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› materials handling
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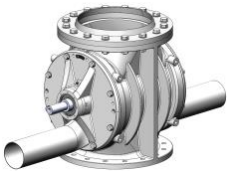
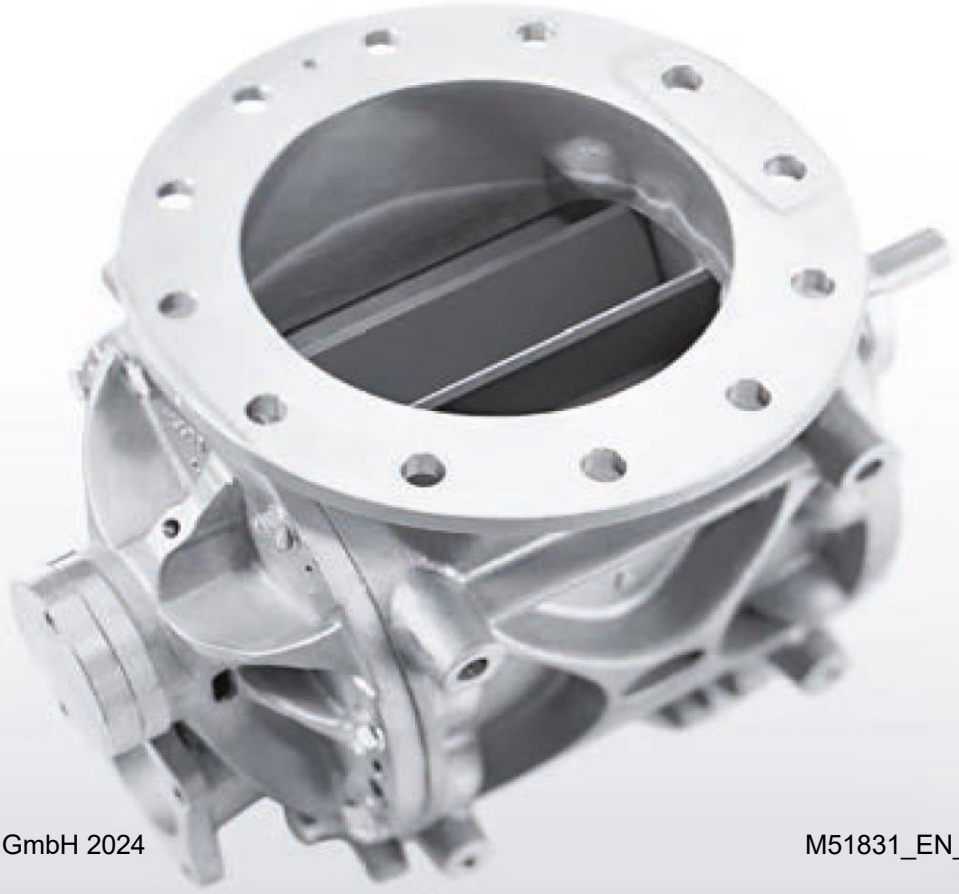
Original installation and operating manual

Rotary valves

Operating manual number **M51831_EN_2024-09**

Valve types:

ZXD	ZRD, ZRC ZRX, ZRT	ZKD ZKC ZKX	ZXQ	ZAQ ZAW
				
ZDD	**ZVD, ZVC, ZVX ZVB, ZVT, ZPD ZPC, ZPX, ZGM ZGD, ZGB**	**ZVH ZPH ZGH ZVU**	**ZFD**	**ZZB ZZD**
				



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Email: service@coperion.com

To ensure smooth and speedy handling, we need the following information from you:

- Serial number (information on the name plate)
- Type designation
- Coperion order no. with assembly (if available)
- Operating data (information on the name plate)
- Description of the problem

Subject to change
(Postal code: 88250)

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1 General

1.1 Introduction

This installation and operating manual contains important information that supports you during the intended use of the machine. The installation and operating manual is intended for qualified, instructed and trained personnel tasked with installing the machine in an existing system.

The rotary valves described here are partially completed machines by definition (Machinery Directive 2006/42/EG, Article 2 g).

The installation and operating manual must always be kept at the machine location. It must be read, understood and used by every person tasked with work on or with the machine. This applies in particular to the safety instructions that are specially marked in this installation and operating manual. Obeying the safety instructions helps to avoid accidents, errors and malfunctions.

This installation and operating manual is intended to aid familiarization with the machine and using the machine as intended.

This installation and operating manual contains important information on operating the machine safely, correctly and cost effectively.

Obeying the installation and operating manual:

- helps prevent hazards and risks,
- increases operational reliability,
- increases the service life of the machine, and
- reduces servicing costs and downtimes.

If we provide you with additional information related to the machine (additional technical information, for example), obey this information, too, and keep it with the installation and operating manual.

If you do not understand the whole installation and operating manual or individual chapters of it, talk to your dealer and/or Coperion GmbH before starting the corresponding activity.

To ensure safe operation of this machine, it is important to comprehend, understand and obey the instructions, recommendations and notes in this installation and operating manual. If you do not obey the instructions, recommendations and notes, any possible warranty claim made with respect to this machine may be restricted or denied.

Examples of such unintended use may be the following:

- Installation errors.
- Poor maintenance.
- Other uses not specified in the installation and operating manual.

1.2 Changes/reservations

We make every effort to ensure that this installation and operating manual is correct and up-to-date. To maintain our technical edge, it may be necessary to make changes to the product and its operation without advance notice. We assume no liability for malfunctions, outages or damage resulting from such changes.

Also obey any additional information that may have been supplied.

1.3 Warranty and liability

Our General Sales Terms and Delivery Conditions always apply. They are available to the end customer upon award of contract at the very latest and can be found on our Internet site.

Coperion GmbH excludes warranty services and liability claims for persons or property damage resulting from one or more of the following causes:

- Use that is not intended.
- Improper installation, commissioning
- Operation with safety equipment that is not attached properly or not functioning.
- Noncompliance with the safety instructions and information in the installation and operating manual.
- Repairs or manipulation by persons who are neither authorized nor trained for this.
- Unauthorized structural modifications or changes.
- Servicing and maintenance work performed improperly or not in due time.
- Process media, accessories, spare parts and additives that cause damage and that have not been approved by the manufacturer. The manufacturer assumes no liability for consequential damages resulting from this.
- Catastrophes resulting from foreign objects and force majeure.
- Product contamination due to malfunctions (for example, abrasion). The manufacturer assumes no liability – the operator is to take appropriate countermeasures (for example, magnetic separators).
- Wet cleaning of the exterior of valves not intended for this (obey the order and shipping documents!).
- Wet cleaning of the exterior of all valves using compressed air, high-pressure or steam jets or aggressive cleaning media.
- Wet cleaning of the interior of valves not intended for this (obey the order and shipping documents!).

Information
Do not perform any actions in or make any changes to the component not authorized by us. This applies in particular to drive systems and mechanical or pneumatic components because this may result in revocation of the Declarations for EC directives, among other consequences.

1.4 Shipment contents

- ⇨ After receiving the shipment, use the shipping documents to check that the machine is complete and that the individual assemblies are present.
- ⇨ In the event of transport damage, the delivering transport manager is to be held liable in writing.
- ⇨ Missing parts are to be reported immediately to the manufacturer/delivery agent.

1.5 Documentation

The installation and operating manual is part of the product and an element of the shipment contents.

One copy of this manual must be made available at all times to the authorized personnel over the entire service life of the machine. Make sure that, for example, if the machine is resold, this manual is supplied with the machine.

We reserve the right to make changes for technical refinement with respect to the data and illustrations contained in this installation and operating manual.

Regardless of this manual, the laws, regulations, directives, provisions and standards applicable in the country of the user and at the location of use must be obeyed.

The text and illustrations correspond to the state of the technology when printed. Subject to change. We are always grateful for improvement suggestions and information on errors in the installation and operating manual.

1.5.1 Language and copyright

Translations have been made to the best of the translator's knowledge. We assume no liability for translation errors or the consequences arising from them, even if the translation was made by us or under contract to us.

The German text is and remains the governing factor for all liability and warranty claims. We expressly reserve all rights under the law by way of copyright.

1.6 Symbols used in this manual

The symbols used in this manual are to help you to utilize this manual and the device quickly and safely.

Information
Information segments provide you with knowledge about the most effective or most practical use of the device and of this manual.

⇨ **Actions**

The defined sequence of actions makes it easy for you to use the device correctly and safely.

✓ **Result**

Here you will find a description of the result of a sequence of actions.

[1] Item number

Item numbers in graphics are marked in the text using brackets **[ ]**.

1.6.1 Safety signs

The safety sign depicts a hazard source using pictures. The safety signs used in all technical documentation comply with ANSI Z 535.4 (Product Safety Signs and Labels).

The following symbols are used in this manual:

Pictogram	Description
	**Warning of a general risk** This warning sign indicates activities that may have several hazard causes.
	**Warning of a shear risk** This warning sign indicates activities that present a hazard of shearing extremities, possibly resulting in death.
	**Warning of a pinch point risk** This warning sign indicates activities that present a pinch point risk, possibly resulting in death.
	**Warning of a dangerous electrical voltage** This warning sign indicates activities that present an electric shock hazard, possibly resulting in death.
	**Warning of a hot surface** This warning sign indicates activities that present hazards due to hot surfaces.
	**Warning of a slipping risk** This warning sign indicates activities that present slipping hazards, possibly resulting in death.
	**Warning of suspended loads** This warning sign indicates activities that present hazards from falling objects, possibly resulting in death.
	**Warning of explosive materials** This warning sign indicates activities that present hazards from explosive materials, possibly resulting in death.
	**Warning of a pinch point risk** This warning sign indicates activities that present crushing hazards.

Pictogram	Description
	**Warning of** pressurized parts and media This warning sign indicates activities that present hazards due to pressurized parts and media.
	**Warning of a health risk** This warning sign indicates activities that present hazards due to skin contact with or swallowing of certain media.
	**Warning of an asphyxiation hazard** This warning sign is used around activities that present asphyxiation hazards.

1.7 Safety instructions – classification of signal words

The following risk levels are used in this manual to warn about potential hazardous situations and important safety codes:

Risk level	Description
DANGER	Warns about a hazardous situation that, if not avoided, will result in death or severe, permanent injuries.
WARNING	Warns about a hazardous situation that, if not avoided, may result in death or severe, permanent injuries.
CAUTION	Warns about a hazardous situation that, if not avoided, may result in slight or moderate injuries.
NOTICE	Warns about a situation that, if not avoided, may result in damage to property or the environment.
SAFETY INSTRUCTIONS	Describes operating procedures that are to be followed consistently, for example, shut down procedures in the event of malfunctions or emergencies.
ATEX	Identifies special specifications, rules and prohibitions for use in potentially explosive atmospheres. Compliance with these are mandatory or countermeasures are necessary to avoid the loss of the CE mark as per ATEX.

1.8 Structure of safety instructions

Warnings are structured as follows in this installation and operating manual:

Pictogram	**RISK LEVEL**
	Type and source of the risk! Consequences if ignored ► Risk-prevention action

1.9 Name plate

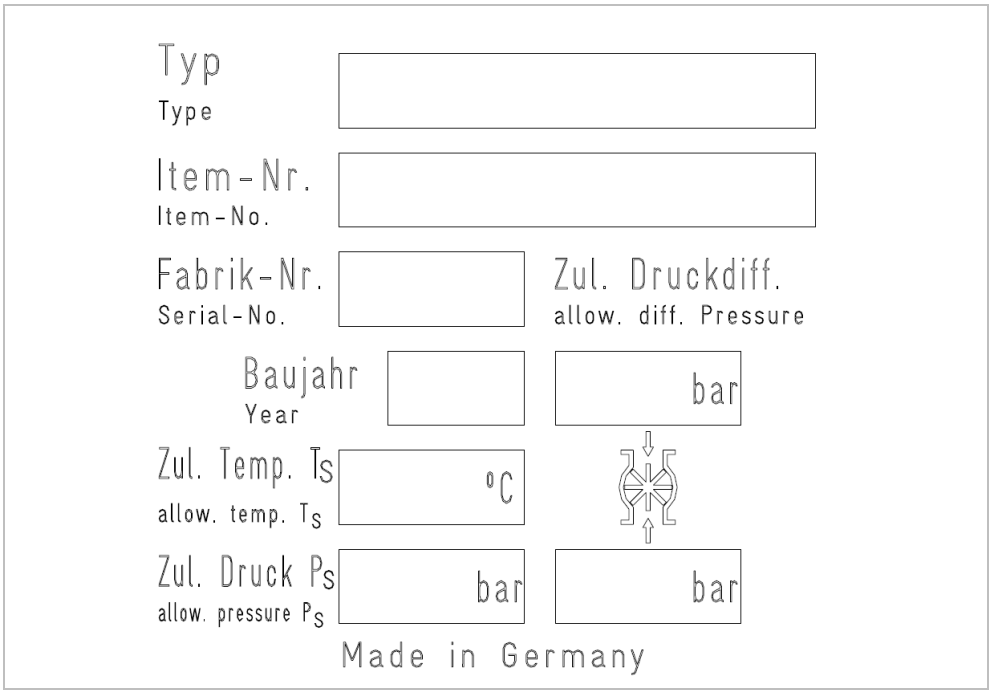


Fig. 1.1: Name plate

Information
The entire label has the status of a document and must not be changed or defaced.

For the allowable differential pressures from above or from below, please specify the differential pressures with respect to atmospheric pressure (0 barg).

⇨ Enter the data from the name plate into the following table:

Bezeichnung	Designation	Data
Typ	Type	
Item-Nr.	Item No.	
Fabrik-Nr.	Serial No.	
Zul. Druckdiff. ↓	Allow. differential pressure ↓	
Zul. Druckdiff. ↑	Allowable pressure difference ↑	
Baujahr	Year of construction	
Zul. Temp.	Allowable temp.	
Zul. Druck	Allowable pressure	

1.9.1 Type designation

Example: **ZR D 320. 1 – 16 – AC – DP40**

Housing type

Rotor type

Size

Design

Rotor capacity in liters

Material designator

Possible additional designation

1.9.2 Additional name plate for valves in the Ex zone

As per (DIN) EN ISO 80079-36:2016/12

Example: Valve as a protection system for use in a potentially explosive dust atmosphere with a permissible temperature of 60 °C.

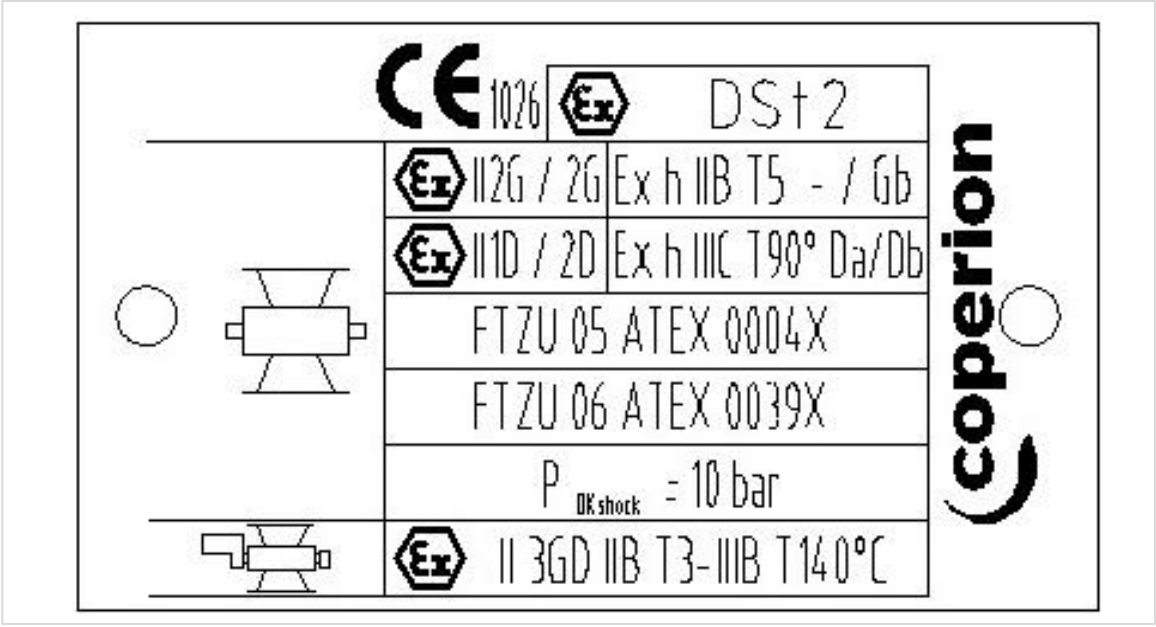
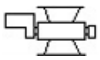


Fig. 1.2: Name plate, Ex zone

 = valves without accessories

 = valves with accessories as per order confirmation

	1026	=	Number of the monitoring, certified body (only for Equipment Category 1 and the protection system)
	D St2	=	Protection system for dusts of dust class St2 (only for the protection system, excluding metallic dusts)
	II- / 2G	=	Equipment category GAS inside / outside
	Ex h	=	Explosion protection of non-electrical operating facilities
	IIB	=	Gas subcategory
	T5	=	Temperature class for the standard design (60 °C valve)
	- / Gb	=	Gas equipment protection level (EPL) inside / outside
	II1D / 2D	=	Equipment category DUST inside / outside
	Ex h	=	Explosion protection of non-electrical operating facilities
	IIIC	=	Dust subcategory
	T90 °C	=	Maximum surface temperature for the standard design (60 °C valve)
	Da / Db	=	Dust equipment protection level (EPL) inside / outside
	FTZU 05 ATEX 0004X	=	Number, EC Type Examination Certificate for Equipment Category 1 (only for Equipment Category 1 and the protection system)
	FTZU 06 ATEX 0039X	=	Number, EC Type Examination Certificate for the protection system (only for the protection system)
	P ex shock	=	Explosion-pressure resistance of the rotary valve
	II3GD	=	Equipment category GAS/DUST outside
	IIB	=	Gas subcategory
	T3	=	Temperature class
	IIIB	=	Dust subcategory
	T140°C	=	Max. surface temperature

Depending on the permissible valve temperature, the maximum surface temperatures for gas in the range of T6 to T2 and dust are adjusted from T85°C to T250°C. The cited gas and dust subcategories apply regardless of the maximum surface temperatures.

1.9.3 Limits to use for operation in Atex zones

ATEX

Potentially explosive dust atmospheres:

$T_{max.} < \frac{2}{3} * T_{Ignition}$

$T_{max.} < T_{Smolder} - 75K$

$T_{max.}$ = maximum surface temperature (see the name plate)

$T_{Smolder}$ = Lowest surface temperature at which a 5 mm layer of dust will ignite (determined according to ISO/IEC 80079-20-2).
$T_{Ignition}$ = Lowest surface temperature at which the most easily ignitable mixture of dust with air (dust cloud) will ignite (determined according to (DIN) EN 50281-2-1)

Potentially explosive gas atmospheres:

Zone 0

$T_{max.} \leq 80\% \, T_{Ignition}$

Zones 1 and 2:

$T_{max.} \leq T_{Ignition} - 5 \, K \, (\text{for T3, T4, T5, T6})$

$T_{max.} \leq T_{Ignition} - 10K \, (\text{for T1, T2})$

$T_{max.}$ = maximum surface temperature (see the name plate)

$T_{Ignition}$ = Lowest surface temperature at which the mixture of gas and air will ignite

1.10 Safety labels on the valve

Label	Description
	This label warns against reaching into the inlet and outlet openings, which could result in the crushing or shearing of limbs and possibly even death.

Fig. 1.3: Warning label

Label	Description
	This label warns against reaching into the chain drive, which could result in the crushing or shearing of extremities and possibly even death.

Fig. 1.4: Warning label (with chain drive)

DANGER

Danger due to moving sharp parts!
May result in severe injuries or death.

► Only operate the valve when installed.

2 Packaging, transport and storage

2.1 Packaging

The machine was carefully packed to ensure sufficient protection during shipment.

Upon receipt, examine the packaging and the goods for damage. Damaged cables and connectors are a safety risk and must not be used.

If there is damage, do not put the machine into service.

In this case, please contact Coperion GmbH.

2.2 Transport

The machine is usually packed and shipped complete and ready for installation. Depending on local circumstances and the lifting equipment available, the machine is delivered disassembled into separate assemblies, depending on the contract. In this case, the assemblies are listed separately in the shipping documents.

2.2.1 Safety and personnel

To avoid life-threatening injuries and property damage during transport, you must keep the following points in mind:

- ⇨ Make sure that transport tasks are only performed by appropriately trained personnel in compliance with the safety instructions.
- ⇨ Keep in mind that protruding sharp edges may lead to injuries.
- ⇨ Never loiter under suspended loads.
- ⇨ Make sure that the transport route is closed off and secured so that no unauthorized persons can enter the hazard zone.
- ⇨ Make sure that the means of transport (overhead crane, crane truck, lifting truck) satisfies the local accident prevention regulations.
- ⇨ Comply with the valid national and regional directives and accident prevention regulations. This applies especially to directives with regard to hazards from transport and conveyance.
- ⇨ Keep the weight and the dimensions of the individual parts of the system in mind when selecting the means of transport.
- ⇨ Attach chains or cables to all suspension points of suitable load suspension gear.
- ⇨ The chains or cables must make as small an angle as possible with respect to the vertical.

2.2.2 Transporting the machine

During transport, avoid impacts and the formation of condensate arising from large temperature fluctuations.

⇨ Attach the transport covers on the inlet and outlet openings.

Information
When selecting the lifting equipment, load attachment points and lashing equipment, keep the total weight of the machine and the drive system in mind (see chapter *4 Technical data*).

DANGER

Danger due to improper transport!
People may be struck by parts of the machine. The machine may slide or overturn. Risk of severe injuries resulting in death.

- ► Only pick up the machine using the lifting eyebolts provided for this purpose. If the machine does not have lifting eyebolts, always sling it at the flanges.
- ► Move the machine to the place of use using a suitable means of transport!
- ► Use appropriate transportation securing devices during transport.
- ► Do not enter or loiter in the hazard zone.
- ► Never loiter under suspended loads.

Valve with lifting eyebolts

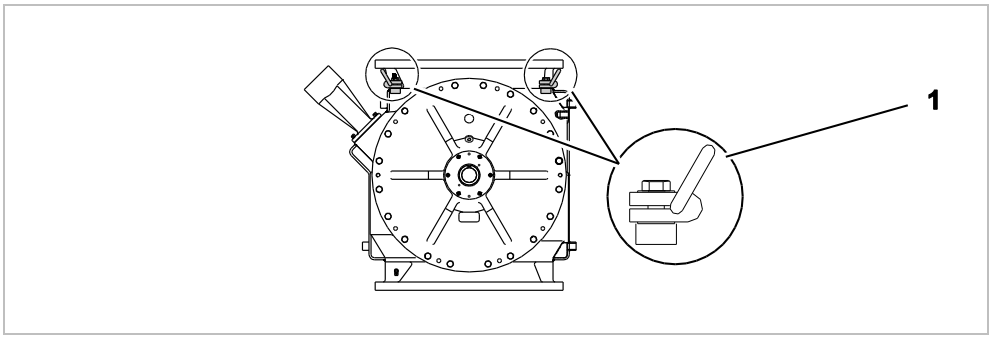


Fig. 2.1: Lifting eyebolts

⇨ Attach the machine to the crane using suitable lashing equipment at the lifting eyebolts **[1]** provided for this purpose.

Permissible fastening

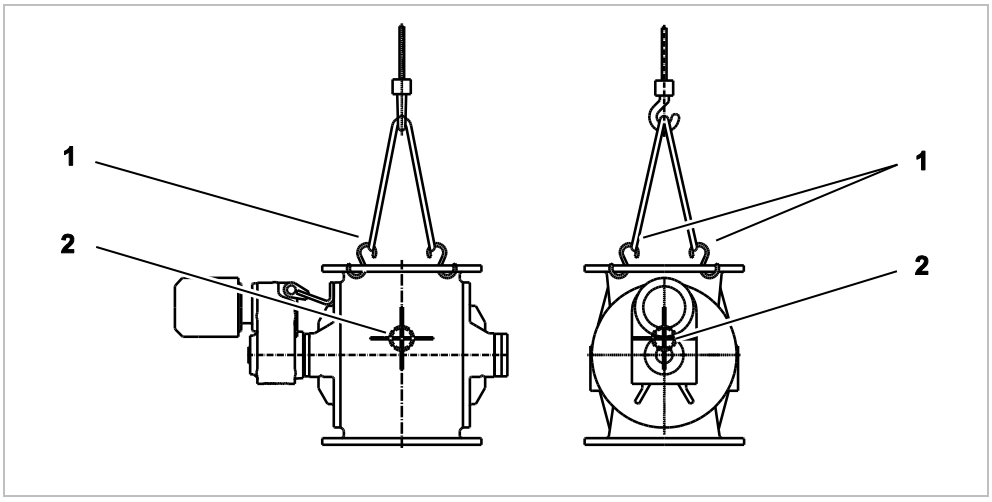


Fig. 2.2: Attachment point with four hooks for a rotary valve

⇨ Attach the machine to the crane at the inlet flange with suitable load attachment means **[1]** (for example, 4-sling lifting gear).

