

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

# ROTARY VALVES

## OUTBOARD BEARINGS

### Installation, Operation and Maintenance Manual

English

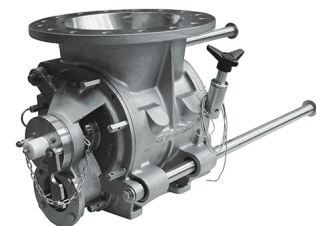
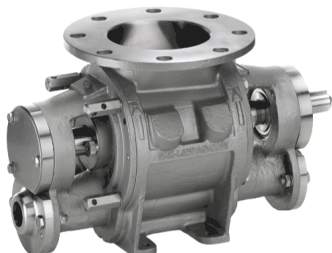
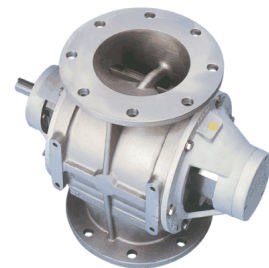
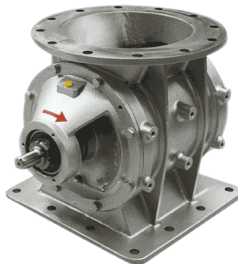
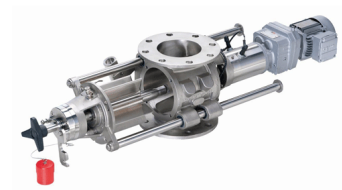
Original English Manual

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

# ROTARY VALVES

## OUTBOARD BEARINGS



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.

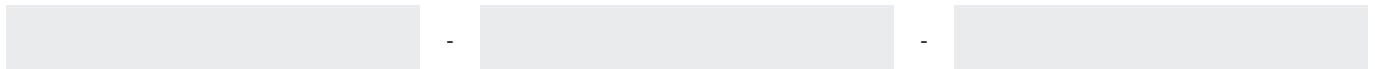


Please contact DMN-WESTINGHOUSE if the desired information is not clear or comprehensive!  
(Refer to chapter [Contact information](#))

**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  
Changes in general  
Improvements

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

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**12 End of lifetime**

## 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](http://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

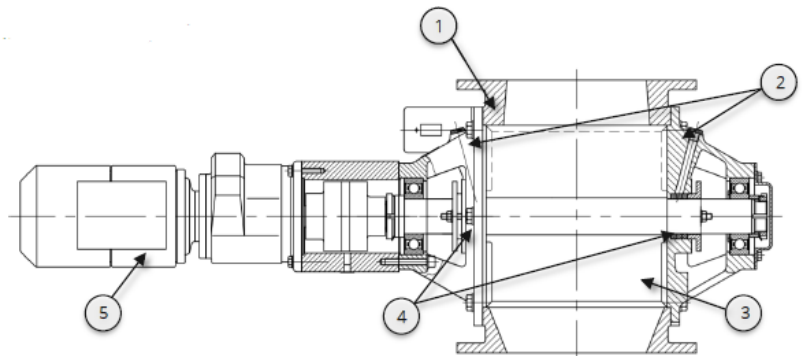


Figure 5.1: Main parts rotary valve (typical standard AL-series)

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.

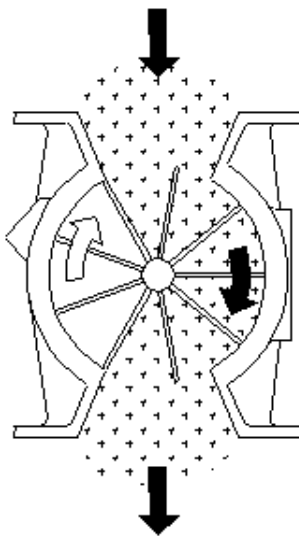


Figure 5.2: Schematic view of a rotary valve

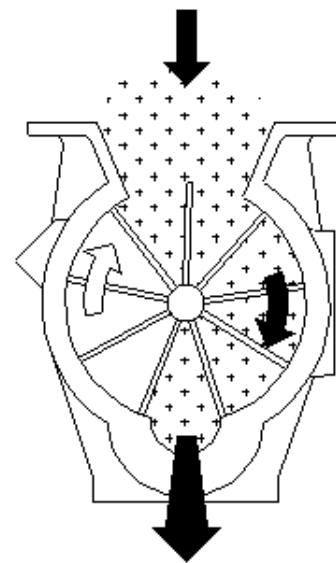


Figure 5.3: Schematic view of a rotary valve with a blow line

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:



 	
<b>Type</b>	AL 250 1
<b>Serial no.</b>	RV xxxxxx
<b>Year</b>	20xx
<b>Job no.</b>	-
<b>Client no.</b>	-
<small>sales@dmnwestinghouse.com Gieterij 3   2211 WC Noordwijkerhout The Netherlands</small>	

Figure 5.4: Name plate (standard product)

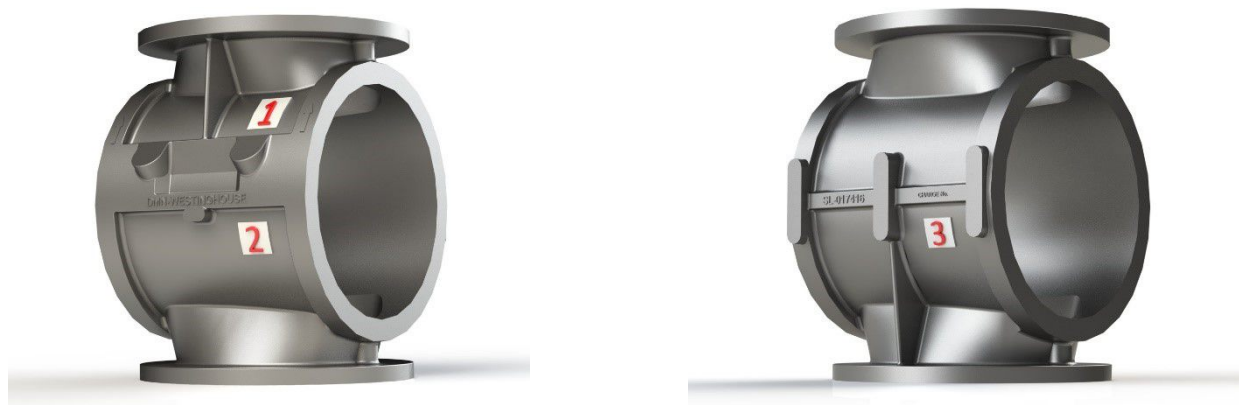


Figure 5.5: Possible locations of name plate

## 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!

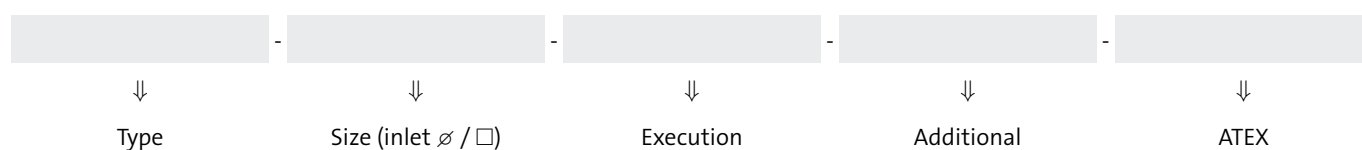
As DMN-WESTINGHOUSE we strongly recommend you to:

- ▶ 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)



For example

AML - 150 - 2 - HT250 - APS

Type	Airlock AML
Size	ø 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 ø / □)		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

Type

Size

Execution

Additional

ATEX

NR - 347 - 2 - - - Eq

Airlock NR

∅ 347 mm inlet size and □ 355 mm x 250 mm outlet size

Stainless steel

Standard

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.





  	
<b>Type</b>	AL 250 1 Eq
<b>Serial no.</b>	RV xxxxxx
<b>Year</b>	20xx
<b>Job no.</b>	-
<b>Client no.</b>	-
<b>T<sub>product</sub></b>	.. °C
<b>T<sub>ambient</sub></b>	-20 °C ≤ T <sub>amb</sub> ≤ +60 °C
	XX XX GEX 19 ATEX xxxX
sales@dmnwestinghouse.com Gieterij 3   2211 WC Noordwijkerhout   The Netherlands	

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.

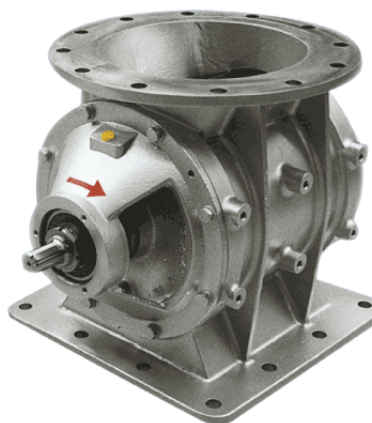


Figure 5.9: AML-series (AML)

#### 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 <b>AML</b>	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.

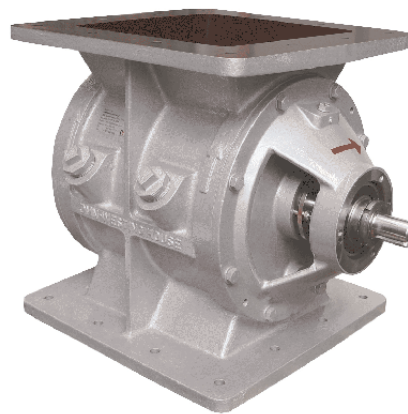


Figure 5.10: AL-series (USAL)

#### 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 <b>USAL</b>	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.

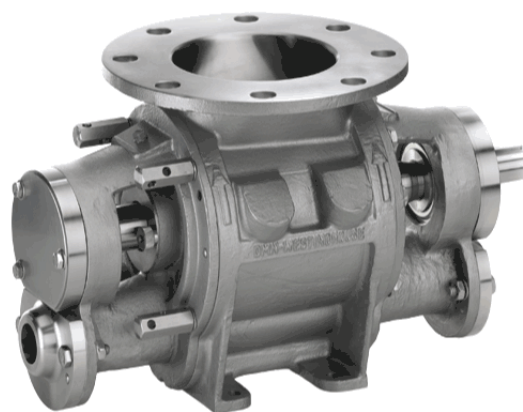


Figure 5.12: BL-series (BL/BXL/BXXL)

#### 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.

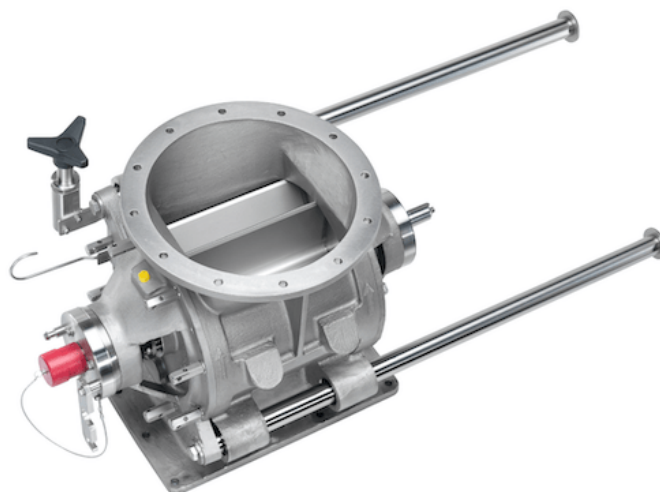


Figure 5.14: NR-series

## 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

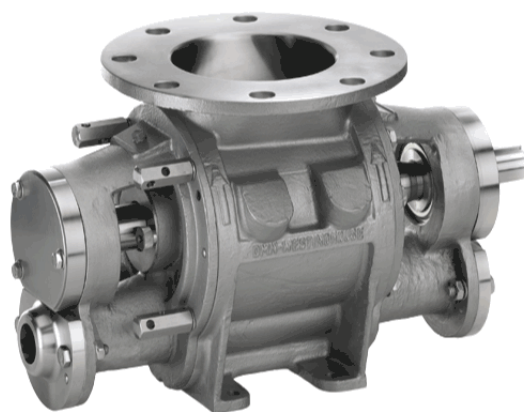


Figure 5.16: BL-series

### 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).



**USDA**

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.

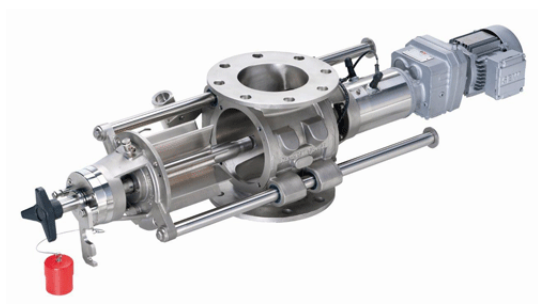


Figure 5.21: AL-series MZC



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.

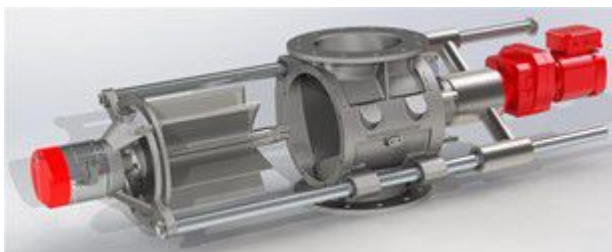


Figure 5.25: AL-series MZC-II



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  $(T_{5mm} - 75^{\circ}C)$ .

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 ambient Ta for T5: -20°C...+55°C	T5
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 **8.8.1**.

## 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.

#### T<sub>product</sub> +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 8.8)
- ▶ The different models of rotary valves as tested with organic dust are specified in the following tables where P<sub>max</sub>, K<sub>st</sub> and M<sub>ESG</sub> 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

$$M_{ESG} = 1.01 * (MIE * (MIT + 273) / 273)^{0.157}$$

M<sub>ESG</sub> [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 P<sub>max</sub> (explosion shock resistance) is given. If an explosion could occur above the P<sub>max</sub>, 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		1, 2, 3N, 3C, 4C, 4TCO, 4TS, Dairy, Dairy-WD, Dairy-EL I	1, 2, 3N, 3C, 4C, 4TCO, 4TS, Dairy, Dairy-WD, Dairy-EL I	1, 2, 3N, 3C, 4C, 4TCO, 4TS, Dairy, Dairy-WD, Dairy-EL I	
Rotor type	BUP rotor 7x adjustable blades 2x scraper blades		Daibi Fixed vane Adjustable blades RC-closed end	Daibi Fixed vane Adjustable blades RC-closed end	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			250 300 350 400			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
Rotor type	Daibi Fixed vane Adjustable blades RC-closed end			Daibi Fixed vane Adjustable blades RC-closed end Without support bars      With support bars			Daibi Fixed vane Adjustable blades RC-closed end
Max. explosion pressure Pmax [bar]	3	3	10	3	3	10	10
Kstmax [bar·m/s]	355	299	272	299	355	272	282
MESG[mm]	≥1.39	≥1.39	≥1.38	≥1.39	≥1.39	≥1.38	≥1.33
Number of rotor pockets	10	10	10	10	10	10	10
Min. Tip width (TW') [mm]	3	6	3	6	3	3	3
Max. Clearances (CL') [mm]	0.3	0.3	0.2	0.3	0.3	0.2	0.4
Max. Rotor speed [1/ min]	20	30	20	30	20	20	30
Vent holes	Yes	Yes	No	Yes	Yes	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	<b> BUP rotor </b> 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)**

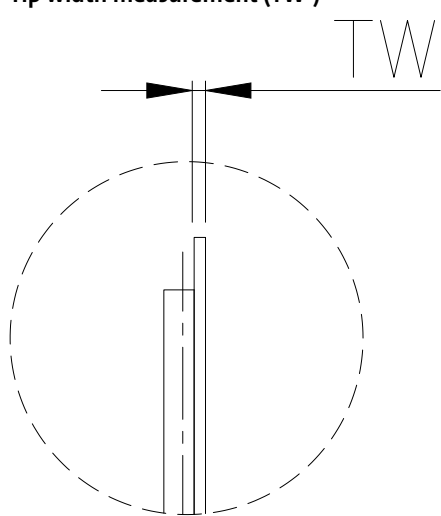


Figure 5.27: Adjustable blades

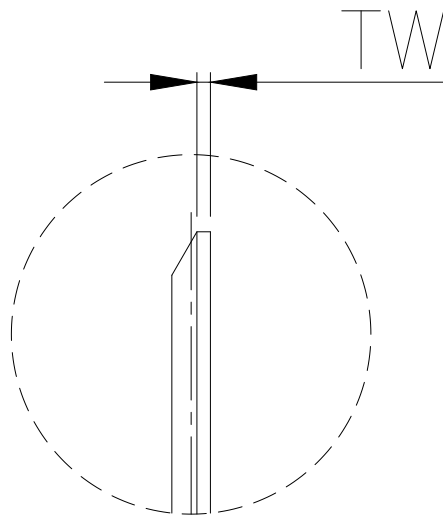


Figure 5.28: Fixed vane rotor

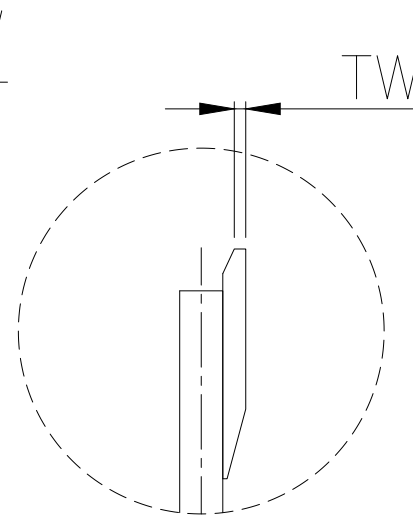


Figure 5.29: Rotor AL 400-450-500

## Clearances measurement (CL')

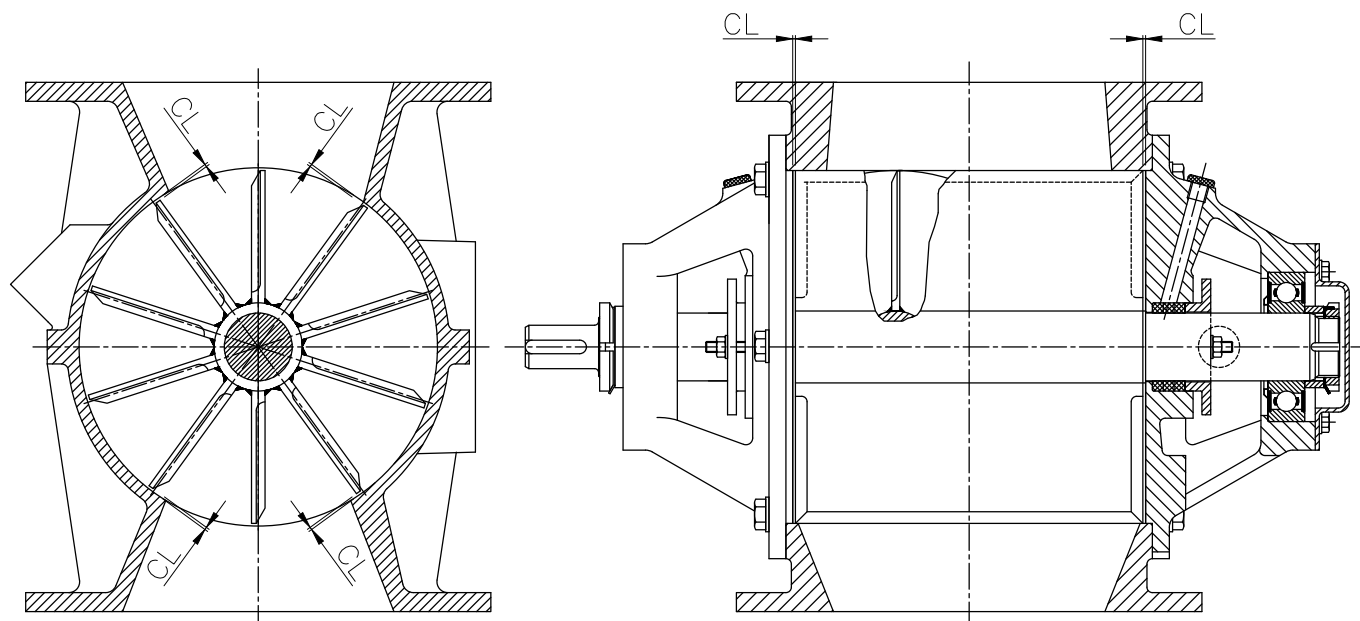


Figure 5.30: Rotor clearances

## 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

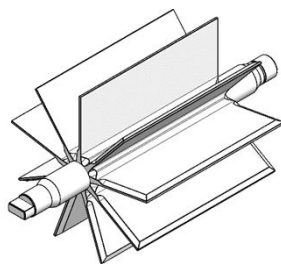
##### Certified executions

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)

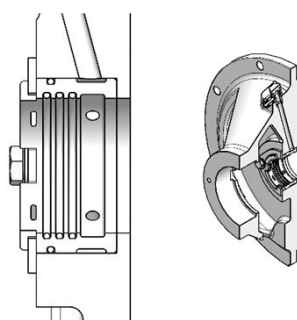


Figure 5.31: SAS-II seal



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.

**USDA** 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

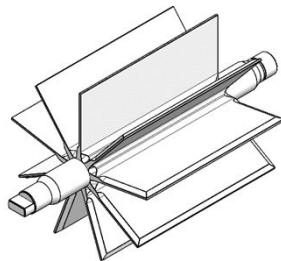
### Approved executions

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)

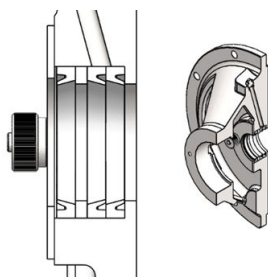


Figure 5.32: Lip seal standard

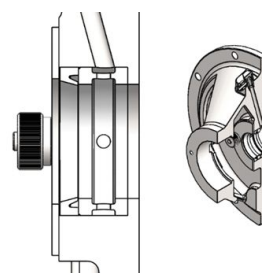


Figure 5.33: Air purge with lip seal and lantern ring

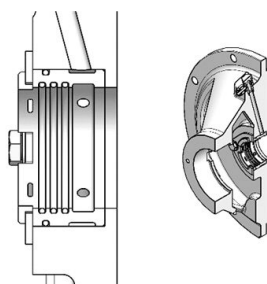


Figure 5.34: SAS-II seal

## 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.)

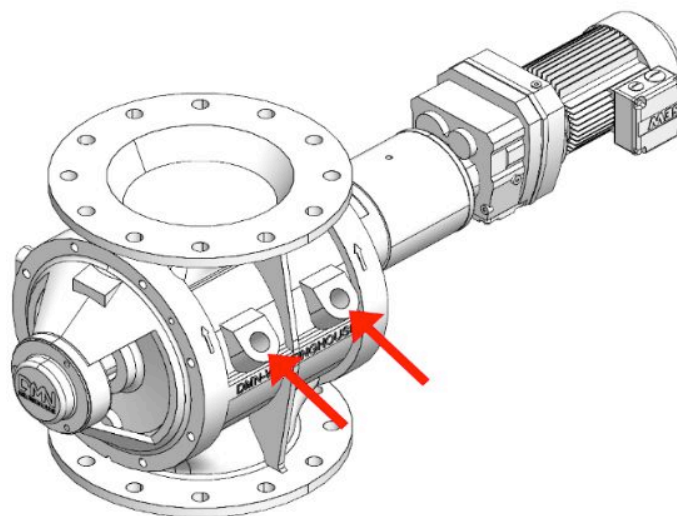


Figure 5.35: Vent holes

## 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.

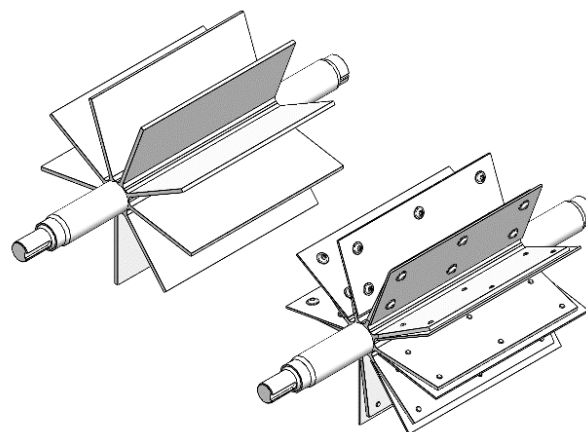


Figure 5.36: Fixed (left) and adjustable blades (right)

### 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.

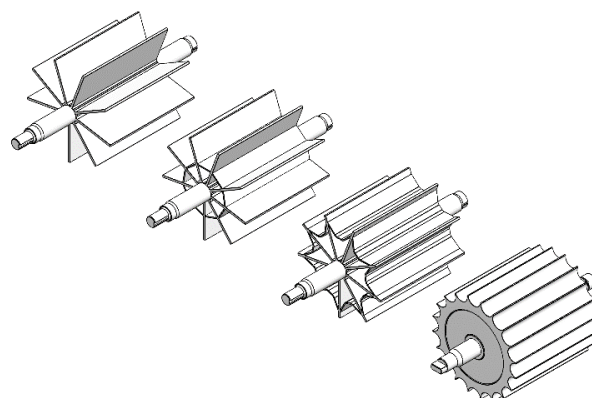


Figure 5.37: Pockets (left to right): standard, reduced capacity, scalloped and fine dosing

### 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.

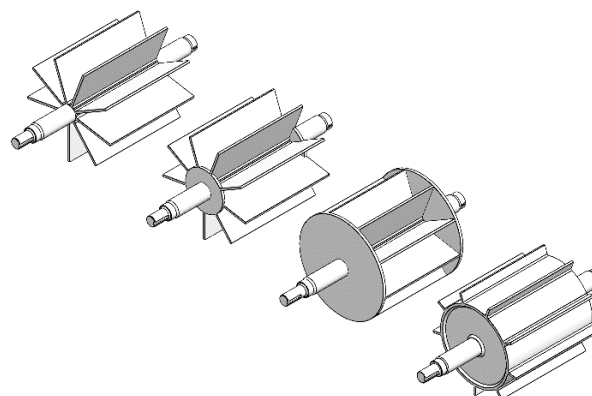


Figure 5.38: Different End Designs (left to right): open ended, semi end disc, end disc and closed end disc

#### 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.

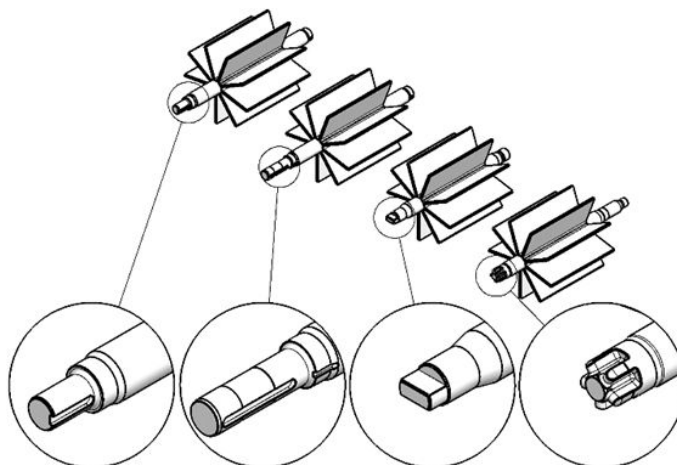


Figure 5.39: Shaft ends (left to right): standard, shaft mounted, easy detachable, MZC-I, MZC-II

#### 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.

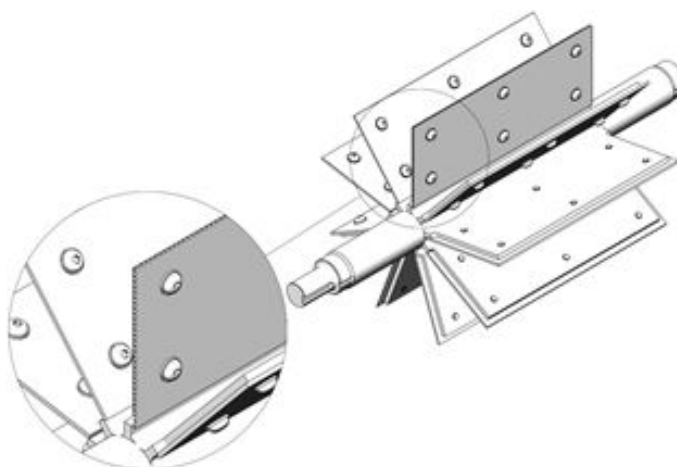


Figure 5.40: BUP rotor option

#### 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.

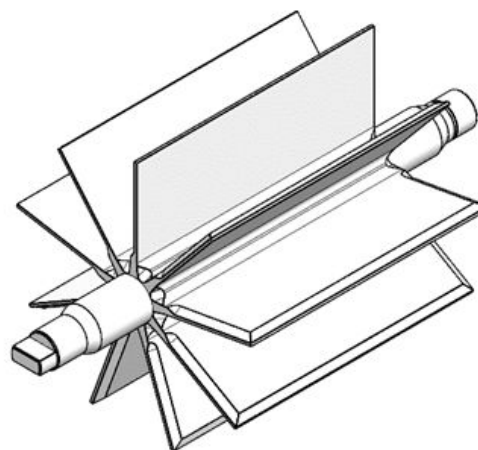


Figure 5.41: Daibi rotor

### 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.

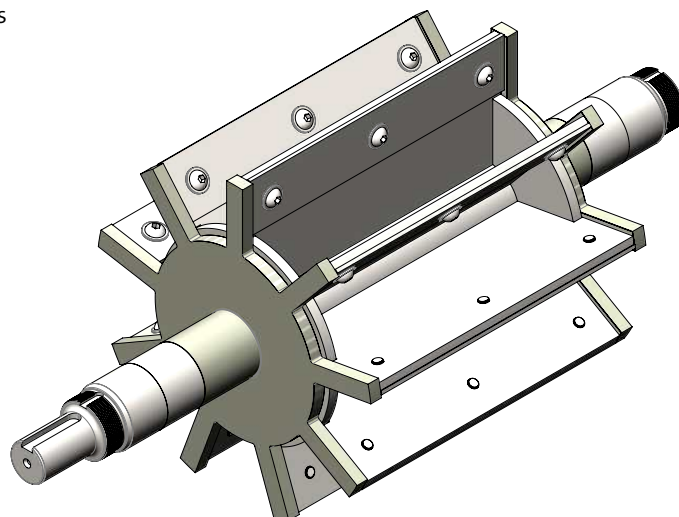


Figure 5.42: RE rotor

## 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.

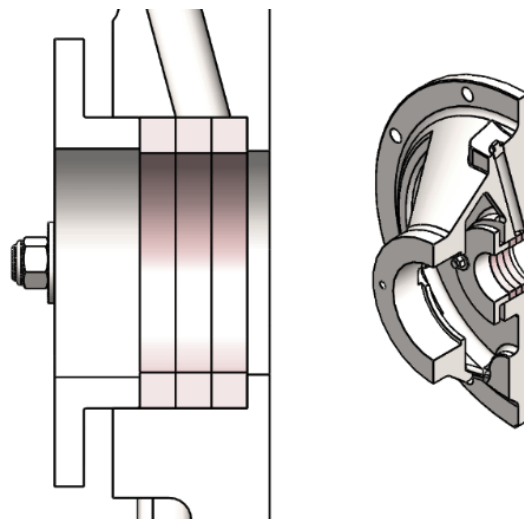


Figure 5.43: standard packing (cord)



### 5.10.1.2 Grease purge packing (cord)

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

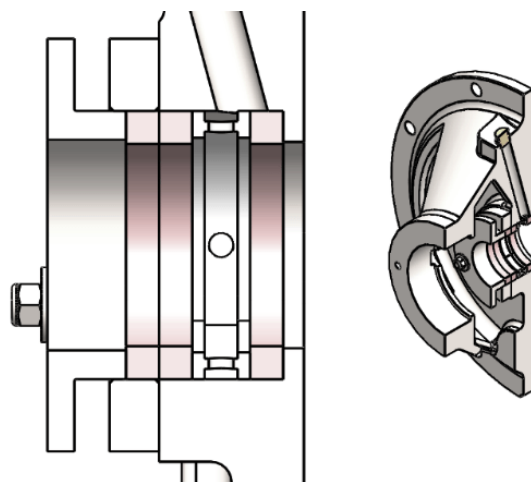


Figure 5.44: Grease purge packing (cord)

### 5.10.1.3 Air purge packing (cord)

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

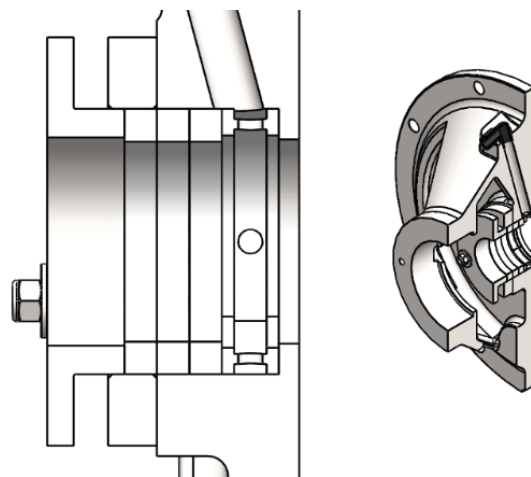


Figure 5.45: Air purge packing (cord)

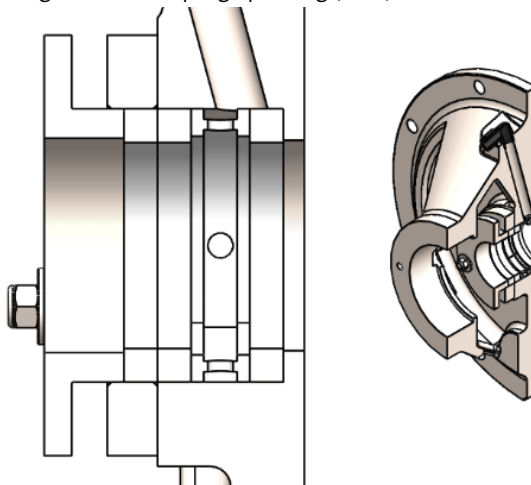


Figure 5.46: Barrier air purge with packing

## 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.

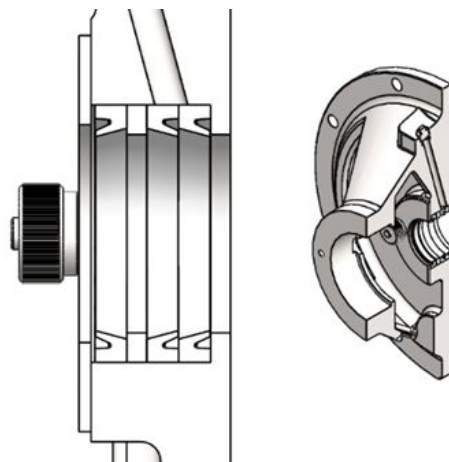


Figure 5.47: Standard lip seal

### 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.

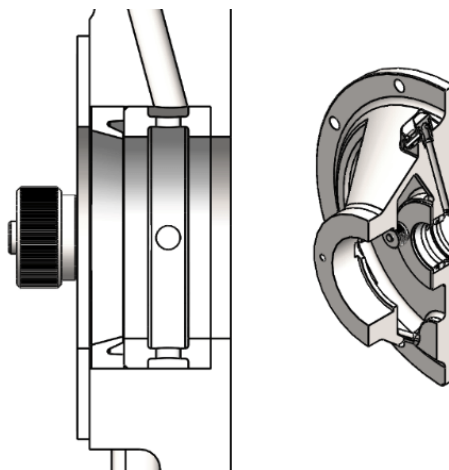


Figure 5.48: Air purge lip seal

### 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.

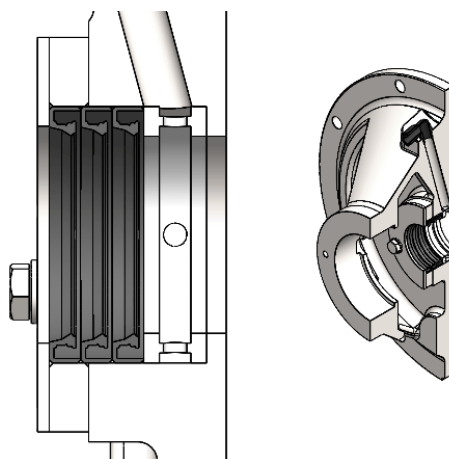


Figure 5.49: Air Purge with 3 lip seals

#### 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.

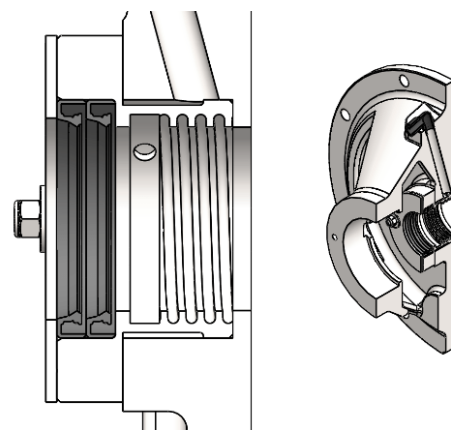


Figure 5.50: Air purge lip seal with grooved lantern ring

#### 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.

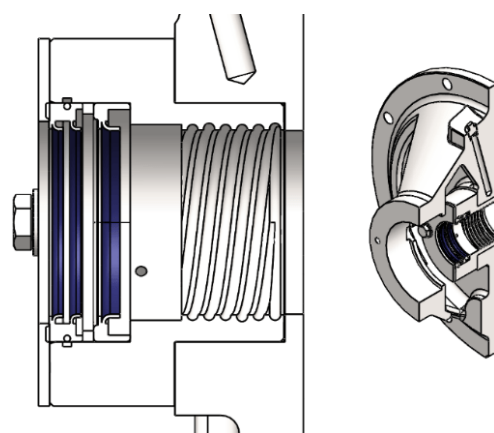


Figure 5.51: Lip seal with liquid cleaning (CIP (Dairy-EL I) seal)

### 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.

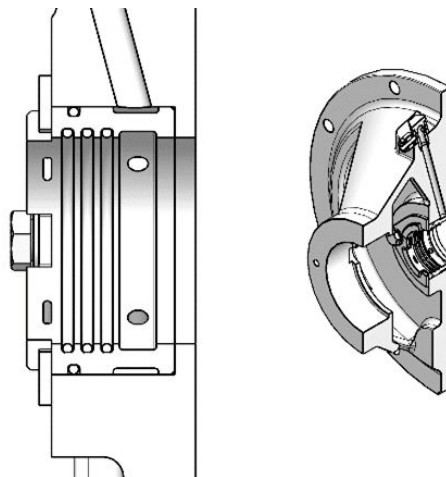


Figure 5.52: SAS-II Sanitary air purge seal

## 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.

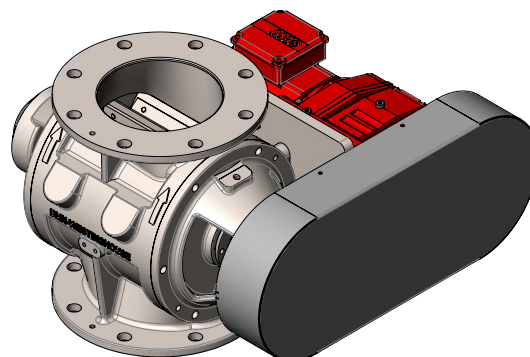


Figure 5.53: Chain drive (SEW R motors with chain)

### 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.

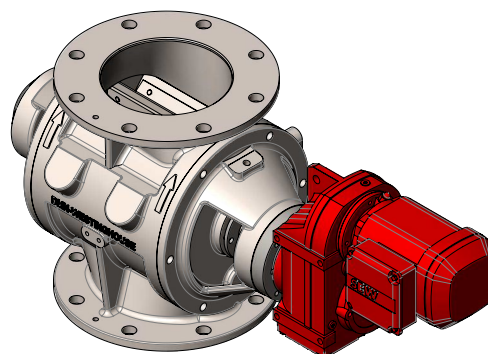


Figure 5.54: Direct drive (with parallel shaft SEW FAZ motor)

### 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.

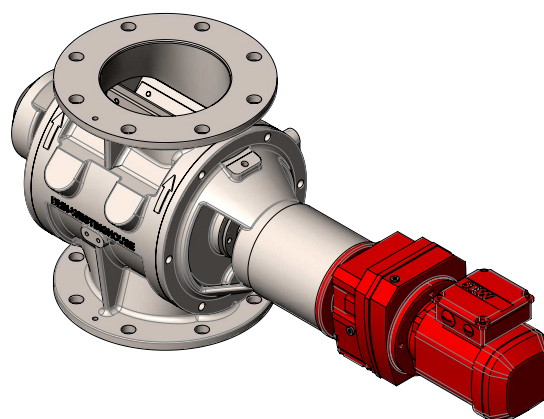


Figure 5.55: Direct drive (with coupling)

## 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.

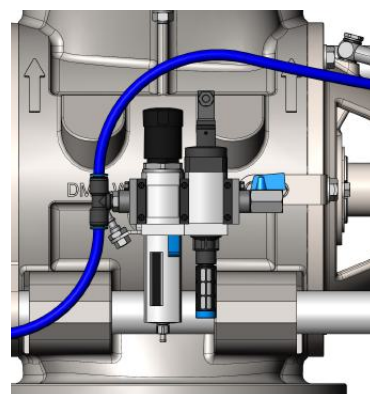


Figure 5.58: Pressure regulator with on/off valve

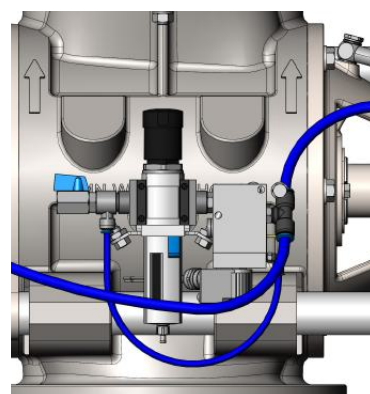


Figure 5.59: Pressure regulator with solenoid valve

## 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.

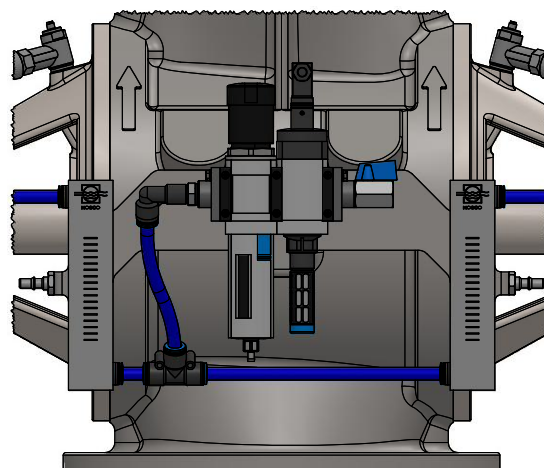


Figure 5.60: Flow regulator with analog flowmeters and on/off valve

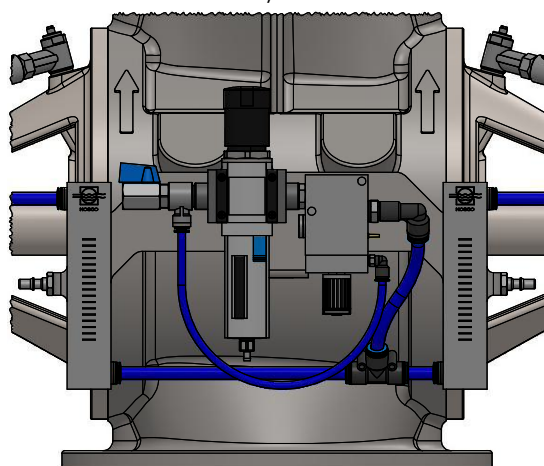


Figure 5.61: Flow regulator with analog flowmeters and solenoid valve

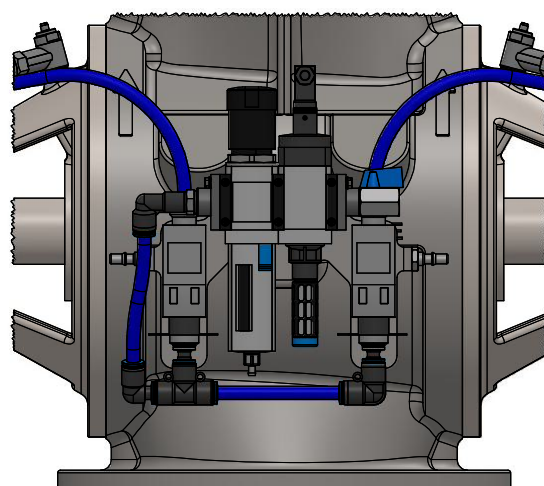


Figure 5.62: Flow regulator with digital flowmeters and solenoid valve

## 5.16 Pulsating air execution (optional)

The pulsating air execution is used to remove specific product more easily from the rotor pocket at the outlet of the valve.

