SERIES : AL-AXL-AML-USAL-AR-NR / GL / BL-BXL-BXXL

ROTARY VALVES

OUTBOARD BEARINGS

Installation, Operation and Maintenance Manual

English

Original English Manual

Document number: RV-01-00-ENG, revision: 5.3.0

DMN WESTINGHOUSE

SERIES : AL-AXL-AML-USAL-AR-NR / GL / BL-BXL-BXXL

ROTARY VALVES

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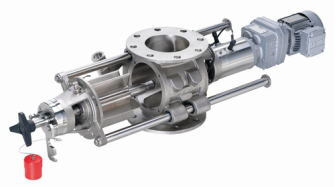
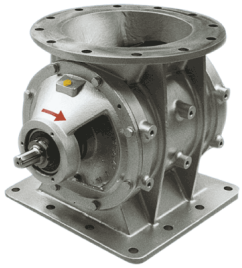
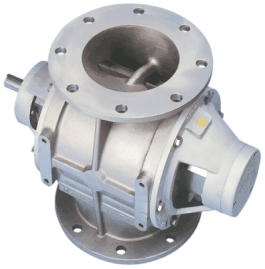
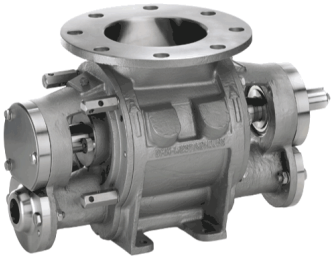

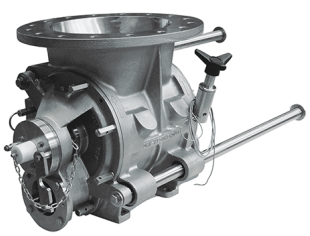

DMN-WESTINGHOUSE rotary valves have a well-established reputation for being able to handle powders and granular products from all industries, such as dairy, food, pharma, plastics and chemicals. We supply cast iron, aluminium and stainless steel valves in a range of executions, depending on the materials to be handled. For abrasive products we offer different coatings depending on the nature of the materials, such as Hardox replaceable blades, Hard Chrome and Tungsten Carbide. For sanitary applications we have our rail rotary valve, the “MZC”, “MZC-I” and “MZC-II”, to allow easy removal of the rotor for cleaning purposes. A solution for CIP (Clean In Place) is also available. The valves can be polished internally and have full USDA / FDA approvals.

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1. FOREWORD

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

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

1.1 Responsibilities for owner and user

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

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

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

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

As DMN-WESTINGHOUSE we strongly recommend you to:

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

1.2 How to work with this manual

This manual is written for the rotary valves with outboard bearings.

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

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

Instruction

1. Pick up this IOM-Manual.
2. Look up serial number from builder's plate (mounted on the rotary valve).
3. Get corresponding documents 'Sales order confirmation' and 'Part list' related to the relevant serial number of the rotary valve (refer to chapter Applicable documents).
4. Look up type of rotary valve and its configuration (rotor, seals, bearings etc.).
5. Consult content page of the IOM-manual, to see which chapter the desired information is on.
6. Get the needed information related to the type of valve and its configuration as mentioned in the corresponding documents.

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

1.3 Revision service

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

The revision number consists of a three-part code:

Change related to ATEX | Changes in general | Improvements

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

2. CONTENTS

2.1 Terms and definitions

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

APS	Autonomous Protective System (ATEX-Approval)
ATEX (EX)	ATmospheres EXplosibles
CE	Conformité Européenne
EAC	EurAsian Conformity
EC	European Commission
EHEDG	European Hygienic Engineering & Design Group
Eq	Equipment (ATEX-Approval)
FDA	Food and Drug Administration
HT	High Temperature
IOM-Manual	Installation, Operation and Maintenance Manual
USDA	United States Department of Agriculture

2.2 Applicable documents

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

3. PREFACE

3.1 Intended and non-intended use of the product

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

3.2 Changes and modifications

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

3.3 Liability

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

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

3.4 Warranty

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

4. CONTACT INFORMATION

DMN-WESTINGHOUSE has a network of offices and distributors around the globe. For your nearest office or distributor please see our contact page on the website: www.dmnwestinghouse.com/nl/contact

Where there is no dedicated office or distributor for your location, please contact our head office.

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5. PRODUCT INFORMATION

5.1 General working principle rotary valve

Rotary airlock valves are also called rotary feeders or rotary valves. The main purpose of a rotary valve is to maintain a pressure differential between inlet and outlet. Rotary valves are used in conveying systems to dose and feed solid bulk products (powder or granular) within processes. These valves serve as a “lock” to prevent air loss while simultaneously performing material handling functions.

We divide a rotary valve into the following main parts:

1. Body
2. End covers
3. Rotor
4. Seals
5. Drive

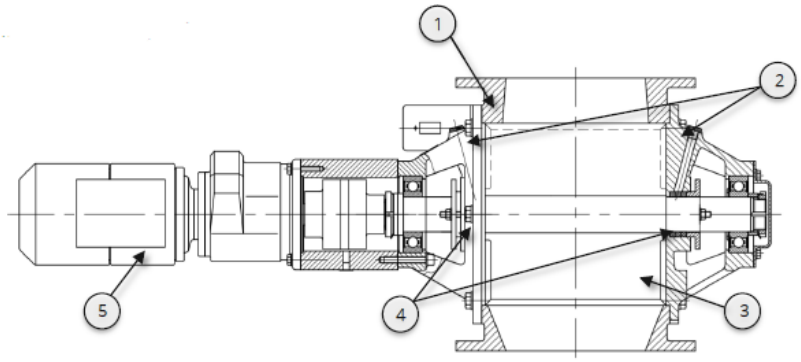


Figure 5.1: Main parts rotary valve (typical standard AL-series)

The rotor blades of a rotary airlock valve rotate during operation. As they do, pockets form between them. The material being handled enters the pockets of the rotor through the inlet and leaves the pockets through the outlet by using a rotor. In an airlock valve, air is sealed (locked) between the inlet and outlet due to typical clearances between the rotor and the body. This allows the materials to travel downward through the valve from the inlet to the outlet while restricting the airflow. Material is moved continuously through the presence of a constant air pressure between the inlet and outlet. This pressure or vacuum difference must be maintained within the valve for proper function.

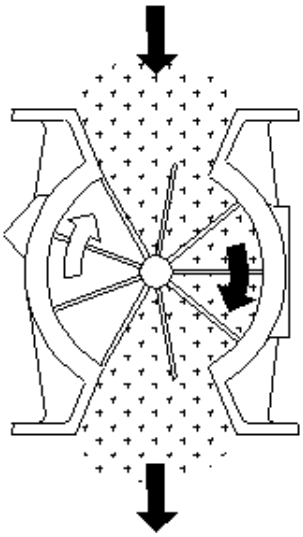


Figure 5.2: Schematic view of a rotary valve

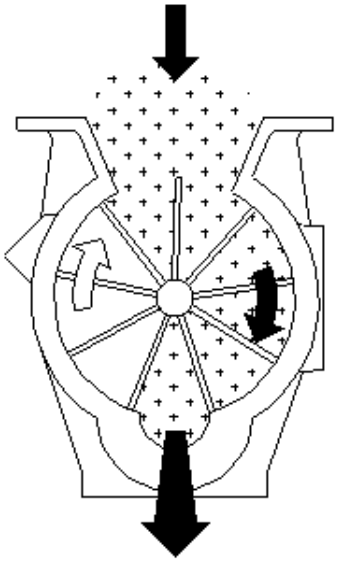


Figure 5.3: Schematic view of a rotary valve with a blow line

In this document the rotary valve is divided into two principles:

1. Product (powder/granular) falls into the inlet and leaves the rotary valve at the outlet. The outlet can be connected to a dropout box to feed a pneumatic conveying line (AL-AXL-AML, USAL-AR-NR, GL).
2. Product (powder) falls into the inlet and leaves the rotary valve through a blow line. The outlet must be connected to a pneumatic conveying line (BL-series).

5.2 Identification

For identification a name plate is mounted on the rotary valve.

5.2.1 Name plate (standard products)

The standard rotary valve is equipped with a name plate which describes:

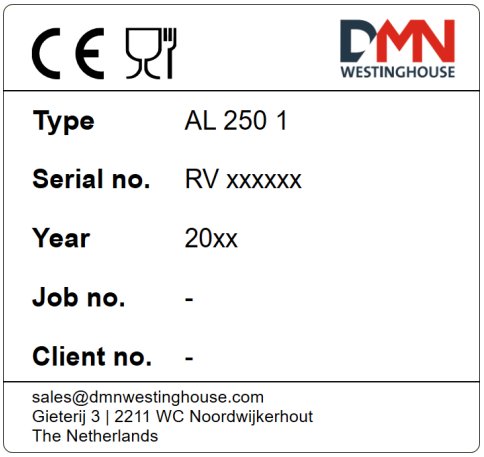


Figure 5.4: Name plate (standard product)

Figure 5.5: Possible locations of name plate

5.3 Responsibilities for owner and user

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

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

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

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

As DMN-WESTINGHOUSE we strongly recommend you to:

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

5.3.1 Type designation

The type designation consists of a five-part code.

5.3.1.1 Type designation (AL-series/BL-series/AML-series/GL-series/BL-series)

	-		-		-		-	
⇓		⇓		⇓		⇓		⇓
Type		Size (inlet ⌀ / ☐)		Execution		Additional		ATEX

For example	AML	–	150	–	2	–	HT250	–	APS

Type	Airlock AML
Size	⌀ 150mm or ☐ 150mm inlet size
Execution	Stainless steel
Additional	High Temperature 250°C
ATEX	ATEX-Approval Autonomous Protective System (APS)

For the explanation of the available types, sizes, materials and executions, we refer to the overview of codes on the following pages.

5.3.1.2 Overview codes of AL-series/BL-series/AML-series/GL-series/BL-series

	-		-		-		-	
⇓		⇓		⇓		⇓		⇓
Types		Sizes (Inlet ⌀/ ☐)		Execution		Additional		ATEX

Code	Description	Code	Description	Code	Description	Code	Description	Code	Description
AL	Airlock AL	100	100 mm	1*	Cast Iron	-	Standard	-	No EX
AXL	Airlock AXL	150	150 mm	2*	Stainless steel	HT250	High temperature 250°C	Eq	EX-Approval Equipment
AML	Airlock AML	175	175 mm	3N*	Cast Iron complete Nickel plated	HT400	High temperature 400°C	APS	EX-Approval Autonomous Protective System
USAL	Airlock AL	200	200 mm	3C*	Cast-Iron Internals Chrome plated	HT600	High temperature 600°C		
BL	Blowing Seal BL	250	250 mm	4C*	Cast-Iron Bore Chrome plated	D	Easy detachable		
BXL	Blowing Seal BXL	300	300 mm	4TCO*	Cast-Iron Tungsten coated	MZC	Easy detachable with slide rails		
BXXL	Blowing Seal BXXL	350	350 mm	4TS	Cast-Iron Tungsten coated	DMZC	Dairy with slide rails		
GL	Granular Airlock GL	400	400 mm	5	Aluminium	MZC-I	Slide rails - Opening at non drive end		
		450	450 mm	Dairy	Stainless steel	MZC-II	Slide rails - Opening at both ends		
		500	500 mm	Dairy-WD	Stainless steel				
				Dairy-EL I	Stainless steel				

* Additional Execution code B for BUP rotor (refer to chapter 5.9.1.5).

For example

AL – 250 – 2B – - – APS

5.3.1.3 Overview codes of AR-series

⇓ Types		⇓ Sizes (Inlet ⌀/ ☐)		⇓ Execution		⇓ Additional		⇓ ATEX	
Code	Description	Code	Description	Code	Description	Code	Description	Code	Description
AR	Airlock AR	300	In- and outlet 200x150mm	2	Stainless steel	-	Standard (Ball Bearing)	-	No EX
		400	In- and outlet 200x200mm					Eq	EX-Approval Equipment
		625	In- and outlet 250x250mm						

For example

AR – 300 – 2 – - – Eq

Type	Airlock AR
Size	☐ 200 mm x 150 mm inlet size and ☐ 200 mm x 150 mm outlet size
Execution	Stainless steel
Additional	Standard
ATEX	ATEX-Approval Equipment

5.3.1.4 Overview codes of NR-series

Types		Sizes (Inlet ⌀/ □)		Execution		Additional		ATEX	
Code	Description	Code	Description	Code	Description	Code	Description	Code	Description
NR	Airlock NR	347	Inlet 347; Outlet 355x250mm	2	Stainless steel	-	Standard (Ball Bearing)	-	No EX
				Dairy	Stainless steel	HT250	High temperature 250°C	Eq	EX-Approval Equipment
				Dairy-WD	Stainless steel	HT400	High temperature 400°C	APS	EX-Approval Autonomous Protective System
				Dairy-EL I	Stainless steel	HT600	High temperature 600°C		
						D	Easy detachable		
						MZC	Easy detachable with slide rails		
						DMZC	Dairy with slide rails		
						MZC-I	Slide rails - Opening at non drive end		
						MZC-II	Slide rails - Opening at both ends		

For example	NR	–	347	–	2	–	-	–	Eq	
Type	Airlock NR									
Size	⌀ 347 mm inlet size and □ 355 mm x 250 mm outlet size									
Execution	Stainless steel									
Additional	Standard									
ATEX	ATEX-Approval Equipment									

5.3.2 Name plate (ATEX certified products)

The ATEX certified rotary valve is equipped with a specific name plate giving additional ATEX information.

Figure 5.6: Name plate (ATEX certified products)

Figure 5.7: Possible locations of name plate

5.3.3 ATEX marking

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

ATEX marking on the products:

ATEX-Approval Equipment (Eq)

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

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

ATEX-Approval Autonomous Protective System (APS)

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

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

*to fill in the concerning temperature or temperature class

Code/symbol	Description
	Ex Mark for equipment in explosive atmospheres
II	Above ground industry
1/2 D	Internal zone 20 (it can also be used for zone 21, 22) External zone 21 (it can also be used for zone 22)
1/2 G	Internal zone 0 (it can also be used for zone 1, 2) External zone 1 (it can also be used for zone 2)
-/2 G	External zone 1 (it can also be used for zone 2)
h	Nonelectrical type of protection constructional safety “c” EN-ISO 80079-37:2016 ► Bearing ► Seal
IIB	Explosion group of explosive Gas atmosphere (a typical gas is ethylene)
IID	Protective system
IIIC	Explosion group of explosive Dust atmosphere (suitable for combustible flyings, non-conductive dust and conductive dust)
T*	The actual maximum surface temperature depends not on the equipment itself, but mainly on operating conditions (temperature of the product) and the marking is T*. The relevant information is given in the instructions for use.
Da/Db	Very high (Da) / High (Db) protection level for use in hazardous areas (Dust).
Ga/Gb	Very high (Ga) / High (Gb) protection level for use in hazardous areas (Gas).
-/Gb	High (Gb) protection level for use in hazardous areas (Gas).

*concerning temperature or temperature class

5.4 Standard Types and Executions

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

5.4.1 AL-series (AL/AXL)

AL/AXL rotary valves handle solid products. The AXL rotary valve is adjusted with an extra enlarged inlet.
Product falls into the inlet and leaves the rotary valve at the outlet. Outlet can be connected to a dropout box to feed a pneumatic conveying line.

Figure 5.8: AL-series (AL/AXL)

AL/AXL

Pressure	Up to 2 bar
Product temp °C	Up to +150°C (optional up to +600°C depending on material of construction)
Ambient temp °C	-20°C...+40°C
Standard / Easy Detachable	Yes
RID control	Yes
Rotor	Adjustable blades / Fixed vanes
Adjustable blades	Steel / Steel hardened / Stainless steel / Polyurethane
Shaft seal	Packing (cord) or lip seal, both with or without air purge
Drive	Chain / Direct drive: Helical gear unit / Parallel shaft helical gear unit
ATEX 2014/34/EU	1GD/2GD Equipment 1D/2GD Protective system

	AL	AXL
MZC/MZC-I/MZC-II	Cast iron / Stainless steel only	Yes
Material of construction	Cast iron / Stainless steel 316 / Aluminium / Ni-hard	Stainless steel 316
Coating	Chrome or Nickel plating / Tungsten carbide / Hard anodising	On request
Flange hole pattern	DIN PN10 / ANSI 150 (AL 100 DIN PN6)	DIN PN10 / ANSI 150

Size type AL	**100**	**150**	**175**	**200**	**250**	**300**	**350**	**400**	**450**	**500**
Size type AXL				**200**	**250**	**300**	**350**			
LTR/Rev at 100% filling	0,8	2,5	5,5	10,5	19	34	58	91	135	230

5.4.2 AML-series (based on AL-series)

AML rotary valves handle solid products. Inlet/outlet is round/square or square/round as specified in the order. Product falls into the inlet and leaves the rotary valve at the outlet. Outlet can be connected to a dropout box to feed a pneumatic conveying line.

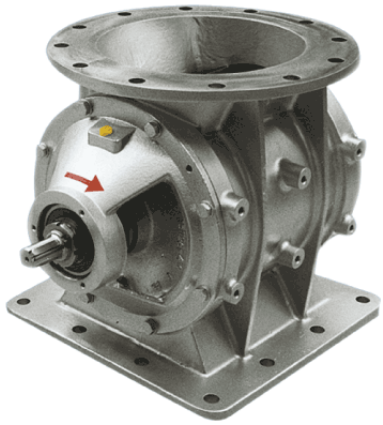


Figure 5.9: AML-series (AML)

AML

Pressure	Up to 2 bar
Product temp °C	Up to +150°C (optional up to +600°C depending on material of construction)
Ambient temp °C	-20°C...+40°C
Standard / Easy Detachable	Yes
MZC/MZC-I/MZC-II	Stainless steel only
RID control	Yes
Material of construction	Cast iron / Stainless steel 316
Coating	Chrome or Nickel plating / Tungsten carbide
Flange hole pattern	Round: DIN PN10 / ANSI 150 Square: to drawing (AML 100 DIN PN6)
Rotor	Adjustable blades / Fixed vanes
Adjustable blades	Steel / Steel hardened / Stainless steel / Polyurethane
Shaft seal	Packing (cord) or lip seal, both with or without air purge
Drive	Chain / Direct drive: Helical gear unit / Parallel shaft helical gear unit
ATEX 2014/34/EU	1GD/2GD Equipment 1D/2GD Protective system

Size type AML	**100**	**150**	**200**	**250**	**300**	**350**	**400**
LTR/Rev at 100% filling	0,8	2,5	5,5	10,5	19	34	58

5.4.3 USAL-series (based on AL-series)

USAL rotary valves handle solid products. Inlet/outlet is square/square.
Product falls into the inlet and leaves the rotary valve at the outlet. Outlet can be connected to a dropout box to feed a pneumatic conveying line.

Figure 5.10: AL-series (USAL)

USAL

Pressure	Up to 2 bar
Product temp °C	Up to +150°C (optional up to +400°C depending on material of construction)
Ambient temp °C	-20°C...+40°C
Standard / Easy Detachable	Yes
MZC/MZC-I/MZC-II	No
RID control	No
Material of construction	Cast iron
Coating	Chrome or Nickel plating / Tungsten carbide
Flange hole pattern	Square: to drawing
Rotor	Adjustable blades / Fixed vanes
Adjustable blades	Steel / Steel hardened / Stainless steel / Polyurethane
Shaft seal	Packing (cord) or lip seal, both with or without air purge
Drive	Chain / Direct drive: Helical gear unit / Parallel shaft helical gear unit
ATEX 2014/34/EU	1GD/2GD Equipment

Size type USAL	**200 (8″)**	**250 (10″)**	**300 (12″)**
LTR/Rev at 100% filling	5,5	10,5	19

5.4.4 GL-series (based on the AL-series)

GL rotary valves handle solid granular products.
Product falls into the inlet and leaves the rotary valve at the outlet. Outlet can be connected to a dropout box to feed a pneumatic conveying line.

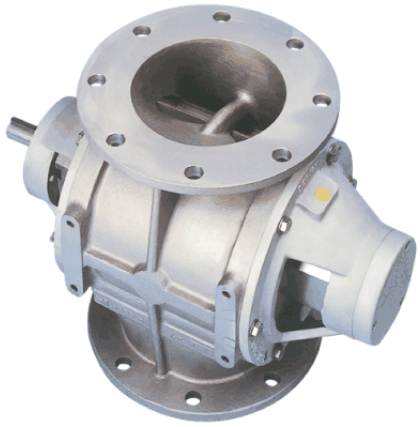


Figure 5.11: GL-series (GL)

GL

Pressure	Up to 1.5 bar
Product temp °C	Up to +150°C (optional up to +250°C depending on the material of construction)
Ambient temp °C	-20°C...+40°C
Material of construction	Stainless steel 316 / Aluminium
Coating	Hard anodising
Flange hole pattern	DIN PN10 / ANSI 150
Rotor	Fixed vane end disc stainless steel 316L
Shaft seal	Packing (cord)
Drive	Chain / Direct drive: Helical gear unit / Parallel shaft helical gear unit
ATEX 2014/34/EU	1GD/2GD Equipment

Size type GL	**150**	**200**	**250**	**300**	**350**
LTR/Rev at 100% filling	5	10	17,5	32	79

5.4.5 BL-series (BL/BXL/BXXL)

BL/BXL/BXXL rotary valves handle solid products and are used to feed a pneumatic conveying line. The BXL/BXXL rotary valves are adjusted with an enlarged inlet.
Product falls into the inlet and leaves the rotary valve through the blow line. Outlet must be connected to a pneumatic conveying line.

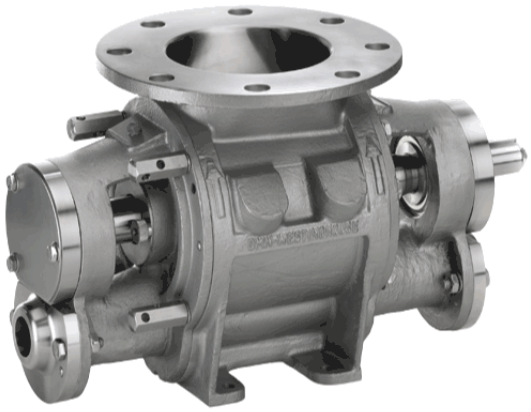


Figure 5.12: BL-series (BL/BXL/BXXL)

BL/BXL/BXXL

Pressure	Up to 2 bar
Product temp °C	Up to +150°C (optional up to +250°C)
Ambient temp °C	-20°C...+40°C
Flange drilled to	DIN PN10 / ANSI 150
Standard / Easy Detachable	Yes
RID control	Yes
Rotor	Adjustable blades / Fixed vanes
Adjustable blades	Steel / Steel hardened / Stainless steel / Polyurethane
Shaft seal	Packing (cord) or lip seal, both with or without air purge
Drive	Chain / Direct drive: Helical gear unit / Parallel shaft helical gear unit
ATEX 2014/34/EU	1GD/2GD Equipment 1D/2GD Protective system

	BL	BXL	BXXL
Material of construction	Cast iron / Stainless steel 316	Stainless steel 316 / Aluminium	Stainless steel 316
Coating	Chrome or Nickel plating / Tungsten carbide layer	Hard anodising	On request
MZC/MZC-I/MZC-II	Stainless steel only	Yes	Yes

Size type BL	**150**	**175**	**200**	**250**	**300**	**350**
Size type BXL			**200**	**250**	**300**	**350**
Size type BXXL						**350**
LTR/Rev at 100% filling	2,5	5,5	10,5	19	34	58

5.4.6 AR-series (based on AL-series)

AR rotary valves handle solid products.
Product falls into the inlet and leaves the rotary valve at the outlet. Outlet can be connected to a dropout box to feed a pneumatic conveying line.

Figure 5.13: AR-series

AR

Pressure	Up to 2 bar
Product temp °C	Up to +150°C
Ambient temp °C	-20°C...+40°C
Standard / Easy Detachable	Yes
RID control	Yes
Rotor	Adjustable blades
Adjustable blades	Stainless steel
Shaft seal	O-ring with air purge and extra lip seal (SAS-II seal)
Drive	Direct drive: Helical gear unit
ATEX 2014/34/EU	1GD/2GD Equipment
Material of construction	Stainless steel 316
Flange hole pattern	DIN PN10

Size type AR	**300**	**400**	**625**
LTR/Rev at 100% filling	7,5	12	19

5.4.7 NR-series (based on AL-series)

NR rotary valves handle solid products.
Product falls into the inlet and leaves the rotary valve at the outlet. Outlet can be connected to a dropout box to feed a pneumatic conveying line.

Figure 5.14: NR-series

NR

Pressure	Up to 2 bar
Product temp °C	Up to +150°C (optional up to +600°C depending on material of construction)
Ambient temp °C	-20°C...+40°C
Standard / Easy Detachable	Yes
RID control	Yes
Rotor	Adjustable blades / Fixed vanes
Adjustable blades	Stainless steel
Shaft seal	Packing (cord) or lip seal, both with or without air purge
Drive	Chain / Direct drive: Helical gear unit / Parallel shaft helical gear unit
ATEX 2014/34/EU	1GD/2GD Equipment 1D/2GD Protective system
MZC/MZC-I/MZC-II	Stainless steel only
Material of construction	Stainless steel 316

Size type NR	**347**
LTR/Rev at 100% filling	19

5.5 Additional & Specifications

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

5.5.1 High Temperature

High Temperature rotary valves handle solid products.

These models can handle products with high temperatures up to 250°C till 600°C depending on the chosen type of material.

Figure 5.15: AL-series

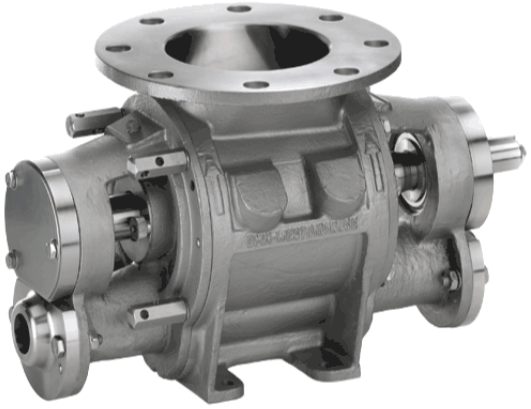


Figure 5.16: BL-series

5.5.2 Easy Detachable

Easy detachable rotary valves handle solid products.

These models can be easily detachable, to enable the rotary valve to be opened/closed without dismantling the valve from the system.

Figure 5.17: AL-series Easy detachable

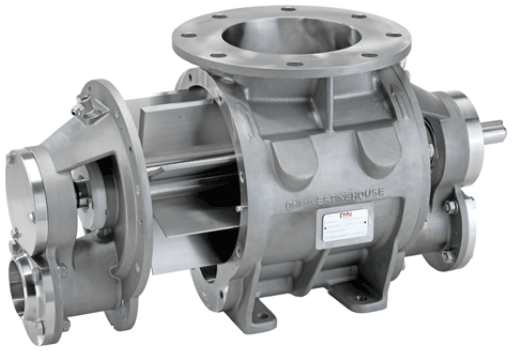


Figure 5.18: BL-series Easy detachable

5.5.3 Dairy

Dairy rotary valves handle solid products.

These models are easily detachable, to enable the rotary valve to be opened/closed without dismantling the valve from the system.

Dairy models are mostly identical to the easy detachable models but completely polished internally to meet the USDA standards and are EHEDG ED CLASS II certified (see chapter 5.7.1).

The rotary valve types AL, AML, AXL ,BL, BXL and BXXL in Dairy execution with MZC sliding rails are constructed according to the EHEDG criteria.

Figure 5.19: AL-series Dairy

Figure 5.20: BL-series Dairy

5.5.4 MZC

MZC rotary valves handle solid products.

These models are easily detachable, to enable the rotary valve to be opened/closed without dismantling the valve from the system.

The MZC sliding rails will support the rotor during the opening/closing procedure.

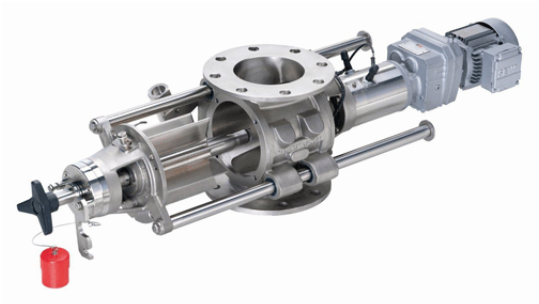


Figure 5.21: AL-series MZC

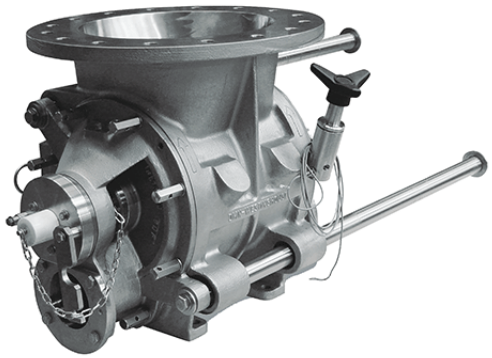


Figure 5.22: BL-series MZC

5.5.5 MZC-I

MZC-I rotary valves handle solid products.

These models are easily detachable, to enable the rotary valve to be opened/closed without dismantling the valve from the system.

The MZC-I sliding rails will support the non-drive side end-cover and the rotor during the opening/closing procedure.

The MZC-I extraction mechanism makes it possible to rotate the rotor for inspection and cleaning when removed from body.

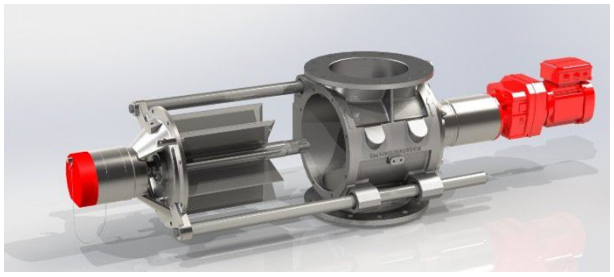


Figure 5.23: AL-series MZC-I

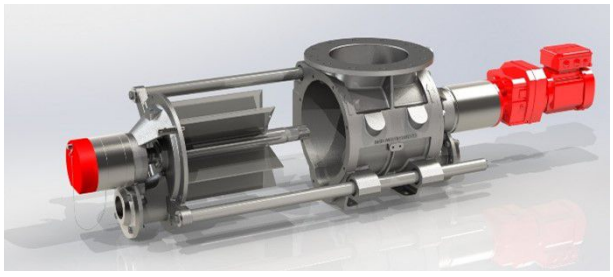


Figure 5.24: BL-series MZC-I

5.5.6 MZC-II

MZC-II rotary valves handle solid products.

These models are easily detachable, to enable the rotary valve to be opened/closed without dismantling the valve from the system.

The MZC-II sliding rails will support the non-drive side end-cover, including the rotor, and drive side end-cover, including the drive during the opening/closing procedure.

The MZC-II extraction mechanism makes it possible to rotate the rotor for inspection and cleaning when removed from body.

Figure 5.25: AL-series MZC-II

Figure 5.26: BL-series MZC-II

5.6 Explosion proof rotary valves

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

5.6.1 ATEX

5.6.1.1 Ambient temperatures

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

5.6.1.2 Ingress Protection (IP rating)

The construction of the rotary valve meets requirements of the ingress protection IP20.
For the inside zone 20 - EPL Da and the outside zone 21 - EPL Db the ingress protection is not necessary.

5.6.1.3 Temperature and dust

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

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

There must be no flammable solvents within the dust!

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

Product temperature	Resulting temperature class
< 55°C	T5
ambient Ta for T5: -20°C...+55°C	
55°C < 90°	T4
90°C < 155°C	T3
155°C < 240°C	T2
240°C ≤ 250°C	T1

5.6.2 ATEX-Approval Equipement (Eq)

5.6.2.1 Intended use

The ATEX Equipment certified rotary valves are designed for the metering and pneumatic transport of products in powder or granular form in a potentially explosive atmosphere. The rotary valve can be mounted under/above a silo, mill, sifter, etc. The rotary valves are not suitable for conveying of products which are sensitive to impact.

Depending on type and execution the rotary valve can be used for pressure differentials up to 2 bar and product temperature up to 250°C.

Internal gas zone 0
Rotary valves for internal gas zone 0 (EPL Ga) must have an O-ring between body and end covers and a SAS-II shaft seal, which must always be gas purged during operation.
Rotary valve Type AL,BXL and GL with aluminium construction material, Execution 5 cannot be used for EPL Ga.

5.6.2.2 Special conditions (X conditions)

The surface temperature of the rotary valve depends on the temperature of the product to be handled and the material of the rotor.

Tproduct +40°C
The maximum product temperature for the rotary valves depends upon on the type of valve, rotor blade material and type of ATEX-Approval.
Maximum product temperature is given on the nameplate and sales order confirmation (refer to chapter Applicable documents).
If the surface temperature is higher than listed on the nameplate, the rotary valve must be stopped immediately!
Surpassing the maximum surface temperature listed on the nameplate is not permitted!
If in doubt, please contact DMN-WESTINGHOUSE!

In normal conditions the following surface and product temperatures are permitted:

Metal rotor (blades)	Eq
Maximum product temperature	250°C
Maximum surface temperature	+290°C/T1

Polyurethane rotor (blades)	Eq
Maximum product temperature	120°C
Maximum surface temperature	+160°C/T3

ATTENTION!
When putting the rotary valve with polyurethane rotor blades into operation it is necessary to measure the surface temperature of the rotary valve and the drive.

There are restrictions on the maximum tip speed (below 1 m/s) and power applied for operation of the rotary valve. See table Power and rotor speed rotary valves chapter 8.9.1.

5.6.3 ATEX-Approval Autonomous Protective System (APS)

5.6.3.1 Intended use

The ATEX APS certified rotary valves are designed for use as explosion isolation system (protective system) for isolation of dust explosions in process facilities.

The rotary valves are designed for the metering and pneumatic transport of products in powder or granular form in a potentially explosive atmosphere.

The rotary valve can be mounted under/above a silo, mill, sifter, etc. The rotary valves are not suitable for conveying of products which are sensitive to impact.

Depending on type and execution the rotary valve can be used for pressure differentials up to 2 bar and product temperature up to 250°C.

5.6.3.2 Special conditions (X conditions)

The surface temperature of the rotary valve depends on the temperature of the product to be handled and the material of the rotor.

Tproduct +40°C
The maximum product temperature for the rotary valves depends upon on the type of valve, rotor blade material and type of ATEX-Approval.
Maximum product temperature is given on the nameplate and sales order confirmation (refer to chapter Applicable documents).
If the surface temperature is higher than listed on the nameplate, the rotary valve must be stopped immediately!
Surpassing the maximum surface temperature listed on the nameplate is not permitted!
If in doubt, please contact DMN-WESTINGHOUSE!

In normal conditions the following surface and product temperatures are permitted:

Metal rotor (blades)	APS
Maximum product temperature	250°C
Maximum surface temperature	+290°C/T1

- The functionality of stopping the rotary valve after detection of an explosion is not part of the current certificate. The rotary valve must be integrated in a control system to guarantee that the valve will automatically stop within 0,5 sec. after explosion detection. This is to prevent burning or smouldering products passing through the rotary valve further into the system once the initial explosion is over. (see chapter 8.9)
- The different models of rotary valves as tested with organic dust are specified in the following tables where Pmax, Kst and MESG are the limiting values. The rotary valves have not been tested or approved for use with metal dusts. The rotor types listed in the following tables refer to this range of accepted rotors with specific requirements listed for each valve type.

5.6.3.3 Specification tables

The table below shows additional specifications for rotary valves functioning as an ATEX-Approval Autonomous Protective System.

The rotary valves are explosion- and flame proof in both directions

MESG	$= 1.01 * (MIE * (MIT + 273) / 273)^{0.157}$
MESG [mm]	Maximum Experimental Safe Gap
MIE [mJ]	Minimum Ignition Energy
MIT [°C]	Minimum Ignition Temperature

APS only!

The rotary valves are no longer a protective system when:

- The rotor tip width (TW) is smaller than mentioned in the table.
- The rotor clearances (CL) are higher than mentioned in the table.

No metal dust allowed!
The end user is responsible for proper explosion isolation beyond the vent holes.

APS only!

On the nameplate of the ATEX certified rotary valves the Pmax (explosion shock resistance) is given. If an explosion could occur above the Pmax, the user of this equipment must ensure adequate safety measures are installed.

Specifications AL

Valve Type	AL					
Valve size	200 250 300 350	150 175 200 250		300 350	400 450 500	
Valve execution	1B, 2B, 3NB, 3CB, 4CB, 4TCOB					
Rotor type	BUP rotor 7x adjustable blades 2x scraper blades	1, 2, 3N, 3C, 4C, 4TCO, 4TS, Dairy, Dairy-WD, Dairy-EL I Daibi Fixed vane Adjustable blades RC-closed end		1, 2, 3N, 3C, 4C, 4TCO, 4TS, Dairy, Dairy-WD, Dairy-EL I Daibi Fixed vane Adjustable blades RC-closed end		1, 2, 3N, 3C, 4C, 4TCO, 4TS, Dairy, Dairy-WD, Dairy-EL I Adjustable blades RC-closed end all with support bars
Max. explosion pressure Pmax [bar]	3	10	3	10	10	10
Kstmax [bar·m/s]	290	355	355	272	228	299
MESG [mm]	≥1.33	≥1.39	≥1.39	≥1.38	≥1.39	≥1.39
Number of rotor pockets	9	10	10	10	10	10
Min. Tip width (TW*) [mm]	3	3	3	3	4	4
Max. Clearances (CL*) [mm]	0.4	0.3	0.3	0.3	0.4	0.4
Max. Rotor speed [1/min]	30	30	20	20	25	20
Vent holes	Yes	Yes	Yes	Yes	Yes	Yes

* See measurement instructions

Specifications AML/AXL/NR

Valve type	AML						AXL	NR
Valve size	150 200 250			300 350 400			250 300 350	347
Valve execution	1, 3N, 3C, 4C, 4TCO, 4TS, 2, Dairy, Dairy-WD, Dairy-EL I			1, 3N, 3C, 4C, 4TCO, 4TS, 2, Dairy, Dairy-WD, Dairy-EL I			2, Dairy, Dairy-WD, Dairy-EL I	2, Dairy, Dairy-WD, Dairy-EL I
Rotor type	Daibi Fixed vane Adjustable blades RC-closed end			Daibi Fixed vane Adjustable blades RC-closed end			Daibi Fixed vane Adjustable blades RC-closed end	Daibi Fixed vane Adjustable blades RC-closed end
				Without support bars	With support bars			
Max. explosion pressure Pmax [bar]	3	3	10	3	3	10	10	10
Kstmax [bar.m/s]	355	299	272	299	355	272	282	290
MESG[mm]	≥1.39	≥1.39	≥1.38	≥1.39	≥1.39	≥1.38	≥1.33	≥1.33
Number of rotor pockets	10	10	10	10	10	10	10	10
Min. Tip width (TW*)[mm]	3	6	3	6	3	3	3	3
Max. Clearances (CL*)[mm]	0.3	0.3	0.2	0.3	0.3	0.2	0.4	0.4
Max. Rotor speed [1/ min]	20	30	20	30	20	20	30	30
Vent holes	Yes	Yes	No	Yes	Yes	No	No	No

* See measurement instructions

Specifications BL/BXL/BXXL

Valve type	BL		BXL	BXXL
Valve size	150 175 200 250 300 350	200 250 300 350	200 250 300 350	350
Valve execution	1, 2, 3N, 3C, 4C, 4TCO, 4TS Dairy, Dairy-WD, Dairy-EL I	1B, 2B, 3NB, 3CB, 4CB, 4TCOB	1, 2, 3N, 3C, 4C, 4TCO, 4TS Dairy, Dairy-WD, Dairy-EL I	2 Dairy, Dairy-WD, Dairy-EL I
Rotor type	Daibi Fixed vane Adjustable blades RC-closed end	BUP rotor 7x adjustable blades 2x scraper blades	Daibi Fixed vane Adjustable blades RC-closed end	Daibi Fixed vane Adjustable blades RC-closed end
Max. explosion pressure Pmax [bar]	10	3	10	10
Kstmax [bar.m/s]	290	290	290	290
MESG [mm]	≥1.33	≥1.33	≥1.33	≥1.33
Number of rotor pockets	10	9	10	10
Min. Tip width (TW*) [mm]	3	3	3	3
Max. Clearances (CL*) [mm]	0.4	0.4	0.4	0.4
Max. Rotor speed [1/ min]	30	30	30	30

5.6.3.4 Measurement instructions

Tip width measurement (TW*)

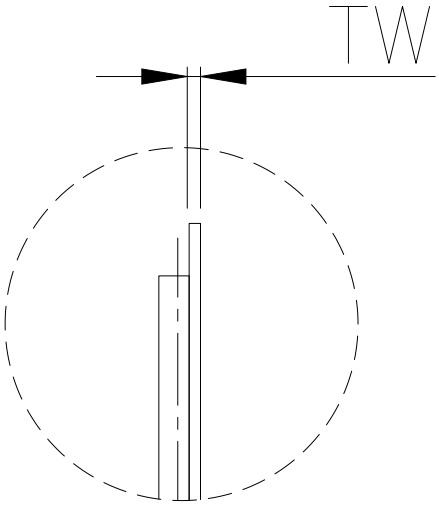


Figure 5.27: Adjustable blades

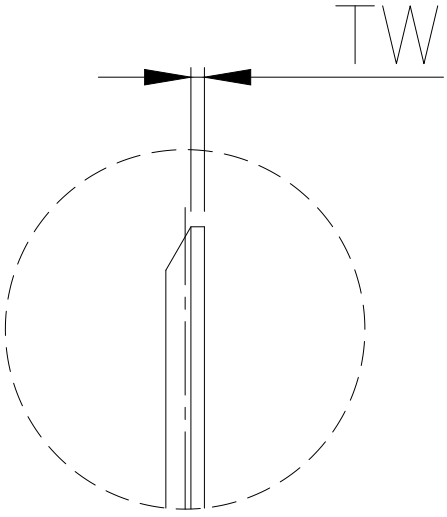


Figure 5.28: Fixed vane rotor

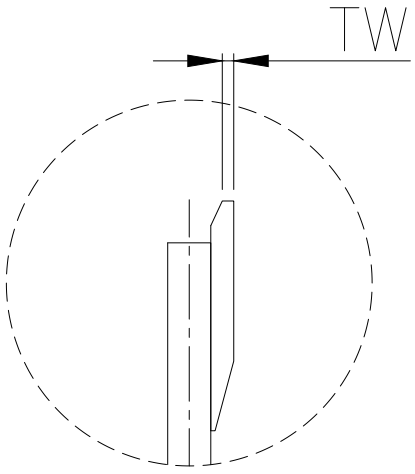


Figure 5.29: Rotor AL 400-450-500

Clearances measurement (CL*)

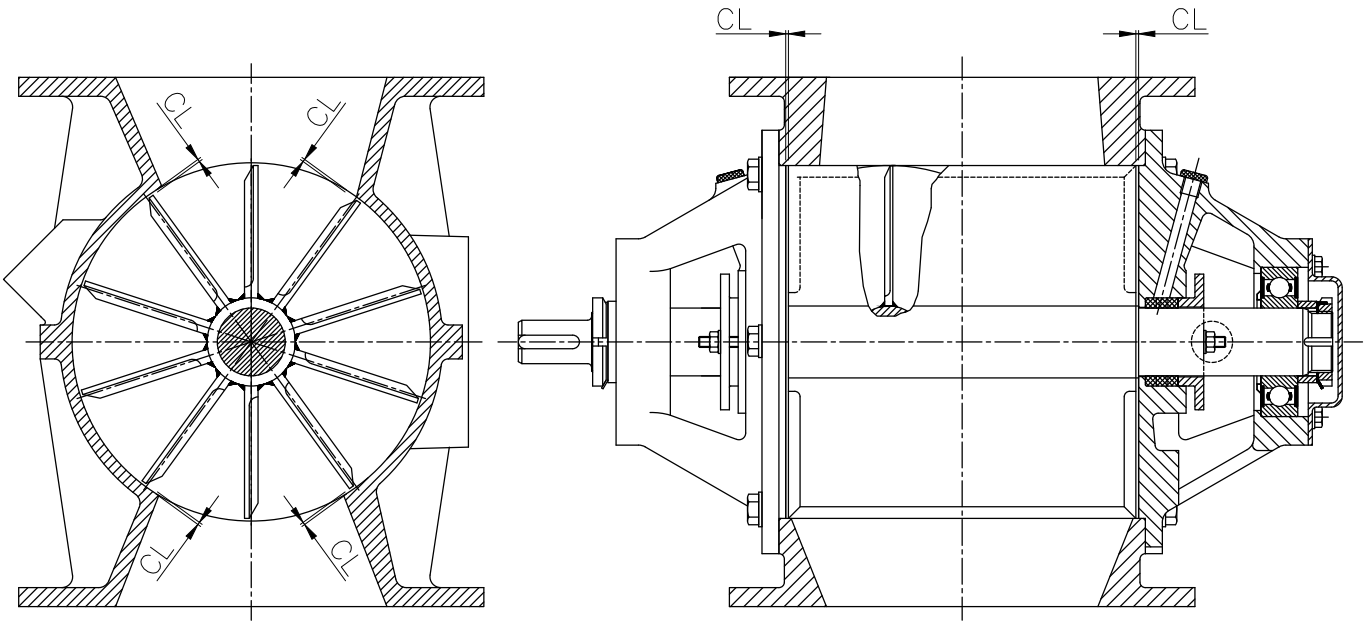


Figure 5.30: Rotor clearances

5.7 Hygienic rotary valves

The hygienic rotary valves are designed for the metering and pneumatic transport of products in powder or granular form in hygienic applications. The rotary valves can be mounted under/above a silo, mill, sifter, etc. Depending on type and execution the rotary valves can be used for pressure differentials up to 2 bar and product temperature up to 150°C.

5.7.1 EHEDG ED CLASS II

Hygienic rotary valve EHEDG certified type ED CLASS II.
The rotary valve types AL, AML, AXL ,BL, BXL and BXXL in Dairy execution with MZC sliding rails are constructed according to the EHEDG criteria. They can be integrated into a process with dry cleaning with dismantling and are easy to clean.

5.7.1.1 EHEDG ED CLASS II certified rotary valves

Certified types and sizes

Valve type	Size					
AL	150	175	200	250	300	350
AXL			200	250	300	350
AML			200	250	300	350
BL	150	175	200	250	300	350
BXL			200	250	300	350
BXXL						350

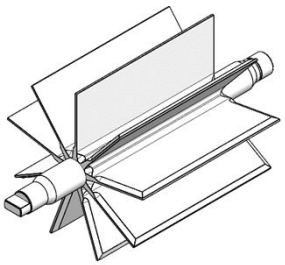
Certified executions

Execution Dairy (see chapter 5.5.3)

- General assembly & part list (see chapter 11.8.1)

Certified rotor types

Daibi rotor (see chapter 5.9.1.6)



Certified shaft seals

Airpurge shaft seals:

- SAS-II seal (see chapter 5.10.3.1)

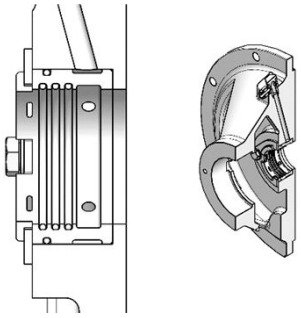


Figure 5.31: SAS-II seal

Rotary valves must always be operated with an air purged shaft seal.
To ensure proper functioning of the air purge seal, regular checks of the pressure drop over the seal should be carried out (see chapter 10.2.6).
An option is to install a pressure sensor and a flow sensor.

5.7.2 USDA approved

Hygienic rotary valve USDA Equipment acceptance certificate.
The rotary valve types AL, AML, AXL, BL, BXL and BXXL in Dairy and Dairy WD execution are constructed according to the USDA guidelines. They can be integrated into a process with dry cleaning with dismantling and are easy to clean.

5.7.2.1 USDA approved rotary valves

Approved types and sizes

Valve type	Size					
AL	150	175	200	250	300	350
AXL			200	250	300	350
AML			200	250	300	350
BL	150	175	200	250	300	350
BXL			200	250	300	350
BXXL						350
NR						347

Table 5.1: Approved executions

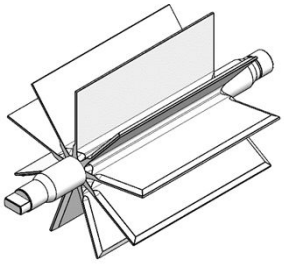
Approved executions

Execution Dairy (see chapter 5.5.3)

- General assembly & part list Dairy (11.8.1)
- General assembly & part list Dairy-WD units are suited for CIP cleaning (11.9.1)

Approved rotor types

Daibi Rotor (see chapter 5.9.1.6)



Approved shaft seals

- Lip seal standard (see chapter 5.10.2.1)
- Air purge with lip seal and lantern ring (see chapter 5.10.2.2)
- SAS-II seal (see chapter 5.10.3.1)

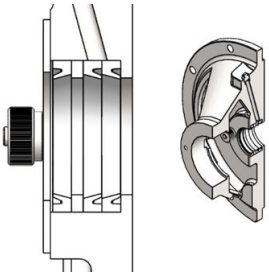


Figure 5.32: Lip seal standard

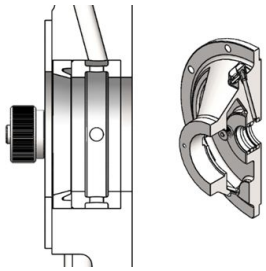


Figure 5.33: Air purge with lip seal and lantern ring

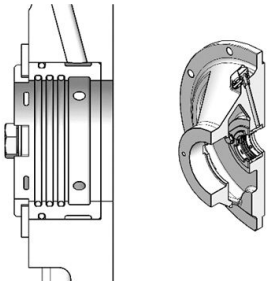


Figure 5.34: SAS-II seal

5.8 Body & end covers

5.8.1 Vent holes

The vent holes vent any overpressure from the empty pockets in the rotor.
(If pressure is higher at the outlet side than the inlet side an overpressure will remain in the empty pockets.)

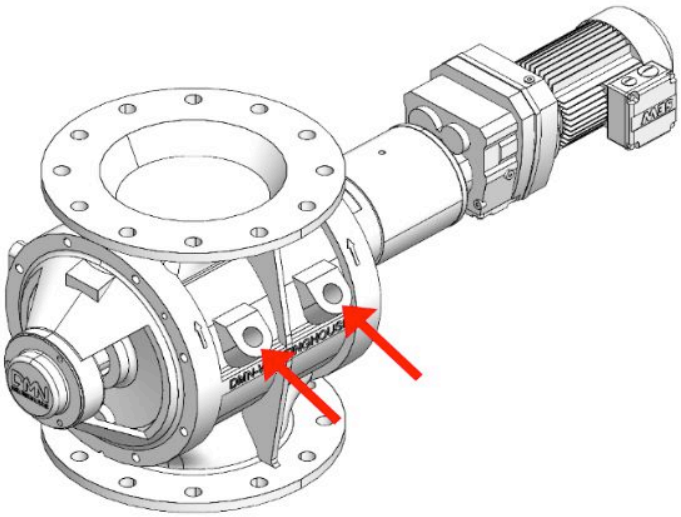


Figure 5.35: Vent holes

5.9 Rotors

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

5.9.1 Rotor options

5.9.1.1 Blades

Number of blades
Most rotors have nine blades. More blades result in better sealing, less blades create a larger angle in the pocket, which reduces the likeliness of the product getting stuck.
Fixed blades
Fixed blades have less components and are more suitable for a hygienic application.
Replaceable and adjustable blades
These blades have the advantage of being individually adjustable and are replaceable when they are worn out. These blades are available in many different materials, such as PU, PTFE, steel, etc.
Scraper blades
Scraper blades are attached to rotors that are used for particularly sticky products. These scraper blades “scrape” the product from the corners to prevent product build-up.

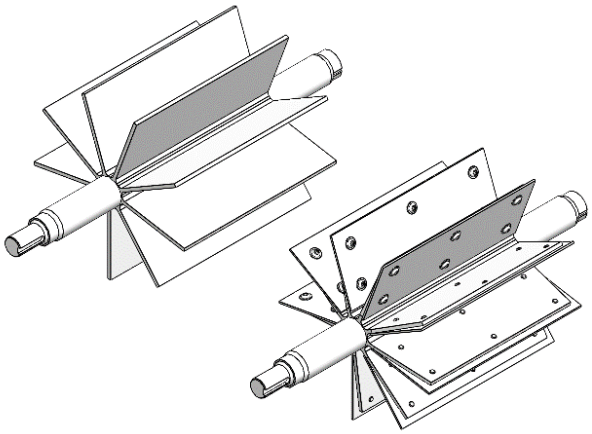


Figure 5.36: Fixed (left) and adjustable blades (right)

5.9.1.2 Pockets

Standard
On this most basic blade design, the blades are welded to the axle. When a particularly hygienic solution is required, the welds are milled smooth.
Reduced capacity
A rotor with reduced capacity is used when a specified throughput is required with a good level of accuracy. Reduced capacity rotors are also available with replaceable blades.
Scalloped
A scalloped rotor is used to help discharging sticky or moist products.
Fine dosing
A fine dosing rotor is mostly used in food and pharmaceutical industries when handling expensive active ingredients.

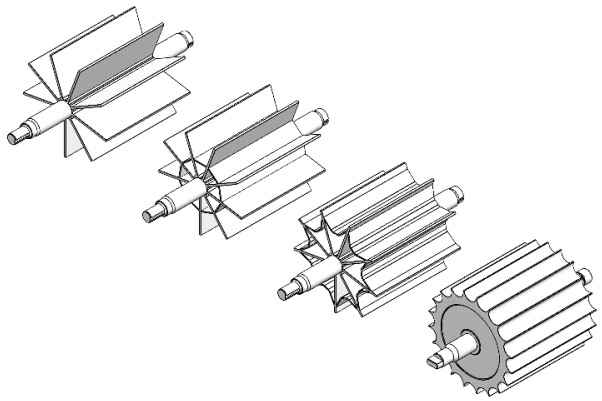


Figure 5.37: Pockets (left to right): standard, reduced capacity, scalloped and fine dosing

5.9.1.3 Rotor End Design

Open end
Normally open ended rotors are used in standard executions.
Semi end disc
Semi end disc prevents product erosion at the critical point where the blades meet the axle.
Full end disc
A full end disc prevents the product from touching the wall of the housing. This rotor is used commonly for granular products. Rotors with end discs always require air pressure. This stops the product from getting in between the disc and the wall of the housing.
Closed end
Reduced capacity rotor in which the reduced area is closed to prevent the product from entering the sides.

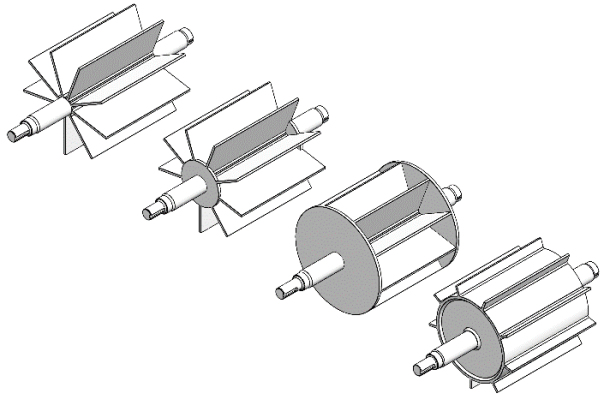


Figure 5.38: Different End Designs (left to right): open ended, semi end disc, end disc and closed end disc

5.9.1.4 Shaft ends

Standard
The standard shaft end is applicable in a direct drive with a coupling configuration or with a chain drive.
Shaft mounted
The shaft end of a shaft mounted rotor is used in combination with a drive that is mounted directly on the shaft of the rotary valve.
Easy detachable
In applications that require fast detachability, this shaft end is used.
MZC-I and MZC-II
In MZC-I and MZC-II applications this shaft end is used.

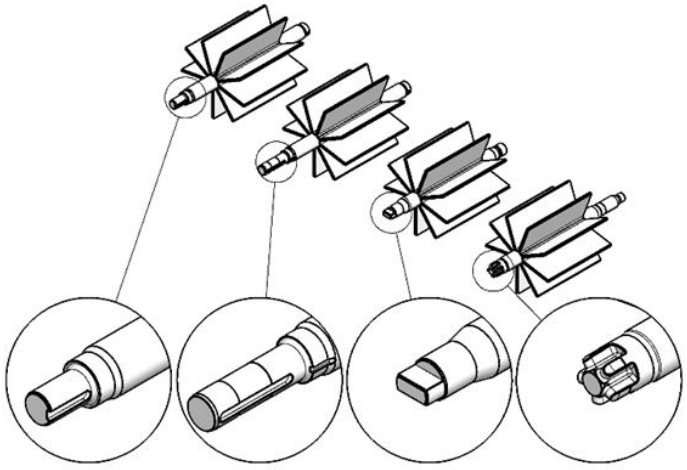


Figure 5.39: Shaft ends (left to right): standard, shaft mounted, easy detachable, MZC-I, MZC-II

5.9.1.5 BUP rotor

The BUP (Build up prevention) rotor option is specially developed for applications where product tends to build up between body / end cover and rotor.
For example processing starch products.
The BUP rotor is a modified rotor with adjustable blades and 2 scraper blades.