⇨ Pay attention to the center of gravity **[2]** of the machine!

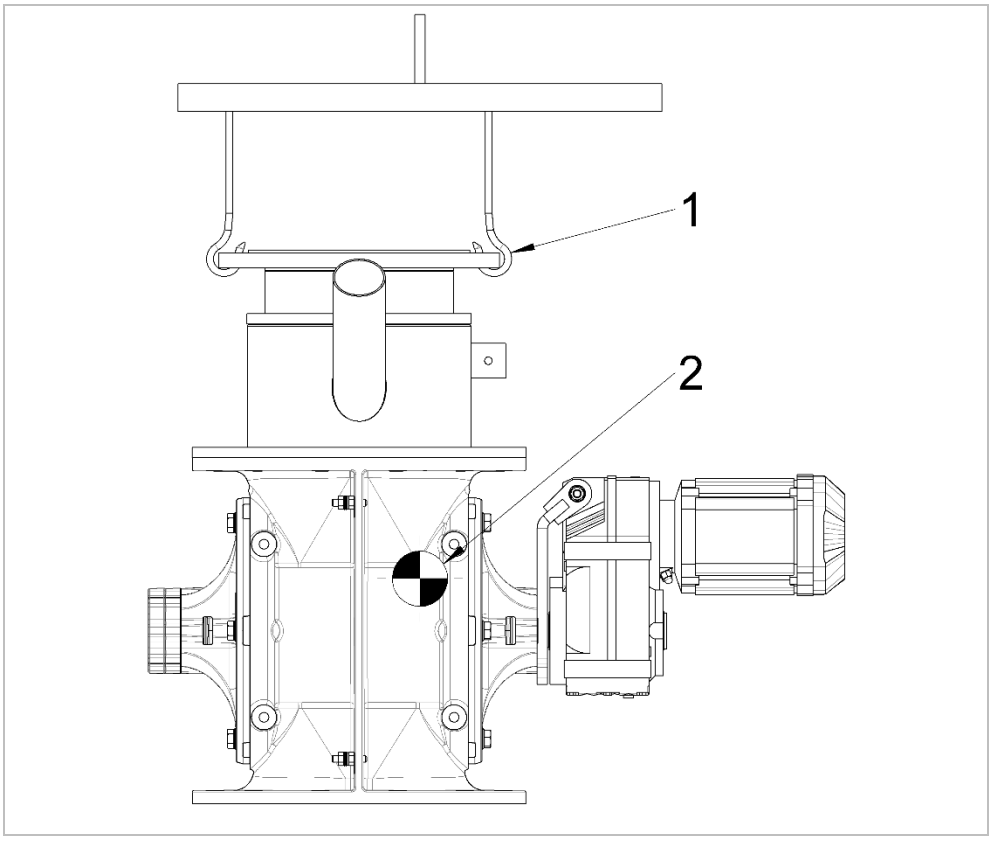


Fig. 2.3: Attachment point with crossbar for a rotary valve with leakage gas collector

⇨ Attach the machine to the crane at the inlet flange with suitable load attachment means **[1]** (for example, crossbar).

⇨ Pay attention to the center of gravity **[2]** of the machine!

Impermissible fastening

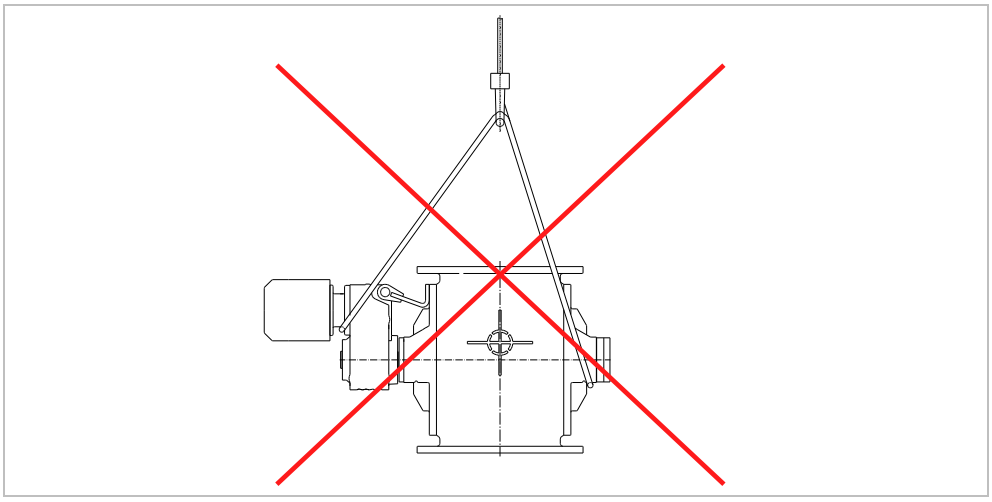


Fig. 2.4: Impermissible suspension points

NOTICE

Risk of damage to the machine
Suspending the machine on the hubs may severely damage it.

► Transport the rotary valve in accordance with the specifications.

2.3 Storage

If the machine is not to be installed and put into service immediately after unpacking, protect it against moisture and dirt.

To properly retain the quality and functional capability, perform the following actions:

- Storage up to 3 months

⇨ Store the machine under a roof in its original packaging or covered with UV-resistant film. All machine openings must be tightly closed.

⇨ Store the machine between -20 °C and 60 °C.

⇨ Prevent the formation of condensate.

- The machine is delivered with desiccant and appropriate packaging.

- Storage more than 3 months

⇨ Package the machine with desiccant so as to be airtight (for example, aluminum composite film) and evacuate the package. Store under a roof. Store the machine between -20 °C and 60 °C.

⇨ Inspect the package monthly for damage and loss of vacuum.

or

⇨ Store the machine in a dry building (relative humidity <50%) in its original packaging or covered with film.
All machine openings must be tightly closed.

- Actions after storing for more than 24 months

⇨ Prior to commissioning, perform maintenance for the 2-year maintenance interval in accordance with the maintenance and lubrication schedule.

3 Safety

Read the following safety instructions and information on safe operation carefully before starting work. Acquaint yourself with all functions. Keep this manual in a safe place and pass it on to others when necessary.
Understanding and obeying all sections on the topic of safety are very important for your safety.

On the topic of safety, read and obey

- Chapter *3 Safety*,
- the special warnings about hazardous actions,
- the safety data sheets at the workplace,
- the work instructions at the workplace.

Ignoring them may lead to a risk for the life and health of people, damage to the environment and/or extensive property damage.

Obeying the safety instructions helps prevent hazards and risks.

3.1 General safety instructions

⇨ General legal occupational safety statutes or directives, accident prevention regulations and environmental laws must be obeyed, for example, the German Occupational Health and Safety Regulations (BetrSichV) or the regulations applicable on a national basis.

⇨ Shut the machine down immediately if safe operation is no longer possible.

- Safe operation is, among other factors, no longer possible if
  - malfunctions in the control system result in uncontrolled movements,
  - the machine is blocked by a workpiece or another machine,
  - damage to parts of the machine is detected.

⇨ Obey IEC/EN 60079-14 (NEC for the USA) and the pertinent installation and operating specifications during installation or when operating electrical systems in potentially explosive atmospheres.

3.2 Intended use

The machine corresponded to the state of technology and satisfied the applicable safety regulations when it was put on the market for its intended use.

Neither the foreseeable misuse nor the residual risks could be eliminated by design without restricting the intended functionality.

The machine is designed:

- for discharging (from the solid, premeasured), (only discharge valves),
- for conveyance (from the solid/premeasured),
- for measurement (only discharge valves),
- for measuring conveyance,
- for pressure termination.

3.2.1 Application range:

- Rotary valve ZAQ, ZRD, ZRC, ZKD, ZKC, ZPD, ZPC, ZPH, ZAW, ZZB, ZZD, ZRT
  - Discharge valve for powdery products
- Rotary valve ZRX, ZKX, ZVX, ZPX
  - Discharge valve for fibrous products
- Rotary valve ZXD, ZXQ, ZDD, ZFD
  - Blow-through rotary valve for powdery products
- Rotary valve ZVH, ZVT, ZVB, ZVD, ZGM, ZGH, ZGB, ZVC, ZGD, ZVU
  - Discharge valve for pellet-like and coarse-grained products

The partially completed machine is only intended to be installed in other machines or in other partially completed machines or equipment or to be combined with such machines or equipment to together form a machine in the sense of this directive (Machinery Directive 2006/42/EG).

The machine can be erected and operated both in confined spaces as well as outdoors as long as the materials and electrical equipment are suitable for this.

Machines that have a defined equipment category according to ATEX may only be used in the corresponding ATEX protection zones.

You can find the operating conditions as per ATEX from the additional name plate of the machine *(*see chapter *1.9 Name plate).*

ATEX

Accessories for valves in ATEX zones must comply with the equipment category required there. If there are different equipment categories for the valves and accessories or between accessories, the valve may only be used for the lowest designated equipment category.

Every use that is not intended or all activities on the machine not described in this manual constitute forbidden misuse outside the legal liability limits of the manufacturer.

Information
Rotary valves are designed with a high degree of shape rigidity to ensure a narrow gap between the housing and the rotor. For this reason, the operating pressure is not the feature determining the design. For this reason, the Pressure Equipment Directive does not apply (classification in Article 1, para. (2) j, Directive 2014/68/EU).

3.3 Reasonably foreseeable misuse

The manufacturer assumes no responsibility for any misuse of the machine. In addition, any misuse voids all warranties provided by the manufacturer with the machine.

Misuse includes the following:

- Operating the machine with the protective equipment and/or warnings removed or disassembled.
- Using the machine for crushing products.
- Operating the machine under conditions other than those of the agreed technical data.
- Operating the machine with products classified as chemically unstable or as explosive.
- Operating the machine if it is not ensured that the bulk material below the valve flows away (congestion of the bulk material in the valve). For this reason, do not use reduced cross-sections below the valve.
- Operating the machine without bulk material if the pressure difference between the inlet and the outlet exceeds the differential pressure of 1 bar. (Heating due to compression of the gas)
- Maintenance or repair work that was not performed or performed incorrectly.
- Operating the machine with products classified as toxic.

3.4 Residual risks

The documentation refers to existing residual risks.

You can avoid existing residual risks by implementing and obeying these specifications on a practical basis:

- The special warnings on the machine.
- The safety instructions and warnings in this operating manual.
- The work instructions of the operator.

A risk of death or injury to people can occur at the machine through the following:

- Misuse
- Improper handling
- Transport
- Missing protective equipment
- Defective or damaged components
- Handling or use by personnel who are not trained or instructed

Property damage to the machine can occur through the following:

- Improper handling
- Noncompliance with operating or maintenance specifications
- Unsuitable operating supplies

Property damage to other assets in the operating area of the machine can occur through the following:

- Improper handling

Constraints on the performance or functionality of the machine can occur through the following:

- Improper handling
- Improper maintenance or repair
- Unsuitable operating supplies

3.4.1 Thermal risks

⚠ CAUTION

Risk due to hot surfaces, hot product and/or hot air streams!
Risk of burns or being startled due to hot media!

- ► Let the machine cool down.
- ► Wear personal protective equipment.
- ► Provide protection against contact.

3.4.2 Mechanical hazards

- Pinch point injuries, crush injuries or impacts may occur due to inattention or negligent use of personal protective clothing.
- At the machine, there is the risk of unexpected malfunctions coming from damage to machine components, a failure or a malfunction of the control system.

DANGER

Danger from moving and/or rotating parts!
When the machine is running, there is a risk of injury or death due to entanglement, crushing or the shearing of extremities!

- ► Do not reach into moving or rotating parts during operation.
- ► Make sure that moving parts are not accessible during operation.
- ► Do not wear loose clothing, jewelry or uncovered long hair.
- ► Before performing any work on moving components, switch off the machine and secure it against being switched on again. Wait until all components come to a stop.

CAUTION

Risk of a cut injury!
Sharp surfaces, edges and corners of the machine may produce a cut injury!

- ► Wear personal protective equipment.
- ► In the event of injuries, see a doctor immediately.

You must comply with the following measures:

- There is a risk of shearing, crushing and entanglement by the unprotected drive mechanisms during installation, commissioning and when changing settings.

⇨ A second person must not be present in the hazard zone during these activities.

⇨ You may only open/remove covers for the duration of maintenance and repair work and these covers must be installed or closed properly during operation.

⇨ Keep hands, hair, pieces of clothing and tools away from moving parts such as the chain drive and shafts.

⇨ Do not reach into the area around moving parts or into rotating drive parts.

3.4.3 Electrical hazards

DANGER

Danger due to electrical voltage!
When working on live components, electric shock presents a danger to life!

- ► Only trained and qualified electricians or instructed personnel under the direction and supervision of an electrician in accordance with electrical rules may perform any work on the electrical equipment of the machine.
- ► Keep the 5 safety rules for working on electrical systems in mind: Disconnect; secure against reconnection; make sure no voltage is present; ground and short circuit; cover or cordon off adjacent live parts.

WARNING

Risk of explosion from open ignition sources!
Generating an arc that causes a flame may result in fires or explosions!

- ► Disconnect electrical connectors only with the equipment powered off.

DANGER

Risk of explosion!
Sparks generated by electrostatic discharge in rooms at risk of fire and explosions.

- ► All machinery is equipped with grounding bolts or lugs that must be connected.

You must comply with the following measures:

⇨ Inspect electrical equipment regularly. Tighten loose connections and replace damaged wires or cables immediately.

- There is an electrical hazard when working on the machine.
  - This arises through direct contact with live parts or parts that have become live due to faults.
- When working on live parts, wires or cables, a second person must always be present who, in the event of an emergency, switches off the master switch.
- Never clean electrical equipment with water or similar liquids.
- Before starting work, check all insulation for damage.

⇨ Before starting work, switch off the system at the master switch, check that no voltage is present and secure the system against being switched on again.

⇨ Use only insulated tools!

3.4.4 Hazards from gas, dust, fumes, steam, smoke

DANGER

Risk of explosion from dust deposits and/or escaping gas!
Dust deposits in a layer > 5 mm and/or escaping gas may ignite on hot surfaces and result in fires or explosions!

- ► Clean the machine regularly such that no dust is dispersed.
- ► Make sure that the maximum surface temperatures of operating materials and components are not exceeded in areas presenting a hazard of dust explosions or the allowable temperature class in areas presenting a hazard of gas explosions.
- ► Check the machine regularly for dust or escaping gas. Pay special attention to the areas around the shaft bearings.
- ► When opening or dismantling the machine, make sure that neither dust nor gas escapes.

DANGER

Asphyxiation hazard from gases and vapors!
There is an asphyxiation hazard when components are used in confined spaces where gases and vapors displace air!

- ► Make sure that enough fresh air is supplied.

WARNING

Danger of lung damage and/or eye injury due to dust!
Whenever working on or with the components, dust may be dispersed and may lead to eye injuries and/or to lung damage if inhaled.

- ► Wear personal protective equipment (suitable filter mask, safety goggles, etc.).
- ► Vacuum up the dust, collect it, etc.

3.4.5 Pneumatic system, steam

⚠ CAUTION

Risk from pressurized parts and media!
When working on pressurized lines or components, the pressurized media may escape suddenly. The escaping media may cause injuries or the uncontrolled movement of components!

- ► Before starting repair work, release the pressure from those system sections or pressure lines (compressed air) to be opened.
- ► Only qualified personnel may work on pressure lines!
- ► Repair damage to lines, hoses and screw connections immediately!
- ► Wear personal protective equipment (appropriate safety goggles, protective gloves).

3.4.6 Oils, greases and other chemical substances

⇨ When handling oils, greases and other chemical substances, obey the safety rules that apply to the product!

- For information, see the *Safety data sheet of the hazardous material*.

⚠ CAUTION

Health risk!
Oils, greases and other chemical substances may cause health damage in the event of skin contact or if swallowed.

► Wear personal protective equipment (appropriate safety goggles, protective gloves).

► In the event of skin contact or if swallowed, institute immediate life-saving measures according to the safety data sheet.

NOTICE

Environmental pollution by oils, greases and other chemical substances!
Pollutants (such as oil) can contaminate soil or ground water!

► Retain, bind and properly dispose of pollutants.

⇨ Machine parts leaking pollutants (oil, grease, etc.) must be repaired immediately and resealed.

⇨ Retention basins for pollutants must be kept free of parts that reduce the retention volume. These retention basins must not have drains.

⇨ You must comply with the inspection intervals given in the maintenance schedule for checking and servicing polluting machines (for example, oil tanks).

⇨ Record the maintenance measures or machine changes to polluting equipment in a plant and equipment register.

3.5 Additional specifications relevant for explosion protection

Accessories for valves in ATEX Protection Zones must comply with the equipment category required there.

If there are different equipment categories for the valves and accessories or between accessories, the valve may only be used for the lowest designated equipment category.

Within the framework of requirements of the EC Directive 2014/34/EU (ATEX) for the use of nonelectrical equipment in potentially explosive atmospheres, Coperion GmbH performed a risk analysis. This risk analysis covered potential ignition sources during normal operation as well as potential ignition sources resulting from predictable faults. In the event of gas zones, appropriate gas alarm systems are to be provided in accordance with the protection considerations for the system as per EN ISO 80079-36.

ATEX

In this analysis, the hazard sources to valves with their potential ignition sources were considered.

The countermeasures to be considered are contained in the following chapters and are appropriately marked (see Chapter 1.7 Safety instructions – classification of signal words).

3.6 Noise data

Information
No changes that result in an increase of the noise emissions may be made to the machine.

- The sound pressure level L_{pA} is less than 70 dB (A), as per EN ISO 3747 and at a measuring distance of 1 m, when operating without pressure and without product throughput. It is not possible to provide data on the noise produced when the valve is integrated into the system under the operating conditions of the system (for example, bulk material, working pressure).
- During operation, noises may be created by gas expansion and product-related operating noises. In this case, sound pressure levels L_{pA} exceeding 95 dB (A) may occur. If necessary, a separate acoustic assessment is required.

CAUTION

Risk of hearing damage!
During operation, noises may be created by gas expansion and product-related operating noises. Sound pressure levels L_{pA} exceeding 95 dB(A) may occur and may lead to hearing damage.

- ► Wear personal protective equipment.
- ► Provide sound insulation.

3.7 Personnel – qualifications and duties

Only authorized personnel may perform any activity on the machine.

Authorized personnel must:

- Be at least 18 years of age.
- Know and be able to apply the accident prevention regulations and safety instructions for the machine.
- Be trained and instructed in the rules of behavior in the event of a malfunction.
- Have the physical and mental abilities to carry out his responsibilities, tasks and activities on the machine.
- Be trained and instructed with regard to his responsibilities, tasks and activities on the machine.
- Understand and be able to implement on a practical basis the technical documentation with regard to his responsibilities, tasks and activities on the machine.

Obey the following instructions:

⇨ Become familiar with the machine and your work area.

⇨ Use the machine only for its intended purpose.

⇨ Use suitable lifting equipment for transporting and attaching heavy accessories.

⇨ Wear your protective equipment, for example, appropriate safety shoes and hearing protection.

⇨ If defects are found on the safety equipment or if any other defects are found, report this to the responsible personnel immediately.

⇨ Obey the following signs and instructions attached to the machine:

- Safety signs.
- Health hazard signs.
- Safety instructions.

3.7.1 Personal protective equipment

All items of the personal protective equipment must be worn for all activities described in this manual on and in the area of the machine.

These include:

- Appropriate safety shoes
- Appropriate protective gloves
- Appropriate hearing protection
- Reflective clothing
- Appropriate safety goggles

Obey the applicable national and local regulations and provisions on personal protective equipment (e.g. hard hat).

3.8 Switching on the machine

SAFETY INSTRUCTIONS

- ► Make sure that there are no people in areas of the machine presenting a risk of injury.
- ► Check to see that the machine is in proper, undamaged and complete condition. Never put the system/machine into operation in a damaged or defective condition.
- ► Check whether all wear parts are in ready to operate condition. Immediately replace worn components or those with other defects.
- ► Check whether the machine is correctly installed and secured.
- ► Never try to operate the machine with the inlet or outlet accessible.
  There is the risk of severe injuries from flying product or shearing of a body part by the rotor!
- ► Operate the machine only with the protection and safety equipment installed!
- ► Never try to operate the machine with the quick cleaning device open.

3.9 Directives for repair, servicing, and maintenance work and in the case of malfunctions

SAFETY INSTRUCTIONS

- ► Perform the prescribed installation, maintenance and inspection work on schedule.
- ► Only trained and qualified electricians may work on electrical machines.
- ► Switch off the master switch and secure it against being switched on again.
- ► Secure service media, such as voltage and compressed air, against being switched on again unintentionally.
- ► All bolts removed for maintenance or inspection work must be retightened using the specified torque and must be checked before recommissioning the machine.
- ► After completing the maintenance or inspection work, check that the safety equipment is operating properly.

4 Technical data

4.1 Characteristics

You can find the characteristics of the valve in chapter *1.9 Name plate*.

4.2 Operating data

Valve type	**ZRD, ZRC, ZRX, ZKD, ZKC, ZKX, ZVD, ZVC, ZVX, ZVB, ZGM, ZPD, ZPC, ZPX, ZGB, ZGD**		**ZXD ZDD ZFD**	**ZVT ZRT**	**ZXQ ZAQ ZVH ZPH ZGH**	**ZVU ZAW ZZB ZZD**
Design	Valve for universal application	Pressure-type rotary valve	Pressure-type rotary valve	Pressure-type rotary valve	Pressure-type rotary valve	Special valve
Allowable pressure	See the name plate					
Allowable pressure difference from above						
Allowable pressure difference from below						

4.2.1 Ambient conditions

The ambient temperature for rotary valves without accessories is between -10 °C and 40 °C. Deviations specific to the order are possible ⇒ See order documentation, including order confirmation.

ATEX

In the case of valves for use in potentially explosive atmospheres (as per ATEX), the maximum surface temperature or the temperature class is specified on the name plate.

4.3 Dimensions, nominal values

- All weight information (in kg) refers to the machine with drive and without attachments.

Information
See the vendor documentation for information about the weights of the accessories.

Valve type	Material	Size									
		150	200	250	320	400	480	550	630	700	800
ZRD, ZRC, ZRX, ZRT	AC	50	75	100	155	245	405	545	765	1170	
	GG, SS	70	110	155	245	405	675	910	1335	1965	
ZKD, ZKC, ZKX	AC		80	105	160	245	415	565	790		
	GG, SS		120	170	265	425	700	965	1415		
ZKD, ZKC, ZKX > 220 °C	GG, SS		170	230	345	510	805	1065	1490		
ZVH, ZGH, ZVT, ZPH, ZVU	AC		105	160	240	335	485	680	1010		1995
	GG, SS		135	205	305	440	665	930	1375		3495
ZVH, ZGH, ZPH > 220 °C	GG, SS		190	280	400	530	765	1025	1445		
ZVB, ZGB, ZGM	AC		80	105	160	255	410	565	780		1865
	GG, SS		105	145	225	365	595	780	1220		2845
ZVB, ZGB, ZGM > 220 °C	GG, SS		150	200	295	440	685	860	1285		
ZVD, ZVC, ZVX, ZGD	AC		80	105	160	255	410	565	780		1865
	GG, SS		120	165	250	420	680	950	1220		3455
ZVD, ZVC, ZVX, ZGD > 220 °C	GG, SS		170	225	325	505	785	1045	1285		
ZDD	AC		80	105	160	245					
	GG, SS		120	170	265	425	700	965	1415		
ZFD	SS		125	175	265	445					
ZPD, ZPC, ZPX	AC		80	105	160	255	410	565	780		
	GG, SS		120	165	250	420	680	950	1220		
ZPD, ZPC, ZPX > 220 °C	GG, SS		170	225	325	505	785	1045	1285		
ZVH L	AC							815	1190		
ZVD L, ZVC L	AC								955		

Valve type	Material	Size									
		150	**200**	**250**	**300**	**350**	**400**	**500**	**600**	**700**	**800**
ZXQ	SS				335	560	675	1035	1780	3030	
	AC										3000
ZAQ	AC				205			660	990	1830	
	SS				335			1135	1730		
ZAW	SS							1315	2270		
ZXD	AC	70	100	135	210	305	405				
	GG, SS	90	135	195	315	485	675				

Valve type	Material	Size									
		80	**100**								
ZZB, ZZD	SS	12	25								

Information
Comprehensive material designations:
GG = GC = CC = NN
SS = SC
AC=AL

4.4 Rotational speeds

Valve type	Rotational speed [rpm]	Size									
		150	200	250	320	400	480	550	630	700	800
ZRD, ZRC, ZRX, ZKD, ZKC, ZKX, ZVD, ZVC, ZVX, ZVB, ZVT, ZDD, ZPD, ZPC, ZGD, ZGB, ZVH, ZGH, ZPH , ZVU, ZFD, ZPX, ZRT	min [1]	6,4	4.8	38	3	2.4	2	1.8	1.5	1.4	1.2
	max [2]	127	95	76	59	47	39	34	30	27	23
	max [3]	90	75	60	45	38	32	28	24	22	19
	max [4]	70	70	50	50	35	35	25	25		
ZGM	min [1]		1	0.8	0.6	0.5					
	max [2]		45	45	35	35					

Valve type	Rotational speed [rpm]	Size									
		150	200	250	300	350	400	500	600	700	800
ZXD, ZXQ, ZAQ, ZAW	min [1]	6	5	4	3	3	2	1.8	1.5	1.3	1.2
	max [2]	115	90	73	57	50	43	36	30	25	23
	max [3]	80	70	60	46	40	35	29	24	21	18
ZXD	max [4]	50	50	50	36	36	36				
ZXQ	max [4]						36	30	30	25	

Valve type	Rotational speed [rpm]	Size								
		80	100							
ZZB, ZZD	min [1]	6.0	6.0							
	max [2]	200	160							
	max [3]	200	160							
	max [4]	-	-							

[1] Underrunning the minimum rotational speed is permissible in individual cases after discussions with Coperion GmbH.