## 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 either 2 or 3 components:

- ▶ Control unit.
- ▶ Resistor box.
- ▶ Zener barrier (Hazardous area).



Figure 5.63: 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.

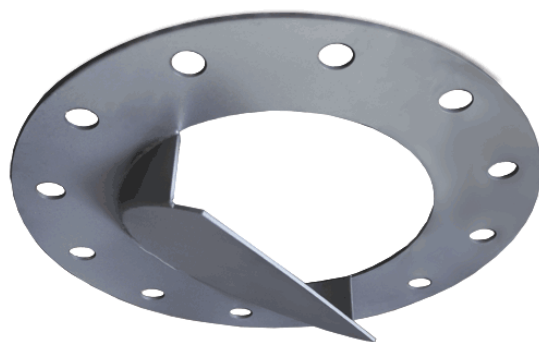


Figure 5.64: Inlet restrictor

### 5.18.2 Dropout box

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

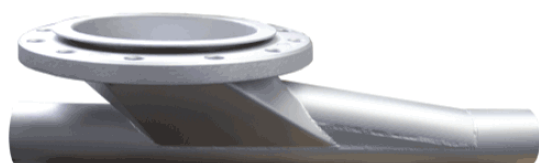


Figure 5.65: Dropout box

### 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.

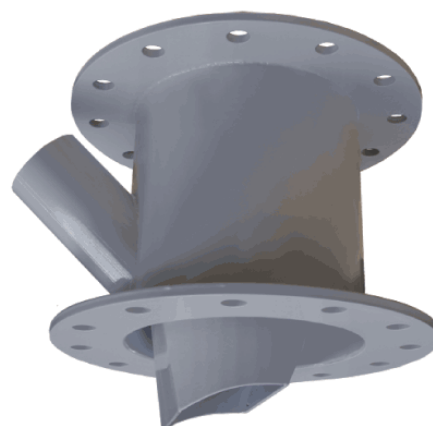


Figure 5.66: Air vent box



## 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 | 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.



**USDA**

### 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!

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

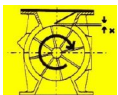
Location: Top of the rotary valve



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).**

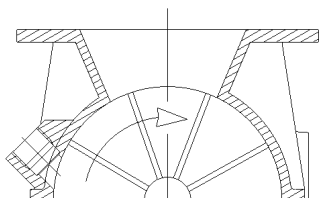


Figure 8.1: Rotation direction of rotor

- ▶ 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.

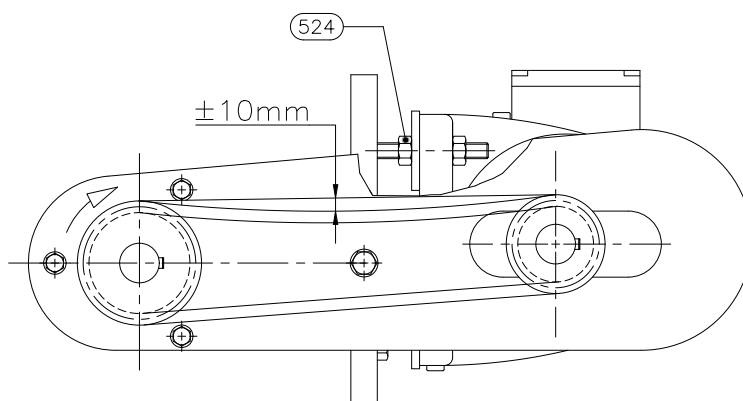


Figure 8.2: Tighten chain

### 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.

#### 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

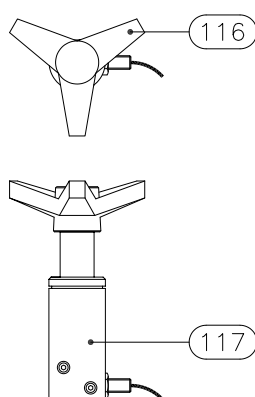


Figure 8.3: T-bolt



**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.

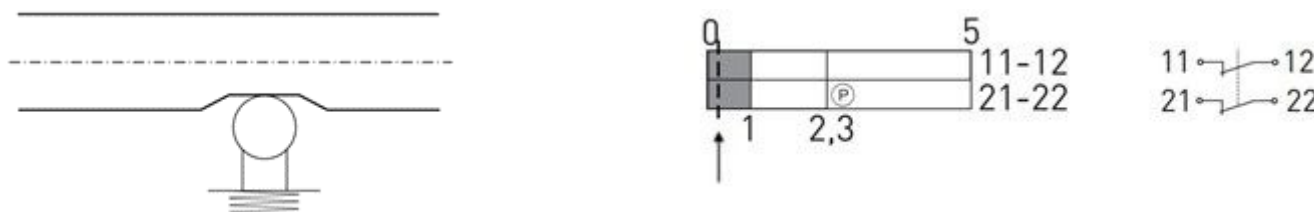


#### 8.4.4.1 Electrical connection

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

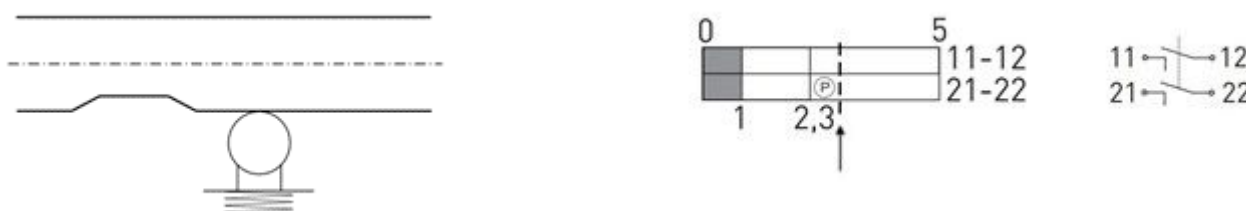
##### Scenario 1:

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

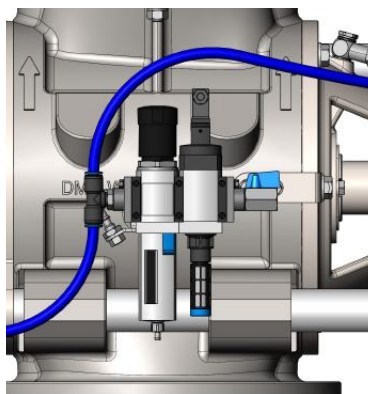


Figure 8.4: Pressure regulator with on/off valve

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

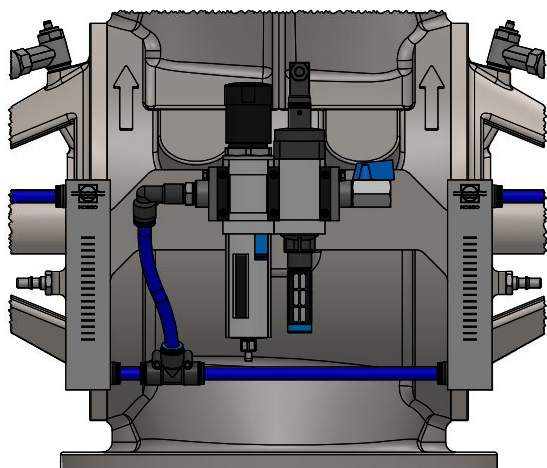


Figure 8.5: Flow regulator with analog flowmeters and on/off valve

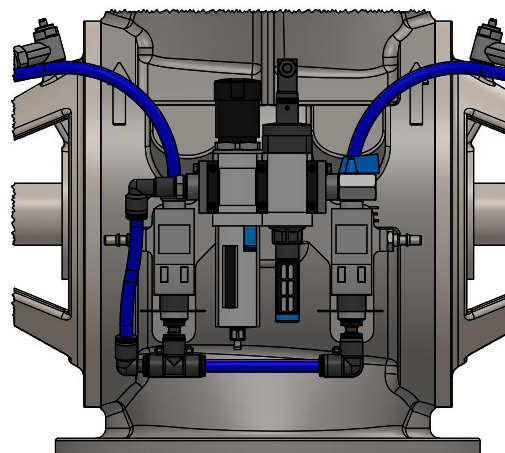


Figure 8.6: Flow regulator with digital flowmeters and solenoid valve

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				Flow [l/min]	
AL-BL	AML-AXL-BXL	BXXL	NR	digital flowmeter <sup>1</sup>	analog flowmeter <sup>2</sup>
150-175	150-200			50	23
200-250	250-300	350	347	60	27
300-350	350-400			85	41

<sup>1</sup>The flow has a margin of  $\pm 10$  l/min.

<sup>2</sup>The flow has a margin of  $\pm 6$  l/min.

Analog and digital flowmeters differ due to different measuring methods.



**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” (NI/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 Rotor Interference Detection (RID) (if fitted)

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

The DMN circuit analyser 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 casing. 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.

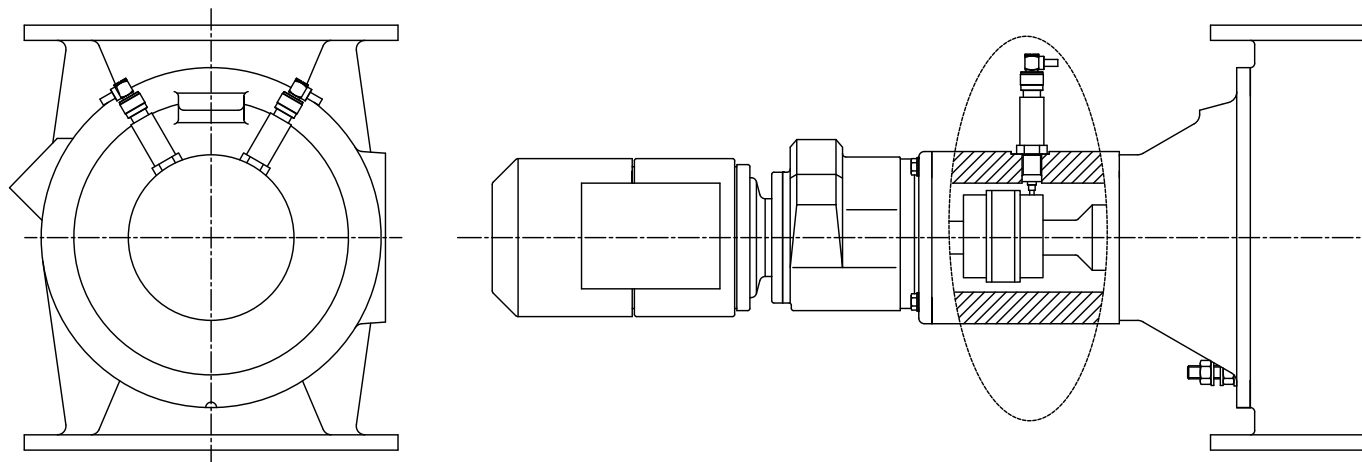


Figure 8.7: RID assembly

### 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 8.8: RID controller

### 8.6.1 Specifications

Rated voltage	18-30VDC, 50mA
Reset input (Pulse)	18-30VDC
Relay Contact loading	24VDC, 1A
Measuring range resistor	0-10 kOhm
Measuring current	<2mA
Measuring speed	1msec-1sec
Maximum measuring cable length	20 meter (0,75mm <sup>2</sup> )
USB connection	USB 2.0
Ambient temperature	0-60°C



**ATTENTION!**

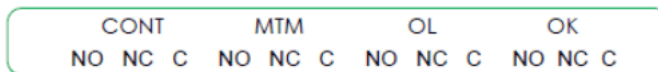
The control unit, resistor box and additional zener barrier are supplied as loose parts.



- ▶ The control unit must be mounted in a suitable enclosure in a safe area.
- ▶ The resistor box must be mounted as close as possible to the rotary valve. (for lead damage and short circuit monitoring).

Complete wiring must be done by the customer.

**8.6.2 Connections**



CONT	Contamination Alarm relay (Common, Normal Open, Normal Closed), will be activated if set values of contamination are reached. (Detection level and minimum Duration see chapter 3 service tool).
MTM	Metal to metal Alarm relay (Common, Normal Open, Normal Closed), will be activated if contact has been made between rotor and housing.
OL	Open loop Alarm relay (Common, Normal Open, Normal Closed), will be activated if there is an open loop.



**ATTENTION!**

Open loop detection.

Cause:

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

OK	OK relay (Common, Normal Open, Normal Closed), will be activated if module is working correctly.
----	--



RST	Reset input (+, -, 24VDC), to reset alarm after identification and fixing of the fault. Reset with a short pulse.
CIP	Input change from MTM to CIP alarm settings (+, -, 24VDC)
24VDC	Input current (+, -, Current 20-30VDC)
SENSE	S1 = Connection to body (hazardous area measuring) S2 = Connection to body (standard measuring) S3 = Connection to rotor (standard measuring) S4 = Connection to rotor (hazardous area measuring)

### 8.6.3 Standard measuring circuit RID

(S2) To body

(S3) To rotor

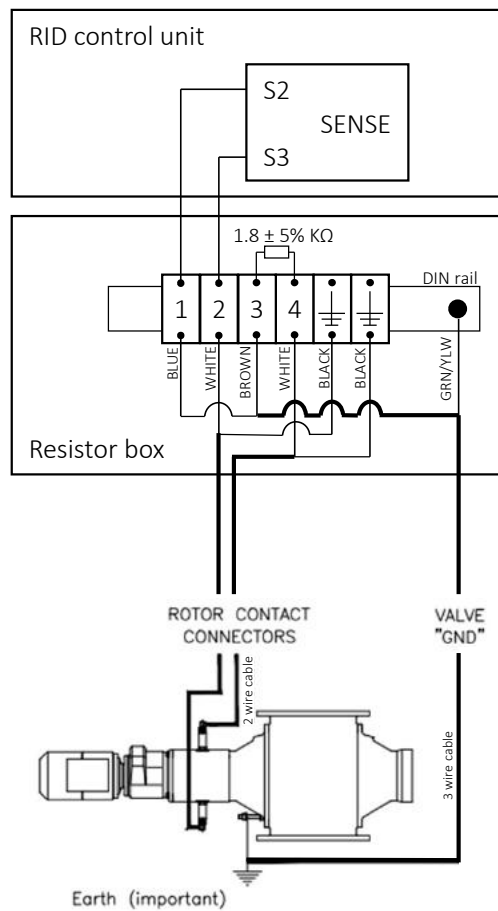


Figure 8.9: Standard measuring circuit RID



**ATTENTION!**

Check connection control unit Sense S2-S3.  
Wrong connection can result in no metal to metal alarm.

## 8.6.4 Hazardous areas measuring circuit RID

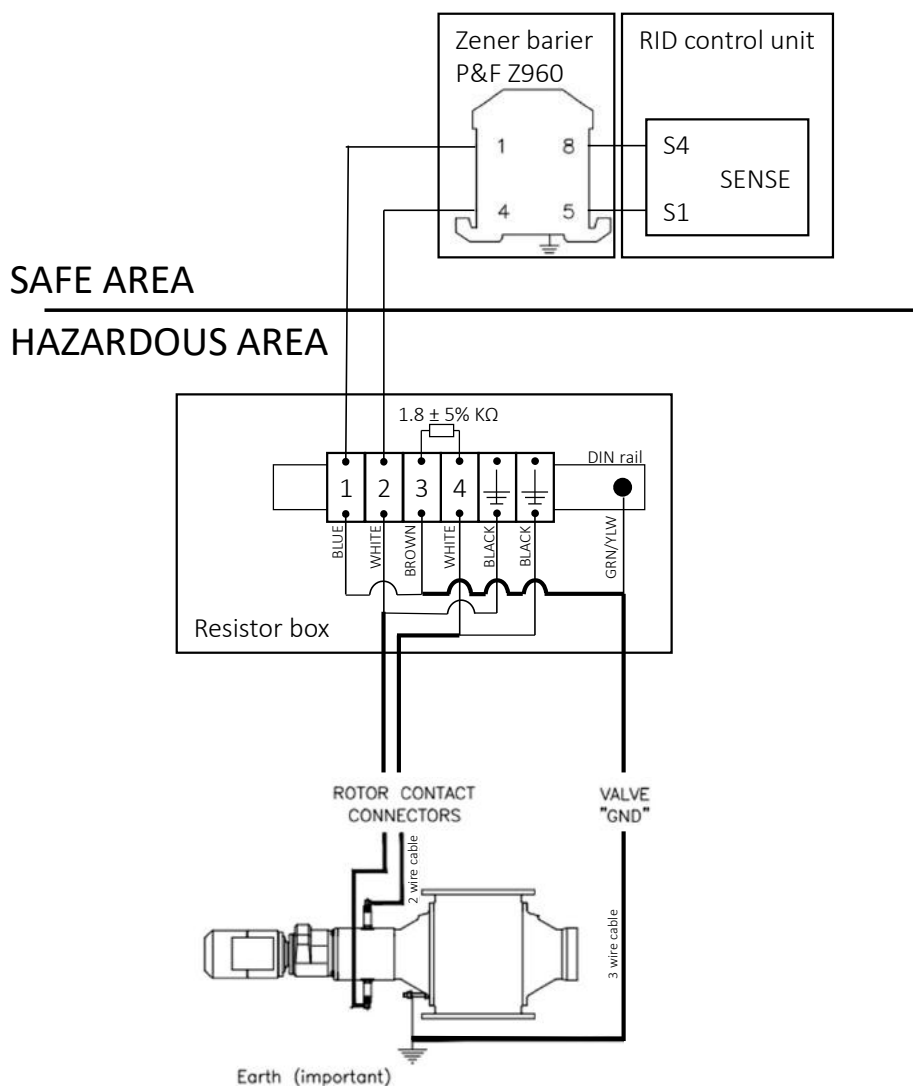


Figure 8.10: Hazardous areas measuring circuit RID

**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 9.4.1.2).

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 9.4.1.2 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 Installing accessories on the rotary valve (if fitted)

### 8.7.1 Mounting inlet restrictor / dropout box / vent box

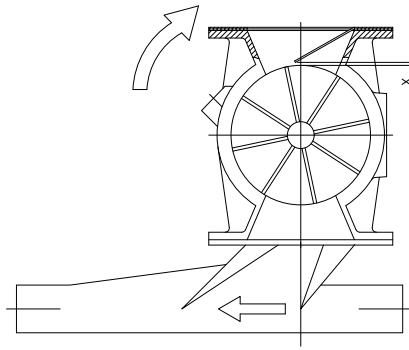


Figure 8.11: Inlet restrictor and Dropout box

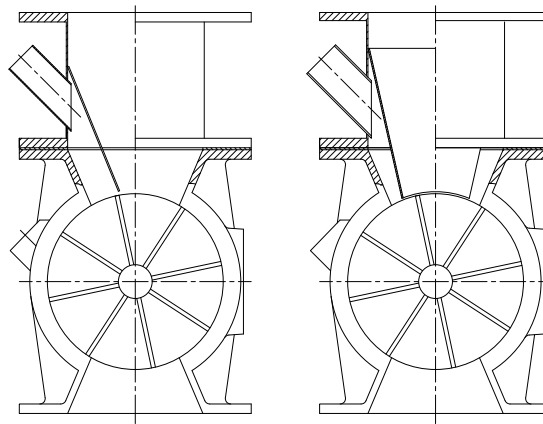


Figure 8.12: Vent box (one side) - Vent box (all around)

#### 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.

## 8.8 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  $10^6 \Omega$ .



### Rotary valve external no zone

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



APS only!

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.



APS only!

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!**

### 8.8.1 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									
	100	150	175	200	250	300	350	400	450	500
AL										
AXL										
AML										
USAL										
AR										
NR										
BL										
BXL										
BXXL										

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

**8.8.2 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  $10^6 \Omega$ .

**ATTENTION!**

After installation test run the valve.

### 8.8.3 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.

### 8.8.4 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.**

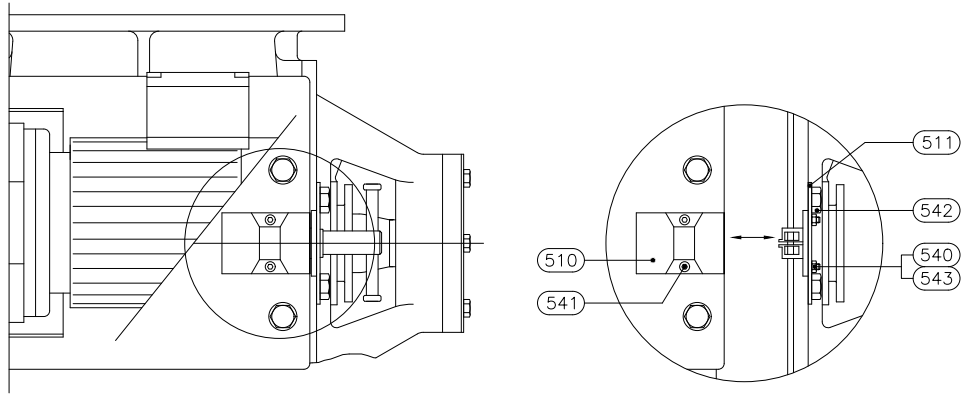


Figure 8.13: Safety switch

**Zero speed indicator**

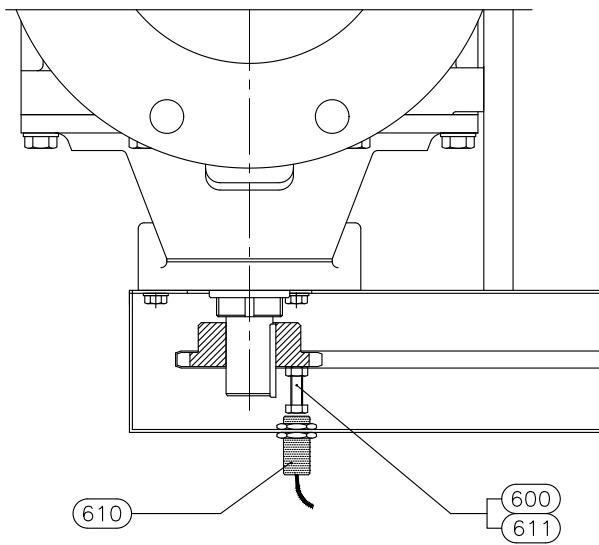


Figure 8.14: Drive side option 1

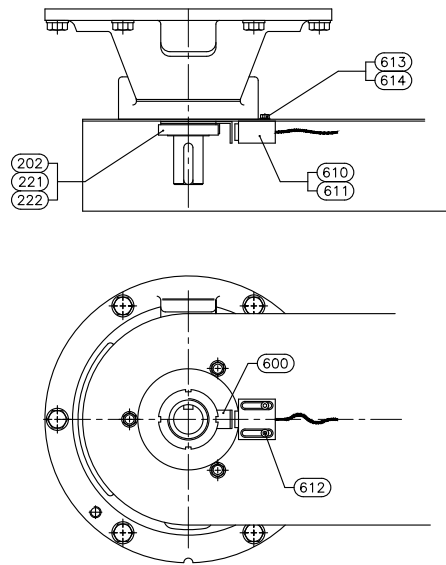


Figure 8.15: Drive side option 2

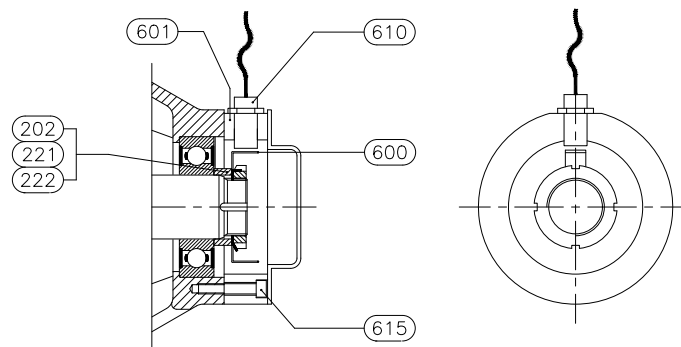


Figure 8.16: Non drive side



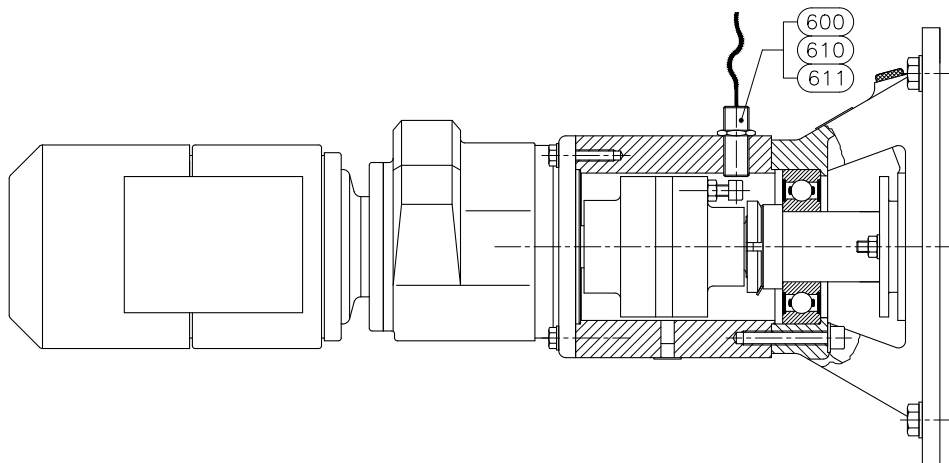


Figure 8.17: Direct drive

## 8.9 Installing the rotary valve in a hygienic application



**USDA**

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.

### 8.9.1 Flange connections



**ATTENTION!**

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

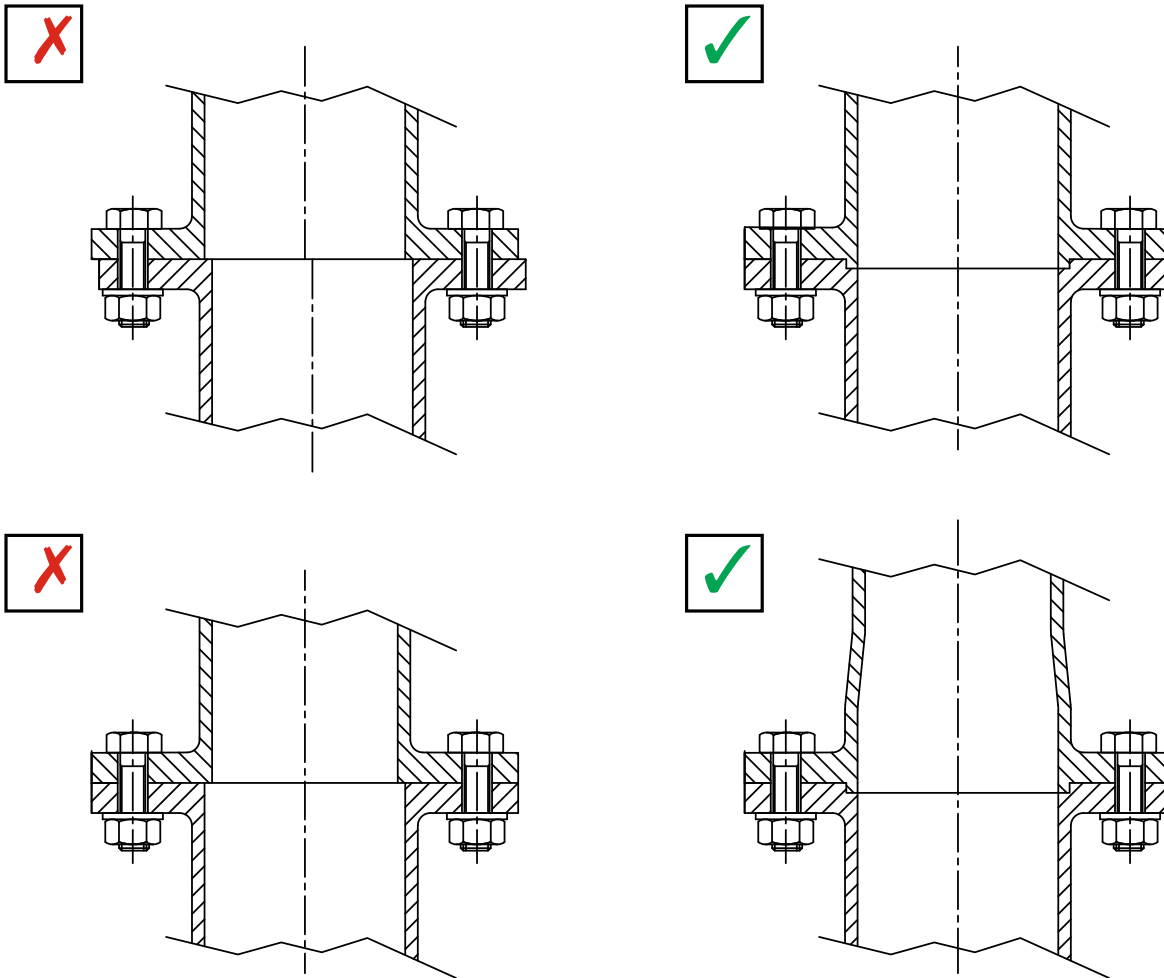


Figure 8.18: Flange connection

**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.

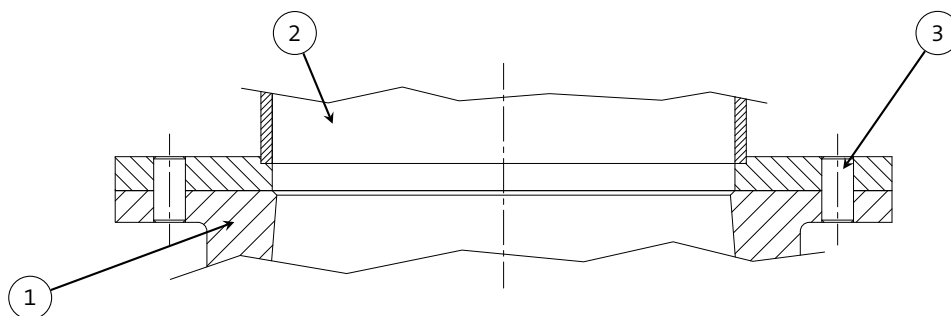
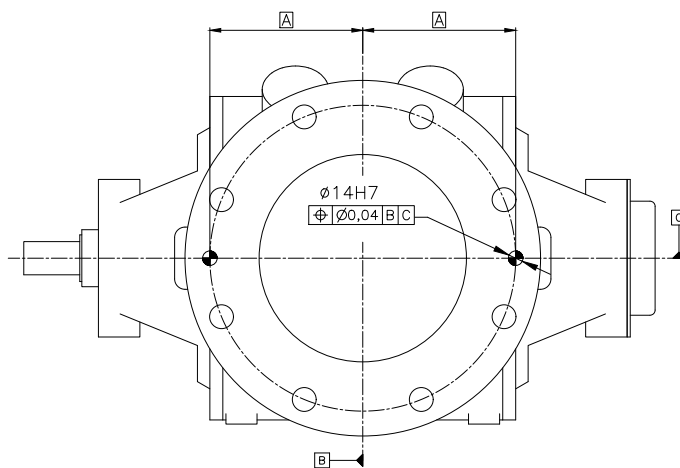


Figure 8.19: In and outlet flange connection

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



### Blowingline flange connection

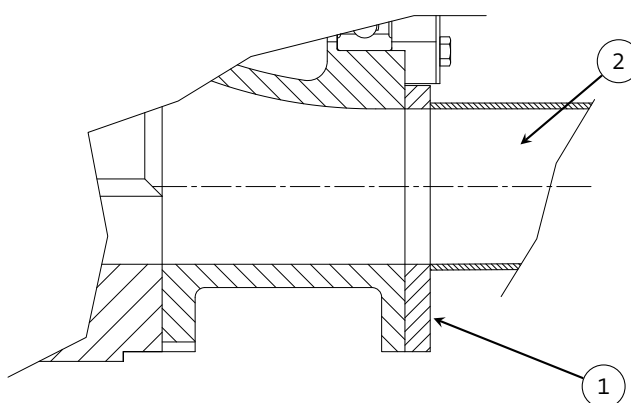


Figure 8.20: Blowingline flange connection

- ▶ 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  $\mu\text{m}$ .



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

## USDA

### 8.9.2 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.



### 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 ( $\leq 0.8 \text{ Ra}$ ) 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 for effective wet cleaning and/ or subsequent drying.

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 housing 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 casing due to foreign objects, excessive temperatures etc., the RID unit will generate an alarm.

**9.4.1.1 LED indication**

P/OL	The Open Loop Alarm relay (Common, Normal Open, Normal Closed) will be activated when an open loop is detected.
CONT	The Contamination Alarm relay (Common, Normal Open, Normal Closed) will be activated if the set values of contamination are reached. (Detection level and minimum duration (refer to chapter 9.4.1.2)).
MTM	The metal to metal alarm relay (Common, Normal Open, Normal Closed) will be activated if contact has been made between rotor and housing.
Reset button (RESET)	Reset button for manual reset.
USB connection	USB connection to PC for services tool (modification and monitoring measure values).