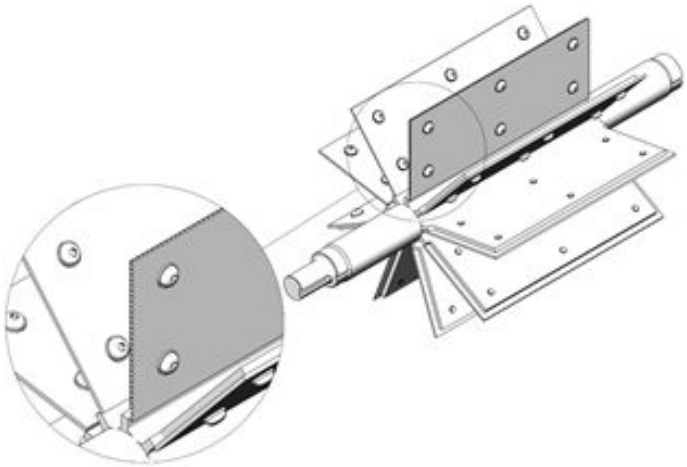


Figure 5.40: BUP rotor option

5.9.1.6 Daibi rotor

The Daibi is a hygienic stainless steel rotor with fixed-vanes, a radius machined between the vanes (8, 9 or 10), and the blades are chamfered on three sides. All product-contact surfaces are machined and polished to 0.8 Ra.

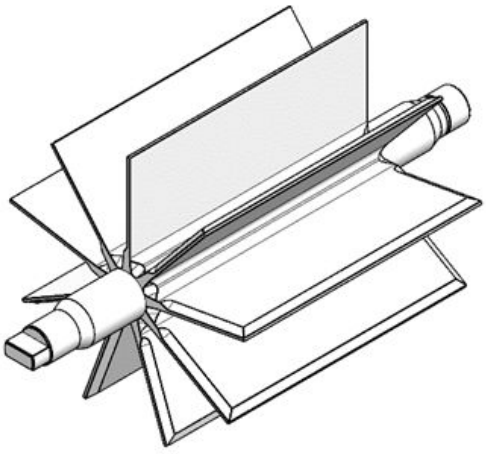


Figure 5.41: Daibi rotor

5.9.1.7 RE rotor

The RE (Resilient Edge) rotor is specially developed for applications where wear resistance is required to protect the end covers.
The RE rotor is a semi end disc rotor with reinforced vane edges.

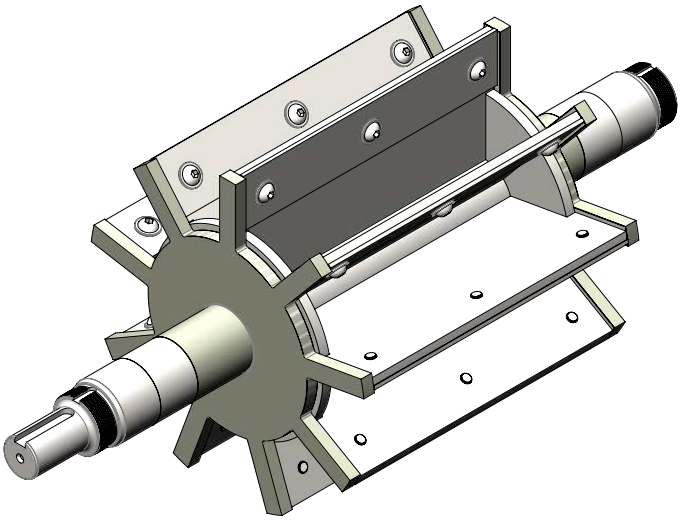


Figure 5.42: RE rotor

5.10 Seals

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

5.10.1 Shaft seals by means of packing cord

5.10.1.1 Standard packing (cord)

Seal with standard packing (cords).
Standard packing (cord) is a robust construction, where no air needs to be connected.

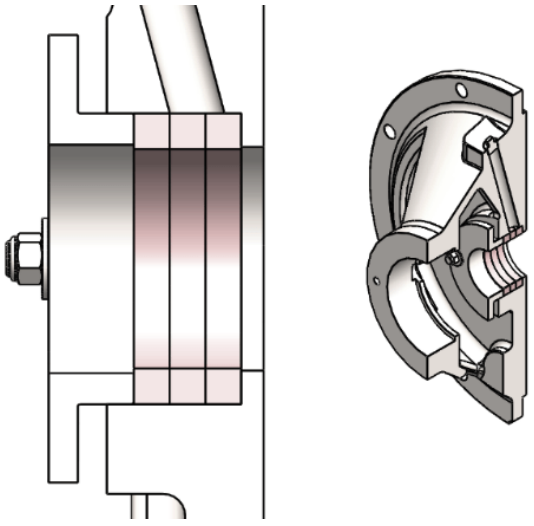


Figure 5.43: standard packing (cord)

5.10.1.2 Grease purge packing (cord)

Seal with packing cord and lubrication capability.
No air needs to be connected.

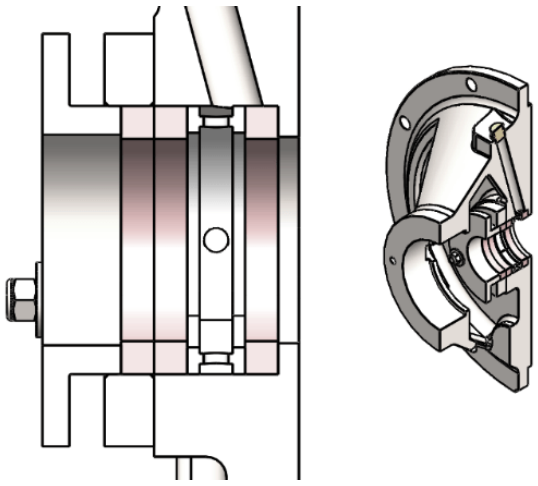


Figure 5.44: Grease purge packing (cord)

5.10.1.3 Air purge packing (cord)

Air purge packing (cord) is used to keep the shaft area clean of product.

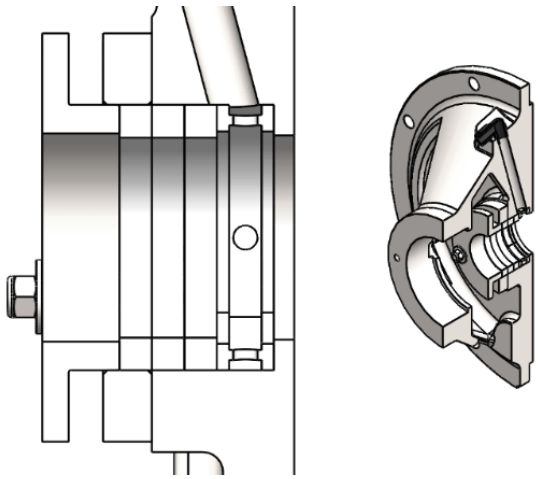


Figure 5.45: Air purge packing (cord)

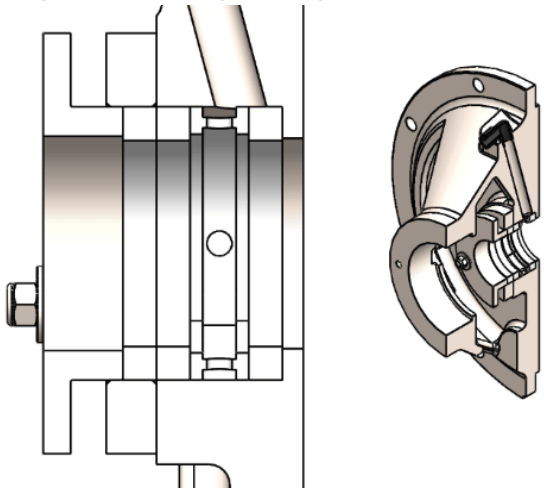


Figure 5.46: Barrier air purge glands

5.10.2 Shaft seals by means of lip seal

5.10.2.1 Standard lip seal

USDA

Seal with standard lip seal.
Standard lip seal is a robust construction, where no air needs to be connected.
Suitable for applications with easy detachable rotor and dairy certified products.

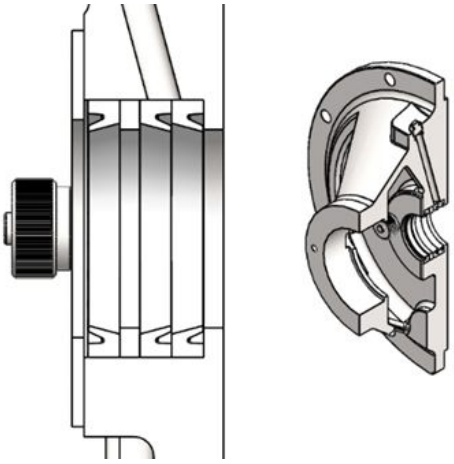


Figure 5.47: Standard lip seal

5.10.2.2 Air purge lip seal

USDA

Air purge with lip seals are used to keep the shaft clean of product.
Suitable for applications with easy detachable rotor and dairy certified products.

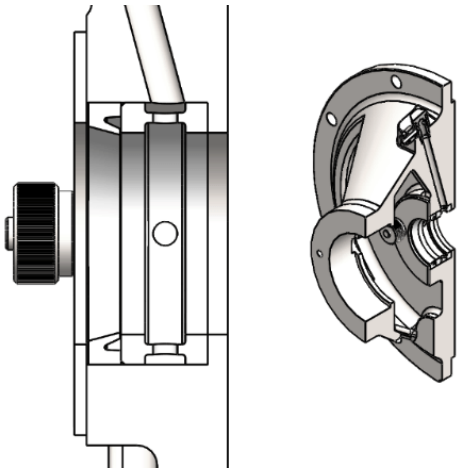


Figure 5.48: Air purge lip seal

5.10.2.3 Air purge with 3 lip seals

USDA

Air purge with 3 lip seals is used to keep the shaft clean of product.
Suitable for applications with easy detachable rotor and dairy certified products.

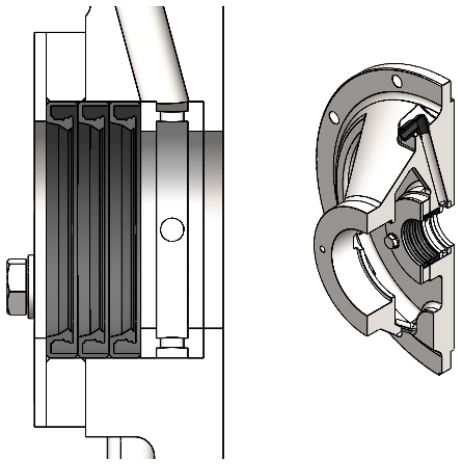


Figure 5.49: Air purge with 3 lip seals

5.10.2.4 Air purge lip seal with grooved lantern ring

Air purge lip seal with grooved lantern ring is used to keep the shaft area clean of product.

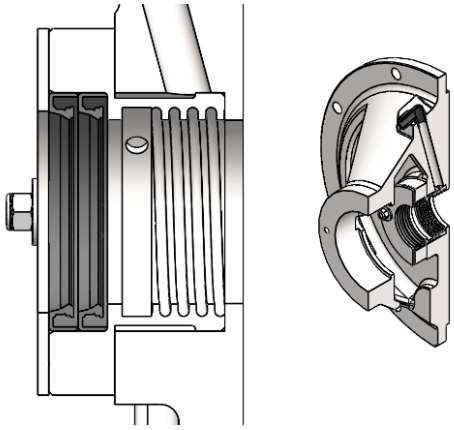


Figure 5.50: Air purge lip seal with grooved lantern ring

5.10.2.5 Lip seal with liquid cleaning (CIP (Dairy-EL I) seal)

Lip seals with liquid cleaning (CIP (Dairy-EL I) seal) are suitable for applications where the shaft sealing is automatically cleaned with a liquid.

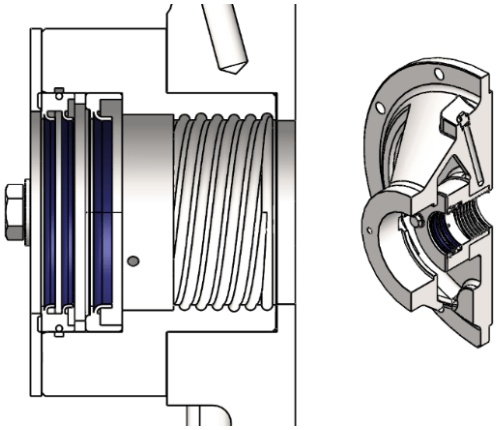


Figure 5.51: Lip seal with liquid cleaning (CIP (Dairy-EL I) seal)

5.10.3 Shaft seals by means of air purge with O-rings

5.10.3.1 SAS-II Sanitary air purge seal

SAS-II Sanitary air purge seal is suitable for applications with dairy certified products.

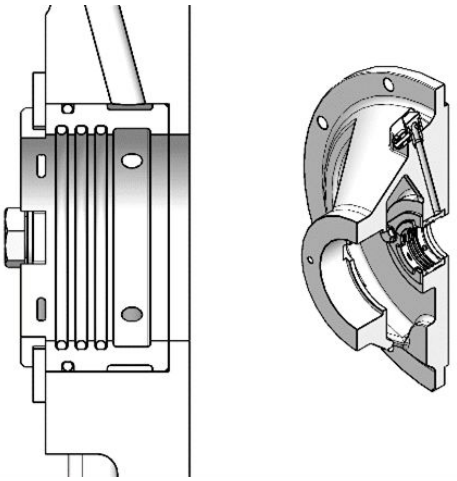


Figure 5.52: SAS-II Sanitary air purge seal

5.11 Drives

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

5.11.1 Chain drive

Chain drive has the ability to determine different rotor speeds by changing the chain wheels if no frequency control is present.

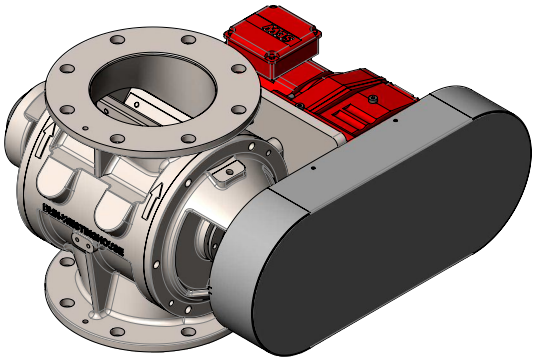


Figure 5.53: Chain drive (SEW R motors with chain)

5.11.2 Direct drive (parallel shaft)

Direct drive with a parallel shaft is directly mounted to the rotor and has a compact design.
Different rotor speeds can only be achieved by a gearbox or frequency controller.

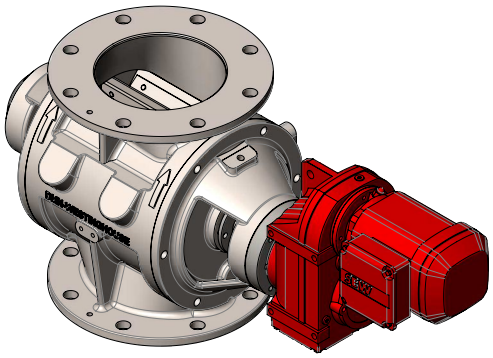


Figure 5.54: Direct drive (with parallel shaft SEW FAZ motor)

5.11.3 Direct drive (in line)

Direct drive with inline shaft has various options available in the coupling piece between rotary valve and drive, such as:

- RID.
- Zero speed detection.

Different rotor speeds can only be achieved by a frequency controller.

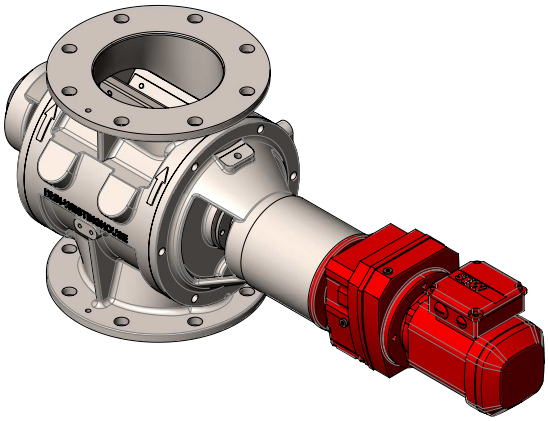


Figure 5.55: Direct drive (with coupling)

5.12 Safety switch (optional)

The safety switch is a mechanical make-break contact to detect that the end cover is removed from the body.

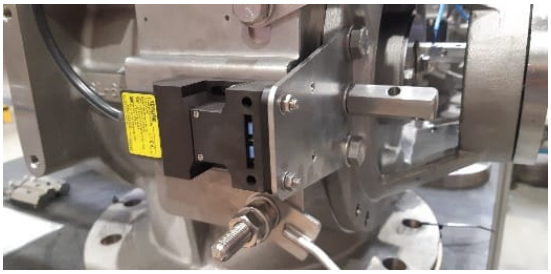


Figure 5.56: Safety switch

5.13 Zero speed indicator (optional)

Zero speed indicator detects the number of rotations per minute.
It can be mounted on the valve in four different ways:

- On the chainguard.
- On coupling piece between drive and rotary valve.
- On the end cover of the rotary valve non drive side.
- Directly on the drive.

Figure 5.57: Zero speed indicator (on coupling)

5.14 Air purge units with pressure control (optional)

The pressure regulator is used to supply and adjust the air purge on the shaft with air.
The pressure regulator comes with an on/off valve or a solenoid valve.

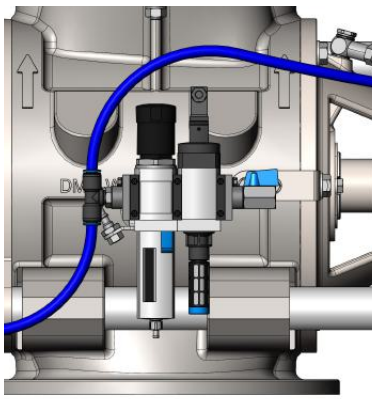


Figure 5.58: Pressure regulator with on/off valve

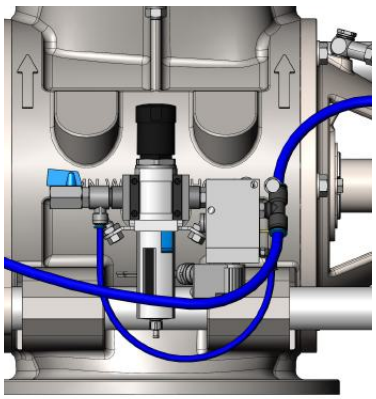


Figure 5.59: Pressure regulator with solenoid valve

5.15 Air purge units with flow control (optional)

The flow regulator is used to supply and adjust the air purge on the shaft with air. The flow regulator controls the air flow and air pressure of each air purge connection.
The flow regulator comes with analog flowmeters or digital flowmeters. Besides, the flow regulator with analog flowmeters comes with an on/off valve or a solenoid valve.

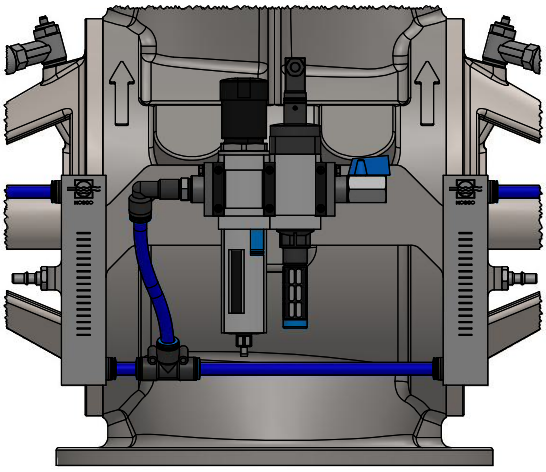


Figure 5.60: Flow regulator with analog flowmeters and on/off valve

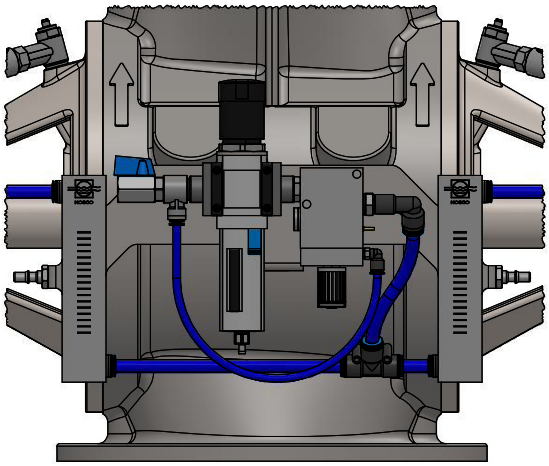


Figure 5.61: Flow regulator with analog flowmeters and solenoid valve

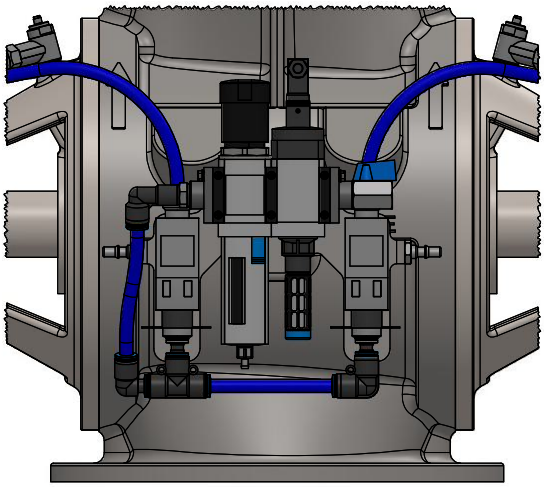


Figure 5.62: Flow regulator with digital flowmeters and solenoid valve

5.16 End cover purging (optional)

End cover purging prevents product getting trapped between the end-disc rotor and the end cover. This to ensure that rotor will run freely.

5.17 Rotor Interference Detection (RID) (optional)

The RID detects contact between rotor and stator due to wear, contamination or poor adjustment.
The RID consists of the following components:

- Control unit.
- Resistor box.
- Two rotor pick-ups.
- Zener barrier (Hazardous area).

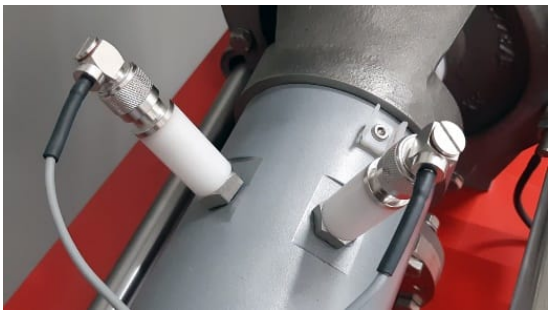


Figure 5.63: Rotor pick-ups for rotor interference detection

5.18 Accessories

5.18.1 Inlet restrictor

The inlet restrictor will decrease the chance that granular product will get trapped between rotor blade and body at the inlet of the valve.

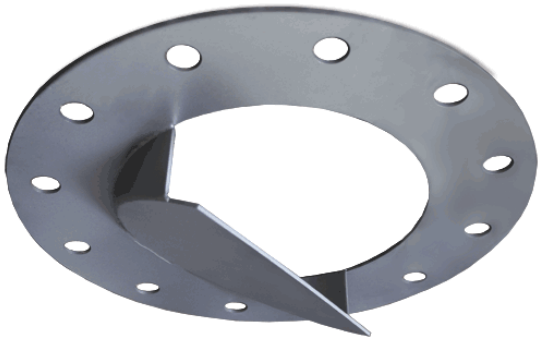


Figure 5.64: Inlet restrictor

5.18.2 Dropout box

The dropout box connects the outlet of the rotary valve to a pneumatic conveying line.

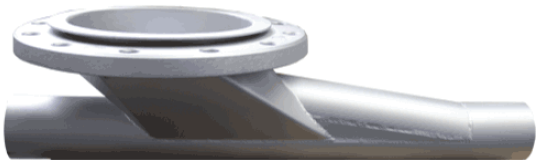


Figure 5.65: Dropout box

5.18.3 Air vent box

The air vent box is used to lead excessive air leakage from the inlet of the rotary valve back into the system.

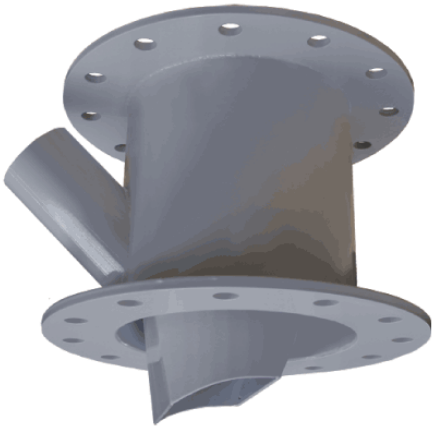


Figure 5.66: Air vent box

5.19 Standard, guidelines and certification (optional)

5.19.1 CE

Conformité Européenne

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

5.19.2 ATEX

ATEX

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

5.19.3 EHEDG

European Hygienic Engineering & Design Group

Hygienic rotary valves are suitable for the food industry. EHEDG is an international organisation (a consortium of equipment manufacturers, food industries, research institutes and public health authorities). Rotary valves that are EHEDG certified comply with the EHEDG guidelines. These hygienic rotary valves are certified as "EHEDG Type ED Class II".
The types and sizes of the certified DMN-WESTINGHOUSE rotary valves can be found in chapter 5.7.1.

5.19.4 EC 1935/2004 | FDA

European Commission 1935/2004 I Food and Drug Administration

Rotary valves compliant with the EC1935/2004 and its supporting regulations EC20/2011 and CEEC2023/2006 and considered safe for food contact. The materials used also comply to FDA regulations regarding food contact.
EC1935/2004 compliant rotary valves are provided with a food safe symbol.

5.19.5 USDA

United States Department of Agriculture

Rotary valves accepted by the USDA (United States Department of Agriculture) are for use in dairy applications. The USDA is the U.S. federal executive department responsible for developing and executing federal laws related to farming, forestry, and food. USDA accepted rotary valves comply with the USDA guidelines and are tested and certified by the USDA.
These USDA accepted rotary valves are certified as "USDA Dairy Accepted".
The types and sizes of the approved DMN-WESTINGHOUSE rotary valves can be found in chapter 5.7.2.

5.19.6 EAC

EurAsian Conformity

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

6. SAFETY

6.1 Safety rules

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

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

6.2 General safety instructions

The safety instructions should be followed when:

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

Management must ensure that:

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

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

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

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

Instruction

Before installation, maintenance and repair work:

- Shut off electrical supply to the valve motor.
- Isolate air pressure to shaft seals (if fitted).

During installation, maintenance and repair work:

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

After installation, maintenance and repair work:

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

6.3 Warnings & symbols in this document

Listed below is an explanation of symbols used in this document to draw the reader's attention to specific situations.

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

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

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

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

Important notes on explosion protection for:
- ATEX-Approval Equipment (Eq)
- ATEX-Approval Autonomous Protective System (APS)

Additional important notes on explosion protection for ATEX-Approval Autonomous Protective System (APS) only!

It is important to read the instruction

6.4 Warnings & symbols on the product

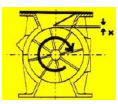
Meaning 1: **Trapping (hand/hair/clothes etc.)**
Meaning 2: **Electrical shock**
Risk: Personal injury
Location: Top of the rotary valve

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

Meaning: **Rotation direction**
Risk: Not functioning correctly
Location: Inlet of the rotary valve

Meaning: **Trapping (hand/hair/clothes etc.)**
Risk: Personal injury
Location: Top of the rotary valve

Meaning: **Mind your fingers**
Risk: Personal injury
Location: Shaft seal



Meaning: **Mounting position of inlet restrictor**
Risk: Not functioning correctly
Location: On inlet restrictor

6.5 Risks for personal injury

Electrocution

Where	When	Precaution	Warning sign
Electrical motor (Electrical wiring)	During maintenance.	Make sure the motor is disconnected from the power before any repairs or service	

Trapping hand

Where	When	Precaution	Warning sign
Inside the rotary valve.	During maintenance.	Make sure the motor is disconnected from the power before any repairs or service. Wear protective gloves.	
Inside the rotary valve.	During storage.	Use cover caps and warning indications at the openings of the rotary valve when it is left unattended.	
Near turning shaft (between end cover and valve)	During operation and maintenance	Avoid maintenance work in the vicinity of the turning shaft. Repairs and maintenance work are only to take place when the device is not running	

Clamping

Where	When	Precaution	Warning sign
Electrical motor (Chain wheel & chain).	During maintenance.	Disconnect from the power before removing the protective cover.	

Burns

Where	When	Precaution	Warning sign
Body rotary valve. (Only HT types)	During technical cleaning or maintenance.	Cool down the rotary valve before any repairs or service. Wear protective gloves.	

Inhalation of toxic substances

Where	When	Precaution	Warning sign
Inside the rotary valve (Only when handling harmful substances).	During technical cleaning or maintenance.	Wear respiratory protection.	

Hearing damage

Where	When	Precaution	Warning sign
Near rotary valve.*	During operation, noise may exceed 80dBA depending on external circumstances.	Wear hearing protection.	

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

6.6 Safety provisions

6.6.1 Safety switch mechanical (optional)

The safety switch is an additional safety feature and is not intended to isolate the rotary valve for performance of maintenance work and repairs!

The safety switch is a mechanical make-break contact to detect that the end cover is removed from the body. Depending on how the contact is connected, the drive will stop, or an alarm will be given.

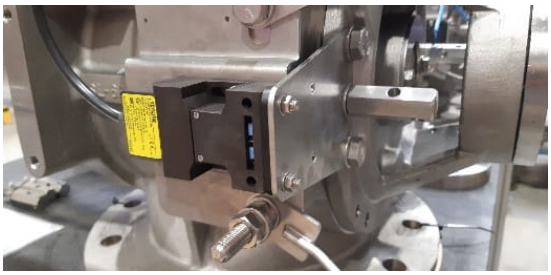


Figure 6.1: Mechanical safety switch

6.6.2 Safety switch magnetic (optional)

DANGER!
The safety switch is an additional safety feature and is not intended to isolate the rotary valve for performance of maintenance work and repairs!

The safety switch is an encoded magnetic make-break contact to detect that the end cover is removed from the body. Depending on how the contact is connected, the drive will stop, and/or an alarm will be given.

Figure 6.2: Magnetic safety switch

6.6.3 Safety switch MZC-II

DANGER!
The safety switch must be connected to the client's safety circuit, which will stop or prevent the valve from operating.

The safety switch is a mechanical make-break contact to detect that the drive side and/or non-drive side end cover is removed from the body. Depending on how the contact is connected, the drive will stop, and/or an alarm will be given.

Figure 6.3: Safety switch MZC-II

6.7 Additional safety instructions for use in potentially explosive atmosphere

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

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

Installation, connection, start-up, maintenance and repair work on the rotary valve may only be performed by a qualified specialist while taking the following into account:

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

  (Explosion protection, Safety, accident prevention)

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

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

7. STORAGE AND TRANSPORT

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

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

7.1 On receipt

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

7.2 Storage

If you do not intend to install the product immediately, it is advisable to store it in its original packaging in a dry and clean place. Overall advice: Always check, inspect, clean; and where possibly test at regular intervals during storage and imperatively before operation.

- Leave the Rotary valve in the original packaging until starting assembly work.
- All non-coated steel parts are protected against corrosion with OKS370 (Colourless universal oil for food processing technology) before packaging at DMN-WESTINGHOUSE.
- Store the Rotary valve in a dry building in its original packaging (relative humidity < 50%).
- Protect the Rotary valve from adverse weather influences.
- Prevent temperature fluctuations.

7.2.1 Long Term Storage Recommendations.

- If the Rotary valve is held in storage the client should use VCI Packaging to prevent moisture ingress.
- Store Rotary valve in temperatures between -20 and +40 °C.
- Check packaging monthly for any damage.

7.2.2 Gearmotor

For storage periods longer than 9 months, SEW recommends the “extended storage” gear unit type:

- VCI anti-corrosion agent (volatile corrosion inhibitors) is added to the lubricant.
- The flange contact surfaces and shaft ends are also treated with an anti-corrosion agent.

7.3 Unpacking

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

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

7.4 Transport

If transporting or lifting the product:

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

7.5 Out of operation

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

8. INSTALLATION & COMMISSIONING

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

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

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

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

8.1 Before installing

Instruction

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

8.2 Drive

First read the instructions carefully supplied by drive manufacturer, before installing the product.

Instruction

- Check gearbox oil level before starting the valve; **the gearbox should be filled with the correct amount and type of oil according to supplier's instruction.**
- Remove plug fitted for transportation purposes from the gear box (if applicable).
- Check rotating direction of valve rotor; **it should rotate clockwise when viewed from the drive end (see direction arrow).**

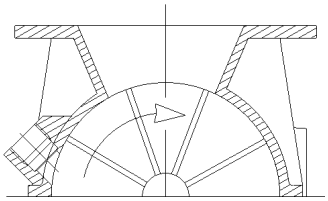


Figure 8.1: Rotation direction of rotor

- Check if electrical specification for connection corresponds to the information stated on name plate of the drive; **Follow instructions of drive supplier, see connection diagram included in junction box.**

8.2.1 Tightening drive chain

ATTENTION!
The sprockets should be fitted on rotor shaft as close as possible to the bearing housing.
The sprockets should **not** be hammered on to the shafts.
Sprockets on the shafts of valve and gear box should always be perfectly aligned.

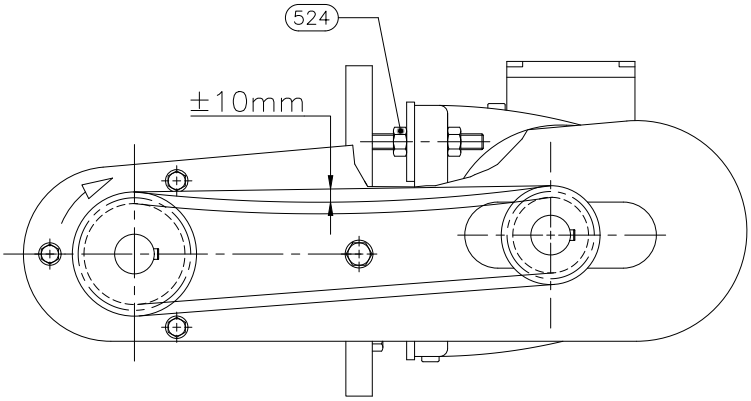


Figure 8.2: Tighten chain

Instruction

- Check position and alignment of the sprockets re-adjust if necessary.
- Tighten chain by adjusting nuts (524) to give 10mm slack at chain.
- Grease chain (for correct lubricant see chapter 10.4).

8.3 If delivery excludes drive

- On one side of the valve, holes have been tapped for fitting the motor base plate.
- To fasten chain guard, three holes have been tapped in the bearing housing of the valve.

8.4 Installing the valve into the system

- If it is a blowing seal, the conveying pipe line to be connected to the blowing seal should ideally have the same diameter as the connections on the seal.
- If there is variation between the inner diameters of the blowing channel and the conveying line, the transition from one diameter to the other should be as smooth as possible.
- If the valve is fitted with vent holes, the area of the venting pipe should be equal to the total area of both vent connections.
- Make sure there is enough space around the rotary valve for opening and closing procedures. So getting pinched between rotary valve and other parts is impossible.

Instruction

- Install valve without side loads.
- Connect conveying pipes without side loads.
- Connect air vent pipe work.
- Connect air purge supply and adjust pressure regulator.
- Fasten shaft seal (refer to chapter 11.16). (if applicable)
- Connect power to drive.

DANGER!
During operation or testing the inlet / outlet and vent hole connections must not be open or unprotected.

- Check rotation direction (refer to chapter 8.2).

ATTENTION!
The rotary valve must not be put into service until the equipment into which it has been incorporated has been declared in conformity with the Machinery Directive.

8.4.1 Shaft seal with packing cord

Where shaft sealing with packing cords are specified it is necessary, before starting the system, to fasten the seal in order to set the packing cords so that it seals, and the rotor will be able to run.

8.4.2 Shaft seal with air purge

When using an air purge shaft sealing, oil-free and dry air must be used. The diameter of the air pipe supply should be equal to or larger than the connection diameter of the valve. If no air purge unit is supplied with the valve, the purging air pressure of this purging air should be 0.5 bar higher than the pressure in the valve. If the air purge unit is supplied with the valve, the specific pressure requirement for the purging air can be found in chapter 8.5.

ATTENTION!
The air pressure must be applied before product enters the valve and before conveying pressures are applied.
The air supply must always be present when there is product in the valve, including after conveying ceases.

8.4.3 MZC T-bolt sensor

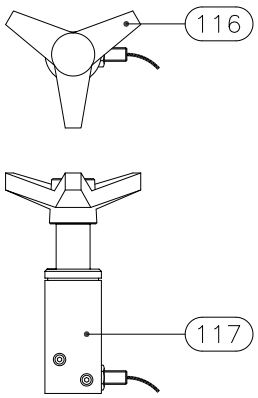


Figure 8.3: T-bolt

DANGER!
The purpose of this securing block is to disconnect the power supply or send a signal to the control room as an extra safety measure.
Its purpose is not to isolate the installation prior to cleaning and/or maintenance and repair work.

DANGER!
The T-bolt switch can be connected to the client safety circuit, which will stop or prevent the valve from operating.
Safety circuit is not part of the DMN supply.

8.4.4 Safety switch MZC-II

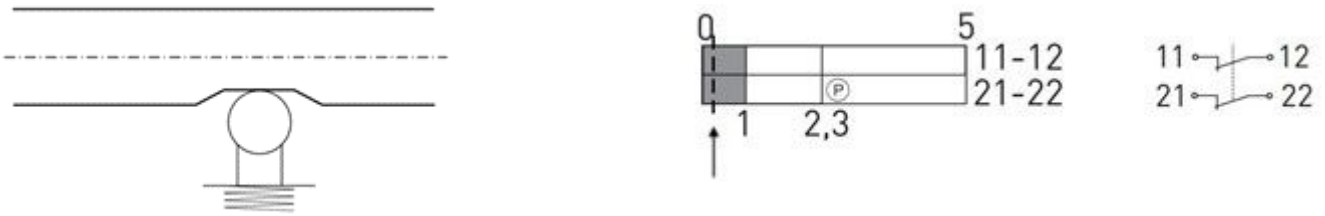
DANGER!
The safety switch must be connected to the client's safety circuit, which will stop or prevent the valve from operating.

The safety switch is a mechanical make-break contact to detect that the drive side and/or non-drive side end cover is removed from the body. Depending on how the contact is connected, the drive will stop, and/or an alarm will be given.

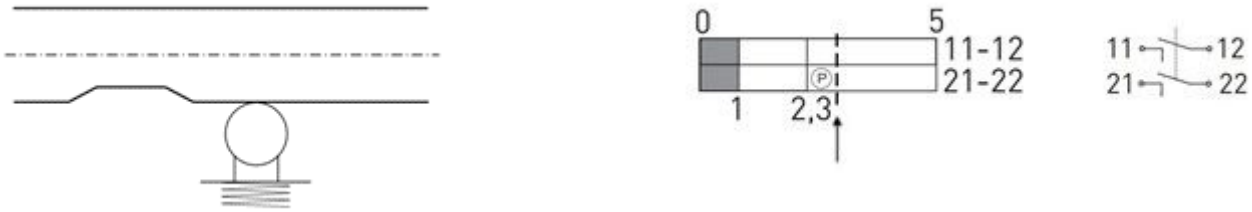
8.4.4.1 Electrical connection

The electrical connections of the safety switch are divided in two scenario's:

Scenario 1:
All connections are closed when both end covers are assembled to the body:



Scenario 2:
All connections are broken when one or more end covers are removed from the body:



8.5 Air purge unit (if fitted)

► Connect air supply to ball valve.

ATTENTION!
The air pressure must be applied before product enters the valve and before conveying pressures are applied.
The air supply must always be present when there is product in the valve, including after conveying ceases.

8.5.1 Setting air purge units with pressure control

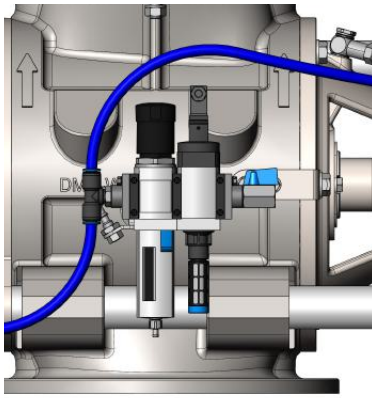


Figure 8.4: Pressure regulator with on/off valve

For setting these units, please refer to chapter Adjusting air purge units with pressure control, 11.20.3.

8.5.2 Setting air purge with flow control units

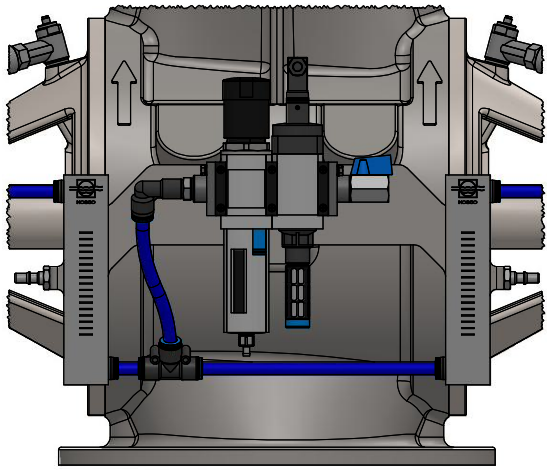


Figure 8.5: Flow regulator with analog flowmeters and on/off valve

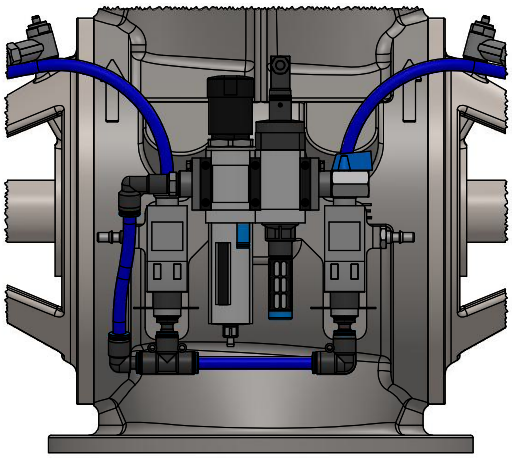


Figure 8.6: Flow regulator with digital flowmeters and solenoid valve

Air purge with flow control units are fitted at the factory and will have been set to the correct air flow.

ATTENTION!
At commissioning, check if the air flow corresponds to the value indicated in the table below. If not, refer to chapter 11.21.4 for instructions on how to set the air flow.

Valve type/size				Indicated flow*	
AL-BL	AML-AXL-BXL	BXXL	NR	digital flowmeter	analog flowmeter
150-175	150-200			50	25
200-250	250-300	350	347	60	30
300-350	350-400			85	43

*The digital meter shows the flow in Nl/min and the analog flow meter shows the flow in l/min. See chapters 11.21.4.2 and 11.21.4.3 for in depth explanation.

ATTENTION!
Check whether the pressure regulator is correctly set at 3.5 bar.

If either of these values is not set correctly, please refer to 11.21.4 for the proper adjusting procedure.

Be aware that the analog and digital flowmeters are set to different flow values. This is because the digital flowmeters are measuring in “normal liters per minute” (Nl/min), which standardizes the measurement by accounting for variations in temperature and pressure, effectively providing a reading as if the conditions were at a standard or ‘normal’ state. On the other hand, the analog flowmeters are only able to measure in “liters per minute” (l/min), which are not able to adjust for these environmental factors.

8.6 End cover purging (if fitted)

- Connect air supply to ball valve.
- Set pressure regulator to 0.1-0.2 bar above system pressure.

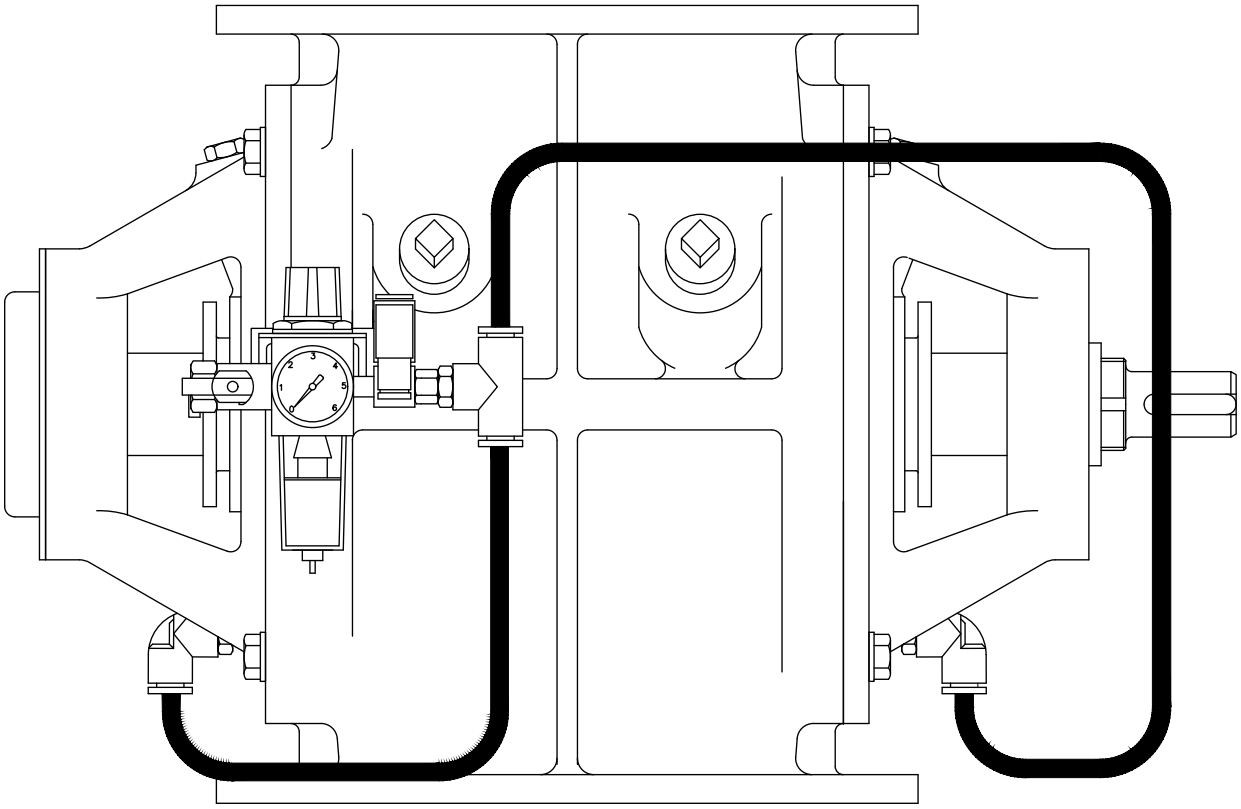


Figure 8.7: End cover purging

8.7 Rotor Interference Detection (RID) (if fitted)

The rotor is electrically isolated from valve body, end covers and drive.

The DMN RID 3.0 control unit supplied will give an output signal when there is rotor contact to body or end covers and provides fail safe monitoring.

As with all such systems, false readings may be caused by a conductive product or previously metal-contaminated product passing through the valve and possibly making contact between rotor and body or end covers. In either case this will result in a signal which, depending on how the system has been integrated, could cause the production process to be halted.

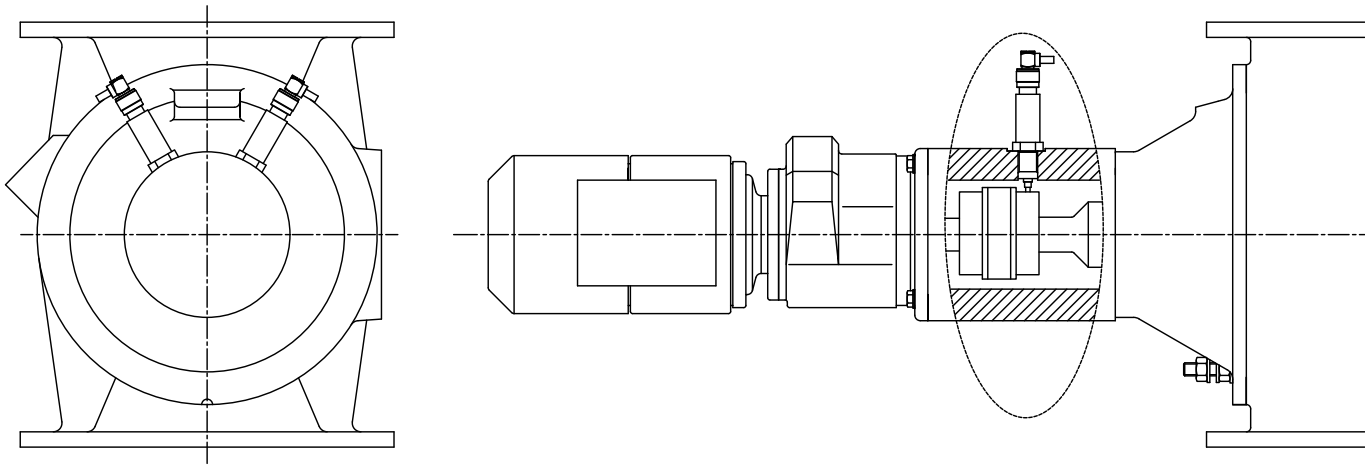


Figure 8.8: RID assembly

ATTENTION!

Ceramic Hybrid Bearings are used, there are no plastic parts to isolate the rotor.
The resistor in the junction box will efficiently ground any static electrical charge generated by the isolated rotor.
Special attention is required on start up in a newly commissioned system due to possible contamination by foreign particles.
After cleaning of the valve, the RID controller must be reset before starting the valve.

Figure 8.9: RID 3.0 control unit

8.7.1 Technical specifications

Technical specifications apply to the RID 3.0 control unit, part number 22464112. The RID 3.0 control unit is an industrial appliance.

Supply voltage	24 VDC ± 10%, Overvoltage category I
Power consumption	150 mA
Ambient temperature	-20°C - 60°C -4°F - 140°F
Storage temperature	-20°C - 60°C -4°F - 140°F
Relative humidity	30% - 70%, non-condensing
Altitude	Sea level to 1000m
Relay contacts OK, MTM, OL, CONT	Max . 1A AC/DC Switching voltage may be max. 48V relative to the 24VDC supply ground
Optically isolated inputs RST and CIP	Max. 24VDC ± 10% Voltage may be max. 48V relative to the 24VDC supply ground
Current floating through sensor inputs S1, S2	<5mA
Open voltage S1,S2	3.3VDC, S2 side must be grounded S1/S2 may be max. 28VDC relative to the 24VDC supply ground.
Maximum cable length S1, S2	20 meter (0,75 mm^2)
Resistant measurement range	0-10kΩ
Measurement accuracy 0-1k/1k-10kΩ	10Ω/100Ω
Sample rate of sensor resistance	1000Hz
USB connection	USB2.0 via USB-C connector
Network connection	EtherNet/IP™ (Dual port)
Current output representing measured resistance (range adjustable by software)	4-20 mA Ground side of the 4-20 mA loop is connected to the 24VDC supply ground

SAFETY PRECAUTIONS!

- The RID 3.0 control unit may only be installed by certified electrical engineers.
- Take the necessary ESD precautions handling and installing the module.
- For ATEX environments a Zener safety barrier (Pepperl & Fuchs Z960) must be added to the system.
- For correct and safe operation the open loop detector resistance box must be connected to the S1/S2 sensor inputs at the most far away position from the RID 3.0, to be sure the whole measurement loop is included for open loop detection.
- The RID may only be operated in indoor situation.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

The RID 3.0 consists of four parts, respectively, the module itself, the open-loop resistor box and two rotor pick-ups. For an ATEX environment, a safety barrier must be added to the system.

8.7.2 Mounting

The RID 3.0 must be mounted on a din rail in a horizontal or vertical position (direction not relevant). The module can be mounted between other modules as long as the ambient temperature not is exceeded. The front panel of the RID 3.0 must be inside the enclosing cabinet. The RID itself does not need any special ventilation requirements.

8.7.3 Electrical installation

The RID has the following relay connections (NO = normal open, NC = normal closed, C = common):

CONT	Contamination detection This relay output switches when the resistance measurement exceeds the contamination level for the given time slot.
MTM	Metal-to-Metal and CIP detection This relay output switches when the resistance measurement exceeds the MTM or CIP level for the given timeslot and incident setting.
OL	Open loop detection This relay output switches when there is an interruption in the sensor wiring.
OK	OK signal This relay is always on when the module is operating.

ATTENTION!
Open loop detection
Cause:

- Resistor box not mounted
- Cable breakage
- Wear rotor contact pick-up: no more contact to coupling

The RID has the following supply connections

24VDC	Connection to which the supply voltage must be applied.
RES	At this optically isolated input a 24VDC can be applied to reset the module. Single minimum 0.1 sec pulse signal.
CIP	At this optically isolated input a 24VDC can be applied to reset the module. Permanent signal during CIP.
IOUT	At this port a 4-20mA measuring device can be connected to monitor the measured resistance. NOTE: the negative side of the 4-20mA output is connected to the negative terminal of the supply voltage.
SENSE (S1/S2)	At this port the sense line must be connected, terminated by the resistor box. S2 must be connected to protective ground at the machine side.

8.7.3.1 Standard measuring circuit RID

(S1) To body

(S2) To rotor

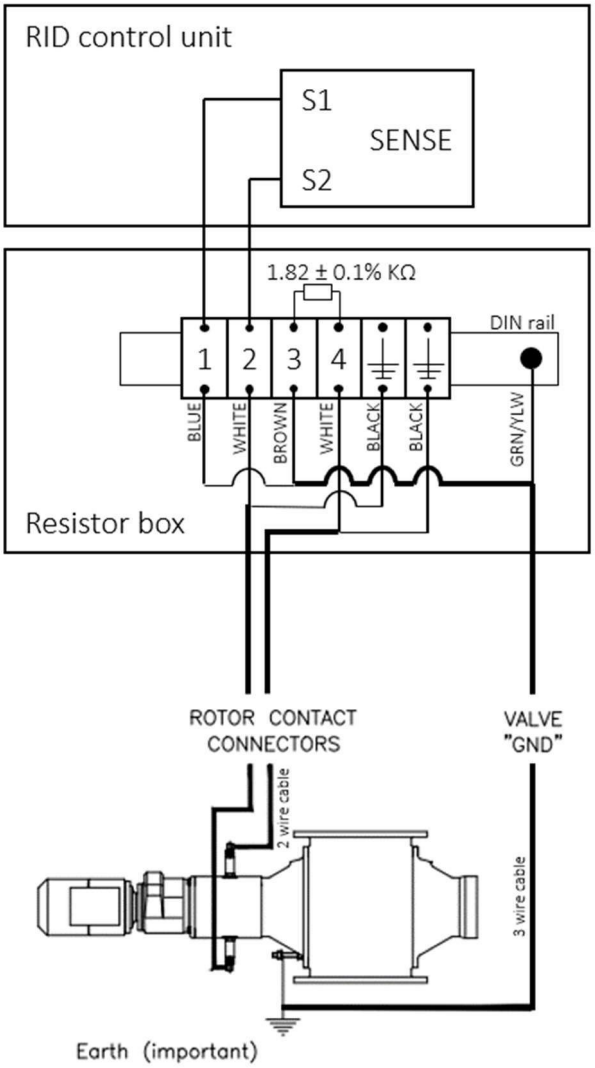


Figure 8.10: Standard measuring circuit RID

ATTENTION!
Check connection control unit Sense S1-S2.
Wrong connection can result in no metal to metal alarm.

8.7.3.2 Hazardous areas measuring circuit RID

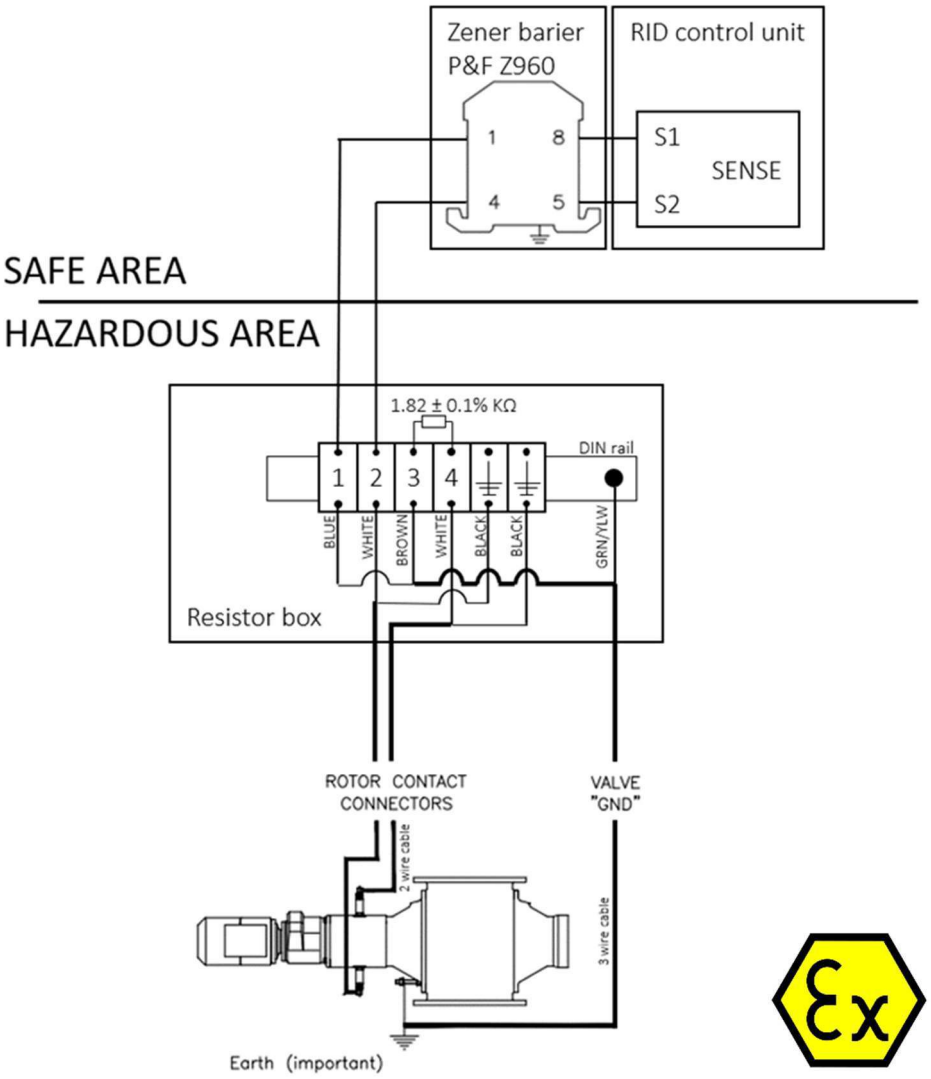


Figure 8.11: Hazardous areas measuring circuit RID

ATTENTION!