[2] Overrunning the maximum rotational speed is permissible in individual cases after discussions with Coperion GmbH for use in atmospheres that are not potentially explosive.

ATEX

[3] Maximum rotational speeds for valves designated for use in areas that are potentially explosive.

The max[2] rotational speeds may also be used, accepting a reduction of the bearing life by 25%.

→ See the maintenance schedule, Chapter 10.1

ATEX

[4] Maximum rotational speeds for valves designated as a protection system as per ATEX.

5 Description

5.1 Operation and structure

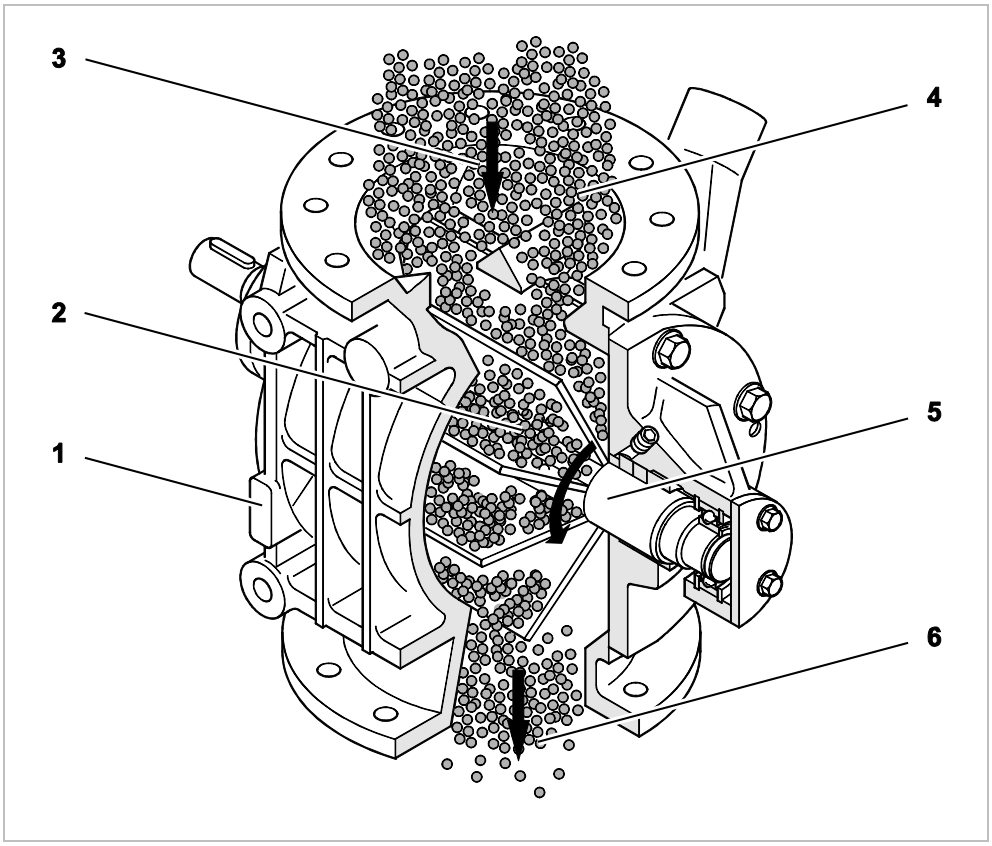


Fig. 5.1: Operation (shown schematically)

Inside the rotary valve **[1]**, a rotor **[5]** with radial blades rotates in a cylindrical housing. The rotation causes individual chambers **[2]** to be filled with product **[4]** one after another by way of the inlet **[3]** and emptied by way of the outlet **[6]**. The product is metered by volume, the amount of material conveyed essentially depends on the rotational speed of the rotor.

5.2 Optional accessories

To provide the optimum match of the valves to the application, the valves are delivered with optional accessories if desired.

Information
You can find precise data on the valve design and accessories in the order and shipping documents.
You can find information on handling the accessories in chapter *6 Installation* or in a separate manual.

6 Installation

6.1 General conditions

- ⇨ Make sure that the foundation can support the weight including the accessories. Check the permissible floor loading.
- ⇨ Make sure to comply with the prescribed tightening torques.
- The system where the rotary valve is installed must have a minimum clearance of 0.85 m for the cleaning and inspection openings to the valve or be equipped with a broken-wire interlock safety switch.
- The valve may only be installed on the lower flanges, upright on the feet or suspended on the upper flange.
- ⇨ **Pay attention to the application ranges and intended use.**
- ⇨ Do not use the rotary valve or its accessories as steps!
- ⇨ Install the rotary valve without mechanical stress. Compensate the forces of containers and pipes using expansion joints.
- ⇨ The flange areas of the valve must be horizontal.
- ⇨ The valve must be removable without additional cranes or scaffolding at all times. Sufficient space must be provided for maintenance and repair work in accordance with the dimensional data sheet.
- ⇨ Pay attention to the direction of rotation **[1]** of the rotary valve.
  - Flow through the ZXD 350/400 and ZXQ blow-through rotary valves must follow the flow direction arrow **[2]**.

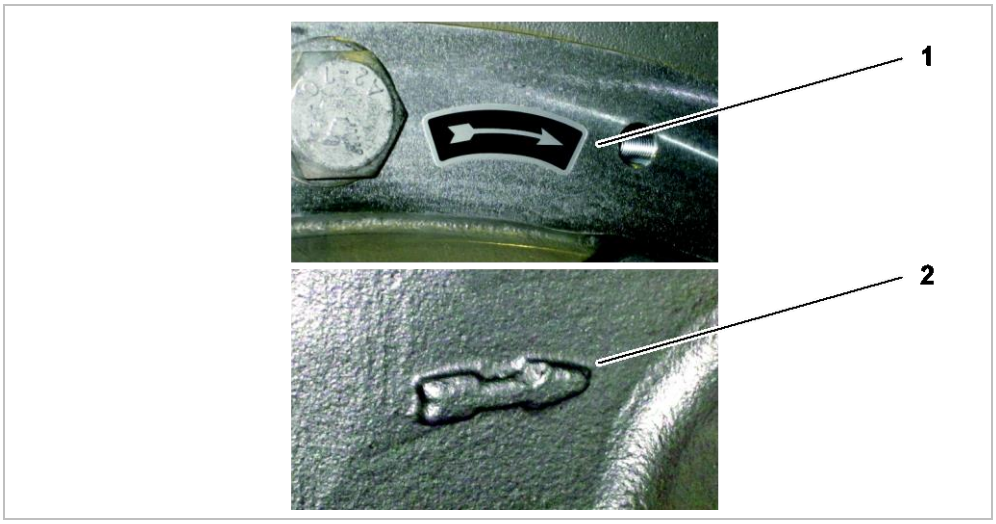


*Fig. 6.1: Direction of rotation arrow **[1]** and flow direction arrow **[2]***

- ⇨ Special provisions apply in rooms at risk of fire and explosions, so obey the appropriate national and international specifications.

Information

The grounding bolts are attached to the housing and marked with ⏚.

ATEX

In the case of valves for use in potentially explosive atmospheres (as per ATEX), there is an explosion risk due to sparking.

► The operator is to attach collision protection.

ATEX

In DP 60 version valves (with ceramic liner) for use in potentially explosive atmospheres (as per ATEX), there is an explosion risk due to propagating brush discharges.

► The drop height of the product must not exceed 3 m.

► If necessary, plan for baffle plates to slow down the product.

6.2 Preparatory actions

DANGER

Danger due to heavy load
The machine may fall down; there is the risk of injury or death.

► When loading by crane, pay attention to the suspension points and the operating weight of the machine.

► Do not enter or loiter in the hazard zone.

⇨ If the rotary valve has not been equipped with a drive system at the factory, this system must be attached before installation. You can find the information required for this in the separate documentation provided by the drive system manufacturer.

⇨ Remove all transport covers immediately before installation.

⇨ Check the rotary valve condition for the following:

- Damage
- Contamination
- Corrosion.

⇨ Check the interior of the valve and make sure that no foreign bodies are inside.

⇨ Check the contact surface of the mounting flange:

- complete flange contact **[1]** is possible (there is no bending moment);
- if this is not the case **[2]**, coordinate further actions with Coperion GmbH.

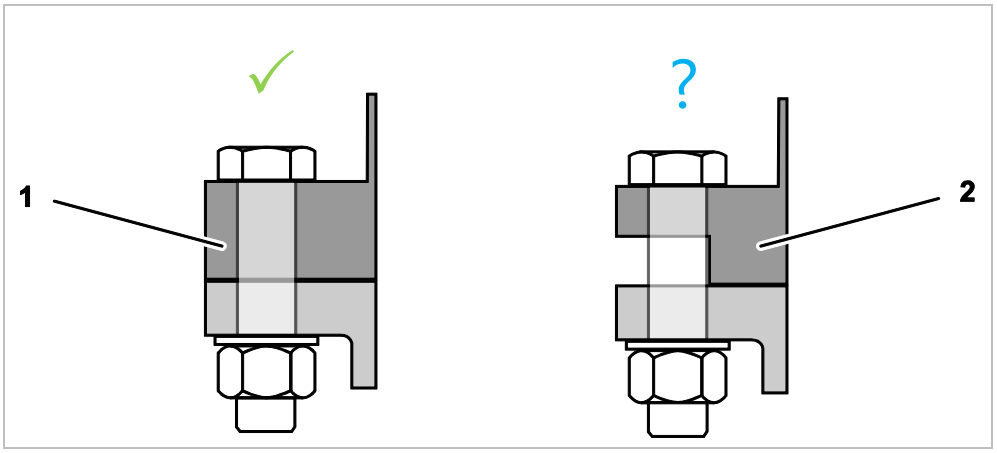


Fig. 6.2: Flange contact

WARNING

Risk of a cut injury!
Sharp surfaces, edges and corners of the housing bore and rotor blades may produce a cut injury!

- ► Wear personal protective equipment.
- ► In the event of injuries, see a doctor immediately.

Information
If there is damage and/or corrosion, coordinate further actions with Coperion GmbH.

6.2.1 Insulation

Insulating the valve is recommended when processing products at over 60 °C and when installed outdoors unprotected against wind or rain (driving rain) or if outdoor temperatures drop below -20 °C. At the same time, the insulation serves as a protection against burns.

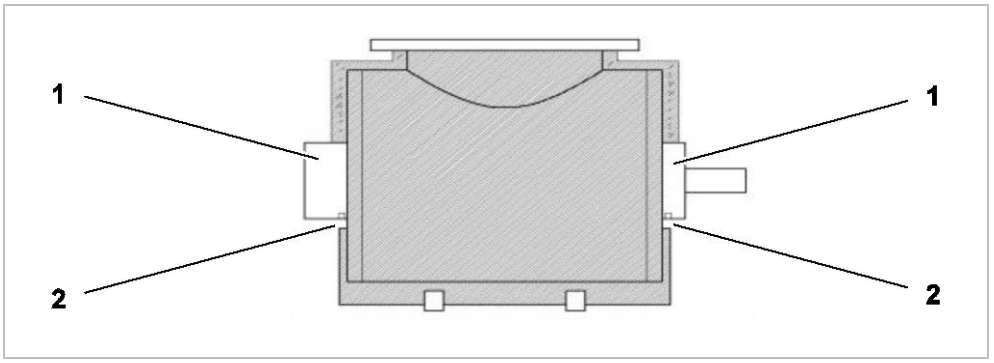


Fig. 6.3: Valve insulation

⇨ To provide sufficient insulation, cover with 80 – 100 mm of glass wool or an equivalent layer of insulation.

- Do not insulate the bearing area **[1]**.
- Product spillage at the fall-out opening **[2]** must be visible.

6.2.2 CIP valve, ZZB valve

⇨ Weld the adapting pipe into the pipeline before installing the valve. Keep the following in mind here:

- Before welding, dismantle the adapting pipe from the valve.
- Choose a suitable welding process.
- Refinish the weld in accordance with the requirements of the operator.

6.2.3 USDA valve

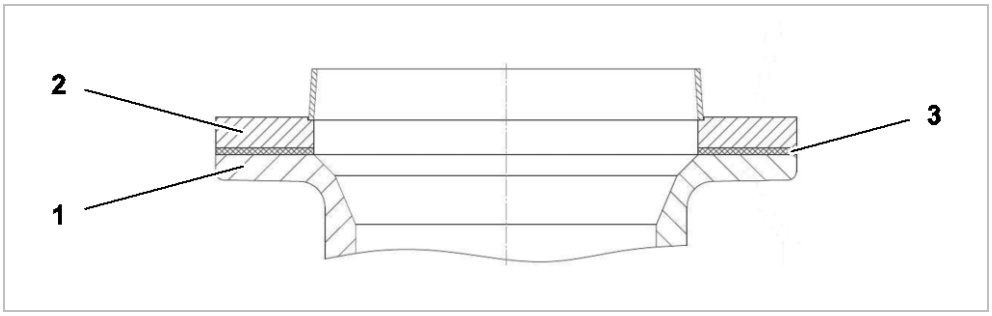


Fig. 6.4: Connection, USDA valve

⇨ Make sure that the inner diameter of the flange connections **[2]** provided by the customer is equal to that of the valve connection flange **[1]** .

⇨ Center the gasket **[3]** during installation.

⇨ Cut off any thread remaining on the grounding bolts.

⇨ Cut the connecting cable to the minimum length needed.

6.3 Connection

⚠ WARNING

Danger due to improper connection!

- ▶ Make sure that all connections – cables, hoses and lines – are routed so that they do not present tripping points!
- ▶ Make sure to comply with the prescribed bending radii when routing cables, hoses and leads!
- ▶ Make sure to comply with the specified configuration as per the connection diagram when connecting cables, hoses and leads!
- ▶ When connecting the cables, hoses and leads, check for the completeness and tight seating of all connections!
- ▶ Keep in mind that cables, hoses and lines that are not connected or incorrectly connected may result in malfunctions that jeopardize the safety of the operating personnel.

6.3.1 Electrical connections

DANGER

Danger due to electrical voltage!
When working on live components, electric shock presents a danger to life!

- ► Only trained and qualified electricians or instructed personnel under the direction and supervision of an electrician in accordance with electrical rules may perform any work on the electrical equipment of the machine.
- ► Keep the 5 safety rules for working on electrical systems in mind: Disconnect; secure against reconnection; make sure no voltage is present; ground and short circuit; cover or cordon off adjacent live parts.

- ⇨ Inspect the proper electrical installation in accordance with the provisions of the customer and the locale.
- ⇨ A disconnecting device that can be locked must be installed near the machine. In this way, the valve can be secured against being switched on unintentionally during maintenance work.
- ⇨ Connect all provided grounding connections.
- ⇨ Inspect and commission the gear motor in accordance with the specifications of the motor manufacturer.
- ⇨ Protect the gear motor against overheating due to overload, not starting, a short circuit or 2-phase operation using monitoring equipment.
- ⇨ Before connecting the gear motor electrically, compare the existing power line voltage and frequency with the values specified on the rating plate of the gear motor.

6.4 Connection specifications of the accessories

Information
If the rotary valve is constructed to be explosion-pressure burst-proof, the accessories and connected parts are also to be correspondingly implemented to be explosion-pressure burst-proof. Pay attention to the supplied documentation!

6.4.1 Direct drive (depending on design)

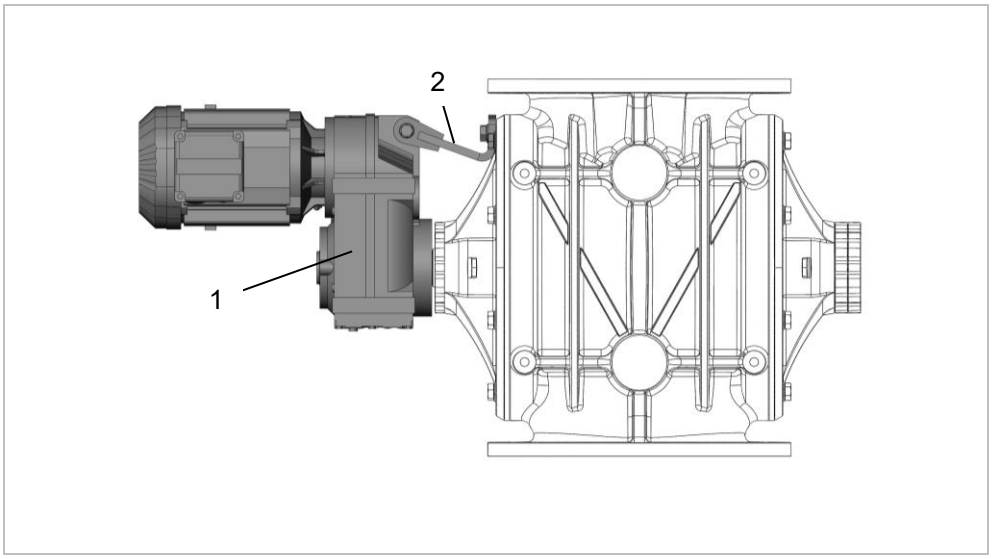


*Fig. 6.5: Direct drive on .1 design (torque support **[2]**)*

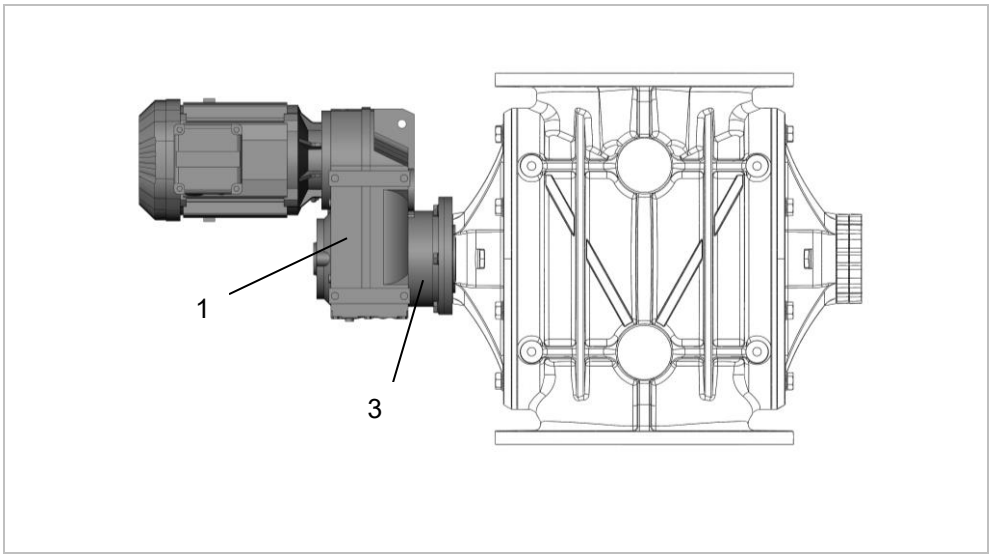


*Fig. 6.6: Direct drive on .2/.3 design (flange drive **[3]**)*

The direct drive **[1]** is a direct shaft-mounted drive system.

Information
If optional accessories are to be used, the instructions and specifications for installation, operation, servicing, and maintenance must be found in the vendor documentation.

Information
Using a variable frequency drive, the metered volume flows can be adjusted to the needed accuracy by changing the rotational speed (especially in metering rotary valves).

NOTICE

Damage to the machine by overheating the gear motor!
Overheating caused by operation on the frequency converter primarily at low speeds and in small rooms.

- ► Provide for adequate cooling, using a separate fan if necessary.
- ► Allow for adequate cool-down phases.
- ► Install temperature monitoring using thermistors.

6.4.2 Chain drive

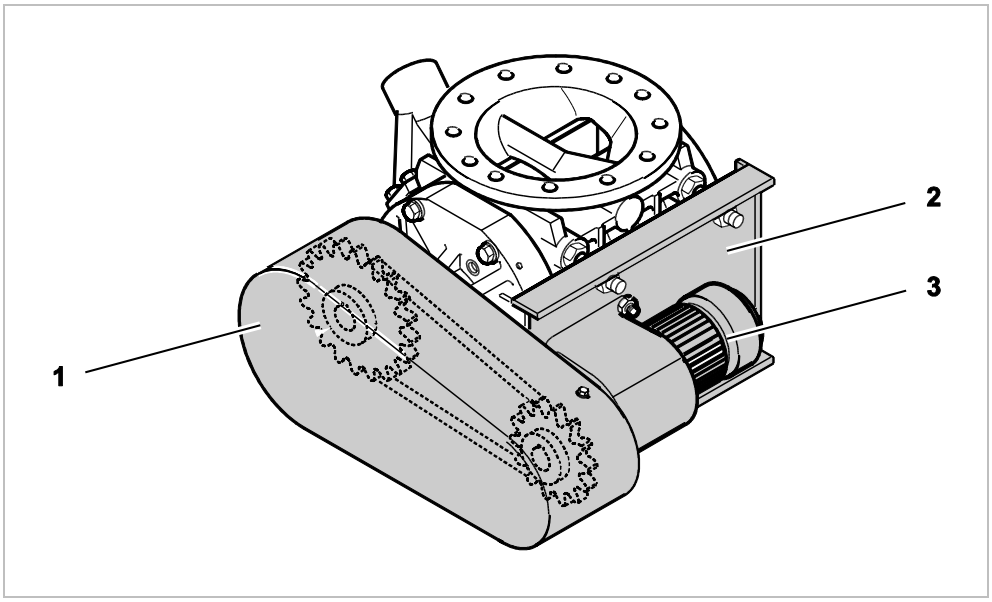


Fig. 6.7: Chain drive

The chain drive is a drive system using a top-drive chain. This consists of the gear motor **[3]** itself, the motor plate **[2]** for mounting to the valve housing, the chain drive and the chain box **[1]**.

Information
If optional accessories are to be used, the instructions and specifications for installation, operation, servicing, and maintenance must be found in the vendor documentation.

6.4.3 Gas purging for the shaft seal

Available for the following valve types as an option:

- **ZXD, ZRD, ZRC, ZRX, ZKD, ZKC, ZKX, ZVD, ZVC, ZVX, ZPD, ZPC, ZPX, ZFD, ZZB, ZZD, ZDD**
- **ZXQ, ZAQ, ZAW, ZVT, ZRT**

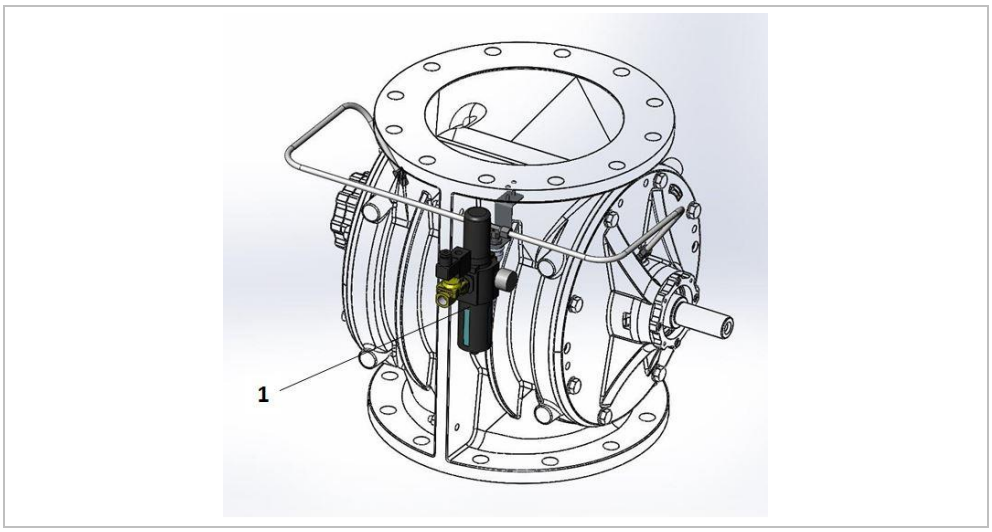


Fig. 6.8: Gas purge for the shaft seal

- Gas purging to protect the shaft seal is used for
  - Bulk materials with a large portion of fine grains
  - Powders
  - Pressure difference between the inlet and outlet:
  - Hygienic applications.
- It consists of the piping for the two purge-gas connections and, optionally, a filter regulator and solenoid shut-off valve **[1]**.

