

## Erection Work, Operating and Maintenance Instructions

Machine: **ModuScreen™ F10-F40(W)**

Manufacturing no.: D-14-815751-010-3053 F10W

D-14-815751-010-3054 F20

D-14-815751-010-3058 F40

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# 1 INTRODUCTION

This manual is part of the technical documentation of Andritz TC. It is intended as a supplement to the training provided, to supply the basic knowledge required for proper, safe and economical use of the equipment delivered by Andritz TC. Observing these instructions helps avoid hazards and reduce repair and downtime costs, as well as increasing the reliability and useful life of machines.

## 1.1 Use

---

<b>Target group</b>	<p>This operating manual is intended for users with a knowledge of mechanical engineering and is for the exclusive use of the operator of the mill and his personnel.</p> <p>Personnel entrusted with work on the machine must have read and understood these operating instructions and comply with them. This refers in particular to the following tasks:</p> <ul style="list-style-type: none"><li>• Handling, starting and stopping</li><li>• Troubleshooting</li><li>• Maintenance and upkeep</li><li>• Haulage</li><li>• Handling process materials, cleaning of machine and area around the machine.</li></ul> <p>The following sections are especially important:</p> <ul style="list-style-type: none"><li>• the chapter on SAFETY,</li><li>• the safety instructions contained in various other chapters</li></ul>
<b>Supplementary instructions</b>	<p>The mill operator shall complete this manual by adding national regulations on safety at work, health protection and environmental protection.</p> <p>Instructions on any special operational conditions concerning work organization, sequence of work/operations and the personnel assigned to the job shall also be added. This also includes instructions on supervising and reporting obligations.</p>
<b>Safe keeping</b>	<p>Keep the entire operating manual near the place where the machine is installed and within easy reach.</p>

## 1.2 Standards and guidelines

---

The machine/plant has been built in accordance with state-of-the-art standards and the recognized safety rules. The equipment conforms with the equivalent appropriate standards.



### 1.3 How to use the manual

**Pictograms**

The following pictograms are used in the manual:



Warning signs

Warning signs are shown with an explanation of the type of the hazard.

The meaning of the different graduations of hazards are described in the chapter on SAFETY.



Marks an instruction on handling of the machine or system.



Marks a useful information.



Marks a cross-reference to other sections, figures and tables in brackets.

Examples:

(▶ Sec. 6.4, Start-up on page 6-3)

(▶ Fig. 9-2/**123.1**) with reference to an item after the slash (/)

(▶ Tab. 3-1, Construction weights on page 3-2)

**Work steps  
(operations)**

Work steps are presented in tables. Work steps are numbered and must be carried out in the order specified.

**Listings**

Lists without numbering do not require operations to be carried out in a certain order.

**Numbering of pages,  
tables and figures**

Pages	Consecutive numbering of chapters	2-1
Tables	Tab. + Consecutive numbering of chapters	Tab. 2-1
Figures	Fig. + Consecutive numbering of chapters	Fig. 2-1

## Abbreviations

Dwg.	Drawing
Fig.	Figure
Sec.	Section
Tab.	Table

## Illustrations and graphic charts

The illustrations and graphic charts show the basic design of the machine. This may not necessarily correspond exactly to the design supplied.

## 1.4 Warranty and guarantee

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Andritz TC's general terms of delivery and sale shall apply.

Guarantee and liability claims on Andritz TC shall become void if personal injury or material damage is caused by one or several of the following:

- Use of the machine/system for any purpose other than its designated use.
- Non-conformity of erection work, start-up and handling of the machine/system.
- Non-observance of the safety instructions in the manual.
- Non-authorized structural changes to the machine/system.
- Non-observance of the maintenance and upkeep instructions.

In the event of a claim for repair under guarantee, Andritz TC reserves the right to assess the damage to the machine/system.

## 1.5 Copyright

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The operating manual is protected by copyright. All usual rights reserved. It must not be wholly or partly reproduced without authorization by Andritz TC. Contraventions shall entail damage claims and may have penal consequences. All rights shall also be reserved for any patents granted, registration of trade marks and technical modifications without prior notification.

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## 2 SAFETY

### 2.1 General safety regulations

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The chapter on safety contains general safety regulations which must be observed when working on the machine/plant.

In addition, the chapters in the operating manual contain further safety regulations. These are marked by warning signs.

Safety instructions on components not supplied by Andritz TC are contained in the descriptions of the components provided by sub-suppliers. The safety instructions supplement Andritz TC's operating instructions.

All safety instructions must be observed. Disregarding the safety instructions may cause a risk to life and limb, environmental pollution hazards and damage to property.

### 2.2 Danger and warning signs

---

The entire SAFETY chapter is of extreme importance and relevant to safety. The information in this chapter, therefore, is not marked with special danger symbols.

In the following chapters of this manual, warnings are marked by a pictogram. The following warning signs are used:



**This symbol indicates there may be a risk to life and limb.**

Non-compliance with the warning signs may lead to serious health problems or even fatal injuries, and can cause extensive damage to property.



**This symbol points to an imminent health risk, as well as a risk of environmental pollution and of damage to property.**

Non-compliance with the warning signs may cause moderate health problems and/or extensive environmental pollution and damage to property.



**This symbol points to a dangerous situation.**

Non-observance of these signs may cause environmental pollution and damage to property.

---

Further symbols and pictograms used are described in the chapter INTRODUCTION.

## 2.3 Designated use

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The equipment should only be used according to the specifications forming part of the purchase order.

Using the machine/plant for other purposes is considered contrary to its designated use.

Any modifications to the scope of supply made without the agreement of Andritz TC are considered contrary to the designated use.

The term designated use shall also include adherence to the operating instructions, observance of the operating, inspection and maintenance conditions and of the regulations on cleaning and upkeep.

## 2.4 General remarks on machine/plant safety

---

The machine/plant has been built in accordance with state-of-the-art standards and the recognized safety rules. Nevertheless, its use may constitute a risk to life and limb of the user or of third parties, or cause damage to the machine/plant and to other material property.

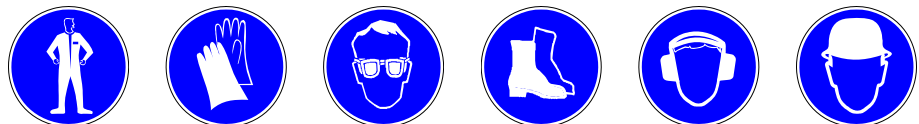
The machine/plant may only be operated when in perfect condition and with due consideration to safety and the risks involved. All protective devices and the emergency cut-out devices must be in place and fully functional.

Malfunctions and unforeseen changes to the machine/plant must be remedied immediately.

## 2.5 Personal protective apparel

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General protective apparel



The following must always be worn when performing work on the machine/plant:

- Protective clothing to prevent the fiber pulp from coming into contact with the skin.
- Gloves to prevent hand injuries
- Goggles to prevent eye injuries
- Safety shoes as protection against foot injuries
- The required personal ear protection to avoid hearing defects
- Standard hard hat as protection against head injuries

## 2.6 Safety at the machine installation site

---

- Adequate lighting must be provided (industrial lighting).
- The foundations must be sized to withstand the loads caused by the machine. Customer will be provided with a load plan.
- Area around machine and marked escapes to be kept free. Area around machine must be marked as danger zone.
- Make sure machine and surrounding area are kept clean. In particular, oil and grease on the floor and on machine elements may cause slipping. This is therefore a considerable source of injuries, as are tools.
- The floor around the machine must be provided with a non-slip finish.
- In order to prevent any falls from or damage to the machine, it is forbidden to climb onto machine elements or on the machine (except for the treading areas provided). Use ladders or similar equipment in accordance with recognised standards.
- Ramps, platforms and lifts must be used to avoid injury or excessive physical effort.

## 2.7 Safety during erection

---

The person in charge of mounting the screen must ensure that there are no risks involved in the mounting. The supplier of the screen is only responsible for the assembly of the screen prior to delivery.

Especially when the electric motor is installed on site, it must be ensured that after installation of protective guards, the potentially dangerous gaps remaining in the screen are smaller than what standard EN 294 requires. The person in charge of mounting must take care of acquiring the necessary supplementary guards if the detachable guards supplied with the screen do not provide sufficient protection.

During mounting, fastening of the washer which installed at the end of the shaft of the electric motor must be taken into account. The washer prevents the belt pulley from falling if the fastening sleeve becomes slack.

## 2.8 Safety during operation

---

The maximum feed pressure of the screen is shown in the dimensional drawing appended to the instructions.

Do not use the screen at a temperature higher than what the customer has notified while the order was being made. When the operating temperature exceeds 65°C (prEN563), short-term surface contact may cause skin burn. Long-term contact may cause skin burn at temperatures below 65°C.

All original guards of the screen must be appropriately fastened while the screen is running, and the guards must not be removed during operation.

All maintenance of the screen and its drive motor is forbidden during operation, except:

- Lubrication of bearings.
- Adjusting sealing water flow and pressure (these are adjusted by valve(s) in the sealing water equipment).
- Deaeration of the screen by the deaeration connection at the cover of the screen

While the drive motor of the screen is rotating, make sure that there is a continuous liquid flow through the screen (due to a risk of over-heating).

## 2.9 Safety during maintenance

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Use appropriate hoisting equipment when lifting the screen, taking into account the design weight of the screen. The design weight and correct lifting methods are shown in the instructions.

If the cover of the screen needs to be opened during maintenance, flush the screen while the motor is still rotating.

Before maintenance, stop the drive motor and disconnect it from the electrical supply by means of a safety switch in accordance with relevant regulations.

Once the drive motor is stopped, close the valve of the sealing water line going to the shaft seal.

Before opening the cover of the screen:

- Make sure that the screen is depressurized.
- Make sure that no liquid or stock can flow into the screen.
- Drain the screen.

Do not take tools or lamps that operate with an electric voltage higher than 24 V into the equipment.

The screen can be started after maintenance only after:

- The cover of the screen has been closed.
- All original guards have been installed properly.

The sealing water valve must be opened before starting the drive motor of the screen.

If there is reason to expect considerable wear, for example, on account of excessive sand content, measure the thickness of the screen material regularly. If significant wear occurs, contact the supplier to ensure safe operation.

With the exception of seals and belt transmission, both stainless and mild steel have been used as the materials of the screen. These can be recirculated after use.

## 2.10 Safety during disassembly

---

The person in charge for the disassembly of the screen shall make sure that no measures at the disassembly site cause a safety risk.

Before disassembling the screen:

- Make sure that the screen is disconnected from power supply.
- Make sure that the screen is not pressurized.
- Make sure that liquid or stock flow into the screen is prevented.
- Drain and flush the screen.

## 3 DELIVERY

### 3.1 Mode of delivery

---

The screen is normally delivered from our factory completely assembled with the belt drive and motor installed. In cases where the customer supplies and installs the motor, the belts and belt pulleys are delivered in a separate package. Before delivery, all the connections of the screen have been protected with cover plates or plugs.



**Do not remove the cover plates or plugs until the piping installation requires it.**

### 3.2 Packaging

---

For transportation by truck, the screen is attached to a transport pallet which allows loading and transferring with a forklift truck. For long distance shipment, the screen with its transport pallet are packed into a sturdy crate to prevent damage during transfers and lifting. The lifting points are marked on the shipping crate. Weights and dimensions are given in the shipping documents.

### 3.3 Receiving inspection

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When the shipment has reached its destination, it is recommended that the screen and its enclosed parts be immediately inspected for potential damage which may have occurred during transportation.

If the delivery has included a separate spare parts shipment, verify the quality and quantity of the spare parts against the dispatch note to detect any potential shortcomings.



Immediately inform your contact person at Andritz TC about possible damages or missing parts so as to agree on further procedures and to determine possible compensation claims.



## 4 ERECTION

### 4.1 Erection site

---

The screen is a closed pressure screen with a maximum working pressure of 400 kPa.



**The screen must not be used at higher pressures.**

The screen can be located at various levels of the building.

Although there are no special requirements as to the operation and location of the screen, the following details should be taken into consideration at the planning stage to allow a trouble-free screening process:

- The dilution liquid requirement according to the production, pressure 150 kPa higher than the inlet pressure of the screen;
- The location of regulating valves and magnetic flow meters and the straight pipe lengths required by them;
- Selection of feed pump head so that the pressure is high enough to transfer the accept and reject to the next stage of treatment, taking the normal pressure loss of approx. 0 - 50 kPa into account;
- The centralization of local instruments to a free space.

The dimensional drawing presents the external dimensions of the screen and the free space requirement above it.



**The requirement of clean sealing water is 0.03 - 0.08 l/s (2 - 5 l/min), the pressure of the water led to the seal is recommended to be 100 kPa higher than the maximum inlet pressure of the screen; however, at least 300 kPa.**

### 4.2 Foundation

---

Make the foundation of concrete in accordance with the dimensional drawing. The quantity and location of foundation screws are given in the foundation drawing.

**F10-F20** The screen can be levelled using the adjustment screws in the foundation (4 pcs). The foundation bolts included in the delivery should be used.

**F40** The screen can be levelled using the adjustment screws in the foundation (6 pcs). The foundation bolts included in the delivery should be used.

Welding must be performed in accordance with the welding instruction given in the dimensional drawing.



To allow after-tightening, there must not be any adjustment nuts in the foundation screws under the base plate. When after-tightening, a nut under the base plate will prevent the tightening of the base plate against the concrete surface!

## 4.3 Lifting equipment

There should be lifting equipment at the installation site to facilitate mounting and maintenance inspections. There must be sufficient space above the screen to lift the rotor, screen basket and shaft.

## 4.4 Installation of ModuScreen™

Lift the screen from its transport pallet using the lifting lugs (► Fig. 4-1, Hoisting of ModuScreen™ on page 4-3).



**DANGER**

**Do not lift the screen by the motor stand.**

For undisturbed operation and to prevent stress to the foundation screws of the screen during operation, the screen must be leveled during installation. This will also ensure the removal of all liquid from the screen during drainage.

Vibrations can be transmitted to the screen from the pump or other near-by equipment as well as through the piping. The screen must therefore be carefully and securely fastened to the foundation.