- Check connections.
- Wrong connection can result in false alarms.
- The control unit is pre-programmed with standard settings by DMN-WESTINGHOUSE. For modification and monitoring measure values of the control unit go to service tool (refer to chapter 9.4.2).
- Should there be any problems, please contact our aftersales department, see chapter Contact information.
- After the circuit analyser has shown a fault condition, whether simulated or actual, and the cause of the fault has been identified and eliminated, the circuit analyser can then be reset manually or by a signal.
- As an option it is also possible that 'auto reset' is done after 5 seconds. See chapter 9.4.2 for setting the checkbox. **This is not recommended!**
- The resistor in the junction box will efficiently ground any static electrical charge generated by the isolated rotor.

CAUTION!

Connect output relays to an appropriate control circuit to ensure the motor is isolated in the event of a fault.
The control system is not part of the standard supply of DMN.
It is the responsibility of the end user to ensure that a control system is installed in the system.

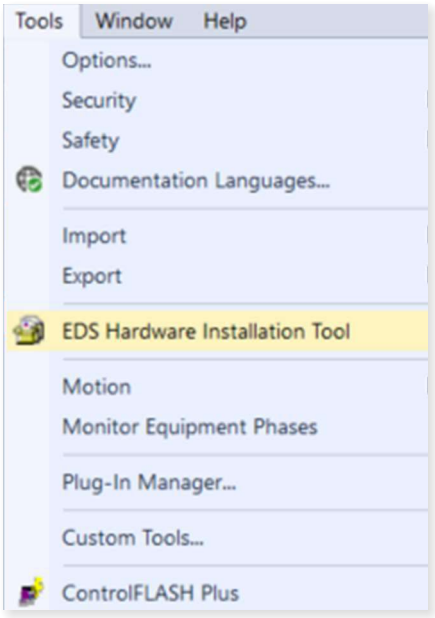
8.7.3.3 Rockwell PLC communication

The RID 3.0 control unit uses the EtherNet/IP™ protocol to communicate with PLC networks.

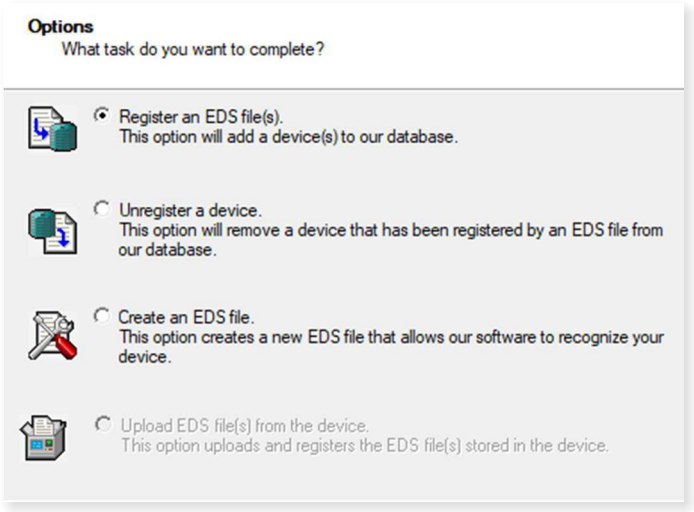
Standard the RID 3.0 control unit is configured to use DHCP to receive a IP address. If a fixed IP address is desired the tool HMS IPConfig should be used.

Perform the following steps to install the EDS file supplied with the RID 3.0 control unit:

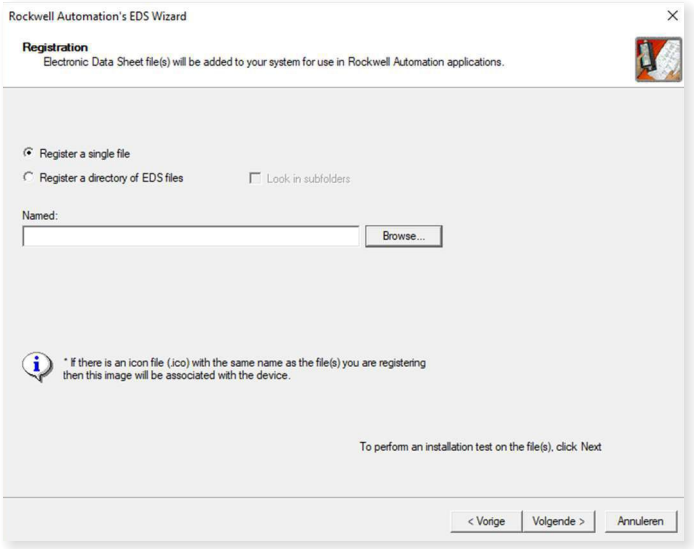
1. Open PLC project in Studio 5000
2. Tools → EDS Hardware Installation Tool [press next]



3. Rockwell Automation's EDS Wizard will start [press next]
4. Register an EDS file [press next]

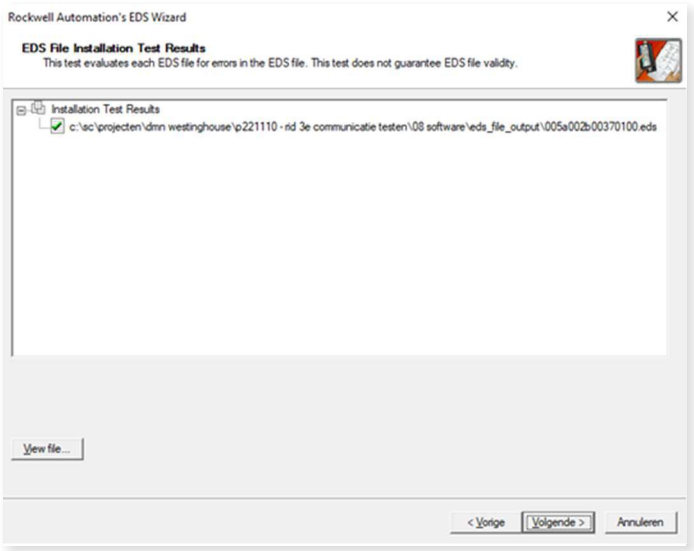


5. Select the required EDS file [press next]

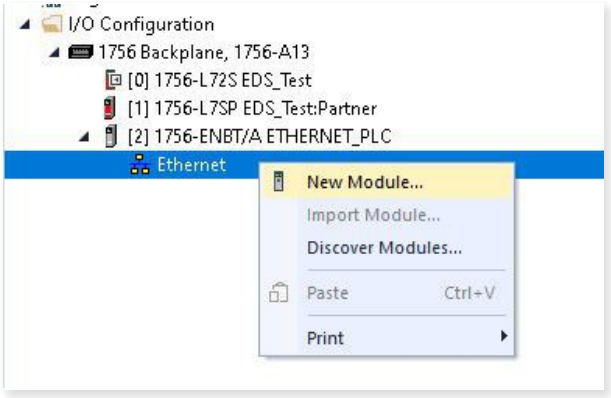


6. View of EDS test results [press next]

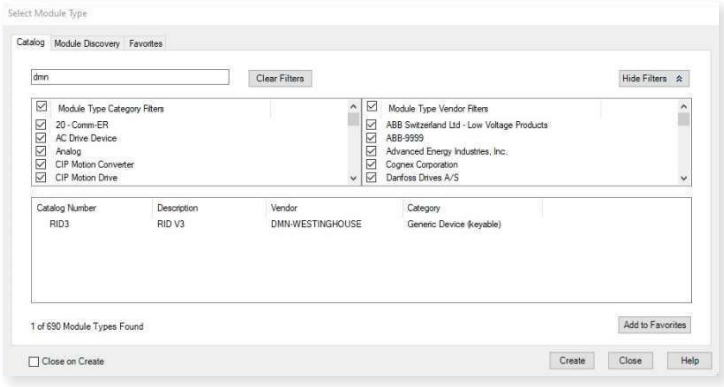
7. Press next on following screens to complete actions



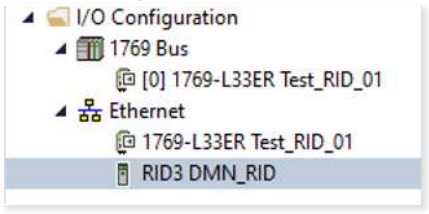
8. Add 'New Module' to PLC project



9. Find and select RID 3.0 to PLC project [press Create]



10. See I/O Configuration to check if the file is installed



11. See also Controller Tags in PLC project

It is also possible to use a web browser to view (and set) the parameters of the RID 3.0 control unit. To do this, execute the following steps:

1. Open web browser
2. Enter IP address of the RID 3.0
3. Select Parameters
4. Use arrows top left to browse through the parameters
5. Use the set button of each individual parameter

8.8 Installing accessories on the rotary valve (if fitted)

8.8.1 Mounting inlet restrictor / dropout box / vent box

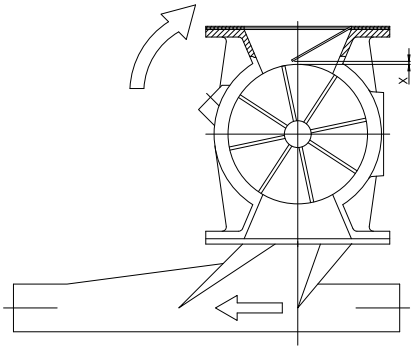


Figure 8.12: Inlet restrictor and Dropout box

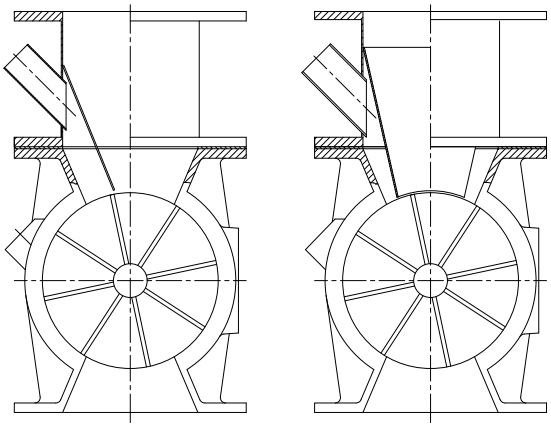


Figure 8.13: Vent box (one side) - Vent box (all around)

Instruction

- Check rotary valve direction of rotation.
- Check clearance between rotor and inlet restrictor / vent box; **a rule of thumb is that the clearance X must be 1.5 x particle size.**
- Check dropout box air flow direction.

8.9 Installing the rotary valve in a potentially explosive atmosphere

Take note of the following important points in addition to the regular product information and safety and installation instructions.

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

- Explosion proof rotary valves (see chapter 5.6)
- Additional safety instructions for use in potentially explosive atmosphere (see chapter 6.7)
- “Installing the rotary valve in a potentially explosive atmosphere” (this chapter)

Before installing the rotary valve in the system check the clearances between rotor and Body/Cover. (refer to chapter 11.15.1).
Check if there are any potentially explosive atmospheres, oils, acids, gases, vapours, radiation etc. present during installation.
Check if the following information on the name plate of the rotary valve corresponds to the potentially explosive on-site atmosphere.

Pay specific attention to:

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

Always ground the rotary valve, use the flange connection bolts, earth-stud on end cover or motor base plate.
Check that the electrical leakage resistance is less than 10^6 Ω.

Rotary valve external no zone

- It is not permitted to have an explosive atmosphere outside.
- No dust accumulation is allowed.

On the name plate of the ATEX certified rotary valves the Pmax (explosion shock resistance) is given.
If an explosion could occur above the Pmax, the user of this equipment must ensure adequate safety measures are installed.

The functionality of stopping the rotary valve after detection of an explosion is not part of the delivery. The rotary valve must be integrated in a control system to guarantee the valve will automatically stop within 0,5 sec. after explosion detection. This is to prevent burning or smouldering products passing through the rotary valve further into the system once the initial explosion is over.
A suitable sensor (specially for this purpose) must be used.
Ensure sensor and control system is installed.
Sensor and control unit are not part of standard DMN supply!

8.9.1 Power and rotor speed rotary valves

The matrix below shows the power and rotor speed for each type and size of DMN-WESTINGHOUSE valve.

For good functioning of the valve the rotor tip speed must not exceed 0.66 m/sec. The standard rotor speeds are usually between 15-25 RPM depending on size of valve.

The Power depends on the minimum required torque and rotor speed.

According to the ATEX directive the maximum velocity must not be higher than 1 m/s and the maximum power of the motor gear unit is not higher than 4 kW.
If higher velocity or power are required, contact DMN.
ATEX approval ceases without prior consultation.

Valve type	Valve size									
AL	100	150	175	200	250	300	350	400	450	500
AXL			200	250	300	350				
AML	100	150	200	250	300	350	400			
USAL			200	250	300					
AR			300	400	625					
NR					347					
BL		150	175	200	250	300	350			
BXL			200	250	300	350				
BXXL					350					

Rotor data	Values of the rotor in relation to the valve size mentioned above									
Rotor diameter [mm]	110	170	210	260	310	380	450	555	620	720
Rotor speed ATEX < 1m/s [RPM]	<173	<112	<90	<73	<61	<50	<42	<34	<30	<26
Max. advised rotor speed [RPM]	≤40	≤40	≤40	≤40	≤40	≤33	≤28	≤23	≤20	≤18
Max. Power [kW]	≤0,37	≤0,75	≤0,75	≤1,1	≤1,5	≤1,5	≤1,5	≤3	≤4	≤4
Minimum Torque [Nm]	70	110	150	210	285	410	560	805	1000	1295

For example

AL valve type with a valve size of 150:

- rotor diameter of 170mm
- max. advised rotor speed of ≤ 40RPM
- max. power of ≤ 0,75kW

8.9.2 Drive

Explosive gas mixtures or concentrations of dust can lead to severe or fatal injuries in connection with hot surfaces, parts under power and moving parts on the gear unit / geared motor.
Installation, connection, start-up, maintenance and repair work on the gear unit / geared motor may only be performed by a qualified specialist while taking the following into account:

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

- Before starting the valve, check the oil level in the gear box. It should be filled with the correct amount and type of oil according to the instructions.

  Fit the breather cap on the gear box and check that the venting nipple is clean.

- Check the rotating direction of the valve rotor. It should rotate clockwise seen from the drive end (see direction of the arrow).

Always ground the rotary valve, use the flange connection bolts, earth-stud on end cover or motor base plate.
Check that the electrical leakage resistance is less than 10^6 Ω.

ATTENTION!
After installation test run the valve.

8.9.3 If delivery excludes drive

Use drive and drive components that are CE marked and with an ATEX-approval equal to or better than that of the rotary valve.
Please study the operation instructions supplied by the drive manufacturer.
Check if the following information on the name plate of the gear unit corresponds to the potentially explosive on-site atmosphere.
Pay specific attention to:

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

Chain drive

- On one side of the valve, holes have been tapped for fitting the motor base plate (see drawing for dimensions).
- To fasten the chain guard, three holes have been tapped in the bearing housing of the valve (see drawing for dimensions).

DANGER!
The chain drive must be protected by a guard.

Check if there are any potentially explosive atmospheres, oils, acids, gases, vapours, radiation etc. present during installation.
Please follow safety instructions of chapter 1 when installing the Rotary valve in a potentially explosive atmosphere.
When assembling the chain guard make sure that no ignition sources (e.g. sparks through contact) can be created.

CAUTION!
The sprockets should be fitted on the rotor shaft as close as possible to the bearing housing.
The sprockets should **not** be hammered on to the shafts.
The sprockets on the shafts of the valve and the gear unit should always be perfectly aligned.

8.9.4 Accessories (if fitted)

Check if the information on the name plate of electrical accessories such as;

- Safety switch
- Solenoid valve
- Proximity switch
- etc.

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

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

All electrical accessories should be CE marked and with an ATEX-approval equal or higher than the ATEX-approval mentioned on the rotary valve.
Please study the operation instructions supplied by the manufacturer.

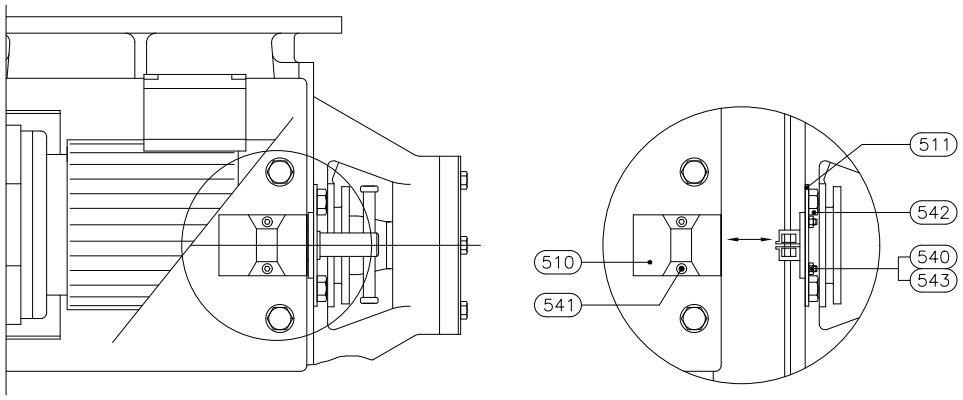


Figure 8.14: Safety switch

Zero speed indicator

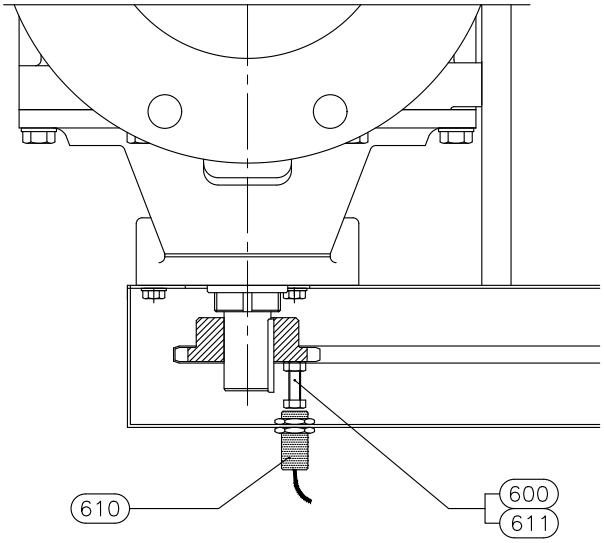


Figure 8.15: Drive side option 1

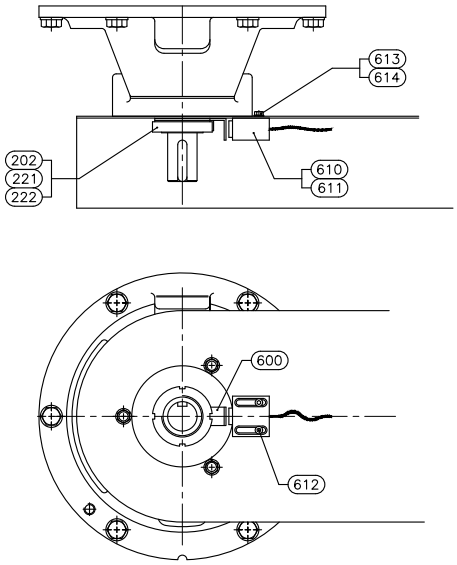


Figure 8.16: Drive side option 2

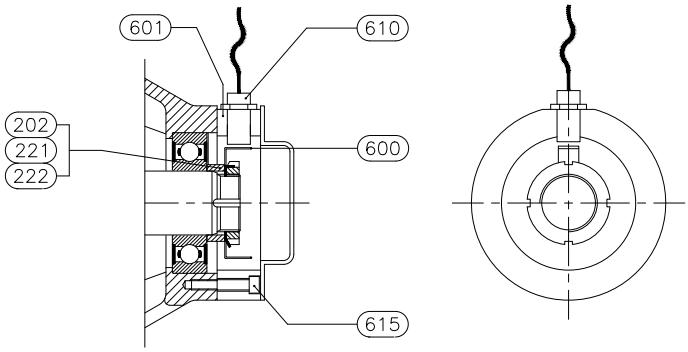


Figure 8.17: Non drive side

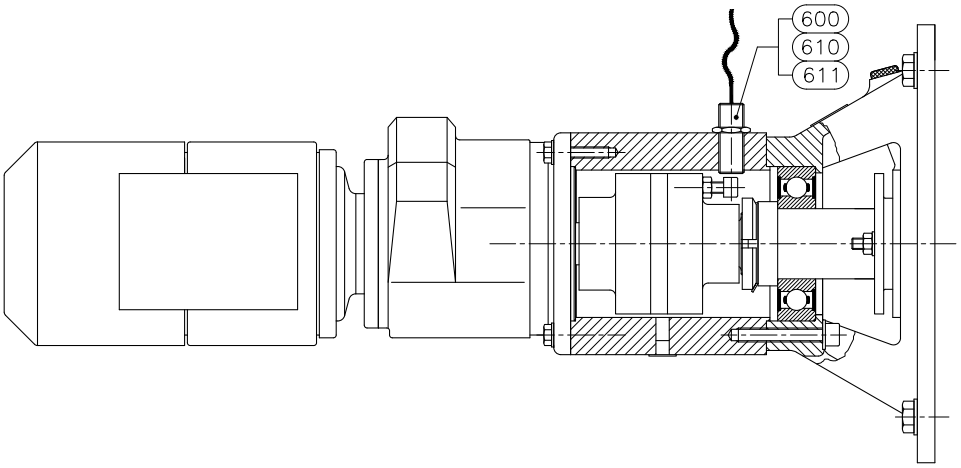


Figure 8.18: Direct drive

8.10 Installing the rotary valve in a hygienic application

Rotary valve must be installed in such a way that there is enough space for easily and safely access for cleaning, service and maintenance so that the required level of hygiene can be maintained.
The rotary valve must be properly mounted vertically to minimize dust build-up.

8.10.1 Flange connections

ATTENTION!
Avoid steps due to misalignment of equipment and pipe connections.
Product can remain in steps and can result in inadequate cleaning.

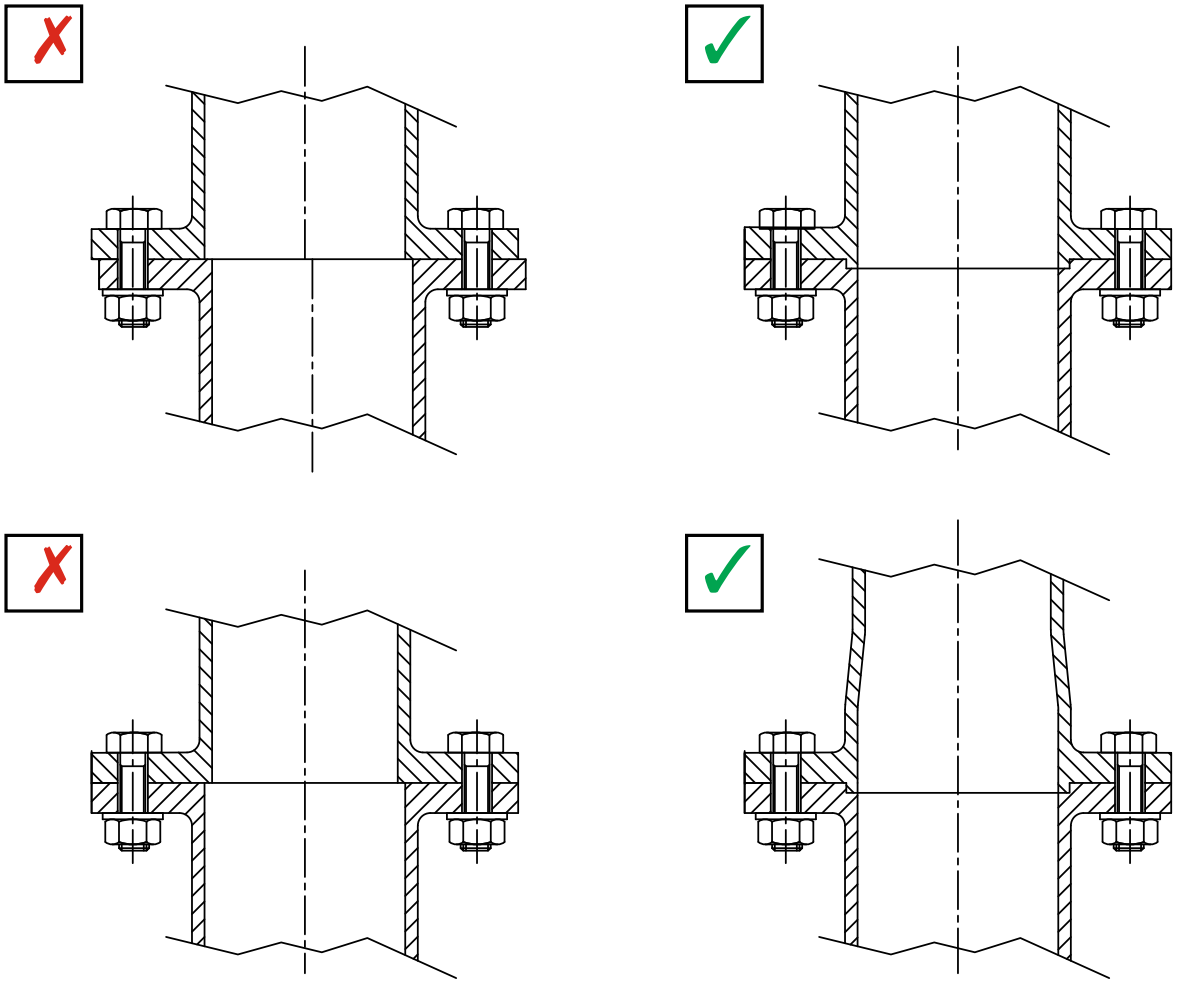


Figure 8.19: Flange connection

In- and outlet flange connection.

- Make sure that in- and outlet diameter of rotary valve (1) and counter flanges (2) are equal.
- Center counter flange with flange rotary valve.

You can use the dowel pin holes (3) in In- and outlet flange rotary valve (see table) for correct alignment.

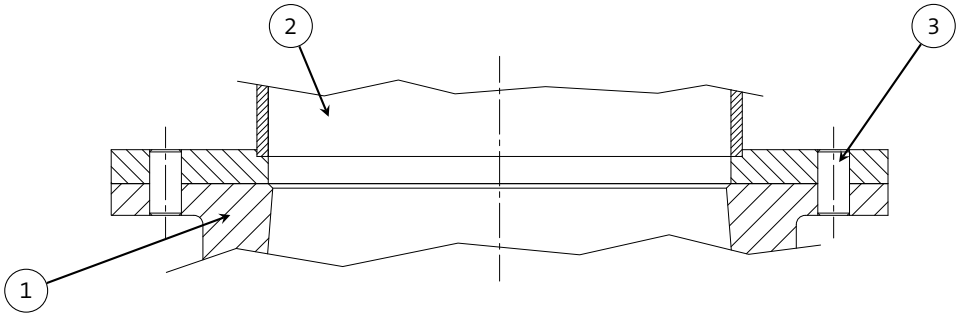
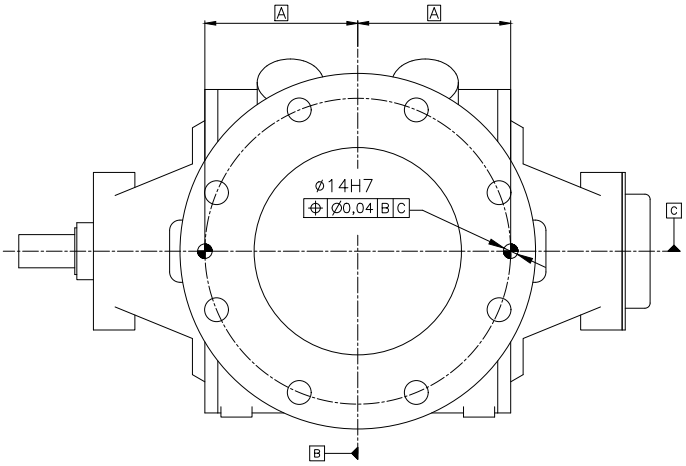


Figure 8.20: In and outlet flange connection

Valve Size	A
150	120
175	135
200	147.5
250	175
300	200
350	230



Blowingline flange connection

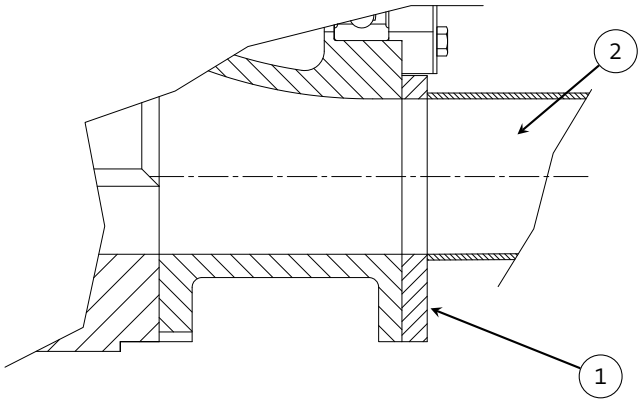


Figure 8.21: Blowingline flange connection

- The conveying pipeline (2) to be connected to the blowingline flange (1) should ideally have the same diameter as the connection flange.
- If there is variation between the inner diameters of the blowing channel and the conveying line, the transition from one diameter to the other should be as smooth as possible.
- Connection between flange and conveying line must be continuously welded and free of imperfections.
- Weld must be internally polished to Ra 0.8 µm.

Use flange/pipe coupling and gaskets that are of a hygienic type.

USDA

8.10.2 Shaft seal with air purge

- Filtered dry and oil-free purge air suited for contact with food should be used to prevent contamination.
- The diameter of the air pipe supply should be equal to or larger than the connection diameter of the valve.
- **1.** If no air purge unit is supplied with the valve, the purging air pressure should be 0.5 bar higher than the pressure in the valve.
  2. If the air purge unit is supplied with the valve, the specific pressure requirement for the purging air can be found in chapter 8.5 (if fitted).
- The air pressure must be applied before product enters the valve and before conveying pressures are applied.
- The air supply must always be present when there is product in the valve, including after conveying ceases.

Ensure proper functioning of the airpurge (see chapter 10.2.6).

9. OPERATION

Read the safety instructions in chapter Safety first, before operating the product.

DANGER!
Operation must only be performed by trained and authorised personnel!
When the valve is in operation no maintenance and repair work must be carried out!
The limits stated in the “Sales order conformation” should not be exceeded!
No pressure difference over rotor allowed for HT600 additional executions!
Only operate the valve when it is fitted with the protective safety parts supplied by DMN-WESTINGHOUSE.
Protective safety parts are:

- Mechanical protection i.e. chain guard and end cover plates.
- Electro-mechanical protection i.e. safety switches (if fitted).

If the rotary valve is shut down for more than one month, make sure that all product residue is removed before starting up the rotary valve.

9.1 First time start up

- Check valve rotor rotation direction; **It should rotate clockwise seen from the drive end (see direction of the arrow).**
- Check voltage of electrical parts.
- Check shaft seal and air purge pressure (if applicable).
- Remove transportation plug from the gear box (if applicable).

9.2 Cleaning

Clean components in accordance with company cleaning regulations.

ATTENTION!
Danger from cleaning agents and operating supplies.
Risk of skin and eye damage. Respiratory hazard.

- Only use approved cleaning agents. Observe the safety data sheet.
- Wear personal protective equipment.
- Consult a doctor immediately in the event of injuries.

CAUTION!
Risk of machine damage due to improper cleaning.
Impermissible auxiliary materials or cleaning agents can cause damage.

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

CAUTION!
Risk of machine damage due to improper cleaning
The cleaning of the components listed below with compressed air, high pressure or Steam jets or liquids are not permitted!

- Bearings
- Guide rails
- Gear motors
- Rotation monitor
- Chain wheels and chain rotary valves
- Pneumatic components

9.2.1 Manual cleaning

The rotary valve types AL,AML,AXL,BL,BXL,BXXL in Easy detachable or Dairy execution are easily dismountable, to enable the rotary valve to be opened/closed without dismantling the valve from the system. The additional MZC sliding rails will support the rotor during the opening/closing procedure.

The additional MZC sliding rails will support the rotor during the opening/closing procedure.

The additional MZC-I sliding rails will support the non-drive side end-cover and the rotor during the opening/closing procedure.

The MZC-I extraction mechanism makes it possible to rotate the rotor for inspection and cleaning when removed from body.

The additional MZC-II sliding rails will support the non-drive side end-cover, including the rotor, and the drive side end-cover, including the drive during the opening/closing procedure.

The MZC-II extraction mechanism makes it possible to rotate the rotor for inspection and cleaning when removed from body.

The rotary valves that are certified EHEDG ED CLASS II and accepted by the USDA (United States Department of Agriculture) require manual dry cleaning.

ATTENTION!
The cleaning process, duration and frequency must be determined and validated individually for each application.
Plant shutdown for cleaning is not required as long as product meets all quality and food safety specifications.

CAUTION!
Cleaning with pressurized air should be avoided as this creates dust clouds that can transfer contaminants to other areas. However, pressurised filtered and dry air in combination with a proper de-dusting can be used for dry cleaning in enclosed equipment.

ATTENTION!
The general “around-the-plant” good housekeeping to prevent accumulation of dust layers on external equipment surfaces must be applied.

CAUTION!
Make sure the rotary valve is empty before opening!
This is to prevent any product from falling out of the rotary valve upon opening; to avoid a dust cloud and to prevent any potential damage from the falling product.

9.2.2 Dry cleaning

Dry cleaning should be focused on the removal of the main deposits and product-layers. Vacuum cleaning, brushing and/or surface scraping are the most common procedures used. Dust formation should be avoided as much as possible. Therefore handling of collected deposits should take place in a vented area associated with a central vacuum system or a dedusting unit.

Acceptable dry cleaning procedures include use of hand-held dedicated tools:

- Brushes and scrapers (e.g. colour coded to indicate their use for different areas [food contact surfaces, non-food contact surfaces, waste])
- Vacuum cleaners (with HEPA filtration system) or central vacuum system
- Wipes, cloths (e.g. microfiber cloths)

Hand-held cleaning equipment used on food product contact surfaces must:

- Not be used for any other purpose or any other product
- Be regularly cleaned and maintained
- Be clearly marked and stored in a clean and dry location
- And shall not be abrasive

Damaged hand-held cleaning tools must not be used as there is a risk of broken parts remaining in the equipment and passing into the dry material pack-off area during subsequent process operations. This creates the possibility of contamination during the filling of bags or silos, etc.

Measures before cleaning

Shut down the rotary valve

- Switch off the material feed and secure it against being switched on again
- Empty the rotary valve
- Switch off the gear motor of the rotary valve
- Switch off the air purging gas
- Rotary feeder and system parts above and / or below without pressure
- Switch off the main switch and secure it against being switched on again
- Secure operating media such as voltage and compressed air against involuntary start-up

9.2.3 Disassembly / assembly

ATTENTION!
Risk of cut injuries!
Sharp surfaces, edges and corners of the housing bore and rotor can lead to cuts!
- Wear personal protective equipment.
- Consult a doctor immediately in the event of injuries.

ATTENTION!
Danger from hot surfaces!
Risk of burns on housing parts!
- Let the machine cool down.
- Wear personal protective equipment.

ATTENTION!
Crush hazard!
The machine parts are heavy. They can fall off when lifting; there is a risk of crushing.
- Wear personal protective equipment.
- Secure the rotary valve against tilting if necessary.
- Secure the cell wheel and side cover against falling.
- Always attach suitable lifting gear and fasten it securely

CAUTION!
Make sure that no scratches occur during disassembly and cleaning, by using the correct disassembly procedure (see chapter 11) and the correct tools.

ATTENTION!
Check at regular intervals and during cleaning if the surfaces roughness (≤ 0.8 Ra) of the product contact surface has not increased and that there are no scratches or irregularities.
If found they must be repaired in order to continue to meet the EHEDG requirements.

ATTENTION!
Make sure the working area is clean during assembly to prevent cross-contamination.

ATTENTION!
Rotary valve EHEDG ED CLASS II.
After assembly check function air purge. (see chapter 8.4.2).

9.2.4 Wet cleaning

ATTENTION!
If wet cleaning is required the rotary valve needs to be dismantled and inspected for confirmation of effective wet cleaning and/ or subsequent drying. This is the responsibility of the user.

The rotary valves can be fitted with dummy covers and shaft to completely closes the valve assembly to the surrounding when rotor and/ or side cover are removed.

The empty valve housing can then be automatically wet cleaned (CIP).

9.3 Malfunctioning

In case of malfunctioning during operation we refer to chapter Maintenance.

9.4 Local control boxes

9.4.1 Rotor Interference Detection (RID)

The Rotor Interference Detection (RID) system monitors rotor to body and end cover contact. The RID can be installed to minimise damage to the rotary valve and warn of possible contamination of the conveyed product in the unlikely instance of the rotor fouling the valve body or end covers.

Rotary valves are produced with the highest accuracy and rotor movement is not likely to occur. However, should the rotor come into contact with the body and end covers due to foreign objects, excessive temperatures etc., the RID unit will generate an alarm.

Figure 9.1: RID 3.0 control unit

9.4.1.1 Setup

The RID has the following default settings:

MTM settings		
Detection level	50	Ohm
Minimum detection time	1000	msec
Number of incidents	3	
Within time	5000	msec
Pulse time relay	0	msec (0 = permanent)
CIP settings		
Detection level	10	Ohm
Minimum detection time	1000	msec
Number of incidents	3	
Within time	0	msec (0 = permanent)
Contamination settings		
Detection level	1000	Ohm
Minimum detection time	60	Sec
Pulse time relay	0	msec (0 = permanent)
General settings		
4-20mA Lower Setpoint	0	Ohm
4-20mA Upper Setpoint	1000	Ohm
Open Loop Detection After	5000	msec
Auto Reset After 5 sec	Disabled	
Activate CIP Mode	Disabled	

The settings can be changed by the web interface (EtherNet/IP™) or service tool (USB-C).

Take care changing the parameters. Contact DMN-WESTINGHOUSE in case of any doubt (refer to chapter Contact information).

9.4.1.2 Front panel buttons

The RID 3.0 control unit has one button. This is an extra alarm Reset button that can only be operated using a small pin, pushing it through the front panel at the location RESET.

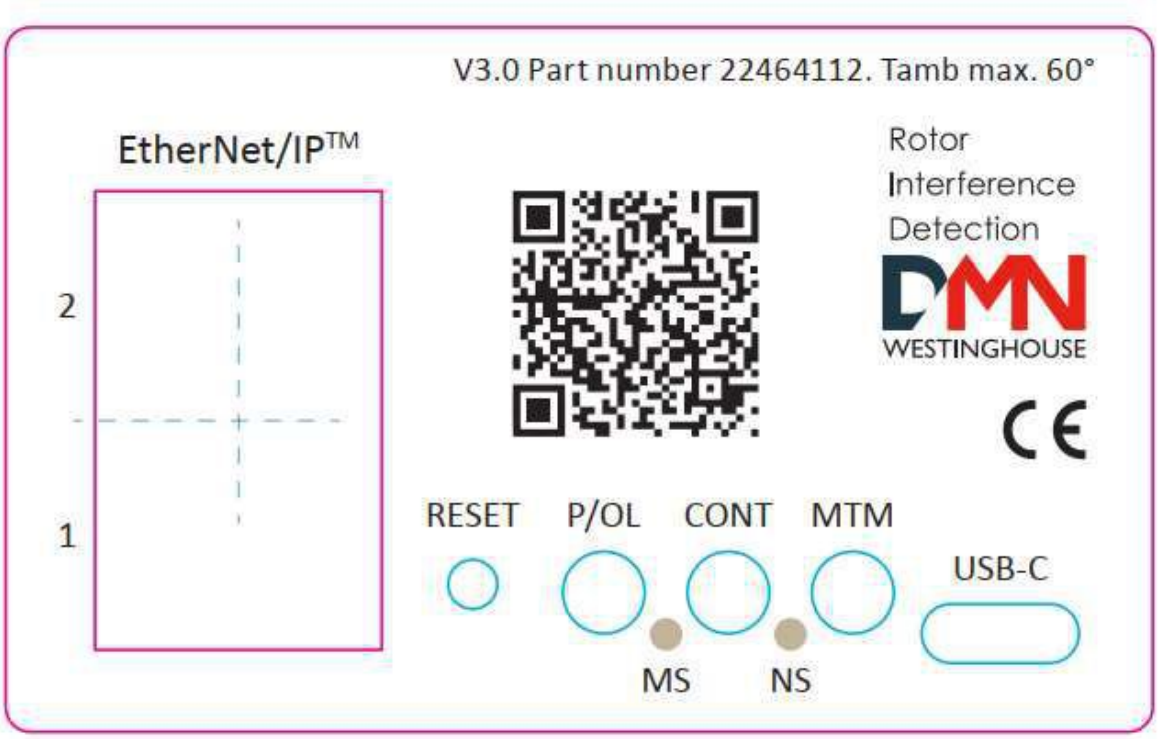


Figure 9.2: Front panel of the RID 3.0 control unit

9.4.1.3 Front panel indicators

The RID 3.0 has 3 operations indicators, 2 network indicators and 4 Ethernet connector indicators.

Operations indicators

P/OL (Green)	This indicator is steady green to show correct power supply. The led flashes fast the moment an Open Loop is detected.
CONT (Yellow)	This indicator turns yellow, the moment a contamination alarm is detected.
MTM (Red)	This indicator turns red when a MTM (or CIP) alarm is detected.

ATTENTION!
During startup, all indicators show a running light and light up together for a short period.
Sticker with LED indication is supplied for placement in the electrical cabinet.

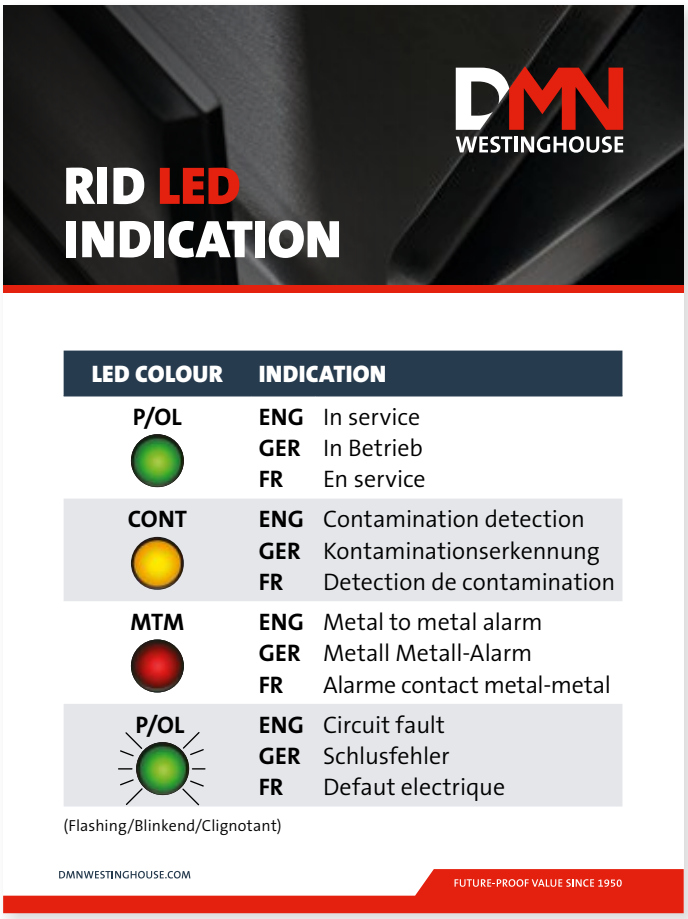


Figure 9.3: Sticker with LED indication

Network indicators

MS	Shows the ethernet Module Status	**Off**	No power, no IP address
		Green	Online, one or more connections established
		Green, flashing	Online, no connections established
		Red	Duplicate IP address, fatal error
NS	Shows the ethernet Network Status.	**Off**	No power
		Green	Controlled by a Scanner in Run state and, if CIP Sync is enabled, time is synchronized to a Grandmaster clock.
		Green, flashing	Not configured, Scanner in Idle state, or, if CIP Sync is enabled, time is synchronized Grandmaster clock.
		Red	Recoverable fault(s). Module is configured, but stored parameters differ from currently used parameters.

ATTENTION!
During startup both indicators show red and green for a short period of time.

Ethernet Connector Indicators

The following table shows the function of these indicators:

Green	Yellow	Indication
Off	Off	No network connection
Off	On	Link detected 10Mbit
On	Off	Link detected 100Mbit
On	On	Link detected 1Gbit

ATTENTION!
These indicators do not light up during startup.

9.4.2 Service tool

For setting up the control unit with this service tool, connect the USB cable to the PC or laptop and control unit.

With EtherNet/IP™ communication the same functions as in the service tool are available.

ATTENTION!
Only use USB connection when the service tool is used to modify/monitor values or to get a logging file.
When there is a permanent connection this can affect the controller and may cause false alarms.

Realtime alarm monitor)

The realtime alarm monitor tab provides realtime information about the alarms. It not only shows the current circuit resistance, but also the number of incidents and the duration of a certain condition.

The 'Reset Alarms' button can be used to reset pending alarms (as done with the reset button on the control unit).

The status bar at the top of all windows shows information about the USB connection, pending alarms and mode (MTM or CIP).

ATTENTION!
Current resistance as shown in service tool screen need to be used to define the set points for MTM and CIP alarm.

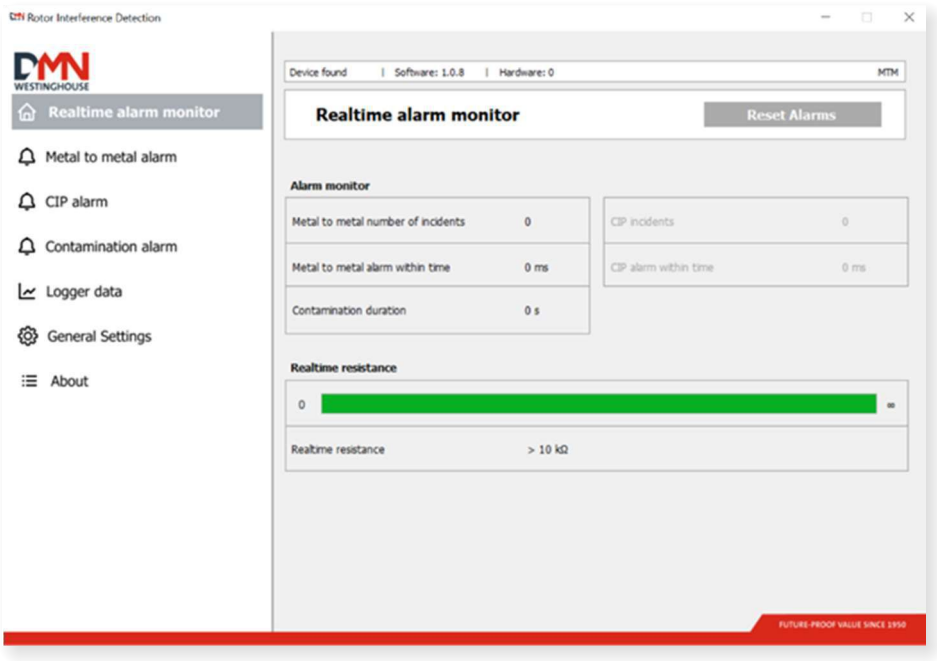


Figure 9.4: Realtime alarm monitor

Metal to metal alarm and CIP alarm

The MTM and CIP alarm tabs are similar. They both contain an incident definition, alarm definition, a calculator with buttons and a 'Write to module button'.

Metal to metal (MTM) alarm arises when the circuit resistance drops below a low threshold resistance (50Ω by default), with additional timing conditions (10-5000 milliseconds, adjustable).

CIP alarm arises when the circuit resistance drops below a very low threshold resistance (10Ω by default), with some additional

timing conditions (10-5000 milliseconds, adjustable).

CIP alarm settings will be used after input signal from control system on CIP connection (refer to chapter Electrical installation).

Status bar will change from MTM mode to CIP Mode.

Both alarms are defined as follows:

- Specify the minimum allowed resistance (Detection Level).
- Specify the minimum duration of one incident (Minimum Detection Time).
- Specify the number of incidents before an alarm rises (Number of Incidents).
- Optionally, specify the time setting for this condition to be reached. (Within Time).

NOTE: the 'within time' must be 0 (OFF) or larger then than 'Minimum Detection Time x Number of Incidents'.

Both CIP and MTM alarm tabs contain a calculator, such that both alarms' 'Minimum detection time' and 'Within Time' are easily calculated.

The 'Write to Module' button writes the new settings to the module.

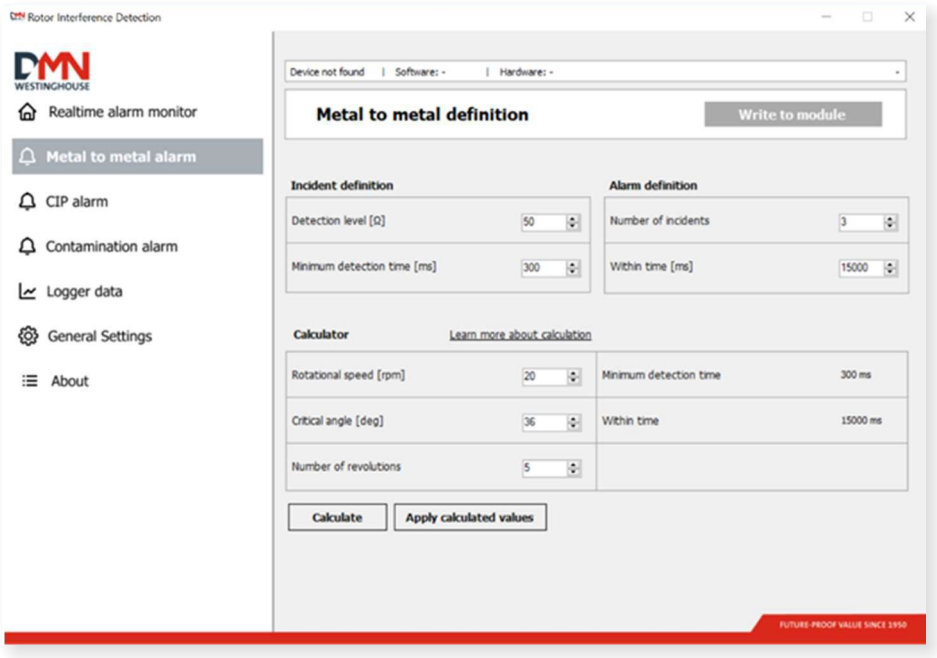


Figure 9.5: Metal to metal alarm tab. CIP alarm tab is similar.

ATTENTION!
Current resistance as shown in service tool screen need to be used to define the set points for MTM and CIP alarm.
If the standard detection level needs to be altered for better working of the RID according to customer process, contact DMN-WESTINGHOUSE for assistance (refer to chapter Contact information).

Contamination alarm

Arises when the circuit resistance (much higher than the 'metal to metal' level) drops below a threshold level (100 – 10k Ω, adjustable) for a given time (1 – 600 seconds, adjustable).

The alarm is defined as follows:

- Specify the resistance level (Detection Level).
- Specify the minimum duration of the alarm (Minimum Duration).

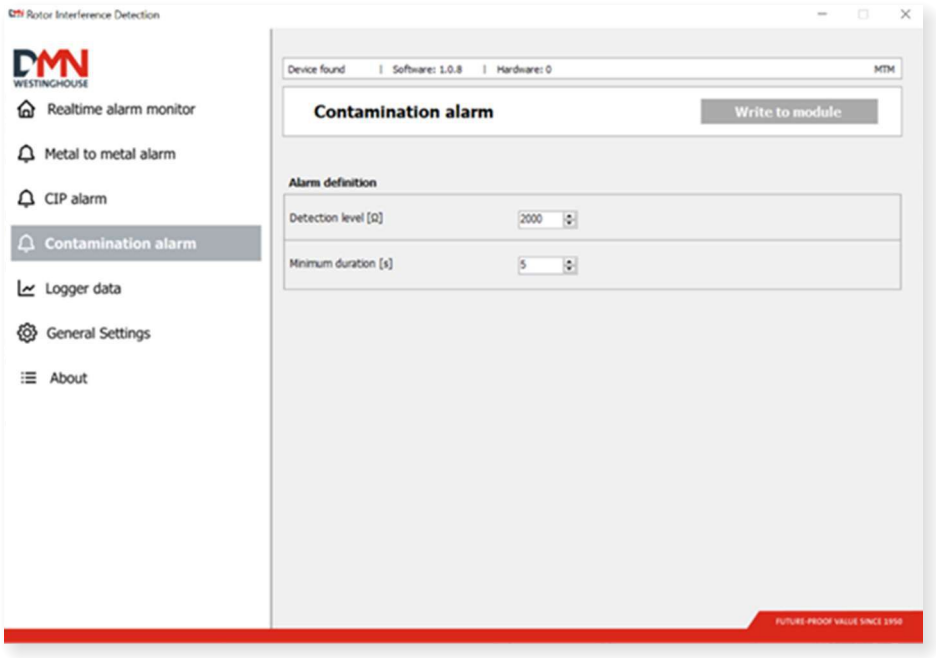


Figure 9.6: Contamination definition

General Settings

'Calibrate Wiring' button

- Calibrates the controller to compensate for the internal resistances (and Zener Barrier).

ATTENTION!
Perform wire calibration before commissioning.
Only perform calibration when valve is free of product.

4-20 mA output between (mA)

- Specify lower setpoint (R1) of resistance output.
- Specify upper setpoint (R2) of resistance output.

The relation between the current output (I) and resistance (R) is as follows:

$$R = \frac{I - 4}{20 - 4}(R_2 - R_1) + R_1$$

Open Loop Detection after (milliseconds)

- Specify the time before the alarm rises.

'Pulse time relay' output (seconds)

- Specify the time after which the alarm relay will be switched back. If set to 0, relay will not switch back.

Checkbox Auto reset is done after 5 seconds

- Will automatically reset the module after 5 seconds.

ATTENTION!
This is not recommended.
Reset will be done without identifying and eliminating the cause of the fault.

'Switch to CIP' (in all tabs)

- CIP Mode can be activated.

ATTENTION!
CIP Mode can be activated either via the USB/Ethernet or via the 24 VDC input. If one of these inputs has activated CIP Mode, it CANNOT be deactivated by the other.

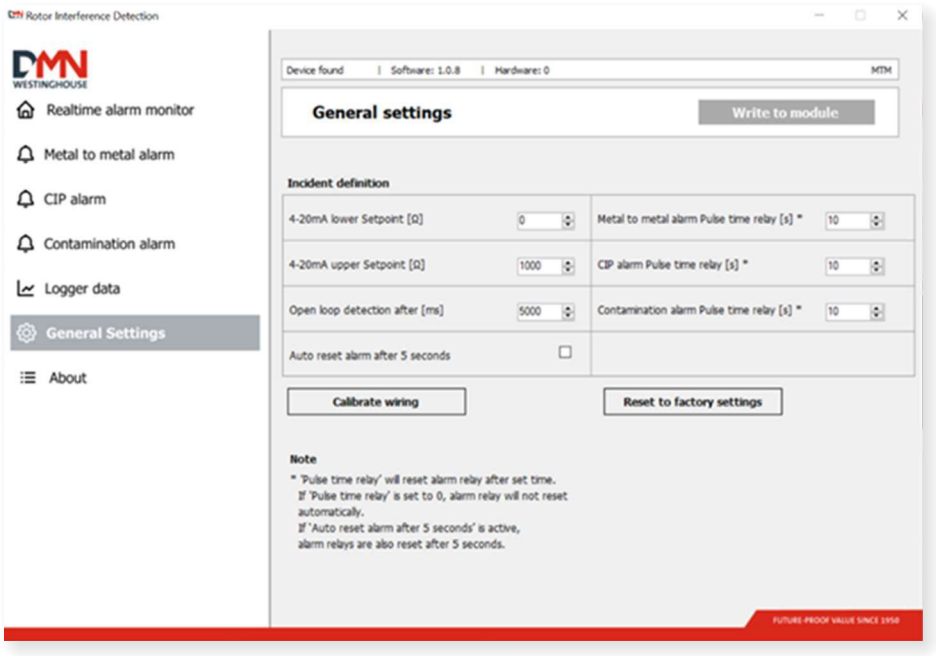


Figure 9.7: General settings

Logger data

The logger data is used to analyse the resistance measurements of the RID and adjust MTM, CIP and contamination alarm definition parameters.