ATEX

Hazards from potential ignition sources of the drive unit!
Possible heating of the bearing area.

► Pay attention to the actions in the following warning.

NOTICE

Risk of damage to the machine
During operation, the conveyed material may penetrate into the area of the labyrinth ring (hub area/shaft channel on the side cover). This can lead to damage of the shaft seals and/or a reduction of the gap between the rotor and side cover resulting in mechanical damage. In addition, this can lead to heating of the bearing area.

- ► Switch on the gas purge.
- ► You must comply with the prescribed purge gas pressure regardless of the purge gas volume.
- ► Keep pressure losses due to piping components in mind.
- ► Design the main system supply according to p_1 and V_{max}.

ATEX

Hazard from gas escaping at the seals!
Risk of explosion.

- ► If flammable gases are handled inside the valve, the gas purge must be operated with inert gases such as nitrogen. The operation of the gas purge must be monitored in accordance with EN ISO 80079-37 Table 1. For a gas purge using air, it must be ensured that the lower explosion limit of the gas (LEL) is not exceeded.

Information
The gas purge control must be designed in such a manner that gas purge is always in operation when positive pressure is present in the housing and / or when there is a product in the housing.

If several rotary valves are connected in series, the gas purge must be active even if only one of the rotary valves is operating.

A permanently excessive purge gas pressure exceeding the specifications leads to increased wear of the shaft seal and can have a negative effect on the delivery rate.

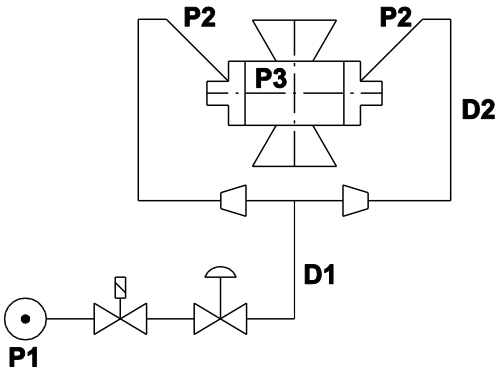
Connection specifications:

- **ZXD, ZRD, ZRC, ZRX, ZKD, ZKC, ZKX, ZVD, ZVC, ZVX, ZPD, ZPC, ZPX, ZFD, ZZB, ZZD**

Size	Supply [D1]	Pressure regulator	Solenoid valve	Connection lines [D2]	Connection to the valve
80 - 600	1/2"	1/2"	1/2"	DN 10	G 1/4"
630 - 800	1/2"	1/2"	1/2"	DN 10	G 3/8"

- **ZRT, ZVT**

Size	Supply [D1]	Pressure regulator	Solenoid valve	Connection lines [D2]	Connection to the valve
250 - 480	1/2"	1/2"	1/2"	DN 10	G 1/4"
550	1/2"	1/2"	1/2"	DN 10	G 3/8"



Size	Value
Purge gas pressure p_2 =	Max. conveying pressure p_3 + 0.5 to 0.7 bar
Main system pressure p_1 =	Max. conveying pressure p_3 + 2 bar
Expected purge-gas consumption V_{erw} =	See the following charts
Maximum purge-gas consumption V_{max} =	V_{erw} x 3

See chapter 8.3.4 Automatic cleaning (CIP cleaning).

- **ZXQ, ZAQ,**

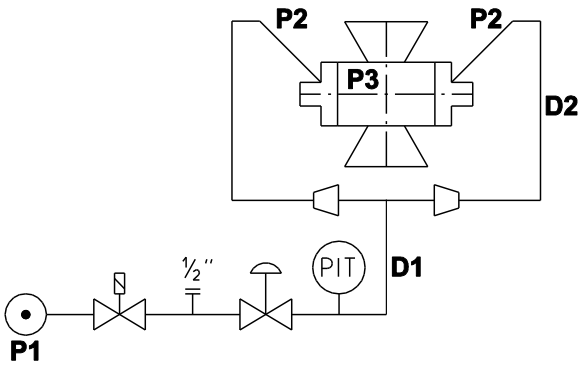
Size	Supply [D1]	Pressure regulator	Solenoid valve	Connection lines [D2]	Connection to the valve
300	22 x 2.0	3/4"	3/4"	12 x 1.0	G 1/2”
350 - 400	28 x 2.0	1"	1"	15 x 1.5	
500 - 600	35 x 2.0	1 1/4"	1 1/4"	28 x 2.0	G 3/4”
700 - 800	42 x 2.0	1½"	1½"		G 1"

- **ZXQ DP60 Wear Model**

Size	Supply [D1]	Pressure regulator	Solenoid valve	Connection lines [D2]	Connection to the valve
300 - 500	Connection specifications are identical to the general layout (see the table above)				
600	42 x 2.0	1 1/4"	1 1/4"	35 x 2.0	G 3/4”
700	48.3 x 2.0	1½"	1½"	42 x 2.0	G 1"

- **ZAW**

Size	Supply [D1]	Pressure regulator	Solenoid valve	Connection lines [D2]	Connection to the valve
500	1½"	1½"	1½"	28 x 2.0	G 3/4”
600					G 1“

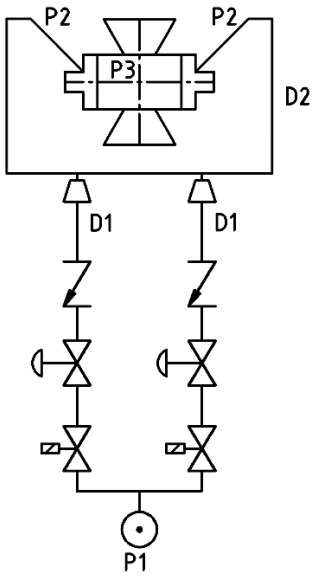


Size	Value
Purge gas pressure p_2 =	Max. conveying pressure p_3 + 1.0 to 1.2 bar
Purge gas pressure p_2 with DuroProtect 6 =	Max. conveying pressure p_3 + 0.5 to 0.7 bar
Main system pressure p_1 =	Max. conveying pressure p_3 + 2 bar
Expected purge-gas consumption V_{erw} =	see the following charts
Maximum purge-gas consumption V_{max} =	V_{erw} x 3

Purge gas pipes for 2 different purge gas pressures (optional)

For valves used in CIP (cleaning-in-place) applications, the pressure of the CIP liquid is often considerably higher than the conveying air pressure.
In such cases, a correspondingly higher purge gas pressure is required during cleaning to keep the seal area free of cleaning fluid.
So that the purge gas pressures need not be manually changed, two different purge gas pressures can be controlled with the optional purge gas supply system.

Connection specifications according to the tables listed above



Terminal diagrams:

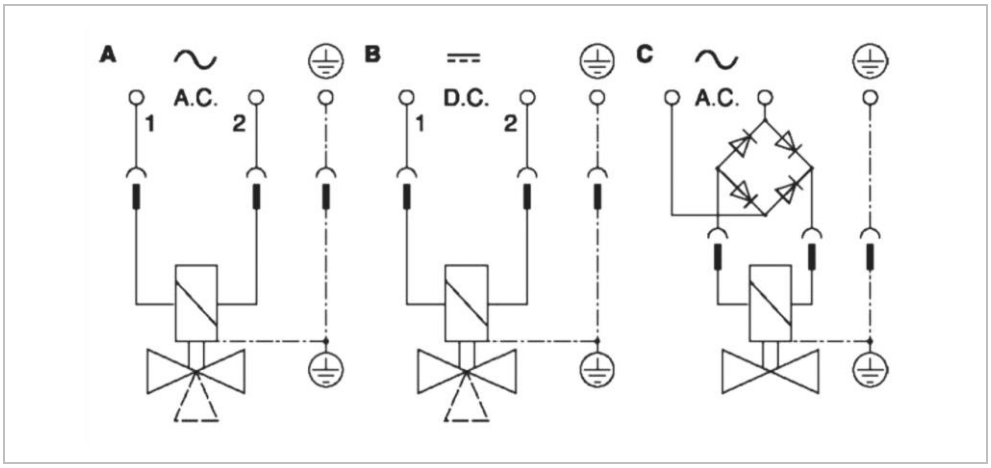


Fig. 6.9: Terminal diagram, gas purge

ATEX

► In explosion-pressure burst-proof valves and valves with a protection system function (flameproof design), the purge gas pipes must be designed with an explosion-pressure burst-proof capability of 10 bar.

Purge gas consumption, medium-pressure rotary valves

The following charts show the purge gas consumption **[V_{erw}]** as a function of the purge gas pressure [p_2]. The determined nominal values are valid for gas (air) at 20 °C, brand-new valves can deviate by up to a factor of 2.

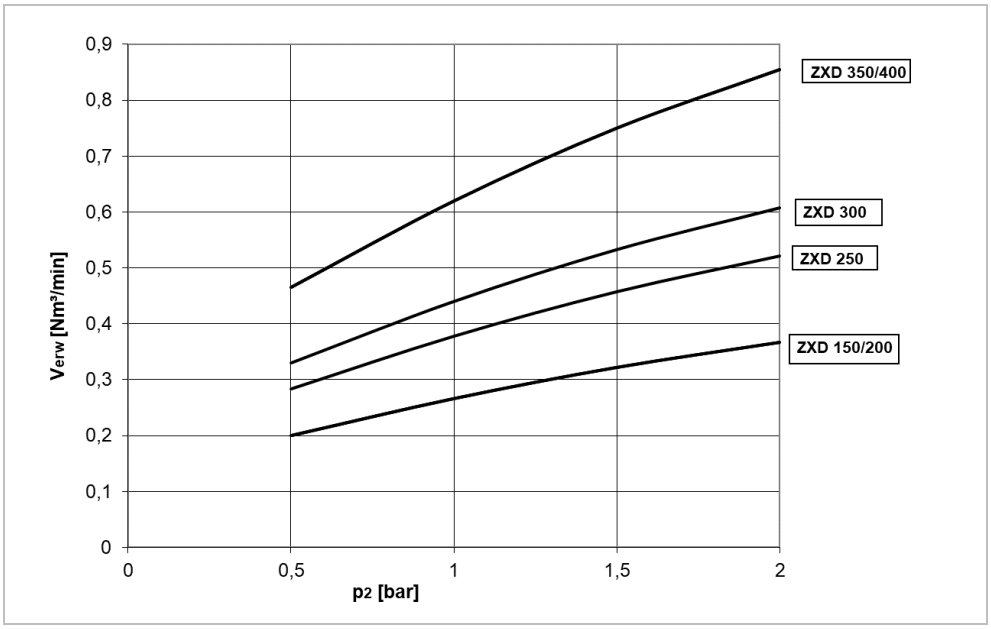


Fig. 6.10: Purge gas consumption for ZXD valves

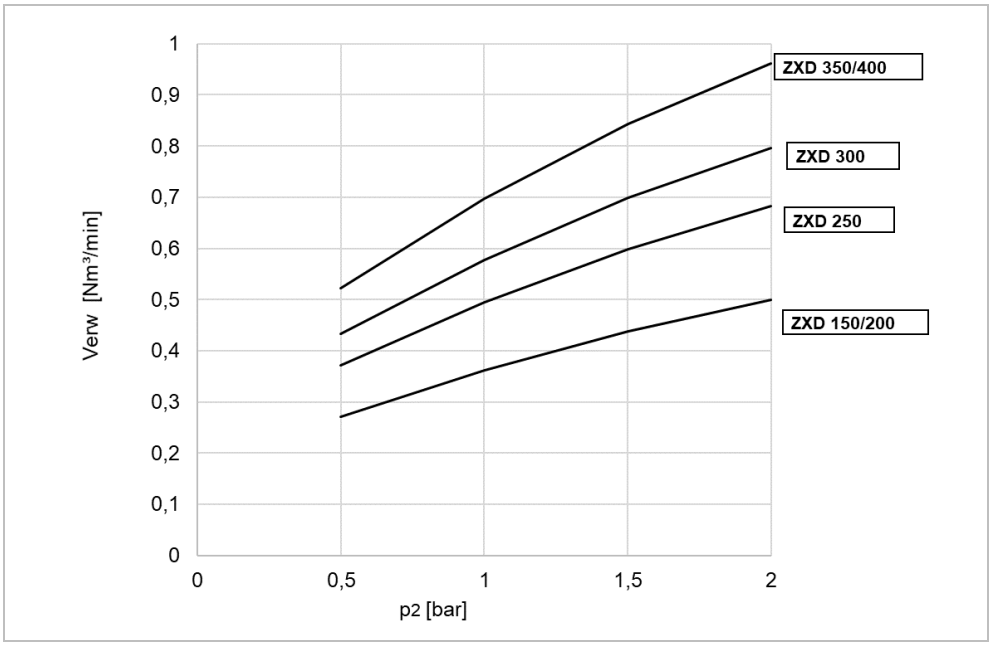


Fig. 6.11: Purge gas consumption for ZXD valves with RotorCheck

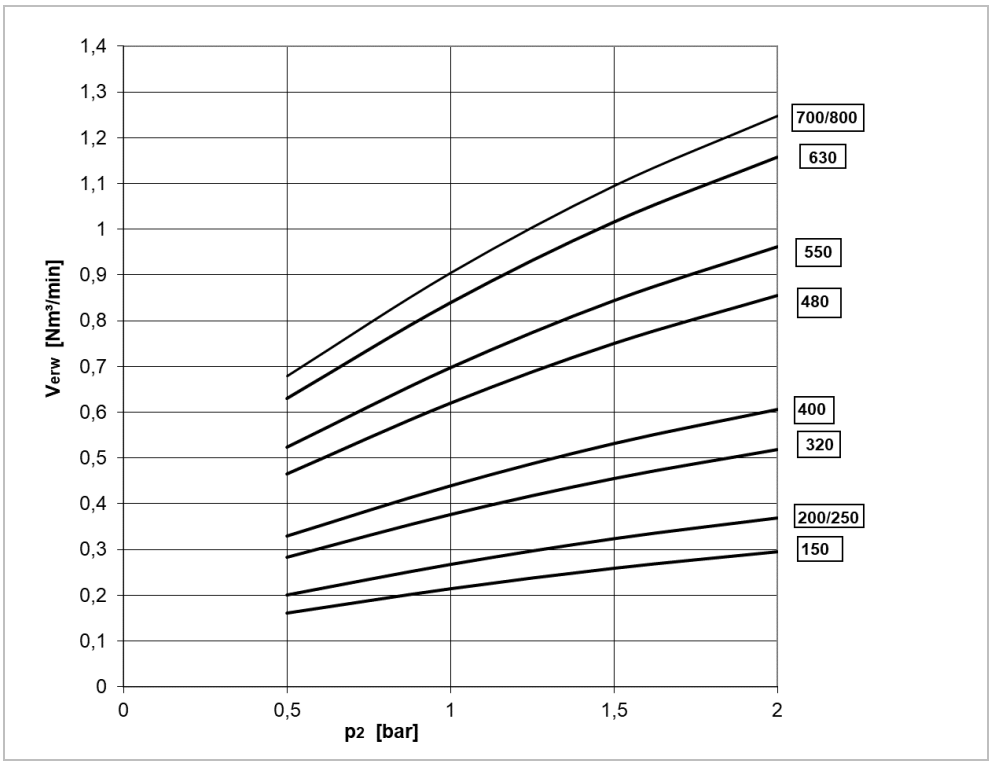


Fig. 6.12: Purge gas consumption for ZRD, ZKD, ZVD, ZRC, ZKC, ZVC, ZRX, ZKX, ZVX, ZPD, ZPC, ZPX, ZDD, ZFD valves

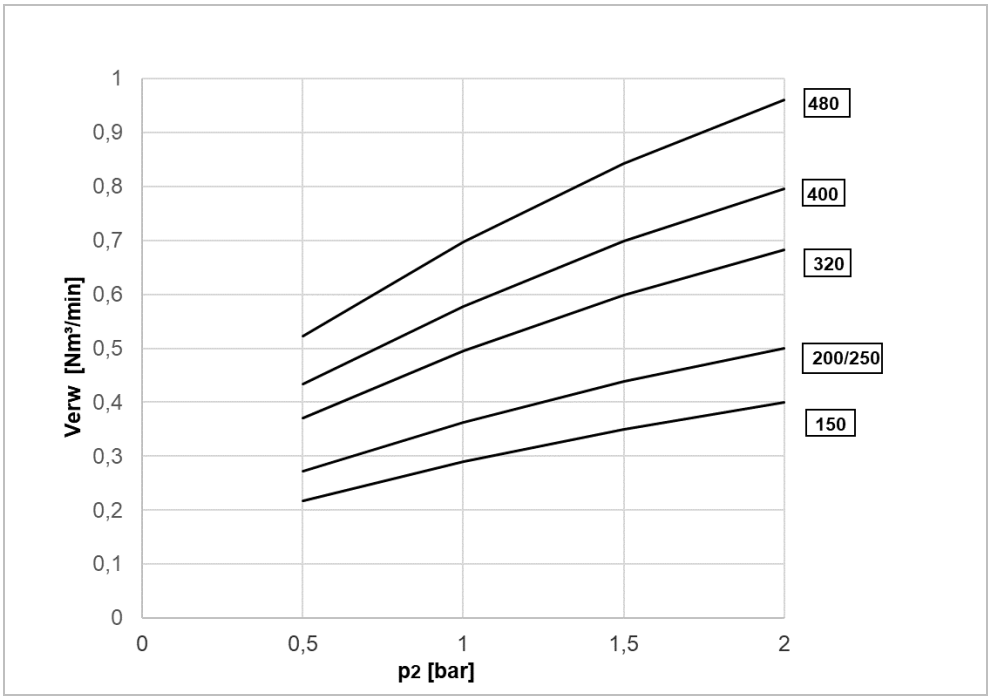


Fig. 6.13: Purge gas consumption for ZRD, ZKD, ZVD, ZRC, ZKC, ZVC, ZRX, ZKX, ZVX, ZPD, ZPC, ZPX, ZDD, ZFD valves with RotorCheck

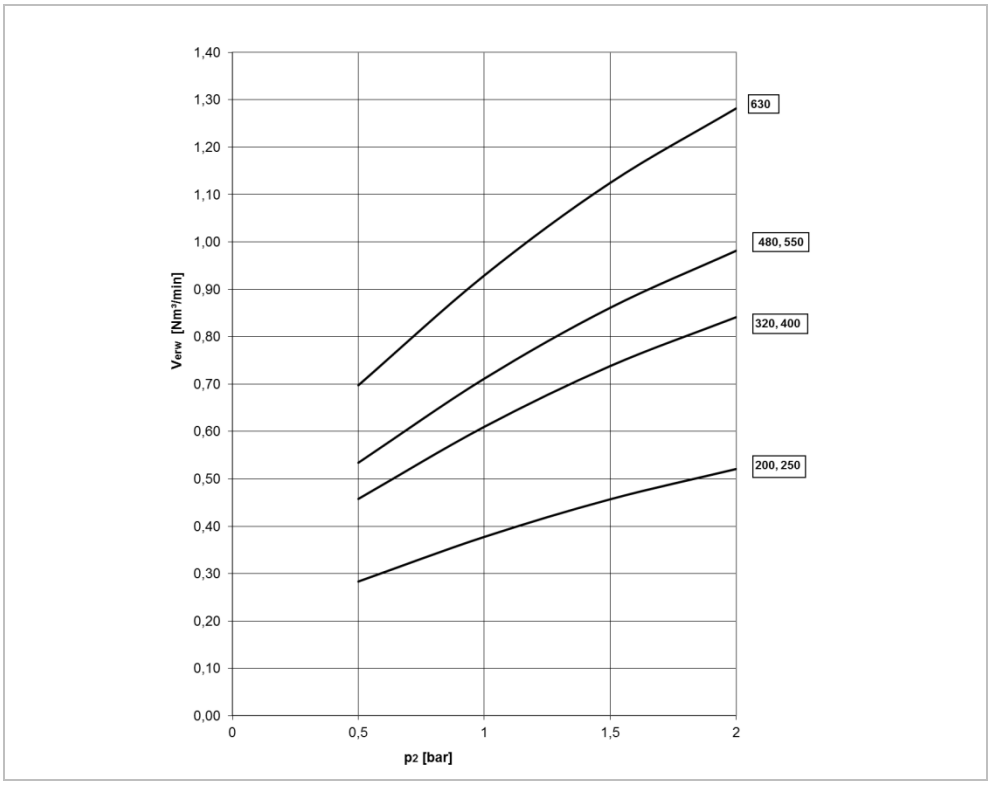


Fig. 6.14: Purge gas consumption for ZRD, ZKD, ZVD, ZRC, ZKC, ZVC, ZRX, ZKX, ZVX, ZPD, ZPC, ZPX valves > 220 °C

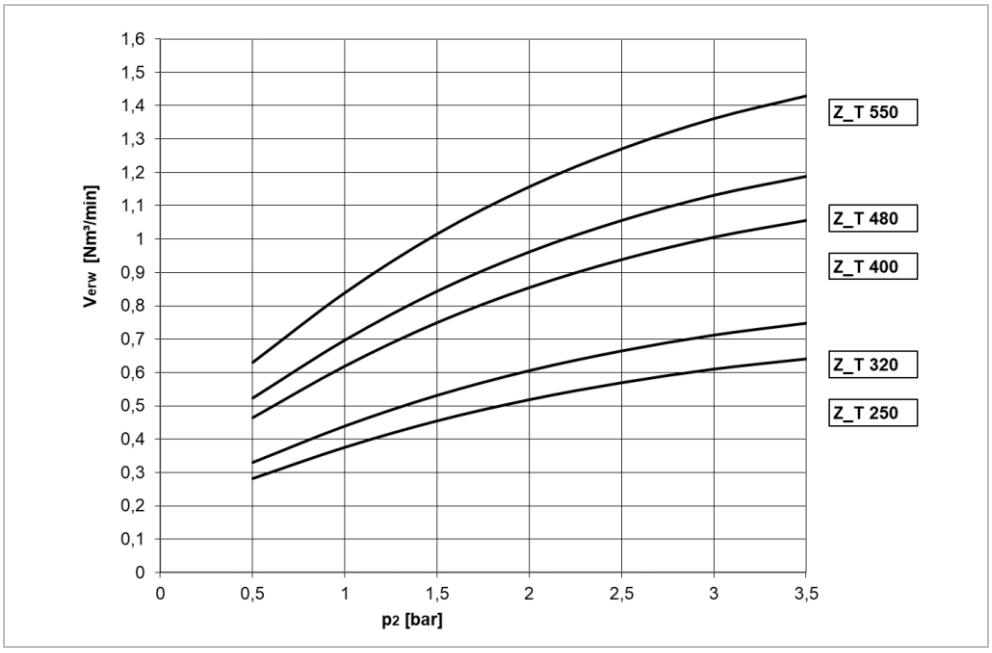


Fig. 6.15: Purge gas consumption for ZVT, ZRT valves

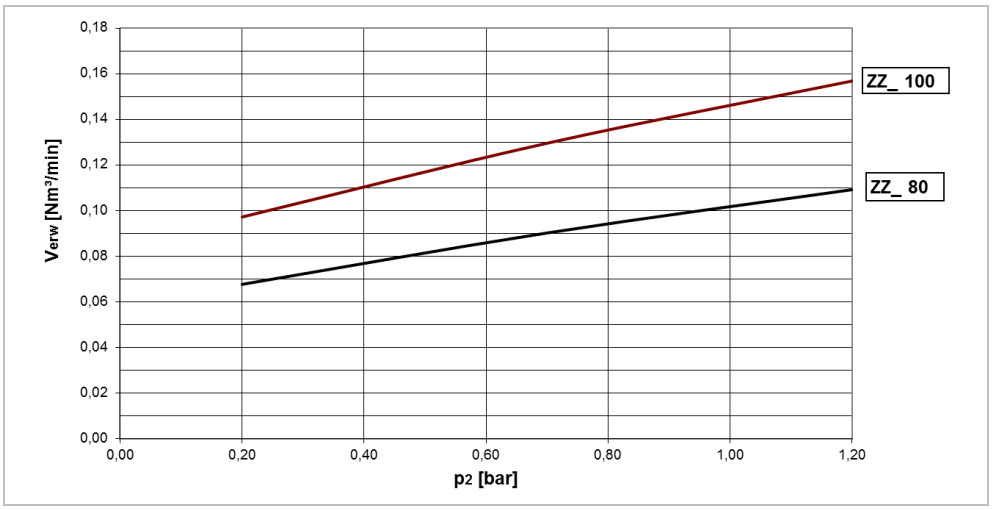


Fig. 6.16: Purge gas consumption for ZZB, ZZD valves

Purge gas consumption, high-pressure valves

The following charts show the purge gas consumption **[V_{erw}]** as a function of the purge gas pressure [p_2]. The determined nominal values are valid for gas (air) at 20 °C, brand-new valves can deviate by up to a factor of 2.