**DANGER**

**Check the tightening of the foundation screws before the screen is taken into use.**

Size	Weight with motor* [kg]	Weight without motor [kg]
F10	1 105 – 1 160 (255 – 310)	850
F20	1 710 – 2 025 (310 – 625)	1 400
F30	3 470 – 4 010 (420 – 960)	3 050
F40	4 425 – 4 960 (625 – 1 160)	3 800
F50	5 965 – 6 850 (665 – 1 550)	5 300
F60	10 500 – 11 300 (1 000 – 1 800)	9 500

\*) weight of motor in brackets

**Tab. 4-1 Construction weights**

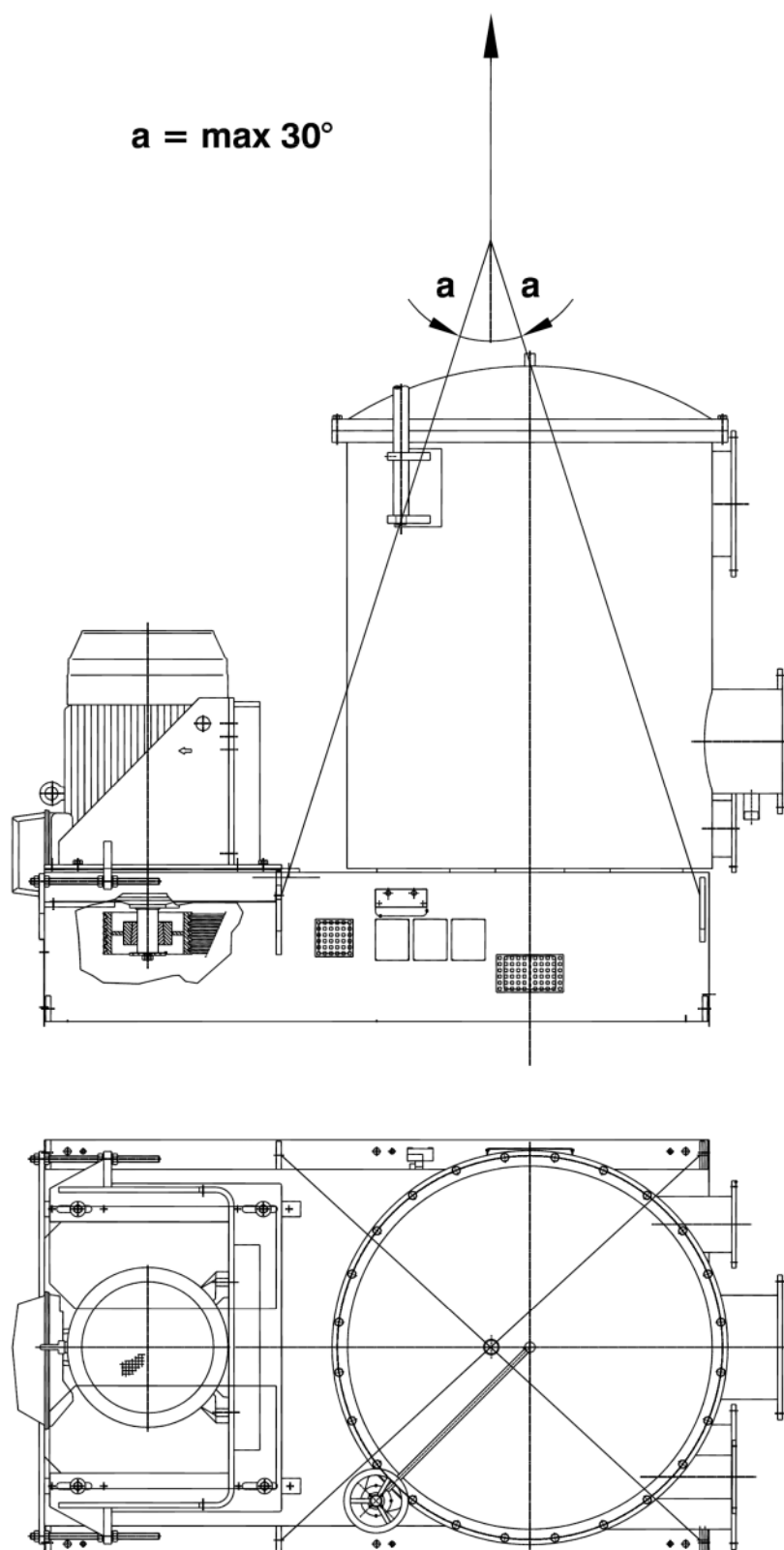


Fig. 4-1 Hoisting of ModuScreen™

## 4.5 Installation of the electric motor

---

The electric motor must be installed at the installation site in case that it is provided by the customer.

Installation of the drive parts is explained in (► Sec. 9.6, Motor and power transmission on page 9-11).

## 4.6 Power transmission

---

The power transmission of the screen is arranged through V-belts.

Move the motor stand in order to tighten the belt(s) (► Fig. 4-2, Moving of the motor in order to tension the belt(s) on page 4-6).

## 4.7 Tensioning of V-belts

---



**Always disconnect the motor from the power supply in accordance with regulations before dismounting the belt guards and inspecting and servicing the transmission! Remount the belt guards before reconnecting the motor to the power supply.**

---

The high power transmission ability of the belts cannot be utilized unless the belts are correctly tensioned. Make sure that the belts are correctly tensioned in the following way:

Measure the perpendicular bending force  $F$  (► Fig. 4-3, Measuring of the belt tension on page 4-6), which leads to a belt tension in accordance with the following table.

Size	Deflection [mm]
F10	5
F20, F30	10
F40, F50	15
F60	20

**Tab. 4-2 Belt deflection**

Compare the measured force with the table below.

Belt profile	Diameter of smaller pulley [mm]	Bending force F [N]
SPB/5V	160 – 200	29 – 44
	212 – 280	36 – 50
	300 – 400	38 – 58
SPC	250 – 355	51 – 75
	375 – 560	60 – 90

**Tab. 4-3 Belt bending force**

If the measured bending force falls between the given values, the tension is suitable. If the force is below the lower value, the belts are too slack. A new belt drive should be tensioned to the higher measured force value because the belts stretch during the run-in period.

After the first 30 minutes or at the latest after the first day of operation, check the belts and tension the slack which has been created during the run-in period back to the recommended range.

After this adjustment, the belts will not slacken during normal operation and need little further adjustment.



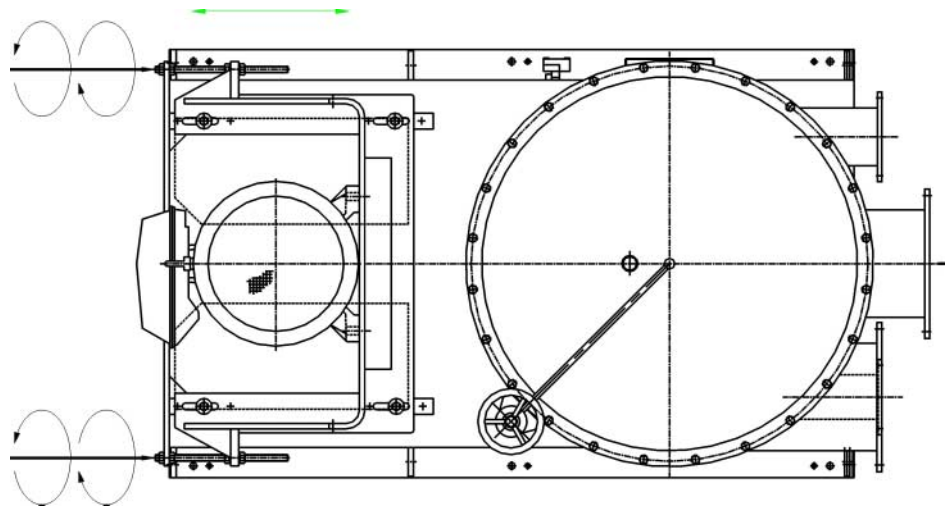
**Do not tension the belts above the recommended range.**

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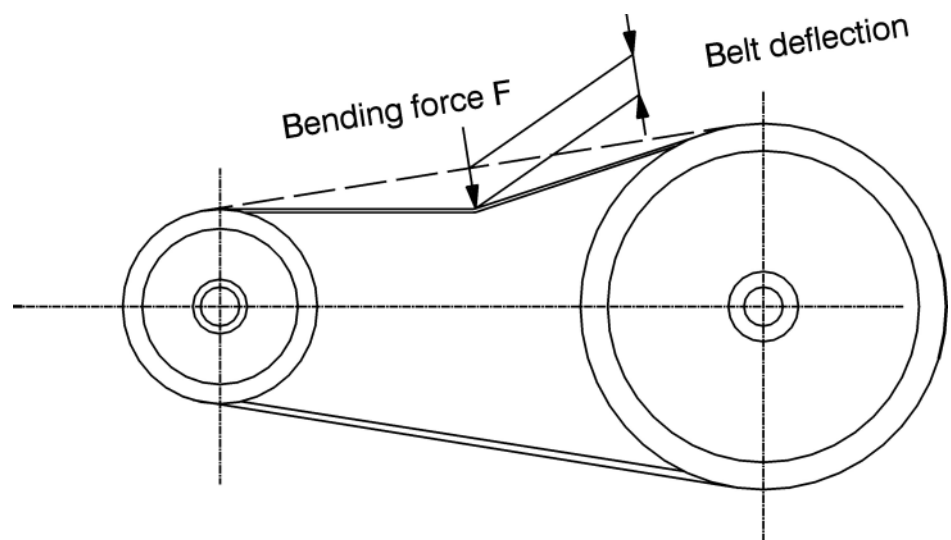


**After installing and tensioning the belts, make sure that all guards are installed before starting.**

---



**Fig. 4-2** Moving of the motor in order to tension the belt(s)



**Fig. 4-3** Measuring of the belt tension

## 4.8 Lifting device for the cover

Fasten the lifting device for the cover which has been detached for transportation into place onto the clamps on the frame and cover with screws which are included in the delivery.

## 4.9 Sealing water equipment

Fasten the sealing water measuring and adjusting equipment with their stands – which have been detached for transportation into place on the base plate. Use the screws which are included in the delivery for this purpose.

Fasten the water hoses to the sealing water equipment.



**CAUTION**

**Do not start the screen without sealing water.**

---

## 5 PIPING AND VALVE INSTALLATION

### 5.1 General instructions for installation

---

The pipe connections for the screen are shown in the dimensional drawing. The piping and other connections must be installed according to approved drawings, in which the special requirements set by the regulating valves as well as consistency and flow measurements have been taken into consideration.

Pipes should be supported in such a way that the weight of the pipes does not rest on the screen. In locating the supports, make sure that the pipes do not cause stress to the screen. The supports must allow for thermal expansion of the pipes.

When engineering and installing stock pipes in particular, make sure that air pockets cannot be formed in the pipes.

#### Connecting the screen

#### Preconditions

- Pipe work is completed.

Step	Action
1	Flush the inside of the piping to remove welding and other residues. The cleaning should be carried out before the pipes are fastened to the screen.
2	After cleaning, remove the cover plates and plugs protecting the connections of the screen.
3	Fasten the connections to the pipes.

**Tab. 5-1 Connecting the screen**

### 5.2 Feed piping

---

The feed piping of a single screen is simple and the valve installed to the feed pipe is a mere shut-off valve. During normal operating conditions, throttling is not used except when reducing pressure on the inlet side.

In a parallel installation of two or more units, individual throttling is avoided by making the feed pipe of each separate unit tapered or stepped in order to even out the flow velocity of stock.

### 5.3 Accept piping

---

The valve installed in the accept pipe of a single screen regulates the throughput.



In a parallel installation of two or more units, the accept collecting pipe must be tapered or stepped in a similar manner as the feed pipe in order to even out the flow velocity of stock. In addition to the accept valves of each unit, there is generally a common remote controlled valve in the collecting pipe.

## 5.4 Reject piping

---

A separate reject flow regulating valve must be installed in the reject pipe of each screen.



The automatic flow regulation must react to flow changes immediately as a large reject amount will plug the reject pipe very quickly. A ball valve is recommended for this duty.

Pipe joints should be smooth.

## 5.5 Reject dilution piping

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The reject dilution connection at the opposite side of the reject outlet connection is mainly required for lowering the consistency which is essential for the next stage of treatment. During starting, this dilution can be used for the fast filling of the screen and for flushing before shutdown. Install a regulating valve in the pipe line.

## 5.6 Sealing water piping

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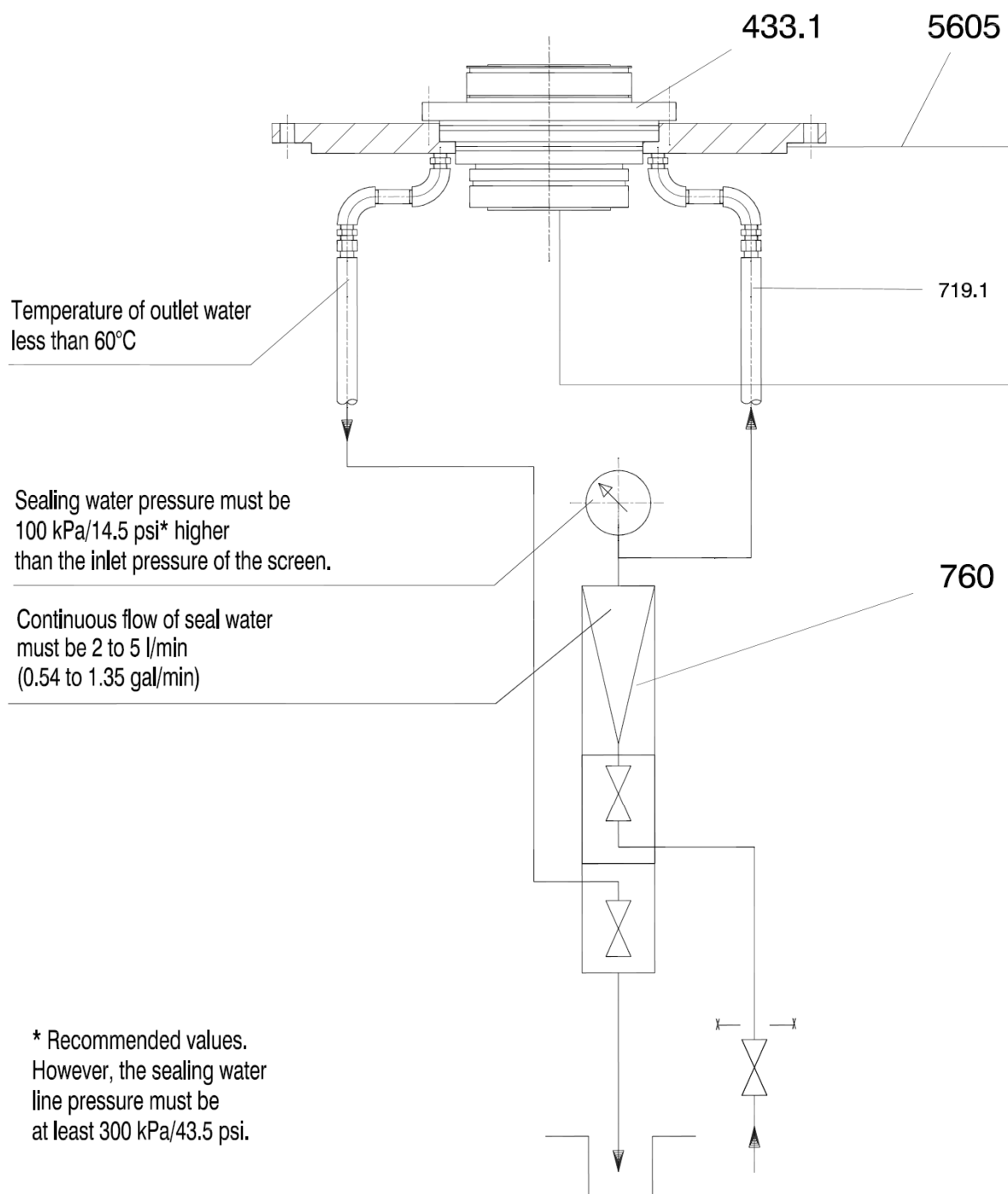
The required measuring equipment and a filter are installed to the installation plate of the sealing water distribution piping for the mechanical seal.