Figure 9.1: LED indication

DMN WESTINGHOUSE RID LED indication	
	In service In Betrieb En service
	Metal to metal alarm Metall-Metall-Alarm Alarme contact métal-métal
	Contamination detection Kontaminationserkennung Détection de contamination
	Circuit fault Schlusfehler Défaut électrique

Figure 9.2: Sticker with LED indication

### 9.4.1.2 Service tool

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



#### ATTENTION!

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

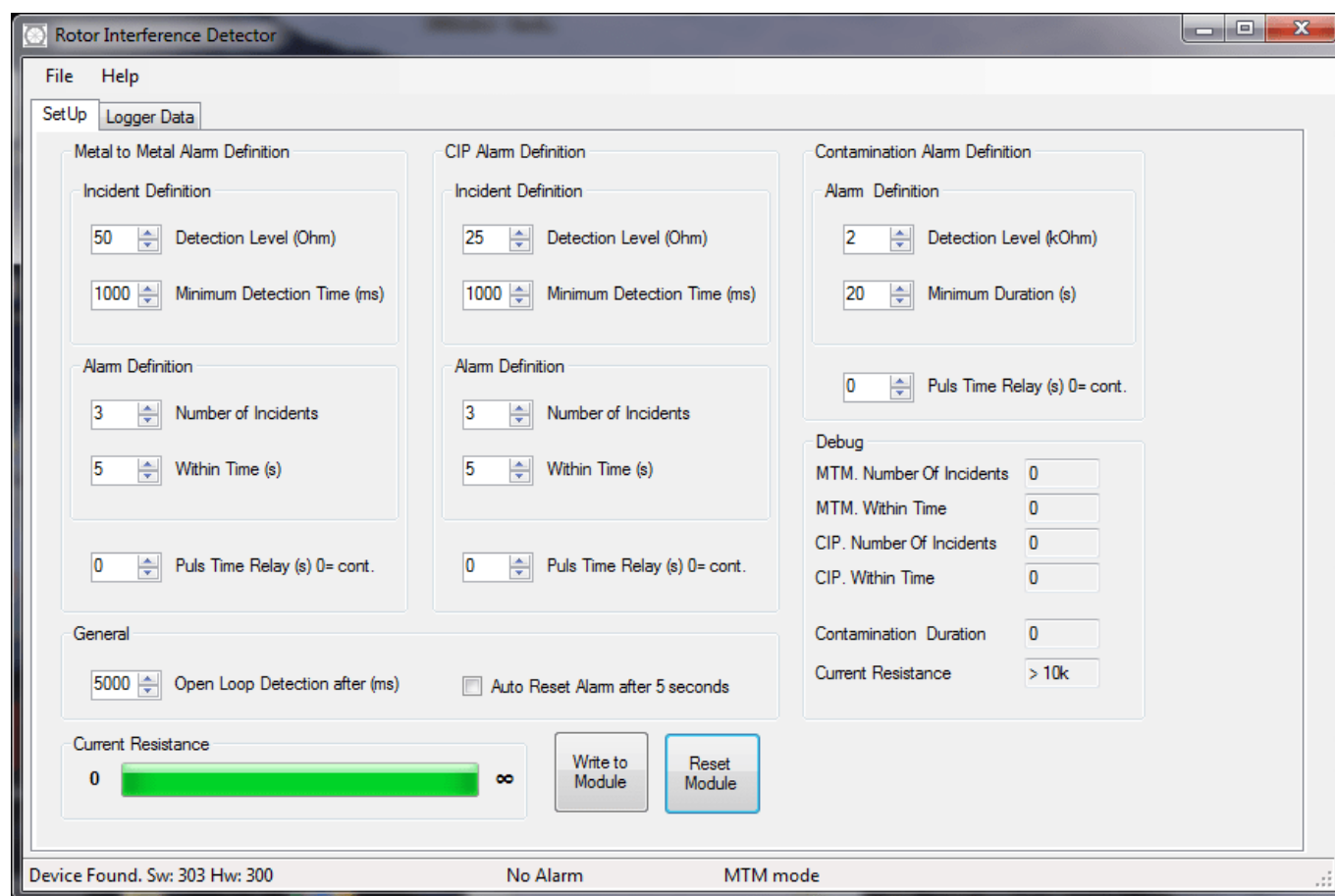


Figure 9.3: Service tools (standard settings)



The circuit analyser has 3 alarm circuits:

- ▶ Metal to metal alarm: Arises when the circuit resistance drops below a quite low resistance, with some additional timing conditions (0-1000 ms).
- ▶ CIP alarm: Arises when the circuit resistance drops below a quite low resistance, with some additional timing conditions (0-1000 ms).
- ▶ CIP alarm settings will be used after input signal from control system on CIP connection (refer to 8.6.2).
- ▶ Status bar will change from MTM mode to CIP Mode.
- ▶ Contamination alarm rises when the circuit resistance (much higher than the “metal to metal” level) drops below a certain level for a certain time (about 1kOhm-10kOhm, adjustable).

**Metal to metal alarm**

Can be defined as follows:

- ▶ Specify the resistance level (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 \* Number of Incidents”.

When this condition is reached, the relay output switches for the time defined in “Pulse Time Relay”. If the value is set to 0, the relay stays on until the reset button is pressed.

**CIP alarm**

Can be defined as follows:

- ▶ Specify the resistance level (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 \* Number of Incidents”.

When this condition is reached, the relay output switches for the time defined in “Pulse Time Relay”. If the value is set to 0, the relay stays on until the reset button is pressed.

**Contamination alarm**

Can be defined as follows:

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

When this condition is reached, the relay output switches for the time defined in “Pulse Time Relay”. If the value is set to 0, the relay stays on until the reset button is pressed.

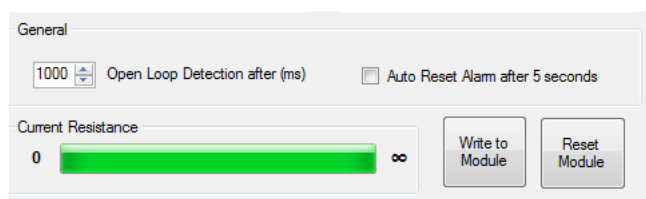
**ATTENTION!**



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](#)).

**General**



Open Loop Detection after (ms).

- ▶ Specify the time before an alarm rises.

Checkbox “Auto reset Alarm after 5 seconds.”

- ▶ Will automatically reset the module after 5 seconds.



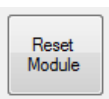
**ATTENTION!**

**This is not recommended.**

Reset will be done without identifying and eliminating the cause of the fault.



The command button “Write to Module” writes the new settings to the module.



The command button “Reset Module” can be used to reset pending alarms. (as done with the reset button on the control unit).

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

**Debug**

The debug section in the window provides additional 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.

Debug	
MTM. Number Of Incidents	0
MTM. Within Time	0
CIP. Number Of Incidents	0
CIP. Within Time	0
Contamination Duration	0
Current Resistance	> 10k



**ATTENTION!**

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

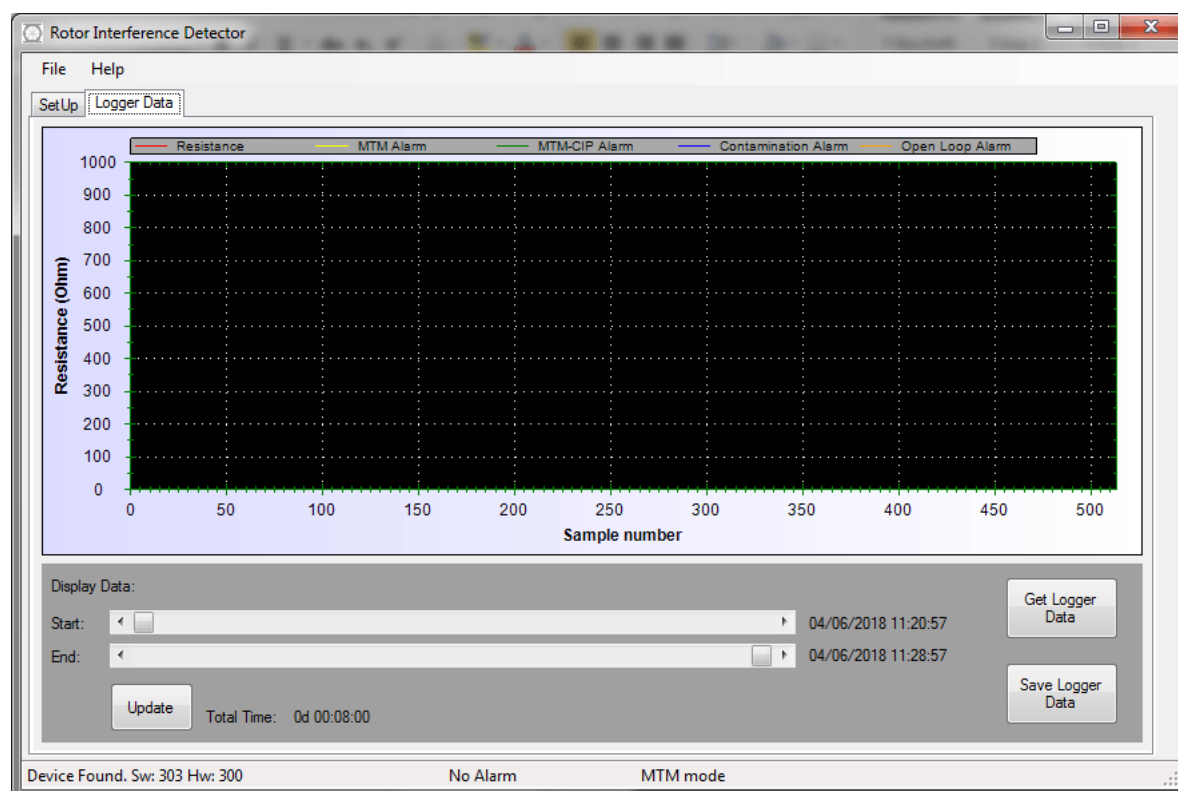
**Logging**



**ATTENTION!**

Only for advanced users.

Select tab (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 downloaded.

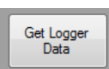
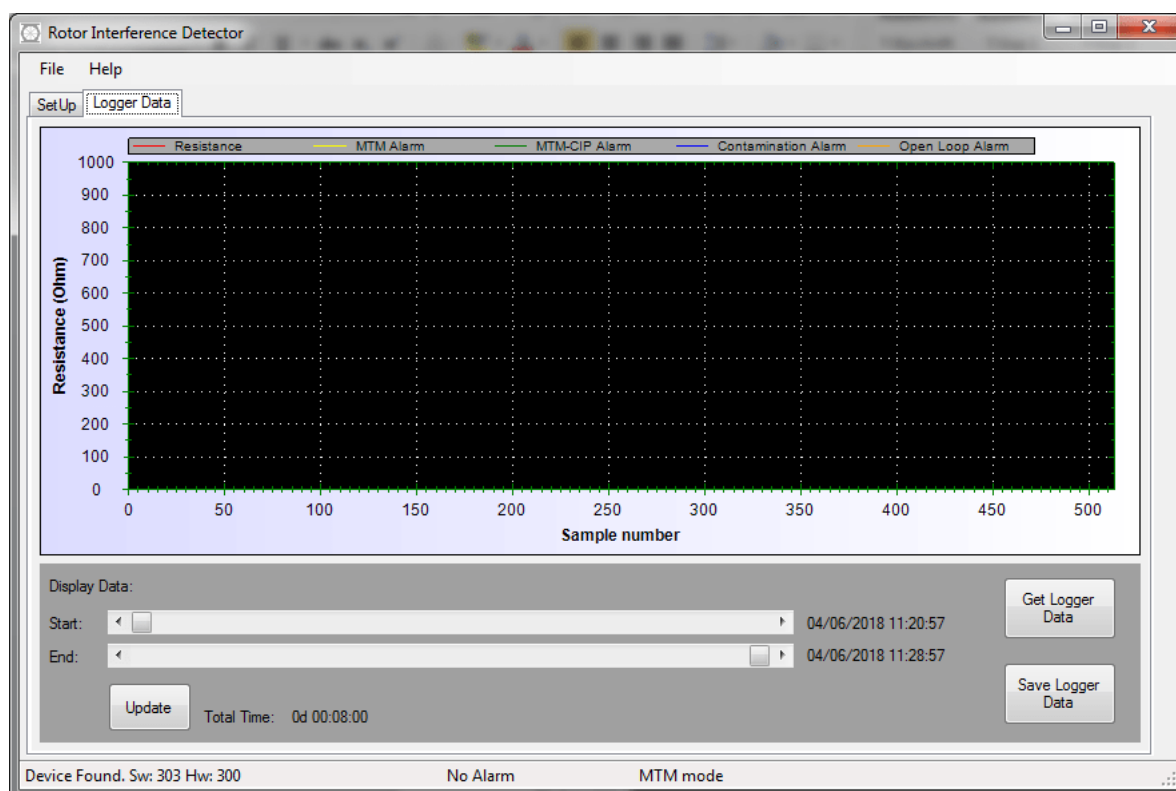


**ATTENTION!**

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

**Colours log screen**

Red	Resistance
Yellow	Metal to metal alarm
Green	CIP metal to metal alarm
Blue	Contamination alarm
Orange	Open loop alarm



Command button “Get Logger Data” will show log data in graph.



The command button “Reset Module” can be used to reset pending alarms. (as done with the reset button on the control unit). Command button “Save Logger Data” will store log data in File (format .CSV).



Command button “Update” will update stored log data.



Slides

Use slides to select a part of the available data, when finished press command button “Get Logger Data” to show selected data in graph.

# 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.

APS only!

## 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 Chain/sprockets HT250	General	Retinax EP2 (Shell)
		Foliac L621 (ROCOL)
Bearings <sup>1</sup>		-
Bearings HT250 <sup>2</sup>		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)

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

<sup>2</sup> 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

Problem	Cause	Solution
<b>OK alarm</b> Module failure Green LED off	No power supply to module	Check power supply is connected to module Check fuse supplying module Check 24Vdc is supplied to module
	Module faulty	Replace module
<b>Open loop alarm</b> Circuit fault Green LED flashing Red LED off	Open circuit	Check if resistor is connected Check contacts resistor (1800 Ω) Check wiring (lead breakage)
	Rotor pick-ups	Check rotor pick-ups for wear (no contact to coupling) Replace pick-ups and clean coupling and lantern piece
<b>Metal - metal alarm</b> > 0 Ohm and < 50 Ohm	Metal - metal contact Alarm does sound again	Reset alarm  (MZC execution after cleaning RID controller must be reset) Alarm does sound again  ▶ Use service tool ▶ Check log file to see values ▶ Check for product and operation conditions changes ▶ After evaluation ▶ Change Ohm value
	Metal - metal contact 0 Ohm	MZC execution after cleaning RID controller must be reset
<b>Metal - metal alarm</b>	Metal - metal contact 0 Ohm	Open valve and check for metal to metal contact  ▶ Clean the valve ▶ Ensure the valve is reassembled correctly ▶ Check clearances
		MZC execution Make sure that axial fixing is not touching ring

Problem	Cause	Solution
Contamination Alarm Green LED on Yellow LED on	Contamination	<div data-bbox="874 208 1409 598" data-label="Image"> </div> <p data-bbox="874 611 1254 640">Check for short circuits in the wiring</p> <p data-bbox="874 678 1190 707">Check valve for contamination</p> <ul style="list-style-type: none"> <li data-bbox="874 779 1066 808">▶ Clean the valve</li> </ul> <p data-bbox="874 846 1066 875">No contamination</p> <ul style="list-style-type: none"> <li data-bbox="874 920 1070 949">▶ Use service tool</li> <li data-bbox="874 965 1182 994">▶ Check log file to see values</li> <li data-bbox="874 1010 1246 1068">▶ Check for product and operation conditions changes</li> <li data-bbox="874 1084 1075 1113">▶ After evaluation</li> <li data-bbox="874 1128 1107 1158">▶ Change Ohm value</li> </ul>

## 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

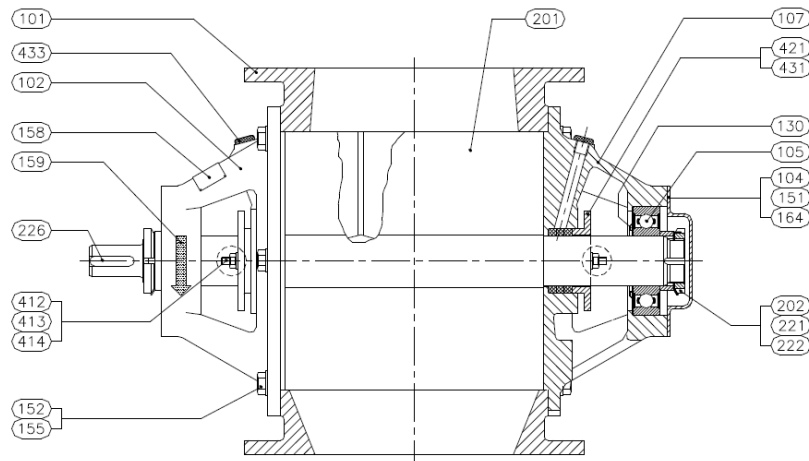


Figure 11.1: General assembly AL-series

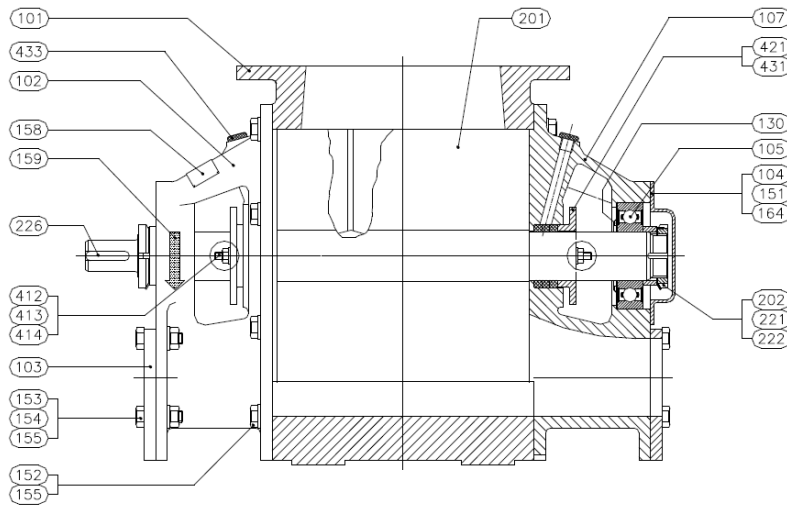


Figure 11.2: General assembly BL-series

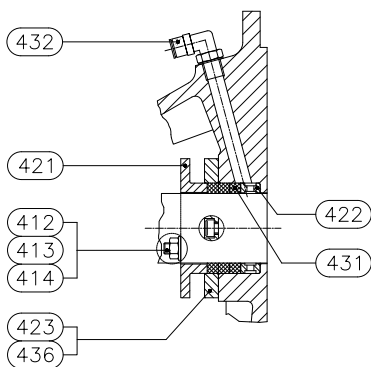


Figure 11.3: Blowing seal

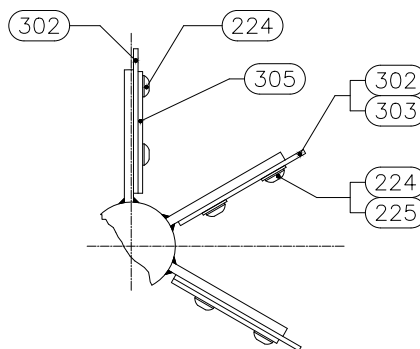


Figure 11.4: rotor

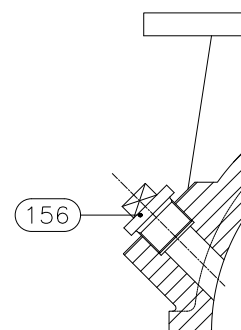


Figure 11.5: Plug connection

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

### 11.2.2 Dismantling

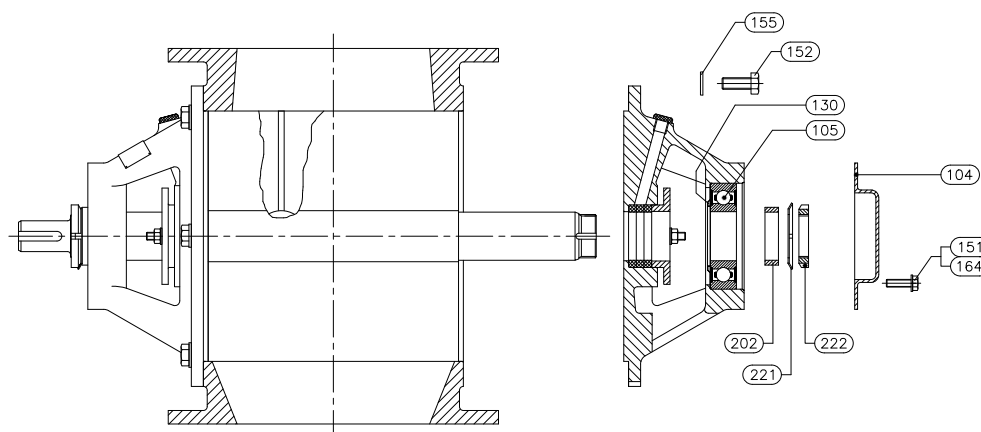


Figure 11.6: Dismantling standard execution

#### 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

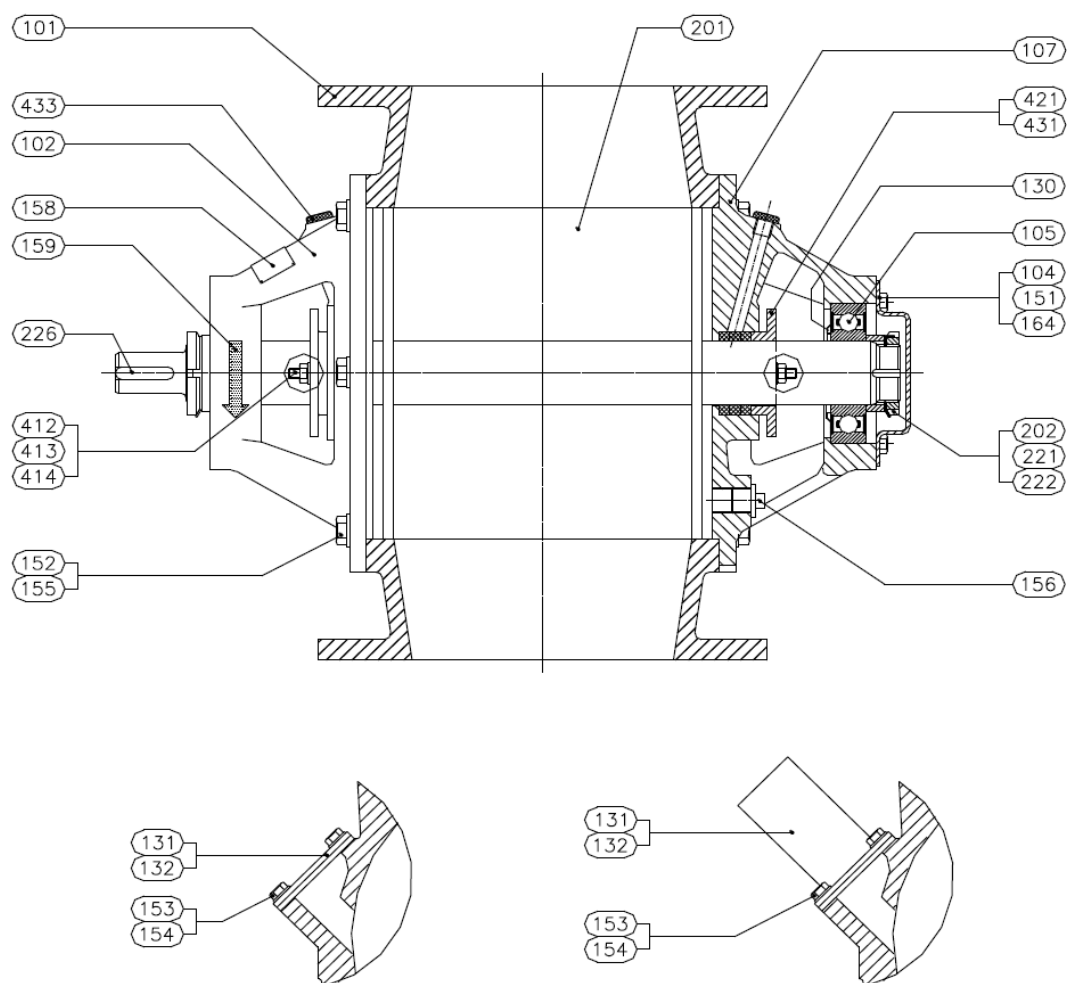


Figure 11.7: General assembly GL-series

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

\*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

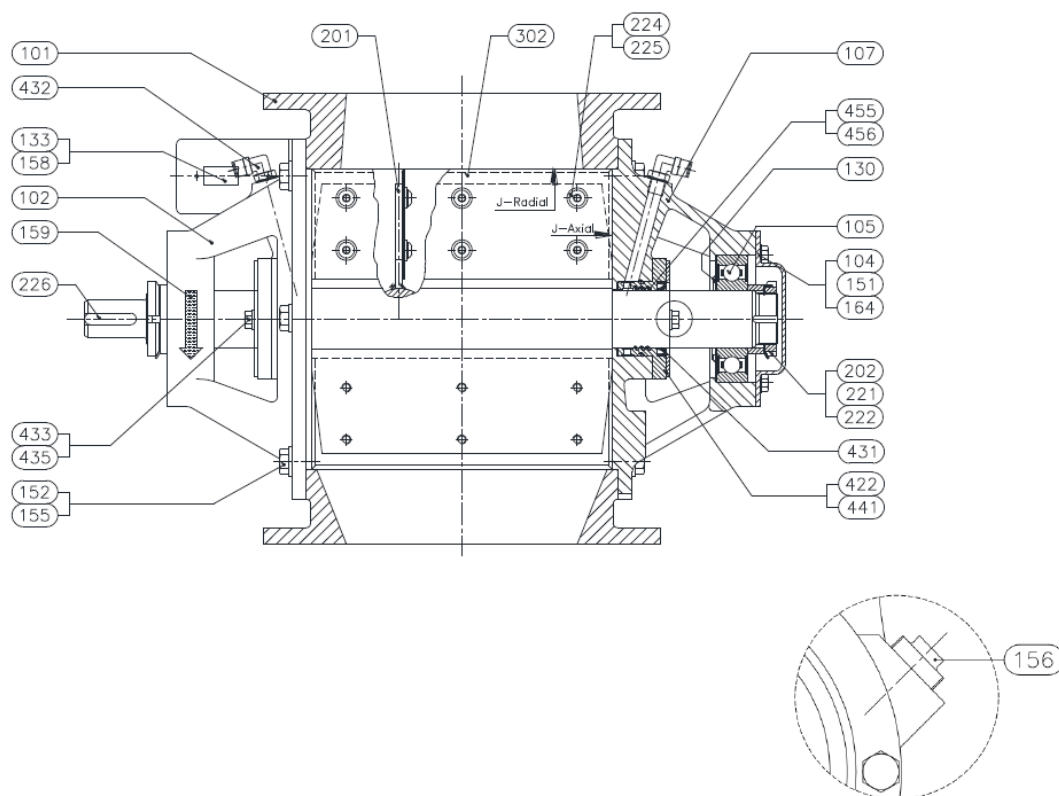


Figure 11.8: General assembly AR-series

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

#### 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

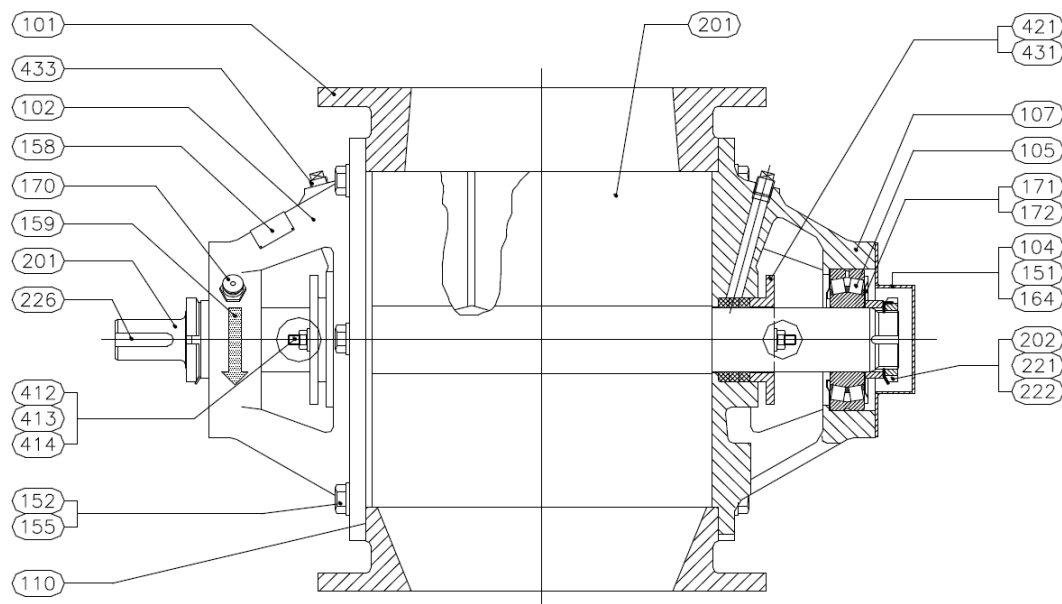


Figure 11.9: General assembly AL-series / BL-series HT 250°C

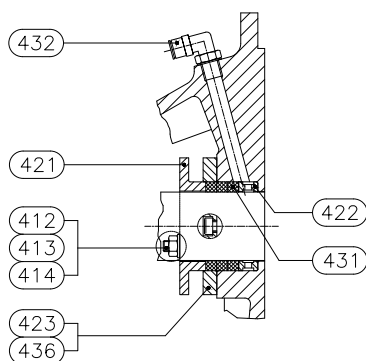


Figure 11.10: Blowing seal

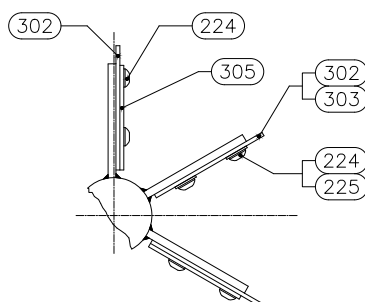


Figure 11.11: rotor

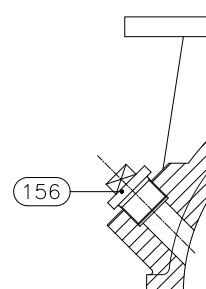


Figure 11.12: Plug connection

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

### **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

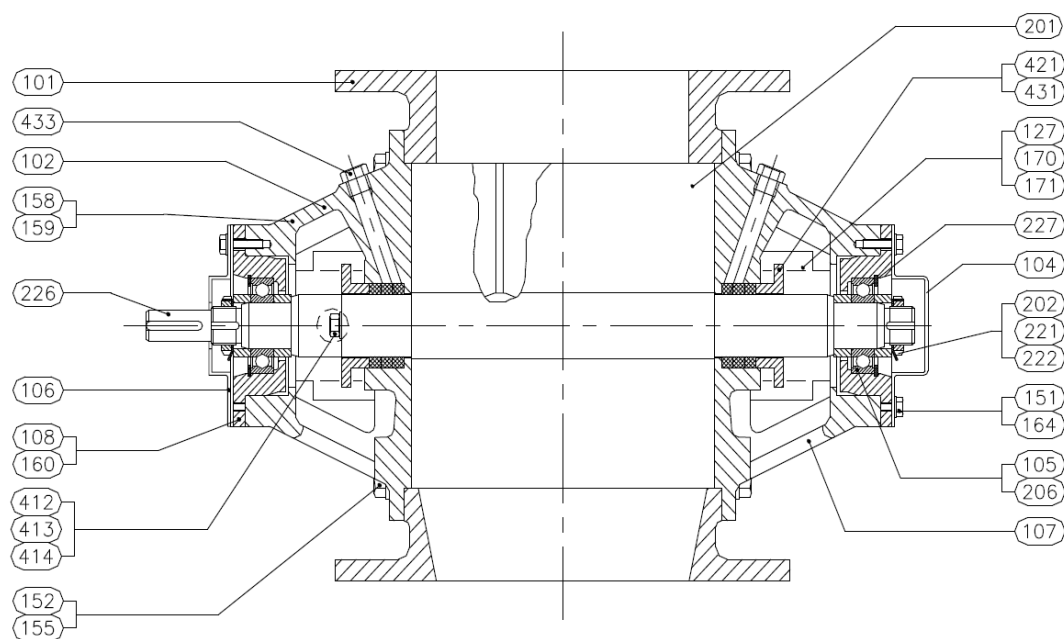


Figure 11.13: General assembly AL-series / BL-series HT 400°C-600°C

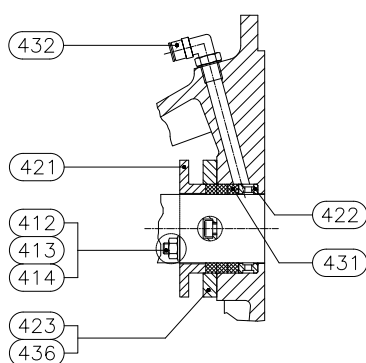


Figure 11.14: Blowing seal

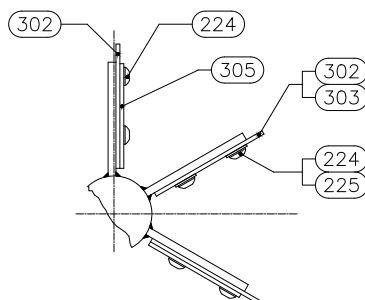


Figure 11.15: rotor

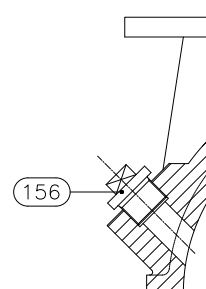


Figure 11.16: Plug connection

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

## 11.6.2 Dismantling

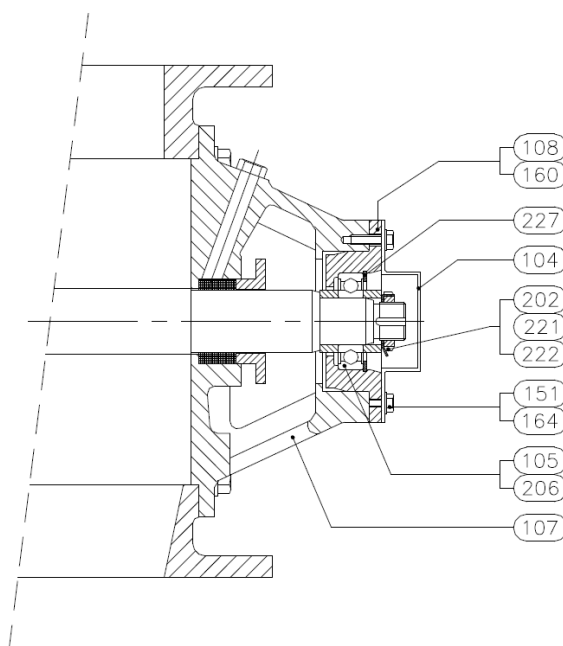


Figure 11.17: Dismantling non drive side

### 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.

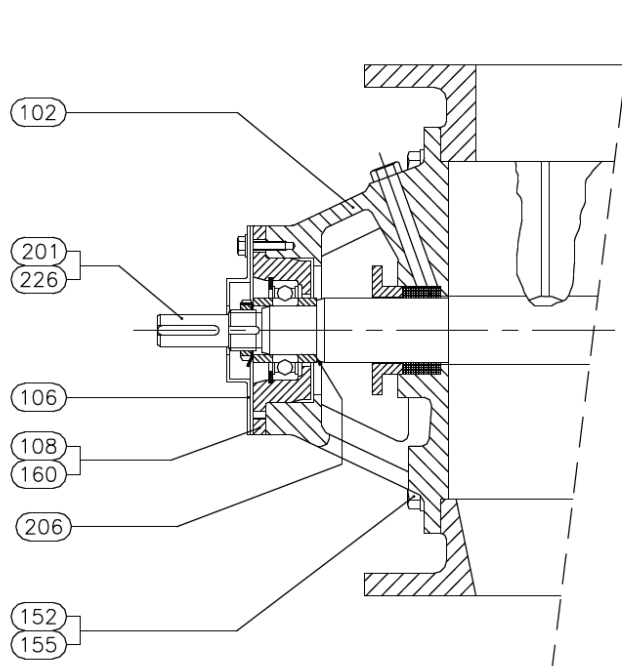


Figure 11.18: Dismantling drive side

### 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

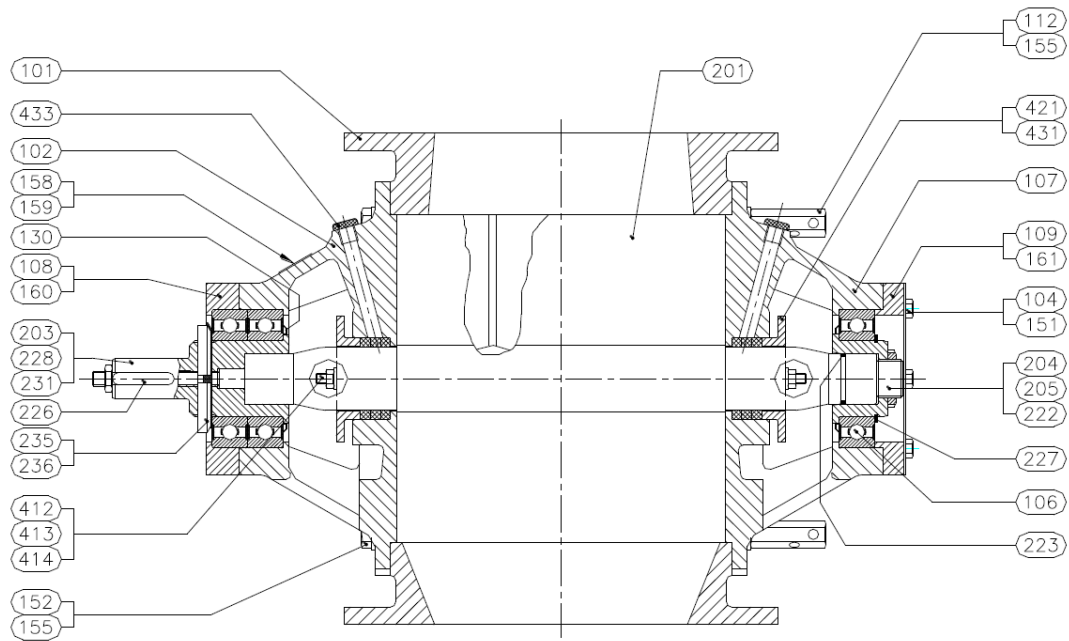


Figure 11.19: Easy detachable execution AL-AXL-AML

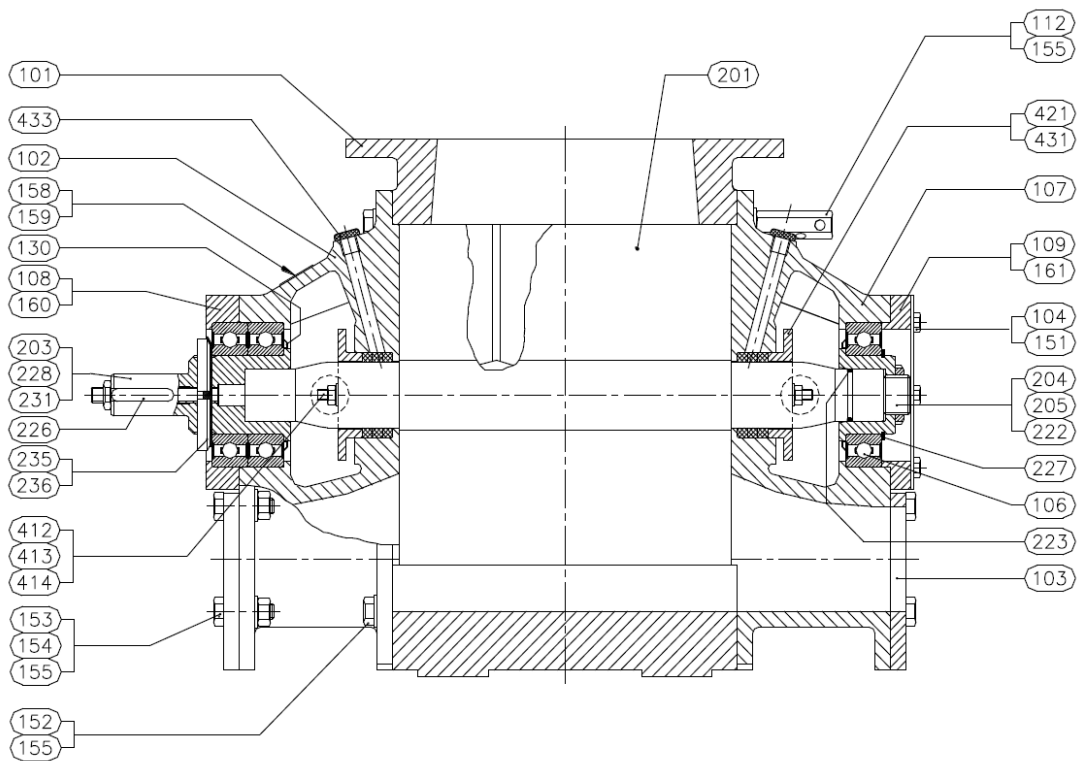


Figure 11.20: Easy detachable execution BL-BXL-BXXL

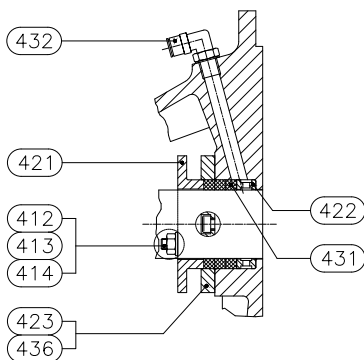


Figure 11.21: Blowing seal

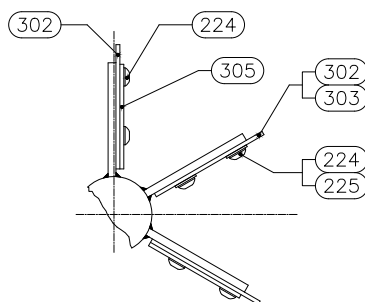


Figure 11.22: rotor

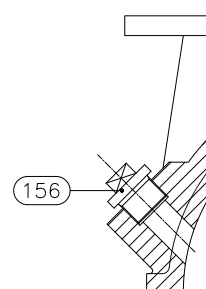


Figure 11.23: Plug connection

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

### 11.7.2 Dismantling (for internal cleaning)

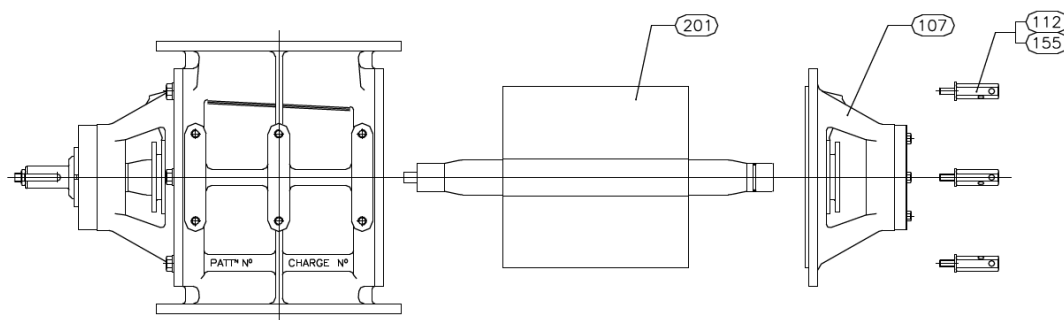


Figure 11.24: Dismantling easy detachable execution (for cleaning)