The values determined from the chart apply to air, nitrogen and brand-new valves. The values may deviate by +/- 50% during operation

Purge gas superimposed pressure: +1 bar

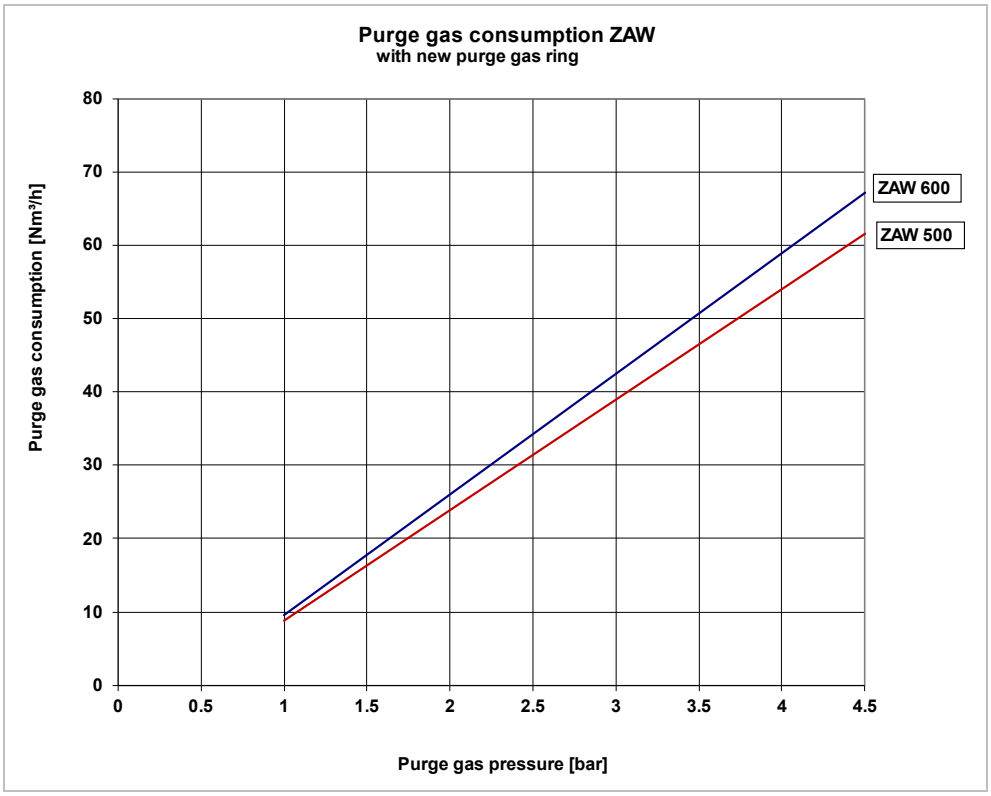


Fig. 6.17: Purge gas consumption for ZAW valves

The values determined from the chart apply to air, nitrogen and brand-new valves. The values may deviate by +/- 50% during operation

Purge gas superimposed pressure: +1 bar

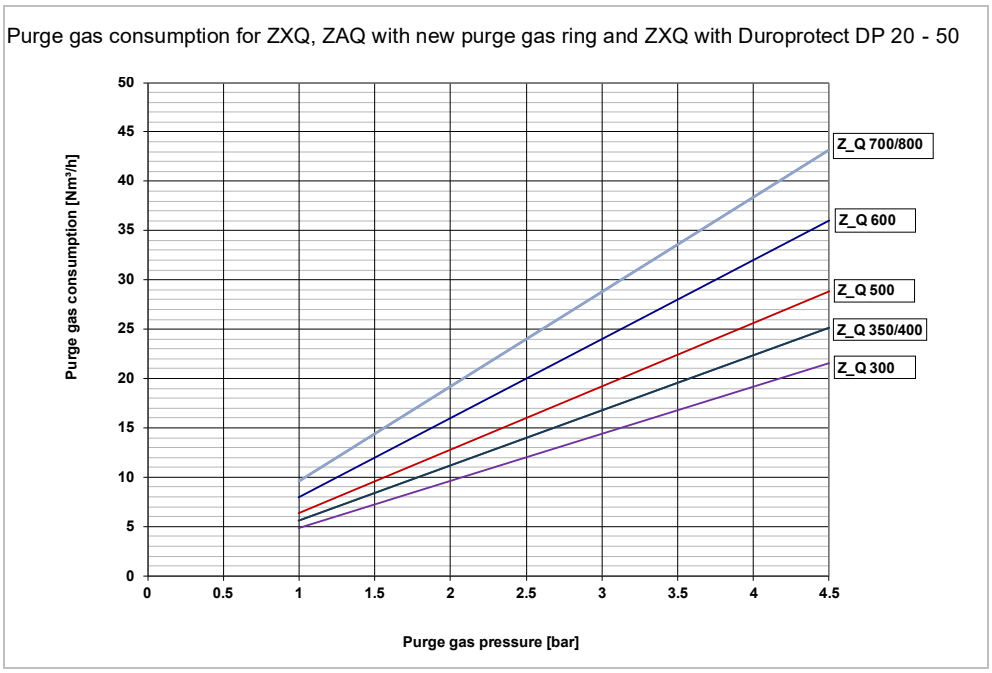


Fig. 6.18: Purge gas consumption for ZXQ, ZAQ valves and ZXQ valves with Duroprotect DP 20 - 50

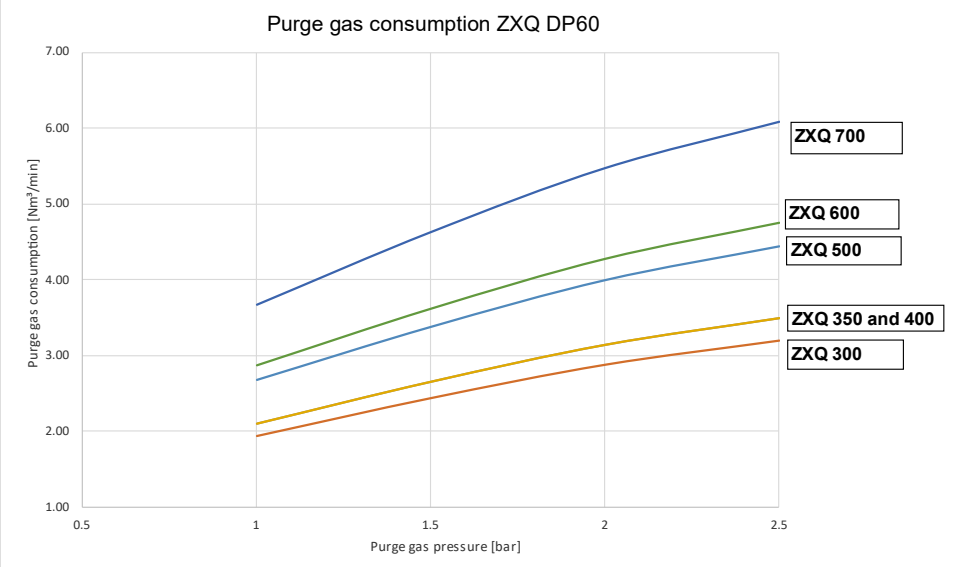


Fig. 6.19: Purge gas consumption for ZXQ DP60 valves

6.4.4 Gas lock for side cover

Available for the following valve types as an option:

- **ZVH, ZPH, ZGH, ZVU**

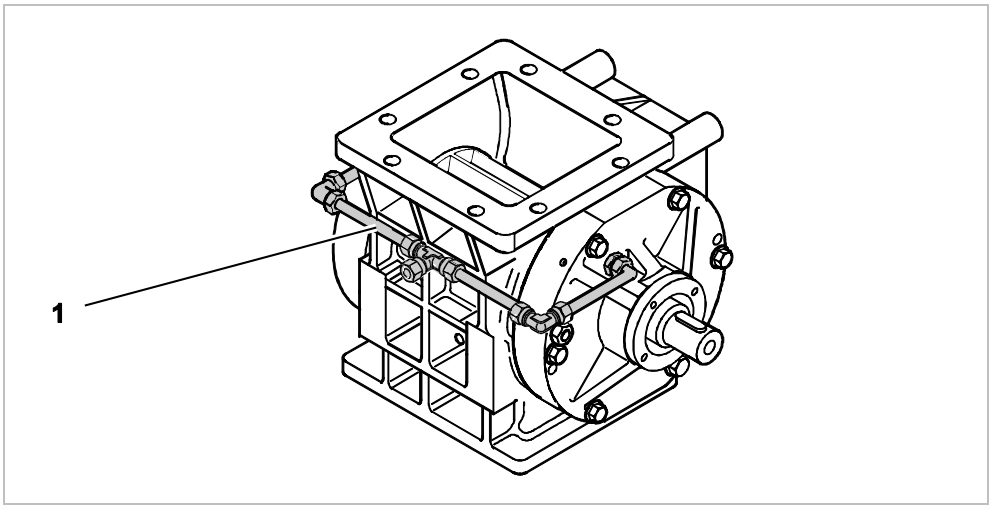


Fig. 6.20: Gas lock for side cover

- The gas lock **[1]** for the side cover serves to prevent penetration of the conveyed material into the seal and side chamber between the rotor and the side cover. The gas lock is used for
  - pellet-like products with a large portion of fine grains
  - hard pellets
  - powdery products.

ATEX

Hazards from potential ignition sources of the drive unit!
Possible heating of the bearing area.

► Pay attention to the actions in the following warning.

NOTICE

Risk of damage to the machine
During operation, the conveyed material may penetrate into the seal and side chamber between the rotor and the side cover. This can lead to damage of the seal and/or a reduction of the gap between the rotor and side cover resulting in mechanical damage.

► The pressure must be equal in both side covers.

► Both connections must be supplied from the same pressure source.

► If a gas lock is present, the control system for the gas lock is to be designed so that the gas lock always operates if there is excess pressure in the valve housing.

► If several rotary valves are connected in series, the gas lock must be active even if only one of the rotary valves is operating
(if the valve is not disconnected on the outlet side using a flap).

ATEX

Hazard from gas escaping at the seals!
Risk of explosion.

- ► If flammable gases are handled inside the valve, the gas purge must be operated with inert gases such as nitrogen. The operation of the gas purge must be monitored in accordance with EN ISO 80079-37 Table 1. For a gas purge using air, it must be ensured that the lower explosion limit of the gas (LEL) is not exceeded.

Connection

Information
Choose the sealing gas pressure in accordance with the following table.
Quality: corresponding to the conveying gas.

Sealing gas consumption

(Maximum values for valves with the standard clearance ≙ 60 °C):

Application		Valve size							
		200	250	320	400	480	550	630	800
Total consumption [Nm³/h]	Sealing gas pressure = operating pressure	22	25	28	31	34	37	39	44
	Sealing gas pressure = operating pressure + 1.0 bar	66	74	83	93	102	110	117	132

Use the following chart to determine consumption at lower conveying pressures. This chart contains, for each overlay stage (0 bar; 1 bar), a graph containing the ratio of sealing gas consumption at the current pressure versus the maximum pressure of 3.5 bar.

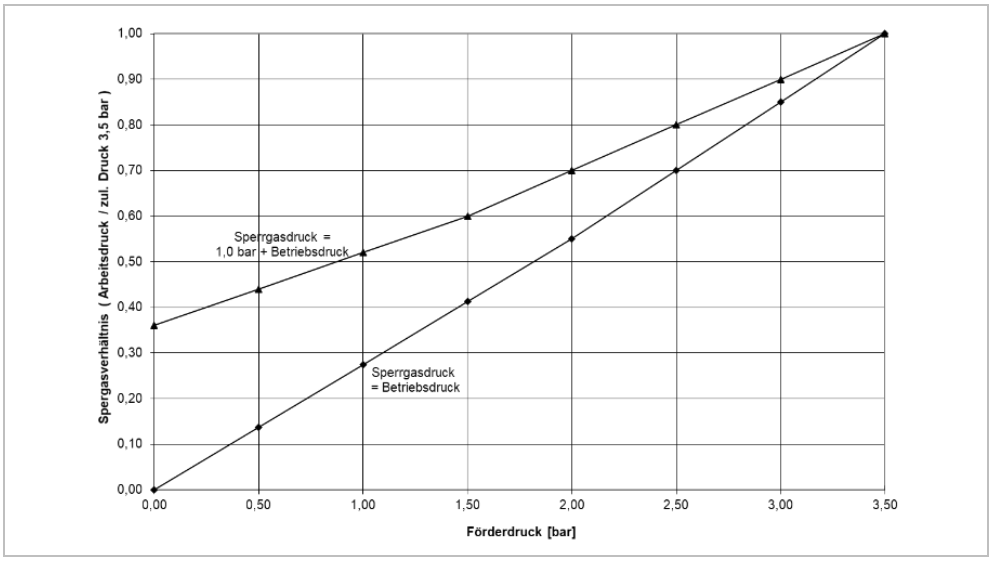


Fig. 6.21: Sealing gas consumption

Example: ZVH 400, powder application:

Sealing gas = 1.0 + operating pressure at a conveying pressure of 1.5 bar yields a factor of 0.6. The value for a ZVH 400 is read from the Maximum values table.

Maximum values (guaranteed values) Nm^3/h x 0.6 = 55.8 Nm^3/h

For the layout of flow meters, four times the expected value is used as a basis for the maximum value.

Wear limit of the radial seal:

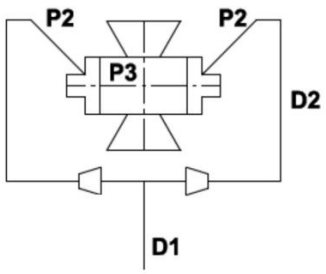
The wear limit of the seal is determined by way of the sealing gas consumption with the valve pressure-less.

Maximum permissible gas consumption with a sealing gas pressure of 0.5 bar and the valve pressure-less	Valve size							
	200	250	320	400	480	550	630	800
Total consumption [Nm^3/h]	44	49	55	62	68	73	78	88

Connection specifications:

- **ZVH, ZPH, ZGH**

Size	Supply [D1]	Connection lines [D2]	Connection to the valve
200 – 250	22 x 2.0	15 x 1.5	G 1/2”
320	28 x 2.0	22 x 2.0	
400			G 3/4”
480			G 1"
550	33.7 x 2.0	28 x 2.0	
630		33.7 x 2.0	
800	48.2 x 2.0	48.3x 2.0	G $1^1/_2$"



6.4.5 X-rotor option

Available for the following valve types as an option:

- **ZRX, ZVX, ZKX, ZPX**

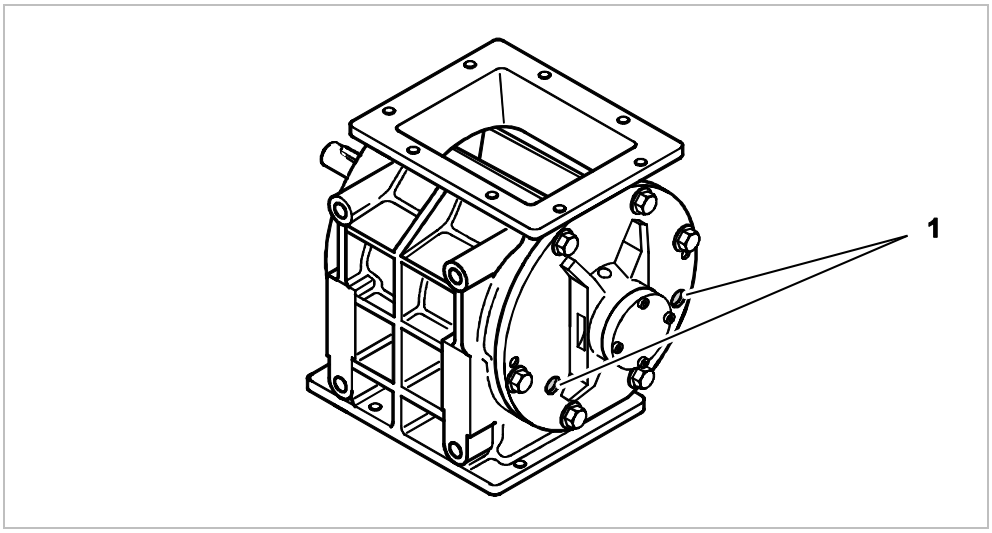


Fig. 6.22: X-rotor

- The side covers have connection holes **[1]** serving to flush the side secondary chambers of the X-rotor. The X-rotor is used for
  - Fibrous products

NOTICE

Risk of damage to the machine
When using an x-rotor, product may become jammed between the rotor and the side cover. As a result, the rotor may run slowly or even stop.
This can damage the drive.

► Open the valve and clean it.

► If the pressure at the inlet to the valve is lower than at the outlet, it is absolutely necessary to use purge gas!

Connection

⇨ Take the purge gas from the conveying gas on the clean gas side (see following *connection diagram*).

⇨ The pressure at the side cover inlet must be between 50 mbar and 150 mbar greater than the internal pressure so that gas flow is ensured into the interior of the valve.

Information
To ensure a uniform gas distribution, all 4 connecting hoses must be of the same length and the connection is to be implemented symmetrically as shown in the following illustration. Quality: corresponding to the conveying gas.

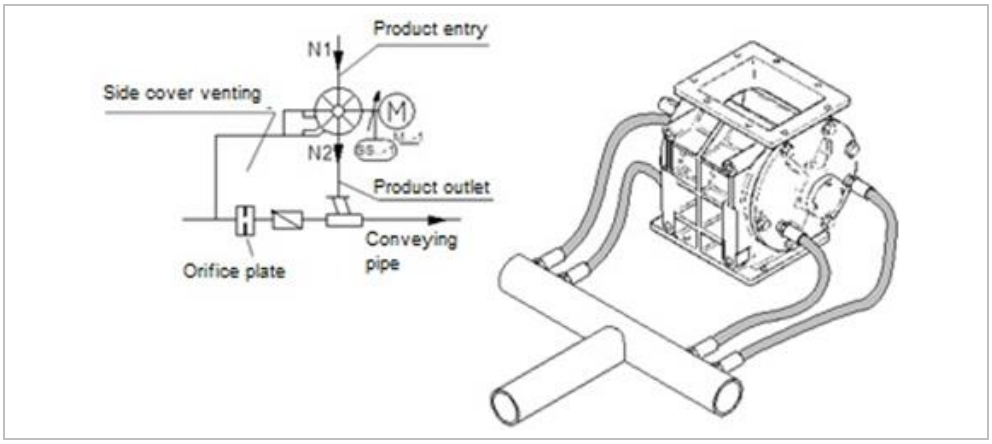


Fig. 6.23: Connection diagram, side cover venting

Size	Connection	Number of (per side)	Hose	Supply
200	G ½"	2	½"	1"/ DN 25
250-320	G ¾"	2	¾"	1 1/2" / DN 40
400-550	G 1"	2	1"	2" / DN 50
630	G 2"	2	2"	4" / DN 100
800	G 2 ½"	2	2 ½"	5" / DN 125

6.4.6 Pick-up tee

Available for all except:

- **ZDD, ZFD, ZXD, ZXQ**

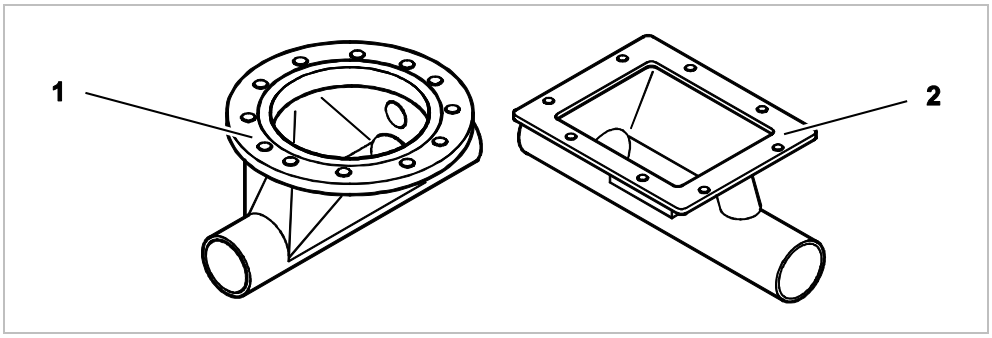


Fig. 6.24: Pick-up tee

- The pick-up tee ensures an optimum read of powder and pellets into the conveyor pipe. In this way, the delivered product can be immediately conveyed further pneumatically.
- Depending on the housing form, design [1] or [2] is possible.
- Straight pipe section before inlet into the pick-up tee: min. 2 m to calm the conveying gas

Connection

- Permissible pressure, pick-up tee for valve types:
  - ZAQ, ZVH, ZGH, ZPH, ZVT = 4.5 bar
  - For all other valves = 1.5 bar

Information
In rotary valves with a circular connection, pay attention to the conveying direction and the installation situation of the pick-up tee in accordance with the illustration. If installed incorrectly, performance may suffer and turbulent running behavior may occur.

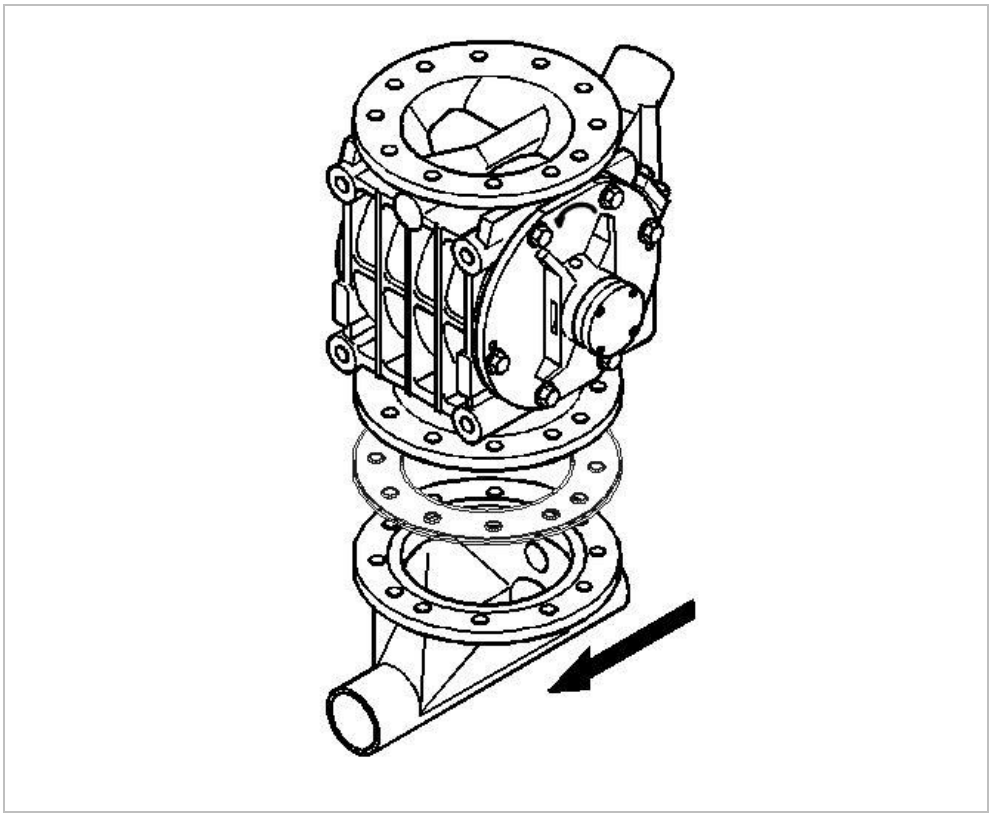


Fig. 6.25: Conveying direction, round pick-up tee

6.4.7 Leakage gas collector and housing vent

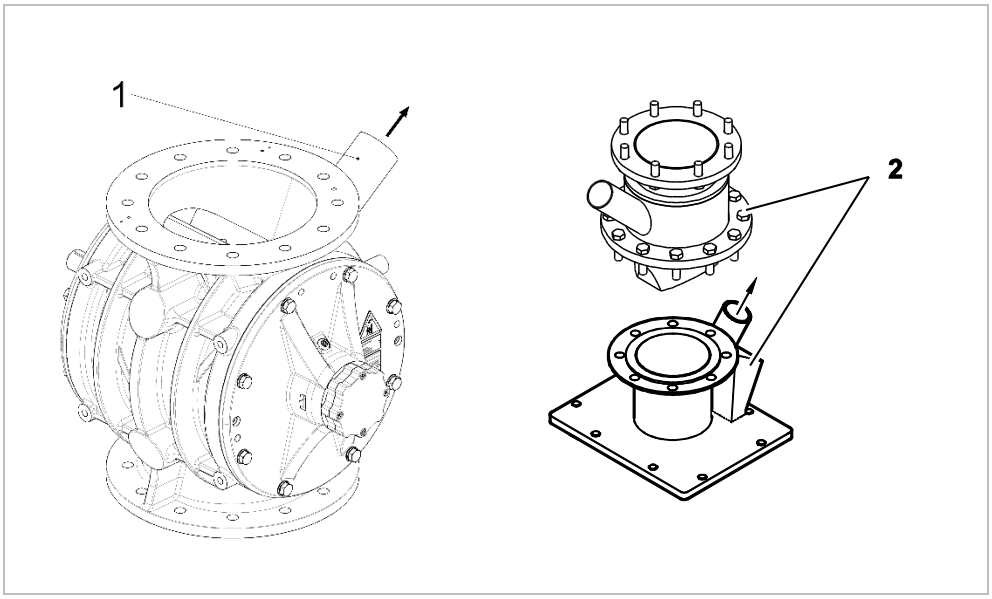


Fig. 6.26: Leakage gas collector / housing vent

- The housing vent **[1]** or the leakage gas collector **[2]** allow leakage gas to be removed. The leakage gas is always carrying product. It must be removed by way of a line provided just for this purpose and routed back into the container/silo. The smaller the grain size and the higher the conveying pressure, the more product conveyed via the leakage gas line. The product feed can be ensured with this option in the case of lengthy gravity tubes or reduced inlet cross-sections.

