific attention to:

- Equipment group
- Equipment category
- Dust- or Gas area
- Temperature class
- Maximum surface temperature

Check if there are any potentially explosive atmosphere, oils, acids, gases, vapours, radiation etc. present during installation.
Always ground the diverter valve, use the flange connection bolts, or the optional earth-stud on end cover or motor base plate.
Check that the electrical leakage resistance is less than 10^6 Ω.
The maximum velocity during position switch of diverter is not higher than 1 m/s and the maximum power of the drive used on the diverter is not higher than 4kW
To avoid build-up of electrostatic charges avoid charging mechanisms on the surfaces stronger than manual rubbing.
Non-metallic coatings or paints used on the diverter must have a layer thickness <2 mm.
Ensure that no foreign objects are conveyed through the diverter.
Precautions must be taken by the user to avoid this.

Check that the electrical leakage resistance is less than 10^6 Ω between pipe and Body.

DIVERTER VALVE EXTERNAL NO ZONE

- No external explosive atmosphere is permitted
- No dust layers are permitted

13.3.3.1 DRIVE

According to the ATEX directive the maximum velocity must not be higher than 1 m/s and the maximum power of the motor gear unit is not higher than 4kW.
Explosive gas mixtures or concentrations of dust can lead to severe or fatal injuries in connection with hot surfaces, parts under power and moving parts on the gear unit / geared motor.
Installation, connection, start-up, maintenance and repair work on the gear unit / geared motor may only be performed by a qualified specialist while taking the following into account:

- These instructions
- The warning and information signs on the gear unit / geared motor
- Currently valid national / regional regulations
  (Explosion protection, Safety, accident prevention)

CAUTION!
After installation test run the diverter valve.

13.3.3.2 ACCESSORIES (IF FITTED)

Only use;
- solenoid valve
- proximity switch
- pressure switch
- terminal box
- electrical actuator
- etc.

that are CE marked and with an ATEX-approval, equal or higher than the ATEX-approval mentioned on the diverter valve.
Please study the operation instructions supplied by the manufacturer.
Check if the information on the nameplate of electrical accessories such as;

- solenoid valve
- proximity switch
- pressure switch
- terminal box
- electrical actuator
- etc.

corresponds to the potentially explosive on-site atmosphere.
Pay specific attention to:
- Equipment group
- Equipment category
- Dust- Gas area
- Temperature class
- Maximum surface temperature

PLEASE STUDY THE OPERATION INSTRUCTIONS SUPPLIED BY THE MANUFACTURER.

13.3.4 CONNECTION DIAGRAMS

Read following chapters carefully in addition to the regular product- and safety information, before installing the product:
- **Installation, commissioning and maintenance** (chapter **13.3**).
- **GPD: Installing the plug diverter valve into the system** (chapter **13.3.2**).

The plug diverter is equipped as standard with a pneumatic torque actuator, electrically operated 5/2 solenoid-solenoid valve 1/4″, micro switches and junction box.

DOUBLE ACTING PNEUMATIC ACTUATOR

Airtorque:	DR00XXXUF05F0717AZ
Medium:	air filtration lubricated or not up to 10 bar
Temperature range:	-40°C...+80°C
Working pressure:	6 bar
Hose:	⌀8 mm

Air consumption:

GPD size	150	200	250	300
Air consumption at 6 barLtr./stroke	12.3	12.3	20.8	20.8

Solenoid valve 5/2 NAMUR bistable execution with manual control.

POSITION INDICATOR

Rotech Switch control:	ACR3ASTAZ10 Electromechanical switches
Material:	Aluminium housing
Protection:	IP65
Cable gland:	M20x1.5; clamp range 8-13mm
Standard voltage:	230V AC 4A – 24V DC 16A
Temperature range:	-25°C...+85°C

Rotech Switch control:	APFN412EASEAZ10
Inductive proximity switch:	P&F NBN4-12GM50-E2 3 wires PNP NO
Material:	Aluminium housing
Protection:	IP65
Cable gland:	M20x1.5; clamp range 8-13mm
Standard voltage:	10-30V DC 0...200mA
Temperature range:	-25°C...+70°C

Rotech Switch control:	APF2V3NASTAZ10B
Inductive proximity switch:	P&F NJ2-V3-N 2GD Namur NC II2G Ex e ia IIC T6 Gb II2D Ex tb IIIC T80°C Db
Material:	Aluminium housing
Protection:	IP65
Cable gland:	M20x1.5; clamp range 5,5-13mm
Standard voltage:	8,2V DC ≥ 3mA inactive - ≤ 1mA active
Temperature range:	-25°C...+85°C

Rotech Switch control:	ACR1ASEAZ10 Electromechanical switches 2GD II2G Ex ed IIC T6 Gb II2D Ex tb IIIC T80°C Db
Material:	Aluminium housing
Protection:	IP67
Cable gland:	M20x1.5; clamp range 5,5-13mm
Standard voltage:	230V AC 4A max
Temperature range:	-25°C...+60°C

ATTENTION!
Please study the operation instructions switchbox manufacturer.

Prior to delivery, the position indication is set for the angle required for the Pneumatic torque actuator.

If adjusting of the cams is necessary, and for instructions for electrical connection, please read the mounting and adjusting instructions Switch control.

13.3.4.1 PNEUMATIC CONNECTION GPD

SOLENOID VALVE 5/2 NAMUR BISTABLE EXECUTION WITH MANUAL CONTROL.

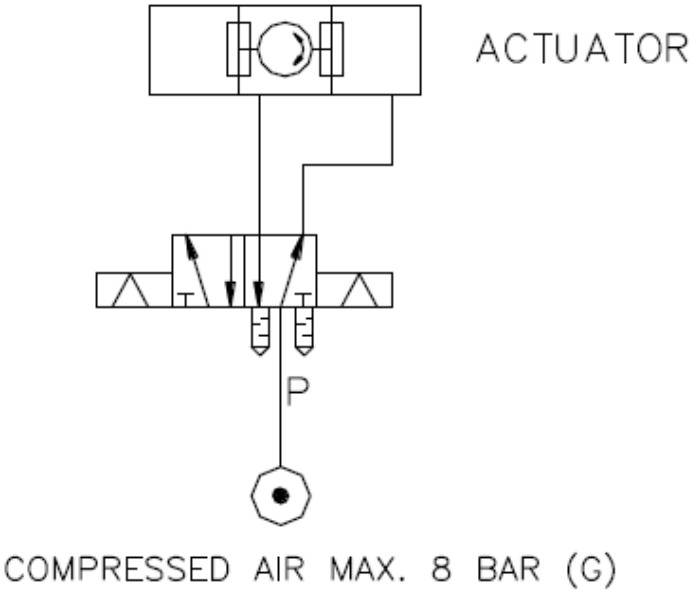


Figure 13.3: Pneumatic connection GPD

13.3.5 GENERAL ASSEMBLY & PART LIST

13.3.5.1 GENERAL ASSEMBLY

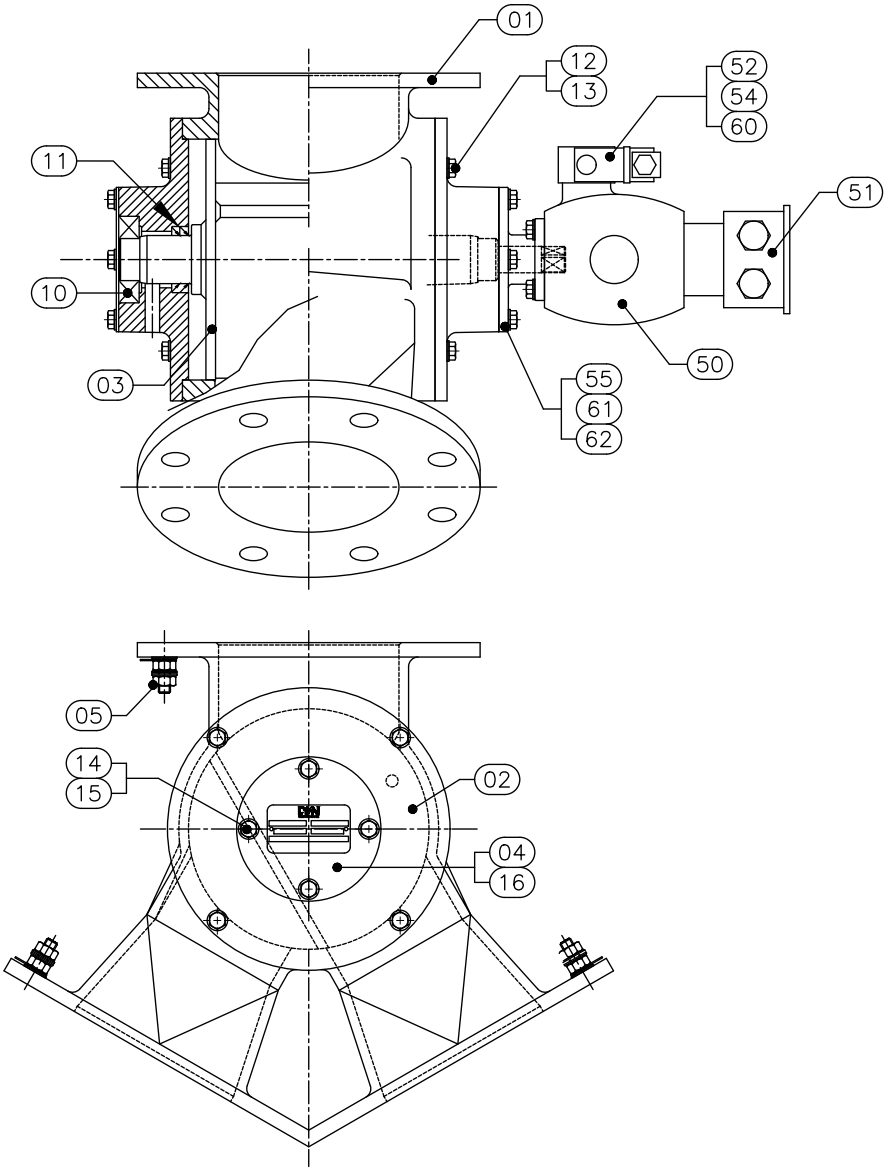


Figure 13.4: General assembly GPD

13.3.5.2 PART LIST

01 Body
02 End cover
03 Plug
04 Cover
05 Earth set
10 Ball bearing
11 Lip seal
12 Bolt
13 Washer
14 Bolt
15 Washer
16 Nameplate
50 Torque actuator unit
51 Switch box
52 Solenoid valve
54 Coil
55 Mounting flange
60 Fitting
61 Bolt
62 Washer
72 Cylinder screw

13.3.6 DISMANTLING

INSTRUCTION

- Disconnect electric wiring from solenoid valve and position switches and remove air hoses.
- Remove bolts (12) and remove end cover (02).
- Remove the plug (03) by pulling it axially from the body.

ATTENTION!
Support the plug to keep it in line with the bore to avoid possible damage to the plug and/or bore of the body. Place the plug on a wooden surface to prevent the plug from being damaged.

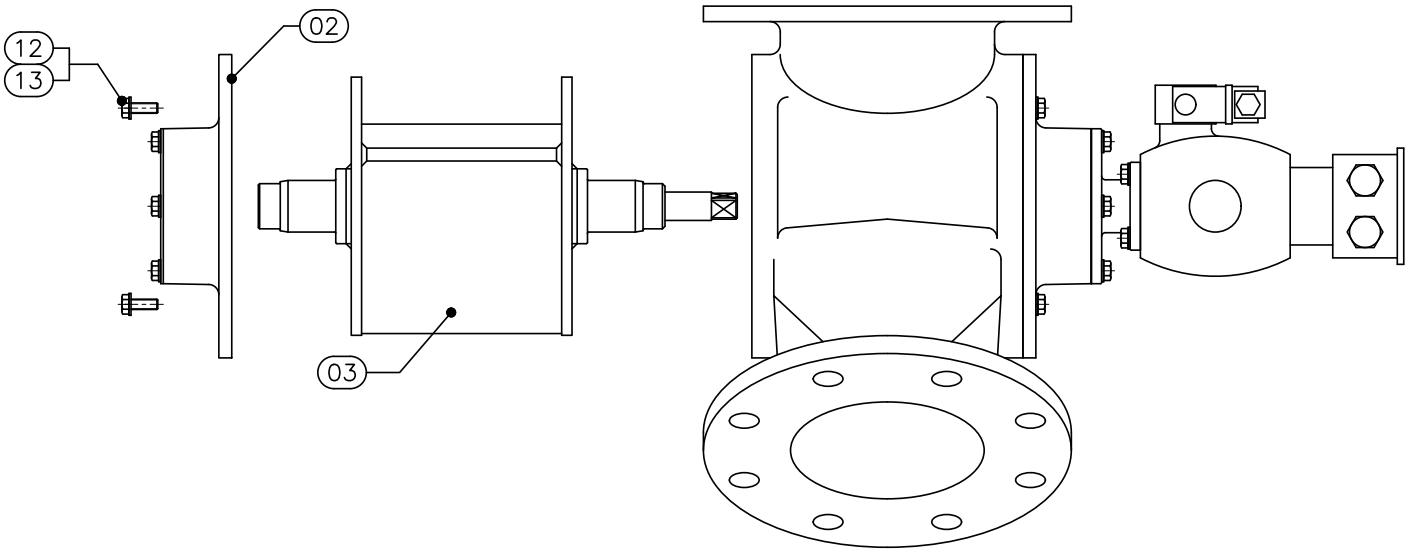


Figure 13.5: Dismantling GPD

- Remove the lip seals (11) from cover.

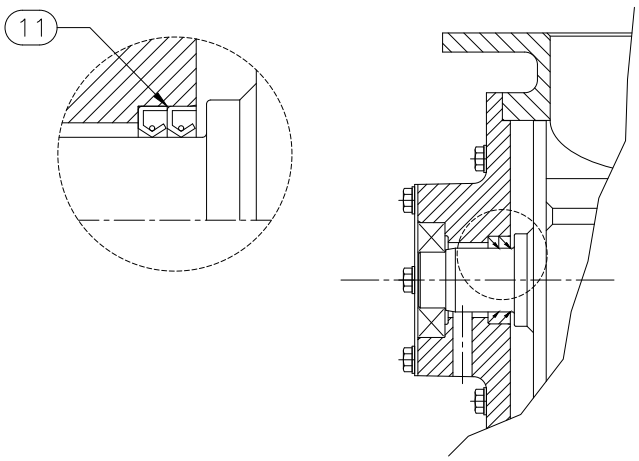


Figure 13.6: Dismantling shaft seal for cleaning GPD

13.3.7 RE-ASSEMBLY

INSTRUCTION

After cleaning and checking or replacement of parts, the diverter valve can be re-assembled as follows:

- Replace shaft seals in the covers.
- Now slide the plug axially in the body and make sure that the position of the square insertion end of the plug correspond to the opening in the actuator.
- Check if the blade is in correct position. The marked line on body and plug must match, if not pull the plug out of the square and rotate the plug in the right position.

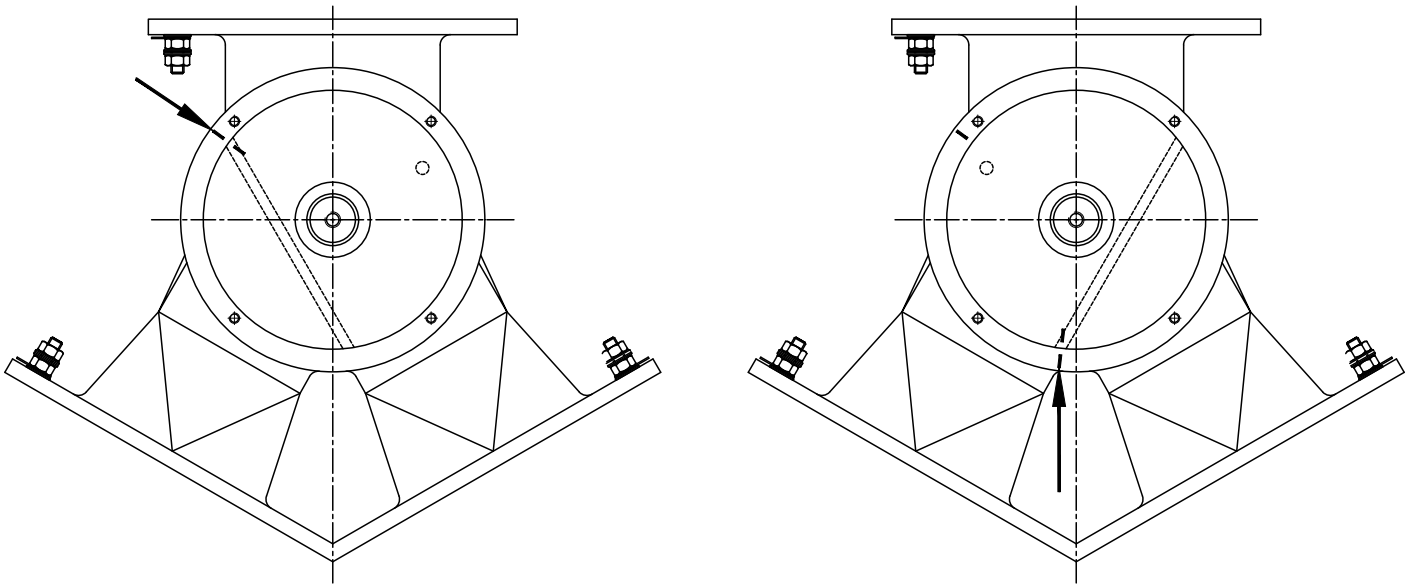


Figure 13.7: Re-assembly GPD

- Place this cover (02) in the body.
- Tighten the bolts (12) in a progressive diagonal manner. There should be zero clearance between the end cover and body contact faces.
- Connect electrical wiring in accordance with the connection diagram and attach air hoses.

ATTENTION!
After assembly test run the diverter valve.

13.4 DISMANTLING, ASSEMBLING AND ADJUSTING

DMN-WESTINGHOUSE diverter valves are manufactured with great care. To reduce air leakage, internal running clearances are kept extremely small during manufacture and assembly of the diverter valve.

First read the safety instructions in chapter **Safety** before dismantling, assembling and adjusting the product.

ATTENTION!
Dismantling, assembling and adjusting must only be performed by trained and authorised personnel!

DANGER!
When carrying out repair work, always shut off the power and set secure against unexpected incoming power.

CAUTION!
- Do not use heavy tools;
- avoid damages such as scratches and burrs etc.;
- clean all components thoroughly.

13.4.1 BEFORE DISMANTLING

INSTRUCTION

- Turn off power supply and/or remove fuses.
- Disconnect electric wiring from solenoid valve and Actuator position switches.
- Close compressed air supply.
- Remove air hoses.

13.4.2 GENERAL ASSEMBLY & PART LIST (USDA APPROVED)

USDA

13.4.2.1 GENERAL ASSEMBLY GPD DAIRY-WD

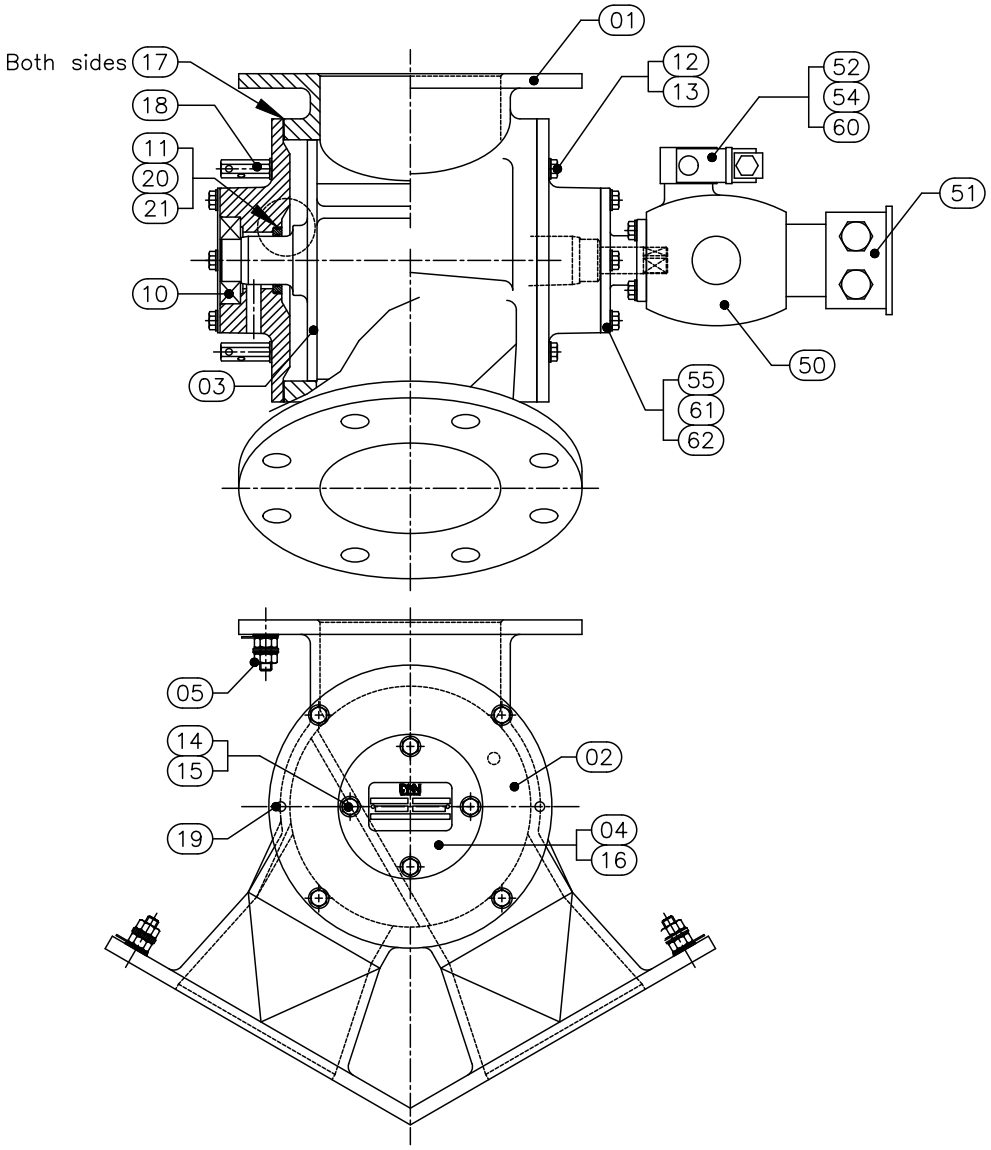


Figure 13.8: General assembly GPD Dairy-WD

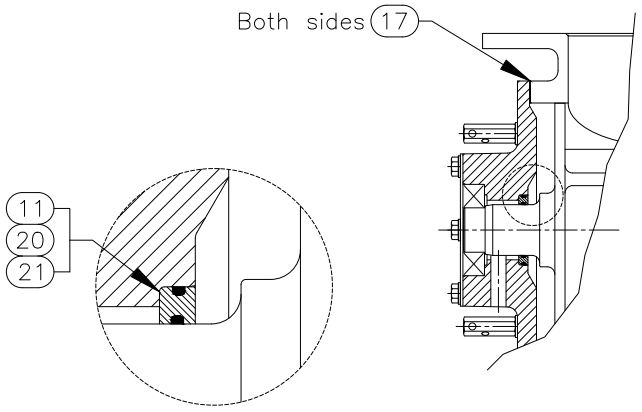


Figure 13.9: Shaft seal detail

13.4.2.2 PART LIST GPD DAIRY-WD

01 Body
02 End cover
03 Plug
04 Cover
05 Earth set
10 Ball bearing
11 Seal ring
12 Bolt
13 Washer
14 Bolt
15 Washer
16 Nameplate
17 Gasket
18 Bolt
19 Dowel
20 O-ring
21 O-ring
50 Torque actuator unit
51 Switch box
52 Solenoid valve
54 Coil
55 Mounting flange
60 Fitting
61 Bolt
62 Washer

13.4.3 DISMANTLING GPD DAIRY-WD

ATTENTION!
The unit requires disassembly for hand cleaning.
Plug and seal should be removed, cleaned and reassembled every time the unit is cleaned.

INSTRUCTION

- Disconnect electric wiring from solenoid valve and position switches and remove air hoses.
- Remove bolts (18) and remove end cover (02).
- Remove Gasket (17).
- Remove the plug (03) by pulling it axially from the body.

CAUTION!
Support the plug to keep it in line with the bore to avoid possible damage to the plug and/or bore of the body. Place the plug on a wooden surface to prevent the plug from being damaged.

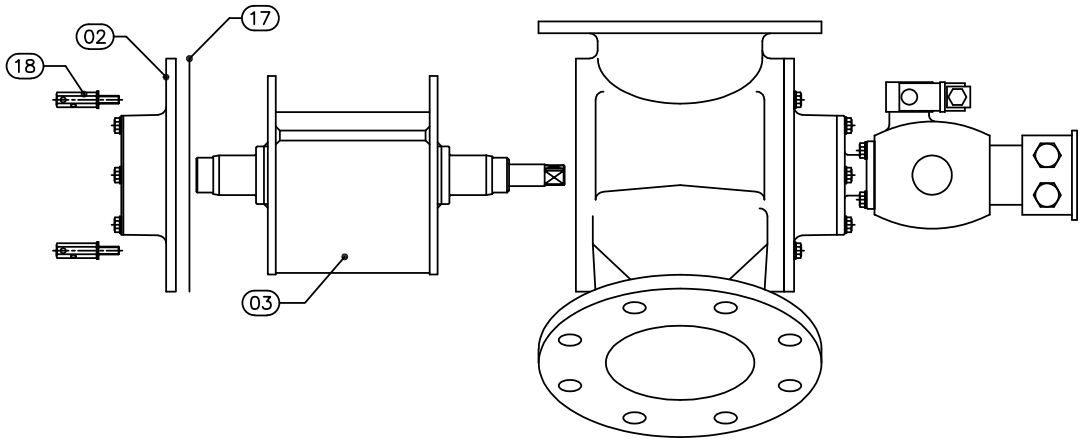


Figure 13.10: Dismantling GPD Dairy-WD

ATTENTION!
Dairy shaft seals require disassembly and manual cleaning.

