SEEPEX.
ALL THINGS FLOW

Not Binding Operating and Assembly Instruction Progressive Cavity Pump

This operating and assembly instruction is only for general information.

Type
BTHE 10-12 up to 130-12
with tapered stuffing part

Issue 27.08.2018

1.1 General notes

- ➢ Always keep the operating and maintenance instructions close by the machine.
- ➢ If problems cannot be solved with reference to the operating and maintenance instructions, please contact the manufacturer.

Observe the following points in addition to these operating and maintenance instructions:

- Prohibition, warning and mandatory signs, warning notes on the machine
- Relevant laws and ordinances
- Statutory provisions on accident prevention
- Corresponding harmonised standards and regulations

1.2 Safety and warning notes

- ➢ Comply with safety and warning notes for safe and efficient use of the product.

Signal words for specific dangers and (possible) consequences are explained below. These are supplemented by symbols (pictograms) if necessary.

1.2.1 Warning notes

NOTICE
Caution for machine! Possible danger. Material damage can occur.

⚠ **CAUTION**
Caution for people and machine! Possible danger. Minor injury or damage to property can occur.

⚠ **WARNING**
Warning for people! Possible danger. Death or serious injury can occur.

⚠ **DANGER**
Danger for people! Possible danger. Immediate risk of sever or fatal injury.

1.2.2 Danger symbols

Warning:
Suspended load.

Warning:
Dangerous electrical voltage.

1.2.3 Information symbols

NOTICE

Ensure environmental protection.

Wear eye protection.

- ➢ Instruction to act/take measures
- • List item

1.3 Dangers that can be caused by the machine

seepex machines are built in accordance with the state of the art.

Nevertheless, there is a residual risk, because the machine works with:

- • Mechanical movements that pose a danger
- • Electrical voltages and currents

We have used design measures and applied safety technology to minimise the risk to the health of people posed by this danger.

1.4 Qualification of the personnel

This handbook is intended for:

- • Owner
- • Operators
- • Setters
- • Maintenance personnel

1.5 Authorised people

People authorised to undertake operation, set up and maintenance are instructed and trained specialists employed by the owner/manufacturer.

Detailed technical knowledge is essential for performing any work on the machine.

The owner is responsible for:

- • Personnel training
- • Compliance with safety regulations
- • Compliance with operating and maintenance instructions

The operator must:

- • Have received instruction
- • Read and understood the relevant parts of the operating instructions before starting work
- • Know the safety devices and regulations

1.5.1 Tasks and information for the owner/operators

- Regularly check and maintain the machine, replacing all parts in good time which no longer guarantee safe operation.
- It is essential to comply with the procedure described in the operating instructions for shutting down the machine.
- On completion of work, attach all safety and protective devices and make sure they are functioning.

1.5.2 Safety notes for maintenance, inspection and assembly work

- Do not work on the machine or system unless it is stationary and depressurised.
- Switch off the master switch and pull out the power plug before starting work on live components.
- Comply with the procedure for shutting down the machine as described in the Shut-down chapter.
- Decontaminate (de-toxify) machines that are used for pumping media that can be harmful to health.
- Refer to the Initial start-up chapter before repeated start-up of the machine.

1.6 Personal protective equipment

- Wear personal protective equipment and/or additional equipment for your own safety.
- Avoid/limit risks by the use of collective technical protective equipment or by organisational measures at work.

1.7 Safety and protective devices

- Prior to start-up, bolt seepex machines onto a concrete foundation so as to ensure stability.
- Starting and stopping devices must be clearly recognisable. Take appropriate measures to avoid defects.
- No protective device is necessary for checking and/or setting the shaft seal.
- Hot surfaces are identified with a danger symbol on the machine.

1.8 Foreseeable misuse

Serious personal injury and damage to property can be caused by:

- Incorrect use
- Incorrect installation or operation of the machine
- Impermissible removal of necessary protective equipment

1.9 Designated use

- Only use seepex machines if they are in perfect condition and in compliance with the operating and maintenance instructions.
- Do not start up the machine unless the system in which the machine is installed is in accordance with the provisions of the applicable guidelines and statutory regulations.
- Equivalent sustained sound pressure level at workplaces of operating personnel C75 dB (A). Cavitation-free operation of the machine and screwed connection to concrete foundation are essential.
- seepex machines are components that are exclusively intended for pumping media in accordance with the technical data (→ chapter 3). Written approval must be obtained from the manufacturer before other media are pumped.
- Refer to the information on the type plate and the operating instructions for technical data (→ chapter 3), and comply with them.
- The operating instructions are assigned to the seepex machine based on the commission number.

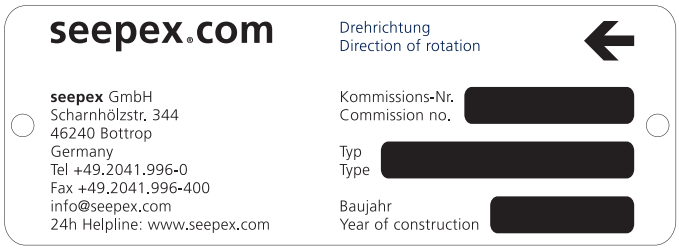


Fig. 1-1 Similar illustration

1.10 Warranty

- Warranty in accordance with our terms and conditions of delivery and order confirmation.
- It is a condition of the machine warranty that the machine must correspond to the listed operating instructions in accordance with the type plate/data sheet.
- All wearing parts are excluded from the warranty.
- These operating instructions are subject to copyright. Reproduction is not permitted and will be punished. Contravention will be pursued through the courts.

1.11 Safety clearances

1.11.1 General

- Open hopper pumps are not ready-to-run units in delivery condition, therefore they are supplied with a declaration by the manufacturer.
- The owner is responsible for appropriate protective devices/feeder hoppers in order to guarantee conformity of the system.

1.11.2 Applicability of the safety clearances

- Inadequate protection for certain dangers (e.g. radiation and substance emissions).
  - Additional or other measures necessary.
- Protection for those persons who are attempting to reach danger areas without additional help and under the conditions defined for various situations of reaching up, reaching under or reaching through.

1.11.3 Definition

1.11.3.1 Protective structure

➢ Use a physical barrier (e.g. guard, part of a machine) in order to limit movement of the body or a body part.

1.11.3.2 Safety clearance

➢ Use appropriate minimum clearance by means of protective structure in front of the danger area.

1.11.4 Values for safety clearances

1.11.4.1 Precondition

Safety clearances defined as follows:

- Protective structures and openings in them retain their shape and position.
- Measure safety clearances between limiting surfaces and the body or affected body part.
- Danger area can be reached with difficulty.
- The reference level is the level on which people normally stand, e.g. floor or working platform.
- Do not use any objects such as chairs, ladders to change the reference level.
- Do not use any objects such as rods or tools to extend the natural reach of upper extremities.

1.11.5 Reaching overprotective structures

The following code letters are used

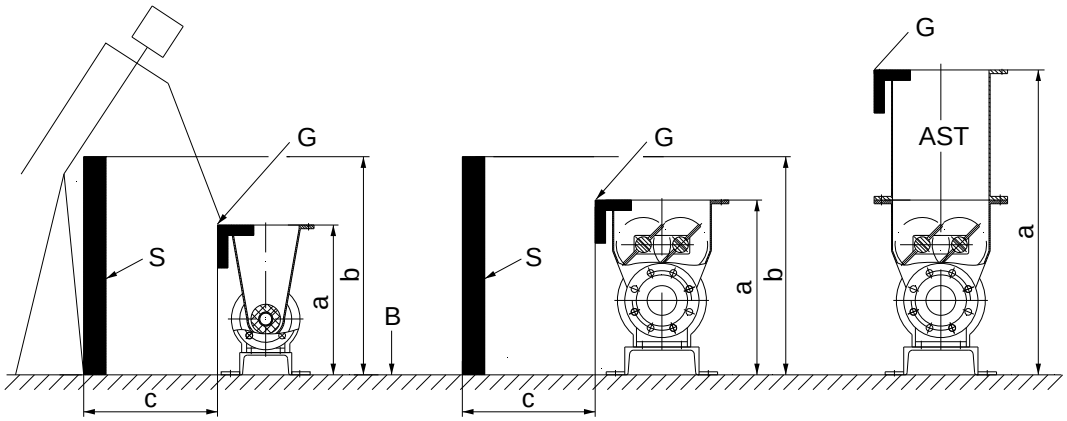
a = Height of the danger area

b = Height of the protective structure

c = Horizontal distance to the danger area

➢ If the danger area represents a severe risk, then the values in the table or other technical safety measures must be used.

➢ If the known values for a, b or c fall between two values in the table, use values that result in a higher level of safety.



Height of the danger area a	Height of the protective structure b[1]									
	1000	1200	1400[3]	1600	1800	2000	2200	2400	2600	2700
	Horizontal distance to the danger area c									
2700[2]	-	-	-	-	-	-	-	-	-	-
2600	900	800	700	600	600	500	400	300	100	-
2400	1100	1000	900	800	700	600	400	300	100	-
2200	1300	1200	1000	900	800	600	400	300	-	-
2000	1400	1300	1100	900	800	600	400	-	-	-
1800	1500	1400	1100	900	800	600	-	-	-	-
1600	1500	1400	1100	900	800	500	-	-	-	-
1400	1500	1400	1100	900	800	-	-	-	-	-
1200	1500	1400	1100	900	700	-	-	-	-	-
1000	1500	1400	1000	800	-	-	-	-	-	-
800	1500	1300	900	600	-	-	-	-	-	-
600	1400	1300	800	-	-	-	-	-	-	-
400	1400	1200	400	-	-	-	-	-	-	-
200	1200	900	-	-	-	-	-	-	-	-
0	1100	500	-	-	-	-	-	-	-	-

1) Protective structures less than 1000 mm in height are not included, because movement is not satisfactorily restricted.

2) If the danger area represents a minor risk, the height h of the danger area must be 2500 mm or more.

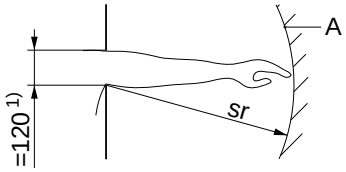
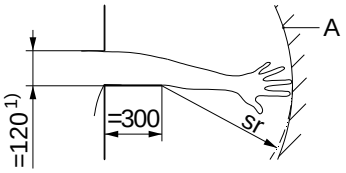
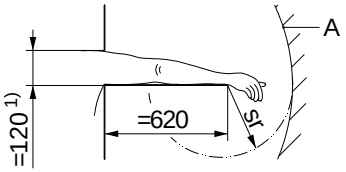
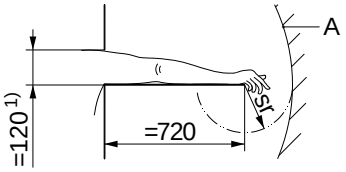
If the danger area represents a high risk, then

- either the height h of the danger area must be 2700 mm or more
- or other technical safety measures must be used..

3) Protective structures below 1400 mm should not be used without additional technical safety measures. (Source: DIN EN ISO 13857)

1.11.6 Reaching around/reaching through openings

Danger in the working area of rotating shafts.

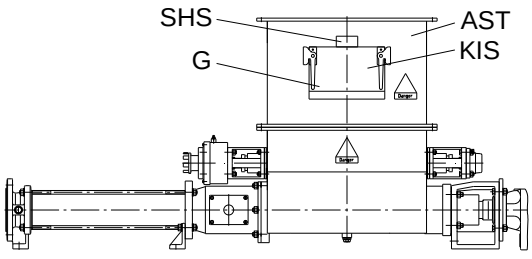
Limitation of movement	Safety clearance sr	Figure
Only at shoulder and armpit	≥ 850	
Arm supported up to the elbow	≥ 550	
Arm supported up to the wrist	≥ 230	
Arm and hand supported up to the finger root	≥ 130	

A: Movement area of the arm

1) Either diameter of a round opening, side of a square opening or width of a slot-shaped opening (source: DIN EN ISO 13857)

1.12 Guard

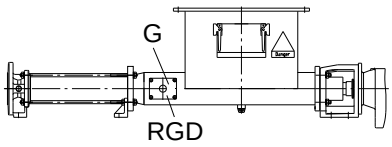
1.12.1 Pump with feeder hopper (AST), inspection hatch (KIS) with safety switch (SHS)



- Before start-up, integrate the safety switch into the electric control system so that the following components are switched off and prevented from reactivation when inspection hatch (KIS) is opened.
  - Bridge breaker driver
  - Pump drive
  - Other drive units projecting into the interior
- Switch off all media feeds in the feeder hopper immediately.
- Restart the system after closing inspection hatch (KIS).
- Press reset to switch on the components.

