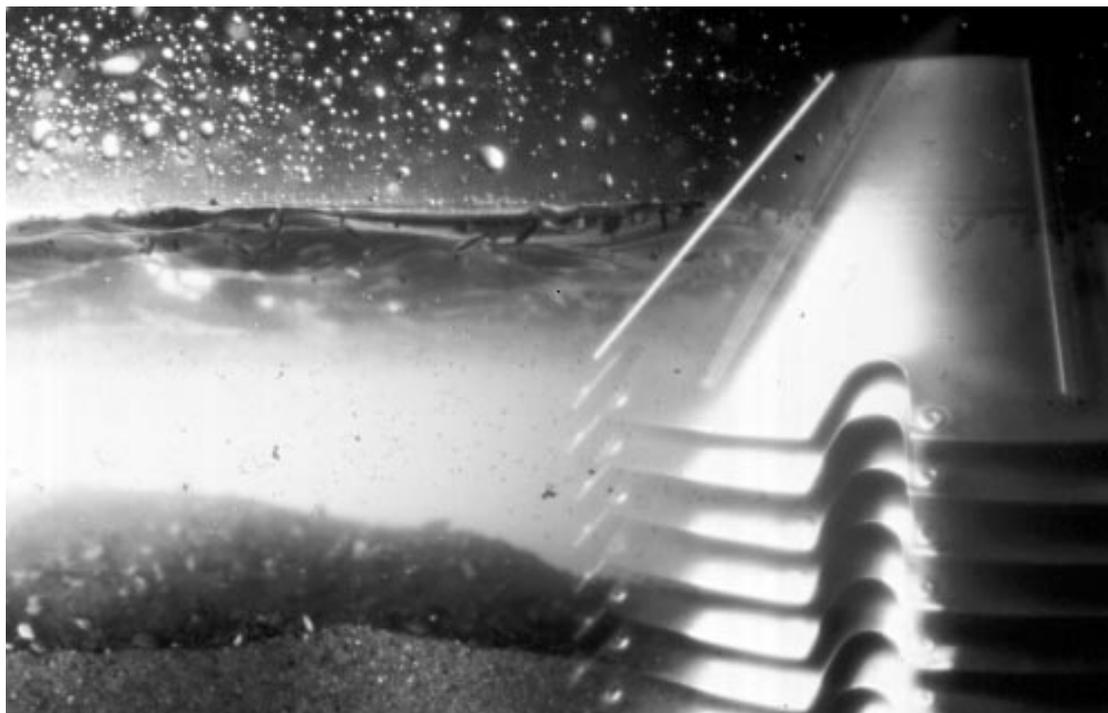


A L F A L A V A L

Service & Maintenance Manual



Separator

AFPX 617XGV-14/74CG

Product No.
Book No.

881218-01-01/0
1271649-02 Rev. 1



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Contents

1	Safety Instructions	9
2	Maintenance Directions	15
2.1	Periodic maintenance	15
2.1.1	Introduction	15
2.1.2	Maintenance intervals	15
2.1.3	Maintenance procedure	17
2.1.4	Service kits	18
2.2	Maintenance Logs	19
2.2.1	Daily checks	19
2.2.2	Lubrication of electric motor	19
2.2.3	Oil change	19
2.2.4	Intermediate Service (IS)	20
2.2.5	Major Service (MS)	22
2.2.6	3-year Service (3S)	24
2.3	Cleaning	26
2.3.1	Cleaning agents	26
2.3.2	Cleaning of bowl discs	27
2.3.3	External cleaning	28
2.4	When changing oil	29
2.4.1	Worm wheel and worm; wear of teeth	29
2.4.2	Oil change procedure	32
2.5	Lubricants	33
2.5.1	Lubrication chart, general	33
2.5.2	Recommended lubricating oils	35
2.5.3	Recommended oil brands	36
2.5.4	Recommended lubricants	37
2.6	Vibration	40
2.6.1	Vibration analysis	40
2.7	Common maintenance directions	41
2.7.1	Ball and roller bearings	41
2.7.2	Before shutdowns	45

3	Dismantling/Assembly	47
3.1	Introduction	47
3.1.1	General directions	47
3.1.2	References to check points	48
3.1.3	Tools	48
3.1.4	Tightening of screws	49
3.2	Intermediate Service (IS), dismantling	50
3.2.1	Inlet/outlet, frame hood	50
3.2.2	Bowl hood and disc stack	52
3.2.3	Bowl body and operating mechanism	58
3.2.4	Operating liquid device	62
3.3	Intermediate Service (IS), check points	65
3.3.1	Introduction	65
3.3.2	Corrosion	65
3.3.3	Cracks	67
3.3.4	Erosion and wear linings	68
3.3.5	Guide surfaces	72
3.3.6	Bowl hood seal ring	74
3.3.7	Bowl spindle taper and bowl body nave taper	75
3.3.8	Lock ring; wear and damage	76
3.3.9	Operating mechanism	78
3.3.10	Sliding bowl bottom	79
3.3.11	Springs for operating mechanism	79
3.3.12	Valve plugs	80
3.3.13	Worm wheel and worm; wear of teeth	80
3.3.14	Inlet pipe and outlet paring disc	80
3.3.15	Vibration sensor	81
3.3.16	Speed sensor	81
3.3.17	Cover interlocking switch (option)	82
3.4	Intermediate Service (IS), assembly	83
3.4.1	Introduction	83
3.4.2	Lubrication	83
3.4.3	Operating liquid device	84
3.4.4	Bowl body and operating mechanism	86

3.4.5	Bowl hood and disc stack	92
3.4.6	Inlet/outlet, frame hood	101
3.5	Major Service (MS), dismantling	102
3.5.1	Introduction	102
3.5.2	Vertical driving device	104
3.5.3	Horizontal driving device	115
3.6	Major Service (MS), check points	120
3.6.1	Introduction	120
3.6.2	Lock ring; priming	120
3.6.3	Brake	122
3.7	Major Service (MS), assembly	124
3.7.1	Introduction	124
3.7.2	Horizontal driving device	125
3.7.3	Vertical driving device	130
3.8	Operating water module compact (OWMC)	142
3.8.1	Exploded view	142
3.8.2	Dismantling (MS service)	144
3.8.3	Check points	145
3.8.4	Assembly (MS service)	146
3.8.5	Air tank	146
	Index	151



Study instruction manuals and observe the warnings before installation, operation, service and maintenance.

Not following the instructions can result in serious accidents.

In order to make the information clear only foreseeable conditions have been considered. No warnings are given, therefore, for situations arising from the unintended usage of the machine and its tools.



1 Safety Instructions



The centrifugal separator includes parts that rotate at high speed. This means that:

- Kinetic energy is high
- Great forces are generated
- Stopping time is long

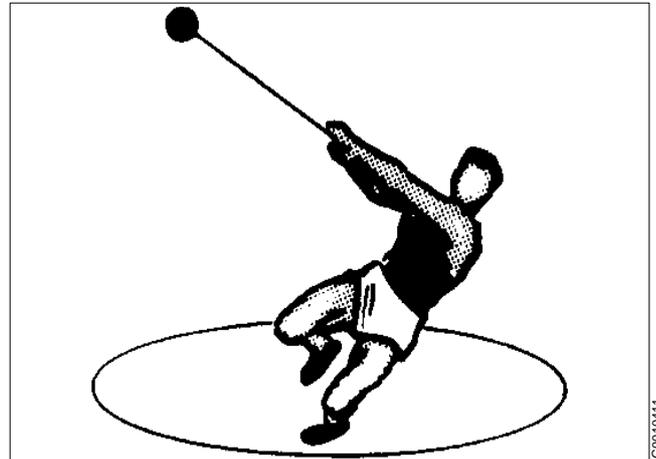
Manufacturing tolerances are extremely fine. Rotating parts are carefully balanced to reduce undesired vibrations that can cause a breakdown. Material properties have been considered carefully during design to withstand stress and fatigue.

The separator is designed and supplied for a specific separation duty (type of liquid, rotational speed, temperature, density etc.) and must not be used for any other purpose.

Incorrect operation and maintenance can result in unbalance due to build-up of sediment, reduction of material strength, etc., that subsequently could lead to serious damage and/or injury.

The following basic safety instructions therefore apply:

- **Use the separator only for the purpose and parameter range specified by Alfa Laval.**
- **Strictly follow the instructions for installation, operation and maintenance.**
- **Ensure that personnel are competent and have sufficient knowledge of maintenance and operation, especially concerning emergency stopping procedures.**
- **Use only Alfa Laval genuine spare parts and the special tools supplied.**



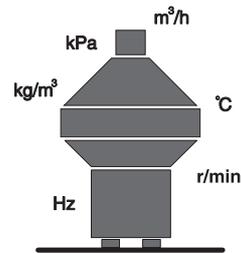
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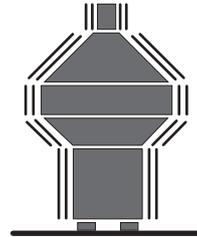
DANGER

Disintegration hazards

- Use the separator only for the purpose and parameter range specified by Alfa Laval.
- If excessive vibration occurs, **stop** separator and **keep bowl filled** with liquid during rundown.
- When power cables are connected, always check direction of motor rotation. If incorrect, vital rotating parts could unscrew.
- Check that the gear ratio is correct for power frequency used. If incorrect, subsequent overspeed may result in a serious break down.
- Welding or heating of parts that rotate can seriously affect material strength.
- Wear on the large lock ring thread must not exceed safety limit. ϕ -mark on lock ring must not pass opposite ϕ -mark by more than specified distance.
- Inspect regularly for **corrosion** and **erosion** damage. Inspect frequently if process liquid is corrosive or erosive.



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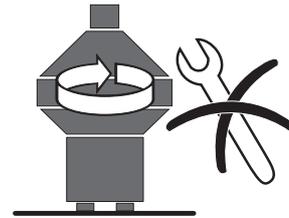
DANGER

Entrapment hazards

- Make sure that rotating parts have come to a **complete standstill** before starting **any** dismantling work.
- To avoid accidental start, switch off and lock power supply before starting **any** dismantling work.
- Assemble the machine **completely** before start. **All** covers and guards must be in place.

Electrical hazards

- Follow local regulations for electrical installation and earthing (grounding).



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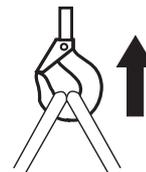
WARNING

Crush hazards

- Use correct lifting tools and follow lifting instructions.
- Do **not** work under a hanging load.

Noise hazards

- Use ear protection in noisy environments.



S0051711



S0051611



CAUTION

Burn hazards

- Lubrication oil and various machine surfaces can be hot and cause burns.

Cut hazards

- Sharp edges on separator discs and lock ring threads can cause cuts.



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Warning signs in the text

Pay attention to the safety instructions in this manual. Below are definitions of the three grades of warning signs used in the text where there is a risk for injury to personnel.



DANGER

Type of hazard

This type of safety instruction indicates a situation which, if not avoided, could result in **fatal injury** or fatal damage to health.



WARNING

Type of hazard

This type of safety instruction indicates a situation which, if not avoided, could result in **disabling injury** or disabling damage to health.



CAUTION

Type of hazard

This type of safety instruction indicates a situation which, if not avoided, could result in **light injury** or light damage to health.

NOTE

This type of instruction indicates a situation which, if not avoided, could result in damage to the equipment.



2 *Maintenance Directions*

2.1 Periodic maintenance

2.1.1 Introduction

Periodic (preventive) maintenance reduces the risk of unexpected stoppages and breakdowns. Follow the maintenance logs on the following pages in order to facilitate the periodic maintenance.



DANGER

Disintegration hazards

Separator parts that are either worn beyond their safe limits or incorrectly assembled may cause severe damage or fatal injury.

2.1.2 Maintenance intervals

The following directions for periodic maintenance give a brief description of which parts to be cleaned, checked and renewed at different maintenance intervals.

The maintenance logs for each maintenance interval later in this chapter give detailed enumeration of the check points that must be done.

Daily checks consist of minor check points to carry out for detecting abnormal operating conditions.

Oil change

The oil change interval is every **1000-1500 hours** or at least once every year if the total number of operating hours is less than **1000-1500 hours**.

Intermediate Service (IS)

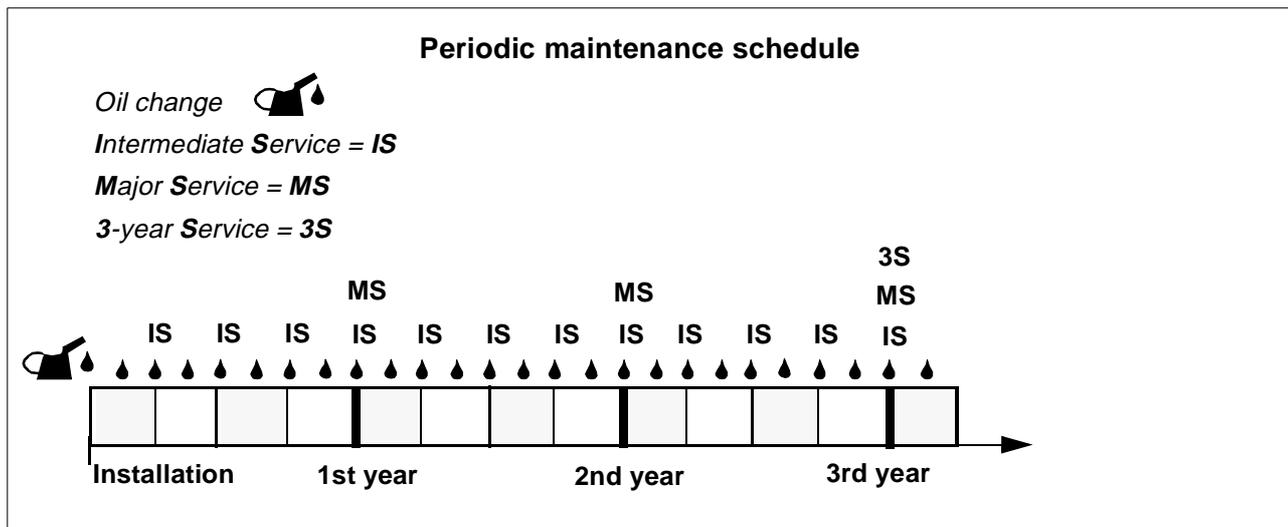
Intermediate Service consists of an overhaul of the separator bowl, inlet/outlet and operating liquid device every **3 months** or **2000 operating hours**. Seals in bowl and gaskets in inlet and outlet devices are renewed.

Major Service (MS)

Major Service consists of an overhaul of the complete separator and includes an Intermediate Service every **12 months** or **8000 operating hours**. Seals and bearings in the bottom part are renewed.

3-year Service (3S)

3-year Service consists of renewing the frame feet. The feet get harder with increased use and age.



2.1.3 Maintenance procedure

At each Intermediate and Major Service, take a copy of the maintenance log and use it for notations during the service.

The Intermediate and Major Services should be carried out in the following manner:

1. Dismantle the parts as mentioned in the maintenance log and described in chapter “[3 Dismantling/Assembly](#)” on page 47.

Place the separator parts on clean, soft surfaces such as pallets.

2. Inspect and clean the dismantled separator parts according to the maintenance log.
3. Fit all the parts delivered in the service kit while assembling the separator.

2.1.4 Service kits

Special kits of spares are available for the periodical maintenance. These kits are designed in accordance with the centrifuge maintenance schedule as follows:

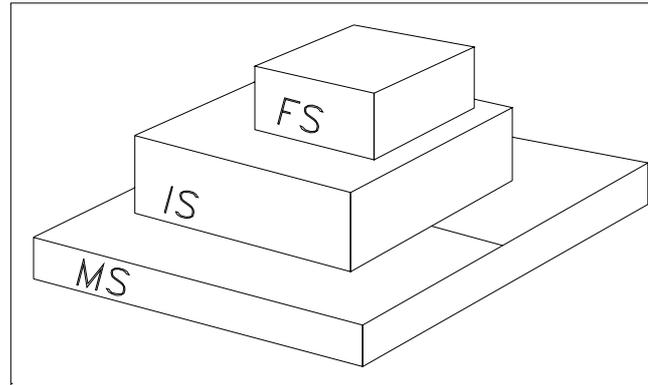
- IS; Intermediate service kit
- MS; Major service kit
- FS; Foundation service kit

A service kit is available also for servicing the operating water module (OWMC).

For other services the spare parts have to be ordered separately.

Note that the parts for IS are **not** included in the MS kit.

The contents of the service kits are described in the *Spare Parts Catalogue*.



Kits are available for Intermediate Service, Major Service and for servicing the frame feet, but also for OWMC

NOTE

Always use Alfa Laval genuine parts as otherwise the warranty will become invalid.

Alfa Laval takes no responsibility for the safe operation of the equipment if non-genuine spare parts are used.



DANGER

Disintegration hazards

Use of imitation parts may cause severe damage.

2.2 Maintenance Logs

2.2.1 Daily checks

The necessary daily checks to be carried out for a safe operation are enumerated in chapter *Running* in the *Operator's Manual*.

2.2.2 Lubrication of electric motor

The bearings of the electric motor shall be greased with intervals that is dependent of the motor speed (50 or 60 Hz), ambient temperature and if the bearing is located on the driving end or non-driving end.

The recommended interval varies from 5500 up to 12000 operating hours.

Correct lubrication interval and recommended type of grease can be found on a plate fixed on the motor. The information can also be found in chapter *Motor specifications* in the *Installation Manual*.

2.2.3 Oil change

The oil change and check of worm gear should be carried out every **1000-1500 hours** of operation.

Note: In a new installation, or after replacement of gear, change the oil after **200 operating hours** and clean the gear housing.

Main component and activity	Part	Page	Notes
Horizontal driving device			
Worm wheel shaft and gear housing			
Check	Worm wheel and worm	29	
Renew	Oil ^{a)} in gear housing	32	

When the separator is running for short periods, the lubricating oil must be changed every **12 months** even if the total number of operating hours is less than **1000-1500 hours**.

a) See chapter "2.5 Lubricants" on page 33 for further information.

2.2.4 Intermediate Service (IS)

Name of plant: _____ Local identification: _____
 Separator: AFPX 617XGV-14/74CG Manufacture No./Year: _____
 Total running hours: _____ Product No: 881218-01-01
 Date: _____ Signature: _____

Main component and activity	Part	Page	Notes
Inlet and outlet			
Clean and inspect	Outlet housing	–	
	Threads of inlet pipe and paring disc	80	
Renew	O-rings, rectangular ring and seal ring(s)	–	
Separator bowl			
Clean and check	Lock ring	74	
	Bowl hood	74	
	Top disc	–	
	Bowl discs	27	
	Distributor	–	
	Distributing cone	–	
	Sliding bowl bottom	79	
	Bowl body	–	
	Guide surfaces	72	
	Bowl spindle cone and bowl body nave	75	
	Operating mechanism	78, 84	
Check	Corrosion	65	
	Cracks	67	
	Erosion	68	
	Galling of guide surface	73	
	Disc stack pressure	97	
Renew	O-rings and sealings	–	

Main component and activity	Part	Page	Notes
Operating liquid device			
Clean and check	Operating liquid device	–	
Renew	O-rings	–	
Horizontal driving device			
Worm wheel shaft and gear housing			
Check	Worm wheel and worm	29	
Renew	Oil in gear housing	32	
Signs and labels on separator			
Check attachment and legibility	Safety label on hood	–	
	Direction of rotation arrow	–	
	Power supply frequency	–	
Monitoring equipment			
Function check	Vibration sensor	81	
	Speed sensor	81	
	Cover interlocking switch (option)	82	

Note: Renew all parts included in the Intermediate Service kit (IS).

2.2.5 Major Service (MS)

Name of plant: _____ Local identification: _____
 Separator: AFPX 617XGV-14/74CG Manufacture No./Year: _____
 Total running hours: _____ Product No: 881218-01-01
 Date: _____ Signature: _____

Main component and activity	Part	Page	Notes
Inlet and outlet			
Clean and inspect	Outlet housing	–	
	Threads of outlet pipe and paring disc	–	
Renew	O-rings, rectangular ring and seal ring(s)	–	
Separator bowl			
Clean and check	Lock ring	74, 120	
	Bowl hood	74	
	Top disc	–	
	Bowl discs	27	
	Distributor	–	
	Distributing cone	–	
	Sliding bowl bottom	79	
	Bowl body	–	
	Guide surfaces	72	
	Bowl spindle cone and bowl body nave	75	
Check	Operating mechanism	78, 84	
	Corrosion	65	
	Cracks	67	
	Erosion	68	
	Galling of guide surface	73	
	Disc stack pressure	97	
	Height position	99	
Renew	O-rings, rectangular rings and sealings	–	

Main component and activity	Part	Page	Notes
Operating liquid device			
Clean and check	Operating liquid device	–	
Check	Height position	85	
Renew	O-rings and throttling ring	–	
Vertical driving device			
Clean and check	Bowl spindle	–	
Check	Radial wobble of bowl spindle	141	
Renew	Spindle bearings, sealings and rubber buffers	130	
Horizontal driving device			
Worm wheel shaft and gear housing			
Check	Worm wheel and worm	29	
	Radial wobble of worm wheel shaft	129	
Renew	Bearings, O-rings, sealings and tolerance ring	125	
	Oil in gear housing	32	
Flexible coupling			
Check	Axial play of elastic plates	127	
Brake			
Renew	Friction pad	122	
Signs and labels on separator			
Check attachment and legibility	Safety label on hood	–	
	Direction of rotation arrow	–	
	Power supply frequency	–	
Monitoring equipment			
Function check	Vibration sensor	81	
	Speed sensor	81	
	Cover interlocking switch (option)	82	

Note: Renew all parts included in the Intermediate Service kit (IS) and Major Service kit (MS).

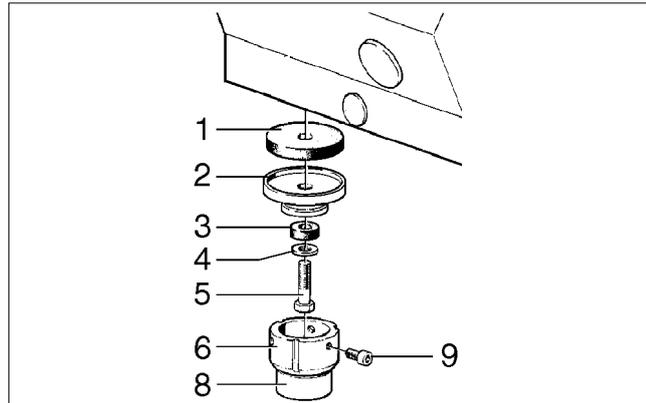
2.2.6 3-year Service (3S)

Renew the frame feet as described below. The 3-year service should be carried out in conjunction with a Major Service (MS). The extent of the 3-year service is the same as for a Major Service plus renewing the parts included in the 3-year service kit (3S).

Frame feet, renewal

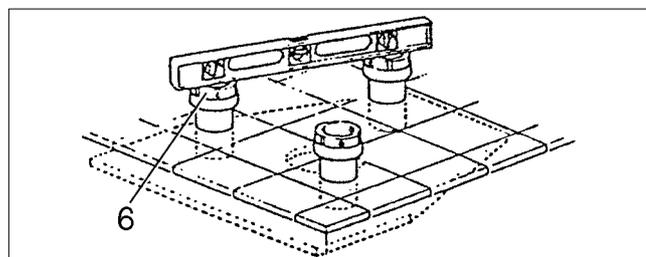
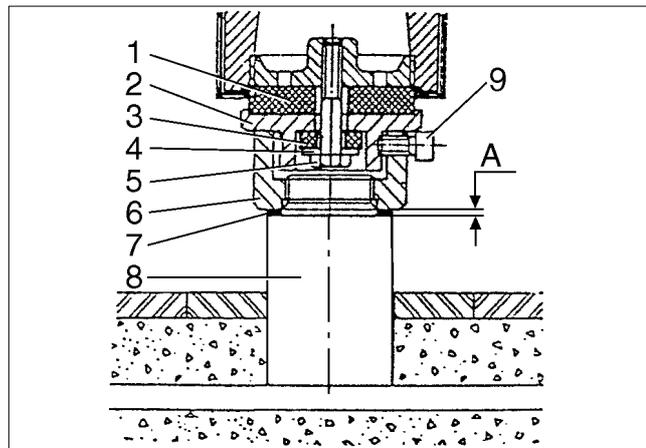
NOTE

Before starting the procedure below, first read the chapter *Lifting instructions* in the *Installation Manual*. Here directions are given which parts that first must be removed before lifting and also which lifting tool that must be used.



- 1. Rubber cushion
- 2. Frame foot
- 3. Rectangular ring
- 4. Washer
- 5. Screw
- 6. Holder
- 7. Adjusting washer
- 8. Foot on foundation plate
- 9. Set screw
- A. Thickness of adjusting washers (max. 4 pcs)

1. Disconnect pipes, hoses and cables connected to the separator and electric motor.
2. Remove the set screws (9), three for each foundation foot.
3. Lift the separator. Follow the directions in the *Lifting instructions* referred to above.
4. Unscrew the screw (5) which is locked with Loctite and then renew the two rubber cushions (1 & 3).
5. Apply Loctite 243 on the screw thread (5) and tighten it with **40 Nm**.
6. Level against the upper face of the three holders (6). Screw the holders to compensate for inclination, if any. Any gap between a holder and a foundation foot (8) must be eliminated by adding or removing one or more adjusting washers (7). Note that the total thickness (A) of the adjusting washers for one foot must not exceed corresponding 4 washers.
7. After all rubber cushions have been renewed lower the separator into the three holders.



Level against the upper face of the holders (6)

8. Tighten the set screws (9), first by hand (or by a hand tool, if necessary) until all of them are in contact with the frame feet (2).

Then tighten the set screws with **100 Nm**.

NOTE

Tighten the set screws before mounting the bowl or cyclone.

9. Connect the previously disconnected pipes, hoses and cables.

2.3 Cleaning

2.3.1 Cleaning agents

When using chemical cleaning agents, make sure you follow the general rules and suppliers' recommendations regarding ventilation, protection of personnel, etc.

For separator bowl, inlet and outlet

A chemical cleaning agent must dissolve the deposits quickly without attacking the material of the separator parts.

	CAUTION
	Skin irritation hazard
<p>Read the instructions on the label of the container before using the chemical cleaning agent.</p>	
<p>Always wear safety goggles, gloves and protective clothing as the liquid is alkaline and dangerous to skin and eyes.</p>	

For operating mechanism

Use 10% acetic acid solution to dissolve lime deposits. The acid should be heated to 80 °C.

For parts of the driving devices

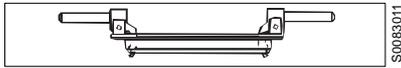
Use white spirit, cleaning-grade kerosene or diesel oil.

Oiling (protect surfaces against corrosion)

Protect cleaned carbon steel parts against corrosion by oiling. Separator parts that are not assembled after cleaning must be wiped and coated with a thin layer of clean oil and protected from dust and dirt.

2.3.2 Cleaning of bowl discs

When the discs are to be removed from the distributor, use the special tool included in the tool kit.



Handle the bowl discs carefully to avoid damage to the surfaces during cleaning.



CAUTION

Cut hazard

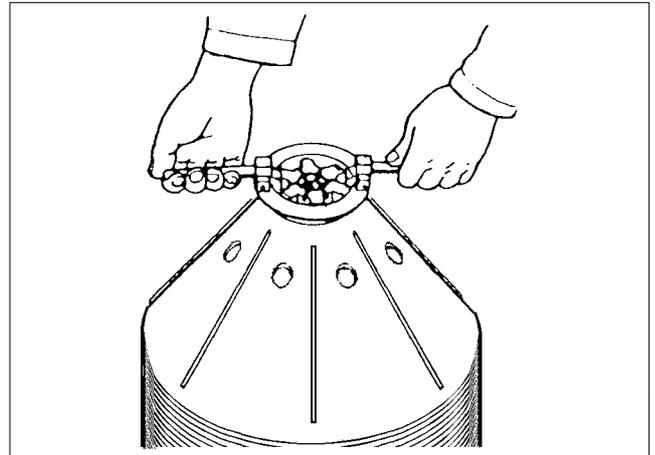
Sharp edges on the separator discs may cause cuts.

NOTE

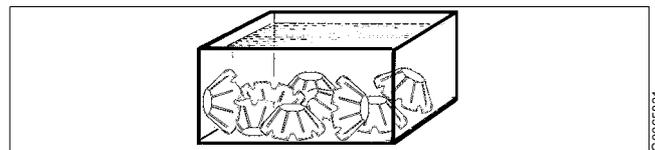
Mechanical cleaning is likely to scratch the disc surfaces causing deposits to form quicker and adhere more firmly.

A gentle chemical cleaning is therefore preferable to mechanical cleaning.

1. Remove the bowl discs from the distributor and lay them down, **one by one**, in the cleaning agent.
2. Let the discs remain in the cleaning agent until the deposits have been dissolved. This will normally take between two and four hours.
3. Finally clean the discs with a **soft** brush.



When removing discs, use the special tool



Put the discs one by one into the cleaning agent



Clean the discs with a soft brush

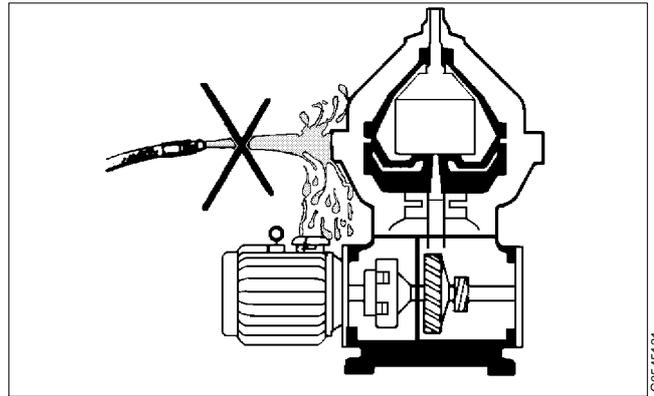
2.3.3 External cleaning

The external cleaning of the frame and motor should be restricted to brushing, sponging or wiping while the motor is running or is still hot.

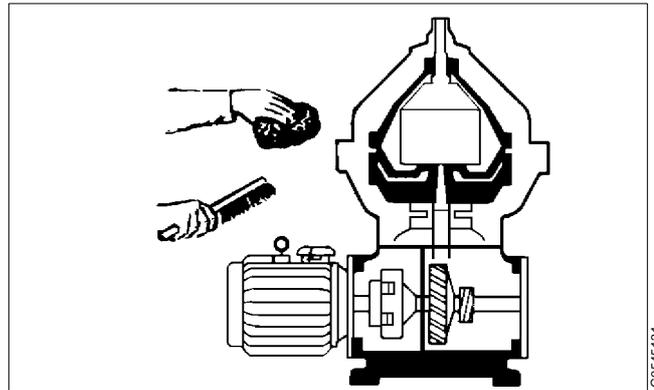
Never wash down a separator with a direct water stream. Totally enclosed motors can be damaged by direct hosing to the same extent as open motors and even more than those, because:

- Many operators believe that these motors are sealed, and normally they are not.
- A water jet played on these motors will produce an internal vacuum, which will suck the water between the metal-to-metal contact surfaces into the windings, and this water cannot escape.
- Water directed on a hot motor may cause condensation resulting in short-circuiting and internal corrosion.

Be careful even when the motor is equipped with a protecting hood. Never play a water jet on the ventilation grill of the hood (if any).



Never wash down a separator with a direct water stream or playing a water jet on the motor



Use a sponge or cloth and a brush when cleaning

2.4 When changing oil

2.4.1 Worm wheel and worm; wear of teeth

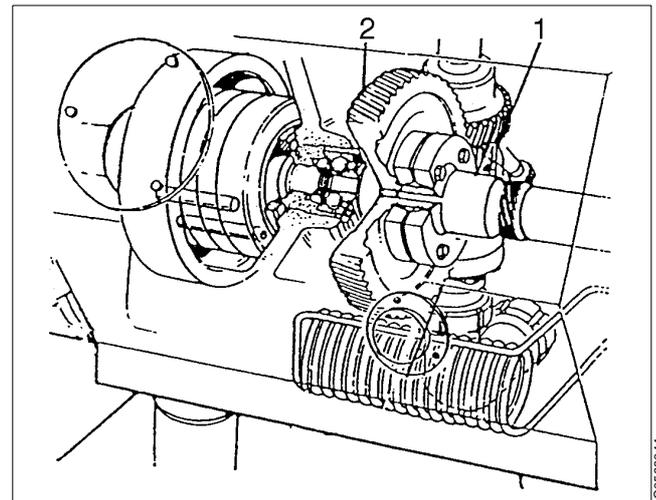
To check at each oil change

Check the teeth of both the worm wheel and worm for wear. Examine the contact surfaces and compare the tooth profiles with the “[Tooth appearance examples](#)” on page 31. The gear may operate satisfactorily even when worn to some degree.

- Replace both worm wheel and worm at the same time, even if only one of them is worn.
- To avoid damaging the teeth when lifting the bowl spindle, push the worm wheel to one side first.

Position the spindle in correct place before fitting the worm wheel.

When replacing the gear, always make sure that the new worm wheel and worm have the same number of teeth as the old ones. See chapter *Technical data* in the *Installation Manual* for correct number of teeth.



1. Worm
2. Worm wheel



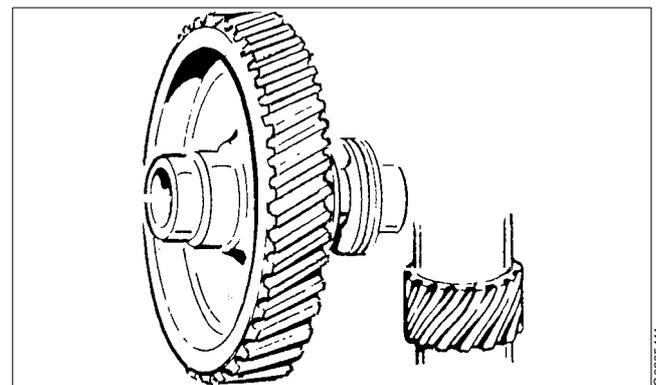
DANGER

Disintegration hazard

Check that gear ratio is correct for power frequency used. If incorrect, subsequent overspeed may result in a serious breakdown.

NOTE

Presence of metal chips in the oil bath is an indication that the gear is wearing abnormally.



Check the gear ratio (number of teeth) when replacing the gear

Important!

When using mineral-type oil in the worm gear housing, the presence of black deposits on the spindle parts is an indication that the oil base has deteriorated seriously or that some of the oil additives have precipitated. If pitting is found on the worm gear, the cause could be that the additives are not suitable for this purpose.

In all these cases it is strongly recommended to change to a high-temperature oil.

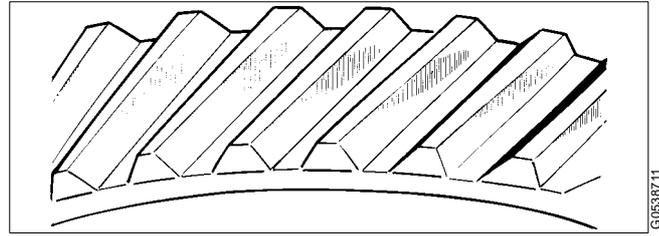
For further information, see chapter “2.5 Lubricants” on page 33.

Tooth appearance examples

Satisfactory teeth:

Uniform wear of contact surfaces. Surfaces are smooth.

Good contact surfaces will form on the teeth when the gear is subjected to only moderate load during its running-in period.

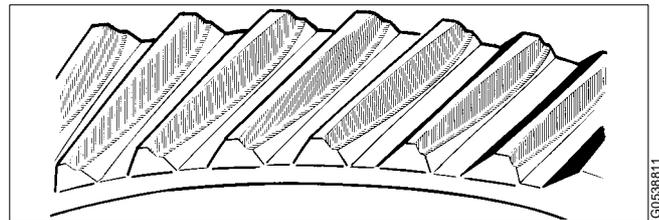


Satisfactory teeth

Worn teeth:

Permissible wear is as a rule 1/3 of the thickness of the upper part of a tooth, provided that

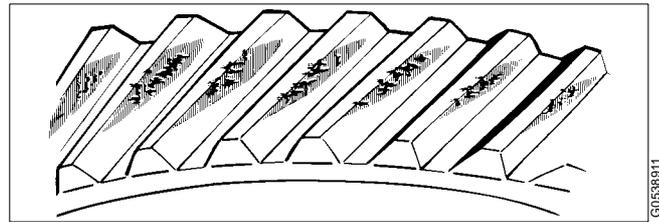
- the wear is uniform over the whole of the flank of a tooth
- all teeth are worn in the same way.



Worn teeth

Spalling:

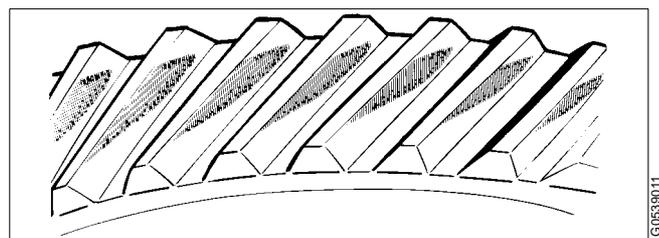
Small bits of the teeth have broken off, so-called spalling. This is generally caused by excessive load or improper lubrication. Damage of this type may not necessitate immediate replacement, but careful checking at short intervals is of imperative importance.



Spalling

Pitting:

Small cavities in the teeth, so-called pitting, can occur through excessive load or improper lubrication. Damage of this type need not necessitate immediate replacement, but careful check at short intervals is of imperative importance.

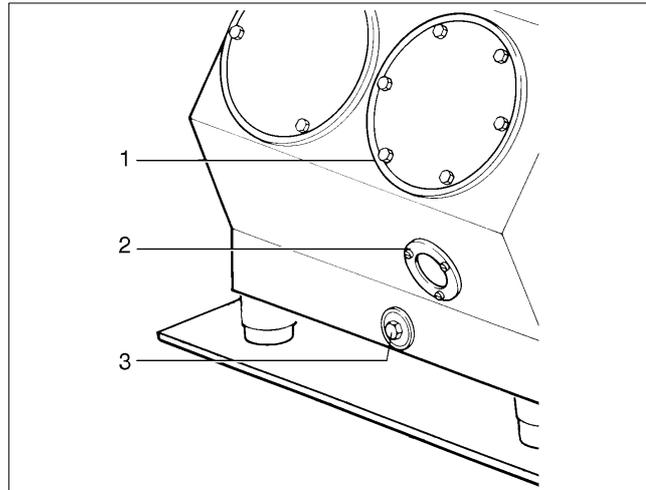


Pitting

2.4.2 Oil change procedure

NOTE

Before adding or renewing lubricating oil in the worm gear housing, the information concerning different oil groups, handling of oils, oil change intervals etc. given in chapter “2.5 Lubricants” on page 33 must be well known.



- 1. Cover
- 2. Sight glass
- 3. Oil drain plug

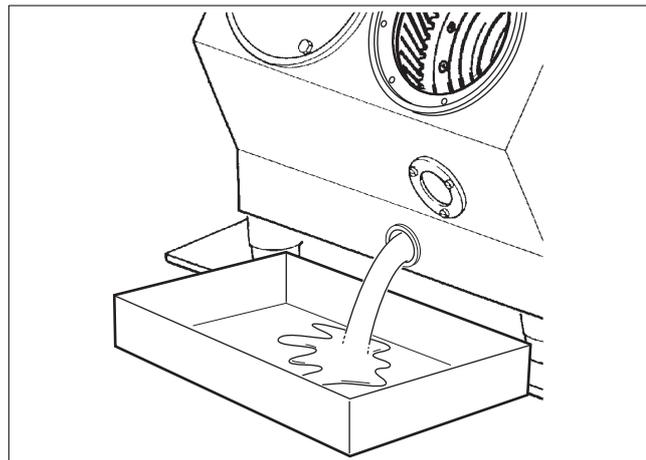
1. Place a collecting tray under the drain hole, remove the cover (1) and the drain plug (3) and then drain off the oil.



CAUTION

Burn hazard

Lubricating oil and various machine surfaces can be sufficiently hot to cause burns.



Burn hazards: The drained oil may be hot

2. Fill new oil in the worm gear housing. The oil level should be slightly above middle of the sight glass.

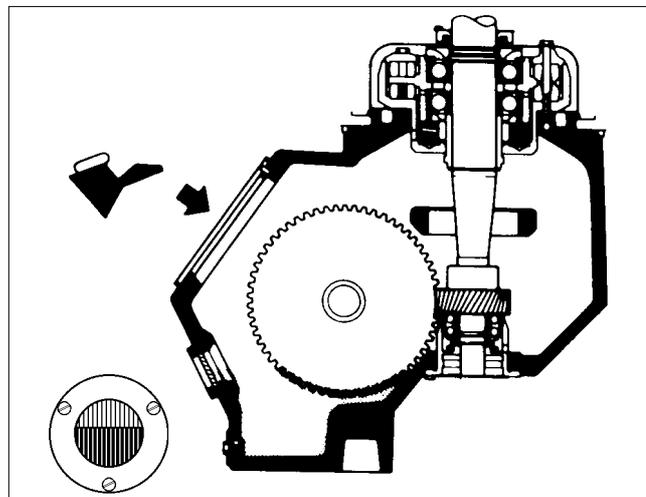
Oil volume: Approx. **13 litres**.

Suitable oil brands can be found in [“2.5.3 Recommended oil brands”](#) on page 36.

NOTE

During operation the oil level must be slightly below the middle of the sight glass.

If the oil level is too high, the lifetime of the rolling bearings will be reduced due to high temperature.



The oil level should be slightly above middle of the sight glass

2.5 Lubricants

2.5.1 Lubrication chart, general

Alfa Laval ref. 553216-01, rev. 6

Lubricating points	Lubricants
Bowl spindle ball bearings and buffers are lubricated by oil mist.	Lubricating oil as specified in “2.5.2 Recommended lubricating oils” on page 35.
Bowl spindle taper.	Lubricating oil (only a few drops for rust protection).
Metal buffers of bowl spindle.	Lubricating oil.
Bowl: Sliding contact surfaces and pressure loaded surfaces such as lock rings, threads of lock rings, bowl hood, and cap nut.	Pastes as specified in “2.5.4 Recommended lubricants” on page 37.
Rubber seal rings.	Grease as specified in “2.5.4 Recommended lubricants” on page 37.
Coupling ball bearings.	The bearings are packed with grease and sealed and need no extra lubrication.
Electric motor.	Follow manufacturer’s instructions.

Alfa Laval Lubricating Oil Groups:

- **Group A oil:** a high quality gear oil on paraffin base with stable AW (anti wear) additives.
- **Group B oil:** a high quality gear oil on paraffin base with stable EP (extreme pressure) additives.
- **Group D oil:** a synthetic base oil with additives stable at high operating temperatures.
- **Group E oil:** Characteristics as a group D oil but suitable at a higher operation power (max. 55 kW).

Do not mix different oil brands or oils from different oil groups.

Always use clean vessels when handling lubricating oil.

Great attention must be paid not to contaminate the lubricating oil. Of particular importance is to avoid mixing of different types of oil. Even a few drops of motor oil mixed into a synthetic oil may result in severe foaming.

Any presence of black deposits in a mineral type oil is an indication that the oil base has deteriorated seriously or that some of the oil additives have precipitated. Always investigate why black deposits occur.

If it is necessary to change from one group of oil brand to another it is recommended to do this in connection with an overhaul of the separator. Clean the gear housing and the spindle parts thoroughly and remove all deposits before filling the new oil.

NOTE

Always clean and dry parts (also tools) before lubricants are applied.

NOTE

Check the oil level before start. Top up when necessary. For correct oil volume see chapter *Technical data* in the *Installation Manual*.

It is of utmost importance to use the lubricants recommended in our documentation. This does not exclude, however, the use of other brands, provided they have equivalently high quality properties as the brands recommended. The use of oil brands and other lubricants than recommended is done on the exclusive responsibility of the user or oil supplier.

Applying, handling and storing of lubricants

Always be sure to follow lubricants manufacturer's instructions.

2.5.2 Recommended lubricating oils

Alfa Laval ref. 553219-05, rev. 1

One group of lubricating oil is approved for this separator. It is designated as Alfa Laval lubricating oil group B.

The numerical value after the letter states the viscosity grade.

The corresponding commercial oil brands are found in chapter [“2.5.3 Recommended oil brands” on page 36](#).

Ambient temperature (°C)	Alfa Laval lubricating oil group	Time in operation Oil change interval
Between +5 and +45 *	B/320	1 500 h

* 55 °C in case of water cooling of the oil in gear housing.

Note:

- In a new installation or after change of gear transmission, change oil after 200 operating hours.
- When the separator is operated for short periods, lubricating oil must be changed every 12 months even if the total number of operating hours is less than stated in the recommendations above.
- Check and prelubricate spindle bearings on separators which have been out of service for 6 months or longer.
- In seasonal operation, change oil before every operating period.

2.5.3 Recommended oil brands

Alfa Laval ref. 553218-05, rev. 2

NOTE

The data in below tables is based on supplier information in regards to lubrication properties. Trade names and designations might vary from country to country, contact your local supplier for more information.

Alfa Laval lubricating oil group B/320	
Viscosity grade VG (ISO 3448/3104)	320
Viscosity index VI (ISO 2909)	> 92
Manufacturer	Designation
Bel-Ray	100 Gear oil
BP	Energol GR-XP 320
Castrol	Alpha SP 320
ELF	Epona Z 320
Esso/Exxon	Spartan EP 320
Fina	Giran 320
Gulf	EP HD 320
Mobil	Mobilgear 632 Mobilgear SHC 320 * (Synthetic)
Nynäs	GL 320
Optimol	Optigear BM 320
Q8/Kuwait Petroleum	Goya 320
Shell	Omala 320 Delima HT 320 * (Synthetic)
Texaco/Caltex	Meropa 320

* This oil must be used when the frame temperature is above 80 °C. If you can't measure the temperature, about 80 °C is reached when you can touch the lower frame surface for a short time only.