- Remove the GPD seal ring (11) from cover.
- Remove O-ring (20-21).

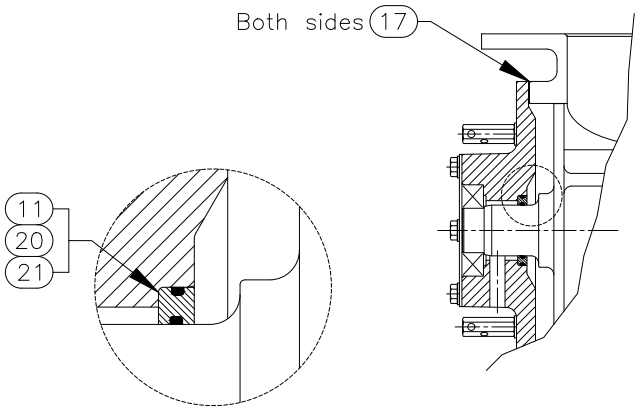


Figure 13.11: Dismantling shaft seal for cleaning GPD Dairy-WD

13.4.4 RE-ASSEMBLY GPD DAIRY WD

INSTRUCTION

After cleaning and checking or replacement of parts, the diverter valve can be re-assembled as follows:

- Replace shaft seals in the covers.
- Now slide the plug axially in the body and make sure that the position of the square insertion end of the plug correspond to the opening in the actuator.
- Check if the blade is in correct position. The marked line on body and plug must match, if not pull the plug out of the square and rotate the plug in the right position.

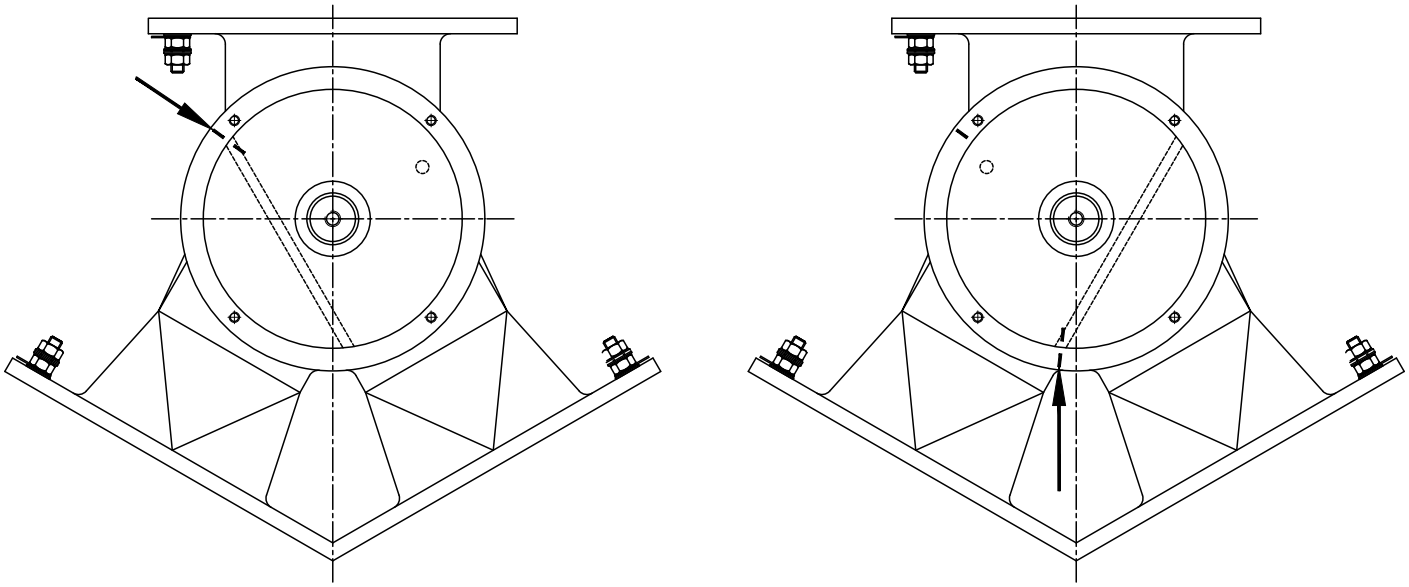


Figure 13.12: Re-assembly GPD-Dairy-WD

ATTENTION!
Clean surfaces end cover (02) carefully.
Check gasket (17) between body and end cover.
If damaged replace gasket.

- Place gasket (17) between body and end cover.
- Place this cover (02) in the body.
- Tighten the bolts (18) in a progressive diagonal manner. There should be zero clearance between the end cover and body contact faces.
- Connect electrical wiring in accordance with the connection diagram and attach air hoses.

ATTENTION!
After assembly test run the diverter valve.

14. 2-TDV

14.1 GENERAL WORKING PRINCIPLE

The 2-TDV, 3-TDV and M-TDV tube diverters pneumatically conveying products in powder or pellet form to multiple destinations (diverging). Or from multiple sources to one destination (converging).

The 2-TDV diverter is driven by means of a pneumatic actuator actuated by a solenoid valve to get a perfect alignment of the swan-neck and selected nozzle. Sealing is by means of inflatable EPDM white rings located outside the product flow.

The 2-TDV is available with inflatable seals (EPDM white) up to 3 bar.

Indication of pipe changeover is by means of position confirmation switches in control box.

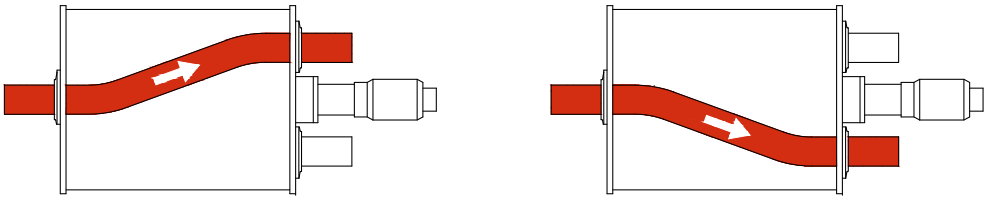


Figure 14.1: Schematic view of a diverter valve (2-TDV)

14.2 STANDARD EXECUTIONS AND SPECIFICATIONS

2-TDV diverters pneumatically convey products in powder or pellet form to multiple destinations (diverging) or from multiple sources to one destination (converging).

Figure 14.2: 2-TDV

Pressure	Inflatable -0,8...+3 bar
Product temp °C	Standard -20°C...+100°C (+130°C for short term only)
Ambient temp °C	Standard -20°C...+40°C
Material of construction	Cover: Aluminium / Stainless steel 316L
	Tube: Stainless steel 316L
	Protection cover: Stainless steel 316L
Pipe	Imperial
Seal	Inflatable: EPDM
USDA	Optional
ATEX 2014/34/EU	1D/2GD Equipment

Sizes 2-TDV

40	50	65	80	100	125	150

14.3 INSTALLATION, COMMISSIONING AND MAINTENANCE

First read the safety instructions in chapter **Safety** before installing the product.

DANGER OF DEATH!
Electrical connection
Make sure that appropriate power supplies are utilised during operation and that in the case of plant or component failure, the diverter valve is isolated from external power sources. Failure to comply may lead to serious or fatal injury, and/or critical product damage.

DANGER!
Installation must only be performed by trained and authorised personnel!
Do not touch the inlet of the diverter valve during or after unpacking!
Do not alter, remove or paint the type specification plates of the diverter, drive unit or fitted switches!
When carrying out installation work, always shut off the power and isolate from all other potential power sources.
When product qualities necessitate supplementary safety instructions and the wearing of protective clothes, it is obligatory to follow local safety instructions.

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

14.3.1 BEFORE INSTALLING

INSTRUCTION

- Remove packaging and delivery protection material from diverter valve.
- Check for any damage; if damaged contact your carrier and supplier.
- Check if diverter valve interior is free from foreign material.

14.3.2 INSTALLING THE DIVERTER VALVE IN A POTENTIALLY EXPLOSIVE ATMOSPHERE

Follow up the following important notes in addition to the regular product information and safety and installation instructions.

Read following chapters carefully in addition to the regular product-, safety- and installation information, before installing the product:

- **Explosion proof diverter valves** (chapter **5.2**)
- **Additional safety instructions for use in potentially explosive atmosphere** (chapter **6.6**)
- “Installing the diverter valve in a potentially explosive atmosphere” (this chapter)

Check if information on the nameplate of the diverter valve corresponds to the potentially explosive on-site atmosphere.
Pay specific attention to:

- Equipment group
- Equipment category
- Dust- or Gas area
- Temperature class
- Maximum surface temperature

Check if there are any potentially explosive atmosphere, oils, acids, gases, vapours, radiation etc. present during installation.
Always ground the diverter valve, use the flange connection bolts, or the optional earth-stud on end cover or motor base plate.
Check that the electrical leakage resistance is less than 10^{6} Ω.
The maximum velocity during position switch of diverter is not higher than 1 m/s and the maximum power of the drive used on the diverter is not higher than 4kW
To avoid build-up of electrostatic charges avoid charging mechanisms on the surfaces stronger than manual rubbing.
Non-metallic coatings or paints used on the diverter must have a layer thickness <2 mm.
Ensure that no foreign objects are conveyed through the diverter.
Precautions must be taken by the user to avoid this.

Check that the electrical leakage resistance is less than 10^6 Ω between pipe and Body.

2-3 TDV TUBE DIVERTER VALVE
When assembling the protection guard make sure that no ignition sources (e.g. sparks, through contact) can be created.

DIVERTER VALVE EXTERNAL NO ZONE
- No external explosive atmosphere is permitted
- No dust layers are permitted

14.3.2.1 DRIVE

According to the ATEX directive the maximum velocity must not be higher than 1 m/s and the maximum power of the motor gear unit is not higher than 4kW.
Explosive gas mixtures or concentrations of dust can lead to severe or fatal injuries in connection with hot surfaces, parts under power and moving parts on the gear unit / geared motor.
Installation, connection, start-up, maintenance and repair work on the gear unit / geared motor may only be performed by a qualified specialist while taking the following into account:
- These instructions
- The warning and information signs on the gear unit / geared motor
- Currently valid national / regional regulations
  (Explosion protection, Safety, accident prevention)

CAUTION!
After installation test run the diverter valve.

14.3.2.2 ACCESSORIES (IF FITTED)

Only use;
- solenoid valve
- proximity switch
- pressure switch
- terminal box
- electrical actuator
- etc.

that are CE marked and with an ATEX-approval, equal or higher than the ATEX-approval mentioned on the diverter valve.
Please study the operation instructions supplied by the manufacturer.
Check if the information on the nameplate of electrical accessories such as;
- solenoid valve
- proximity switch
- pressure switch
- terminal box
- electrical actuator
- etc.

corresponds to the potentially explosive on-site atmosphere.
Pay specific attention to:
- Equipment group
- Equipment category
- Dust- Gas area
- Temperature class
- Maximum surface temperature

PLEASE STUDY THE OPERATION INSTRUCTIONS SUPPLIED BY THE MANUFACTURER.

14.3.3 2-TDV: INSTALLING THE TUBE DIVERTER VALVE INTO THE SYSTEM

DANGER!
Do not switch position.
Danger to fingers and hands.
During operation or testing of the tube diverter, pipe connections must not be open or unprotected.
Pipe changeover must only be carried out when the product pipes are not pressurised and do not contain product!
The diverter valve must not be put into service until the equipment into which they have been incorporated have been declared in conformity with the Machinery Directive.

CAUTION!
Solenoid exhaust air regulators are set at the factory.
Changing these settings can cause malfunction or damage to the diverter.

ATTENTION!
Check voltage of individual components as these vary according to customer specification.
The solenoid valve must be connected to correct power supply and a compressed air supply of at least 4 bar.

INSTRUCTION

- Install tube diverter.
- Attach product pipes and ensure that tube diverter is adequately supported and secured.
- Connect the position switches to the user's control system.
- Connect all cables as per terminal wiring diagram and earth connection.
- Check compressed air pressure
- Check if the solenoid valve auxiliary manual operation is in "0" position.

ATTENTION!
INFLATABLE SEAL EXECUTION
Factory setting 4,5 bar.
Difference between conveying pressure and pressure on the seals must be min. 1 bar.
The max. pressure for the seals is 6-7 bar.

- Check compressed air pressure.

CAUTION!
After installation test run the diverter valve.

14.3.4 CONNECTION DIAGRAMS

Read following chapters carefully in addition to the regular product- and safety information, before installing the product:

- **Installation, commissioning and maintenance** (chapter **14.3**).
- **2-TDV: Installing the tube diverter valve into the system** (chapter **14.3.3**).

14.3.4.1 CONNECTION DIAGRAM FOR THE 2-TDV TUBE DIVERTER

The 2-TDV tube diverter is equipped as standard with a pneumatic actuator, electrically operated 5/2 solenoid-solenoid valve and switchbox with Micro-switches.

For the inflatable seal version there is an extra pressure regulator, solenoid valve and pressure switch.

DOUBLE ACTING PNEUMATIC ACTUATOR

Airtorque:	DR00XXXUF05F0717AZ
Medium:	Air filtration lubricated or not up to 10 bar
Temperature range:	-40°C...+80°C
Working pressure:	5 bar
Hose:	⌀ 8 mm

ACTUATOR

Solenoid valve 5/2 NAMUR bistable execution with manual control.

Solenoid valve 3/2 Monostable execution with manual control.

Pressure switch

POSITION INDICATOR

Rotech Switch control:	ACR3ASTAZ10 Electromechanical switches
Material:	Aluminium housing
Protection:	IP65
Cable gland:	M20x1.5; clamp range 8-13mm
Standard voltage:	230V AC 4A – 24V DC 16A
Temperature range:	-25°C...+85°C

Rotech Switch control:	APFN412EASEAZ10
Inductive proximity switch:	P&F NBN4-12GM50-E2 3 wires PNP NO
Material:	Aluminium housing
Protection:	IP65
Cable gland:	M20x1.5; clamp range 8-13mm
Standard voltage:	10-30V DC 0...200mA
Temperature range:	-25°C...+70°C

Rotech Switch control:	APF2V3NASTAZ10B
Inductive proximity switch:	P&F NJ2-V3-N 2GD Namur NC II2G Ex e ia IIC T6 Gb II2D Ex tb IIIC T80°C Db
Material:	Aluminium housing
Protection:	IP65
Cable gland:	M20x1.5; clamp range 5,5-13mm
Standard voltage:	8,2V DC ≥ 3mA inactive - ≤ 1mA active
Temperature range:	-25°C...+85°C

Rotech Switch control:	ACR1ASEAZ10 Electromechanical switches 2GD II2G Ex ed IIC T6 Gb II2D Ex tb IIIC T80°C Db
Material:	Aluminium housing
Protection:	IP67
Cable gland:	M20x1.5; clamp range 5,5-13mm
Standard voltage:	230V AC 4A max
Temperature range:	-25°C...+60°

ATTENTION!
Please study the operation instructions switchbox manufacturer.

Prior to delivery, the position indication is set for the angle required for the Pneumatic torque actuator.

If adjusting of the cams is necessary, and for instructions for electrical connection, please read the mounting and adjusting instructions Switch control.

14.3.4.2 PNEUMATIC CONNECTION 2-TDV

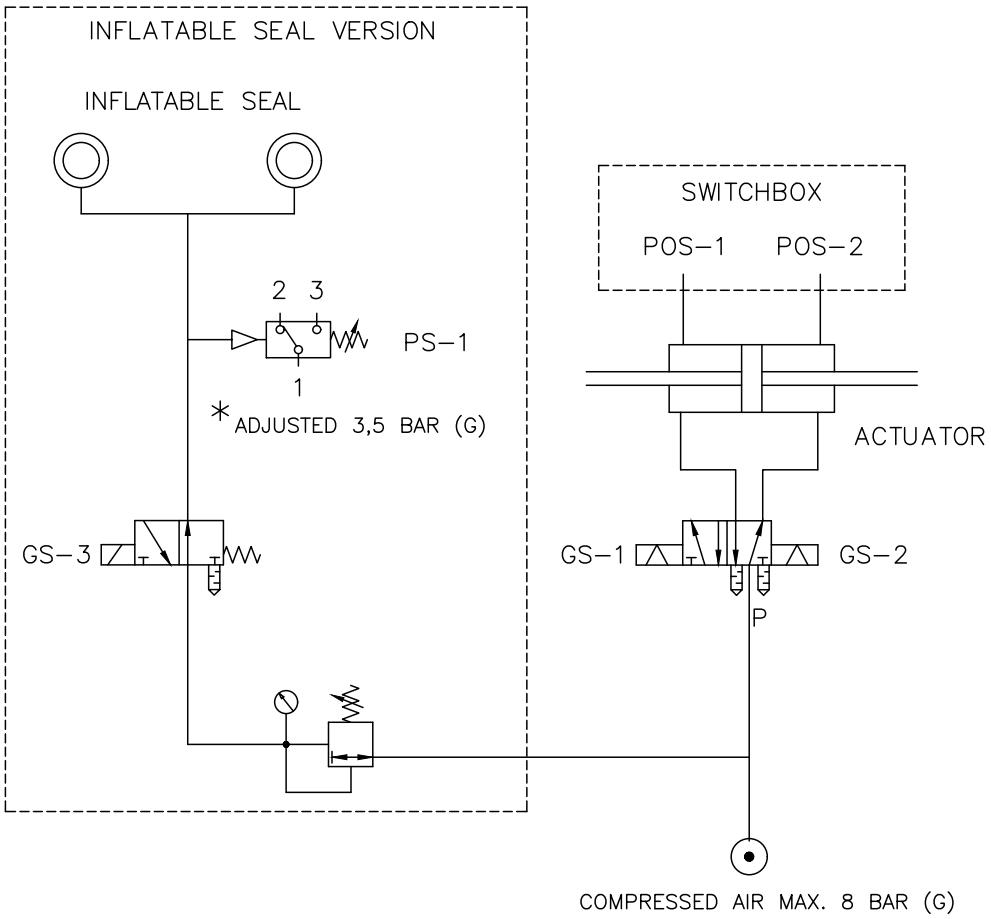


Figure 14.3: Pneumatic connection 2-TDV

CAUTION!

*After pressure switch deflation signal, program a 2 second delay before moving to new position so that seals are completely deflated before movement.

14.3.4.3 ELECTRICAL CONNECTION 2-TDV

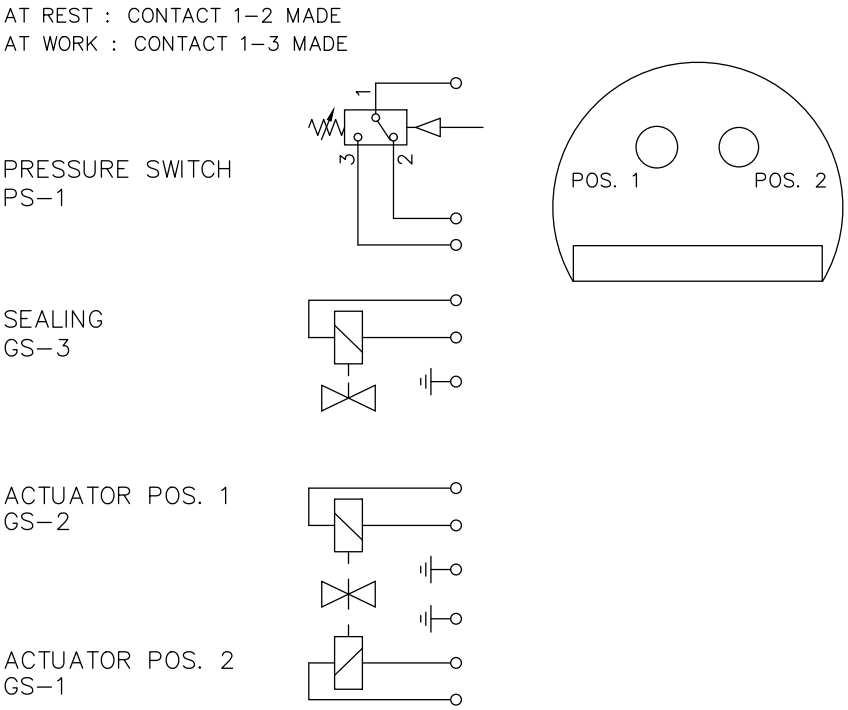


Figure 14.4: Electrical connection 2-TDV

14.4 DISMANTLING, ASSEMBLING AND ADJUSTING

DMN-WESTINGHOUSE diverter valves are manufactured with great care. To reduce air leakage, internal running clearances are kept extremely small during manufacture and assembly of the diverter valve.

First read the safety instructions in chapter **Safety** before dismantling, assembling and adjusting the product.

ATTENTION!
Dismantling, assembling and adjusting must only be performed by trained and authorised personnel!

DANGER!
When carrying out repair work, always shut off the power and set secure against unexpected incoming power.

CAUTION!
- Do not use heavy tools;
- avoid damages such as scratches and burrs etc.;
- clean all components thoroughly.

14.4.1 BEFORE DISMANTLING

INSTRUCTION

- Turn off power supply and/or remove fuses.
- Disconnect electric wiring from solenoid valve and Actuator position switches.
- Close compressed air supply.
- Remove air hoses.

14.4.2 GENERAL ASSEMBLY & PART LIST

14.4.2.1 GENERAL ASSEMBLY (2-TDV)

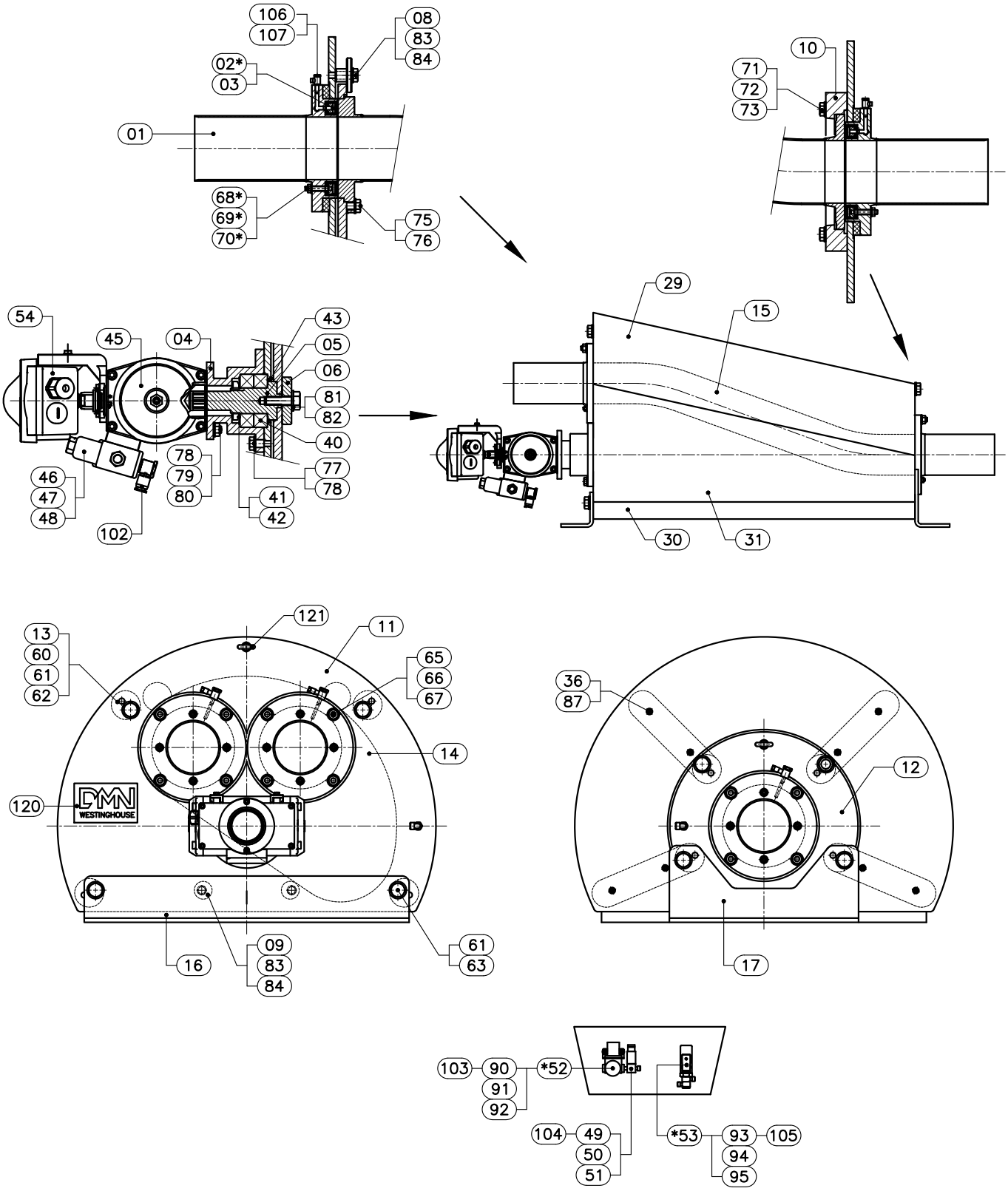


Figure 14.5: General assembly (2-TDV)

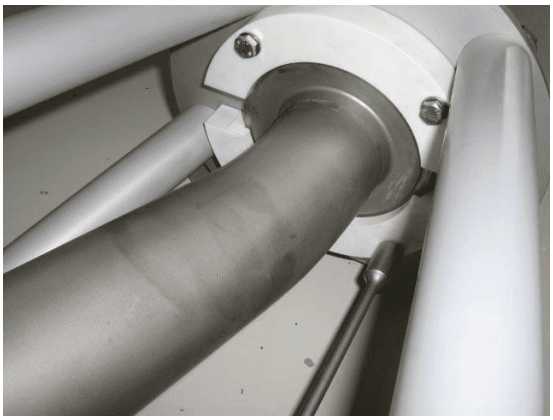
14.4.2.2 PART LIST (2-TDV)

01 Nozzle
02 Tension ring
03 Seal
04 Bearing house
05 Drive shaft
06 End plate drive shaft
08 Stop rotating disc
09 Position stop
10 Slide ring
11 Front cover
12 Back cover
13 Support bar
14 Rotating disc
15 Swan neck
16 Frame front cover
17 Frame back cover
29 Guard top
30 Guard bottom
31 Guard side
36 Thread adaptor guard
40 Ball bearing
41 Locknut
42 Safety ring
43 Lip seal
45 Actuator
47 Coil
48 Connector
49 Solenoid valve 3/2
50 Coil
51 Connector
52 Filter regulator
53 Pressure switch
54 Switch box
60 Bolt
61 Washer
62 Dowel pin
63 Bolt
65 Stud
66 Washer
67 Nut
68 Stud
69 Washer
70 Nut
71 Bolt
72 Washer
73 Dowel pin
75 Bolt
76 Washer
77 Bolt
78 Washer
79 Stud
80 Nut
81 Bolt
82 Washer
83 Bolt
84 Nut
87 Bolt
90 Cylinder bolt
91 Nut
92 Washer
93 Cylinder bolt
94 Nut
95 Washer
100 Tube
102 Coupling multiple distributor
103 Coupling multiple distributor
104 Coupling multiple distributor
105 Coupling multiple distributor
106 Coupling
107 Coupling
108 Coupling
109 Coupling
120 Nameplate
121 Coupling
121 Ring bolt
122 Coupling

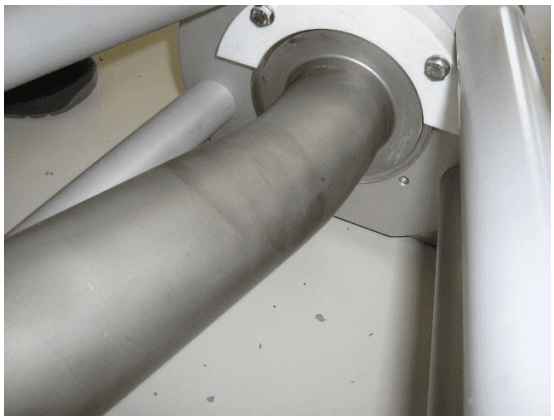
14.4.3 DISMANTLING

DISMANTLING (FOR CLEANING)

- Remove bolts (71) and washer (72).