The rotameter and the pressure gauge are the sealing water measuring devices. As a last protection, a 40 micron pipe filter prevents impurities from entering the seal. A high-capacity 40 micron pipe filter is recommended for the inlet pipe.

The rotameter is provided with flow alarm.



**The pressure of the water led to the seal must be min. 300 kPa. However, it is recommended that the seal water pressure is 100 kPa higher than the inlet pressure of the screen.**



**Fig. 5-1 Sealing water piping**

## 5.7 Deaeration piping

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Connect a shut-off valve and a flexible plastic hose to the deaeration connection on the screen cover.

The plastic hose allows the screen cover to be turned sideways easily without detaching the deaeration piping. The deaeration is required mainly when starting and periodically during operation. If air-containing liquid must be exhausted continuously, a plastic hose must be led to the feed tank.

## 5.8 Drain pipes

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There is a drain connection in the accept connection.

A separate drain pipe can be fastened to the reject pipe unless drainage is carried out through the reject regulating valve.

The drain pipes should be extended to floor level to minimize splashing in the vicinity of the belts.

When drawing the pipes, note that the drain pipes are also used as sample taking pipes.

## 6 OPERATION

### 6.1 Inspection before operation

**Preconditions**

- The motor is disconnected from the electric network according to regulations.

Step	Action
1	Flush sealing water line.
2	Inspect the pipe supports and ensure that the pipelines are in accordance with approved drawings.
3	Open the cover and remove the screen basket according to (► Sec.9.2, Cleaning of a plugged screen on page 9-2).
4	Check that the interior is clean and that no foreign objects have entered the screen during transportation and installation.
5	Flush inside if necessary.
6	Check the belt tension.
7	Check the direction of motor rotation. The direction of rotation is clockwise. The arrow on the motor stand shows the direction of rotation.
8	Perform water test run according to (► Sec.6.2, Water test run on page 6-1).

**Tab. 6-1 Inspection before first start-up**

### 6.2 Water test run

Before the screen is taken into productive use, perform a water test run in order to flush the piping from wastes and foreign objects.



**The screen must not be running during the test run.**

Perform the water test run as follows.

**Water test run**

**Preconditions**

- The motor is disconnected from the electric network according to regulations.

Step	Action
1	Flush the sealing water piping so that the weld slag and other wastes do not plug the sealing water rotameter.
2	Lock the V-belt pulley with wedges so that the screen rotor cannot rotate with the feed flow.
3	Open the deaeration valve on the cover.
4	Open the sealing water and adjust the flow according to the instructions.
5	Fill the screen with water.
6	Close the deaeration valve on the screen cover.
7	Open the valve on the feed pipe. Open also the valve on the accept pipe if available.
8	Start up the feed pump.
9	Open the reject valve completely.
10	Let the water flow through the screen for 10 to 15 min. Meanwhile, adjust the flow control instrumentation and check the pressure instruments.
11	Stop the feed pump.
12	Close the feed, the accept and the reject valves.

**Tab. 6-2 Performing a water test run**



**Open the sealing water though the screen is not running during the water test run because the sealing water serves as sealing liquid and prevents the water pressure of the screen from opening the sliding surfaces of the seal.**



**Start opening the feed valve slowly in order to prevent hydraulic shock against the screen basket.**

**After the water test run**

Step	Action
1	Drain the screen.
2	Open the screen cover.
3	Inspect the screen inside.
4	Remove possible wastes and foreign objects.
5	Remove the wedges from the V-belt pulley so that the rotor can rotate freely.
6	Rotate the rotor by hand to ensure that it rotates freely.
7	Put the screen basket back into the screen and close the cover.

**Tab. 6-3 Check up after water test run**

After these actions the screen can be taken into productive use.

## 6.3 Instrumentation and alarms

Of the instruments, the pressure difference measurement system with alarm is the most important. The normal pressure difference is 0 - 50 kPa. The alarm limit can be set to e.g. 55 kPa when still, by changing the running mode through the adjusting of the accept side flow regulating valve, potential plugging of the screen can be prevented.

The sealing water pressure gauge is an important indicator of the cleanliness of the 40 micron pipe filter. The sealing water measuring rotameter is equipped with a flow guard which can be connected to the alarm centre.

Reject flow from the various units is regulated with the automatic reject regulating valves. The flow regulation must be rapid as the plugging of the screen might start at the reject side when screening stock which contains a large quantity of reject.

Feed stock consistency regulation takes place right after the feed tank by means of the consistency controller or dilution flow controller.

The consistency of reject is lowered through dilution flow control.

## 6.4 Start-up

- Double-acting seal** The pressure of the sealing water led to a double-acting mechanical seal is recommended to be 100 kPa higher than the pressure of the pulp flow fed into the screen; however, at least 300 kPa. The pressure is measured at the pressure gauge of the sealing water equipment.
- A constant sealing water flow of 0.03 - 0.08 l/s (2 - 5 l/min) must be maintained.
- Start-up** Start-up the screen in the following sequence:

Step	Action
1	Open the sealing water valve and adjust the flow to 0.05 l/s (3 l/min).
2	Open the deaeration valve on the screen cover
3	Fill the screen with water.
4	Start the screen drive motor.
5	Open the reject valve about 20 %, keep the accept valve closed and open the reject dilution valve about 30 %.
6	Open the feed valve completely.
7	Start the feed pump of the screen.
8	Adjust the feed consistency to the level shown in the flow sheet.
9	Adjust the required flow with the accept valve while the feed valve is fully open.
10	Adjust the amount of flow to be discharged as reject with the reject valve.
11	Perform deaeration through the deaeration valve on the screen cover and close the valve when there is a continuous flow of liquid from the connection.

**Tab. 6-4 Start-up of the screen**

## 6.5 Operational control and flow adjustment

Once the screen has been started and the flow adjustments are in the correct ranges, the screen requires very little attention under normal operating conditions.

If the instrumentation has been equipped with remote control, the necessary adjustments can easily be made from the control room.

Most important issues in operational control are:

- Pressure difference measurement indicates the most of the operating conditions of a screen. The measurement must be equipped with a pressure difference alarm. The pressure difference in the screen varies depending on screen basket perforation, flow rate, consistency, reject percentage and pulp type. Generally, an increase in the flow rate and consistency will increase the pressure difference; the perforation is to be chosen on the basis of the pulp type and cleanliness requirements. The screen does not work, on the other hand, if the flow rate is too low. A small water quantity is rapidly discharged, causing the thickening of the fibers and an excessive increase in the reject consistency and even plugging, of which the pressure difference indicator gives an alarm.

The normal pressure difference range is 0 - 50 kPa.

- The reject amount is regulated with the reject flow regulating valve. Should the regulating valve open often allowing reject accumulations to pass through, the set value of the throughflow should be increased. (The reject

must be drained at shorter intervals where screens are equipped with intermittent reject discharge).

- With the reject dilution regulating valve, the consistency of the reject can be adjusted to the proper level for the next process stage.
- The pressure and flow of sealing water should be checked once in each shift.



**The pipe filter in sealing water supply must be cleaned regularly to avoid plugging, and at the latest when the flow indicator gives an alarm.**

## 6.6 Instructions in case of a disturbance

Plugging of the screen baskets most commonly cause disturbances, which can be seen as decreased screen capacity and increased pressure difference.

### Slightly plugged screen basket

A slight plugging of the screen basket can be cleaned by:

Step	Action
1	Opening the reject valve completely.
2	Close the accept valve slowly.
3	Let the screen run for several minutes.

**Tab. 6-5 Cleaning slightly plugged screen basket**



Adding dilution through any connection is helpful, but not guarantee to clear a plugged screen.

### Severely plugged screen basket

If the screen basket is plugged so severely that the above procedure do not help, the screen must be stopped, flushed and drained (► Sec. 6.7, Shutdown on page 6-6).

Operational interruptions in the reject treatment stage can be due to too high consistency, in which case additional dilution is required. If the reject percentage in the feed flow is high, the feed quantity must be decreased so that reject treatment can handle the excess amount of reject fraction.

It is not necessary to empty the screen if it is out of operation for a short time only, e.g. due to a power failure.

If the shutdown period is longer, the screen should be drained (► Sec. 6.7, Shutdown on page 6-6) and restarted (► Sec. 6.4, Start-up on page 6-3).



## 6.7 Shutdown

Shutdown and flush the screen in the following sequence.

Step	Action
1	Stop the feed pump.
2	Close the accept valve completely while the screen is still operating.
3	Close the feed valve completely.
4	Open the dilution valve in order to flush the reject and fibers to reject treatment.
5	Close the reject valve and open the deaeration valve on the screen cover.
6	Continue flushing until the liquid flowing from the deaeration pipe no longer contains fibers.

**Tab. 6-6 Downshutting the screen**

### Short downtime

Unless it is necessary to open the cover and carry out a maintenance inspection, the screen can be left filled with water until the next start-up.

Step	Action
1	Close the dilution, fresh water and deaeration valves.
2	Stop the screen drive motor.
3	Close the sealing water valve.

**Tab. 6-7 Completing the shutdown for a short downtime**

**Prolonged shutdown** If the downtime is longer or intended for maintenance inspections, continue as follows.

Step	Action
1	Leave the deaeration valve open and close only the dilution and fresh water valves.
2	Stop the motor of the screen.
3	Drain the screen by opening the valves of drain pipes on the reject side of the accept connection and the junk trap valves.

**Tab. 6-8 Completing the shutdown for a prolonged downtime**

### Maintenance/Inspection

#### Preconditions

- The motor is disconnected from the electric network according to regulations.

The screen is now ready to be maintained and inspected (► Sec. 9, INSPECTION AND MAINTENANCE on page 9-1).

## 6.8 Troubleshooting

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In case of a disturbance, its cause can be found out on the basis of the following figures (► Fig. 6-1, Breakdown due to disturbance in operation on page 6-8 and ► Fig. 6-2, Breakdown due to mechanical causes on page 6-9).