ATTENTION!
Only for advanced users.

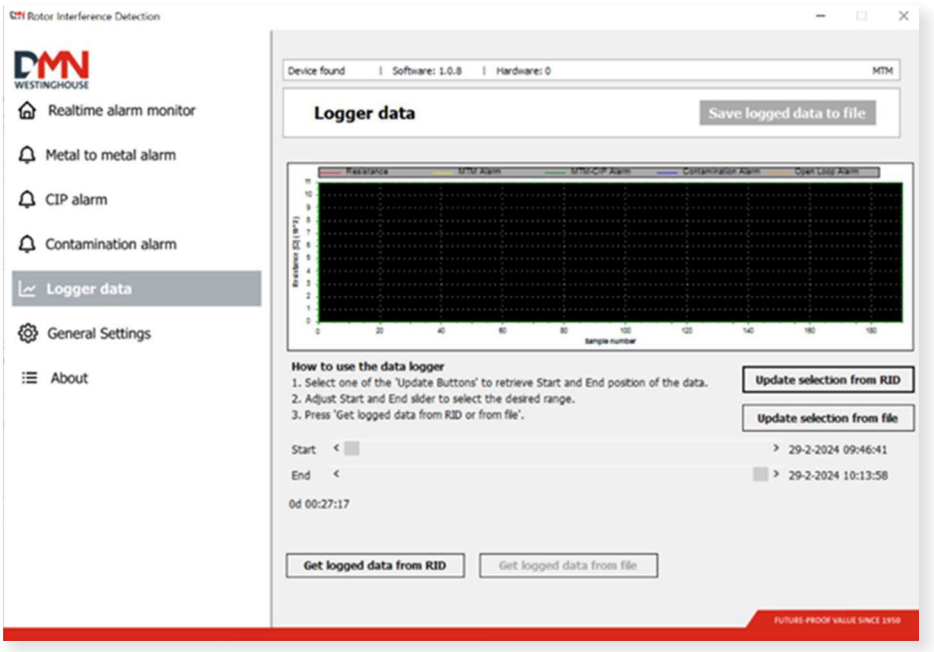


Figure 9.8: Logger data

Will log resistance value and alarms at set intervals of 1 second.

The value is date stamped by the clock of the PC running this application.

Data will be logged for the past 11-12 days; this data can be saved to and read from a .csv file.

ATTENTION!
If power is removed from the controller, log data will be removed.

10. MAINTENANCE

Read the safety instructions in chapter Safety first, before operating the product.

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

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

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

Periodic inspection check must be carried out to ensure that the system reacts as originally designed in the event of an explosion.

10.1 General

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

It is the responsibility of the user to determine the time between inspections (recommendation: for non-abrasive materials every 6 months). Wear will be influenced by abrasiveness of product, pressure difference over rotor, temperature etc.

Maintenance, apart from planned overhaul, should be adequately covered by regular and frequent attention to the rotor shaft sealing, reduction gear lubrication and adjustment and lubrication of the motor drive chain and chain sprockets.

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

10.2 Maintenance instructions

10.2.1 Before maintenance

Instruction

- ► Isolate electrical supply to valve motor
- ► Isolate air pressure to shaft seals (if fitted)

10.2.2 Maintenance every 3 months or after 2500 operating hours

Instruction

- ► Check if valve turns smoothly
- ► Check adjustment and functioning of air purge. If necessary, re-adjust (if applicable)
- ► Check chain tighten and grease (refer to chapter 8.2.1) (if applicable)

10.2.3 Maintenance every 3 months or after 2500 operating hours of ATEX certified valves

Instruction

- Check if valve turns smoothly
- Check rotor clearances (refer to chapter 11.15.1)
- Check rotary valve for erosion and corrosion damage
- Check bearings
- Check shaft sealing
- Check chain

10.2.4 General maintenance every 12 months or after 10,000 operating hours

Instruction

- Remove valve from system and clean it completely
- Dismantle valve
- Check packing material/O-ring(s)/lip seal(s) for damages
- Check drive shaft for wear or damage
- Check rotor blades for wear or damage; **if needed repair/replace**
- Assemble the valve and adjust rotor/rotor blades clearances (refer to chapter 11.15.1)
- Connect air coupling and adjust
- Check chain tighten and grease (refer to chapter 8.2.1) (if applicable)

10.2.5 General maintenance every 18 months or after 13,500 operating hours of ATEX certified valves

The bearings are selected for operation of more than 15,000 hours under normal conditions. These bearings are lubricated for life and do not require further maintenance. (Under normal operation conditions, valve located inside, or by exception outside. Regulate external cleaning with liquid, excessive humidity, etc.)

10.2.5.1 Instruction

- Replace bearings

10.2.6 Maintenance of Hygienic Rotary valve EHEDG ED CLASS II

It is important to have a continuous air flow on the shaft seals to prevent contamination between the shaft and the shaft seals.

Instruction

- Check air purge every 2 weeks after first start up.
- Time between inspections can be changed based on practical experience.
- It is the responsibility of the user to determine the time between inspection.
- If necessary, re-adjust air purge pressure and/or flow.

10.2.7 Maintenance drive

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

10.3 Cleaning

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

10.4 Lubricants

The table below indicates the lubricant per part.

Part	Application	Lubricant (Supplier)
Bolt	General	Retinax EP2 (Shell)
	Food NSF H1	Cassida RLS2 (Shell)
Chain	General	Retinax EP2 (Shell)
Chain/sprockets HT250		Foliac L621 (ROCOL)
Bearings[1]		-
Bearings HT250[2]		HM 83-402 (Klüber)
Rotor axis (MZC-I/MZC-II)	Food NSF H1	Berulub FG-H 2 EP (Bechem)
Center bolt (MZC-I/MZC-II)	Food NSF H1	Berulub FG-H 2 EP (Bechem)

[1] The bearings fitted in the rotary valve are dust-proof ball-bearings. These bearings are lubricated for life and do not require further maintenance.

[2] The bearings (up to max. 250°C) fitted in the rotary valve are roller bearings. Apply a few shots of lubrication to the bearing grease nipples using a gun before starting the valve and at any future opportunity when the valves are 'cool'. Check bearings monthly and grease if necessary. Do not apply to valves when hot as the carrier in the lubricant will 'FLASH OFF'.

10.5 Spare parts

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

10.6 Malfunction

In the event of a malfunction consult the table below to find the solution. If the problem does not feature in the table, please contact DMN-WESTINGHOUSE (refer to chapter Contact information).

10.6.1 Rotary valve

Problem	Cause	Solution
Low capacity	Insufficient product supply	Check supply
	Speed too low	Increase speed
	Too much air leakage	Improve venting, check blades (adjust/replace)
Rotor is not turning	Broken chain	Replace chain
	Rotor jammed	Dismantle valve
	Working temperature too high	Adjust rotor
	Malfunction drive	Check drive
Shaft seal is leaking	Shaft seal worn out	Tighten gland follower
	Lip seal damaged	Replace lip seal

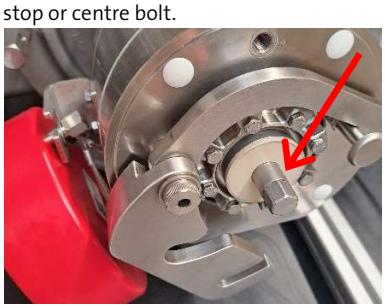
10.6.2 Rotor Interference detection

The RID 3.0 control unit does not need any maintenance, unless following situations occur:

Problem	Cause	Solution
OK alarm Module failure All LEDs off	No power supply to module	► Check if 24VDC power supply is connected to module ► Check fuse supplying module
	Module faulty	► Update firmware ► Replace module
Open loop alarm Circuit fault Green LED flashing	Open circuit	► Check wiring (lead breakage) ► Check if resistor box is connected ► Check loop resistor (1820)Ω
	Rotor pick-ups	1. Check rotor pick-ups for wear (no contact to coupling) 2. Replace pick-ups and clean coupling and lantern piece

Continued on next page

Continued from previous page

Problem	Cause	Solution
Metal - metal alarm Green LED on Red LED on	Metal - metal contact	1. Open valve and check for metal to metal contact 2. Clean the valve 3. Ensure the valve is reassembled correctly 4. Check clearances MZC-I/MZC-II execution: ► Make sure that lock plate (handle) is not touching end stop or centre bolt.  ► Check for short circuits in the wiring. MZC execution: ► Make sure that axial fixing is not touching ring  ► Check for short circuits in the wiring
	Wrong operation settings (Beware: regular and CIP mode use different settings)	Calibration (RID 3.0 only): 1. Empty valve 2. Use service tool 3. Calibrate wiring Adjust operation settings: 1. Use service tool 2. Check log file to see values 3. Check for product and operation conditions changes 4. After evaluation change Ohm value
Contamination Alarm Green LED on Yellow LED on	Contamination	1. Open valve and check for contamination 2. Clean the rotary valve
	Wrong operation settings	Calibration (RID 3.0 only): 1. Empty valve 2. Use service tool 3. Calibrate wiring Adjust operation settings: 1. Use service tool 2. Check log file to see values 3. Check for product and operation conditions changes 4. After evaluation change Ohm value

10.7 After an explosion

After an explosion the valve must be removed from the installation and completely dismantled, cleaned and re-assembled as described in this manual (refer to chapter 11). All damaged parts should be replaced.

Check product temperature and set clearances according to the sales order confirmation related to the serial number of relevant rotary valve (refer to chapter Applicable documents).

11. DISMANTLING, ASSEMBLING AND ADJUSTING

Read the safety instructions in chapter Safety first, before dismantling, assembling and adjusting the product.

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

DANGER!
While the valve is in operation no repair work must be carried out!
When carrying out repair work, always shut off the power and set secure against unexpected incoming power.

CAUTION!

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

ATTENTION!
After assembly test run the valve.

11.1 Before dismantling

Instruction

- Turn off electrical supply, lock the switch and/or remove the fuses.
- If necessary, disengage chain from drive to ensure rotor does not turn.
- If necessary, isolate air pressure from the valve.

11.2 AL-series / BL-series (Standard execution)

11.2.1 General assembly & part list

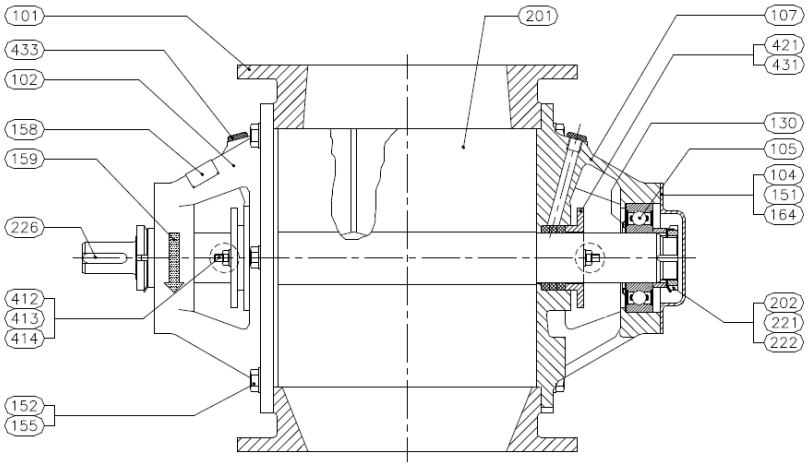


Figure 11.1: General assembly AL-series

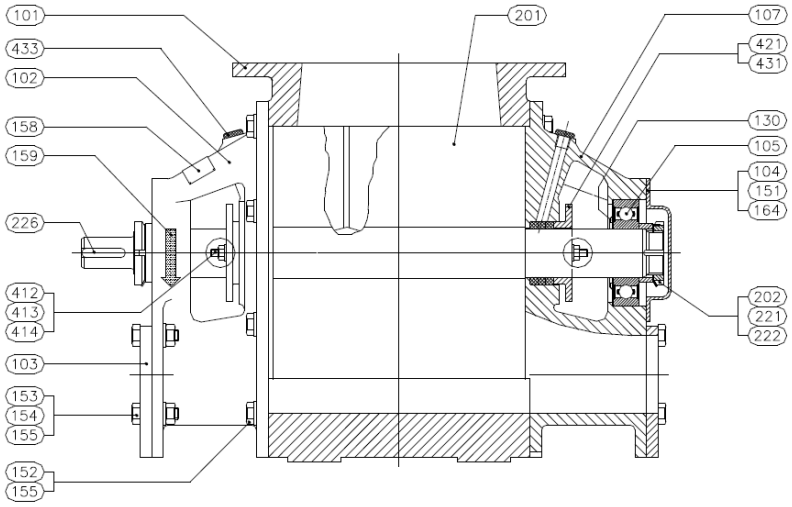


Figure 11.2: General assembly BL-series

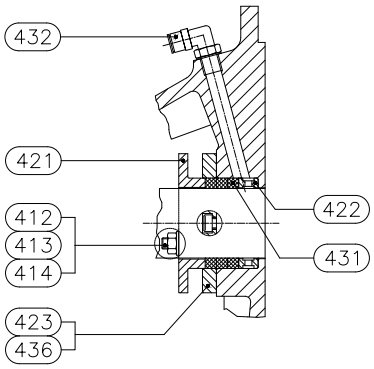


Figure 11.3: Blowing seal

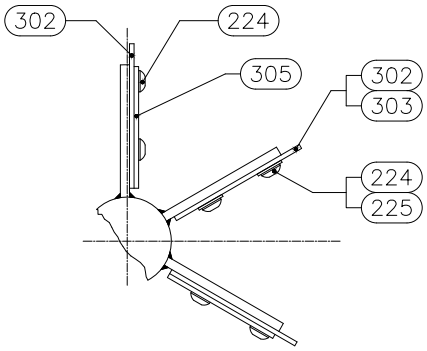


Figure 11.4: rotor

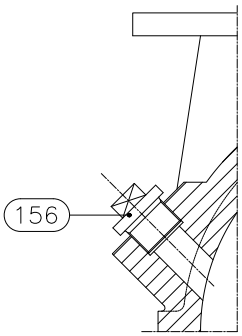


Figure 11.5: Plug connection

101 Body
102 End cover
103 Flange
104 Cover
105 Ball-bearing
107 End cover
130 Nilos ring
151 Bolt
152 Bolt
153 Nut
154 Bolt
155 Washer
156 Plug
158 Name plate
159 Arrow
164 Washer
201 Rotor
202 Spacer ring
221 Safety ring
222 Locknut
224 Head screw
225 Washer
226 Key
302 Rotor blade
303 Scraper blade
305 Clamp plate
412 Stud
413 Nut
414 Washer
421 Gland follower
422 Lantern ring
423 Extension piece
431 Packing cord
432 Coupling
433 Plug
436 Cylinder bolt

11.2.2 Dismantling

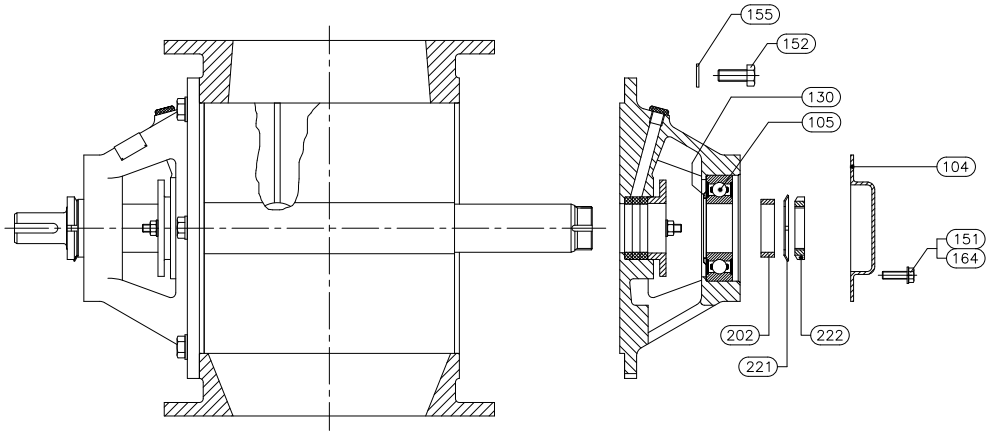


Figure 11.6: Dismantling standard execution

Instruction

11.2.2.1 Non-drive side

- Remove bolts (151) from bearing cover (104) and remove cover.
- Loosen locking nut (222), remove safety ring (221) and spacer ring (202).
- Remove end cover fixing bolts (152). Fit two of these bolts in the tapped jacking holes provided in end cover (107) and remove cover.

11.2.2.2 Drive side

- Dismantle drive parts.
- Loosen locking nut (222), remove safety ring (221) and spacer ring (202).
- Remove end cover fixing bolts (152). Fit two of these bolts in the tapped jacking holes in end cover (102) and remove end cover. The rotor is removed by pulling it axially from the body.

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

- Remove packing cord (431).

11.2.3 Re-assembly

Instruction

After thoroughly cleaning, checking and renewing necessary parts the valve should be re-assembled as follows:

- Check that ball-bearings (105) are pressed in tight to end cover (102/107). If necessary, tap lightly on the outer bearing ring using a copper rod, to ensure bearing is seated properly.

Packing cord with air purge:

- Reassemble complete packing cord with air purge in both end covers and secure by means of nuts (413).

Packing cord:

- Reassemble gland follower (421) to end covers without packing cord.

ATTENTION!
Clean the spigot edges of both end covers (102/107) carefully.
To ensure the rotor position is concentric with the valve bore the end cover spigots are a light interference fit in the body. Before assembly the jack screws (152) must be removed.

- Assemble end cover to the non-drive side of the body and secure using bolts (152).
- Assemble rotor blades finger tight to rotor with screws and washers.
- Fit rotor (the adjustable blade not yet adjusted) in body and gently push the rotor shaft through the sealing area at the non-drive side end cover. Push the rotor further until the shaft end is positioned inside the ball-bearing.
- Fit drive side end cover. Fit spacer ring (202), safety ring (221) and locknut (222) at both ends of the rotor shaft.

11.3 GL-series (Standard execution)

11.3.1 General assembly & part list

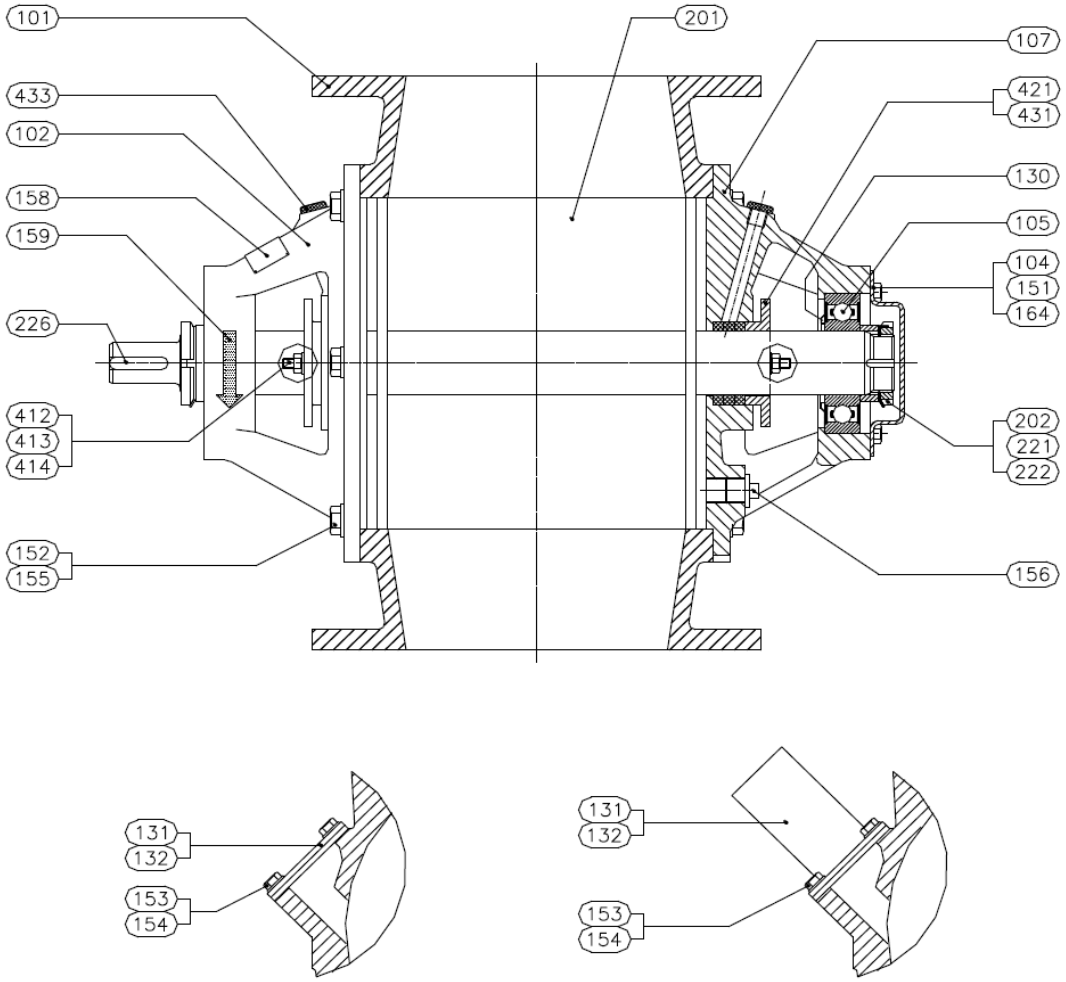


Figure 11.7: General assembly GL-series

101 Body
102 End cover
104 Cover
106 Ball-bearing
107 End cover
130 Nilos ring
131 Gasket
132 Vent plate
132 Vent adapter*
151 Bolt
152 Bolt
154 Washer
155 Washer
156 Plug
158 Name plate
159 Arrow
160 Washer
201 Rotor
202 Spacer ring
221 Safety ring
222 Locknut
226 Key
412 Stud
413 Nut
414 Washer
421 Gland follower
431 Packing cord
433 Plug

*Option

11.3.2 Dismantling

Refer to chapter 11.2.2

11.3.3 Re-assembly

Refer to chapter 11.2.3

11.4 AR-series (Standard execution)

11.4.1 General assembly & part list

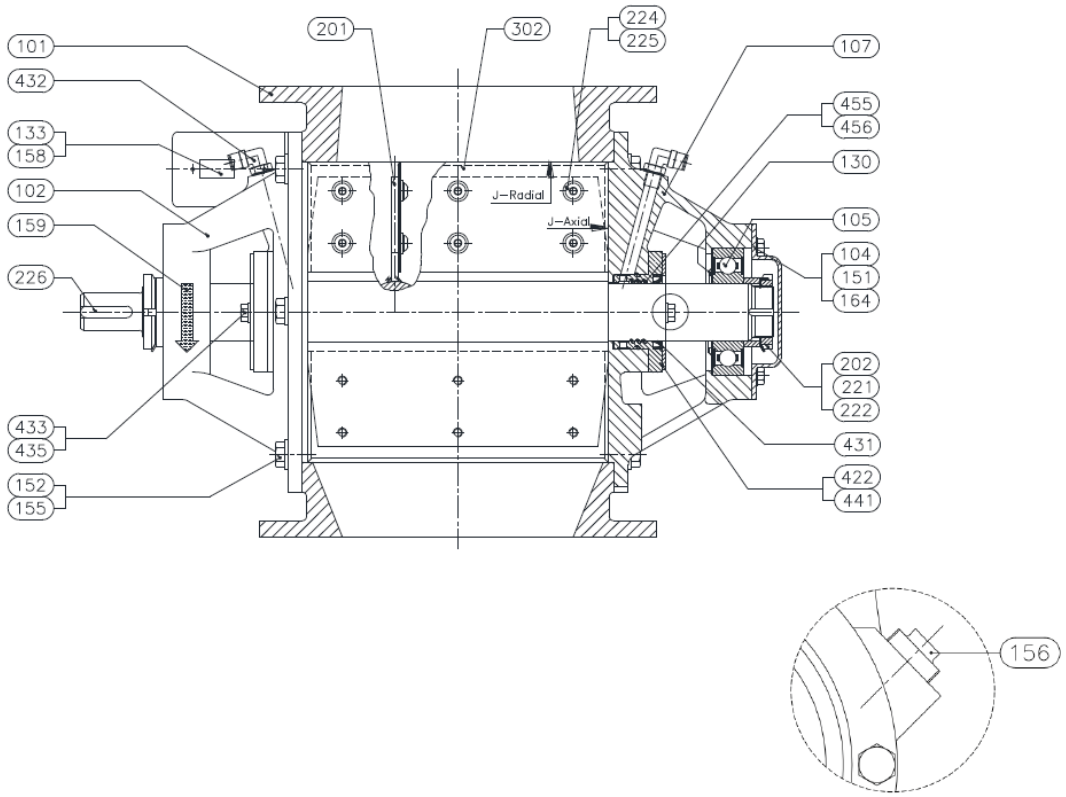


Figure 11.8: General assembly AR-series

101 Body
102 End cover
104 Cover
105 Ball-bearing
107 End cover
130 Nilos ring
151 Bolt
152 Bolt
155 Washer
156 Plug
158 Name plate
159 Arrow
164 Washer
201 Rotor
202 Spacer ring
221 Safety ring
222 Locknut
224 Head screw
225 Washer
226 Key
302 Rotor blade
422 Lantern ring
431 O-ring/Lip seal
433 Bolt
435 Washer
441 Cover
455 O-ring
456 O-ring

11.4.2 Dismantling

Refer to chapter 11.2.2

11.4.3 Re-assembly

Refer to chapter 11.2.3

11.5 AL-series / BL-series (HT execution 150°C - 250°C)

Clearance depends upon valve size, product temperature and valve material.

See enclosed table of clearances for the right adjustment of the rotor.

To achieve rotor end clearances, a gasket is fitted between the body and end cover non-drive end.

For instructions to adjust the rotor and blades, refer to chapter 11.15.3

11.5.1 General assembly & part list

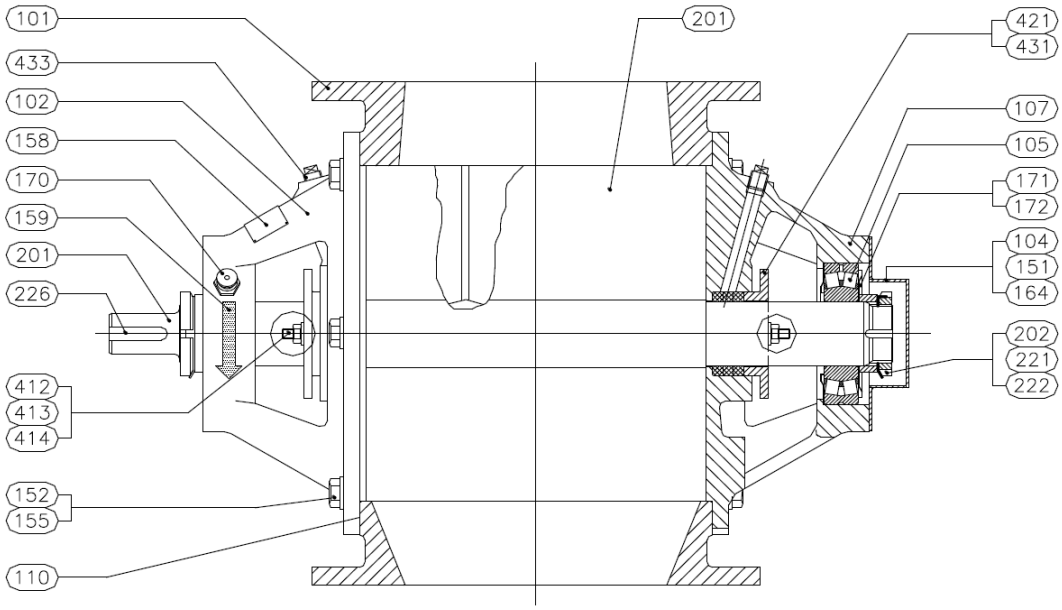


Figure 11.9: General assembly AL-series / BL-series HT 250°C

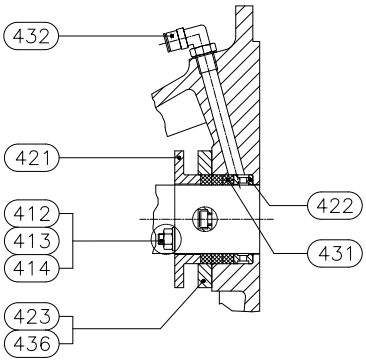


Figure 11.10: Blowing seal

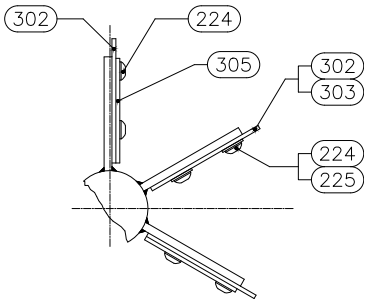


Figure 11.11: rotor

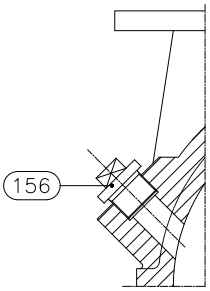


Figure 11.12: Plug connection

101 Body
102 End cover
104 Cover
105 Spherical roller bearing
107 Cover
151 Bolt
152 Bolt
155 Washer
156 Plug
158 Name plate
159 Arrow
170 Grease nipple
171 Nilos ring
172 Nilos ring
201 Rotor
202 Spacer ring
221 Safety ring
222 Locknut
224 Head screw
225 Washer
226 Key
302 Rotor blade
303 Scraper blade
412 Stud
413 Nut
414 Washer
421 Gland follower
422 Lantern ring
431 Packing cord
432 Coupling
433 Plug
436 Cylinder bolt

11.5.2 Dismantling

Refer to chapter 11.2.2

11.5.3 Re-assembly

Refer to chapter 11.2.3

11.6 AL-series (HT execution 400°C - 600°C)

11.6.1 General assembly & part list

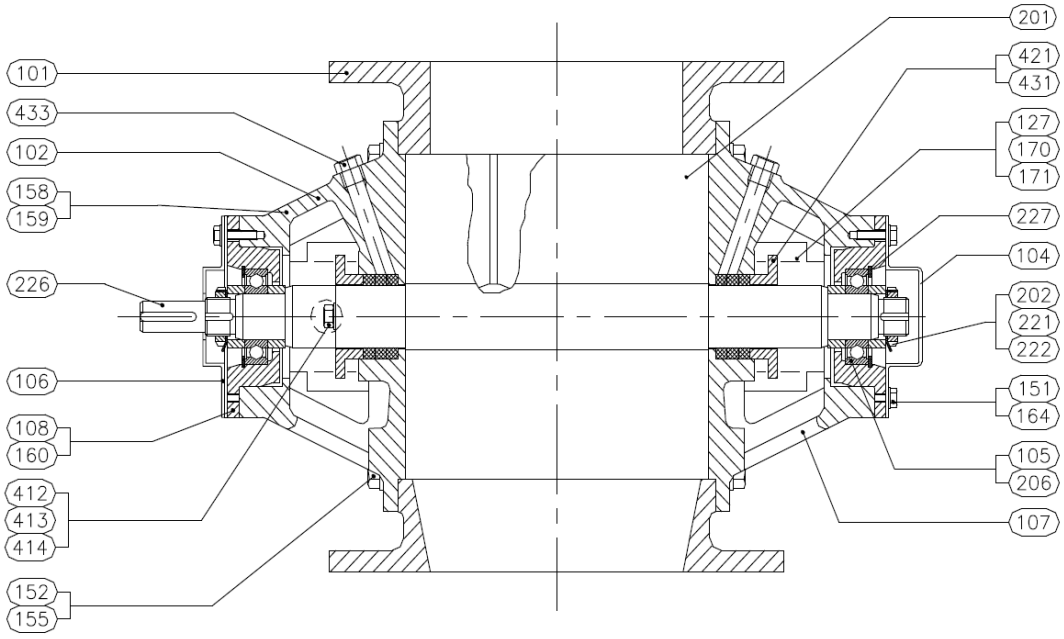


Figure 11.13: General assembly AL-series / BL-series HT 400°C-600°C

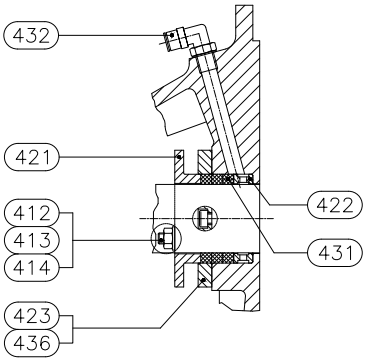


Figure 11.14: Blowing seal

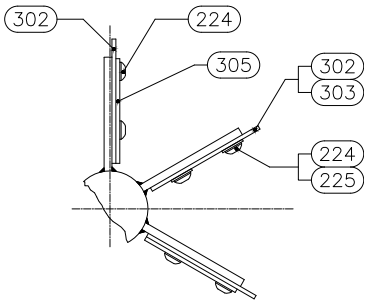


Figure 11.15: rotor

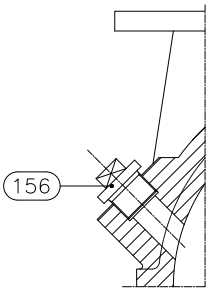


Figure 11.16: Plug connection

101 Body
102 End cover
104 Bearing cover
105 Ball-bearing HT
106 Bearing cover
107 End cover
108 Bearing house
127 Shaft protection
151 Bolt
152 Bolt
155 Washer
156 Plug
158 Name plate
159 Arrow
160 Countersunk screw
164 Washer
201 Rotor
202 Support ring
206 Shim
221 Safety ring
222 Locknut
224 Head screw
225 Washer
226 Key
227 Circlip
302 Rotor blade
303 Scraper blade
412 Stud
413 Nut
414 Washer
421 Gland follower
422 Lantern ring
423 Extension piece
431 Packing cord
432 Coupling
433 Plug
436 Cylinder bolt

11.6.2 Dismantling

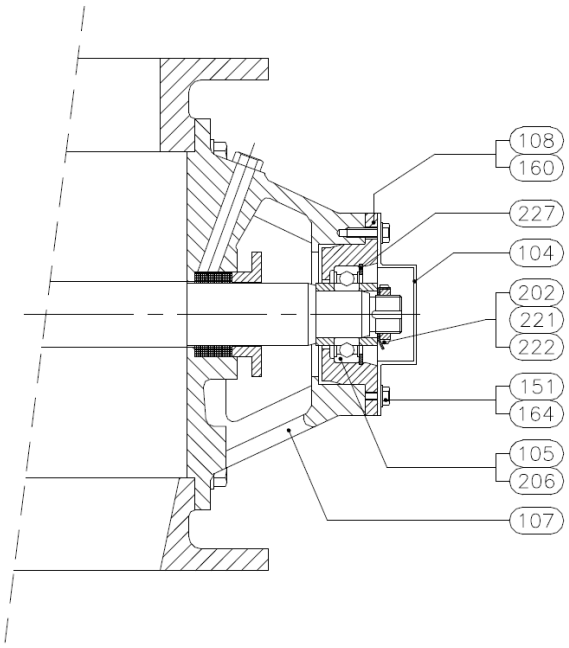


Figure 11.17: Dismantling non drive side

Instruction

11.6.2.1 Non-drive side

- Remove shaft guards.
- Remove bolts (151) from bearing cover (104) and remove cover.
- Loosen locking nut (222), remove safety ring (221) and spacer ring (202).
- Remove bearing housing assembly countersunk screws (160). Fit two of these bolts in the tapped jacking holes provided in bearing housing (108) and remove bearing housing.
- Remove inner spacer, shim (206) and retain.
- Remove end cover fixing bolts (152). Fit two of these bolts in the tapped jacking holes provided in end cover (102) and remove cover.
- Remove retaining circlip (227) and press out bearing (105) from bearing housing.

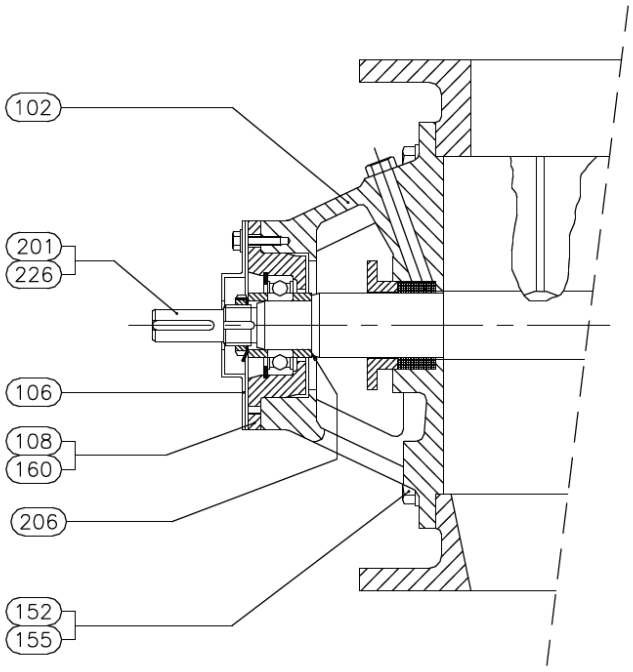


Figure 11.18: Dismantling drive side

11.6.2.2 Drive side

- Remove shaft guards.
- Dismantle drive parts.
- Loosen locking nut (222), remove safety ring (221) and spacer ring (202).
- Remove bearing housing assembly countersunk screws (160). Fit two of these bolts in the tapped jacking holes provided in bearing housing (108) and remove bearing house.
- Remove inner spacer, shim (206) and retain.
- Remove end cover fixing bolts (152). Fit two of these bolts in the tapped jacking holes in end cover (102) and remove cover.
- Remove retaining circlip (227) and press out bearing (105) from bearing housing.
- The rotor is removed by pulling it axially from the body.

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

- Remove seal.

11.6.3 Re-assembly

After thoroughly cleaning, checking and renewing necessary parts the valve should be re-assembled as follows:

CAUTION!
It has been stressed by SKF that no grease is to be used in the assembly or operation of the bearings.

Instruction

11.6.3.1 Packing cord

- Re-assemble lantern ring (422) and gland follower (421) to end covers without packing cord.

Bearing house assembly:

- Press high temperature bearing into the housing and ensure it is tight to housing shoulder, re-fit circlip (227).

ATTENTION!
Clean the spigot edges of both end covers (102/107) carefully.
To ensure the rotor position is concentric with the valve bore the end cover spigots are a light interference fit in the body. Before assembly the jack screws (152) must be removed.

- Assemble end cover to the non-drive side of the body and secure using bolts (152).

- Fit rotor in the body and gently push the rotor shaft through sealing area at the non-drive side end cover.
- Fit drive side end cover.
- Fit inner spacer ring (202) to rotor shaft, press in bearing house assembly to end cover and secure.
- Loosely fit outer spacer ring (202), safety ring (221) and locknut (222) at both ends of the rotor shaft.

11.7 AL-series / BL-series (Easy Detachable)

11.7.1 General assembly & part list

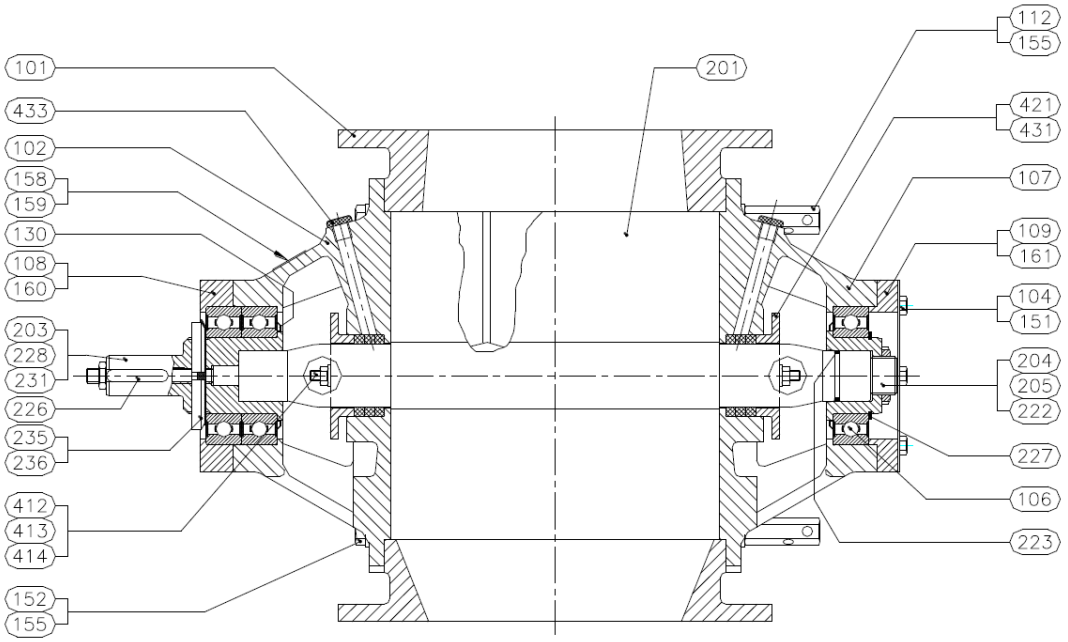


Figure 11.19: Easy detachable execution AL-AXL-AML

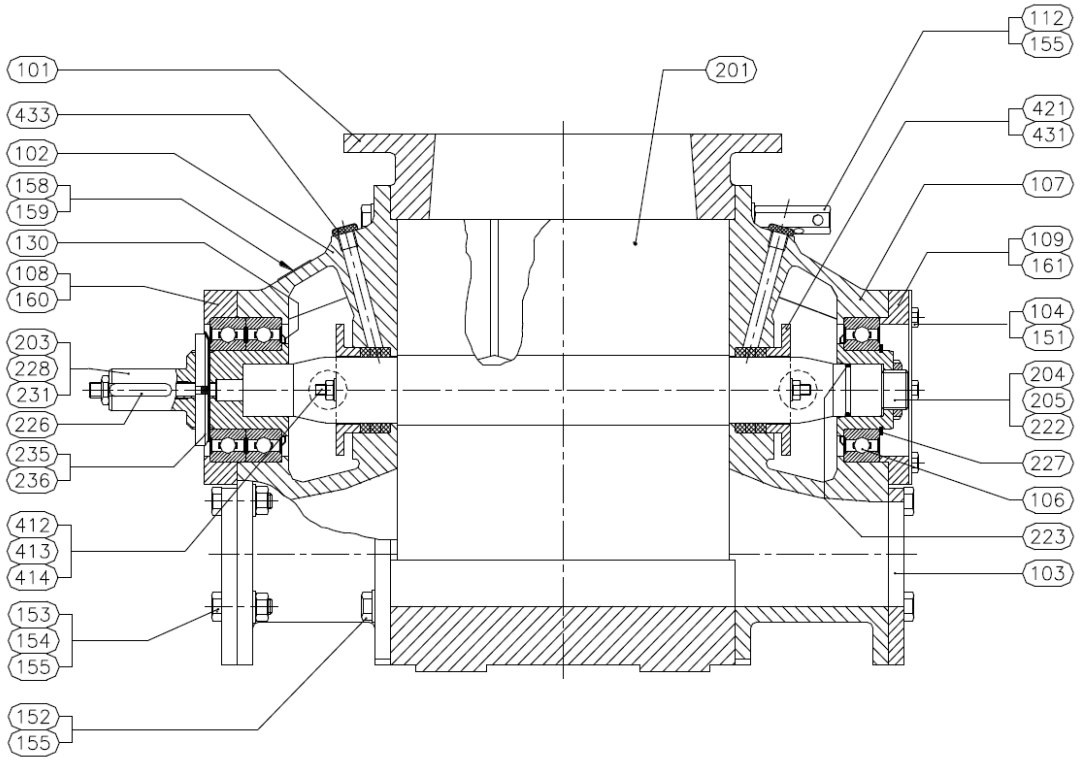


Figure 11.20: Easy detachable execution BL-BXL-BXXL

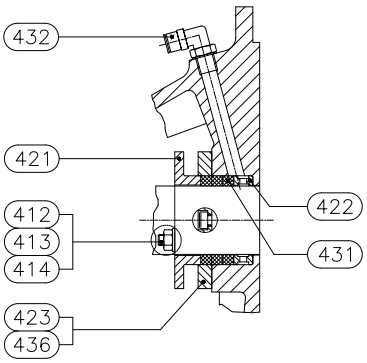


Figure 11.21: Blowing seal

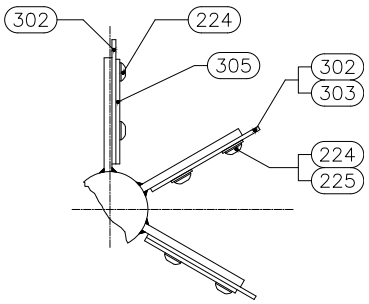


Figure 11.22: rotor

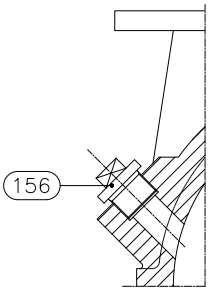


Figure 11.23: Plug connection

101 Body
102 End cover
104 Cover
106 Ball-bearing
107 End cover
108 Bearing house
109 Bearing house
112 Bolt
130 Nilos ring
151 Bolt
152 Bolt
153 Nut
154 Bolt
155 Washer
156 Plug
158 Name plate
159 Arrow
160 Countersunk screw
161 Countersunk screw
201 Rotor
203 Driveshaft
204 Bearing bushing
205 Adjusting screw
222 Locknut
223 O-ring
224 Head screw
225 Washer
226 Key
227 Retainer ring
228 Cyl. adjusting screw
231 Nut
235 Locknut
236 Safety ring
302 Rotor blade
303 Scraper blade
305 Clamp plate
412 Stud
413 Nut
414 Washer
421 Gland follower
422 Lantern ring
423 Extension piece
431 Packing cord
432 Coupling
433 Plug
436 Cylinder bolt

11.7.2 Dismantling (for internal cleaning)

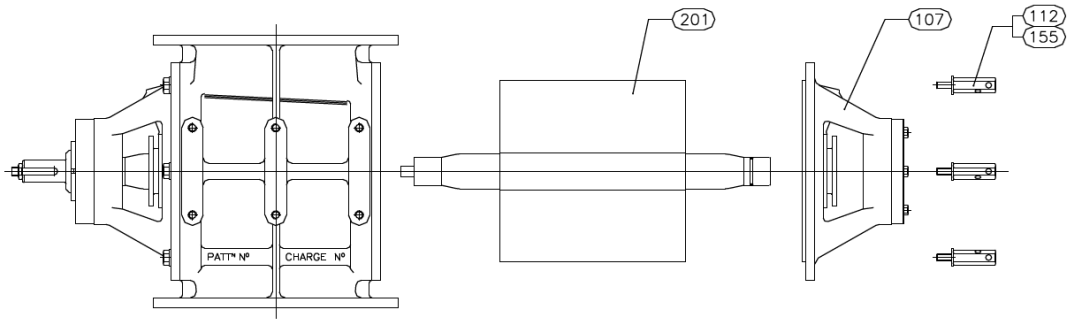


Figure 11.24: Dismantling easy detachable execution (for cleaning)

Instruction

11.7.2.1 Non-drive side

- Remove bolts (112) from end cover (107).
- To remove the end cover screw two of these bolts into the jacking holes in the end cover.
- Remove rotor by pulling it axially from the body.

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

- Remove packing cord with air purge (431).

11.7.3 Re-assembly (after cleaning)

After cleaning, checking and if necessary, replacing certain parts the valve can be reassembled as follows:

Instruction

- Check position of the flat insertion end of the rotor and make it correspond to the opening in the shaft bearing. Two marks have been applied one on the end of the shaft (drive side) and one on the side of the bearing bush.
- Now slide rotor axially in the body and make sure that flat end of drive shaft is entirely inside the bearing bush.

ATTENTION!
Clean the spigot edges of both end covers (107) carefully.
To ensure the rotor position is concentric with the valve bore the end cover spigots are a light interference fit in the body. Before assembly the jack screws (152) must be removed.

- Place cover (107) in body.
- Tighten bolts (112) in a progressive diagonal manner. There should be zero clearance between end cover and body contact faces.

11.7.4 Dismantling (for maintenance)

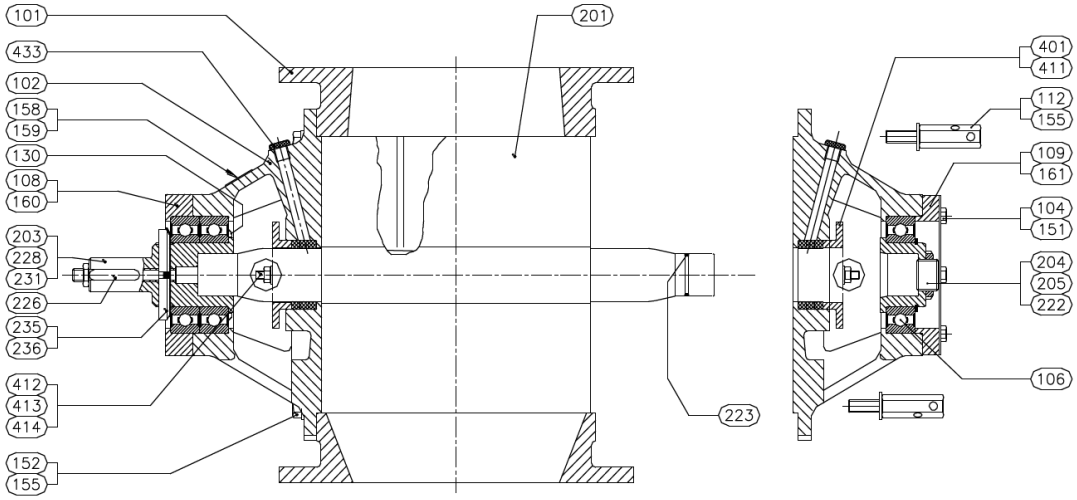


Figure 11.25: Dismantling easy detachable execution (for maintenance)

Instruction

11.7.4.1 Non-drive side

- Remove bolts (112) from end cover (107).
- To remove the end cover screw two of these bolts into the jacking holes in the end cover.
- Remove packing cord with air purge.
- If necessary, loosen ball-bearings.
- Remove cover (104) and bearing housing (109).
- Remove retainer ring (227) and dismantle bearing bushing (204) and ball-bearings (106).

11.7.4.2 Drive side

- Dismantle drive parts (see chapter 11.17.)
- Remove bolts (152) of cover. Remove cover of the body using jacking holes and loosened bolts.
- Remove the rotor by pulling it axially from the body.

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

- Remove packing cord with air purge.
- If necessary, ball-bearings can be dismantled.
- Remove bearing housing (108).
- Remove locknut (235), safety ring (236) and dismantle driveshaft (203) and ball-bearings (106).

11.7.5 Re-assembly (after maintenance)

Instruction

After cleaning, checking and if necessary, renewing parts the valve can be reassembled as follows:

11.7.5.1 Drive side

- Fit ball-bearings (106) to drive shaft (203).
- Fit safety ring (236) and locknut (235).
- Fit ball-bearings in end cover (102) and bearing house (108).
- Mount packing cords with air purge (complete).

ATTENTION!
Clean the spigot edges of both end covers (102/107) carefully.
To ensure the rotor position is concentric with the valve bore the end cover spigots are a light interference fit in the body. Before assembly the jack screws (152) must be removed.

- Fit end cover drive side and fasten with bolts (152).
- Check position of the flat insertion end of the rotor and make it correspond to the opening in the shaft bearing. Two marks have been applied one on the end of the shaft (drive side) and one on the side of the bearing bush.
- Now slide rotor axially in the body and make sure that flat end of drive shaft is entirely inside the bearing bush.

11.7.5.2 Non-drive side

- Fit ball-bearing (106) to bearing bush (204).
- Fit retainer ring (227).
- Fit ball-bearings in end cover (107) and bearing housing (109).
- Mount packing cords with air purge (complete).
- Fit cover (104).

ATTENTION!
Clean the spigot edges of both end covers (102/107) carefully.
To ensure the rotor position is concentric with the valve bore the end cover spigots are a light interference fit in the body. Before assembly the jack screws (152) must be removed.

- Mount end cover (107) in body.
- Tighten bolts (112) in a progressive diagonal manner. There should be zero clearance between end cover and body contact faces.