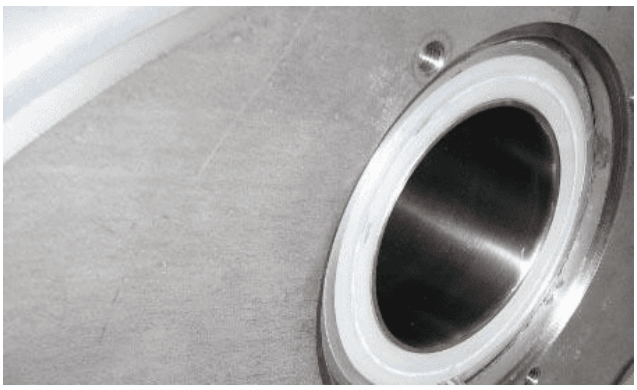
- Remove slide ring (10).



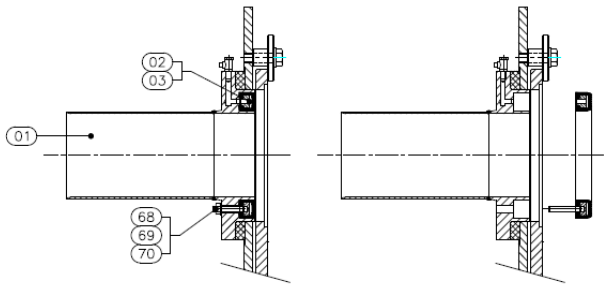
- Remove bolts (75) and washer (76).

- Remove swan neck. (15).

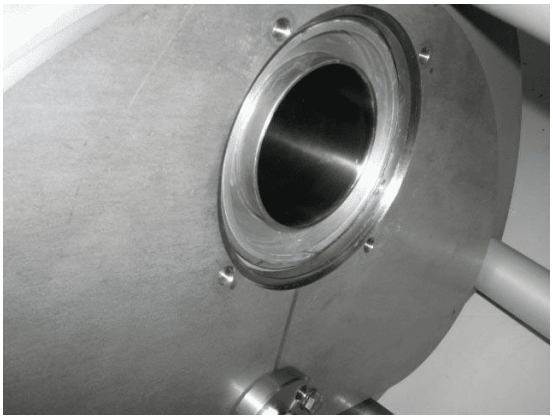
- Position rotation disc to remove seal (03).



- Remove nut (68) and washer (69).
- Press the seal (03) and tension ring (02) out of the nozzle.



- Clean nozzle.
- Rotate disc and remove other seal and clean nozzle.



- Remove tension ring (02).
- Clean tension ring and seal.

ROTATING DISC (CLEANING SURFACE PRODUCT SIDE)

INSTRUCTION

- Remove bolts (81), washer (82) and end plate (06).
- Remove bolt (83), washer (84) and stop rotating disc (08).
- Remove rotating disc and clean.

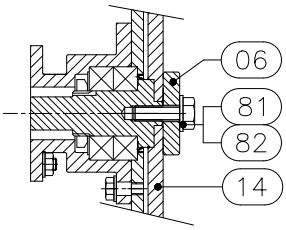


Figure 14.6: Rotating disc (cleaning surface product side) 3-TDV

14.4.4 RE-ASSEMBLY

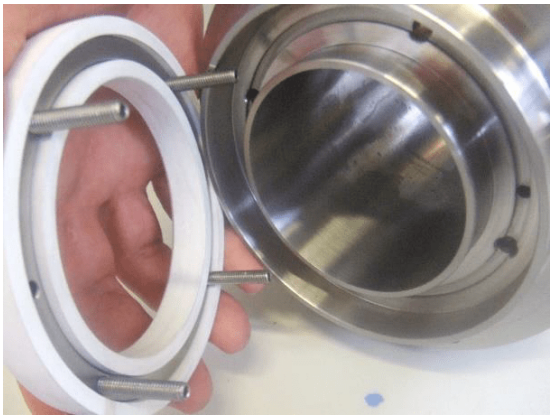
INSTRUCTION

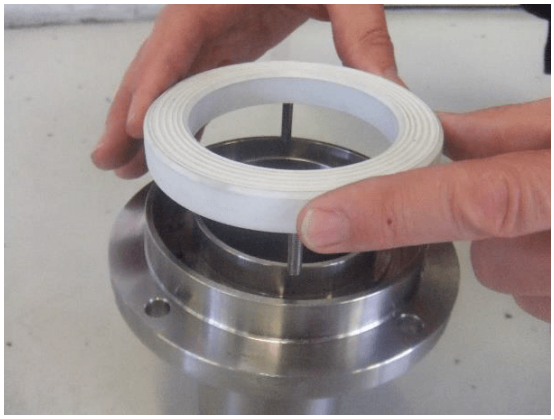
After cleaning and checking or replacement of parts, the diverter valve can be re-assembled as follows:

- Re-assemble the parts in reverse of dismantling procedure.

PAY SPECIAL ATTENTION TO THE FOLLOWING POINTS:

- Seal assembly.





- Fit protection cover(s)
- Connect electrical wiring and attach air hose.

ATTENTION!
After assembly test run the diverter valve.

15. 3-TDV

15.1 GENERAL WORKING PRINCIPLE

The 2-TDV, 3-TDV and M-TDV tube diverters pneumatically conveying products in powder or pellet form to multiple destinations (diverging). Or from multiple sources to one destination (converging).

The 3-TDV diverter is driven by means of an electric 3-position actuator and a pneumatic cylinder to get a perfect alignment of the swan-neck and selected nozzle. Sealing is by means of inflatable EPDM white rings located outside the product flow.

Connections for all electrical components are in a terminal box and control box.

Indication of pipe changeover is by means of position confirmation switches in control box.

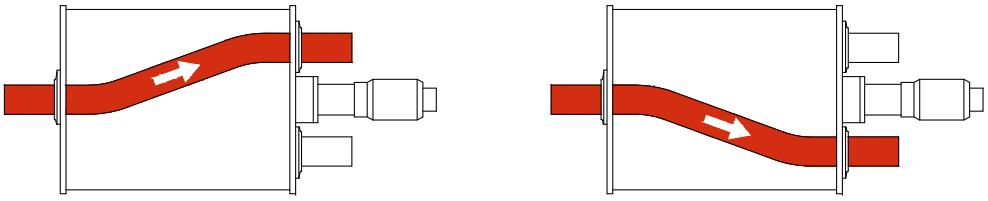


Figure 15.1: Schematic view of a diverter valve (3-TDV)

15.2 STANDARD EXECUTIONS AND SPECIFICATIONS

2-3 TDV diverters pneumatically convey products in powder or pellet form to multiple destinations (diverging) or from multiple sources to one destination (converging).

Figure 15.2: 3-TDV

Pressure	Inflatable -0,8...+3 bar
Product temp °C	-20°C...+100°C (+130°C for short term only)
Ambient temp °C	Standard -20°C...+40°C
Material of construction	Cover: Aluminium / Stainless steel 316L
	Tube: Stainless steel 316L
	Protection cover: Stainless steel 316L
Pipe	Imperial
Seal	Inflatable: EPDM
USDA	Optional
ATEX 2014/34/EU	1D/3GD Equipment

Sizes 3-TDV

40	50	65	80	100	125	150

15.3 INSTALLATION, COMMISSIONING AND MAINTENANCE

First read the safety instructions in chapter **Safety** before installing the product.

DANGER OF DEATH!
Electrical connection
Make sure that appropriate power supplies are utilised during operation and that in the case of plant or component failure, the diverter valve is isolated from external power sources. Failure to comply may lead to serious or fatal injury, and/or critical product damage.

DANGER!
Installation must only be performed by trained and authorised personnel!
Do not touch the inlet of the diverter valve during or after unpacking!
Do not alter, remove or paint the type specification plates of the diverter, drive unit or fitted switches!
When carrying out installation work, always shut off the power and isolate from all other potential power sources.
When product qualities necessitate supplementary safety instructions and the wearing of protective clothes, it is obligatory to follow local safety instructions.

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

15.3.1 BEFORE INSTALLING

INSTRUCTION

- Remove packaging and delivery protection material from diverter valve.
- Check for any damage; if damaged contact your carrier and supplier.
- Check if diverter valve interior is free from foreign material.

15.3.2 INSTALLING THE DIVERTER VALVE IN A POTENTIALLY EXPLOSIVE ATMOSPHERE

Follow up the following important notes in addition to the regular product information and safety and installation instructions.

Read following chapters carefully in addition to the regular product-, safety- and installation information, before installing the product:

- **Explosion proof diverter valves** (chapter **5.2**)
- **Additional safety instructions for use in potentially explosive atmosphere** (chapter **6.6**)
- “Installing the diverter valve in a potentially explosive atmosphere” (this chapter)

Check if information on the nameplate of the diverter valve corresponds to the potentially explosive on-site atmosphere.
Pay specific attention to:

- Equipment group
- Equipment category
- Dust- or Gas area
- Temperature class
- Maximum surface temperature

Check if there are any potentially explosive atmosphere, oils, acids, gases, vapours, radiation etc. present during installation.
Always ground the diverter valve, use the flange connection bolts, or the optional earth-stud on end cover or motor base plate.
Check that the electrical leakage resistance is less than 10^{6} Ω.
The maximum velocity during position switch of diverter is not higher than 1 m/s and the maximum power of the drive used on the diverter is not higher than 4kW
To avoid build-up of electrostatic charges avoid charging mechanisms on the surfaces stronger than manual rubbing.
Non-metallic coatings or paints used on the diverter must have a layer thickness <2 mm.
Ensure that no foreign objects are conveyed through the diverter.
Precautions must be taken by the user to avoid this.

Check that the electrical leakage resistance is less than 10^{6} Ω between pipe and Body.

2-3 TDV TUBE DIVERTER VALVE
When assembling the protection guard make sure that no ignition sources (e.g. sparks, through contact) can be created.

DIVERTER VALVE EXTERNAL NO ZONE
- No external explosive atmosphere is permitted
- No dust layers are permitted

15.3.2.1 DRIVE

According to the ATEX directive the maximum velocity must not be higher than 1 m/s and the maximum power of the motor gear unit is not higher than 4kW.
Explosive gas mixtures or concentrations of dust can lead to severe or fatal injuries in connection with hot surfaces, parts under power and moving parts on the gear unit / geared motor.
Installation, connection, start-up, maintenance and repair work on the gear unit / geared motor may only be performed by a qualified specialist while taking the following into account:
- These instructions
- The warning and information signs on the gear unit / geared motor
- Currently valid national / regional regulations
  (Explosion protection, Safety, accident prevention)

CAUTION!
After installation test run the diverter valve.

15.3.2.2 ACCESSORIES (IF FITTED)

Only use;
- solenoid valve
- proximity switch
- pressure switch
- terminal box
- electrical actuator
- etc.

that are CE marked and with an ATEX-approval, equal or higher than the ATEX-approval mentioned on the diverter valve.
Please study the operation instructions supplied by the manufacturer.
Check if the information on the nameplate of electrical accessories such as;
- solenoid valve
- proximity switch
- pressure switch
- terminal box
- electrical actuator
- etc.

corresponds to the potentially explosive on-site atmosphere.
Pay specific attention to:
- Equipment group
- Equipment category
- Dust- Gas area
- Temperature class
- Maximum surface temperature

PLEASE STUDY THE OPERATION INSTRUCTIONS SUPPLIED BY THE MANUFACTURER.

15.3.3 3-TDV: INSTALLING THE TUBE DIVERTER VALVE INTO THE SYSTEM

DANGER!
Do not switch position.
Danger to fingers and hands.
During operation or testing of the tube diverter, pipe connections must not be open or unprotected.
Pipe changeover must only be carried out when the product pipes are not pressurised and do not contain product!
The diverter valve must not be put into service until the equipment into which they have been incorporated have been declared in conformity with the Machinery Directive.

CAUTION!
Solenoid exhaust air regulators are set at the factory.
Changing these settings can cause malfunction or damage to the diverter.

ATTENTION!
Check voltage of individual components as these vary according to customer specification.
The solenoid valve must be connected to correct power supply and a compressed air supply of at least 4 bar.

INSTRUCTION

- Install tube diverter.
- Attach product pipes and ensure that tube diverter is adequately supported and secured.
- Connect the position switches to the user's control system.
- Connect all cables as per terminal wiring diagram and earth connection.
- Check compressed air pressure
- Check if the solenoid valve auxiliary manual operation is in "0" position.

ATTENTION!
INFLATABLE SEAL EXECUTION
Factory setting 4,5 bar.
Difference between conveying pressure and pressure on the seals must be min. 1 bar.
The max. pressure for the seals is 6-7 bar.

- Check compressed air pressure.

CAUTION!
After installation test run the diverter valve.

15.3.4 CONNECTION DIAGRAMS

Read following chapters carefully in addition to the regular product- and safety information, before installing the product:

- **Installation, commissioning and maintenance** (chapter **15.3**).
- **3-TDV: Installing the tube diverter valve into the system** (chapter **15.3.3**).

The 3-TDV tube diverter is equipped as standard with a 3 position electric actuator, pneumatic cylinder, electrically operated 5/2 solenoid-solenoid valve.

To inflate the seal there is a pressure regulator, solenoid valve and pressure switch.

ELECTRIC ACTUATOR.

VALPES:	Type VS(X)xxx.xxx.GF6	(X)= ATEX 2GD certified
Supply voltage:	100V...240V 50/60Hz (100V...350V DC)	(Standard)
	15V...30V 50/60Hz (12V...48V DC)	(Optional)
Protection:	IP68	
Cable gland:	M20x1.5	
Limit switch:	4...250 V AC/DC	1mA...5A max
Temperature range:	-20°C...+70°C	

DOUBLE ACTING PNEUMATIC CYLINDER

Festo:	Type ADN
Medium:	air filtration lubricated or not up to 10 bar
Temperature range:	-20°C...+80°C
Working pressure:	5-10 bar

PROXIMITY-SWITCH.

Festo:	Type SME-8M-DS-24V-K-2,5-OE
Protection:	IP65
Standard voltage:	5-30 V AC/DC
Temperature range:	-20°C...+70°C

CYLINDER

Solenoid valve 5/2 bistable execution with manual control.

FOR INFLATABLE SEAL EXECUTION

Solenoid valve 3/2 Monostable execution with manual control.

Pressure switch

15.3.4.1 PNEUMATIC CONNECTION 3-TDV

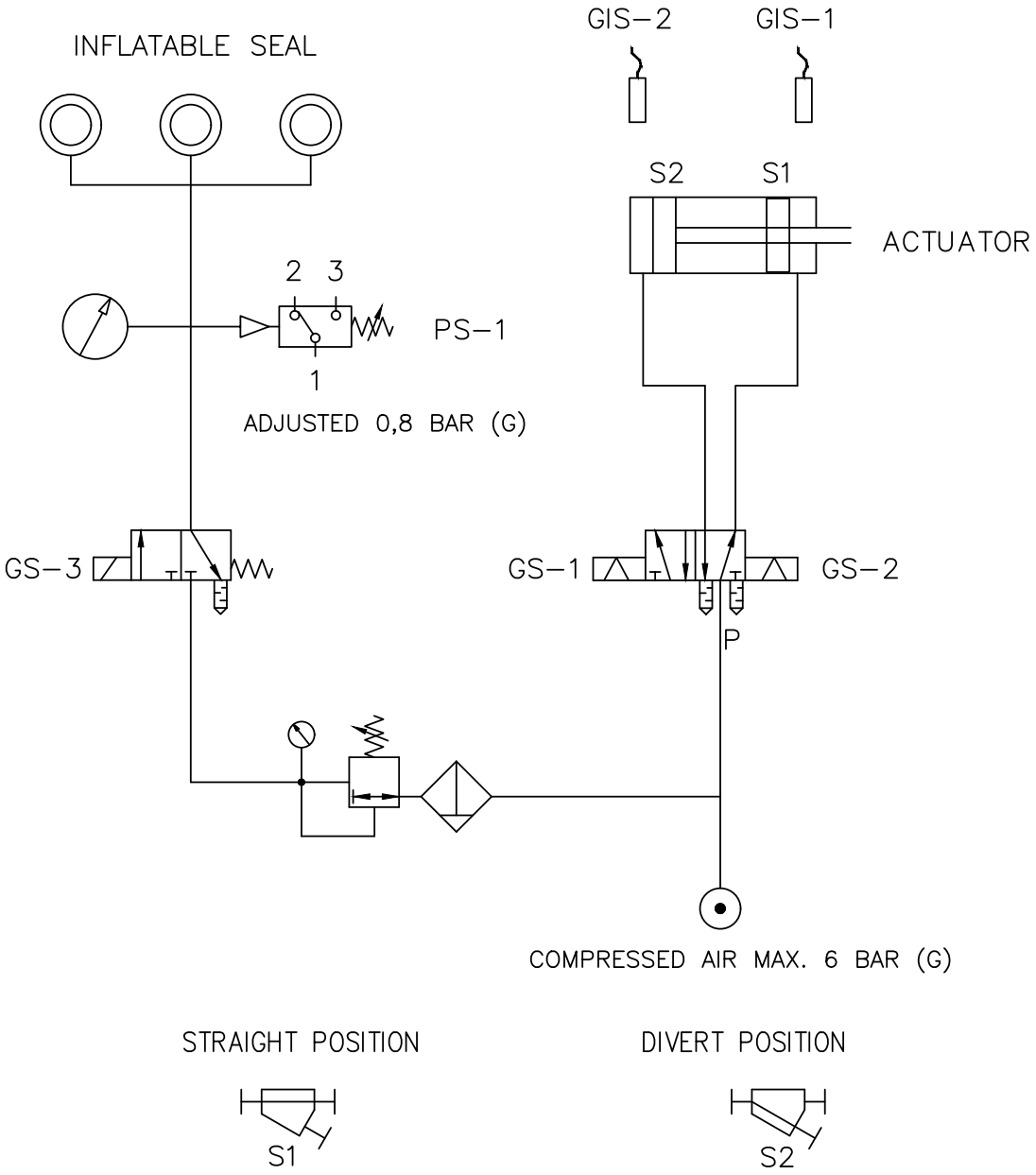


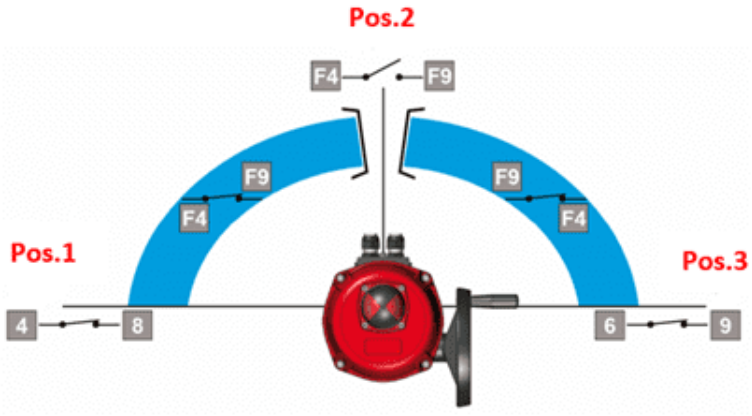
Figure 15.3: Pneumatic connection 3-TDV

CAUTION!

*After pressure switch deflation signal, program a 2 second delay before moving to new position so that seals are completely deflated before movement.

15.3.4.2 ELECTRICAL CONNECTION 3-TDV

First carefully read the instructions supplied by the manufacturer of the Electric actuator, before installing the product.



Terminals	6 & 9	4 & 8	F4 & F9
Position 1	Open	Closed	Closed
Position 2	Open	Open	Open
Position 3	Closed	Open	Closed

Rep.	Description	Rep.	Description
FCO	Open limit switch	FC1	Auxiliary limit switch 1
FCF	Close limit switch	FC2	Auxiliary limit switch 2
FCIO	Intermediate open limit switch	FC3	Auxiliary limit switch 3
FCIF	Intermediate close limit switch	R	Red
W	White	B	Black

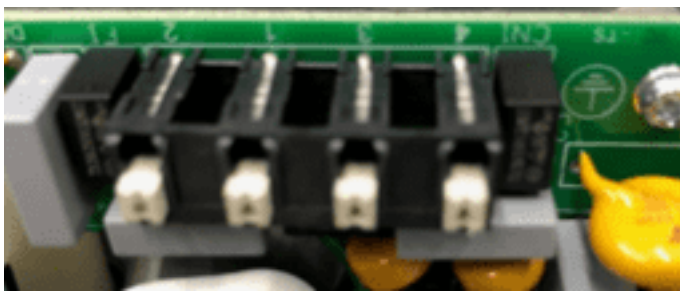


Figure 15.4: Main terminal electric actuator (3-TDV)

Figure 15.5: Feedback terminal electric actuator (3-TDV)

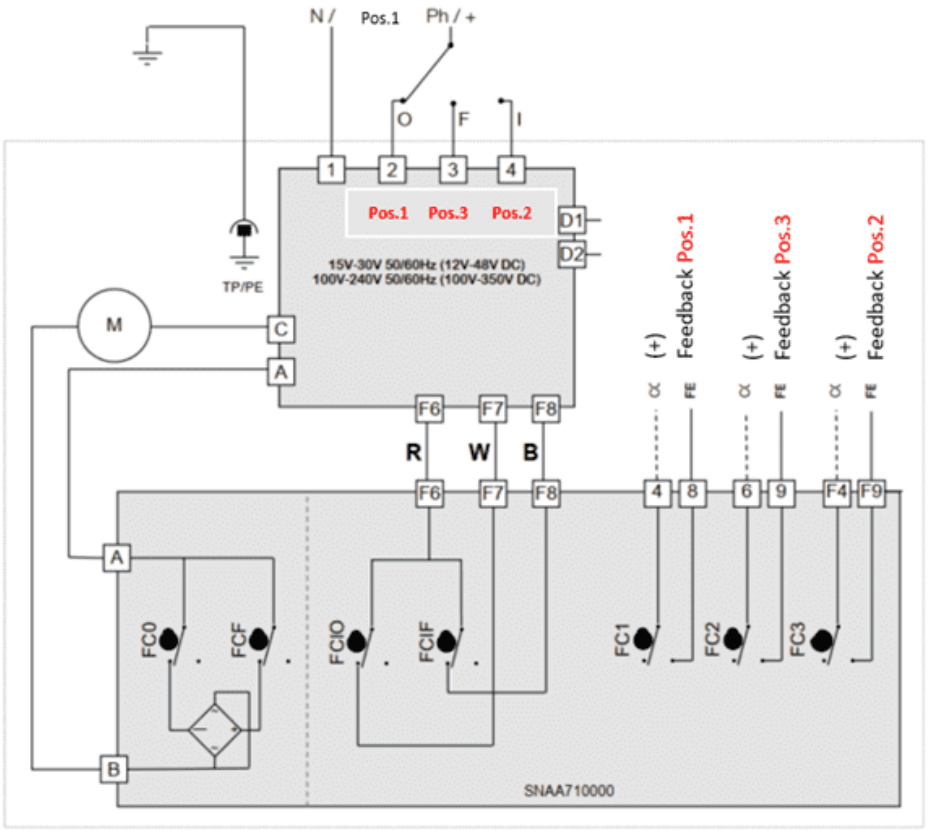


Figure 15.6: Electrical connection electric actuator (3-TDV)

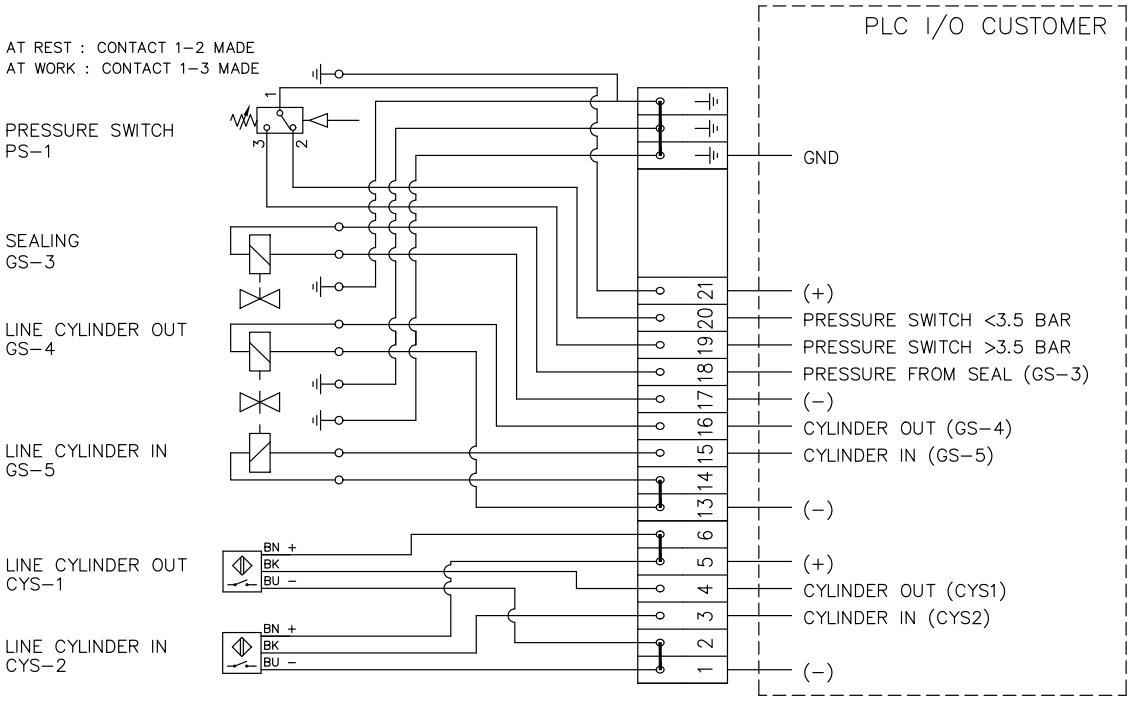


Figure 15.7: Electrical connection terminal box 3-TDV

PS1	Pressure switch	
GS3	Solenoid valve inflatable seal	3/2 NO solenoid-spring execution
GS4-GS5	Solenoid valve positioning cylinder	5/2 bistable execution
CYS1	Proximity-switch.	
CYS2	Proximity-switch.	