2.5.4 Recommended lubricants

Alfa Laval ref. 553217-01, rev. 7

NOTE

The data in below tables is based on supplier information in regards to lubrication properties. Trade names and designations might vary from country to country, contact your local supplier for more information.

Brands with Alfa Laval article number are approved and recommended for use.

Pastes for food applications:

Manufacturer	Designation	Comment	Alfa Laval No.	
Fuchs Lubritech	Gleitmo 805			
	Geralyn 2	USDA H1	561764-01 (50 g)	
Dow Corning	Molykote TP 42 Molykote D			
	Molykote Foodslip EP-2	USDA H1 (Mineral oil base)	537086-07 (50 g)	
Klüber	Klüberpaste 46 MR 401			
	Klüberpaste UH1 96-402	USDA H1		
Lubrication Engineers	LE 4025	USDA H1		

Pastes for non-food applications:

Manufacturer	Designation	Alfa Laval No.	
Fuchs Lubritech	Gleitmo 805K Gleitmo 705K		
Dow Corning	Molykote 1000 (Paste)	537086-02 (1000 g)	
	Molykote 1000 (Paste)	537086-03 (100 g)	
	Molykote G-rapid plus (Paste)	537086-04 (50 g)	
Rocol	Antiscuffing (ASP) (Paste)		
Klüber	Wolfracoat C (Paste)		

Bonded coatings:

Manufacturer	Designation	Alfa Laval No.	
Fuchs Lubritech	Gleitmo 900 (Varnish or spray)		
Dow Corning	Molykote D321R (Spray) Molykote D321R (Varnish)	535586-01 (300 ml) 535586-02 (60 ml)	

Silicone grease for rubber rings:

Manufacturer	Designation	Alfa Laval No.	
Dow Corning	Molykote 111 (Compound) Molykote 111 (Compound)	539474-02 (100 g) 539474-03 (25 g)	
Fuchs Lubritech	Gleitmo 750		
Klüber	Unisilikon L 250 L		
Wacker	Silicone P (Paste)		

Greases for ball and roller bearings:**NOTE**

Always follow the specific recommendation for lubrication as advised by the manufacturer.

Manufacturer	Designation	Alfa Laval No.
BP	Energrease MM-EP2 Energrease LS2	
Castrol	APS 2 Grease EPL 2	
Chevron	Dura-Lith Grease EP2	
Elf	Epexa 2	
Esso/Exxon	Beacon EP2 Unirex N2	
Fina	Marson EPL 2A	
Mobil	Mobilith SHC 460 Mobilux EP2	
Gulf	Gulflex MP2	
Q8/Kuwait Petroleum	Rembrandt EP2	
Shell	Alvania EP Grease 2 Albida Grease EP2	
SKF	LGEP2 or LGMT2	
Texaco	Multifak AFB 2	

2.6 Vibration

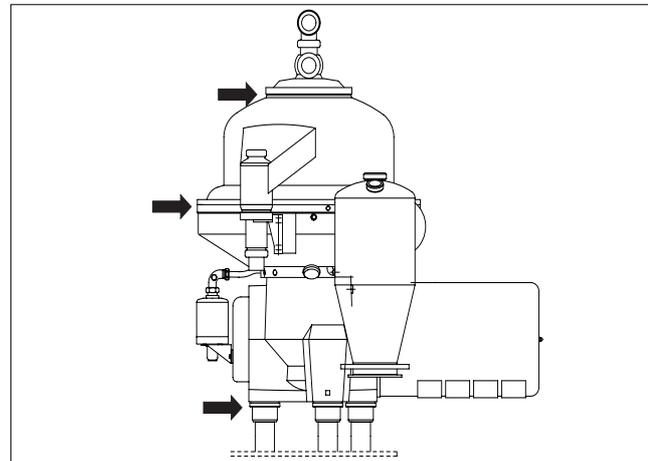
2.6.1 Vibration analysis

Excessive vibration or noise indicates a malfunction. Stop the separator and identify the cause.

Use vibration analysis instrument to periodically check and record the level of vibration. See the illustration where to take measurements.

NOTE

The level of vibration should not exceed **9,0 mm/s** at full speed.



Measuring points for vibration analysis

G09231D1



DANGER

Disintegration hazard

If excessive vibration occurs, **keep bowl filled** and **stop** separator.

The cause of the vibration must be identified and corrected before the separator is restarted. Excessive vibration can be due to incorrect assembly or poor cleaning of the bowl.

2.7 Common maintenance directions

2.7.1 Ball and roller bearings

Special-design bearings for the bowl spindle

The bearings used for the bowl spindle are specified to withstand the speed, vibration, temperature and load characteristics of high-speed separators.

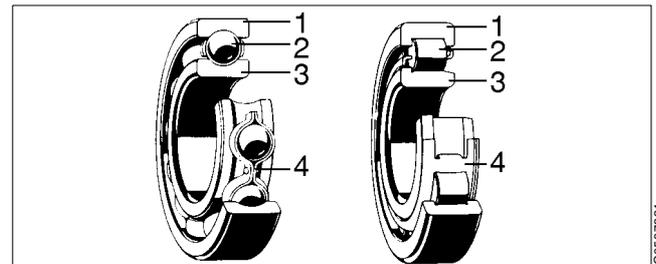
Only Alfa Laval genuine spare parts should be used.

A bearing that appears equivalent to the genuine may differ considerably in various respects: inside clearances, design and tolerances of the cage and races as well as material and heat treatment.

NOTE

Using an incorrect bearing can cause a serious breakdown with damage to equipment as a result.

Do not re-fit a used bearing. Always replace it with a new.



- 1 Outer race
- 2 Ball/roller
- 3 Inner race
- 4 Cage

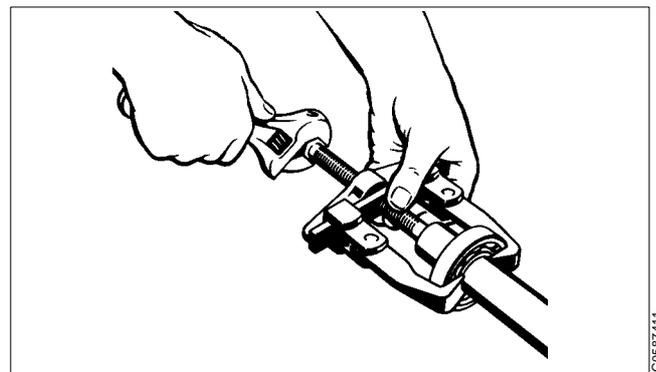
Dismantling

For bearings where no driving-off sleeve is included in the tool kit, remove the bearing from its seat by using a puller. If possible, let the puller engage the inner ring, then remove the bearing with a steady force until the bearing bore completely clears the entire length of the cylindrical seat.

The puller should be accurately centred during dismantling; otherwise, it is easy to damage the seating.

NOTE

Do not strike with a hammer directly on the bearing.



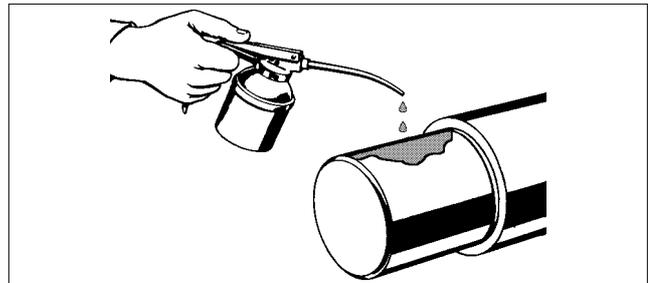
For bearings where no driving-off sleeve is included in the tool kit, use a puller when removing bearings

Cleaning and inspection

Check shaft (spindle) end and/or bearing seat in the housing for damage indicating that the bearing has rotated on the shaft (spindle) and/or in the housing respectively. Replace the damaged part(s), if the faults cannot be remedied by polishing.

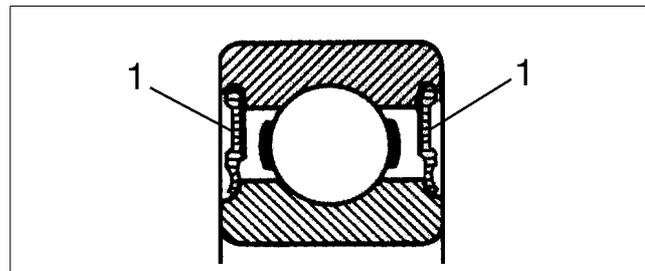
Assembly

- Leave new bearings in original wrapping until ready to fit. The anti-rust agent protecting a new bearing should not be removed before use.
- Use the greatest cleanliness when handling the bearings.
- To facilitate assembly and also reduce the risk of damage, first clean and then lightly oil the bearing seating on shaft (spindle) or alternatively in housing, with a thin oil.



Clean and oil the bearing seating before assembly

- Bearings fitted with two seals (1) are filled with grease at delivery. These bearings should not be heated above 60-70 °C before fitting and **never** heated in oil. If heating in oil or exceeding the temperature above, the grease in the bearing will be dissolved and the lifetime of the bearing will be considerably reduced.



Bearing with two seals (1)

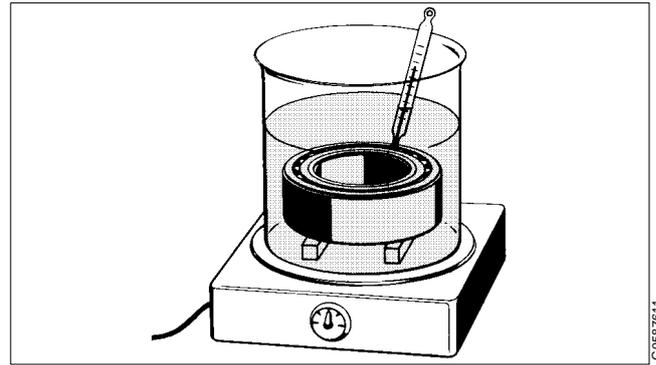
- When assembling ball bearings without seals, the bearings must be heated in oil to **max. 125 °C**.

NOTE

Heat the bearing in a clean container.

Use only clean oil with a flash point above 250 °C.

The bearing must be well covered by the oil and not be in direct contact with the sides or the bottom of the container. Place the bearing on some kind of support or suspended in the oil bath.

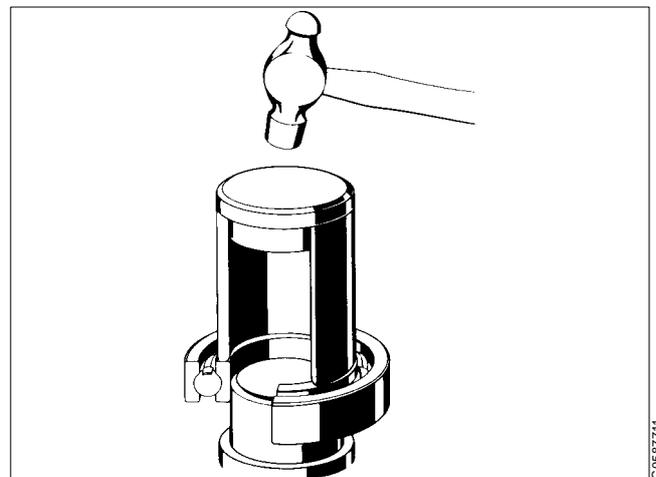


The bearing must not be in direct contact with the container

**WARNING****Burn hazards**

Use protective gloves when handling the heated bearings.

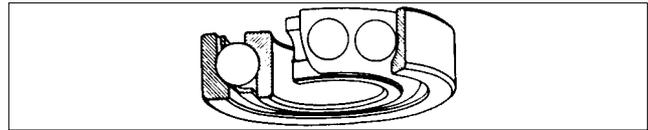
- There are several basic rules for assembling cylindrical bore bearings:
 - Never directly strike a bearing's rings, cage or rolling elements while assembling. A ring may crack or metal fragments break off.
 - Never apply pressure to one ring in order to assemble the other.
 - Use an ordinary hammer. Hammers with soft metal heads are unsuitable as fragments of the metal may break off and enter the bearing.
 - Make sure the bearing is assembled at a right angle to the shaft (spindle).
- If necessary use a driving-on sleeve that abuts the ring which is to be assembled with an interference fit, otherwise there is a risk that the rolling elements and raceways may be damaged and premature failure may follow.



Use a driving-on sleeve for bearings that are not heated

Angular contact ball bearings

Always fit single-row angular contact ball bearings with the wide shoulder of the inner race facing the axial load (upwards on a bowl spindle).



The wide shoulder of the inner race must face the axial load

Lubrication

NOTE

Since roller bearings are normally treated only with rust protection oil from the factory, an initial lubrication of new bearings must always be performed whenever bearings are replaced. This is, however, not valid for bearings with seals because they are already filled with grease at delivery.

The initial lubrication implies adding a few drops of lube oil to the bearings. Use the same oil type as in the spindle cartridge.

2.7.2 Before shutdowns

Before the separator is shut-down for a period of time, the following must be carried out:

- Remove the bowl, according to instructions in chapter [“3 Dismantling/Assembly”](#) on page 47.

NOTE

The bowl must not be left on the spindle during standstill for more than one week.

Vibration in foundations can be transmitted to the bowl and produce one-sided loading of the bearings. The resultant indentations in the ball bearing races can cause premature bearing failure.

- Protect cleaned carbon steel parts against corrosion by oiling. Separator parts that are not assembled after cleaning must be wiped and protected against dust and dirt.
- If the separator has been shut-down for more than 3 months but less than 12 months, an Intermediate Service (IS) has to be made. If the shut-down period has been longer than 12 months, a Major Service (MS) should be carried out.

3 Dismantling/Assembly

3.1 Introduction

3.1.1 General directions

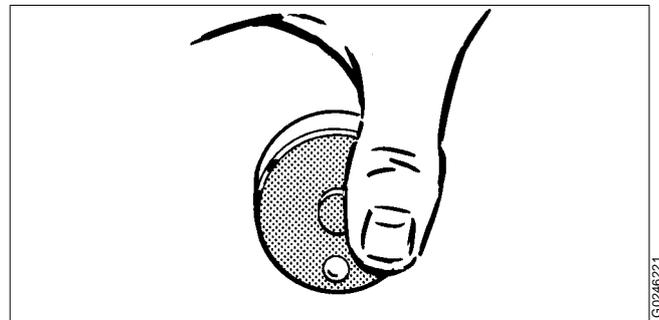
The separator must be dismantled regularly for cleaning and inspection.

The recommended intervals are stated in chapter “2.1.2 Maintenance intervals” on page 15.

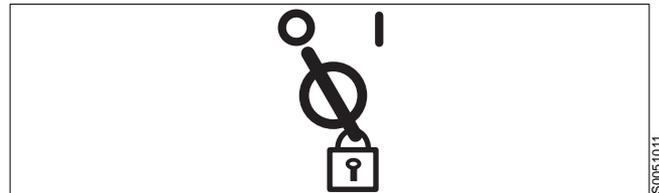
 **DANGER**

Entrapment hazard

1. Make sure that rotating parts have come to a **complete standstill** before starting **any** dismantling work.
The revolution counter and the motor fan indicate if separator parts are rotating or not.
2. To avoid accidental start, switch off and lock power supply before starting **any** dismantling work.



The revolution counter indicates if the separator still is rotating



Lock power supply before starting dismantling

The frame hood and heavy bowl parts must be lifted by hoist. Position the hoist directly above the bowl centre. Use an endless sling and a lifting hook with catch.

These parts must be handled carefully.

Do not place parts directly on the floor, but on a clean rubber mat, fibreboard or a suitable pallet.

NOTE**Never interchange bowl parts**

To prevent mixing of parts, e.g. in an installation comprising several machines of the same type, the major bowl parts carry the machine manufacturing number or its last three digits.

3.1.2 References to check points

In the beginning of each sub-chapter describing the assembly you will find references to the check point instructions included in separate chapters located after the dismantling chapters. The references appear in the text as in the following example:

✓ Check point

[“3.3.12 Valve plugs” on page 80.](#)

It is assumed that these check points are done before starting the assembly.

3.1.3 Tools

Special tools from the tool kit must be used for dismantling and assembly. The special tools are specified in the *Spare Parts Catalogue* and are shown as illustrations together with the dismantling/assembly instructions.

NOTE

When lifting parts without weight specifications, always use lifting straps with the capacity of at least **500 kg**.

3.1.4 Tightening of screws

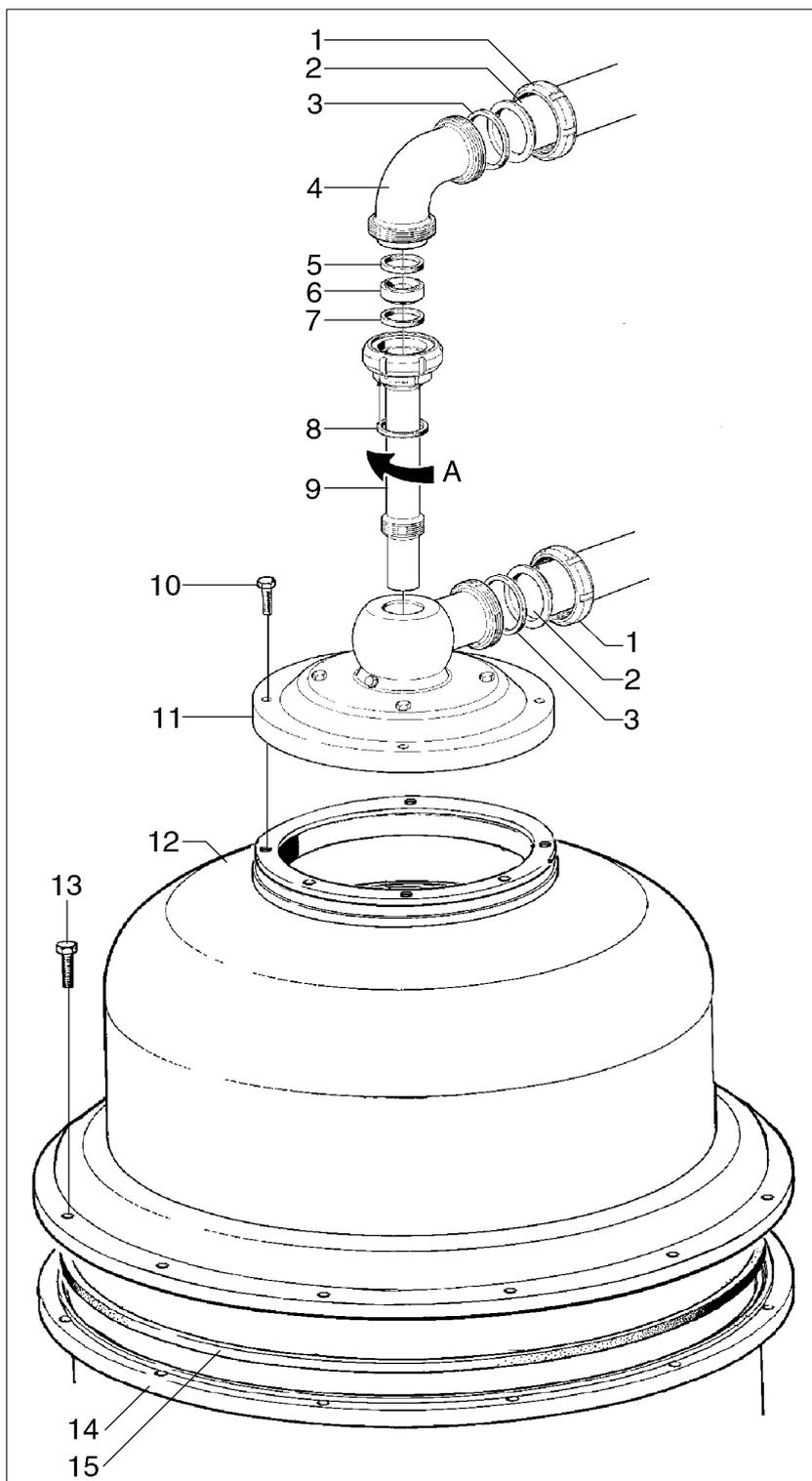
When tightening screws, use the torques stated in the table below unless otherwise stated. The figures apply to oiled, stainless screws tightened with a torque wrench.

METRIC THREAD		
Thread	Torque in Nm	
	Stainless steel	Carbon steel
M6	7	8
M8	17	20
M10	33	39
M12	57	68
M16	140	155
M20	275	325
M24	470	570

3.2 Intermediate Service (IS), dismantling

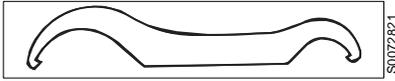
3.2.1 Inlet/outlet, frame hood

- 1. Coupling nut
 - 2. Pipes for feed/cleaned liquid outlet
 - 3. Rectangular ring
 - 4. Inlet bend
 - 5. Rectangular ring
 - 6. Nozzle (Ø20, 25, 30 mm)
 - 7. Rectangular ring
 - 8. Seal ring
 - 9. Inlet pipe
 - 10. Screw
 - 11. Discharge cover
 - 12. Frame hood
 - 13. Screw
 - 14. Frame top part
 - 15. Seal strip
- A. Left-hand thread



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1. Disconnect and remove the in and outlet pipe connections (1-2) and the inlet bend (4).



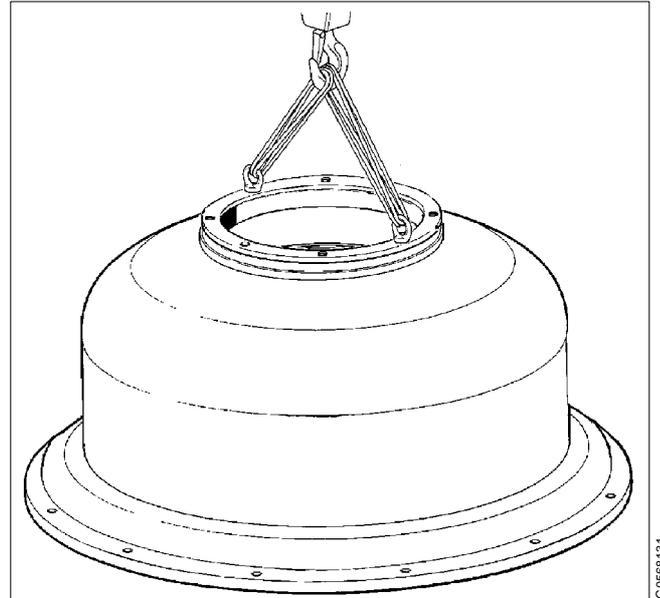
2. Unscrew the inlet pipe (9).

Left-hand thread!

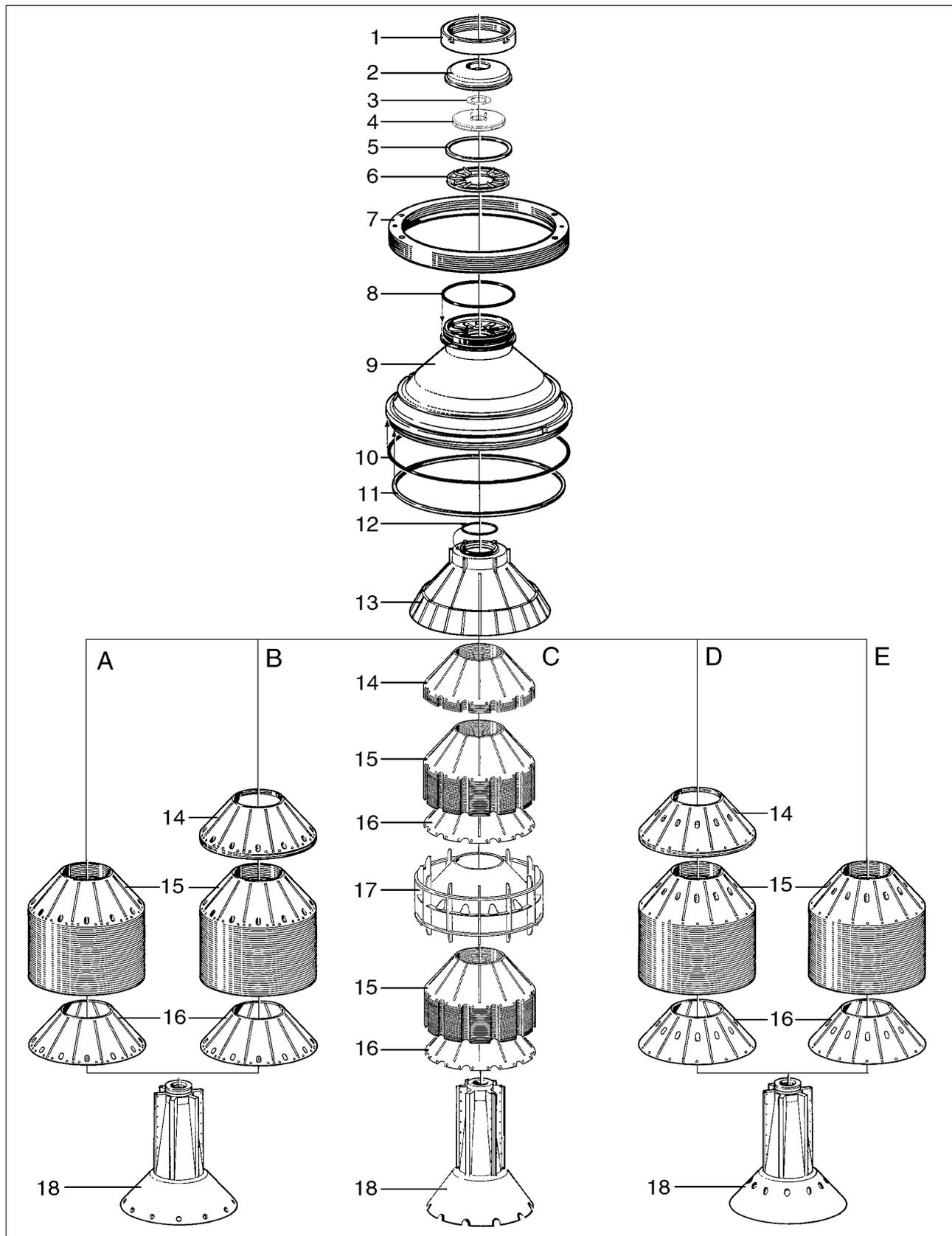


3. Unscrew the four screws (10) and remove the discharge cover (11).
4. Remove the twelve screws (13), fit two eye bolts on top of the frame hood (12) and lift it off from the frame top part (14).

The seal strip (15) should be replaced only at Major Service (MS).



3.2.2 Bowl hood and disc stack

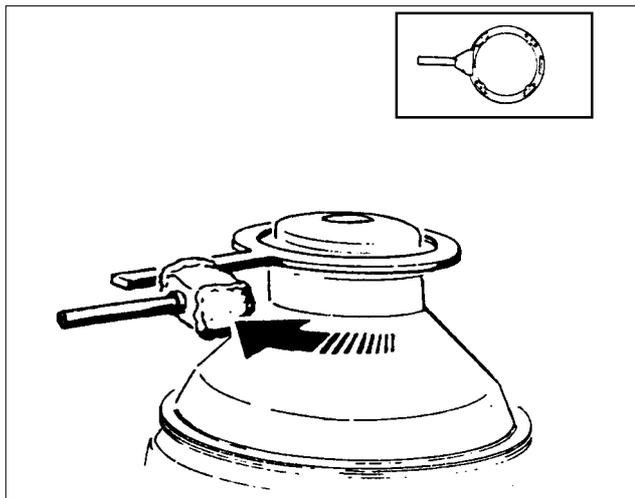


G0923611

1. *Small lock ring*
 2. *Paring chamber top part*
 3. *Gasket*
 4. *Paring disc*
 5. *Gasket*
 6. *Gravity disc*
 7. *Large lock ring*
 8. *O-ring*
 9. *Bowl hood*
 10. *O-ring*
 11. *Seal ring*
 12. *O-ring*
 13. *Top disc*
 14. *Bowl discs, top (have thinner caulks than other discs in the disc stack)*
 15. *Bowl discs*
 16. *Bottom bowl disc (has caulks also on its underside)*
 17. *Wing insert*
 18. *Distributor*
- A. *Bowl 545247-12, purifier*
 - B. *Bowl 545247-10, purifier*
 - C. *Bowl 545247-14, purifier with wing insert*
 - D. *Bowl 545247-11, concentrator*
 - E. *Bowl 545247-13 / -09, concentrator
(Bowl -13, pos. 15: Caulks = 0,6 mm)
(Bowl -09, pos. 15: Caulks = 1,0 mm)*

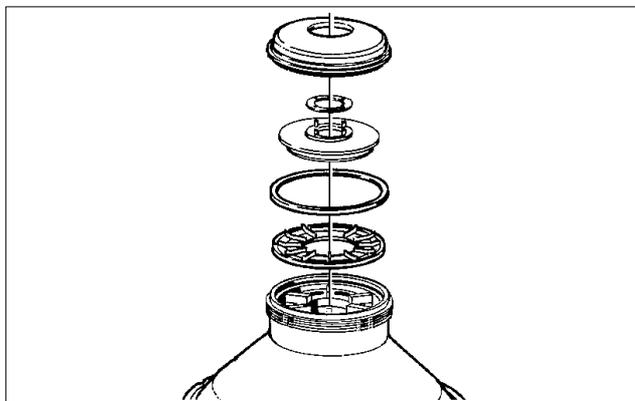
1. Unscrew the small lock ring using the special spanner.

Left-hand thread!



G0727911

2. Remove:
 - paring chamber top part,
 - gasket,
 - paring disc
 - gasket
 - gravity disc.



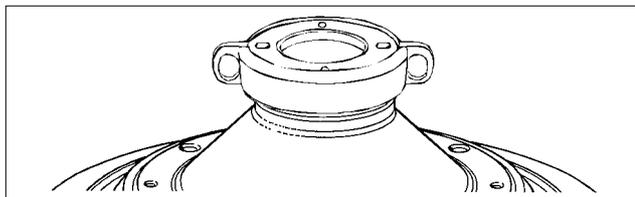
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3. Unscrew the large lock ring with the compressing tool as described below.

NOTE

Use the compressing tool to reduce shocks to bearings and thread wear minimized when unscrewing the large lock ring.

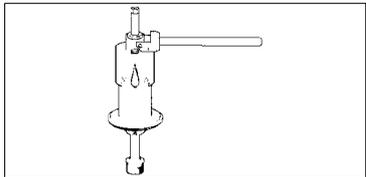
- a. Fit the lifting tool on the bowl hood.



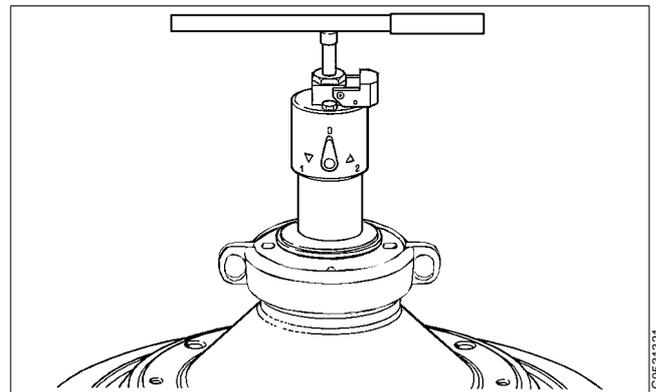
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- b. Fit the compressing tool by screwing the pillar of the tool into the threads of the distributor using the horizontal handle.

The control lever on the compressing tool should be in position 0.



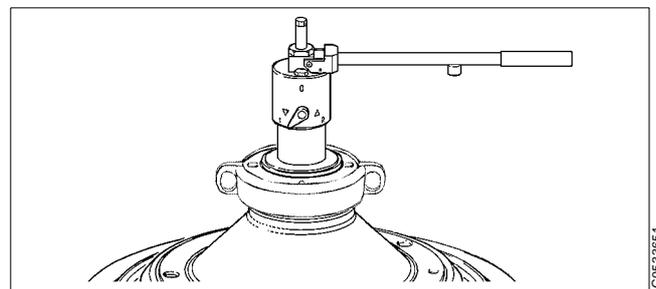
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- c. Turn the control lever to position 1 for compression.

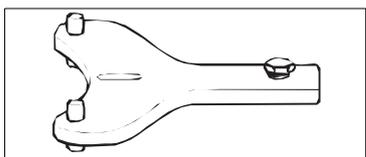
Compress the disc stack by pumping the horizontal handle until the oil pressure is released through the relief valve.



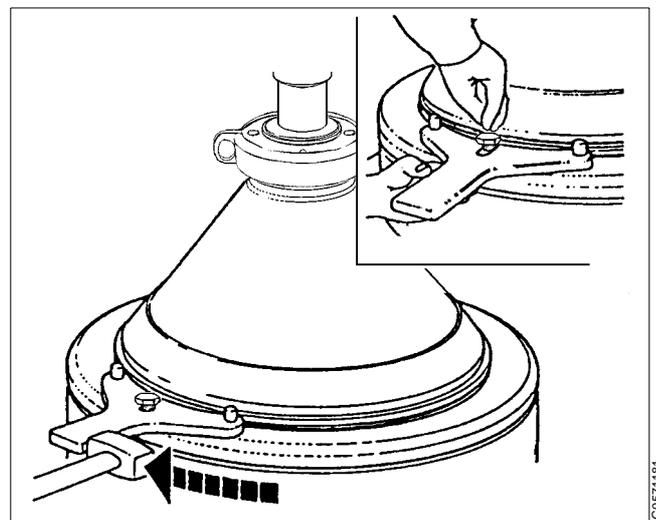
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- d. Fit the lock ring spanner and unscrew the large lock ring.

Left-hand thread!

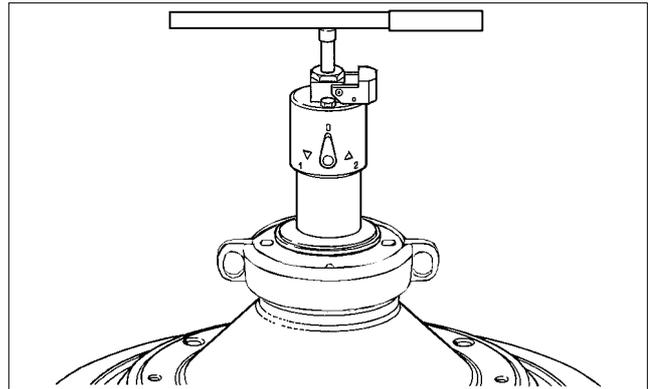


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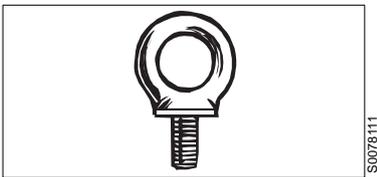
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- e. Release the pressure in the compressing tool and remove it from the lifting tool.

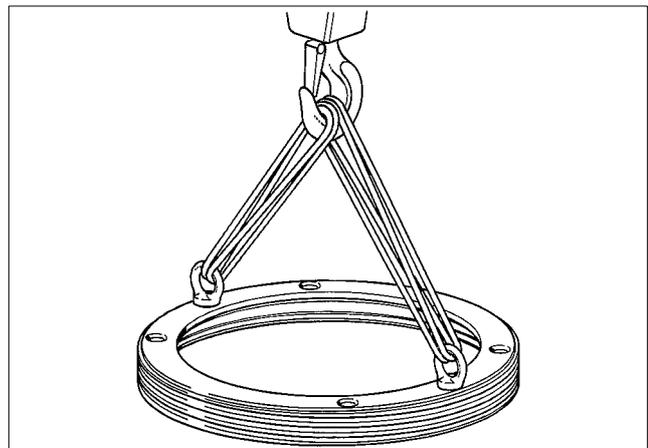


G0531321

- 4. Fit two eye bolts and remove the large lock ring by a hoist.



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NOTE

The lock ring must be kept lying horizontally or it may become distorted. Even the slightest distortion could make it impossible to refit.

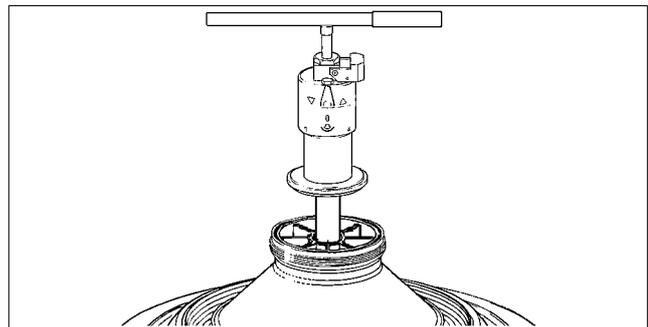
- 5. Separate the bowl hood from the bowl body by using the compression tool as described below before lifting off the bowl hood.

- a. Remove the lifting tool from the bowl hood.
- b. Fit the compressing tool by screwing the pole of the tool into the threads of the distributor using the horizontal handle.

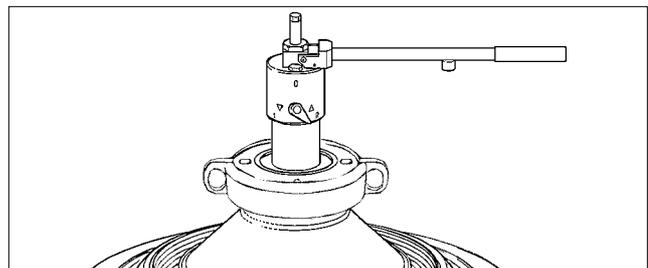
The control lever on the compressing tool should be in position 0.

- c. Fit the lifting tool on the bowl hood.
- d. Turn the control lever to position 2 for expansion.

Separate the bowl hood from the bowl body by pumping the horizontal handle.



G0543921



G0544021

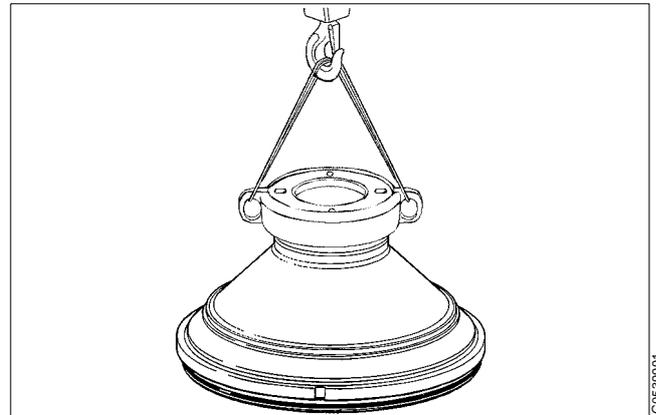
- e. Remove the lifting tool and the compressing tool. Then refit the lifting tool.
- 6. Lift off the bowl hood using a hoist. Be careful not to scratch the bowl hood seal ring.



CAUTION

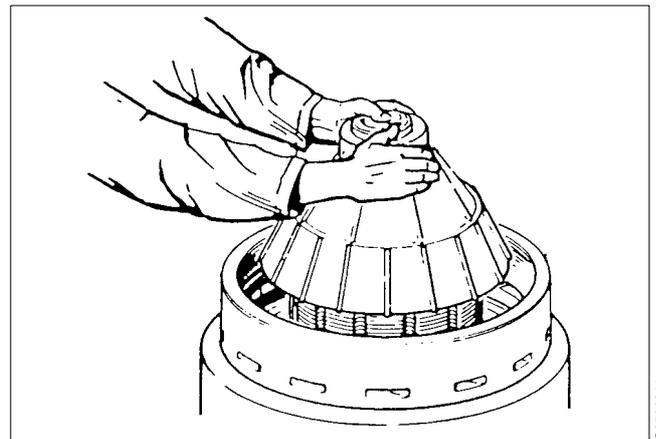
Crush hazards

If the top disc is stuck into the bowl hood, remove it now before it accidentally falls out.



G0539991

- 7. Remove the top disc.

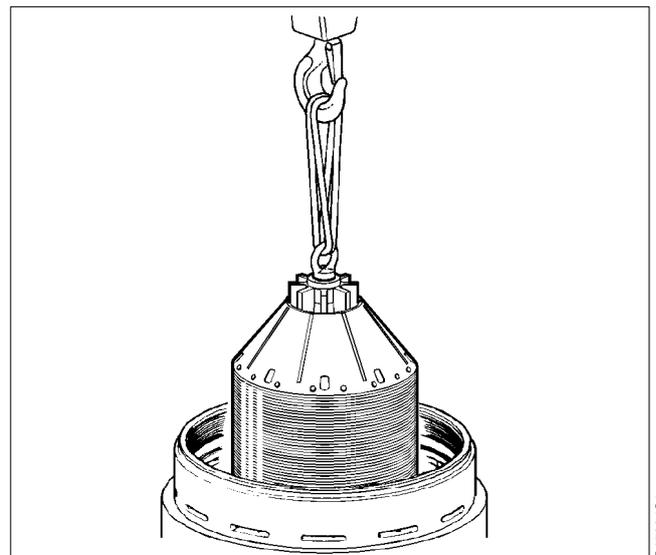


G0728341

- 8. Fit the lifting tool into the distributor and lift the distributor with disc stack out of the bowl body using a hoist.



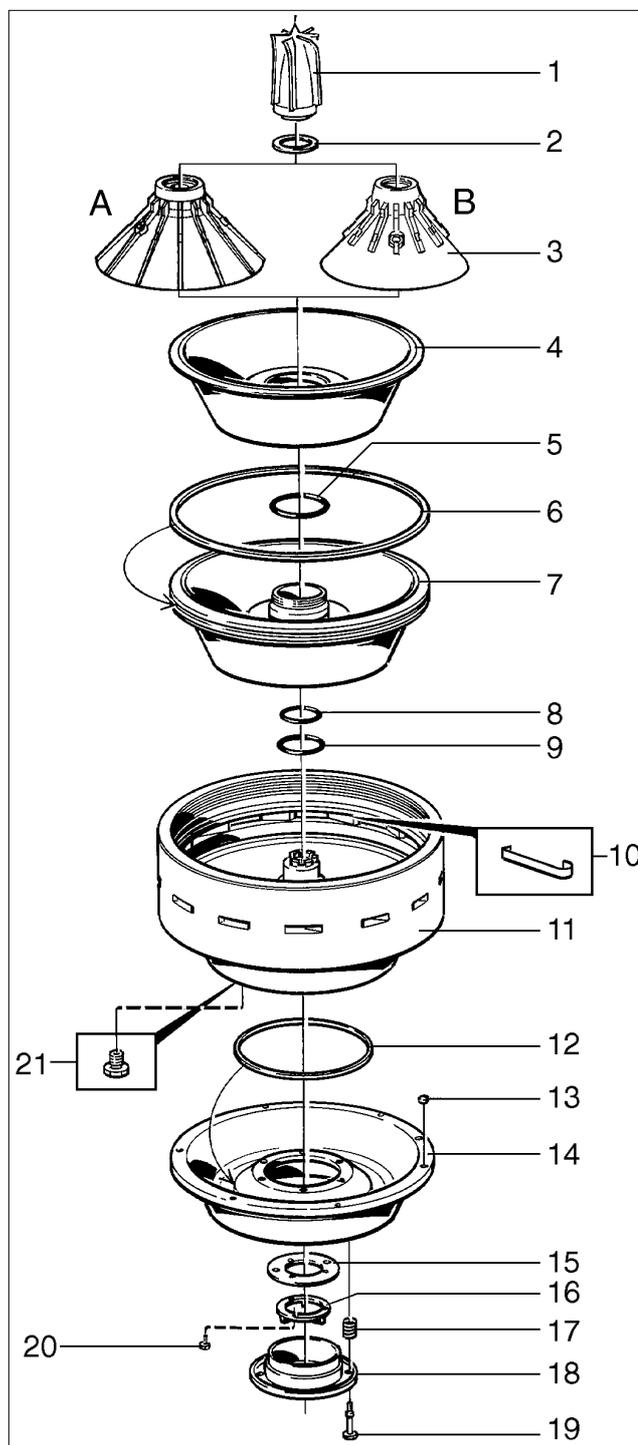
S011111



G0728401

3.2.3 Bowl body and operating mechanism

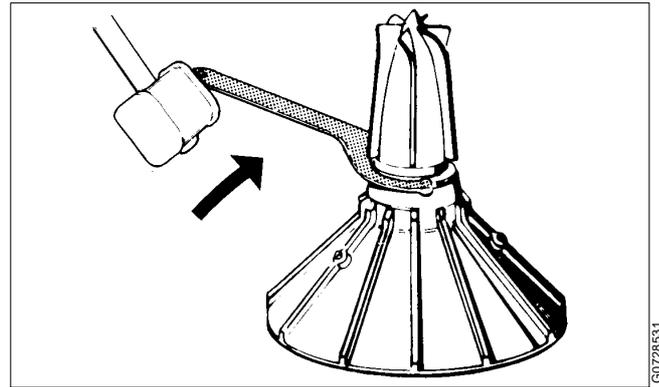
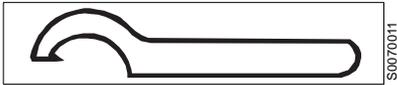
1. Cap nut
2. Gasket
3. Distributing cone
A. Purifier bowl
B. Concentrator bowl
4. Wear lining *
5. O-ring *
6. Rectangular ring
7. Sliding bowl bottom
8. Rectangular ring
9. O-ring
10. Wear protection *
11. Bowl body
12. Rectangular ring
13. Valve plug
14. Operating slide
15. Gasket
16. Sleeve with wings
17. Spring
18. Spring support
19. Screw
20. Screw
21. Nozzle *



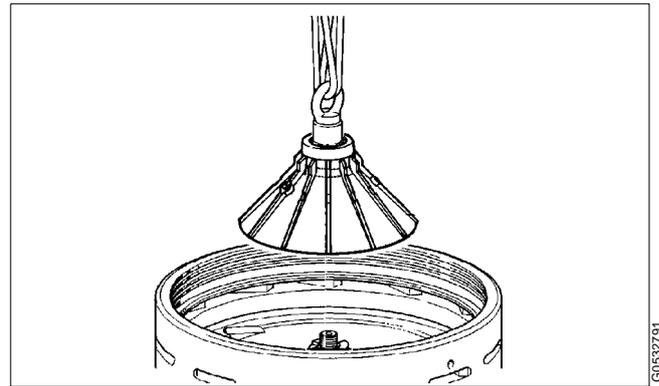
* Normally not dismantled

1. Unscrew and remove the cap nut. Place the heel of the special tool into one of the holes, not on a wing.

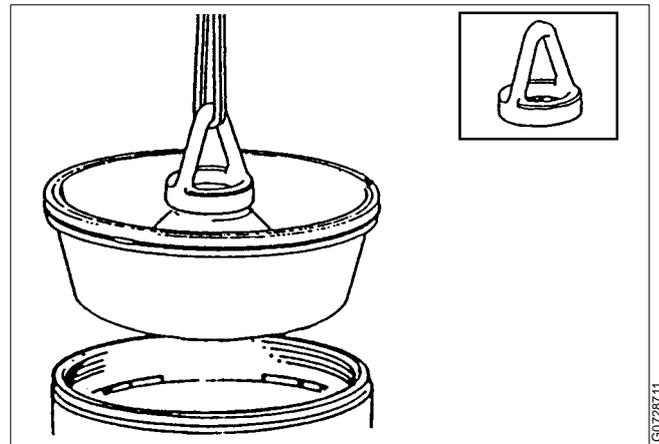
Left-hand thread!