11.8 AL-series / BL-series (Dairy)

11.8.1 General assembly & part list (EHEDG ED CLASS II certified)

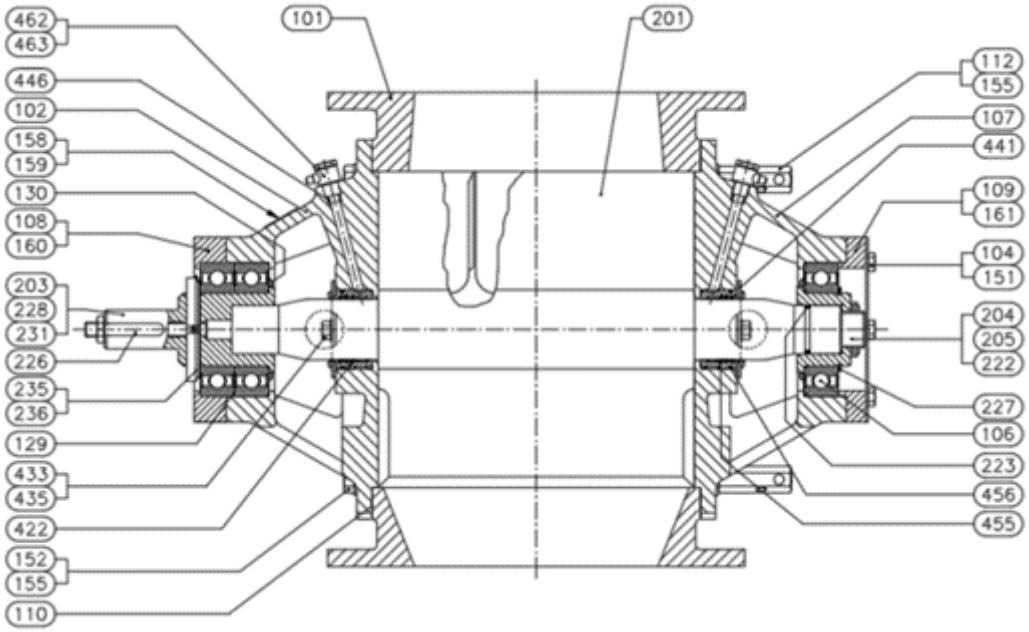


Figure 11.26: Dairy execution AL-AXL-AML (EHEDG ED CLASS II)

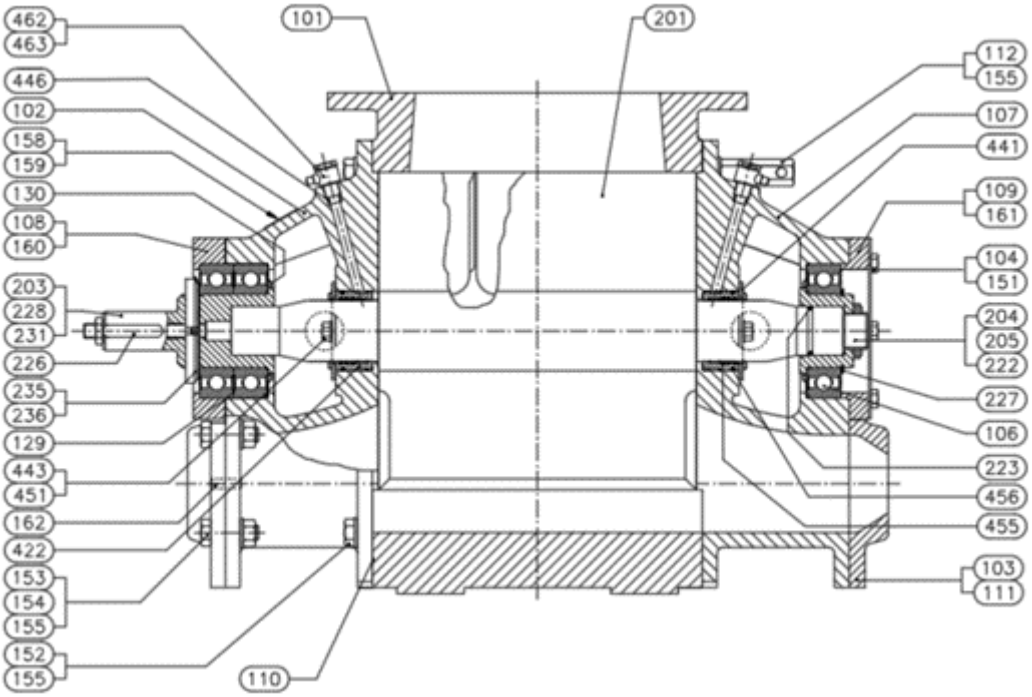


Figure 11.27: Dairy execution BL-BXL-BXXL (EHEDG ED CLASS II)

101 Body
102 End cover
104 Cover
106 Ball-bearing
107 End cover
108 Bearing house
109 Bearing house
110 Shim (Gasket)
111 Shim (Gasket)
112 Bolt
130 Nilos ring
151 Bolt
152 Bolt
153 Nut
154 Bolt
155 Washer
158 Name plate
159 Arrow
160 Counter screw
161 Counter screw
162 Dowel
166 Dowel
201 Rotor
203 Driveshaft
204 Bearing bushing
205 Adjusting screw
222 Locknut
223 O-ring
226 Key
227 Retainer ring
228 Cyl. adjusting screw
231 Nut
235 Locknut
236 Safety ring
422 Lantern ring
433 Bolt
435 Washer
441 Cover plate
446 Ring
455 O-ring
456 O-ring
462 Elbow banjo body
463 Banjo bolt

11.8.2 General assembly & part list (USDA approved)

USDA

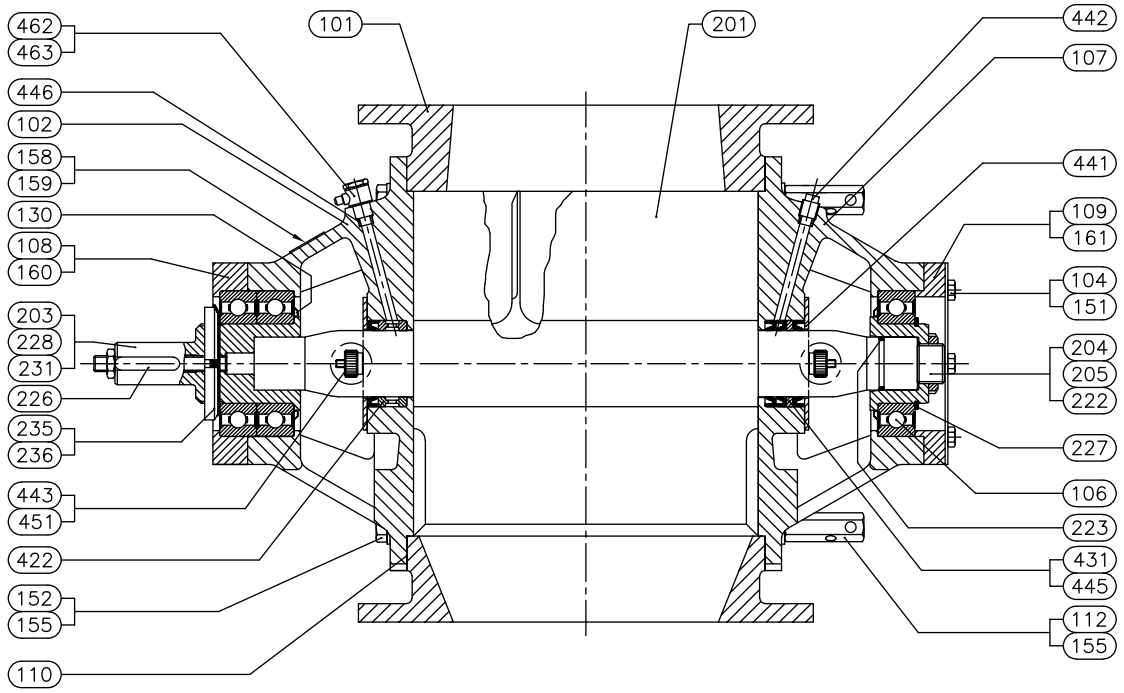


Figure 11.28: Dairy execution AL-AXL-AML (USDA)

USDA

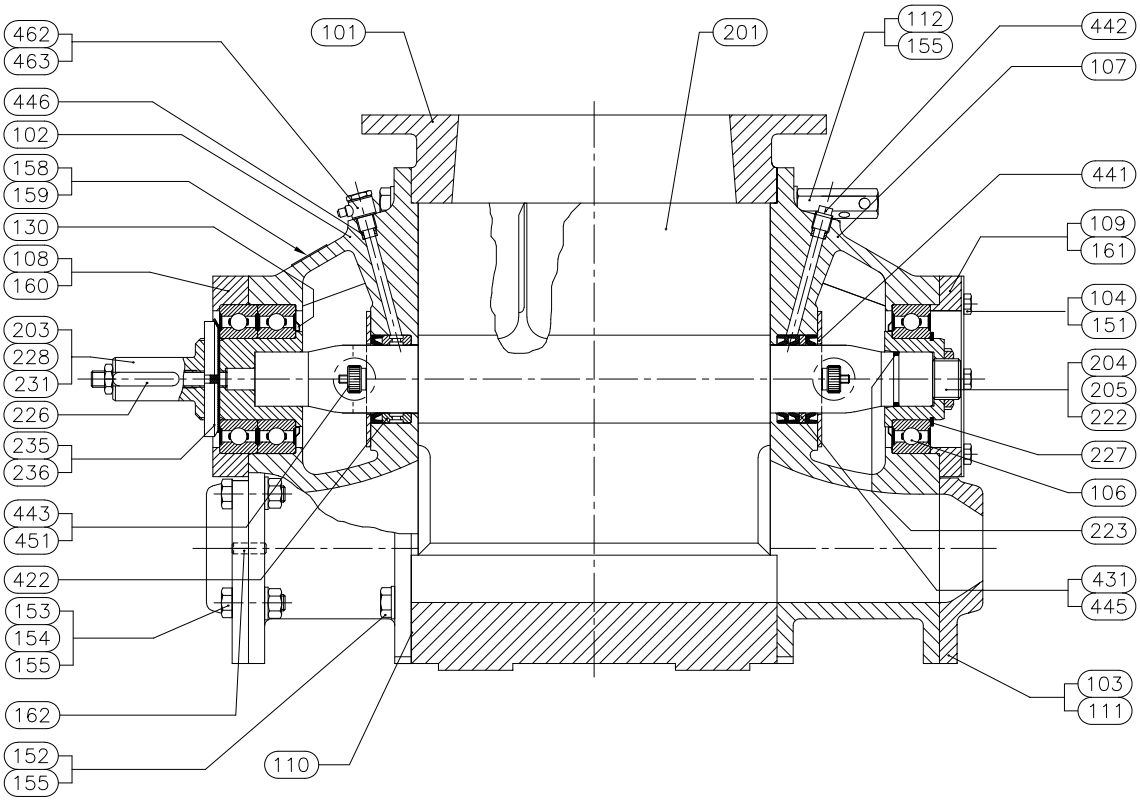


Figure 11.29: Dairy execution BL-BXL-BXXL (USDA)

101 Body
102 End cover
103 Pipe connection
104 Cover
106 Ball-bearing
107 End cover
108 Bearing house
109 Bearing house
110 Gasket
111 Gasket
112 Bolt
130 Nilos ring
151 Bolt
152 Bolt
153 Nut
154 Bolt
155 Washer
158 Nameplate
159 Arrow
160 Counter screw
161 Counter screw
162 Dowel
166 Dowel
201 Rotor
203 Driveshaft
204 Bearing bushing
205 Adjusting screw
222 Locknut
223 O-ring
226 Key
227 Retainer ring
228 Cyl. Adjust. screw
231 Nut
235 Locknut
236 Safety ring
422 Lantern ring
431 Lip seal
441 Cover plate
442 Plug
443 Nut
445 Filling ring
446 Ring
451 Stud
462 Elbow banjo body
463 Banjo bolt

11.8.3 Dismantling

Refer to chapter 11.7.2

11.8.4 Re-assembly

Refer to chapter 11.7.3

11.9 AL-series / BL-series (Dairy-WD)

11.9.1 General assembly & part list (USDA approved)

USDA

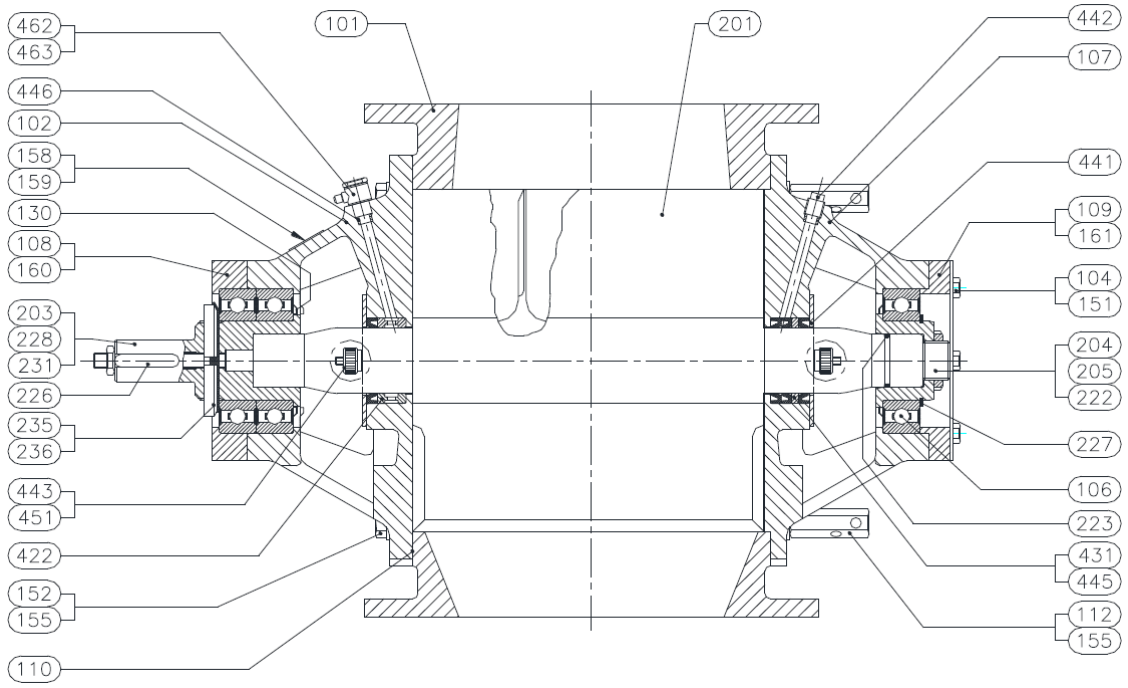


Figure 11.30: Dairy-WD execution AL-AXL-AML

USDA

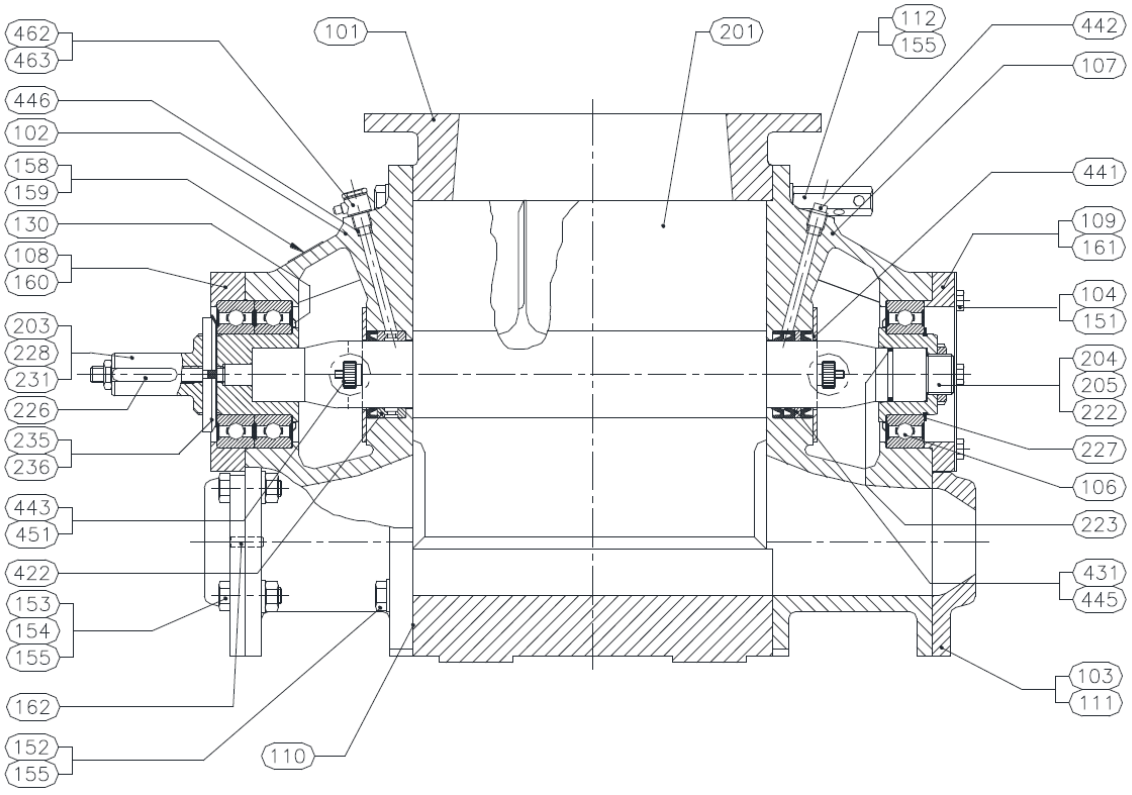
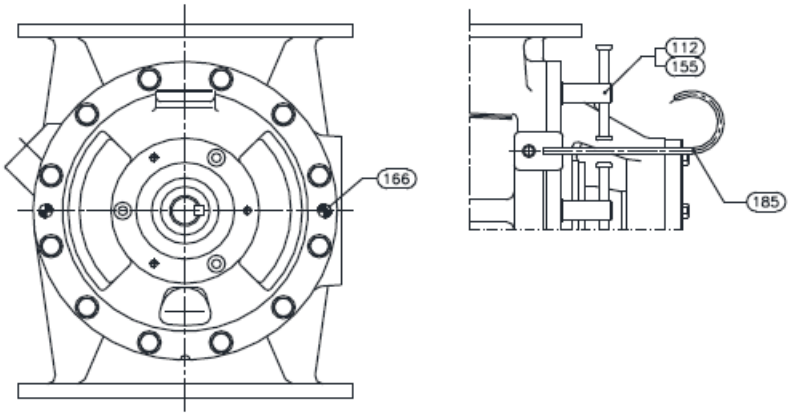


Figure 11.31: Dairy-WD execution BL-BXL-BXXL



101 Body
102 End cover
103 Pipe connection
104 Cover
106 Ball-bearing
107 End cover
108 Bearing house
109 Bearing house
110 Gasket
111 Gasket
112 Bolt
130 Nilos ring
151 Bolt
152 Bolt
153 Nut
154 Bolt
155 Washer
158 Name plate
159 Arrow
160 Counter screw
161 Counter screw
162 Dowel
166 Dowel
201 Rotor
203 Driveshaft
204 Bearing bushing
205 Adjusting screw
222 Locknut
223 O-ring
226 Key
227 Retainer ring
228 Cyl. adjusting screw
231 Nut
235 Locknut
236 Safety ring
422 Lantern ring
431 Lip seal
441 Cover plate
442 Plug
443 Nut
445 Filling ring
446 Ring
451 Stud
462 Elbow banjo body
463 Banjo bolt

11.9.2 Dismantling

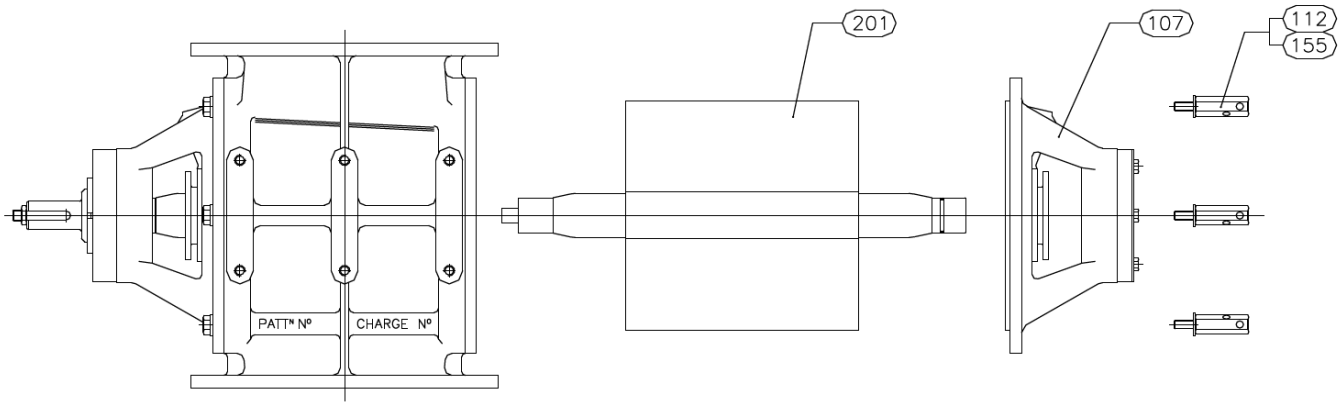


Figure 11.32: Dismantling for cleaning

Instruction

11.9.2.1 Non-drive side

- Remove bolts (112) from end cover (107).
- To remove the end cover screw two of these bolts into the jacking holes in the end cover.
- Remove rotor by pulling it axially from the body.

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

ATTENTION!
Dairy shaft seals require disassembly and manual cleaning.

11.9.3 Re-assembly

Instruction

After cleaning, checking and if necessary, replacing certain parts the valve can be reassembled as follows:

- Check position of flat insertion end of the rotor and make it correspond to the opening in the shaft bearing. Two marks have been applied one on the end of the shaft (drive side) and one on the side of the bearing bush.

CAUTION!
Ensure that mating faces and drive dog of rotor are always thoroughly clean before re-assembly.

- Slide rotor axially in body and make sure that flat end of drive shaft is entirely inside the bearing bush.

ATTENTION!
Clean the spigot edges of both end covers (107) carefully.
To ensure the rotor position is concentric with the valve bore the end cover spigots are a light interference fit in the body. Before assembly the jack screws (152) must be removed.

- Place cover (107) in body.
- Tighten bolts (112) in a progressive diagonal manner; **there should be zero clearance between end cover and body contact faces.**

11.10 AL-series / BL-series (Dairy-EL I)

ATTENTION!
Rotary valve EHEDG Dairy-EL I
THE DAIRY-EL I HAS NO EHEDG EL CLASS I CERTIFICATION.
Validation is the responsibility of system integrator / end-user.

11.10.1 General assembly & part list

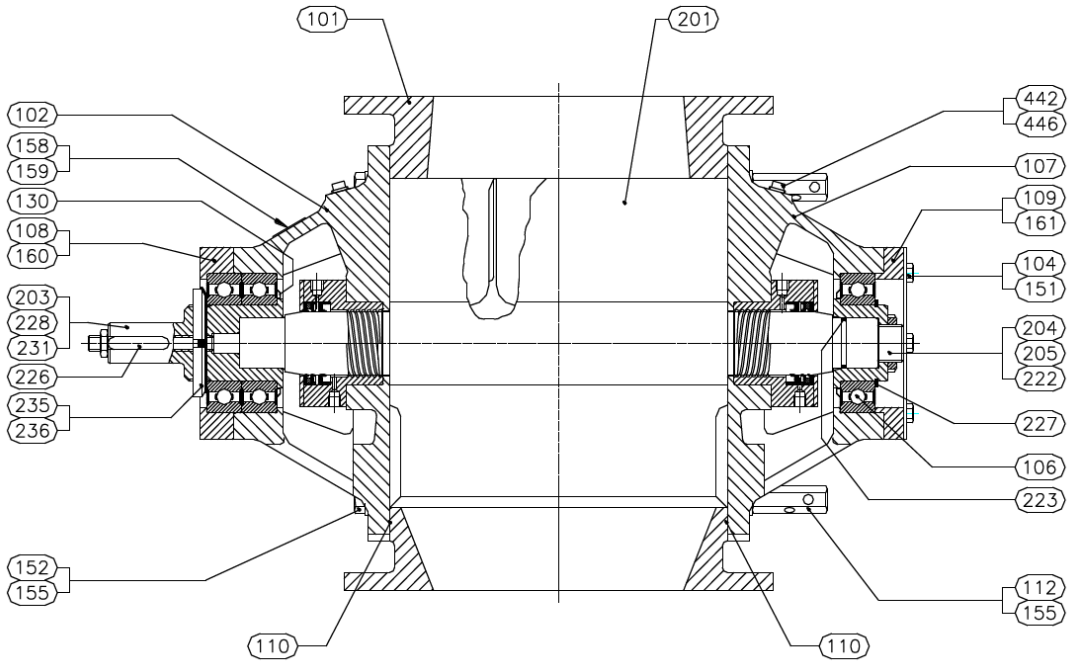


Figure 11.33: Dairy-EL I execution AL-AXL-AML

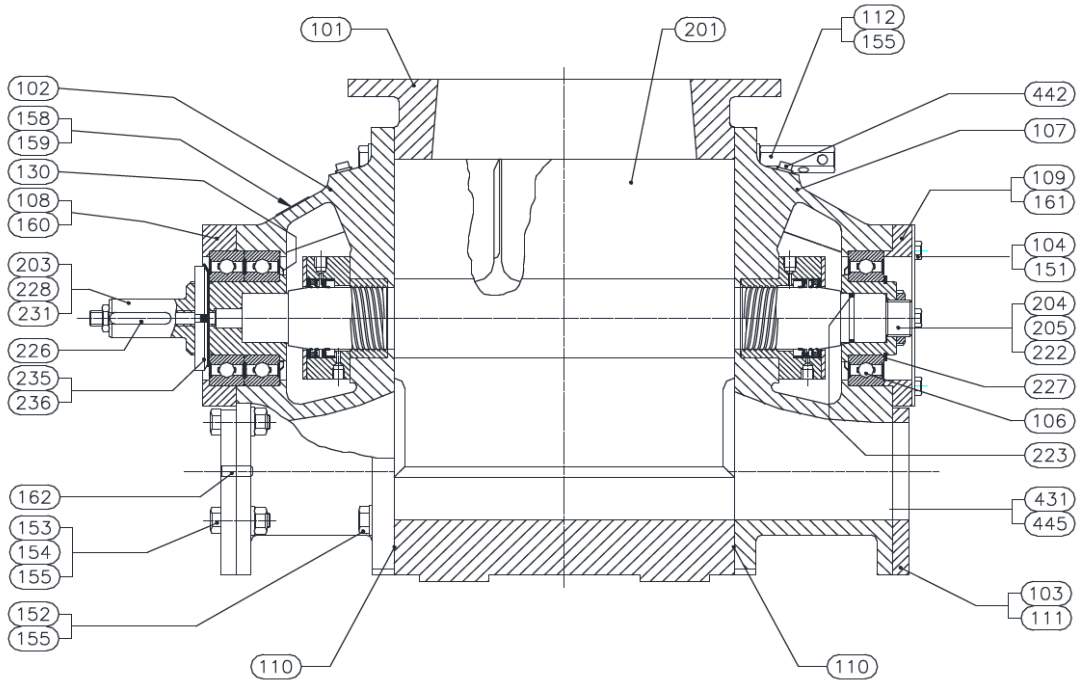
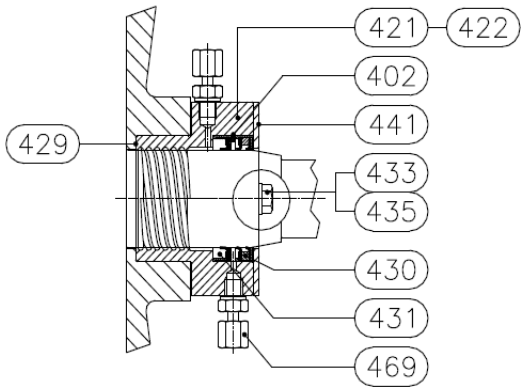
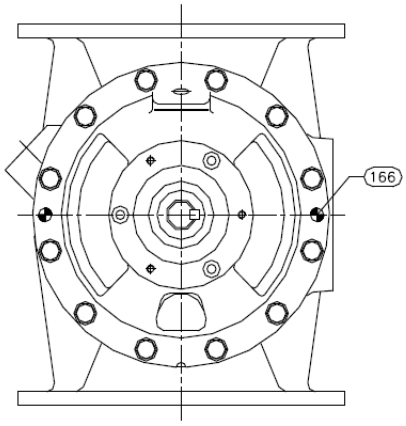
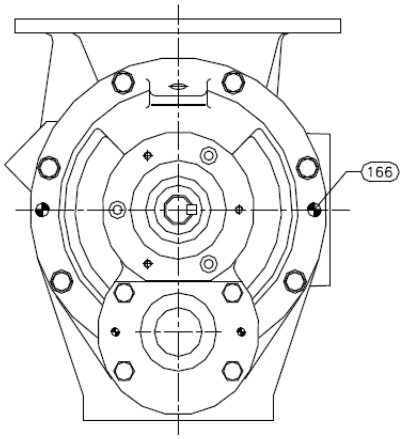
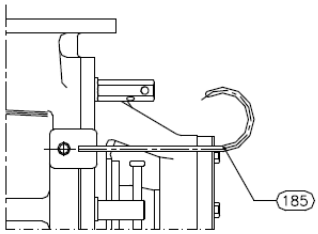


Figure 11.34: Dairy-EL I execution BL-BXL-BXXL









101 Body
102 End cover
103 Pipe connection
104 Cover
106 Ball-bearing
107 End cover
108 Bearing house
109 Bearing house
110 Gasket
111 Gasket
112 Bolt
130 Nilos ring
151 Bolt
152 Bolt
153 Bolt
154 Nut
155 Washer
158 Name plate
159 Arrow
160 Countersunk screw
161 Countersunk screw
162 Dowel
166 Dowel
185 Hexagon bolt holder
201 Rotor
203 Driveshaft
204 Bearing bushing
205 Adjusting screw
222 Locknut
223 O-ring
226 Key
227 Retainer ring
228 Cyl. adjusting screw
231 Nut
235 Locknut
236 Safety ring
402 Distance ring
421 Seal unit DS
422 Seal unit NDS
429 Gasket seal unit
430 PS seal tandem
431 PS seal
433 Bolt
435 Washer
441 Cover plate
442 Plug
446 Ring
469 Pipe coupling

11.10.2 Dismantling

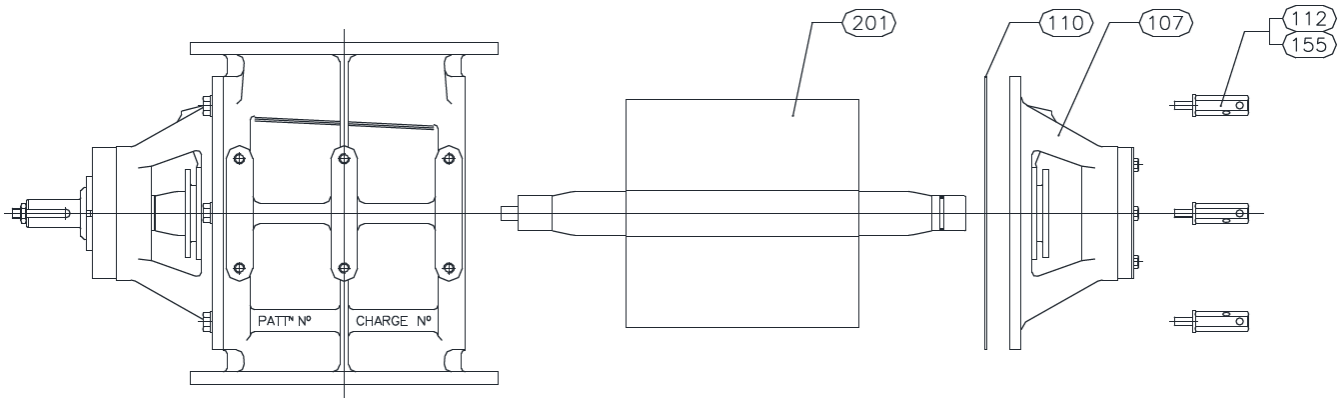


Figure 11.35: Dismantling for cleaning

Instruction

11.10.2.1 Non-drive side

- Remove bolts (112) from end cover (107).
- To remove the end cover screw two of these bolts into the jacking holes in the end cover.
- Remove Gasket (110).
- Remove rotor by pulling it axially from the body.

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

11.10.3 Re-assembly

Instruction

After cleaning, checking and if necessary, replacing certain parts the valve can be reassembled as follows:

- Check position of the flat insertion end of the rotor and make it correspond to opening in the shaft bearing. Two marks have been applied one on the end of the shaft (drive side) and one on the side of the bearing bush.

CAUTION!
Ensure that mating faces and drive dog of rotor are always thoroughly clean before re-assembly.

- Slide rotor axially in body and make sure that flat end of drive shaft is entirely inside the bearing bush.

ATTENTION!
Clean surfaces end covers (107) carefully.
Before assembly, jack screws (152) must be removed.

ATTENTION!
Check gasket (110) between body and end cover.
If damaged replace gasket, gasket is supplied as spare with the rotary valve.

- Place gasket (110) between body and end cover.
- Place cover (107) in body.
- Tighten bolts (112) in a progressive diagonal manner. There should be zero clearance between end cover and body contact faces.

11.11 AL-series / BL-series (MZC)

11.11.1 General assembly & part list

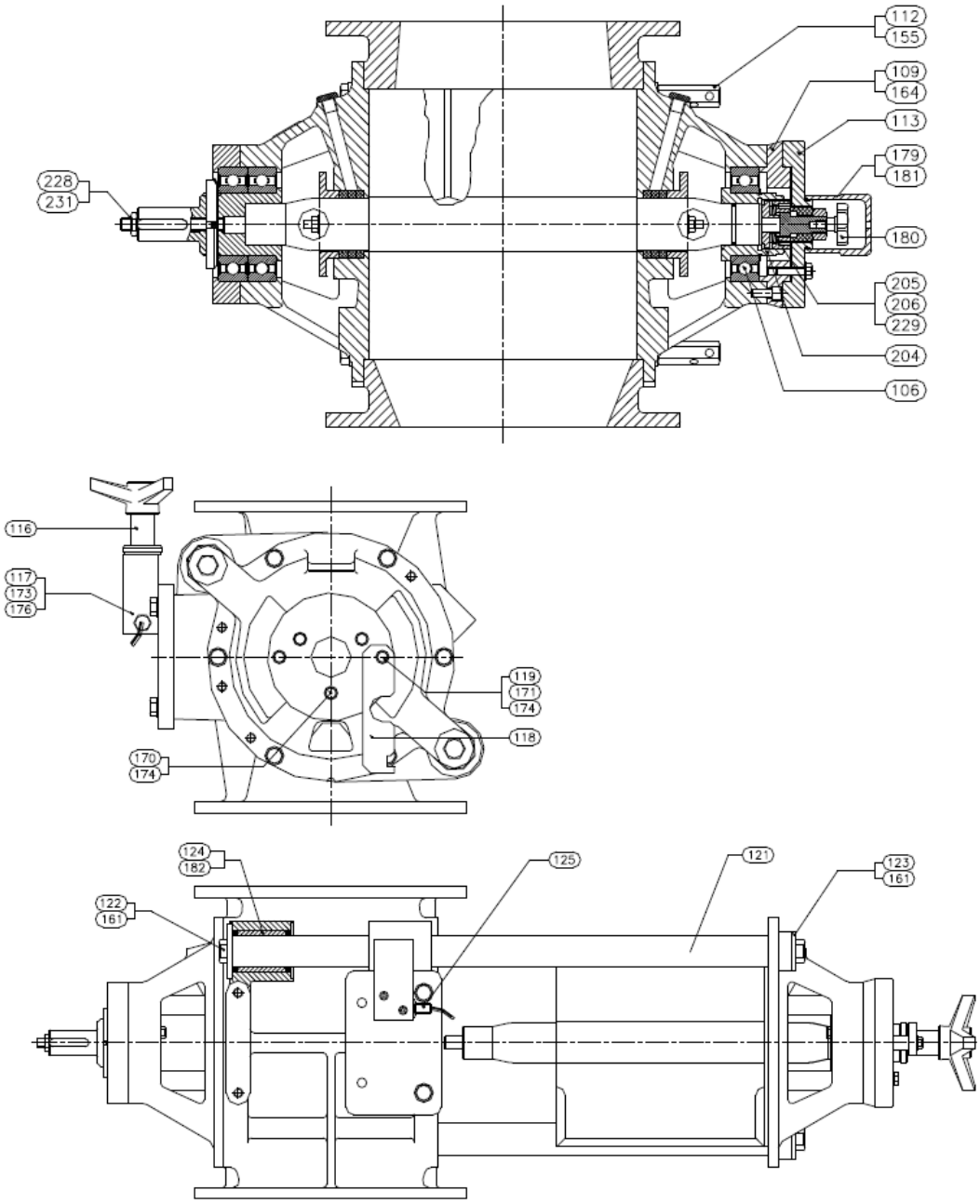


Figure 11.36: MZC parts

106 Ball-bearing
109 Bearing ring
112 Bolt
113 Support
116 Centrist-bar
117 Sensor housing
118 Lock strip
119 Distance tube
121 Guide rod
122 Ring
123 Ring
124 Linear ball bearing
125 Proximity switch
155 Washer
161 Bolt
164 Cylinder bolt
170 Bolt
171 Bolt
173 Bolt
174 Washer
176 Washer
179 Cap
180 Locking unit
182 Sealing unit
204 Bearing bush
205 Adjustment screw
206 Ring
229 Disc spring

11.11.2 Dismantling

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

Instruction

11.11.2.1 Non drive side

- Stop valve and isolate motor.
- Remove central T-bolt (116) from securing block (117).

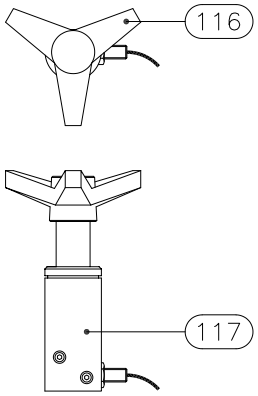


Figure 11.37: T-bolt

DANGER!
The purpose of this securing block is to disconnect the power supply or send a signal to the control room as an extra safety measure.
Its purpose is not to isolate the installation prior to cleaning and/or maintenance and repair work.

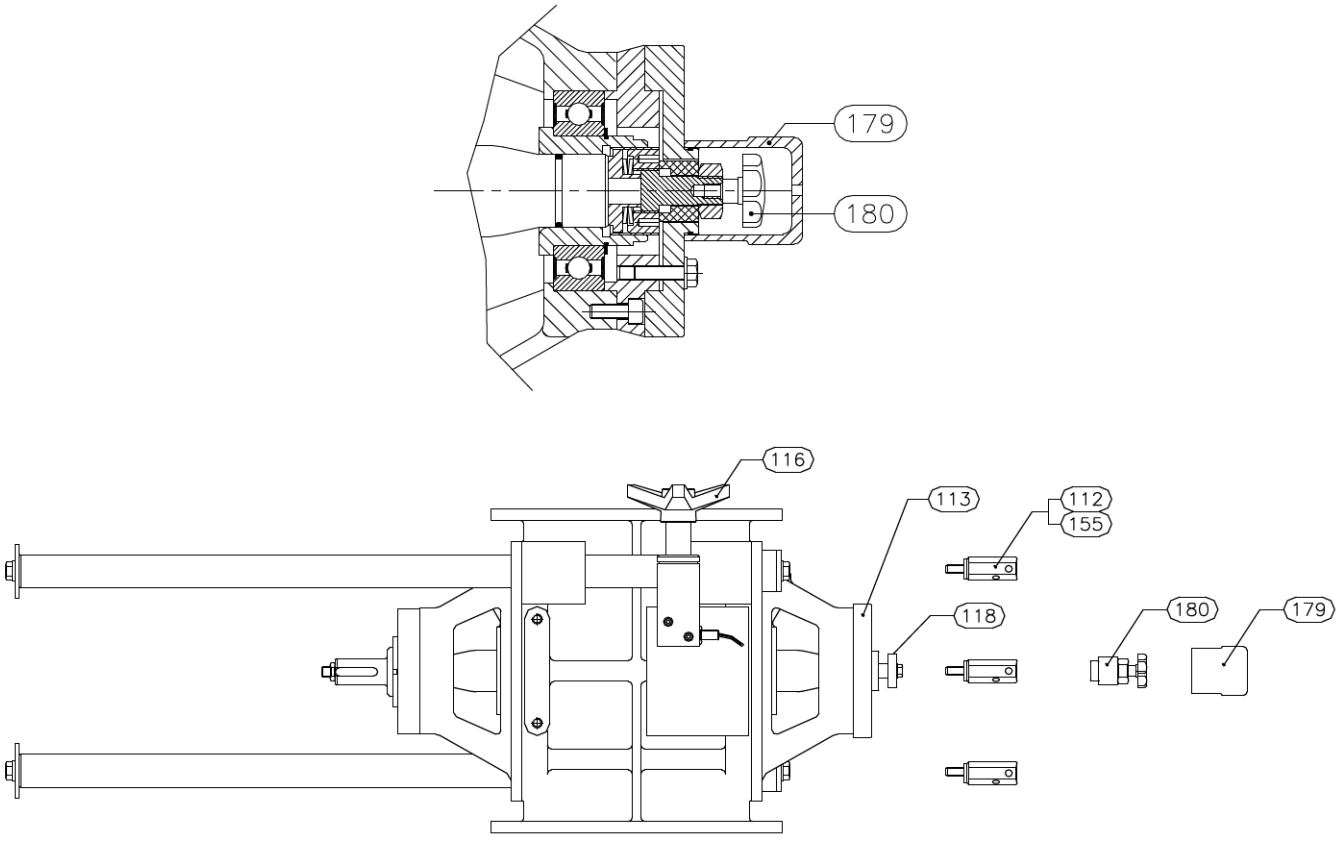


Figure 11.38: Dismantling MZC execution

- Remove big plastic cap (179) from bearing cover (113).
- Loosen nut from locking unit (180) and remove.
- Mount lock strip (118) in such a way that central T-bolt (116) can be turned into the hole. Turn central T-bolt into rotor as far as possible.
- Roll over lock strip in order to block central T-bolt.
- Remove bolts (112) from cover.
- To prevent damage to bearings and deflectors, guide bars (121) must be well cleaned.
- Turn central T-bolt anti-clockwise to expel cover from the body.
- Keep turning until separate cover can be moved backwards. The rotor will be left in the body.
- If necessary, two bolts can be turned into the jacking holes of the cover to enable dismounting.
- Clean rotor surface of the cover as well as the head ends of the rotor.
- Remove two bolts used as extractors from cover.

ATTENTION!
Dairy shaft seals require disassembly and manual cleaning.

- Put cover back to body.

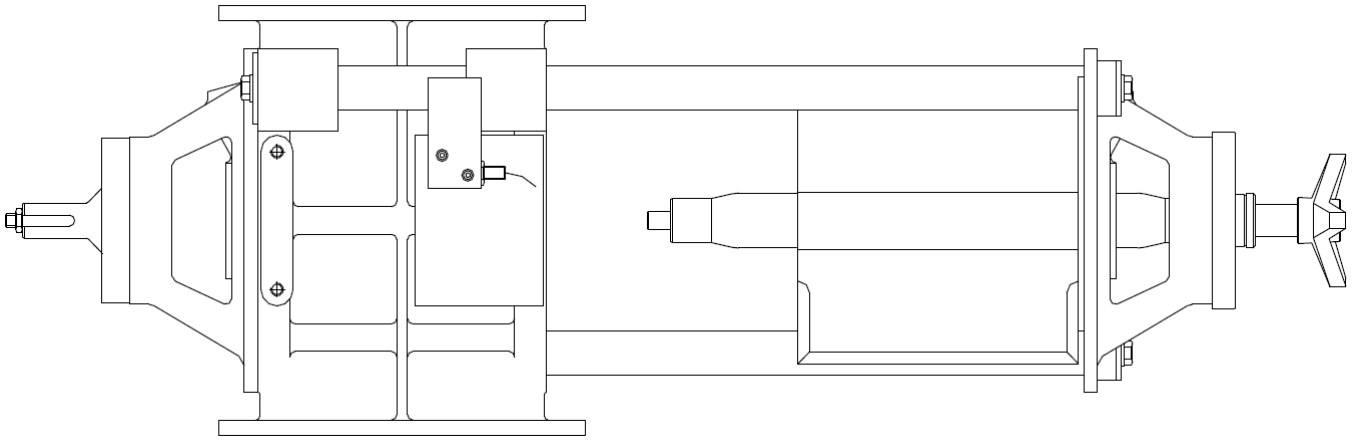


Figure 11.39: Dismantling MZC execution

- Turn central T-bolt into rotor in such a way that rotor is pulled against cover surface.

ATTENTION!
Dairy shaft seals require disassembly and manual cleaning.

CAUTION!
Ensure that mating faces and drive dog of rotor are always thoroughly clean before re-assembly.

11.11.3 Re-assembly

Instruction

After cleaning, checking and if necessary, replacing certain parts the valve can be reassembled as follows:

Carefully slide cover and rotor into the body until drive dog enters drive shaft.

- Tighten bolts crosswise in such a way that the cover fits without any clearance to flat side of the body.
- Turn lock strip (118) away in such a way that central T-bolt can be screwed out of the rotor.
- Turn locking unit (180) in position and hand tight the secure nut with minimum force.
- Replace plastic cover in hole of support (113).
- Screw central T-bolt into the securing block (117) provided for this purpose.

DANGER!
Always remove central T-Bolt before operation!
Never place any metal object other than the central T-Bolt in the T-Bolt holder.

11.12 AL-series / BL-series (Dairy-WD-MZC / Dairy-EL I-MZC)

11.12.1 General assembly & part list

11.12.1.1 General assembly Dairy-WD-MZC

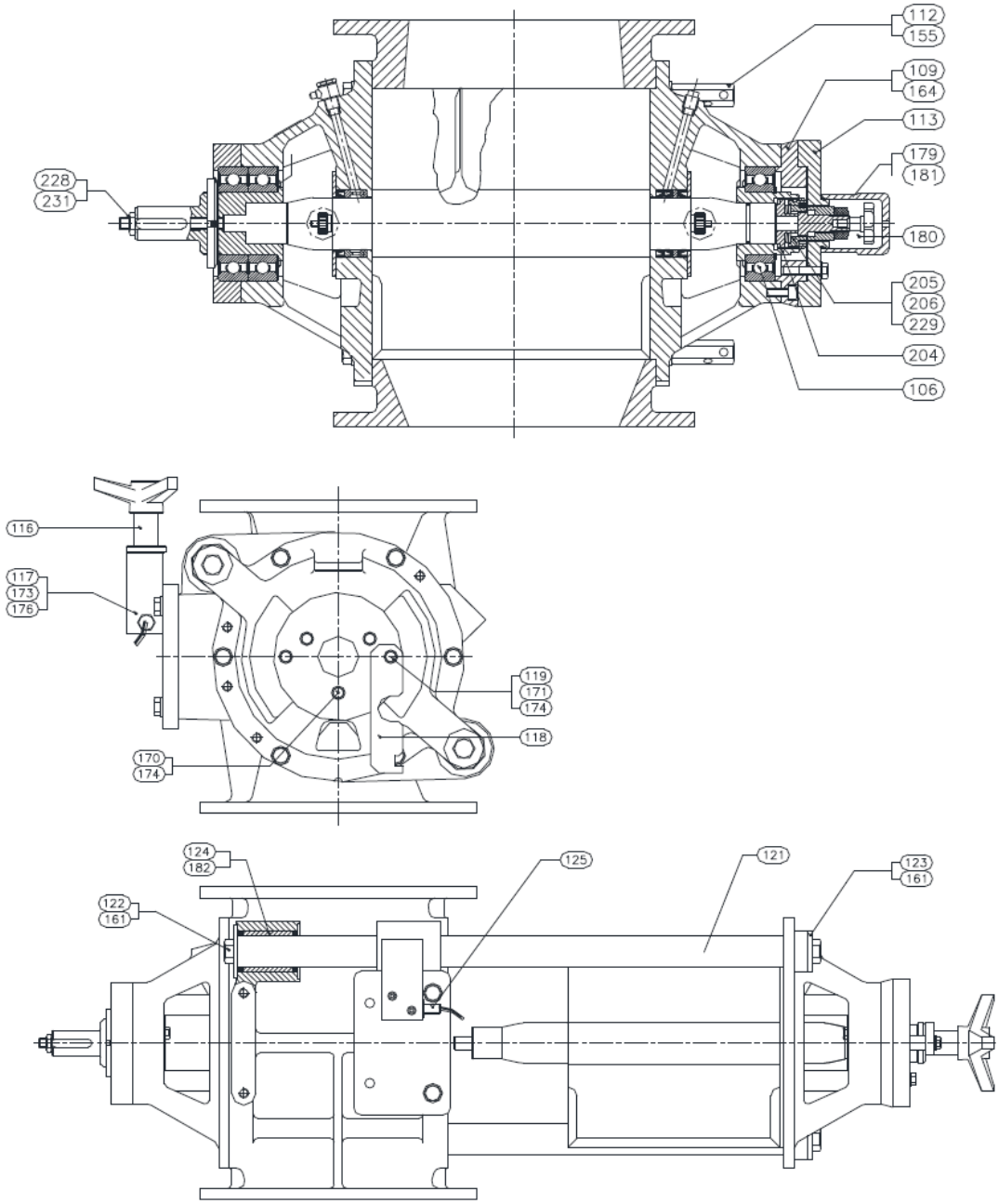


Figure 11.40: Drawing MZC parts (Dairy-WD-MZC)

106 Ball-bearing
109 Bearing ring
112 Bolt
113 Support
116 T-bolt
117 Securing block
118 Lock strip
119 Distance tube
121 Guide rod
122 Ring
123 Ring
124 Linear ball bearing
125 Proximity switch
155 Washer
161 Bolt
164 Cylinder bolt
170 Bolt
171 Bolt
173 Bolt
174 Washer
176 Washer
179 Cap
180 Locking unit
182 Sealing unit
204 Bearing bush
205 Adjustment screw
206 Ring
229 Disc spring

11.12.1.2 General assembly & part list (Dairy-EL I-MZC)

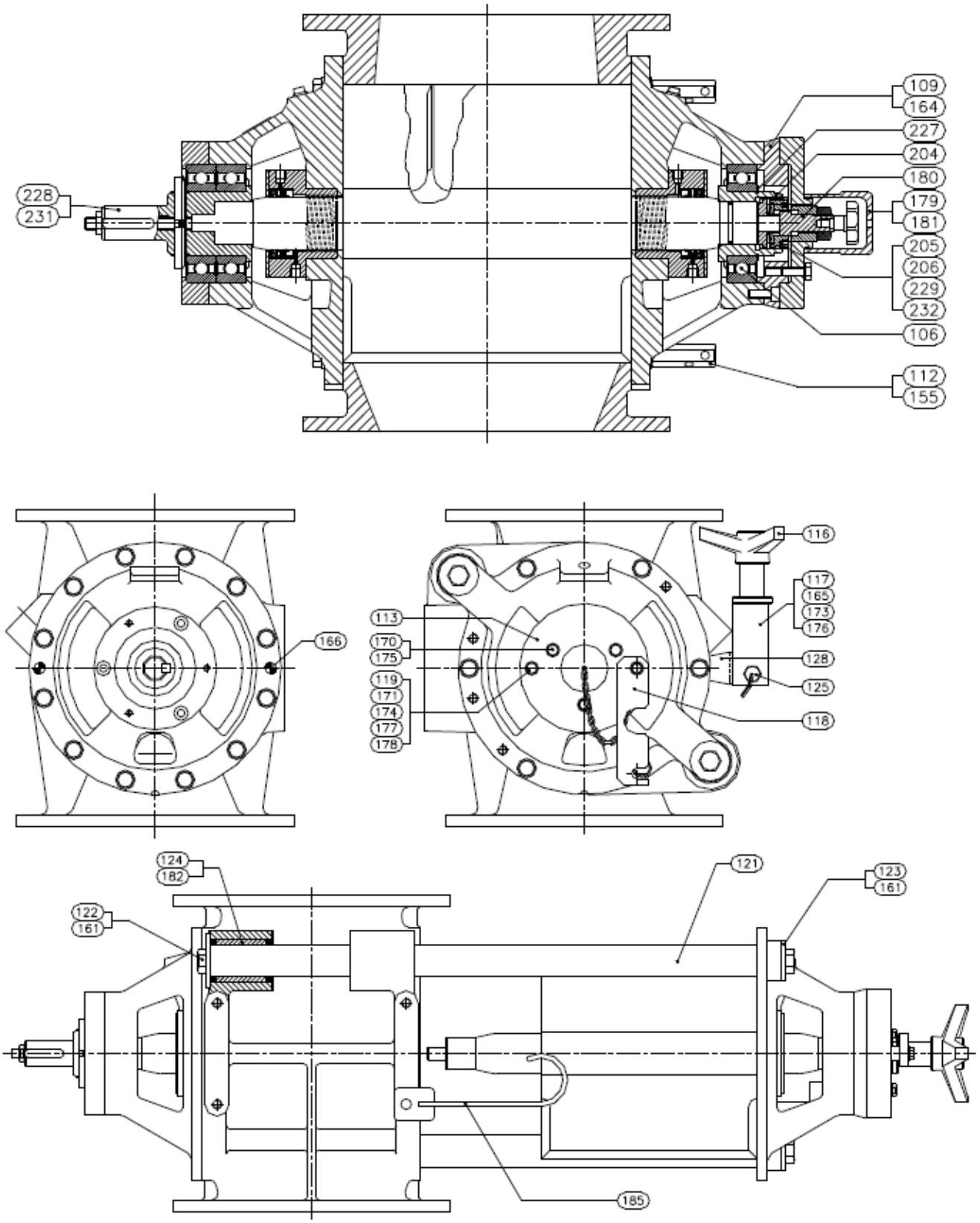


Figure 11.41: Drawing MZC parts (Dairy-EL I-MZC)

106 Ball-bearing
109 Bearing ring
112 Bolt
113 Support
116 Centrist-bar
117 Securing block
118 Lock strip
119 Distance tube
121 Guide rod
122 Ring
123 Ring
124 Linear ball bearing
125 Proximity switch
155 Washer
161 Bolt
164 Cylinder bolt
170 Bolt
171 Bolt
173 Bolt
174 Washer
176 Washer
179 Cap
180 Locking unit
182 Sealing unit
189 Hexagon bolt holder
204 Bearing bush
205 Adjustment screw
206 Ring
229 Disc spring

11.12.2 Dismantling

Instruction

11.12.2.1 Non drive side

- Stop valve and isolate motor.
- Remove central T-bolt (116) from securing block (117).

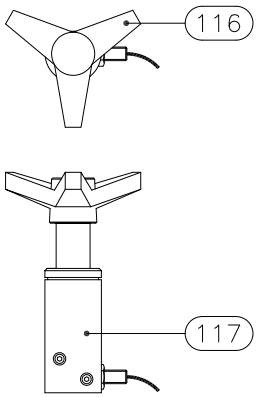


Figure 11.42: T-bolt

DANGER!
The purpose of this securing block is to disconnect the power supply or send a signal to the control room as an extra safety measure.
Its purpose is not to isolate the installation prior to cleaning and/or maintenance and repair work.

ATTENTION!
Axial Rotor fixing non drive side.
The purpose of this is to make sure that the rotor cannot move against the disc spring and cause damage to the end cover on the non-drive side.

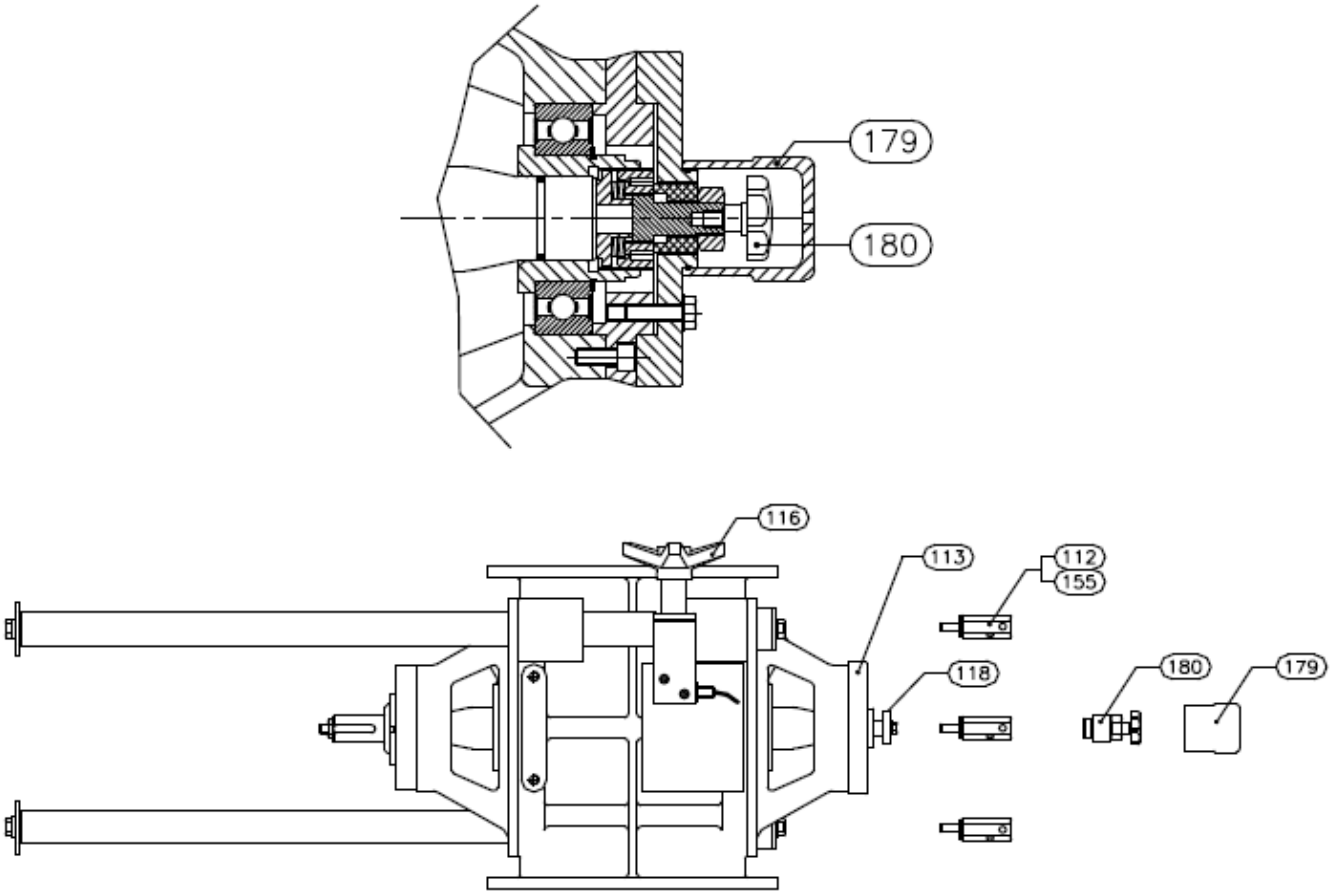
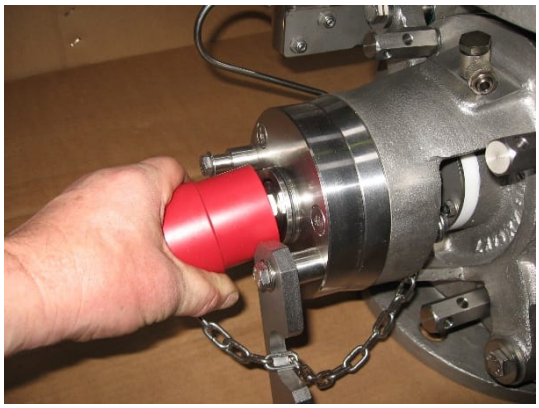
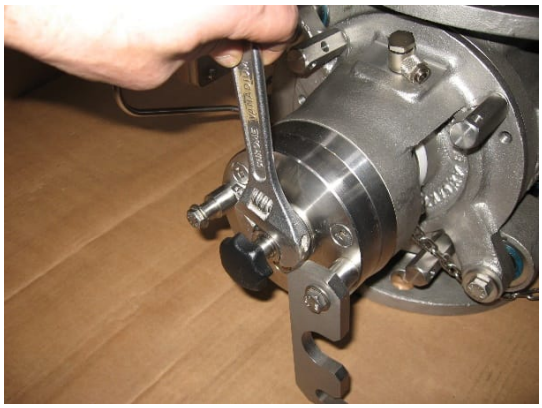


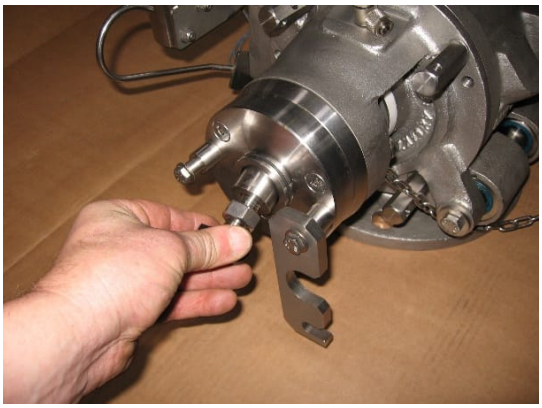
Figure 11.43: Dismantling MZC execution

Remove big plastic cap (179) from bearing cover (113).