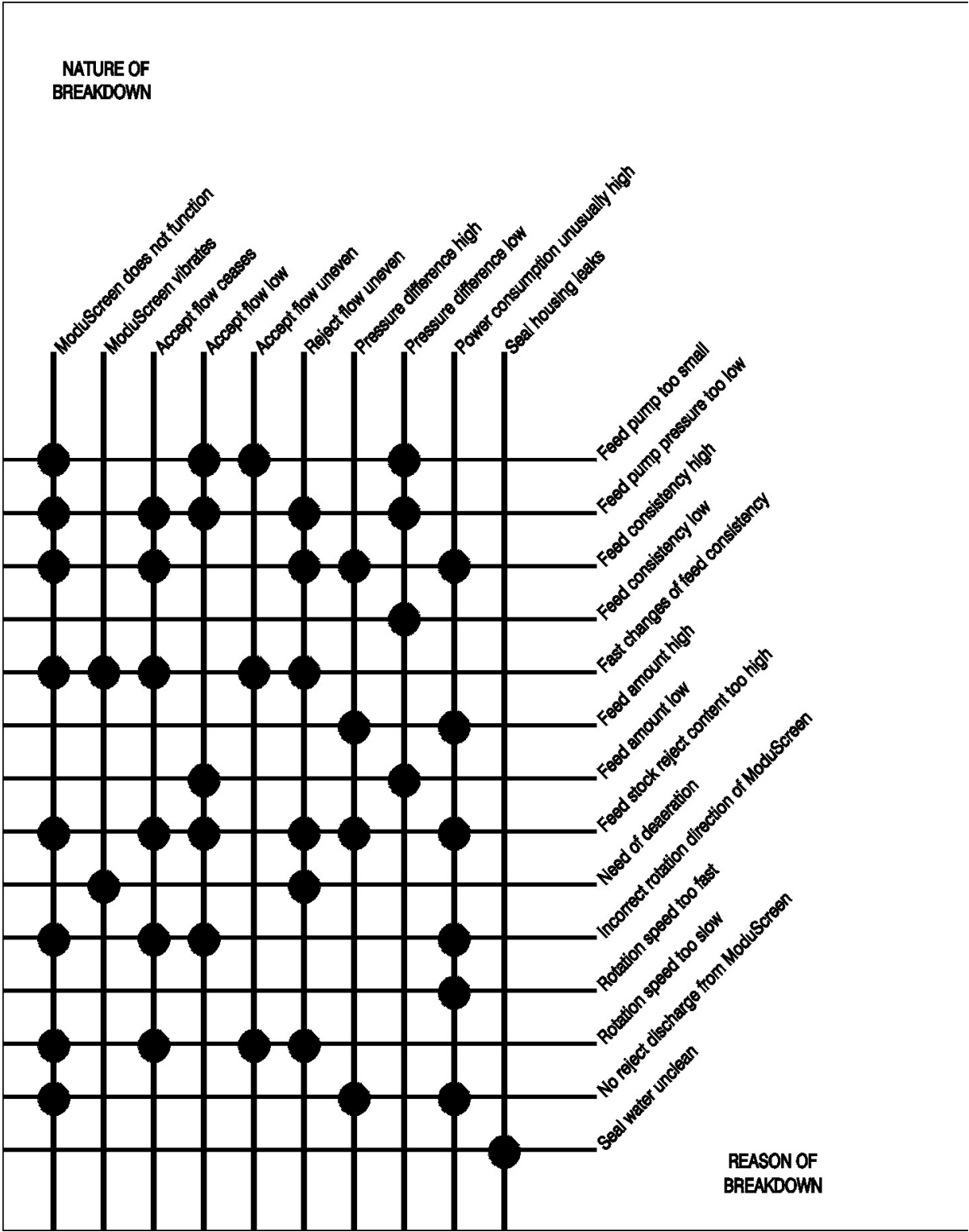


Fig. 6-1 Breakdown due to disturbance in operation

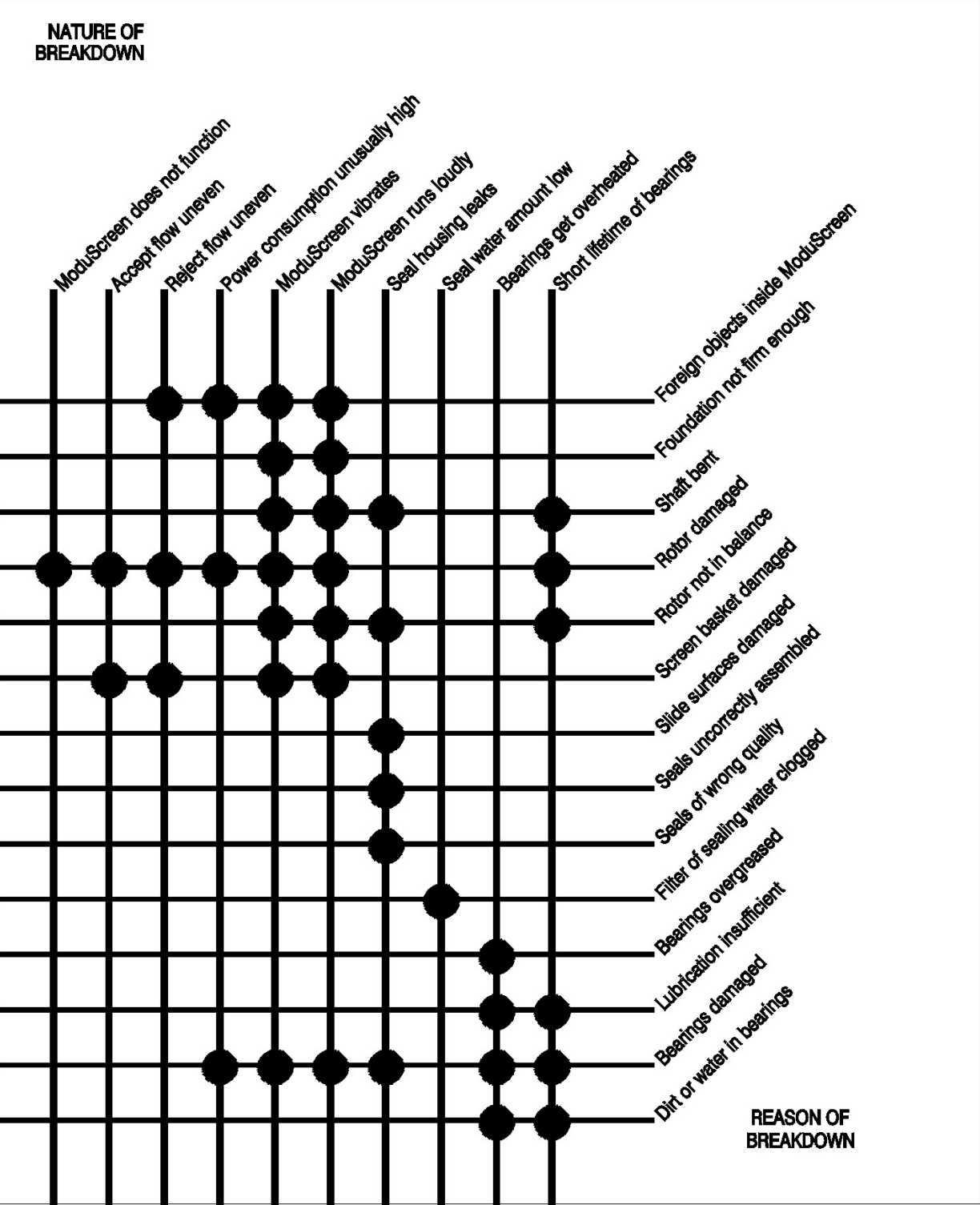


Fig. 6-2 Breakdown due to mechanical causes

## 7 SEALS AND LUBRICATION

### 7.1 Bearing lubrication instructions

The bearings of the supplied screens are pre-lubricated. In post-lubrication, lubricants of different manufacturers can be used (► Tab. 7-1, Recommended lubricants for the re-lubrication of the bearing housings on page 7-1).

The bearing housing re-greasing quantities and the lubrication intervals are given by the tables below (► Tab. 7-2, Re-greasing of the upper bearing housing on page 7-2 and ► Tab. 7-3, Re-greasing of the lower bearing housing on page 7-2).

The intervals for manual lubrication on the bases of operation hours are given at a temperature of +70°C and 110°C. If the bearing is used at higher temperatures, the greasing interval should be reduced so that each increase of +15°C reduces the greasing interval by a half.

If required, small changes can be made to the values of the tables as long as the ratio between the grease amount and lubrication interval is constant.

Locations of the lubricating hoses inside the screen are shown by the figure (► Fig. 7-1, Location of the lubricating hoses inside the screen on page 7-3).

F10 – F40*	F50, F60**
Mobilux EP 2	Mobilith SHC 460
Esso Beacon EP 2	Esso Ronex Extra Duty 1
Shell Alvania G3	Shell Albida PPS
Tebo Multi-Purpose Extra	SKF LGHB 2
SKF LGMT 3	Neste Templex

\*) The operating temperature range for the lubricants is -30°C...+110°C. Should the temperature exceed +110°C, lubricants are to be chosen as for F50/60.

\*\*) Heat resisting lubricant grades only.

**Tab. 7-1 Recommended lubricants for the re-lubrication of the bearing housings**

Size	Bearing type	Temperature 70 °C		Temperature 110 °C	
		Manual lubrication: Amount/ interval	Centralized lubrication: Amount / interval	Manual lubrication: Amount / interval	Centralized lubrication: Amount / interval
F10	2 x 7313 BG	46 g/6000 h	0.3 g/ d**	46 g/950 h	1.8 g/d**
F20	2 x 7316 BG	66 g/6900 h	0.3 g/ d**	66 g/1100 h	2.1 g/d**
F30, F40	2 x 7324 BG	144 g/6300h	0.9 g/ d**	144 g/1000 h	5.1 g/d**
F50*	2 x 7330 BCBM + 1 x 7230 BCBM	312 g/4700 h	1.5 g/ d	312 g/750 h	9.9 g/d
F60*	2 x 7330 BCBM + 1 x 7230 BCBM	312 g/5500 h	1.5 g/ d	312 g/870 h	8.7 g/d

\*) F50 and F60 can be supplied with a lubrication center as an option.

\*\*) The standard delivery does not include a lubrication center.

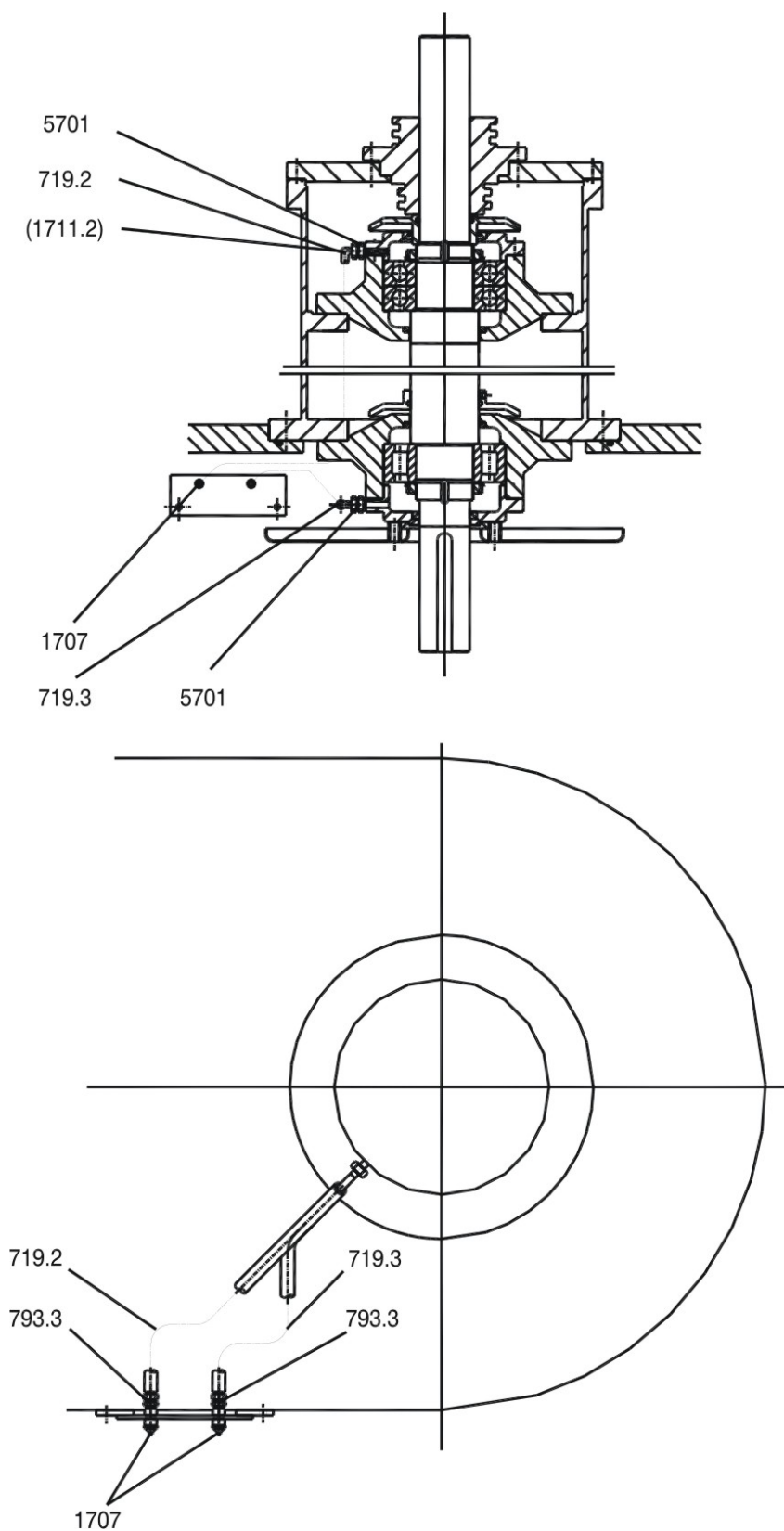
**Tab. 7-2 Re-greasing of the upper bearing housing**

Size	Bearing type	Temperature 70 °C		Temperature 110 °C	
		Manual lubrication: Amount/ interval	Centralized lubrication: Amount / interval	Manual lubrication: Amount / interval	Centralized lubrication: Amount / interval
F10	1 x NU 2313	34 g/3000 h	0.3 g/d	34 g/470 h	1.7 g/d
F20	1 x NU 2316	49 g/3600 h	0.3 g/d	49 g/570 h	2.1 g/d
F30,	1 x NU 2324	112 g/3200 h	0.8 g/d	112 g/510 h	5.3 g/d
F50	1 x 23228 CC/ W33	110 g/3200 h	0.8 g/d	110 g/510 h	5.8 g/d
F60	1 x 23228 CC/ W33	110 g/4200 h	0.6 g/d	110 g/660 h	4.0 g/d

\*) F50 and F60 can be supplied with a lubrication center as an option.

\*\*) The standard delivery does not include a lubrication center.

**Tab. 7-3 Re-greasing of the lower bearing housing**



**Fig. 7-1** Location of the lubricating hoses inside the screen

## 7.2 Mechanical sealing water supply

In order to operate properly, mechanical shaft seal always requires the use of sealing water.



The pressure of the water led to the seal must be min. 300 kPa. However, it is recommended that the seal water pressure is 100 kPa higher than the inlet pressure of the screen.



Do not rotate the screen without sealing water.

Sealing water value	Max. value
Solids content:	Max. 10 mg/l
Particle size:	Max. 50/μm
Permanganate number:	Max. 30
Iron content:	Max. 1 mg/l
Total hardness:	Max. 10°dH

**Tab. 7-4 Recommended sealing water values**

The normal sealing water flow amount is 0.05 l/s (3 l/min). In case the mechanical seal requires cooling, for example in connection with hot stock, the amount of sealing water flow can be increased up to 0.08 l/s (5 l/min).



The temperature of the water leaving the seal should not exceed +60°C.



## 8 ACCESSORIES

### 8.1 Discharge pipe and dilution for light reject

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A light reject discharge pipe for plastics removal can be installed in the screen. In such cases a dilution liquid pipe is led to the exhaust location.

Dilution and discharge pipes for light reject are not included in the delivery.

### 8.2 Pressure gauges

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Local pressure gauges indicating the pressure of the fed stock and the accept as well as their pressure difference can be installed in the screen.

Local pressure gauges are not included in the delivery.

### 8.3 Bearing condition monitoring equipment

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Vibration sensors can be installed in the bearing housings of the screen for the follow-up of bearing vibration. The measuring results can then be transferred to the control equipment along cables.

Vibration sensors are not included in the delivery.

### 8.4 Bearing temperature sensors

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To be able to follow the bearing temperature, temperature sensors can be installed on the bearing housings. The measuring results are transferred to the control equipment through cables.

Bearing temperature measuring device is not included in the delivery

## 9 INSPECTION AND MAINTENANCE

### 9.1 ModuScreen™

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In the design of ModuScreen™, modern methods have been used to utilize the development of materials and accessories. ModuScreen™ has been divided into easily exchangeable functional scopes of delivery which minimize the time required by the exchange of parts due to damage or due to a process modernization.