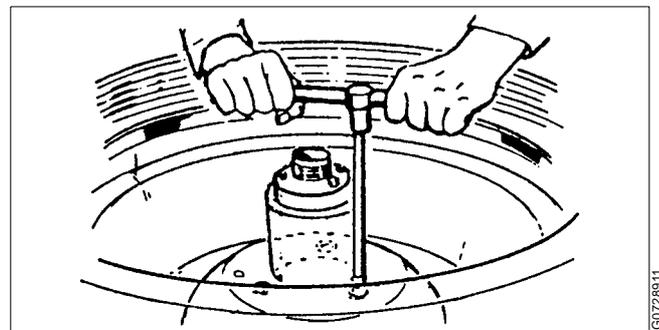
2. Remove the gasket from the cap nut contact surface on the distributing cone.
3. Fit the lifting tool into the distributing cone and lift it out.



4. Fit the lifting tool onto the sliding bowl bottom and lift it out by a hoist.

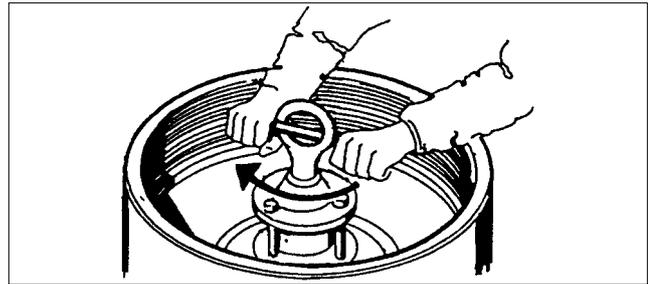


5. Unscrew the three screws in the bottom of the bowl body.



6. Fit the lifting tool into the bowl body bottom with the three screws.

Release the bowl body from the spindle by using the lifting tool as a puller. Turn the handle at top of the lifting tool until the bowl body comes loose from the spindle taper. Turn the handle two more turns in order to avoid damaging the paring disc device.

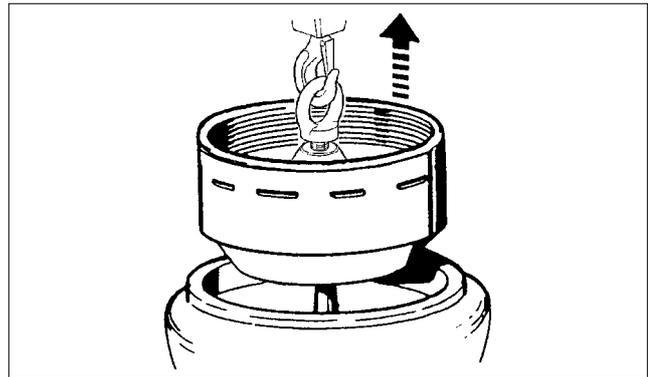


G0729011

7. Lift out the bowl body using a hoist.

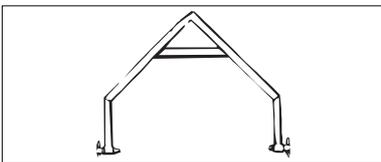
NOTE

Handle the bowl body carefully. If it is roughly handled, the ejection mechanism may be damaged.



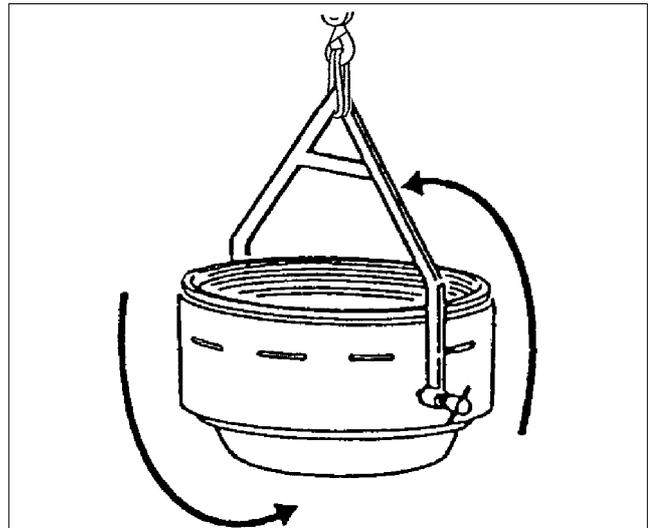
G0729131

8. Remove the bowl body lifting tool. Turn the bowl body using the turning tool.



S0082811

Ensure that the screws on the turning tool are properly tightened.



G0570211

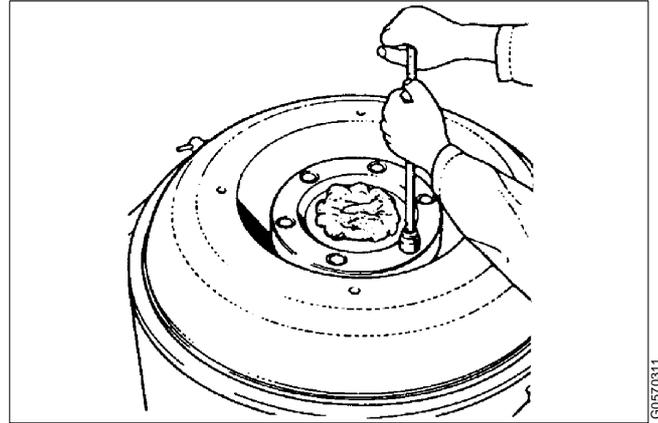
WARNING



Crushing hazard

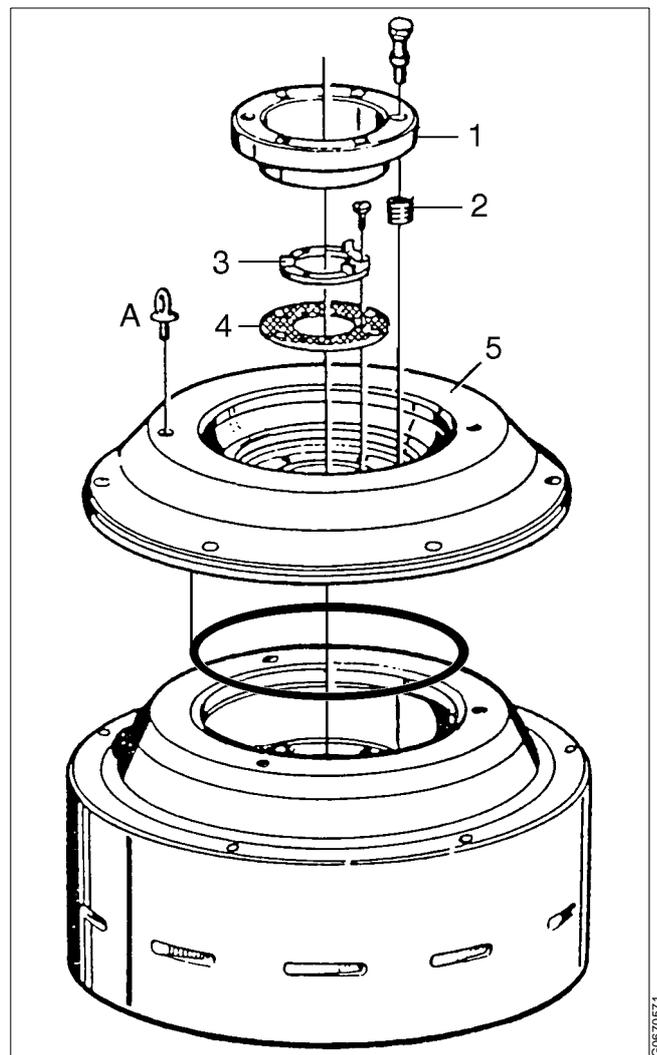
Risk for jamming injury when turning the bowl body.

9. Protect the nave bore in bowl body with a rag.
10. Loosen the screws for the spring support successively a little at a time.



G0570311

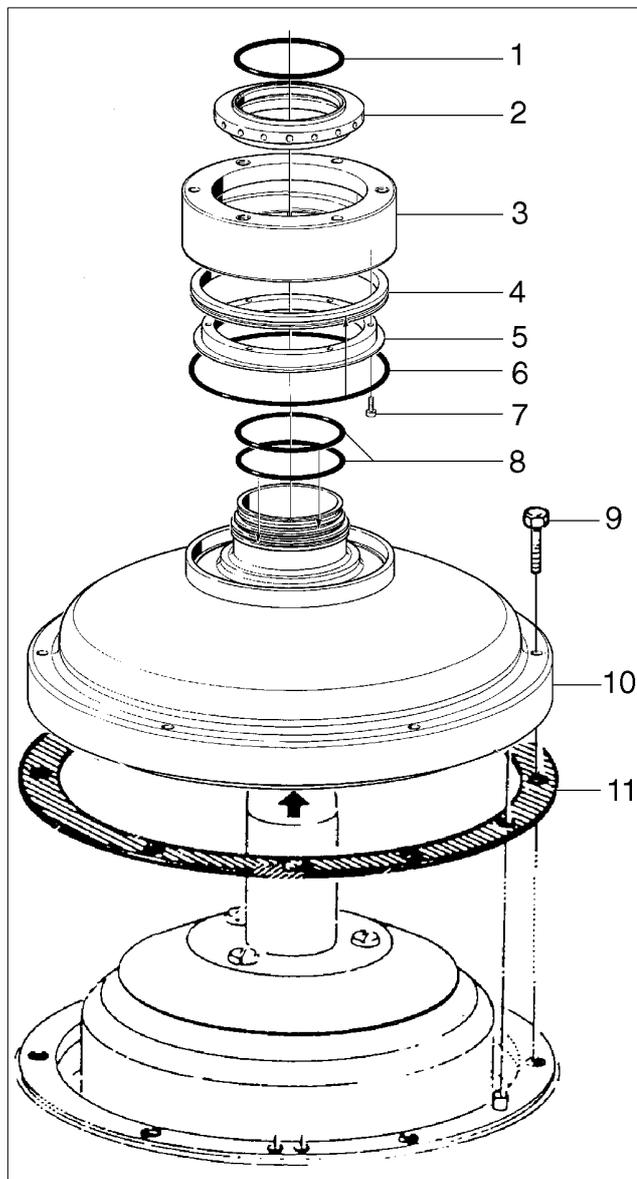
11. Remove the spring support (1) and the springs (2).
12. Loosen the screws for the sleeve with wings (3). Remove the sleeve and gasket (4).
13. In order to remove the operating slide (5), first remove the two protecting plugs and then install the two lifting eye lugs (A).
Loosen the operating slide by threading the lifting eye lugs evenly until they bottom up.
Lift off the operating slide from the bowl body using the lifting eye lugs.
14. Place the operating slide with the valve plugs facing upwards.



G0670571

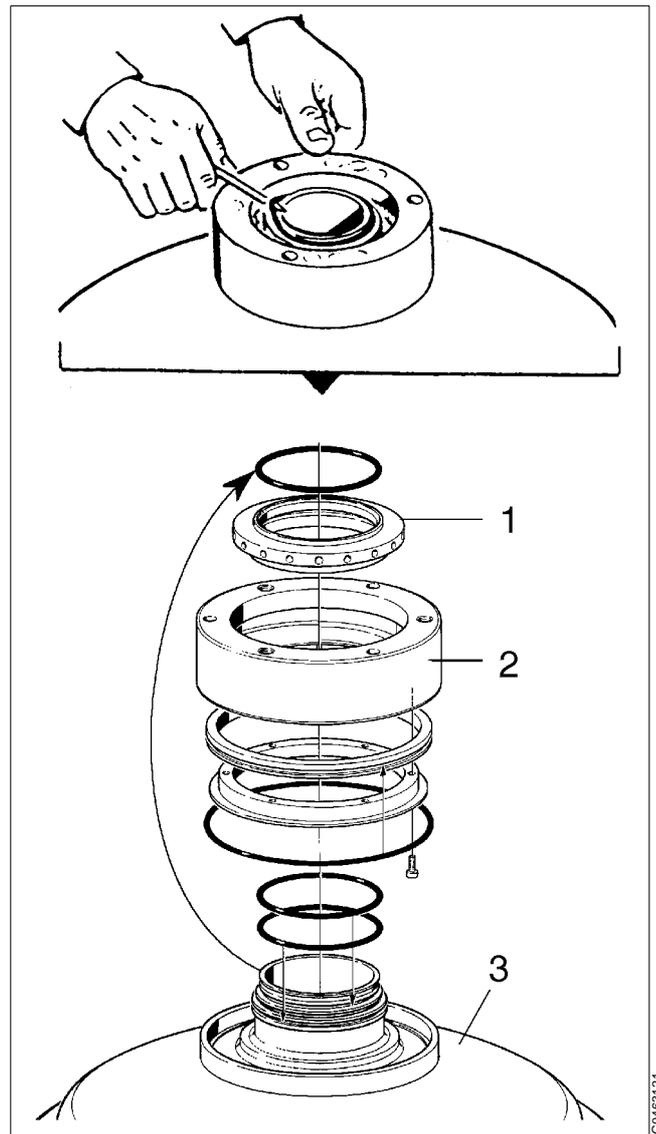
3.2.4 Operating liquid device

- 1. O-ring
- 2. Control paring disc
- 3. Distributing ring
- 4. Throttling ring
- 5. Holder
- 6. O-ring
- 7. Screw
- 8. O-ring
- 9. Screw
- 10. Distributing cover
- 11. Height adjusting ring

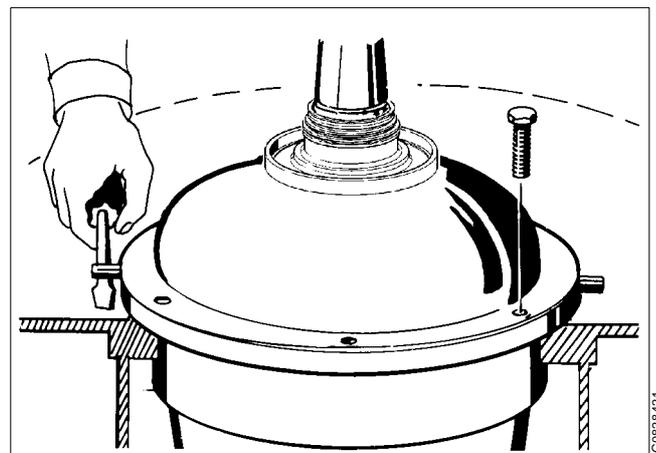


G0687741

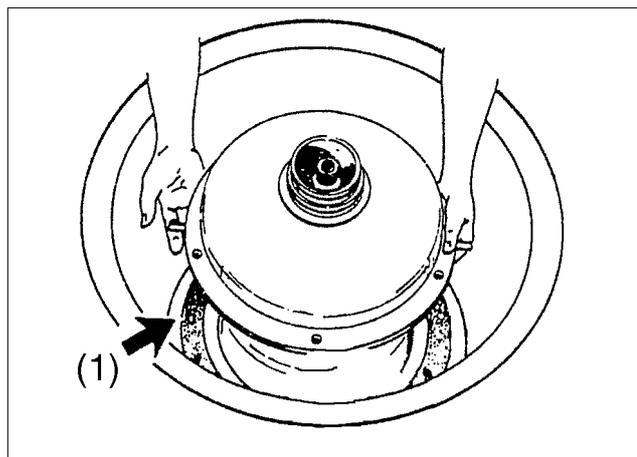
1. Tap the control paring disc (1) carefully with a soft hammer, so that the upper O-ring is unloaded.
2. Remove the O-ring with a small screw driver or similar tool.
3. Remove the control paring disc by lifting up the distributing ring (2).
4. Separate the holder and throttling ring from the distributing ring by unscrewing the screws.



5. Unscrew and remove the screws. Loosen the distributing cover as shown in the illustration.



- 6. Lift off the distributing cover. Remove the height adjusting rings. Note the number.



G0672831

1. Guide pin

After dismantled all parts for Intermediate Service, remove any thick deposits in the frame top part and clean all other parts thoroughly in a suitable cleaning agent. See chapter “2.3 Cleaning” on page 26.

If carry out a Major Service, proceed the dismantling of the separator. The dismantling instructions continue on page “3.5 Major Service (MS), dismantling” on page 102.

3.3 Intermediate Service (IS), check points

3.3.1 Introduction

This chapter consists of check points that can be done when the separator has been dismantled for Intermediate Service but before it is assembled. Other check points that can be done only in conjunction with the assembly are described in the assembly sections.

3.3.2 Corrosion

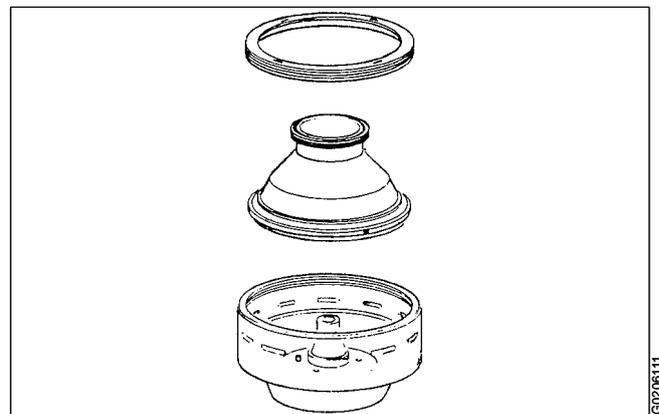
Evidence of corrosion attack should be looked for and rectified each time the separator is dismantled. Main bowl parts such as the bowl body, bowl hood and lock ring must be inspected with particular care for corrosion damage.



DANGER

Disintegration hazard

Inspect regularly for corrosion damage. Inspect frequently if the process liquid is corrosive.



Main bowl parts to check for corrosion

Always contact your Alfa Laval representative if you suspect that the largest depth of the corrosion damage exceeds 1,0 mm or if cracks have been found. Do not continue to use the separator until it has been inspected and given clearance for operation by Alfa Laval.

Cracks or damage forming a line should be considered as being particularly hazardous.

Non-stainless steel and cast iron parts

Corrosion (rusting) can occur on unprotected surfaces of non-stainless steel and cast iron. Frame parts can corrode when exposed to an aggressive environment.

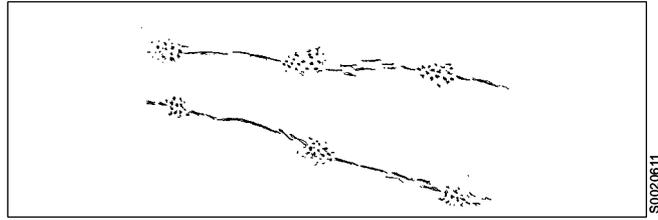
Stainless steel

Stainless steel parts corrode when in contact with either chlorides or acidic solutions. Acidic solutions cause general corrosion. The chloride corrosion is characterised by local damage such as pitting, grooves or cracks. The risk of chloride corrosion is higher if the surface is:

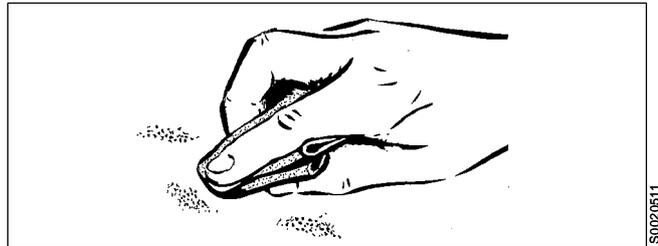
- Exposed to a stationary solution.
- In a crevice.
- Covered by deposits.
- Exposed to a solution that low pH.

Corrosion damage caused by chlorides on stainless steel begins as small dark spots that can be difficult to detect.

1. Inspect closely for all types of damage by corrosion and record these observations carefully.
2. Polish dark-coloured spots and other corrosion marks with a fine grain emery cloth. This may prevent further damage.



Example of chloride corrosion in stainless steel



Polish corrosion marks to prevent further damage



DANGER

Disintegration hazard

Pits and spots forming a line may indicate cracks beneath the surface.

All forms of cracks are a potential danger and are totally unacceptable.

Renew the part if corrosion can be suspected of affecting its strength or function.

Other metal parts

Separator parts made of materials other than steel, such as brass or other copper alloys, can also be damaged by corrosion when exposed to an aggressive environment. Possible corrosion damage can be in the form of pits and/or cracks.

3.3.3 Cracks

Cracks can initiate on the machine after a period of operation and propagate with time.

- Cracks often initiate in an area exposed to high cyclic material stresses. These are called fatigue cracks.
- Cracks can also initiate due to corrosion in an aggressive environment.
- Although very unlikely, cracks may also occur due to the low temperature embrittlement of certain materials.

The combination of an aggressive environment and cyclic stresses will speed-up the formation of cracks. Keeping the machine and its parts clean and free from deposits will help to prevent corrosion attacks.



DANGER

Disintegration hazard

All forms of cracks are potentially dangerous as they reduce the strength and functional ability of components.

Always replace a part if cracks are present.

It is particularly important to inspect for cracks in rotating parts and especially the pillars between the sludge ports in the bowl wall.

Always contact your Alfa Laval representative if you suspect that the largest depth of the damage exceeds 1,0 mm. Do not continue to use the separator until it has been inspected and cleared for operation by Alfa Laval.

3.3.4 Erosion and wear linings

Erosion can occur when particles suspended in the process liquid flow along or strike against a surface. Erosion can become intensified locally by flows of higher velocity.

As an extra wear protection the surface of the sliding bowl bottom is chromed.



DANGER

Disintegration hazard

Inspect regularly for erosion damage. Inspect frequently if the process liquid is erosive.

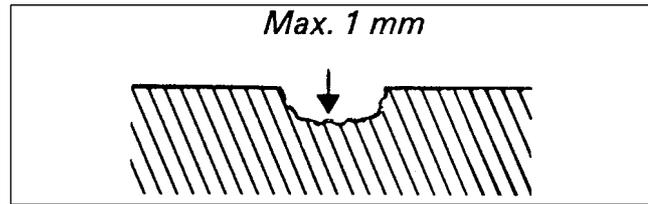
Always contact your Alfa Laval representative if the largest depth of any erosion damage exceeds 1,0 mm or if the chromed surface of the sliding bowl bottom shows any sign of damage. Valuable information as to the nature of the damage can be recorded using photographs, plaster impressions or hammered-in lead.

Erosion is characterised by:

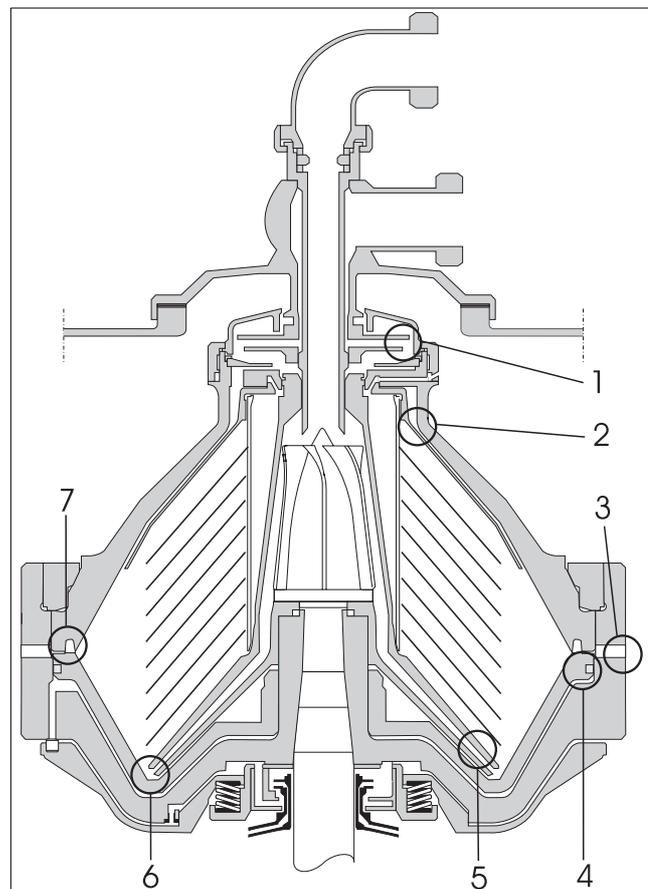
- Burnished traces on the material.
- Dents and pits having a granular and shiny surface.

Surfaces particularly subjected to erosion are:

1. The paring disc.
2. The top disc.
3. The pillars between the sludge ports in the bowl wall.
4. The sealing edge of the bowl body for the seal ring in the sliding bowl bottom.
5. The underside of the distributor in the vicinity of the distribution holes and wings.
6. The surface of the sliding bowl bottom that faces the conical part of the distributor.
7. The sealing edge of the sliding bowl bottom.



Max. permitted erosion



Surfaces particularly subjected to erosion

Look carefully for any signs of erosion damage. Erosion damage can deepen rapidly and consequently weaken parts by reducing the thickness of the metal.



DANGER

Disintegration hazard

Erosion damage can weaken parts by reducing the thickness of the metal.

Pay special attention to the pillars between the sludge ports in the bowl wall.

Renew the part if erosion is suspected of affecting its strength or function.

Wear linings in the bowl

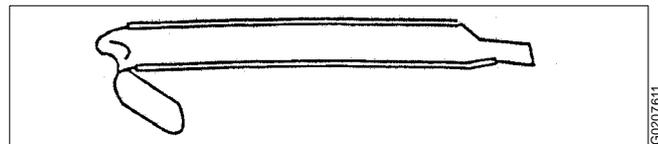
The wear linings protect both the wall pillars in the bowl body and the sliding bowl bottom. They must be replaced before the linings have been perforated by erosion.

Wear linings in wall pillars

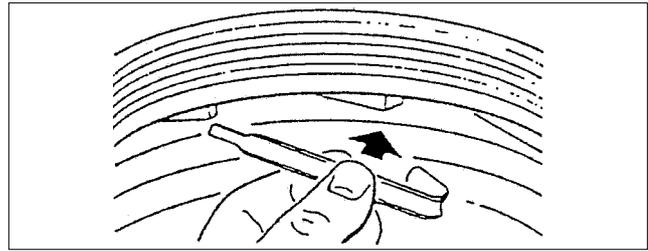
As option the wall pillars in the bowl body can be protected by fitted wear linings. These wear linings must be replaced before they have been perforated by erosion.

When fitting new linings keep in mind that they will be subjected to a very high service stress. Forces up to 10 000 G are not unusual at the bowl periphery. It is essential, therefore, that the linings are being mounted carefully and in full agreement with the following instructions:

The wear linings are made of stainless steel according to the adjoining illustration.

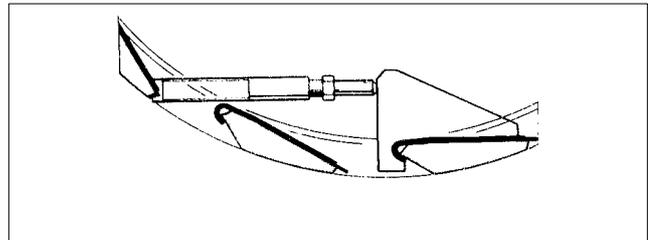


1. Remove the old lining and place the new lining blank in the wall pillar.



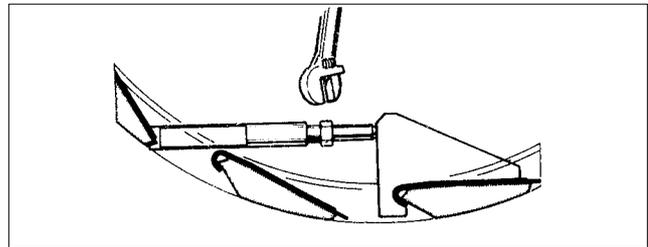
S0032011

2. Fasten the mounting tool between the wall pillars as shown in the illustration. Clamp the wear lining with the tool.



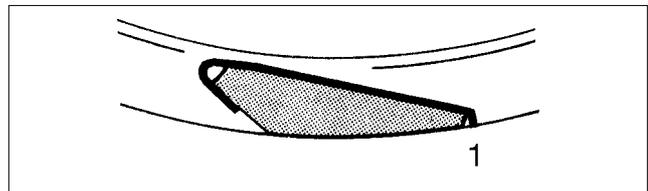
G0298611

3. Tighten the tool nut with a spanner until the lining is firmly pressed to its seat.



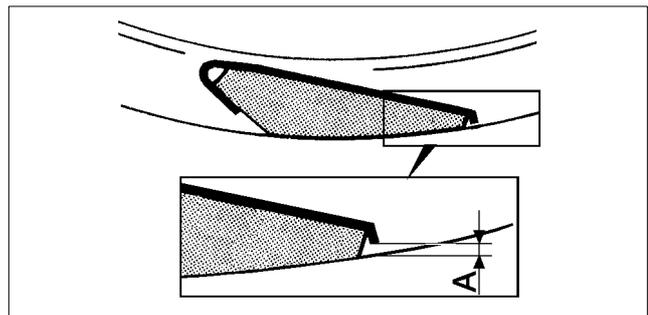
G0298711

4. Bend the shank (1) at right angles to the outside of the bowl wall using a drift.



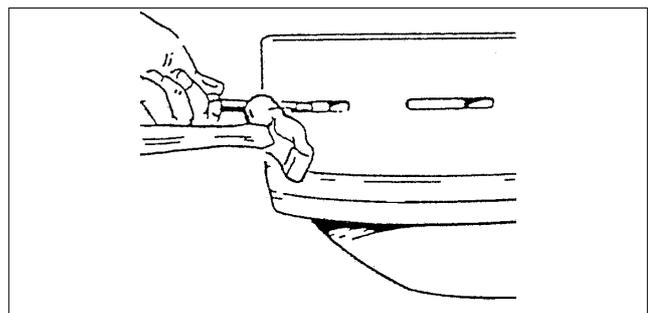
G0298921

5. Back off the nut of the tool and remove it.
6. Remove the lining and cut the shank so that it ends 0,5 - 1,5 mm (A) from the bowl wall.



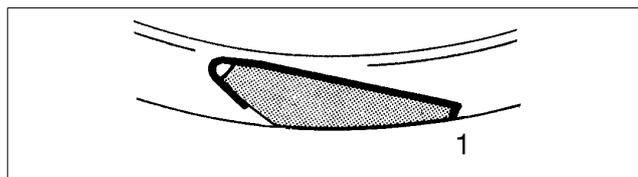
G0298941

7. Fit the wear lining in the wall pillar and clamp it with the tool. Knock the shank flat against the wall of the pillar.



S0031811

8. Remove the tool and check that the wear lining is well attached and that the shank (1) does not protrude beyond the bowl periphery. Fit the other linings as described above.



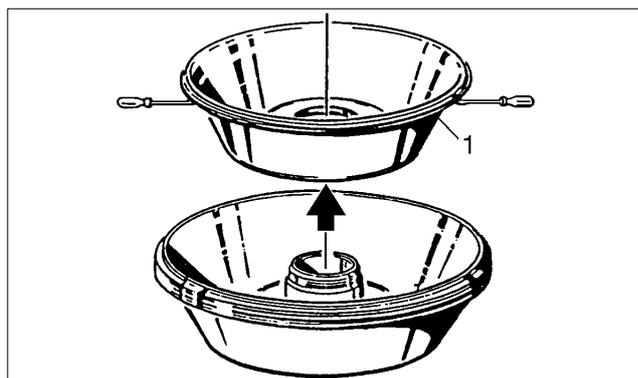
G0298621

Wear liner in sliding bowl bottom

When removing the old wear liner (1) from the sliding bowl bottom, it can preferably be pressed out by using two screw drivers or similar. Normally the wear liner will be destroyed when removed.

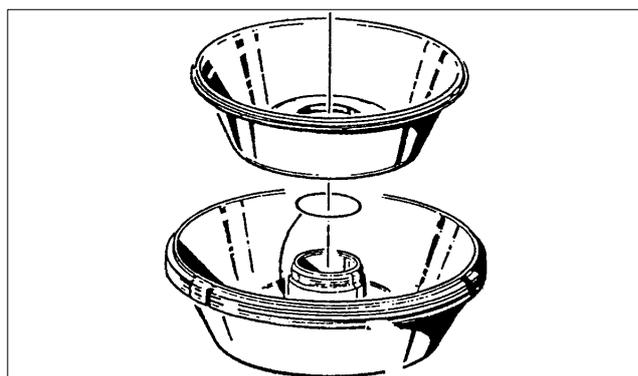
NOTE

Check that a new wear liner is available before removing the fitted one.



G0728861

When fitting the new wear liner, first fit a new O-ring.



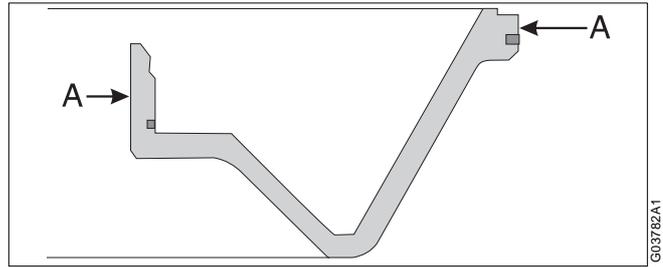
G0728871

3.3.5 Guide surfaces

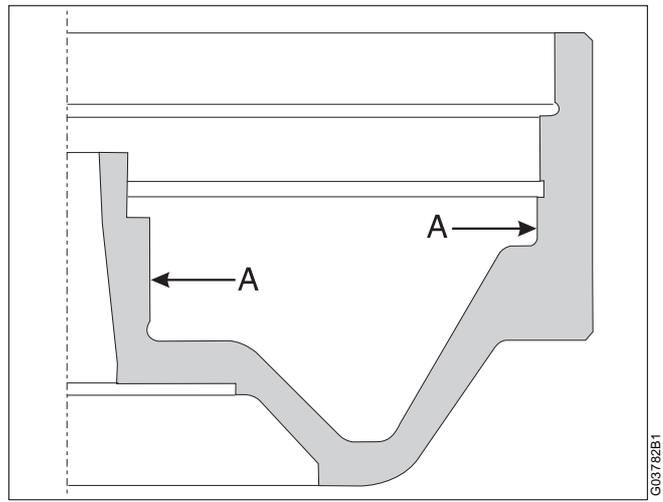
Check surfaces indicated (A) for burrs or galling. Rectify when necessary.

Repair of galling on guide surfaces; see following pages.

Clean the indicated surfaces and apply lubricating paste with a well-cleaned brush.

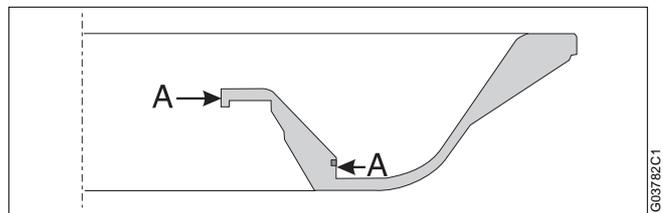


Sliding bowl bottom

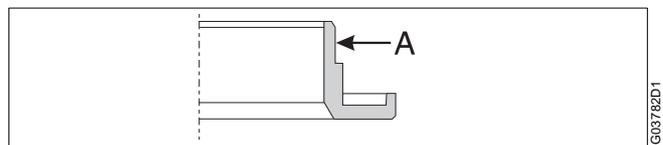


Bowl body

Lubricate the O-rings and the seal rings with silicone grease making sure they are not damaged and lie properly in their grooves.



Operating slide



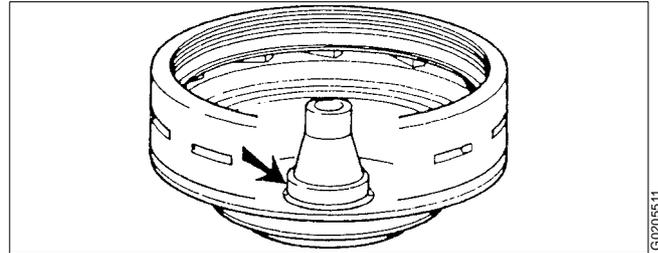
Spring support

A. Lubricated with lubricating paste.

Repair of galling on guide surfaces

Galling (friction marks) may appear on guide surfaces in the operating system, the bowl body and the sliding bowl bottom. Surfaces subject to repair are indicated by an arrow.

The example below describes the repair of the lower guide surface of the bowl body nave.

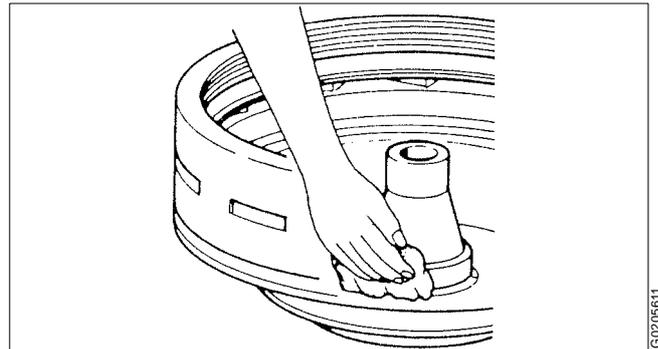


Guide surface in the bowl body

Recommended tools for correction of galling:

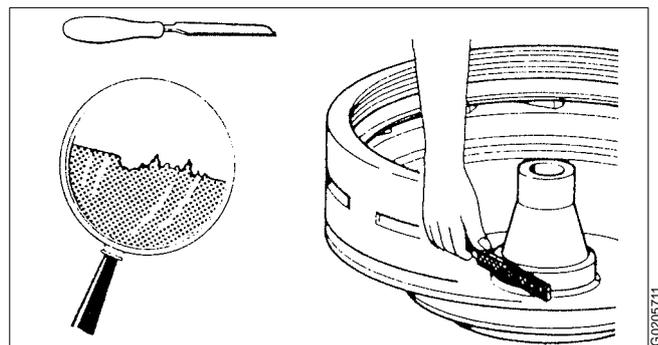
- Emery cloth, 240 grade.
- Small power drill
- Degreasing agent.
- Fibre brush, Ø 25mm.
- Fibre brush, Ø 50 mm.
- Very fine single-cut file.

1. Clean the surface thoroughly with a degreasing agent, i.e. white spirit. This is important.

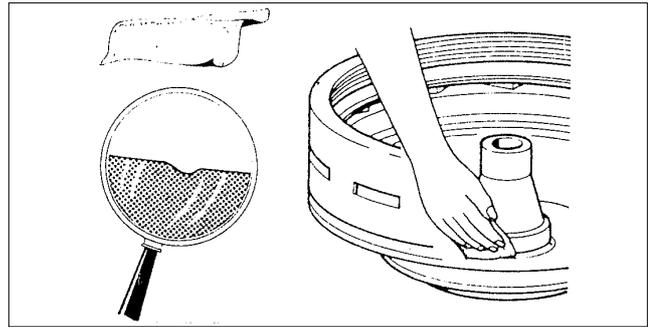


2. If the galling is excessive, first use the fine single-cut file. The file should be used with caution so that the damage is not made worse.

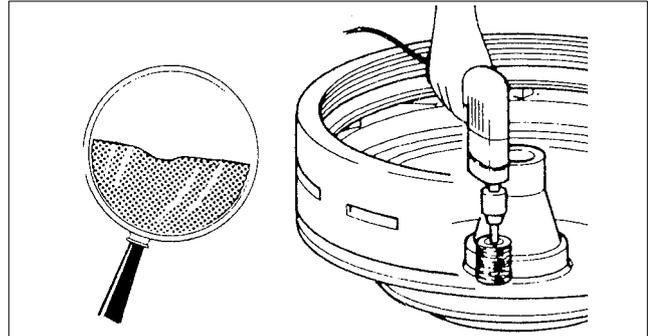
Remove the high spots on the surface. Do not use rotating files or similar. Remove the high spots only - not the undamaged material.



3. An emery cloth of 240 grade should be used to smooth the edges and to remove any burnt-in foreign matter.



4. Finish off by polishing the damaged spot with the fibre brushes and brush wax. It is recommended that the whole area where galling may occur is polished. Polishing will help smooth the whole of the damaged area, even in the deepest parts.

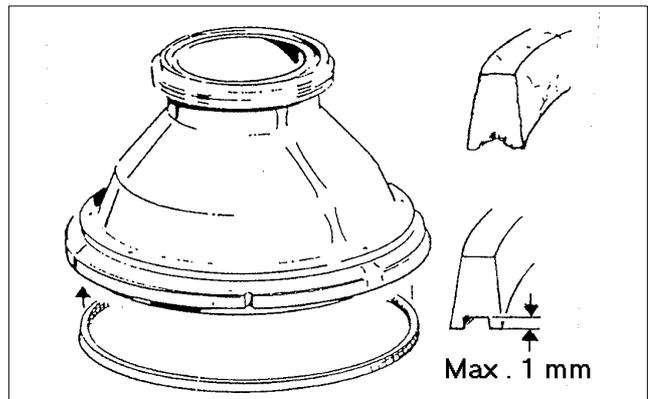


Prime the repaired area with slide lacquer. Read the correct procedure under check point [“3.6.2 Lock ring; priming”](#) on page 120. Apply Molykote 1000 Paste on the surface after priming.

3.3.6 Bowl hood seal ring

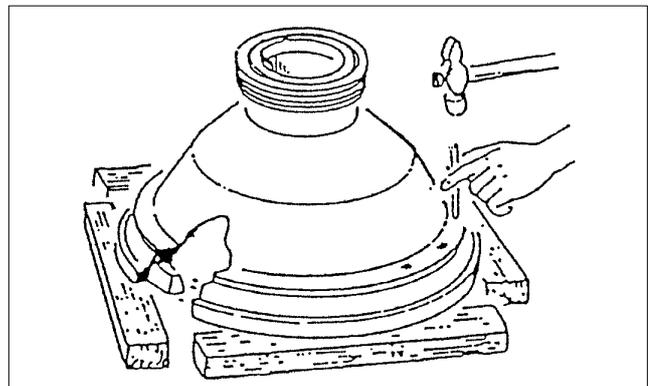
Poor sealing between the bowl hood seal ring and the sealing edge of the sliding bowl bottom will cause a leakage of process liquid from the bowl.

Renew the bowl hood seal ring at each Intermediate Service (IS).



Max. permitted indentation of the seal ring is 1 mm

Knock out the old ring by means of a pin inserted in the holes intended for this purpose.



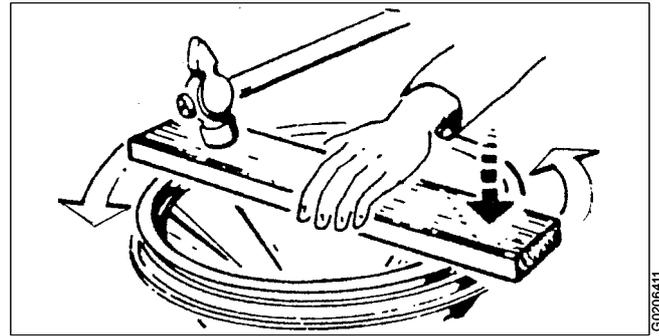
Removal of the seal ring

Fit the new ring as follows:

Press the ring into the groove with a straight wooden board placed across the ring.

NOTE

If the new ring is too narrow, place it in hot water (70-80 °C) for about 5 minutes.
If it is too wide, it will shrink after drying at 80-90 °C for about 24 hours.



Fitting of the seal ring

3.3.7 Bowl spindle taper and bowl body nave taper

Impact marks on the spindle taper or in the bowl body nave taper may cause poor fit and out-of-balance vibrations.

The bowl spindle and the nave should also be checked if the bowl spindle has been dismantled or if the bowl runs roughly.

Corrosion may cause the bowl to stick firmly to the spindle taper and cause difficulties during the next dismantling.