Connection

⇨ Keep the following points in mind when connecting the leakage gas line:

- Minimum pressure loss by using short, direct pipe routing with as few turns as possible
- Pressure-less terminal
- Pay attention to vertical and steep pipe routes (α max. 30° with respect to the vertical for powder and 45° with respect to the vertical for pellets)

- Permissible pressure, leakage gas collector for valve types:
  - ZRD, ZRC, ZRX, ZXD, ZKD, ZKC, ZKX, ZDD = 1.5 bar
  - ZXQ, ZAQ = 4.5 bar

Sizing of the leakage gas line

	Valve type					
Nominal diameter	ZVH		ZVD, ZVB		ZXD, ZRD, ZKD, ZXQ	
Leakage gas line	Leakage gas flow from the chart					
	min.	max.	min.	max.	min.	max.
DN	[m³/min]	[m³/min]	[m³/min]	[m³/min]	[m³/min]	[m³/min]
25	-	-	-	-	0.6	1.2
32	1.4	2.8	1.7	3.4	0.9	1.9
40	1.9	3.7	2.2	4.4	1.2	2.4
50	3	6	3.6	7.2	2	4
65	5	10	6	12	3.3	6.7
80	6.6	13.2	8	16	4.4	8.9
100	11.7	13.4	14	28	7.8	15.6
125	16.7	33.4	20	40	11.1	22.2
150	24	50	29	58	16.1	32.2

Take the leakage gas values from the Product range charts
For ZXD, ZRD, ZKD and ZXQ valves, use "Leakage gas flow with product"
The leakage gas charts apply to valves with a permissible temperature of 60 °C
For leakage gas values for valves at a higher permissible temperature, please contact Coperion

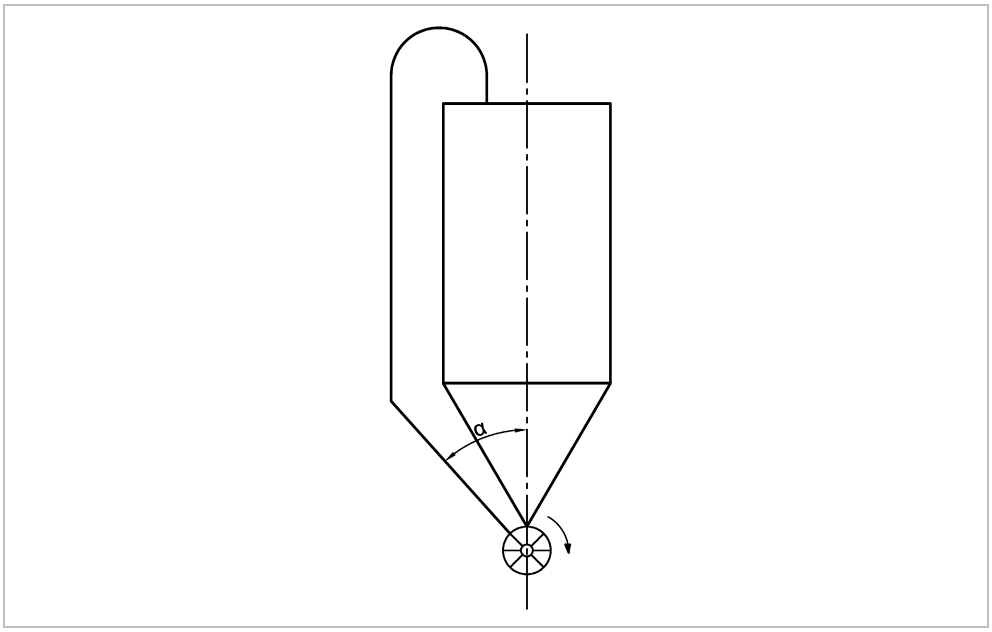


Fig. 6.27: Leakage gas line

Example:

Type:	ZRD 630
Conveying pressure:	0.5 bar (operating pressure)
Nominal diameter, leakage gas line:	65mm

Procedure:

⇨ Determine the leakage gas flow in the leakage gas chart of the product range versus the pressure difference and size of the rotary valve

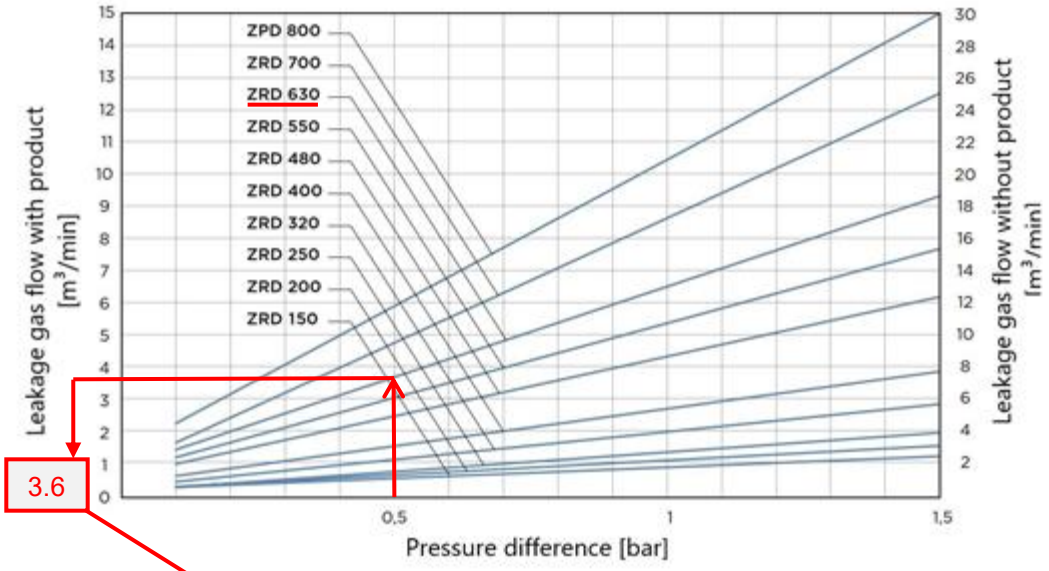
⇨ Find the resulting leakage gas flow in the table (see the Sizing of the leakage gas line table)

⇨ Read the nominal diameter of the leakage gas line in the left column

Note:

- If it is possible to choose among different nominal diameters, select the larger nominal diameter.
- If there are different operating points, determine the nominal diameters for all operating points and select the shared nominal diameter.

Leakage gas chart
(brand-new, standard clearance, 60 °C, max. rotational speed)



	Valve type					
Nominal diameter	ZVH		ZVD, ZVB		ZXD, ZRD, ZKD, ZXQ	
Leakage gas line	Leakage gas flow from the chart					
	min.	max.	min.	max.	min.	max.
DN	[m³/min]	[m³/min]	[m³/min]	[m³/min]	[m³/min]	[m³/min]
25	-	-	-	-	0.6	1.2
32	1.4	2.8	1.7	3.4	0.9	1.9
40	1.9	3.7	2.2	4.4	1.2	2.4
50	3	6	3.6	7.2	2	4
65	5	10	6	12	3.3	6.7
80	6.6	13.2	8	16	4.4	8.9
100	11.7	13.4	14	28	7.8	15.6
125	16.7	33.4	20	40	11.1	22.2
150	24	50	29	58	16.1	32.2

6.4.8 Rotational speed sensor

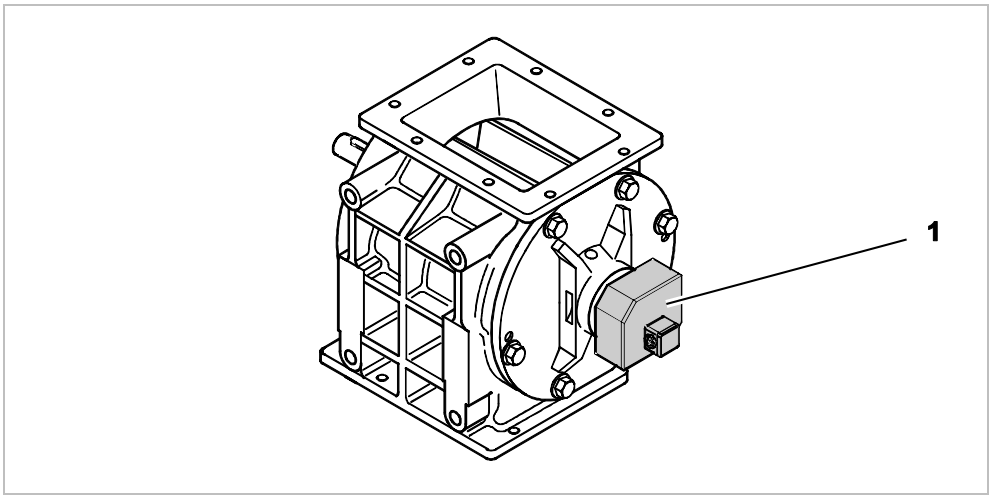


Fig. 6.28: Rotational speed sensor

- The rotational speed sensor **[1]** is used to monitor operation and to measure the rotational speed.

NOTICE

Damage to the machine
If the rotational speed sensor does not provide speed signals when the drive unit is switched on, stop the drive unit immediately and determine the cause.

Terminal diagrams

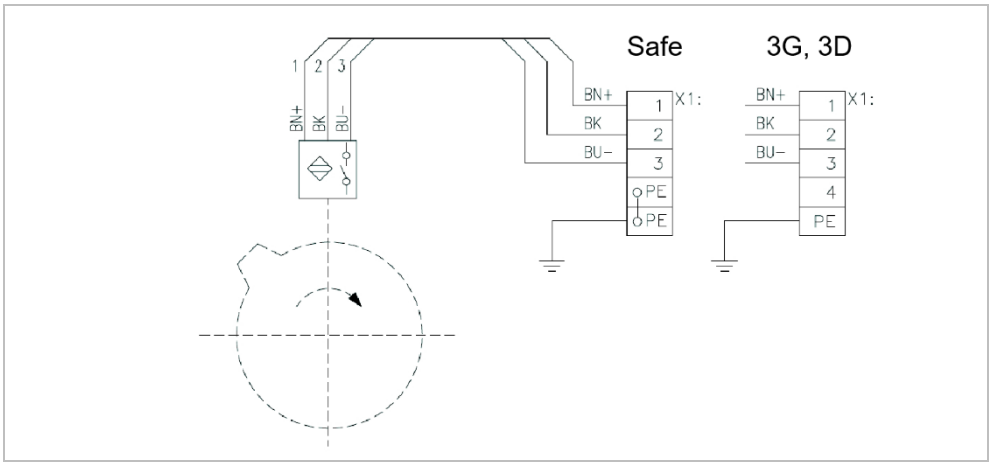


Fig. 6.29: Limit switch type: 3-wire/PNP

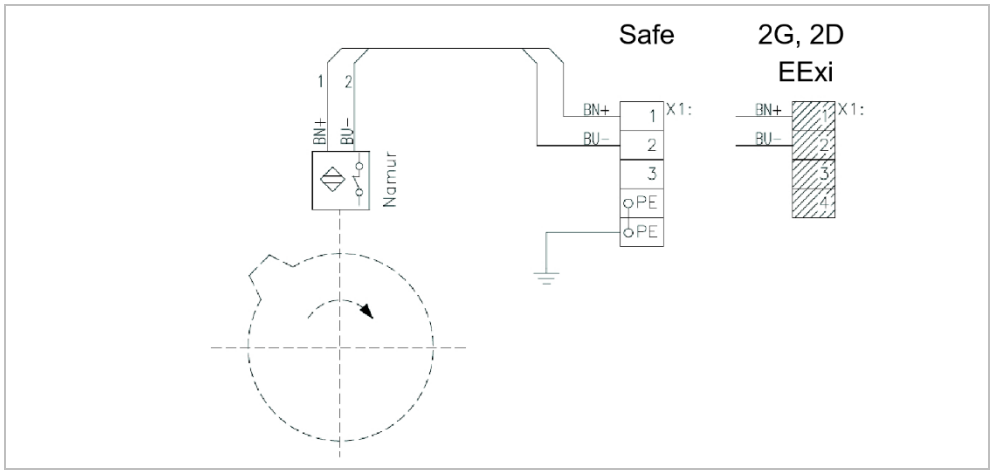


Fig. 6.30: Limit switch type: 2-wire/Namur

Connection

⇨ Keep the following points in mind when connecting the rotational speed sensor:

- The minimum required digital sampling rate: 21 x maximum valve rotational speed
- Measuring transducer: 4-20 mA output signal

6.4.9 Contact monitoring – RotorCheck 5.0

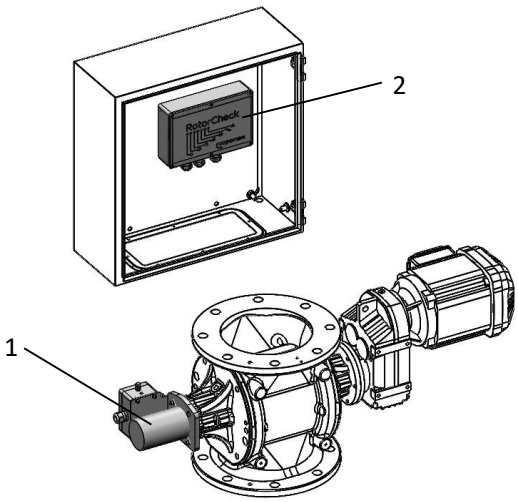


Fig. 6.31: RotorCheck 5.0

RotorCheck **[1]** is an intelligent electronic system for the continuous monitoring of unwanted contact between the rotary valve and the housing, thus helping to prevent product contamination by metal abrasion and/or serious damage to the rotary valve.

The evaluation unit **[2]** is located in a control cabinet on the customer's side outside the production area and outside of potentially explosive atmospheres.

Connection

Specifications for connection and general operation can be found in the separate operating and assembly instructions.

Information
For valves with RotorCheck, the expected purge gas consumption [$\mathbf{V_{erw}}$] from the charts must be multiplied by a factor of 1.5. The determined nominal values are valid for gas (air) at 20 °C, brand-new valves can deviate by up to a factor of 2.

7 Commissioning

7.1 General

We urgently recommend having Coperion GmbH perform commissioning due to a variety of effects and for warranty reasons.

During commissioning, the following actions are performed:

- the rotary valve and accessories are checked (errors during installation, etc.),
- depending on the contract, the entire system is checked and the optimum settings are determined,
- the operators are briefed,
- additional recommendations are provided for operating the rotary valve, for maintenance and repairs.

7.2 Safety and personnel

To avoid life-threatening injuries or property damage during commissioning, you must keep the following points in mind:

⇨ You must perform a visual inspection of the machine and accessories for damage prior to initial commissioning but after installation. Have trained service personnel repair all damage before commissioning.

⇨ Make sure that commissioning is only performed by qualified personnel while obeying the safety instructions.

⇨ Make sure that only authorized personnel are present in the work area and that no other persons are put at risk by commissioning.

⇨ Check and obey the pertinent regulations and provisions for occupational safety and health protection of the employer's liability insurance carrier or the occupational safety regulations for the country in question.

⇨ Prior to initial commissioning, check whether all tools and foreign materials have been removed from the machine.

⇨ Prior to commissioning, check all cables, hoses and lines for the completeness and tight seating of all connections!

⇨ When attaching the motor with a top-drive chain, the chain box must be installed.

⇨ For all inspection work requiring the machine to be stopped for safety reasons, make sure that the machine is secured against being switched on unexpectedly.

⇨ Read Chapter *3 Safety*.

7.3 Preparatory actions

7.3.1 No-load test without product when installed

Information
The permissible operating data must not be exceeded (see chapter *4 Technical data*).
If malfunctions occur during commissioning, check chapter *8.6.1 Malfunctions, possible causes and remedies* for advice.

SAFETY INSTRUCTIONS

- ► Make sure that there are no people in areas of the machine presenting a risk of injury.
- ► Never try to operate the machine with the inlet or outlet accessible. There is the risk of severe injuries from flying product or shearing of a body part by the rotor!
- ► Operate the machine only with the protection and safety equipment installed!

⇨ Switch on the gear motor.

⇨ Check the direction of rotation and the rotational speed.

⇨ Check the top-drive chain for smooth operation. If necessary, realign the chain sprockets (unnecessary with direct drive).

⇨ Listen for abnormal noises.

⇨ Check the operation of the emergency stop switch (if present).

⇨ Check the operation of the safety valve (if present).

7.4 Commissioning

After successfully completing the no-load test, you can now perform the test run with the product feed system.

Information
If product throughput is too low, check chapter *8.6.1 Malfunctions, possible causes and remedies* for advice.

⇨ Listen for abnormal noises.

⇨ Keep a watch for product spillage.

⇨ After the first 10 operating hours, check all screw connections for a firm seat and retighten if necessary.

- For the tightening torques, see chapter *12.1 Tightening torques*

8 Operation

8.1 Safety and personnel

⚠ WARNING

Danger due to improper operation!
The machine presents risks when operated improperly or when not in the proper condition.

- ► Before switching on the machine, make sure that no one can be put at risk by the starting machine.
- ► Avoid any risky behavior!
- ► Only operate the machine if all protective and safety equipment, such as removable protective equipment and EMERGENCY stop devices, are present.

SAFETY INSTRUCTIONS

- ► Make sure that there are no people in areas of the machine presenting a risk of injury.
- ► Check to see that the machine is in proper, undamaged and complete condition. Never put the system/machine into operation in a damaged or defective condition.
- ► Check whether all wear parts are in ready to operate condition. Immediately replace worn components or those with other defects.
- ► Check whether the machine is correctly installed and secured.
- ► Never try to operate the machine with the inlet or outlet accessible.
  There is the risk of severe injuries from flying product or shearing of a body part by the rotors!
- ► Operate the machine only with the protection and safety equipment installed!

Information
Leakage gas
When operating the rotary valve with a pressure drop between the inlet and the outlet as a result of the clearance between the rotor and the housing, a flow of leakage gas occurs in the direction of the pressure drop.
The amount of leakage gas is a function of the valve type, valve design and the operating conditions. Consequently, generally valid values cannot be specified.
Upon request, values for implemented valves can be given.
Leakage gas rising in the valve inlet can lead to a reduction of the delivery rate.

► In this case, the valve should be equipped with a leakage gas removal system.

8.2 Normal operation

8.2.1 General

Purge gas must be switched on as soon as there is product in the rotary valve or there is pressure above or below the rotary valve.

Deviations are only allowed after consulting with Coperion.

The settings for purge gas and sealing gas are described in this installation and operating manual.

8.2.2 Start sequence - without a standing product column

⇨ Switch on the purge gas/sealing gas.

⇨ If provided, switch on discharge aids (for example, fluidization) and process gas (for example, conveying gas).

⇨ Switch on the gear motor of the rotary valve.

⇨ Switch on the material feed system.

8.2.3 Stop sequence - without a standing product column

⇨ Switch off the material feed system.

⇨ Run the rotary valve until empty and, if necessary, purge with gas until empty.

⇨ Switch off the gear motor of the rotary valve, if provided, empty the system and depressurize.

⇨ Switch off discharge aids (for example, fluidization) and process gas (for example, conveying gas).

⇨ Switch off the purge gas/sealing gas.

8.2.4 With a standing product column

During normal operation with a standing product column, the purge gas/sealing gas must not be switched off as long as there is product in the rotary valve!

NOTICE

Risk of damage to the machine
If the conveying air (cold) continues to operate while the warm product column is stopped, deformations at the rotary valve may occur due to temperature.

- ► If the rotary valve is stopped, also shut off the conveying air.
- ► Make sure that the temperature has equalized before restarting.

8.3 Cleaning

⚠ WARNING

Risk from cleaning agents and process media
Risk of damage to skin and eyes. Risk for the breathing passages.

- ► Use only approved agents. Keep the safety data sheet in mind.
- ► Wear personal protective equipment.
- ► In the event of injuries, see a doctor immediately.

NOTICE

Risk of damage to the machine due to improper cleaning
Using non-approved process media or cleaning agents may result in damage.

- ► Make sure that the cleaning agent does not damage any components!
- ► Never clean electronic components with water or other liquids!
- ► Make sure that no water or other liquids get into the electrical components!

NOTICE

Risk of damage to the machine due to improper cleaning
Do not clean the components listed below with compressed air, high-pressure jets, steam jets or liquids!

- ► Gear motors
- ► Rotational speed sensor
- ► Hub area on the side cover
- ► Joint heads and cylinders
- ► Guide carriages and rails
- ► Chain sprockets and chains

8.3.1 Manual cleaning

Information
The housing, side covers and rotor form a single unit and are matched to each other. These parts must not be replaced with the same parts from other valves and must always be installed at the previous position.

In valve designs conceived for manual cleaning, the rotor can be removed with a few manual actions without having to remove the rotary valve or disassemble it completely.

There are four designs for easier manual cleaning:

- **.2 design:** One-sided connector of the rotor shaft with the coupling on the driven end. You may pull the side cover and rotor as a single unit easily from the housing without changing the setting.
- **.3 design:** Two-sided connector of the rotor shaft with the coupling on the driven end and the receptacle on the non-driven end. You can pull the rotor from the housing and also pull it from the side cover.
- **.4 design:** USDA-certified design with coupling/receptacle like the .3 design also including the shaft sealing cartridge. You must open both side covers for regular cleaning in the .4 design.
- **.5 design:** USDA-certified design with coupling/receptacle like the .3 design also including the shaft sealing cartridge and CIP seal on the driven end. You must open only the side cover on the non-driven end for regular cleaning in the .5 design.

Note: For explanations on the labeling of each version, see Chapter 1.9.1 Type designation

Actions before cleaning

⇨ Stop the rotary valve.

SAFETY INSTRUCTIONS

- ► Switch off the material feed system and secure it against being switched on again.
- ► Run the rotary valve until empty and, if necessary, purge with air until empty (hazardous atmospheres).
- ► Switch off the gear motor of the rotary valve.
- ► If installed, switch off the purge gas and sealing gas.
- ► Release the pressure in the rotary valve and parts of the system at the top and/or the bottom.
- ► Switch off the master switch and secure it against being switched on again.
- ► Secure service media, such as voltage and compressed air, against being switched on again unintentionally.

8.3.2 Disassembly/assembly

⚠ WARNING

Risk of a cut injury!
Sharp surfaces, edges and corners of the housing bore and rotor blades may produce a cut injury!

- ► Wear personal protective equipment.
- ► In the event of injuries, see a doctor immediately.

⚠ WARNING

Danger due to hot surfaces!

Risk of burns from housing parts!

- ► Let the machine cool down.
- ► Wear personal protective equipment.

⚠ WARNING

Pinch point risk!
Machine parts are heavy. They may fall while being lifted; this is a pinch point risk.

- ► Wear personal protective equipment.
- ► Secure the rotary valve against overturning if necessary.
- ► Secure the rotor and side cover against falling.
- ► Always attach and securely fasten suitable lifting equipment.

NOTICE

Risk of damage to the machine!
When the FXS or AZV is open, the rotor makes contact with the side cover on the underside.

- ► While manually turning the rotor, lift it slightly to avoid damage.
- ► With the AZV, apply a turning gear starting at size 480.

Side cover and rotor as a unit (.2 /.3 /.4 /.5 design) and the ZZB valve

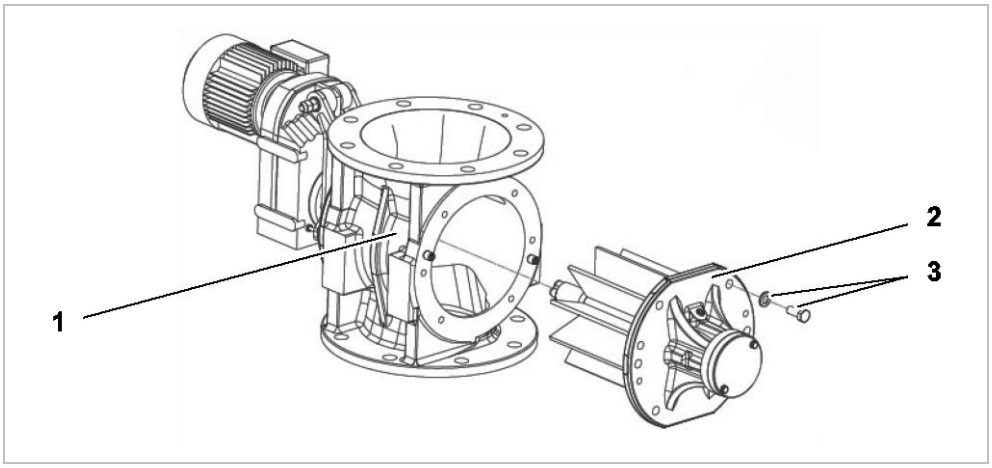


Fig. 8.1: Unit (.2 /.3 /.4 /.5 design) and ZZB valve

Disassembly:

⇨ Unscrew the side cover screw connection **[3]** and screw a threaded rod into any fastening thread to prevent rotation.