The main scopes of delivery are:

- Screen housing and stand
- Rotor (► Sec. 9.3, Rotor on page 9-6).
- Mechanical seal (► 9.4).
- Electric motor (► Sec. 9.6, Motor and power transmission on page 9-11).
- Belt pulleys, taper lock bush and belts (► Sec. 9.6, Motor and power transmission on page 9-11).
- Shaft package (► Sec. 9.7, on page 9-15).
- Sealing water and lubrication hoses.
- Screen basket.

The maintenance and inspection instructions for ModuScreen™ have been prepared to ensure that normal repair and service procedures can be easily carried out by following these instructions, provided that the instructions for installation and operation have also been studied.

If the lubrication instructions for bearings and the cleanliness requirements for the sealing water of the mechanical seal are followed, together with the operating instructions in various situations in general, your ModuScreen™ will function reliably and without disturbances, and no production downtimes will occur.

## 9.2 Cleaning of a plugged screen

### Opening and cleaning of a plugged screen

Under difficult operating conditions, ModuScreen™ may sometimes plug so thoroughly that it is necessary to open it and remove the screen basket for a clean up.

Step	Action
1	Stop, flush and drain the screen (► Sec. 6.7, Shutdown on page 6-6)
2	Disconnect the motor from the electrical network according to regulations and attach a warning tag to the starter.
3	Remove the hose from the deaeration connection on the cover.
4	Slacken and remove the hexagonal screws (► Fig. 9-1/901.64) of the cover and lift the cover aside.
5	Inspect the rubber seal (► Fig. 9-1/5401.1).
6	Slacken and remove the socket head screws (► Fig. 9-1/914.11) of the spacer ring (► Fig. 9-1/504) and lift off the spacer ring.
7	Detach the screen basket from its fitting by unscrewing the socket head screws (► Fig. 9-1/914.11).
8	If the screen basket is tightly attached to its fitting, detach it by screwing two spacer ring socket head screws (► Fig. 9-1/914.11) into two opposite threaded holes in the screen basket.
9	Screw two lifting eyes into two opposite holes and lift off the screen basket.
10	Wash the detached screen basket and all inner parts with high-pressure water.
11	Inspect for potential wear.
12	Inspect the condition of the rubber band (► Fig. 9-1/5401.7) at the bottom end of the screen basket.

**Tab. 9-1 Opening and cleaning of a plugged screen**

In screening plants with slime problems, the screen basket must be removed regularly and the screen interior carefully washed with high-pressure water.

### Reassembly after cleaning

After washing and inspection, reassemble ModuScreen™ into working condition as follows:

Step	Action
1	Lower the screen basket into ModuScreen™. Ensure that the basket is straight. The fitting at the bottom end and the anti-torsion screws (► Fig. 9-1/914.14) at the top end guide the screen basket into place.
2	Install the spacer ring (► Fig. 9-1/504) into place. When the spacer ring is properly in its place, install the mounting screws (► Fig. 9-1/914.11) of the spacer ring.
3	Tighten the screws with a torque wrench to a tightness of 60 Nm crosswise (► Fig. 9-2, Tightening of the screen basket on page 9-5). If there are more screws than in the figure, follow the same principle as to the order in which the screws are tightened.
4	Place the cover back into place and tighten the hexagonal nuts.
5	Fasten the deaeration connection hose on the cover.

**Tab. 9-2 Reassembly after cleaning**

ModuScreen™ is now ready to be taken into use in accordance with the starting instructions (► Sec. 6.4, Start-up on page 6-3).

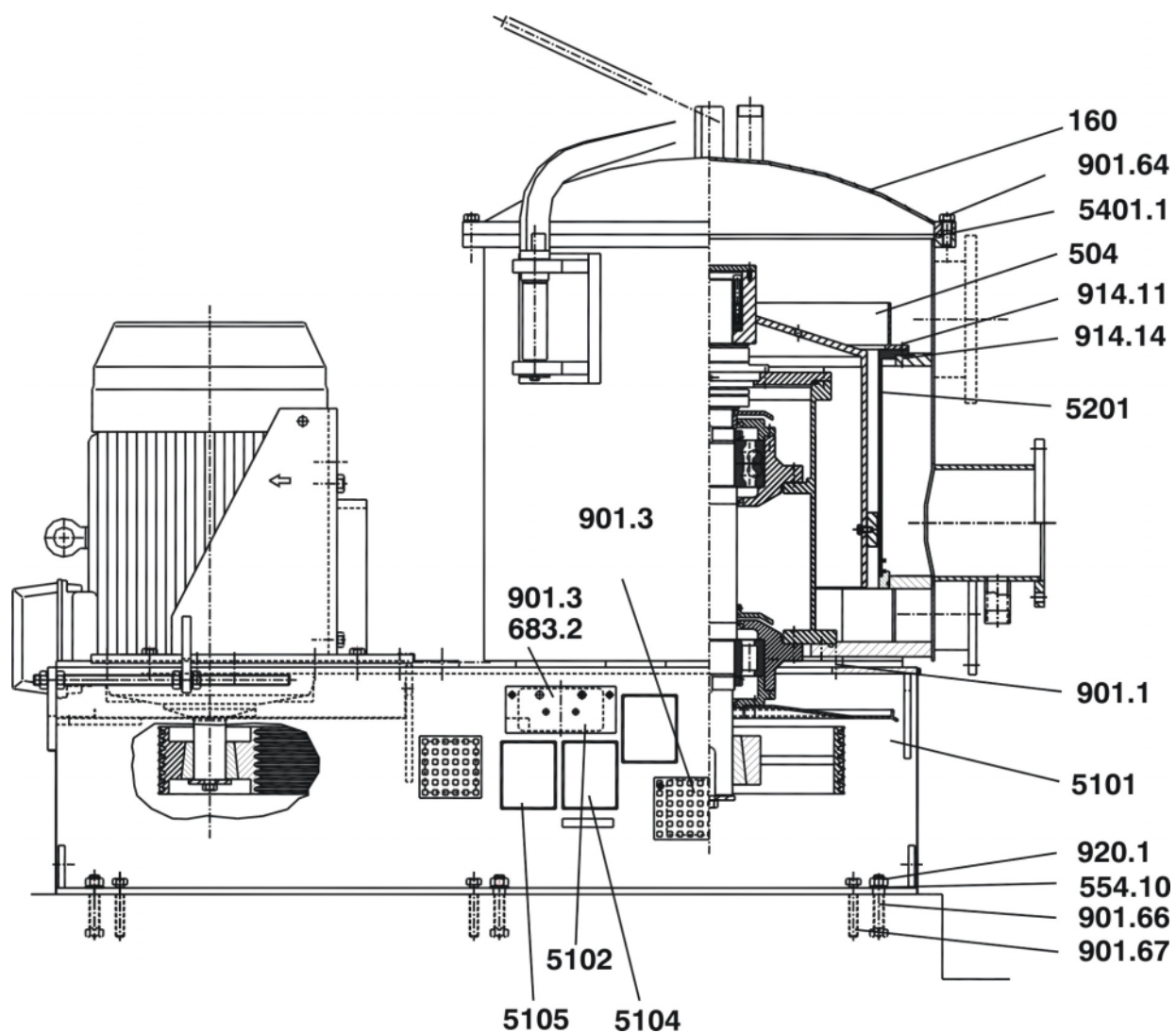


Fig. 9-1 Screen housing and stand

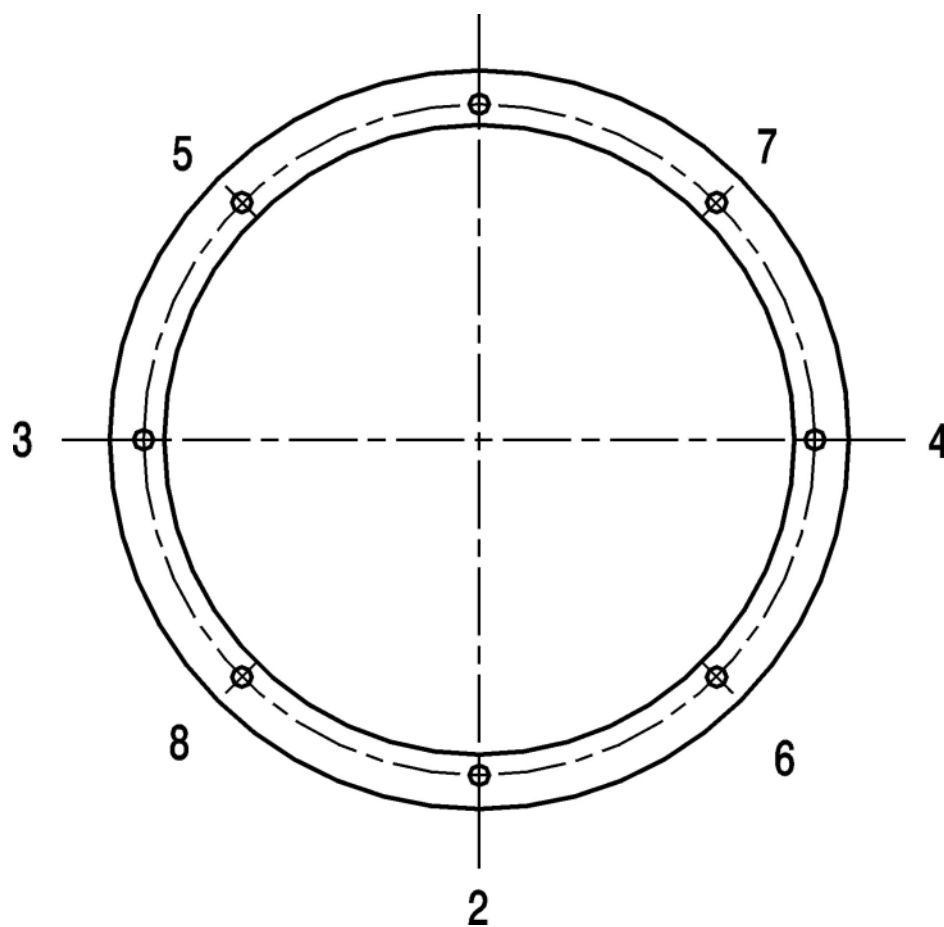


Fig. 9-2 Tightening of the screen basket

## 9.3 Rotor

**Removing the rotor** The rotor must be removed for maintenance purposes or for the inspection of the mechanical seal or the bearing unit.

Step	Action
1	Remove the screen cover and screen basket (► Sec. 9.2 ,Cleaning of a plugged screen on page 9-2).
2	Detach the socket head screws (► Fig. 9-3/ <b>914.12</b> ) of the pressure plate (► Fig. 9-3/ <b>5207</b> ).
3	Remove the pressure plate and the gasket (► Fig. 9-3/ <b>400.1</b> ).
4	Dismount the fixing sleeve (► Fig. 9-3/ <b>531.1</b> ) according to attachment "Installation and removal instruction 1008 & 4061 series".
5	If the rotor is tightly fixed to the shaft, detach it from the shaft by means of an extractor bar. When the rotor is moving, attach two eye screws into the holes on the rotor hub and lift off the rotor from the shaft.

**Tab. 9-3 Removing the rotor**

**Reinstalling the rotor** After the service and inspection procedures, reinstall the rotor onto the shaft as follows:

Step	Action
1	Thinly oil the shaft end, rotor hub and the outer as well as the conical surfaces of the fixing sleeve.
2	Attach two eye screws into the holes on the rotor hub and lift the rotor onto the shaft.
3	Mount the fixing sleeve (► Fig. 9-3/ <b>531.1</b> ) according to attachment "Installation and removal instruction 1008 & 4061 series".
4	Place the gasket (► Fig. 9-3/400.1) and the pressure plate (► Fig. 9-3/ <b>5207</b> ) onto the rotor hub.
5	Tighten the fastening screws.
6	Place the screen basket and cover into position (► Sec. 9.2, Cleaning of a plugged screen on page 9-2).

**Tab. 9-4 Reinstalling the rotor**

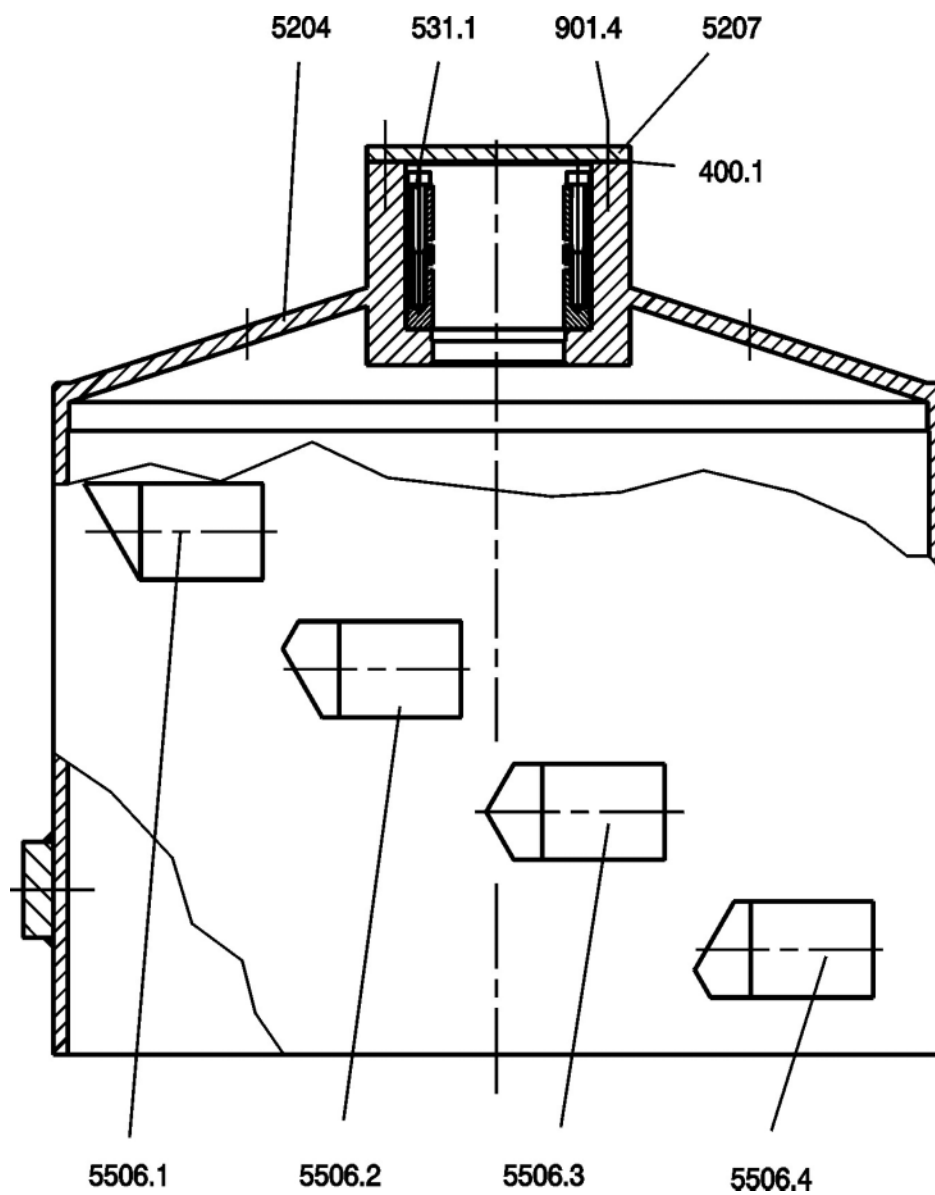


Fig. 9-3 Rotor



## 9.4 Mechanical seal

### Dismounting the mechanical seal



Due to wear and aging may it in the long run be necessary to dismount the mechanical seal for a check-up or for possible exchange.