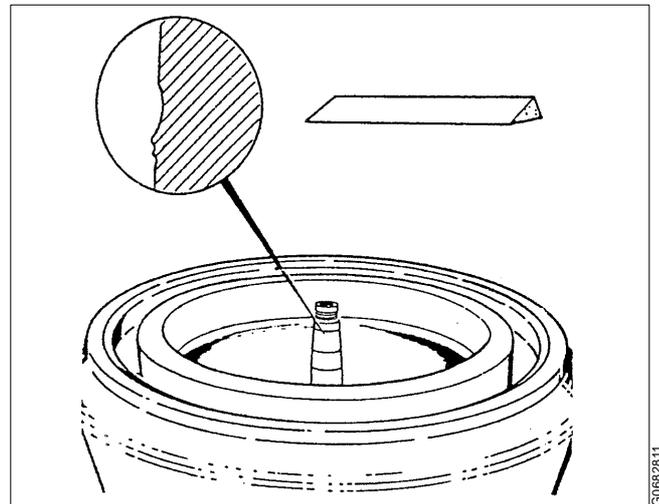
- Remove any impact marks with a scraper and/or whetstone.

Rust can be removed by using a fine-grain emery cloth (e.g. No. 320).

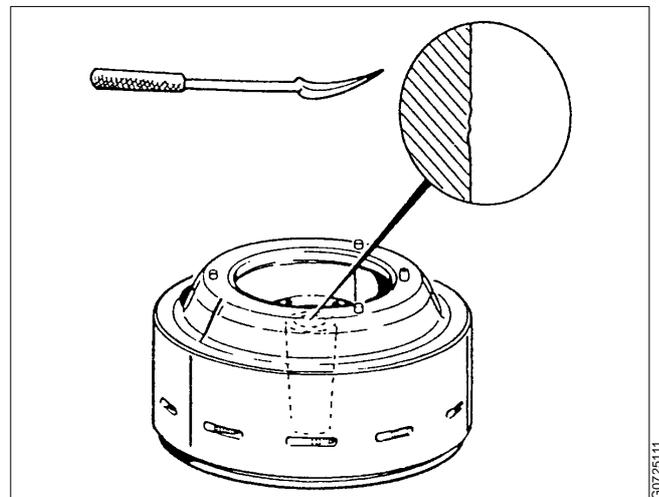
Finish with polishing paper (e.g. No. 600).

NOTE

Always use a scraper with great care. The taper shape must not be deformed.



Remove impact marks from the bowl spindle taper...



... and from the bowl body nave taper

3.3.8 Lock ring; wear and damage

Excessive wear or impact marks on threads, guide and contact surfaces of the lock ring, bowl hood and bowl body may cause hazardous galling.

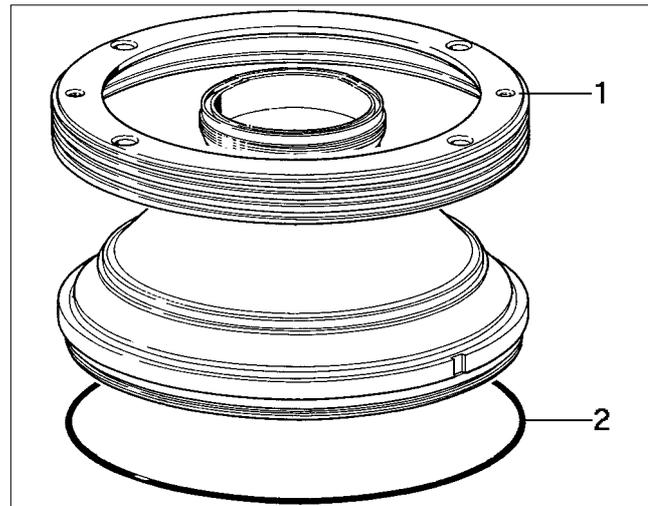
Check the thread condition by tightening the lock ring (1) after removing the disc stack and bowl hood O-ring (2) from the bowl.



DANGER

Disintegration hazard

Wear on large lock ring thread must not exceed safety limit. The ϕ -mark on lock ring must not pass opposite ϕ -mark by more than the specified distance.



1. Lock ring
2. O-ring for the bowl hood

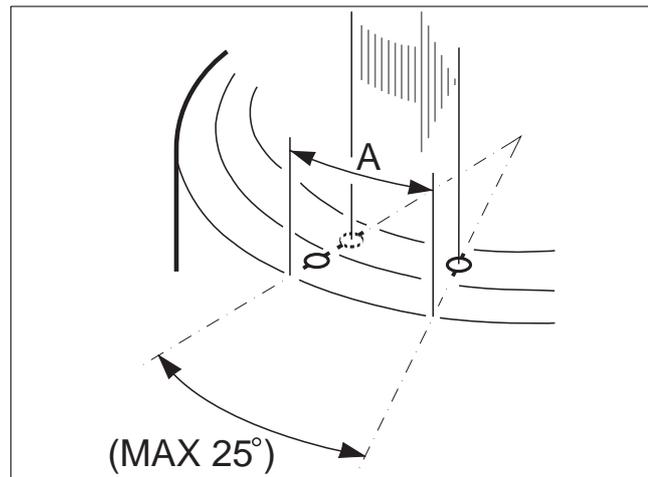
G0535211

In a new bowl the alignment marks on the lock ring and the bowl body are exactly opposite each other.

If thread wear is observed, mark the lock ring at the new position opposite the alignment mark on the bowl body by punching in a new mark.

If the original ϕ -mark on the lock ring passes the ϕ -mark on the bowl body by more than 25° (which corresponds to **A=150 mm**), an Alfa Laval representative must be contacted immediately.

If the marks become illegible, an Alfa Laval representative should be contacted immediately to inspect thread wear and for determining the position of new alignment marks.



The ϕ -mark on the lock ring must not pass the ϕ -mark on the bowl body by more than 25°

G0578131

Damage

The position of the threads, contact and guide surfaces are indicated by arrows in the illustration.

Clean the threads, contact and guide surfaces with a suitable degreasing agent, see chapter [“2.3.1 Cleaning agents”](#) on page 26.

Check for burrs and protrusions caused by impact.



CAUTION

Cut hazard

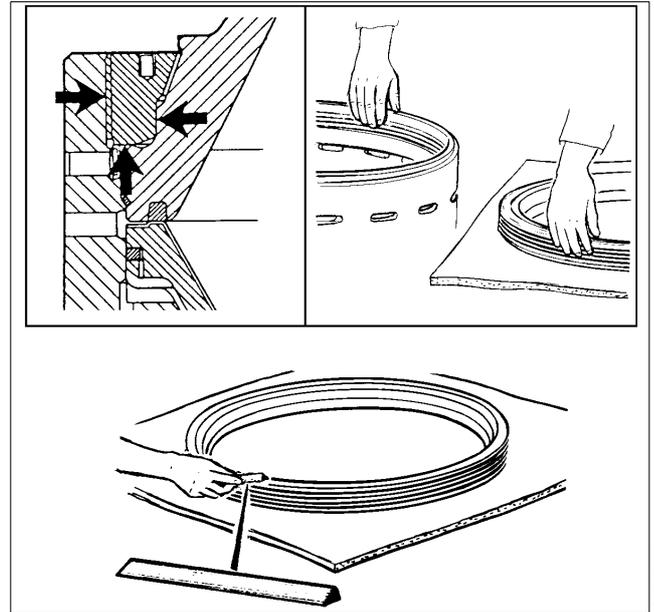
The lock ring thread may have sharp edges which can cause cuts.

If damage is established, rectify by using a whetstone or fine emery cloth (recommended grain size 240). Do not use rotating files etc. If the damage is considerable, use a fine single-cut file, followed by a whetstone.

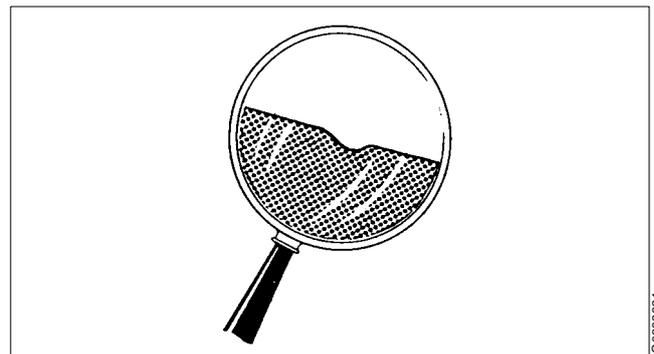
Remove the damage material on top of the surface. Just take away the damage, not the undamaged material.

After remedy, the edges of the damaged surfaces should be smooth.

Accomplish the treatment by priming the damaged surfaces if Intermediate Service. If Major Service, the whole lock ring should anyway be primed as described in chapter [“3.6.2 Lock ring; priming”](#) on page 120.



Clean and check thread, contact and guide surfaces of the lock ring



The edges of treated surfaces should be smooth

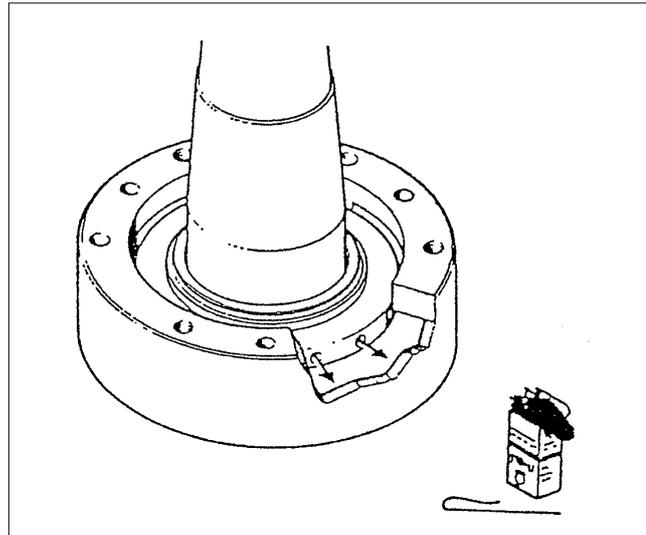
3.3.9 Operating mechanism

Dirt and lime deposits in the operating mechanism may cause poor discharge function or no function at all.

Clean all ducts in the control paring disc with a soft iron wire or similar. Remove deposits on other surfaces with steel wool.

NOTE

Lime deposits can preferably be dissolved in 10% acetic solution which should preferably be heated to 80 °C.

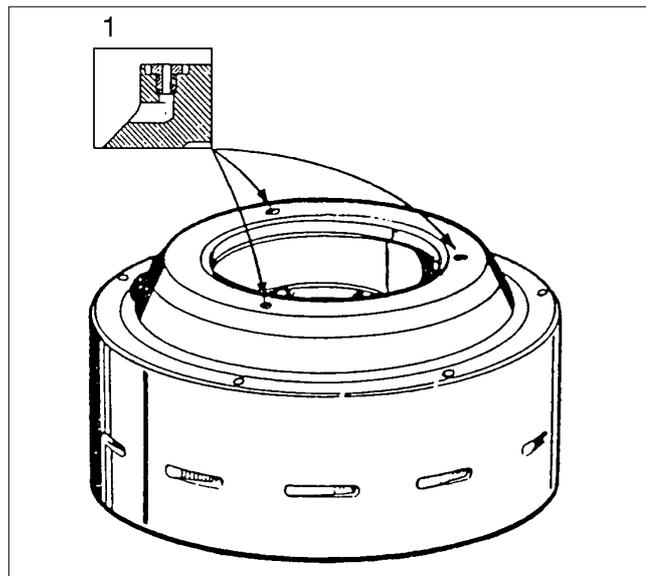


Clean all ducts in the control paring disc and then check the make-up water flow

Clean the three nozzles (1) in bottom of the bowl casing. Preferably use a soft iron wire.

Reasons for dirt or deposits:

- Hard or unclean operating water. Change water supply or install a water softener or a fine filter.
- Sludge has been sucked down into bowl casing and into the operating system. Check the installation and the venting system of both the sludge tank and bowl casing drain.



1. Three nozzles

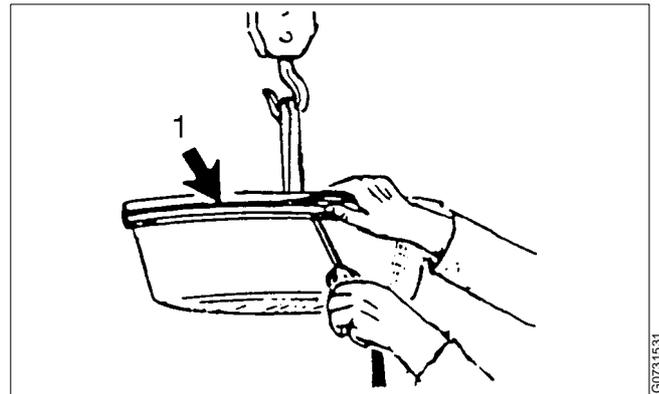
3.3.10 Sliding bowl bottom

Poor sealing between the bowl hood seal ring and the sealing edge of the wear lining fitted in the sliding bowl bottom will cause a leakage of process liquid from the bowl.

Check the sealing edge of the wear lining. If damaged either through corrosion or erosion, replace the lining as described in “3.3.4 Erosion and wear linings” on page 68.

If the seal ring (1) for the sliding bowl bottom is to be renewed, turn the sliding bowl bottom upside down and inject compressed air through the hole on the underside. This will press the ring outwards far enough to be gripped easily.

	WARNING
	Risk for eye injury
	Wear safety goggles.

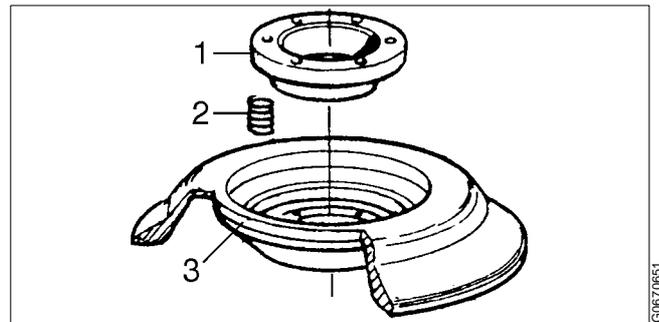


Removal of the seal ring in sliding bowl bottom using compressed air

3.3.11 Springs for operating mechanism

Defective or broken springs may prevent complete closing of the bowl.

If one or more springs differ from other springs in regard to length or are defective in other respects, all springs have to be renewed.



Check for defective or broken springs

1. Spring support
2. Spring
3. Operating slide

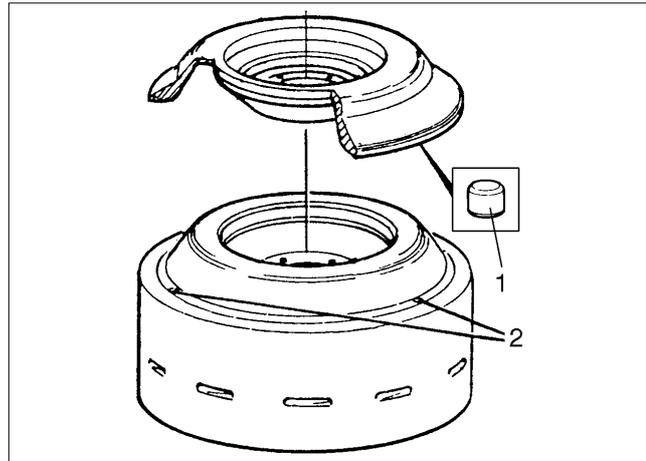
3.3.12 Valve plugs

Poor sealing between the valve plugs (1) in the operating slide and bowl body may prevent complete closing of the bowl.

Examine the sealing surfaces (2) of the bowl body in contact with the valve plugs. Remove any marks and lime deposits with a very fine grain emery cloth.

Remove all the valve plugs. Tap in the new plugs.

Correct height of plugs: **16 mm**.



1. Valve plug
2. Bowl body sealing surfaces in contact with the valve plugs

3.3.13 Worm wheel and worm; wear of teeth

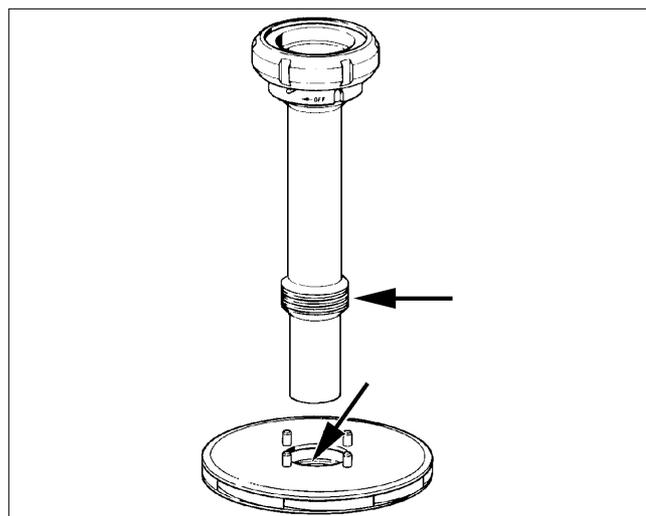
As described in [“2.4.1 Worm wheel and worm; wear of teeth”](#) on page 29.

3.3.14 Inlet pipe and outlet paring disc

Damage to the threads of inlet pipe and the surfaces of distributing cone, bowl hood, gravity disc and paring chamber top part may cause the paring disc to scrape against the paring chamber cover even if the height of the outlet housing has been adjusted correctly.

Screw the outlet pipe into the paring disc and check that the outlet pipe turns easily.

Left-hand thread!



Check the threads of the inlet pipe and paring disc

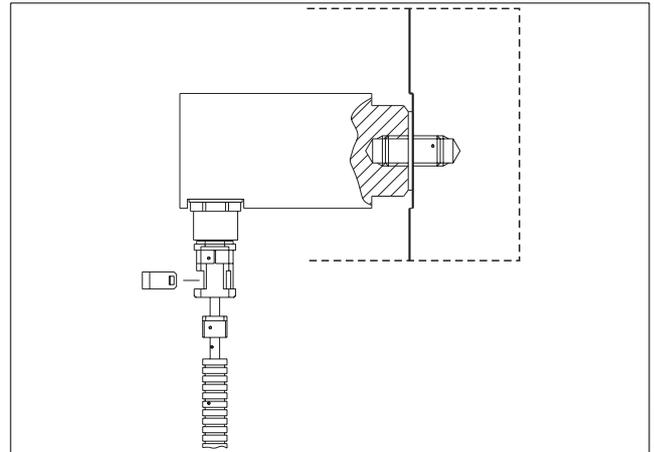
3.3.15 Vibration sensor

- Check that the electrical cables and connections are not damaged.
- Check that the sensor is well attached to the frame. If the sensor has to be tightened, see below.
- For function check of the sensor and the belonging monitoring equipment, see separate instruction manual.

If the sensor, for any reason, has to be replaced, fit it in the following way:

1. Check that the contact surfaces on the sensor and separator frame are clean.
2. Mount the screw in the frame, if removed, and secure with Loctite 243.
3. Mount the vibration sensor. Adjust with washer(s) in order to get the cable downwards.
Tightening torque: **35 Nm**.

For technical reference, see chapter *Connection list* in the *Installation Manual*.



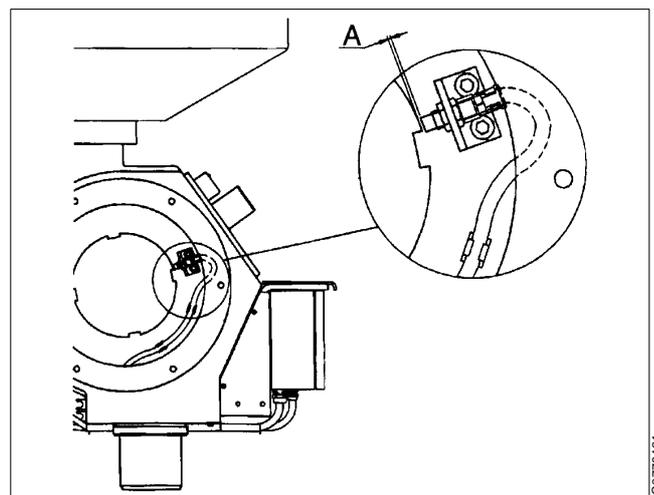
Vibration sensor

G0778341

3.3.16 Speed sensor

- Check that the electrical cables and connections are not damaged.
- Check that the distance (A) between the sensor and the rotating coupling disc is **2 ±0,5 mm**, see the illustration.
- Check that the sensor and its bracket are well attached. The tightening torque of the nuts fixing the sensor in the bracket is **50 Nm**.

For technical reference, see chapter *Connection list* in the *Installation Manual*.

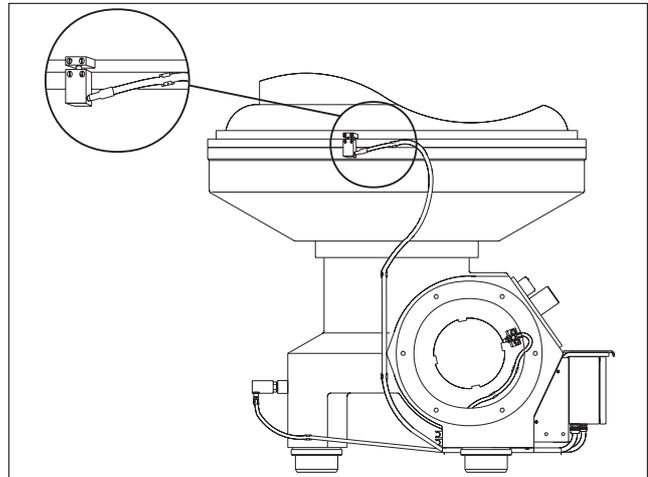


Measurement of the air gap (A) between sensor and coupling disc

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3.3.17 Cover interlocking switch (option)

- Check that the electrical cables and connections are not damaged.
- Check that the screws fixing the switch to the frame are tightened.

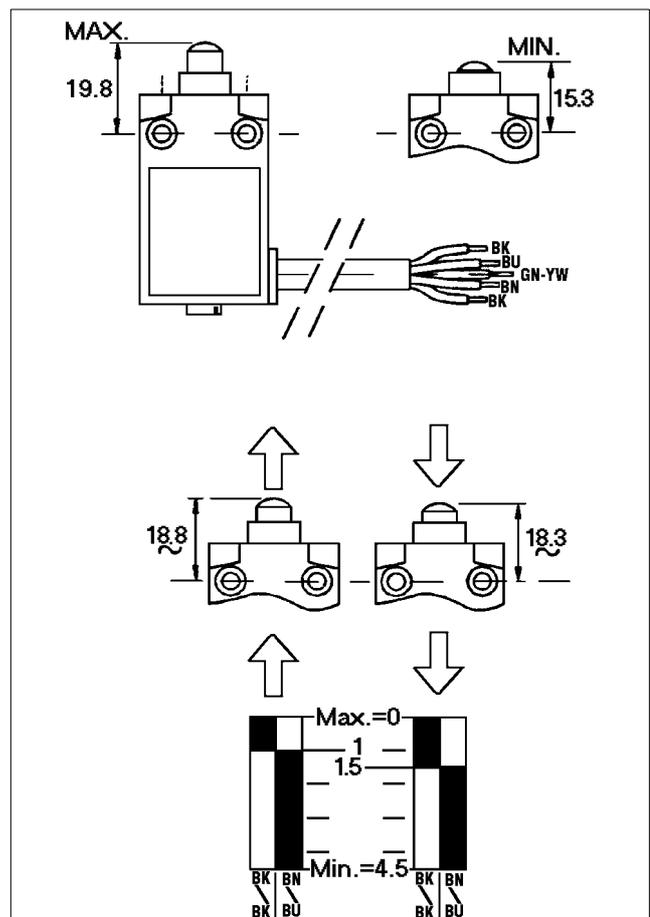


Position of cover interlocking switch

- When the button is pushed, check that the brown and blue wires are short-circuited and the two black wires are open circuit. Check also the reverse when the button not pressed. See the illustration for exact measurement when the button is operated.

■	Contact closed
□	Contact open
BK	Black
BN	Brown
BU	Blue
GN-YW	Green-Yellow

For technical reference, see connection No. 760 in chapter *Connection list* in the *Installation Manual*.



Measurements for operation range of the cover interlocking switch button

3.4 Intermediate Service (IS), assembly

3.4.1 Introduction

Before starting the assembly first carry out the Intermediate Service check points starting on page [65](#).

NOTE

Renew all parts included in the IS-kit. The O-rings and other sealing rings should be lubricated with grease of silicone type.

3.4.2 Lubrication

NOTE

The separator is designed for use in food application and requires lubricants in food areas that are approved for this application.

Lubricate the O-rings, rectangular rings, threads and guide surfaces before assembly, see [“2.5.4 Recommended lubricants”](#) on page [37](#).

3.4.3 Operating liquid device

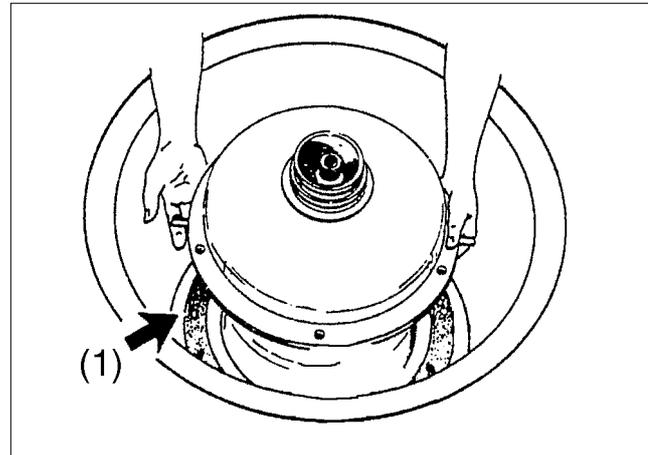
✓ Check point

“3.3.9 Operating mechanism” on page 78.

An exploded view of the operating water device can be found on page 62.

1. Replace the height adjusting rings, the same number as were removed.

Fit the distributing cover. Bring the cover into position defined by the guide pin (1) and tighten the screws.



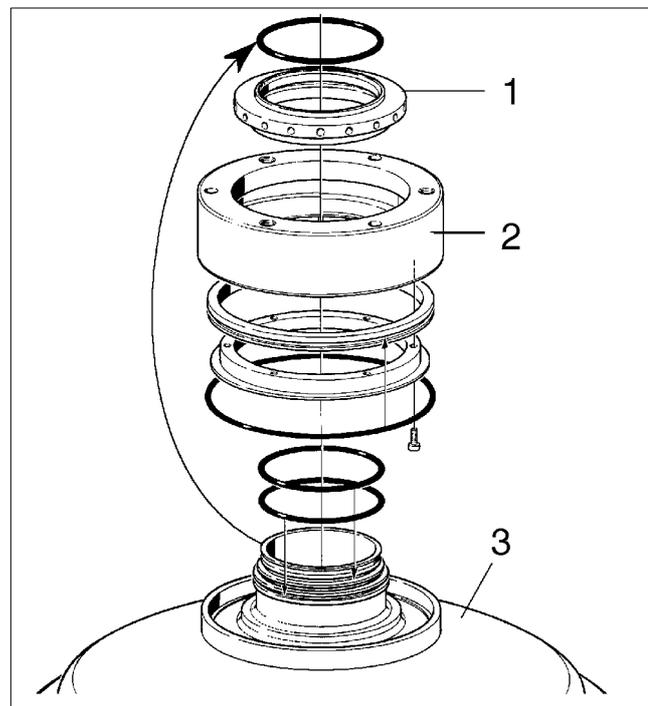
1. Guide pin

2. Fit the control paring disc arrangement according to the illustration.

The upper O-ring must be fitted after that the control paring disc (1) has been fitted.

If it is difficult to press down the control paring disc in position by hand, knock it down cautiously by means of a soft hammer.

3. Check that the upper O-ring (locking the control paring disc) lies properly in its groove without being twisted.
4. In order to ensure a good sealing between the control paring disc and the O-ring, jerk a few times in the distributing ring after assembly.



1. Control paring disc
2. Distributing ring
3. Distributing cover

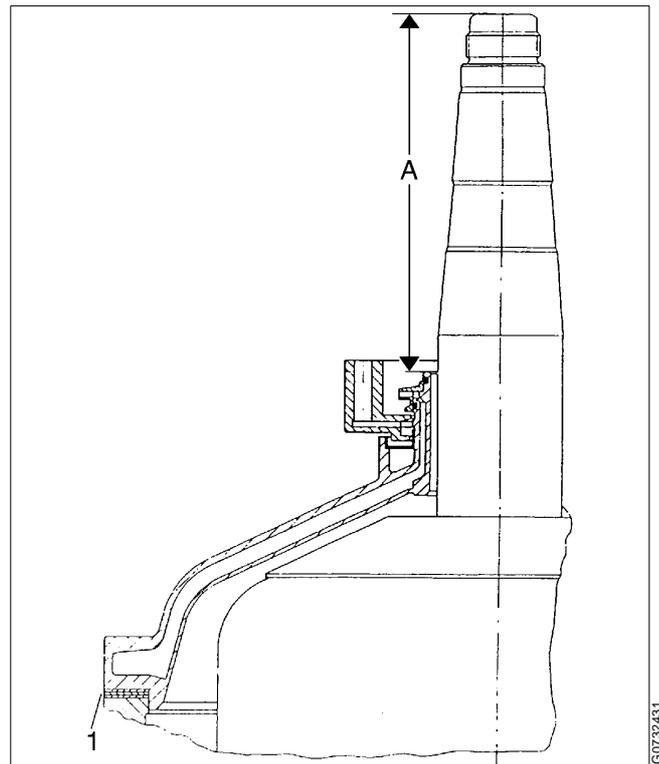
5. Check the height position of the operating liquid device relative to the bowl spindle in following way:

Alfa Laval ref. 529692, rev. 0

- Use two steel rules or a depth gauge for measuring.
- Correct measurement (A) is **225 ±0,5 mm**.
- The height position is adjusted by adding or removing height adjusting rings (1) under the distributing cover.

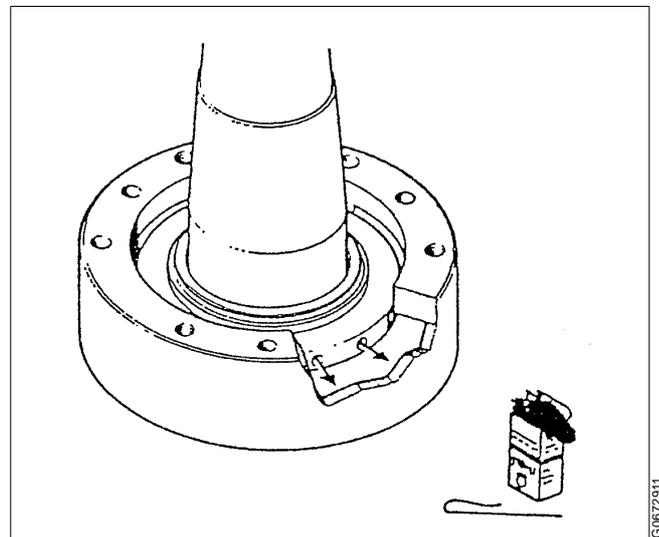
The adjusting rings have a thickness of 1,0 mm.

- After adjustment rotate the spindle. If a scraping noise occurs, re-adjust.



The height position (A) can be adjusted with height adjusting rings (1)

6. If possible, open the make-up water supply and check that there are weak water jets out of the ducts in the control paring disc.



If possible, check the make-up water flow

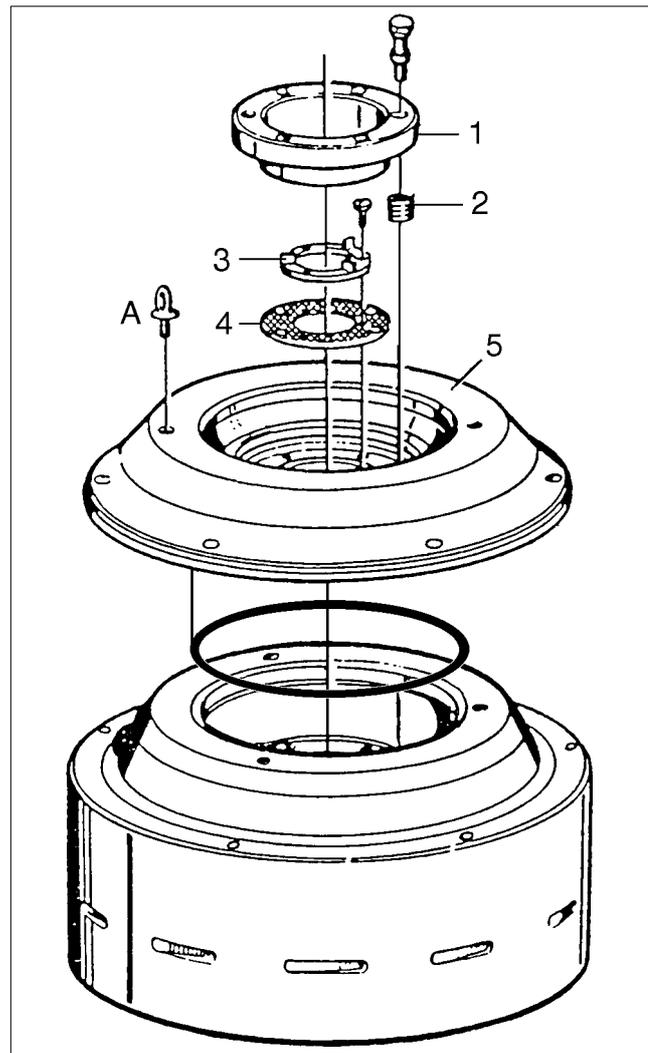
3.4.4 Bowl body and operating mechanism

✓ Check point

- “3.3.2 Corrosion” on page 65,
- “3.3.3 Cracks” on page 67,
- “3.3.4 Erosion and wear linings” on page 68,
- “3.3.5 Guide surfaces” on page 72,
- “3.3.7 Bowl spindle taper and bowl body nave taper” on page 75,
- “3.3.9 Operating mechanism” on page 78,
- “3.3.10 Sliding bowl bottom” on page 79,
- “3.3.11 Springs for operating mechanism” on page 79,
- “3.3.12 Valve plugs” on page 80.

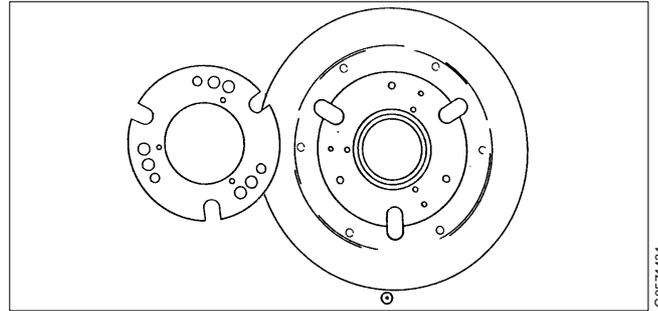
An exploded view of the bowl body and operating mechanism can be found on page 58.

1. Protect the nave bore in the bowl body with a rag.
2. Except lubrication of the parts mentioned in chapter “3.3.5 Guide surfaces” on page 72, also lubricate the guide pin fitted in the bottom of the bowl body with Molykote 1000 Paste.
3. Fit the operating slide (5) onto the bowl body. Check that the guide pin in the bowl body enters the hole in the operating slide.
4. After the eye bolts (A) are removed, fit the two protecting plugs in the holes.

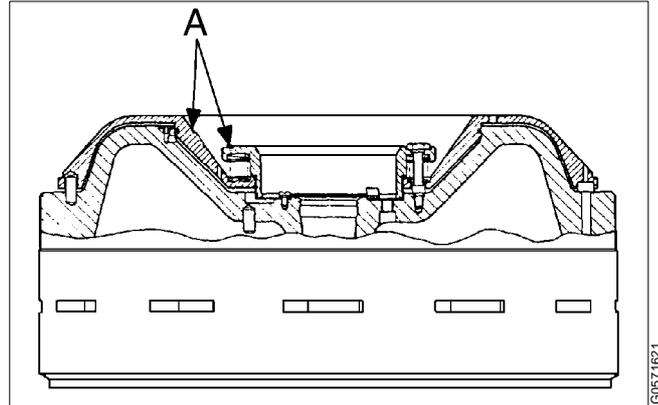


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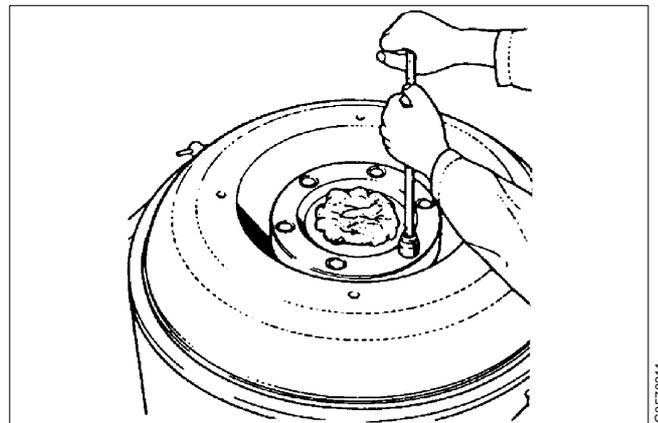
5. Fit a new gasket (4) and the sleeve with wings (3) onto the operating slide.
Turn the gasket in the right way. A gasket turned in the wrong way could block the ducts for operating water. This gasket (illustrated below) is used for many separator types. For the type dealt with in this manual some of the holes have no function.
6. Lubricate the guide surface of the spring support (1) faces the operating slide. Use Molykote 1000 Paste or similar.
Fit springs (2) and support. Place the support in the same position as before it was dismantled. The machine number or punch marks (A) on the support and the operating slide should normally be directed towards each other, see the illustration.
7. Lubricate the six screws for the spring support with Molykote 1000 Paste.
Start to tighten two diametrically opposite screws. Then tighten the screws successively, little at a time.
Final tightening torque: **40 Nm**



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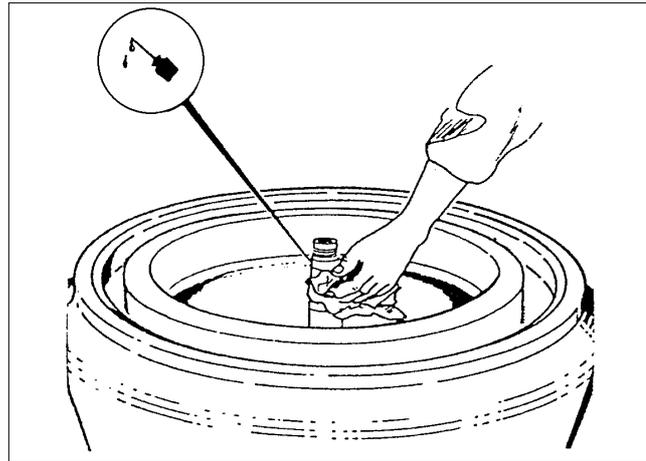


G0570311

8. Wipe off the spindle top and nave bore in the bowl body. For rust protection, lubricate the tapered end of the spindle with a few drops of oil (**no** other lubricant shall be used). Spread it over the surface carefully. Wipe off surplus oil with a clean cloth.

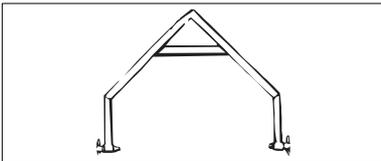
NOTE

Too much oil on the surface between the spindle and the bowl body, or if other lubricant is used, will reduce the friction between the two parts. This may result in a relative rotation between the parts, which can lead to seizure, scoring, and possible welding.



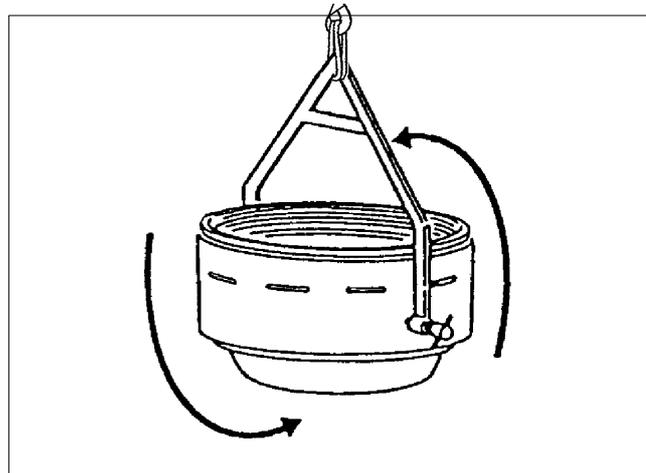
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9. Turn the bowl body using the turning tool.



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Ensure the screws on the turning tool are properly tightened.



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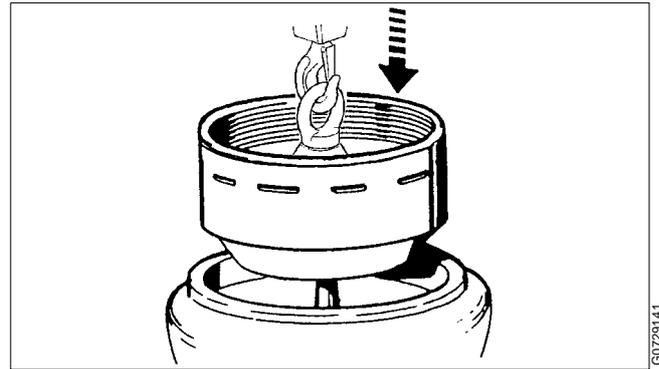
WARNING

Crushing hazard

Risk for jamming injury when turning the bowl body.

10. Turn the bowl body and then remove the turning tool.

11. Fit the lifting tool into the bowl body bottom with the three screws.
Turn the handle at the top of the lifting tool so that the central screw is home.



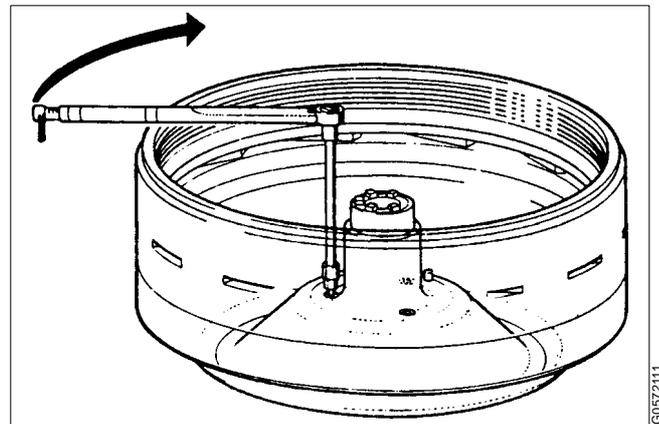
12. Lower the bowl body slowly using a hoist until the central screw rests on the spindle top.
Then screw up the central screw so that the bowl body sinks down onto the spindle.
Remove the tool.

13. Rotate the bowl body and align it so that the three screw holes in the bowl body bottom are exactly above the three holes in the distributing ring.

Lubricate the three screws with Molykote 1000 Paste. Tighten the screws with a torque wrench.

Tightening torque: **40 Nm**

14. Rotate the bowl body by hand and make sure that it moves freely. A scraping noise may be an indication of incorrect height position of the paring disc device under the bowl body.



15. Lubricate and fit a new rectangular ring in the sliding bowl bottom groove. Make sure the ring is well recessed in the groove.
16. Except lubrication of the parts mentioned in chapter "3.3.5 Guide surfaces" on page 72, also lubricate the guide pin fitted in the bottom of the bowl body.
17. Fit the lifting tool to the sliding bowl bottom and lift it into the bowl body using a hoist.
18. Align the guide pin hole on the underside of the sliding bowl bottom with the guide pin in the bowl body. Slowly lower the sliding bowl bottom into the bowl body until the guide pin starts to locate.

Maintain sufficient lifting force to enable sliding bowl bottom to be rocked by hand, verifying that it is properly located on the guide pin. Lower into final position and remove the lifting tool.

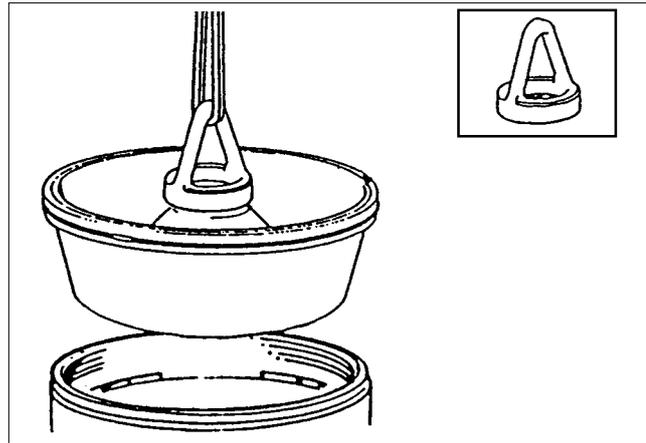
19. Fit the O-ring in the groove between the bowl body nave and sliding bowl bottom.

It is important that the O-ring is fitted after the sliding bowl bottom is fitted to avoid the risk of deforming the O-ring. As the bowl in operation is completely filled with process liquid under pressure, a defective seal ring can cause leakage of process liquid into the operating liquid system.

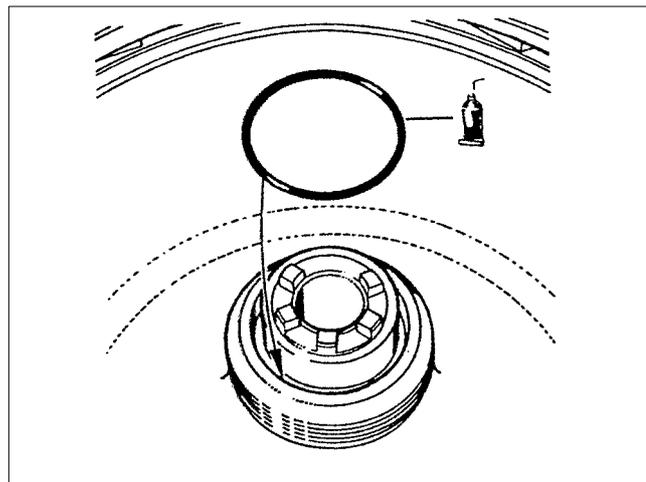
Lubricate the bowl body nave with an anti-seize compound.