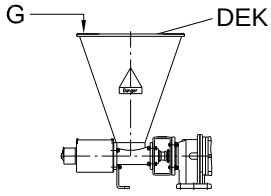
1.12.2 Pump with cleaning cover

- Before opening cleaning cover (RGD), switch off the pump drive and bridge breaker drive and prevent them from being switched back on.
- Start up the pump drive and bridge breaker drive after closing cleaning cover (RGD).



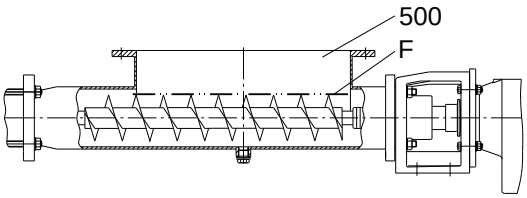
1.12.3 Pump with cover

- Open cover (DEK) for topping-up purposes, but first switch off the pump drive and secure it against being switched back on.
  - The owner may install a safety switch which is integrated in the electric control unit.
- Do not switch on the drive until after closing the cover.



1.13 Filling level hopper (500)

- Fill in the hopper (500) max. up to the top edge of the auger feed screw.
- Install alternative a level control (F).



2.1 General description

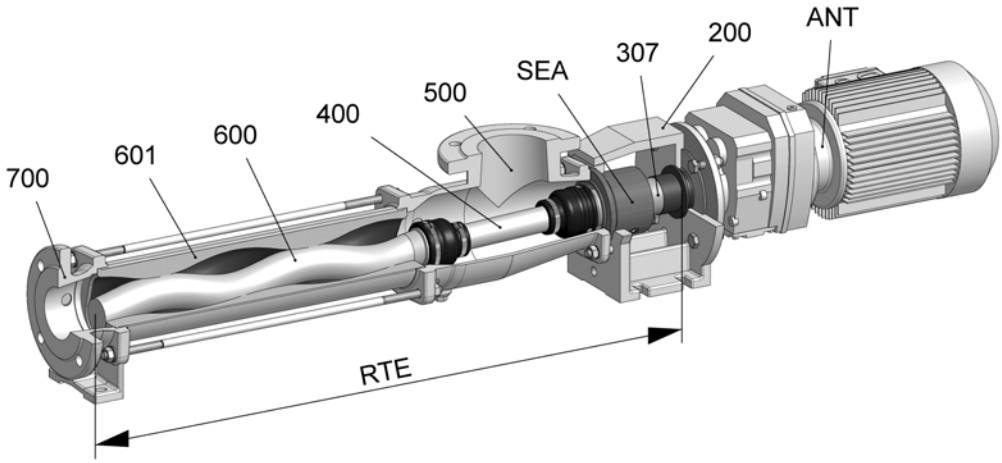
seepex pumps are members of the group of rotating displacement pumps.

- Characteristic features
  - Special configuration/arrangement of the rotor and stator pumping elements.
  - Motion sequence

2.2 Mode of action and pumping principle of the seepex pump

- Sealing bands are produced through geometric design/contact of both conveying elements.
- Sealing bands ensure a perfect fit between the suction and pressure side.
  Result:
  - Increased pump suction.
  - Higher pressure build-up independent of speed possible.

2.3 Constructive design



No.	Designation
ANT	Drive
200	Lantern
307	Plug-in shaft
400	Coupling rod
SEA	Shaft seal
500	Suction casing
600	Rotor
RTE	Rotating unit
601	Stator
700	Pressure branch

3.1 Data sheet

3.2 Characteristic Curves

3.3 Declaration

- Data sheet, characteristic curves and declarations are commission specific documents and not part of this not binding operating and assembly instruction.

4.1 Safety

CAUTION
Damage to property/injuries due to incorrect transport Slight injury or damage to property can occur ➢ Comply with the safety notes and transport notes on the packaging. ➢ Use suitable means of transport, lifting devices and tools. ➢ Use protective equipment.

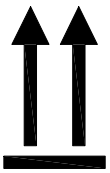
4.2 Transport

4.2.1 Dimensions, weights and center of gravity

➢ Note the dimensional drawing (→ chapter 5.6).

4.2.2 Symbols

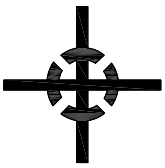
- Meaning of symbol



Top

Fragile item

Against moisture protect

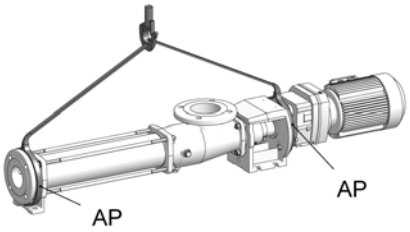
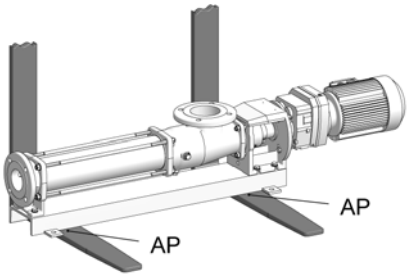


Centre of gravity

Lashing points

4.2.3 Sling points (AP) for lifting devices

WARNING
Warning of suspended load. Death of serious injury can occur. ➢ Use the lashing points **(AP)** for lifting divices. ➢ Note the centre of gravity (→ dimensional drawing, chapter 5.6).

Lifting machine	Industrial trucks
	

4.2.4 Unpacking the machine

➢ Comply with the symbols and notices on the packaging.
➢ Remove the screwed connection between the machine and packaging.
➢ Remove the machine with a lifting machine/industrial truck.

4.3 Temporary storage/Corrosion protection

- All seepex machines have corrosion protection applied as standard prior to transport.

NOTICE
Damage to property if corrosion protection is missing Property damage can occur due to corrosion. ➢ Temporary storage must be in a dry, enclosed, frost-free room in order to provide protection against ambient influences. ➢ Contact seepex regarding the necessary corrosion protection for temporary storage.

4.4 Disposal

	NOTICE
	**Environmental protection** Material damage can occur. ➢ Drain the pumping medium and dispose of it in accordance with the regulations. ➢ Dispose of the machine with regard to its composition and existing regulations.

5.1 Mounting tools / lifting gear

CAUTION

Pump falling over.
Slight injury or damage to property can occur.

- Adhere to the lifting tool's starting point.
- Pay attention to the dimensions, weight and centre of gravity of the pump.
- Use suitable mounting tools/lifting gear.

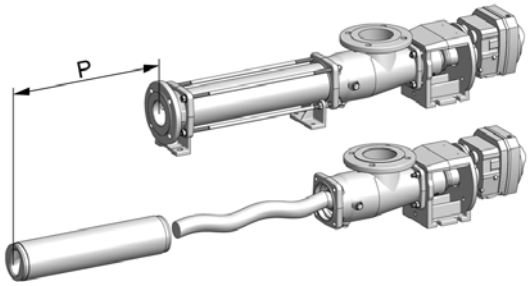
5.2 Space requirement

The required space should be determined by considering the following factors:

- Dimensions and weight.
- Requisite transport and lifting equipment.
- Pipe routing – dismantling (dimension for stator replacement).

5.2.1 Dimension for stator replacement (P)

- Refer to the dimensional drawing.



5.3 Assembly of the complete mounted pump

- Assemble according to technical data (→ chapter 3.).
- Note dimensional drawing.

Tension-free mounting of the pump

- Balance unevenness with suitable supports.
- Applies to mounting on foundations/load-bearing elements.
- Total areas of all pump bearing areas are resting on the surface.

Correct position of the drives

- All drives are set up ready for operation and mounted.
- Correct displacements of the drive during transport/installation of the pump by adjusting/fixing the drive.

CAUTION

Safety protection equipment.
Slight injury or damage to property may result.

- Connect safety protection equipment and activate.

5.4 Power supply of the seepex pump

DANGER

Supply voltage and power frequency.
Death or serious injury will result.

- ➢ Heed type plate on the pump.
- ➢ Pay attention to manufacturer's directions (→ chapter 13.).
- ➢ Pay attention to safety regulations.

5.5 Pipelines

5.5.1 Suction and pressure connection

- Refer to the dimensional drawing for the position, nominal width and standard.
- Note direction of rotation/flow direction.

5.5.2 Pipeline dimensions

- Adhere to specifications regarding pressure in the pressure respectively suction connection.
- Note technical data (→ chapter 3.).
- Nominal width of suction pipe = nominal width of suction connection of pumps.

5.5.3 Residue-free pipelines

NOTICE

Damage to property through assembly residue.
No claims under guarantee if violated.

- ➢ Keep all pipe work free of foreign objects.
- ➢ Remove weld spatters, screws, steel chips etc.

5.5.4 Tension-free assembly

- ➢ Assemble pipelines and other components in a tension-free manner on the pump.

Master Copy

6.1 Commissioning report

Send commissioning report online to www.seepex.com\ **Must be specified with every order!**			**From:**
Commission: _____	**Model:** _____		Contact person: ..... Tel.: ..... Fax: ..... E-mail: .....
Customer Service: seepex GmbH Postfach 10 15 64 D-46215 Bottrop service@seepex.com	**Germany** **Rest of Europe** **Outside Europe**	Phone:+49 2041.996-231 Fax: +49 2041.996-431 Phone:+49 2041.996-224 Fax: +49 2041.996-424 Phone:+49 2041.996-120 Fax: +49 2041.996-432	**Address of plant:** ....

Delivery date:		
Date of installation:		
Assembly check carried out on:		
Please enter operational data:		
Conveying liquid:		
Temperature:		
Fuse level/motor protection or power consumption		
Frequency control	☐ no	
	☐ yes	If yes:
		☐ Supplied by seepex
		☐ Supplied by customer
		Frequency:
		Speed:
		Power consumption:

_____ _____

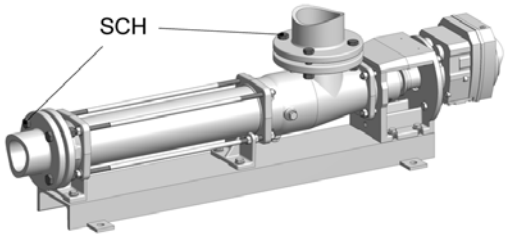
Place, date Signature / company stamp

6.2 Measures before commissioning

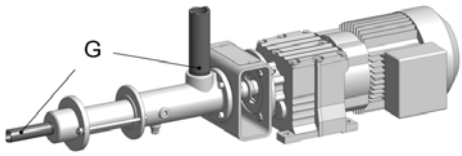
➢ Note the technical data (→ chapter 3.).

6.2.1 Checking pipelines

➢ Check flange screwed connections **(SCH)**.



➢ Check threaded connections **(G)**.



NOTICE
Ensure the liquid can flow through without obstruction. Malfunction and/or irreparable damage to the pump. ➢ Open all shut-off elements before switching on the pump.

6.2.2 Protective devices on the pump

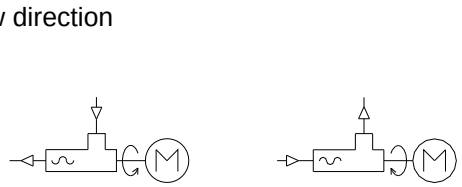
⚠ **DANGER**
Missing protective device. Danger of pulling in and crushing. ➢ Equip the pump with a protective device. Protective devices provided for preventing contact with surfaces or moving parts must be regarded as suitable if contact is not possible in a test involving a test finger, with regard to the penetration possibility, strength and shock resistance. ➢ Comply with national protection regulations. ➢ In pumps with an open suction flange/feed hopper, attach touch protection. These safety clearances protect those persons who are attempting to reach danger areas without additional help and under the conditions defined for various situations of reaching up, reaching under or reaching through In shaft seals, touch protection is only necessary if there are components on the rotating shaft.