⇨ Loosen the side cover **[2]** using the extraction thread for forcing off.

⇨ Pull the side cover with the rotor from the housing **[1]**.

Assembly:

⇨ Inspect the coupling parts for cleanliness and clean them if necessary.

- Inspect polished surfaces and refinish if necessary.

⇨ Align the coupling and the mating piece to each other by rotating the rotor.

⇨ Carefully push the side cover **[2]** straight into the housing using the rotor until the side cover makes contact with the housing.

- Pay attention that the seal ring seats properly.

NOTICE

Risk of damage to the machine

► You must always be able to close the housing easily. Do not pull on the side cover using the cover screws!

► If you cannot push the rotor completely into the housing, pull the rotor back somewhat and rotate by about 10°. This makes engaging the coupling easier.

⇨ Screw in the side cover screw connection **[3]** by hand and then tighten cross-wise (watch the tightening torques).

Side cover and rotor as individual parts (.3 /.4 /.5 design)

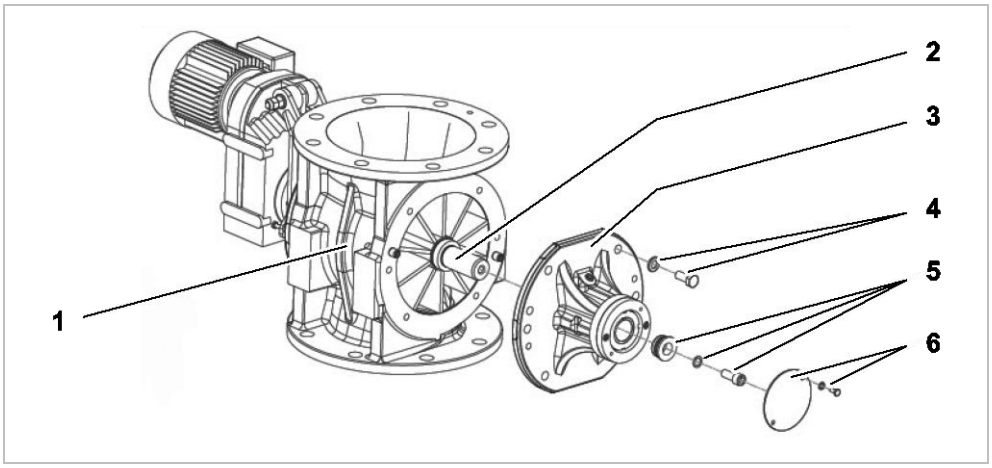


Fig. 8.2: Individual parts (.3 /.4 /.5 design)

Disassembly:

⇨ Remove the cover plate **[6]**.

⇨ Unscrew the bolt with seal ring **[5]** and adapter sleeve.

⇨ Unscrew the side cover screw connection **[4]** and screw a threaded rod into any fastening thread to prevent rotation.

⇨ Loosen the side cover using the extraction thread for forcing off.

⇨ Pull off the side cover **[3]** with the entire bearing unit.

⇨ Screw in the eye bolt in place of the bolt **[5]** and pull the rotor **[2]** out of the housing **[1]** using it.

Assembly:

⇨ Inspect the coupling parts for cleanliness and clean them if necessary.

- Inspect polished surfaces and refinish if necessary.

⇨ Align the coupling and the mating piece to each other by rotating the rotor.

⇨ Carefully push the rotor **[2]** straight into the housing **[1]**.

⇨ Seat the side cover **[3]**, fasten using the side cover screw connection **[4]**.

- Pay attention that the seal ring seats properly.

NOTICE

Risk of damage to the machine

► If you cannot push the rotor completely into the housing, pull the rotor back somewhat and rotate by about 10°. This makes engaging the coupling easier.

► You must always be able to close the housing easily. Do not pull on the side cover using the cover screws!

⇨ Install the bolt with seal ring and adapter sleeve **[5]**.

⇨ Install the cover plate **[6]**.

Quick-release shaft sealing cartridge (.4 /.5 design)

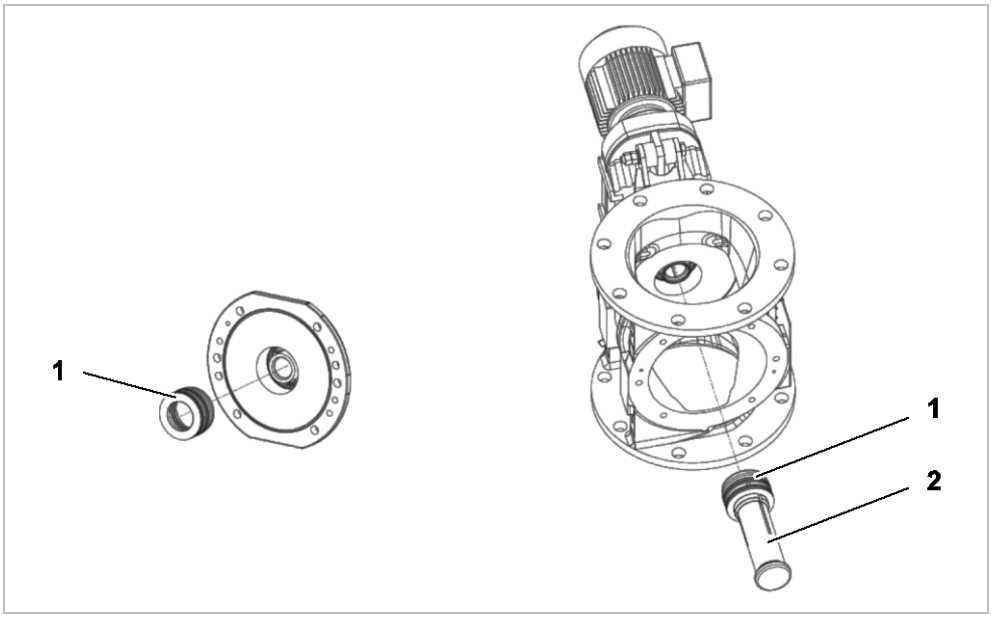


Fig. 8.3: Individual parts, shaft sealing cartridge (.4 /.5 design)

⇨ Disassemble the side cover and rotor as individual parts as described previously in the chapter.

⇨ Pull the shaft sealing cartridge **[1]** using the tool **[2]**.

⇨ After disassembly, carefully clean all parts.

Shaft sealing cartridge

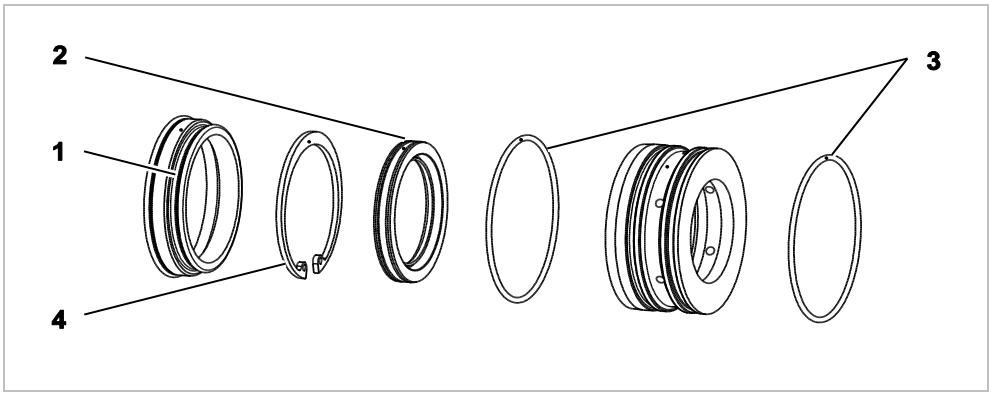


Fig. 8.4: Shaft sealing cartridge

Information
It is recommended to work with replacement shaft sealing cartridges so that the fouled shaft sealing cartridge can be cleaned separately, keeping the downtime of the valve short.

Disassembly:

⇨ Disassemble the shaft sealing cartridge for complete cleaning as follows:

- Remove the clamping ring **[1]**.
- Remove the retaining ring **[4]**.
- Pull out the shaft seal **[2]**.
- Remove the seal ring/O-rings **[3]**.

Assembly:

⇨ Assemble the cleaned shaft sealing cartridge in reverse order.

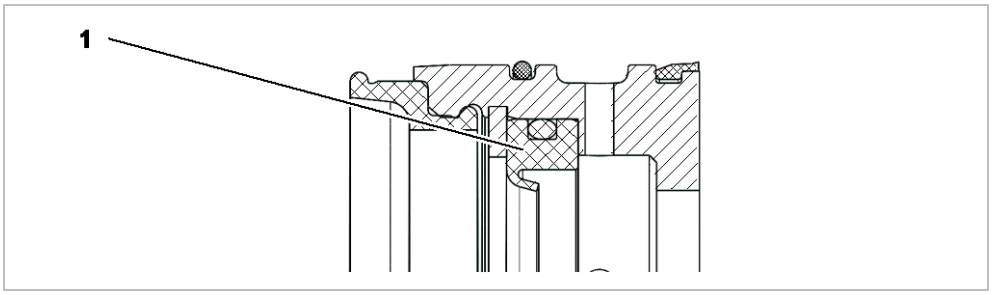


Fig. 8.5: Installing the shaft seal

⇨ Make sure the shaft seal **[1]** is installed properly!

8.3.3 Cleaning the valve (wet or dry)

⇨ Clean the components in accordance with the shop cleaning specifications.

NOTICE

Risk of damage to the machine
Water can penetrate inside the components and damage them.

- ► Authorization from Coperion GmbH is necessary for wet cleaning.
- ► Do not spray the valve from the outside.
- ► Protect electrical and pneumatic components against water.

⇨ Dry all components after wet cleaning.

8.3.4 Automatic cleaning (CIP cleaning)

The following valve types are provided for automatic cleaning without disassembling the rotor:

- **ZRD-CIP and ZFD-CIP**

Information
While CIP cleaning of the other valve types approved for wet cleaning is possible in theory, inadequate cleaning of specific areas (for example, joints and flange connections) is still possible. It is necessary to check the cleaning results afterward by disassembly, re-cleaning if necessary and manual drying.

Actions before cleaning

⇨ Prepare the entire system for CIP cleaning.

⇨ Configure CIP cleaning for the contamination level or degree of pollution and validate.

⇨ When selecting the cleaning media, temperatures, pressures and times, pay attention to the material resistance (standard sealing materials: hydrolysis-resistant polyurethane + EPDM, optionally PTFE).

⇨ The average flow rate of the cleaning solution must be at least 1.5 m/s!

⇨ Choose the maximum temperature of the cleaning solution in accordance with the name plate.

Cleaning the conveying paths

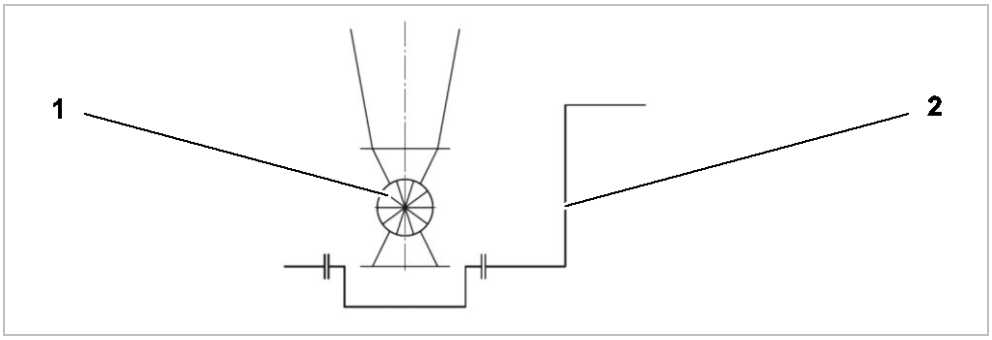
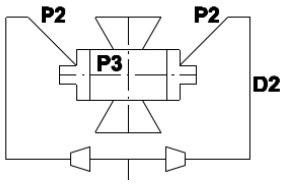


Fig. 8.6: Decoupling the valve for CIP cleaning

⇨ Decouple the valve **[1]** from the conveying pipe **[2]** (recommendation).

⇨ If decoupling is not possible or not desired, keep the following points in mind:

- Maximum permissible pressure with a turning rotor as per the name plate
- Maximum permissible pressure with a stopped rotor = 2.8 bar
- Purging gas pressure inside the valve (due to conveying pressure or hydrostatic pressure in adjacent components) during cleaning.

	**Pressure in the valve**	**Purge gas pressure**	**Value**
	p3 ≤ 1.5 bar	Purge gas pressure p2 =	max. p3 + 0.5 to 0.7 bar
	p3 > 1.5 bar (Stationary rotor)		max. p3 + 1.0 to 1.2 bar

Information
A permanently excessive purge gas pressure leads to increased wear and tear of the shaft seal and can have a negative effect on the delivery rate.

- Perform the subsequent cleaning of the valve and the components by way of the valve.

Cleaning the valve

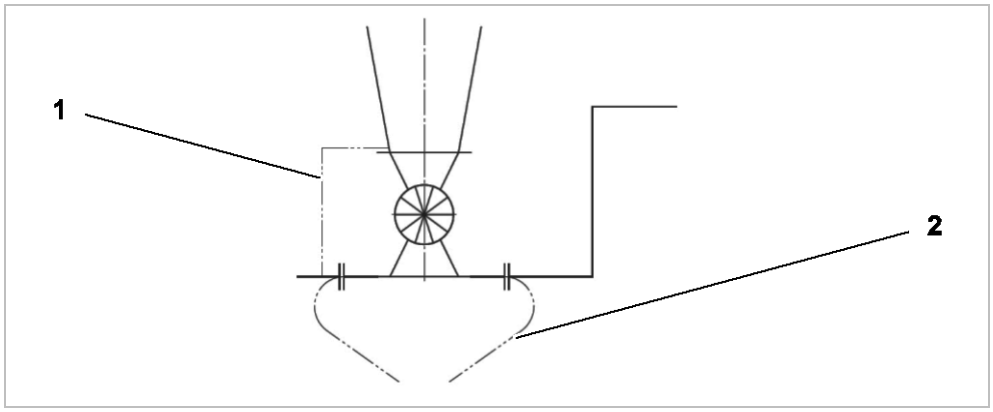


Fig. 8.7: Decoupling the valve for CIP cleaning

⇨ Clean the valve with the container/component above it.

- The valve must rotate during the cleaning process.

⇨ Drain the dirty water through the decoupling point **[2]**.

⇨ For the purge gas pressure, see the Cleaning the conveying paths table.

Information
There must be no back-up of the cleaning water above or below.
Use a bypass **[1]** if there are large quantities of water that cannot be removed directly through the valve!

Information
A permanently excessive purge gas pressure leads to increased wear and tear of the shaft seal and can have a negative effect on the delivery rate.

Drying the conveying paths and the valve

⇨ Dry the valve and conveying pipe completely using hot air (for the maximum temperature, see Chapter *1.9 Name plate*).

- The valve must rotate during the drying process.

⇨ The purge gas pressure must be at least 1.0 bar greater than the pressure in the valve caused by drying.

Information
A permanently excessive purge gas pressure leads to increased wear and tear of the shaft seal and can have a negative effect on the delivery rate.

Design information

The valves of the ZRD, ZVD, ZXD, ZXQ series in the hygienic version have been designed in accordance with the EHEDG criteria. They can be integrated into a dry cleaning process and can be easily cleaned.

Information
The cleaning procedure and the cleaning duration must be determined and validated for each application individually.
The cleaning procedure may have to be adapted.

8.4 Chopping valves, Level 1 (L1) & Level 2 (L2)

8.4.1 General operation

Chopping valves per Level 1 or Level 2 (recognizable by the abbreviation L1 or L2, respectively, on the name plate) must be operated with a suitable variable frequency drive and current-signal monitoring or a rotational speed sensor. A suitable variable frequency drive means one with the same power level as the motor being used for operation (for example, a 9.2 kW motor must be operated with a 9.2 kW variable frequency drive).

It is absolutely necessary to limit the current consumption to 150% of the nominal current and thus to about 1.5 times the nominal torque. This can only be guaranteed by a variable frequency drive of the same power level. The mechanical valve structure is designed for this. Exceeding this power level (for example, by using a larger variable frequency drive) may destroy the chopping valve.

8.5 Reverse operation for chopping valves Level 1 (L1) & Level 2 (L2) (to dissolve blockages)

Chopping valves per Level 1 or Level 2 (recognizable by the abbreviation L1 or L2, respectively, on the name plate) must be operated with a suitable variable frequency drive and current-signal monitoring or a rotational speed sensor.

In rare cases, there may be blockages of the rotor when used in chopping operation. This situation is detected by monitoring the current consumption or the rotational speed sensor.
In most cases, the blockage may be dissolved with brief reverse operation and the valve can then be operated normally.

To do this, use the following procedure:

- ⇨ Stop the valve
- ⇨ Set the motor frequency on the variable frequency drive to f_{Eck} (50 Hz / 87 Hz) and do not use a start ramp
- ⇨ Reverse the direction of rotation and rotate the valve for a maximum of 5 seconds (Level 1) or for a maximum of 10 seconds (Level 2) in reverse operation
- ⇨ Stop the valve
- ⇨ Set the motor frequency on the variable frequency drive to f_{Eck} (50 Hz / 87 Hz) and do not use a start ramp
- ⇨ Continue to operate the valve in the prescribed direction of rotation
- ⇨ After at least 10 seconds of operation without additional blockages, the desired rotational speed can be set again using the variable frequency drive.

If the process is unsuccessful, you can repeat it up to 5 times within 90 seconds.

If this is still not successful, you must disassemble and inspect the valve.

8.6 Behavior in the event of malfunctions

The local safety regulations apply in every case regardless of the following information.

SAFETY INSTRUCTIONS

- ► Switch off the master switch and secure it against being switched on again.
- ► Secure service media, such as voltage and compressed air, against being switched on again unintentionally.
- ► Disconnect the machine from the product flow.
- ► Make sure that there are no people in areas of the machine presenting a risk of injury.
- ► After correcting a malfunction, check the operation of the safety equipment.

⇨ Eliminate the cause of the malfunction.

8.6.1 Malfunctions, possible causes and remedies

Information
The malfunctions listed below are only examples.
The remedies given in the list may not be the only ones.

Malfunction	Possible causes	Remedies
Too little product conveyed	Bulk material supply interrupted	Check the bulk material supply
	Rotational speed too low	Increase the rotational speed
	Leakage gas removal inadequate, possibly air resistance too high or clogged	Check the leakage gas removal
	Leaky sealing cartridge for side-sealed rotors	Repair
Dust/gas escaping at the shaft seal	ATEX	Repair
	Defective shaft seal	
Running off center	Defective bearing	Repair
Only with chain drive	Defective chain drive	Inspect the chain drive
	Chain sprocket not flush	Adjust the chain sprocket
	Chain loose	Tighten the chain
Rotary valve blocked	Foreign matter in the rotary valve	Repair
	Excessive operating temperature or temperature difference between the rotor and the housing	Discussions with Coperion necessary!
	Housing twisted	Install the housing without mechanical stress
	Caked product	Clean
Sudden or continuous drop of a monitored purge gas pressure	Wear and tear or a defective shaft seal Malfunction in the supply line (provided by the customer)	Repair

⇨ For malfunctions that you cannot eliminate yourself using this table, please contact our Customer Service.

Information
Loud squealing or whistling noises may occur.
These can all be traced back to the bulk material and are not considered malfunctions.

8.6.2 Switching on after correcting a malfunction

SAFETY INSTRUCTIONS

- ► All malfunctions have been remedied.
- ► Make sure that there are no people in areas of the machine presenting a risk of injury.
- ► Check whether all wear parts are in ready to operate condition. Immediately replace worn components or those with other defects.
- ► Never try to operate the machine with the inlet or outlet open.
  There is the risk of severe injuries or death from flying product or shearing of a body part by the rotor!
- ► Operate the machine only with the protection and safety equipment installed!

⇨ Commission the valve as per chapter *7.4 Commissioning*.

9 Servicing

- Operational malfunctions caused by inadequate or improper maintenance may result in very high repair costs and long downtimes of the rotary valves. For this reason, regular maintenance is absolutely necessary.
- The operational reliability and the service life of the rotary valve depends on proper maintenance in addition to several other factors.
- When disassembling the components, pay special attention that the main components, which are matched to one another and identified by the serial number, are reassembled in their original position with respect to one another.

Information
Servicing and repair work require special technical knowledge and special abilities (neither of which is provided in this operating manual) and may only be performed by qualified technicians.
As was the case for commissioning, we recommend using Coperion personnel when making repairs to the rotary valve for the first time. This will give your maintenance personnel the opportunity to gain first-hand experience.
Only repair work that may be performed during maintenance are described.
For more extensive servicing and maintenance tasks, we make reference to the appropriate repair manual (available upon order).
A test run in a detached condition may only be performed with tightly closed inlet and outlet openings. Use the transport covers to close the openings.

Information
For removal and installation work as well as for all maintenance work on the gear unit or motor, we make reference to the separate operating manuals of the manufacturers.

9.1 Safety and personnel

Only trained, authorized and instructed maintenance personnel may do the work.

As per the EU Directive 2009/104/EC, ATEX devices may only be repaired or inspected by knowledgeable persons possessing the pertinent qualifications in explosion protection (for example, engineering knowledge, up-to-date and regular training). It is recommended to have COPERION perform the maintenance and repair work for reasons of operational safety.

DANGER

Danger due to unexpected starting
Machines can hit people. Risk of severe injuries resulting in death.

► Make sure that the master switch of the central power supply is switched off and a warning label is attached to prevent it from being switched on again. It must not be possible for the machine to be switched on while even one person is present in the hazard zone.

DANGER

Danger due to electrical voltage!
When working on live components, electric shock presents a danger to life!

- ► Only a trained and qualified electrician or instructed personnel under the direction and supervision of an electrician in accordance with electrical rules may perform any work on the electrical systems/machines or operating facilities.
- ► Make sure that the master switch of the central power supply is switched off and a warning label is attached to prevent it from being switched on again.
- ► Before beginning work, visually inspect live parts.
- ► Use suitable tools with sufficient dielectric strength.
- ► When performing repairs on electrical equipment, it must be separately switched off in advance.
- ► After opening the control cabinets and equipment of all components that store electric charge, discharge them and make sure that all components are deenergized.

WARNING

Risk of fire/explosion!
Dispersed dust deposits may lead to an explosion.

- ► Regularly clean the housing surface.

WARNING

Risk of fire/explosion!
Exhausting flammable gas from the inside of the valve may result in an explosion if operating with flammable gas.

- ► Run the rotary valve until empty and, if necessary, purge with air until empty (hazardous atmospheres).

9.2 Inspection and maintenance tasks

The following inspection and maintenance tasks are to be performed at regular intervals depending on the operating conditions:

- ⇨ Inspect the rotary valve for visible defects and peculiar conditions, for example, listen for abnormal running noises and product spillage at fall-out openings.
- ⇨ Check all screw connections for a firm seat.
- ⇨ Check the flange connections for leaks and a firm seat.
- ⇨ Inspection and maintenance tasks on the gear motor (see *Manufacturer's specifications*).

⚠ DANGER

Danger from moving and/or rotating parts!
When the machine is running, there is a risk of injury or death due to entanglement, crushing or the shearing of extremities!

- ► Do not reach into moving or rotating parts during operation.
- ► Make sure that moving parts are not accessible during operation.
- ► Do not wear loose clothing, jewelry or uncovered long hair.
- ► Before performing any work on moving components, switch off the machine and secure it against being switched on again. Wait until all components come to a stop.

⚠ WARNING

Danger of lung damage and/or eye injury due to dust!
Whenever working on or with the machines, dust may be dispersed and may lead to eye injuries and/or to lung damage by breathing.

- ► Wear personal protective equipment (suitable filter mask, safety goggles, etc.).
- ► Vacuum up the dust, collect it, etc.

⚠ CAUTION

Risk of a cut injury!
Sharp surfaces, edges and corners of the machine may produce a cut injury!

- ► Wear personal protective equipment.
- ► In the event of injuries, see a doctor immediately.

10 Maintenance

10.1 Maintenance and lubrication schedule

SAFETY INSTRUCTIONS

- ► Perform the prescribed installation, maintenance and inspection work on schedule.
- ► Only trained and qualified electricians may work on electrical machines.
- ► Switch off the master switch and secure it against being switched on again.
- ► Secure service media, such as voltage and compressed air, against being switched on again unintentionally.
- ► All bolts removed for maintenance or inspection work must be retightened using the specified torque and must be checked before recommissioning the machine.
- ► After completing the maintenance or inspection work, check that the safety equipment is operating properly.