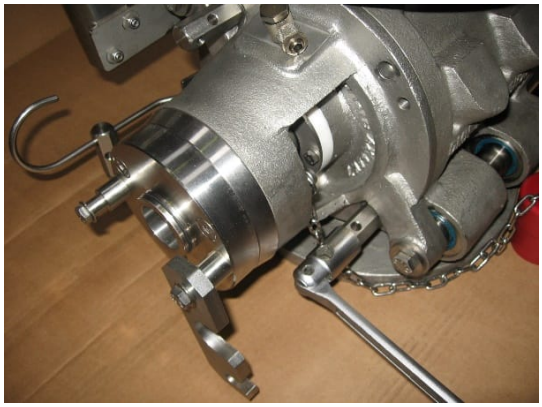


Loosen nut from locking unit (180) and remove.

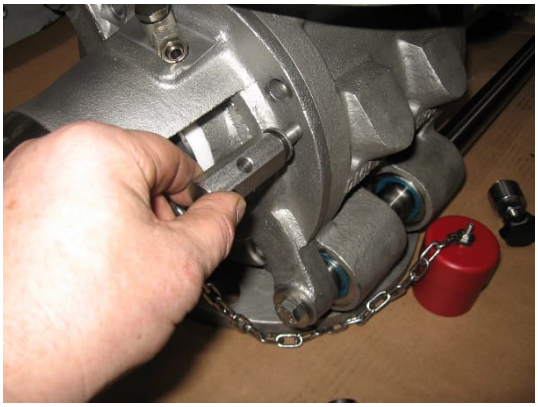




Remove bolts (112) from cover.

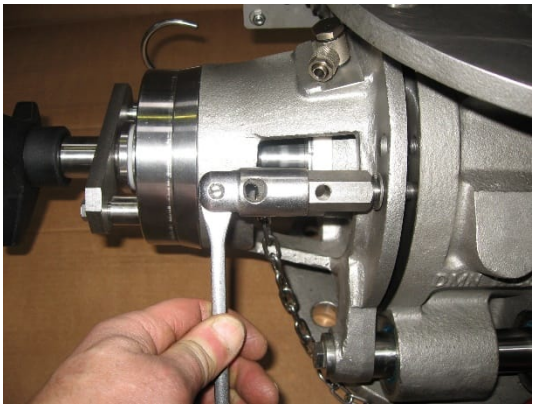


If necessary two bolts can be fitted into jacking holes of cover to enable dismounting.

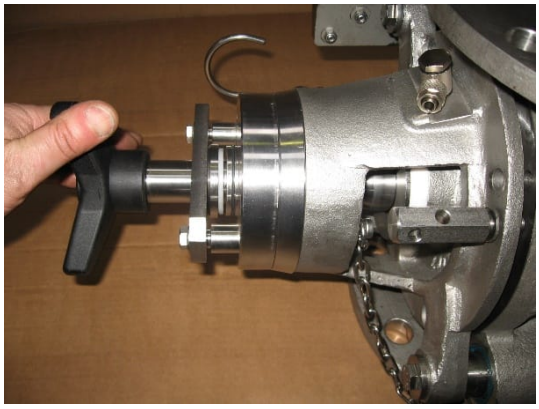


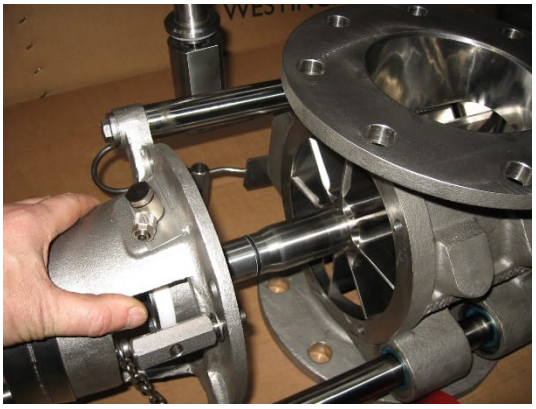
- Position lock strip (118) in such a way that central T-bolt (116) can be turned into the hole.
- Turn central T-bolt into rotor as far as possible.

- Roll over lock strip in order to block central T-bolt.
- To prevent damage to bearings and deflectors, guide bars (121) must be well cleaned.



- Now turn central T-bolt anti-clockwise to expel cover from body.
- Keep turning until separate cover can be moved backwards. The rotor will be left in the body.

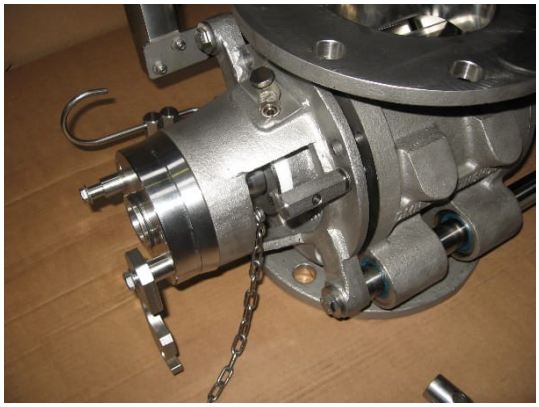




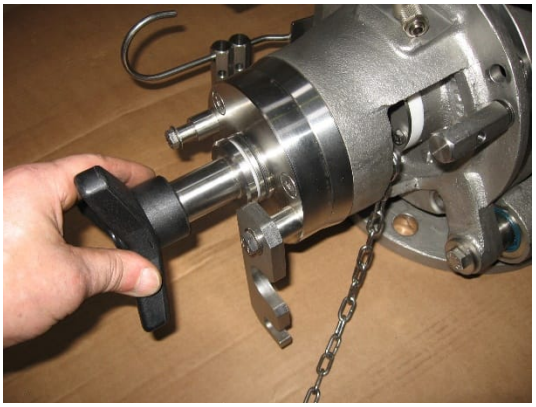
- Clean rotor surface of cover as well as head ends of rotor.

ATTENTION!
Dairy shaft seals require disassembly and manual cleaning.

Put cover back to body.



Turn central T-bolt into rotor in such a way that rotor is pulled against cover surface.



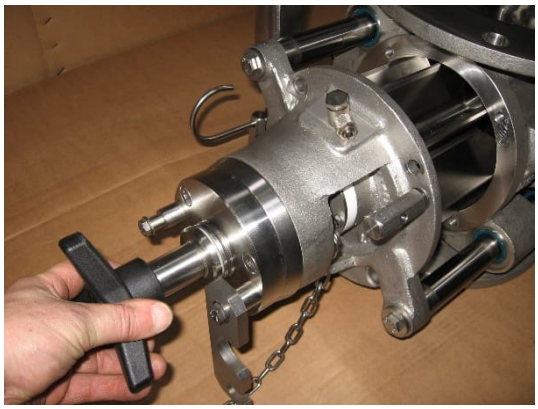
DANGER!
When the rotor is not correctly pulled against the cover, removal of the cover with the rotor from the body may cause damage to the body or the rotor.

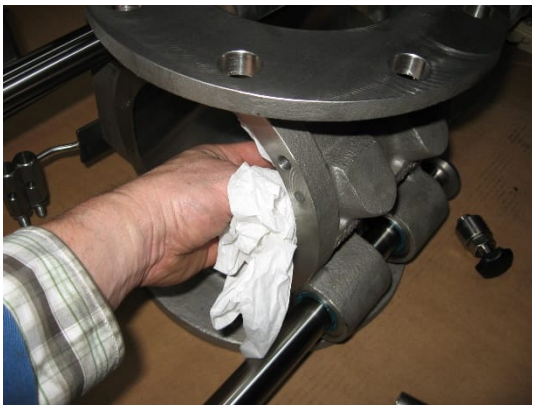
- Remove cover with rotor by gently pulling it axially from the body.
- Pull cover with rotor backward as far as possible until bore is accessible.

Only for Dairy EL I execution

Remove gasket (110)

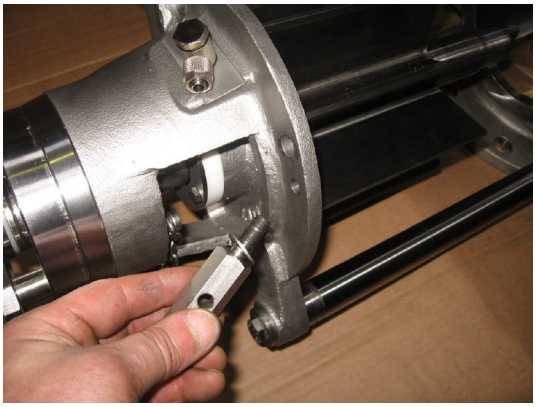
Clean body surface.





Clean rotor and shaft end.

Remove two bolts used as extractors from cover.



CAUTION!
Ensure that mating faces and drive dog of rotor are always thoroughly clean before re-assembly.

ATTENTION!
Dairy shaft seals require disassembly and manual cleaning.

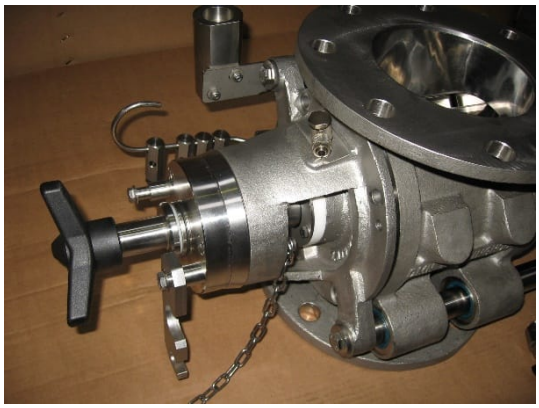
11.12.3 Re-assembly

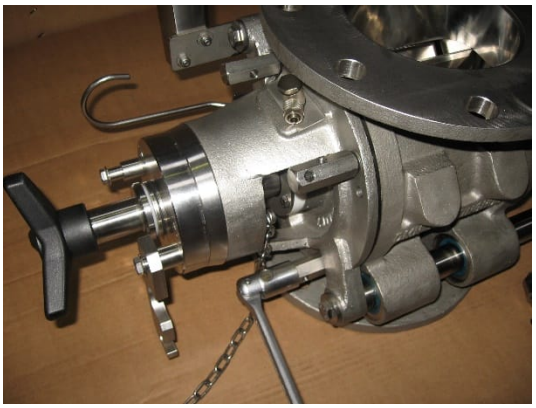
CAUTION!
Only for Dairy EL I execution
Check gasket (110) between body and end cover.
If damaged replace gasket, gasket is supplied as spare with the rotary valve.

Only for Dairy EL I executions

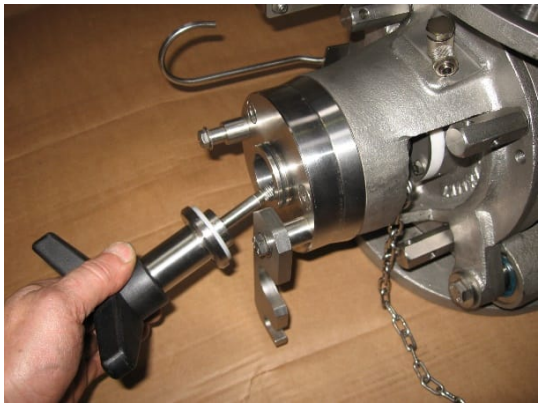
- Place gasket (110) between body and end cover.

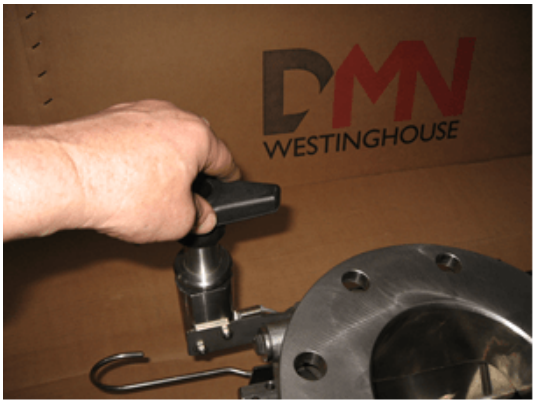
- Carefully slide cover and rotor into body until drive dog enters drive shaft.
- Tighten bolts crosswise in such a way that the cover fits without any clearance to flat side of body.





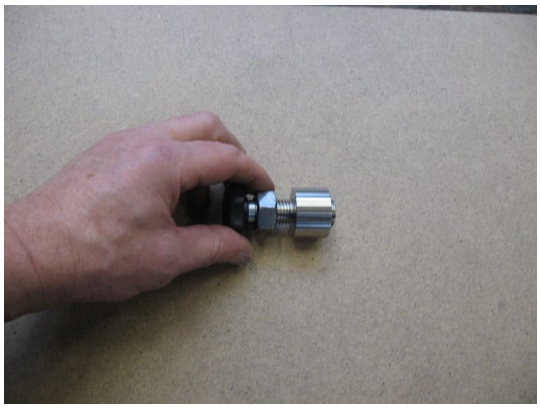
- Turn lock strip (118) away in such a way that central T-bolt can be screwed out of the rotor.
- Screw central T-bolt into securing block (117) provided for this purpose.

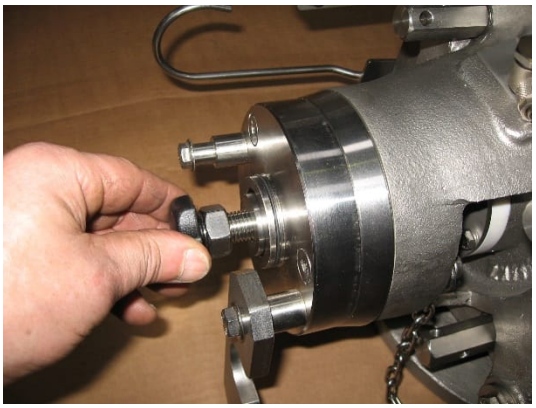




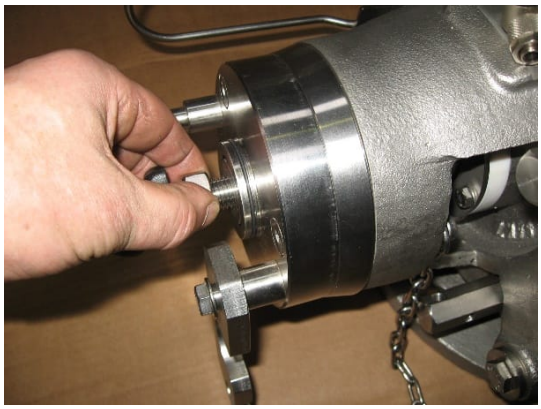
Unscrew nut

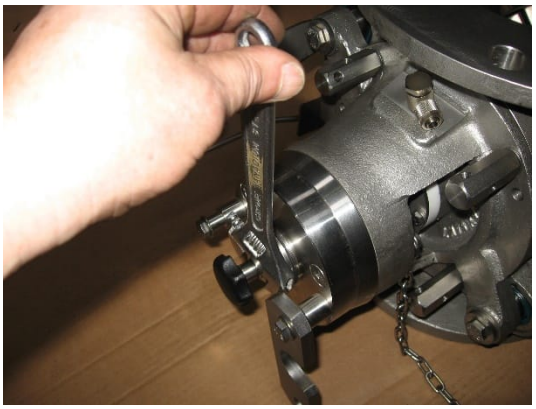
Turn locking unit (180) in position (only hand tight!).



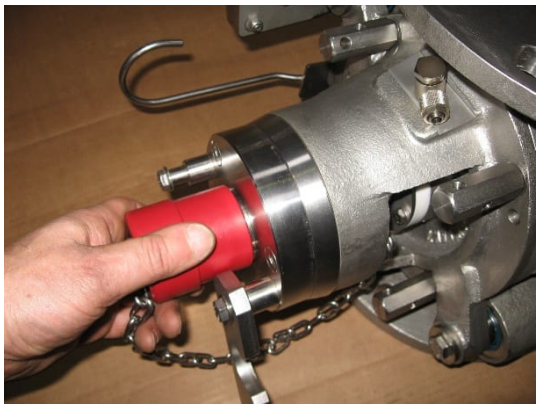


Secure nut with minimum force, if possible, prevent rotor to rotate.





Replace plastic cover in hole of support (113).



DANGER!
Always remove central T-Bolt before operation!
Never place any metal object other than the central T-Bolt in the T-Bolt holder.

11.13 AL-series / BL-series (MZC-I)

11.13.1 General assembly & part list

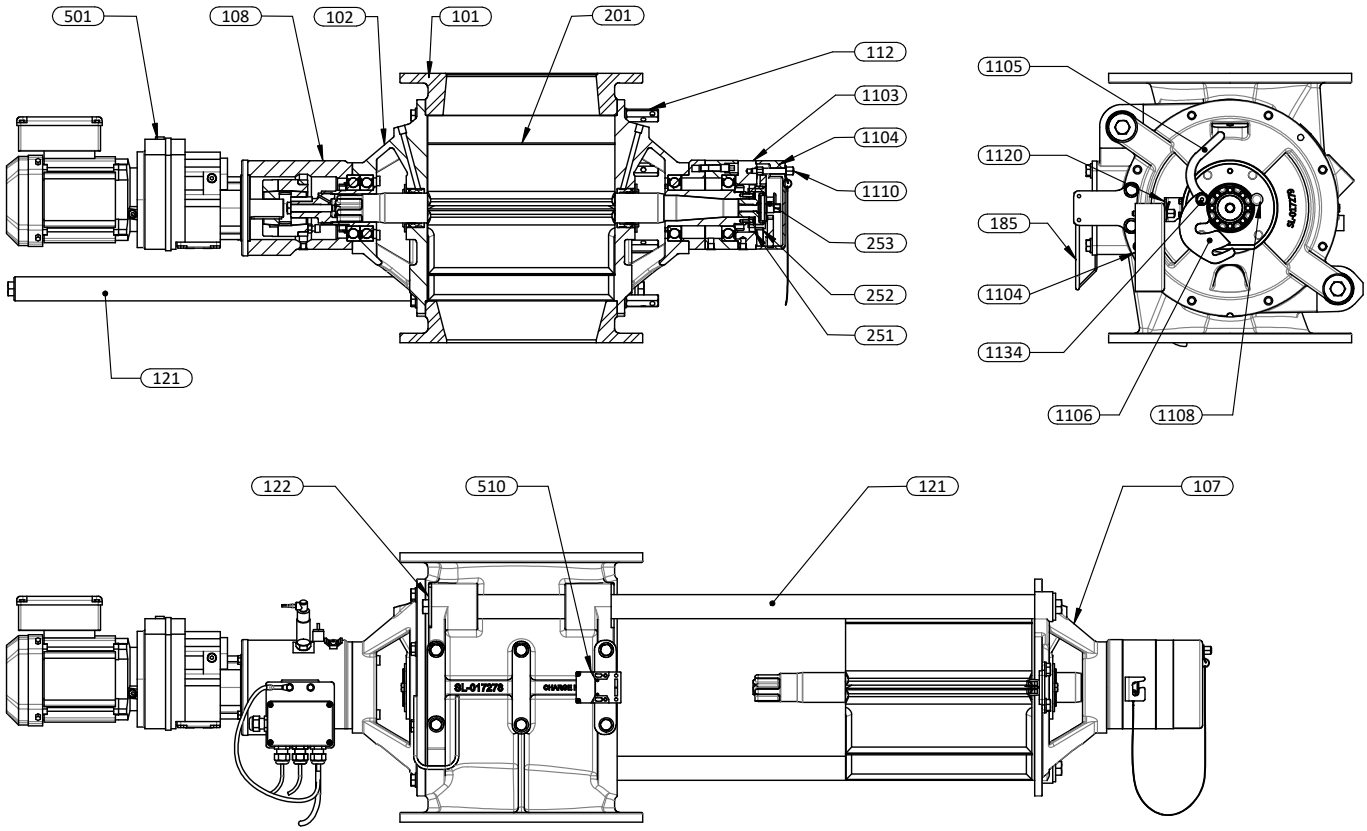


Figure 11.44: Drawing MZC-I parts

101 Body
102 End cover
107 End cover
108 Connection piece
112 Bolt
121 Guiding rod
185 Holder extended bolt
1101 Base flange
1102 Adjustment flange
1103 Cover flange
1104 Red cap
1105 Lock plate handle
1106 Lock plate
1107 Spacer
1108 Stopper bolt
1110 Screw red cap
1120 Bracket red cap
201 Rotor
251 Shim plate
252 End stop
253 Centerbolt
501 Drive [gearmotor]
510 Safety switch

11.13.2 Inspection and cleaning

Read the cleaning instructions (see chapter 9.2).

USDA

Hygienic rotary valve USDA Equipment acceptance certificate.
The USDA requires that non drive- and drive side of the rotary valve must be opened for inspection during each dry or wet cleaning.
It is the responsibility of the user to determine the time between inspections.
The frequency must be determined and validated individually for each application based on practical experience.
DMN-WESTINGHOUSE advise to do inspection and cleaning after wet cleaning (CIP).

Instruction

- Stop valve and isolate motor.

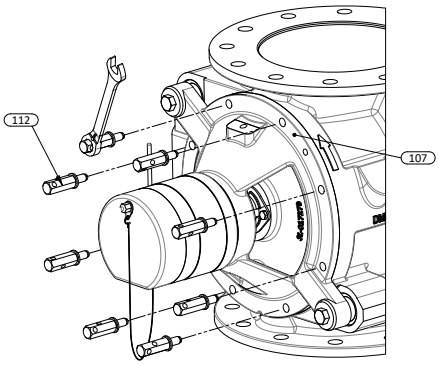
DANGER!
A lockable separator must be installed close to the valve so that the valve can be safeguarded against accidental activation during servicing and maintenance work

- Make sure that there is no more product above the valve
- Remove conveying pipeline of the Rotary valve type BL,BXL,BXXL
- Remove air / hoses

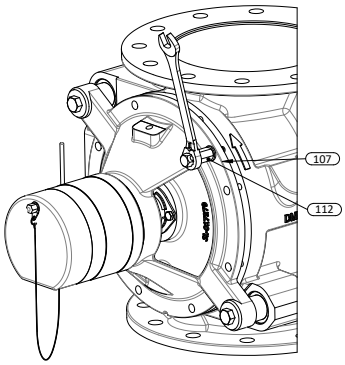
DANGER!
The safety switch must be connected to the client's safety circuit, which will stop or prevent the valve from operating.
The safety switch is a mechanical make-break contact to detect that an end cover is removed from the body. (see chapter 8.4.4)

11.13.2.1 Procedure 1: Basic cleaning non-drive side

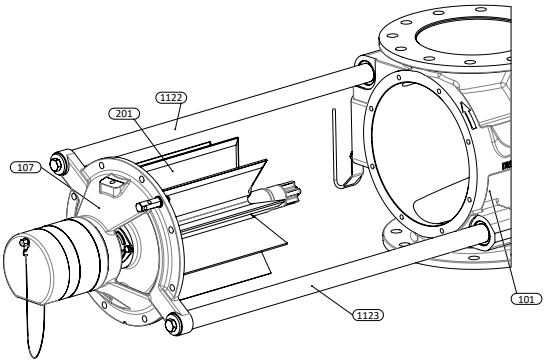
Remove bolts (112) from the end cover.



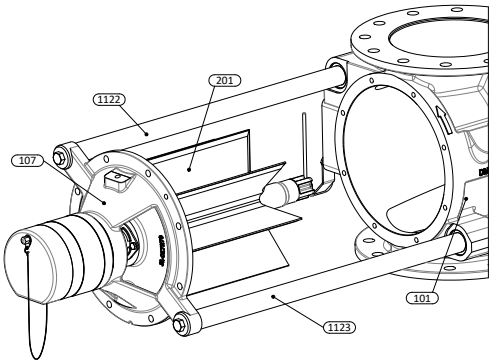
- To remove the end cover (107) screw two of these bolts into the jacking holes in the end cover.



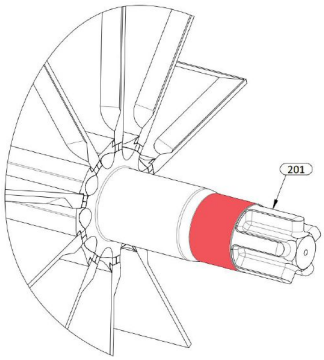
- Remove end cover and rotor (201) by pulling it axially from the body.



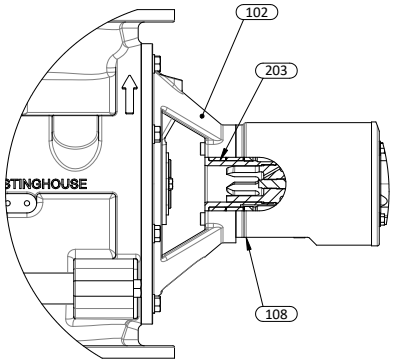
- Remove bolts (112) from end cover.
- Rotor (201) can rotate for inspection and cleaning.
- Clean body internally.



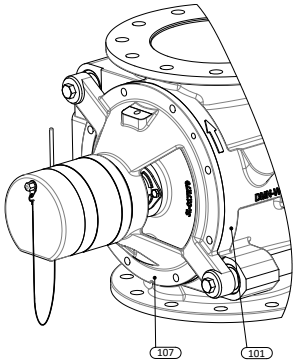
- Thoroughly clean rotor shaft drive side.
- Apply Berulub FG-H 2 EP to fitting (shown in red)



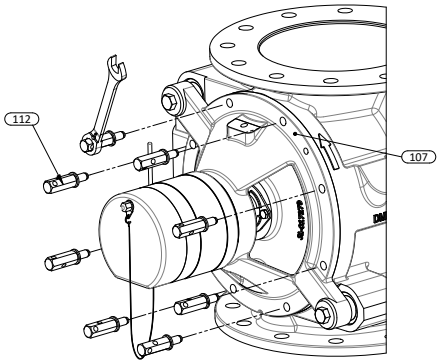
- Inspect and clean drive shaft (203)



- Slide end cover (107) back in body (101).

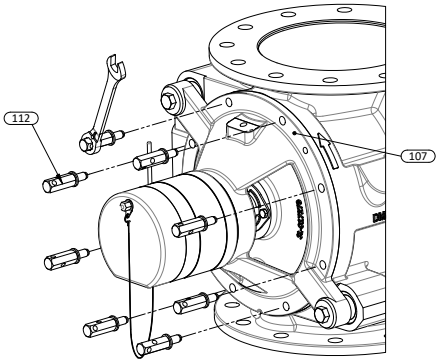


- Tighten bolts (112) crosswise in such a way that end cover fits without any clearance to the flat side of the body.

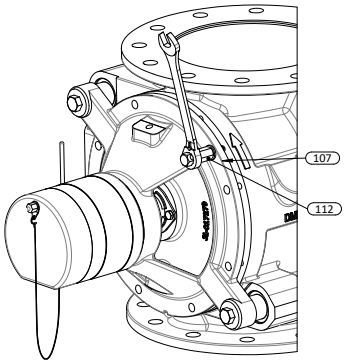


11.13.2.2 Procedure 2: Thorough cleaning non-drive side

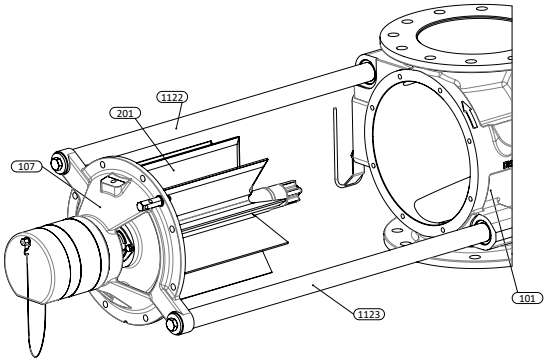
- Remove bolts (112) from the end cover.



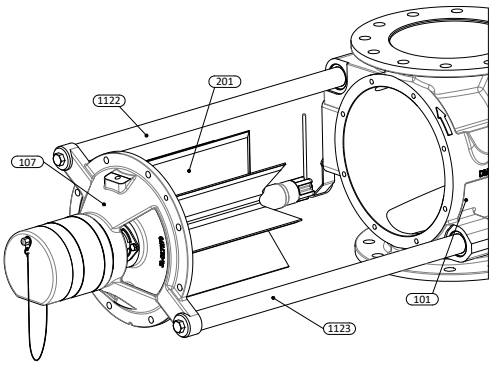
- To remove the end cover (107) screw two of these bolts into the jacking holes in the end cover.



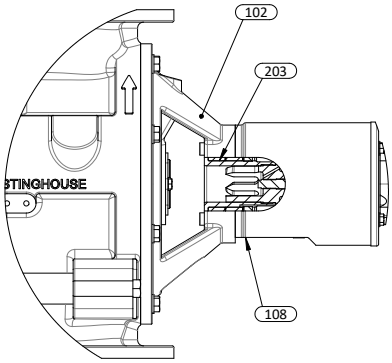
- Remove end cover and rotor (201) by pulling it axially from the body.



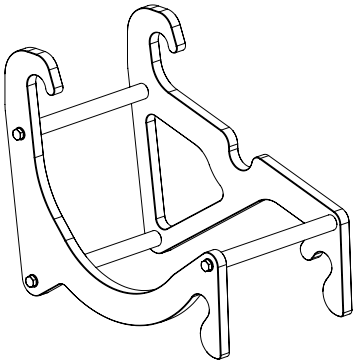
- Remove bolts (112) from end cover.
- Rotor (201) can rotate for inspection and cleaning.
- Clean body internally.



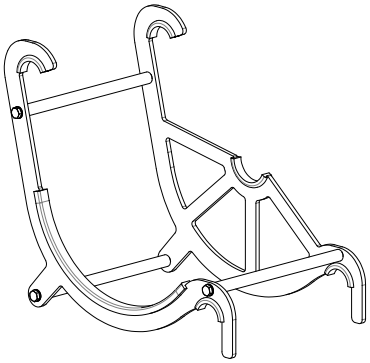
- Inspect and clean drive shaft (203).



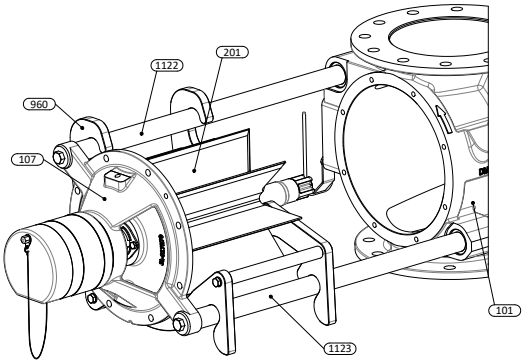
- Rotor Support 150-250 (960)



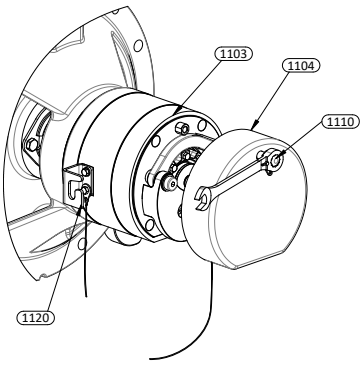
- Rotor Support 300-350 (960)



- Place Rotor Support (960) on slide rails (1122-1123).

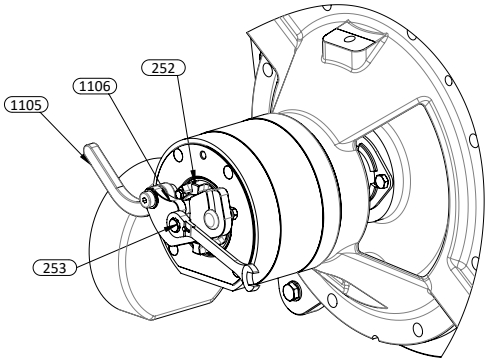


- Loosen bolt (1110) to remove cap (1104).
- Place cap on bracket (1120).

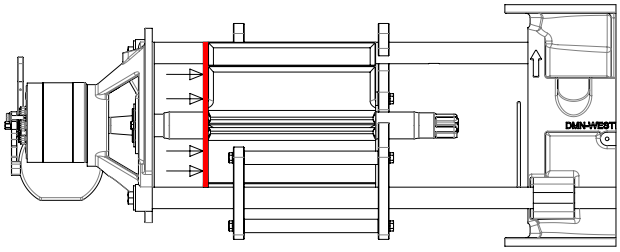


To remove rotor from end cover for inspection and cleaning of seal.

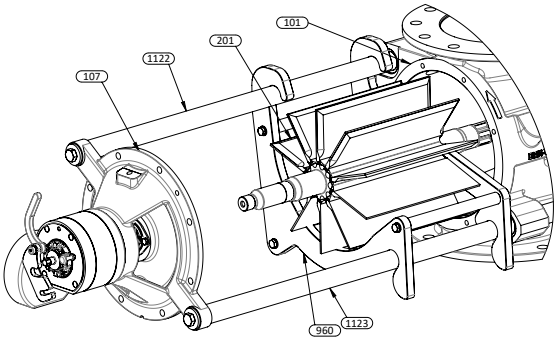
- Turn handle (1105) to locked position.
- Turn centerbolt (253) anti clockwise until in rotates free.



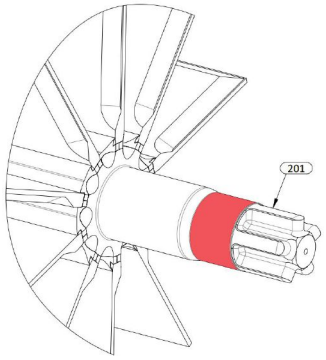
ATTENTION!
Only put force on the ROTOR while pulling it away from the end cover!



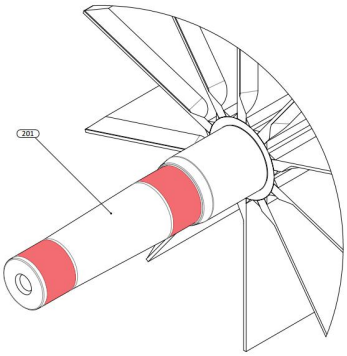
- Slide rotor support away from end cover.



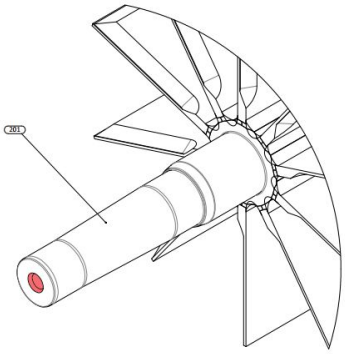
- Thoroughly clean rotor shaft drive side.
- Apply Berulub FG-H 2 EP to fitting (shown in red).



- Clean rotor shaft non drive side.
- Apply Berulub FG-H 2 EP to fittings (shown in red).
- Clean shaft seal (see chapter 11.16) and end cover.



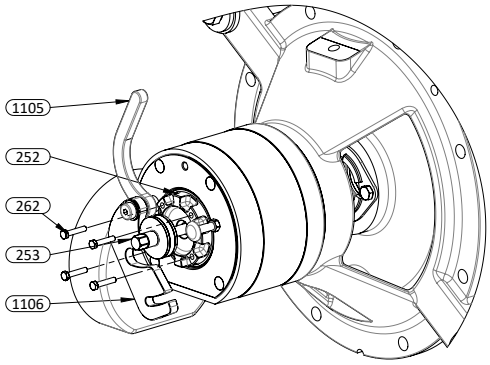
- Clean thread hole (shown in red) of rotor shaft non drive side.
- Apply Berulub FG-H 2 EP to thread hole.



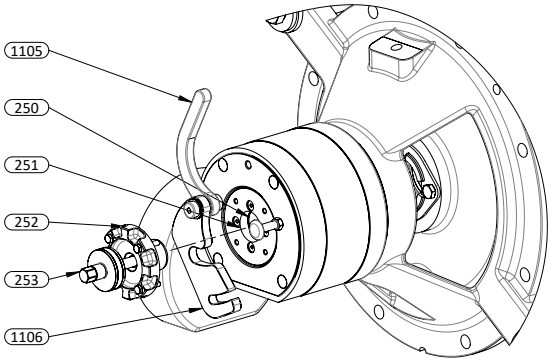
Non drive side Shaft seal instruction (see chapter 11.16)

Clean shaft hub

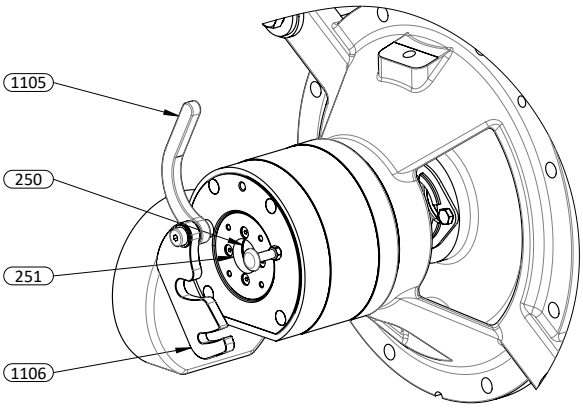
- Remove the bolts (262) from the end stop (252).



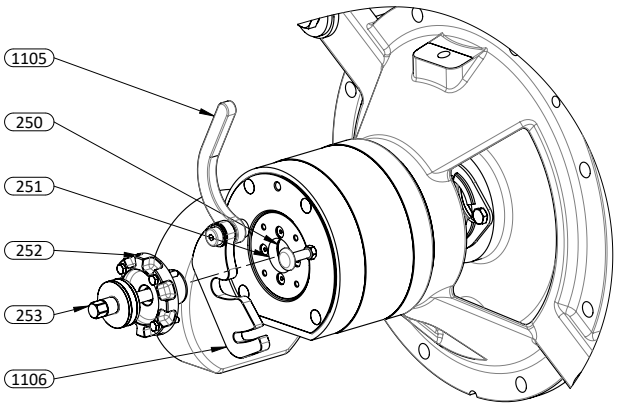
- Remove end stop (252).
- Clean centerbolt (253) thread.
- Apply Berulub FG-H 2 EP to centerbolt (253) thread.



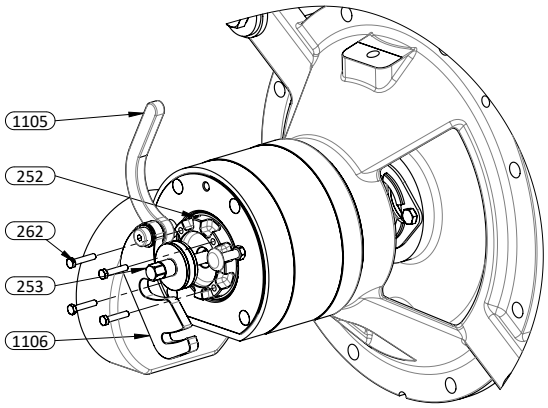
- Clean rotor shaft hub (250).



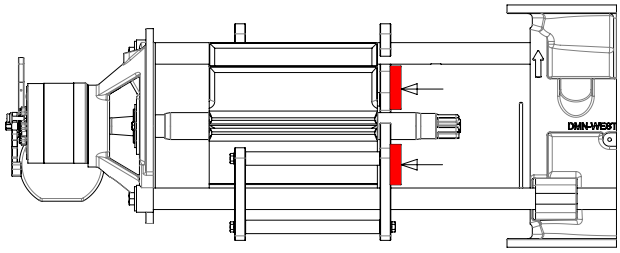
- Fit end stop (252) back in the rotor shaft hub.



- Use the bolts (262) to re-assemble end stop.

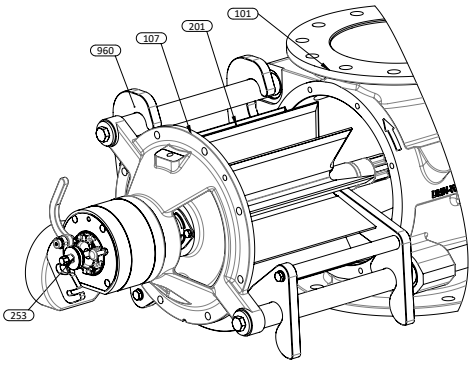


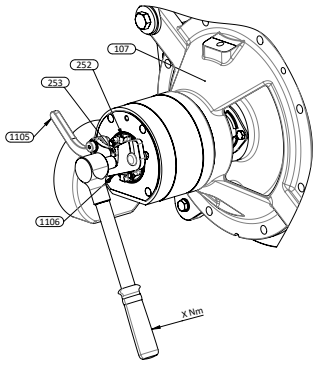
ATTENTION!
Only put force on the CRADLE while pushing it towards the end cover!



- Slide rotor back into the end cover.

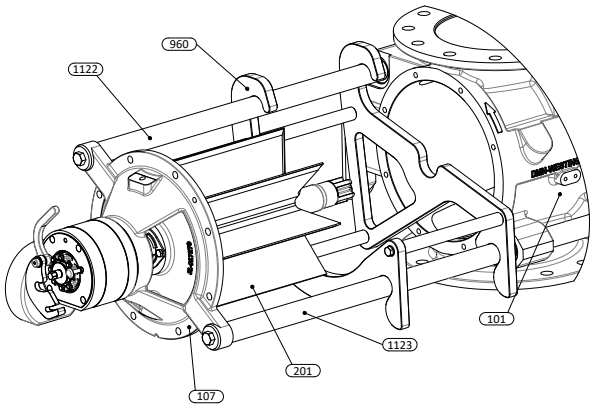
- Turn centerbolt (253) clockwise.
- Turn handle (1105) to locked position.
- Fasten centerbolt clockwise with torque wrench to the specified torque



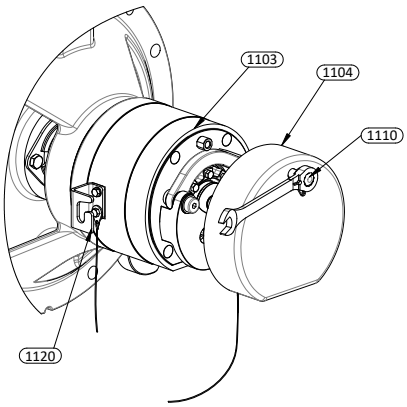


AL-BL	AXL-BXL-AML	BXXL	NR	Torque (X)
150-175	200			17-21Nm
200-250	250-300	350	347	20-25Nm
300-350	350-400			35-40Nm

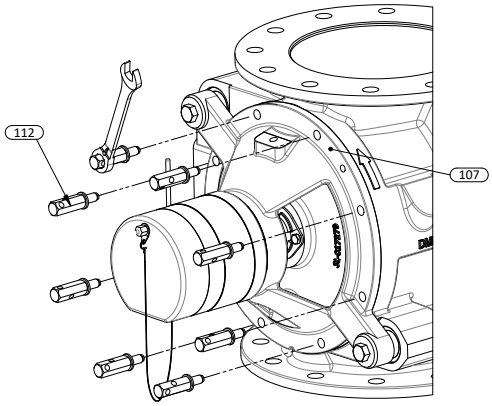
- Remove Rotor support (960).



- Use bolt (1110) to re-assemble cap (1104).



- Slide end cover and rotor back in body (101).
- Tighten bolts (112) crosswise in such a way that cover fits without any clearance to the flat side of the body.



Non drive side Shaft seal instruction (see chapter 11.16).

11.14 AL-series / BL-series (MZC-II)

11.14.1 General assembly & part list

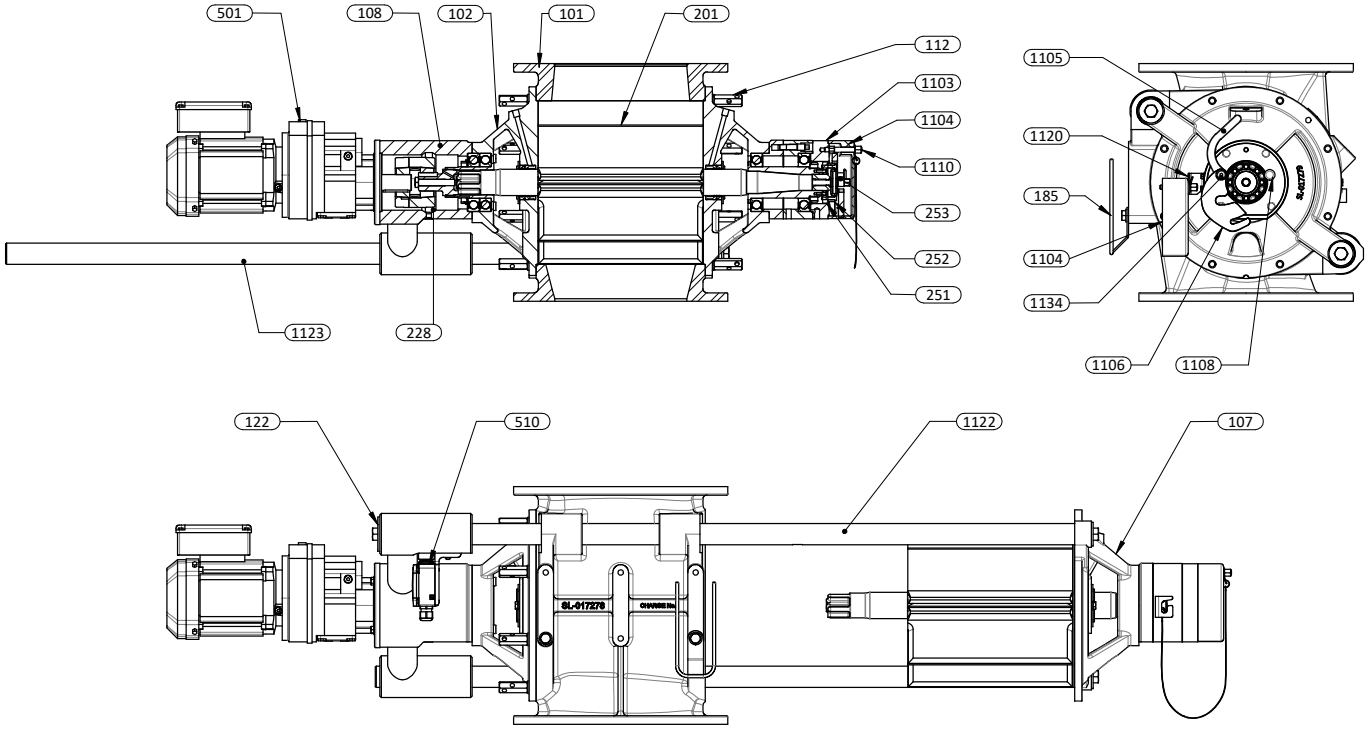


Figure 11.45: Drawing MZC-II parts

101 Body
102 End cover
107 End cover
108 Drive side sliding unit
112 Bolt
185 Holder extended bolt
1101 Base flange
1102 Adjustment flange
1103 Cover flange
1104 Red cap
1105 Lock plate handle
1106 Lock plate
1107 Spacer
1108 Stopper bolt
1110 Screw red cap
1120 Bracket red cap
1122 Guiding rod Top
1123 Guiding rod Bottom
201 Rotor
251 Shim plate
252 End stop
253 Centerbolt
501 Drive [gearmotor]
510 Safety switch

11.14.2 Inspection and cleaning

Read the cleaning instructions (see chapter 9.2).

USDA

Hygienic rotary valve USDA Equipment acceptance certificate.
The USDA requires that non drive- and drive side of the rotary valve must be opened for inspection during each dry or wet cleaning.
It is the responsibility of the user to determine the time between inspections.
The frequency must be determined and validated individually for each application based on practical experience.
DMN-WESTINGHOUSE advise to do inspection and cleaning after wet cleaning (CIP).

Instruction

- Stop valve and isolate motor.

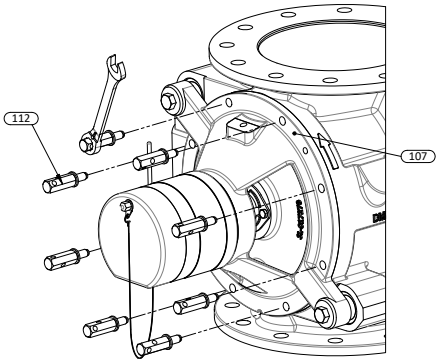
DANGER!
A lockable separator must be installed close to the valve so that the valve can be safeguarded against accidental activation during servicing and maintenance work

- Make sure that there is no more product above the valve
- Remove conveying pipeline of the Rotary valve type BL,BXL,BXXL
- Remove air / hoses

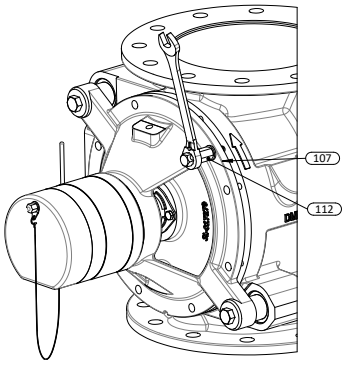
DANGER!
The safety switch must be connected to the client's safety circuit, which will stop or prevent the valve from operating.
The safety switch is a mechanical make-break contact to detect that an end cover is removed from the body. (see chapter 8.4.4)

11.14.2.1 Procedure 1: Basic cleaning non-drive side

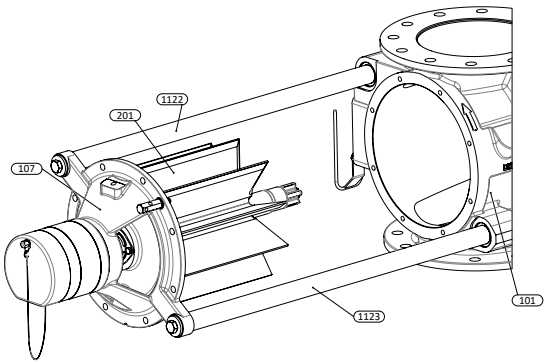
- Remove bolts (112) from the end cover.



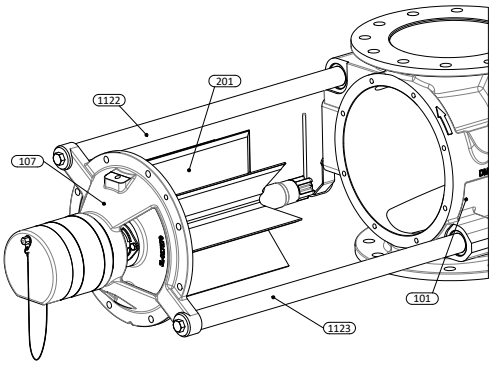
- To remove the end cover (107) screw two of these bolts into the jacking holes in the end cover.



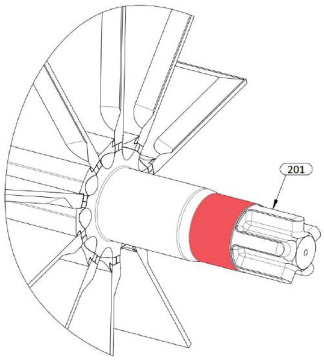
- Remove end cover and rotor (201) by pulling it axially from the body.



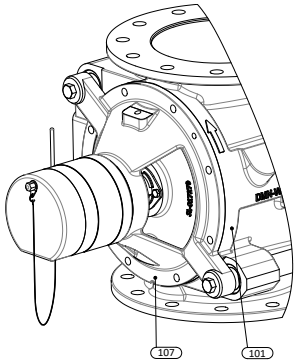
- Remove bolts (112) from end cover.
- Rotor (201) can rotate for inspection and cleaning.
- Clean body internally.



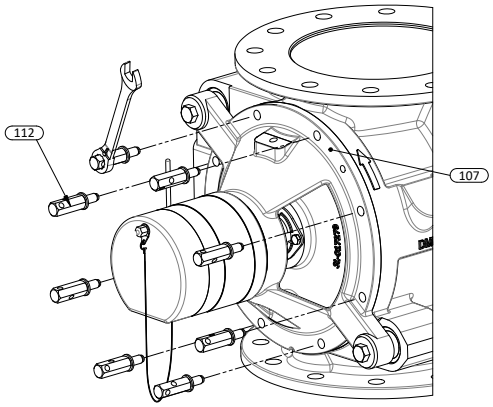
- Thoroughly clean rotor shaft drive side.
  Apply Berulub FG-H 2 EP to fitting (shown in red)



- Slide end cover (107) back in body (101).

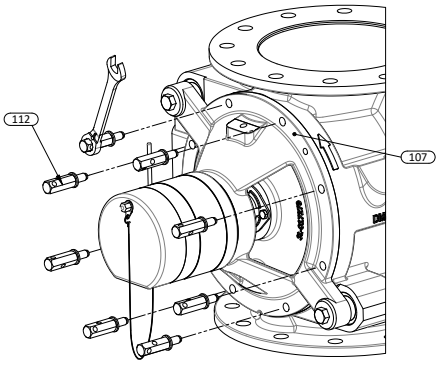


- Tighten bolts (112) crosswise in such a way that end cover fits without any clearance to the flat side of the body.

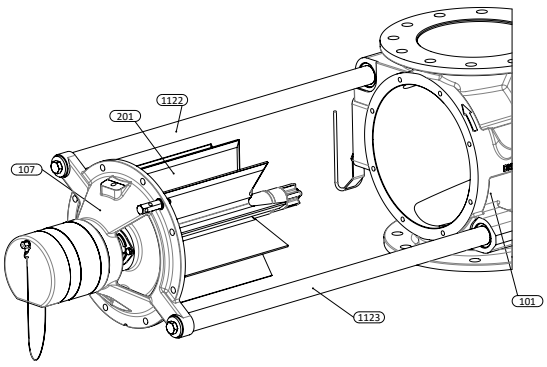


11.14.2.2 Procedure 2: Thorough cleaning non-drive side

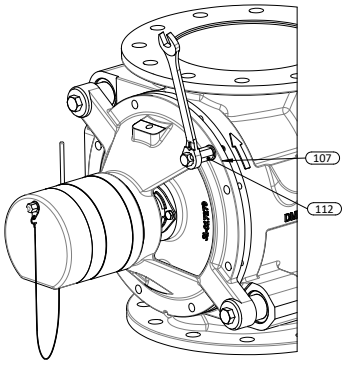
- Remove bolts (112) from the end cover.



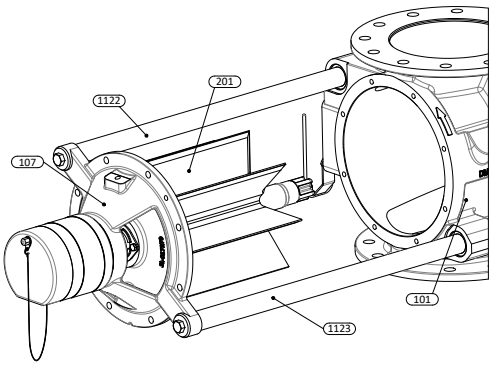
- Remove end cover and rotor (201) by pulling it axially from the body.



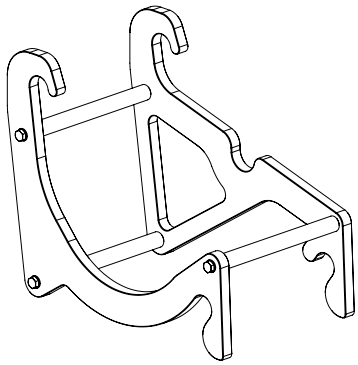
- To remove the end cover (107) screw two of these bolts into the jacking holes in the end cover.



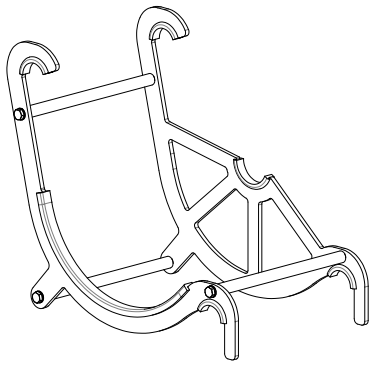
- Remove bolts (112) from end cover.
- Rotor (201) can rotate for inspection and cleaning.
- Clean body internally.



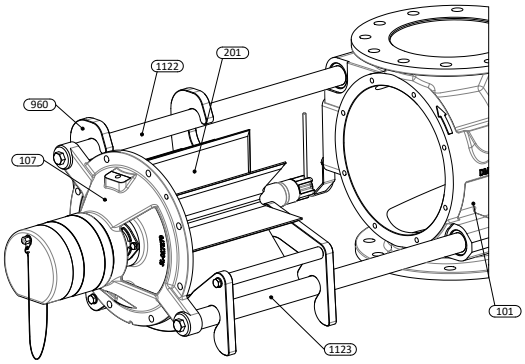
- Rotor Support 150-250 (960)



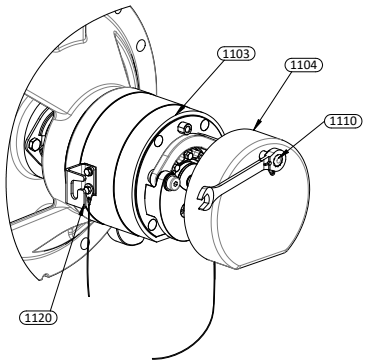
- Rotor Support 300-350 (960)



- Place Rotor Support (960) on slide rails(1122-1123).

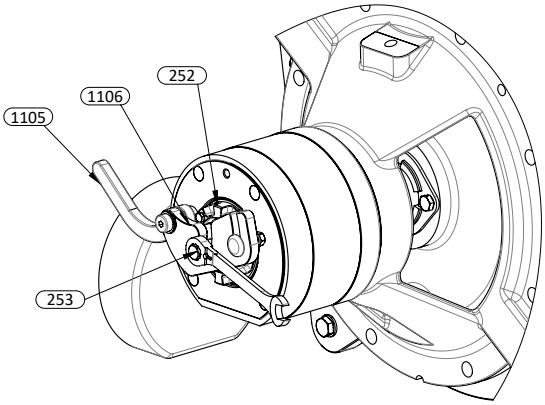


- Loosen bolt (1110) to remove cap (1104).
- Place cap on bracket (1120).