#### 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)

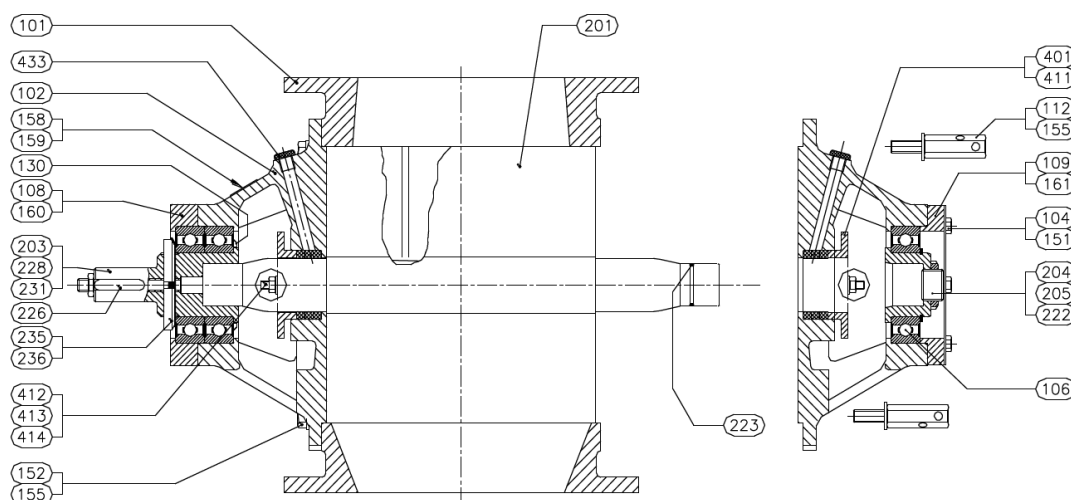


Figure 11.25: Dismantling easy detachable execution (for maintenance)

#### 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)

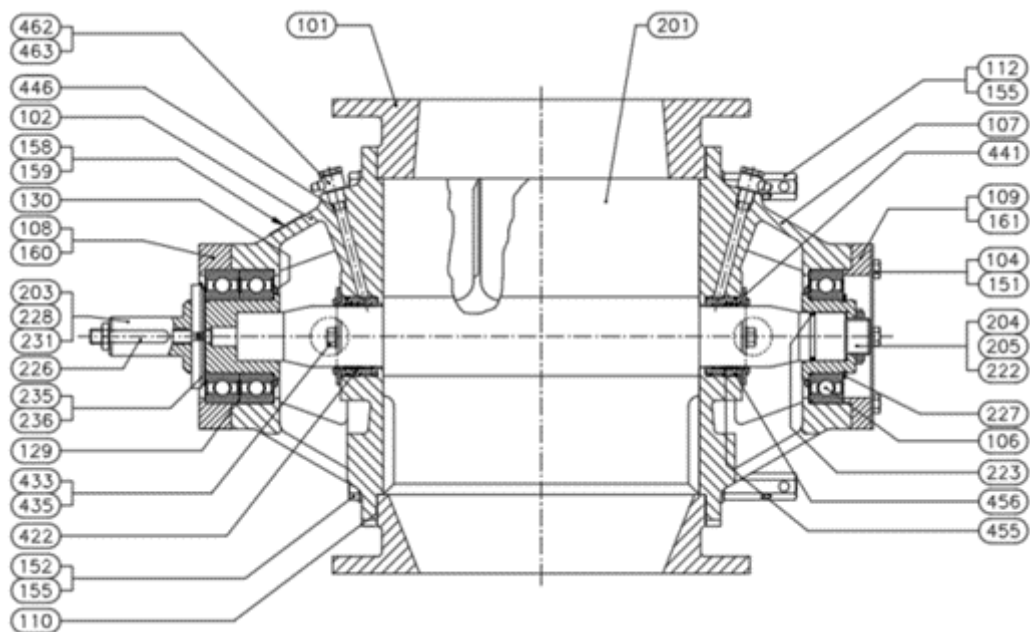


Figure 11.26: Dairy execution AL-AXL-AML (EHEDG ED CLASS II)

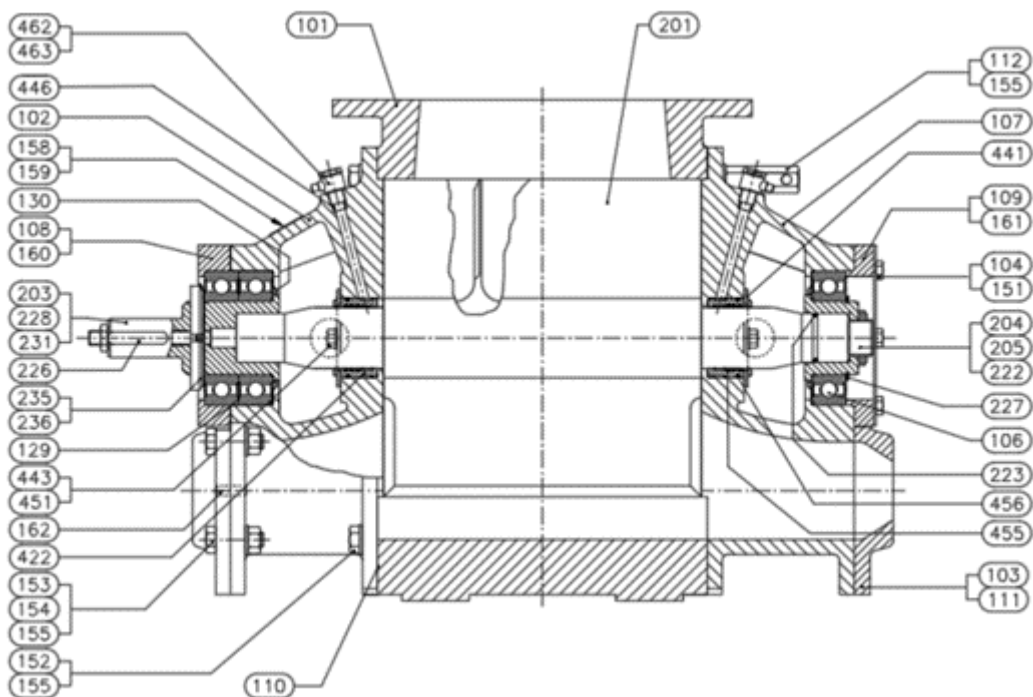


Figure 11.27: Dairy execution BL-BXL-BXXL (EHEDG ED CLASS II)

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

11.8.2 General assembly & part list (USDA approved)

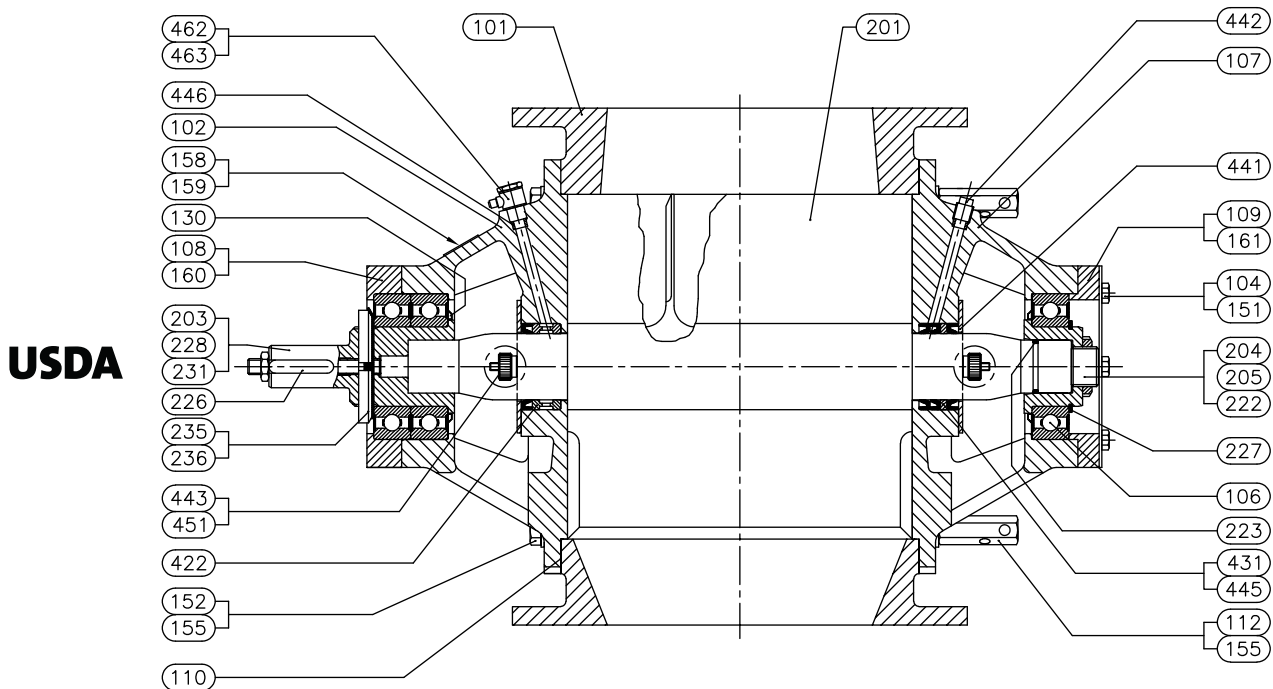


Figure 11.28: Dairy execution AL-AXL-AML (USDA)

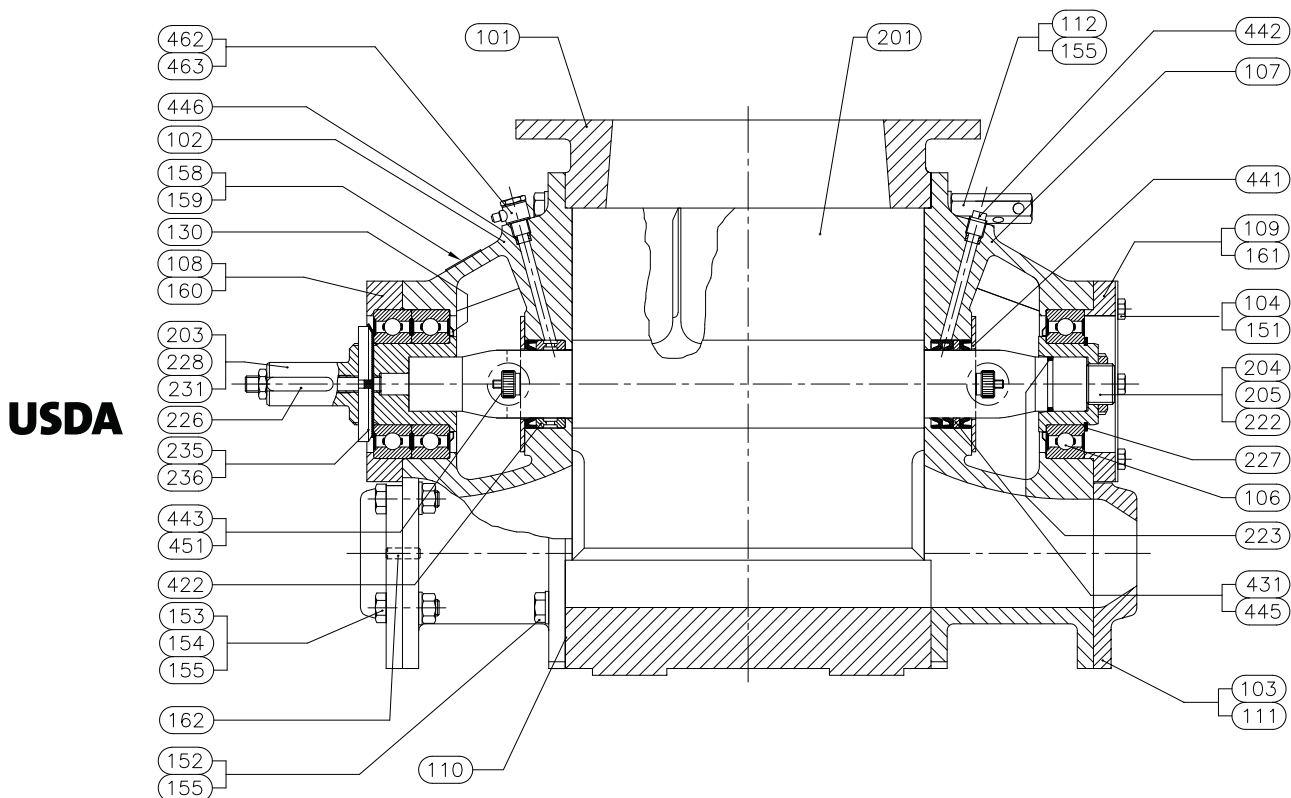


Figure 11.29: Dairy execution BL-BXL-BXXL (USDA)

**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**

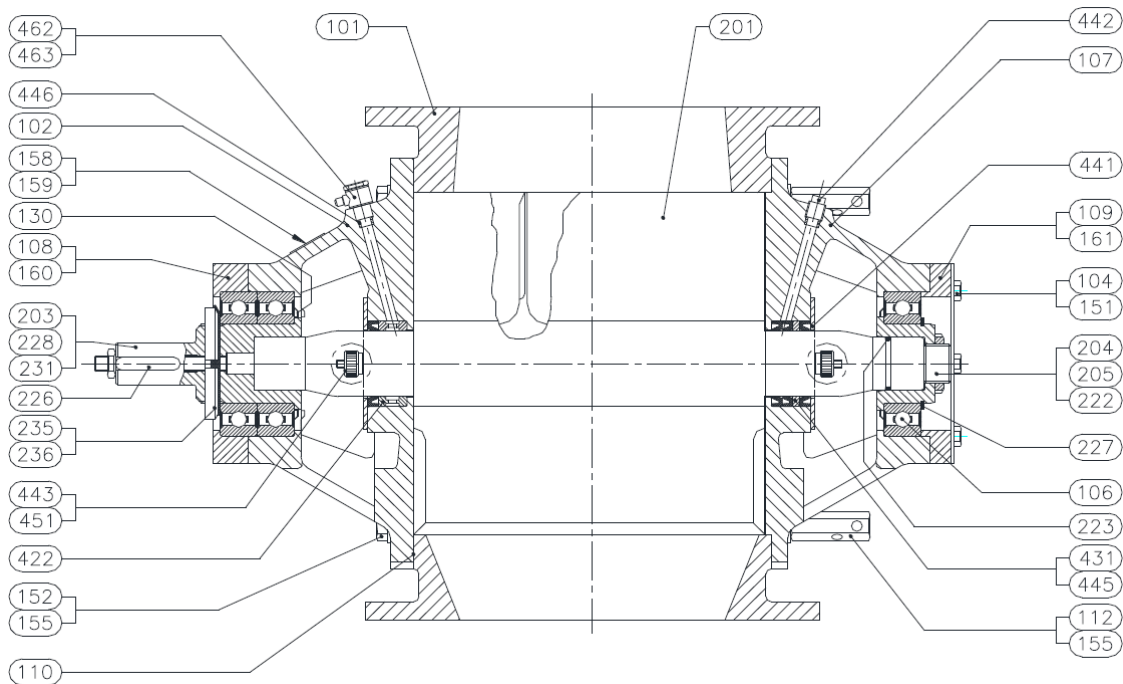


Figure 11.30: Dairy-WD execution AL-AXL-AML

**USDA**

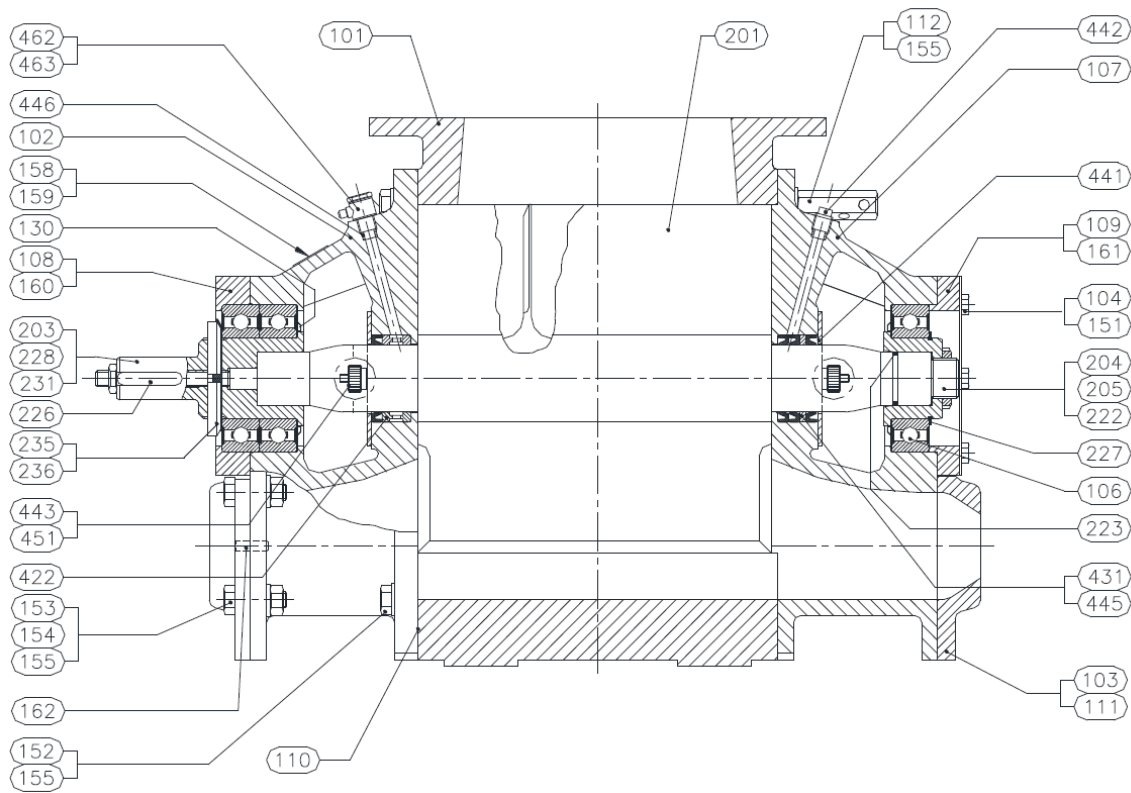
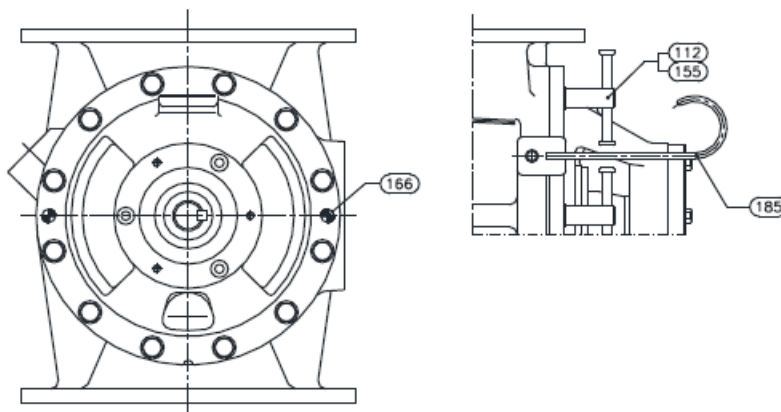


Figure 11.31: Dairy-WD execution BL-BXL-BXXL



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

### 11.9.2 Dismantling

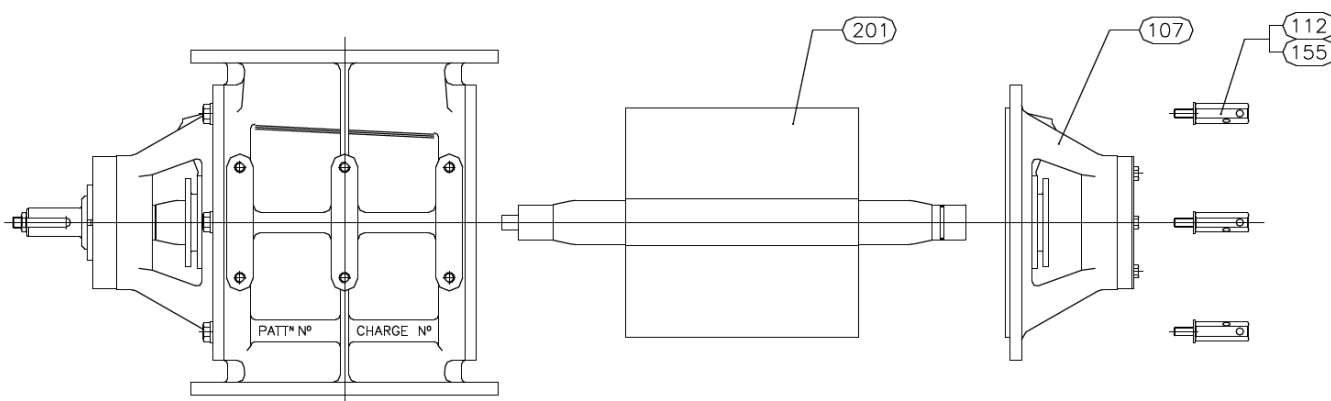


Figure 11.32: Dismantling for cleaning

#### 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

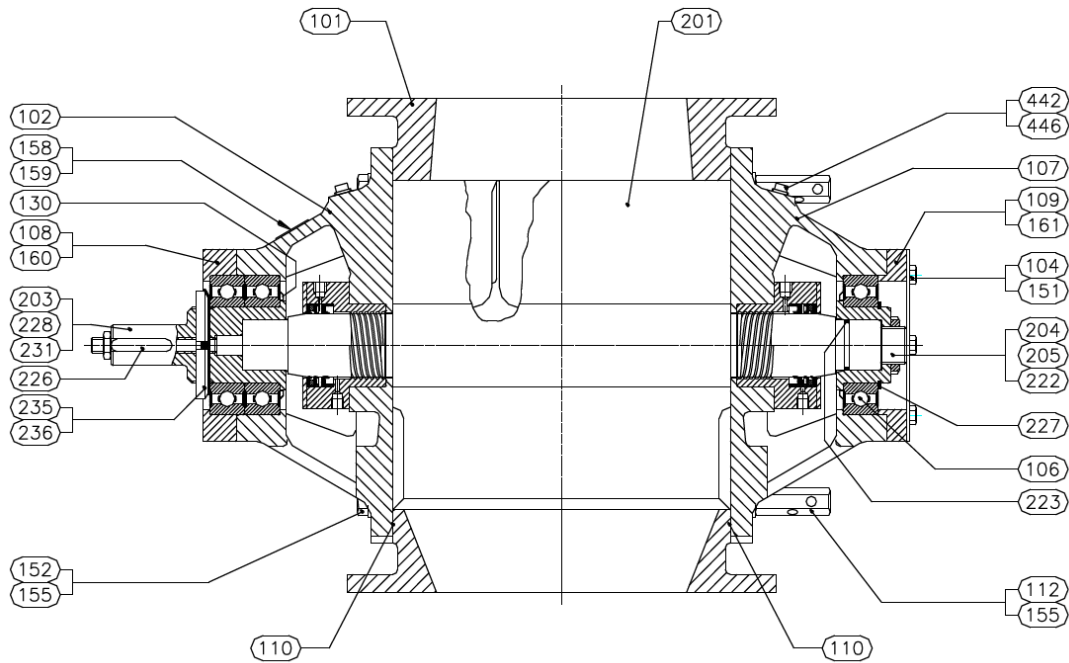


Figure 11.33: Dairy-EL I execution AL-AXL-AML

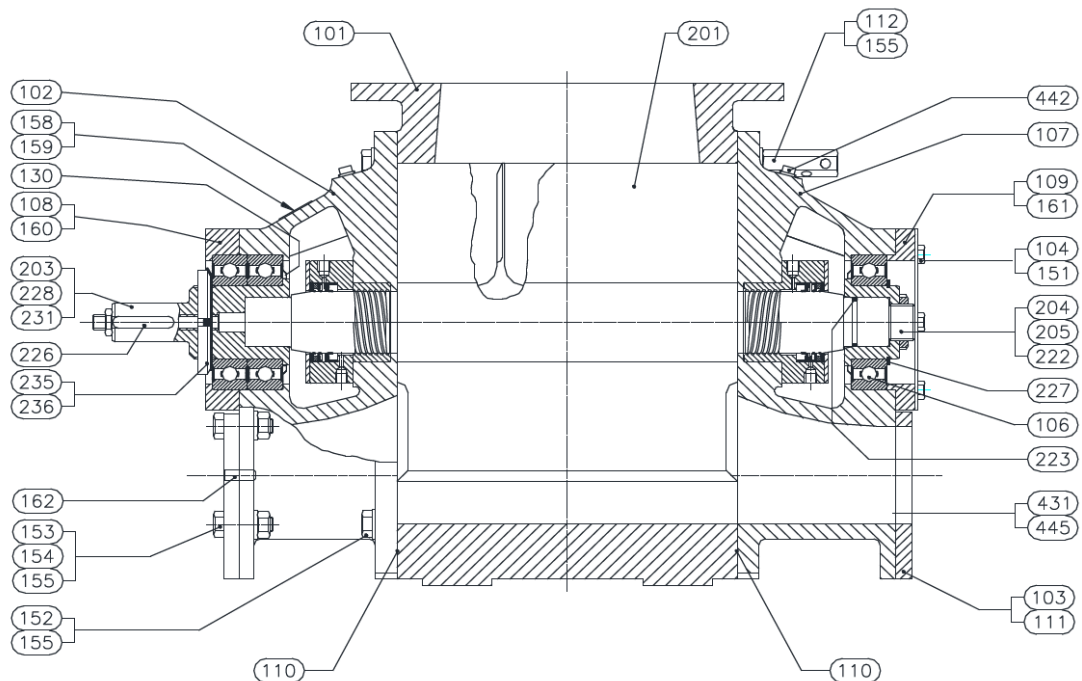
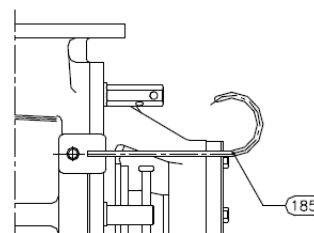
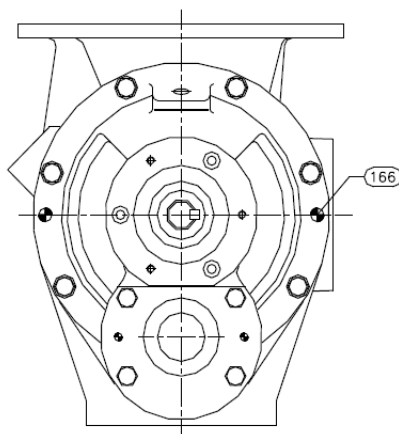
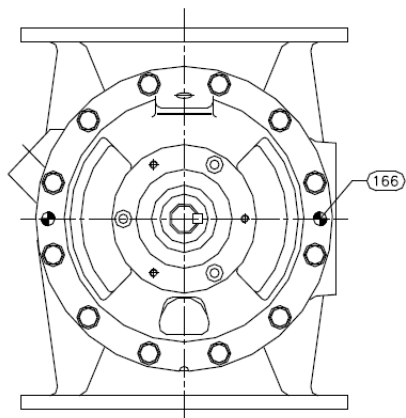
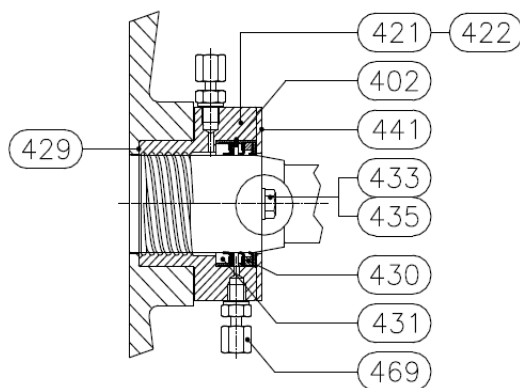


Figure 11.34: Dairy-EL I execution BL-BXL-BXXL





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

### 11.10.2 Dismantling

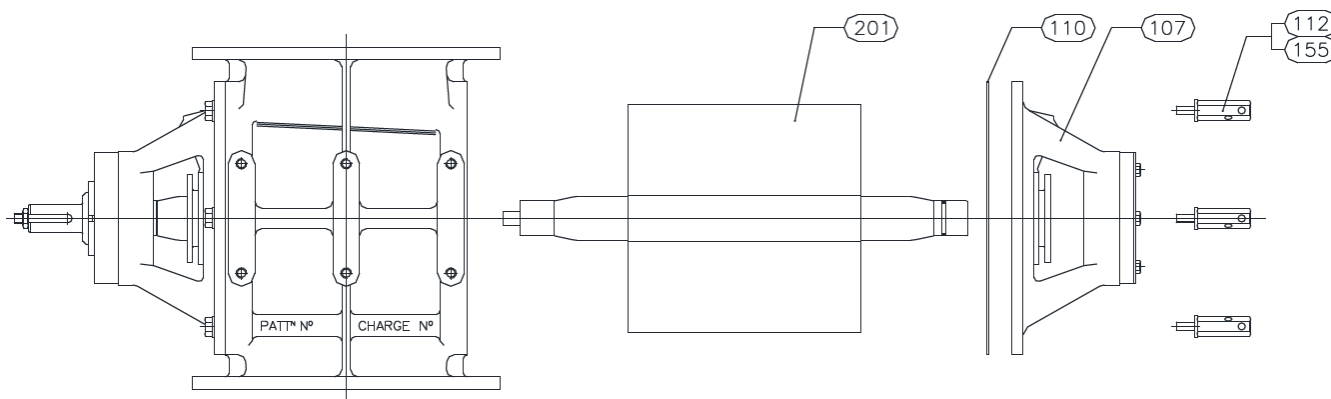


Figure 11.35: Dismantling for cleaning

#### 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

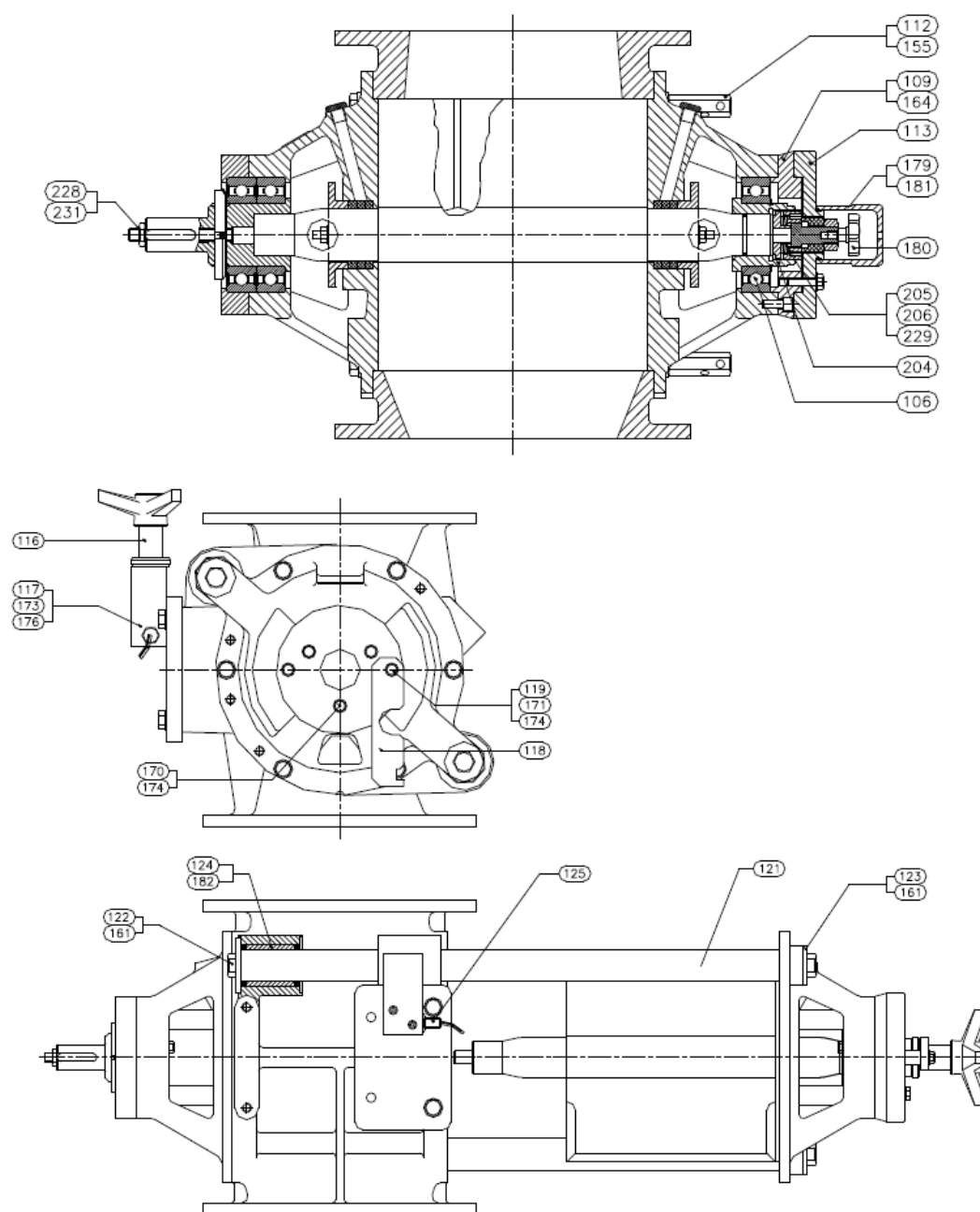


Figure 11.36: MZC parts

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

### 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).

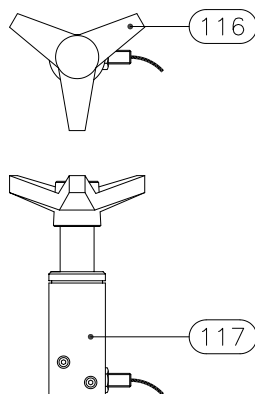


Figure 11.37: T-bolt



#### **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.

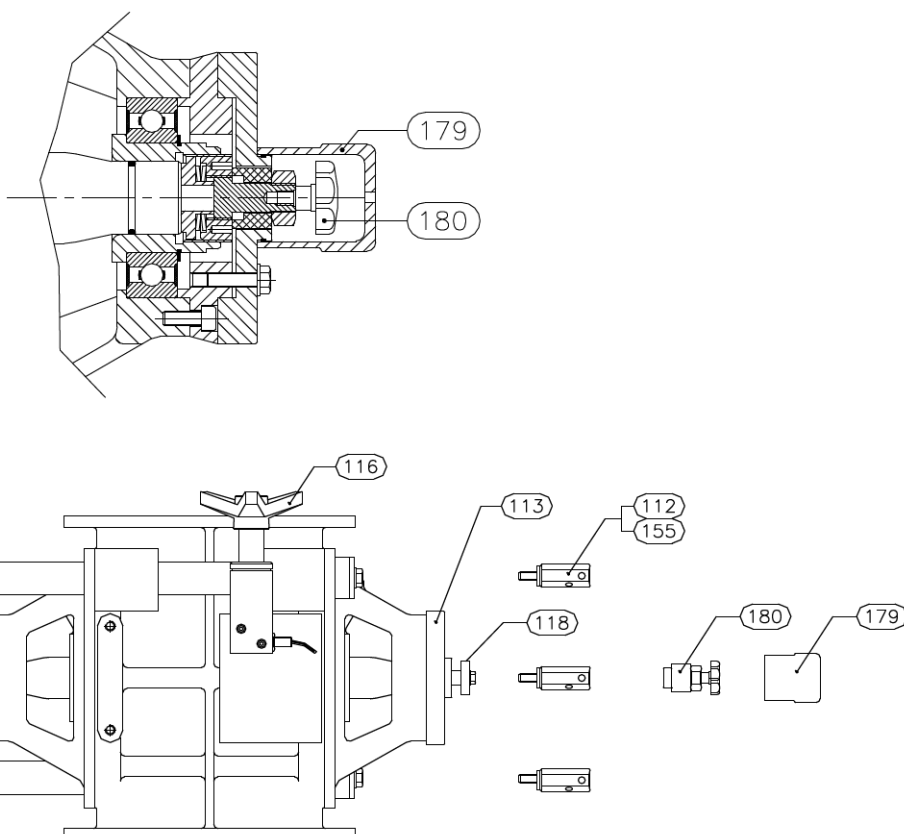


Figure 11.38: Dismantling MZC execution

- ▶ 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 dismantling.
- ▶ 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.