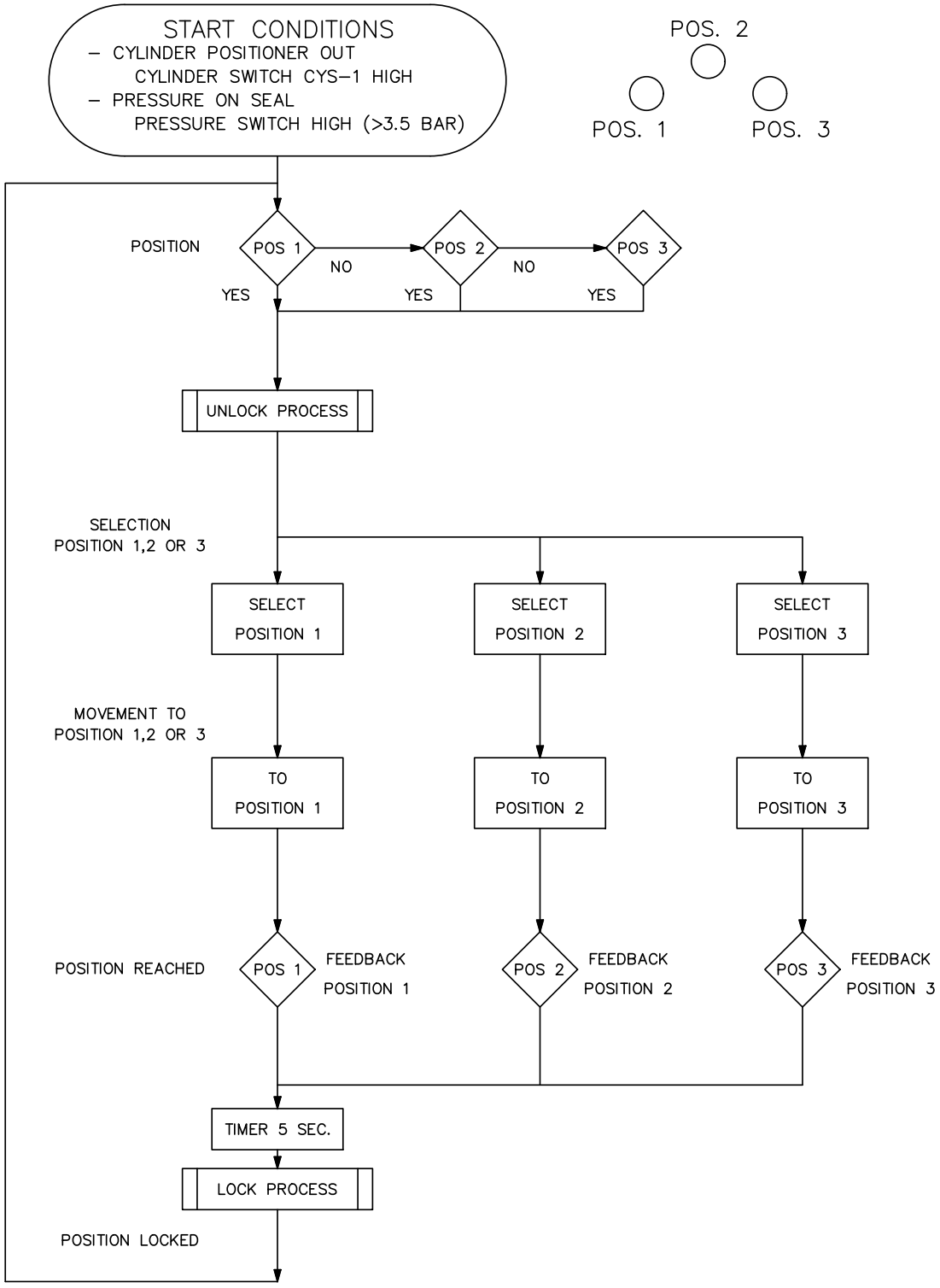


Figure 15.8: Flow diagram 3-TDV

See next pages for unlock and lock process

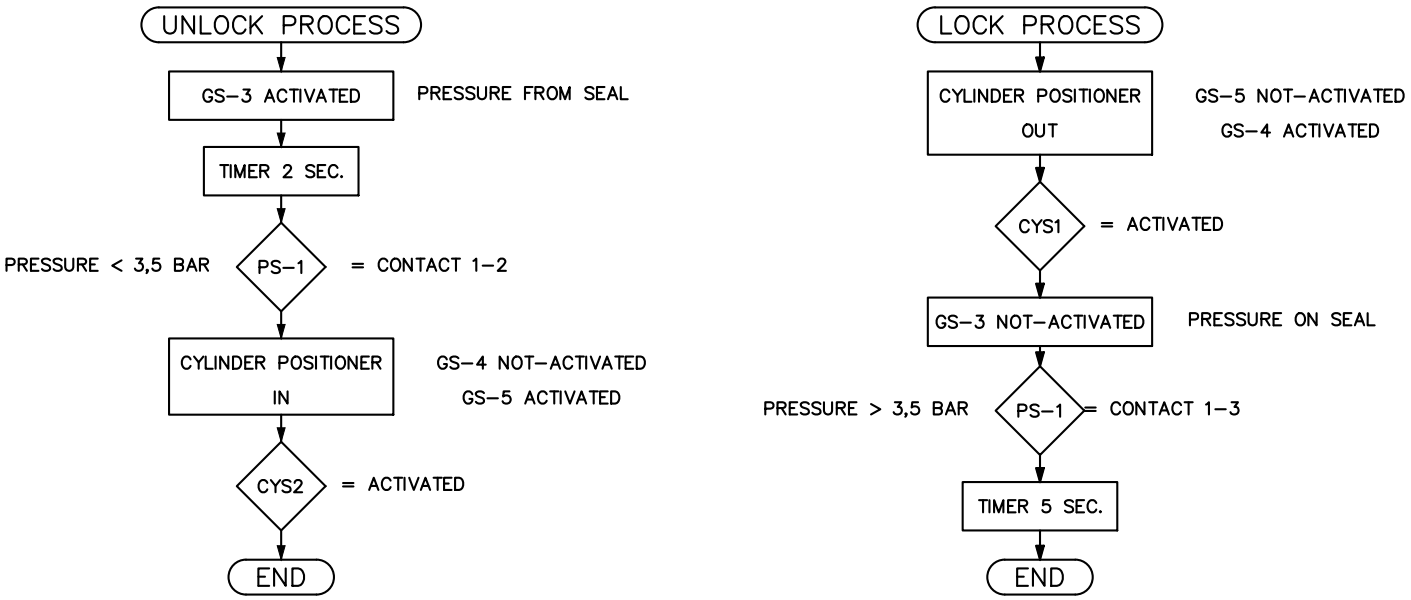


Figure 15.9: Unlock and lock process 3-TDV

15.4 DISMANTLING, ASSEMBLING AND ADJUSTING

DMN-WESTINGHOUSE diverter valves are manufactured with great care. To reduce air leakage, internal running clearances are kept extremely small during manufacture and assembly of the diverter valve.

First read the safety instructions in chapter **Safety** before dismantling, assembling and adjusting the product.

ATTENTION!
Dismantling, assembling and adjusting must only be performed by trained and authorised personnel!

DANGER!
When carrying out repair work, always shut off the power and set secure against unexpected incoming power.

CAUTION!
- Do not use heavy tools;
- avoid damages such as scratches and burrs etc.;
- clean all components thoroughly.

15.4.1 BEFORE DISMANTLING

INSTRUCTION

- Turn off power supply and/or remove fuses.
- Disconnect electric wiring from solenoid valve and Actuator position switches.
- Close compressed air supply.
- Remove air hoses.

15.4.1.1 GENERAL ASSEMBLY (3-TDV)

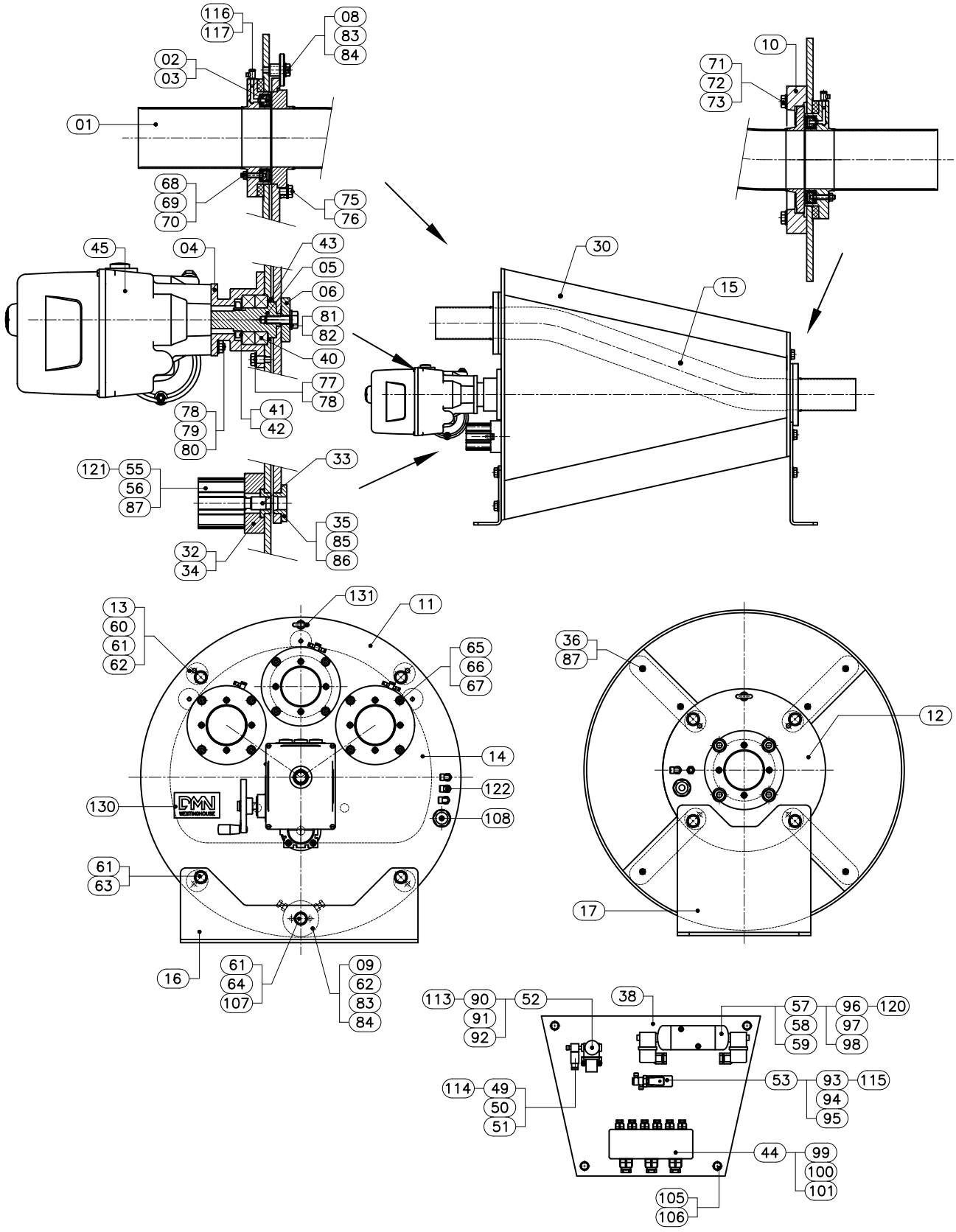


Figure 15.10: General assembly (3-TDV)

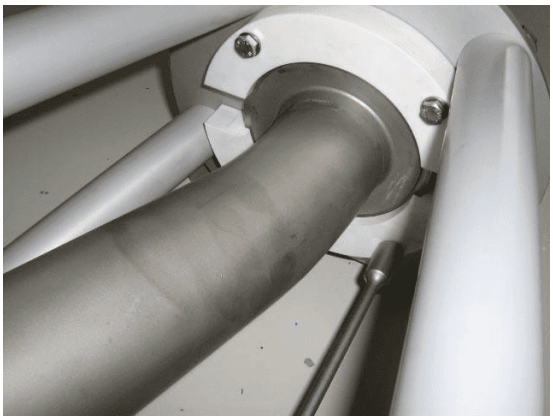
15.4.1.2 PART LIST (3-TDV)

01 Nozzle
02 Tension ring
03 Seal
04 Bearing house
05 Drive shaft
06 End plate drive shaft
08 Stop rotating disc
09 Position stop
11 Front cover
12 Back cover
13 Support bar
14 Rotating disc
15 Swan neck
16 Frame front cover
17 Frame back cover
30 Guard
32 Ring cylinder
33 Pin cylinder
34 Bush cylinder
35 Bush Rotating disc
36 Thread adaptor guard
38 Mounting plate
40 Ball bearing
41 Locknut
42 Safety ring
43 Lip seal
44 Terminal box
45 Actuator
49 Solenoid valve 3/2
50 Coil
51 Connector
52 Filter regulator
53 Pressure switch
55 Cylinder
56 Proximity sensor
57 Solenoid valve 5/2
58 Coil
59 Connector
60 Bolt
61 Washer
62 Dowel pin
63 Bolt
64 Nut
65 Stud
66 Washer
67 Nut
68 Stud
69 Washer
70 Nut
71 Bolt
72 Washer
73 Dowel pin
75 Bolt
76 Washer
77 Bolt
78 Washer
79 Stud
80 Nut
81 Bolt
82 Washer
83 Bolt
84 Nut
85 Bolt
86 Washer
87 Bolt
87 Cylinder bolt
90 Cylinder bolt
91 Nut
92 Washer
93 Cylinder bolt
94 Nut
95 Washer
99 Cylinder bolt
100 Nut
101 Washer
105 Bolt
106 Washer
107 Bolt
108 Cable gland
10S Slide ring
110 Tube
111 Tube
113 Coupling multiple distributor
114 Coupling multiple distributor
115 Coupling multiple distributor
116 Coupling
117 Coupling
118 Coupling
119 Coupling
121 Coupling
122 Coupling
130 Nameplate
131 Ring bolt

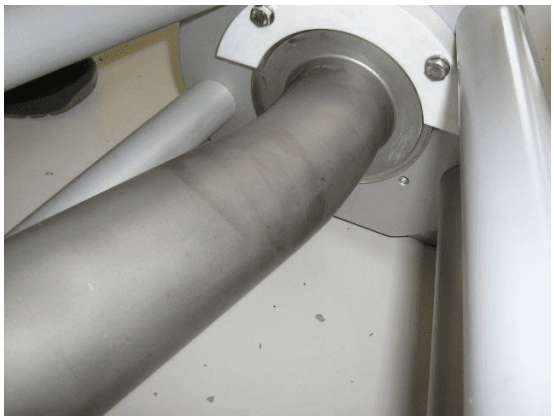
15.4.2 DISMANTLING

DISMANTLING (FOR CLEANING)

- Remove bolts (71) and washer (72).



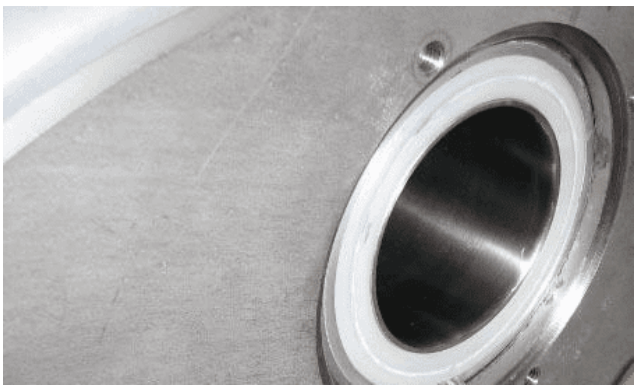
- Remove slide ring (10).



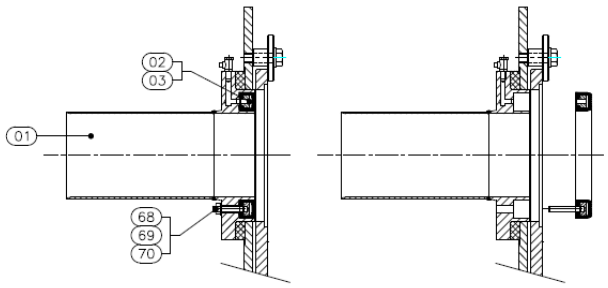
- Remove bolts (75) and washer (76).

- Remove swan neck. (15).

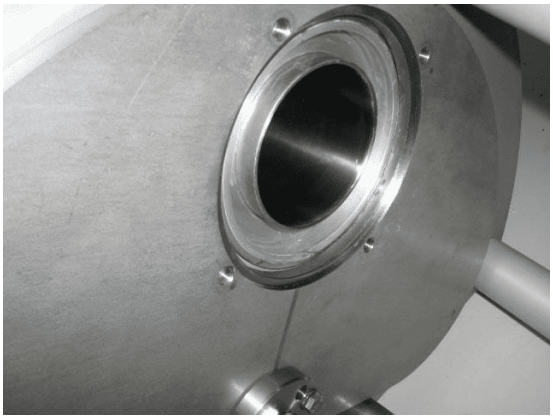
- Position rotation disc to remove seal (03).



- Remove nut (68) and washer (69).
- Press the seal (03) and tension ring (02) out of the nozzle.



- Clean nozzle.
- Rotate disc and remove other seal and clean nozzle.



- Remove tension ring (02).
- Clean tension ring and seal.

ROTATING DISC (CLEANING SURFACE PRODUCT SIDE)

INSTRUCTION

- Remove bolts (81), washer (82) and end plate (06).
- Remove bolt (83), washer (84) and stop rotating disc (08).
- Remove rotating disc and clean.

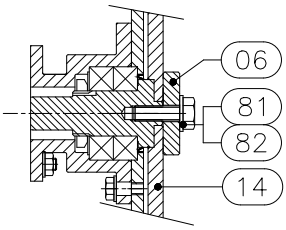


Figure 15.11: Rotating disc (cleaning surface product side) 3-TDV

15.4.3 RE-ASSEMBLY

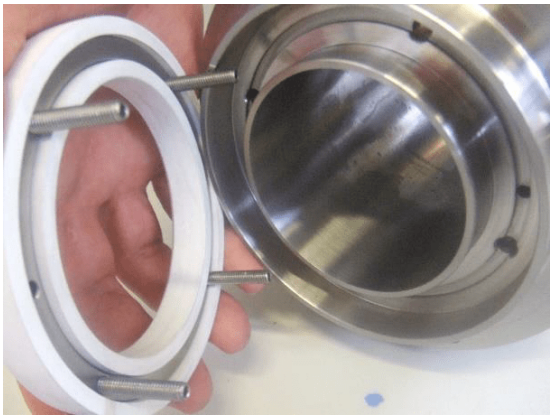
INSTRUCTION

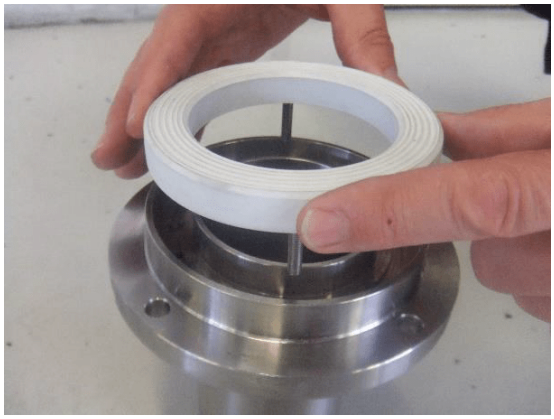
After cleaning and checking or replacement of parts, the diverter valve can be re-assembled as follows:

- Re-assemble the parts in reverse of dismantling procedure.

PAY SPECIAL ATTENTION TO THE FOLLOWING POINTS:

- Seal assembly.





- Fit protection cover(s)
- Connect electrical wiring and attach air hose.

ATTENTION!
After assembly test run the diverter valve.

16. M-TDV

16.1 GENERAL WORKING PRINCIPLE

The 2-TDV, 3-TDV and M-TDV tube diverters pneumatically conveying products in powder or pellet form to multiple destinations (diverging). Or from multiple sources to one destination (converging).

The M-TDV diverter unit is driven by means of a geared motor, fitted with an encoder.

The LTi Lust position controller makes it possible to get a perfect alignment of the swan-neck and selected nozzle. Sealing is by means of inflatable EPDM seals located outside the product flow. The indexing plate seals off unused ports.

The position controller includes an integrated PLC which controls the position changes, inflating and deflating of the seals and the reference run. After 20 position movements a new reference run will be done. Connections for all electrical components are in a terminal box.

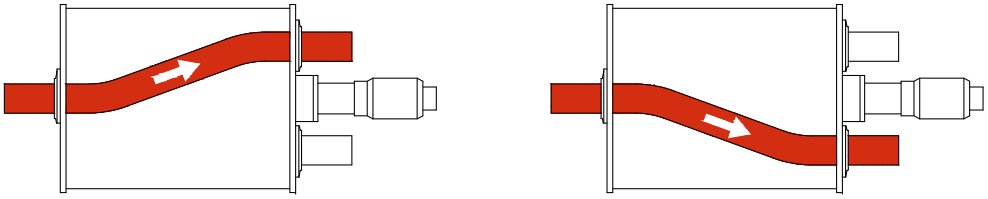


Figure 16.1: Schematic view of a diverter valve (M-TDV)

16.2 STANDARD EXECUTIONS AND SPECIFICATIONS

M-TDV tube diverters pneumatically conveying products in powder or pellet form to multiple destinations (diverging). Or from multiple sources to one destination (converging).

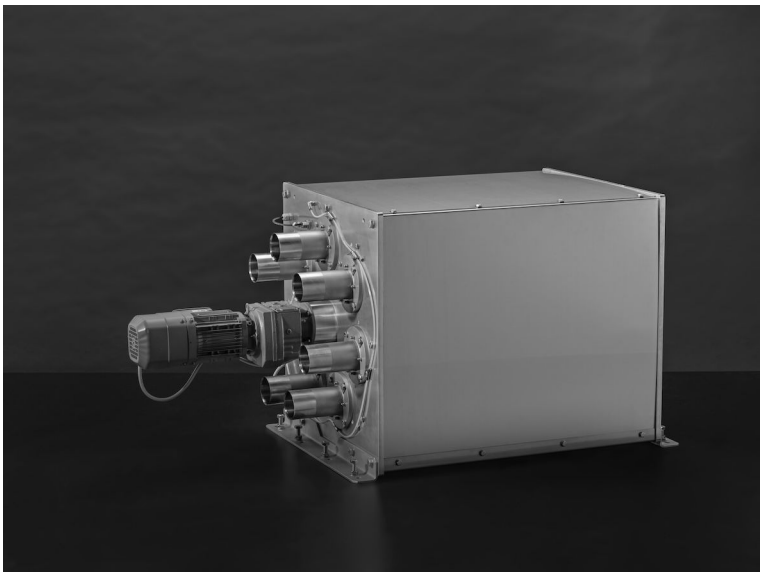


Figure 16.2: M-TDV

Pressure	Inflatable -0,8...+3 bar
Product temp °C	-20°C...+100°C (+130°C for short term only)
Ambient temp °C	Standard -20°C...+40°C
Material of construction	Cover: Aluminium / Stainless steel 316L
	Tube: Stainless steel 316L
	Protection cover: Stainless steel 316L
Pipe	Imperial
Seal	Inflatable: EPDM
USDA	Optional
ATEX 2014/34/EU	1D/2GD Equipment
Remark	Specify mounting position and function on order. Upwards conveying while diverging is not recommended.

Sizes M-TDV	40	50	65	80	100	125	150
Number of ports	4-14	4-13	4-12	4-11	4-10	4-8	4-7

16.3 INSTALLATION, COMMISSIONING AND MAINTENANCE

First read the safety instructions in chapter **Safety** before installing the product.