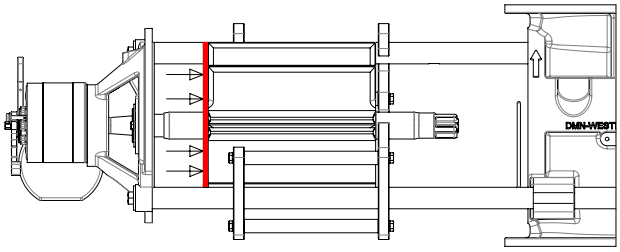


To remove rotor from end cover for inspection and cleaning of shaft seal.

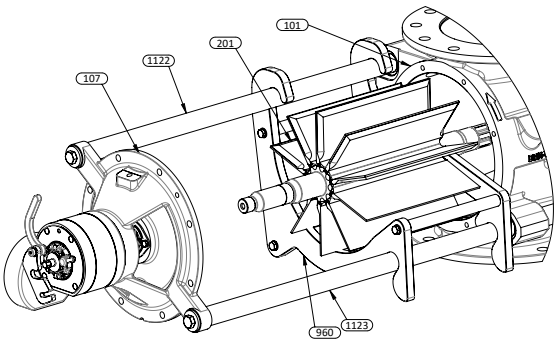
- Turn handle (1105) to locked position.
- Turn centerbolt (253) anti clockwise until in rotates free.



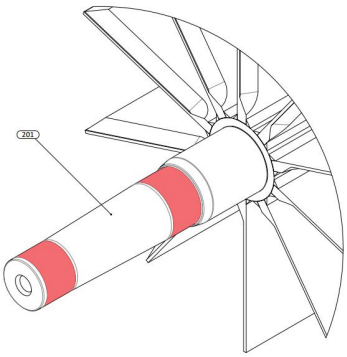
ATTENTION!
Only put force on the ROTOR while pulling it away from the end cover!



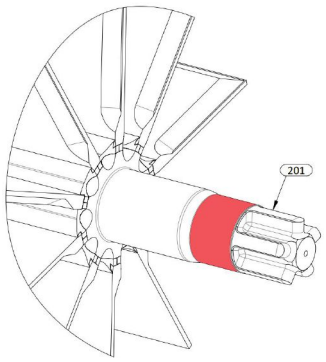
- Slide rotor with rotor support away from end cover.



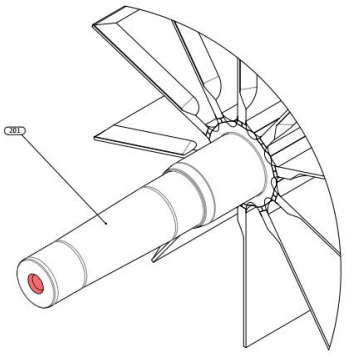
- Clean rotor shaft non drive side.
- Apply Berulub FG-H 2 EP to fittings (shown in red).
- Clean shaft seal (see chapter 11.16) and end cover.



- Thoroughly clean rotor shaft drive side.
- Apply Berulub FG-H 2 EP to fitting (shown in red).



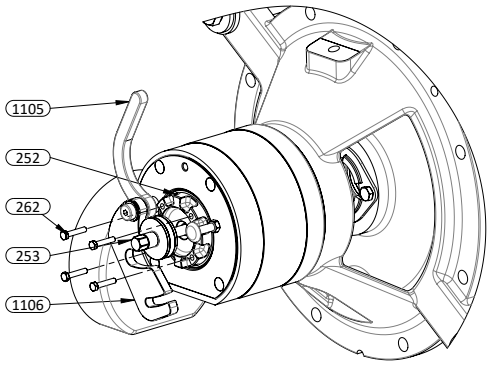
- Clean thread hole (shown in red) of rotor shaft non drive side.
- Apply Berulub FG-H EP to thread hole.



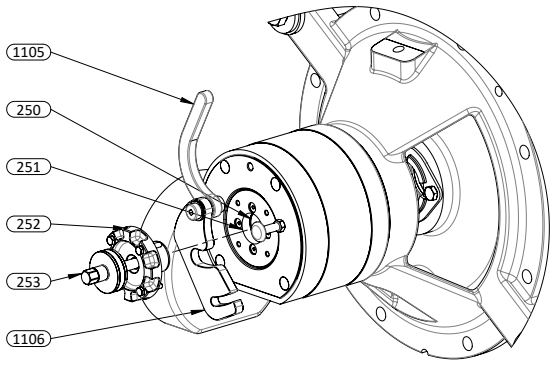
Non drive side Shaft seal instruction (see chapter 11.16).

Clean shaft hub

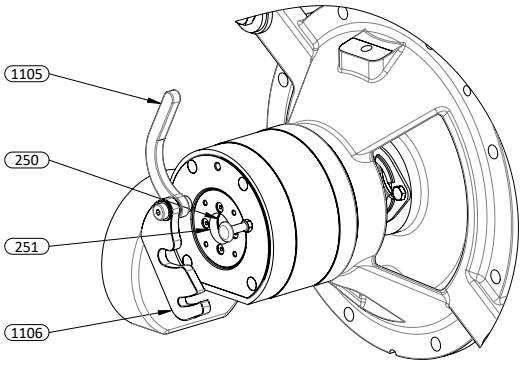
- Remove the bolts (262) from the end stop (252).



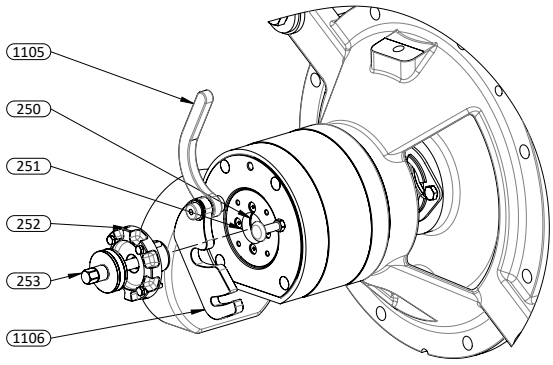
- Remove end stop (252).
- Clean centerbolt (253) thread.
- Apply Berulub FG-H 2 EP to centerbolt (253) thread.



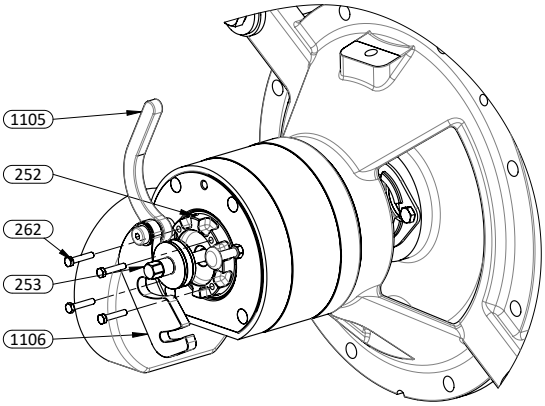
- Clean rotor shaft hub (250).



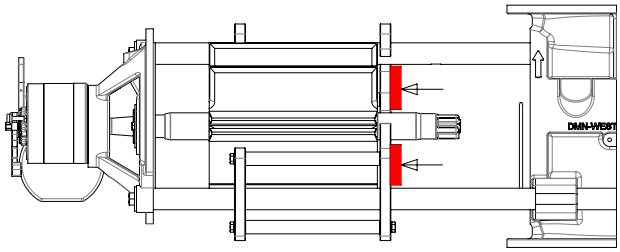
- Fit end stop (252) back in the rotor shaft hub.



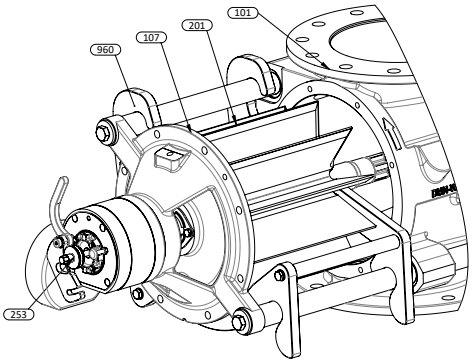
- Use the bolts (262) to re-assemble end stop.



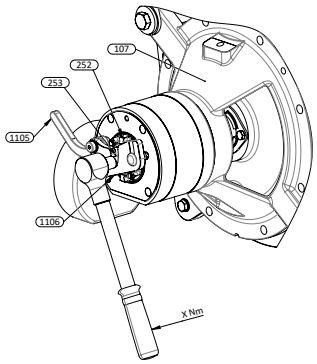
ATTENTION!
Only put force on the CRADLE while pushing it towards the end cover!



- Slide end cover over rotor shaft.

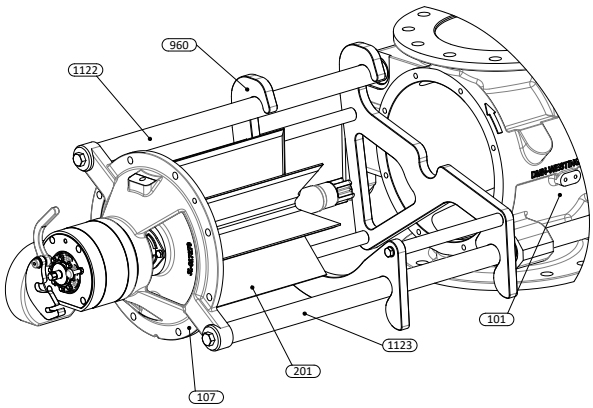


- Turn centerbolt (253) clockwise.
- Turn handle (1105) to locked position.
- Fasten centerbolt clockwise with torque wrench to the specified torque

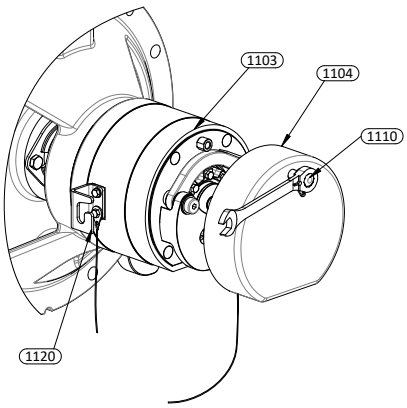


AL-BL	AXL-BXL-AML	BXXL	NR	Torque (X)
150-175	200			**17-21Nm**
200-250	250-300	350	347	**20-25Nm**
300-350	350-400			**35-40Nm**

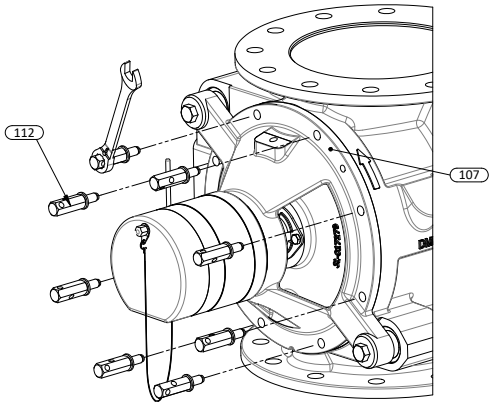
- Remove Rotor support (960).



- Use bolt (1110) to re-assemble cap (1104).

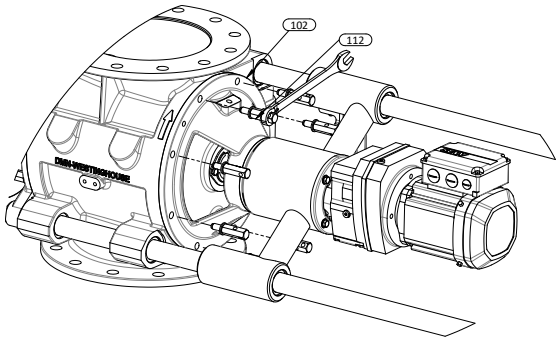


- Slide end cover and rotor back in body (101).
- Tighten bolts (112) crosswise in such a way that cover fits without any clearance to the flat side of the body.

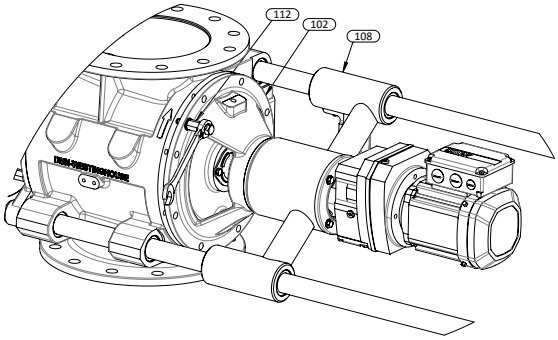


Clean drive side

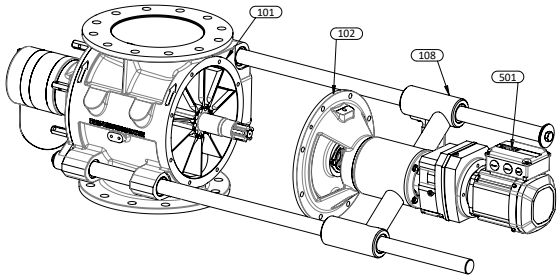
- Remove bolts (112) from end cover (102).



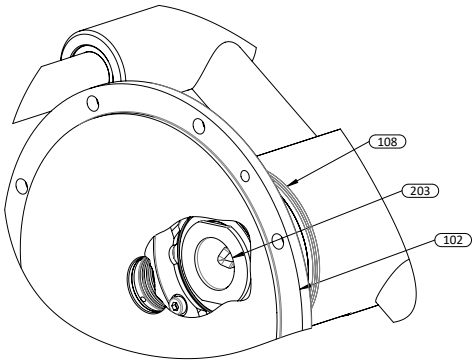
- To remove the end cover (102) screw two of these bolts into the jacking holes in the end cover.



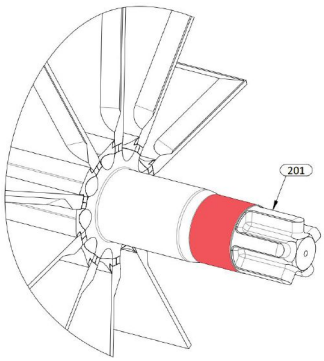
- Remove end cover and Drive side sliding unit (108) by pulling it axially from the body.
- Remove bolts (112) from end cover.



- Inspect and clean drive shaft (203).

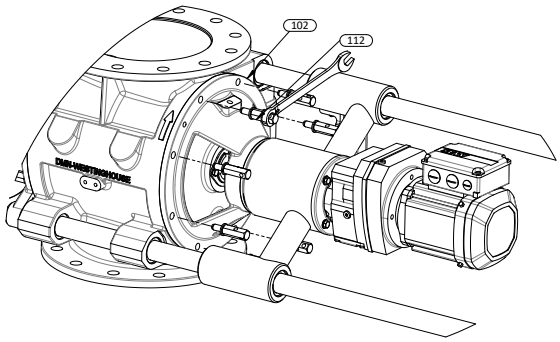


- Thoroughly clean rotor shaft drive side.
- Apply Berulub FG-H 2 EP to fitting (shown in red).



Non drive side shaft seal instruction (see chapter 11.16).

- Slide end cover and Drive side sliding unit back in body.
- Tighten bolts (112) crosswise in such a way that end cover fits without any clearance to the flat side of the body



11.15 Rotor

11.15.1 Clearance settings

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

CAUTION!
Always set clearances as mentioned on the sales order confirmation.

APS only!

The rotary valve is no longer a protective system when:

- The rotor tip width (TW) is smaller than mentioned in the table.
- The rotor clearances (CL) are higher than mentioned in the table. (refer to 5.6.3.3)

The standard executions have the following axial and radial clearances:

CAUTION!
Special clearances are to be set with product temperatures of 50°C and higher, according to special instructions, depending on size and material of the valve.
Product characteristics may influence the clearance. If in doubt, please contact DMN-WESTINGHOUSE (refer to chapter Contact information).

Type	Body end covers material	Rotor material	Size valve	Clearance axial and radial
AL-BL	Cast Iron	Mild Steel	150-350	**0,12-0,17mm**
			400-500	**0,15-0,20mm**
		Stainless Steel	150-350	**0,12-0,17mm**
			400-500	**0,15-0,20mm**
	Stainless Steel	Mild Steel	150-350	**0,12-0,17mm**
			400-500	**0,15-0,20mm**
		Stainless Steel	150-350	**0,12-0,17mm**
			400-500	**0,15-0,20mm**
AXL-AML-BXL	Cast Iron	Mild Steel	150-400	**0,12-0,17mm**
		Stainless Steel	150-400	**0,12-0,17mm**
	Stainless Steel	Stainless Steel	150-300	**0,12-0,17mm**
			350-400	**0,15-0,20mm**
BXXL	Stainless Steel	Stainless Steel	350	**0,12-0,17mm**
NR	Stainless Steel	Stainless Steel	347	**0,12-0,17mm**

Type	Part number			Clearance settings
AR	R.AR0300.1	R.AR0400.1	R.AR0625.1	**0,12 - 0,17mm**
	R.AR0300.2	R.AR0400.2	R.AR0625.2	**0,20 - 0,25mm**
	R.AR0300.3	R.AR0400.3	R.AR0625.3	**0,30 - 0,35mm**

11.15.2 Rotor adjustment standard executions

11.15.2.1 Rotor with fixed blades

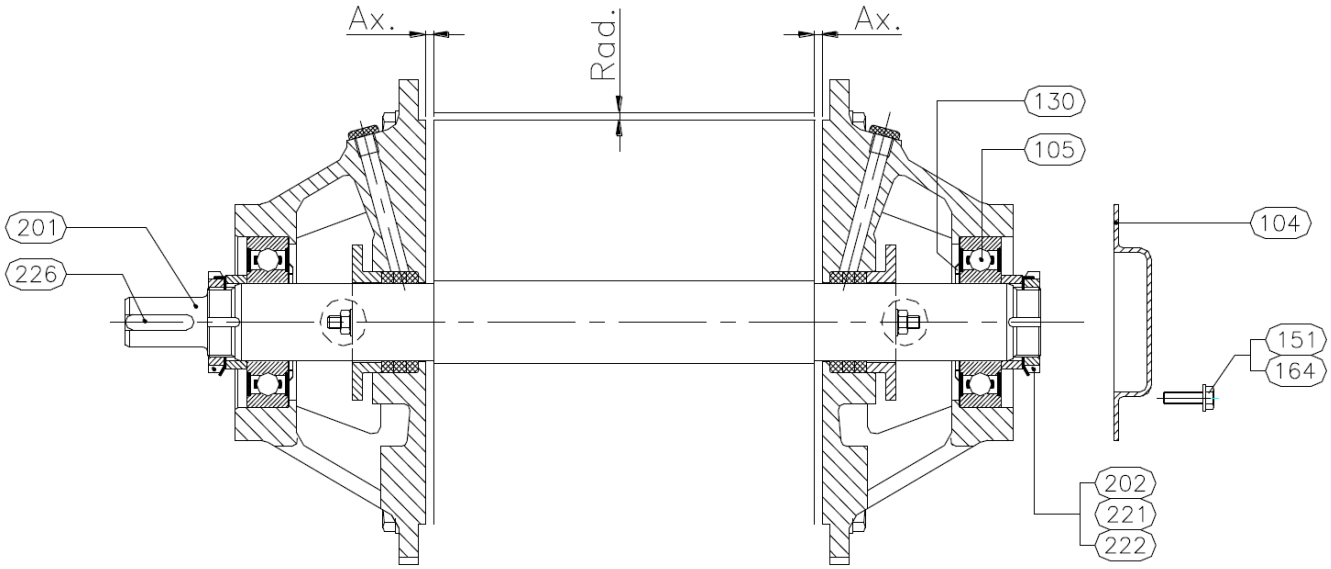


Figure 11.46: Adjustment for axial clearance

Instruction

The rotor must be adjusted in axial direction (at both sides) with a tolerance between the machined surfaces of the rotor.

- Push rotor hard against the inside face of end cover at non-drive end.
- Measure total end clearance. Equalise this clearance by placing a feeler gauge between the vane and the non-drive end cover.
- Tighten locknut until gauge is just nipped in position.
- Secure locknut.
- Tighten locknut at drive end until feeler gauge can be removed.
- Secure drive end locknut and check that both end clearances are equal.

11.15.2.2 Rotor with adjustable blades

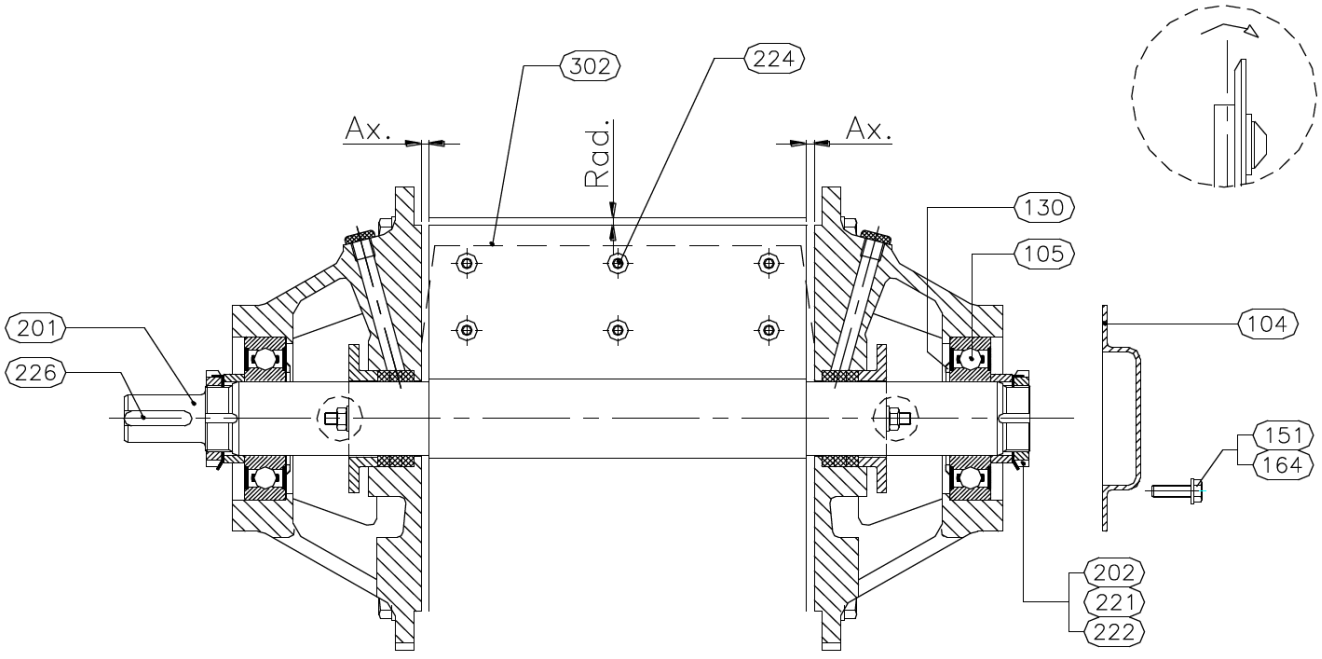


Figure 11.47: Adjustment for axial clearance

Adjustment of axial direction of rotor is as described under rotor with fixed blades (refer to chapter 11.15.2).

Axial/radial adjustment of the rotor blades

The tolerances for the axial adjustment of the rotor blades are the same as stated for the rotor.

The radial clearance should normally be between 0.12-0.17 mm (refer to chapter 11.15.1) but it is preferable to try and achieve the smallest possible clearance (i.e. 0.12-0.15 mm).

CAUTION!
Feeler gauges or copper shims of the correct thickness should be used for adjusting clearances. They are placed between the free rotating rotor blades and the cylindrical wall of the body. (i.e. adjacent to the inlet opening and as close to the end covers as possible).

Instruction

- Adjust axial/radial clearance and rotor blade using feeler gauges or copper shims of the correct thickness; **adjustment must be carried out with all blades.**

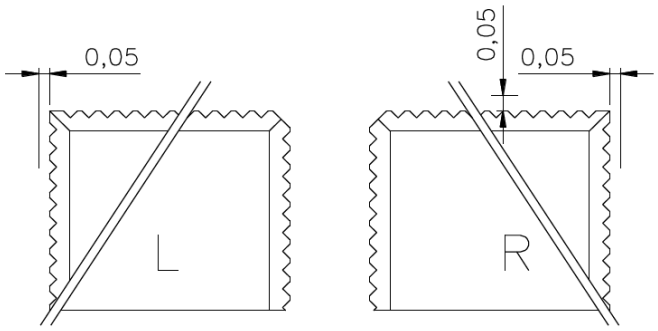


Figure 11.48: Adjustment scraper blades

11.15.2.3 Adjustment of scraper blades

The axial clearance must be adjusted to a slightly closer tolerance (0.05-0.08mm).

Again, use feeler gauges or copper shims of the correct thickness.

The two scraper blades are set with the correct clearance on one side.

Blade L on the left side, blade R is set on the right side with the correct clearance.

CAUTION!
After adjustment of the blade, feeler gauges or copper shims must be removed. Never let them remain in the valve.

11.15.2.4 Rotor with adjustable synthetic or flexible blades

Instruction

- Average axial clearance of rotor blades.
- Adjust radially with zero clearance.
- Fasten clamp plate simultaneously.

Check the final adjustment by turning the rotor by hand carefully. If larger valves of 300 and 350 size have flexible blades it may be necessary to rotate by lever action. If steel blades are used the rotor should turn noiselessly.

Instruction

- Assemble cover.
- Assemble shaft seal.
- Mount drive parts.

ATTENTION!
After assembly test run the valve.

11.15.3 Rotor adjustment for standard execution HT

DANGER!
Special clearances are to be set with high product temperatures, according to special instructions.
Product characteristics may influence the clearance. If in doubt, please contact DMN-WESTINGHOUSE (refer to chapter Contact information).

Prior to delivery the axial position of the rotor is set at the right clearance. This means that differences in clearance between the rotor and the end cover on both drive side and non-drive side have been equated as far as possible. Nevertheless, should it be necessary to readjust the axial position of the rotor, proceed as follows:

Shim thickness clarification

Rotate rotor freely in the valve bore.

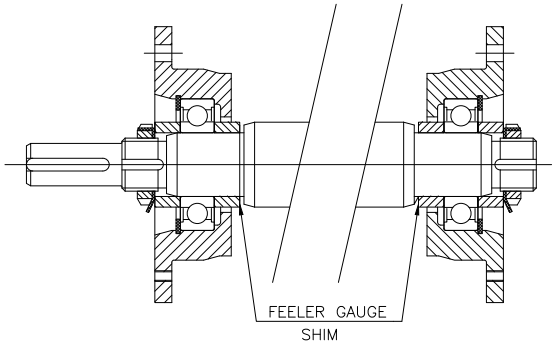


Figure 11.49: Shim thickness clarification

The special bearings will locate themselves centrally in their recesses. When this has been achieved check the clearances between inner spacer and the rotor shaft shoulder at both ends of the rotor.

Instruction

- Loosen locking nut (222), remove safety ring (221) and spacer ring (202).
- Remove bearing housing assembly countersunk screws (160). Fit two of these bolts in the tapped jacking holes provided in bearing housing (108) and remove bearing housing.
- Remove inner spacer ring, place required shim onto the rotor shaft followed by inner spacer ring. Press bearing housing assembly and secure.
- Fit spacer ring, safety ring (221) and locknut (222), tighten locknut and secure.
- Check that both end clearances are equal.

Rotor with adjustable blades

Axial/radial adjustment of the rotor blades

- The tolerances for adjustment of the rotor blades depends on the product temperature.
- For special settings, please contact aftersales.
- If in doubt, please contact DMN-WESTINGHOUSE (refer to chapter Contact information).

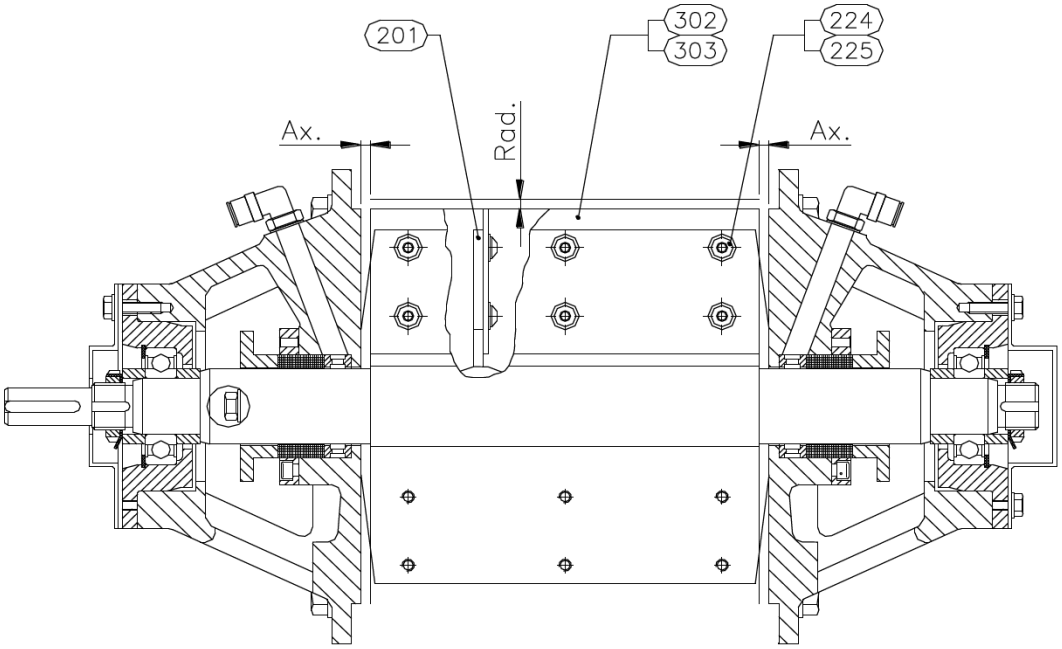


Figure 11.50: Adjustment for axial and radial clearance rotor blades

Instruction

- Adjust axial/radial clearance and rotor blade using feeler gauges or copper shims of the correct thickness.
- The adjustment described above must be carried out with all blades.

CAUTION!
After adjustment of the blade, feeler gauges or copper shims must be removed. Never let them remain in the valve.

Check the final adjustment by turning the rotor by hand carefully. If steel blades are used the rotor should turn noiselessly.

Instruction

- Assemble bearing cover.
- Assemble shaft seal.
- Assemble shaft guard.
- Mount drive parts.

ATTENTION!
After assembly, test run the valve.

11.15.3.1 Axial adjustment of the rotor clearances

Prior to delivery the axial position of the rotor is set at the right clearance. This means that differences in clearance between the rotor and the end cover on both drive side and non-drive side have been equated as far as possible. Nevertheless, should it be necessary to readjust the axial position of the rotor, proceed as follows:

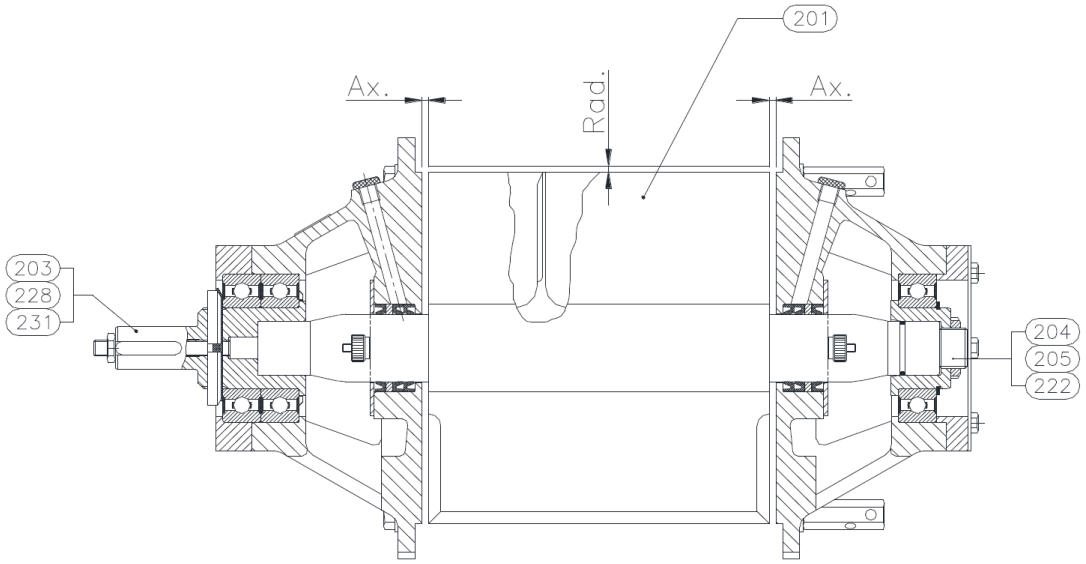


Figure 11.51: Adjusting axial clearance

- Determine the axial clearance with the use of feeler gauges.
- Remove the drive guard.
- The centre of the drive shaft contains a cylindrical adjusting screw (228), which can be turned with an allen key and a nut (231).
- Loosen the nut.

Instruction

- Remove cover (104) at non-drive side and loosen lock nut (222).
- Adjusting screw (205) can be loosened or tightened in conjunction with the cylindrical adjusting screw (228) in order to adjust axial position of rotor. This is carried out using a special pin key.

11.16 Seals

DANGER!
Take care of fingers when accessing rotating parts.

11.16.1 Shaft seals by means of packing cord

11.16.1.1 Standard packing (cord)

412 Stud
413 Nut
414 Washer
421 Gland follower
431 Packing cord
433 Plug

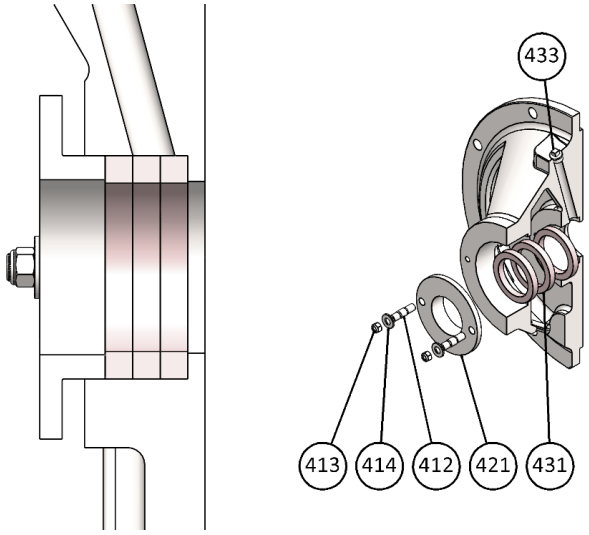


Figure 11.52: Standard packing (cord)

11.16.1.2 Grease purge packing (cord)

412 Stud
413 Nut
414 Washer
421 Gland follower
422 Lantern ring
423 Extension piece
431 Packing cord
433 Plug
436 Cylinder bolt

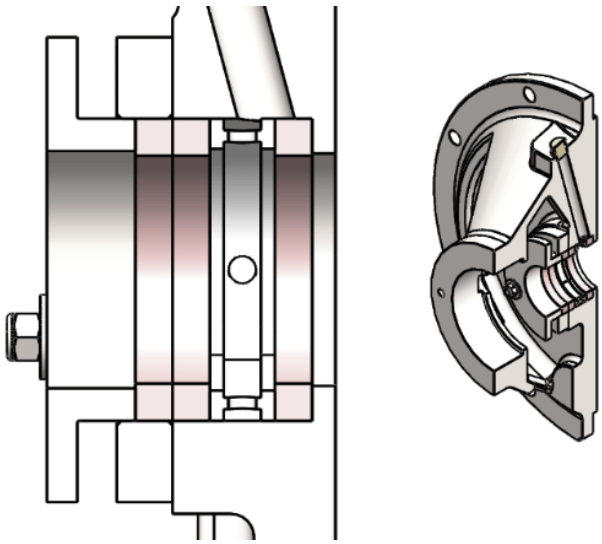
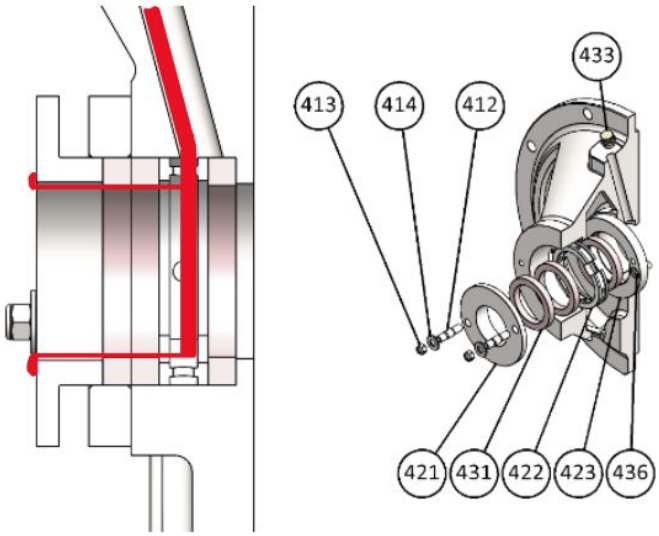


Figure 11.53: Grease purge packing (cord)

- Grease purge packings come without grease applied from the factory.
- Seals are regreaseable to protect shaft seals in harsh operating environments.
- Grease acts as a barrier to prevent abrasive grit and corrosive fluid from affecting shaft seal.
- Suggested grease for application is Shell Gadus S2 V220 (red grease). The choice of grease depends on the application and user preference.
- Grease can be manually applied using a grease gun.
- Limit the application of grease gun pressure to 1.5 bar (20 psi) to prevent malfunction of seals.
- Caution: Some grease guns can apply grease at up to 10,000 psi, which may cause the grease to blow past the seals.
- Lubrication intervals depend on the operating frequency of the rotary valve.
- Grease purge seals should be periodically purged to flush abrasive grit away from shaft seals.
- Recommended to purge at least every three months as a minimum and visually inspect for cleanliness.

- Adjust regreasing frequency based on the contamination level of the grease.
- A properly purged grease purge seal will display a bead of grease at the gland follower gap as shown below:



As for the shaft seal assembly instructions / procedure:

1. Insert the extension ring (423) and tighten with the two cylinder screws (436).
2. Use a standard air distribution ring to centre the extension ring and tighten the cylinder screws (and remove the air distribution ring again).
3. Insert a packing cord (431), the split air distribution ring (422) and two more packing cords (431) in both covers.
4. Turn two studs (412) into the holes provided in the extension ring.
5. Place the gland follower (421). The two threaded studs will protrude through the holes in the gland follower.
6. Place a flat washer (414) over each threaded stud.
7. Turn two lock nuts a few turns on the threaded studs.
8. Turn the grease nipple (433) into the seal feed channel on the outside of the cover.

11.16.1.3 Air purge packing (cord)

412 Stud
413 Nut
414 Washer
421 Gland follower
422 Lantern ring
423 Extension piece
431 Packing cord
432 Coupling
436 Cylinder bolt

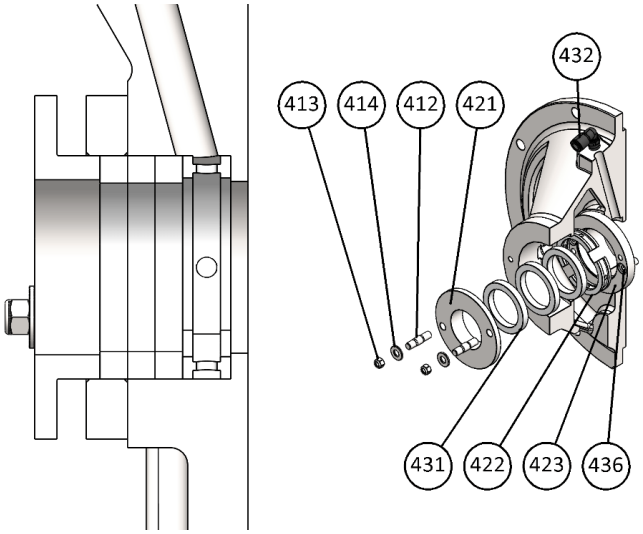


Figure 11.54: Air purge packing (cord)

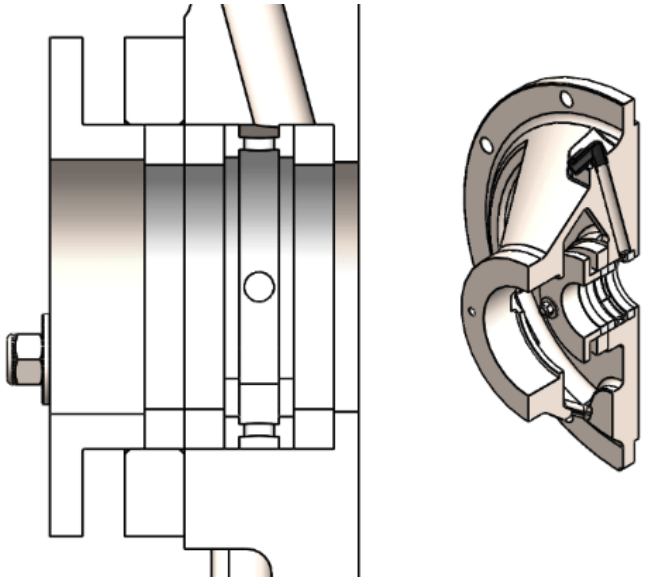


Figure 11.55: Barrier air purge glands

11.16.1.4 Adjustment and replacement of packing cords

Adjustment of the packing cord seals should be made with the unit in stationary condition. Before starting the system, the seal needs to be fastened. The gland follower should be tightened up evenly to prevent leakage.

If adjustment of the gland follower is insufficient to prevent leakage or overheating, the packing cord should be completely renewed. Fresh seals prevent contamination and unnecessary wear.

Instruction

Replace the packing cord as follows:

- Withdraw gland follower (421) and pull these against ball-bearing place.
- Remove old packing cord using a suitable packing extractor tool.

ATTENTION!
Examine shaft journal for wear. Excessive wear or scoring in this area will reduce the effective life of the seal.

- Fit new packing cord seals.
- Insert packing cord carefully, one at the time with joints staggered 60° apart.
- Re-assemble gland follower (421), which must be positioned evenly by tightening the nuts (413) but not beyond finger tight at this stage.

11.16.2 Shaft seal by means of lip seal

11.16.2.1 Standard lip seal

433 Plug
431 Lip seal
441 Cover plate
443 Nut
445 Distance ring
446 Ring
451 Stud

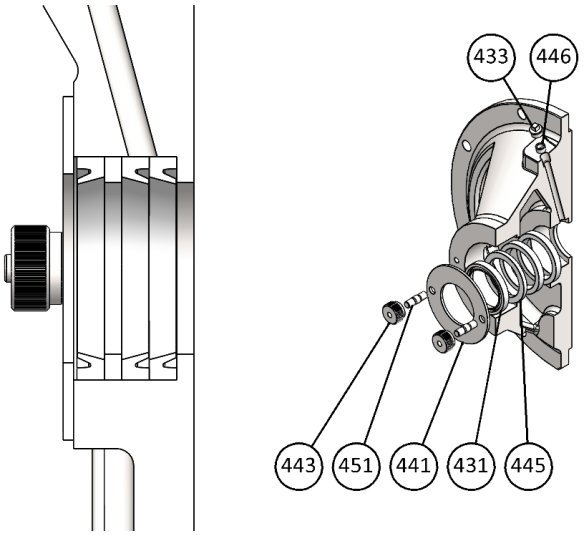


Figure 11.56: Standard lip seal

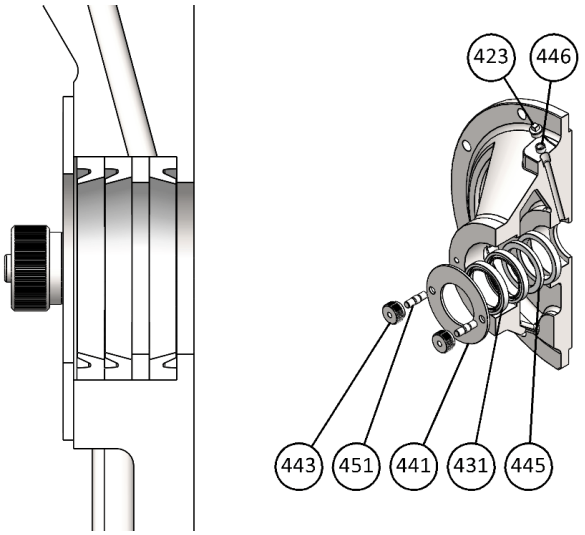


Figure 11.57: Vacuum shaft seal by means of lip seals (notice the different order of the lip seals)

11.16.2.2 Air purge lip seal

422 Lantern ring
431 Lip seal
441 Cover plate
443 Nut
446 Ring
451 Stud
462 Elbow banjo body
463 Banjo bolt

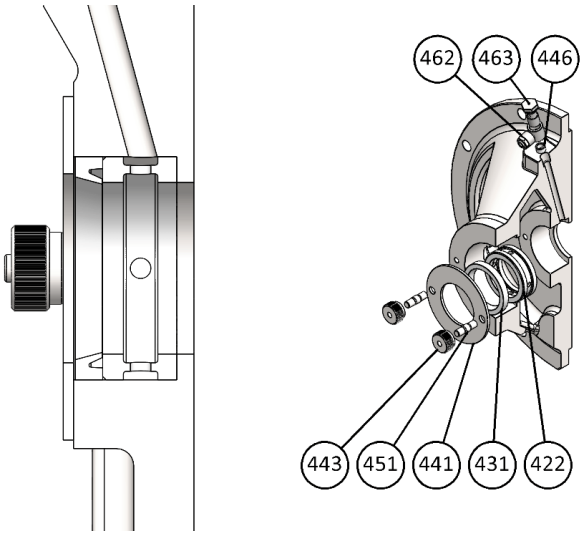


Figure 11.58: Air purge lip seal

11.16.2.3 Air purge with 3 lip seals

412 Bolt
414 Washer
421 Cover plate
422 Lantern ring
423 Extension ring
431 Lip seal
432 Coupling
436 Allen screw

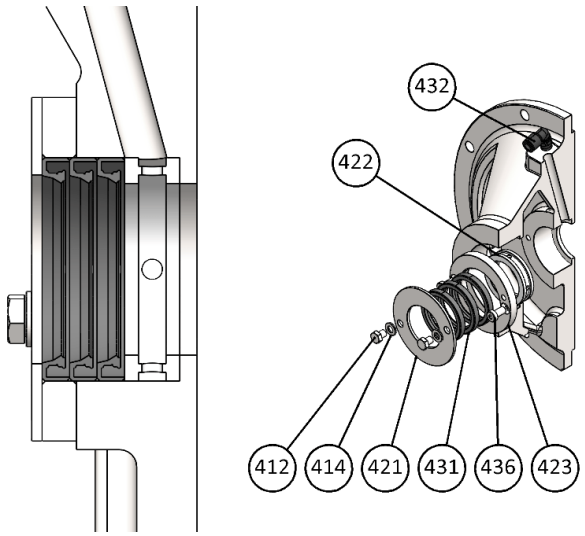


Figure 11.59: Air purge with 3 lip seals

11.16.2.4 Air purge lip seal with grooved lantern ring

421 Seal unit DS
422 Seal unit NDS
423 Cover plate
431 Lip seal
432 Coupling
434 Nut
435 Washer

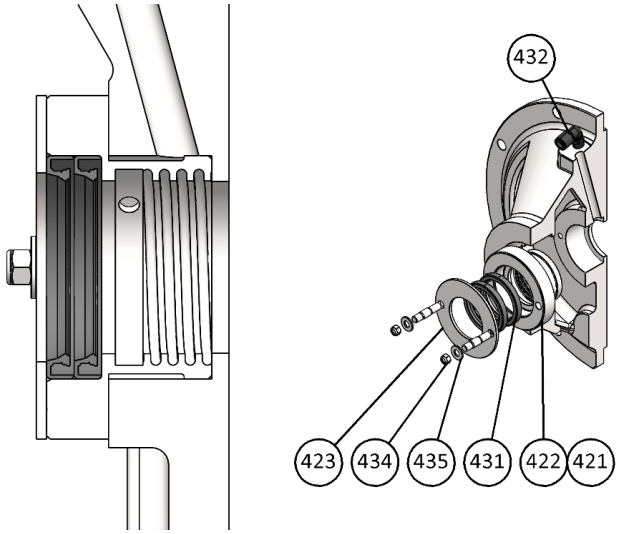


Figure 11.60: Air purge lip seal with grooved lantern ring

11.16.2.5 Lip seal with liquid cleaning (CIP (Dairy-EL I) seal)

402 Distance ring
421 Seal unit DS
422 Seal unit NDS
429 Gasket seal unit
430 PS seal tandem
431 PS seal
433 Bolt
435 Washer
441 Cover plate
442 Plug
446 Ring
457 O-ring
469 Pipe coupling

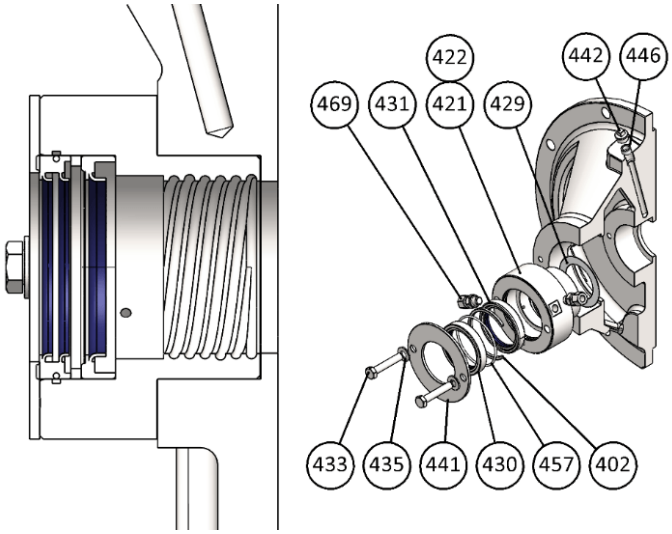
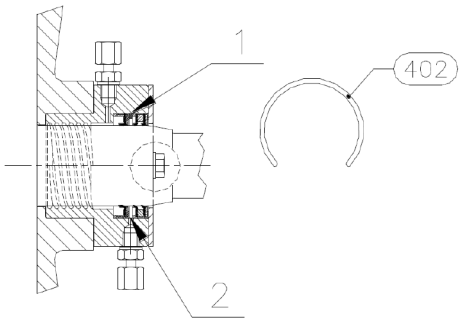


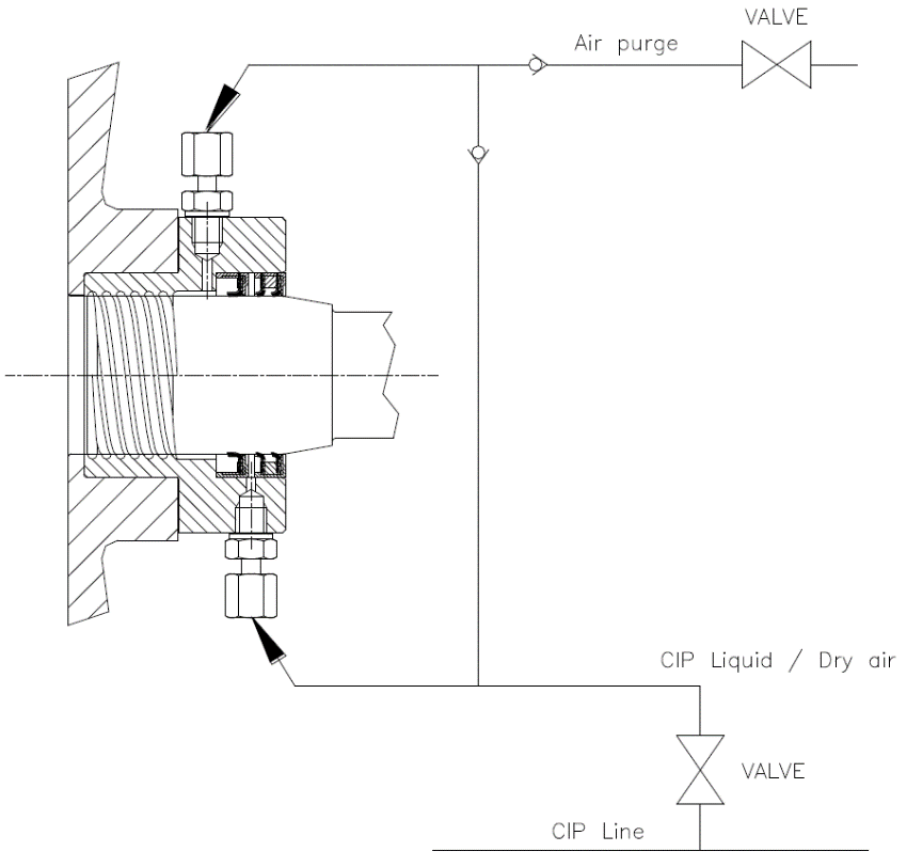
Figure 11.61: Lip seal with liquid cleaning (CIP (Dairy-EL I) seal)

Changing PS seals



Make sure the distance ring (402) between the PS seals (1) does not block the purge hole (2).

Connecting lines



Typical example seal layout. Seal configuration to be determined by user depending on process.

11.16.2.6 Replacement of lip seals

ATTENTION!
Lip seals cannot be adjusted. When carrying out a complete overhaul the lip seals must be cleaned and checked for damage and if necessary, replaced.
All parts to be lightly greased prior to assembling the seals.
Examine shaft journal for wear. Excessive wear or scoring in this area will reduce the effective life of the seal.

Instruction

Replace the lip seals as follows:

- Remove (knurled) nuts and cover plate from seal arrangement.
- Remove lip seal(s).
- Clean air passage to seal arrangement.
- Clean parts and seal area thoroughly before mounting.

11.16.3 Shaft seals by means of O-ring

11.16.3.1 SAS-II Sanitary air purge seal

422 Seal unit
433 Bolt
435 Washer
441 Retaining plate
446 Ring
455 O-ring
456 O-ring
462 Elbow banjo body
463 Banjo bolt

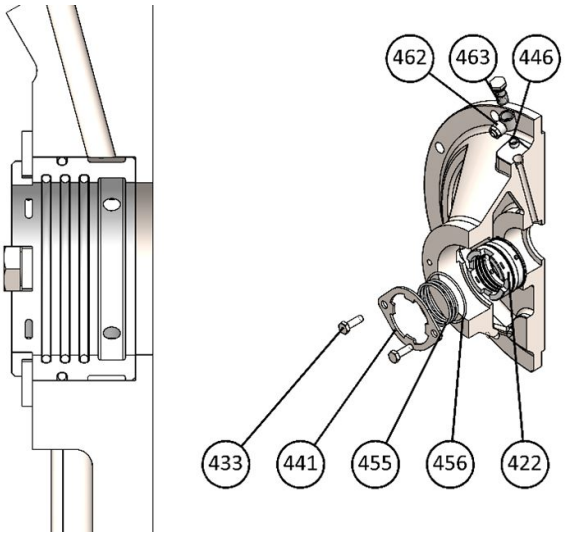
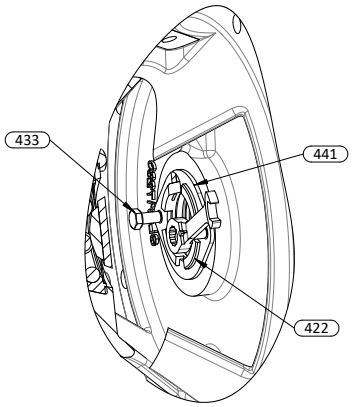


Figure 11.62: SAS-II Sanitary air purge seal

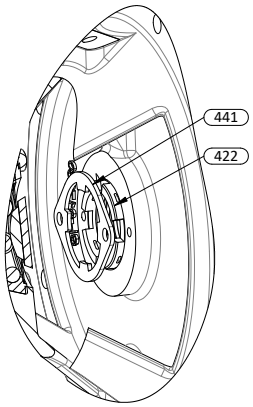
ATTENTION!
O-rings to be lightly greased with FDA approved grease (Food NSF H1) prior to assembling.

11.16.3.2 Inspection and cleaning SAS-II seal

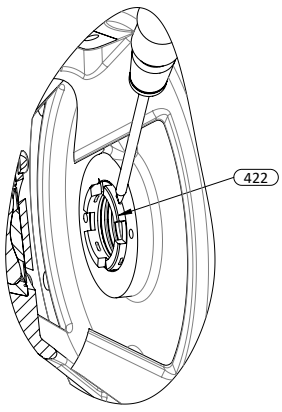
- Remove bolts (433).



- Remove Retaining plate (441).



- Remove Seal unit (422).