6.2.3 Electrical/hydraulic connections

⚠ **DANGER**
Dangerous voltage. Death or serious injury can occur. ➢ Note safety regulations. ➢ Disconnect motor from all sources of energy. ➢ Secure electrical connections against restarting.

6.2.4 Direction of rotation check

- The pump direction of rotation determines the flow direction of the pumping medium.
- Note the direction of rotation arrow on the type plate.



6.2.5 Additional devices - optional

- Refer to additional devices (→ chapter 12.1).

6.3 Initial commissioning/repeated commissioning

- Start up the pump.

NOTICE
Dry running of the pump. Malfunction and/or irreparable damage to the pump. ➢ Fill the suction casing with liquid in order to lubricate the pumping elements.

6.3.1 Avoid dry running of the pump

NOTICE
High temperature between rotor and stator. Stator material burned. Complete failure of the pump. ➢ Make sure that the suction-side conveying capacity does not cavitate. ➢ If this cannot be guaranteed on the machine side, assemble a seepex dry running protection (TSE).

6.3.2 Pressure in the suction and pressure connection

⚠ **CAUTION**
High pressure. Malfunction and/or irreparable damage to the shaft seal or pump. ➢ Maintain pressure in the suction connection in accordance with the technical data (→ chapter 3.).

Recommendation:

- Assemble an oil-filled contact pressure gauge to monitor and deactivate the pump.

6.4 De-commissioning

Protect the pump and additional devices against the following:

- Frost
- Deposit of solids
- Sedimentation from the liquid
- Corrosion of parts that come into contact with the medium

6.4.1 Switching off the pump

DANGER

Dangerous voltage.
Death or serious injury can occur.

- ➢ Note safety regulations.
- ➢ Disconnect motor from all sources of energy.
- ➢ Secure electrical connections against restarting.

6.4.2 Emptying the pump

CAUTION

Liquid draining out.
Minor injury or damage to property can occur.

- ➢ Wear suitable protective clothing.
- ➢ Refer to the technical data (→ chapter 3.) for the corresponding configuration of the pump housing.

To drain the pump:

- ➢ If the pump housing has screwed plugs, remove the screwed plugs.
- ➢ Drain using a connection branch (suction casing, pressure branch) if the pump housing is coated or the housing does not have screwed plugs.
- ➢ Drain the residual liquid from the pump housing.
- ➢ Drain the pipelines on the suction and pressure sides, or shut off behind the pump connections.

6.4.3 Removing the pump

WARNING

Risk of pump tipping or falling.
Death or serious injury can occur.

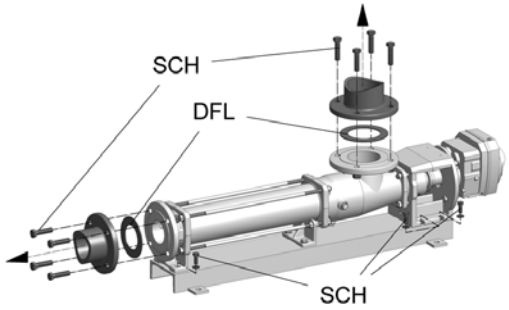
- Support the drive unit to guarantee stability.

Pipeline dismantling

- Remove flange bolts **(SCH)** and flange seals **(DFL)**.

with/without base plate

- Remove bolts **(SCH)** from the pump feet.

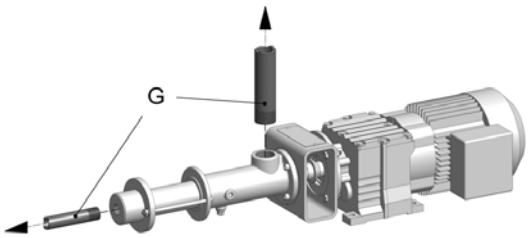


Pipeline dismantling

- Remove threaded connections **(G)**.

with/without base plate

- Remove bolts **(SCH)** from the pump feet.



6.4.4 Preservation/storage of the pump

NOTICE

Damage to property due to lack of corrosion protection.
Property damage can occur due to corrosion.

- Contact seepex to discuss suitable preservation measures.
  - State the commission number of the pump.

7.1 Preventive measures

The maintenance personnel must have these operating instructions, follow them and also require corresponding qualifications.

DANGER

Dangerous voltage.
Death or serious injury can occur.

- Note safety regulations.
- Disconnect pump from all sources of energy.
- Secure electrical connections against restarting.

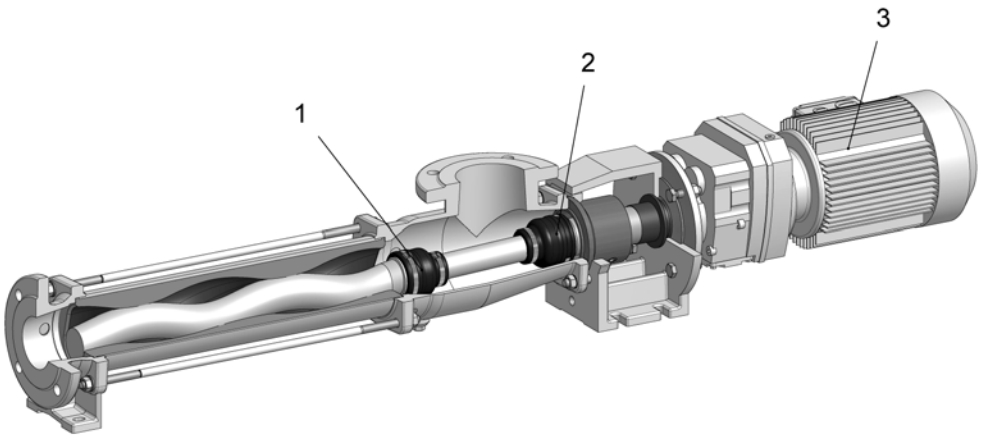
7.1.1 Pump down-time

NOTICE

Pump down-time.
Production failure due to wear.

- Acquisition of a set of wearing parts and a set of gaskets.

7.2 Lubrication



No.	Denomination	Lubricant	Lubricant change in operating hours	Fill volume
1	Pin joint	seepex special grease *	10000 h	*
2	Pin joint	seepex special grease *	10000 h	*
3	Drive	Refer to manufacturer's documentation (chapter 13._)		
Rotor/stator		Conveying medium	---	---
Shaft seal		Conveying medium	---	---

* Type and filling quantities are commission specific information.

7.2.1 Joint grease

NOTICE
Other grease types. Malfunction and/or irreparable damage to the joints or the pump. ➢ Exclusively use seepex special grease.

7.3 Inspection

Component	Interval	Action
Joints	Every 10,000 operating hours	Renew joint grease
Stator	Every week	Visual check for leaks
Shaft seal	Every week	Visual check for leaks
Drive unit	Every 3000 operating hours, at least every 6 months	Comply with manufacturer's documentation

Refer to technical data (chapter 3.) for application range of the pump.

Malfunction										Causes	Rectification
Pump is not sucking	Pump pumping unevenly	Conveying capacity is not achieved	Pressure head is not reached	Pump does not start up	Pump seized / pump does not pump	Pump is loud when running	Motor gets too hot	Premature stator wear	Shaft seal is leaky		
				X			X		X	Static friction between stator/rotor too great.	Apply lubricant (liquid soap) between stator and rotor.
X										Incorrect direction of rotation.	Check direction of rotation and swap over motor connections if necessary.
X	X	X			X	X				Suction pipe or shaft seal leaking.	Eliminate leaks.
X	X	X				X				Suction head too great.	Check the suction head, if necessary increase pipe cross section on suction pipe and use a larger filter, open suction-side valve fully.
X	X	X								Viscosity of conveying product too great.	Check/adapt (data sheet).
		X		X			X			Pump rotation speed incorrect.	Correct rotation speed (data sheet).
	X	X									Avoid air bubbles in the conveying product.
		X		X	X		X	X		Pressure head too great.	Check pressure head with pressure gauge, reduce pressure head by using larger pressure pipe crossed section or shortening the pressure pipe.
X	X	X			X			X		Pump running partially/ completely dry.	Check there is adequate conveying product available on the suction side. Dry running protection DRP.
						X	X			Check coupling.	If necessary, move pump in relation to drive, check wear on coupling gear, re-adjust coupling if necessary.
X		X								Rotation speed too low.	Increase rotation speed for low-viscosity media/large suction volume.

Malfunction										Causes	Rectification
Pump is not sucking	Pump pumping unevenly	Conveying capacity is not achieved	Pressure head is not reached	Pump does not start up	Pump seized / pump does not pump	Pump is loud when running	Motor gets too hot	Premature stator wear	Shaft seal is leaky		
X	X					X				Rotation speed too high.	Reduce rotation speed for high-viscosity media, risk of cavitation.
						X				Joint play too large.	Check mounting of coupling rod bushing.
X		X		X	X			X		Foreign objects in pump.	Dismantle pump, remove foreign bodies, replace defective parts.
X		X	X		X					Stator/rotor worn.	Dismantle pump and renew defective parts.
X		X			X	X				Joint parts worn.	Renew joint parts, use seepex pin joint grease.
X		X			X			X		Suction pipe blocked.	Clean the suction pipe.
X				X	X		X	X		Temperature of pumping liquid too high.	Check temperature, use an undersize rotor.
X		X		X			X		X	Gland packing too firm/ worn.	Loosen packing gland or tighten. Renew unusable packing rings.
X				X	X			X		Solid content and/or grain size too great.	Reduce pump speed, install screen with permitted mesh width. Increase liquid proportion.
X				X				X	X	Sedimentation/gumming of solids when pump stationary.	Rinse through and clean the pump immediately.
X				X	X			X	X	Conveying product hardens when the temperature drops below a certain limit.	Heat the pump.
				X	X		X	X		Stator swollen and unable to withstand conveying product.	Select a suitable stator material, use an undersize rotor.
						X			X	Bearings in pump drive housing or drive unit defective.	Renew bearings.
									X	Mechanical seal defective.	Check sliprings and O-rings for wear/resistance, renew if necessary.

9.1 Dismantling/Reassembly of the pump

Recommended tools

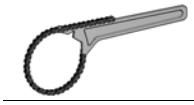
Keep the listed tools ready (not part of the delivery scope):

Illustration	Denomination
	Hammer
	Set allen keys
	Set ring spanners size 10 - size 30
	Set fork spanners size 10 - size 30
	Ratchet
	Metal cutting saw **(WH)**
	Screwdriver **(WS)**
	Chisel **(WM)**
	Spirit level **(WW)**

Recommended special tools

Special tools are not part of the delivery scope.

- Order special tools using the order form (→ chapter 11).

Illustration	Denomination
	Packing puller **(W1)**
	Chain wrench **(W2)**

9. Dismantling/reassembly

Illustration	Denomination
	Mounting tool **(W3)**
	Mounting lever **(W9)**
	Dismantling tool **(W10)**

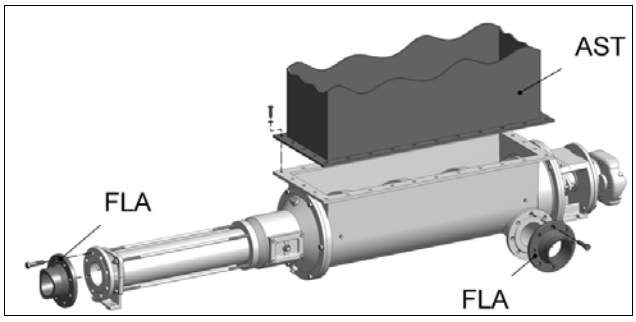
9.1.1 Prepare pump for dismantling

DANGER

Risk of fatal injury from electrical current.
There is an immediate danger of fatal electric shock through contact with live parts.