20. Fit the distributing cone in the bowl body.

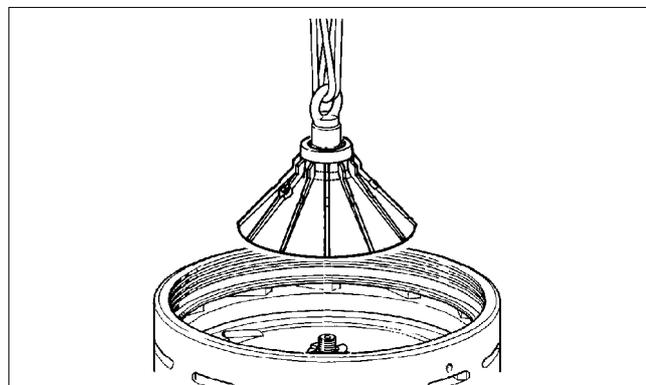
Align the wide guide slot in the distributing cone with the wide lug in the bowl body. Lower the distributing cone into position by unscrewing the lifting tool.



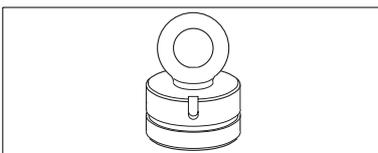
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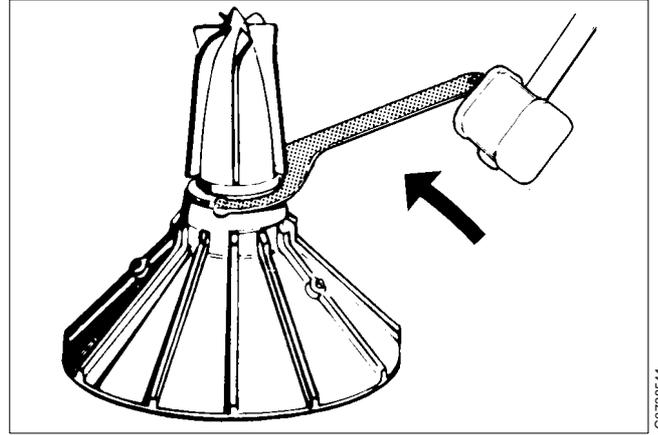
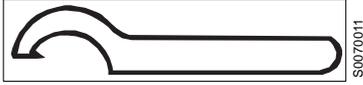


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21. Replace gasket underneath the centre screw.
Fit and tighten the centre screw.
Left-hand thread!



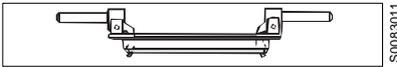
3.4.5 Bowl hood and disc stack

✓ Check point

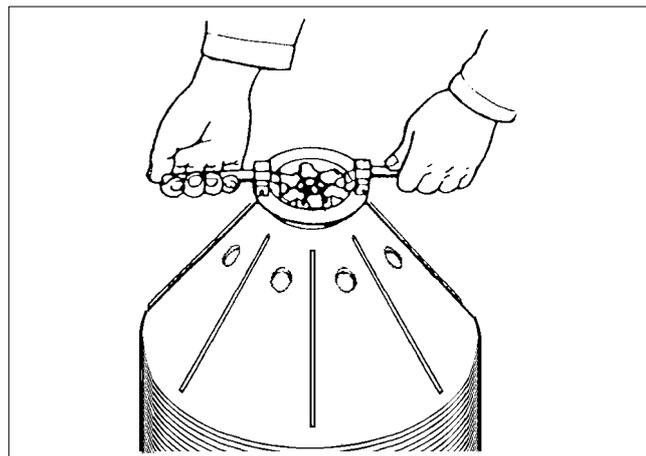
[“3.3.2 Corrosion” on page 65,](#)
[“3.3.3 Cracks” on page 67,](#)
[“3.3.4 Erosion and wear linings” on page 68,](#)
[“3.3.6 Bowl hood seal ring” on page 74,](#)
[“3.3.8 Lock ring; wear and damage” on page 76,](#)
[“3.3.14 Inlet pipe and outlet paring disc” on page 80,](#)
[“3.6.2 Lock ring; priming” on page 120 \(only when Major Service\).](#)

An exploded view of the bowl hood and disc stack can be found on page [52](#).

1. Assemble the disc one by one on the distributor. The distributor has one guide rib for the correct positioning of the discs. Use the special tool included in the tool kit.
See further description below how to proceed.



Handle the bowl discs carefully to avoid damage to the surfaces during cleaning.



When removing discs, use the special tool

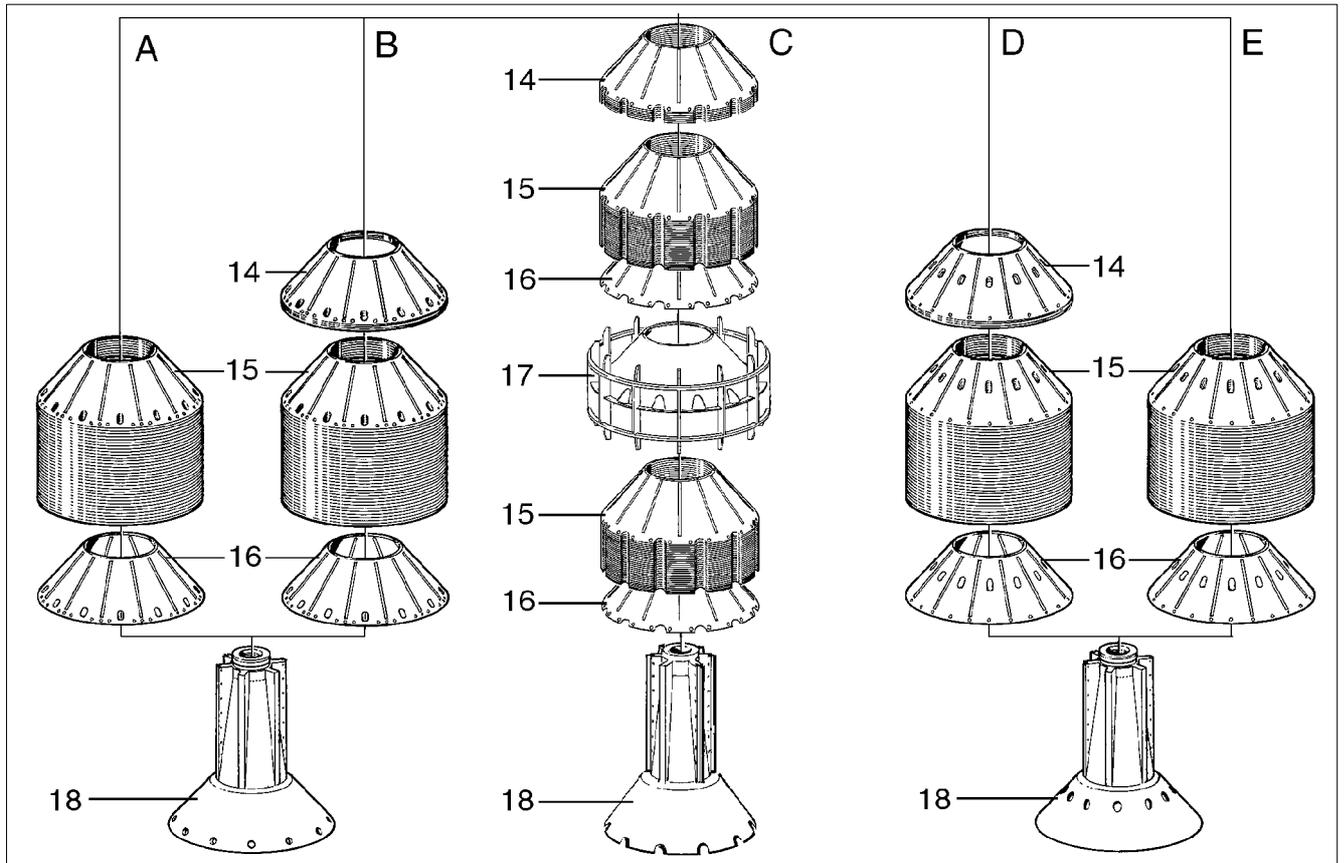
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CAUTION

Cut hazard

Sharp edges on the separator discs may cause cuts.



14. Bowl discs, top (have thinner caulks than other discs in the disc stack)
 15. Bowl discs
 16. Bottom bowl disc (has caulks also on its underside)
 17. Wing insert
 18. Distributor

- A. Bowl 545247-12, purifier
 B. Bowl 545247-10, purifier
 C. Bowl 545247-14, purifier with wing insert
 D. Bowl 545247-11, concentrator
 E. Bowl 545247-13 / -09, concentrator
 (Bowl -13, pos. 15: Caulks = 0,6 mm)
 (Bowl -09, pos. 15: Caulks = 1,0 mm)

Bowl A and E

- Start with the bottom disc (16) which has caulks also on its underside.
- Continue with the other discs.

Bowl B and D

- Start with the bottom disc (16) which has caulks also on its underside.
- Continue with the discs that have thicker caulks than the six upper discs.
- Complete the disc assembly with the six upper discs.

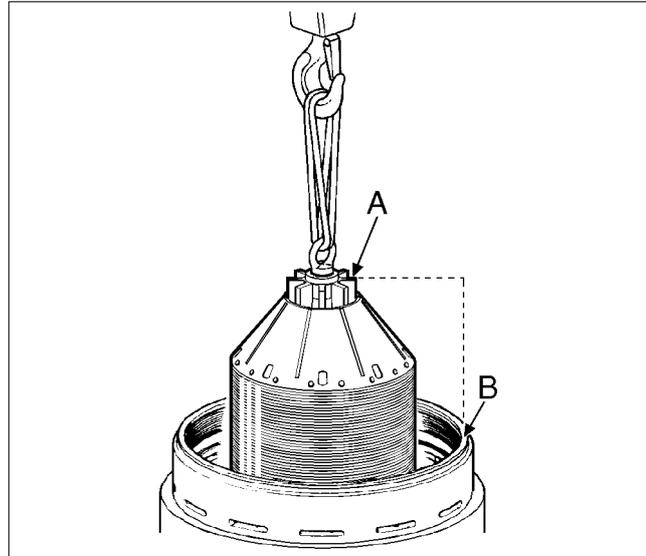
Bowl C

- Start with the bottom disc (16) which has caulks also on its underside.
- Continue with 70 discs (15).
- Fit the wing insert (17).
- Then fit the other bottom disc (16) which has caulks also on its underside.
- Complete the disc assembly with the upper discs, which should be at least 65 pcs depending of made adjustment of the disc stack pressure.

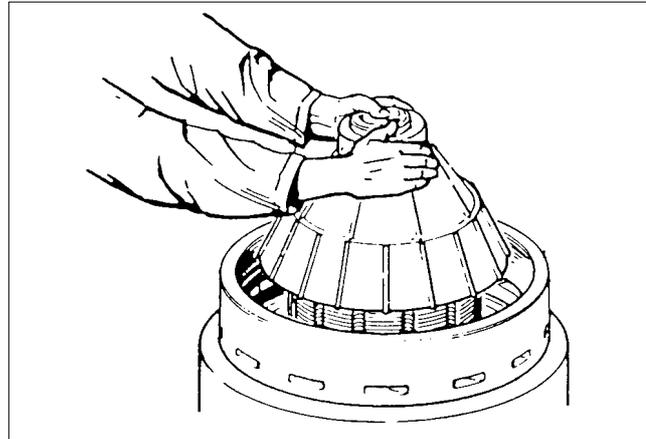
2. Fit the lifting tool to the distributor and lift the distributor with disc stack into the sliding bowl bottom using a hoist.



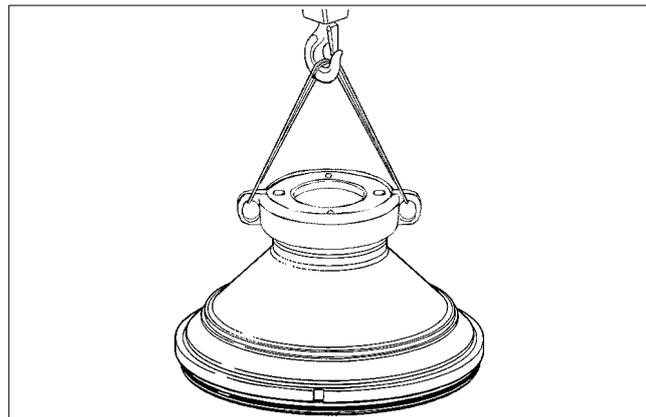
Check that the drill mark (A) on the distributor is in line with the guide key (B) on the bowl body. The guide pins in the distributing cone will then fit into the recesses on the underside of the distributor.



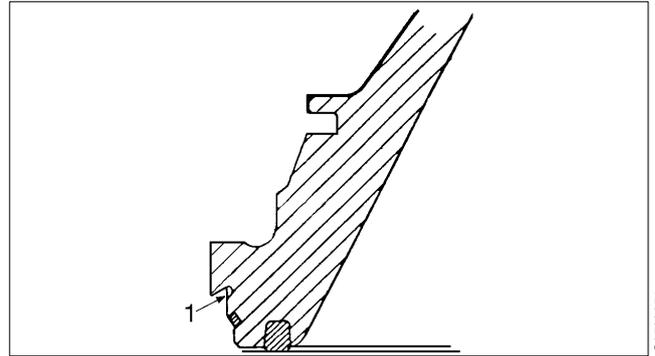
3. Fit the top disc onto the distributor.



4. Fit the lifting tool to the bowl hood and lift it using a hoist.

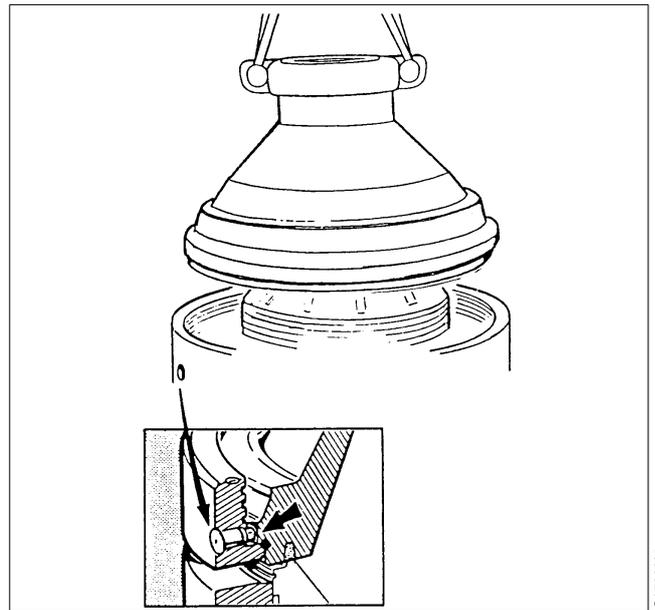


5. Check that the O-ring and the seal ring of the bowl hood are properly fitted and lubricated. Make certain that the so-called dovetail slot (1) is well cleaned.



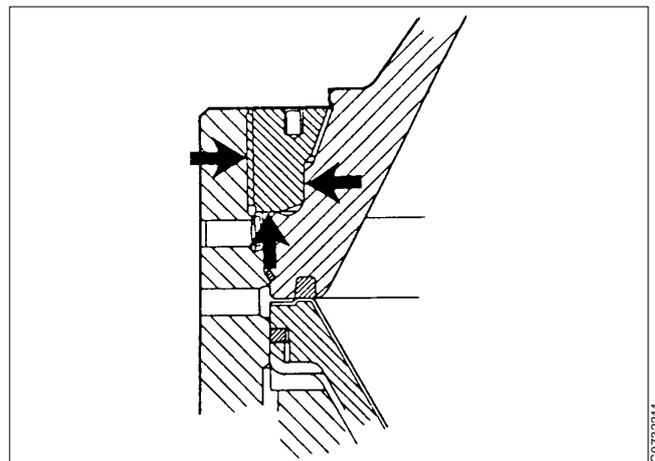
G0732271

6. Lower the bowl hood straight down onto the disc stack, otherwise it may get stuck. Be careful not to scratch the bowl hood seal ring. Check that the guide recess on the bowl hood enters the guide lug in the bowl body.



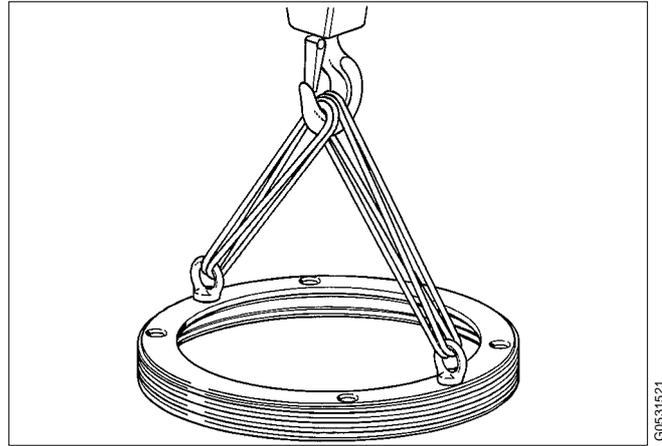
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7. Remove the lifting tool.
8. Lubricate the lock ring threads, contact and guide surfaces with lubricating paste.



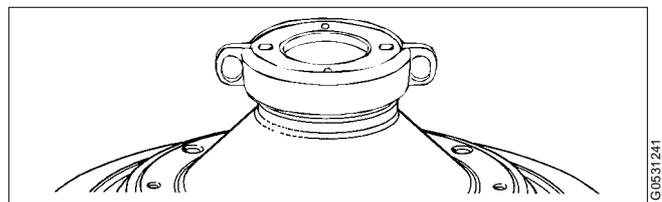
G0732211

9. Lift the lock ring by using eye bolts and a hoist. Tighten the lock ring by hand.

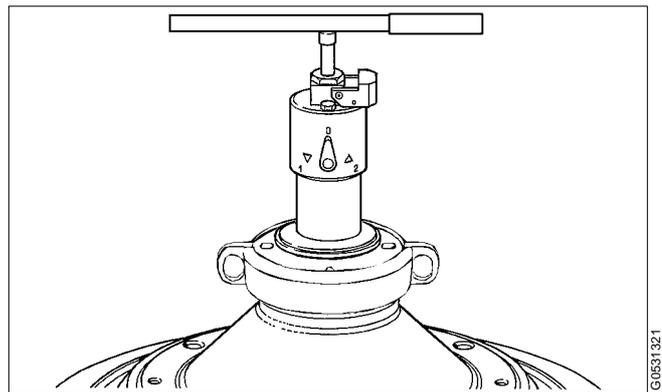
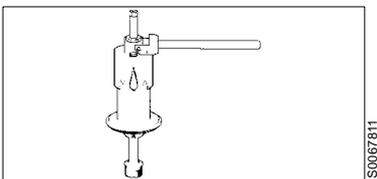


10. Tighten the lock ring using the compressing tool as described below.

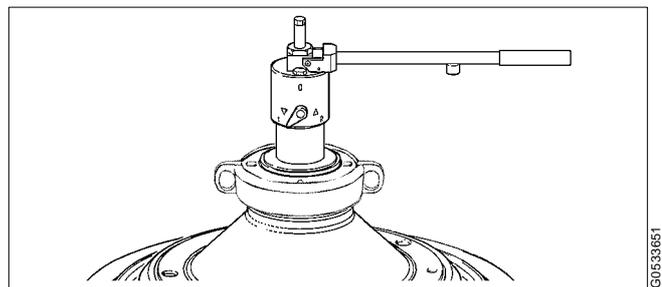
- a. Fit the lifting tool onto the bowl hood.
- b. Fit the compressing tool by screwing the pole of the tool into the threads of the distributor by the horizontal handle.



The control lever on the compressing tool, should be in position 0.



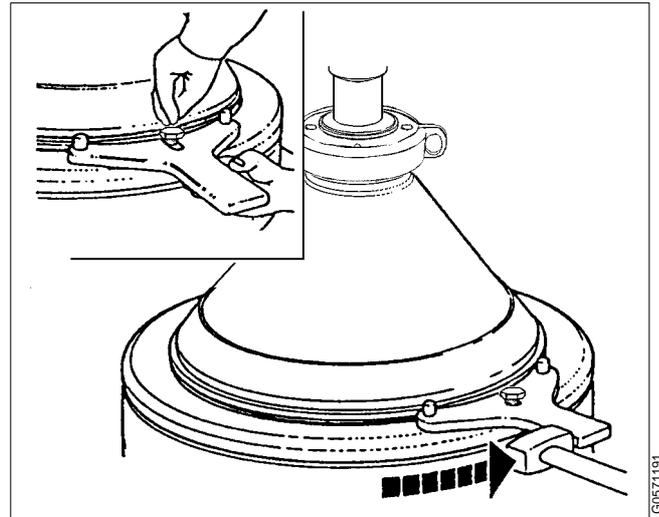
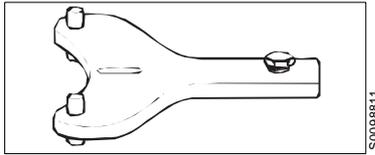
- c. Turn the control lever to position 1 for compression.
- Compress the disc stack by pumping with the horizontal handle until the oil pressure is released through the relief valve.



- d. Fit the lock ring spanner and tighten the large lock ring, first by hand.

Then advance the lock ring by giving the spanner handle some blows until the ϕ -marks are in line or passed.

Left-hand thread!



Check of disc stack pressure

- If the disc stack pressure is correct it should be possible to tighten the lock ring so far by hand that the ϕ -mark on the lock ring is positioned 20-30 mm before the mark on the bowl hood when the compressing tool is used.

To achieve this an appropriate number of discs in the disc stack beneath the top disc must be fitted. Add or remove discs if necessary.

NOTE

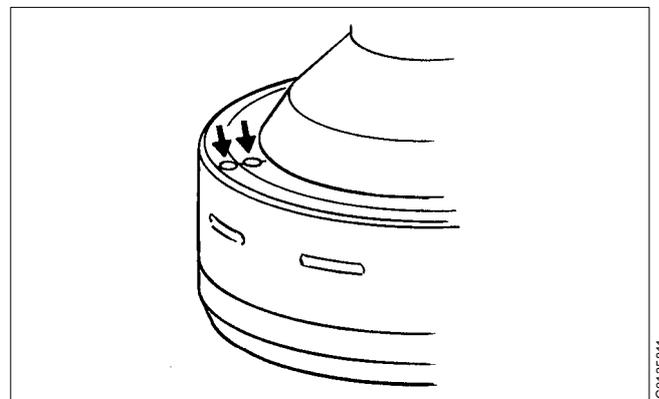
When checking the disc stack pressure in this way, the threads of the lock ring and the bowl body must be well cleaned.

If the ϕ -marks do not reach or pass each other after giving the spanner handle some blows, the reason could be an incorrectly assembled bowl or too many discs in the disc stack. Reassemble and check.

NOTE

Ensure that the disc stack pressure is sufficient to maintain bowl balance.

Insufficient pressure in the disc stack can cause vibration and reduce lifetime of ball bearings.



ϕ -marks on bowl body and lock ring in line

Complementary check of disc stack pressure using the compressing tool

- With the large lock ring correctly tightened and the compressing tool mounted on the separator bowl, turn the control lever to position 1 for compression.
- Compress the disc stack by pumping the horizontal handle until the oil pressure is released through the relief valve.
- Measure the height (H1) of the piston rod (see illustration) with the slide calliper depth gauge. Make a note of the reading obtained.
- Release the pressure in the compressing tool by turning the control lever to position 0. The piston rod will now move downwards slightly when the disc set is released inside the bowl.
- Measure once again the height (H2) of the piston rod with the slide calliper and make a note of the reading obtained.

If the difference between **H1** and **H2** is less than the vertical height of a disc (including a caulk), the disc stack pressure is correct. Otherwise add one or more discs and repeat the above procedure until the correct disc stack pressure is obtained.

The vertical height of a disc with 0,6 mm caulk is 1,7 mm.

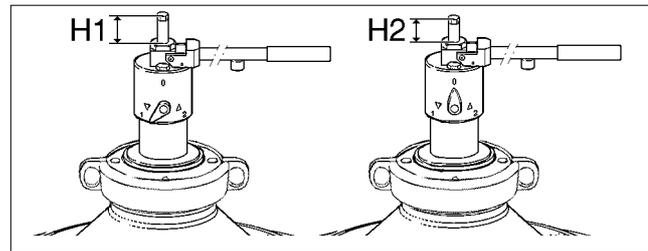
The vertical height of a disc with 1,0 mm caulk is 2,3 mm.

The vertical height of a disc with 2,0 mm caulk is 3,8 mm.

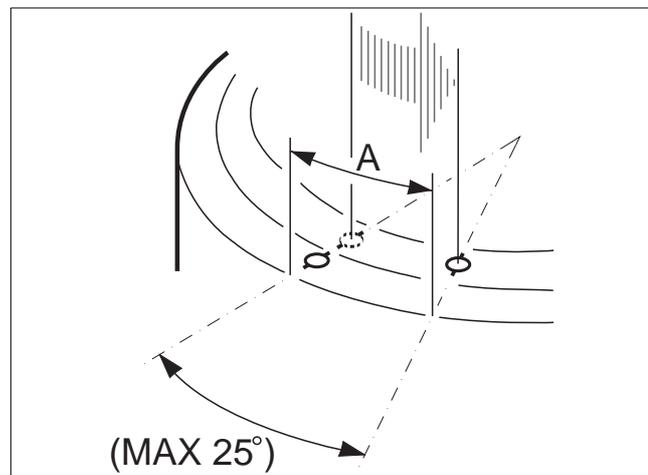
- e. If the assembly marks have passed each other by more than 25° after tightening the lock ring, contact your Alfa Laval representative.

NOTE

The assembly marks must never pass each other more than 25° which corresponds to A=150 mm.



Measure of disc stack pressure with use of a compressing tool



25° corresponds to A=150 mm

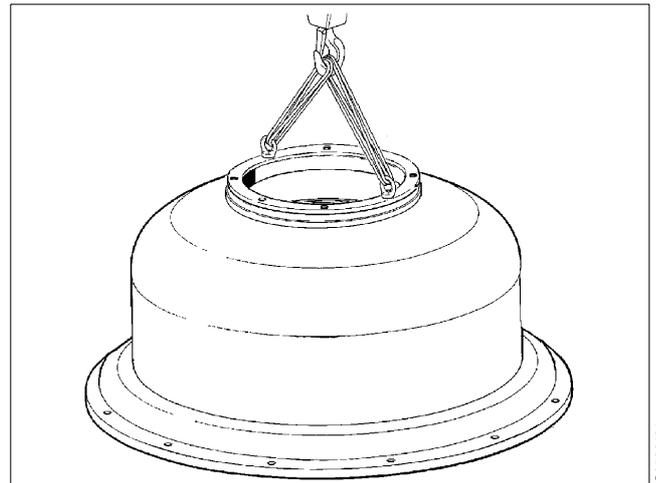
- f. Release the pressure in the compressing tool by turning the control lever to position 0 and then remove the compressing and lifting tools.

Control of height position

Alfa Laval ref. 538596, rev. 0

The height position should normally not be checked at Intermediate Service but when the bowl spindle has been removed (each Major Service) or when the bowl has been replaced.

When checking the height position, first put the frame hood in place and tighten it with the twelve screws.



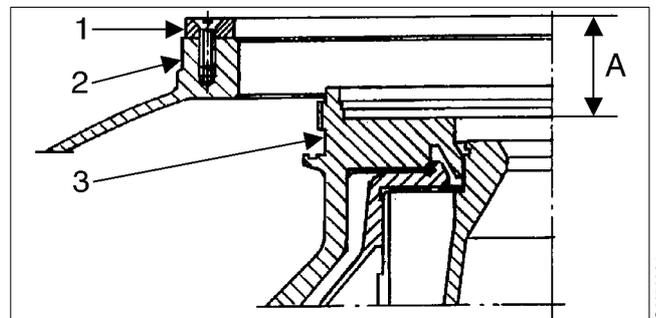
G0668131

The height position of the outlet paring discs in the in- and outlet device is decided by the position of the bowl hood (3) in relation to the height adjusting ring (1) on the frame hood (2).

The tolerances are narrow and therefore it is of great importance that the parts are well cleaned and free from burrs.

- Measure the distance (A) according to the illustration. The distance should be **74,5 ±0,7 mm**.
- Adjust the distance by replacing the height adjusting ring (1). Five rings with different thicknesses are delivered with the separator.

After the height position has been checked, remove the frame hood.



G06788A1

Measurement of distance A

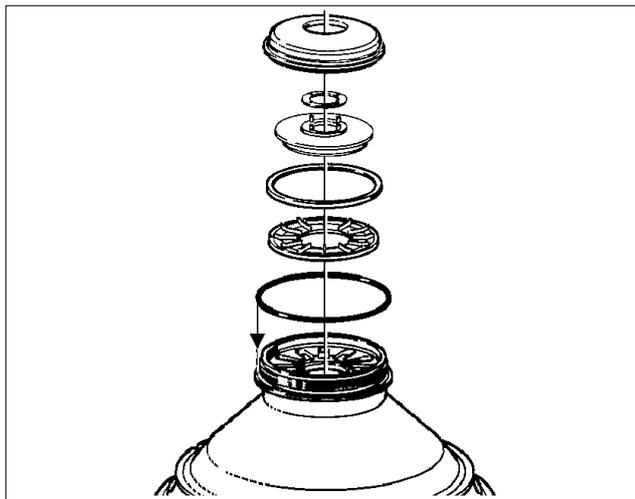
1. Height adjusting ring
2. Frame hood
3. Bowl hood

The height adjusting ring (1) is fixed to the frame hood (2) by screws

11. Fit:

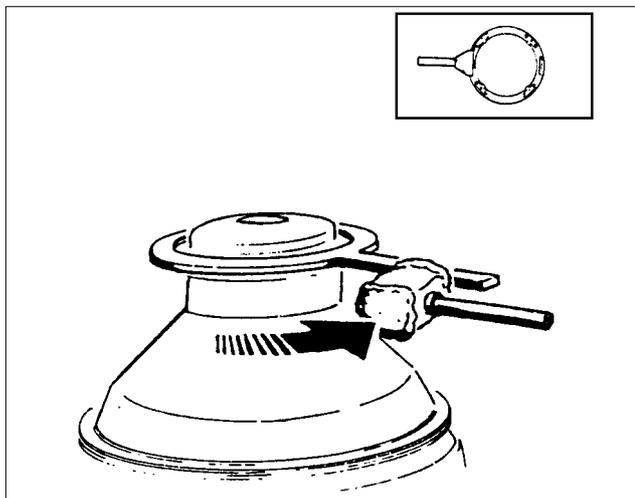
- O-ring,
- gravity disc,
- gasket,
- paring disc,
- gasket,
- paring chamber top part.

Some of the above parts have guide pins. Check that these guide pins enter corresponding holes for correct assembly.



12. Lubricate the small lock ring with Molykote 1000 and tighten it using the special spanner.

Left-hand thread!



3.4.6 Inlet/outlet, frame hood

The figures within brackets below refer to the exploded view on page 50.

1. Renew and lubricate with silicone grease the rectangular rings (3, 5, 7) and seal ring (8) which are included in the IS-kit.
2. Place the frame hood (12) in place on the frame top part (14) and tighten it with the twelve screws (13).
3. Fit the discharge cover (11) and secure it with the four screws (10).
4. Fit the inlet pipe (9) and tighten it firmly.

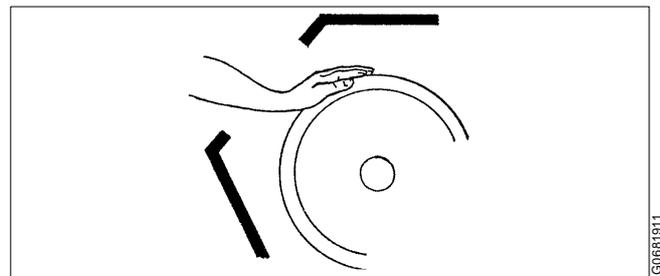
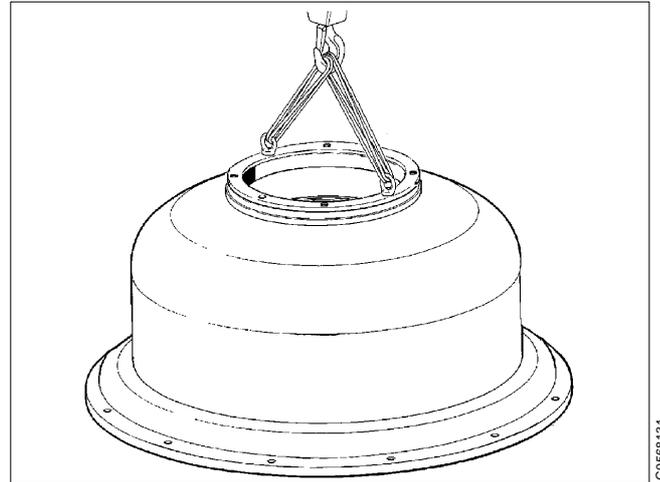
Left-hand thread!



5. Connect the inlet bend (4) and the in and outlet connections (1-2).



6. When the in and outlet device is assembled, revolve the worm wheel shaft by hand. If it turns heavily or if a scraping noise is heard, wrong height adjustment of the in and outlet device or wrong fitting of the inlet pipe may be the cause.



NOTE

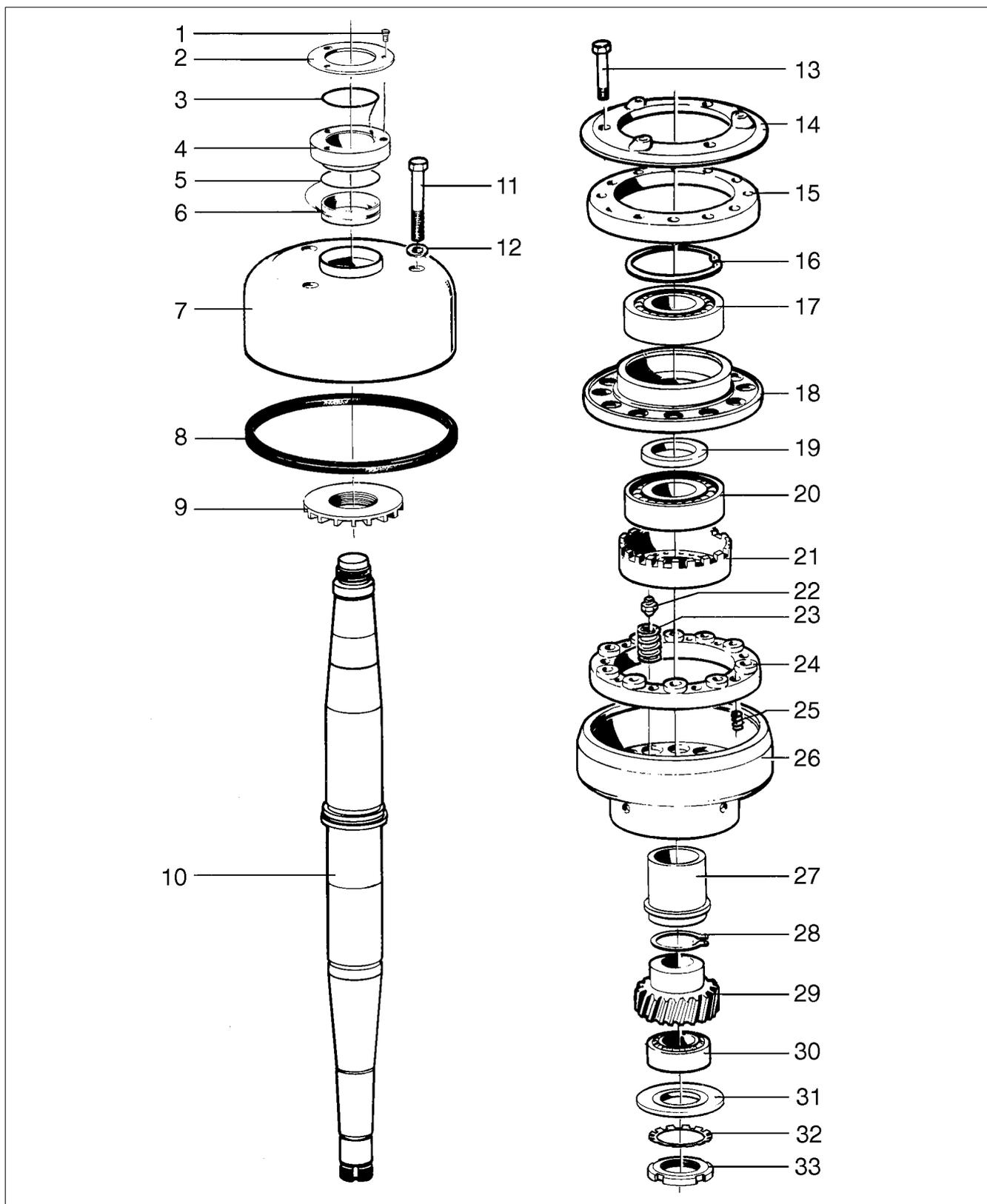
When starting a separator after finishing the maintenance work, follow the directions given in chapters *Ready for start* and *Start* in the *Operator's Manual*.

3.5 Major Service (MS), dismantling

3.5.1 Introduction

When carry out a Major Service an Intermediate Service is always included. By that reason it is assumed that the dismantling for Intermediate Service starting on page [50](#) is already done.

3.5.2 Vertical driving device



G0026551

1. *Screw*
2. *Protecting plate*
3. *O-ring*
4. *Protecting collar*
5. *O-ring*
6. *Seal ring*
7. *Guard*
8. *Rectangular ring*
9. *Oil fan*
10. *Bowl spindle*
11. *Screw*
12. *Seal ring*
13. *Screw*
14. *Top bearing cover*
15. *Rubber buffer*
16. *Snap ring*
17. *Ball bearing*
18. *Ball bearing housing*
19. *Spacing sleeve*
20. *Ball bearing*
21. *Bearing housing*
22. *Guide pin*
23. *Compression spring*
24. *Rubber buffer*
25. *Spring*
26. *Top bearing support*
27. *Sleeve*
28. *Snap ring*
29. *Worm*
30. *Ball bearing*
31. *Washer*
32. *Lock washer*
33. *Round nut*

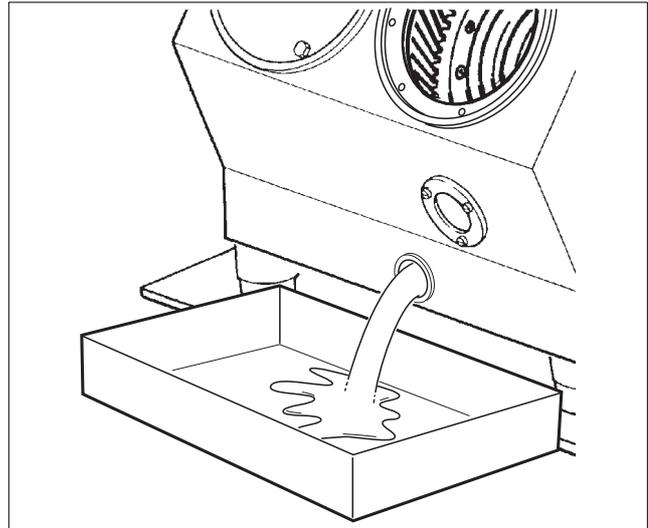
NOTE

Clean the space in the bowl casing thoroughly before starting to dismantle the bowl spindle to prevent contaminations falling down into the oil gear housing.

1. Place a collecting tray under the oil drain hole. Remove the cover and the drain plug and let the oil be drained from the worm gear housing.

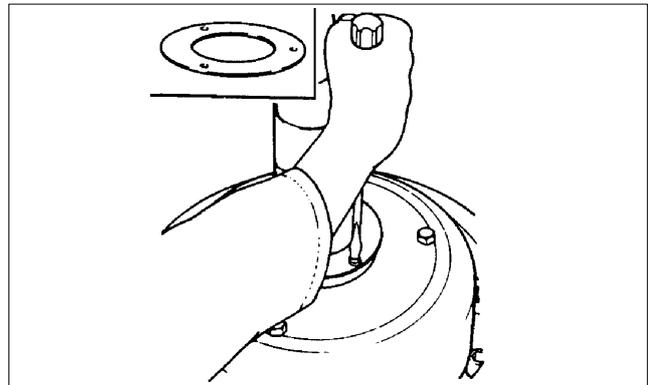
**CAUTION****Burn hazard**

Lubricating oil and various machine surfaces can be hot and cause burns.



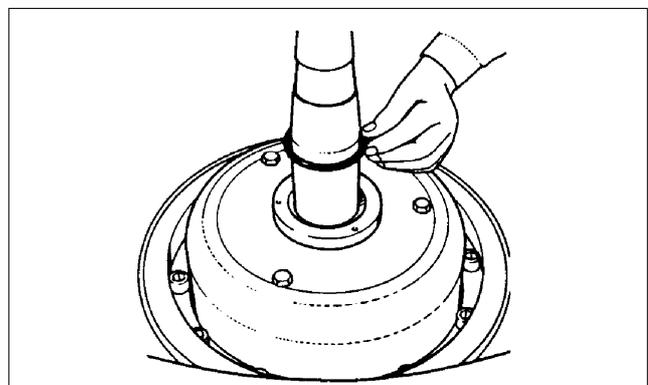
G0484241

2. Unscrew the three screws and remove the protecting plate.



G0675411

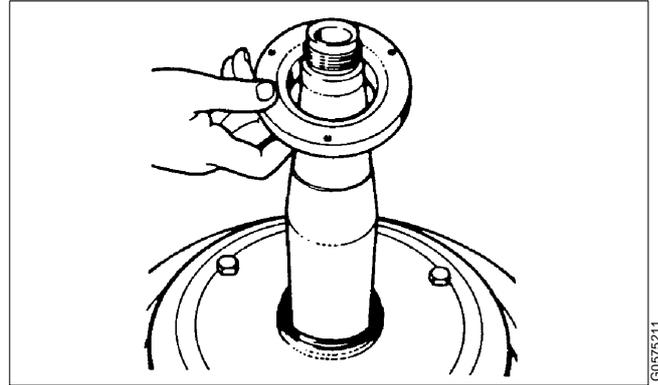
3. Remove the O-ring fitted above the protecting collar.



G0575311

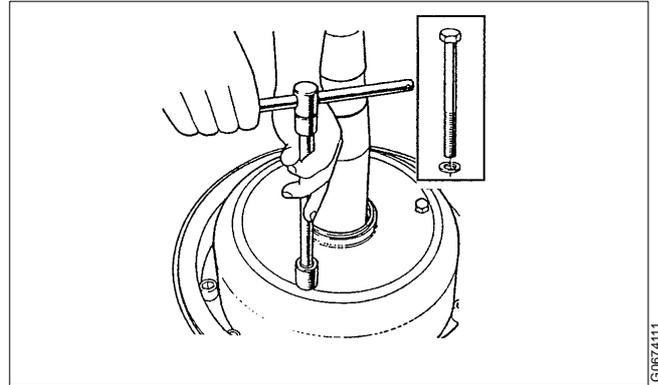
4. Pull off the protecting collar.

Note! No threads.



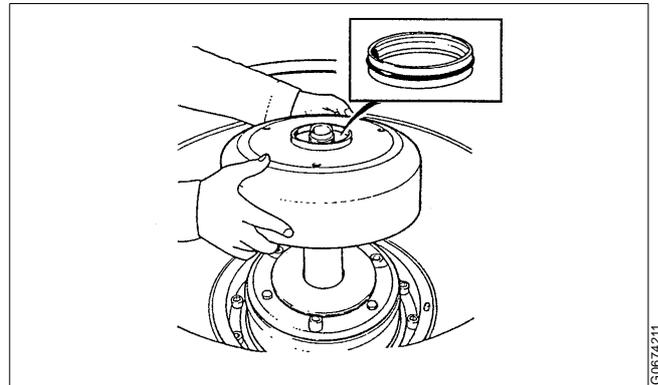
G0575211

5. Unscrew the three screws and remove the guard.



G0674111

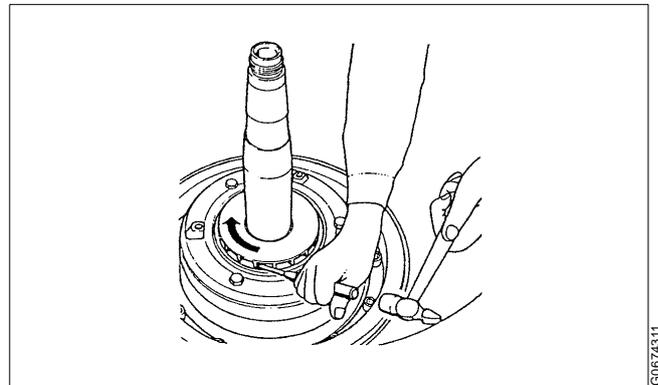
6. Remove the seal ring fitted in the guard.



G0674211

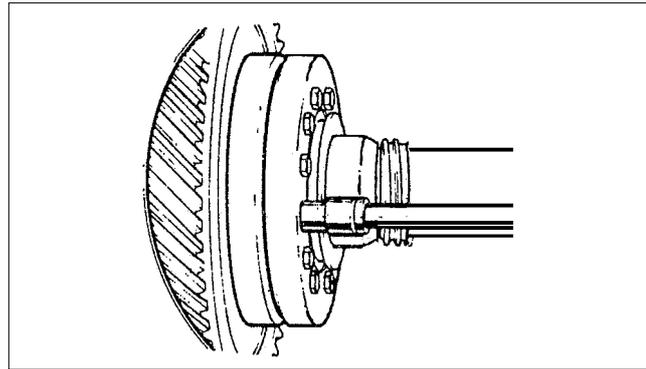
7. Remove the oil fan by hitting with light blows on the wings.