11.17 Drives

11.17.1 Chain drive

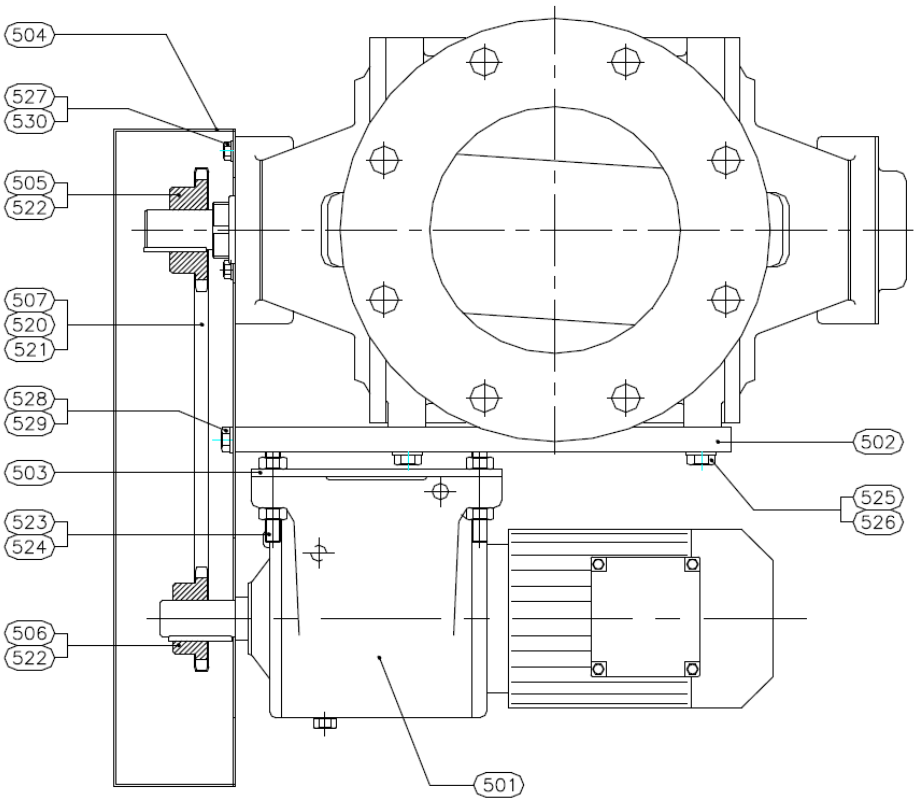


Figure 11.63: Chain drive

501 Drive
502 Support plate
503 Plate
504 Chain guard
505 Chain wheel
506 Chain wheel
507 Chain
520 Chain joint
521 Half a link
522 Adjusting screw
523 Stud
524 Nut
525 Bolt
526 Washer
527 Bolt
528 Washer
529 Bolt
530 Washer

Instruction

11.17.1.1 Dismantling

- Remove chain guard.
- Dismantle chain.
- Remove chain from chain wheel.
- Loosen adjusting screw of chain wheel.
- Remove chain wheels.

11.17.1.2 Assembly

- Fit chain wheels on shaft.
- Align chain wheels and secure.
- Mount chain.
- Tighten chain (refer to chapter 8.2.1).
- Refit chain guard.

11.17.2 Direct drive (parallel shaft)

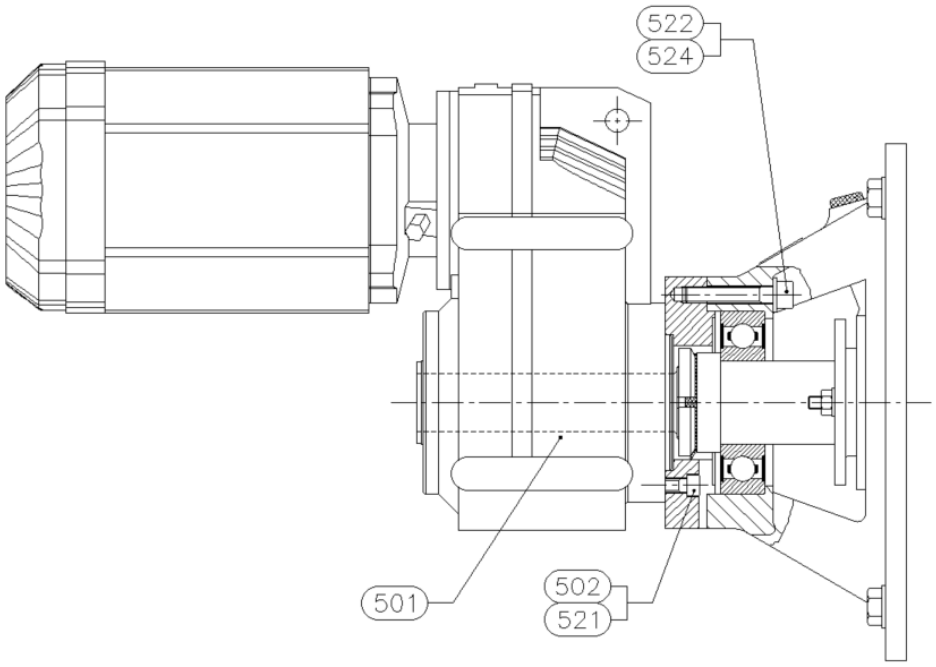


Figure 11.64: Direct drive (parallel shaft)

501 Drive
502 Connecting piece
521 Bolt
522 Cylinder bolt
524 Washer

Instruction

11.17.2.1 Dismantling

- Dismantle drive.
- Remove connecting piece from end cover.

11.17.2.2 Assembly

- Mount connecting piece on end cover.
- Mount drive on connecting piece.

11.17.3 Direct drive (in line)

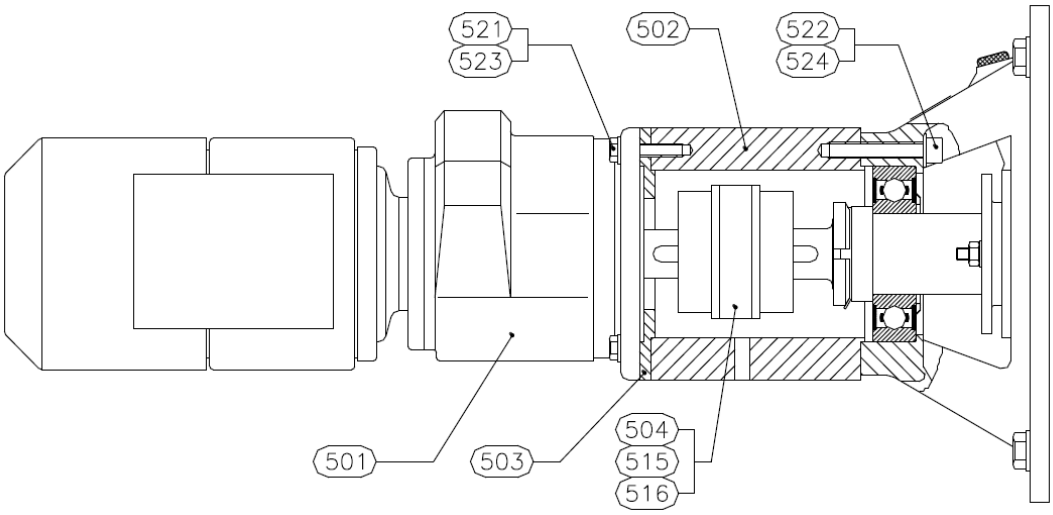


Figure 11.65: Direct drive (in line with coupling)

501 Drive
502 Connecting piece
503 Flange 150/175
504 Coupling
515 Bush rotor
516 Bush motor
521 Bolt
522 Cylinder bolt
523 Washer
524 Washer

Instruction

11.17.3.1 Dismantling

- Dismantle drive.
- Remove connecting piece.
- Remove coupling.

11.17.3.2 Assembly

- Mount and secure coupling parts.
- Mount connecting piece on end cover.
- Mount drive on connecting piece.

11.18 Safety switch (optional)

ATTENTION!
The safety switch must be connected to the client safety circuit, which will stop or prevent the valve from operating.
Safety control module is not part of the DMN supply.

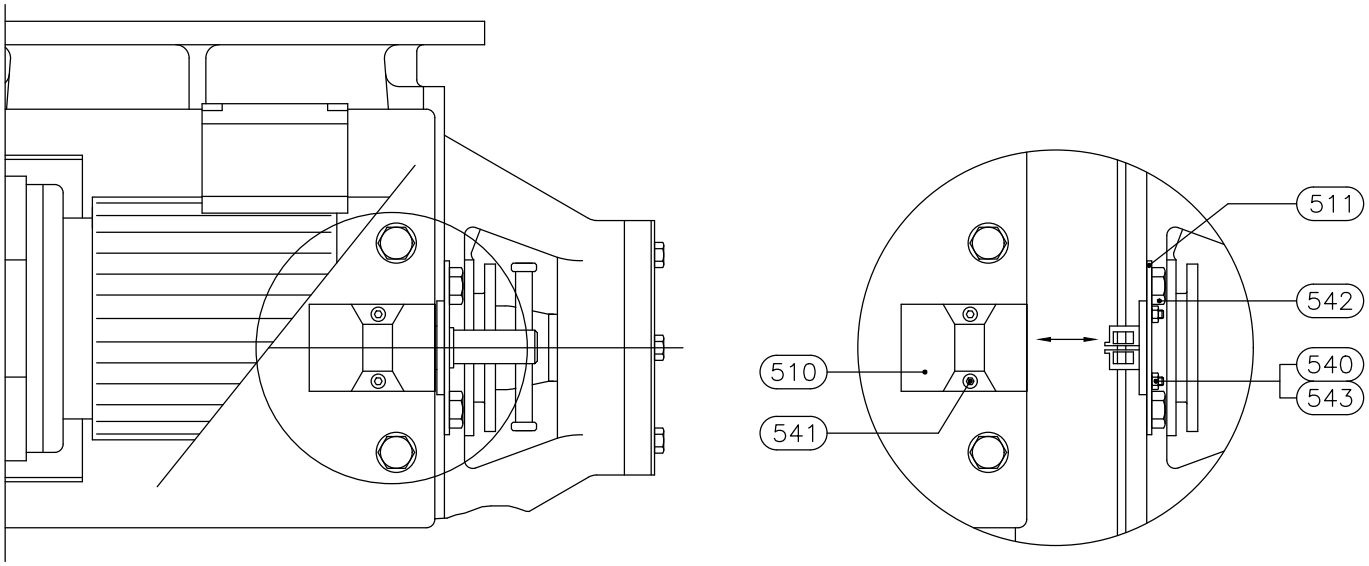


Figure 11.66: Safety switch

510 Safety switch
511 Fastening plate
540 Countersunk screw
541 Cylinder bolt
542 Bolt
543 Nut

11.19 Zero speed indicator (optional)

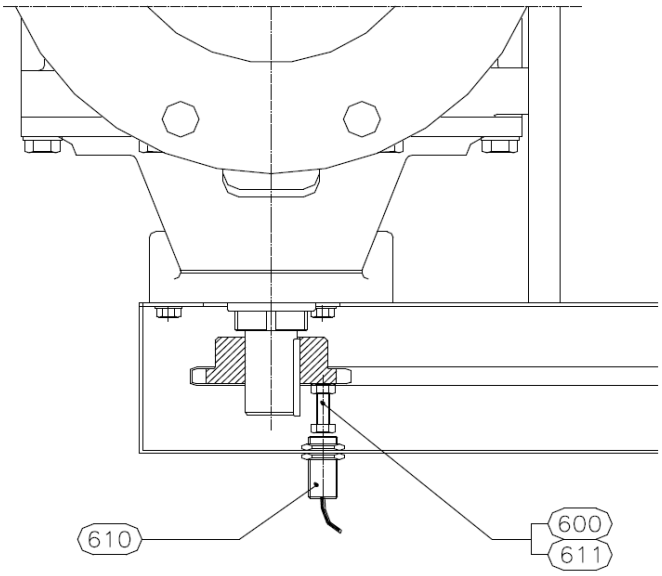


Figure 11.67: Drive side

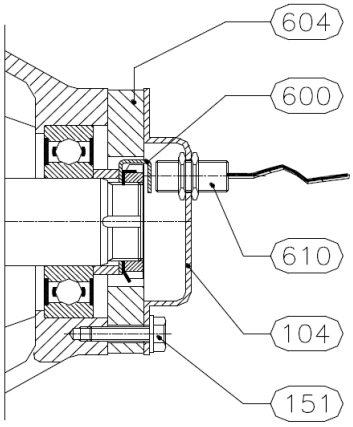


Figure 11.68: Non drive side

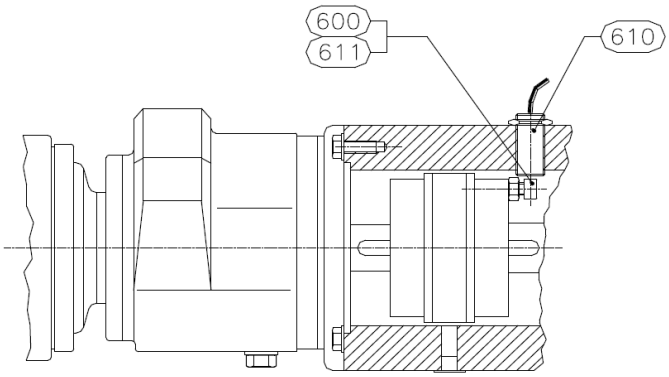


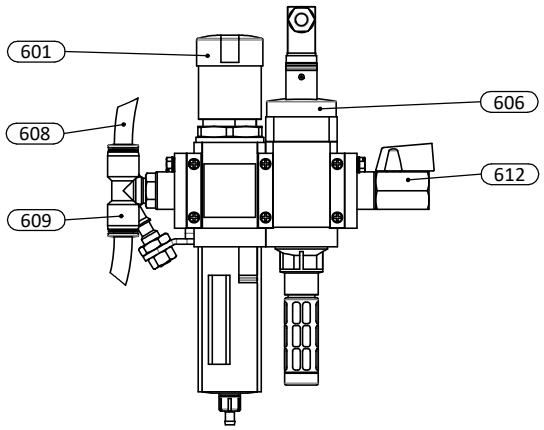
Figure 11.69: Direct drive

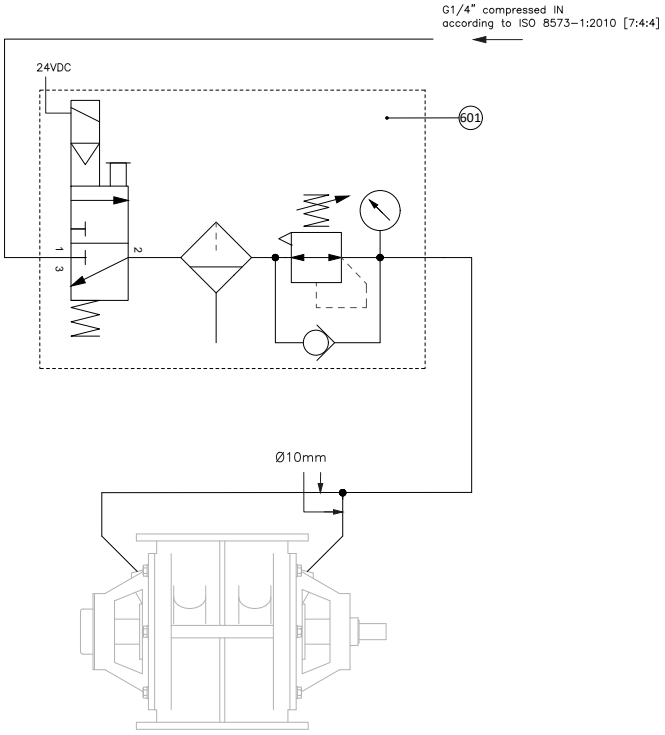
104 Bearing cover
151 Bolt
600 Impulssender
604 Cover plate
610 Proximity switch
611 Nut

11.20 Air purge units with pressure control (optional)

The pressure regulator should be set at 0.5 bar above system pressure. If it is not, refer to chapter 11.20.3 for instructions on how to set the pressure.

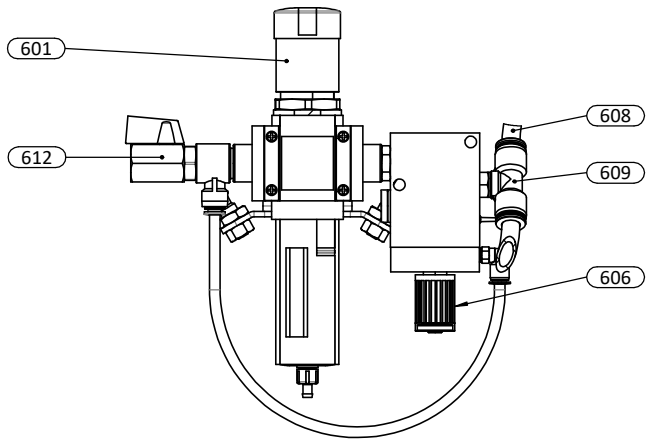
11.20.1 Pressure regulator with on/off valve

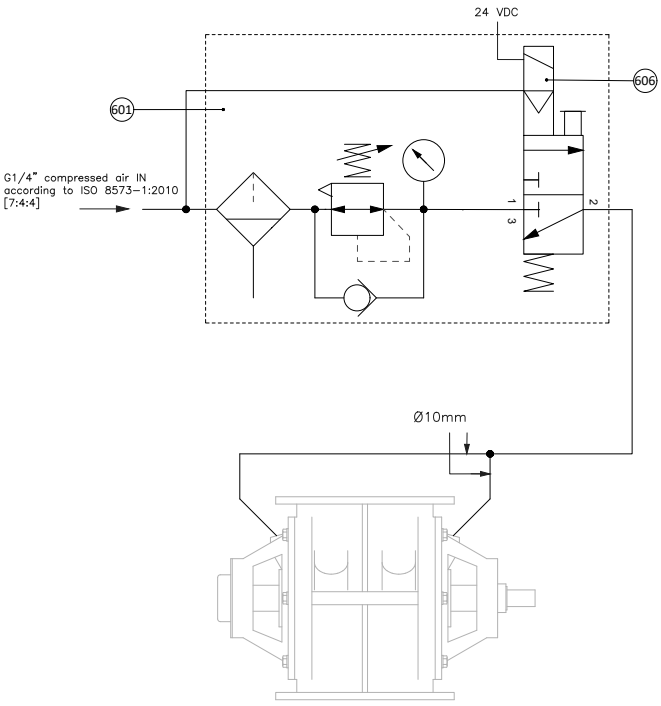




601 Air filter / Pressure regulator with pressure gauge
606 On/off valve
608 Tube
609 T-coupling ⌀10mm
612 Ball valve G 1/4″

11.20.2 Pressure regulator with solenoid valve





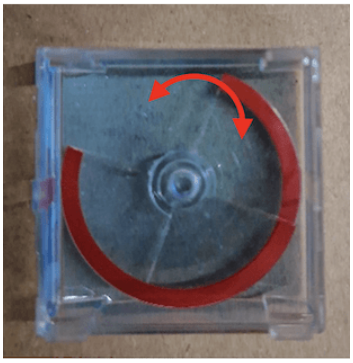
601 Air filter / Pressure regulator with pressure gauge
606 Solenoid valve
608 Tube
609 T-coupling ⌀10mm
612 Ball valve G 1/4″

11.20.3 Adjusting air purge units with pressure control

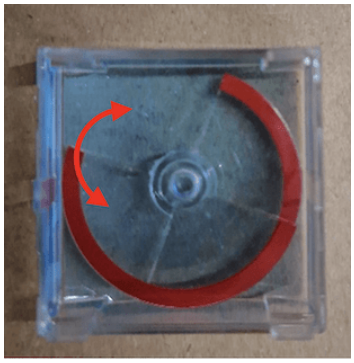
To maintain an effective seal and prevent the ingress of unwanted substances, it is crucial that the pressure of the purging air is set at a level 0.5 bar higher than the pressure inside the valve. This ensures the proper functioning of the shaft seal with air purge.

- Remove sight glass by pinching the sight glass.

- Adjust the rear red disc (closest to the sight glass) in the sight glass to set the lower limit to 0 bar.

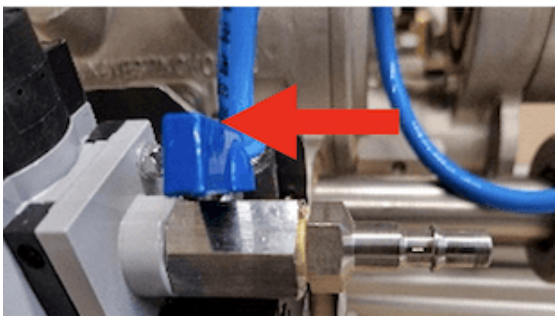


- Set the front red disc (furthest from the sight glass) in the sight glass to set the upper limit to 1.5 bar. The range between 0 and 1.5 bar is now green and red outside these limits.

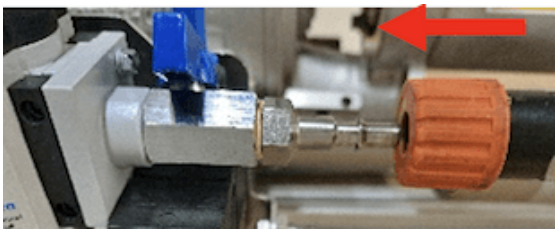


- Click the sight glass back in place.

- Make sure the ball valve is closed.

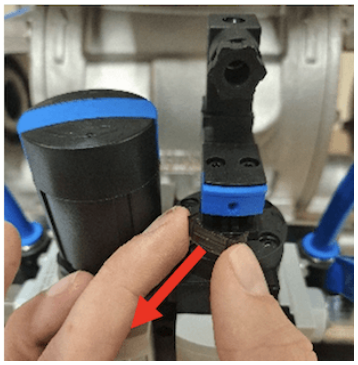


- Connect the main air supply to the ball valve.



On/off valve

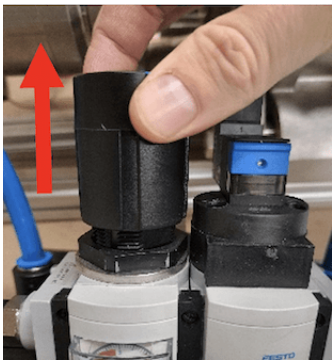
- Remove the manual bypass safety.



On/off valve

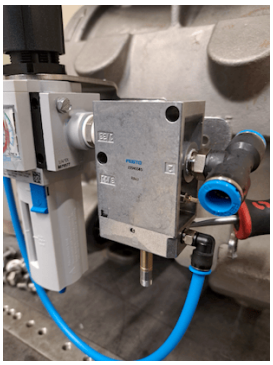
- Open the on/off valve by pushing the manual bypass down.

- Open the pressure regulator by pulling out the round knob.



Solenoid valve:

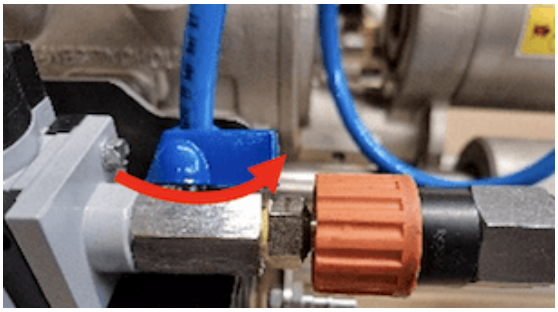
- Rotate the manual bypass at the rear of the solenoid valve.



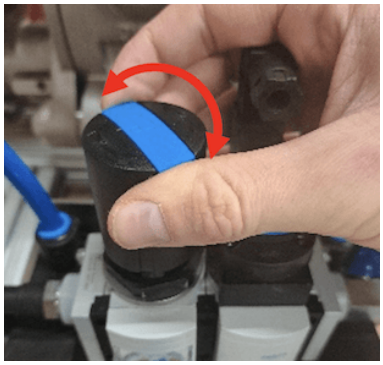
Solenoid valve:

- Check whether the bypass is switched from 0 to 1.

- Open the ball valve.



- Set the pressure regulator 0.5 bar higher than the pressure inside the valve.

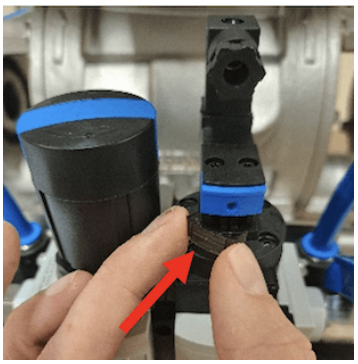


On/off valve:

- Close the on/off valve by pushing the manual bypass back up.

On/Off valve:

- Place the manual bypass safety back on the on/off valve.

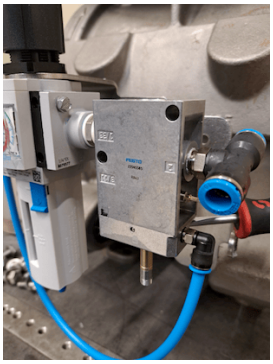


- Lock the rotating knob of the pressure regulator to secure the pressure.Use a padlock for extra security.

- Push the round knob back down.Example:
  Pressure inside valve 0.4 bar
  Pressure setting regulator is then 0..4 + 0.5 = **0.9** bar

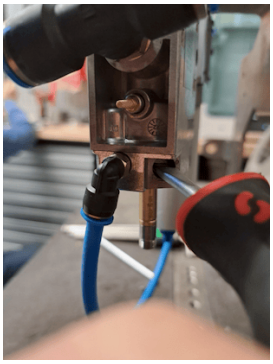
Solenoid valve:

- Rotate the manual bypass at the rear of the solenoid valve.



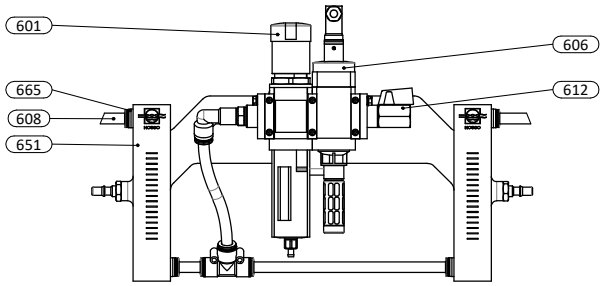
Solenoid valve:

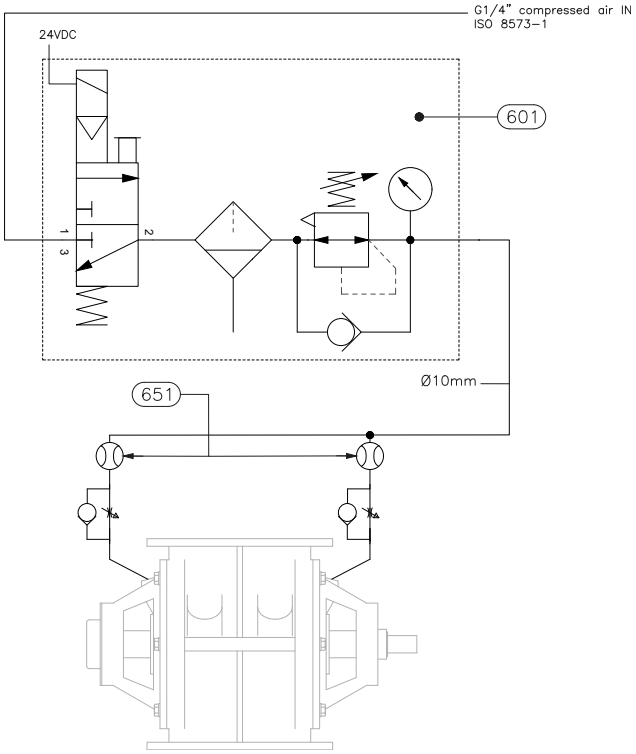
- Check whether the bypass is switched from 1 to 0.



11.21 Air purge units with flow control (optional)

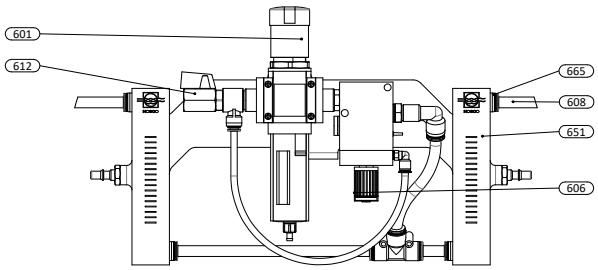
11.21.1 Flow regulator analog with on/off valve

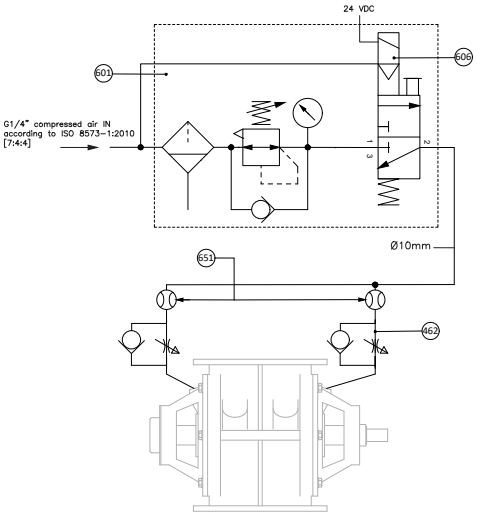




601 Air filter / Pressure regulator with pressure gauge
606 On/off valve
608 Tube
612 Ball valve G 1/4″
651 Flow meter
665 H-coupling

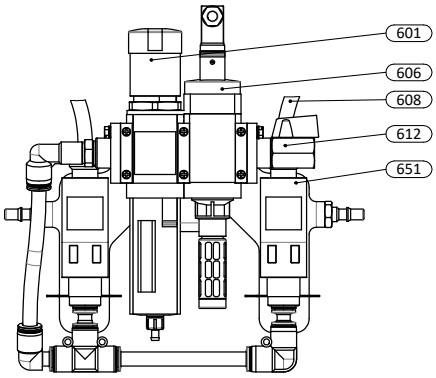
11.21.2 Flow regulator analog with solenoid valve

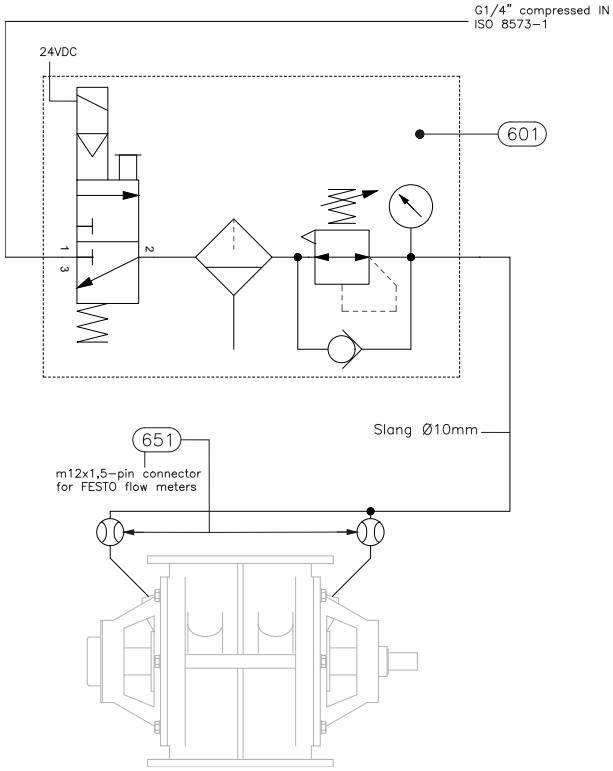




601 Air filter / Pressure regulator with pressure gauge
606 Solenoid valve
608 Tube
612 Ball valve G 1/4”
651 Flow meter
665 H-coupling

11.21.3 Flow regulator digital with on/off valve





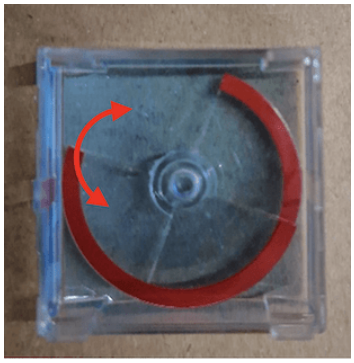
601 Air filter / Pressure regulator with pressure gauge
606 On/off valve
608 Tube
612 Ball valve G 1/4”
651 Flow meter
665 H-coupling

11.21.4 Adjusting air purge units with flow control

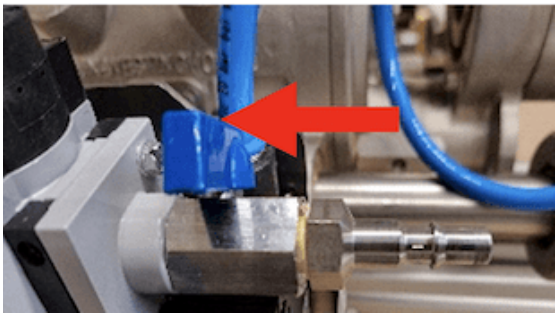
11.21.4.1 Set limits of the pressure regulator

- Remove sight glass by pinching the sight glass.

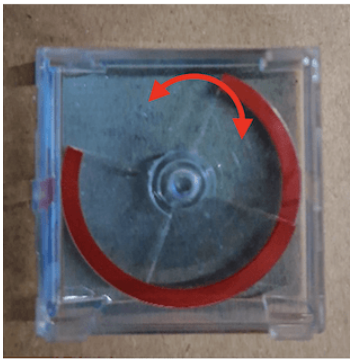
- Set the front red disc (furthest from the sight glass) in the sight glass to set the upper limit to 4 bar. The range between 3 and 4 bar is now green and red outside these limits.



- Make sure the ball valve is closed.

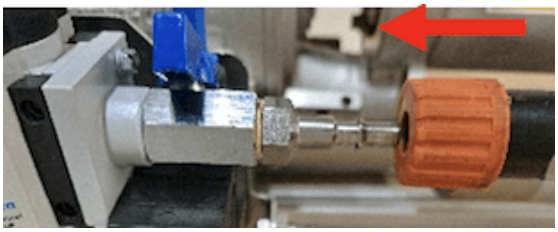


- Adjust the rear red disc (closest to the sight glass) in the sight glass to set the lower limit to 3 bar.



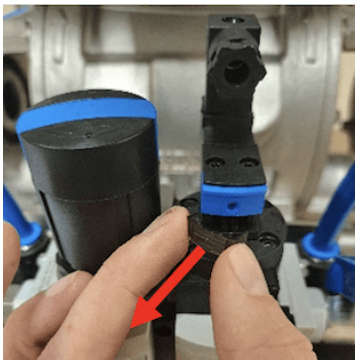
- Click the sight glass back in place.

- Connect the main air supply to the ball valve.



On/off valve:

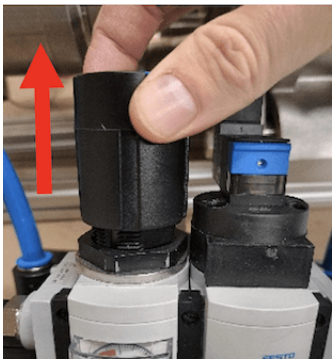
- Remove the manual bypass safety.



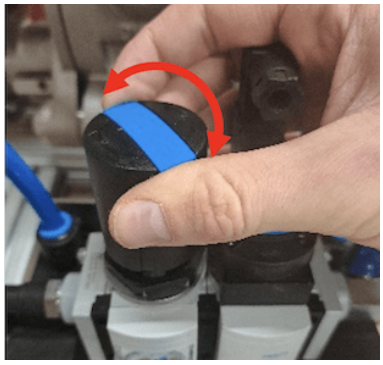
On/off valve:

- Open the on/off valve by pushing the manual bypass down.

- Open the pressure regulator by pulling out the round knob.

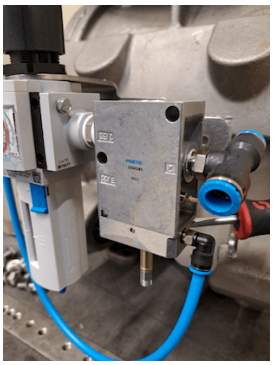


- Set the pressure regulator to 3.5 bar by rotating the round knob.



Solenoid valve:

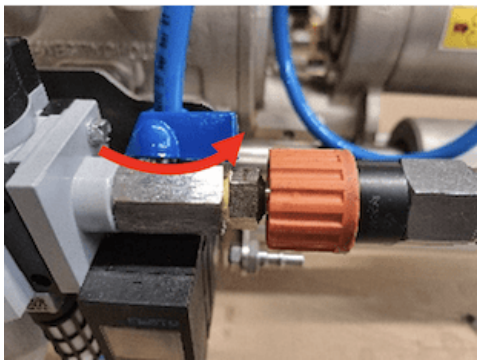
- Rotate the manual bypass at the rear of the solenoid valve.



Solenoid valve:

- Check whether the bypass is switched from 0 to 1.

- Open the ball valve.



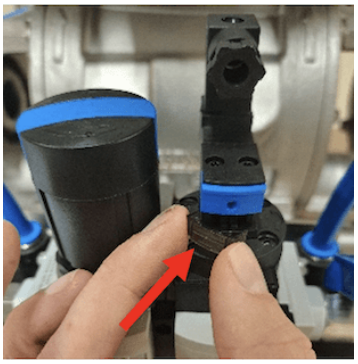
- Push the round knob back down.

On/off valve:

- Close the on/off valve by pushing the manual bypass back up.

On/off valve:

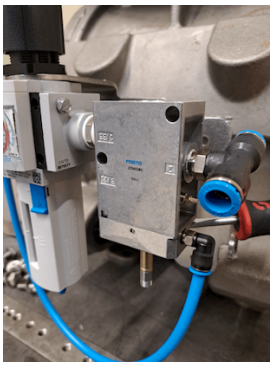
- Place the manual bypass safety back on the on/off valve.



- Lock the rotating knob of the pressure regulator to secure the pressure.Use a padlock for extra security.

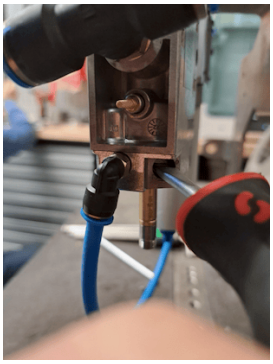
Solenoid valve:

- Rotate the manual bypass at the rear of the solenoid valve.



Solenoid valve:

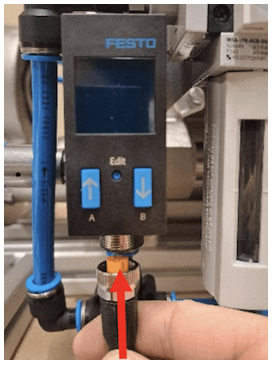
- Check whether the bypass is switched from 1 to 0.



11.21.4.2 Set the digital flowmeters

For analog units: skip and go to chapter 11.21.4.3

- Plug in the flowmeter



- Push the arrow down/“B” button, now “OutB” (Output B), blinks at the top of the “SPEC” screen.

- Push the arrow down/“B” button to set the upper and lower flow limit. The screen shows “⎍” (Window comparator).

- Push the “Edit” button of the flow indicator [651], “OutA” (Output A) blinks at the top of the “SPEC” (Special Menu) screen.

- Push the “Edit” button.

- Push the “Edit” button.

- When the screen shows “SP.Lo” (Switching Point - Low), set the lower limit with the arrow buttons to the flow values from the table below.

- When the screen shows “SP.Hi” (Switching Point - High), set the upper limit with the arrow buttons to the flow values from the table below:

Valve type/size				Flow [Nl/min]*	
AL-BL	AML-AXL-BXL	BXXL	NR	Advised lower limit	Advised upper limit
150-175	150-200			40	60
200-250	250-300	350	347	50	70
300-350	350-400			75	95

*The digital flowmeter shows the flow for 1 atmosphere and 0°C.

- Push the “Edit” button.

- When the screen shows “Hy” (Hysteresis), set the hysteresis to 1.0 with the arrow buttons.

- Push the “Edit” button.

- Push the “Edit” button twice. For confirmation: the screen shows “bLUE”.

- Push the arrow down/“B” button, the screen turns red and shows “r.OFF” (Display turns red with switching status off and/or logic 0).

- Push the “Edit” button to finish setting the flowmeter. The screen should be red and the sensor indicates a flow of 0.0 l/min.

- Adjust the air flow of both flow meters by turning the two flow regulators in or out with a flat head screwdriver.

- Test whether the screen is blue between the upper and lower flow limit by adjusting the flow regulators, and red outside the limits.

- Set the flow meter to one of the following flow values:

Valve type/size				Flow digital meter
AL-BL	AML-AXL-BXL	BXXL	NR	[Nl/min]*
150-175	150-200			50
200-250	250-300	350	347	60
300-350	350-400			85

*The digital flowmeter shows the flow for 1 atmosphere and 0°C.

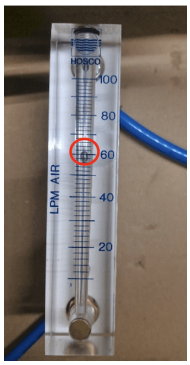
- Repeat this procedure (C1 - C17) for the second flowmeter.

For in depth instructions of the SFAB sensor see Festo SFAB Operating Instructions.

11.21.4.3 Set the analog flowmeters

- Adjust the air flow of both flow meters by turning the two flow regulators in or out with a flat head screwdriver.

- Test whether the ball moves up and down.



- Set the flow meter to one of the following flow values:

Valve type/size				Flow analog meter	
AL-BL	AML-AXL-BXL	BXXL	NR	Indicated[l/min]	Corrected [Nl/min]*
150-175	150-200			25	53
200-250	250-300	350	347	30	63
300-350	350-400			43	90

*The analog flowmeter, a rotameter, is calibrated to measure air flow in normal liters per minute (Nl/min) at normal conditions of 1 atmosphere (P_{atm}) and 20°C.

The analog flowmeter operates based on the Bernoulli principle to measure the flow of air. To understand and use this device effectively, it is essential to correct the indicated flow rate ($V_{indicated}$) at the operating pressure ($P_{operating}$) to the equivalent flow rate at standard atmospheric conditions ($V_{corrected}$).

To correct the measured flow rate at a given pressure to the equivalent flow rate at atmospheric pressure, use the following formula:

$$V_{\text{corrected}} = \sqrt{\frac{P_{\text{operating}}}{P_{\text{atm}}}} \times V_{\text{indicated}}$$

With a standard overpressure of 3.5 bar ($P_{operating}$), the formula simplifies to:

$$V_{\text{corrected}} = 2.1 \times V_{\text{indicated}}$$

This correction factor accounts for the difference in pressure and ensures accurate readings at standard atmospheric conditions.

Important note

Be aware that the digital and analog flowmeters are calibrated for different temperatures. This means that the normal liters (Nl) displayed by each may differ slightly due to this variation in calibration temperature. Ensure you are aware of this difference when interpreting flow reading

11.22 Pulsating air execution (optional)

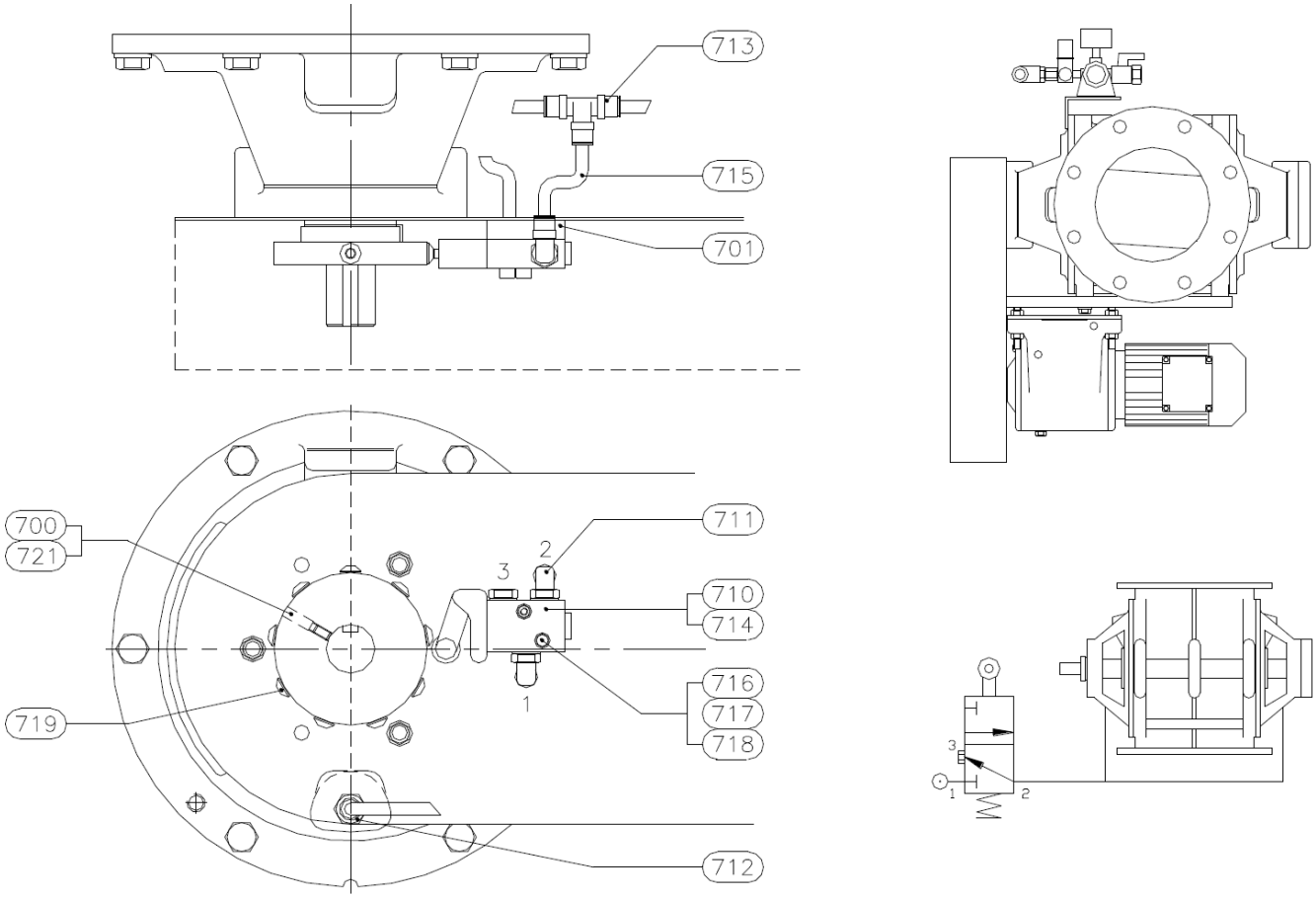


Figure 11.70: Pulsating air injection

700 Cam disc
701 Shim
710 Solenoid
711 Coupling 1/8″
712 Coupling 1/4″
713 T-coupling
714 Plug 1/8″
715 Tube ⌀8mm
716 Bolt
717 Washer
718 Nut
719 Bolt
721 Cyl. adjusting screw

Technical data

Valve mechanical	Norgren type S/666
Connection	1/4″ Tube Ø8mm
Operating pressure	2...10 Bar
Operating temperature	-5°C...+80°C
Air consumption	15-20 m^3/H at 6 Bar

11.23 End cover couplings (optional)

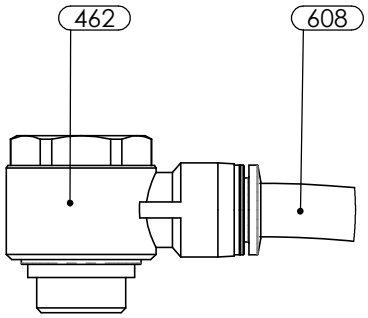


Figure 11.71: Pressure regulator: End cover coupling

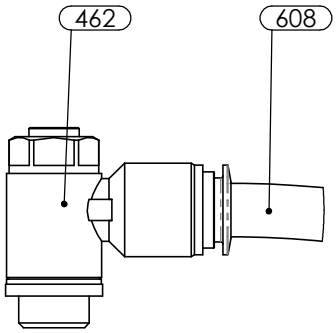


Figure 11.72: Flow regulator: End cover coupling

462 Banjo elbow / flow regulator
608 Tube
620 Quick coupling plug
621 Quick coupling socket
622 Pneumatic fitting

11.24 End cover Quick release couplings (optional)

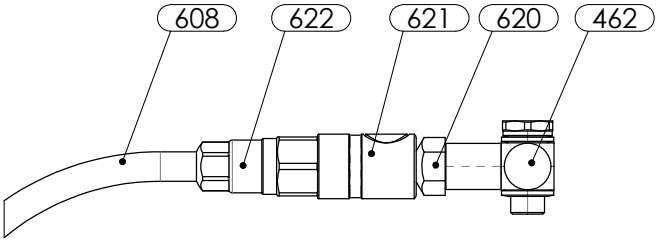


Figure 11.73: Pressure regulator: Quick release coupling

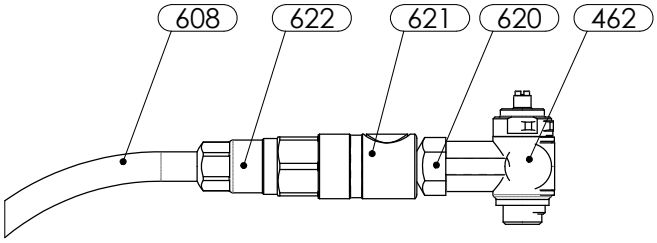


Figure 11.74: Flow regulator: Quick release coupling

462 Banjo elbow / flow regulator
608 Tube
620 Quick coupling plug
621 Quick coupling socket
622 Pneumatic fitting

11.24.1 Dairy vent holes

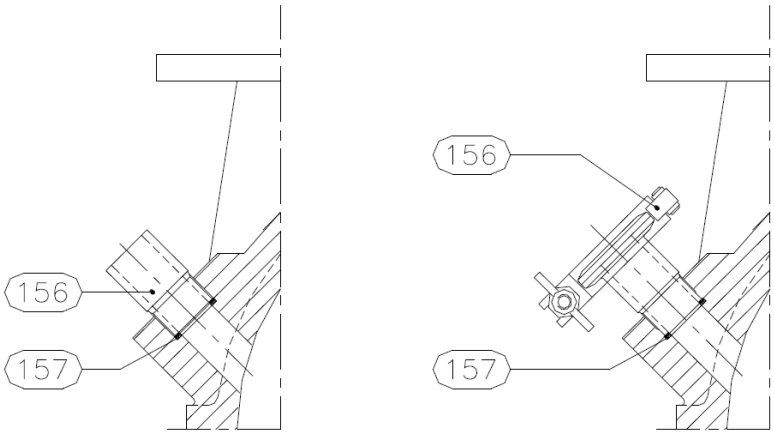


Figure 11.75: Dairy vent hole options

11.25 Accessories

11.25.1 Inlet restrictor / Dropout box

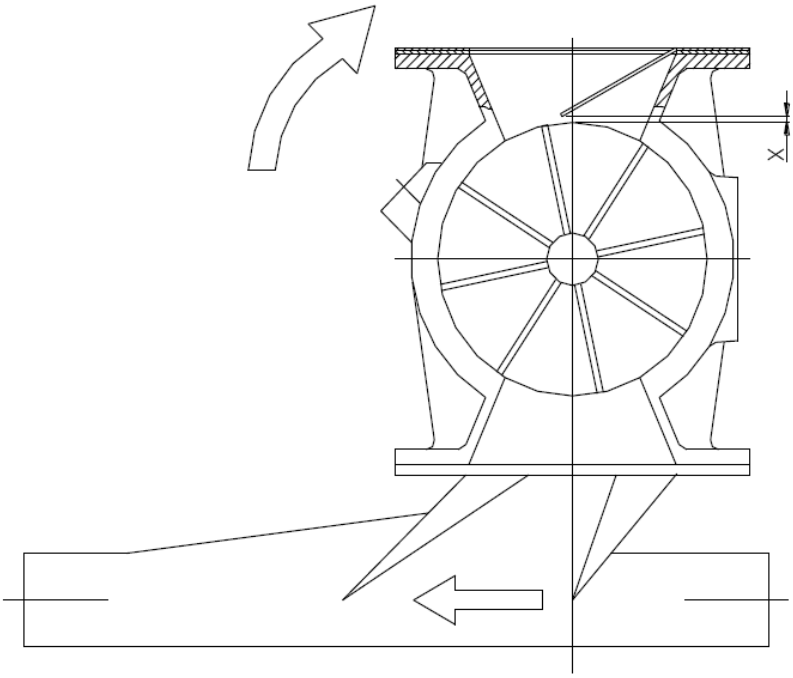


Figure 11.76: Inlet restrictor and Dropout box

For mounting the inlet restrictor and dropout box, refer to 8.8.1

11.25.2 Air vent box

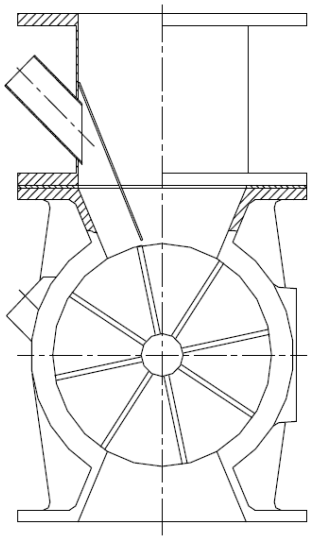


Figure 11.77: Vent box (one side)

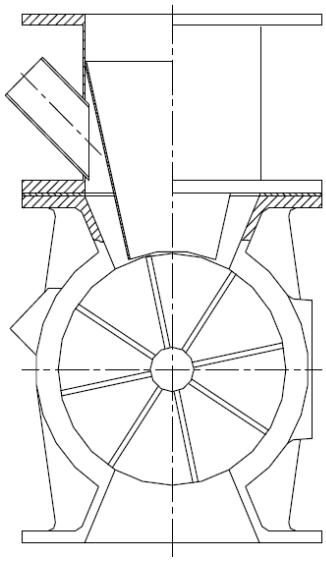


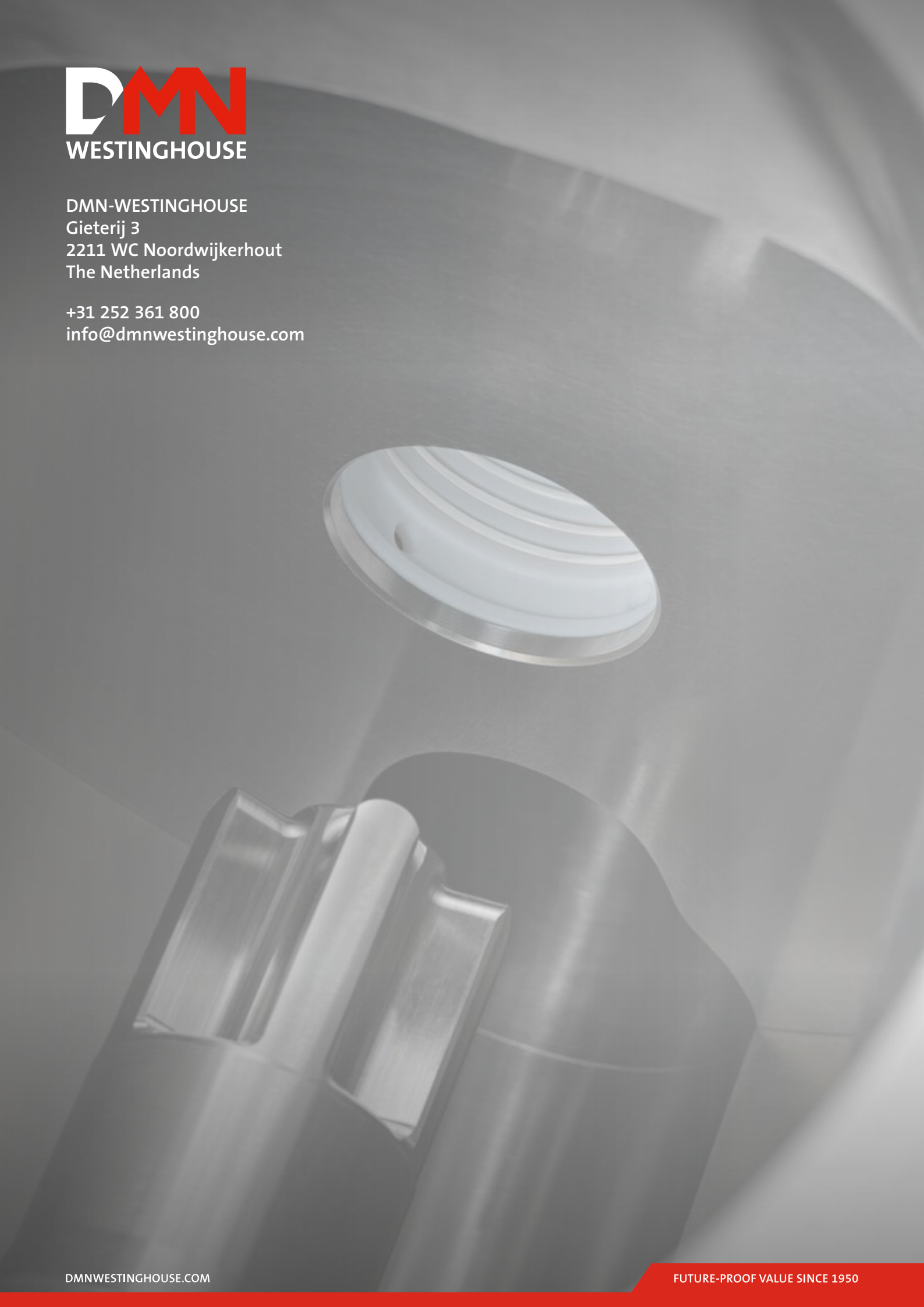
Figure 11.78: Vent box (all around)

For mounting the inlet restrictor and dropout box, refer to 8.8.1

12. END OF LIFETIME

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

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



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