Information
If more extensive work (for example, severe damage to the rotary valve) is necessary, a general overhaul must be performed in the manufacturer's factory.

Information
For maintenance and lubrication intervals, choose the time that comes first.

Activity	Maintenance intervals	
	Every six months or 2250 operating hours	Every two years or 9000 operating hours
Check the screw connections and joints for leaks and for a firm seat.	■	
Check all grounding bolts for a firm seat and check the ground for continuity.	ATEX ■	
Check the valve for smooth running	■	
Check the chain tension[7)] and adjust if necessary (only with a top-drive chain)	■	
Check the chain lubrication and relubricate if necessary (only with a top-drive chain)	[4)]	
Check the purge gas supply for the labyrinth ring - solenoid valve and piping for leaks and proper function (if present)	■	
Sealing gas supply for the side cover (type ZVH, ZGH, ZPH) - Check the solenoid valve, pressure regulator and piping for leaks and proper function (if present)	■	
Shaft seals, side cover seals and flange seals - Check tightness / condition, replace if necessary	ATEX ■	
Shaft seals with grease lubrication - In the design with grease lubrication, force in 2 to 3 piston strokes of grease	[4)]	
Sealing cartridge (type ZVH, ZPH, ZGH, ZVU) -Check the condition of the rope seals	■ [2)]	■ [3)]
Replace the shaft seals		■
Check the working surface of the seals for the proper condition, re-polish or replace the shaft sleeve if necessary		■
Relubricate the bearings	[4)]	
Bearing[1)] - check for proper condition when used in a safe atmosphere, replace it necessary. - replacement is mandatory if used in potentially explosive atmospheres.		ATEX ■
With the valve as a protection system. Inspecting the gaps.	See Chapter *12.3 EC-type examination certificate Protection system*	ATEX ■
Completely clean the valve		■
Hygienic valves: Check the cleaning result, modify cleaning if necessary	■ [5)]	
Gear motor	Comply with the manufacturer's specifications.	
In the case of valves used in wear-intensive applications (for example, DuroProtect valves or the use of minerals), perform a visual and dimensional check[6)] of all surfaces that come into contact with the product.	■	

[1)] The bearings used are designed for a service life in excess of 10,000 h under maximum operating conditions. Reducing the load (pressure difference, torque, rotational speed) increases the bearing life.

[2)] With purge gas piping installed: Measurement of air consumption at 0.5 bar system pressure in the side cover with the valve depressurized. The values must not exceed the specifications in the “Sealing gas consumption" table (see chapter *6 Installation*) for a pressure difference of 0.5 bar.

[3] Without sealing gas piping, check the condition with the valve removed.

[4] For the interval, see chapter *10.2 List of lubricating points*

[5] Obey the specifications of the branch and/or location.

[6] The explosion surge resistance may not be ensured due to a reduction in wall thickness

[7] Tighten the chain so that it can be pressed down by hand by about 15 mm.

10.2 List of lubricating points

Designation	Lubricating point	Interval	Location / Component	Lubricant*	Amount
All valves without lubricating nipples 4+5	Lubricated for life				
ZXQ ZAQ ZAW ZVU	**[4]**	Every two years or 9000 operating hours	Side cover top	Application range -20 °C to 120 °C: Lithium soap based Application range -45 °C to 230 °C: PTFE based** Application range Food products -45 °C to 230 °C: NSF H1 Authorization	
	[5]	Every year or 4500 operating hours			
ZVH, ZGH, ZPH Starting at size 480	**[4]**	Every two years or 9000 operating hours			
	[5]				
All valves >220 °C	**[4]**	Every year or 4500 operating hours			
	[5]				
Set of seals WS_	**[1] + [3]**	Every six months or 2250 operating hours	Below on the side cover, at the top starting with size 480		2 to 3 piston strokes of grease
Chain (all sizes)	**[2]**	Every six months or 2250 operating hours	Chain box	Lithium soap based	As needed

Information
For valves in the process area for PE/PP processes (with CH atmospheres) and PTA/CTA applications, PTFE-based grease is used regardless of the temperature.

⇨ * Choose an appropriate lubricant and manufacturer from the list of lubricants. This recommendation, of course, does not exclude the use of lubricants of other makes having the same properties. The operator is responsible for checking.

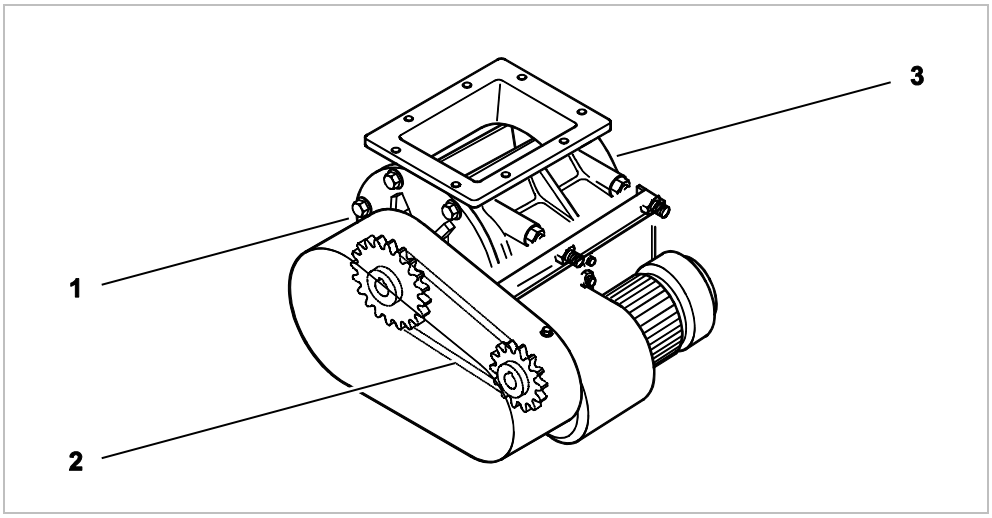


Fig. 10.1: Lubricating points

10.3 Bearing lubrication

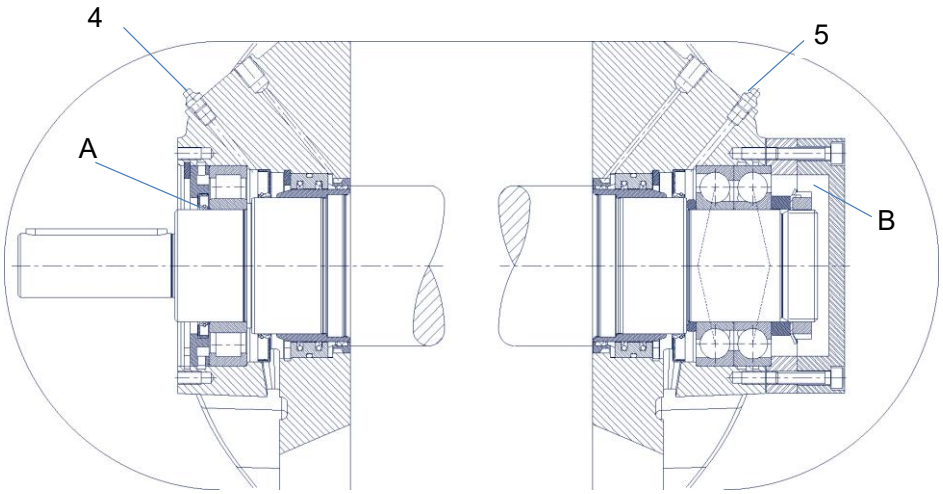


Fig. 10.2: Drawing of lubricating points

⇨ Remove the bearing covers and apply grease by way of the lubricating nipples **[4, 5]** until new grease seeps out of the bearing on the other side.

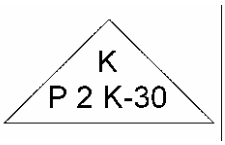
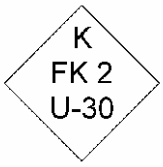
⇨ The space in the direction of the drive system or slotted nut must not be filled with grease.

10.3.1 Greasing the bearings for the first time

Greasing the bearings for the first time only refers to valves with lubricating nipples **[4, 5]**.

After properly installing the seal configuration for the inside of the valve, insert the angular contact ball bearing completely filled with grease or fill the cylindrical roller bearing completely with grease after insertion. Then, add grease by way of the lubricating nipples **[4]** and **[5]** until grease seeps out of the bearing on the other side. The spaces **[A]** and **[B]** in the direction of the drive system or slotted nut must not be filled with grease.

10.4 Lubricant list

Manufacturer	Grease based		Special application
	Lithium soap based	PTFE-based*	Food products
	Designation as per DIN 51502		
			NSF H1
AVIA	AVIALITH 2 EP -30 °C to 120 °C	-	-
Teccem	-	Fluoronox MS 30/2 / NSF H1 -45 °C to 230 °C	
Klüber	Centoplex 2 EP -20 °C to 120 °C	KLÜBERTEMP HM 83-402 -30 °C to 260 °C	Klüberalfa HPX 93-1202 / NSF H1 -20 °C to 300 °C
Fuchs	Renolit LZR 2 H -30 °C to 140 °C	-	-
Bechem	High Lub L2 EP -20 °C to 120 °C	Berutox VPT 54-2 / NSF H1 -30 °C to 230 °C	
Setral	MI-setral-LI/PD 2 -35 °C to 230 °C	SYN-setral-INT/250 FD-2 -40 °C to 260 °C	-
Mobil	Mobilux EP 2 -20 °C to 130 °C	-	-
Shell	Shell Gadus S2 V145KP 2 -30 °C to 120 °C	-	-
	Shell Gadus S2 V220 2 -30 °C to 120 °C	-	-

* Do not mix with mineral lubricants. Keep products unmixed. Only relubricate with the same lubricant or the specified alternate lubricants.

11 Disposal

Information
The manuals supplied for the accessories must generally be observed.

11.1 Environmental protection

Packaging material and used or left-over operating supplies are to be sent to recycling in accordance with the environmental protection regulations and provisions applicable at the location.

Protecting natural resources is one of the top-priority tasks. Proper disposal avoids negative effects on humans and the environment, and allows reuse of valuable raw materials.

11.2 Operating supplies and materials

Dispose of operating supplies and materials in accordance with the pertinent specifications and the regulations of the country.

11.3 Electrical system/electronics

Dispose of the electrical/electronic components in accordance with the pertinent regulations of the country.

12 Appendix

12.1 Tightening torques

If no other data are provided, all screw connections on the component must be tightened as per the following tables with due consideration given to the permissible mounting flanges:

See chapter 6.2 Fig. Flange contact.

	Bolt size										
Property class (bolt head)	M6	M8	M10	M12	M14	M16	M20	M24	M27	M30	M33
	Channel hole [mm]										
	6.4-7	8.4-10	10.5-12	13-14.5	15-16.5	17-18.5	21-24	25-28	28-32	31-35	34-38
	Tightening torque M_a [Nm]										
5.6	4	15	21	36	57	90	176	302	446	610	815
8.8	9	23	45	77	122	192	375	645	951	-	-
10.9	14	33	66	114	179	282	551	947	1397	-	-
A2/A4 – 70	6	14	28	48	76	119	233	402	-	-	-
A2/A4 – 50	-	-	-	-	-	-	-	187	275	271	503

5.6 - 10.9: with washer, dry and zinc plated; A2/A4 – XX: with washer, greased

	Bolt size								
Property class (bolt head)	-	-	-	-	5/8"	3/4"	7/8"	1"	1 1/4"
	Channel hole [mm]								
	-	-	-	-	17-19.1	20-22.2	23.2-25.4	26.4-28.6	32.8-34.9
	Tightening torque M_a [Nm]								
ASTM A 193 B7	-	-	-	-	291	418	679	1015	1827
18 – 8	-	-	-	-	79	139	224	335	665

ASTM A 193 B7: with washer, dry and zinc plated; 18 – 8: with washer, greased

Information
The tightening torques given in the tables above must not be exceeded.

12.2 Additional operation and maintenance specification for explosion-pressure burst-proof rotary valves and rotary valves as a protection system

12.2.1 Explosion-pressure burst-proof capability

The explosion-pressure burst-proof capability of Coperion rotary valves of the types ZXD, ZRD, ZRC, ZRX, ZKD, ZRC, ZKX, ZVD, ZVC, ZVX, ZVB, ZVT, ZGB, ZGM, ZPD, ZPC, ZPX, ZDD, ZFD, ZVH, ZGH, ZPH, ZXQ, ZAQ, ZAW, ZZB, ZZD can only be ensured if the following items are taken into consideration:

- A manufacturers' declaration must be provided.
- Any change to the rotary valve requires the approval of Coperion.
- All bolts must always be carefully tightened with the prescribed torque (see chapter *12.1 Tightening torques*). Defective threads and bolts must be replaced immediately.
- All accessories and connection parts must meet the increased requirements on pressure and temperature.

12.2.2 Protection system and equipment category 1 according to Directive 2014/34/EU (ATEX)

The flameproof design and/or equipment category 1 of Coperion rotary valves of types ZXD, ZXQ, ZRD, ZRC, ZRX, ZRT, ZVD, ZVC, ZVX, ZVT, ZPD, ZPC, ZKD, ZKC, ZKX, ZFD, ZDD, ZZD and ZZB can only be ensured over the long term if the following items are taken into consideration:

- A declaration of conformity identifying the valve as a protection system or as a device of Category 1 must be provided.
- A name plate identifying the valve as a protection system or as a device of Category 1 must be attached to the valve.
- Any change to the rotary valve requires the approval of Coperion.
- All bolts must always be carefully tightened with the prescribed torque (see chapter *12.1 Tightening torques*). Defective threads and bolts must be replaced immediately.
- The bolts on any wear blades present must be reliably secured to absolutely prevent an unintentional change in the gaps. Loctite 243 must be used to secure the bolts. The wear blades must also be secured with tack welds.
- All accessories and connection parts must meet the increased requirements on pressure and temperature.
- Only original spare parts may be used for repairs.

12.2.3 Protection system only

- The valve must be checked regularly for wear and damage. The operator is responsible for specifying the inspection intervals. (Recommendation: about every 6 months for non-abrasive products). The maximum permissible gaps between the rotor and the housing or the rotor and the side cover are specified in the table (see chapter *12.3 EC-type examination certificate* Protection system).
- The rotary valve drive system must be controlled such that in the event of an explosion, the rotor stops immediately. The Stop equipment is not included in the shipment contents from Coperion. After this, the valve must be thoroughly examined and overhauled before it is put back into operation.
- For valves in CIP design (ZRD-CIP and ZFD) the condition of all front-flush seals (CIP seals, e.g. between side cover and housing) must be checked in accordance with the maintenance schedule and replaced after an explosion.

12.3 EC-type examination certificate Protection system

Valve type	ZXD	ZRD, ZRC, ZRX, ZRT, ZVD, ZVX, ZVT, ZKD, ZKC, ZKX, ZFD, ZVC, ZPD, ZPC	ZXQ	ZDD
Size	150 - 400	150 - 630	400 - 700	200 – 550
Min. blade width [mm]	1.5			
Max. radial gap [mm]	0.45			
Max. axial gap [mm]	0.6			
Max. rotational speed [rpm]	See Chapter *4 Technical data*).			
Dust class	ST2			
Max. explosion-pressure burst-proof capability [bar]	10			5
Maximum experimental safe gap (MESG) [mm] (Maximum Experimental Safety Gap)	≥ 1.3			
Gas subcategory	No authorization			
Dust subcategory	IIIC (excluding metallic dusts)			

The protection system is satisfied with the valve stationary and with the valve rotating in the prescribed direction at the permissible rotational speed as well as in the direction of product conveyance and opposite the direction of product conveyance.

Gap width measurement

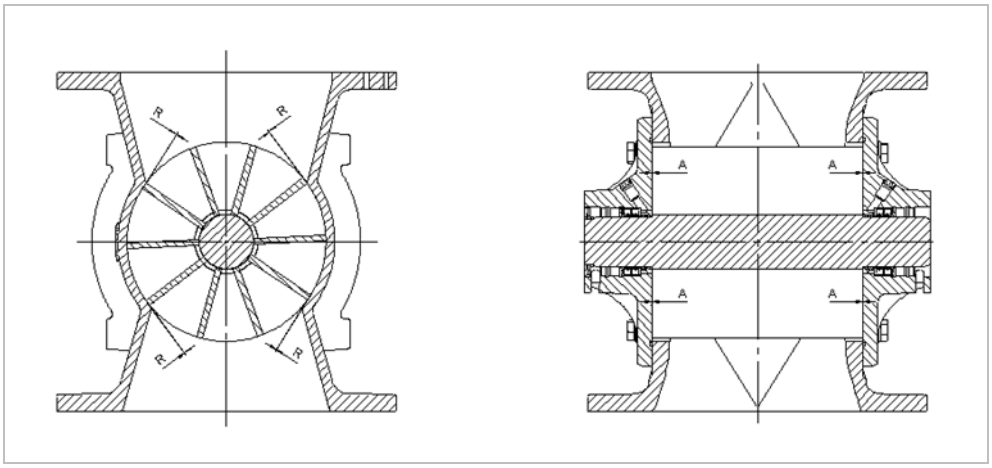


Fig. 12.1: Radial gap R and axial gap A

⇨ Measure the radial gap R and axial gap A with a feeler gauge.

⇨ Compare the measurement result with the limits in the table.

NOTICE

Gap dimensions must not be exceeded anywhere!

► Loss of function as a protection system.

Information
If the rotor is closed on the side, the valve must be partially disassembled to measure the axial gap.

Blade width measurement

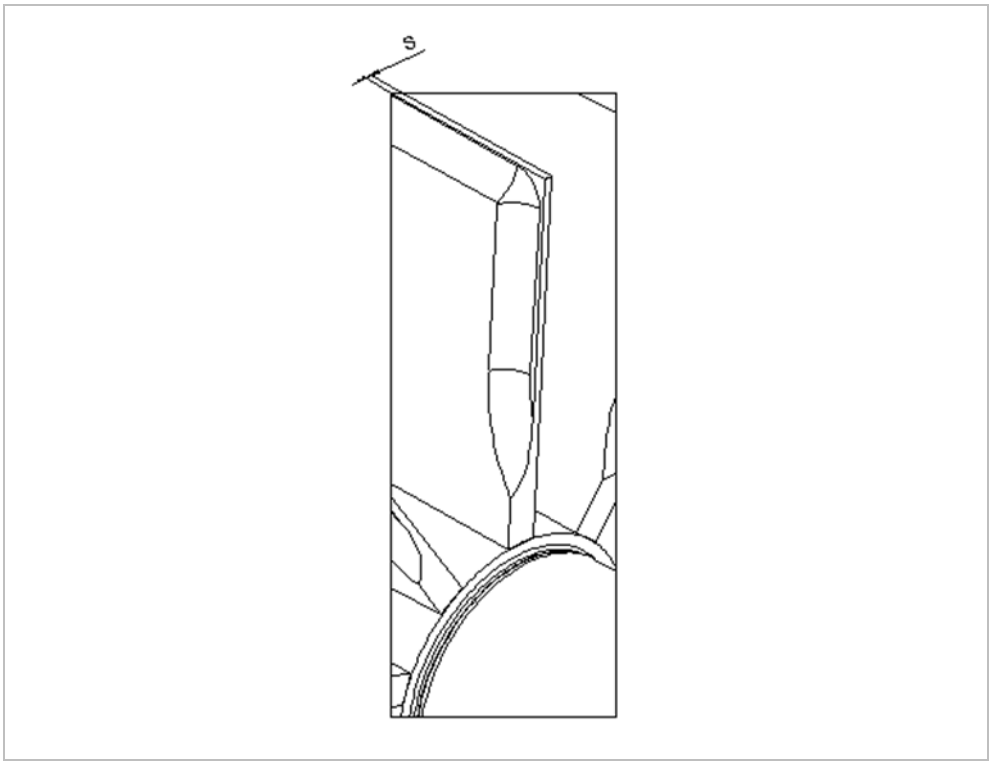


Fig. 12.2: Blade width S

⇨ Measure the blade width S with a vernier gauge.

⇨ Compare the measurement result with the limits in the table.

NOTICE

The blade width must not be exceeded anywhere!

► Loss of function as a protection system.

13 Certificates

Translation of the original

Declaration of conformity with the Directive 2014/34/EU (ATEX)

Coperion GmbH, Niederbieger Str. 9, 88250 Weingarten

declares that, under our sole responsibility, the following types:

Medium-pressure rotary valve:	**ZXD, ZRD, ZRC, ZRX, ZKD, ZKC, ZKX, ZVD, ZGD, ZVC, ZVT, ZRT, ZVX, ZVB, ZGB, ZGM, ZPD, ZDD, ZFD, ZPC, ZPX, ZZB, ZZD**
High-pressure rotary valve:	**ZVH, ZGH, ZPH, ZXQ, ZAQ, ZAW**

complies with the following EC Directive:

ATEX 2014/34/EU Equipment Category II 2GD for Zone 1 and 21

The following harmonized standards were applied:
DIN EN 1127-1:2019, DIN EN IEC 60079-0:2019 including Corrigendum 1: DIN EN IEC 60079-0:2021, DIN EN ISO 80079-36:2016, DIN EN ISO 80079-37:2016

The following national standards and directives were also applied:
None

The documents in accordance with Appendix VIII No. 2 have been submitted to the named agency

FTZÚ
Pikartská 1337/7
CZ - 71607 Ostrava-Radvanice
Identification No. 1026

Notice:
Accessories for valves in ATEX must comply with the equipment category required there.
If there are different equipment categories for the valves and accessories or between accessories, the valve may only be used for the lowest designated equipment category.

We point out that commissioning is forbidden until it has been determined that the machine/system into which this product is installed complies with the specifications of additional directives used as a basis and the information contained in the operating manual.

This declaration is only valid in conjunction with the corresponding identification on the device.

23 June 2021		
Date	by order of Bruno Zinser Head of Design Construction ATEX inspector	by order of Thomas Schöllhorn CE inspector

Translation of the original
Declaration of incorporation regarding Directive 2006/42/EC

The manufacturer
Coperion GmbH, Niederbieger Straße 9, 88250 Weingarten,
declares herewith that for the products:

Rotary valves of

ZXD, ZRD, ZRC, ZRX, ZRT, ZKD, ZKC, ZKX, ZXQ, ZAQ, ZAW, ZDD, ZVD, ZVC, ZVX,

ZVB, ZVT, ZPD, ZPC, ZPX, ZGM, ZGD, ZGB, ZVH, ZPH, ZGH, ZVU, ZFD, ZZB, ZZD

the following basic health and safety requirements as per Appendix I

of Machinery Directive 2006/42/EC

have been applied and complied with.

- General principles no. 1
- Numbers 1.1.2, 1.1.3, 1.1.5, 1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.3.7, 1.3.8, 1.4.1, 1.4.2.1, 1.5.1, 1.5.2, 1.5.3, 1.5.7, 1.5.8, 1.5.9, 1.6.1, 1.6.4, 1.7.2, 1.7.3, 1.7.4, 2.1.1

Commissioning is forbidden until it has been determined that the machine into which the partially completed machine listed above is to be installed complies with the specifications of the Machinery Directive.
To this end, the following additionally applied basic health and safety requirements as per Appendix I must be assessed during planning.

- Numbers 1.1.7, 1.2.1, 1.2.2, 1.2.3, 1.2.4.1, 1.2.4.2, 1.2.4.3, 1.2.4.4, 1.2.5, 1.2.6, 1.5.5, 1.5.6, 1.5.13, 1.6.2, 1.6.3, 1.6.5, 1.7.1

The special technical documents were created as per Appendix VII Part B.

We pledge to provide the special documents on the partially completed machine to the national bodies in paper form upon request.

The following harmonized standards were applied: EN ISO 12100-2010 including Corrigendum 1: DIN EN ISO 12100:2013

Responsible for the document:
Thomas Schöllhorn, Niederbieger Straße 9, 88250 Weingarten

Date	by order of Dr. Bernhard Stark Manager, Research & Development Polymer Division	by order of Thomas Schöllhorn CE inspector
13 January 2021		

Translation of the original
Manufacturers' declaration for Directive 2014/30/EU (EMC)

Coperion GmbH, Niederbieger Str. 9, 88250 Weingarten

declares that, under our sole responsibility, the following type of

Rotary valves

ZXD, ZRD, ZRC, ZRX, ZRT, ZKD, ZKC, ZKX, ZXQ, ZAQ, ZAW, ZDD, ZVD, ZVC, ZVX, ZVB, ZVT, ZPD, ZPC, ZPX, ZGM, ZGD, ZGB, ZVH, ZPH, ZGH, ZVU, ZFD, ZZB, ZZD

with connected electrical accessories

The device is intended for installation in one specific stationary system and is not available on the open market. As per Article 19, paragraph 1 of Directive 2014/30/EU, this device does not receive an EU Declaration of Conformity or CE marking according to this Directive.

To establish conformity of the overall system, the device must be installed and documented according to the recognized engineering rules of electromagnetic compatibility.

25 June 2019		
Date	by order of Dr. Bernhard Stark General Manager, Technology Research & Development	by order of Michael Volz Head of Automation