Left-hand thread!



G0674311

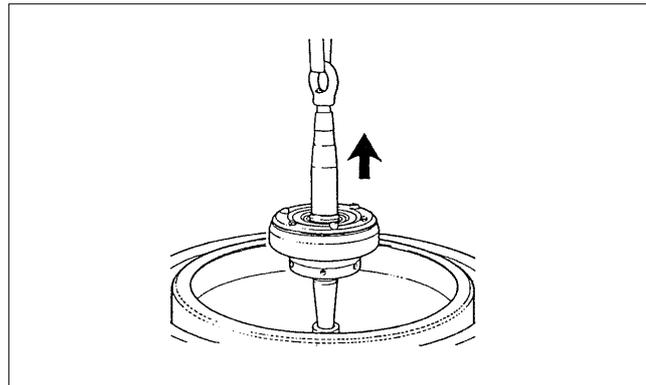
8. On the horizontal driving device, loosen the screws in the clamping element uniformly and successively in the order shown in the illustration. In the first step, do not loosen the screws more than $\frac{1}{4}$ turn to avoid distortion in the clamping element. Do not unscrew the screws entirely.



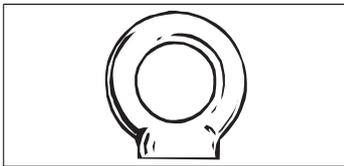
G0207831

9. Push the worm wheel to one side before lifting the spindle.

10. Fit the lifting tool onto the spindle and lift it out by using a hoist.
To avoid damaging the teeth, lift slowly and with great care.

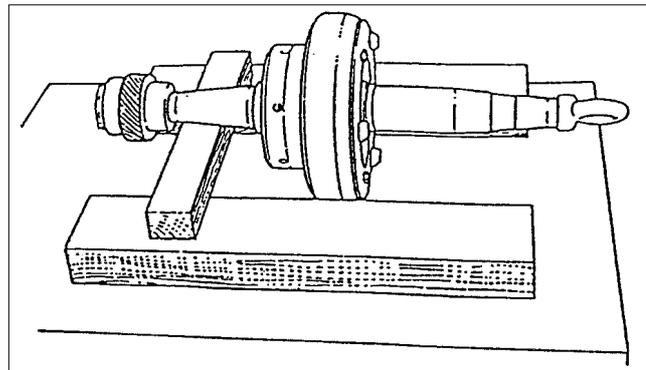


G0674411



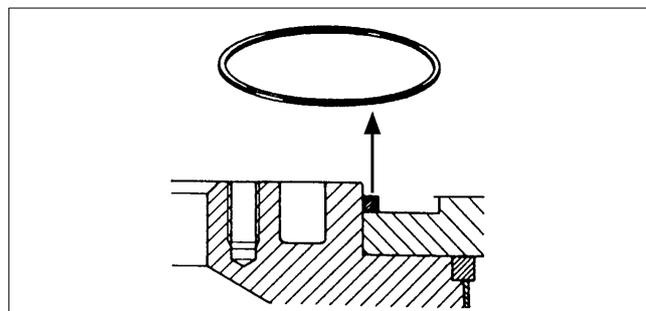
S0089111

11. Place the spindle on a wooden support, which will be useful during certain sub-operations.



G0674521

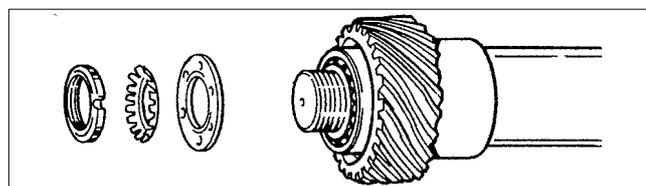
12. Remove the rectangular ring from the frame.



G0574921

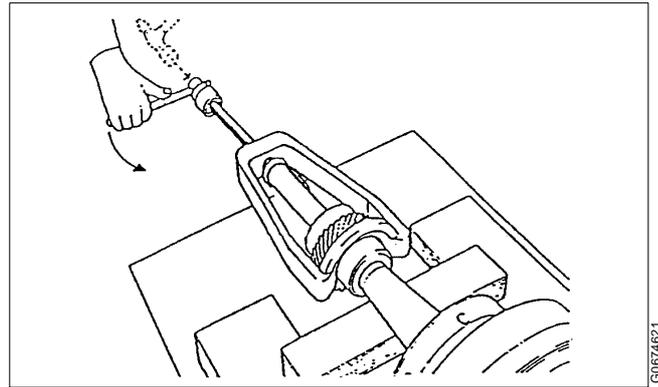
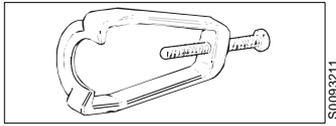
13. Open the lock washer and loosen the round nut.

14. Remove the round nut, the lock washer and the spacing washer.

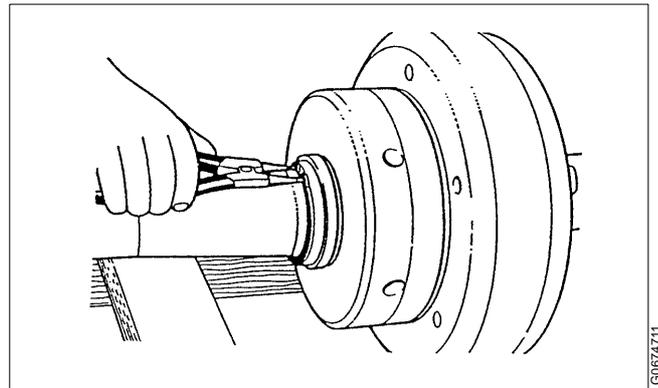


G0168311

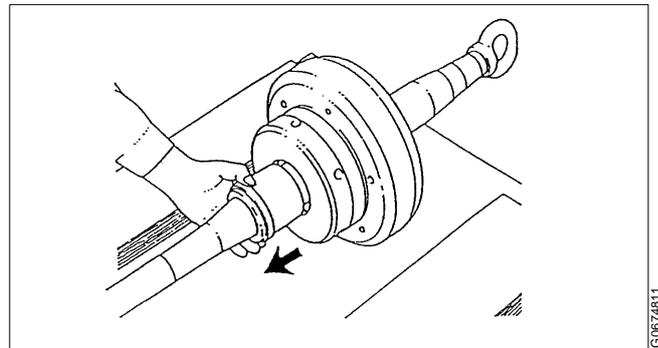
15. Pull off the worm together with the roller bearing.
Now and then hit on the head of the centre screw.



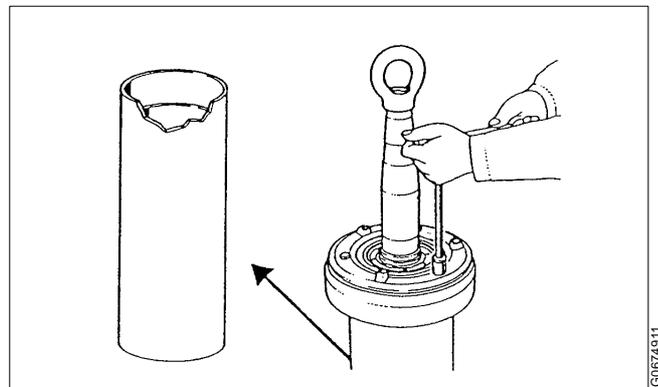
16. Remove the snap ring.



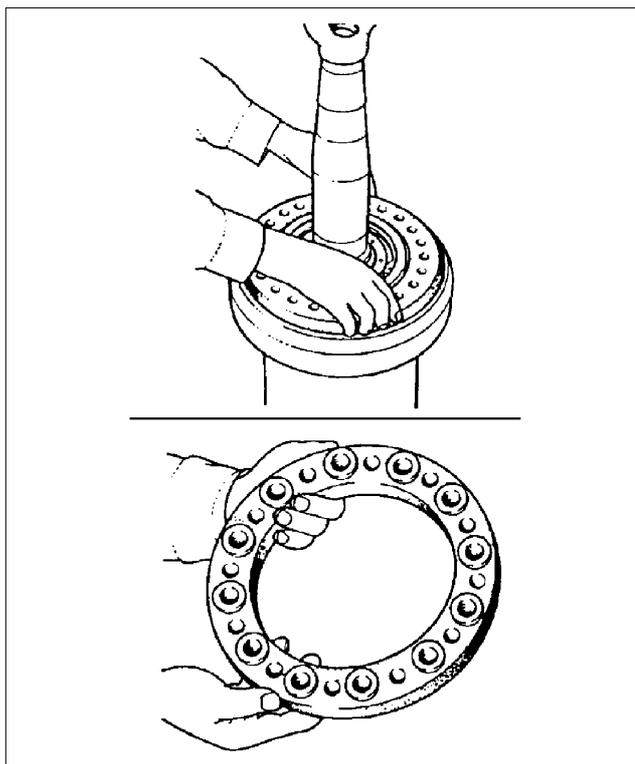
17. Pull off the sleeve.
Note! No thread.



18. Lift the spindle into the mounting tube.
19. Remove the three screws fixing the top bearing cover to the top bearing support.
Loosen the screws alternately and a little at a time.
20. Remove the top bearing cover.

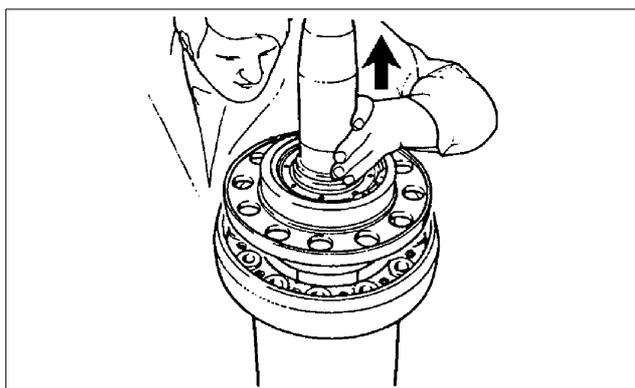


21. Remove the upper rubber buffer (not provided with springs).



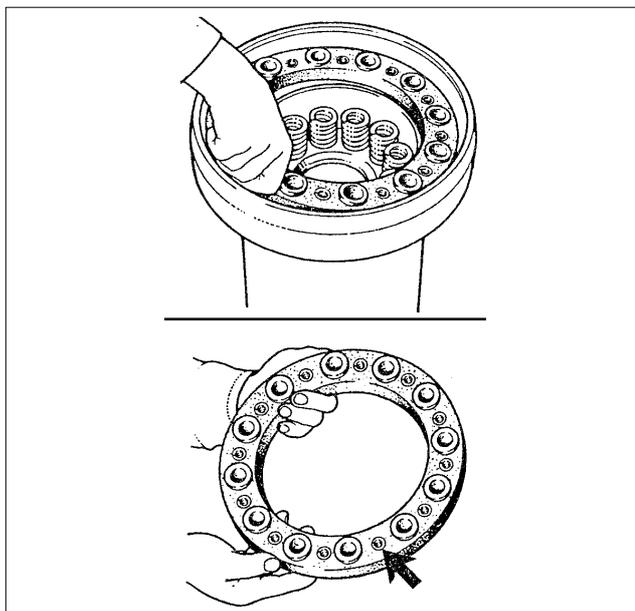
G0573011

22. Lift the spindle out of the spring support.



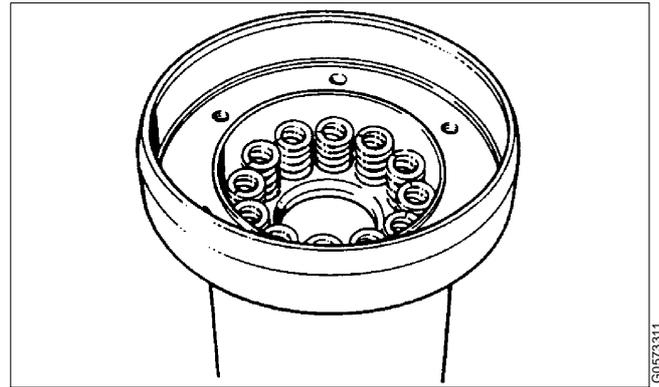
G0573111

23. Remove the lower rubber buffer (provided with springs) from the top bearing support.

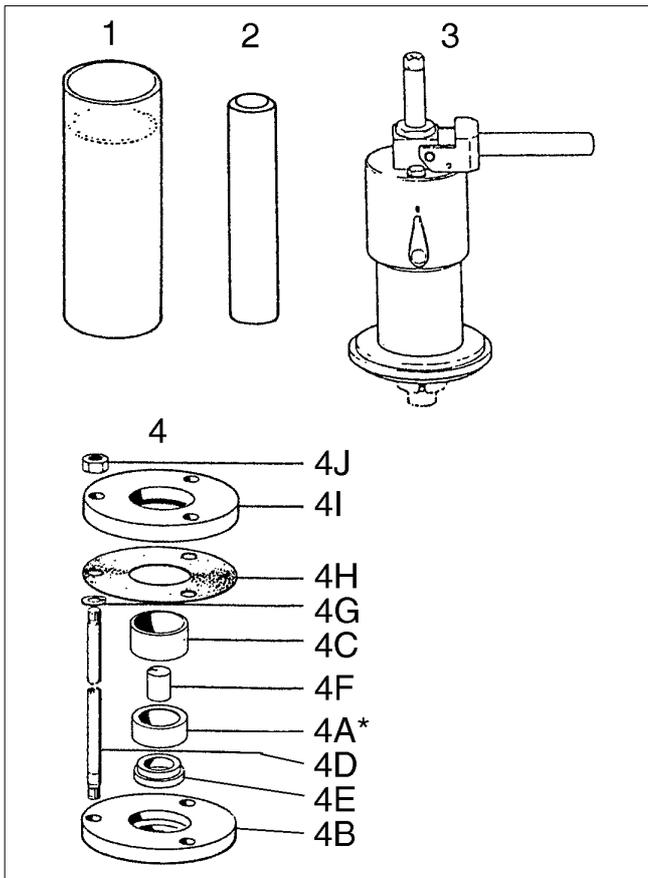


G0573211

24. Remove the springs from the top bearing support.
25. Then remove the top bearing support from the mounting tube.



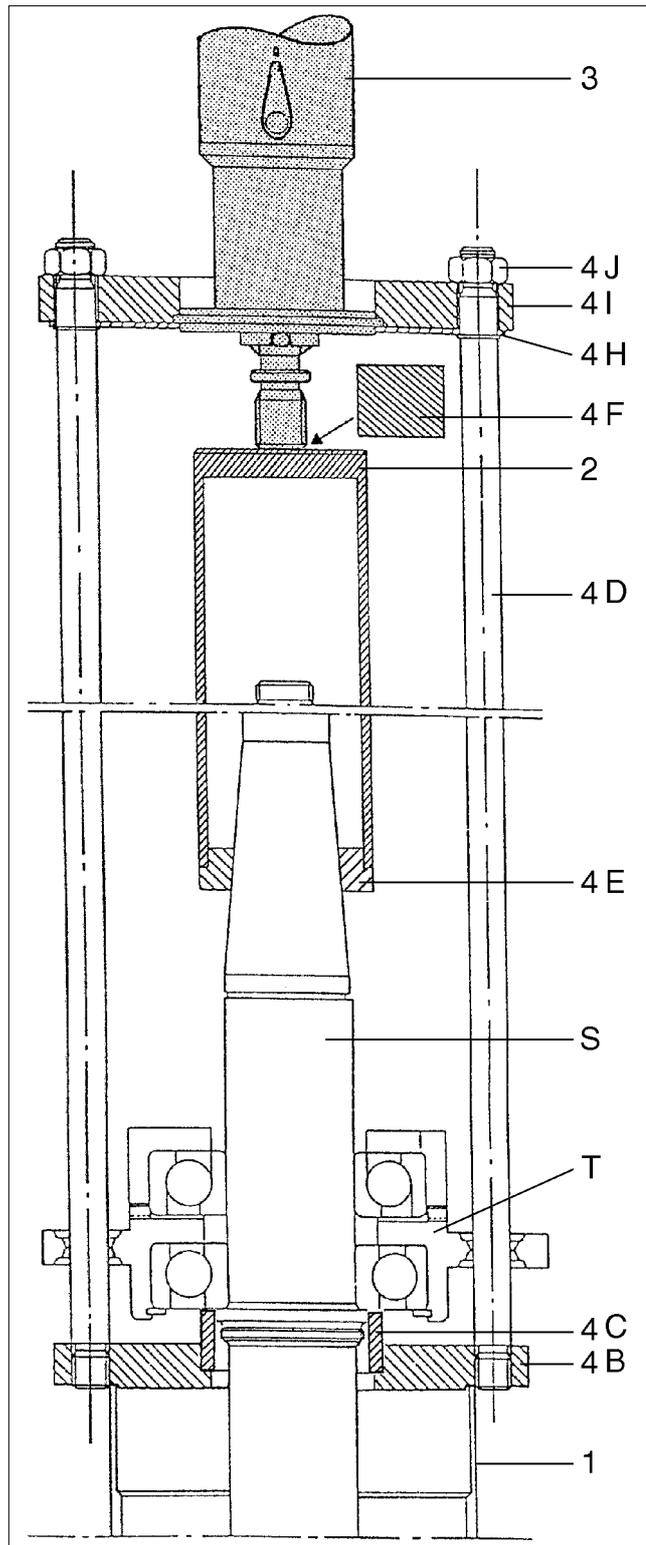
G0573311



- 1. Tube
- 2. End tube
- 3. Compressing tool
- 4. Dismantling and assembly tool
- 4A.* Ring
- 4B. Plate, lower
- 4C. Sleeve
- 4D. Bar
- 4E. Support ring
- 4F. Intermediate part
- 4G. Snap ring (normally mounted on the bar)
- 4H. Washer
- 4I. Plate, upper
- 4J. Nut

- S. Bowl spindle
- T. Bearing support

* Not used at dismantling

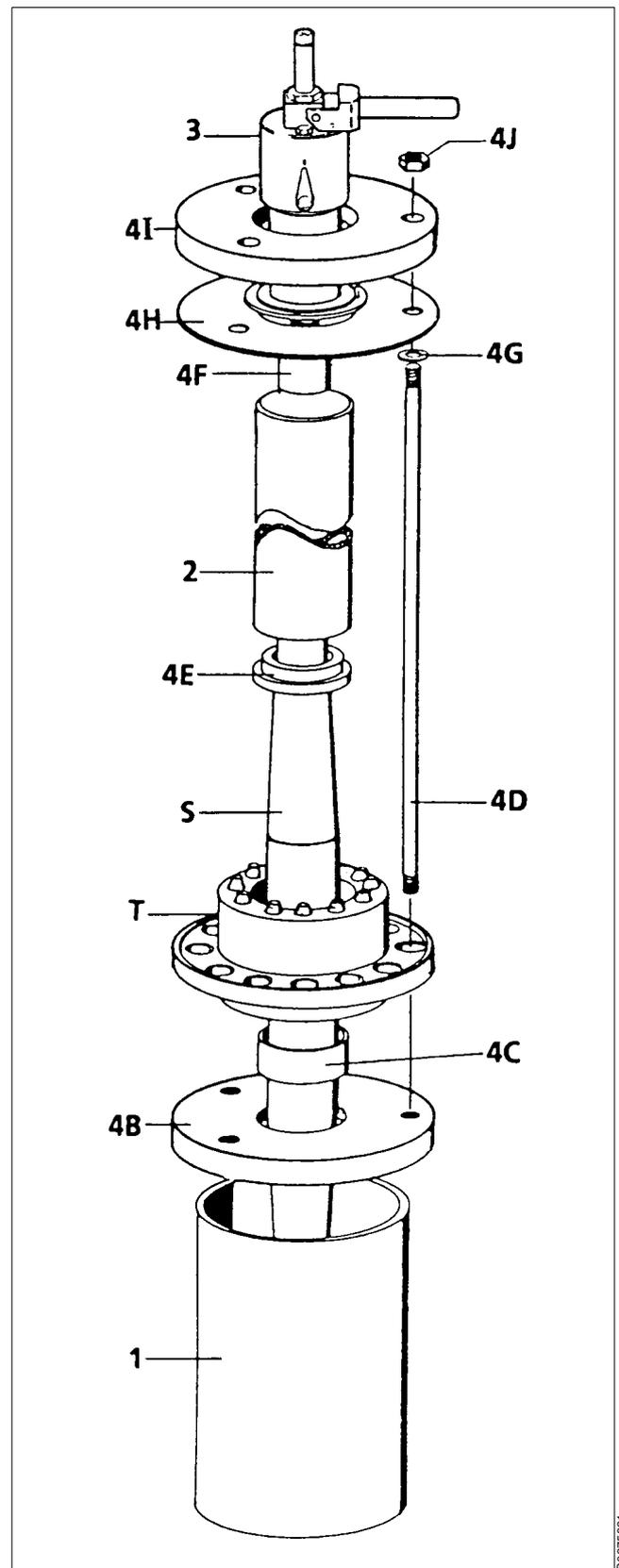


26. Dismantle the top bearing support from the spindle in the following way:
- Arrange the tube (1) on a firm support. Fill the tube with rags to protect the spindle from damage when pressing out.
 - Fit the bottom plate (4B) on the tube (1).
 - Fit the sleeve (4C) with inside diameter $\varnothing 90$ mm on the bottom plate (4B).
 - Place the spindle (S) upside down in the bottom plate (4B). Check that the inner race of the ball bearing is in contact with the face of the sleeve (4C).
 - Mount the three bars (4D) by fitting them through the holes in the top bearing support (T) and screwing them into the bottom plate (4B).
 - Fit the support ring (4E) on spindle (S).

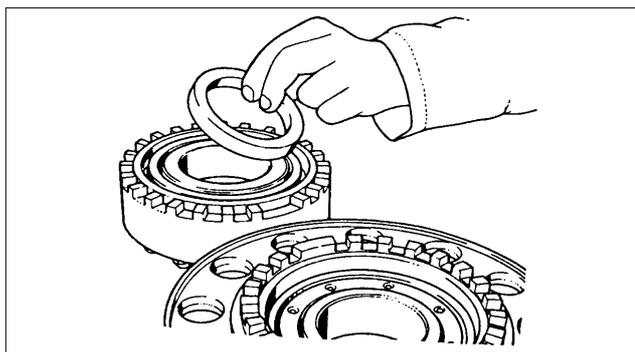
Note! The inside diameter of the ring is tapered.
 - Fit the end tube (2) over the spindle (S) and let it rest on the support ring (4E).
 - Check that the snap rings (4G) is fitted. Then fit the washer (4H) for the compressing tool (3) onto the rods (4D).
 - Fit the compressing tool (3).

Note! The piston must be in top position.
 - Fit the top plate (4I) and secure the assembly with the three nuts (4J).
 - Set the control lever of the compressing tool (3) in position 2. Then pump until the piston has reached the bottom position.
 - Set the control lever in position 1. Pump until the piston reaches its upper position.
 - Place the intermediate part (4F) between the piston and the end tube (2).
 - Set the control lever in position 2 again and continue to pump until the spindle is pressed out of the ball bearings.

Note! Pump slowly during the final stage of pressing out to avoid damage to the spindle when it falls down.

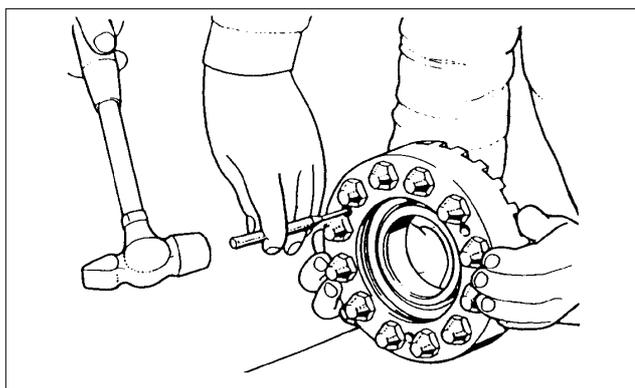


27. The parts pressed off the spindle are the upper and lower ball bearing housings and the spacing sleeve.



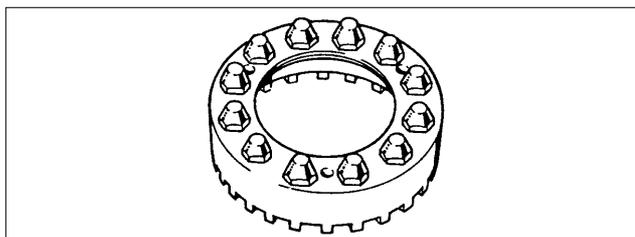
G0573411

28. Force out the ball bearing from the lower ball bearing housing.



G0573521

29. Check the guide pins.
Replace any damaged pins but do not loosen the others.



G0573611

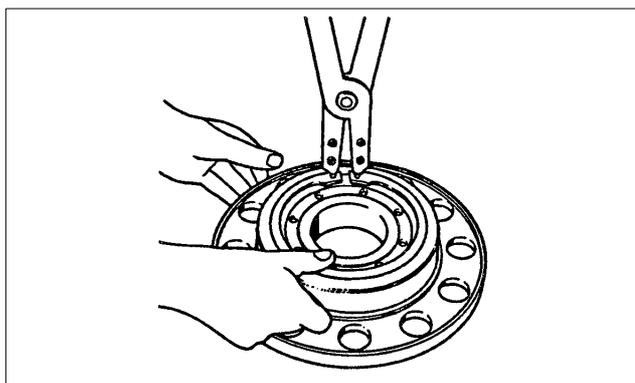
30. Remove the snap ring from the upper ball bearing housing.



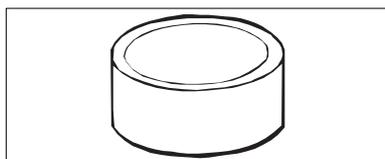
WARNING

Risk for eye injury

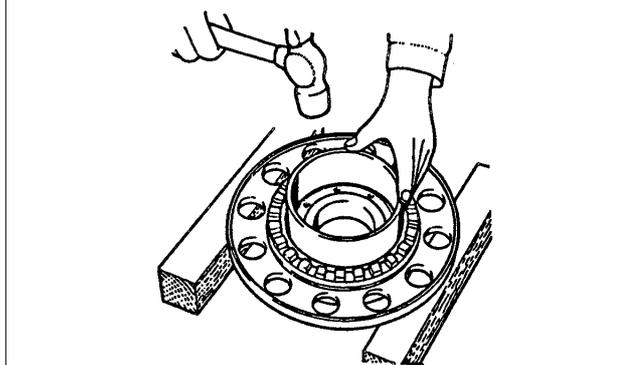
Use the correct pliers for the snap ring to avoid accidental release.



31. Force out the ball bearing.

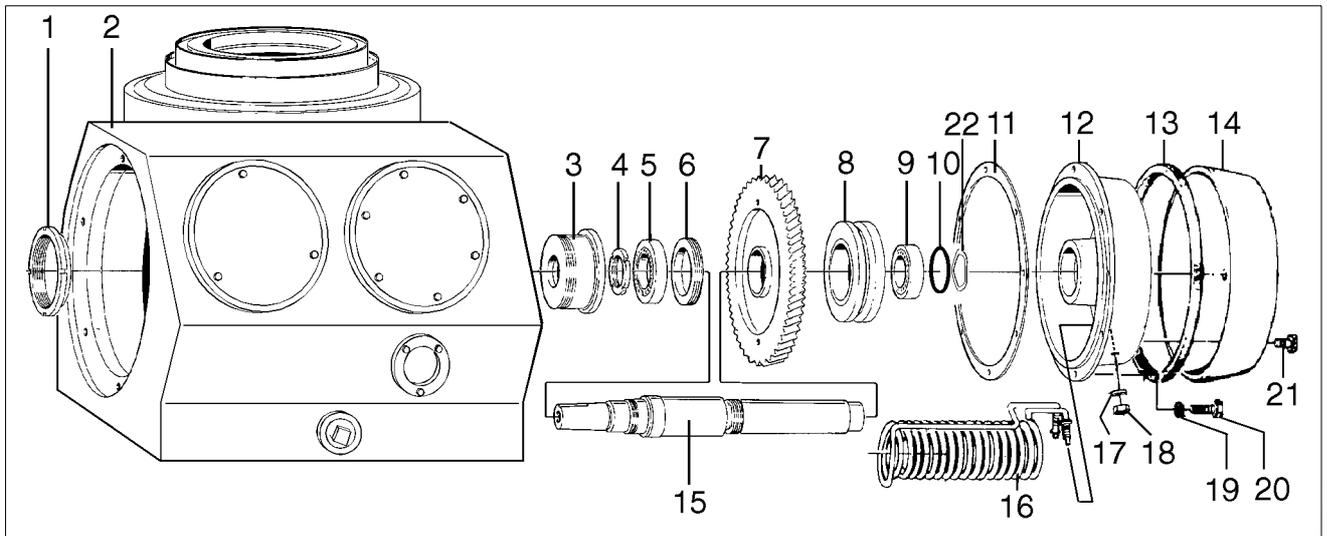


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G0573711

3.5.3 Horizontal driving device



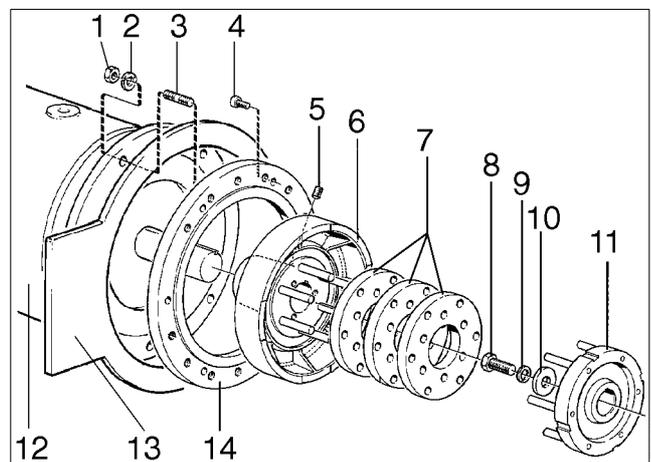
Worm gear end

- | | | |
|-----------------------|-----------------------|----------------------|
| 1.* Round nut | 8. Clamp element | 15. Worm wheel shaft |
| 2. Frame bottom part | 9. Small ball bearing | 16. Cooling coil |
| 3.* Bearing housing | 10. O-ring | 17. Washer |
| 4. Round nut | 11. Gasket | 18. Nut |
| 5. Large ball bearing | 12. Bearing shield | 19. Washer |
| 6. Lock ring | 13. Seal strip | 20. Screw |
| 7. Worm wheel | 14. Guard | 21. Screw |
| | | 22. Corrugated shim |

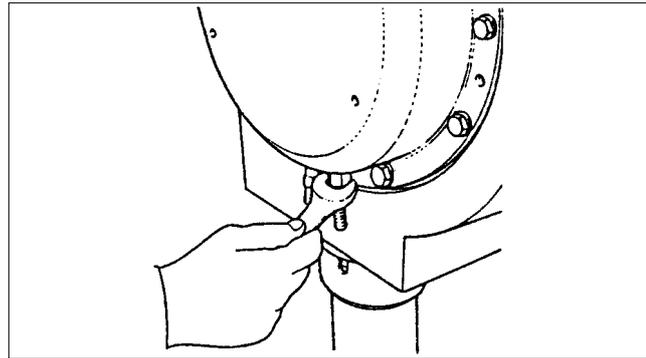
* The bearing housing should normally remain sitting in the frame. It should be dismantled only when it is necessary to replace it or when the separator is to be reconditioned. When fitting a new bearing housing, apply Loctite 601 on its guiding surface against the frame.

Drive motor end

1. Nut
2. Washer
3. Stud bolt
4. Screw
5. Stop screw
6. Brake pulley
7. Elastic plate
8. Screw
9. Spring washer
10. Washer
11. Coupling disc
12. Electric motor
13. Guide ring
14. Motor adapter

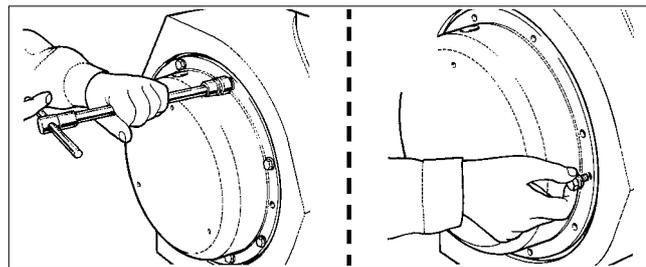


1. Remove the guard covering the bearing shield.
2. Shut off the water supply and disconnect the cooling water connections to the cooling coil in the worm gear housing.
3. Remove the nuts and washers fixing the cooling coil to the bearing shield and press the two tube ends up into the bearing shield.

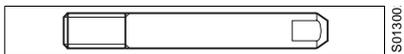


G0797911

4. Remove the bearing shield: ease it off by means of two of the fastening screws.
To prevent dropping the bearing shield during dismantling, first fit the two guide pins included in the tool kit.



G0212421



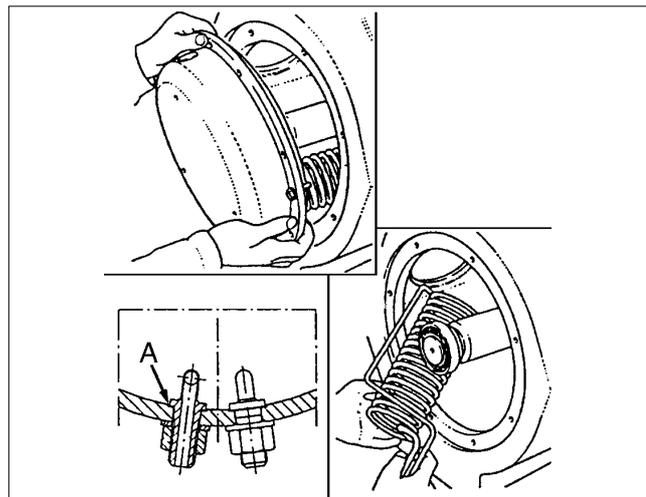
S01300

CAUTION

Crush hazard

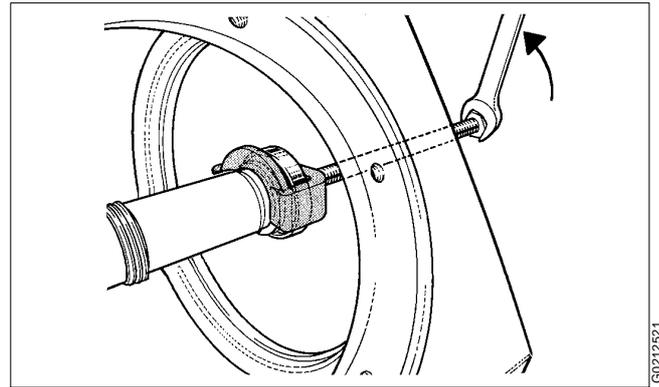
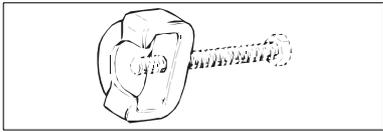
The shield is quite heavy (15 kg cast iron). Hold the shield firmly.

5. Lift out the cooling coil, take care of the gaskets (A).



G0798011

6. Fit the puller tool and pull off the ball bearing from the worm wheel shaft.

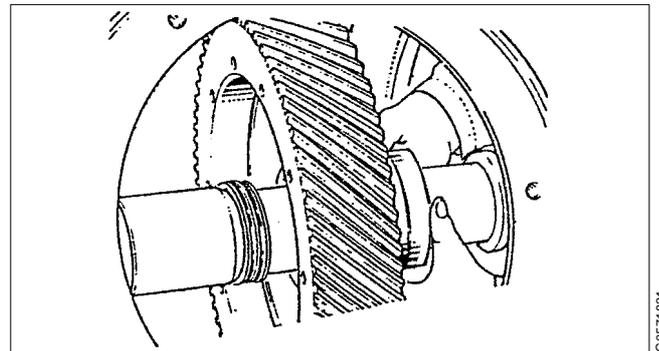


7. Remove the worm wheel and clamping element.

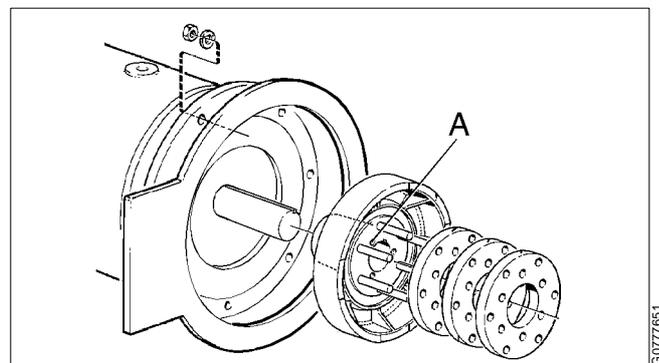
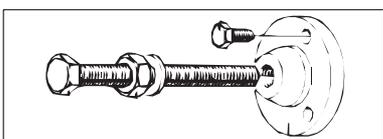
CAUTION

Crush hazard

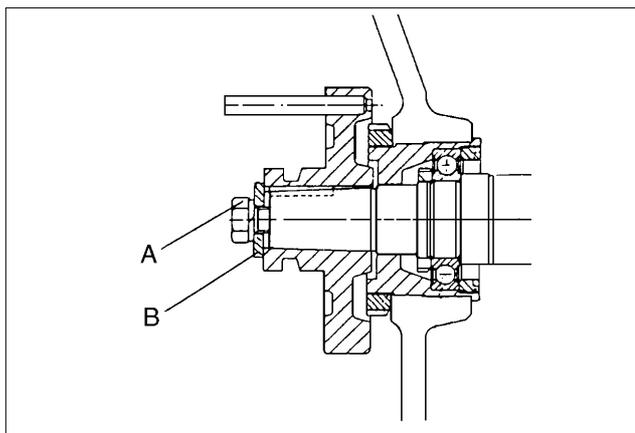
The worm wheel is quite heavy. Hold it firmly when dismantling. Risk for jamming injury.



8. Remove the protecting housing covering the electric motor.
9. Disconnect the motor cables. Note the positions of cables in the terminal box to re-connect correctly (for correct direction of rotation).
10. Hook up the motor in a hoist and loosen the motor from the separator frame. Pull out the motor carefully.
11. Take care of the guide ring.
12. Remove the three elastic plates.
13. If the brake pulley has to be dismantled, use the tool illustrated below together with a washer to protect the threaded hole in the motor shaft. But first unscrew the stop screw. Fit the tool in the three holes (A).

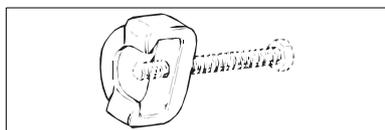


14. To remove the coupling disc from the horizontal driving shaft, unscrew the centre screw (A) and remove the plain washer (B). Then tighten the screw (A) again to protect the worm wheel shaft during next operation.

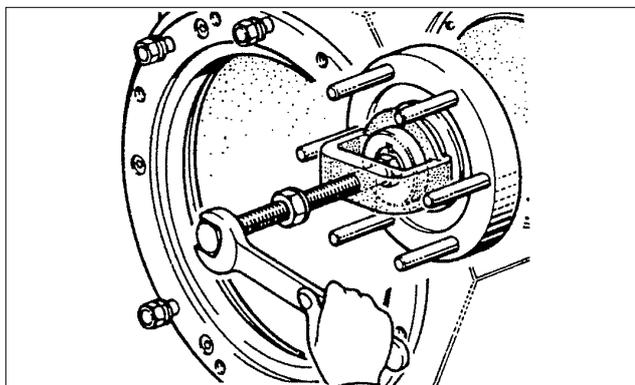


G0462711

15. Fit the puller tool illustrated below and pull off the coupling disc.



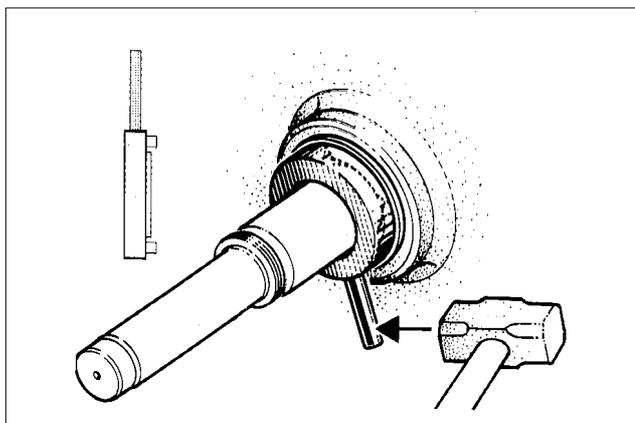
S0092911



G0484111

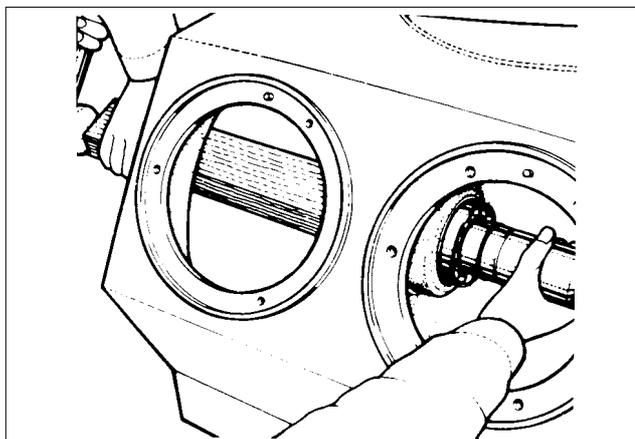
16. Remove the lock ring on the worm wheel side.

Left-hand thread!



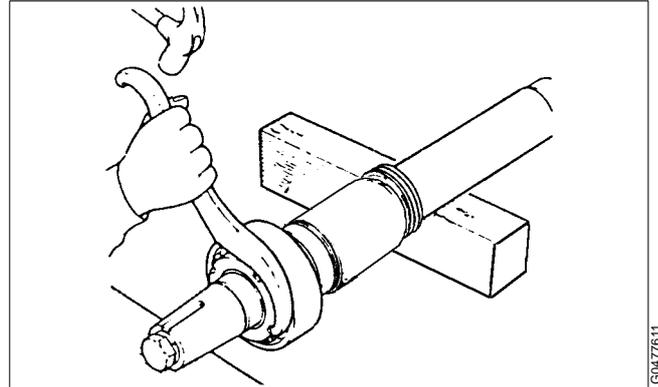
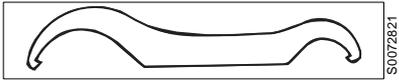
G0192311

17. Knock loose the worm wheel shaft by means of a piece of wood and a tin hammer. Use light blows from the motor side.

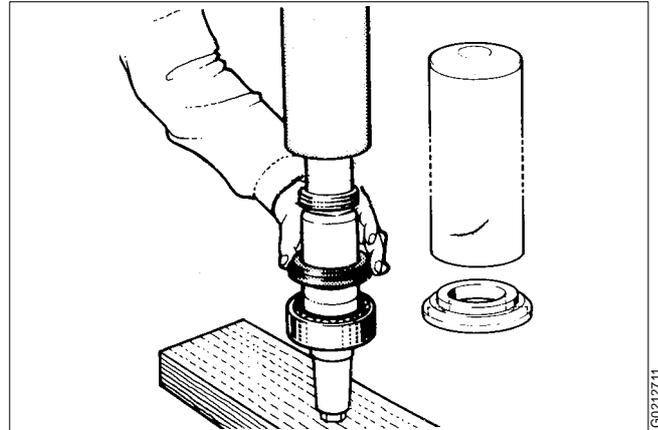


G0213421

18. Unscrew the round nut fixing the ball bearing.



19. Remove the ball bearing. Put some cotton twist into the tool to avoid damage to the shaft. The pressure should be applied to the inner race of the ball bearing.



After dismantled all parts for Major Service, remove any deposits from the internal of the frame bottom part and clean all other parts thoroughly in a suitable cleaning agent. See chapter “[2.3 Cleaning](#)” on page 26.

3.6 Major Service (MS), check points

3.6.1 Introduction

This chapter consists of check points that can be done when the separator has been dismantled for Major Service but before it is assembled. Other check points that can be done only in conjunction with the assembly are described in the assembly sections.

NOTE

At Major Service the check points for Intermediate Service starting on page 65 should also be carried out in conjunction with the check points in this chapter.

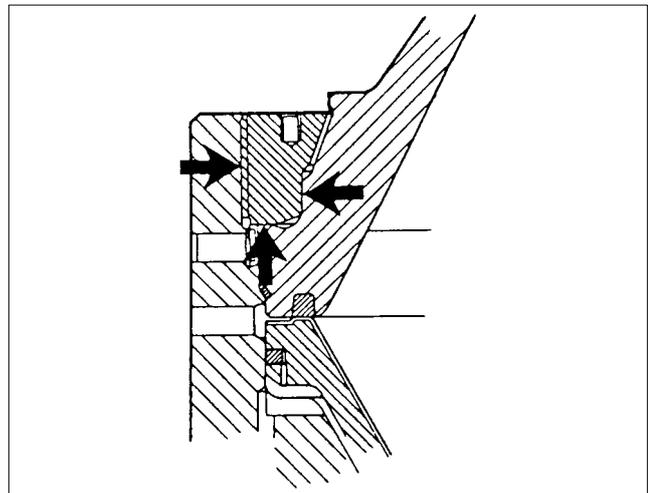
3.6.2 Lock ring; priming

The arrows indicate positions of threads, guide and contact surfaces to be primed.