Do not dismount the mechanical seal unless it is apparent that the seal is leaking too much or it is necessary to dismount the upper bearing. Excess leakage of the mechanical seal is discovered from the amount of water or fibers running on the splashguard.

### Preconditions

- The screen cover and basket are removed (► Sec. 9.2, Cleaning of a plugged screen on page 9-2).
- The rotor is removed (► Sec. 9.3, Rotor on page 9-6).

Step	Action
1	Slacken and remove the hexagonal screws (► Fig. 9-4/901.6) of the seal (► Fig. 9-4/433.1).
2	Mechanical seal: Lock the flange and the shaft end of the seal (► Fig. 9-4/433.1) to each other with fastening plates (► Fig. 9-4/A) to prevent damage to the seal sliding surfaces.
3	Pull the seal (► Fig. 9-4/433.1) off from the shaft (► Fig. 9-4/210) using an extractor.

**Tab. 9-5 Dismounting the mechanical seal**

### Replacing the mechanical seal

After above actions, mount a new or serviced mechanical seal onto the shaft as follows:

### Preconditions

- The previous mounted mechanical seal is removed.

Step	Action
1	Carefully wipe the seal surfaces of the bearing frame cover (► Fig. 9-4/ <b>5301</b> ) clean from possible fibers which may allow the bypass of sealing water.
2	Check dimension X1 (► Fig. 9-4/ <b>X1</b> ). When the dimension is correct at the tolerance accuracy (+/- 0.5 mm), the seal surfaces of the shaft seal press against each other at a correct force, ensuring the tightness of the shaft seal. If the dimension is below the allowed tolerance, it can be corrected by placing a gasket between the bearing frame (► <b>5302</b> ) and the bearing frame cover (► Fig. 9-4/ <b>5301</b> ). When dimension X1 is above the tolerance, place a gasket between the seal (► Fig. 9-4/ <b>433.1</b> ) and the deflector (► Fig. 9-4/ <b>507.1</b> ).
3	Grease the O-ring seals with silicon grease. Surround the water drilling in the bearing frame cover with silicon.
4	Push the seal package onto the shaft so that the water drilling marks on the mechanical seal (► Fig. 9-4/ <b>433.1</b> ) and on the bearing frame cover (► Fig. 9-4/ <b>5301</b> ) meet each another. The double-sided mechanical seal must always be mounted so that sealing water enters through the hole marked with "IN" and comes out through the "OUT" hole.
5	Mechanical seal: Remove the transport supports.
6	Install the rotor (► Sec. 9.3, Rotor on page 9-6).
7	Install the cover (► Sec. 9.2, Cleaning of a plugged screen on page 9-2).

**Tab. 9-6 Replacing the mechanical seal**

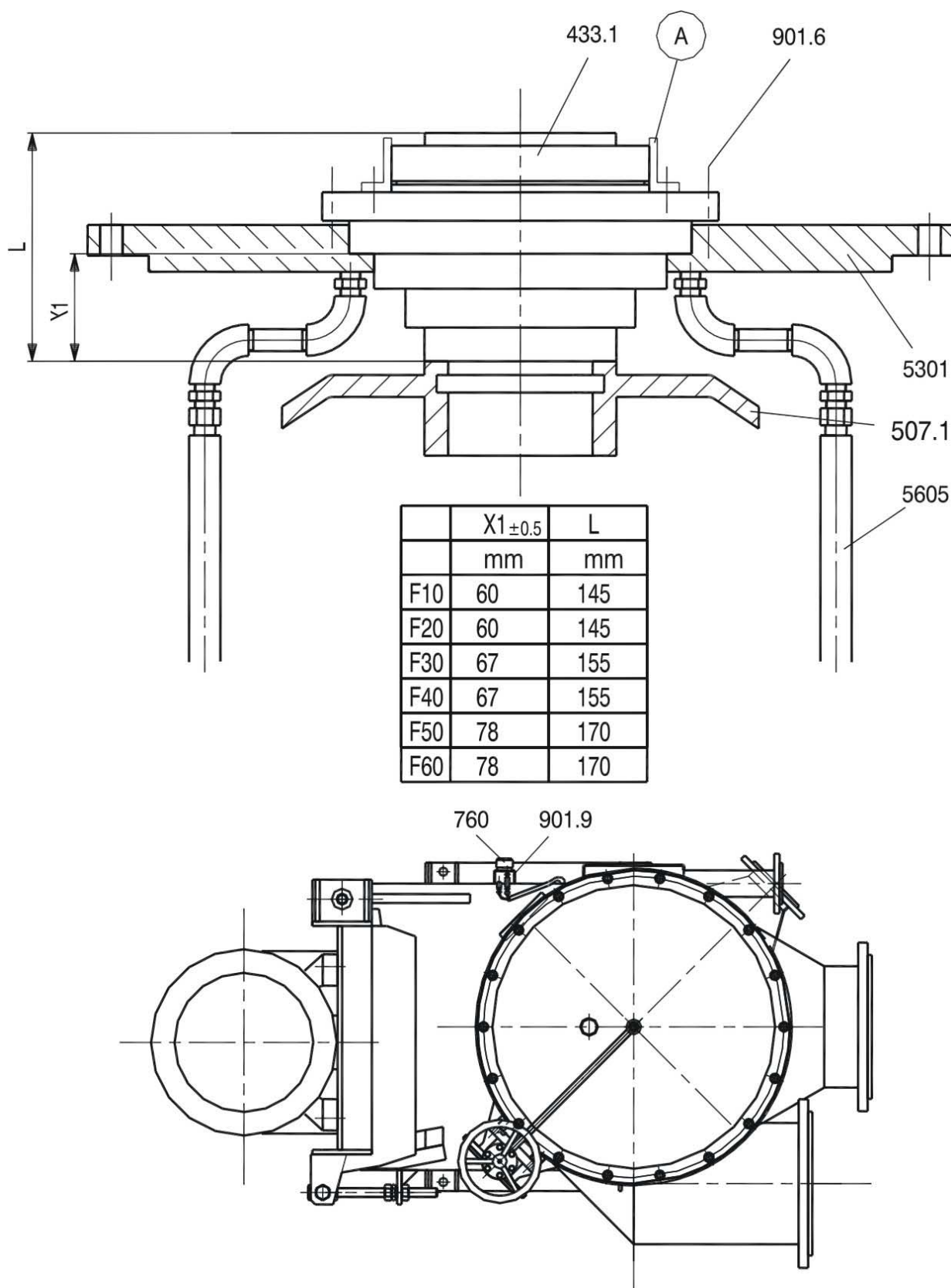


Fig. 9-4 Shaft seal

## 9.5 General on the installation of the seal

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It is essential to use the correct method of mounting and to observe the rules of cleanliness during installation.



**Do not mount the parts by applying direct blows on them; the parts must slide into their places by pushing them manually. Avoid touching the sliding surfaces. If this cannot be avoided, wipe over the surfaces with a cleaning solvent and a soft cloth before they are pressed against each other. Smear the joint surfaces of the various components and auxiliary seals before they are joined together. Remove sharp edges from all shoulders over which the seal is pushed during mounting.**

Prior to mounting:

Inspect the seal consignment to ensure that no damage has occurred during transportation. Follow the assembly and mounting instructions of the screen.

## 9.6 Motor and power transmission

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### Dismounting the drive equipment

The dismounting of the drive equipment will become necessary if a part of the drive equipment must be changed or if the shaft must be dismounted for a change of bearings.

### Preconditions

- Screen is stopped, flushed and emptied (► Sec. 6.7, Shutdown on page 6-6).
- The electric motor is disconnected from the electrical network according to regulations and a warning tag is attached to the power supply.

Step	Action
1	Loosen the screws and remove the power transmitter guards (► Fig. 9-5/683 and 5804).
2	Remove the hexagonal screws (► Fig. 9-5/901.65) and washers (► Fig. 9-5/554.9) of the motor stand (► Fig. 9-5/5801).
3	Loosen the hexagonal nuts (► Fig. 9-5/920.5) of the motor stand (► Fig. 9-5/5801).
4	Push the electric motor (► Fig. 9-5/800) with its stand towards the screen so that the V- belt (► Fig. 9-5/884) comes off and can be removed.
5	Detach the screw (► 901.14) and the washer (► 554.6).
6	Loosen, but do not detach, the taper lock bush (► Fig. 9-5/1812.2) screws and detach the V-belt pulley (► Fig. 9-5/882.2) from the motor shaft.
7	Detach the screws from the taper lock bush (► Fig. 9-5/1812.2) and detach it from the V-belt pulley (► Fig. 9-5/882.2).
8	<b>Do not dismount the electric motor from the motor stand unless necessary.</b> If the motor must be exchanged, fasten it to the lifting device by the lifting eye and two feet, detach the hexagonal nuts (► Fig. 9-5/920.3) and the hexagonal screws (► Fig. 9-5/901.10) and lift it onto the transfer pallet.
9	Detach the screw (► 901.13) and the washer (► 554.5).
10	Loosen, but do not detach, the taper lock bush (► Fig. 9-5/1812.1) screws and detach the V-belt pulley (► Fig. 9-5/882.1) from the screen shaft.
11	<b>Note! the V-belt pulley is heavy and must be supported to prevent injuries.</b>
12	Detach the screws from the taper lock bush (► Fig. 9-5/1812.1) and detach it from the V-belt pulley (► Fig. 9-5/882.1).

**Tab. 9-7 Dismounting the drive equipment**

#### Reinstalling the drive equipment

When the service and inspection procedure of the drive equipment has been carried out and the drive belt has been replaced (if necessary), reinstall the drive equipment as follows.

Step	Action
1	Check that the taper lock bush (► Fig. 9-5/1812.1) and the key (► Fig. 9-5/940) fit to the shaft (► Fig. 9-5/210).
2	Fasten the taper lock bush (► Fig. 9-5/1812.1) screws to the V-belt pulley (► Fig. 9-5/882.1) so that they stay together while lifted.
3	Put the key to the screen shaft (► Fig. 9-5/210).
4	Lift the V-belt pulley to the shaft and support the V-belt pulley. <b>Note! the V-belt pulley is heavy and must be supported to prevent injuries.</b>
5	Tighten the taper lock bush screws.
6	Secure with a washer (► Fig. 9-5/554.5) and the hexagonal screws (► Fig. 9-5/901.13).
7	If the electric motor (► Fig. 9-5/800) has been removed, lift it into upright position with a lifting eye and two feet. While lifted, fasten the motor to the motor stand (► Fig. 9-5/5801) with hexagonal screws (► Fig. 9-5/901.10) and hexagonal nuts (► Fig. 9-5/920.3).
8	Fasten the taper lock bush (► Fig. 9-5/1812.2) to the V-belt pulley (► Fig. 9-5/882.2) so that they stay together while lifted.
9	Put the key to the motor shaft.
10	Lift the V-belt pulley to the shaft to the same level as the screen V-belt pulley.
11	Check the direction of motor rotation. The direction of rotation is clockwise. The arrow on the motor stand shows the direction of rotation.
12	Tighten the taper lock bush screws.
13	Secure with a washer (► Fig. 9-5/554.6) and hexagonal screws (► Fig. 9-5/901.14).
14	Install the V- belt (► Fig. 9-5/884) and tighten it to the tension recommended above (► Sec. 4.7, Tensioning of V-belts on page 4-4). Increase the tension by turning the hexagonal nuts (► Fig. 9-5/920.5) away from the motor stand.
15	When the desired belt tension has been reached, lock the motor stand into place by tightening the hexagonal nuts (► Fig. 9-5/920.5) with washers (► Fig. 9-5/554.9) and by tightening the hexagonal screws (► Fig. 9-5/901.65).
16	Fasten the power transmitter guards (► Fig. 9-5/683 and 5804) with screws.
17	Connect the electrical motor to the electric network and remove the warning tag from the power supply.