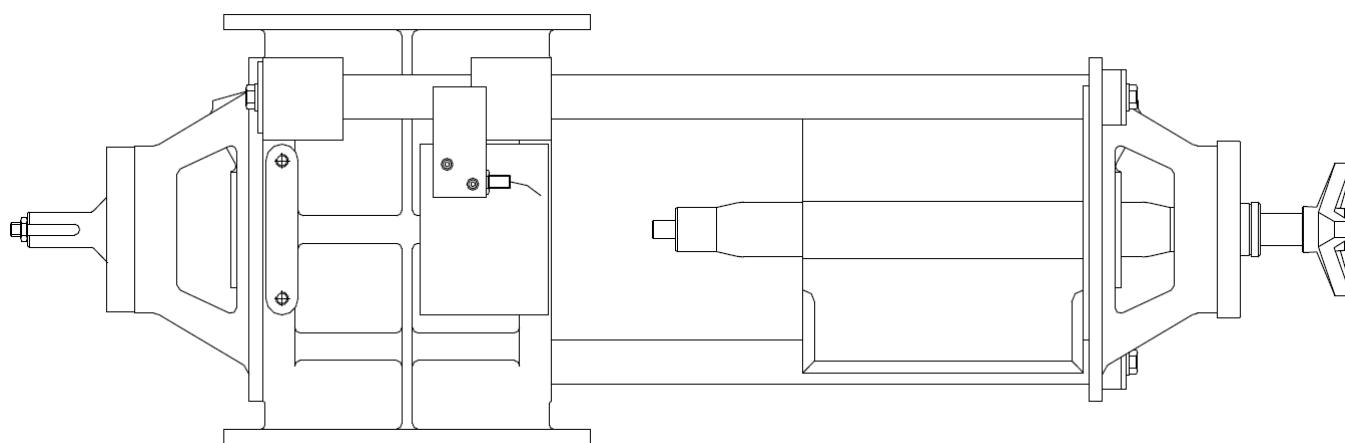


Figure 11.39: Dismantling MVC execution

- ▶ 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

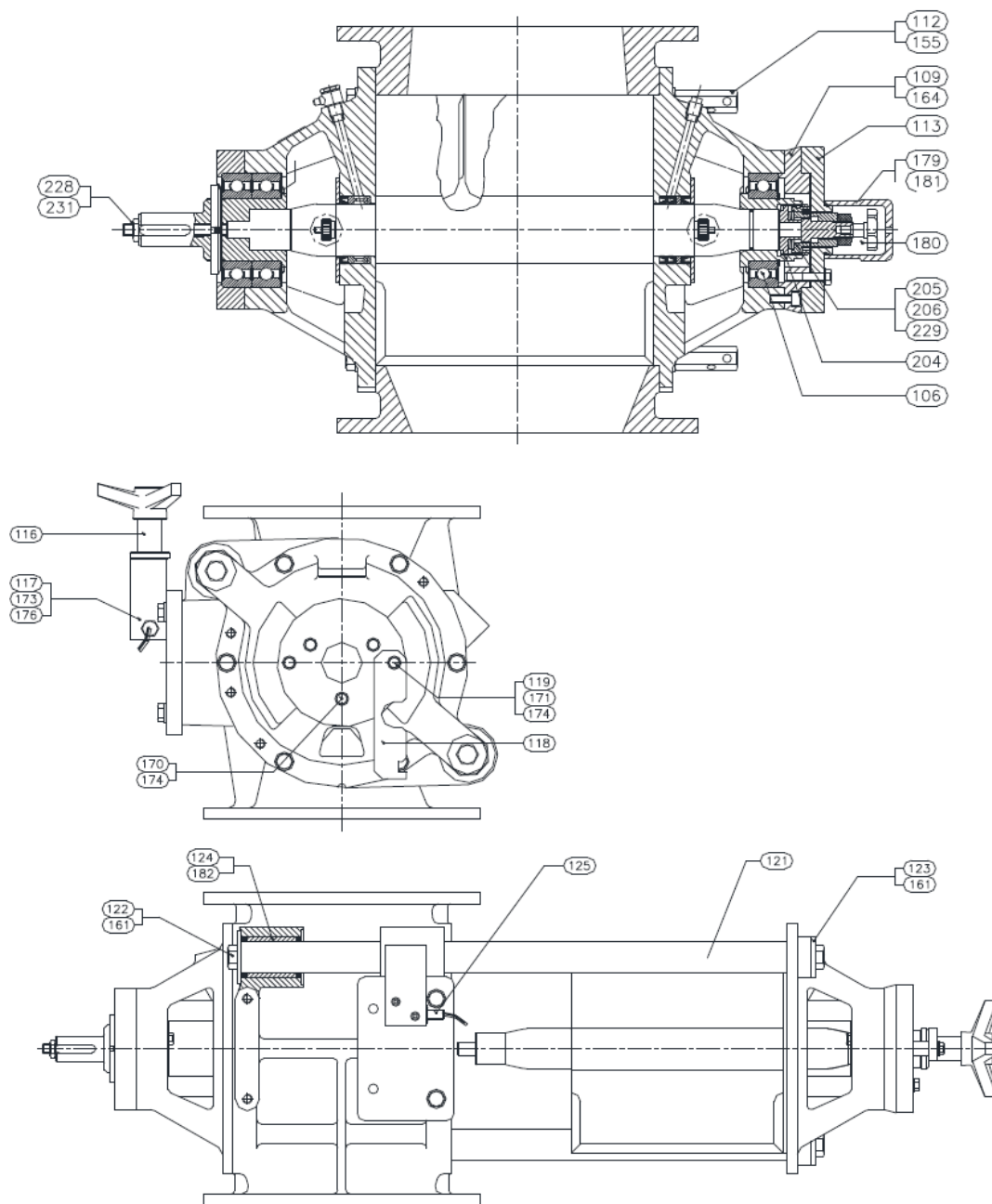


Figure 11.40: Drawing MZC parts (Dairy-WD-MZC)

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

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

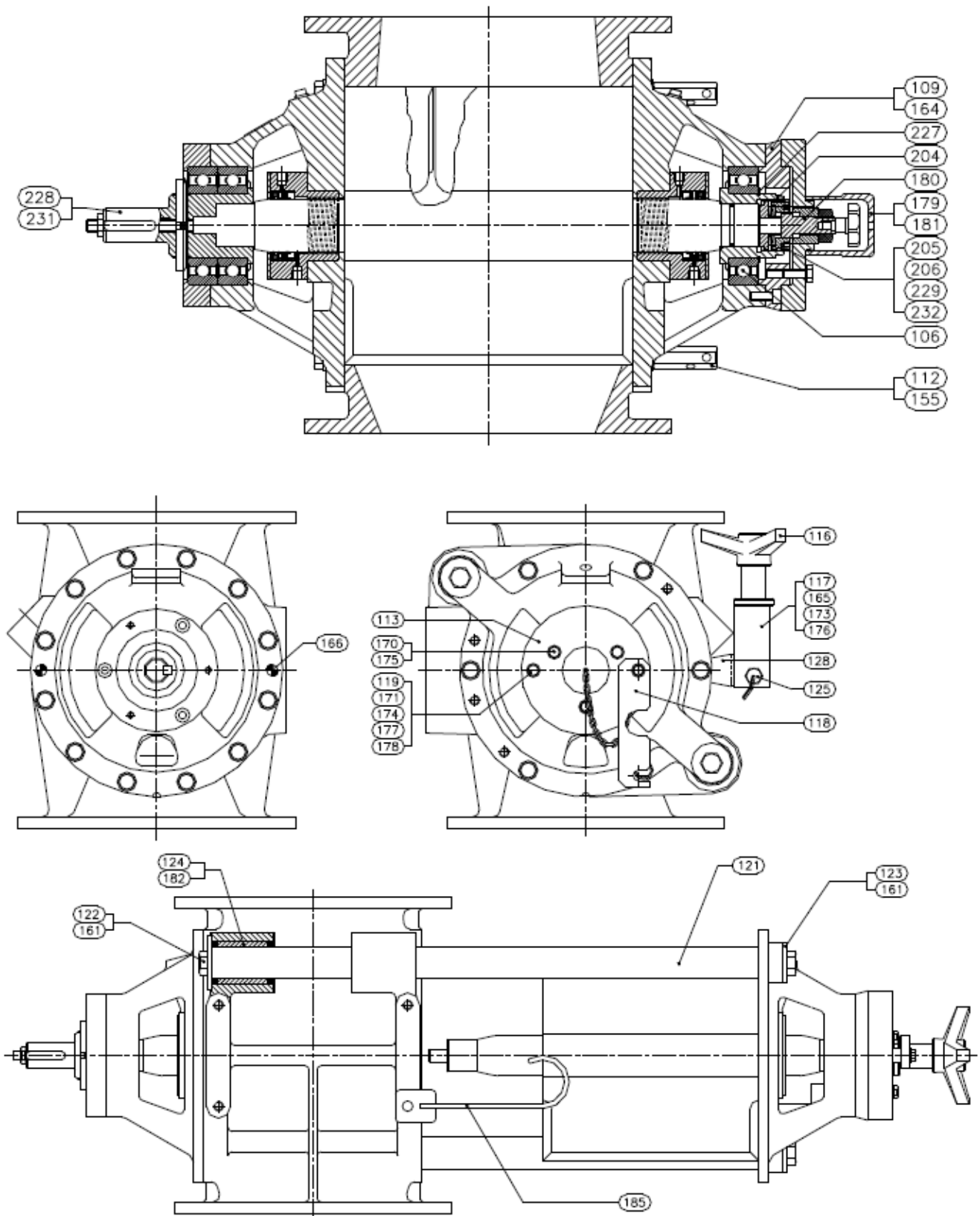


Figure 11.41: Drawing MZC parts (Dairy-EL I-MZC)



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

### 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).

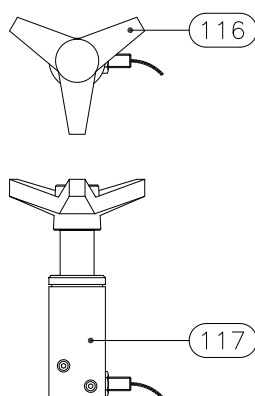


Figure 11.42: T-bolt



#### **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.

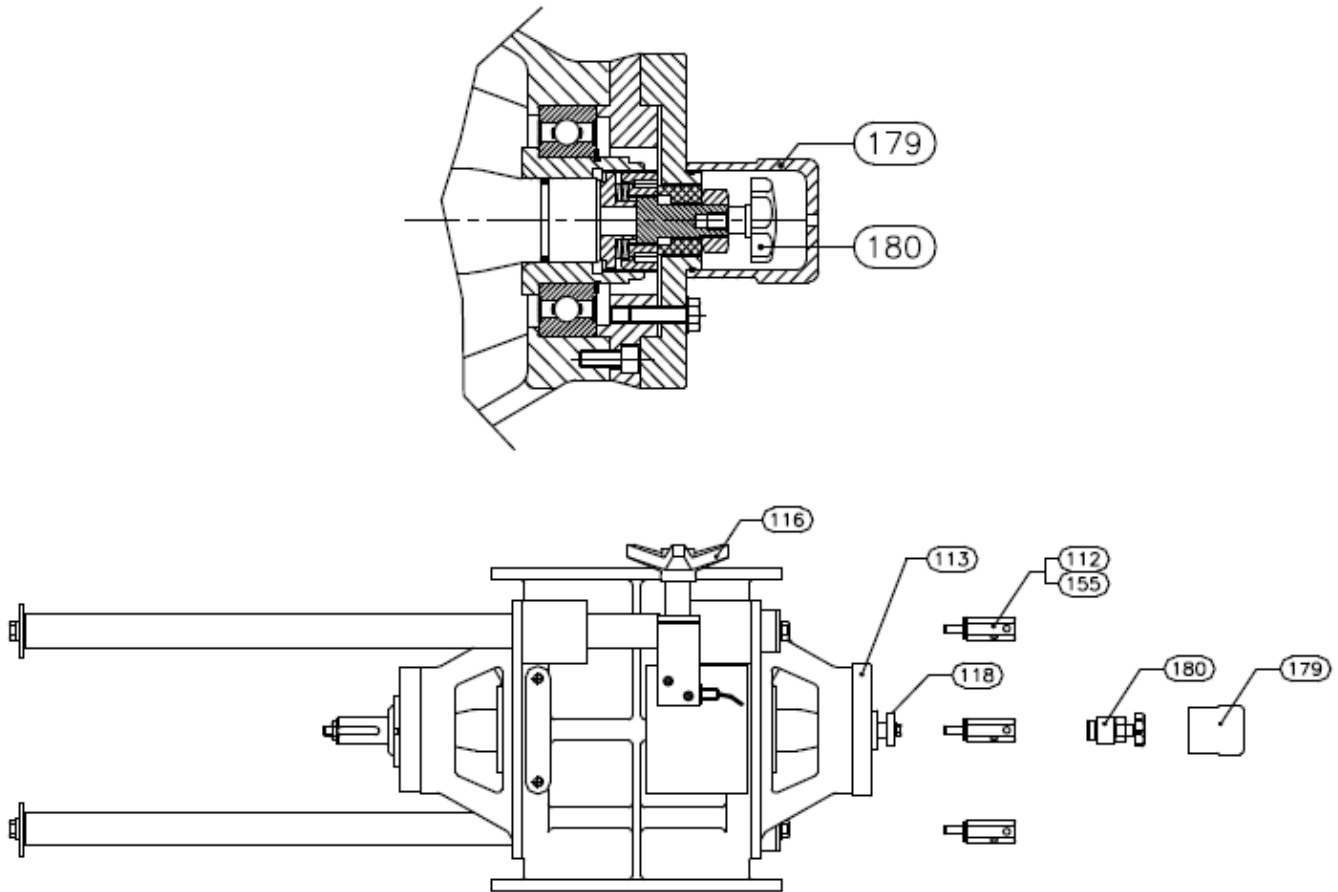
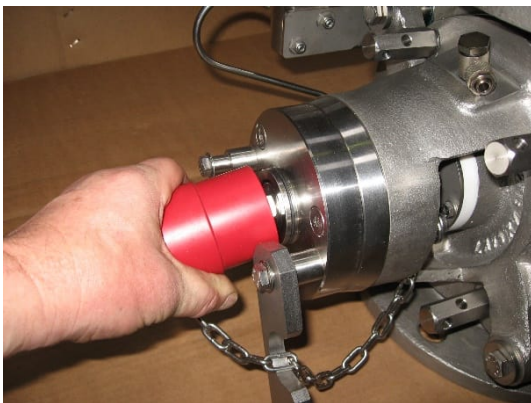
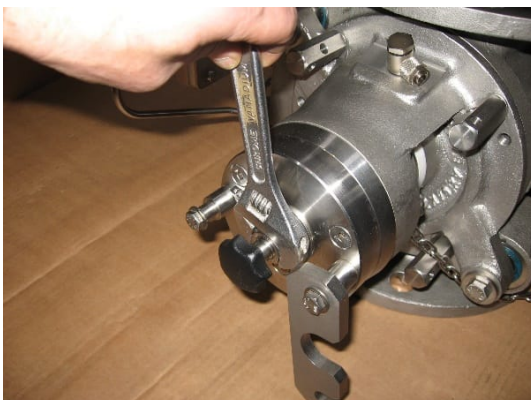


Figure 11.43: Dismantling MZC execution

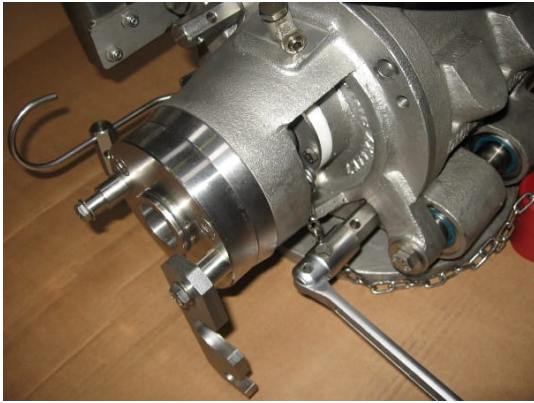
Remove big plastic cap (179) from bearing cover (113).



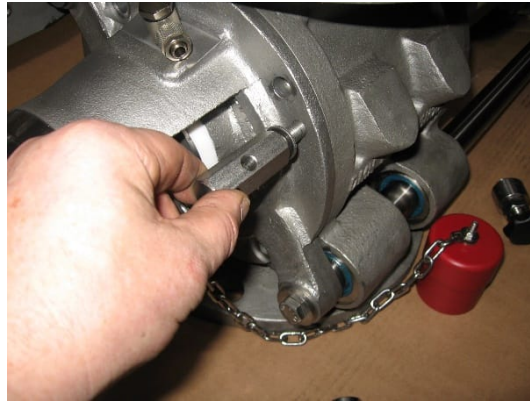
Loosen nut from locking unit (180) and remove.



Remove bolts (112) from cover.



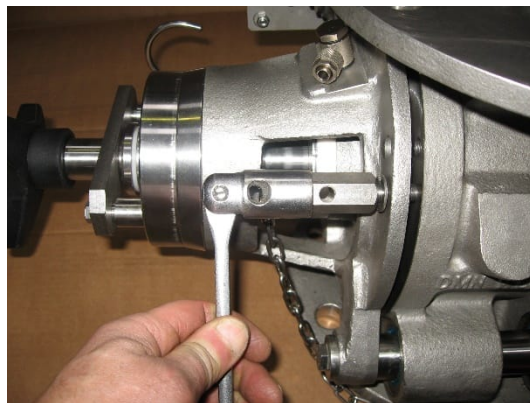
If necessary two bolts can be fitted into jacking holes of cover to enable dismantling.



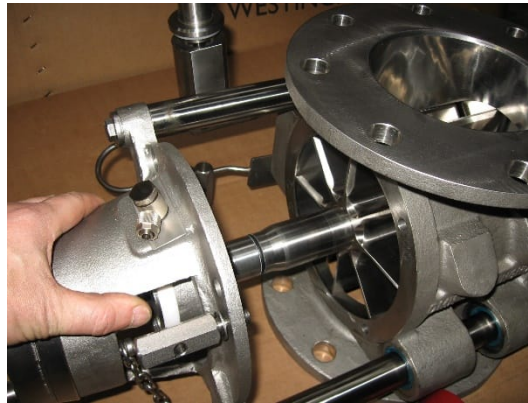
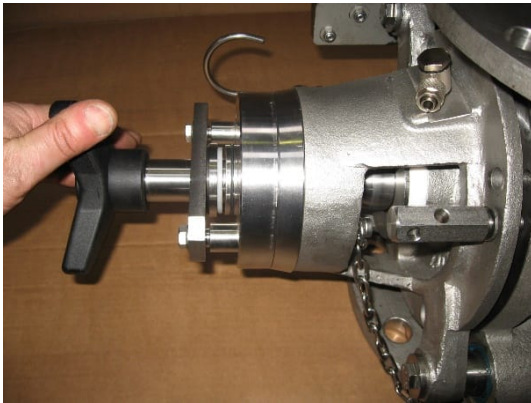
- ▶ Position lock strip (118) in such a way that central T-bolt (116) can be turned into the hole.
- ▶ Turn central T-bolt into rotor as far as possible.



- ▶ 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.

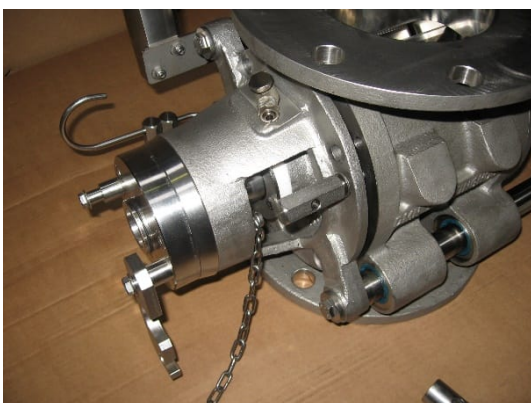


**ATTENTION!**

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!**

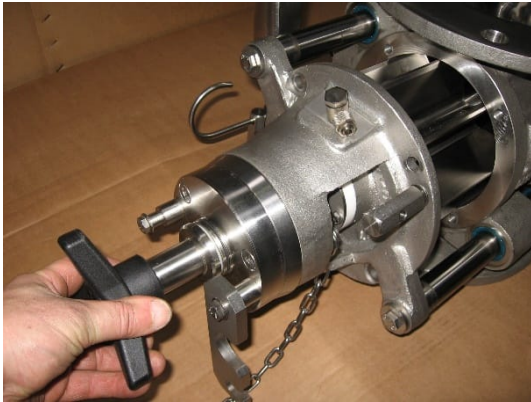
When the rotor is not correctly pulled against the cover, removal of the cover with the rotor from the body may cause damage to the body or the rotor.

- ▶ 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)

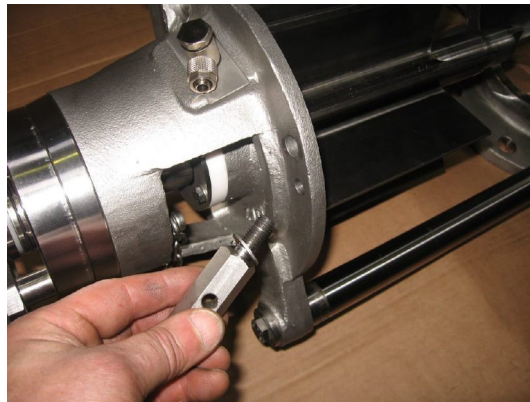
Clean body surface.



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!**

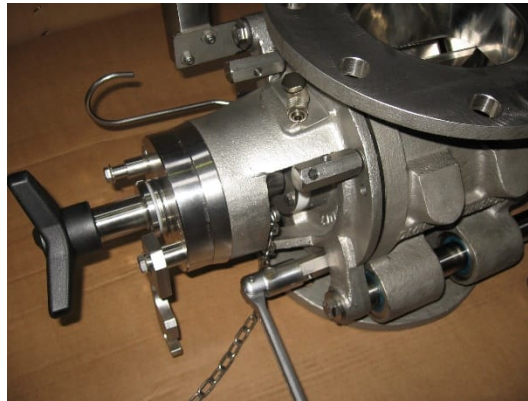
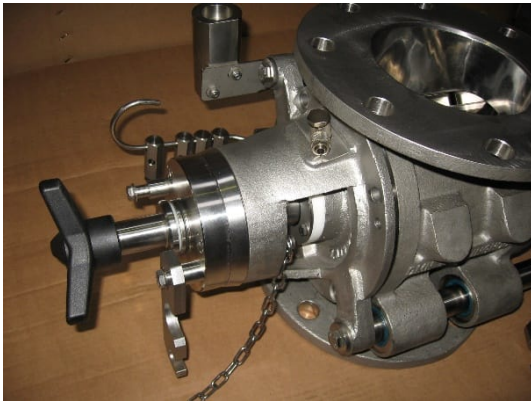
Only for Dairy EL I execution

Check gasket (110) between body and end cover.

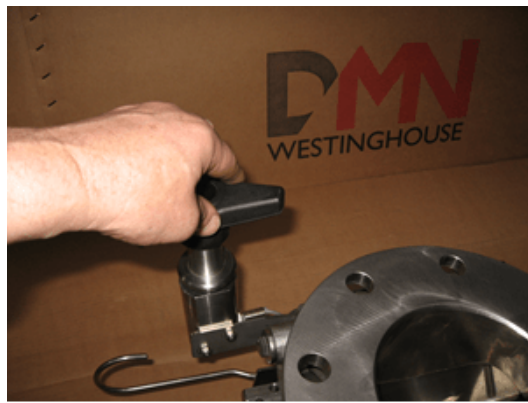
If damaged replace gasket, gasket is supplied as spare with the rotary valve.

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.

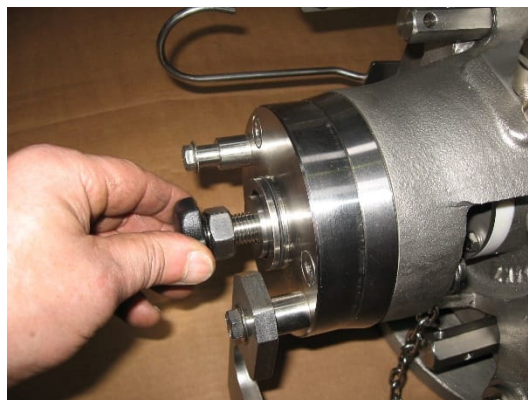


- ▶ Turn lock strip (118) away in such a way that central T-bolt can be screwed out of the rotor.
- ▶ Screw central T-bolt into securing block (117) provided for this purpose.

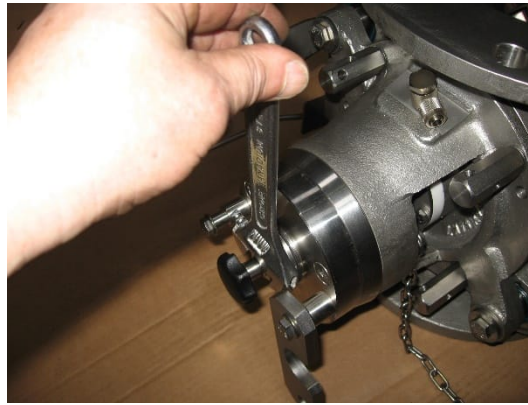
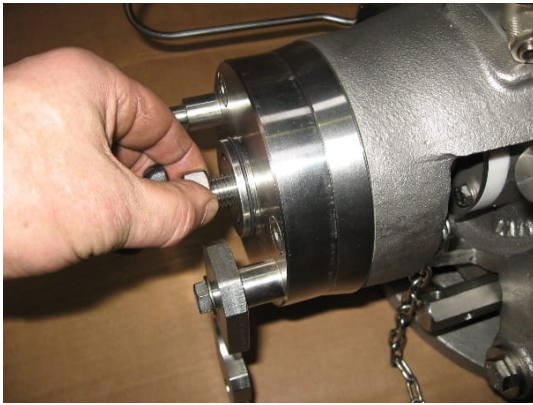


Unscrew nut

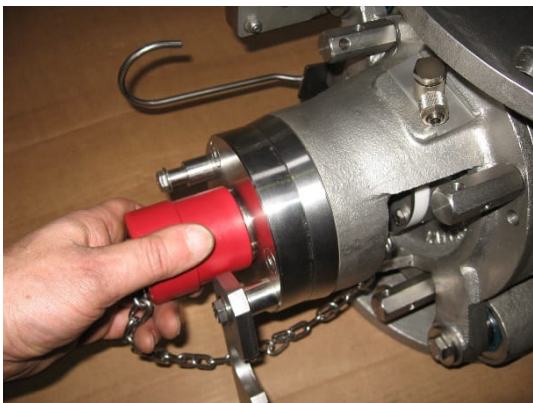
Turn locking unit (180) in position (only hand tight!).



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

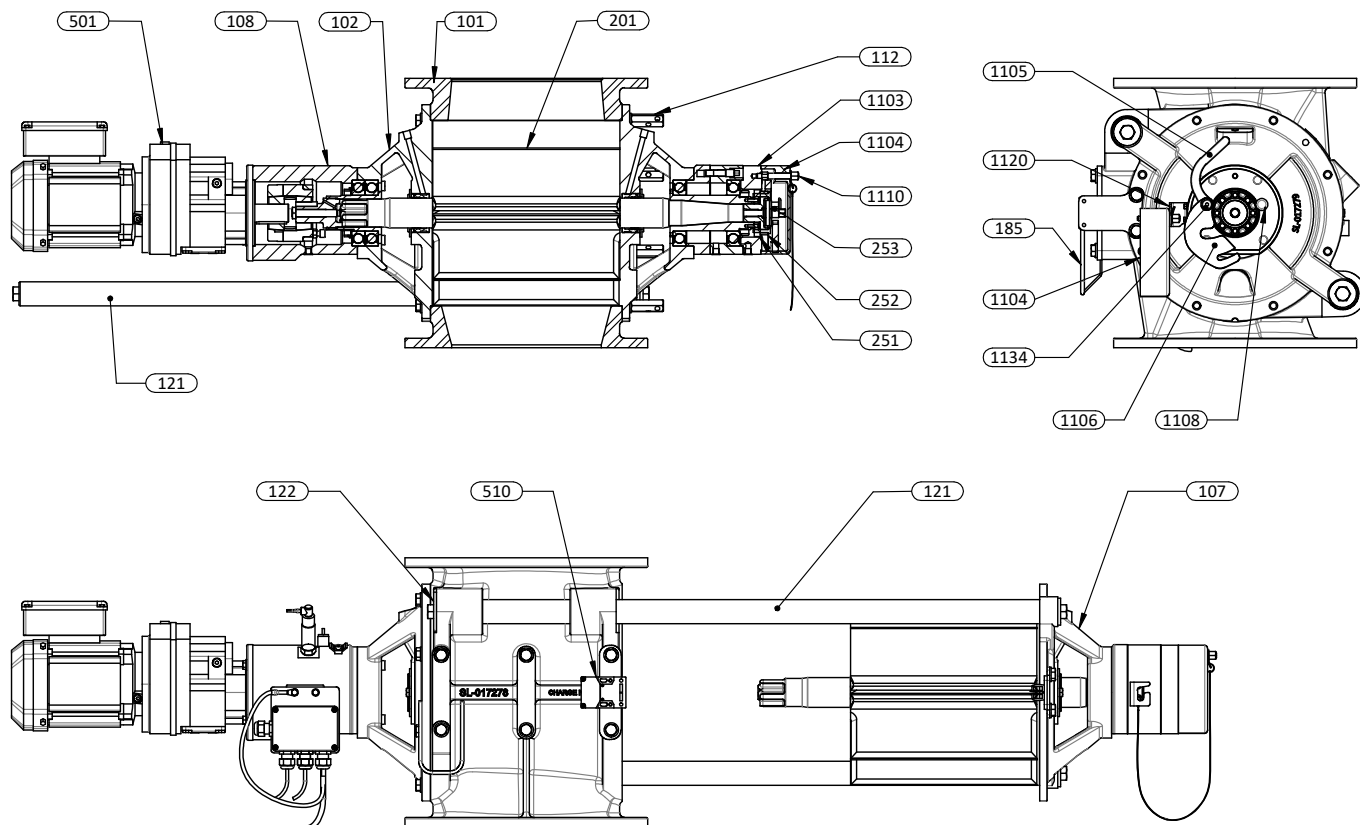


Figure 11.44: Drawing MZC-I parts

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

### 11.13.2 Inspection and cleaning



Read the cleaning instructions (see chapter 9.2).

#### 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.

## USDA

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.

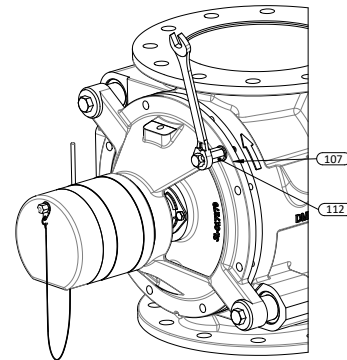
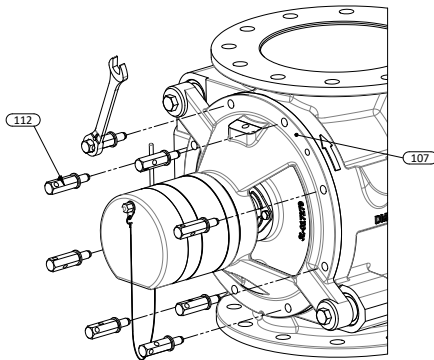


The safety switch is a mechanical make-break contact to detect that an end cover is removed from the body. (see chapter 8.4.4)

**11.13.2.1 Procedure 1: Basic cleaning non-drive side**

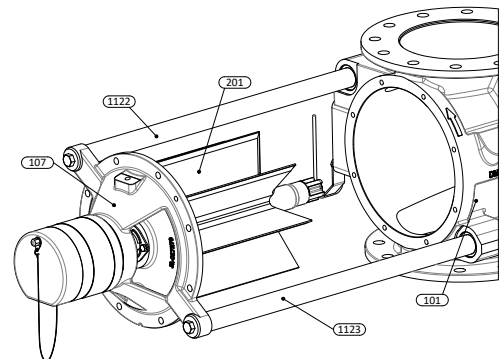
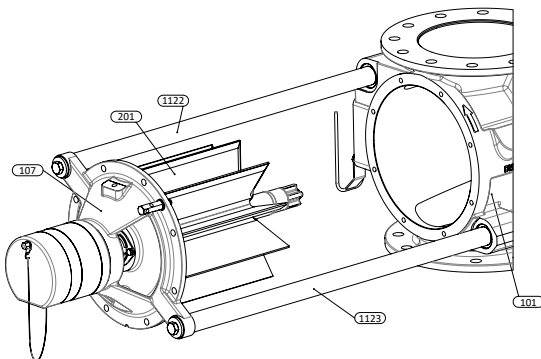
Remove bolts (112) from the end cover.

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

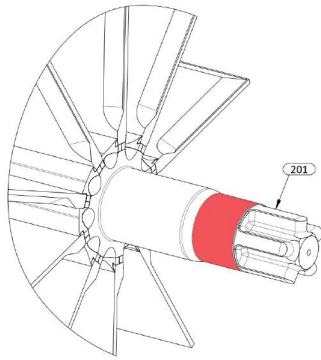


- ▶ Remove end cover and rotor (201) by pulling it axially from the body.

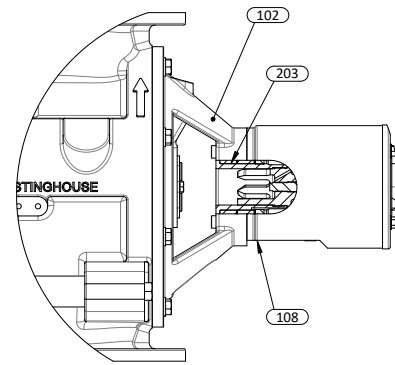
- ▶ Remove bolts (112) from end cover.
- ▶ Rotor (201) can rotate for inspection and cleaning.
- ▶ Clean body internally.



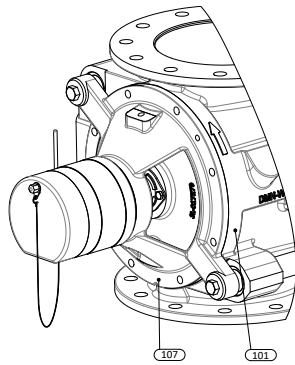
- ▶ Thoroughly clean rotor shaft drive side.
- ▶ Apply Berulub FG-H 2 EP to fitting (shown in red)



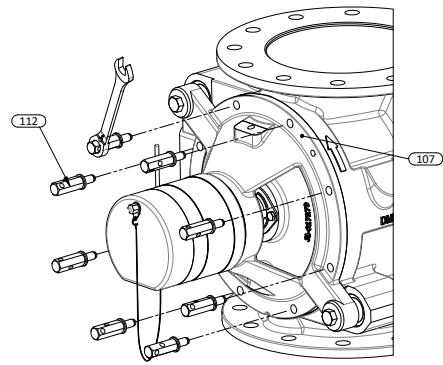
- ▶ Inspect and clean drive shaft (203)



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

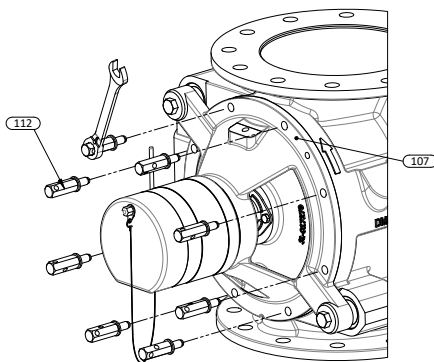


- ▶ Tighten bolts (112) crosswise in such a way that end cover fits without any clearance to the flat side of the body.

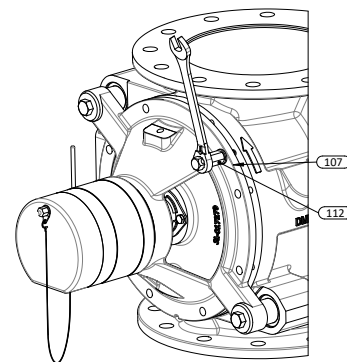


### 11.13.2.2 Procedure 2: Thorough cleaning non-drive side

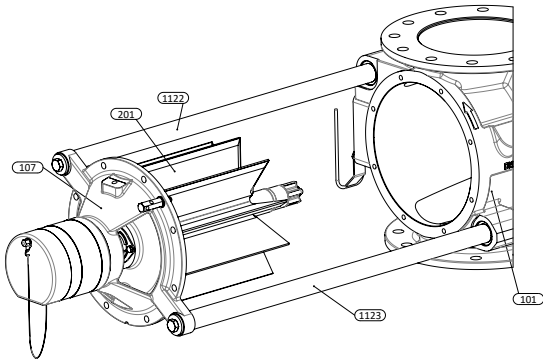
- ▶ Remove bolts (112) from the end cover.



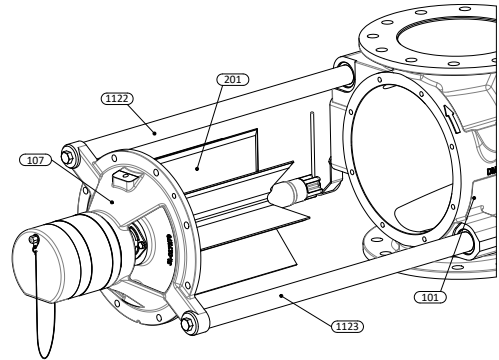
- ▶ To remove the end cover (107) screw two of these bolts (112) into the jacking holes in the end cover.



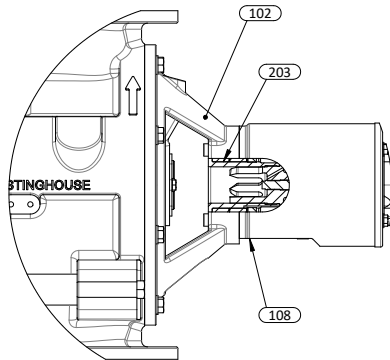
- ▶ Remove end cover and rotor (201) by pulling it axially from the body.



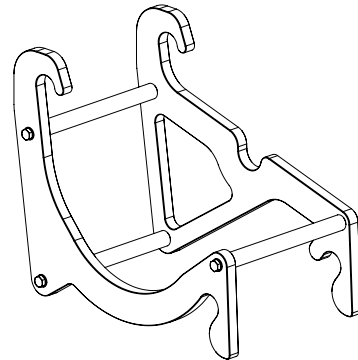
- ▶ Remove bolts (112) from end cover.
- ▶ Rotor (201) can rotate for inspection and cleaning.
- ▶ Clean body internally.



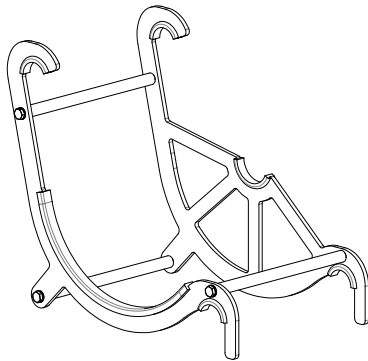
- ▶ Inspect and clean drive shaft (203).