Recommended agents for priming procedure:

- Degreasing agent
- Slide lacquer Molykote D321R (varnish or spray)
- Small power drill
- 2 fibre brushes

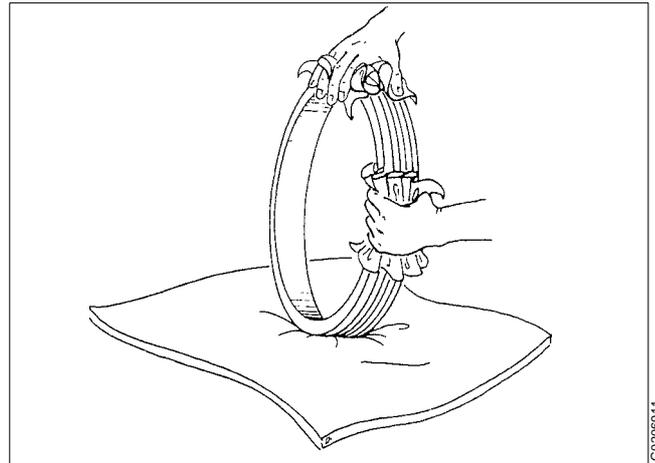
This instruction describes how to treat with Molykote spray D321R.



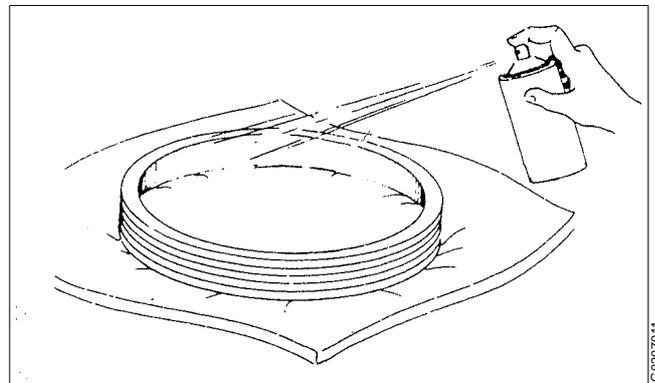
Threads, guide and contact surfaces to be primed

G073211

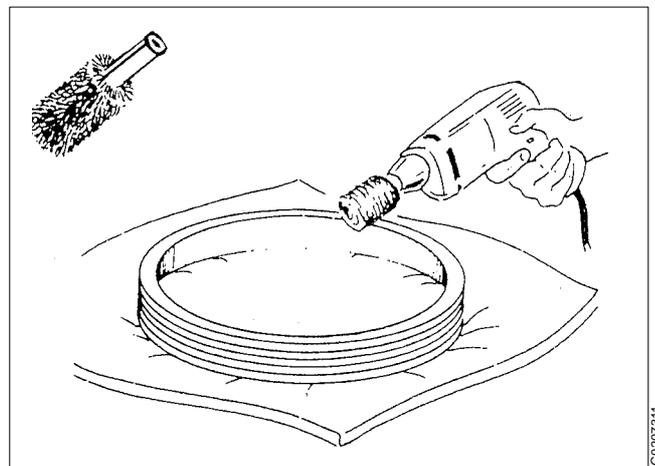
1. Clean the lock ring thoroughly with a degreasing agent and wipe it off.



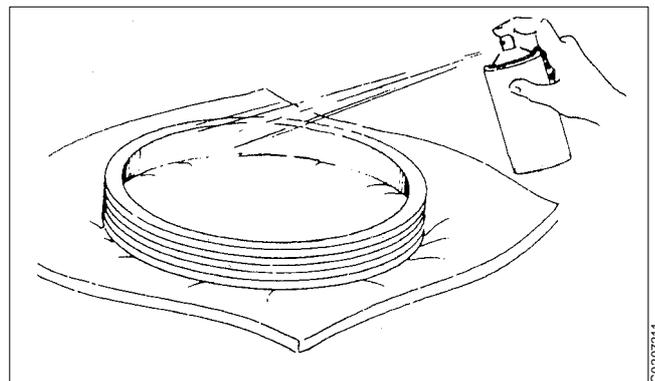
2. Spray the threads, guide and contact surfaces with slide lacquer Molykote D321R. Let the lacquer air-cure for about 15 minutes.



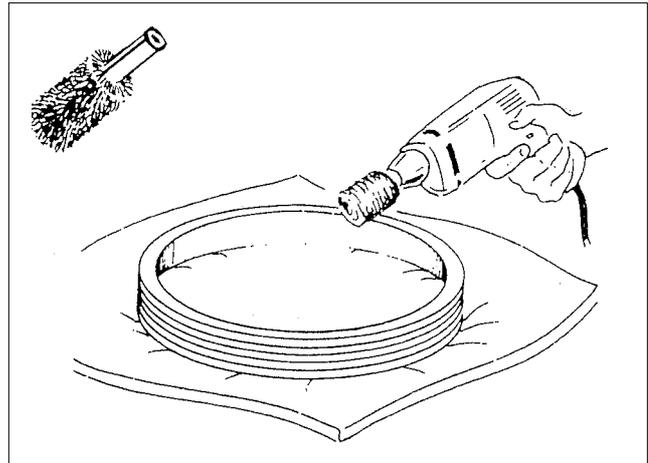
3. Use a fibre brush to polish the slide lacquer into the surface. The black spray will look like well-polished leather when properly finished.



4. Spray the lock ring a second time and let it dry for about 15 minutes.



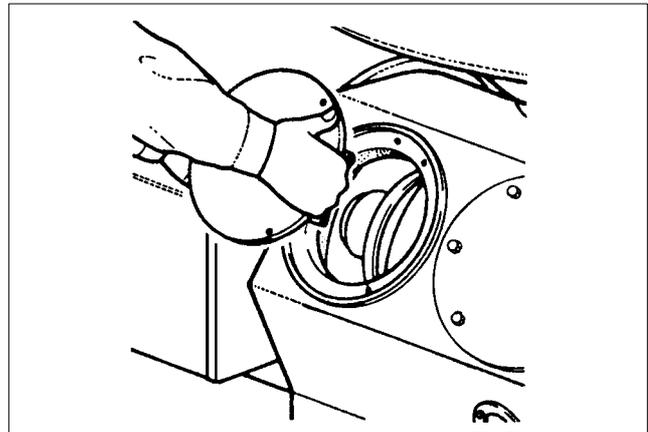
5. Polish the slide lacquer to a black shiny surface which will now last about a year.
Proceed in the same way with the threads of the bowl body and with the guide surfaces of the bowl hood and bowl body.



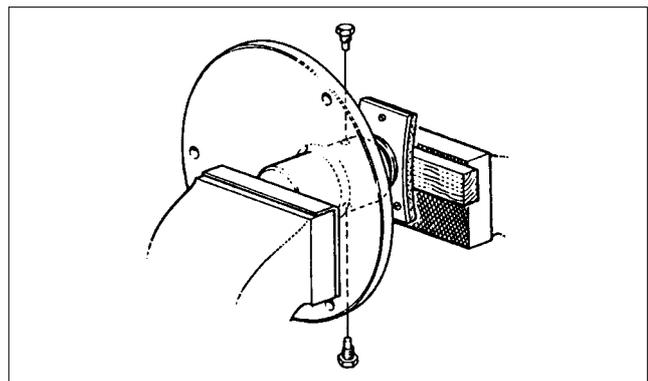
G0207311

3.6.3 Brake

1. Shut off and then disconnect the air supply to the brake.
2. Remove the cover from the separator frame if not already done.
3. Dismantle the brake unit by compressing it in a screw wise and remove the two stop screws (2), see the illustration.



G0575611



G0575651

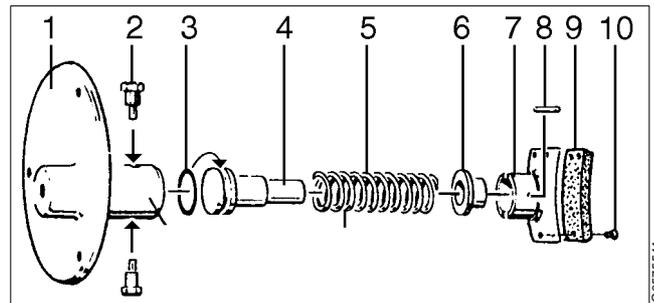


WARNING

Risk for eye injury by flying parts

Be careful when decompressing the unit, the spring power can rip parts.

4. Note that the screws (10) are slotted at both ends.
5. Remove any rust and brake dust from the surface of the brake shoe (7) and the corresponding guiding surface in the cover (1).
Formation of rust on the brake parts may cause the brake to jam.
6. Rub the surfaces for instance with Molykote Paste 1000 or similar.
7. Renew the O-ring (3) and check piston (4) and its cylinder in the cover (1). Rub the cylinder with Molykote Paste 1000 or similar.
8. Renew the spring (5) if it has lost its stiffness.
Oil the spring when assembly.



1. Cover
2. Stop screw
3. O-ring
4. Piston
5. Spring
6. Gland
7. Brake shoe
8. Slotted pin
9. Friction pad
10. Screw

NOTE

When assembly, depress the brake shoe (7) entirely in the cover (1) before tightening the stop screws (2), otherwise the screws may jam the brake shoe.



WARNING

Risk for eye injury by flying parts

Be careful when compressing the unit, the spring power can rip parts.

9. Supply compressed air to the brake unit and check the brake function.
A bad function and/or a worn friction pad will prolong the braking period.
10. Fit a new gasket when mounting the cover on the separator frame.

3.7 Major Service (MS), assembly

3.7.1 Introduction

Before starting the assembly first carry out the Intermediate Service check points starting on page [65](#) and Major Service check points starting on page [120](#).

NOTE

Renew all parts included in the IS- and MS-kits. The O-rings and other sealing rings should be lubricated with grease of silicone type.

When mounting some of the ball bearings and bearing housings on the bowl spindle and worm wheel shaft as described in this chapter, these must be heated in oil to **max. 125 °C**.



WARNING

Burn hazard

Use protective gloves when handling the heated bearings.

NOTE

If any doubt how to mount roller bearings in a correct way, see the detailed description in chapter [“2.7.1 Ball and roller bearings”](#) on [page 41](#).

NOTE

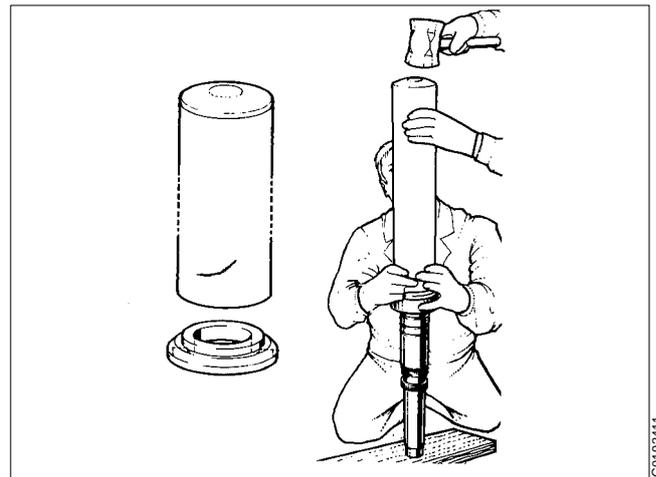
Since roller bearings are normally treated only with rust protection oil from the factory, an initial lubrication of new bearings must always be performed whenever bearings are replaced.

The initial lubrication implies adding a few drops of lube oil to the bearings. Use the same oil type as in the separator worm gear housing.

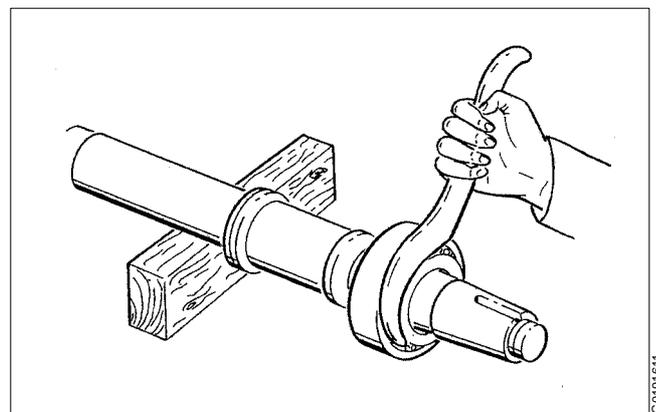
3.7.2 Horizontal driving device

An exploded view of the horizontal driving device can be found on page 130.

1. Clean and oil the seat of the large ball bearing on the worm wheel shaft.
2. Fit the large ball bearing. The bearing is pre-lubricated and sealed with two seals. It should therefore **not** be heated before fitting. If necessary, knock the ball bearing into its seat with the driving-on sleeve tool and the ring.



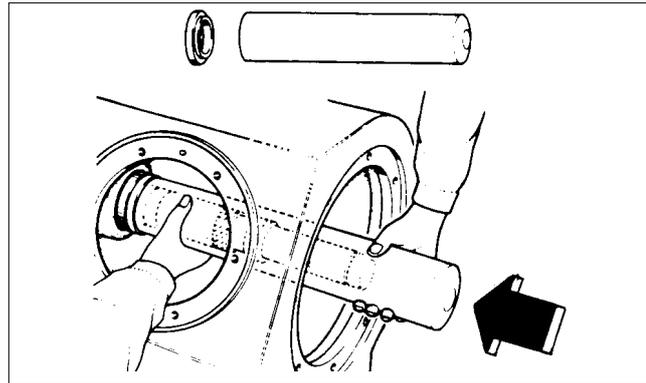
3. Apply some Loctite 243 on the threads of the round nut. Lock the ball bearing in its position by tightening the nut.



4. Clean the ball bearing housing in the frame and oil the outer race of the ball bearing.

NOTE

The bearing must cool down before fitting the worm wheel shaft into the frame. Otherwise the tolerance between the outer diameter of the bearing and the bearing housing will be too narrow.

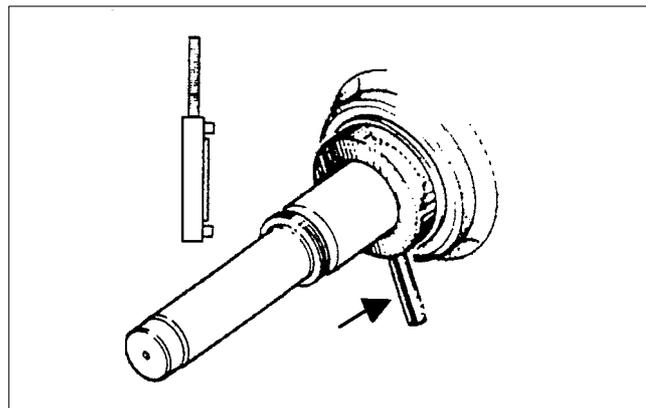


G0213521

Force the worm wheel shaft into its position in the frame so that the ball bearing enters correctly into its seat. Use the driving-on sleeve and the ring forcing the outer race of the ball bearing.

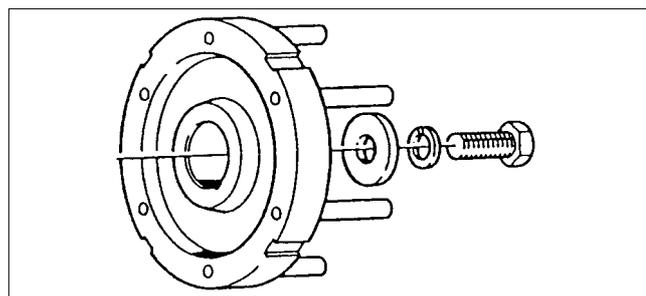
5. Fit the lock ring. Tighten it with the pin spanner.

Left-hand thread!



G0246011

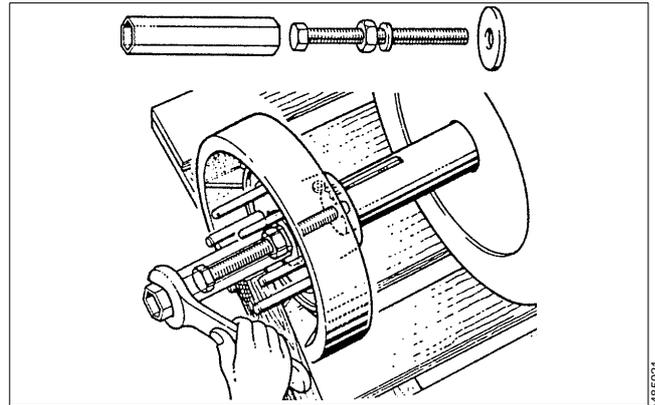
6. Fit the coupling disc. Check that the key in the worm wheel shaft enters into the recess in the nave of the disc.
7. Lock the coupling disc in its position by means of the plain washer, spring washer and centre screw.



G0777711

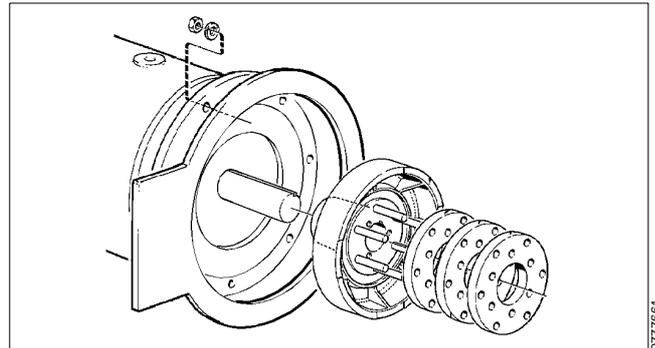
8. If the brake pulley has been removed, first lubricate the motor shaft with Molykote Paste 1000. Then knock the disc on to the motor shaft as far as possible using a piece of wood and a hammer.

Screw the tool illustrated into the motor shaft as far it goes and apply some grease to its washer. Then turn the tool until the pulley is in position. Lock with the lock screw.



G0485921

9. Fit the three elastic plates (included in the MS-kit).
10. Fit the electric motor, using a hoist.

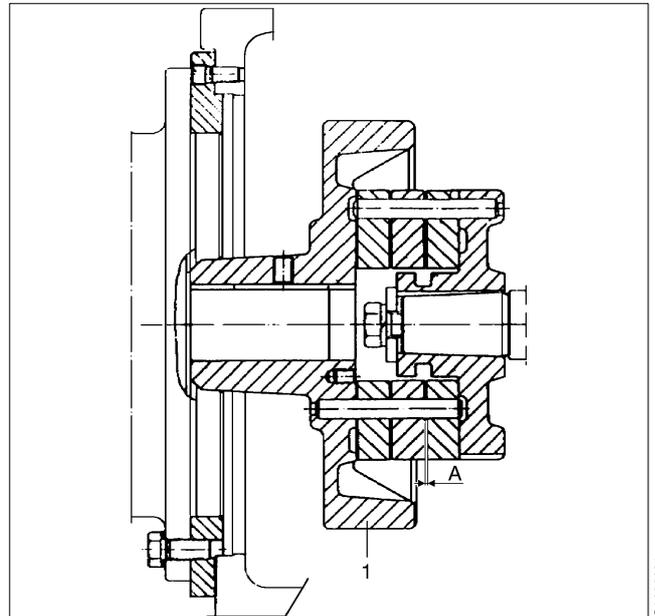


30771661

11. Check the axial play between two of the flexible plates.

Correct measure (A) is 4 ± 2 mm.

The measure can be adjusted by moving the pulley (1) axially on the motor shaft.

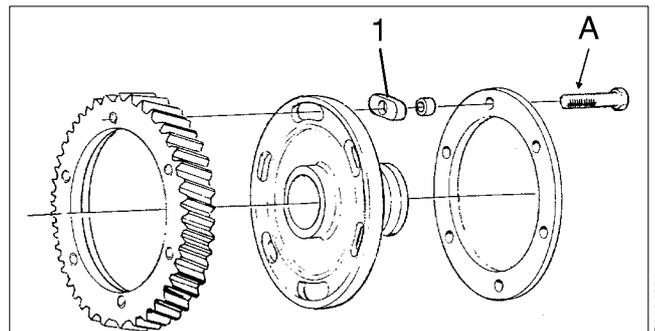


G0633821

Where to measure the axial play (A) in the coupling

12. Worm wheel assembly:

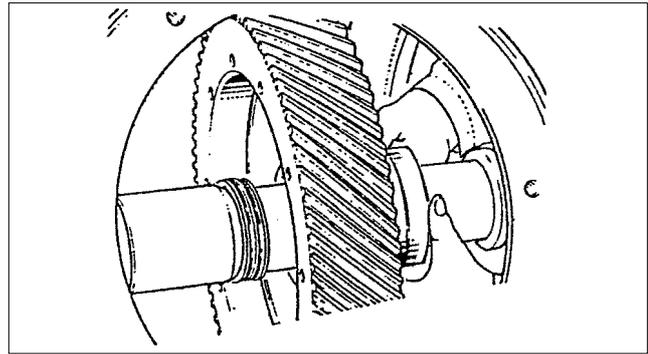
If the rubber buffers (1) have been replaced in the worm wheel, apply some Loctite 270 on the six screws (A). Then tighten crosswise with **25 Nm**.



G0191921

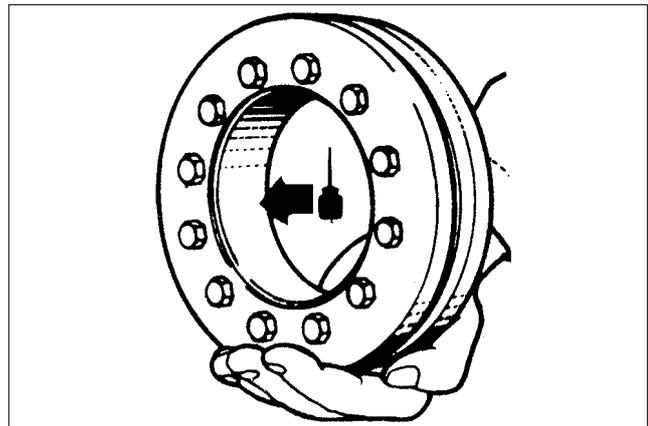
13. Clean the worm wheel shaft and the inner surface of the worm wheel nave thoroughly with a clean cloth. Then oil the surfaces. The oil must be of the same quality as used in the worm gear housing.

Carefully push the worm wheel as far as possible onto the shaft.



G0571821

14. Clean the inner surface of the clamping element and oil it. The oil must be of the same quality as is used in the gear housing. Slip the clamping element onto the worm wheel. The tightening is described later in this assembly instruction.

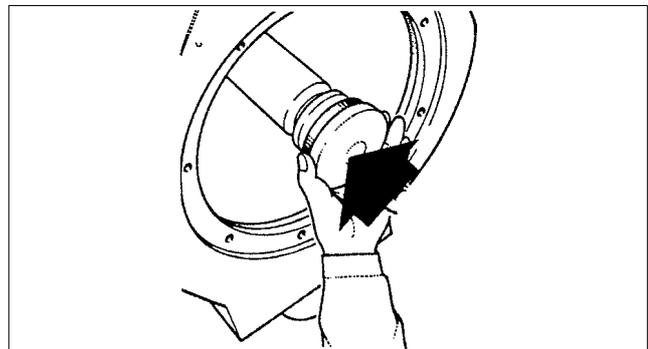


G0273811

15. Mount the **heated** ball bearing onto the free end of the worm wheel shaft. If necessary, apply the mounting tool and hit a few blows on the bearing to get it in the correct position.

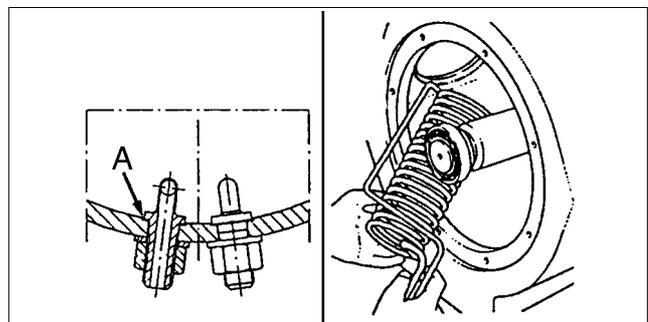
NOTE

Hitting with heavy strokes can damage the inner bearing on the worm wheel shaft.



G0485611

16. Fit gaskets (A) onto the cooling coil tubes and place the cooling coil in the worm gear housing.

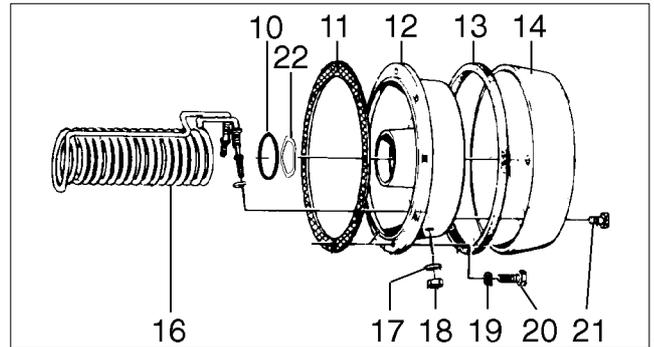


G0798021

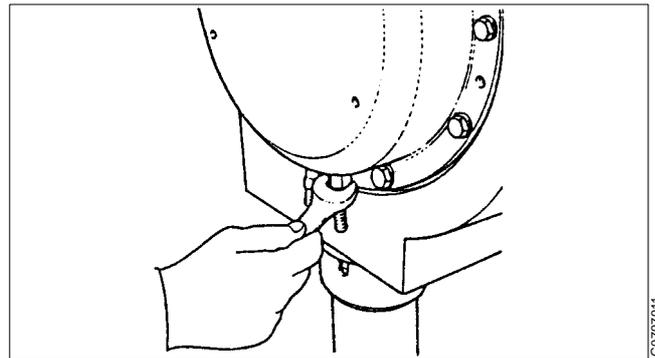
17. Clean the bearing seat in the bearing shield (12). Fit a new corrugated shim (22) and O-ring (10) into the bearing shield.
The parts are included in the MS-kit).

NOTE

Check that the end bearing on the shaft has cooled down. Otherwise the tolerance between the outer diameter of the bearing and the tolerance ring will be too narrow.



18. Renew the gasket (11) and fit the bearing shield. Note that the shield can be fitted in one position only.
If necessary, pull it into position using the screws or tap its centre with a tin hammer.
19. Press the two tube ends of the cooling coil (16) into the bearing shield.
20. Fit the washers (17) and nuts (18) and tighten the coil to the shield.
21. Connect the cooling water to the coil. Supply the cooling water and check for leakages.
22. Fit the seal strip (13) and the guard (14) covering the bearing shield (see previous illustration).



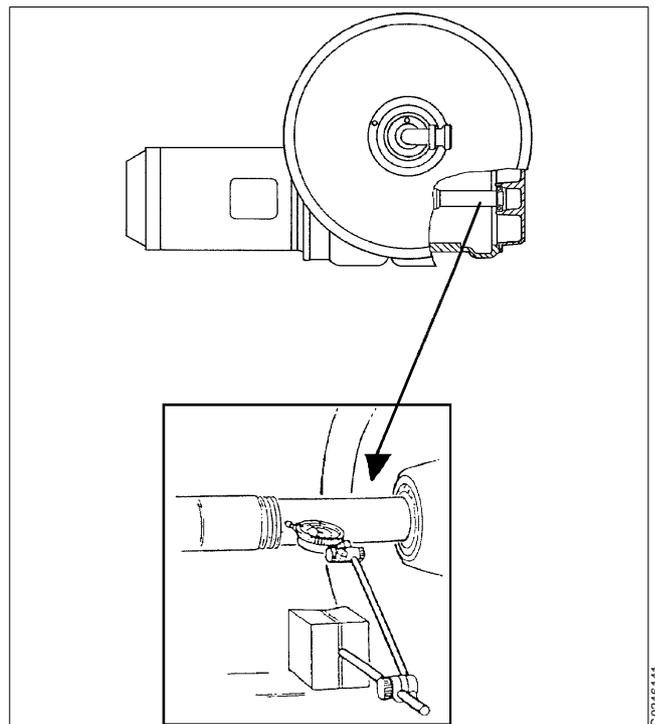
23. Check the radial wobble of the worm wheel shaft by first camping a dial indicator in a magnetic support and fasten it to the surface for the worm wheel guard. Turn the worm wheel shaft by hand.

Permissible radial wobble is **maximum 0,10 mm**.

If the wobble is greater, the worm wheel shaft must be removed from the frame for closer examination. Get in touch with your Alfa Laval representative as the worm wheel shaft may need to be renewed.

NOTE

Excessive wobble on the worm wheel shaft may cause vibration and noise.



3.7.3 Vertical driving device

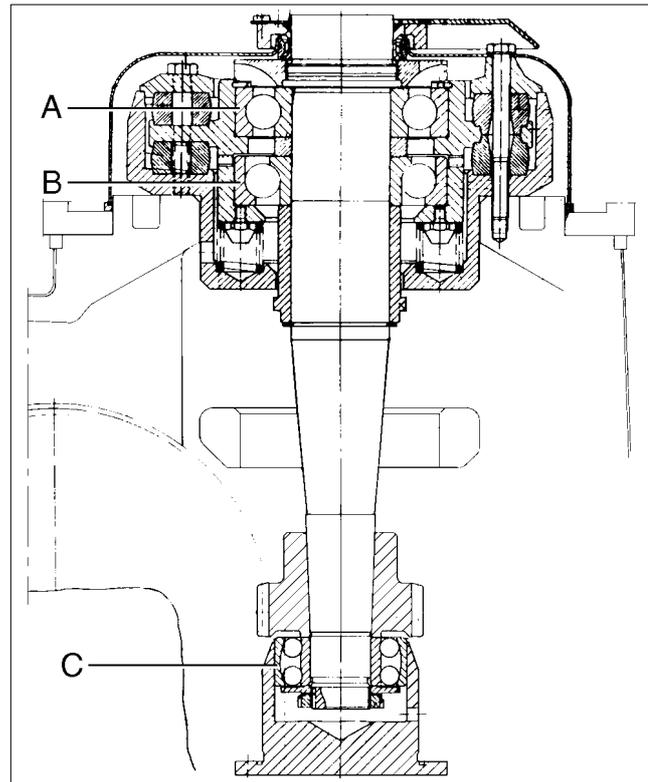
✓ Check point

“2.4.1 Worm wheel and worm; wear of teeth”
on page 29.

An exploded view of the vertical driving device can be found on page 104.

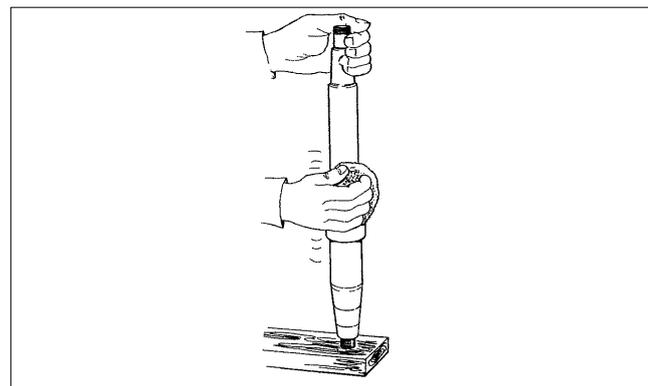
All three bearings on the bowl spindle are of different types as follows:

- A. Deep groove ball bearing to be fitted in the upper housing.
- B. Angular contact ball bearing to be fitted in the lower housing.
- C. Self-aligned ball bearing to be fitted at the bottom end of the spindle.



G0830611

1. Wipe off and oil the bearing seats before fitting the bearing support and ball bearings.



G0189011

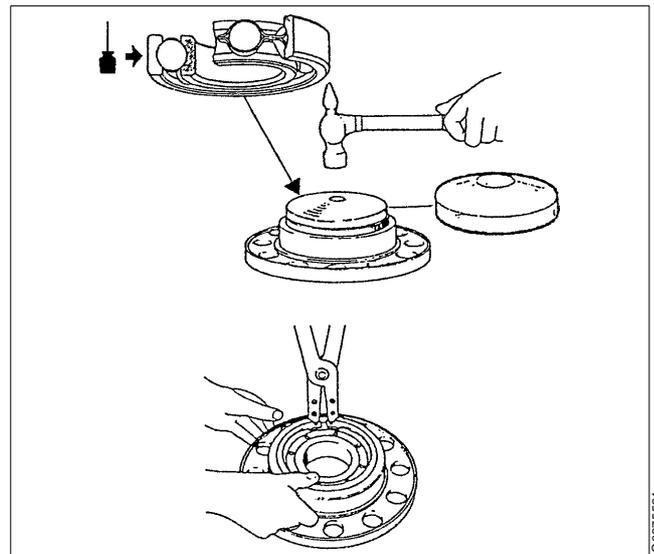
2. Fit the **cold** deep groove ball bearing into the **heated** upper housing using the special mounting tool included in the set of tools.
3. Lock the bearing with a snap ring.



WARNING

Risk for eye injury

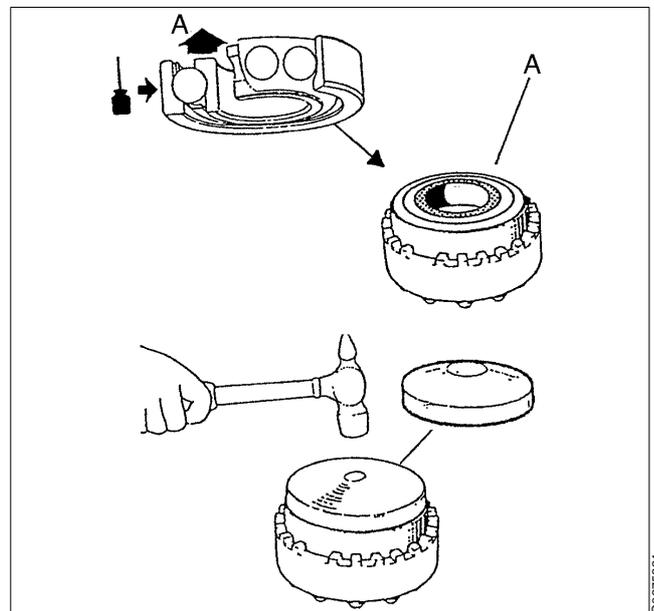
Use the correct pliers for the snap ring to avoid accidental release.



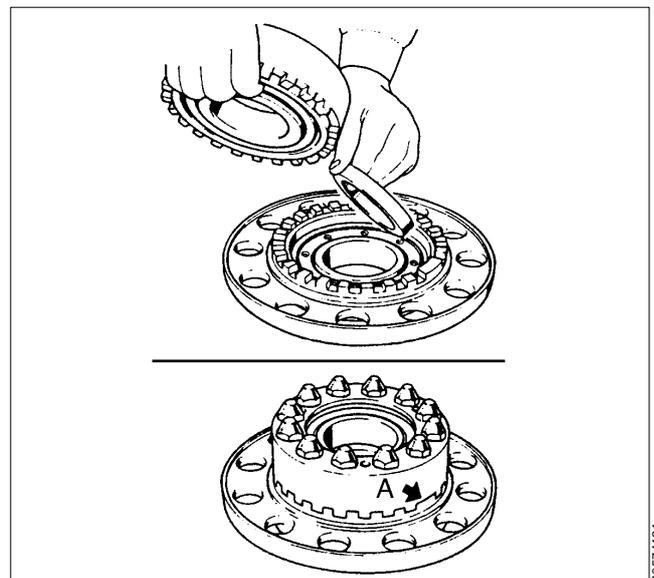
4. Fit the **cold** angular contact ball bearing into the **heated** lower housing using the special mounting tool.

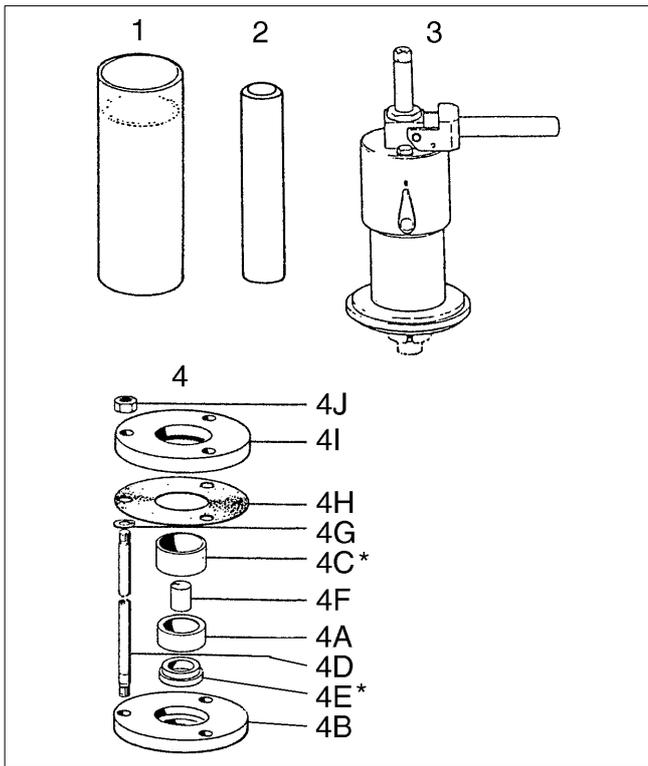
NOTE

Turn the angular contact ball bearing the right way - the **wide** shoulder of the **inner** race must face **upwards** (A). A bearing of this kind turned upside down cannot carry any load. It collapses when loaded resulting in breakdown.



5. Assemble the two bearing housings and the space sleeve into a unit.
Note that one tooth and the corresponding recess (A) is wider than the others.

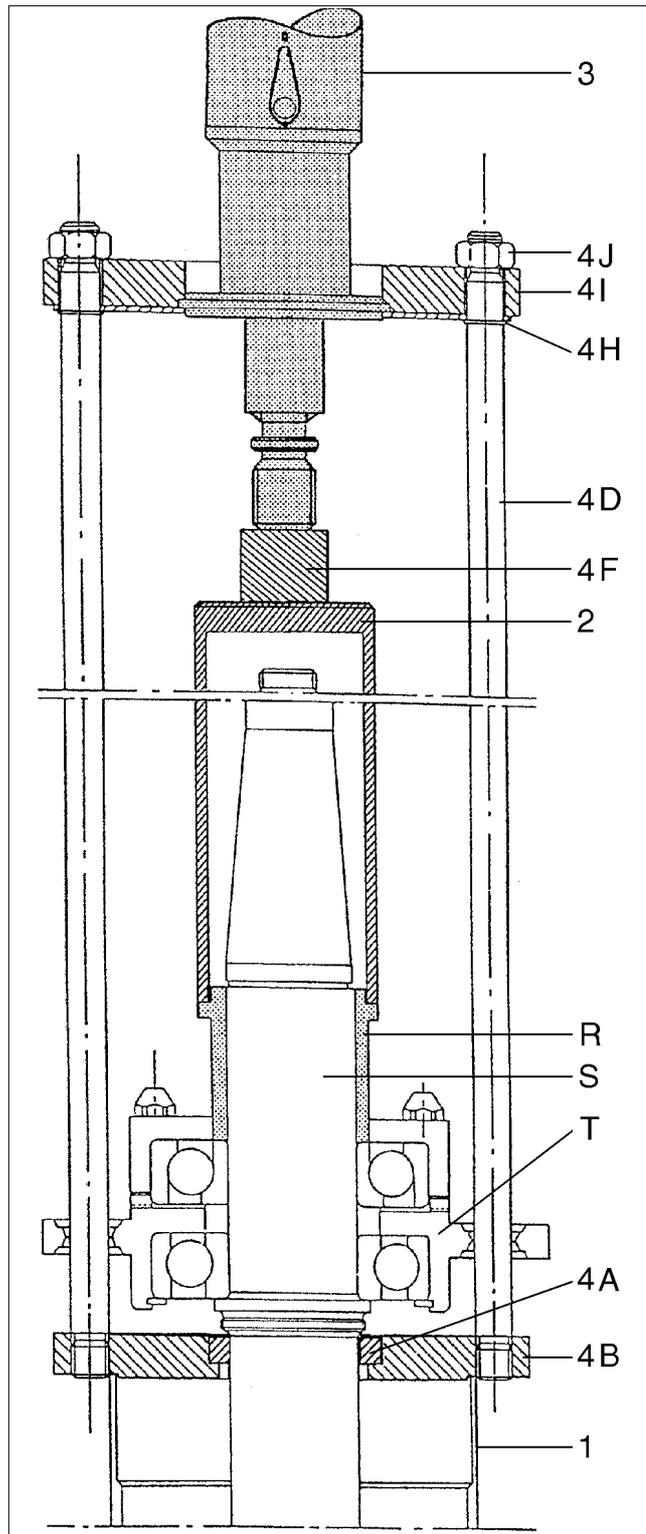




G0675931

- 1. Tube
- 2. End tube
- 3. Compressing tool
- 4. Dismantling and assembly tool
- 4A. Ring
- 4B. Plate, lower
- 4C.* Sleeve
- 4D. Bar
- 4E.* Support ring
- 4F. Intermediate part
- 4G. Snap ring (normally mounted on the bar)
- 4H. Washer
- 4I. Plate, upper
- 4J. Nut
- R. Sleeve
- S. Bowl spindle
- T. Bearing support

* Not used at assembly

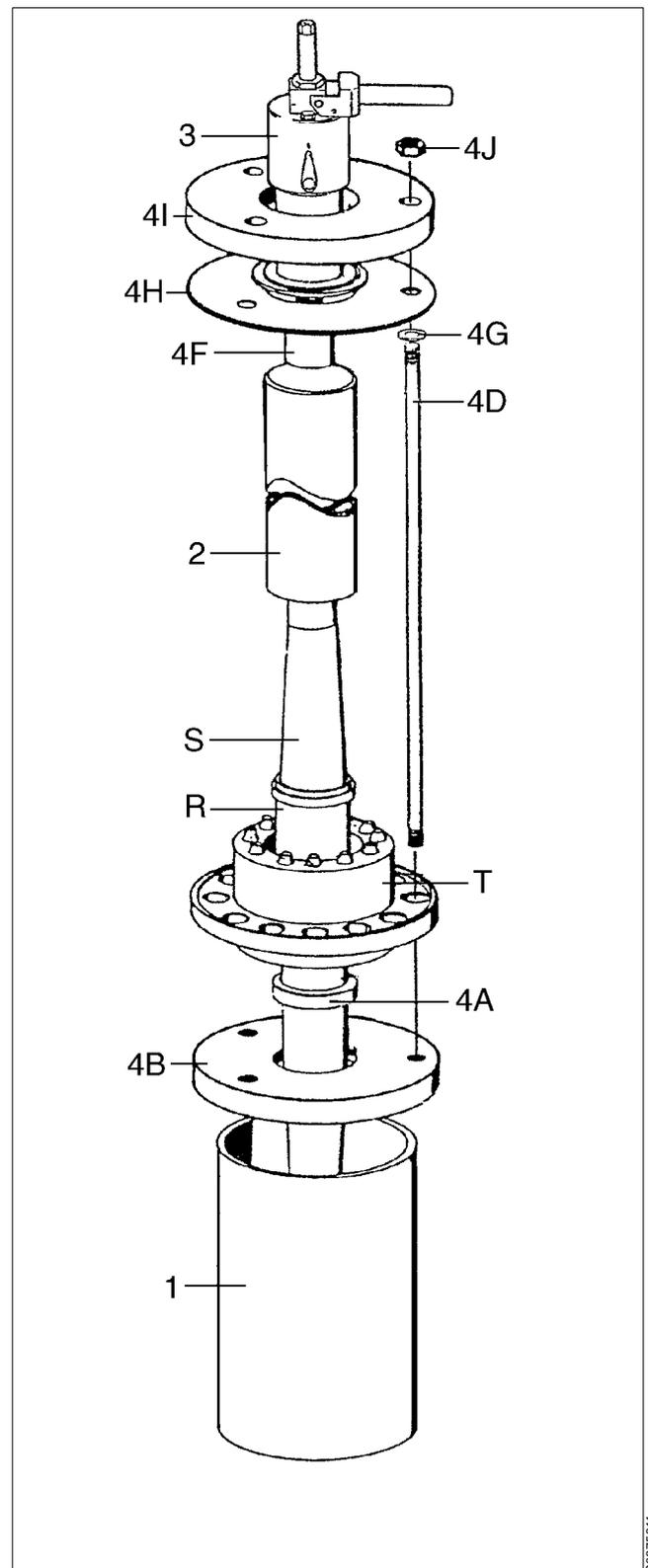


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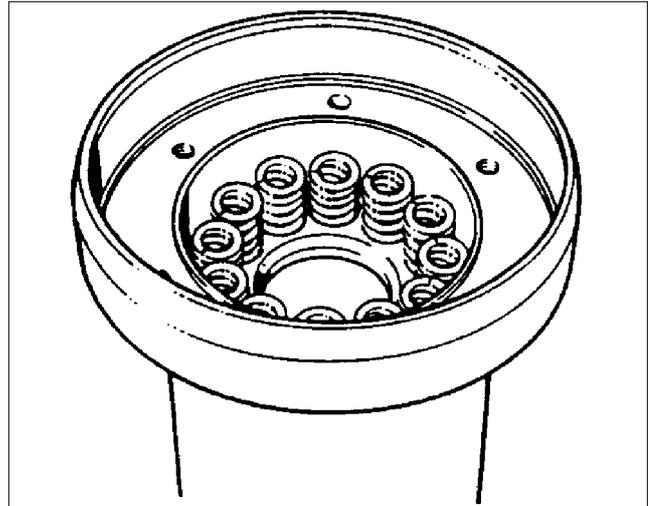
6. Assemble the top bearing support on the spindle in the following way:
 - a. Arrange the tube (1) on a firm support.
 - b. Fit the bottom plate (4B) on the tube (1).
 - c. Fit the ring (4A) with inside diameter $\text{\O}77$ mm in the bottom plate (4B).
 - d. Wipe off and oil the bearing seats of the spindle (S).
 - e. Place the spindle (S) upside down in the bottom plate (4B).