DANGER OF DEATH!
Electrical connection
Make sure that appropriate power supplies are utilised during operation and that in the case of plant or component failure, the diverter valve is isolated from external power sources. Failure to comply may lead to serious or fatal injury, and/or critical product damage.

DANGER!
Installation must only be performed by trained and authorised personnel!
Do not touch the inlet of the diverter valve during or after unpacking!
Do not alter, remove or paint the type specification plates of the diverter, drive unit or fitted switches!
When carrying out installation work, always shut off the power and isolate from all other potential power sources.
When product qualities necessitate supplementary safety instructions and the wearing of protective clothes, it is obligatory to follow local safety instructions.

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

16.3.1 BEFORE INSTALLING

INSTRUCTION

- Remove packaging and delivery protection material from diverter valve.
- Check for any damage; if damaged contact your carrier and supplier.
- Check if diverter valve interior is free from foreign material.

16.3.2 INSTALLING THE DIVERTER VALVE IN A POTENTIALLY EXPLOSIVE ATMOSPHERE

Follow up the following important notes in addition to the regular product information and safety and installation instructions.

Read following chapters carefully in addition to the regular product-, safety- and installation information, before installing the product:

- **Explosion proof diverter valves** (chapter **5.2**)
- **Additional safety instructions for use in potentially explosive atmosphere** (chapter **6.6**)
- “Installing the diverter valve in a potentially explosive atmosphere” (this chapter)

Check if information on the nameplate of the diverter valve corresponds to the potentially explosive on-site atmosphere.
Pay specific attention to:

- Equipment group
- Equipment category
- Dust- or Gas area
- Temperature class
- Maximum surface temperature

Check if there are any potentially explosive atmosphere, oils, acids, gases, vapours, radiation etc. present during installation.
Always ground the diverter valve, use the flange connection bolts, or the optional earth-stud on end cover or motor base plate.
Check that the electrical leakage resistance is less than 10^{6} Ω.
The maximum velocity during position switch of diverter is not higher than 1 m/s and the maximum power of the drive used on the diverter is not higher than 4kW
To avoid build-up of electrostatic charges avoid charging mechanisms on the surfaces stronger than manual rubbing.
Non-metallic coatings or paints used on the diverter must have a layer thickness <2 mm.
Ensure that no foreign objects are conveyed through the diverter.
Precautions must be taken by the user to avoid this.

Check that the electrical leakage resistance is less than 10^{6} Ω between pipe and Body.

DIVERTER VALVE EXTERNAL NO ZONE

- No external explosive atmosphere is permitted
- No dust layers are permitted

16.3.2.1 DRIVE

According to the ATEX directive the maximum velocity must not be higher than 1 m/s and the maximum power of the motor gear unit is not higher than 4kW.
Explosive gas mixtures or concentrations of dust can lead to severe or fatal injuries in connection with hot surfaces, parts under power and moving parts on the gear unit / geared motor.
Installation, connection, start-up, maintenance and repair work on the gear unit / geared motor may only be performed by a qualified specialist while taking the following into account:

- These instructions
- The warning and information signs on the gear unit / geared motor
- Currently valid national / regional regulations
  (Explosion protection, Safety, accident prevention)

- Before starting the diverter valve, check the oil level in the gear box. It should be filled with the correct amount and type of oil according to the instructions.
  Fit the breather cap on the gear box and check that the venting nipple is clean.

CAUTION!
After installation test run the diverter valve.

16.3.2.2 ACCESSORIES (IF FITTED)

Only use;

- solenoid valve
- proximity switch
- pressure switch
- terminal box
- electrical actuator
- etc.

that are CE marked and with an ATEX-approval, equal or higher than the ATEX-approval mentioned on the diverter valve.
Please study the operation instructions supplied by the manufacturer.
Check if the information on the nameplate of electrical accessories such as;

- solenoid valve
- proximity switch
- pressure switch
- terminal box
- electrical actuator
- etc.

corresponds to the potentially explosive on-site atmosphere.
Pay specific attention to:

- Equipment group
- Equipment category
- Dust- Gas area
- Temperature class
- Maximum surface temperature

PLEASE STUDY THE OPERATION INSTRUCTIONS SUPPLIED BY THE MANUFACTURER.

16.3.3 M-TDV: INSTALLING THE TUBE DIVERTER VALVE INTO THE SYSTEM

DANGER!
Do not switch position.
Danger to fingers and hands.
During operation or testing of the tube diverter, pipe connections must not be open or unprotected.
Pipe changeover must only be carried out when the product pipes are not pressurised and do not contain product!
The diverter valve must not be put into service until the equipment into which they have been incorporated have been declared in conformity with the Machinery Directive.

CAUTION!
Solenoid exhaust air regulators are set at the factory.
Changing these settings can cause malfunction or damage to the diverter.

ATTENTION!
Check voltage of individual components as these vary according to customer specification.
The solenoid valve must be connected to correct power supply and a compressed air supply of at least 4 bar.

INSTRUCTION

- Install tube diverter.
- Attach product pipes and ensure that tube diverter is adequately supported and secured.
- Connect the position switches to the user's control system.
- Connect all cables as per terminal wiring diagram and earth connection.
- Check compressed air pressure
- Check if the solenoid valve auxiliary manual operation is in "0" position.

ATTENTION!
INFLATABLE SEAL EXECUTION
Factory setting 4,5 bar.
Difference between conveying pressure and pressure on the seals must be min. 1 bar.
The max. pressure for the seals is 6-7 bar.

- Check compressed air pressure.

CAUTION!
After installation test run the diverter valve.

16.3.4 CONNECTION DIAGRAMS

Read following chapters carefully in addition to the regular product- and safety information, before installing the product:

- **Installation, commissioning and maintenance** (chapter **16.3**).
- **M-TDV: Installing the tube diverter valve into the system** (chapter **16.3.3**).

16.3.4.1 DRIVE

DRIVE / POSITIONING SPECIFICATION

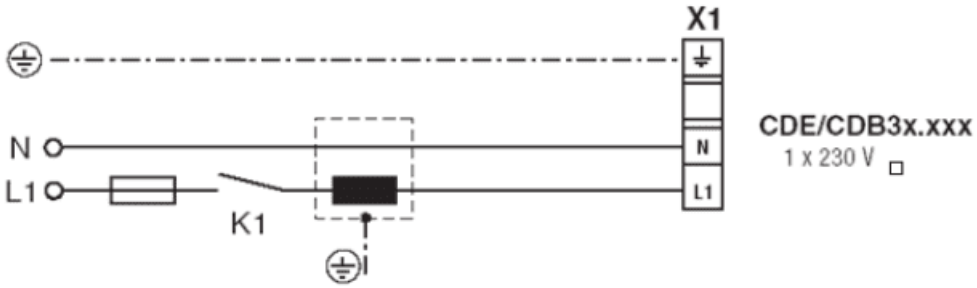
SEW drive:	Type RF37/R DRSS4/TF/ES7C
SEW drive:	Type RF37/R EDRS71M4/TF/ES7C/AL-II3GD
Encoder:	Type ES7C
Motor power:	0.37kW
Speed:	23rpm / 50Hz
Electrical supply:	230/400 Volt 50Hz
Protection:	IP55
Isolation:	F

LTI MOTION

STANDARD (1X230V)

Position controller	Type CDB32.003, C2.4	art.nr. 1017.0010.1
Terminal extension module	Type UM-8I4O,2.0	art.nr. 0917.0000.2

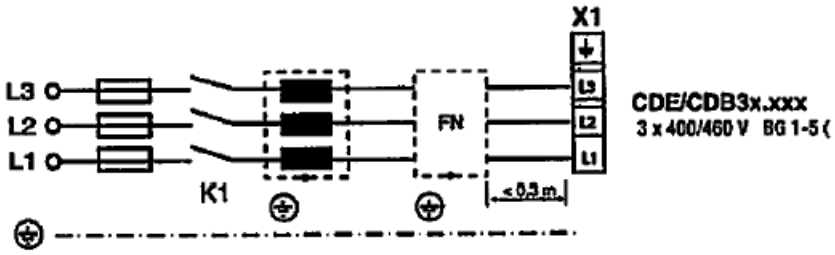
Rated motor output:	0.37 kW
Supply voltage:	1 x 230V (-20%...+15%) 50/60Hz
Nominal output current:	2,4A / 4,3A Peak for 30s
Protection:	IP20
Ambient temperature:	-10°C...+45°C (...+55°C with derating)



OPTION (3X400/460V)

Position controller	Type CDB34.003, C3.0	art.nr. 1008.0010.1
Terminal extension module	Type UM-8I4O,2.0	art.nr 0917.0000.2

Rated motor output:	0.37kW
Supply voltage:	3 x 460V (-25%...+10%) 50/60Hz
Nominal output current:	2,2A / 4,0A Peak for 30s
Protection:	IP20
Ambient temperature:	-10°C...+45°C (...+55°C with derating)



All data set by DMN-WESTINGHOUSE.

Positioning by Binary code input.

For more information about LTi MOTION products see https://www.keba.com/en/industrial-automation/keba-lti

PROXIMITY SWITCH FOR REFERENCE RUN

- P&F Type NCB5-18GM40-Z1
- P&F Type NCB5-18GM40-Z1-3G-3D

PROXIMITY SWITCH FOR POSITION CONFORMATION. (OPTIONAL)

SOLENOID VALVE INFLATABLE SEAL

FESTO	TypeMOFH-3-1/8-EX NO	(24VDC)
Coil	Type MSFG-24/42-50/60-OD	
MSFG-24-EX	ATEX 3GD	

PRESSURE SWITCH

FESTO	Type PEV-1/4 B IP65	
Norgren	Type 18D 0880380	ATEX 3GD

16.3.4.2 PRINCIPLE OF OPERATION.

The unit is driven by means of a geared motor, fitted with an encoder.

The LTi MOTION position controller makes it possible to get a perfect alignment of the swan-neck and selected nozzle.

Sealing is by means of inflatable EPDM seals located outside the product flow.

The indexing plate seals off unused ports.

The position controller includes an integrated PLC which controls the position changes, inflating and deflating of the seals and the reference run.

After 20 position movements a new reference run will be executed.

Connections for all electrical components are in a terminal box.

CUSTOMER REQUIREMENTS.

- The position controller is programmed by DMN. It will be supplied as a loose part and must be placed in a control cabinet.
- External 24 V - feed for supply of the control electronics in case of a possible mains failure, current consumption Imax = 1000 mA + holding brake current Tolerance of feed + 20 %

ATTENTION!
Depending on the type of power supply unit a decoupling diode to protect the mains unit may be required as a protective measure, because the 24 V of the CDE/CDB and the 24 V mains unit may feedback, depending on the tolerances.

Position selection is by Binary-coded input. See table **16.1**: **Position selection Binary code**.

The customer must give the following signals (see connection position controller)

INPUTS

- **Release**

  The release signal is 24V DC and should be on the terminal permanently. This is comparable with an emergency stop. Briefly removing the release signal should clear any errors showing up at first commissioning.

  Otherwise this signal must be on all the time.

- **Selection position**

  Operation from diverter with an 24V DC signal on the requested port (IED01 –IED05). This needs to stay until the requested port is reached and there is a “position reached” feedback on OED00 is received.

- **Start position**

  To initiate driving to the requested port there is a short impulse (min 20msec) with 24V DC on terminal IED00 “Start position” needed.

OUTPUT

- Drive OK (no Fault).
- Position reached.

Additional output (extra information)

- Pressure switch OK (When pressure is according to pressure switch output).

BEFORE SELECTING THE NEXT OUTPUT PORT, THE CONVEYING MUST BE STOPPED, AND PRESSURE MUST BE EQUALISED.

Optional:	Proximity switches for position confirmation. (Extra inputs for proximity switches for position confirmation)

16.3.4.3 CONTROL

LTI MOTION

Read operation manual LTi MOTION - CDE/CDB3000.

The Position controller is supplied as a loose part.

An external power supply is required; this is not part of DMN-WESTINGHOUSE supply.

Table 16.1: Position selection Binary code

Port	IED01-X1	IED02-X2	IED03-X4	IED04-X8
	0	0	0	0
1.	1	0	0	0
2.	0	1	0	0
3.	1	1	0	0
4.	0	0	1	0
5.	1	0	1	0
6.	0	1	1	0
7.	1	1	1	0
8.	0	0	0	1
9.	1	0	0	1
10.	0	1	0	1
11.	1	1	0	1
12.	0	0	1	1
13.	1	0	1	1
14.	0	1	1	1

16.3.4.4 CONNECTING THE ELECTRICAL MOTOR

- Sew star connection

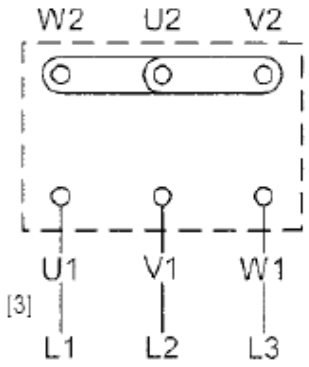


Figure 16.3: Connection of E-motor (M-TDV)

- Connections U1, V1 and W1 (Fig. 2.4.1) must be connected with U, V and W (Fig. 2.4.2) from controller X1.

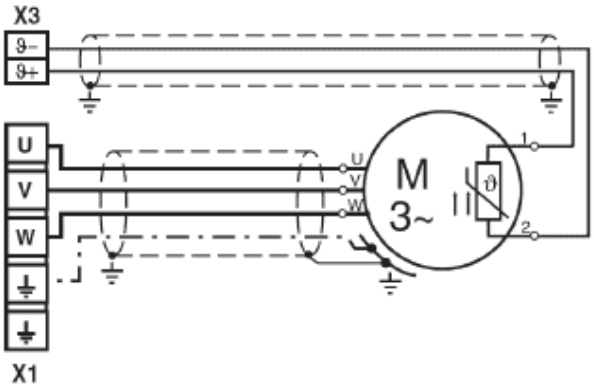


Figure 16.4: Connection of motor (M-TDV)

- The temperature sensor from the E-motor must be connected to the + and - connections from controller X3

16.3.4.5 ENCODER

NOTE:

Encoder voltage supply

- Voltage supply on encoder: + 5V ± 5%, max. power consumption 150 mA (including load)
- The encoders must have a separate sensor line terminal or sensor line must be connected to supply on encoder side. The sensor lines are required to measure a supply voltage drop in the encoder line. Only the use of the sensor lines assures that the encoder is supplied with the correct voltage.

THE SENSOR LINES MUST ALWAYS BE CONNECTED!

SPECIFICATION OF ENCODER INTERFACE X7

TTL ENCODER

Connection	Miniature D-SUB 15-pin socket (high-density)
Interface	RS422 (differential)
Wave terminating resistor	Track A, R: 120 Ù (internal) Track B wired by customer
Max. signal frequency fGrenz	500kHz
Voltage supply	+ 5V ±5% (controlled via sensor lines) max. 150mA not isolated from the control electronics
Sampling rate of the controls	4kHz
Lines per revolution / resolution	32-8192
Max. cable length	50m (further cable specifications as specified by motor manufacturer)

ASSIGNMENT OF ENCODER INTERFACE X7

X7/Pin	Function TL	Encoder core colours	DMN Terminal box
1	A-	Green	1
2	A+	Yellow	2
3	+5V (150mA)	White	3
4	don't use		
5	don't use		
6	B-	Blue	4
7	don't use		
8	GND	Brown	5
9	R-	Gray	6
10	R+	Pink	7
11	B+	Red	8
12	+5V (Sensor)	Sensor lead violet	9
13	GND (Sensor)	Brown	5
14	(connect with Pin 15 to activate the connection resistance)[1]		
15	Bridge 120 Ù termination track B (connect with Pin 14 to activate the connection resistance)[1]		

[1] Track B must be terminated via a bridge between Pins 14 and 15. The terminating resistor (120 Ù) is installed in the device. The customer must perform the wiring as track CLK (pin 6, 11) must not be terminated if an SSI interface is used.

16.3.4.6 POSITION CONTROLLER

ATTENTION!

The Position controller is supplied as a loose part and as such should be remotely mounted in a suitable enclosure.
The position controller is programmed for the specific diverter.
On the position controller is a sticker with the description, serial- and DMN order number of the corresponding diverter.
Make sure that the correct position controller is connected to the diverter.
Complete wiring of the position controller and the wiring from position controller to terminal box and E-motor must be done by the customer.

Position controller	Type CDB32.003, C2.4
Terminal extension module	Type UM-8I4O,2.0

Rated motor output:	0.375kW
Supply voltage:	1 x 230V (-20%...+15%) 50/60Hz
Nominal output current:	2,4A / 4,3A Peak for 30s
Protection:	IP20
Ambient temperature:	-10°C...+45°C (...+55°C with derating)

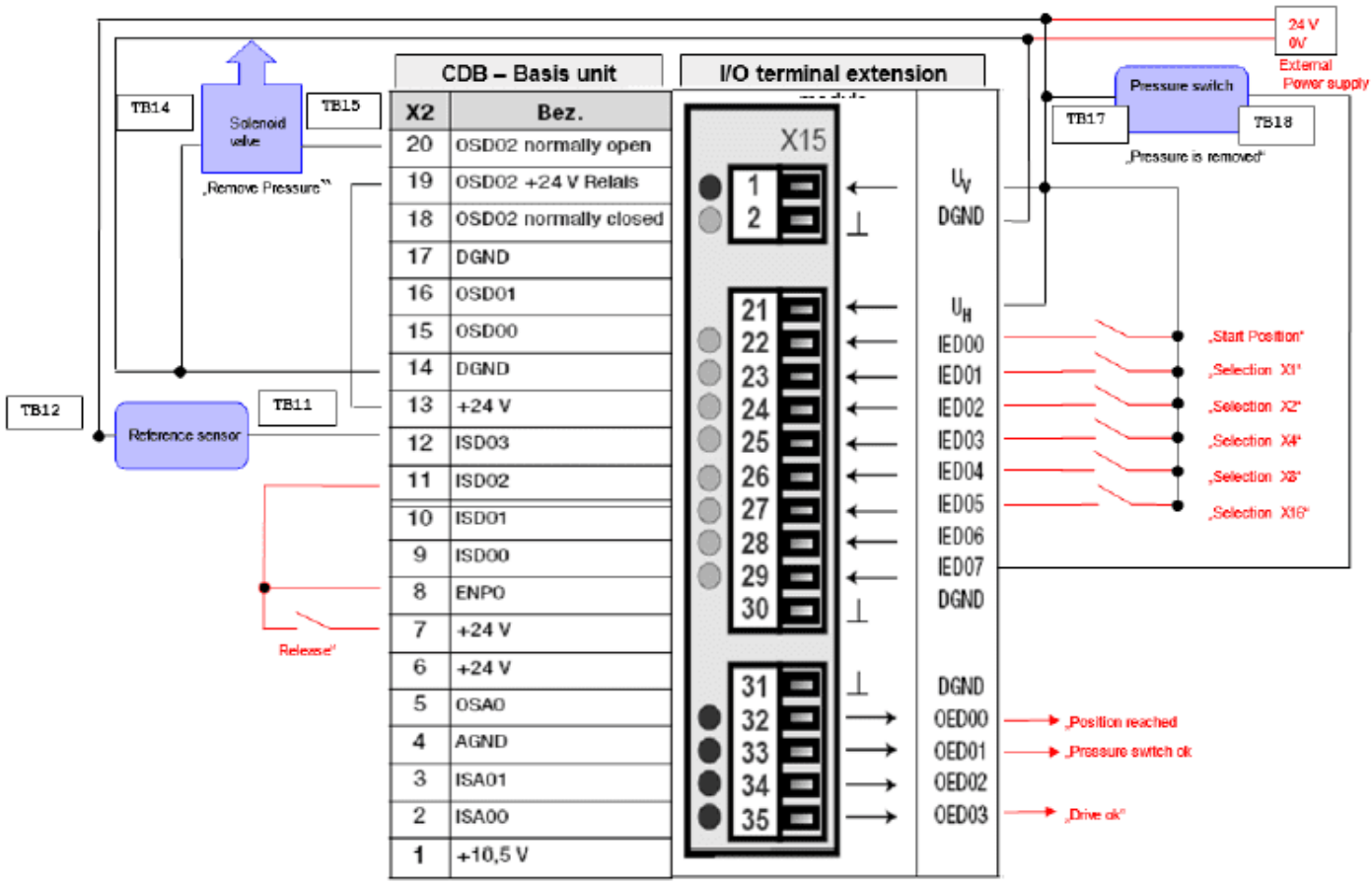
All data set by DMN-WESTINGHOUSE.

Positioning by Binary code input (chapter **11.3.4.2**)

ATTENTION!

An error in the position controller can be acknowledged in removal / new installation of the ENPO release with the messages “power supply under voltage” or “contouring error in positioning”.
With more serious problems such as excess current, excessive temperature, etcetera, the unit must be completely removed from the network.

For more information about LTi MOTION products see https://www.keba.com/en/industrial-automation/keba-lti



16.3.4.7 DMN TERMINAL BOX CONNECTION

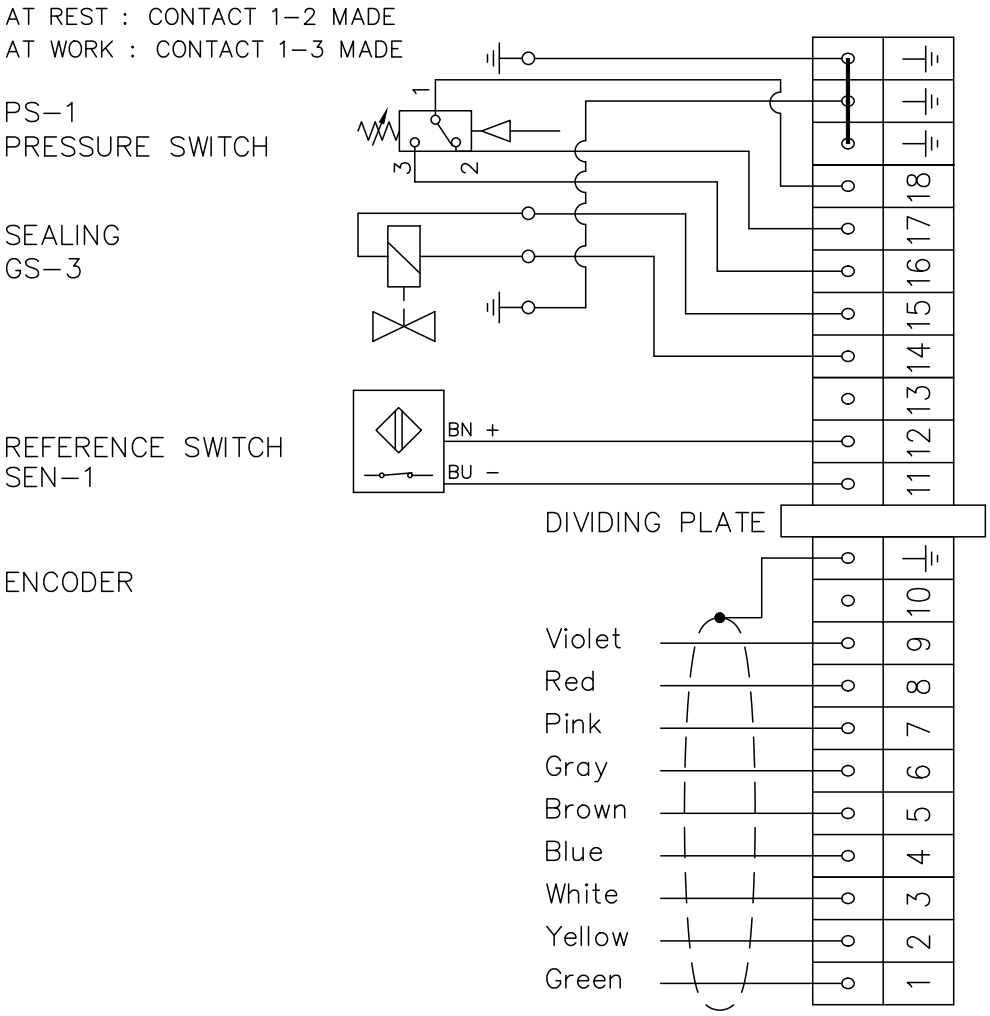


Figure 16.5: Electrical connection terminal box (M-TDV)

16.3.4.8 ENCODER CONNECTIONS

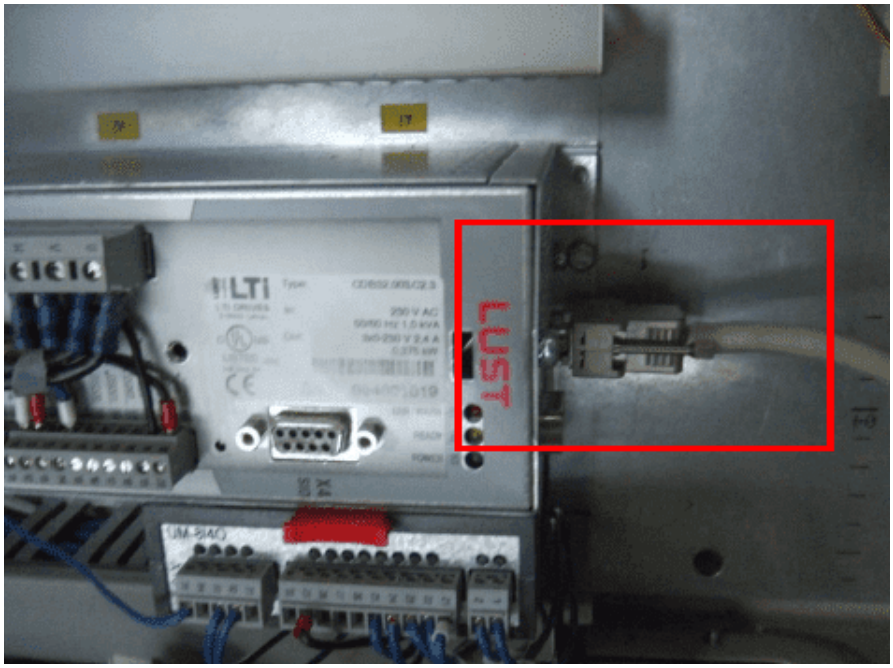


Figure 16.6: Controller (M-TDV)

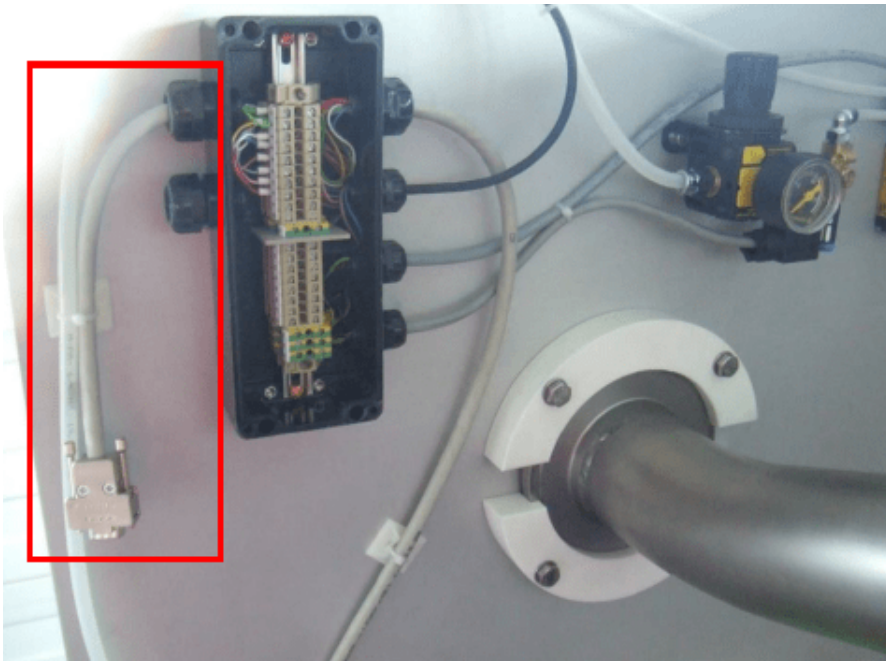


Figure 16.7: Controller (M-TDV)

CABLE OPTION

- Available in different length (5m, 10m, 20m and 50m)
- A 0.5m cable is mounted to the diverter and connected to the terminal box.