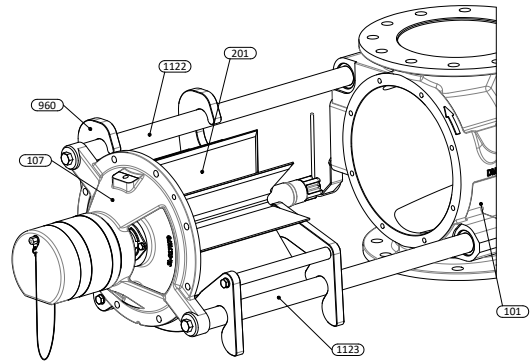
- ▶ Rotor Support 150-250 (960)



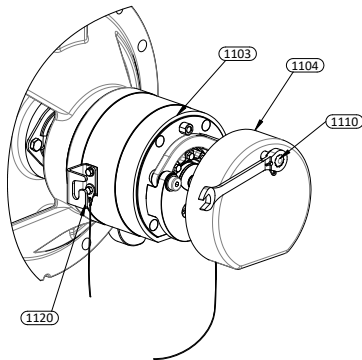
- ▶ Rotor Support 300-350 (960)



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

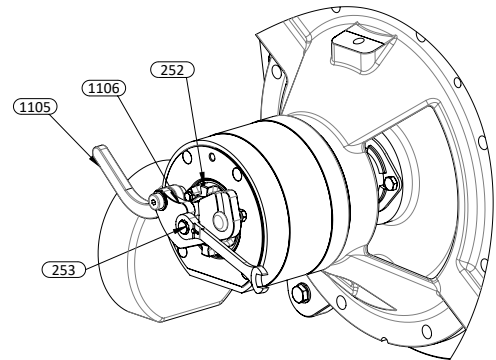


- ▶ Loosen bolt (1110) to remove cap (1104).
- ▶ Place cap on bracket (1120).



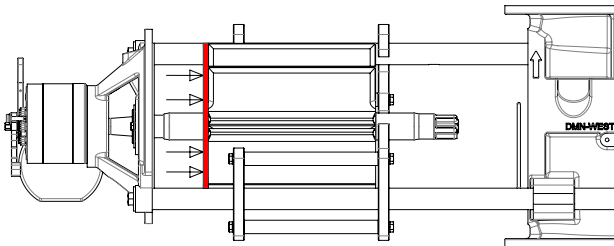
To remove rotor from end cover for inspection and cleaning of seal.

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



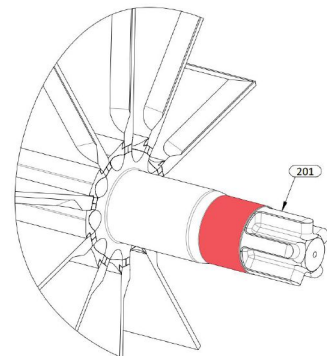
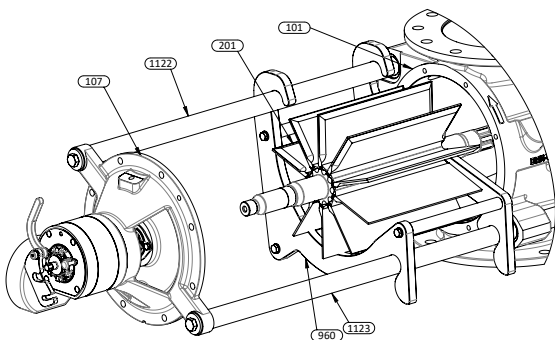
**ATTENTION!**

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

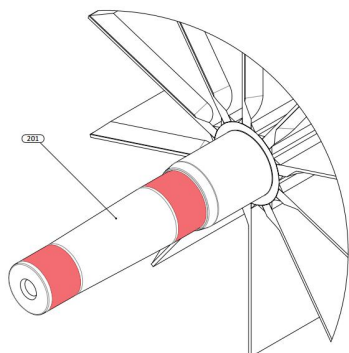


- ▶ Slide rotor support away from end cover.

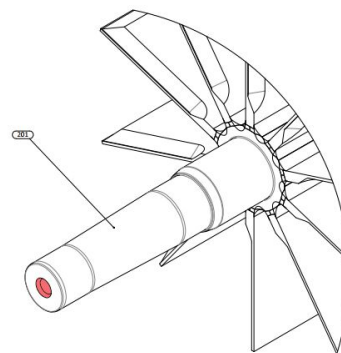
- ▶ Thoroughly clean rotor shaft drive side.
- ▶ Apply Berulub FG-H 2 EP to fitting (shown in red).



- ▶ 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.



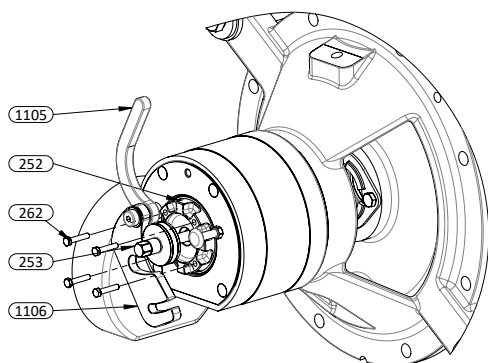
- ▶ Clean thread hole (shown in red) of rotor shaft non drive side.
- ▶ Apply Berulub FG-H 2 EP to thread hole.



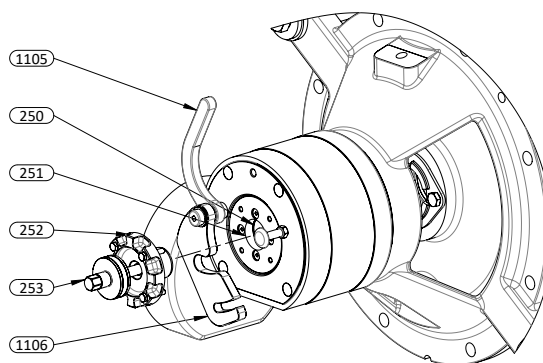
Non drive side Shaft seal instruction (see chapter 11.16)

### Clean shaft hub

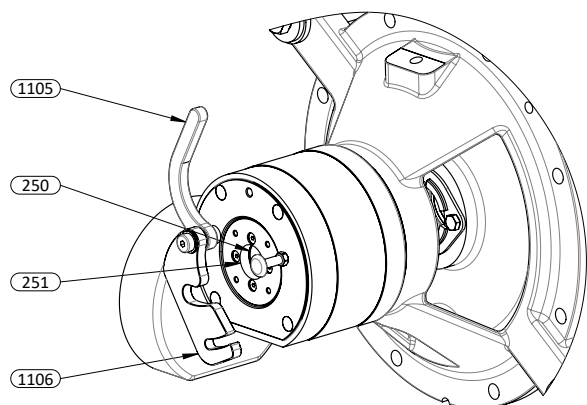
- ▶ Remove the bolts (262) from the end stop (252).



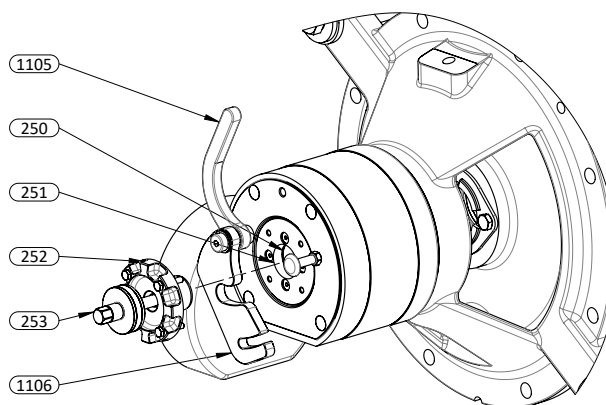
- ▶ Remove end stop (252).
- ▶ Clean centerbolt (253) thread.
- ▶ Apply Berulub FG-H 2 EP to centerbolt (253) thread.



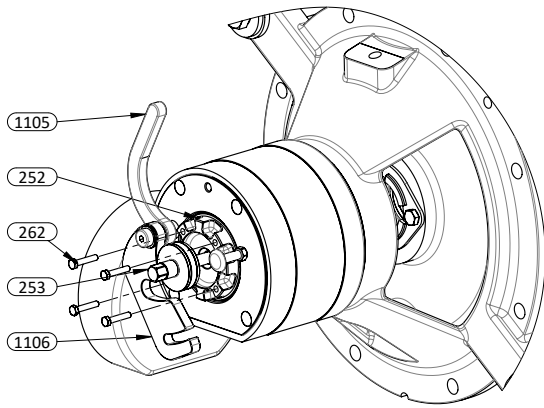
- ▶ Clean rotor shaft hub (250).



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

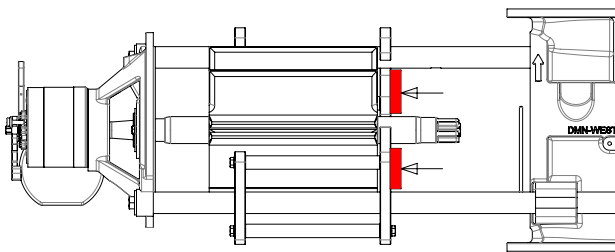


- ▶ Use the bolts (262) to re-assemble end stop.



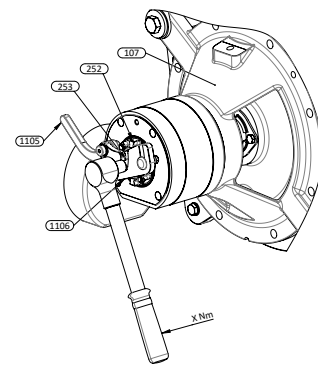
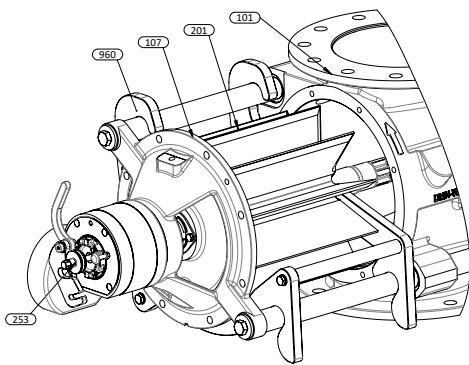
**ATTENTION!**

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



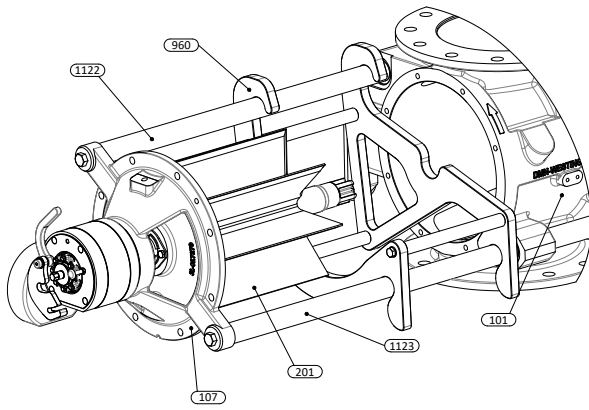
- ▶ Slide rotor back into the end cover.

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

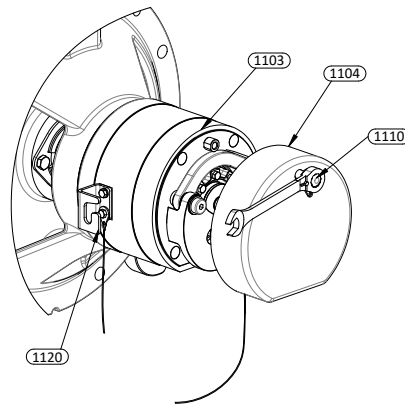


AL-BL	AXL-BXL-AML	BXXL	NR	Torque (X)
150-175	200			17-21Nm
200-250	250-300	350	347	20-25Nm
300-350	350-400			35-40Nm

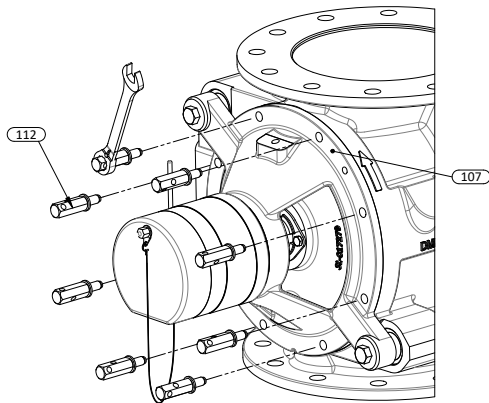
- ▶ Remove Rotor support (960).



- ▶ 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

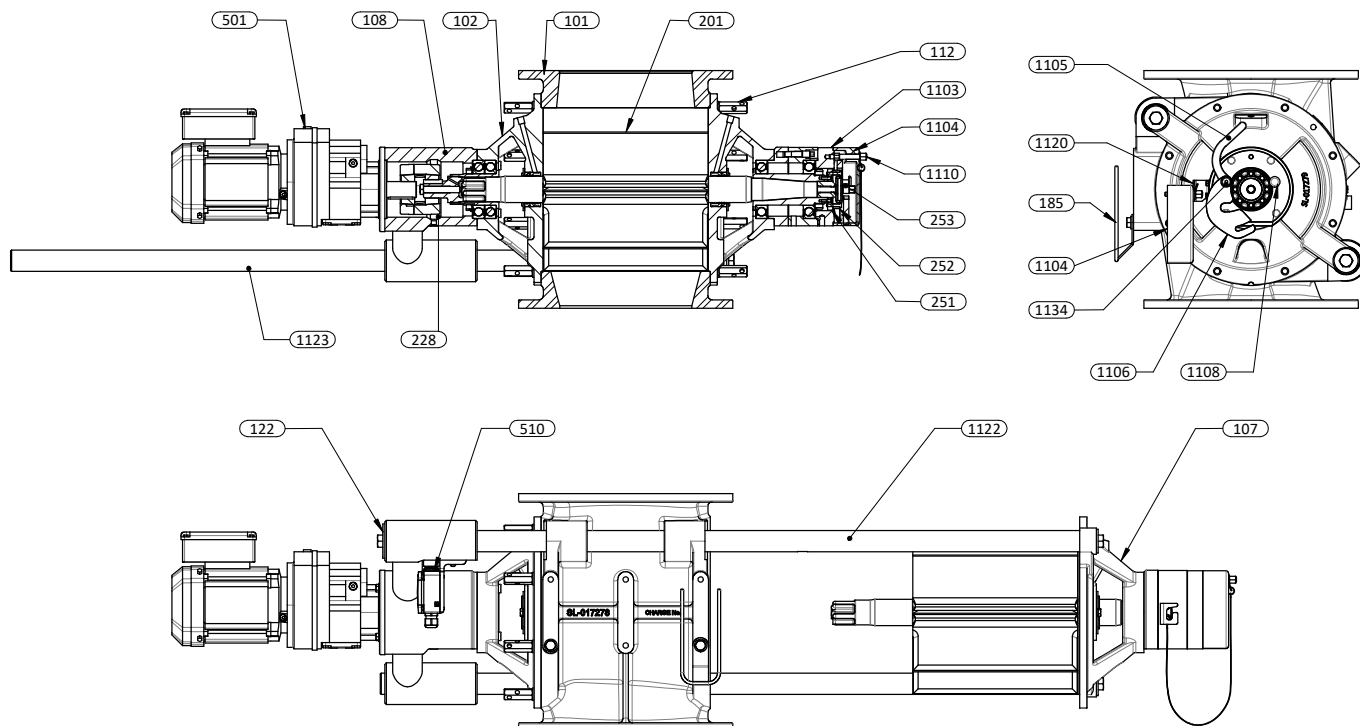


Figure 11.45: Drawing MZC-II parts

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

### 11.14.2 Inspection and cleaning



Read the cleaning instructions (see chapter 9.2).

#### 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.

## USDA

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



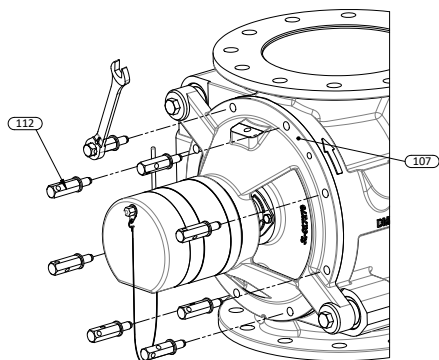
**DANGER!**

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

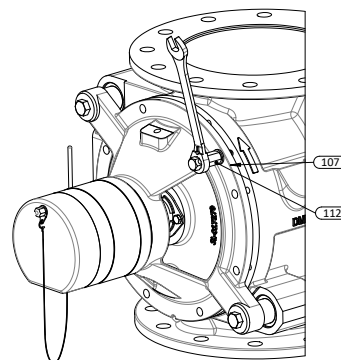
The safety switch is a mechanical make-break contact to detect that an end cover is removed from the body. (see chapter 8.4.4)

**11.14.2.1 Procedure 1: Basic cleaning non-drive side**

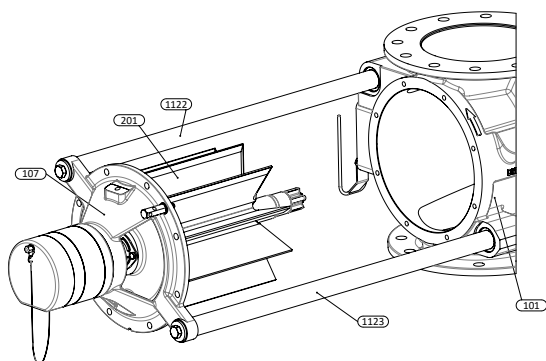
- ▶ Remove bolts (112) from the end cover.



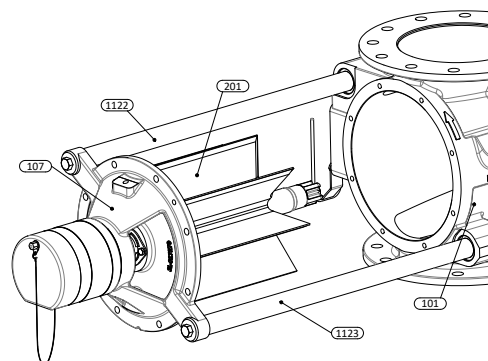
- ▶ To remove the end cover (107) screw two of these bolts into the jacking holes in the end cover.



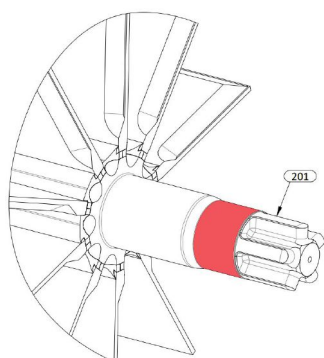
- ▶ Remove end cover and rotor (201) by pulling it axially from the body.



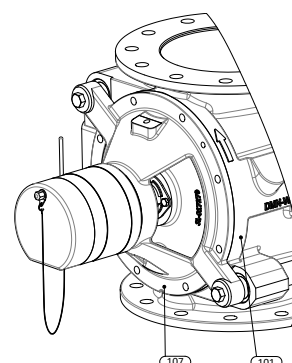
- ▶ Remove bolts (112) from end cover.
- ▶ Rotor (201) can rotate for inspection and cleaning.
- ▶ Clean body internally.



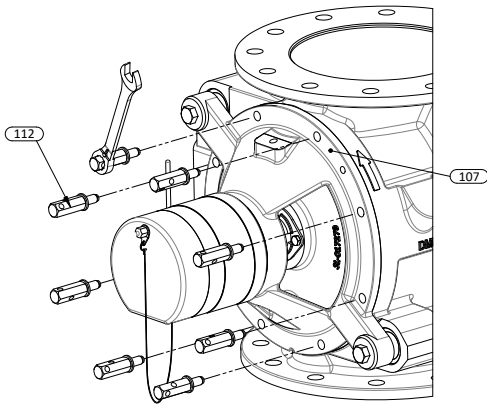
- ▶ Thoroughly clean rotor shaft drive side. Apply Berulub FG-H 2 EP to fitting (shown in red)



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

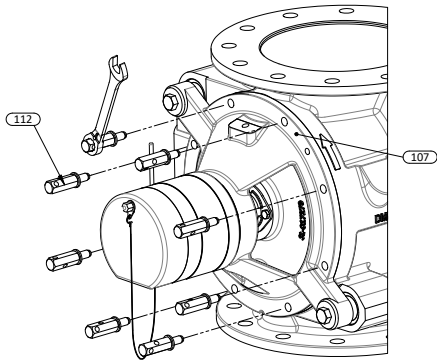


- ▶ Tighten bolts (112) crosswise in such a way that end cover fits without any clearance to the flat side of the body.

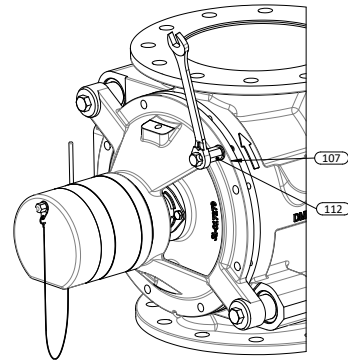


#### 11.14.2.2 Procedure 2: Thorough cleaning non-drive side

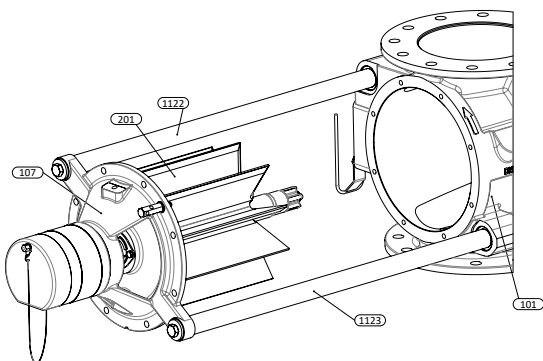
- ▶ Remove bolts (112) from the end cover.



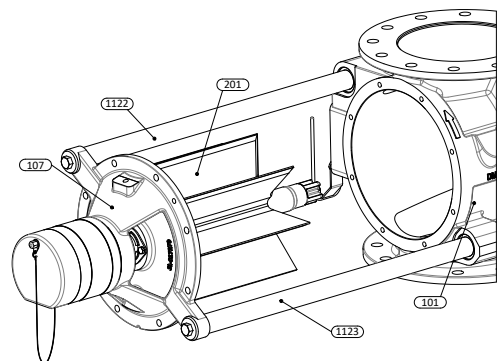
- ▶ To remove the end cover (107) screw two of these bolts into the jacking holes in the end cover.



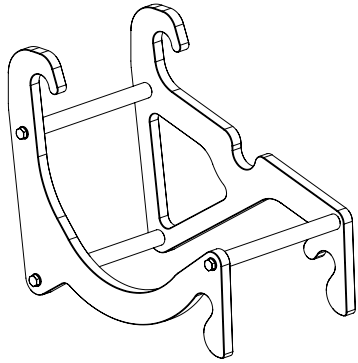
- ▶ Remove end cover and rotor (201) by pulling it axially from the body.



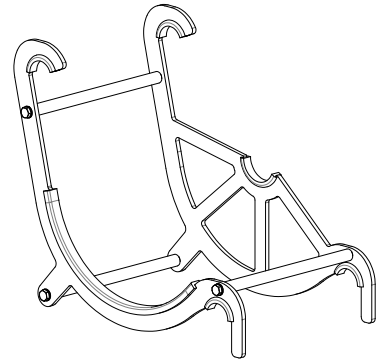
- ▶ Remove bolts (112) from end cover.
- ▶ Rotor (201) can rotate for inspection and cleaning.
- ▶ Clean body internally.



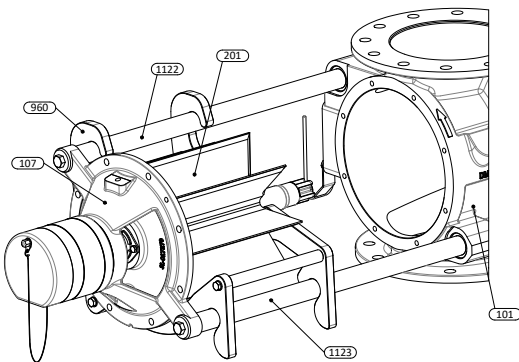
- ▶ Rotor Support 150-250 (960)



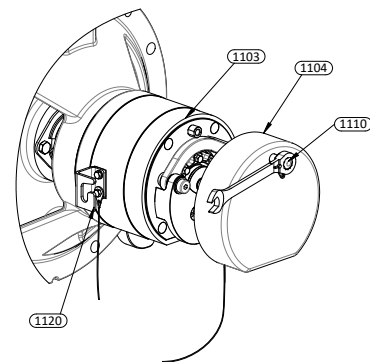
- ▶ Rotor Support 300-350 (960)



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

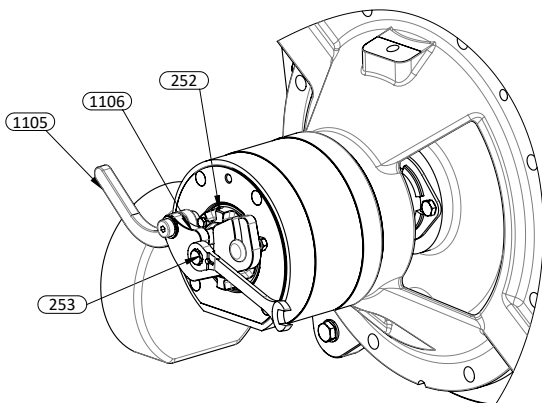


- ▶ Loosen bolt (1110) to remove cap (1104).
- ▶ Place cap on bracket (1120).



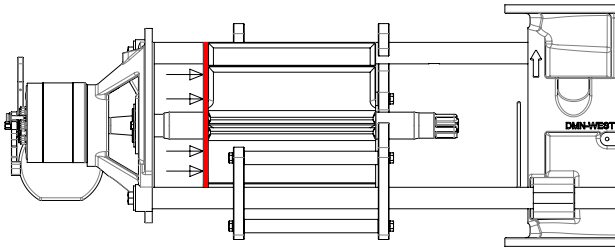
To remove rotor from end cover for inspection and cleaning of shaft seal.

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



**ATTENTION!**

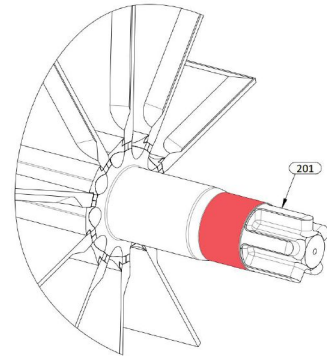
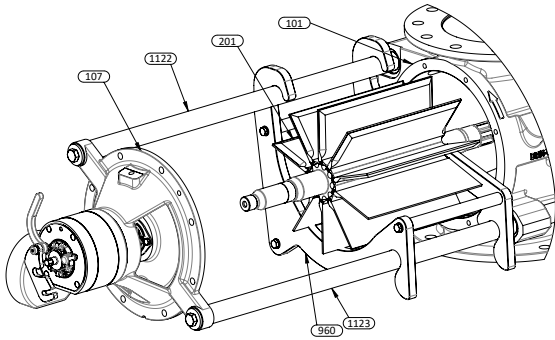
Only put force on the ROTOR while pulling it away from the end cover!



▶ Slide rotor with rotor support away from end cover.

▶ Thoroughly clean rotor shaft drive side.

▶ Apply Berulub FG-H 2 EP to fitting (shown in red).



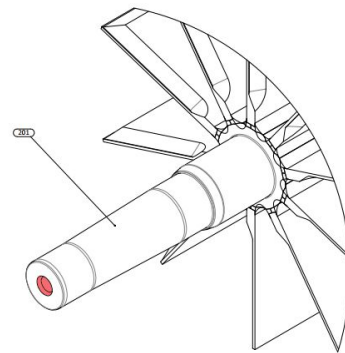
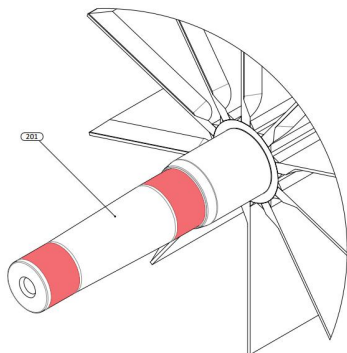
▶ Clean rotor shaft non drive side.

▶ 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.

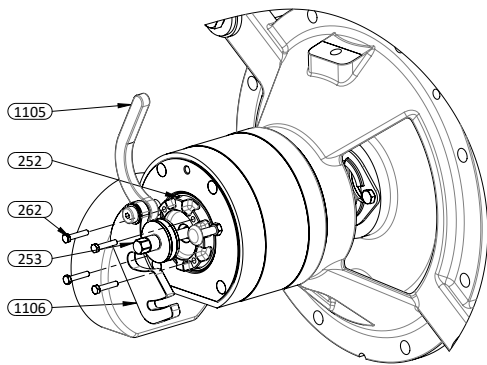
▶ Apply Berulub FG-H EP to thread hole.



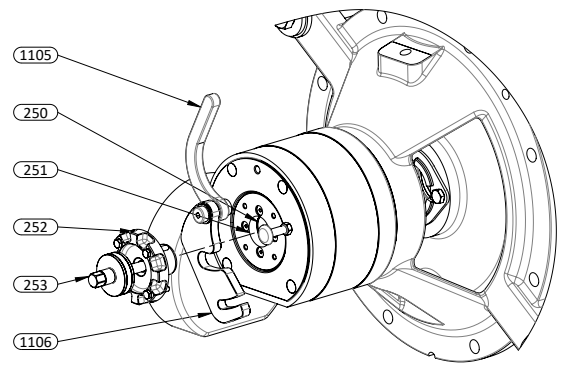
Non drive side Shaft seal instruction (see chapter 11.16).

**Clean shaft hub**

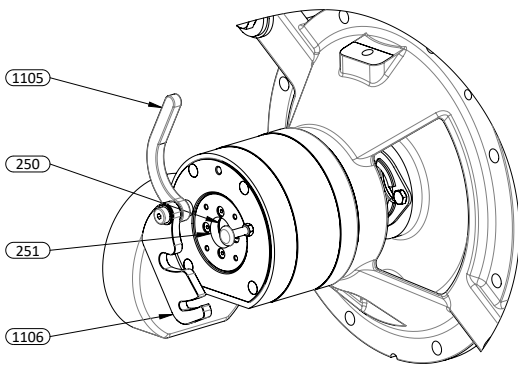
- ▶ Remove the bolts (262) from the end stop (252).



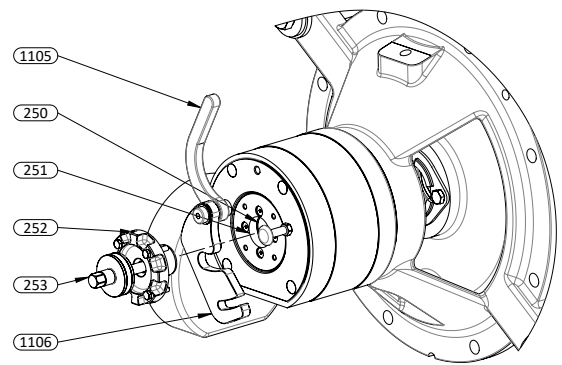
- ▶ Remove end stop (252).
- ▶ Clean centerbolt (253) thread.
- ▶ Apply Berulub FG-H 2 EP to centerbolt (253) thread.



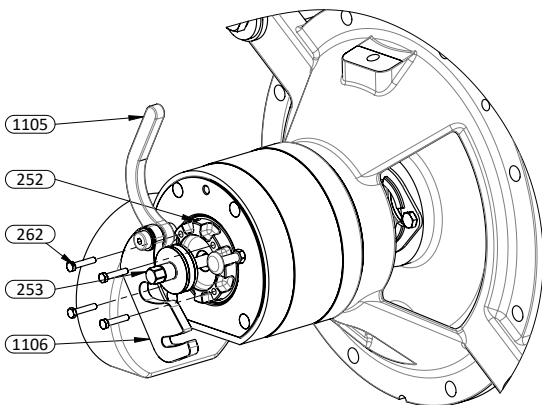
- ▶ Clean rotor shaft hub (250).



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

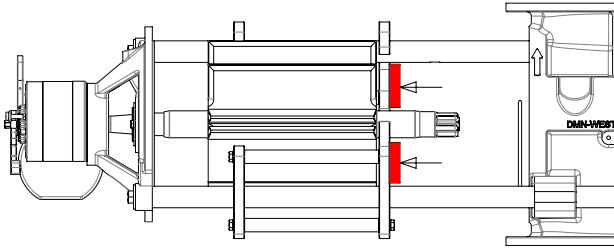


- ▶ Use the bolts (262) to re-assemble end stop.



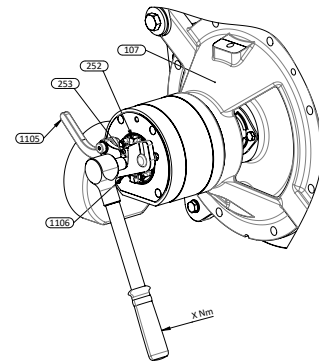
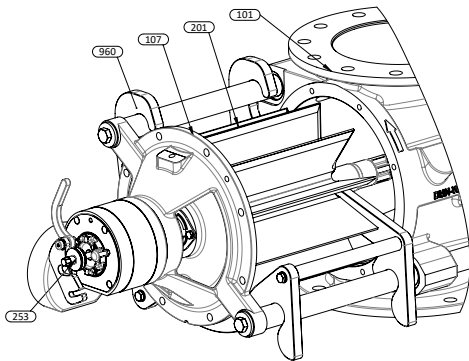
**ATTENTION!**

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



► Slide end cover over rotor shaft.

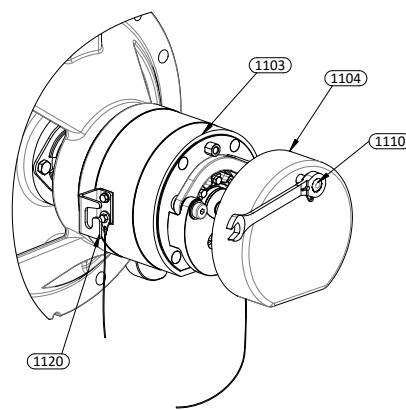
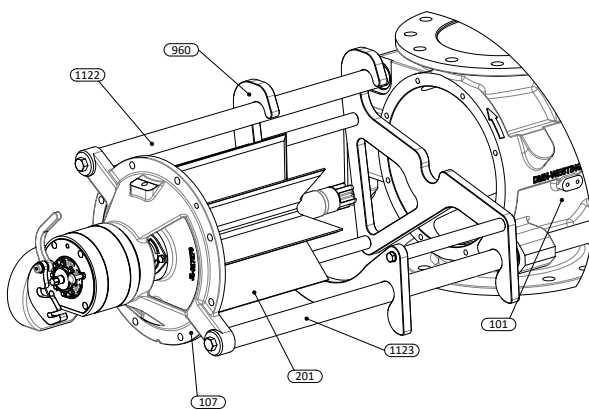
- Turn centerbolt (253) clockwise.
- Turn handle (1105) to locked position.
- Fasten centerbolt clockwise with torque wrench to the specified torque



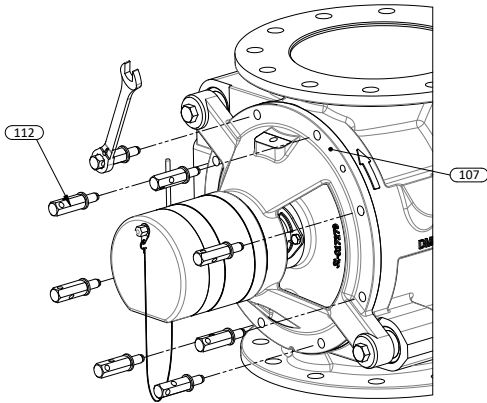
AL-BL	AXL-BXL-AML	BXXL	NR	Torque (X)
150-175	200			<b>17-21Nm</b>
200-250	250-300	350	347	<b>20-25Nm</b>
300-350	350-400			<b>35-40Nm</b>

► Remove Rotor support (960).

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

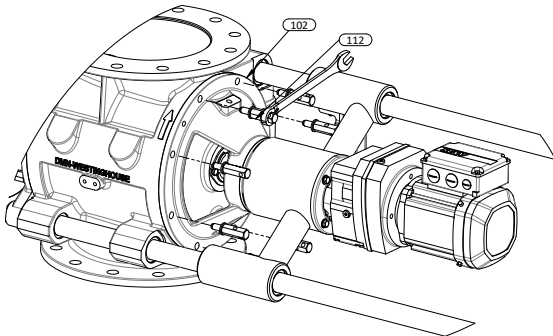


- ▶ Slide end cover and rotor back in body (101).
- ▶ Tighten bolts (112) crosswise in such a way that cover fits without any clearance to the flat side of the body.

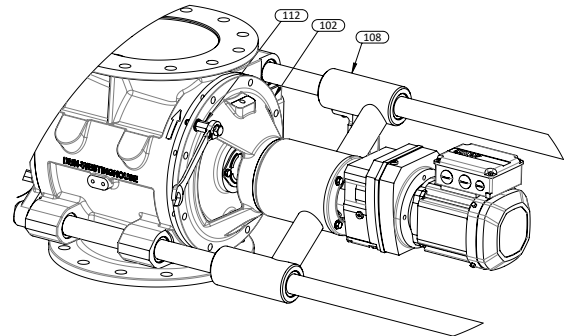


**Clean drive side**

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

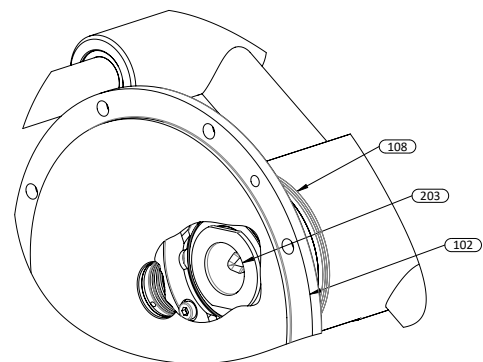
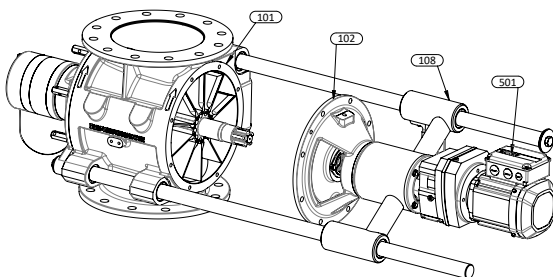


- ▶ To remove the end cover (102) screw two of these bolts into the jacking holes in the end cover.

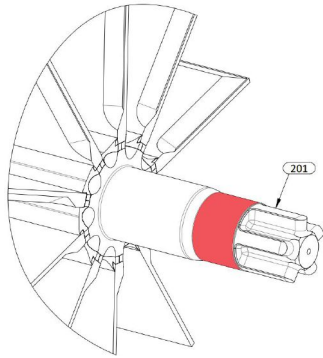


- ▶ Remove end cover and Drive side sliding unit (108) by pulling it axially from the body.
- ▶ Remove bolts (112) from end cover.