- Observe safety regulations.
- Disconnect the drive from all energy sources.
- Prevent electrical connections from being switched on again.
- Ensure that residual voltage is not present at any electrical connections of the machine.

- Empty pipelines.
- Allow pipelines to cool.
- Remove the connections to the pipelines **(CFL)** and the extension hopper **(AST)** (suction side/ pressure side).
- Observe de-commissioning instructions (→ chapter 6).

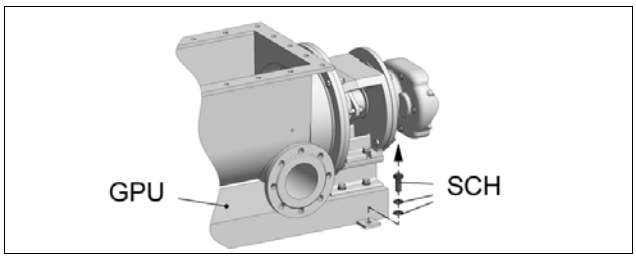


9.1.2 Dismantle pump

⚠ WARNING Risk of injury due to lack of stability of pump. Crushing of body parts due to the pump or pump parts tipping or falling down.

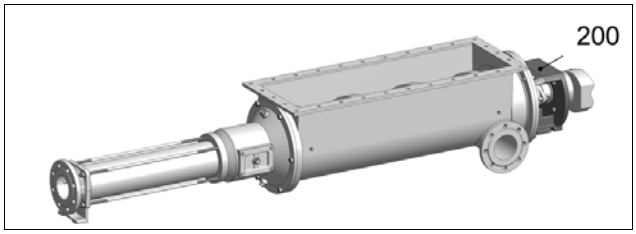
Design with base plate

- Fasten base plate **(GPU)** to secure pump.
  - Recommendation: Fasten to suitable base using a screw fitting **(SCH)**.



Design without base plate

- Fasten lantern **(200)** to secure the pump.
  - Recommendation: Fasten to suitable base using a screw fitting **(SCH)**.

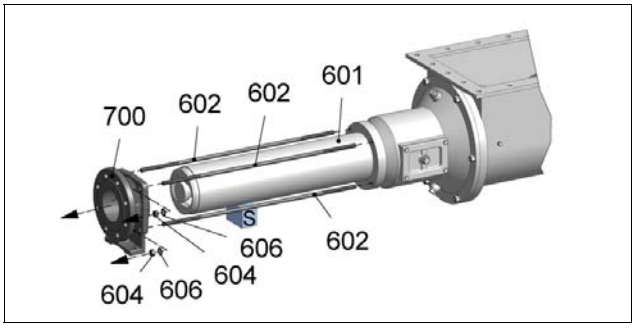


9.1.2.1 Dismantle dry-running protection device (TSE) (optional)

- Before dismantling the pump, dismantle the dry running protection device **(TSE)**.
  - Observe associated documents (→ chapter 12.1) of the operating and assembly instructions.

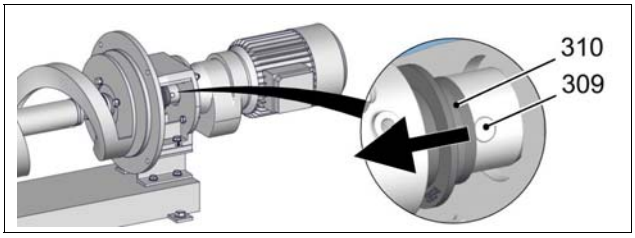
9.1.2.2 Dismantle pressure branch (700)

- Support the stator **(601)** with the support **(S)**.
- Dismantle screw fitting **(604, 606)**.
- Remove pressure branches **(700)** and tensioning screws **(602)**.

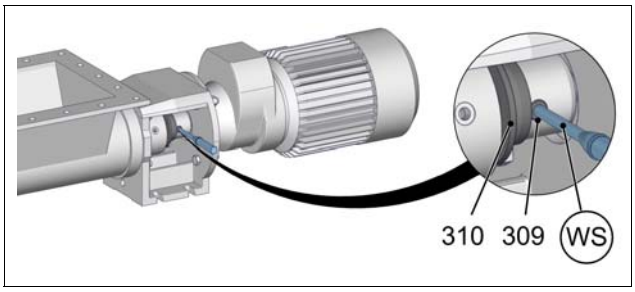


9.1.2.3 Dismantle stator (601)

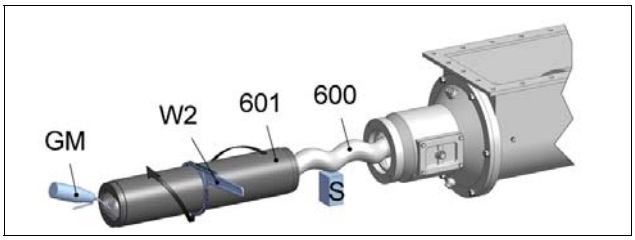
- Raise/reposition splash ring **(310)** to remove plug-in shaft pin **(309)**.



- Eject plug-in shaft pin **(309)**.
  - Use a suitable tool **(WS)**.

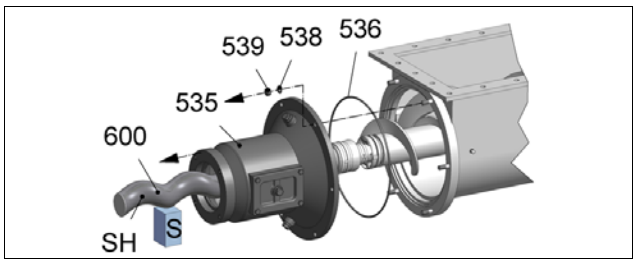


- Turn stator **(601)** to remove it.
  - Apply lubricant **(GM)** into the opening between rotor **(600)** and stator **(601)** for easier dismantling.
  - Use tool **(W2)**.



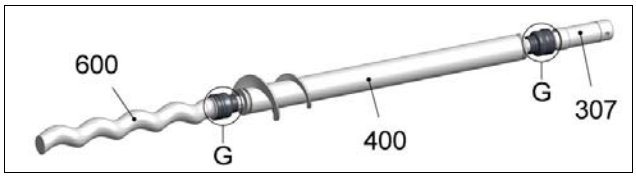
9.1.2.4 Dismantle stuffing part (535)

- Fit rotor **(600)** with protective cover **(SH)**.
- Prop up rotor **(600)** with support **(S)**.
- Dismantle screw fitting **(538, 539)**.
- Remove stuffing part **(535)** and o-ring **(536)**.



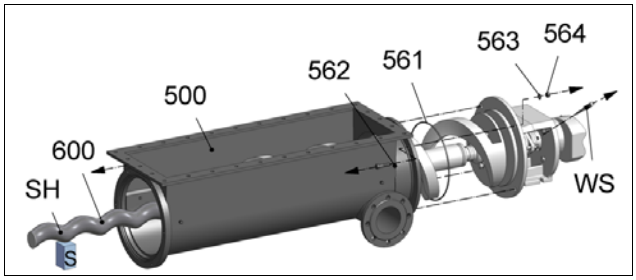
9.1.2.5 Dismantle rotor (600) with feed hopper installed (500)

- Dismantling the joints **(G)**
  - Note chapter on Rotating unit components (→ chapter 9.2).



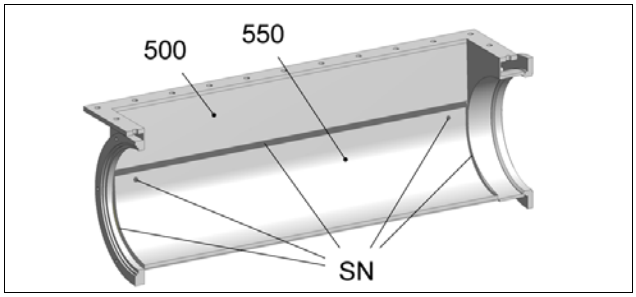
9.1.2.6 Dismantle feed hopper (500)

- Remove tool **(WS)**.
- Dismantle screw fitting **(562, 563, 564)**.
- Remove feed hopper **(500)** and o-ring **(561)**.

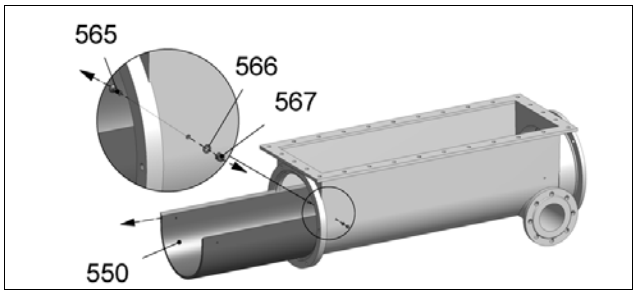


9.1.2.7 Dismantle inlay (550)

- Remove silicone seam **(SN)** along the inlay **(550)**.



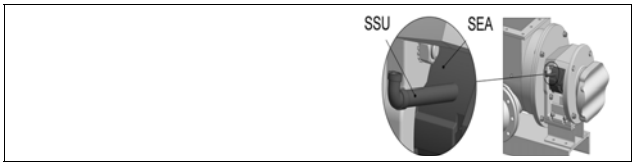
- Dismantle screw fitting **(565, 566, 567)**.
- Remove inlay **(550)** from feed hopper **(500)**.



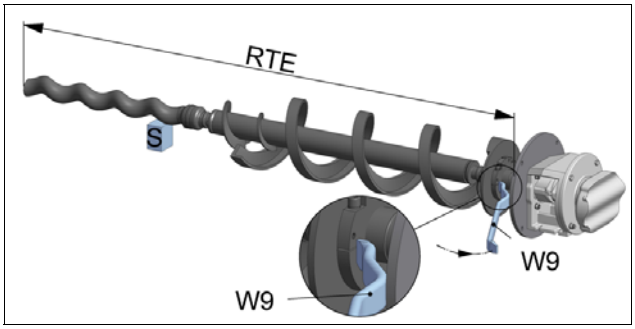
9.1.2.8 Dismantle rotating unit (RTE)

Dismantle flush connection (SSU) (optional)

- Remove flush connection **(SSU)** from the casing of the shaft sealing **(SEA)**.

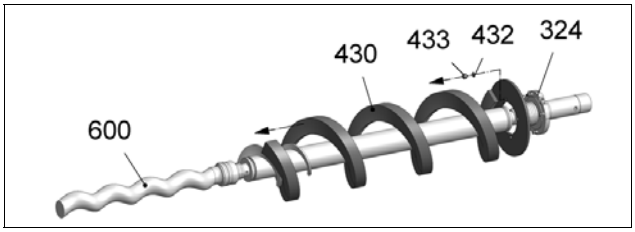


- Detach rotating unit **(RTE)** from output shaft of the drive **(ANT)**.
  –  Use tool **(W9)**.

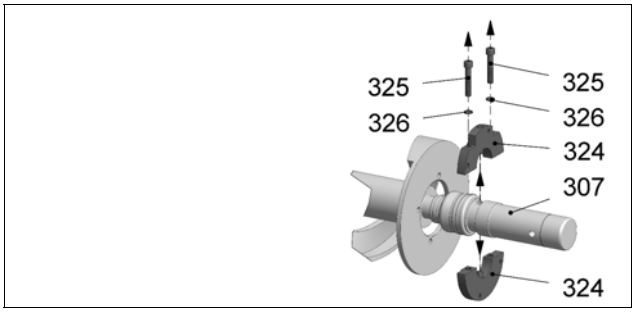


9.1.2.9 Dismantle ribbon screw (430) and clamping ring (324)

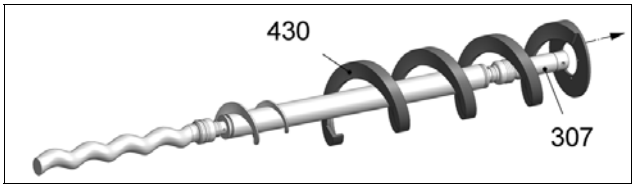
- Dismantle screw fitting **(433, 432)**.
- Slide ribbon screw **(430)** towards rotor **(600)**.



