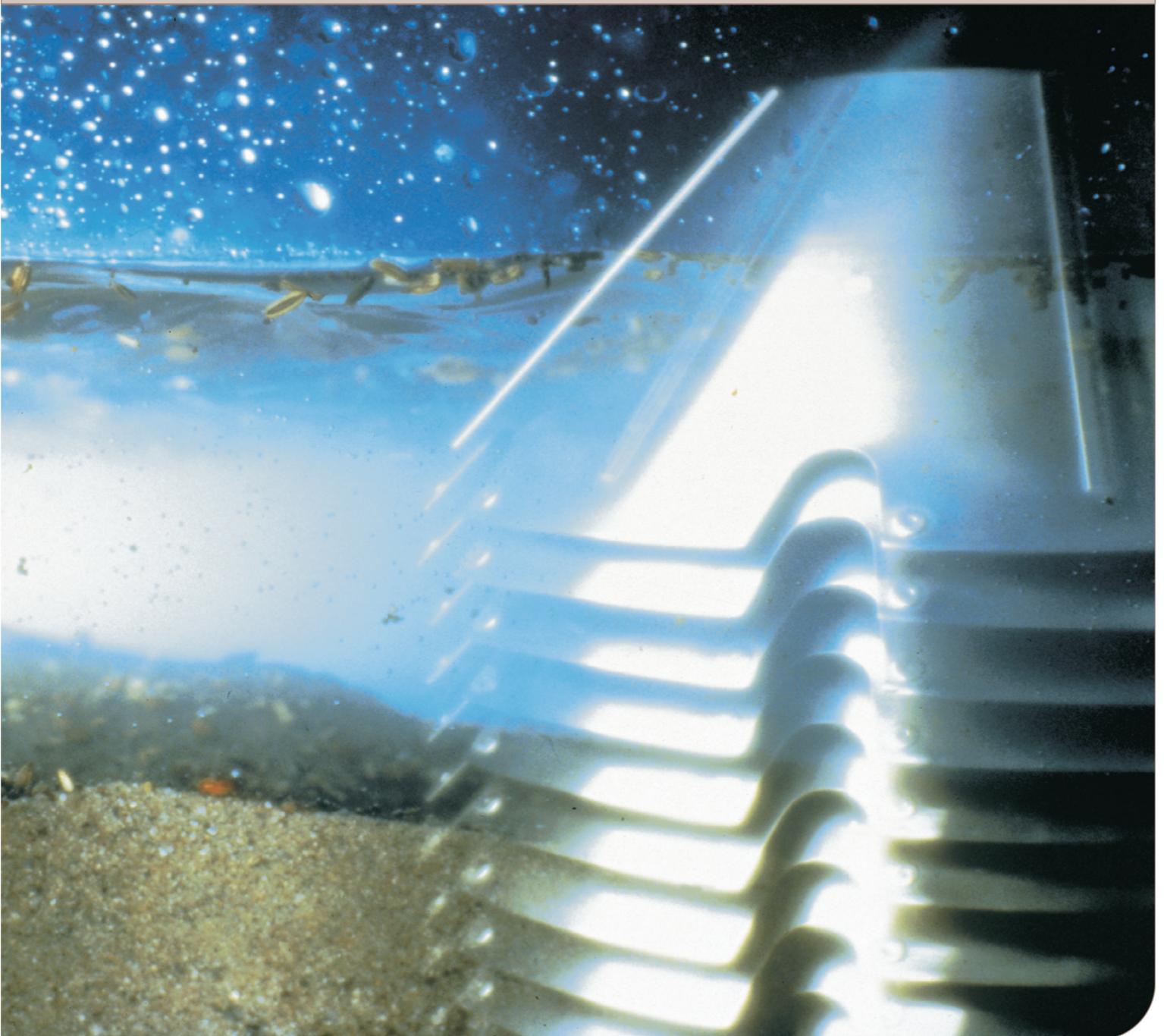




Instruction book
High speed separator

BWPX 307TGD-71



Published By:

Alfa Laval Technologies AB
Box 74
SE-221 00 Lund, Sweden
+46 46 366500

The original instructions are in English

© Alfa Laval Corporate AB 04 April 2022

This document and its contents are subject to copyrights and other intellectual property rights owned by Alfa Laval Corporate AB. No part of this document may be copied, re-produced or transmitted in any form or by any means, or for any purpose, without Alfa Laval Corporate AB's prior express written permission. Information and services provided in this document are made as a benefit and service to the user, and no representations or warranties are made about the accuracy or suitability of this information and these services for any purpose. All rights are reserved.