Figure 16.8: Cable (M-TDV)

16.3.4.9 INSTALLATION OF THE M-TDV DIVERTER VALVE.

Read following chapters carefully in addition to the regular product- and safety information, before installing the product:

- **Installation, commissioning and maintenance** (chapter **16.3**).
- **M-TDV: Installing the tube diverter valve into the system** (chapter **16.3.3**).

INSTRUCTION

- Install Multi-Port diverter valve using holes in the base plate (see dimensional drawing);

  It is recommended that if the diverter valve is to be cleaned periodically a connection in the conveying lines be provided within 2 meters of the front plate to facilitate disassembly.

- Attach product pipes and ensure that Multi-Port diverter valve is adequately supported and secured.

The Multi-Port diverter is supplied with a Position controller.

The electrical installation and wiring must be done by the client.

Read operation manual LTi MOTION - CDE/CDB3000.
Read SEW operation instructions Gear units RF.

DANGER!
Check mounting position M-TDV, lubrication quantity and position breather valve depending on mounting position gearmotor.

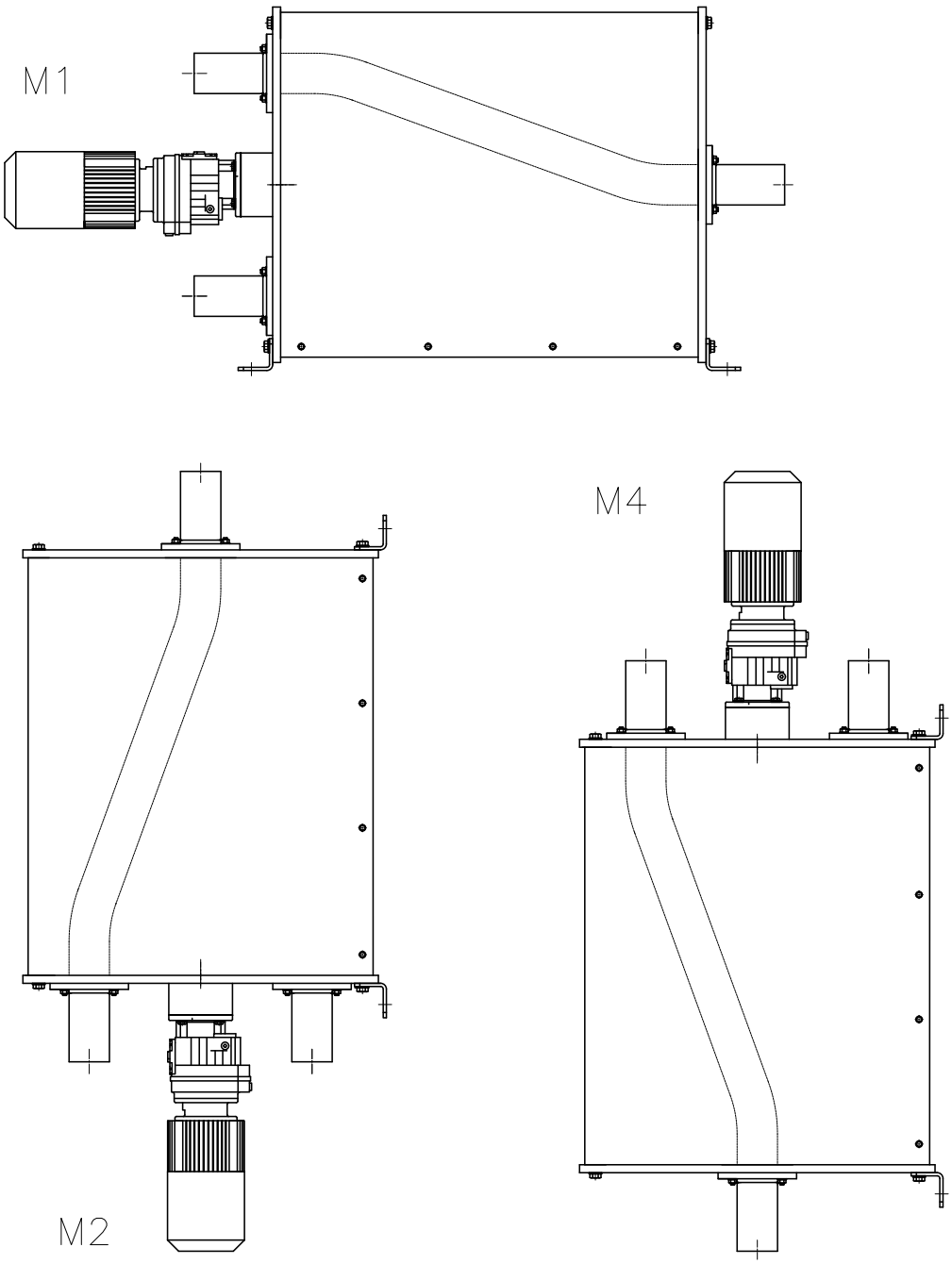


Figure 16.9: Mounting position M-TDV

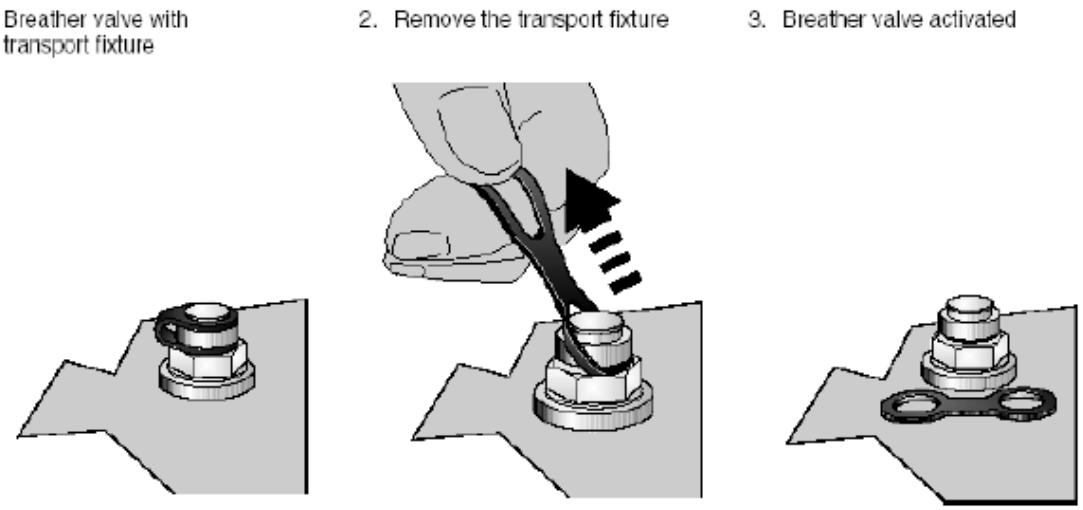


Figure 16.10: Activating the breather valve gear unit (M-TDV)

INSTALLATION SEQUENCE

INSTRUCTION

- Install the diverter without connecting to power source.
- Connect product pipes.
- Connect compressed air to diverter valve.
- Connect solenoid valve and check the pressure regulator setting.
- Check mounting position gear motor.
- Check the operation of the Multi-Port diverter.

16.3.4.10 TROUBLE SHOOTING AT THE COMMISSIONING

Error	Movement	Problem	Cause
Yes	Yes	Gear box	Bridges from electric gear box changed. (See page 12)
Yes	No	Gear box	No terminal sensor connected. (See page 12)
Yes	Yes	Controller	24 VDC for instrumentation not from an external power unit.
Yes	No	Controller	No bridges from pin 13 to 19 (See page 16)
No	No	Pressure	No air pressure on the diverter
No	No	Pressure	Pressure switch connected wrong
No	No	Release	Pin 7 and 8 for release signal not connected correct. (See page 16)

CHECKING FUNCTION OF DIVERTER BY LOOKING TO THE SIGNALS ON CONTROLLER

- If diverter is in access position - Signal on (32), (33) and (35).
- Also green LED's (2).
- If a position is requested:

  Pos 1 = LED 23

  Pos 2 = LED 24

  Pos 3 = LED 23 + 24

  Pos 4 = LED 25
- Start Signal on controller - LED (22) short signal.
- LED (29) signal pressure released, feedback signal (33) disappears during positioning.
- If Position is reached Feedback signals (32), (33) and (35) are activated.

Figure 16.11: Position controller (M-TDV)

MEANING OF THE LIGHT EMITTING DIODES

The positioning controller is fitted with three status LED's in red (H1), yellow (H2) and green (H3) at the top right.

Device status	red LED (H1)	yellow LED (H2)	green LED (H3)
Supply voltage 24 V DC (internal or external) for control element applied or closed loop control in "Parameterization" status	❍	❍	●
Ready (ENPO set)	❍	●	●
In service/auto-tuning active	❍	✻	●
Warning (at Standby)	❍	●	●
Warning (active with operation/self-adjustment)	❍	✻	●
Error	✻(flash code)	❍	●

❍ LED off, ● LED on, ✻ LED flashing

Flash code of red LED	Display control unit	Cause of fault
1x	E-CPU	Collective error message
2x	E-OFF	Undervoltage cut-off
3x	E-OC	Overcurrent cut-off
4x	E-OV	Overvoltage cut-off
5x	E-OLM	Motor overloaded
6x	E-OLI	Device overloaded
7x	E-OTM	Motor temperature too high
8x	E-OTI	Cooling temperature too high

16.4 DISMANTLING, ASSEMBLING AND ADJUSTING

DMN-WESTINGHOUSE diverter valves are manufactured with great care. To reduce air leakage, internal running clearances are kept extremely small during manufacture and assembly of the diverter valve.

First read the safety instructions in chapter **Safety** before dismantling, assembling and adjusting the product.

ATTENTION!
Dismantling, assembling and adjusting must only be performed by trained and authorised personnel!

DANGER!
When carrying out repair work, always shut off the power and set secure against unexpected incoming power.

CAUTION!
- Do not use heavy tools;
- avoid damages such as scratches and burrs etc.;
- clean all components thoroughly.

16.4.1 BEFORE DISMANTLING

INSTRUCTION

- Turn off power supply and/or remove fuses.
- Disconnect electric wiring from solenoid valve and Actuator position switches.
- Close compressed air supply.
- Remove air hoses.

16.4.2 GENERAL ASSEMBLY & PART LIST

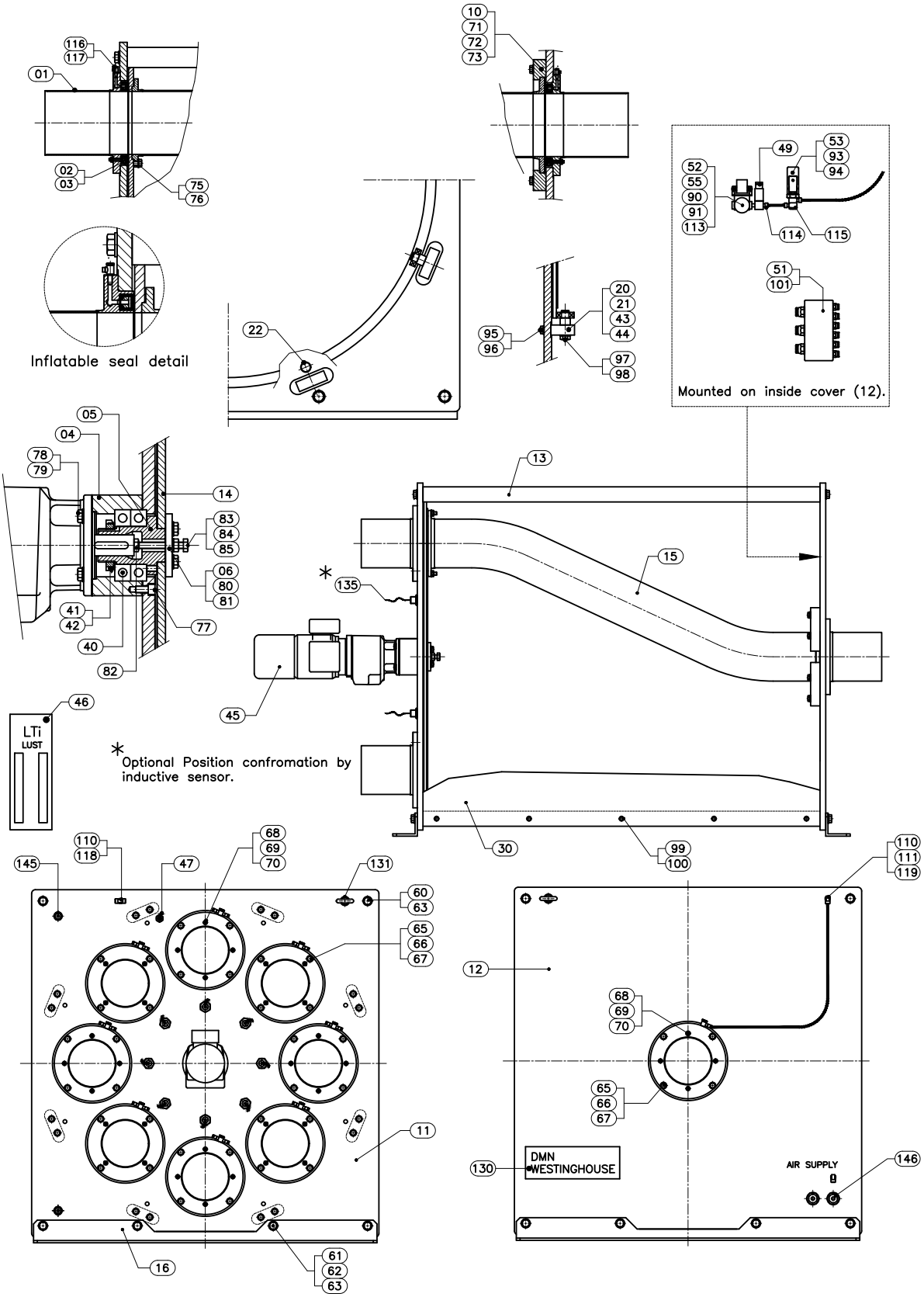


Figure 16.12: General assembly (M-TDV)

16.4.2.1 PART LIST

01 Nozzle
02 Tension ring
03 Seal
04 Bearing house
05 Drive shaft
06 End plate drive shaft
11 Cover multi-Port
12 Cover 1 port
13 Support bar
14 Rotating disc
15 Swan neck
16 Frame
20 Frame
21 Fixing block
22 Shaft
23 Fixing plug
30 Guard
40 Ball bearing
41 Locknut
42 Safety ring
43 Ball bearing
44 Retainer ring
45 Drive
46 Position controller
47 Proximity sensor
49 Solenoid valve 3/2
50 Coil + Connector
51 Terminal box
52 Filter regulator
53 Pressure switch
55 Nipple
56 Proximity sensor
60 Bolt
61 Bolt
63 Washer
64 Nut
65 Stud
66 Washer
67 Nut
68 Stud
69 Washer
70 Nut
71 Bolt
72 Washer
75 Bolt
76 Washer
78 Bolt
79 Washer
80 Bolt
80 Nut
81 Washer
82 Bolt
83 Bolt
84 Nut
84 Washer
90 Cylinder bolt
91 Nut
91 Washer
93 Cylinder bolt
94 Nut
94 Washer
95 Bolt
96 Washer
97 Bolt
97 Nut
98 Washer
99 Bolt
100 Nut
101 Cylinder bolt
101 Washer
10S Slide ring
110 Tube
111 Tube
113 Coupling
114 Coupling
115 Coupling multiple distributor
116 Coupling
117 Coupling
118 Coupling
119 Coupling multiple distributor
130 Nameplate
131 Ring bolt
145 Cable gland
146 Cable gland

16.4.3 DISMANTLING

The unit requires disassembly for hand cleaning.

INSTRUCTION

- Disconnect electric wiring and remove air hoses.

1. Internal disassembly of diverter valve remove swan-neck and rotating disc.
2. External disassembly of diverter valve remove piping and nozzle.

16.4.3.1 INTERNAL DISASSEMBLY OF DIVERTER VALVE REMOVE SWAN-NECK AND ROTATING DISC.

- Remove protection cover (30).
- Remove slide rings (10).
- Remove swan neck (15).

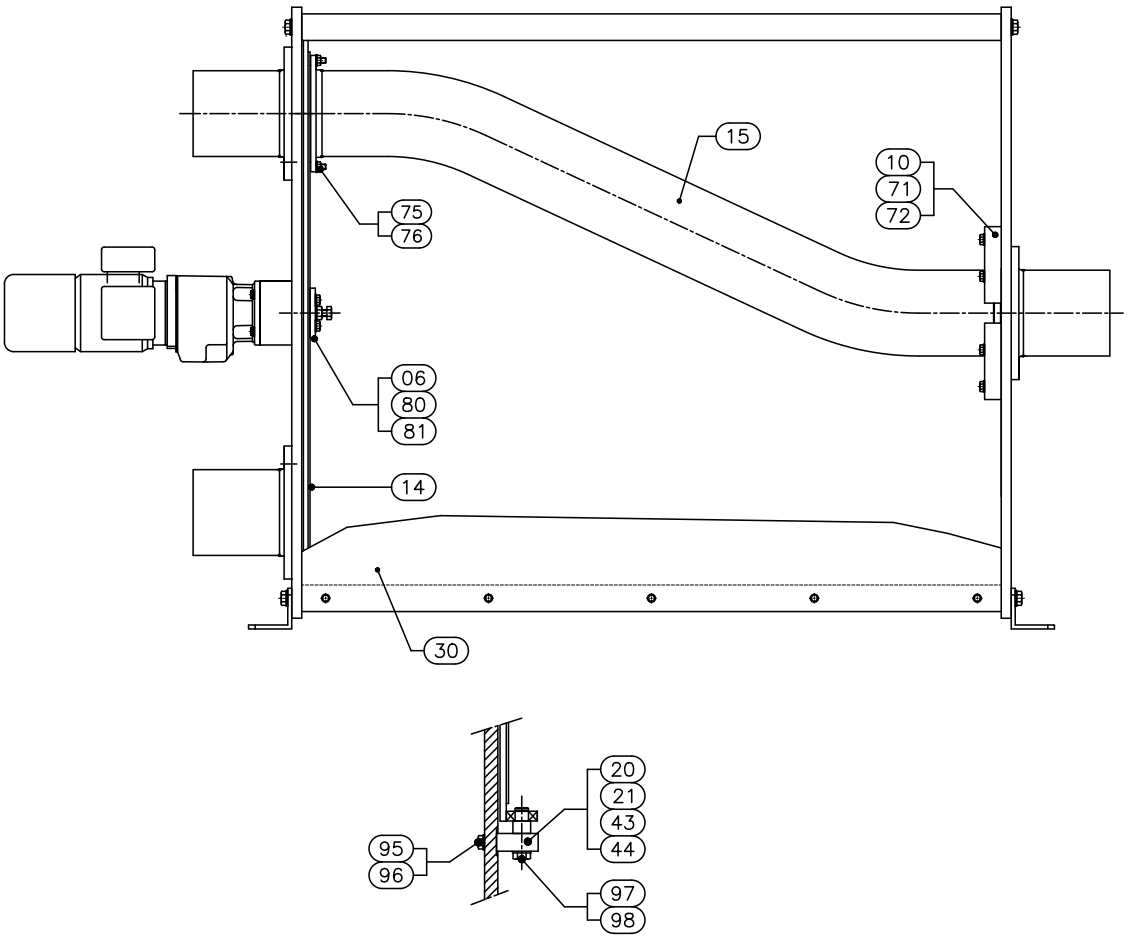
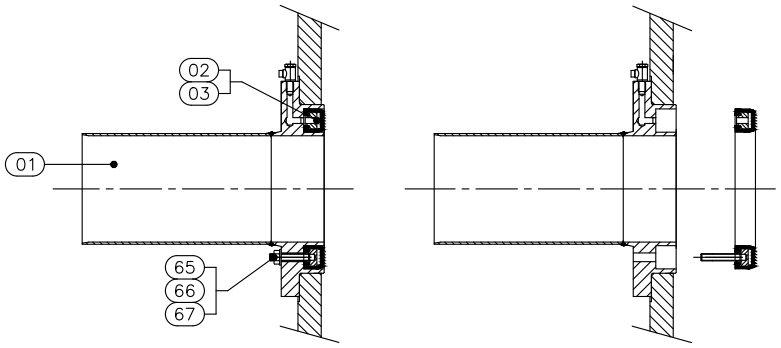


Figure 16.13: Disassembly for cleaning (M-TDV)

- Remove air seals (03) from nozzle.
- Check seal for damage and replace, if necessary.
- Clean nozzles and cover.



16.4.3.2 EXTERNAL DISASSEMBLY OF DIVERTER VALVE REMOVE PIPING AND NOZZLE.

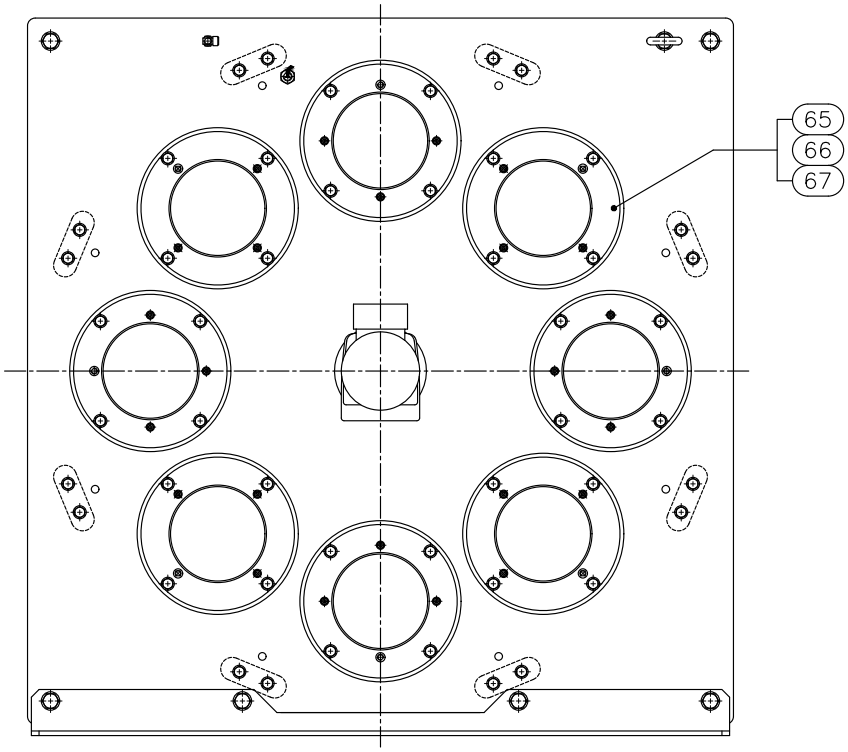
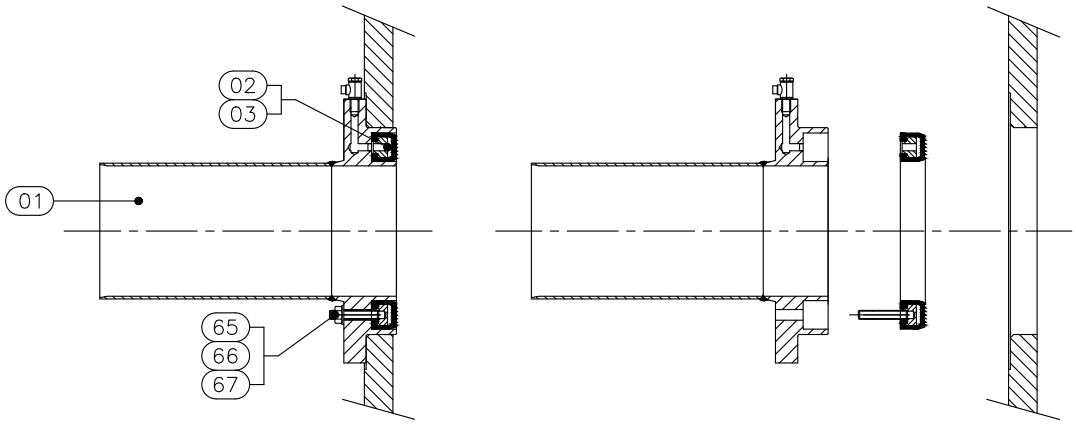


Figure 16.14: Disassembly for cleaning (M-TDV)

- Remove nuts (65) from the cover.
- Remove nozzles (01).
- Remove air seals (03) from nozzle.
- Check seal for damage and replace, if necessary.
- Clean nozzles and cover.