Note! The collar on the spindle (S) must be resting on the ring (4A).

- f. Fit the **heated** ball bearing housing (T) onto the spindle (S).
- g. Fit the sleeve (R), which must be in contact with the inner race of the ball bearing.
- h. Fit the end tube (2) on the sleeve (R).
- i. Screw the three bars (4D) into the bottom plate (4B).
- j. Check that the retaining rings (4G) have been fitted. Fit the washer (4H), compressing tool (3) and top plate (4I). Secure the assembly by tightening the three nuts (4J).
- k. Set the control lever of the compressing tool (3) in position 2 and pump until the piston reaches the bottom position.
- l. Set the control lever in position 1 and pump until the piston reaches its upper position.
- m. Place the spacer (4F) between the end tube (2) and the piston of the compressing tool (3).
- n. Set the control lever in position 2 again and continue compressing until the inner race of the ball bearing is in contact with the collar on the spindle (S).
- o. Remove the tool and continue with the assembly of the other parts for the vertical driving device.

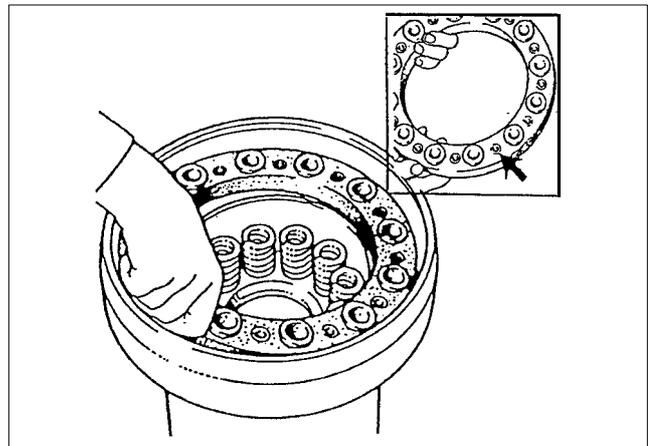


7. Remove the spindle from the tube and instead fit the top bearing support in the tube.
8. Fit the top bearing support in the tube and put the springs in place.



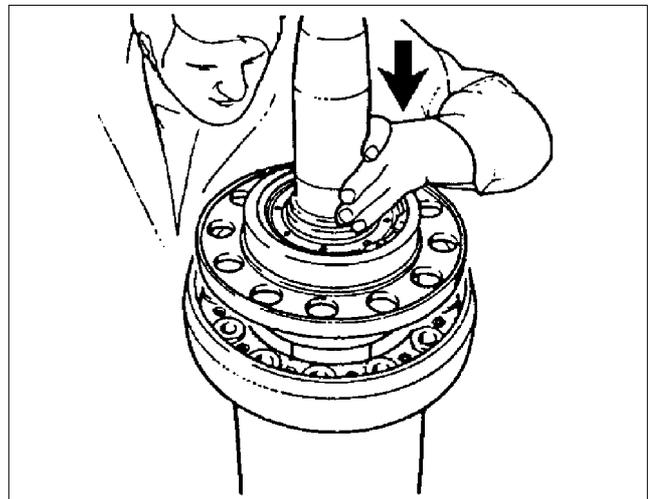
G0573311

9. Fit the rubber buffer **with** springs.



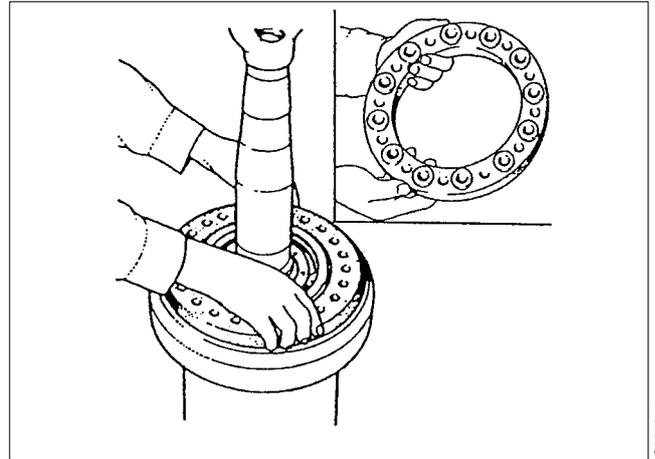
G0676021

10. Place the bowl spindle in upright position in the bearing support.
Ascertain that the guide pins enter the springs when lowering.
11. Pour a few drops of oil in the ball bearings (of the same type as used in the worm gear housing).



G0573131

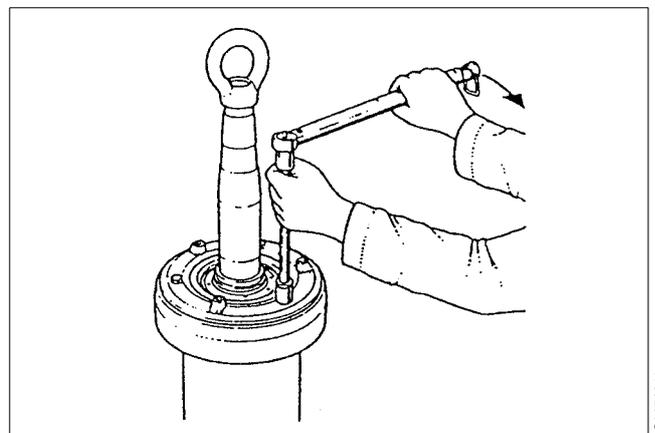
12. Fit the rubber buffer **without** springs.



G067611

13. Fit the cover and tighten its screws alternately, a little at a time.

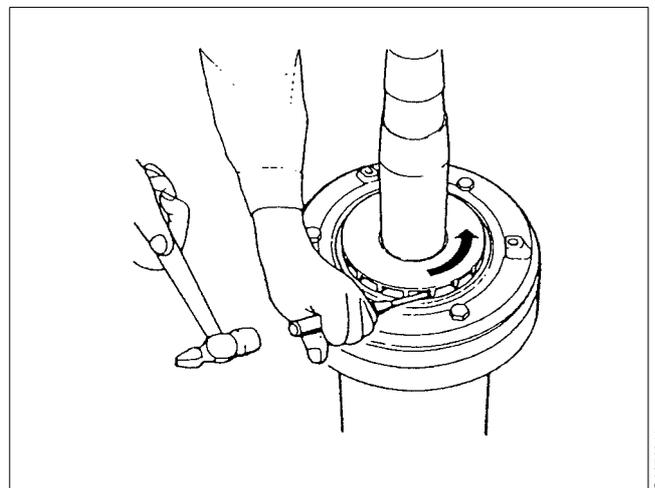
Final tightening torque: **60 Nm**



G067621

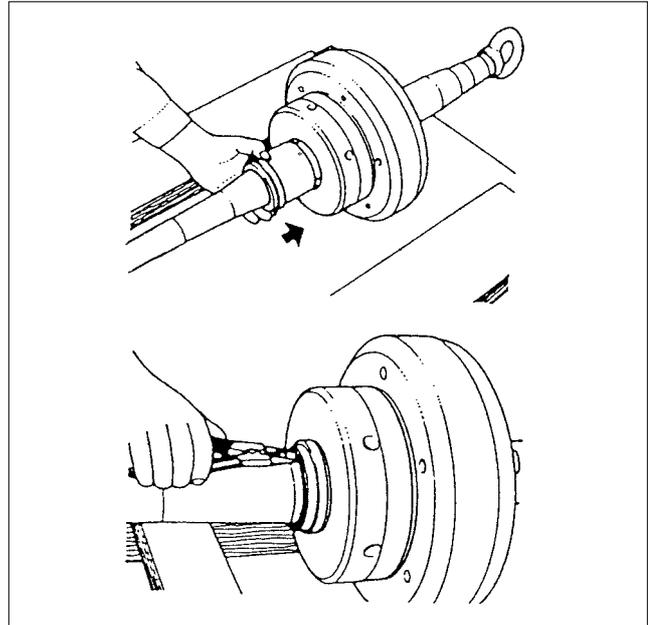
14. Fit the oil fan. Hit with light blows on the wings.

Left-hand thread!



G067631

15. Lay down the spindle, fit the sleeve and lock it with the snap ring.

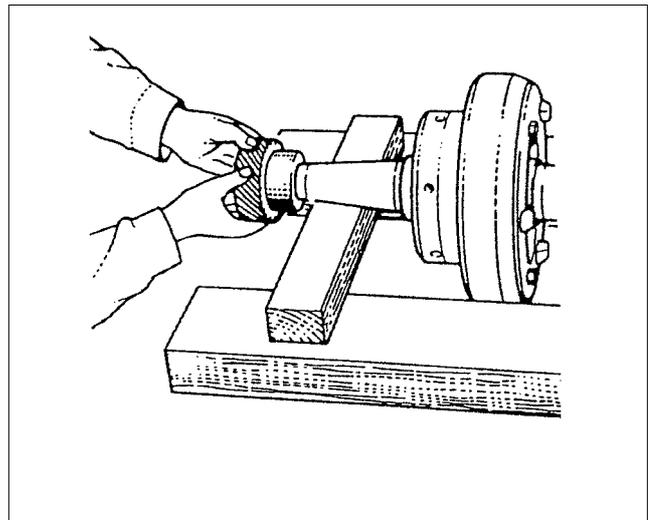


G0676411

16. Make sure that the conical surfaces inside the worm and on the spindle are clean and free from oil before fitting the worm.

NOTE

The worm should not be heated before assembly.



G0676521

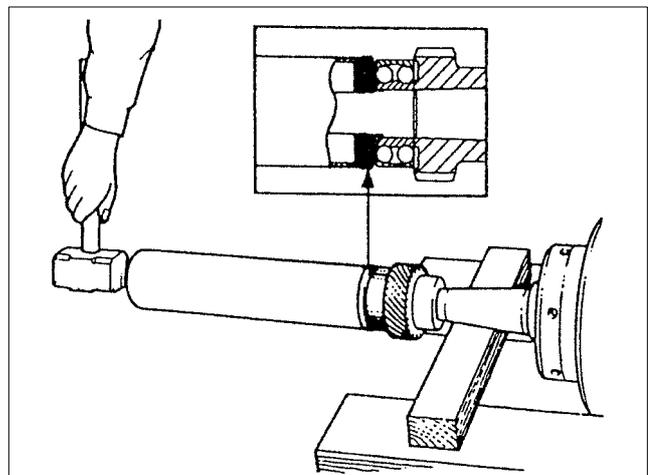
17. Wipe off and grease the bearing seat before fitting the ball bearing.

18. Fit the heated bearing.

When it has **cooled**, fit the ring and the driving-on tool as shown in the illustration. Hit a few times to ascertain that the bearing is in correct position.

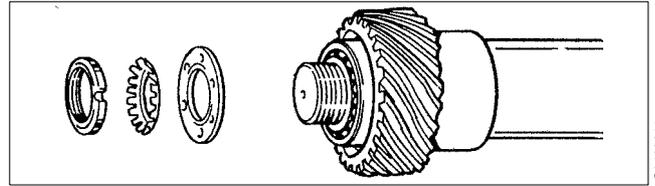


S0097811



G0676731

19. Fit the spacing washer, the lock washer and the round nut.

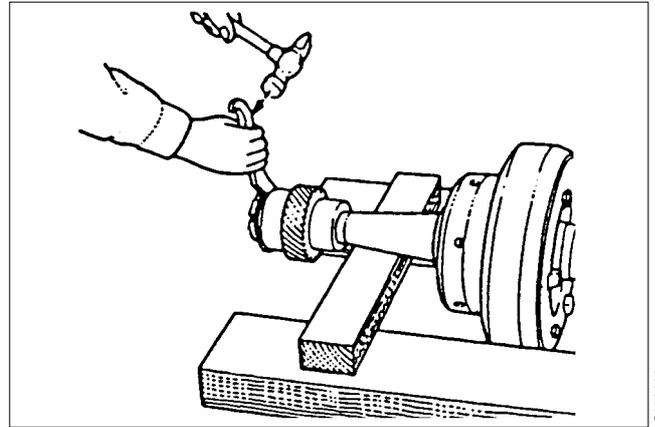


G0188311

20. Fasten the hole assembly with the round nut and lock it with the lock washer.



S0072821



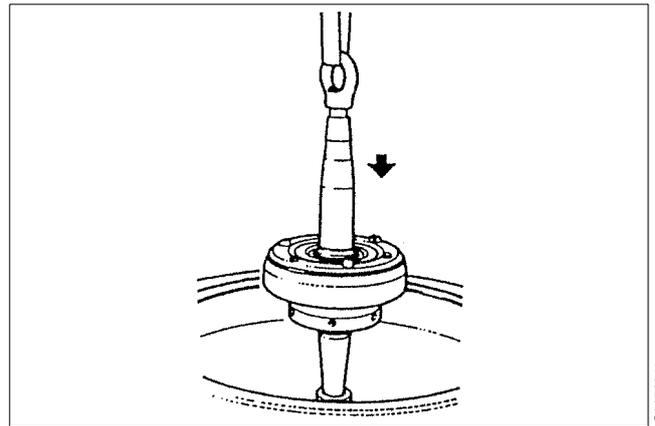
G0732631

21. Wipe off the contact surfaces for frame and spindle assembly.

22. Lower the spindle with great care to avoid damaging the worm teeth.

Guide the spindle into the bottom bearing housing. Also guide the spindle so the screw holes in the bearing housing are in line with the holes in the frame, see next suboperation.

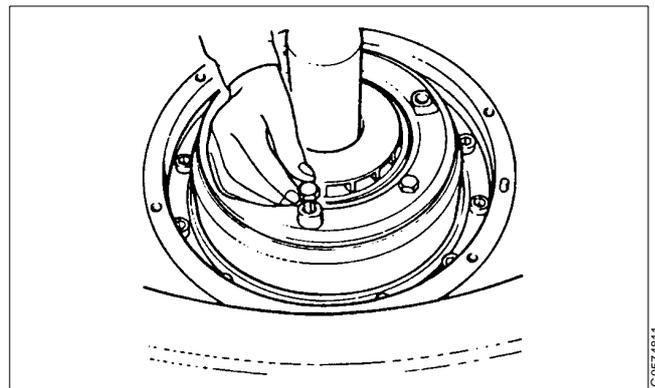
If the spindle assembly does not quite bottom in its seat, knock lightly on the spindle top with a tin hammer.



G0676811

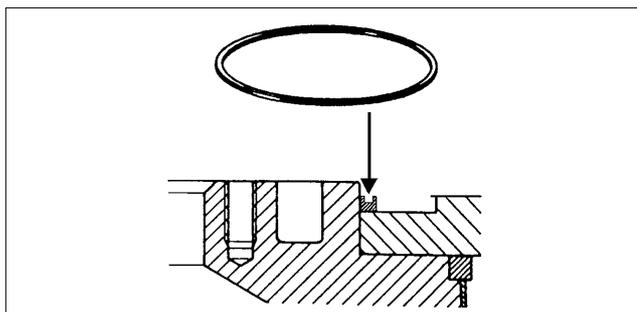
23. Make sure that the top bearing assembly is in correct angular position by means of one of the screws that fastens the assembly. Then lower the spindle to the bottom.

Remove the screw.



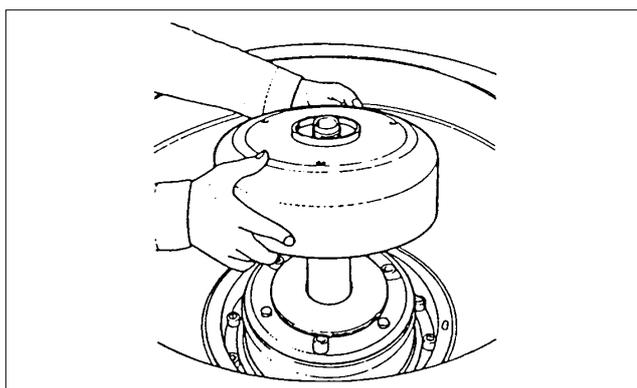
G0574811

24. Fit the rectangular ring into the frame.



G0574931

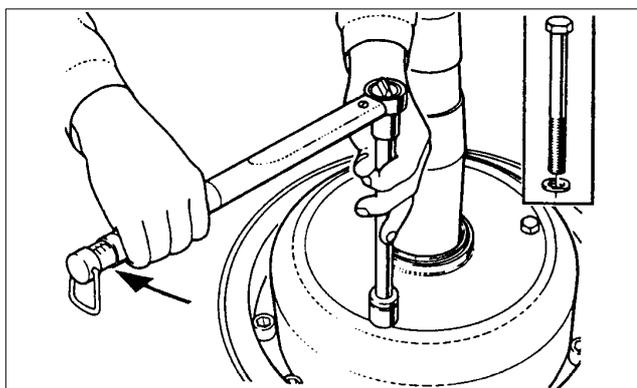
25. Fit the guard into position.



G0731011

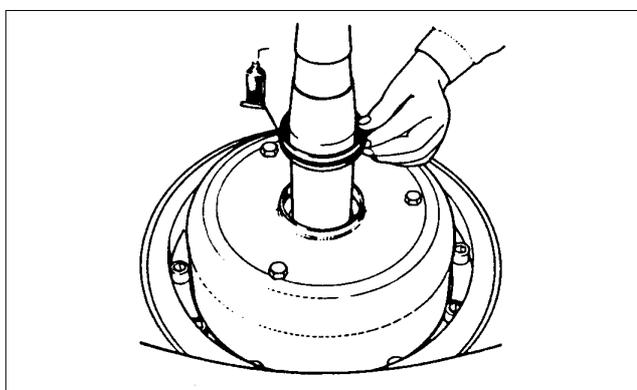
26. Fit new seal rings under the screw heads. Tighten the screws alternately, a little at a time.

Final tightening torque: **40 Nm**



G0575011

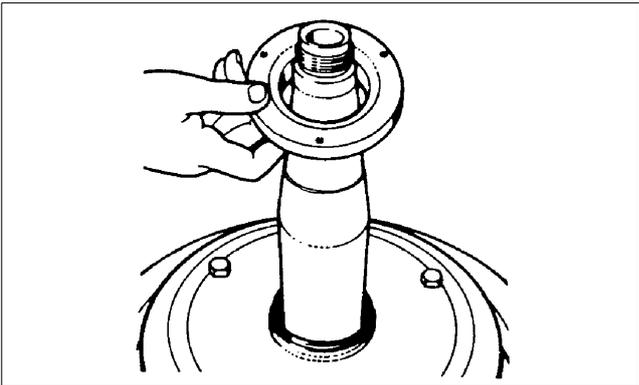
27. Fit the seal (seal ring and O-ring).



G0575321

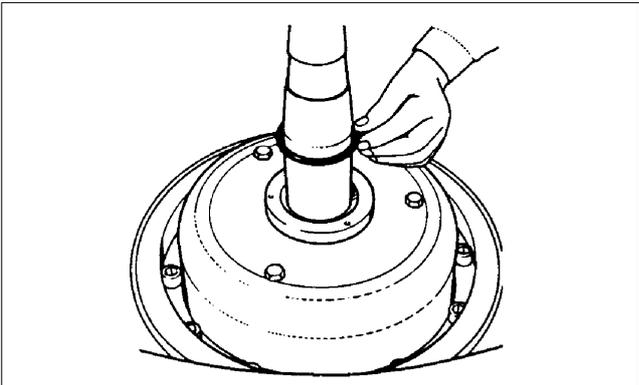
28. Fit the protecting collar and push it **firmly** down against the oil fan.

NOTE
Check that the protecting collar is in the bottom position (resting against the oil fan) before tightening the protecting plate.



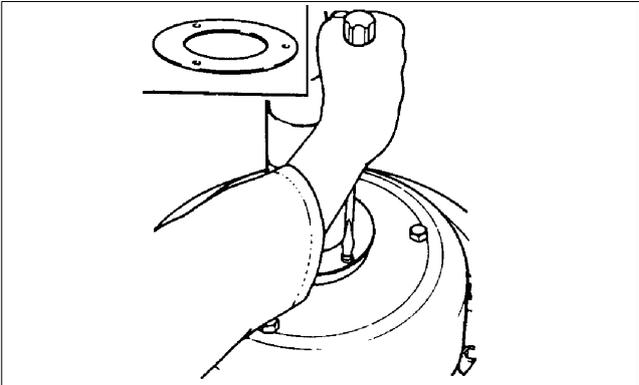
G0575211

29. Fit the O-ring dry (do not grease).



G0576311

30. Fit the protecting plate and tighten the screws.

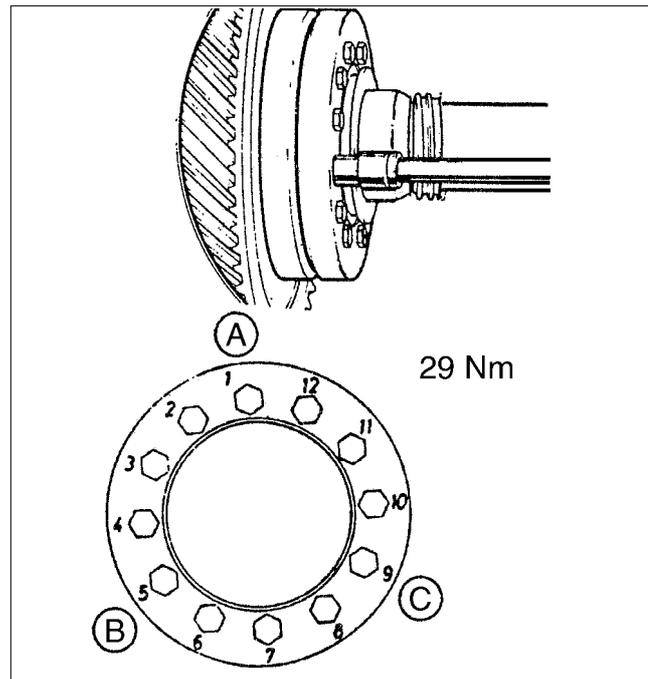


G0576411

31. Clean and oil the worm wheel shaft, the nave of the clamping element and the nave and outer surface of the worm wheel. The oil must be of the same quality as used in the worm gear housing.
32. Push the worm wheel on the horizontal shaft into position for driving the bowl spindle and then slip the clamping element onto the worm wheel.
33. Fix the worm wheel by first tightening the three clamping element screws A, B and C (see illustration), but only such that the clamping element just sticks on the worm wheel.
34. Then tighten all the screws uniformly and successively around the clamping ring in the order indicated in the illustration (1-12). Do not tighten crosswise.

Tightening torque: **29 Nm**

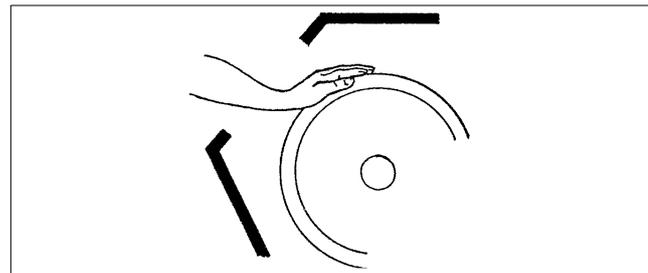
The tightening must be repeated several turns around the clamping element until the screws are fully tightened.



NOTE

Check continuously that the ring of the clamping element fits evenly.

35. Rotate the spindle by rotating the coupling drum by hand and check for smooth run. No scraping or other jarring sounds must be heard.



36. Check the radial wobble of the bowl spindle.

NOTE

Spindle wobble will cause rough bowl running. This leads to vibration and reduces lifetime of ball bearings.

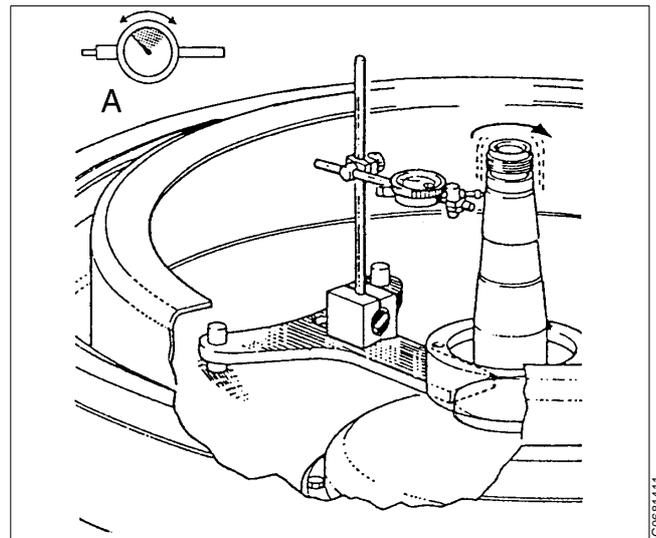
- Set up a dial indicator on a magnetic stand. Use the key for the large lock ring as a support for the stand, see the illustration.
- Use the coupling drum to revolve the spindle manually.
- Measure the wobble at the top of the tapered end of the spindle. Permissible radial wobble is **maximum 0,04 mm**.

37. Fit the oil drain plug and pour oil into worm gear housing. The oil level should be slightly above middle of the sight glass.

Oil volume: Approx. **13 litres**

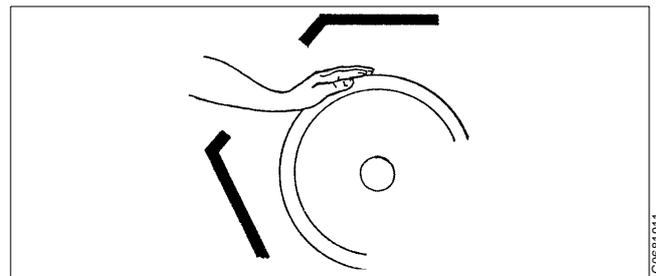
Suitable oil brands can be found in ["2.5.3 Recommended oil brands"](#) on page 36.

The assembly instructions are proceeding on page [83](#).

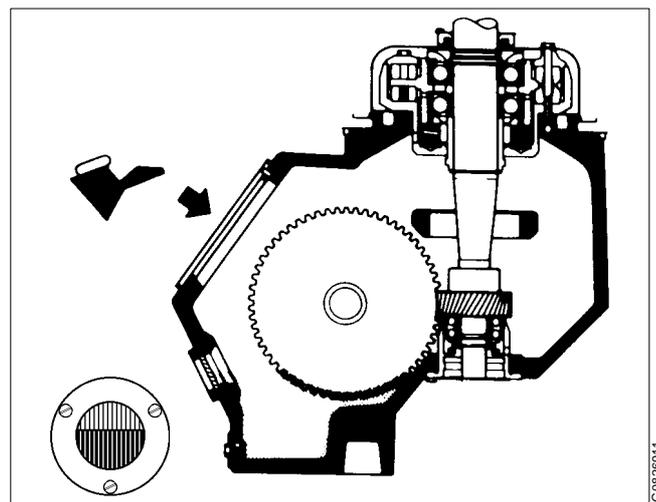


Measurement of the radial wobble

A. Max. permissible radial wobble = 0,04 mm

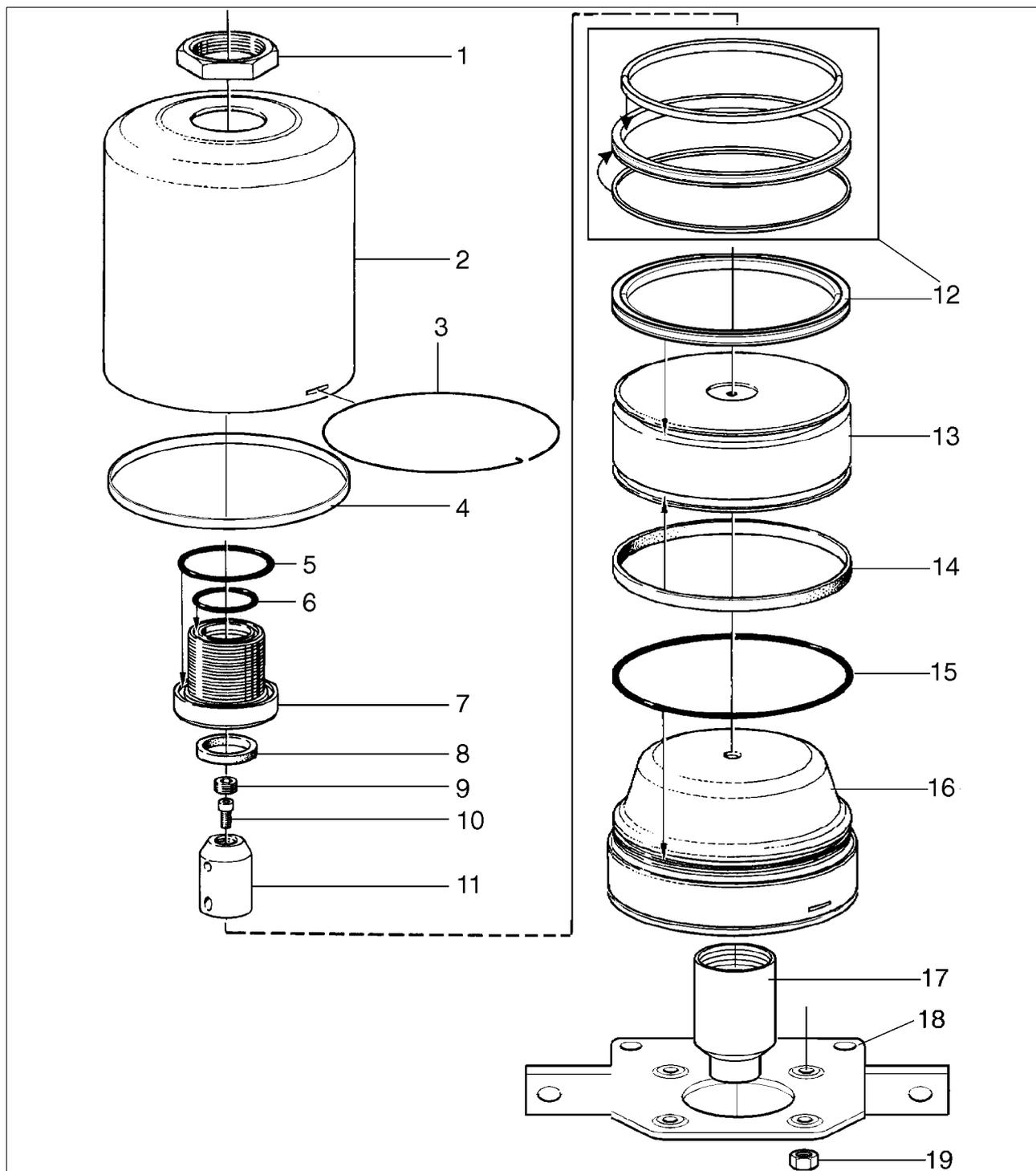


Remove the coupling cover and revolve the spindle manually by turning the coupling drum



3.8 Operating water module compact (OWMC)

3.8.1 Exploded view



G0878321

1. Nut
2. Cylinder
3. Locking wire, upper
4. Garter strap
5. O-ring
6. O-ring
7. Outlet
8. Turcon variseal "M"
9. Nozzle
10. Screw
11. Two-pulse adapter
12. Turcon AQ-seal (3 pieces)
13. Piston
14. Turcite slidering
15. O-ring
16. Air tank
17. End protection
18. Bracket
19. Nut

3.8.2 Dismantling (MS service)

The figures within brackets refer to the exploded view on page 142.

When dismantling, the OWMC Service kit is needed.

1. Shut off the air and operating water supply to the OWMC.



DANGER

Crush hazard

Never dismantle the OWMC when pressurized.

2. Remove the connections for operating water.

NOTE

The Air tank (16) must only be dismantled by Alfa Laval personel.

3. Turn the cylinder (2) anti-clockwise relative to the air tank (16). The upper locking wire is thereby forced out.

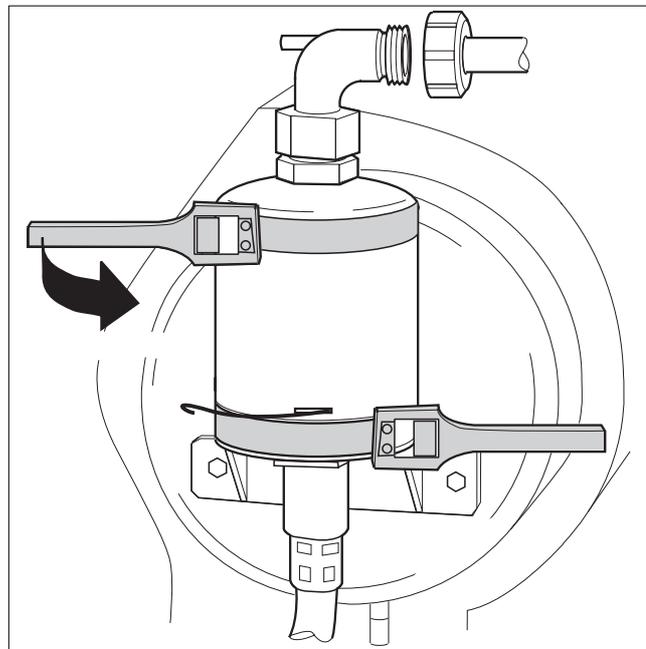
Use two belt wrenches when turning the cylinder, see the illustration. The lower tool prevents the air tank from rotating.

NOTE

Be careful to keep the cylinder straight against the air tank.

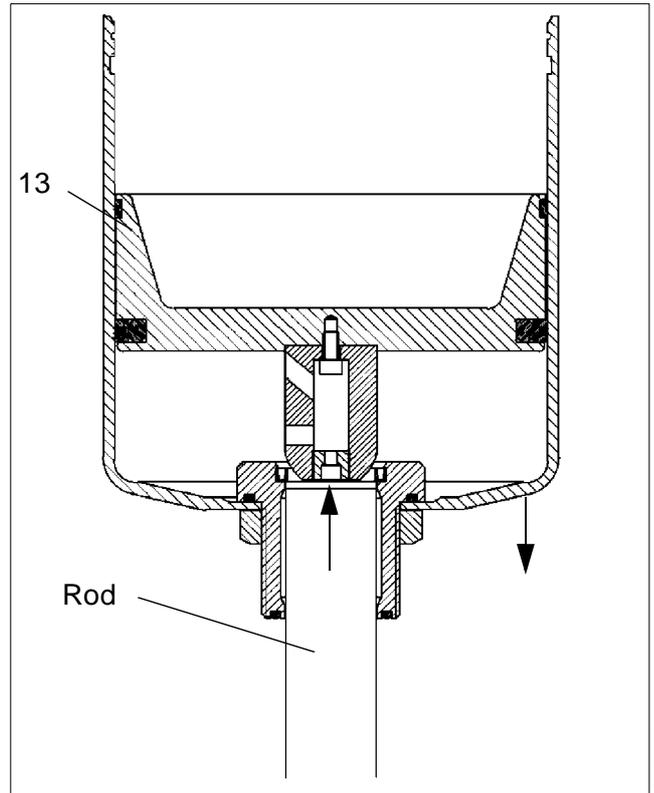
NOTE

In order not to damage the water tank, make sure to place the upper wrench at the top of the water tank, as illustrated.



G0878131

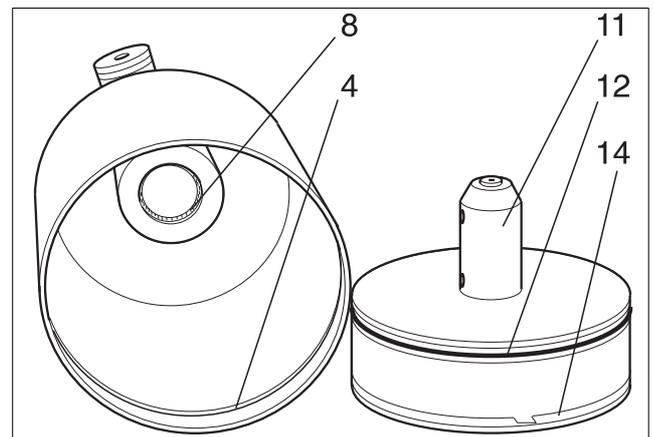
4. Pull off the cylinder (2)
5. Carefully press the piston (13) out of the cylinder using a soft rod or similar.



3.8.3 Check points

Clean and check the condition of the dismantled parts.

- Check the cylinder (2), piston (13) and two-pulse adapter (11) for scratches and scuffing marks.
- Renew the garter strap (4) fitted inside the cylinder.
- Renew the piston seal rings (12 & 14) and the seal (8) which are included in the service kit for the module.
- Renew all other parts included in the service kit.



3.8.4 Assembly (MS service)

1. Check that the piston and inside of the cylinder are well cleaned.
Lubricate the inside of the cylinder with the grease included in the Service kit for OWMC.
2. Assemble the OWMC unit opposite the dismantling.

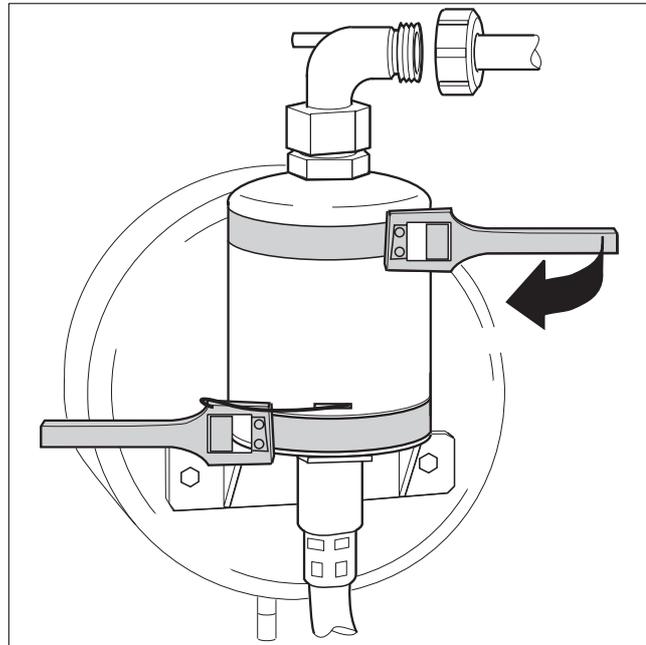
NOTE

Make sure that the hole in the groove (for the locking wire end) on the air tank can be seen through the slot on the cylinder.

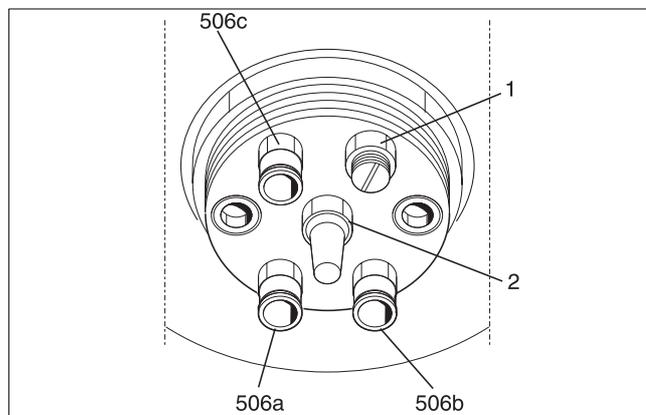
3. Lubricate the locking wire with the grease included in the Service kit for OWMC.
4. Place the locking wire end in the hole in the air tank. Secure the cylinder to the air tank with the locking wire by turning the cylinder clockwise relative to the air tank until the hook on the locking wire reaches the groove.
5. Fit water and air connections.
6. Turn on the air and operating water supply. Check that there are no leakages.

1. Needle valve
2. Silencer

506a. Inlet for compressed air to air tank
 506b. Inlet for activating a small discharge
 506c. Inlet for activating a large discharge



G0878161



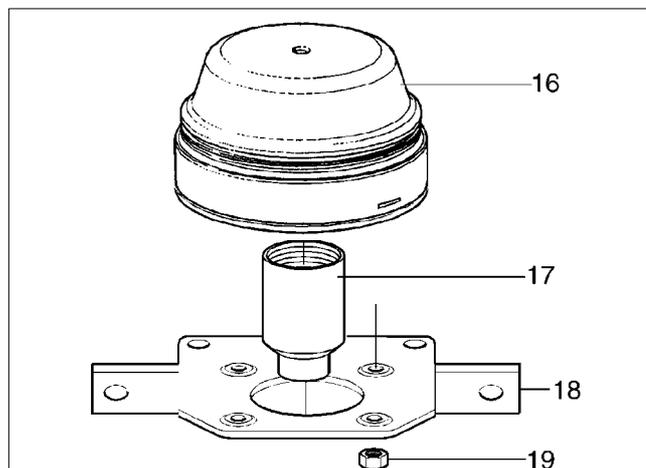
G0878021

3.8.5 Air tank

If the air tank has to be dismantled (i.e. repair) it is removed by removing the nuts (19).

NOTE

If problems are related to the Air tank (16), always contact Alfa Laval representative.



G0878331

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Index

A

Air tank	146
Assembly	
Bowl body and operating mechanism	86
Bowl hood and disc stack	92
General directions	47
Horizontal driving device	125
Inlet/outlet, frame hood	101
Operating water device	84
Operating water module (OWMC)	146
Tools (special)	48
Vertical driving device	124

B

Bearings	
Maintenance directions	41
Replacement on bowl spindle	104
Replacement on horizontal driving device	115
Bowl body and operating mechanism	
Assembly	86
Check point	72, 75, 79, 80
Dismantling	58
Bowl discs	
Cleaning	27
Disc stack pressure	97
Bowl hood and disc stack	
Assembly	92
Check point	80
Dismantling	52
Bowl spindle	
Assembly	124
Check point	75, 141
Dismantling	104
Brake	
Check point	122

C

Check points	
Ball and roller bearings	41
Before shutdowns	45
Bowl hood seal ring	74
Bowl spindle - radial wobble	141
Bowl spindle cone and bowl body nave	75
Brake	122
Cleaning agents	26
Cleaning of bowl discs	27
Corrosion	65

Cover interlocking switch	82
Cracks	67
Disc stack pressure	97
Elastic plates in coupling	127
Erosion	68
External cleaning	28
Guide surfaces	72
Inlet pipe and outlet paring discs	80
Lock ring - priming	120
Lock ring - wear and damage	76
Oil change procedure	32
Operating mechanism	78
Operating paring disc - height position	85
Operating slide	80
Operating water module (OWMC)	145
Repair of galling	73
Sliding bowl bottom	79
Speed sensor	81
Springs for operating mechanism	79
Valve plugs	80
Vibration analysis	40
Vibration sensor	81
Wear linings	68
Worm wheel and worm - wear of teeth	29
Worm wheel shaft - radial wobble	129
Cleaning	
Bowl discs	27
Cleaning agents	26
External cleaning	28
Corrosion	65
Coupling	
Elastic plates, check point	127
Cover interlocking switch	
Check point	82
Cracks	67

D

Daily checks	19
Disc stack pressure	97
Dismantling	
Bowl body and operating mechanism	58
Bowl hood and disc stack	52
General directions	47
Horizontal driving device	115
Inlet/outlet, frame hood	50
Operating liquid device	62
Operating water module (OWMC)	144
Tools	48
Vertical driving device	104

E	
Erosion	68
Exploded views	
Bowl body and operating mechanism	58
Bowl hood and disc stack	52
Horizontal driving device	115
Inlet/outlet, frame hood	50
Operating liquid device	62
Operating water module (OWMC)	142
Vertical driving device	104

F	
Frame feet	
Replacement	24

G	
Gear	
Wear of teeth	29
Guide surfaces	
Intermediate Service	72
Repair of galling	73

H	
Horizontal driving device	
Assembly	125
Check point	29, 129
Dismantling	115

I	
Inlet/outlet, frame hood	
Assembly	101
Check point	80, 99
Dismantling	50
Intermediate service	15, 20

L	
Lock ring	
Priming	120
Wear and damage	76
Lubricants	
Lubrication chart, general, oil groups	33
Oil change interval	35
Oil change procedure	32
Oil level	32
Recommended greases	39
Recommended lubricating oils	35
Recommended oil brands	36
Recommended pastes and bonded coatings	37

M	
Maintenance intervals	16
Maintenance logs	
3-year Service (3S)	24
Daily checks	19
Intermediate Service (IS)	20
Major Service (MS)	22
Oil change	19
Maintenance, general information	
Ball and roller bearings	41
Before shutdowns	45
Cleaning	26
Maintenance intervals	15
Maintenance procedure	17
Oil change procedure	32
Service kits	18
Vibration analysis	40
Major service	15, 22
Metal surfaces	
Cleaning and cleaning agents	26, 28
Corrosion	65
Cracks	67
Erosion	68
Motor	
Cleaning	28

O	
Oil. See Lubricants	
Operating liquid device	
Assembly	84
Check point	85
Dismantling	62
Operating water module (OWMC)	
Assembly	146
Check point	145
Dismantling	144
Outlet paring disc and inlet pipe	
Check point	80

S	
Safety Instructions	9
Service instructions. See Check points	
Service kits	18
Shutdown	45
Spare parts	18
Speed sensor	
Check point	81

T

Tightening torques

Bowl body - distributing ring	89
Bowl body - operating slide	87
Bowl spindle, bearing support	135
Bowl spindle, guard	138
Frame feet	24
Large lock ring	98
Screws, common	49
Speed sensor	81
Vibration sensor	81
Worm wheel assembly	127
Worm wheel clamping ring	140

V

Vertical driving device

Assembly	124
Check point	141
Dismantling	104

Vibration

Vibration analysis	40
--------------------	----

Vibration sensor

Check point	81
-------------	----

W

Warning signs	13
---------------	----

Wear linings in bowl, check point	68
-----------------------------------	----

Worm gear

Wear of teeth	29
---------------	----