**Tab. 9-8 Reinstalling the drive equipment**

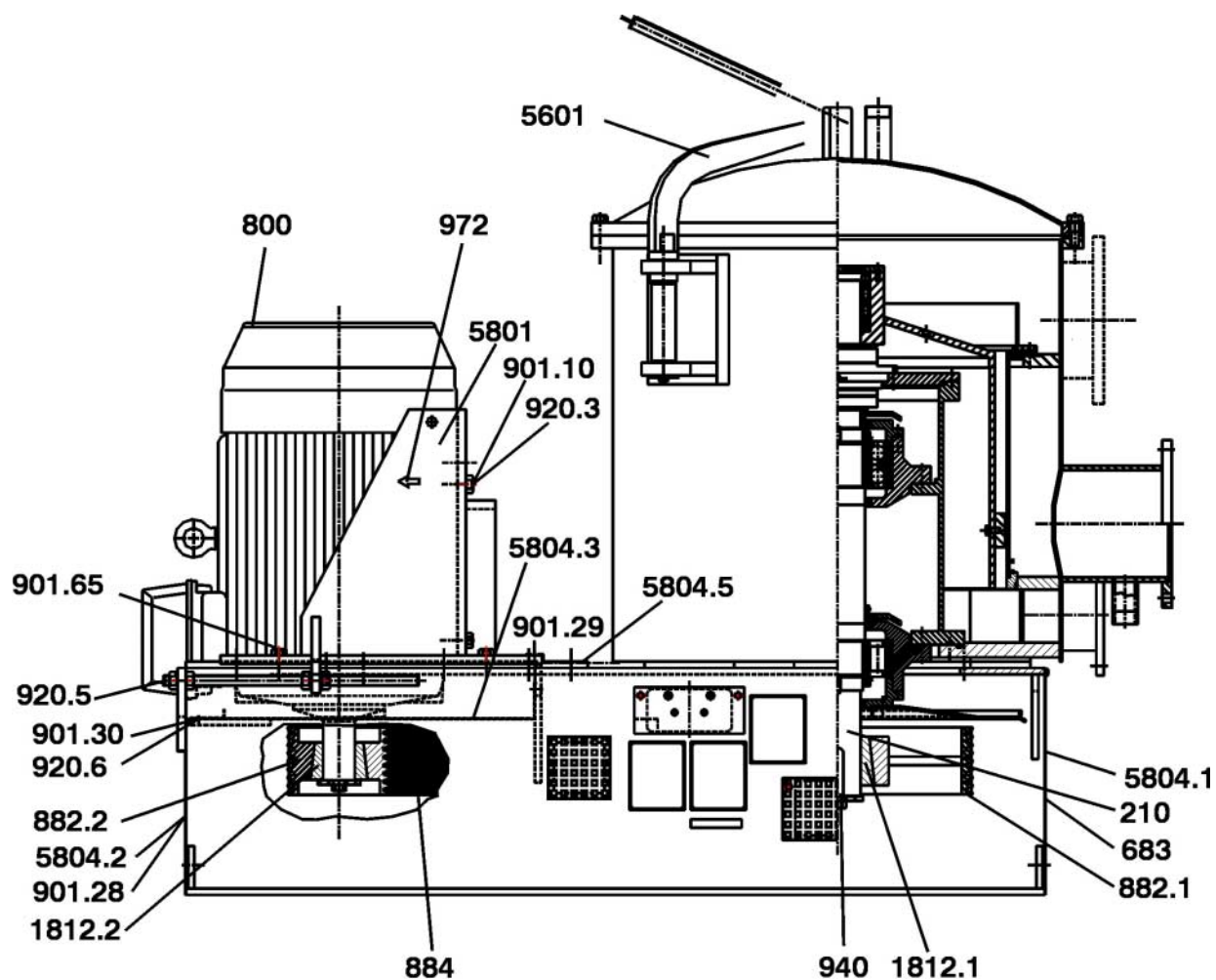


Fig. 9-5 Motor and power transmission

## 9.7 Shaft package

### Dismounting the shaft

The shaft must be dismounted in connection with service inspection or change of bearings. As many other parts must be dismounted before the shaft, can these at the same time be cleaned and serviced.

### Preconditions

- The screen basket is removed (► Sec. 9.2, Cleaning of a plugged screen on page 9-2).
- The rotor is removed (► Sec. 9.3, rotor on page 9-6).
- The drive equipment is removed (► Sec. 9.6, Motor and power transmission on page 9-11).



The shaft can be dismounted with or without the bearing frame. We recommend that the shaft be removed with the bearing frame.

### Shaft removal without the bearing frame

Step	Action
1	Detach the bearing lubricating hoses (► <b>5605</b> ) from the plate fastened to ModuScreen™'s base and other potential bearing condition monitoring cables from the instrument panel and the sealing water hoses from the distributing unit.
2	Slacken and remove the screws (► Fig. 9-6/ <b>901.22</b> ) and remove the splash guard (► Fig. 9-6/ <b>5212</b> ).
3	<b>This sentence is only for F10 W, !!!!!</b> Remove dilution pipes (► <b>5504</b> ).
3(4)	Remove the shaft seal from the shaft (► Sec. 9.4, Mechanical seal on page 9-8).
4(5)	Remove the bearing frame cover (► Fig. 9-6/ <b>5301</b> ) by unscrewing the hexagonal screws (► Fig. 9-6/ <b>901.17</b> ), followed by the hexagonal screws (► Fig. 9-6/ <b>901.19/901.21</b> ) which fasten the bearing housings (► Fig. 9-6/ <b>330.2/330.1</b> ) to the bearing frame (► Fig. 9-6/ <b>5302</b> ).
5(6)	Attach an eye screw to the shaft (► Fig. 9-6/ <b>210</b> ) end and lift it by the lifting device.
6(7)	Turn the shaft enough so that the bearing housing fastening lugs slide past the fastening supports of the bearing frame, and lift the shaft with bearings out of ModuScreen™.

**Tab. 9-9 Shaft removal without the bearing frame**



**Shaft removal with  
the bearing frame**

Step	Action
1	Detach the bearing lubricating hoses (► 5605) from the plate fastened to ModuScreen™'s base and other potential bearing condition monitoring cables from the instrument panel and the sealing water hoses from the distributing unit.
2	Slacken and remove the screws (► Fig. 9-6/901.22) and remove the splash guard (► Fig. 9-6/5212).
3	<b>This sentence is only for F10 W!!!</b> Remove dilution pipes (► 5504) and turn the angle connection 90° so that the bearing frame (► Fig. 9-6/5302) can be lifted up.
3(4)	The shaft package with bearing frame can also be lifted out of ModuScreen™'s housing as a complete unit. In this case only the screws (► Fig. 9-6/901.16) that fasten the bearing frame to ModuScreen™'s housing are detached. The bearing frame must be supported by e.g. boards so that it can not fall down during detachment.
4(5)	<b>F10-F20</b> Inspect the rubber seals (► Fig. 9-6/410.3 and 5401.2). <b>F40</b> Inspect the rubber seals (► Fig. 9-6/5410.2 and 5401.3).
5(6)	Support the bearing frame outside ModuScreen™ into horizontal position and while the shaft is lifted, remove the shaft seal (► Sec. 9.4, Mechanical seal on page 9-8) and thereafter slacken and remove the bearing housing fastening screws, turn the shaft the width of the fastening supports, and pull the shaft with bearings out of the bearing frame.

**Tab. 9-10 Shaft removal with the bearing frame**

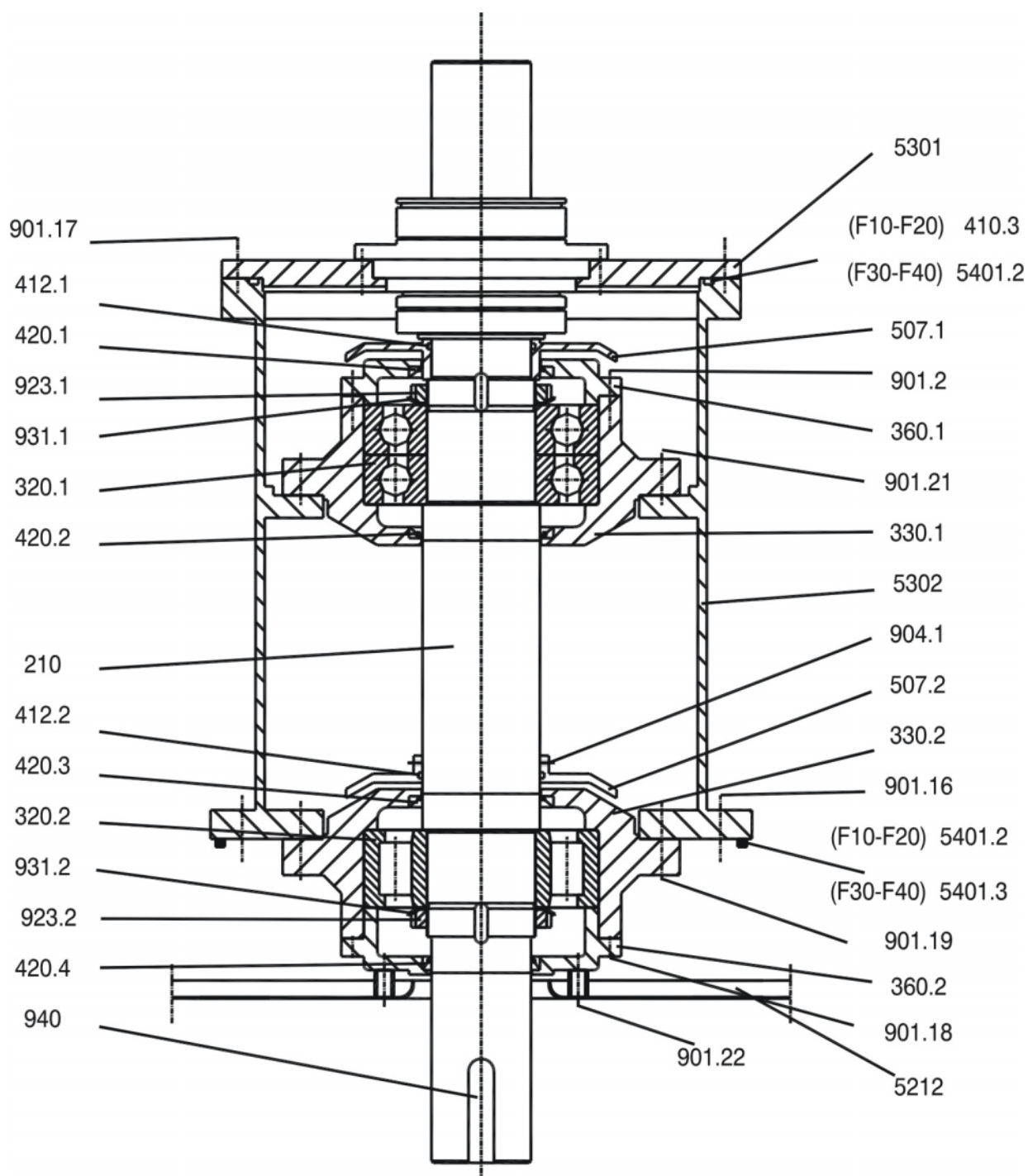


Fig. 9-6 Shaft and bearing unit

## 9.8 Dismounting the lower bearing

Step	Action
1	Firmly fasten the shaft in a vice using protecting plates.
2	Detach the bearing lubricating hoses and possible measuring cables.
3	Slacken and remove the screws (► Fig. 9-6/ <b>901.18</b> ) and pull the bearing housing cover (► Fig. 9-6/ <b>360.2</b> ) and the shaft seal (► Fig. 9-6/ <b>420.4</b> ) from the shaft.
4	Loosen the set screws (► Fig. 9-6/ <b>904.1</b> ) and pull the deflector (► Fig. 9-6/ <b>507.2</b> ) and the O-ring (► Fig. 9-6/ <b>412.2</b> ) backwards on the shaft.
5	Pull the bearing housing (► Fig. 9-6/ <b>330.2</b> ) and shaft seal (► Fig. 9-6/ <b>420.3</b> ) backwards on the shaft.

**Tab. 9-11 Revealing the lower bearing**

#### Inspection of lower bearing

Inspect whether the condition of the lower bearing is satisfactory.



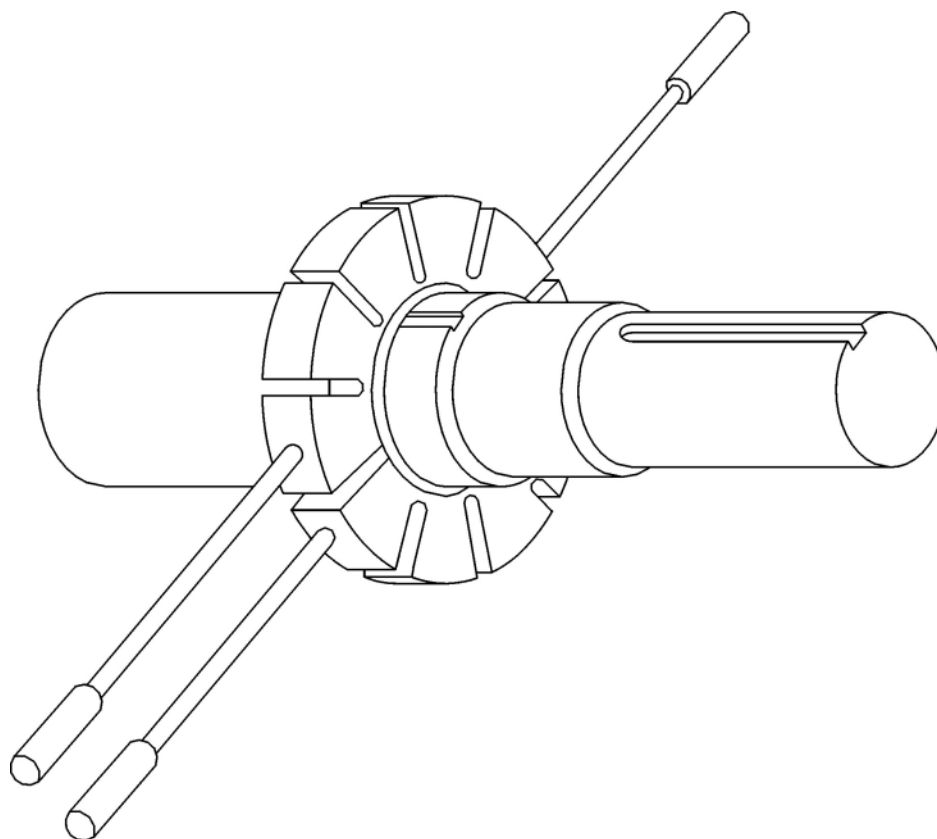
Do not remove the lower bearing from the shaft when its condition is satisfactory.

#### Dismounting the lower bearing

If the lower bearing is to be dismantled, proceed as follows:

Step	Action
1	Remove the shaft nut (► Fig. 9-6/ <b>923.2</b> ) and the lock washer (► Fig. 9-6/ <b>931.2</b> ) of the bearing (► Fig. 9-6/ <b>320.2</b> ) using a suitable wrench.
2	Remove the outer ring of the bearing and the rollers.
3	Clean the surface of the inner ring of the bearing.
4	Smear it with a thick antioxidant.
5	Remove the inner ring (► Fig. 9-7, Dismounting the lower bearing on page 9-19) with a heating ring which has been heated to 200 - 220°C by an electric plate. Using isolated grips, press the heating ring onto the inner ring, and the oil will swiftly transfer the heat to the inner ring and detach it from the shaft.
6	Pull the bearing housing, shaft seal, deflector with set screws and the O-ring from the shaft.
7	Clean the bearing housing, shaft seal, deflector and O-ring.
8	Inspect the bearing housing, shaft seal, deflector and O-ring.