16.4.4 RE-ASSEMBLY

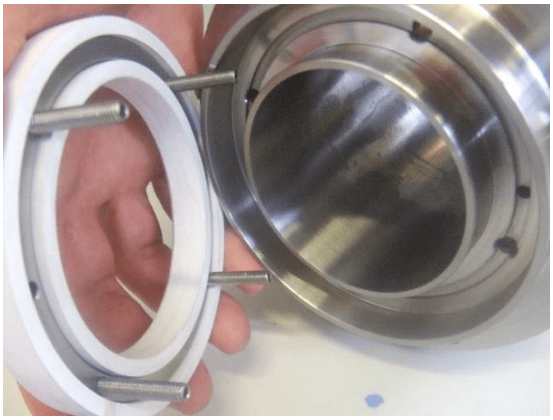
INSTRUCTION

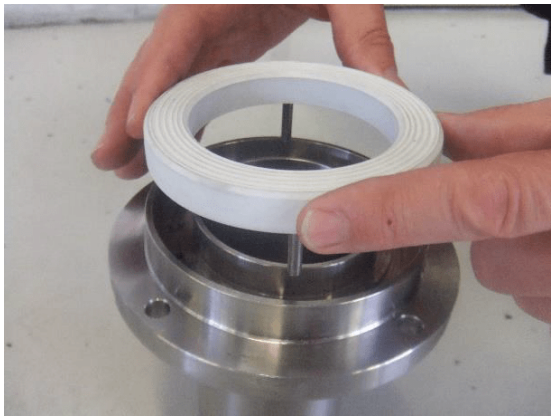
After cleaning and checking or replacement of parts, the diverter valve can be re-assembled as follows:

- Re-assemble the parts in reverse of dismantling procedure.

PAY SPECIAL ATTENTION TO THE FOLLOWING POINTS:

- Seal assembly.



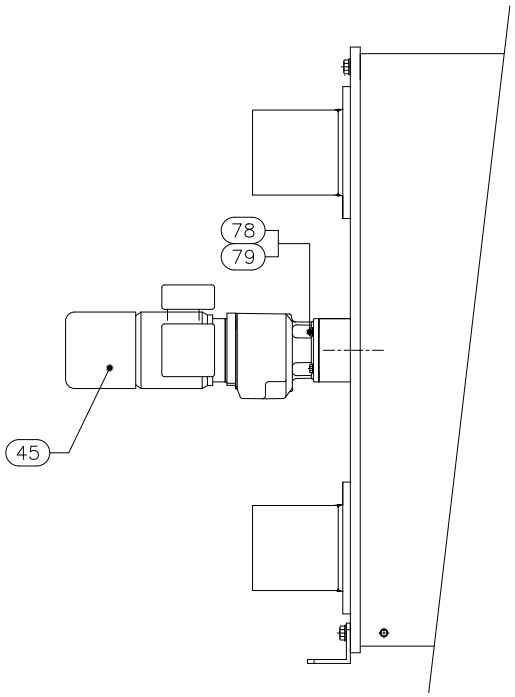


- Replace nozzles (01).
- Evenly tighten all nuts.
- Attach air hoses.
- Fit protection cover(s)
- Connect electrical wiring and attach air hose.

16.4.4.1 DISMANTLING AND ASSEMBLY DRIVE

DISMANTLING

- Remove bolts (78).
- Dismantle drive-encoder (45) from bearing house.



RE-ASSEMBLY

- Assemble drive to bearing house using bolts.
- Check correct mounting position drive.

ATTENTION!
After assembly test run the diverter valve.

ATTENTION!
If further maintenance or repair work of the M-TDV unit is required, please contact our Service Department.

17. FDV

17.1 GENERAL WORKING PRINCIPLE

The FDV flap diverter has been specially designed to re-route powders and pellets in pneumatic conveying systems.

Pipe changeover is achieved by turning the flap in the body.

The unit is driven by means of an integral pneumatic cylinder or torque actuator actuated by a solenoid valve.

The flap diverter valve housing is cast and may be of aluminium, iron or stainless steel, with a pipe or flange fittings.

Sealing is by means of a parabolic style blade of polyurethane or food quality material.

Indication of pipe changeover is by means of magnetic sensors.

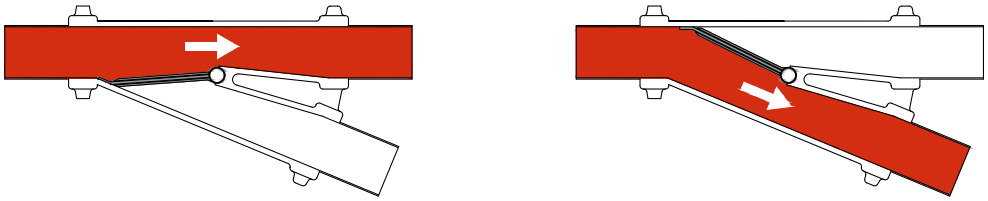


Figure 17.1: Schematic view of a diverter valve (FDV)

17.2 STANDARD EXECUTIONS AND SPECIFICATIONS

FDV flap diverter has been specially designed to re-route powders and pellets in pneumatic conveying systems.

Figure 17.2: FDVP / FDVF

Pressure	-0,3...+2 bar
Product temp °C	Standard -25°C...+80°C (Optional up to +150°C)
Ambient temp °C	Standard -20°C...+40°C
Material of construction	Body cover: Cast iron / Aluminium / Stainless steel 316
	Plug: Mild steel / Stainless steel 304L
Flange hole pattern	DIN PN 10 / ANSI 150 lbs
Pipe	Metric
Seal	Static: Polyurethane / Silicone
ATEX 2014/34/EU	1D/2GD Equipment

Sizes FDVP / FDVF

50	65	80	100	125	150	200	250

17.3 INSTALLATION, COMMISSIONING AND MAINTENANCE

First read the safety instructions in chapter **Safety** before installing the product.

DANGER OF DEATH!
Electrical connection
Make sure that appropriate power supplies are utilised during operation and that in the case of plant or component failure, the diverter valve is isolated from external power sources. Failure to comply may lead to serious or fatal injury, and/or critical product damage.

DANGER!
Installation must only be performed by trained and authorised personnel!
Do not touch the inlet of the diverter valve during or after unpacking!
Do not alter, remove or paint the type specification plates of the diverter, drive unit or fitted switches!
When carrying out installation work, always shut off the power and isolate from all other potential power sources.
When product qualities necessitate supplementary safety instructions and the wearing of protective clothes, it is obligatory to follow local safety instructions.

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

17.3.1 BEFORE INSTALLING

INSTRUCTION

- Remove packaging and delivery protection material from diverter valve.
- Check for any damage; if damaged contact your carrier and supplier.
- Check if diverter valve interior is free from foreign material.

17.3.2 INSTALLING THE DIVERTER VALVE IN A POTENTIALLY EXPLOSIVE ATMOSPHERE

Follow up the following important notes in addition to the regular product information and safety and installation instructions.

Read following chapters carefully in addition to the regular product-, safety- and installation information, before installing the product:

- **Explosion proof diverter valves** (chapter **5.2**)
- **Additional safety instructions for use in potentially explosive atmosphere** (chapter **6.6**)
- “Installing the diverter valve in a potentially explosive atmosphere” (this chapter)

Check if information on the nameplate of the diverter valve corresponds to the potentially explosive on-site atmosphere.
Pay specific attention to:

- Equipment group
- Equipment category
- Dust- or Gas area
- Temperature class
- Maximum surface temperature

Check if there are any potentially explosive atmosphere, oils, acids, gases, vapours, radiation etc. present during installation.
Always ground the diverter valve, use the flange connection bolts, or the optional earth-stud on end cover or motor base plate.
Check that the electrical leakage resistance is less than 10^{6} Ω.
The maximum velocity during position switch of diverter is not higher than 1 m/s and the maximum power of the drive used on the diverter is not higher than 4kW
To avoid build-up of electrostatic charges avoid charging mechanisms on the surfaces stronger than manual rubbing.
Non-metallic coatings or paints used on the diverter must have a layer thickness <2 mm.
Ensure that no foreign objects are conveyed through the diverter.
Precautions must be taken by the user to avoid this.

FDVP WITH PIPE BONDED IN BODY

Check that the electrical leakage resistance is less than 10^6 Ω between pipe and Body.

DIVERTER VALVE EXTERNAL NO ZONE

- No external explosive atmosphere is permitted
- No dust layers are permitted

17.3.2.1 DRIVE

According to the ATEX directive the maximum velocity must not be higher than 1 m/s and the maximum power of the motor gear unit is not higher than 4kW.
Explosive gas mixtures or concentrations of dust can lead to severe or fatal injuries in connection with hot surfaces, parts under power and moving parts on the gear unit / geared motor.
Installation, connection, start-up, maintenance and repair work on the gear unit / geared motor may only be performed by a qualified specialist while taking the following into account:

- These instructions
- The warning and information signs on the gear unit / geared motor
- Currently valid national / regional regulations
  (Explosion protection, Safety, accident prevention)

CAUTION!
After installation test run the diverter valve.

17.3.2.2 ACCESSORIES (IF FITTED)

Only use;

- solenoid valve
- proximity switch
- pressure switch
- terminal box
- electrical actuator
- etc.

that are CE marked and with an ATEX-approval, equal or higher than the ATEX-approval mentioned on the diverter valve.
Please study the operation instructions supplied by the manufacturer.
Check if the information on the nameplate of electrical accessories such as;

- solenoid valve
- proximity switch
- pressure switch
- terminal box
- electrical actuator
- etc.

corresponds to the potentially explosive on-site atmosphere.
Pay specific attention to:

- Equipment group
- Equipment category
- Dust- Gas area
- Temperature class
- Maximum surface temperature

PLEASE STUDY THE OPERATION INSTRUCTIONS SUPPLIED BY THE MANUFACTURER.

17.4 INSTALLING THE FLAP DIVERTER VALVE INTO THE SYSTEM

DANGER!
Do not turn flap by hand or switch position.
Danger to fingers and hands.
During operation or testing of the flap diverter, pipe connections must not be open or unprotected.
Pipe changeover must only be carried out when the product pipes are not pressurised and do not contain product!
The diverter valve must not be put into service until the equipment into which they have been incorporated have been declared in conformity with the Machinery Directive.

CAUTION!
Solenoid exhaust air regulators are set at the factory.
Changing these settings can cause malfunction or damage to the diverter.

ATTENTION!
Check voltage of individual components as these vary according to customer specification.
The solenoid valve must be connected to correct power supply and a compressed air supply of at least 4 bar.

INSTRUCTION

- Install flap diverter.
- Attach product pipes and ensure that flap diverter is adequately supported and secured.
- Connect the position switches to the user's control system.
- Connect all cables as per terminal wiring diagram and earth connection.
- Check compressed air pressure
- Check if the solenoid valve auxiliary manual operation is in "0" position.

CAUTION!
After installation test run the diverter valve.

17.4.1 CONNECTION DIAGRAMS

Read following chapters carefully in addition to the regular product- and safety information, before installing the product:

- **Installation, commissioning and maintenance** (chapter **17.3**).
- **Installing the flap diverter valve into the system** (chapter **17.4**).

The flap diverter is equipped as standard with:

Pneumatic torque actuator, electrically operated 5/2 monostable valve 1/4″, micro switches and junction box.

DANGER!
Only an electrical expert is allowed to connect the unit.

DOUBLE ACTING PNEUMATIC ACTUATOR

Airtorque:	DR00XXXUF05F0717AZ
Medium:	Air filtration lubricated or not up to 10 bar
Temperature range:	-40°C...+80°C
Working pressure:	6 bar
Hose:	⌀8mm

Table 17.1: Air consumption:

FDV size	50	65	80	100	125	150	200	250
Air consumption at 6 barLtr./stroke	0.35	0.4	0.8	0.9	1.6	1.7	4	4

Solenoid valve 5/2 NAMUR monostable execution with manual control.

POSITION INDICATOR

Rotech Switch control:	ACR3ASTAZ10 Electromechanical switches
Material:	Aluminium housing
Protection:	IP65
Cable gland:	M20x1.5; clamp range 8-13mm
Standard voltage:	230V AC 4A – 24V DC 16A
Temperature range:	-25°C...+85°C

Rotech Switch control:	APFN412EASEAZ10
Inductive proximity switch:	P&F NBN4-12GM50-E2 3 wires PNP NO
Material:	Aluminium housing
Protection:	IP65
Cable gland:	M20x1.5; clamp range 8-13mm
Standard voltage:	10-30V DC 0...200mA
Temperature range:	-25°C...+70°C

Rotech Switch control:	APF2V3NASTAZ10B
Inductive proximity switch:	P&F NJ2-V3-N 2GD Namur NC II2G Ex e ia IIC T6 Gb II2D Ex tb IIIC T80°C Db
Material:	Aluminium housing
Protection:	IP65
Cable gland:	M20x1.5; clamp range 5,5-13mm
Standard voltage:	8,2V DC ≥ 3mA inactive - ≤ 1mA active
Temperature range:	-25°C...+85°C

Rotech Switch control:	ACR1ASEAZ10 Electromechanical switches 2GD II2G Ex ed IIC T6 Gb II2D Ex tb IIIC T80°C Db
Material:	Aluminium housing
Protection:	IP67
Cable gland:	M20x1.5; clamp range 5,5-13mm
Standard voltage:	230V AC 4A max
Temperature range:	-25°C...+60°C

ATTENTION!
Please study the operation instructions switchbox manufacturer.

Prior to the delivery the position indication is set for the angle required for the Pneumatic torque actuator.

If adjusting of the cams is necessary, and for instructions for electrical connection, please read the mounting and adjusting instructions Switch control.

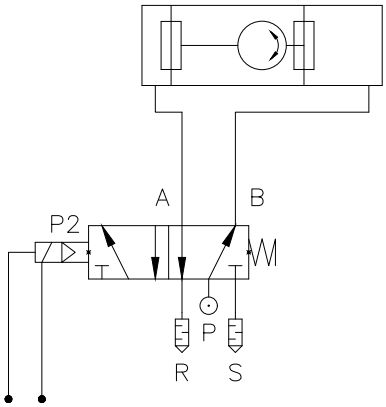


Figure 17.3: Pneumatic connection torque actuator (FDV)

17.5 DISMANTLING, ASSEMBLING AND ADJUSTING

DMN-WESTINGHOUSE diverter valves are manufactured with great care. To reduce air leakage, internal running clearances are kept extremely small during manufacture and assembly of the diverter valve.

First read the safety instructions in chapter **Safety** before dismantling, assembling and adjusting the product.

ATTENTION!
Dismantling, assembling and adjusting must only be performed by trained and authorised personnel!

DANGER!
When carrying out repair work, always shut off the power and set secure against unexpected incoming power.

CAUTION!
- Do not use heavy tools;
- avoid damages such as scratches and burrs etc.;
- clean all components thoroughly.

17.5.1 BEFORE DISMANTLING

INSTRUCTION

- Turn off power supply and/or remove fuses.
- Disconnect electric wiring from solenoid valve and Actuator position switches.
- Close compressed air supply.
- Remove air hoses.

17.5.2 GENERAL ASSEMBLY & PART LIST

17.5.2.1 GENERAL ASSEMBLY FDV

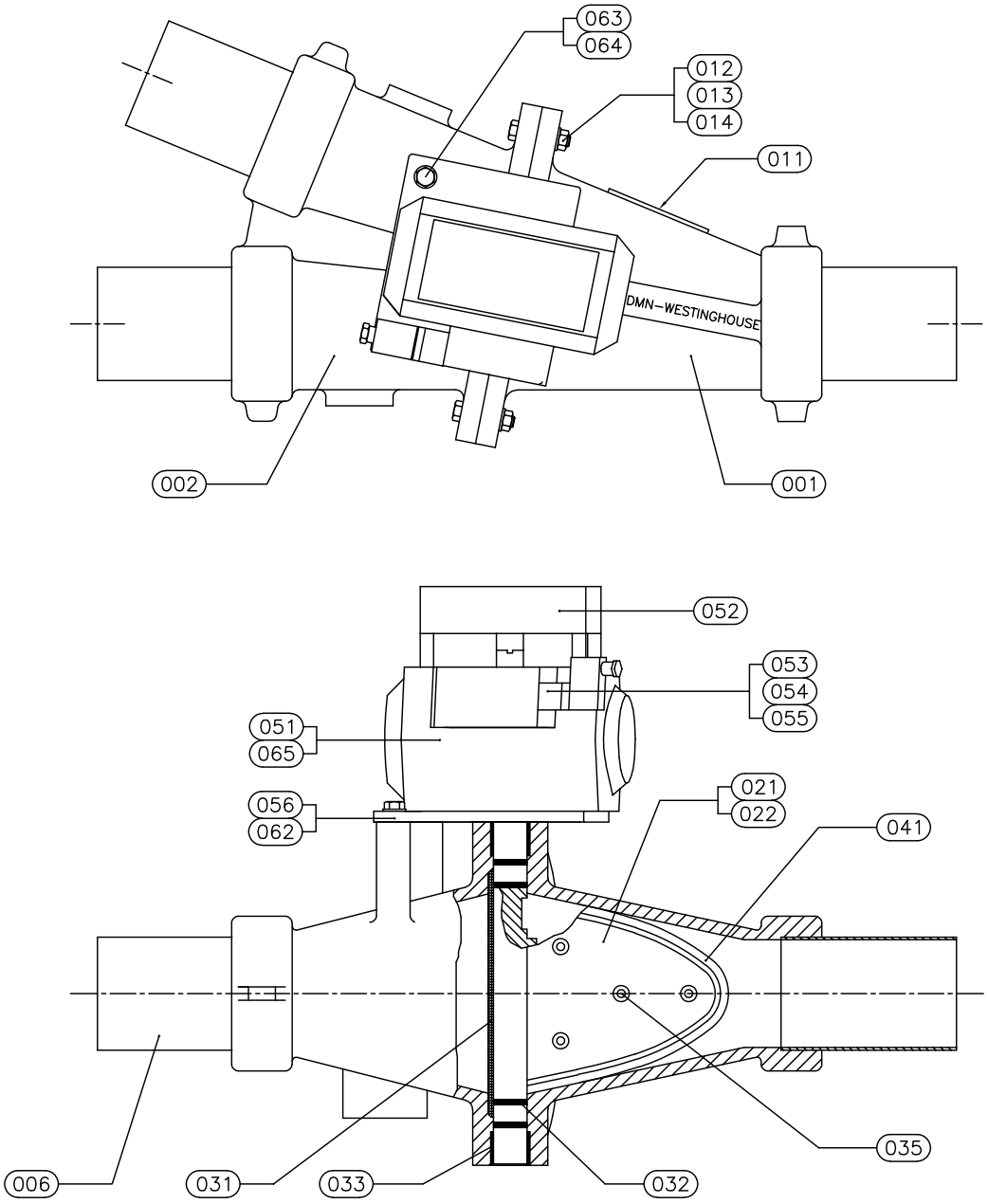


Figure 17.4: General assembly (FDV)

17.5.2.2 PART LIST

001 Flap housing
002 Trouser legs
006 Pipe
011 Nameplate
012 Bolt
013 Washer
014 Nut
021 Flap
022 Clamp plate
031 Seal
032 O-ring
033 Slide bearing
035 Counter sunk screw
041 Flap seal
051 Torque actuator unit
052 Switch box
053 Solenoid valve
054 Silencer
055 Coil
056 Mounting plate
061 Fitting
062 Counter sunk screw
063 Bolt
064 Washer

17.5.3 DISMANTLING & RE-ASSEMBLY

17.5.3.1 DISMANTLING STANDARD EXECUTION

INSTRUCTION

- Disconnect electric wiring from solenoid valve and position switches and remove air hoses.
- Remove bolts (63).
- Remove Mounting plate (56) including actuator unit (51/52/53).

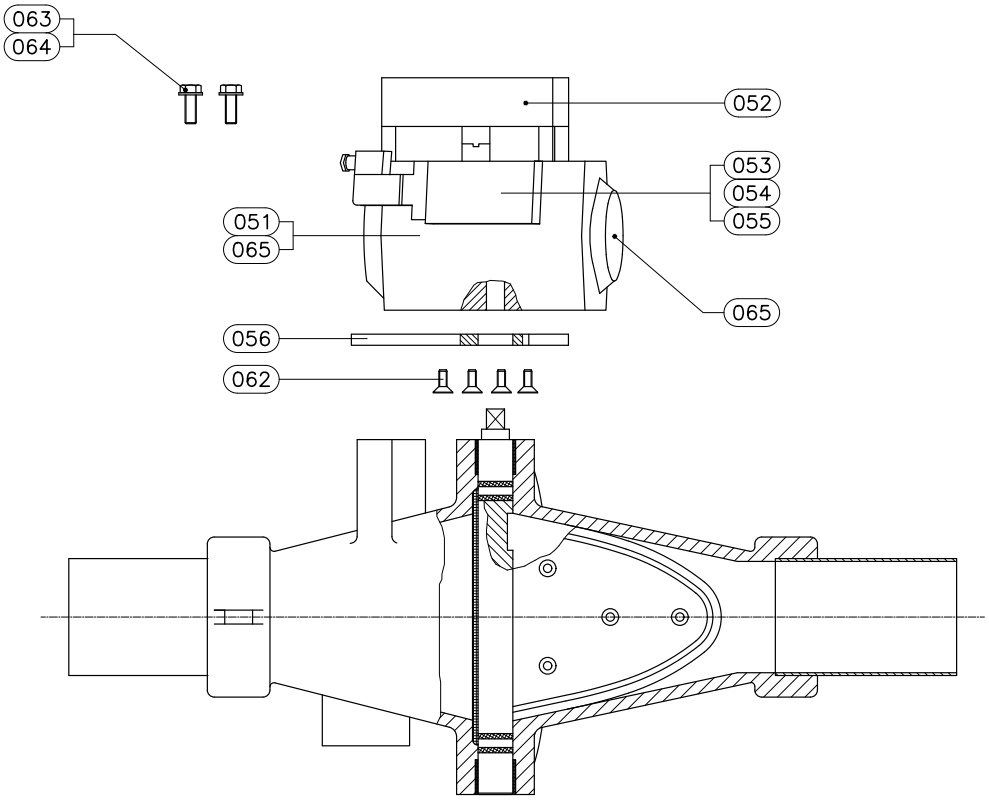


Figure 17.5: Disassembly torque actuator execution (FDV)

INSTRUCTION

- Remove bolts (12) and remove flap housing (01) and flap assembly.
- Remove bearing (33) and “O”-ring (32) from flap assembly.
- Disassemble flap assembly and remove seal (31) from trouser legs (02).
- Check flap shaft (21), flap seal and bearings for damage and replace, if necessary.
- Replace “o”-rings and seal.

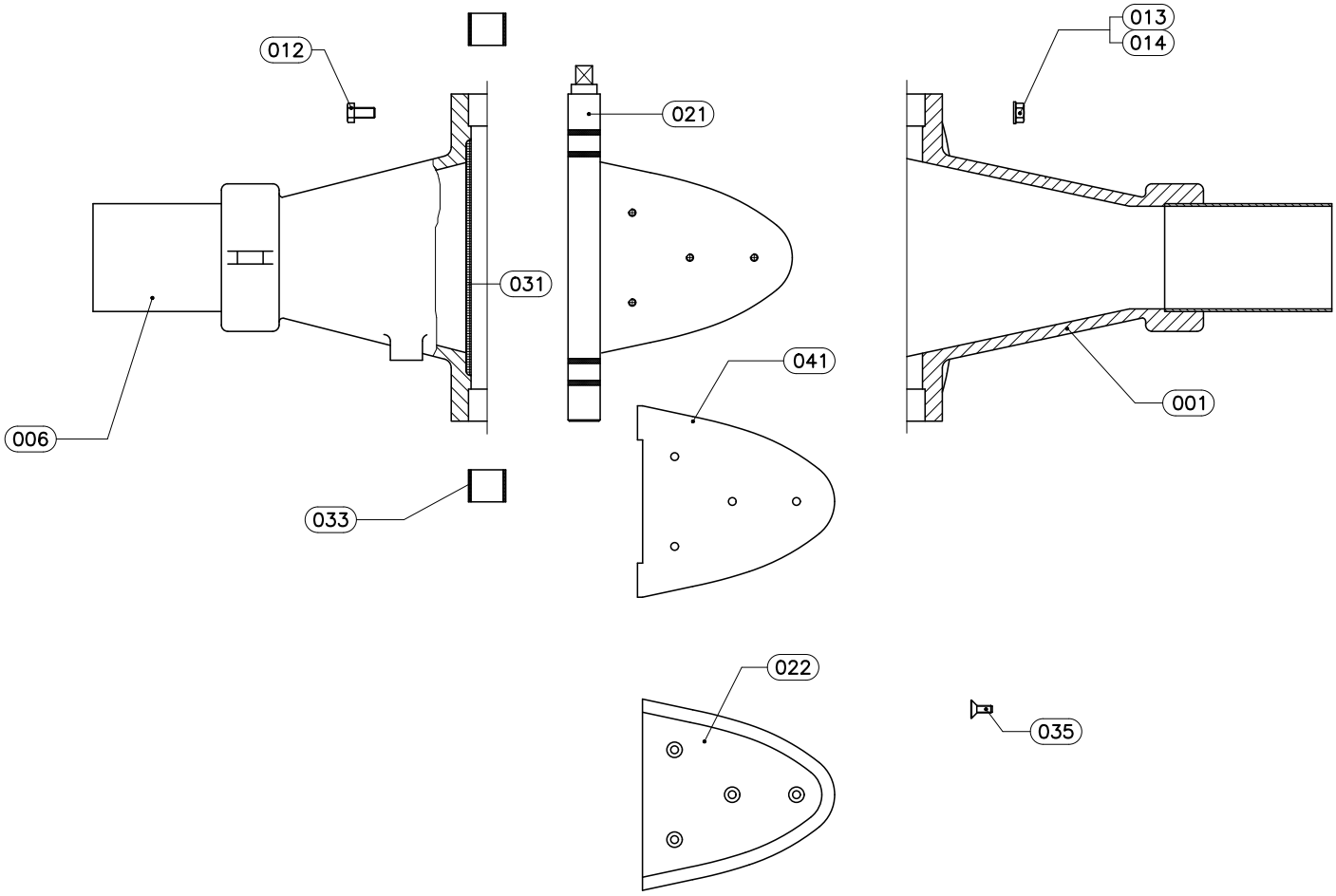


Figure 17.6: Disassembly flap assembly (FDV)

17.5.3.2 RE-ASSEMBLING STANDARD EXECUTION

INSTRUCTION

AFTER CLEANING AND CHECKING OR REPLACEMENT OF PARTS, THE DIVERTER VALVE CAN BE RE-ASSEMBLED AS FOLLOWS:

- To assemble flap, fit seal (41) between flap (21) and flap clamp (22) and secure with counter sunk screws (35).
- Slip “o”-rings and bearings over shaft.
- Place seal inside trouser legs (02) and position flap assembly in recess, before assembly, grease “O”-ring and seal lightly.
- Slip flap housing (01) over flap and secure to trouser legs (02) with bolts (12), washer (13) and nuts (14).
- Secure mounting plate (56) together with actuator unit using bolts (63).
- Prior to delivery, the flap position is set at the right angle.
- Connect electrical wiring in accordance with the connection diagram and attach air hoses.