- Dismantle the screw fitting **(325, 326)**.
- Remove clamping ring **(324)** from plug-in shaft **(307)**.

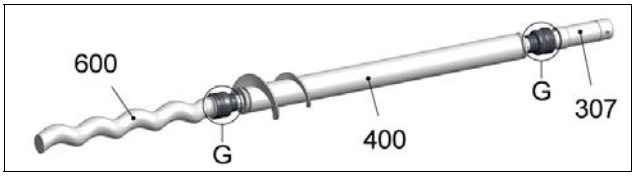


- Pull ribbon screw off **(430)** over plug-in shaft **(307)**.



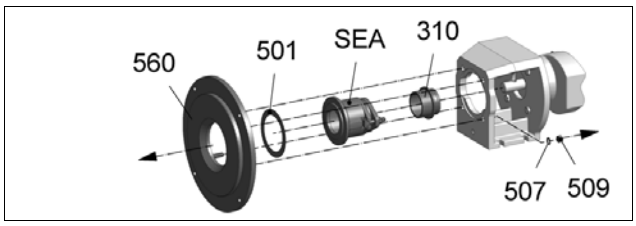
9.1.2.10 Dismantle rotor (600), coupling rod (400) and plug-in shaft (307)

- Dismantling the joints **(G)**
  – Note chapter on Rotating unit components (→ chapter 9.2).



9.1.2.11 Remove centering cover (560), shaft seal (SEA)

- Dismantle screw fitting **(507, 509)**.
- Remove centering cover **(560)**, suction casing gasket **(501)**, shaft seal **(SEA)** and splash ring **(310)**.

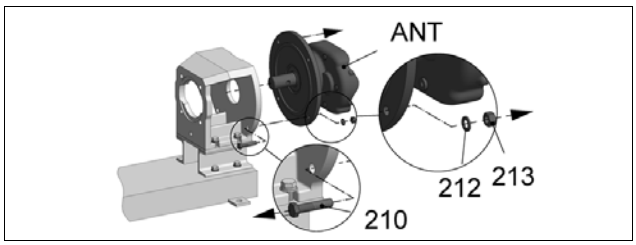


9.1.2.12 Dismantle lantern (200) and drive (ANT)

⚠ CAUTION

Falling or tilting drive.
Slight injuries can occur.
- Secure the drive (ANT).

- Dismantle screw fitting **(210, 212, 213)**.
- Remove drive **(ANT)**.

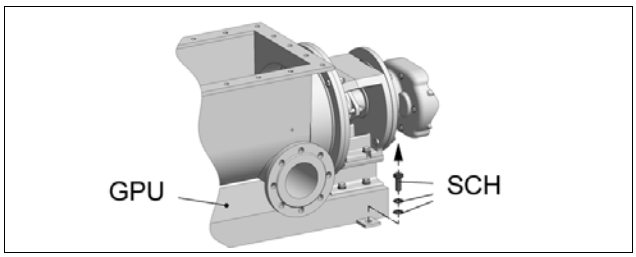


9.1.3 Assemble pump

⚠ WARNING Risk of injury due to lack of stability of pump. Crushing of body parts due to the pump or pump parts tipping or falling down.

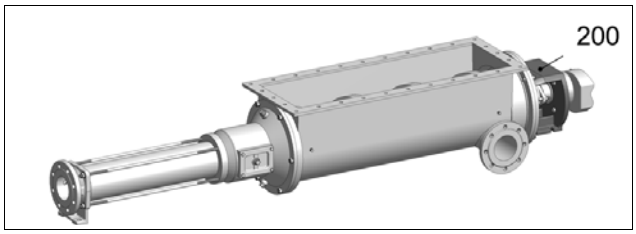
Design with base plate

- Fasten base plate **(GPU)** to secure pump.
  - Recommendation: Fasten to suitable base using a screw fitting **(SCH)**.



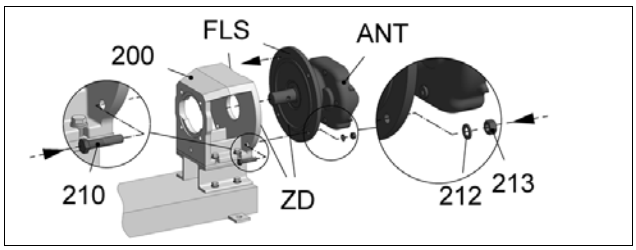
Design without base plate

- Fasten lantern **(200)** to secure the pump.
  - Recommendation: Fasten to suitable base using a screw fitting **(SCH)**.



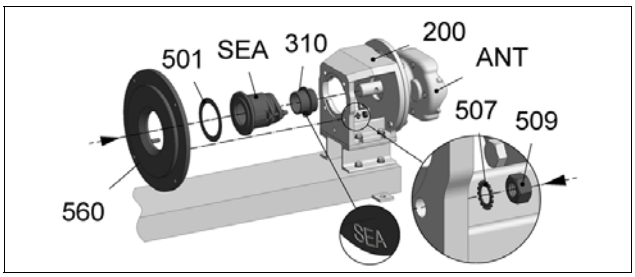
9.1.3.1 Assemble lantern (200) and drive (ANT)

- Clean flange bearing surfaces **(FLS)**, centering surface **(ZD)** and output shaft of the drive **(ANT)**.
- Assemble drive **(ANT)** with screw fitting **(210, 212, 213)** on lantern **(200)**.



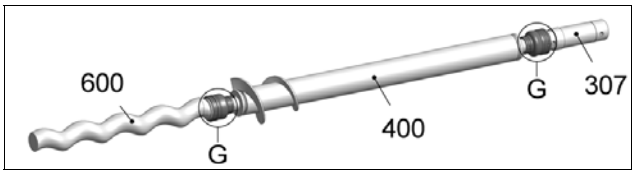
9.1.3.2 Assemble centering cover (560), shaft seal (SEA)

- Slide the splash ring **(310)** onto the drive shaft **(ATW)**.
- Place shaft seal **(SEA)** and casing gasket **(501)** in lantern **(200)**.
- Mount centring cover **(560)** with screw fitting **(507, 509)**.



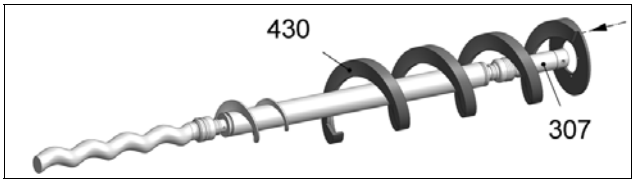
9.1.3.3 Assemble rotor (600), coupling rod (400) and plug-in shaft (307)

- Assembling the joints **(G)**
  - Note chapter on Rotating unit components (→ chapter 9.2).

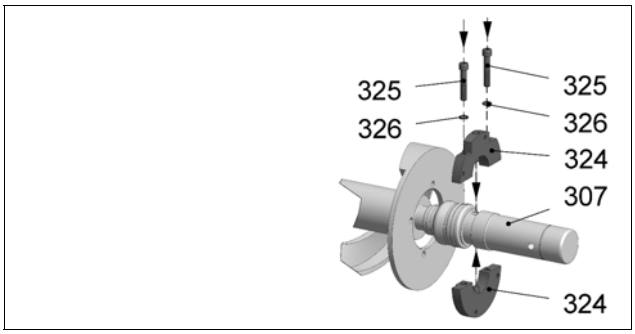


9.1.3.4 Assemble ribbon screw (430) and clamping ring (324)

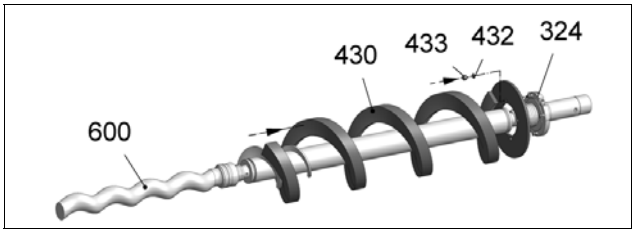
- Slide ribbon screw **(430)** over the plug-in shaft **(307)** towards the rotor **(600)**.



- Insert clamping ring **(324)** into the groove and hole of the plug-in shaft **(307)**.
- Install screw fitting **(326, 325)** on clamping ring **(324)**.

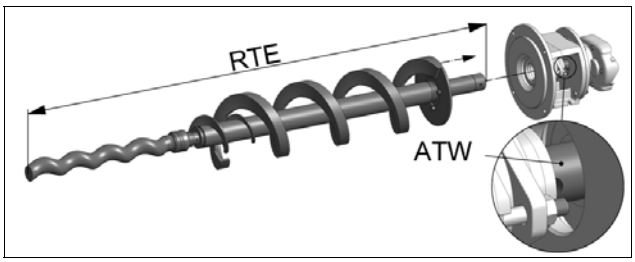


- Push the ribbon screw **(430)** back to the clamping ring **(324)** and assemble with screw fitting **(432, 433)**.



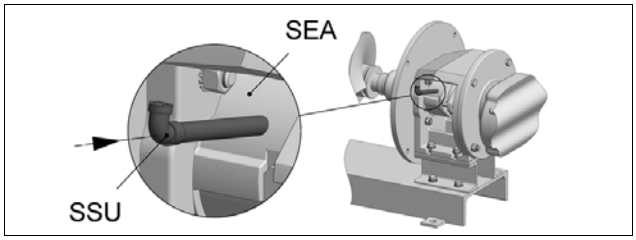
9.1.3.5 Assemble rotating unit (RTE)

- For simpler assembly, moisten outer surface of plug-in shaft **(307)** with anti-seize graphite petroleum.
- Push rotating unit **(RTE)** onto output shaft of the drive **(ANT)**.
- Slide splash ring **(310)** onto plug-in shaft **(307)**.



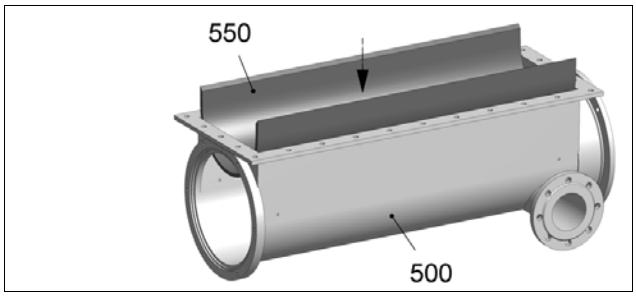
Assemble the flush connection (SSU) (optional)

- Assemble flush connection **(SSU)**.

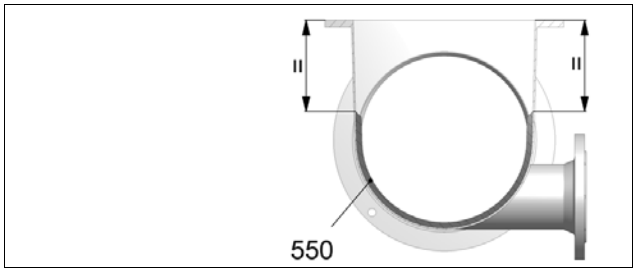


9.1.3.6 Assemble the inlay (550)

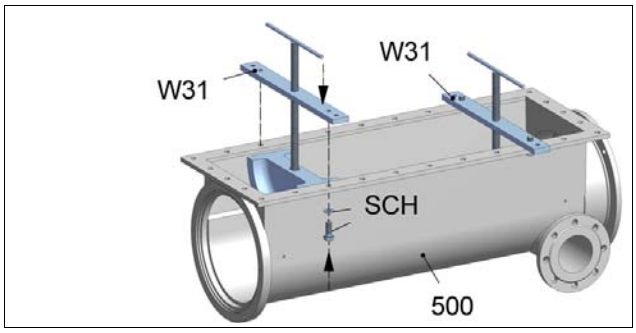
- Degrease the interior of the feed hopper **(500)**.
- Place the inlay **(550)** into the feed hopper **(500)** from above.