**Tab. 9-12 Dismounting the lower bearing**



**Fig. 9-7 Dismounting the lower bearing**

## 9.9 Dismounting the upper bearing

Step	Action
1	Firmly fasten the shaft in a vice using protecting plates.
2	Detach the bearing lubricating hoses and possible measuring cables.
3	Dismount the mechanical seal (► Sec. 9.4, Mechanical seal on page 9-8).
4	Pull the deflector (► Fig. 9-6/ <b>507.1</b> ) and O-ring (► Fig. 9-6/ <b>412.1</b> ) off the shaft.
5	Remove the screws (► Fig. 9-6/ <b>901.20</b> ) and pull the bearing housing cover (► Fig. 9-6/ <b>360.1</b> ) and shaft seal (► Fig. 9-6/ <b>420.1</b> ) off the shaft.
6	Pull the bearing housing (► Fig. 9-6/ <b>330.1</b> ) and the shaft seal (► Fig. 9-6/ <b>420.2</b> ) backwards on the shaft.

**Tab. 9-13 Revealing the upper bearing**

### Inspection of the upper bearing

Inspect the condition of the upper bearing.



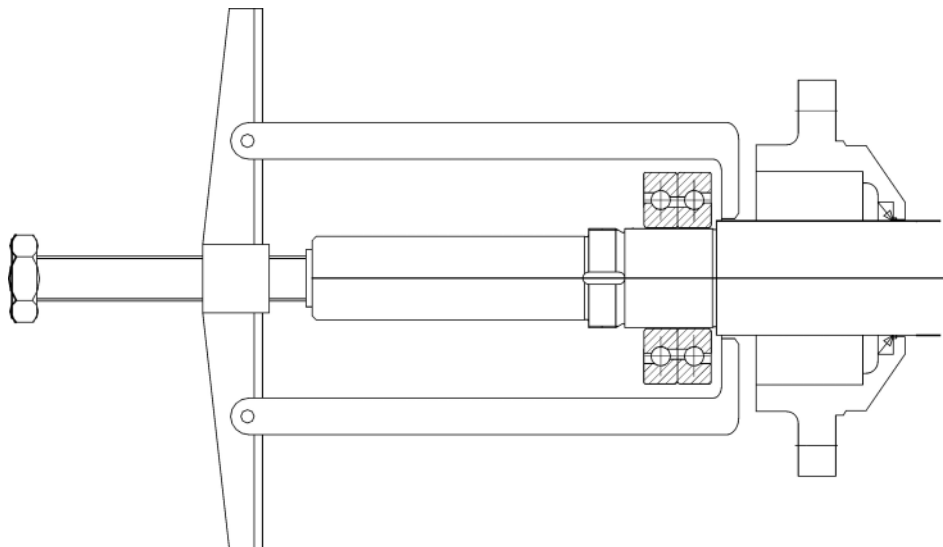
Do not remove the upper bearings from the shaft when their condition is satisfactory.

### Dismounting the upper bearing

Proceed as follows when the upper bearings are to be dismantled:

Step	Action
1	Remove the shaft nut (► Fig. 9-6/923.1) and the lock washer (► Fig. 9-6/931.1) of the bearings (► Fig. 9-6/320.1) using a suitable wrench.
2	Protect the threaded hole in the shaft center with a spacer and pull the bearings from the shaft with the help of a two-leg extractor (► Fig. 9-8, Dismounting the upper bearing on page 9-20).
3	Pull the bearing housing and the shaft seal from the shaft.
4	Clean the bearing housing and the shaft seal.
5	Inspect the bearing housing and the shaft seal.

**Tab. 9-14 Dismounting the upper bearing**



**Fig. 9-8 Dismounting the upper bearing**

## 9.10 Bearing maintenance and mounting instructions

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When greasing a new or cleaned bearing, fill the free spaces in the bearing and the bearing housing only partially with grease: 30 - 50% depending on the housing. When operating at high rotational speeds, too much grease will only cause a rise in the temperature of the bearing housing.

At low rotational speeds, the free spaces in the bearing and bearing housing can be completely filled with grease, as this does not affect the temperature.



When mounting the bearings, it is imperative to avoid hitting directly on bearing rings, retainers or rolling parts as the bearings will be damaged. The mounting force must never be directed through the rolling parts. Oil the joint faces thinly.

Particularly when assembling ball-shaped bearings, an assembly ring should be used between the bearing and the pipe punch. This ring will transfer the mounting force evenly over the lateral surfaces of the inner and outer rings, preventing the outer ring from turning or slanting.



When lubricating and handling the bearings, carefully follow the instructions given by the manufacturer!

## 9.11 Mounting the upper bearing

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### Preconditions

- The parts belonging to the upper bearing are cleaned, inspected and changed if necessary.
- Appropriate spare parts are at hand for those parts used and in need of being replaced.
- The shaft is tightly fastened to a vice using protective plates.

Assemble the upper bearing according the provided figure (► Fig. 9-9, Mounting the upper bearing on page 9-22).

Step	Action
1	Push the upper bearing housing (► Fig. 9-6/330.1) and the shaft seal (► Fig. 9-6/420.2) onto the shaft (► Fig. 9-6/210).
2	Mount the upper bearings (► Fig. 9-6/320.1) one by one onto the shaft using an assembly ring and a pipe punch, the first bearing against the shaft shoulder and the other to the former. To facilitate mounting, the bearings can be heated to a temperature of approx. 110°C before mounting begins.
3	<b>Make sure that the shaft threads are not damaged during assembly.</b>
4	Mount the bearings into the position as shown (► Fig. 9-9, Mounting the upper bearing on page 9-22), i.e. in accordance with the O-system.
5	<b>Make sure that there is no gap between the inner and outer rings of the bearings after installation.</b>
6	Push the lock washer (► Fig. 9-6/931.1) into place and lock the bearings onto the shaft with the shaft nut (► Fig. 9-6/923.1) using a suitable wrench.
7	When the bearings have cooled, pull the bearing housing with shaft seal onto the bearings and mount the bearing housing cover (► Fig. 9-6/360.1) onto the shaft. Attach the cover to the bearing housing with screws (► Fig. 9-6/901.20).
8	Push the deflector (► Fig. 9-6/507.1) and the O-ring (► Fig. 9-6/412.1) onto the shaft against the shaft shoulder, after which an approx. 1 mm wide gap is formed between the bearing housing cover and the deflector.
9	Attach the bearing lubrication hoses (► 5605) and possible measuring cables.

Tab. 9-15 **Mounting the upper bearing**

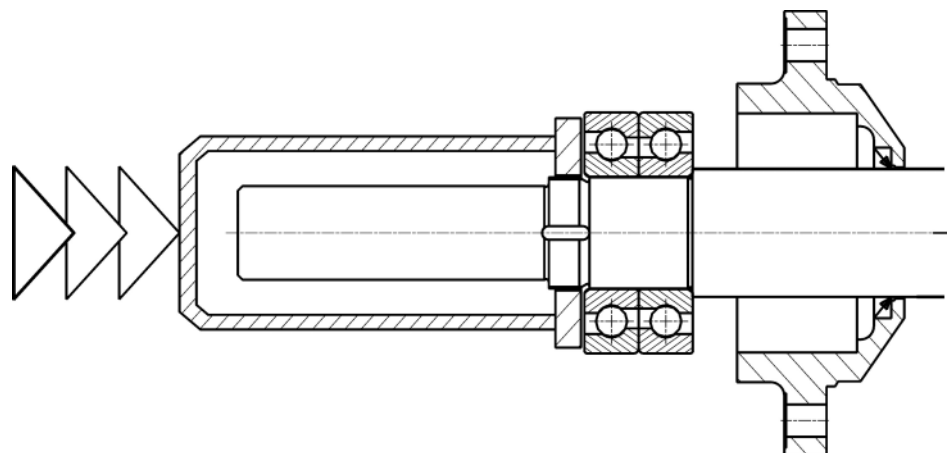


Fig. 9-9 **Mounting the upper bearing**

## 9.12 Mounting the lower bearing

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### Preconditions

- Actions of previous paragraph (► Sec. 9.11, Mounting the upper bearing on page 9-21) are completed.
- The parts belonging to the lower bearing are cleaned and inspected.
- Appropriate spare parts are at hand for those parts used and in need of being replaced.
- The shaft is tightly fastened to a vice using protective plates.

Assemble the lower bearing according the provided Fig. (► Fig. 9-10, Mounting the lower bearing on page 9-24).



Step	Action
1	Push the deflector (► Fig. 9-6/507.2) with the retainer screws (► Fig. 9-6/904.1) loosened and the O-ring (► Fig. 9-6/412.2) onto the shaft.
2	Push the lower bearing housing (► Fig. 9-6/330.2) and the shaft seal (► Fig. 9-6/420.3) onto the shaft behind the bearing location.
3	Heat the inner ring of the lower bearing (► Fig. 9-6/320.2) to a temperature of approximately 110°C and mount it against the bearing shoulder using an assembly ring and a pipe punch.
4	<b>Make sure that the shaft threads are not damaged during assembly.</b>
5	Pull the lower bearing housing (► Fig. 9-6/330.2) into its final location.
6	Pull the deflector (► Fig. 9-6/507.2) into contact with the bearing housing and tighten the retainer screws (► Fig. 9-6/904.1).
7	The outer ring of the bearing and the rollers fastened to it can now be installed against the bottom of the bearing housing locked into position.
8	Push the lock washer (► Fig. 9-6/931.2) into place and lock the bearing onto the shaft with the shaft nut (► Fig. 9-6/923.2) using a suitable wrench.
9	Mount bearing housing cover (► Fig. 9-6/360.2) and seal ring (► Fig. 9-6/420.4) onto the shaft and fasten them to the bearing housing with screws (► Fig. 9-6/901.18).
10	Slacken the retainer screws (► Fig. 9-6/904.1) and pull the deflector (► Fig. 9-6/507.2) off from the bearing housing so that an approximately 1 mm wide gap is formed, then retighten the set screws.
11	Attach the bearing lubrication hoses (► 5605) and possible measuring cables.

Tab. 9-16 Mounting the lower bearing

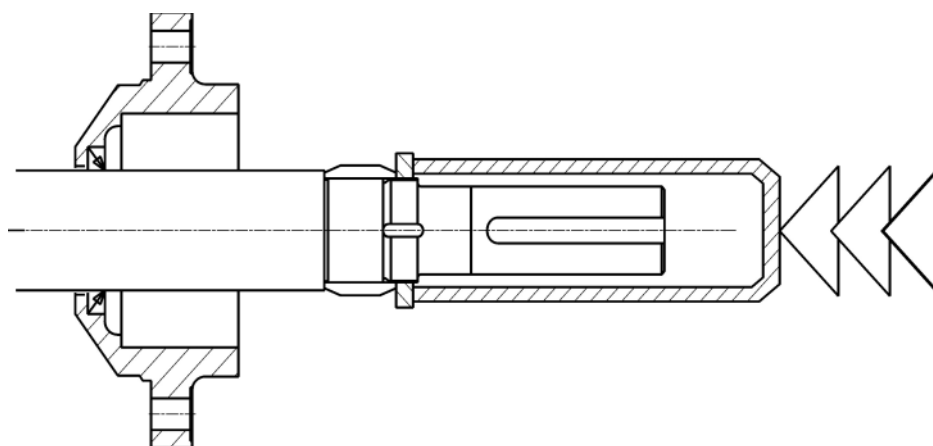


Fig. 9-10 Mounting the lower bearing

## 9.13 Assembly of ModuScreen™

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Assemble the screen in stages following the part numbers of the assembly drawing.

### Shaft

The assembled shaft is mounted into the screen by attaching a lifting eye to the shaft end and lifting the shaft into the screen. Whereby the ear lugs of the bearing housings pass the fastening supports of the bearing frame.

Inspect at the same time that the ends of the bearing lubricating hoses and the ends of potential bearing measuring cables are in the vicinity of their mounting locations. Turn the bearing housings so that the fastening lugs rest upon the fastening supports, and fasten them to the supports with hexagonal screws (► Fig. 9-6/**901.21/901.19**).

### Mounting the shaft with the shaft seal

If the shaft with its bearing frame has been removed for service, the shaft and shaft seal can be installed into the bearing frame outside the screen in the way described above.

Ensure that lubrication and sealing water hoses and potential measuring cables (if any) are in the same line.

#### **F10-F20**

Check the rubber bands (► Fig. 9-6/**410.3 and 5401.2**).

#### **F40**

Check the rubber bands (► Fig. 9-6/**5401.2 and 5401.3**).

Lift the shaft with bearing frame into the screen and fasten it to the frame of the screen from below with screws (► Fig. 9-6/**901.16**).

### Hoses and cables

Attach the lubricating hoses to the grease nipples.

Connect the sealing water hoses to the distributing unit (► Fig. 5-1, Sealing water piping on page 5-3 and Fig. 7-1, Location of the lubricating hoses inside the screen on page 7-3).

Connect the measuring cables (if any) to their indicating devices.

Check that all hoses are at the outer edge of the bearing frame.

### Splash plate

Attach the splash plate (► Fig. 9-6/**5212**) with screws (► Fig. 9-6/**901.22**) to the cover (► Fig. 9-6/**360.2**) of the lower bearing housing.

### Power transmission

Install the power transmitting equipment (► Sec. 9.6, Motor and power transmission on page 9-11 and Fig. 9-5, Motor and power transmission on page 9-14).

### Shaft seal

If the shaft seal has not been installed earlier, install it now (► 9.4 and Fig. 9-4, Shaft seal on page 9-10).

### Rotor

Install the rotor (► Sec. 9.3, Rotor on page 9-6 and Fig. 9-3, Rotor on page above).

**Screen basket assembly**

Install the screen basket, feed plate-wing-support ring assembly, rotating screen basket and the cable for internal pressure measurement (project specific) (► Sec. 9.2, Cleaning of a plugged screen on page 9-2).

**Screen cover**

Place the screen cover into place.

Attach the hose to the deaeration connection on the cover.

If the screen is provided with a dilution nozzle, install the nozzle.

The ModuScreen™ is now ready to be started (► Sec. 6.4, Start-up on page 6-3).