ATTENTION!
After assembly test run the diverter valve.

18. BTD

18.1 GENERAL WORKING PRINCIPLE

The BTD ball 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 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 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 diverter valve in place by removing the two side covers.

The diverter valve is operated by using a pneumatic actuator controlled by a solenoid valve. Line change indication is provided by a switch box equipped with microswitches or inductive sensors.

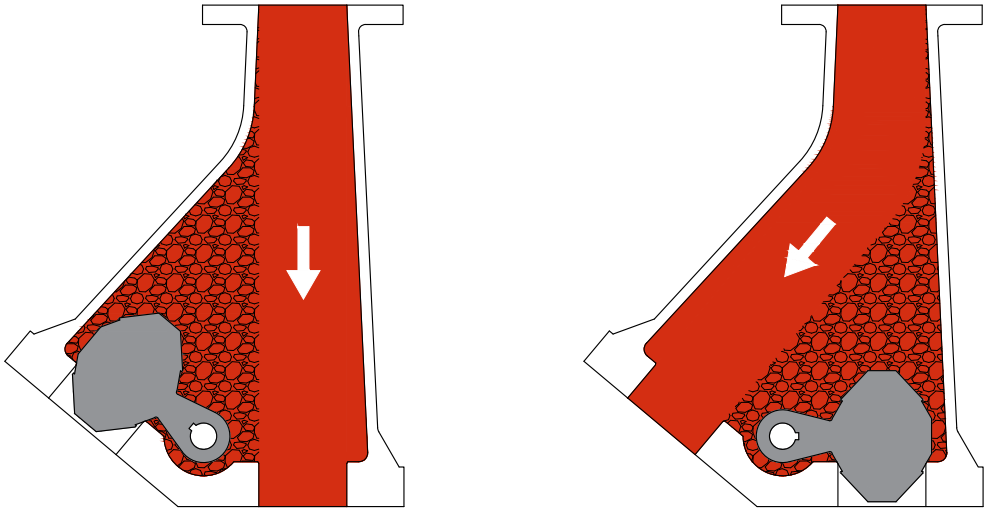


Figure 18.1: Schematic view of a diverter valve (BTD)

18.2 STANDARD EXECUTIONS AND SPECIFICATIONS

BTD ball 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.

Figure 18.2: BTD

Pressure	-0,5...+6 bar
Product temp °C	Standard -25°C...+80°C (Optional up to +150°C Non ATEX)
Ambient temp °C	Standard -20°C...+40°C
Material of construction	Ductile spheroidal cast iron GS 55/7
Flange hole pattern	DIN PN 10 / ANSI 150 lbs
Pipe	Metric
Seal	Static: Polyurethane
	Option: Viton (HT) / Silicone
ATEX 2014/34/EU	1D/2GD Equipment
Remark	Horizontal mounting is not recommended

Sizes BTD						
65	80	100	125	150	200	250

18.3 INSTALLATION, COMMISSIONING AND MAINTENANCE

First read the safety instructions in chapter **Safety** before installing the product.

DANGER OF DEATH!
Electrical connection
Make sure that appropriate power supplies are utilised during operation and that in the case of plant or component failure, the diverter valve is isolated from external power sources. Failure to comply may lead to serious or fatal injury, and/or critical product damage.

DANGER!
Installation must only be performed by trained and authorised personnel!
Do not touch the inlet of the diverter valve during or after unpacking!
Do not alter, remove or paint the type specification plates of the diverter, drive unit or fitted switches!
When carrying out installation work, always shut off the power and isolate from all other potential power sources.
When product qualities necessitate supplementary safety instructions and the wearing of protective clothes, it is obligatory to follow local safety instructions.

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

18.3.1 BEFORE INSTALLING

INSTRUCTION

- Remove packaging and delivery protection material from diverter valve.
- Check for any damage; if damaged contact your carrier and supplier.
- Check if diverter valve interior is free from foreign material.

18.3.2 INSTALLING THE DIVERTER VALVE IN A POTENTIALLY EXPLOSIVE ATMOSPHERE

Follow up the following important notes in addition to the regular product information and safety and installation instructions.

Read following chapters carefully in addition to the regular product-, safety- and installation information, before installing the product:

- **Explosion proof diverter valves** (chapter **5.2**)
- **Additional safety instructions for use in potentially explosive atmosphere** (chapter **6.6**)
- “Installing the diverter valve in a potentially explosive atmosphere” (this chapter)

Check if information on the nameplate of the diverter valve corresponds to the potentially explosive on-site atmosphere.
Pay specific attention to:

- Equipment group
- Equipment category
- Dust- or Gas area
- Temperature class
- Maximum surface temperature

Check if there are any potentially explosive atmosphere, oils, acids, gases, vapours, radiation etc. present during installation.
Always ground the diverter valve, use the flange connection bolts, or the optional earth-stud on end cover or motor base plate.
Check that the electrical leakage resistance is less than 10^{6} Ω.
The maximum velocity during position switch of diverter is not higher than 1 m/s and the maximum power of the drive used on the diverter is not higher than 4kW
To avoid build-up of electrostatic charges avoid charging mechanisms on the surfaces stronger than manual rubbing.
Non-metallic coatings or paints used on the diverter must have a layer thickness <2 mm.
Ensure that no foreign objects are conveyed through the diverter.
Precautions must be taken by the user to avoid this.

Check that the electrical leakage resistance is less than 10^{6} Ω between pipe and Body.

BTD BALL DIVERTER VALVE
Maximum product temperature is 80°C
WARNING – SELF-IGNITION OF DUSTS - Self-ignition temperature (SIT) of the product to be handled must be higher than Product temperature +10°C.

DIVERTER VALVE EXTERNAL NO ZONE
- No external explosive atmosphere is permitted
- No dust layers are permitted

18.3.2.1 DRIVE

According to the ATEX directive the maximum velocity must not be higher than 1 m/s and the maximum power of the motor gear unit is not higher than 4kW.
Explosive gas mixtures or concentrations of dust can lead to severe or fatal injuries in connection with hot surfaces, parts under power and moving parts on the gear unit / geared motor.
Installation, connection, start-up, maintenance and repair work on the gear unit / geared motor may only be performed by a qualified specialist while taking the following into account:
- These instructions
- The warning and information signs on the gear unit / geared motor
- Currently valid national / regional regulations
  (Explosion protection, Safety, accident prevention)

CAUTION!
After installation test run the diverter valve.

18.3.2.2 ACCESSORIES (IF FITTED)

Only use;
- solenoid valve
- proximity switch
- pressure switch
- terminal box
- electrical actuator
- etc.

that are CE marked and with an ATEX-approval, equal or higher than the ATEX-approval mentioned on the diverter valve.
Please study the operation instructions supplied by the manufacturer.
Check if the information on the nameplate of electrical accessories such as;
- solenoid valve
- proximity switch
- pressure switch
- terminal box
- electrical actuator
- etc.

corresponds to the potentially explosive on-site atmosphere.
Pay specific attention to:
- Equipment group
- Equipment category
- Dust- Gas area
- Temperature class
- Maximum surface temperature

PLEASE STUDY THE OPERATION INSTRUCTIONS SUPPLIED BY THE MANUFACTURER.

18.4 INSTALLING THE BALL DIVERTER VALVE INTO THE SYSTEM

DANGER!
Do not switch position.
Danger to fingers and hands.
During operation or testing of the ball diverter, pipe connections must not be open or unprotected.
Pipe changeover must only be carried out when the product pipes are not pressurised and do not contain product!
The diverter valve must not be put into service until the equipment into which they have been incorporated have been declared in conformity with the Machinery Directive.

DANGER!
Solenoid exhaust air regulators are set at the factory.
Changing these settings can cause malfunction or damage to the diverter.

ATTENTION!
Check voltage of individual components as these vary according to customer specification.
The solenoid valve must be connected to correct power supply and a compressed air supply of at least 4 bar.

INSTRUCTION

- Install ball diverter using tapped holes in the body.
- Attach product pipes and ensure that ball diverter is adequately supported and secured.
- Connect the position switches to the user's control system.
- Connect all cables as per terminal wiring diagram and earth connection.
- Check compressed air pressure
- Check if the solenoid valve auxiliary manual operation is in "0" position.

CAUTION!
After installation test run the diverter valve.

18.4.1 CONNECTION DIAGRAMS

Read following chapters carefully in addition to the regular product- and safety information, before installing the product:

- **Installation, commissioning and maintenance** (chapter **18.3**).
- **Installing the ball diverter valve into the system** (chapter **18.4**).
- There are no restrictions regarding the installation position of the BTD diverters.

Note:

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 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 BTD to a fixed anchor point using the tapped holes in the diverter body if possible. If the system arrangement does not permit this, use fixed anchor points as close to the BTD as possible.

INSTRUCTION

On assembly, it is advisable to proceed as follows:

- Verify that the ball can move without any effort (refer to manual operation on next page).
- Position the diverter and firmly anchor it to the structure.
- Connect pipes by inserting proper flexible 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 (refer to manual operation on next page)
- Carry out all necessary electric and pneumatic connections using the diagram supplied with the system.

WORKING PRESSURE AT THE PNEUMATIC ACTUATOR: 4.5 ÷ 7 BAR.

CAUTION!

It is advisable to provide a local terminal board with an AUT - 0 - MAN selector and an extractable key on “0”, which makes it possible to electrically insulate the diverter in case of maintenance interventions.
Before commencing any maintenance operation or removal of fixed guarding, IT IS ESSENTIAL that all power and air supplies are switched off. (AUT-O-MAN selector on “O” with the key out).
The diverter must NOT be operated when product is flowing through the diverter 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.

Operation of the diverter valve should ONLY be carried out after the product has ceased to flow. (20 to 40 seconds dependent on conveying length).
Power supply shall correspond to the plate rating of individual users.
In case of non-compliance, contact DMN WESTINGHOUSE.

MANUAL EMERGENCY OPERATION

In the event of an emergency due to the loss of power and air supplies, the BTD 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 key on shaft “P”.
- After this operation, extract the key.

Reconnect compressed air.
The diverter shall be protected by proper insulation or barriers in case it operates at temperatures > 40°C.

INSTALLATION SEQUENCE

ATTENTION!
Observe safety instructions.

INSTRUCTION

Install the diverter without tension:

- Connect product pipes.
- Connect compressed air to diverter 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 diverter.

After the installation sequence has been carried out, the control system and operation of the diverter 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.

DO NOT USE WATER:

The personnel shall be trained to know how to operate in such conditions and shall be informed about any dangers of fire due to the products used in the system.

18.4.1.1 CONNECTION DIAGRAM FOR THE BALL DIVERTER

The Ball diverter is equipped as standard with:

- Pneumatic torque actuator, electrically operated 5/2 double solenoid valve 1/4'' micro switches and junction box.

ATTENTION!
All electrical connections Must be carried out by a qualified electrician.

DOUBLE ACTING PNEUMATIC ACTUATOR

Airtorque:	DR00XXXUF05F0717AZ
Medium:	air filtration lubricated or not up to 10 bar
Temperature range:	-40°C...+80°C
Working pressure:	6 bar
Hose:	⌀ 8mm

Air consumption:

BTD size	65	80	100	125	150	200	250
Torque actuator size	85	85	100	115	115	125	150
Nl/cycle[1]	12.3	12.3	21.5	36.3	36.3	50	88

[1] Air consumption for a complete cycle at 6 bar (complete cycle: opening/closure actuator)

For pressures <4.5 bar the actual operating conditions of the diverter shall be evaluated from time to time in order to define the type of actuator to be used.

Solenoid valve 5/2 NAMUR double solenoid execution with manual control.

POSITION INDICATOR

Rotech Switch control:	ACR3ASTAZ10
	Electromechanical switches
Material:	Aluminium housing
Protection:	IP65
Cable gland:	M20x1.5; clamp range 8-13mm
Standard voltage:	230V AC 4A – 24V DC 16A
Temperature range:	-25°C...+85°C

Rotech Switch control:	APFN412EASEAZ10
Inductive proximity switch:	P&F NBN4-12GM50-E2
	3 wires PNP NO
Material:	Aluminium housing
Protection:	IP65
Cable gland:	M20x1.5; clamp range 8-13mm
Standard voltage:	10-30V DC 0...200mA
Temperature range:	-25°C...+70°C

Rotech Switch control:	APF2V3NASTAZ10B
Inductive proximity switch:	P&F NJ2-V3-N 2GD
	Namur NC
	II2G Ex e ia IIC T6 Gb
	II2D Ex tb IIIC T80°C Db
Material:	Aluminium housing
Protection:	IP65
Cable gland:	M20x1.5; clamp range 5,5-13mm
Standard voltage:	8,2V DC ≥ 3mA inactive - ≤ 1mA active
Temperature range:	-25°C...+85°C

Rotech Switch control:	ACR1ASEAZ10
Electromechanical switches 2GD	II2G Ex ed IIC T6 Gb
	II2D Ex tb IIIC T80°C Db
Material:	Aluminium housing
Protection:	IP67
Cable gland:	M20x1.5; clamp range 5,5-13mm
Standard voltage:	230V AC 4A max
Temperature range:	-25°C...+60°C

ATTENTION!
Please study the operation instructions switchbox manufacturer.

Prior to the delivery the position indication is set for the angle required for the Pneumatic torque actuator.

If adjusting of the cams is necessary and for instructions for electrical connection read the mounting and adjusting instructions Switch control.

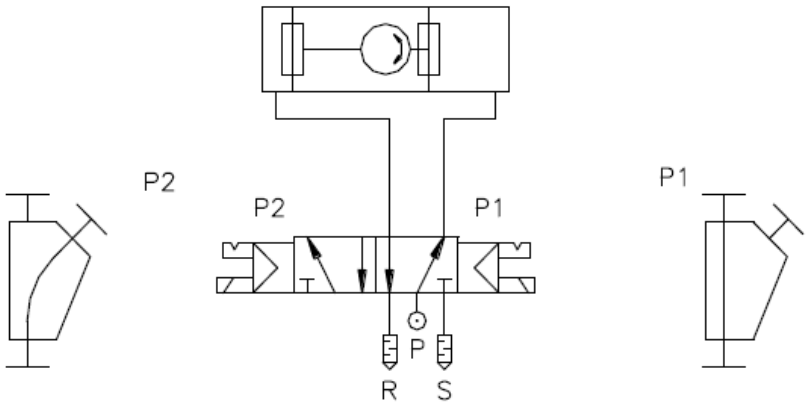


Figure 18.3: Pneumatic connection torque actuator (BTD)

18.5 DISMANTLING, ASSEMBLING AND ADJUSTING

DMN-WESTINGHOUSE diverter valves are manufactured with great care. To reduce air leakage, internal running clearances are kept extremely small during manufacture and assembly of the diverter valve.

First read the safety instructions in chapter **Safety** before dismantling, assembling and adjusting the product.

ATTENTION!
Dismantling, assembling and adjusting must only be performed by trained and authorised personnel!

DANGER!
When carrying out repair work, always shut off the power and set secure against unexpected incoming power.

CAUTION!
- Do not use heavy tools;
- avoid damages such as scratches and burrs etc.;
- clean all components thoroughly.

18.5.1 BEFORE DISMANTLING

INSTRUCTION

- Turn off power supply and/or remove fuses.
- Disconnect electric wiring from solenoid valve and Actuator position switches.
- Close compressed air supply.
- Remove air hoses.

18.5.1.1 GENERAL ASSEMBLY (BTD)

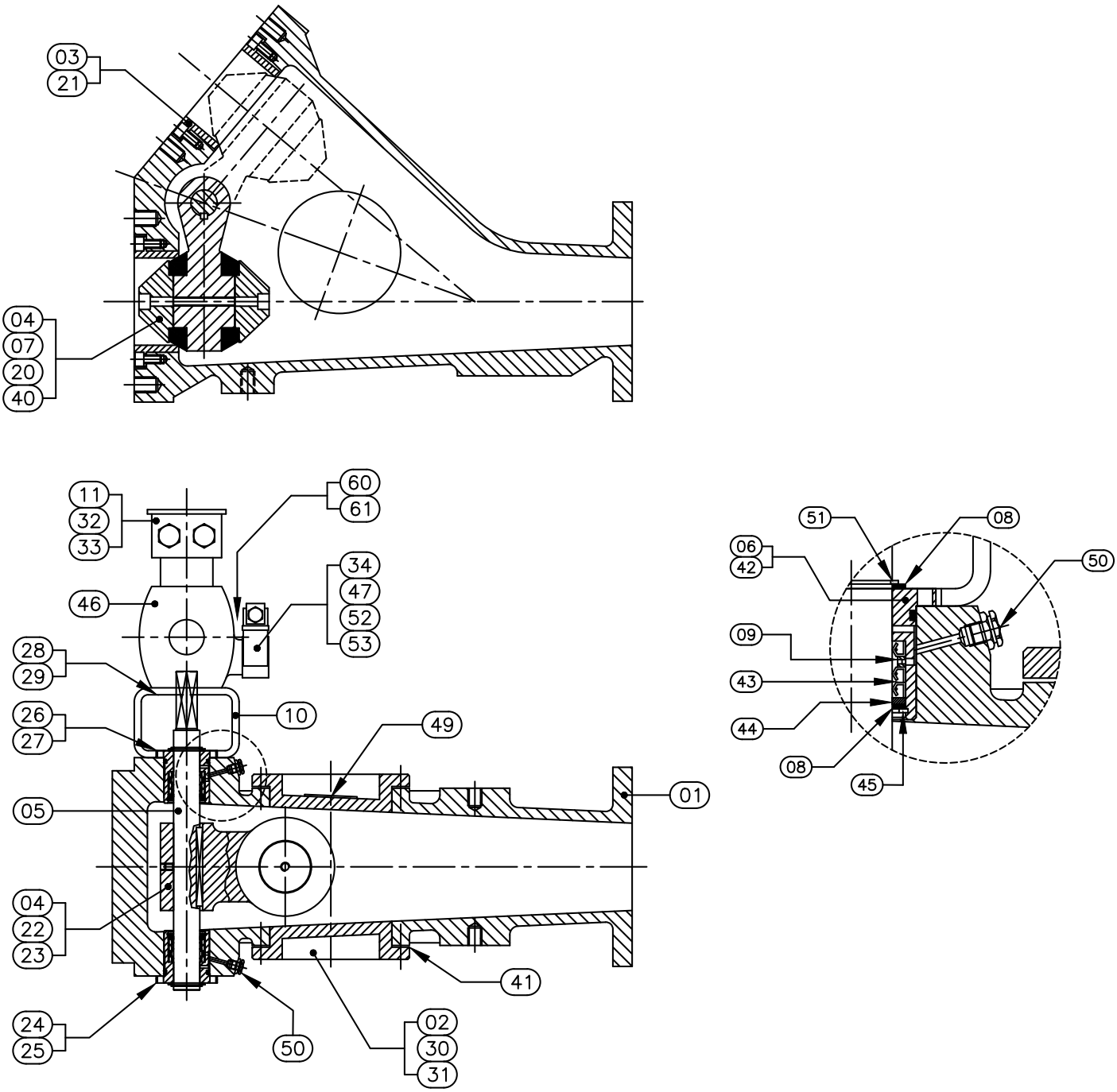


Figure 18.4: General assembly (BTD)

18.5.1.2 PART LIST

01 Body
02 Inspection cover
03 Wear ring
04 Ball
05 Shaft
06 Bush
07 Seal-holder
08 Inner distance piece
09 Intermediate distance ring
10 Actuator bracket
11 Switch box
20 Socket head screw
21 Socket head screw
22 Locking dowel
23 Key
24 Socket head screw
25 Spring washer
26 Hexagonal head screw
27 Spring washer
28 Hexagonal head screw
29 Spring washer
30 Hexagonal head screw
31 Spring washer
32 Hexagonal head screw
33 Spring washer
34 Socket head screw
40 Seal
41 Cover gasket
42 "O"-ring
43 Lip seal
44 Barrier ring
45 Retainer ring internal
46 Pneumatic actuator
47 Solenoid valve
50 Grease nipple
51 Retainer ring external
52 Straight union
53 Valve adaptor Namur
60 "O"-ring
61 "O"-ring

18.5.2 DISMANTLING & RE-ASSEMBLY

There are no operations requiring the diverter valve to be completely dismantled.

The seals may be inspected in situ by removing the two-side inspection covers (02), but replacement of the seals is best carried out by removing the diverter valve to the workshop.

18.5.2.1 REPLACEMENTS OF SEALS

INSTRUCTION

- Unscrew and remove screws and washers (30&31).
- Remove inspection covers (02) and relevant gaskets (41).

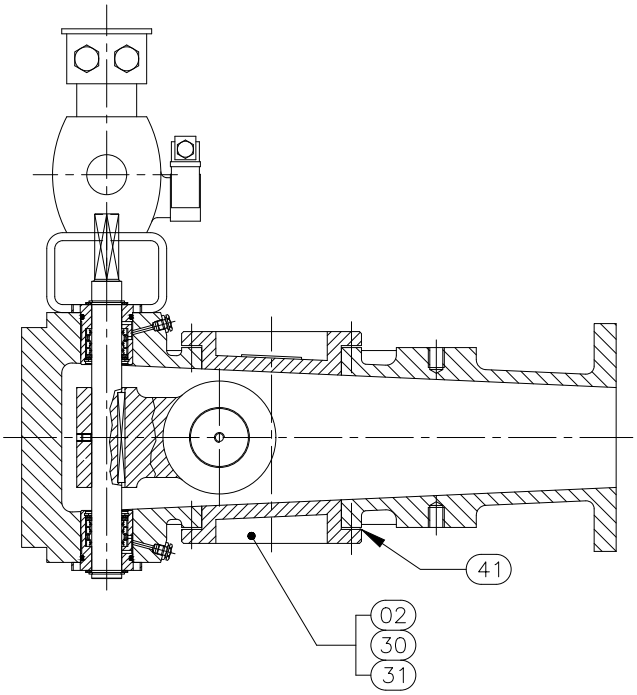


Figure 18.5: Replacement of seals (BTD)

18.5.2.2 REPLACEMENTS OF SEALS

INSTRUCTION

- Remove screw (20).
- Remove seal-holder (07) and seal (40) on one side of the ball.
- Clean seal seats and the inside of the diverter valve in the area where seals are and insert a new seal.
- Re-assemble seal-holder (07) and screw (20).
- Manually operate diverter valve to relocate ball to the other outlet.
- Repeat above operations for seal on opposite side of ball.
- Check seating of both seals.
- Re-assemble inspection covers (02), gaskets (41), screws (31) and washers (30).

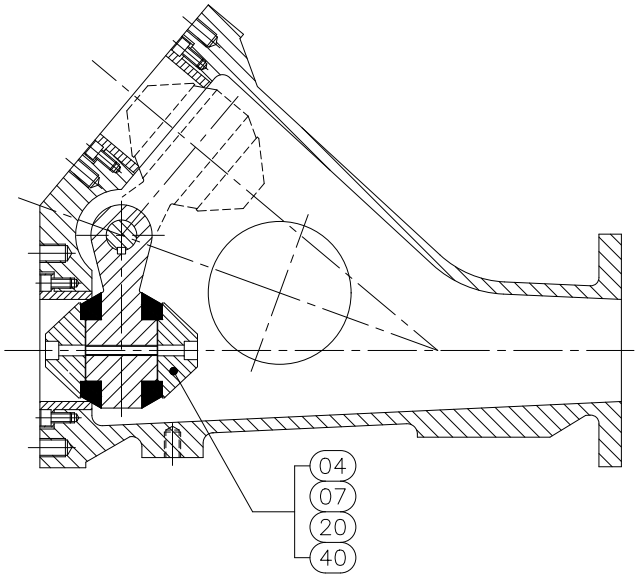


Figure 18.6: Replacement of seals (BTD)

ATTENTION!
It is important that care is taken to ensure correct re-assembly of the diverter valve, as the sealing and seal wear may otherwise be adversely affected.
After re-assembly, carry out the function tests to ensure correct operation of the diverter valve.

19. END OF LIFETIME

After lifetime, the system must be decommissioned according to prevailing safety rules.

All contaminated or harmful parts must be disposed of in accordance with the statutory requirements.

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