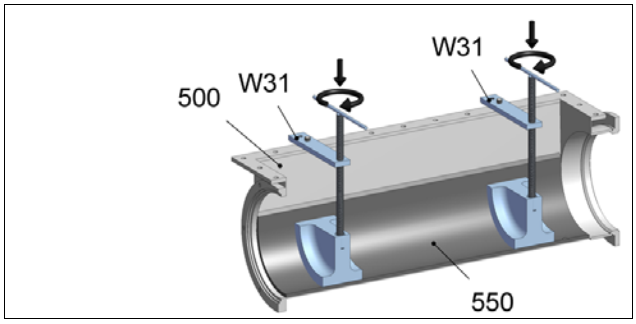
- Align inlay **(550)**.



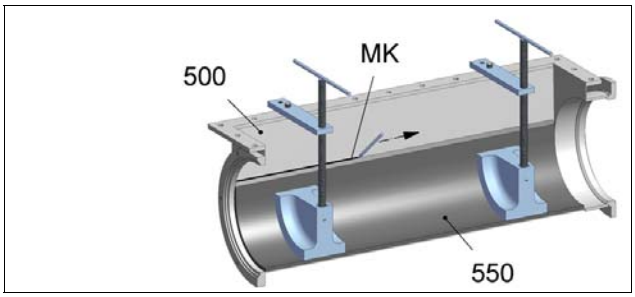
- Install tool **(W31)** with screw fitting **(SCH)** on feed hopper **(500)**.



- Press the inlay **(550)** evenly and completely against the inner wall of the feed hopper **(500)**.
  – Use tool **(W31)**.



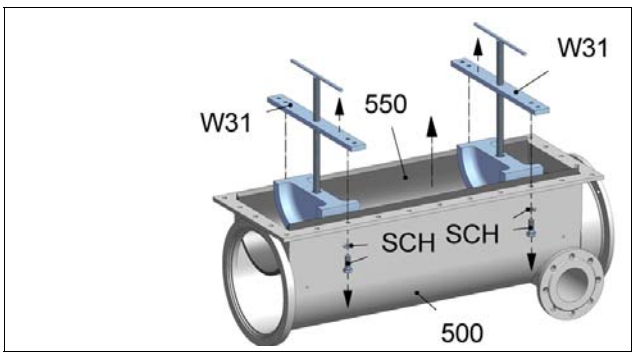
- Mark (MK) the position of inlay **(550)** on the inner wall of the feed hopper **(500)**.



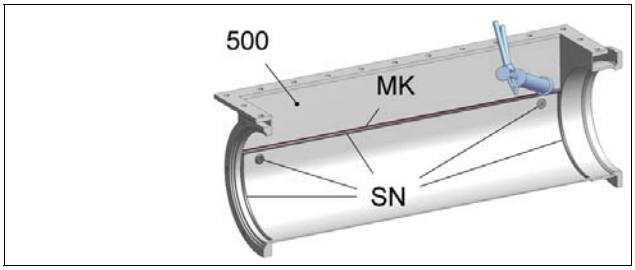
For feed hopper (500) with flush connection (optional)

- Mark **(MK)** cut-out for flush connection from outside on the inlay **(550)**.

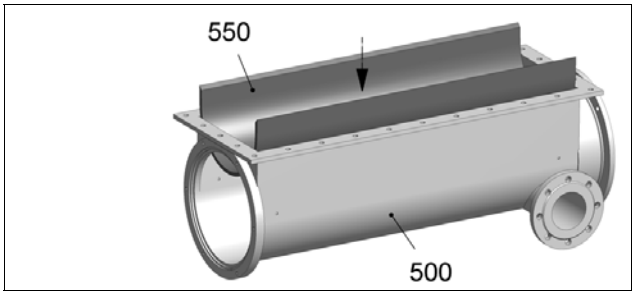
- Dismantle the screw fitting **(SCH)** and remove the tool **(W31)**.
- Remove inlay **(550)** from feed hopper **(500)**.
- Cut out the marked area for flush connection (optional).



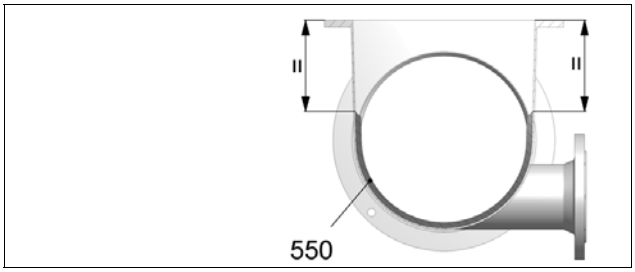
- In order to seal the inlay **(550)**, apply silicone **(SIL)** to all the outer edges and edges of the screw fittings and flush connection (optional) on the inner wall of the feed hopper **(500)**.
  - Note the marking **(MK)**.
  - Use tool **(WZ)**.



- Place the inlay **(550)** into the feed hopper **(500)** from above.

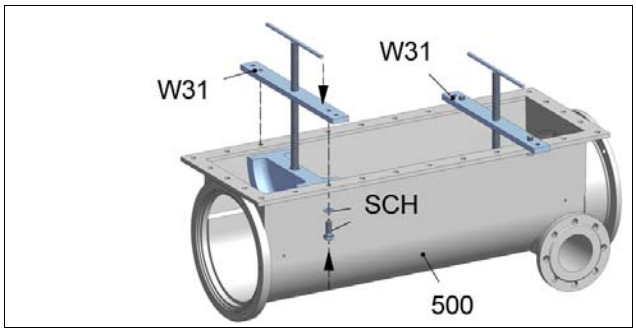


- Align inlay **(550)**.

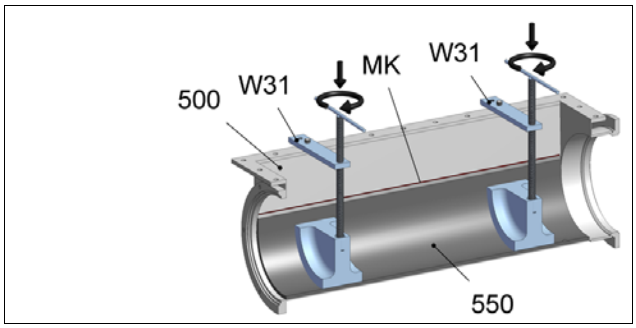


9. Dismantling/reassembly

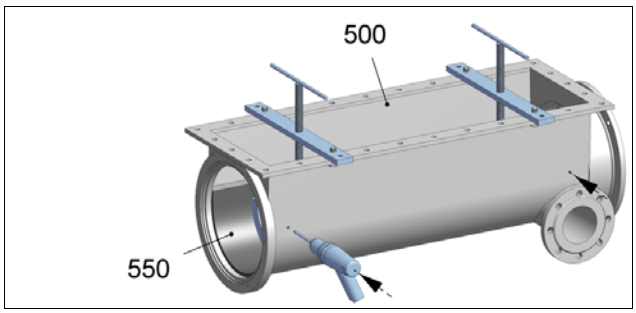
➢ Install tool **(W31)** with screw fitting **(SCH)** on feed hopper **(500)**.



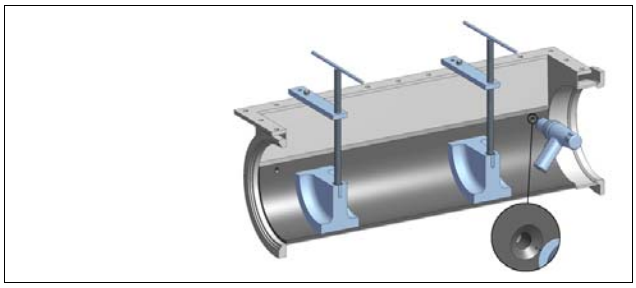
➢ Press the insert **(550)** evenly and completely against the inner wall of the feed hopper **(500)**.
– Note the marking **(MK)**.
– Use tool **(W31)**.



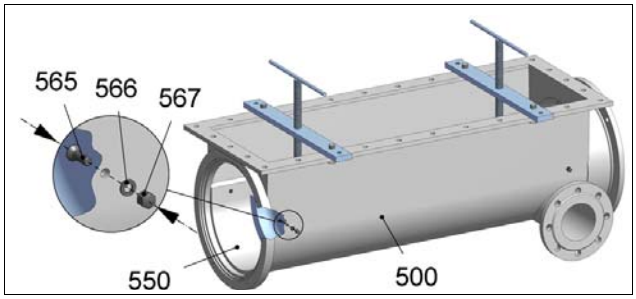
➢ Pierce inlay **(550)** from exterior.
– Use available holes in feed hopper **(500)**.
– Use tool **(DRM)**.



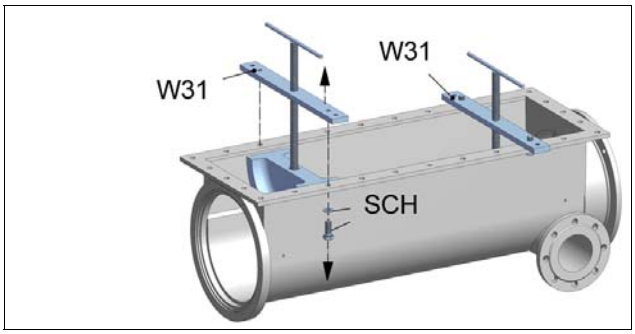
➢ Countersink holes from the inside.
– Use tool **(DRM)**.



➢ Install the inlay **(550)** with screw fitting **(565, 566, 567)** on the feed hopper **(500)**.

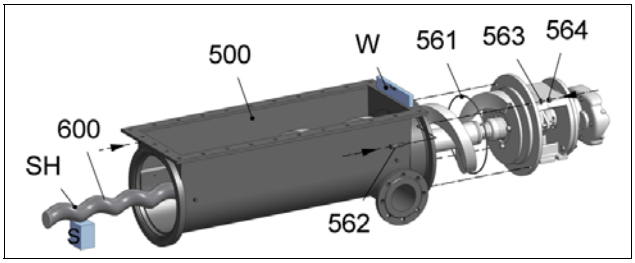


- Allow the silicone seams to dry as per the manufacturer specifications.
- Only then dismantle the screw fitting **(SCH)** and remove the tool **(W31)**



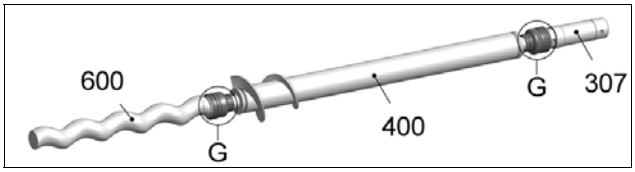
9.1.3.7 Assemble feed hopper (500)

- Fit rotor **(600)** with protective cover **(SH)**.
- Prop up **(600)** with support **(S)**.
- Push on o-ring **(561)**.
- Assemble and align feed hopper **(500)** with screw fitting **(562, 563, 564)**.
  - Use spirit level **(WW)**.



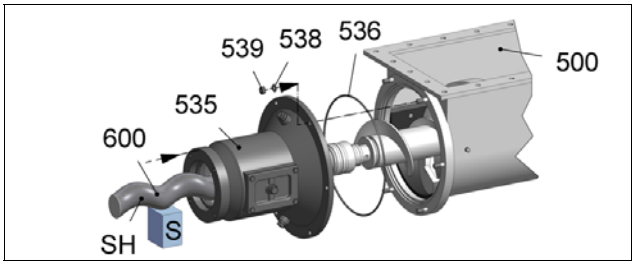
9.1.3.8 Assemble rotor (600) with feed hopper installed (500)

- Assembling the joints **(G)**
  - Note chapter on Rotating unit components (→ Chapter 9.2).



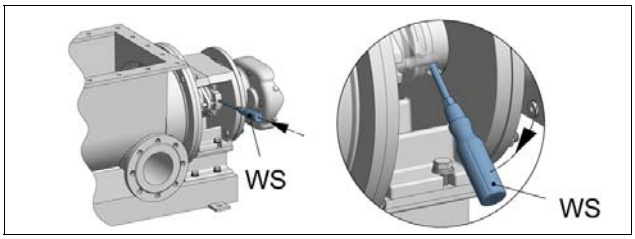
9.1.3.9 Assemble stuffing part (535)

- Insert the O-ring **(536)** on the stuffing part **(535)**.
- Install the stuffing part **(535)** with screw fitting **(538, 539)** on the feed hopper **(500)**.
- Remove protective cover **(SH)**.