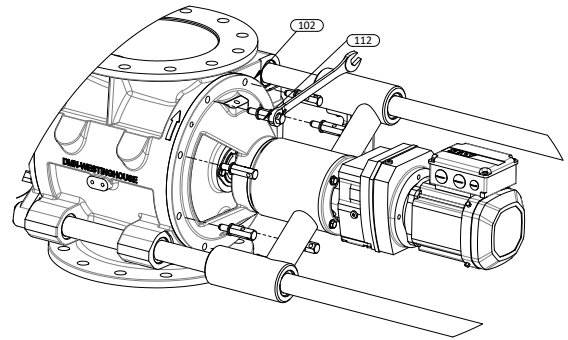
- ▶ Inspect and clean drive shaft (203).



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



- ▶ 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



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



## 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
<b>AL-BL</b>	Cast Iron	Mild Steel	150-350	<b>0,12-0,17mm</b>
			400-500	<b>0,15-0,20mm</b>
	Stainless Steel	Stainless Steel	150-350	<b>0,12-0,17mm</b>
			400-500	<b>0,15-0,20mm</b>
		Mild Steel	150-350	<b>0,12-0,17mm</b>
			400-500	<b>0,15-0,20mm</b>
Stainless Steel	Stainless Steel	150-350	<b>0,12-0,17mm</b>	
		400-500	<b>0,15-0,20mm</b>	
<b>AXL-AML-BXL</b>	Cast Iron	Mild Steel	150-400	<b>0,12-0,17mm</b>
		Stainless Steel	150-400	<b>0,12-0,17mm</b>
	Stainless Steel	Stainless Steel	150-300 350-400	<b>0,12-0,17mm</b> <b>0,15-0,20mm</b>
<b>BXXL</b>	Stainless Steel	Stainless Steel	350	<b>0,12-0,17mm</b>
<b>NR</b>	Stainless Steel	Stainless Steel	347	<b>0,12-0,17mm</b>

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

### 11.15.2 Rotor adjustment standard executions

#### 11.15.2.1 Rotor with fixed blades

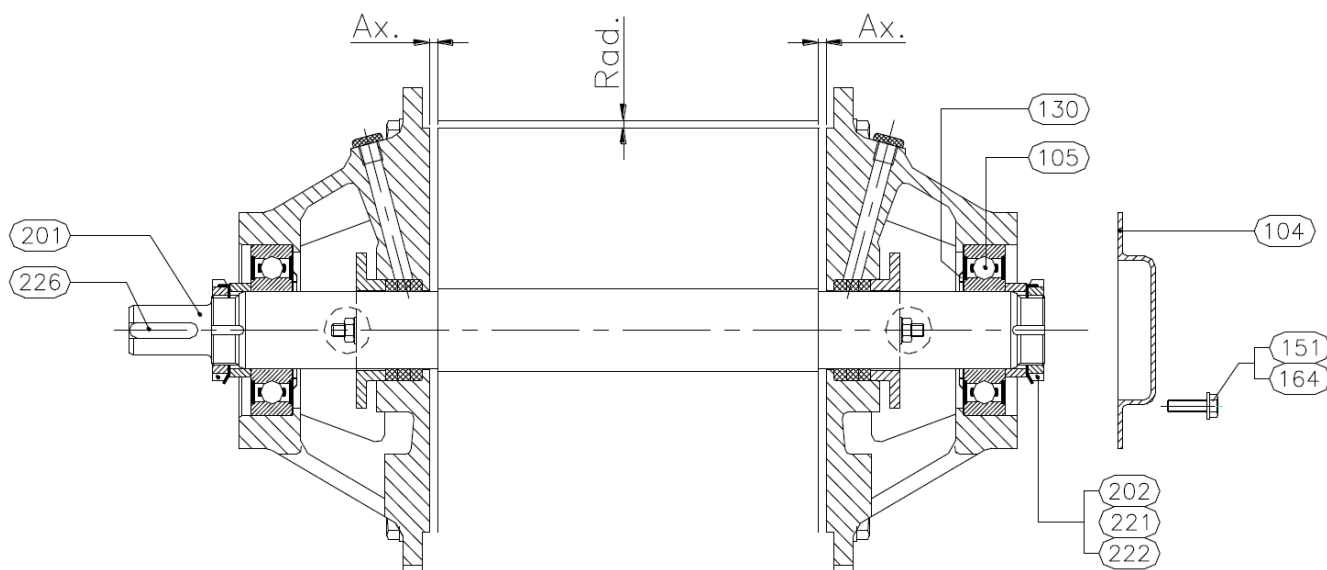


Figure 11.46: Adjustment for axial clearance

#### 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

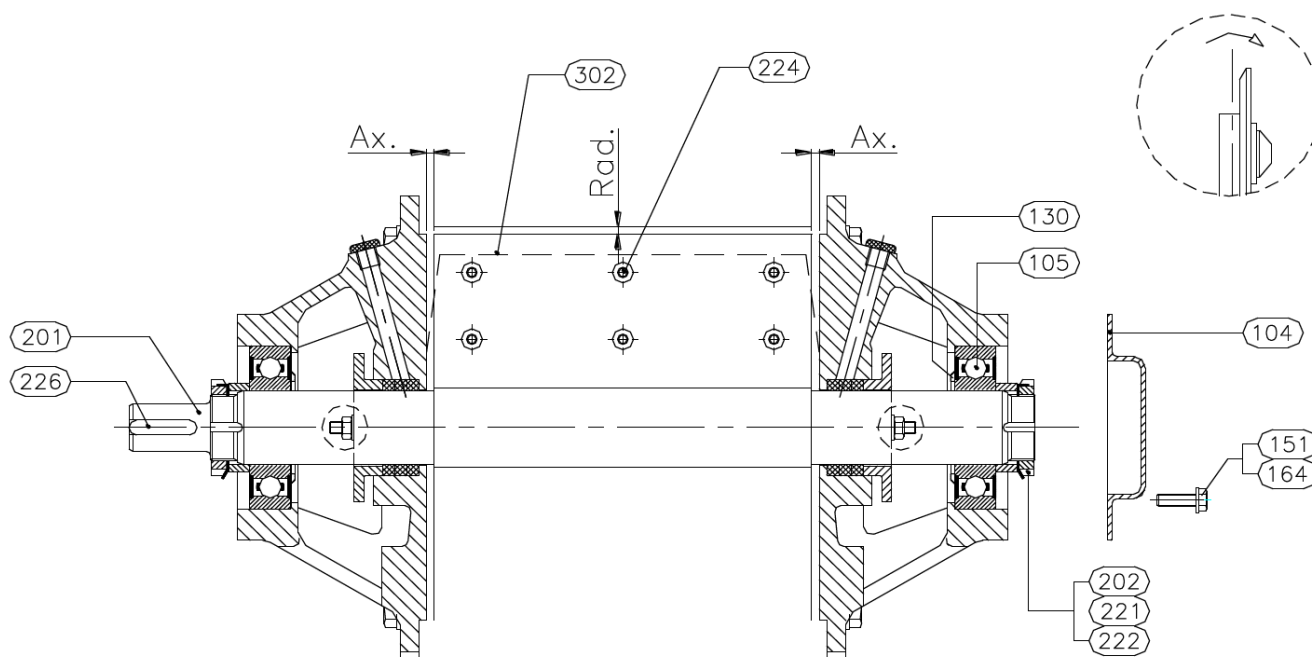


Figure 11.47: Adjustment for axial clearance

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.**

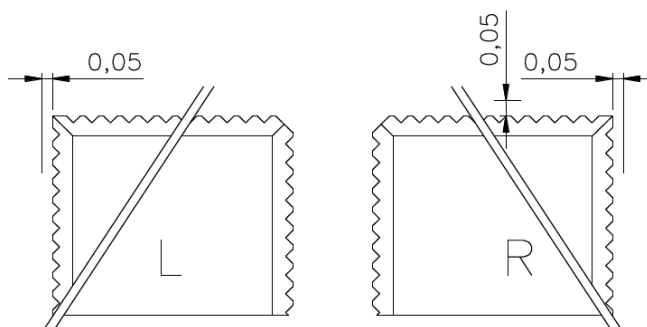


Figure 11.48: Adjustment scraper blades

#### 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.

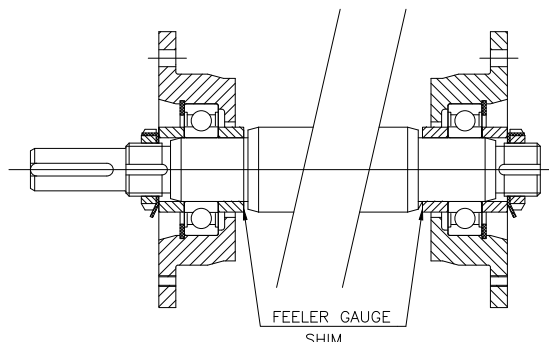


Figure 11.49: Shim thickness clarification

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](#)).

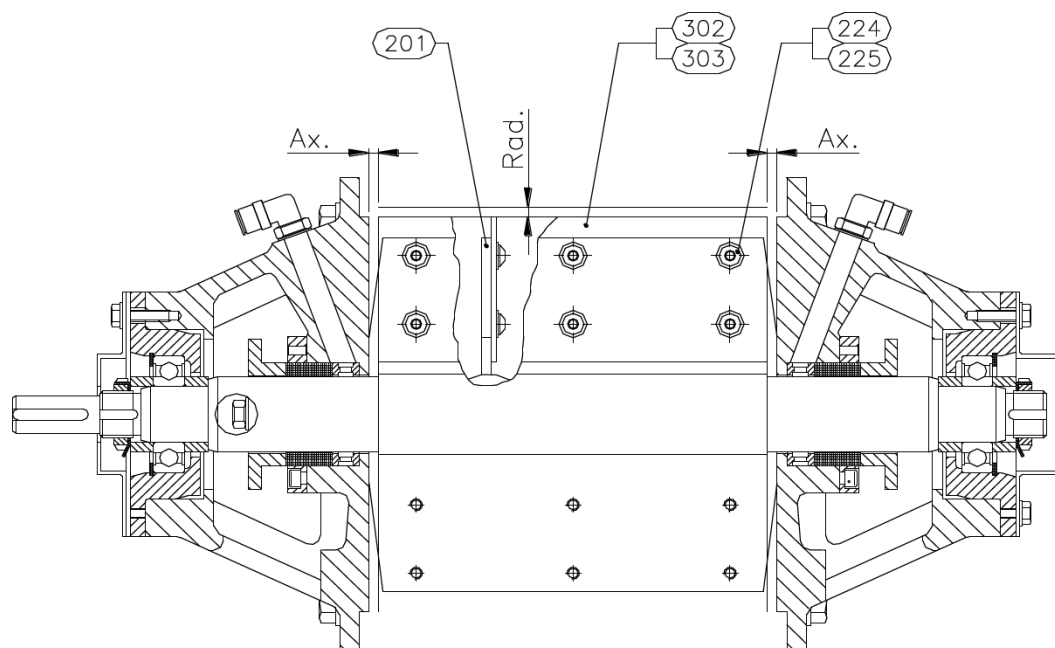


Figure 11.50: Adjustment for axial and radial clearance rotor blades

#### 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:

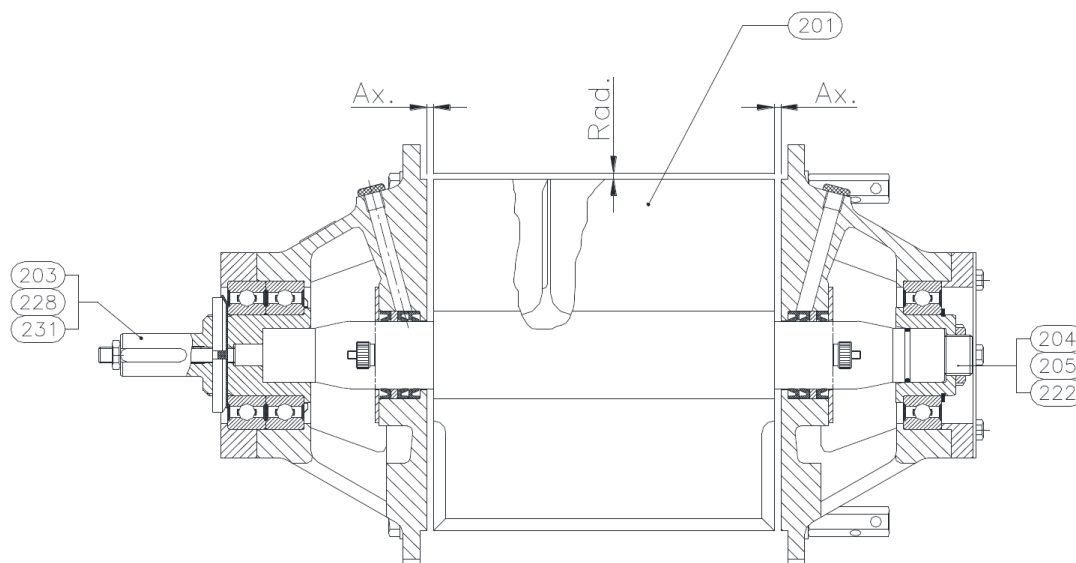


Figure 11.51: Adjusting axial clearance

- ▶ 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	421 Gland follower
413 Nut	431 Packing cord
414 Washer	433 Plug

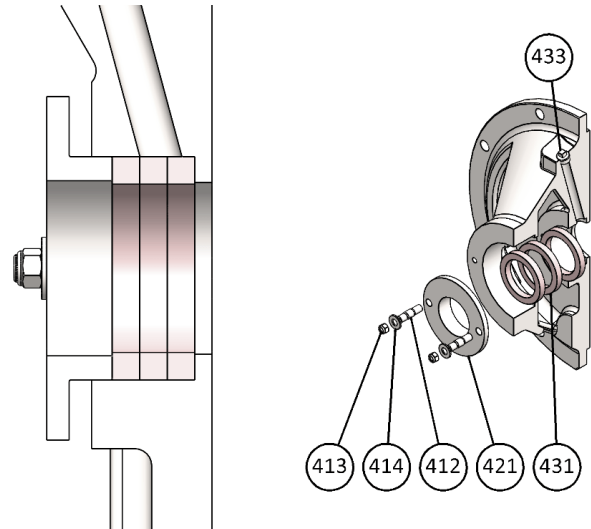


Figure 11.52: Standard packing (cord)

#### 11.16.1.2 Grease purge packing (cord)

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

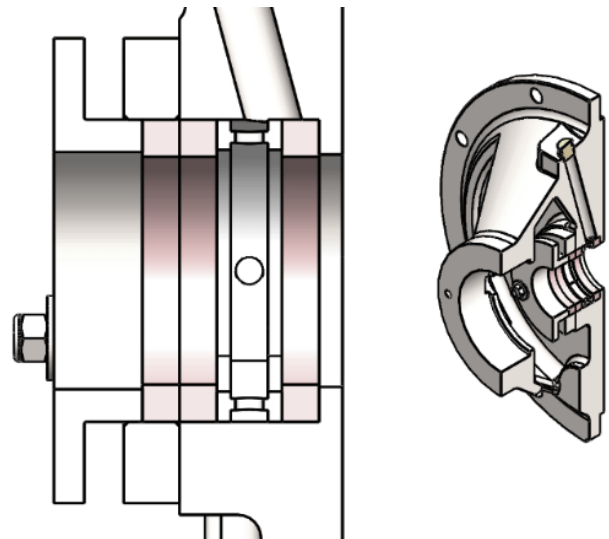
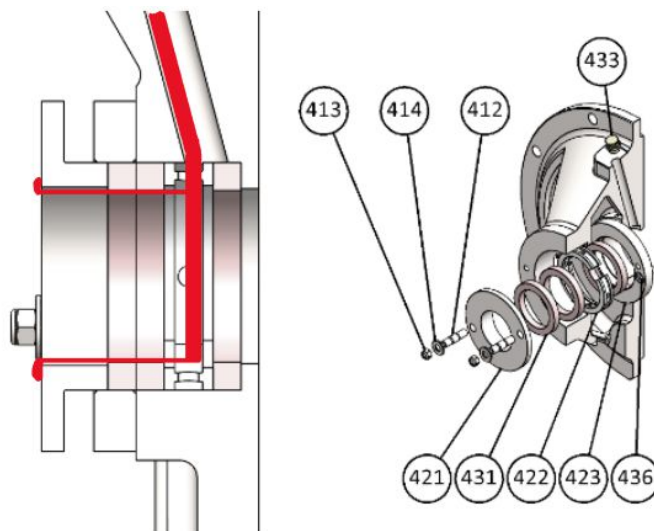


Figure 11.53: Grease purge packing (cord)

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

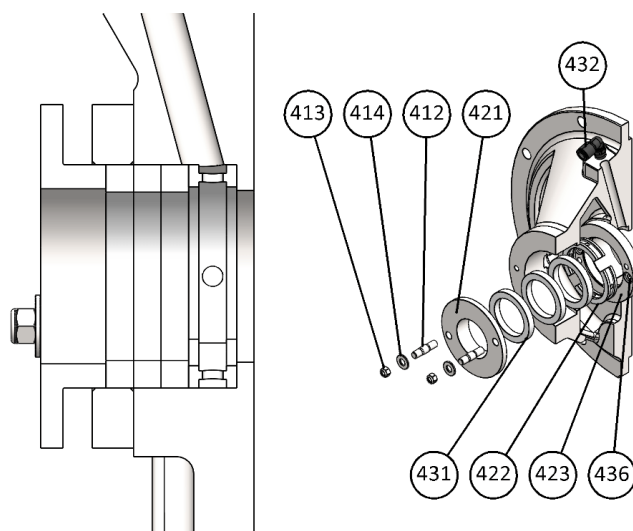


Figure 11.54: Air purge packing (cord)

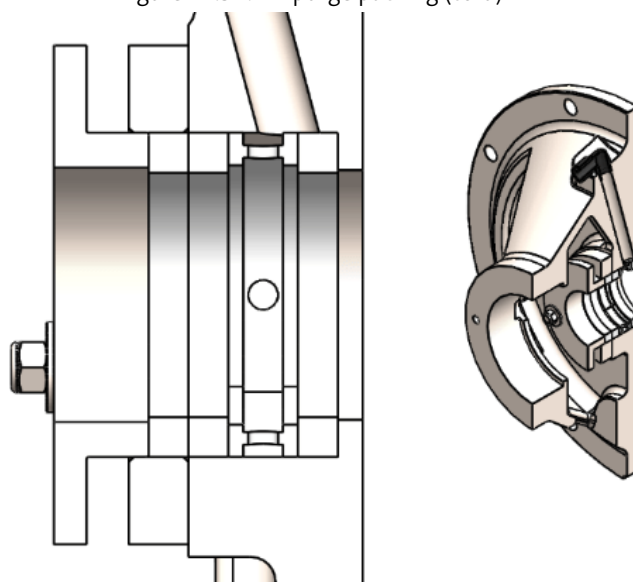


Figure 11.55: Barrier air purge with packing

### 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

- |                        |                          |
|------------------------|--------------------------|
| <b>433</b> Plug        | <b>445</b> Distance ring |
| <b>431</b> Lip seal    | <b>446</b> Ring          |
| <b>441</b> Cover plate | <b>451</b> Stud          |
| <b>443</b> Nut         |                          |

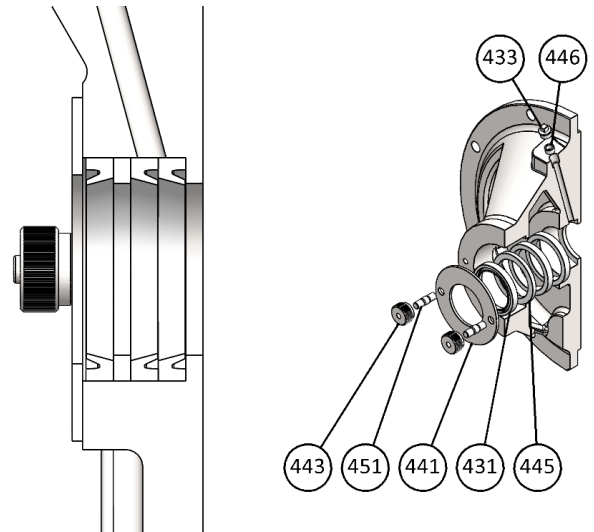


Figure 11.56: Standard lip seal

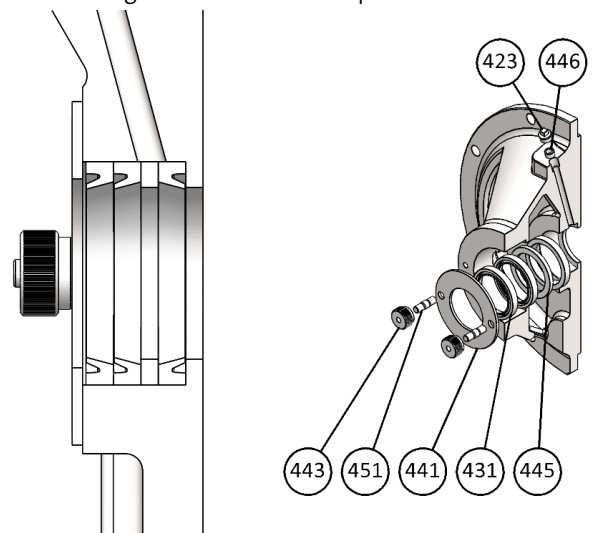


Figure 11.57: Vacuum shaft seal by means of lip seals (notice the different order of the lip seals)

#### 11.16.2.2 Air purge lip seal

- |                         |                             |
|-------------------------|-----------------------------|
| <b>422</b> Lantern ring | <b>446</b> Ring             |
| <b>431</b> Lip seal     | <b>451</b> Stud             |
| <b>441</b> Cover plate  | <b>462</b> Elbow banjo body |
| <b>443</b> Nut          | <b>463</b> Banjo bolt       |

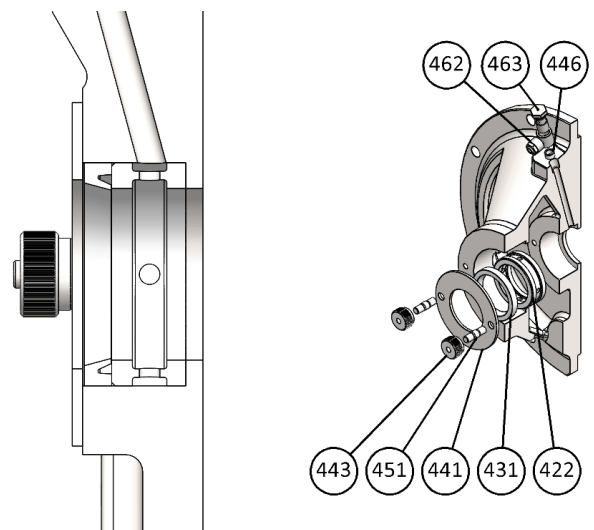


Figure 11.58: Air purge lip seal

### 11.16.2.3 Air purge with 3 lip seals

- |                         |                           |
|-------------------------|---------------------------|
| <b>412</b> Bolt         | <b>423</b> Extension ring |
| <b>414</b> Washer       | <b>431</b> Lip seal       |
| <b>421</b> Cover plate  | <b>432</b> Coupling       |
| <b>422</b> Lantern ring | <b>436</b> Allen screw    |

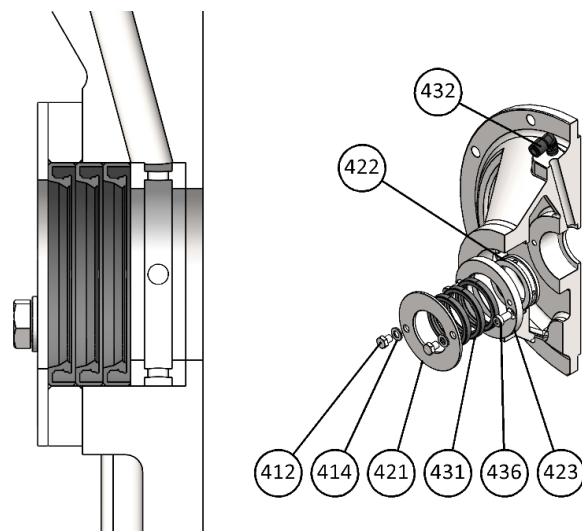


Figure 11.59: Air purge with 3 lip seals

### 11.16.2.4 Air purge lip seal with grooved lantern ring

- |                          |                     |
|--------------------------|---------------------|
| <b>421</b> Seal unit DS  | <b>432</b> Coupling |
| <b>422</b> Seal unit NDS | <b>434</b> Nut      |
| <b>423</b> Cover plate   | <b>435</b> Washer   |
| <b>431</b> Lip seal      |                     |

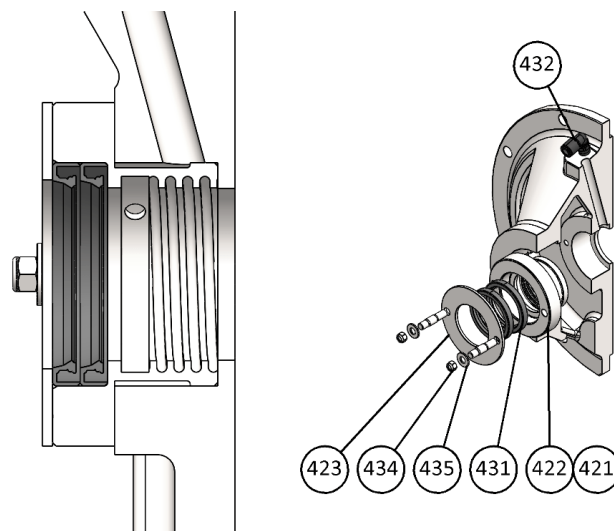


Figure 11.60: Air purge lip seal with grooved lantern ring

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

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

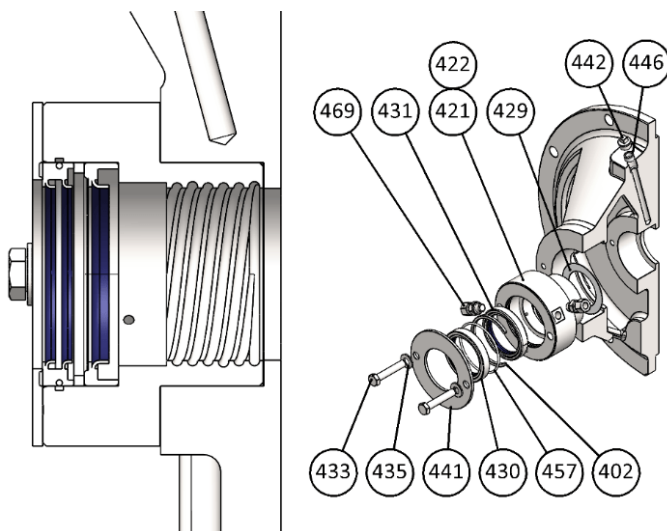
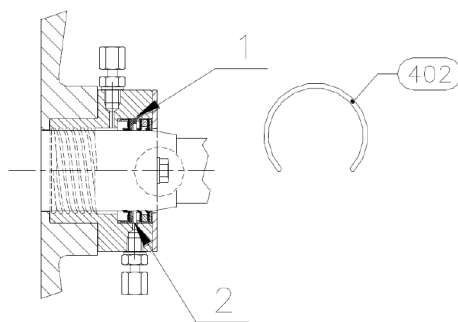


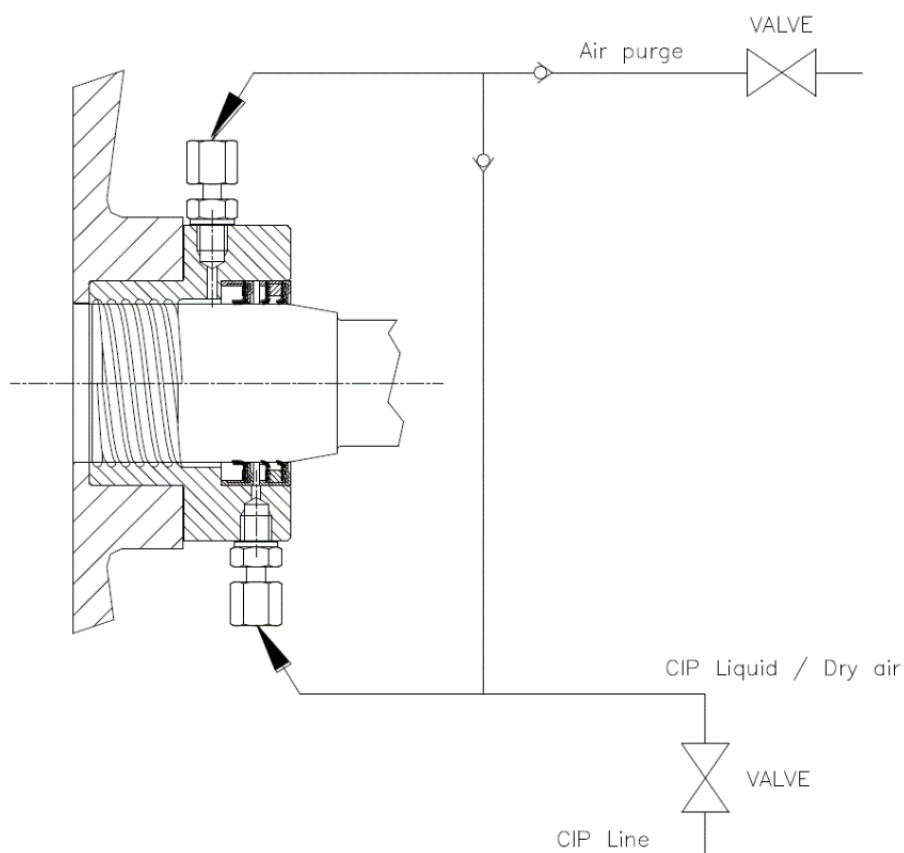
Figure 11.61: Lip seal with liquid cleaning (CIP (Dairy-EL I) seal)

## 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

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

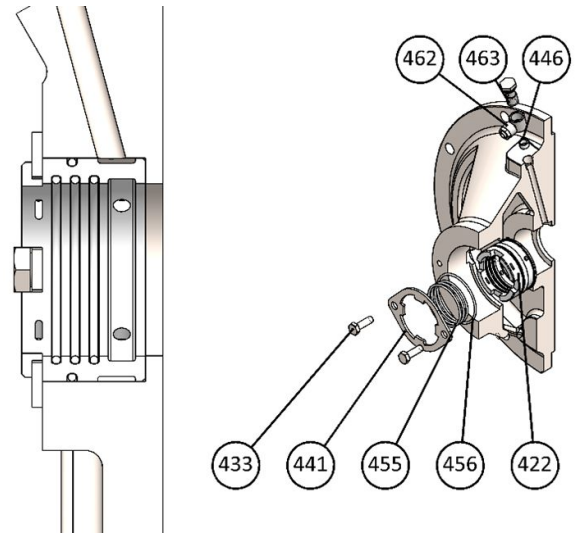


Figure 11.62: SAS-II Sanitary air purge seal



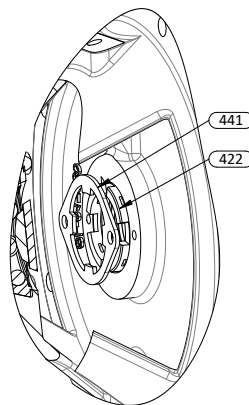
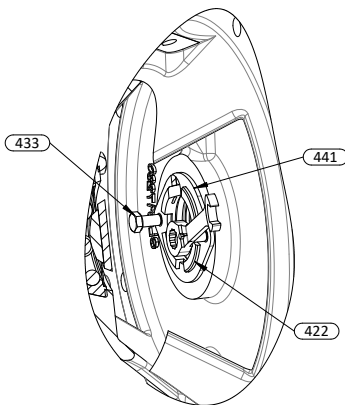
#### ATTENTION!

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

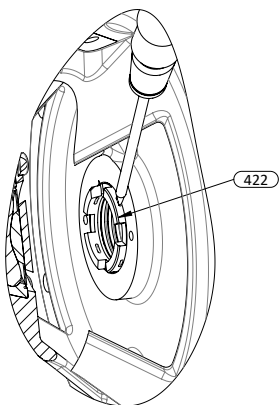
#### 11.16.3.2 Inspection and cleaning SAS-II seal

► Remove bolts (433).

► Remove Retaining plate (441).



► Remove Seal unit (422).



## 11.17 Drives

### 11.17.1 Chain drive

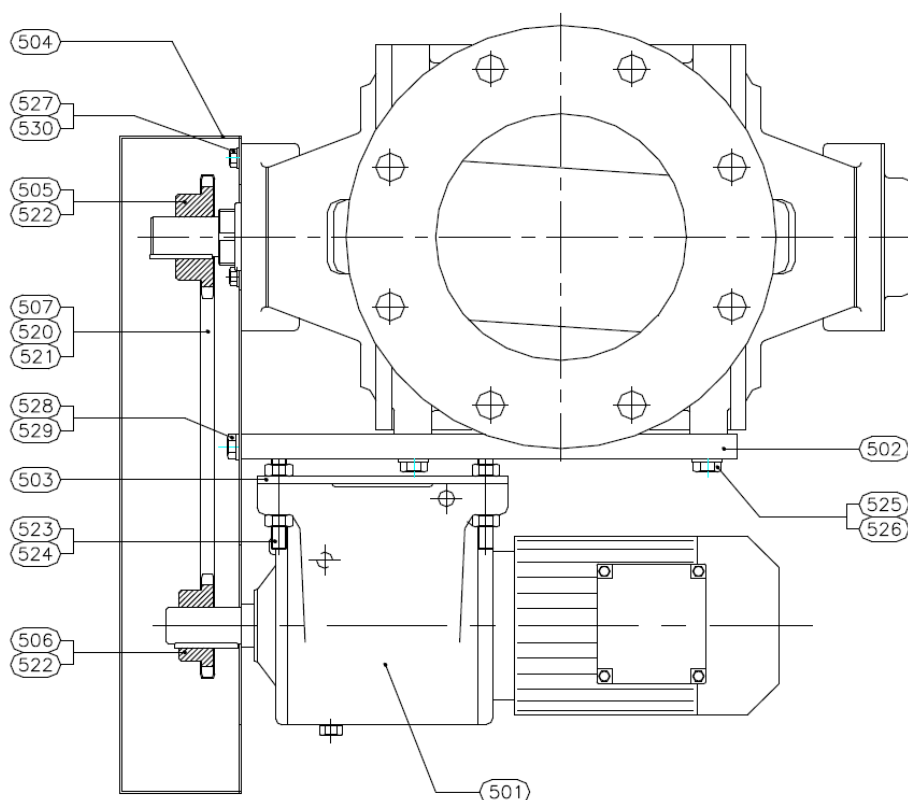


Figure 11.63: Chain drive

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

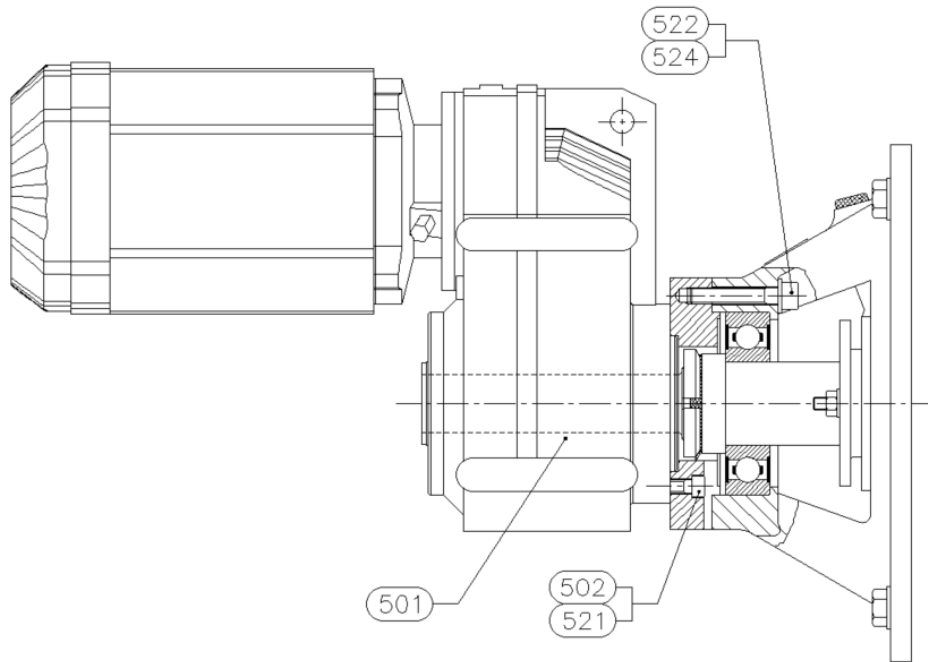


Figure 11.64: Direct drive (parallel shaft)

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)

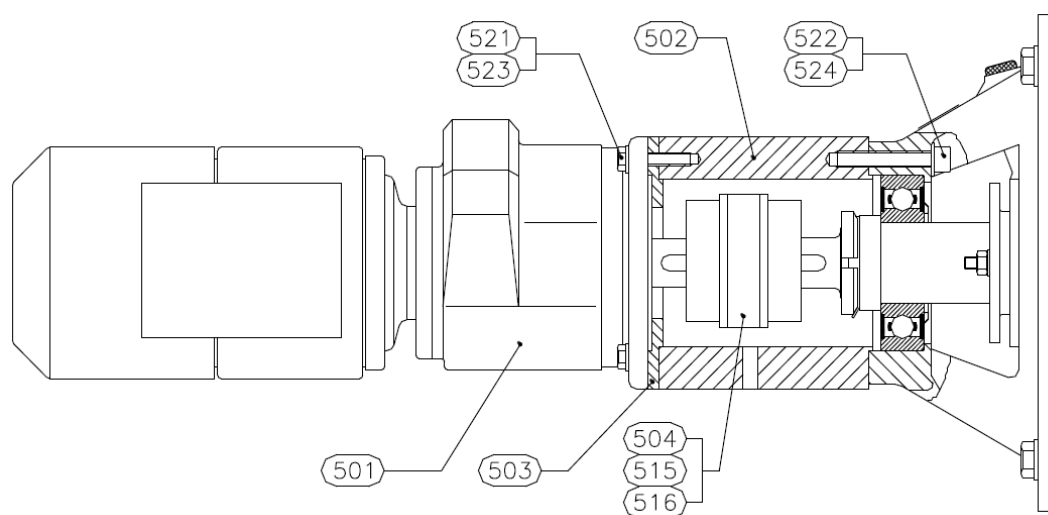


Figure 11.65: Direct drive (in line with coupling)

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.