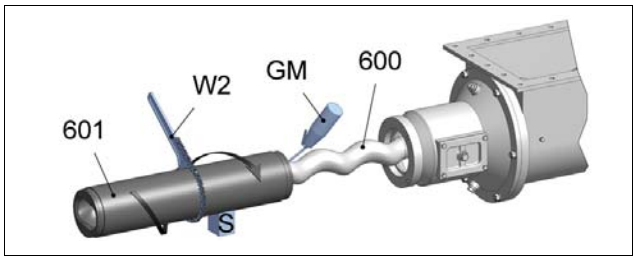


9.1.3.10 Assemble stator (601)

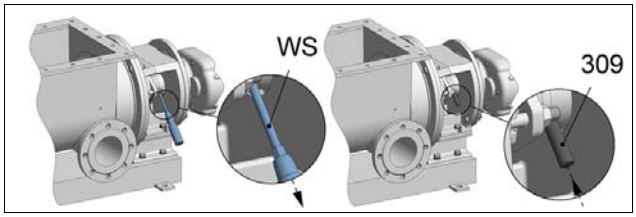
- Insert tool **(WS)** and turn downwards as locking device for stator assembly.



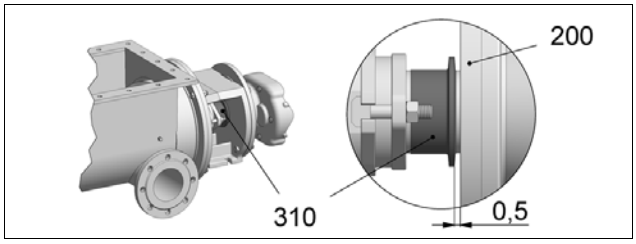
- Coat outer surface of rotor **(600)**.
  and inner surface of stator **(601)** with lubricant **(GM)** for easier assembly of the stator **(601)**.
- Support the stator **(601)** with a support **(S)**.
- Slide the stator **(601)** onto the rotor **(600)** by turning it.
  – Use tool **(W2)**.



- Remove tool **(WS)**.
- Coat the plug-in shaft pins **(309)** with anti-seize graphite petroleum **(GC)** and insert in plug-in shaft **(307)**.



- Note position of splash ring **(310)**.
- Insert splash ring collar at a distance of 0.5 mm from the lantern **(200)**.

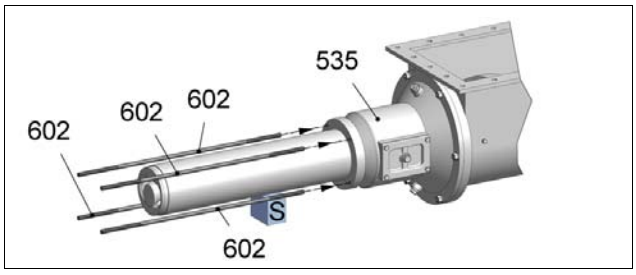


Assemble dry-running protection device (TSE) (optional)

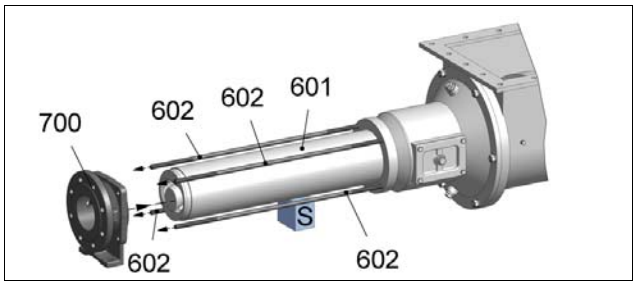
- Assemble dry-running protection device **(TSE)**.
  – Observe associated documents (→ Kapitel 12.1) of the operating and assembly instructions.

9.1.3.11 Assemble pressure branch (700)

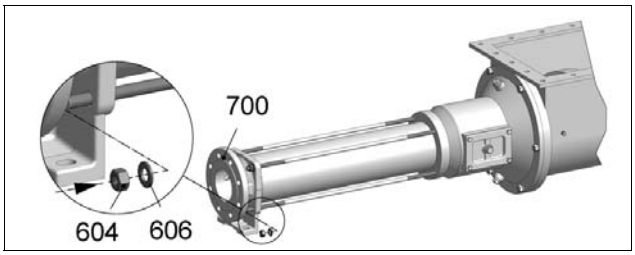
- Prop up stator **(601)** with support **(S)**.
- Assemble the tie bolts **(602)** in the stuffing part **(535)**.



- Push pressure branch **(700)** onto the stator **(601)**.
- Insert tie bolts **(602)** loosely in the pressure branch **(700)**.
- Remove the support **(S)**.



- Assemble screw fitting **(604, 606)**.
- Tighten tie bolts **(602)** evenly.



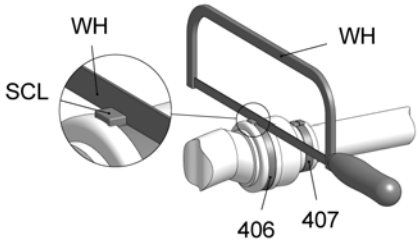
9.2 Rotating unit individual parts

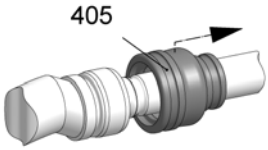
9.2.1 Dismantling

9.2.1.1 Holding band (406, 407) - dismantling

⚠ CAUTION
Danger of injury. Parts might be thrown out. ➢ Wear safety glasses.

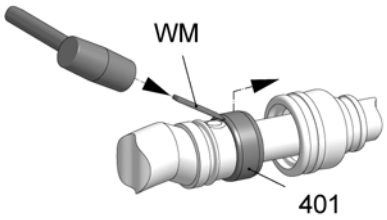
- ➢ Detach holding band loop **(SCL)**.
  - – Use suitable tool **(WH)**.
- ➢ Push out parts of holding band loop **(SCL)**.
- ➢ Remove holding band **(406, 407)**.
- ➢ Pull back universal joint sleeve **(405)**.





9.2.1.2 Retaining sleeve (401) - dismantling

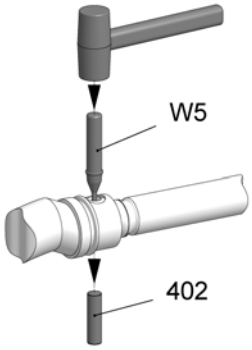
- ➢ Knock back retaining sleeve **(401)**.
  - – Use suitable tool **(WM)**.



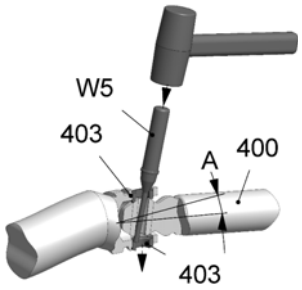
9.2.1.3 Detach joint

Tool (**W5**/drift)

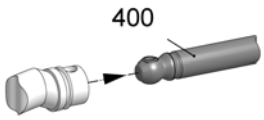
- ➢ Eject coupling rod pins **(402)**.



- Bend **(A)** the coupling rod **(400)**. Knock guide bushing **(403)** out with tool **(W5)**.



- Remove coupling rod **(400)**.



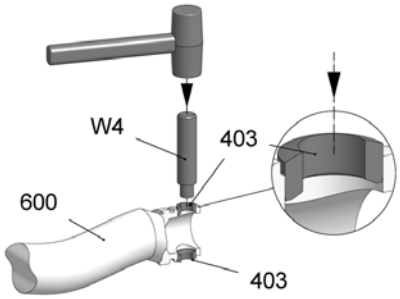
9.2.2 Rotating unit (RTE) - prepare individual parts for reassembly

9.2.2.1 Rotor (600)

- Remove any damage.
- Clean rotor **(600)**.

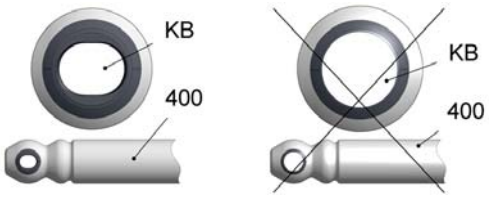
Tool (**W4**/assembly mandrel)

- Press in guide bushings **(403)** (depth = 2/3).
  - Use tool **(W4)**.



9.2.2.2 Coupling rod (400)

- Clean the coupling rod **(400)**.
- Examine bore head for wear.
  - If wearing is detected on the bore head, replace the coupling rod **(400)**.

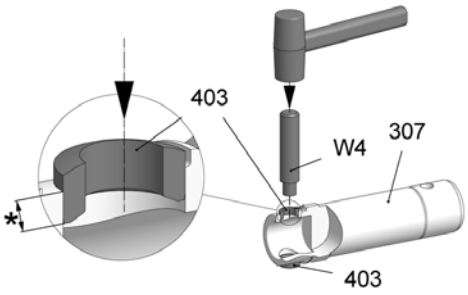


9.2.2.3 Plug-in shaft (307)

- Remove any damage.
- Clean rotor **(600)**.

Tool (**W4**/assembly mandrel)

- Press in guide bushings **(403)** (depth = 2/3).
  - Use tool **(W4)**.



9.2.3 Rotating unit (RTE) - individual parts - reassembly

NOTICE

Malfunction of the joints.
Malfunction and/or destruction of joints.

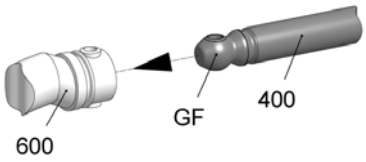
- Replace coupling rod pins **(402)** and guide bushings **(403)** jointly.

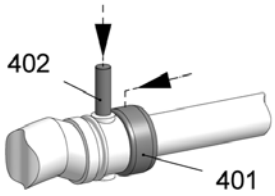
9.2.3.1 Coupling rod (400) - reassembly

- Slide the universal joint sleeve **(405)** and holding bands **(406, 407)** onto coupling rod **(400)**.
- Fit the diameter and width of the holding band of the universal joint sleeve.
- Fill the joint head with seepex joint grease.

Rotor (600)

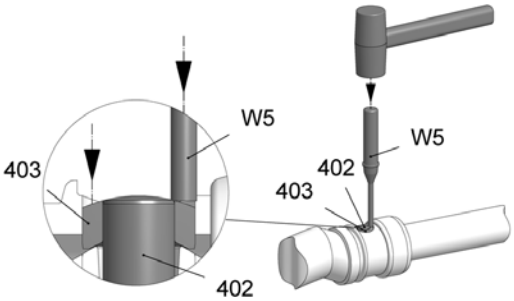
- Insert coupling rod pins **(402)**.
- Slide on retaining sleeve **(401)**.
- Connect rotor/coupling rod.





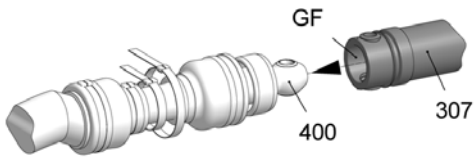
Tool (**W5**/drift)

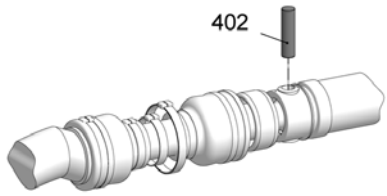
- Slide in the coupling rod pins **(402)**.
- Knock the guide bushings **(403)** in.
  - Use tool **(W5)**.



Plug-in shaft (307)

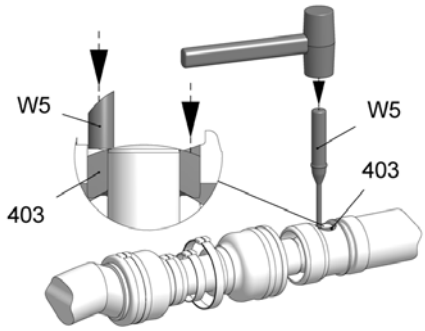
- Insert coupling rod pins **(402)**.
- Slide on retaining sleeve **(401)**.
- Connect plug-in shaft/coupling rod.