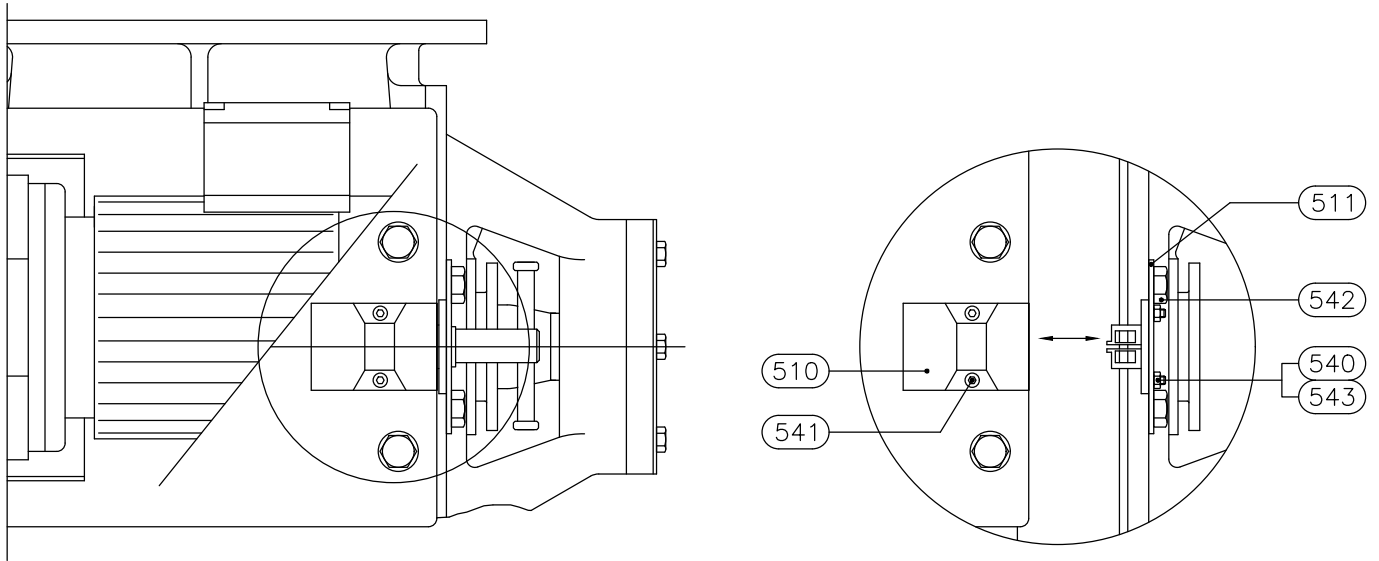


Figure 11.66: Safety switch

**510** Safety switch  
**511** Fastening plate

**540** Countersunk screw  
**541** Cylinder bolt

**542** Bolt  
**543** Nut

## 11.19 Zero speed indicator (optional)

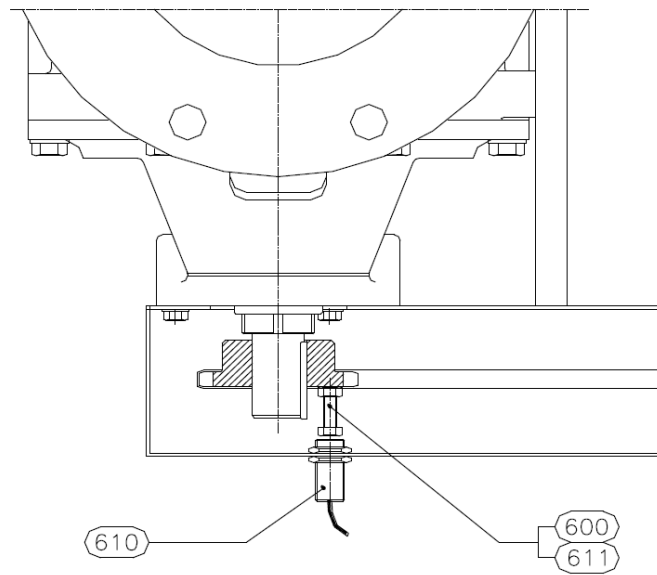


Figure 11.67: Drive side

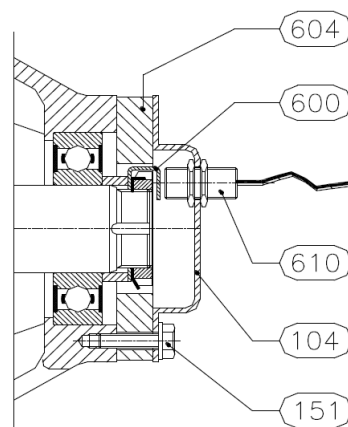


Figure 11.68: Non drive side

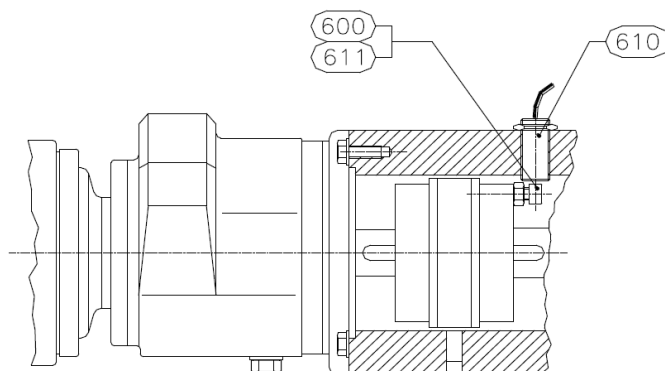


Figure 11.69: Direct drive

**104** Bearing cover

**151** Bolt

**600** Impuls sender

**604** Cover plate

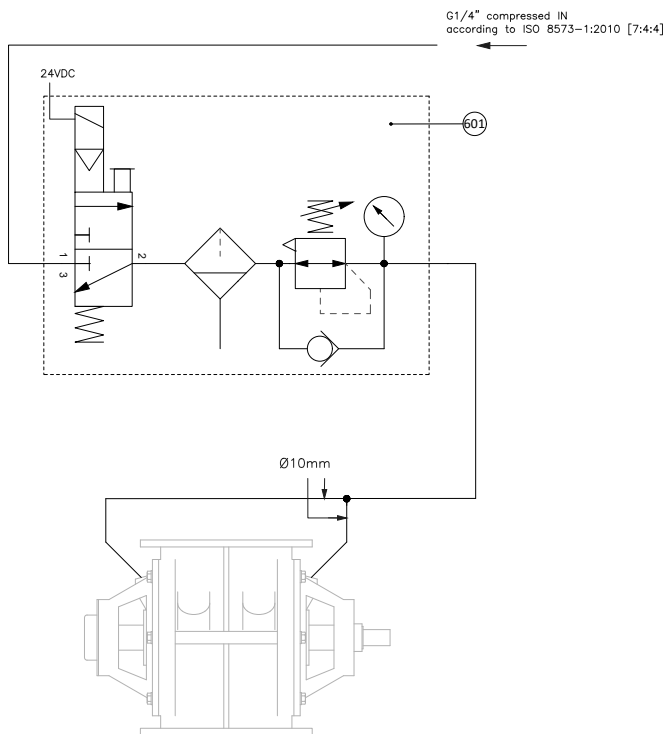
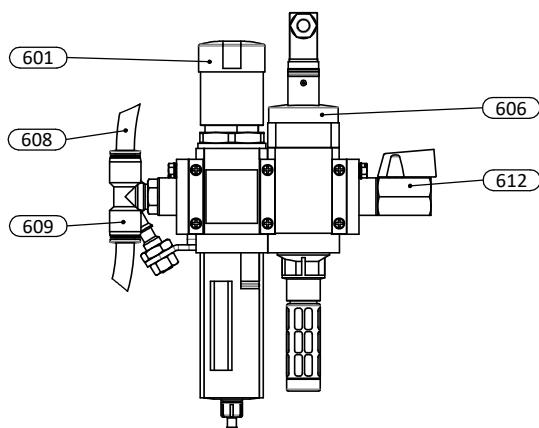
**610** Proximity switch

**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

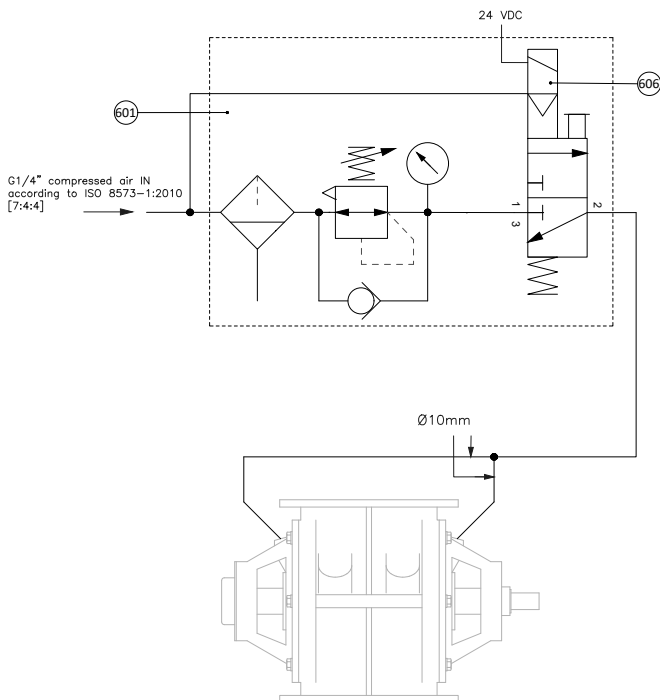
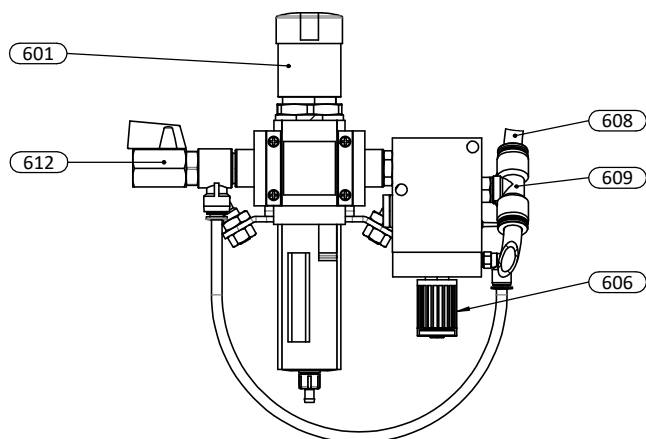


**601** Air filter / Pressure regulator with pressure gauge

**606** On/off valve  
**608** Tube

**609** T-coupling Ø10mm  
**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 Ø10mm  
**612** Ball valve G 1/4"

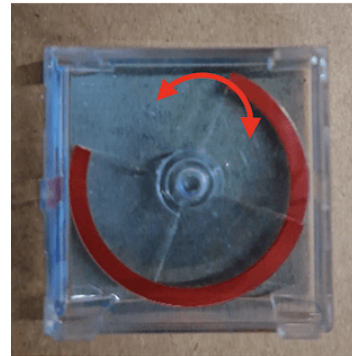
### 11.20.3 Adjusting air purge units with pressure control

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.

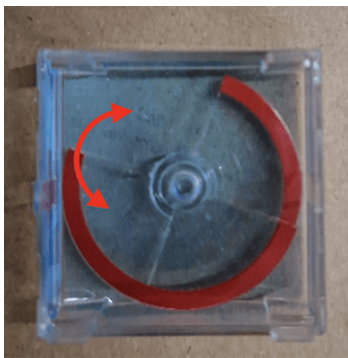
- ▶ Remove sight glass by pinching the sight glass.



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

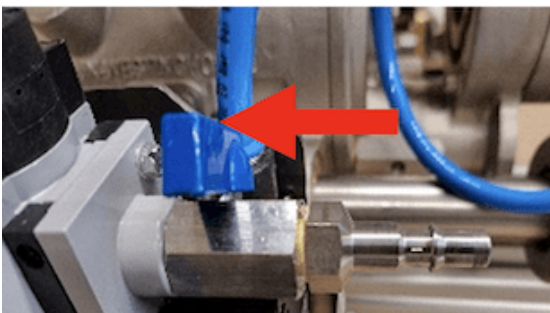


- ▶ Set the front red disc (furthest from the sight glass) in the sight glass to set the upper limit to 1.5 bar. The range between 0 and 1.5 bar is now green and red outside these limits.

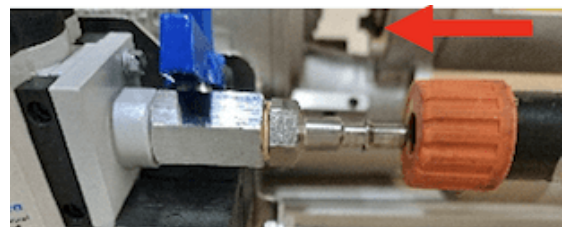


- ▶ Click the sight glass back in place.

- ▶ Make sure the ball valve is closed.

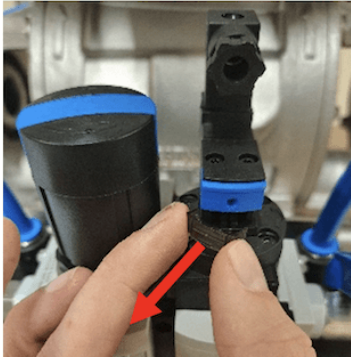


- ▶ Connect the main air supply to the ball valve.



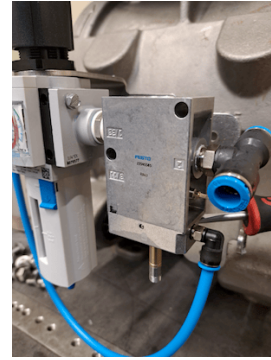
**On/off valve**

- ▶ Remove the manual bypass safety.



**Solenoid valve:**

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



**On/off valve**

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

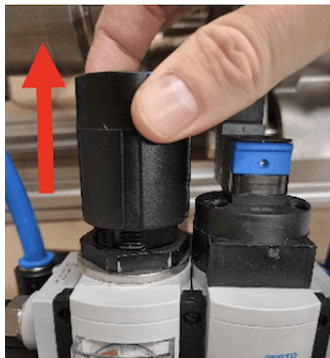


**Solenoid valve:**

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



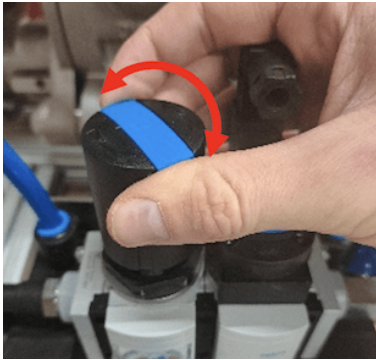
- ▶ Open the pressure regulator by pulling out the round knob.



- ▶ Open the ball valve.



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



- ▶ 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

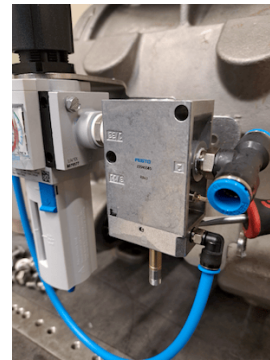
**On/off valve:**

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



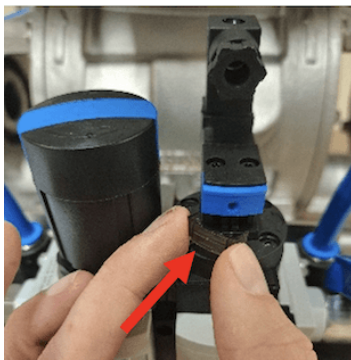
**Solenoid valve:**

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



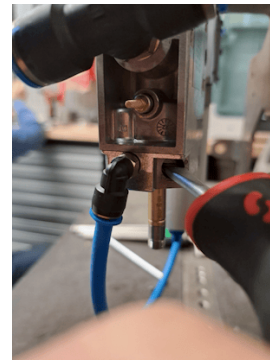
**On/Off valve:**

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



**Solenoid valve:**

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

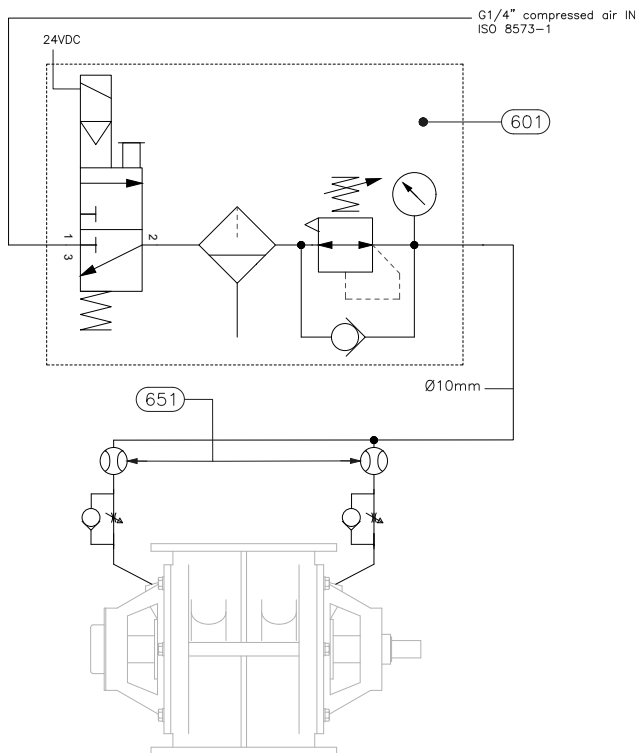
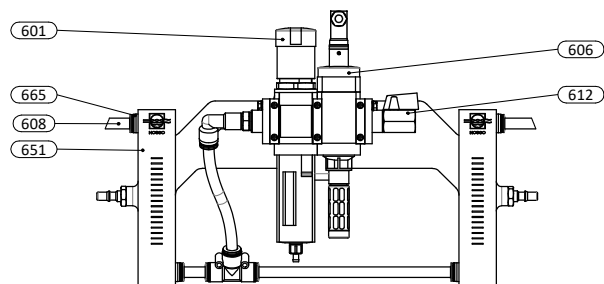


- ▶ Lock the rotating knob of the pressure regulator to secure the pressure. Use a padlock for extra security.



## 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

**608** Tube

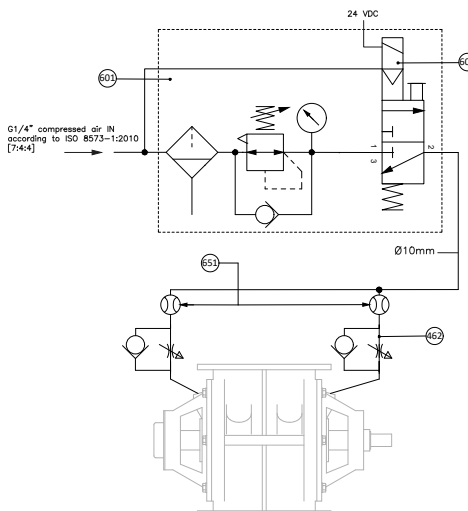
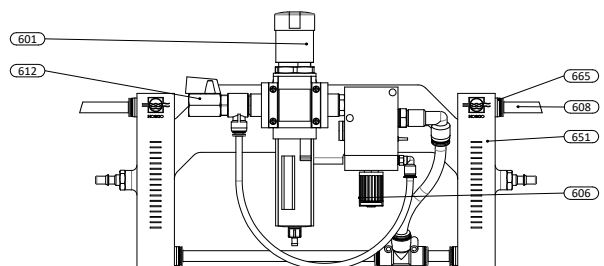
**651** Flow meter

**606** On/off valve

**612** Ball valve G 1/4"

**665** H-coupling

### 11.21.2 Flow regulator analog with solenoid valve



**601** Air filter / Pressure regulator with pressure gauge

**608** Tube

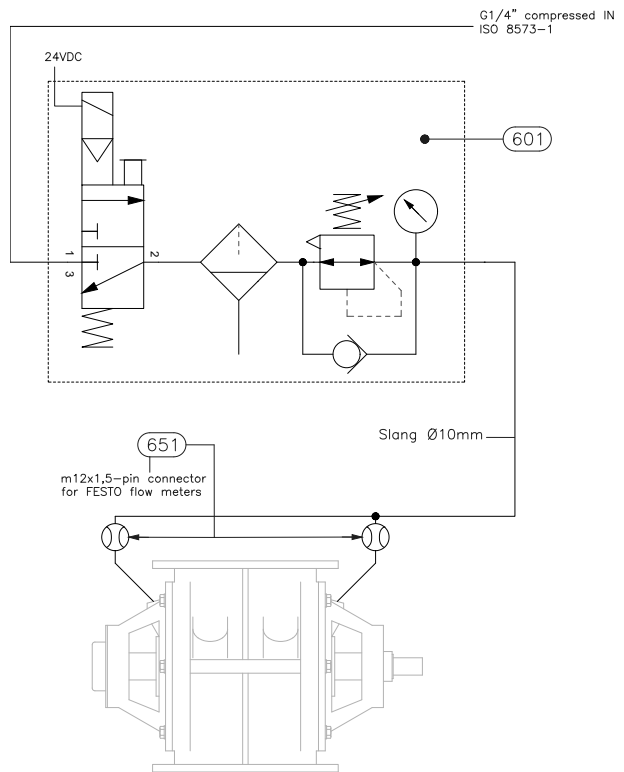
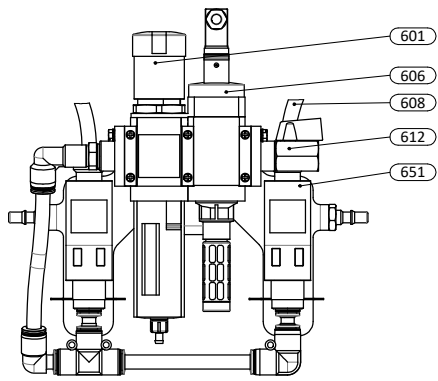
**651** Flow meter

**606** Solenoid valve

**612** Ball valve G 1/4"

**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

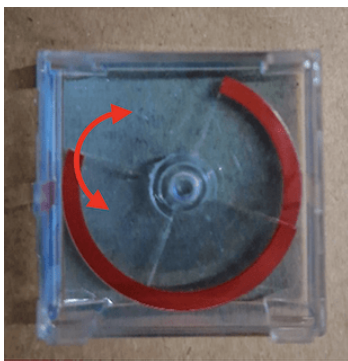
- ▶ Remove sight glass by pinching the sight glass.



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

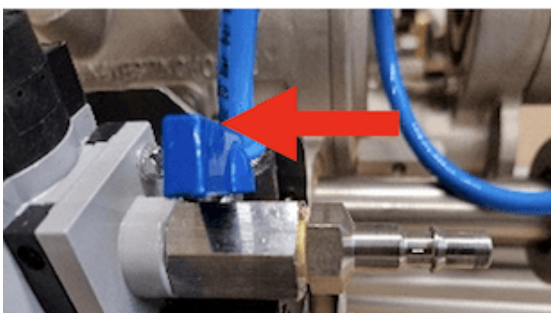


- ▶ Set the front red disc (furthest from the sight glass) in the sight glass to set the upper limit to 4 bar. The range between 3 and 4 bar is now green and red outside these limits.

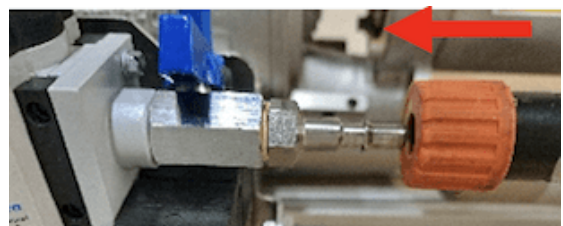


- ▶ Click the sight glass back in place.

- ▶ Make sure the ball valve is closed.



- ▶ Connect the main air supply to the ball valve.



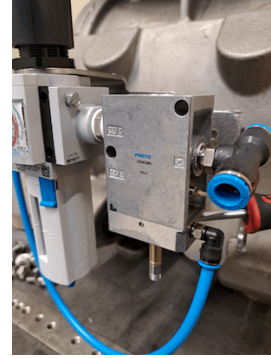
**On/off valve:**

- ▶ Remove the manual bypass safety.



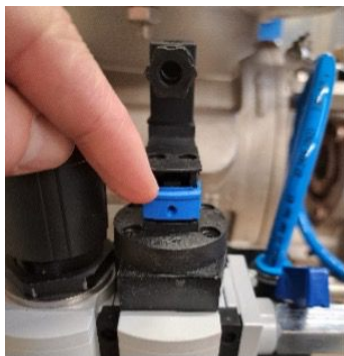
**Solenoid valve:**

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



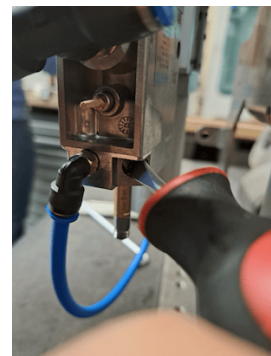
**On/off valve:**

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

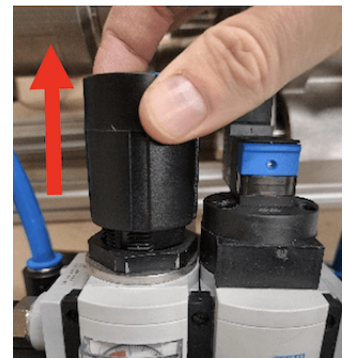


**Solenoid valve:**

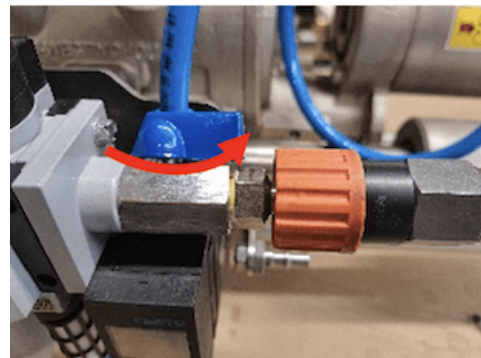
- ▶ Check whether the bypass is switched from 0 to 1.



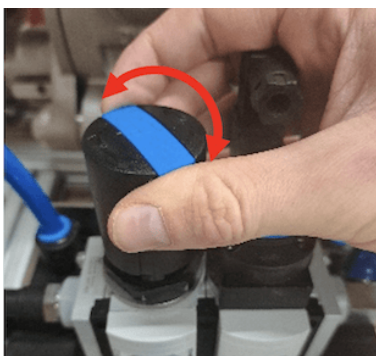
- ▶ Open the pressure regulator by pulling out the round knob.



- ▶ Open the ball valve.



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



- ▶ Push the round knob back down.

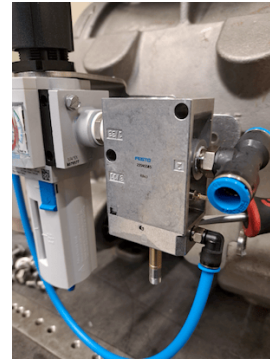
**On/off valve:**

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



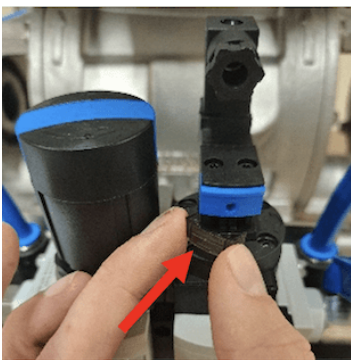
**Solenoid valve:**

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



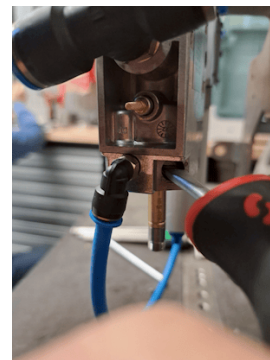
**On/off valve:**

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



**Solenoid valve:**

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



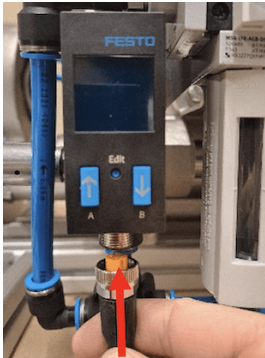
- ▶ Lock the rotating knob of the pressure regulator to secure the pressure. Use a padlock for extra security.



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



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



- ▶ Push the “Edit” button.

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



- ▶ 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.



- ▶ Push the “Edit” button.

- ▶ 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:



AL-BL	Valve type/size			Flow [l/min]	
	AML-AXL-BXL	BXXL	NR	Lower limit	Upper limit
150-175	150-200			40	60
200-250	250-300	350	347	50	70
300-350	350-400			75	95

- ▶ Push the “Edit” button.

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



- ▶ 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:

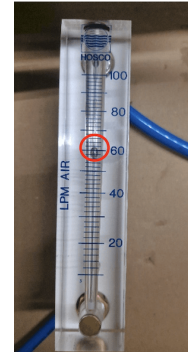
Valve type/size				Flow [l/min]
AL-BL	AML-AXL-BXL	BXXL	NR	Digital flowmeter
150-175	150-200			50
200-250	250-300	350	347	60
300-350	350-400			85

- ▶ 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 [l/min]
AL-BL	AML-AXL-BXL	BXXL	NR	Analog flowmeter*
150-175	150-200			21
200-250	250-300	350	347	27
300-350	350-400			41

\*The flow has a margin of  $\pm 6$  l/min. Analog and digital flowmeters differ due to different measuring methods.

## 11.22 Pulsating air execution (optional)

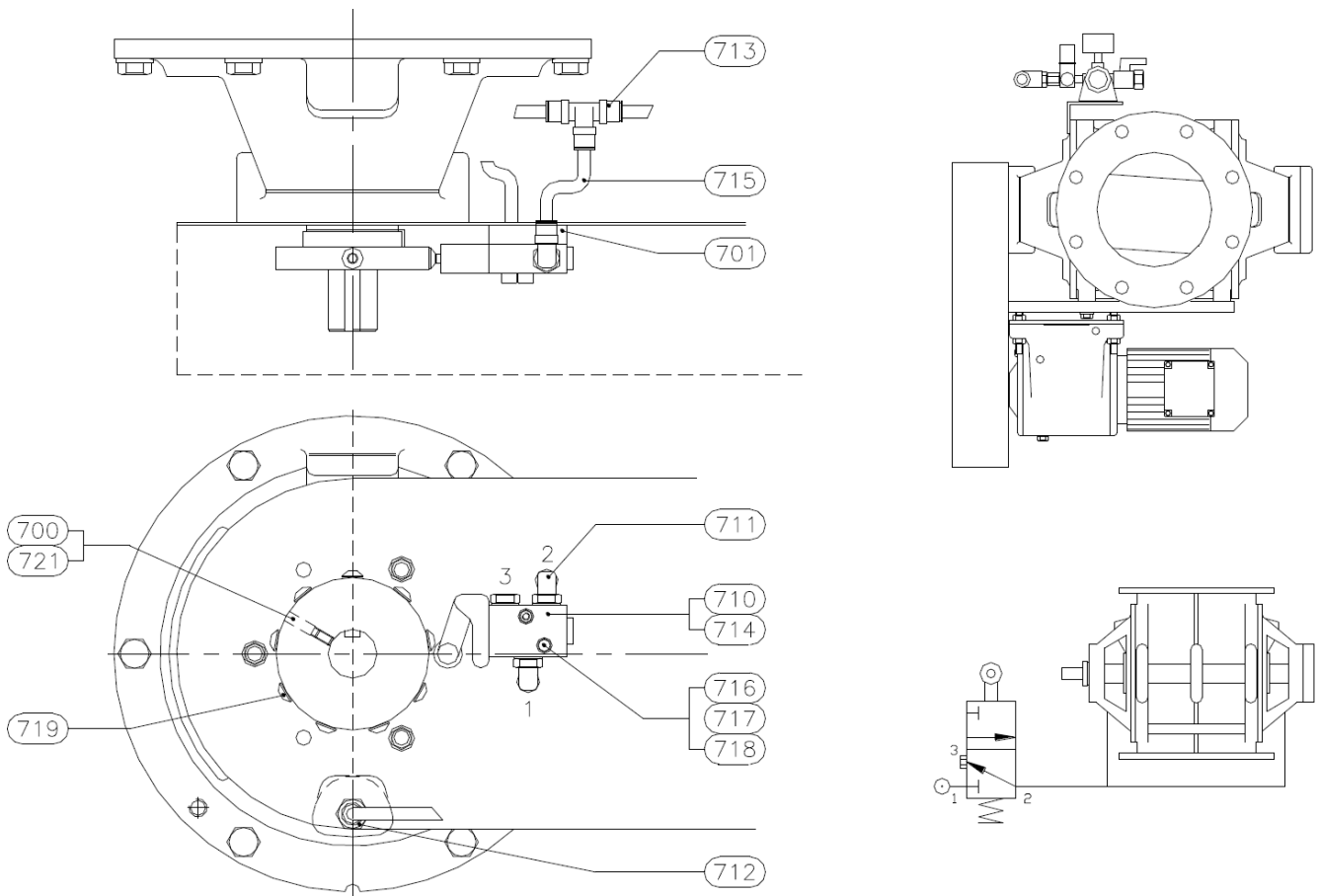


Figure 11.70: Pulsating air injection

<b>700</b> Cam disc	<b>713</b> T-coupling	<b>718</b> Nut
<b>701</b> Shim	<b>714</b> Plug 1/8"	<b>719</b> Bolt
<b>710</b> Solenoid	<b>715</b> Tube $\varnothing$ 8mm	<b>721</b> Cyl. adjusting screw
<b>711</b> Coupling 1/8"	<b>716</b> Bolt	
<b>712</b> Coupling 1/4"	<b>717</b> Washer	

### Technical data

Valve mechanical	Norgren type S/666
Connection	1/4" Tube $\varnothing$ 8mm
Operating pressure	2...10 Bar
Operating temperature	-5°C...+80°C
Air consumption	15-20 m <sup>3</sup> /H at 6 Bar



## 11.23 End cover couplings (optional)

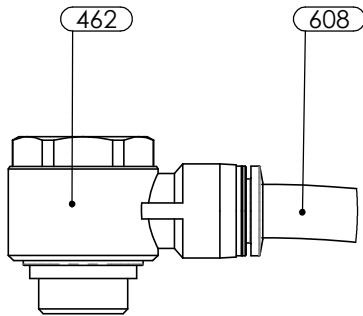


Figure 11.71: Pressure regulator: End cover coupling

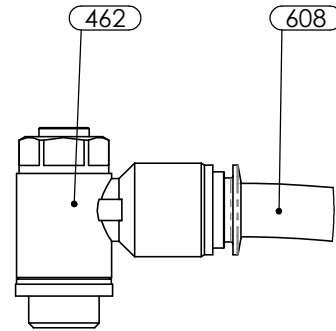


Figure 11.72: Flow regulator: End cover coupling

**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)

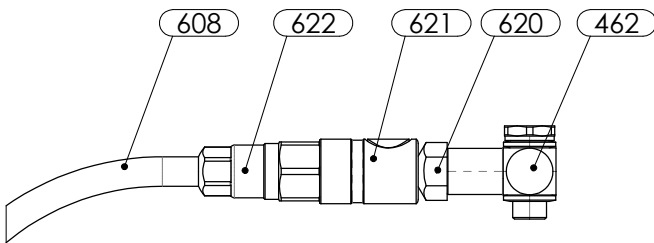


Figure 11.73: Pressure regulator: Quick release coupling

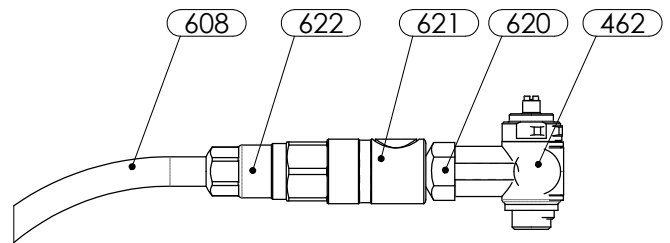


Figure 11.74: Flow regulator: Quick release coupling

**462** Banjo elbow / flow regulator

**608** Tube

**620** Quick coupling plug

**621** Quick coupling socket

**622** Pneumatic fitting

### 11.24.1 Dairy vent holes

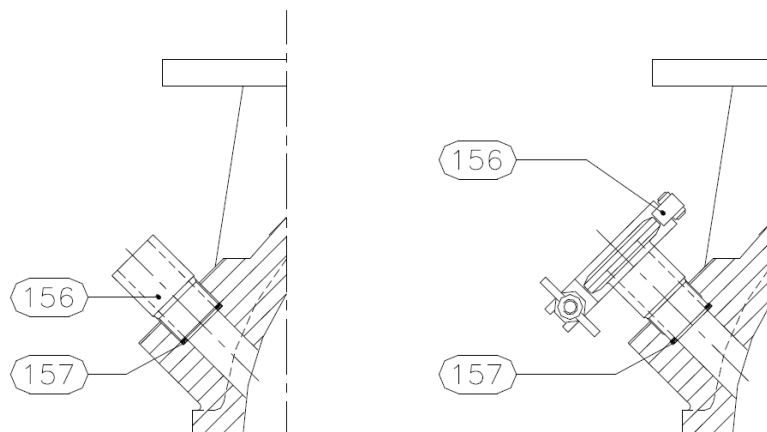


Figure 11.75: Dairy vent hole options

## 11.25 Accessories

### 11.25.1 Inlet restrictor / Dropout box

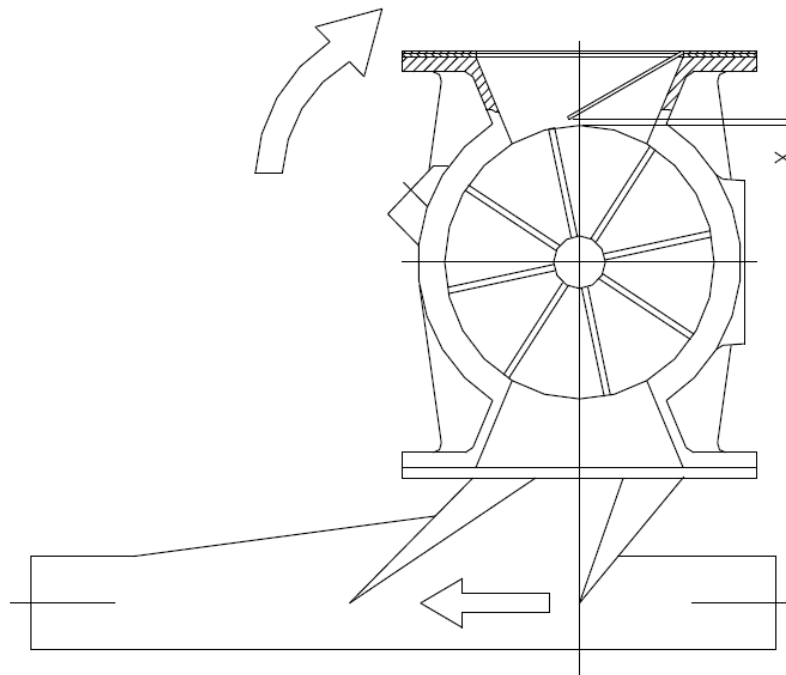


Figure 11.76: Inlet restrictor and Dropout box

For mounting the inlet restrictor and dropout box, refer to [8.7.1](#)

### 11.25.2 Air vent box

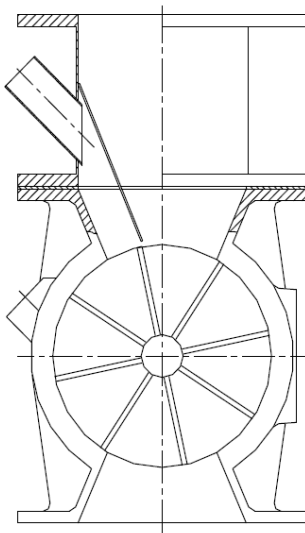


Figure 11.77: Vent box (one side)

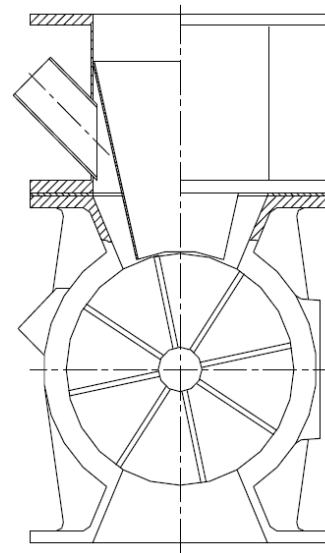


Figure 11.78: Vent box (all around)

For mounting the inlet restrictor and dropout box, refer to [8.7.1](#)

## **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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