Tool (**W5**/drift)

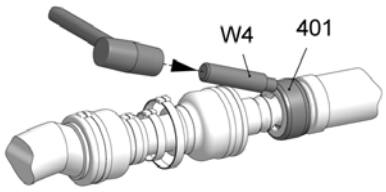
- Slide in the coupling rod pins **(402)**.
- Knock the guide bushings **(403)** in.
  - Use tool **(W5)**.



9.2.3.2 Retaining sleeve (401) - reassembly

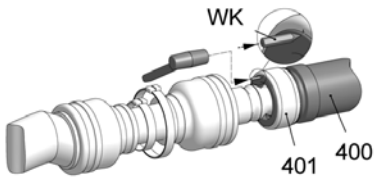
Tool (**W4**/assembly mandrel)

- Knock back retaining sleeve **(401)**.
  - Use tool **(W4)**.



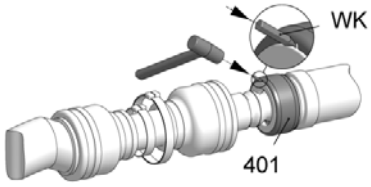
Rotor (600) unhardened material

- Secure retaining sleeve **(401)** in a displaced manner (2x180°).
  - Use suitable tool **(WK)**.



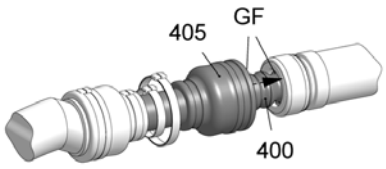
Rotor (600) hardened material

- Secure retaining sleeve **(401)** in a displaced manner (2x180°).
  - Use suitable tool **(WK)**.

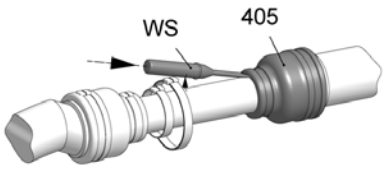


9.2.3.3 Universal joint sleeve (405) - reassembly

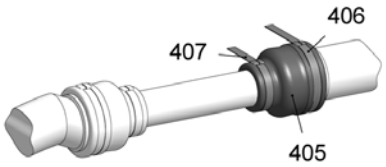
- Moisten the surface of coupling rod **(400)** / inner surface of universal joint sleeve **(405)** with joint grease (maintenance → chapter 7.).
- Slide on universal joint sleeve **(405)**.



- Remove air from the inside of the joint.
  - Use suitable tool **(WS)**.



- Assemble the holding band.
  - Holding band assembly (→ chapter 9).



9.3 Holding band - assembly

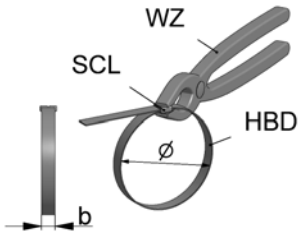
9.3.1 Prepare the holding band

➢ Only use prefabricated double-band holding bands may.

9.3.2 Check the holding band

- Bent-over holding band **(HBD)** is in contact with holding band loop **(SCL)** to avoid damaging universal joint sleeve.

➢ Press on holding band **(HBD)** using tool **(WZ)** if necessary.



9.3.3 Assemble the holding band

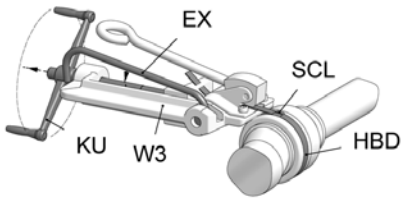
➢ Use tool (**W3**/mounting tool)

➢ Feed holding band into tool **(W3)**.

➢ Hold ends of holding band with the eccentric lever **(EX)**.

➢ Turn the crank (KU) until the holding band is strained and lies against the holding band loop **(SCL)**.

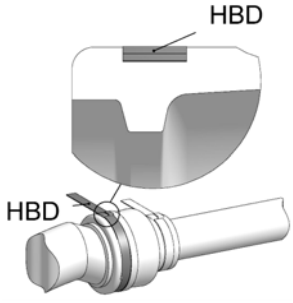
➢ Carefully pull the holding band together until it is in contact with the circular groove of universal joint sleeve.



9.3.4 Correct tension of holding band (HBD)

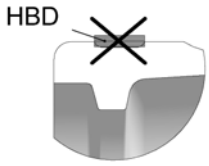
Correct

The holding band **(HBD)** has drawn in the out shape of the universal joint sleeve and is firmly seated.



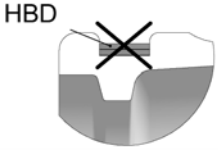
Incorrect

The holding band **(HBD)** is too loose, can slip off.



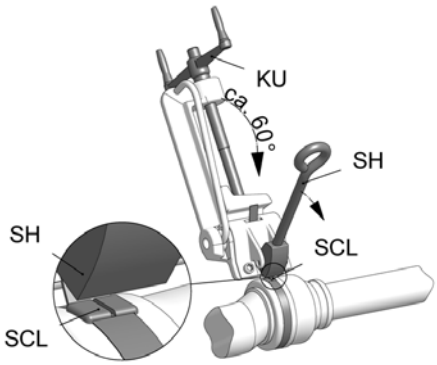
Incorrect

The holding band **(HBD)** is too tight, universal joint sleeve will be damaged/sheared off.



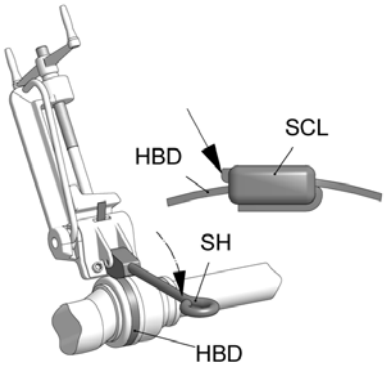
9.3.5 Cant up the holding band

- Swivel mounting tool **(W3)** approx. 60° upwards.
- Loosen crank **(KU)** by a half turn.
- Swivel cutting lever **(SH)** forward until the pressure piece is lying behind the holding band loop **(SCL)**.



9.3.6 Shear the holding band (material: 1.4301; 1.4401)

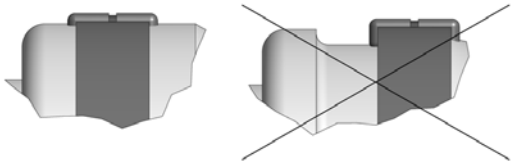
- Hit the cutting lever **(SH)** with the inside of your hand.
  - Cant up and shear the end of the holding band behind the loop **(SCL)**.
  - Carefully straighten up the holding band **(HBD)** if it rises up on the sheared side.



NOTICE
Universal joint seal damage. Pin joint grease can emerge. ➢ Avoid hammering or striking.

9.3.7 Check the holding band after assembly

- The holding band must lie in the groove of the universal joint sleeve.
- Replace the holding band if the holding band slips back through the loop.



9.4 / 9.5 Shaft sealing

9.4.1 Safety

WARNING

Shaft seal is leaky.
Leakage may escape into the atmosphere.

- Take safety measures to protect persons and the environment.
- Wear suitable protective clothing.
- Dispose of leakage appropriately.
- Note applicable regulations when handling hazardous substances.

9.4.2 Operating conditions and material combination

- Adjust to the relevant application
  - Design variants you will find at http://www.seepex.com/en/service/downloads/.

10.1 Spare parts list

10.1 Ordering spare parts

Commission number .....

Type .....

The commission number and type are printed on the type plate of your SEEPEX machine.

Request ☐

Order ☐

After placing the order, you will receive an order confirmation and deadline before the parts are shipped.

Your data

First Name .....

Surname .....

Company .....

Department .....

Street .....

Postcode, City .....

Telephone .....

Fax .....

E-mail .....

Our contact data

Customer Service
Fax +49.2041.996-5350
service@seepex.com

10. Spare parts

Order spare parts or complete packages tailored to your pump type.

Spare parts

Plug-in shaft and shaft seal

No.	Component	Qty.
301	Packing ring (set) *	
307	Plug-in shaft	
309	Plug-in shaft pin	
310	Splash ring	
330	Mechanical seal *	

Coupling rod and joint parts

No.	Component	Qty.
400	Coupling rod + Coupling rod bushing	
401	Retaining sleeve	
402	Coupling rod pin	
403	Guide bushing	
405	Universal joint sleeve	
406	Holding band	
407	Holding band	
411	Holding band	
412	Holding band	
413	Rubber strip	

Pumping elements

No.	Component	Qty.
600	Rotor	☐
601	Stator	☐

Miscellaneous parts

No.	Component	Qty.
430	Ribbon screw	☐
501	Casing gasket	☐
503	Sealing ring	☐
536	O-ring	☐
550	Inlay for feed hopper	☐
561	O-ring	☐
706	Sealing ring	☐
098	Joint grease (GF) = 300 g (~ 315 cm³) for the required grease quantity refer to chapter 10	☐

Complete packages

small wearing parts package

consisting of: **Qty.** ☐

1 x Retaining sleeve (401)
1 x Coupling rod pin (402)
2 x Guide bushing (403)
1 x Universal joint sleeve (405)
1 x Holding band (406)
1 x Holding band (407)
1 x Casing gasket (501)
1 x Rotor (600)
1 x Stator (601)
Joint grease (098)

10. Spare parts

large wearing parts package

consisting of:	**Qty.**
1 x Packing ring (set) (301) *	☐
1 x Plug-in shaft (307)	
1 x Splash ring (310)	
1 x Flushing ring (311) *	
1 x Mechanical seal (330) *	
1 x Coupling rod (400)	
2 x Retaining sleeve (401)	
2 x Coupling rod pin (402)	
4 x Guide bushing (403)	
2 x Universal joint sleeve (405)	
2 x Holding band (406)	
2 x Holding band (407)	
1 x Holding band (411)	
1 x Holding band (412)	
1 x Rubber strip (413)	
1 x Ribbon screw	
1 x Casing gasket (501)	
1 x Inlay for feed hopper550)	
1 x Rotor (600)	
1 x Stator (601)	
Joint grease (098)	

* according to pump design

_____ _____

Place, date Signature, company stamp

Version for copying

Spare parts can be ordered online or requested from
www.seepex.com\

Must be specified with every order!

Sender:

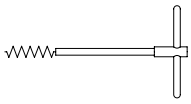
Commission:

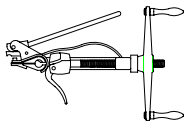
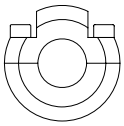
Mark tool!

X

Contact: .....
Tel.: .....
Fax: .....
E-mail: .....

Customer service:	**Germany**	Tel +492041.996-231	**Delivery address:**
seepex GmbH		Fax +492041.996-431	.....
Postfach 10 15 64	**Rest of Europe**	Tel +492041.996-224	.....
D-46215 Bottrop		Fax +492041.996-424	.....
service@seepex.com	**outside Europe**	Tel +492041.996-120	.....
		Fax +492041.996-432	.....

For installation of:	Packing gland	Stator		
Tool no.	**W1** ☐	**W2** ☐	☐	☐
Denomination:	Packing puller	Chain wrench plus spare chain		
Order no.	PKZ	KRZ		
				

For installation of:	**Rotating unit**			
	Holding band	Joint		
Tool no.	**W3** ☐	**W10** ☐	☐	☐
Denomination:	Mounting tool	Dismantling tool		
Order no.	MHB	AZV		
				

For installation of:	**General**			
Tool no.	**W9** ☐	☐	☐	☐
Denomination:	Mounting lever			
Order no.	MHL			

12.1 Accessories/Technical information

- Accessories and technical information are commission specific documents not part of this not binding operating and assembly instruction.

13.1 Manufacturer's and supplier's documents

- Manufacturer's and supplier's documents are commission specific documents and not part of this not binding operating and assembly instruction.

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