Contents

1	Safety instructions	9
1.1	Warning signs in text	14
1.2	Recycling Information	15
1.3	Requirements of personnel	16
1.4	Remote start	16
2	Description	17
2.1	General description	19
3	Function	21
3.1	Separating function	22
3.2	Sludge discharge function	24
3.3	Concentrator and purifier principles	26
4	Operating instruction	31
4.1	Before start	32
4.2	Start and run-up	33
4.3	Operation	34
4.4	Stop	34
4.5	Emergency stop	35
4.6	Lubrication of electric motor	36
5	Trouble tracing	37
5.1	Separating function	38
5.2	Separator mechanical functions	40
6	Maintenance - General	43
6.1	Periodic maintenance	44
6.2	Maintenance schedule	46
6.3	Lubricants	49
6.4	Cleaning	56

6.5	Miscellaneous maintenance	58
7	Maintenance - Dismantling	61
7.1	General information	63
7.2	Inlet/outlet, device	64
7.3	Bowl – dismantling	65
7.4	Bowl spindle – dismantling	77
8	Maintenance - Assembly	85
8.1	Bowl spindle – assembly	86
8.2	Bowl – assembly	94
9	Maintenance – Other	109
9.1	Friction coupling	110
9.2	Flat belt	118
9.3	Cover with brake	123
9.4	Oil change	125
9.5	Oil filling device	126
9.6	Mounting of speed sensor and junction box	127
9.7	Mounting of unbalance sensor and junction box	129
9.8	Speed sensor	132
9.9	Checking of speed sensor fitting	135
9.10	Unbalance sensor	136
9.11	Frame feet	139
9.12	Electric motor	140
10	Maintenance - Check points	143
10.1	Corrosion	144
10.2	Erosion	145
10.3	Bowl spindle cone and bowl body nave	147
10.4	Discharge mechanism	148
10.5	Large lock ring joint	149

10.6	Paring disc height adjustment	150
10.7	Bowl spindle radial wobble	151
10.8	Guiding surfaces	152
11	Technical references	155
11.1	Product description	156
11.2	Px sealing diagram	160
11.3	Power consumption	161
11.4	Performance data, in-and outlet device	164
11.5	Basic size drawings	167
11.6	Foundation drawing	173
11.7	Connection list	174
11.8	Interface description	176
11.9	Operating water interface	182
11.10	Demand specification, service water	183
11.11	Unbalance sensor kit	184
11.12	Speed sensor kit	187
11.13	Interconnection diagram	191
11.14	Electric motor	193
11.15	Identification and safety signs on machine	194
12	Installation	197
12.1	Installation	198
12.2	Storage of goods	199
12.3	Transport of goods	201
12.4	Service space	202
12.5	Foundation	203



**Read and understand 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.



2 Safety instructions



The centrifuge 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:

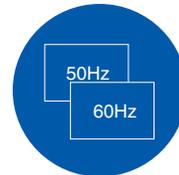
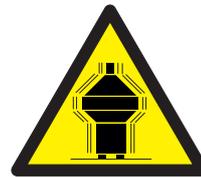
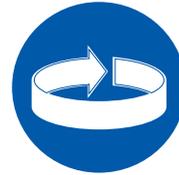
- **Use the separator only for the purpose and parameter range specified by Alfa Laval.**
- **Strictly follow the instructions for installation, operation and maintenance.**
- **Ensure that personnel are competent and have sufficient knowledge of maintenance and operation, especially concerning emergency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





Disintegration hazards

- When power cables are connected, always check direction of motor rotation. If incorrect, vital rotating parts could unscrew.
- If excessive vibration occurs, **stop** separator and **keep bowl filled** with liquid during rundown.
- Use the separator only for the purpose and parameter range specified by Alfa Laval.
- 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.



S01512F1

S01512N1

S01512P1

S01512L1

S0151241

S01512G1

S01512H1



Entrapment hazards

- Do NOT stand on the separator or parts of.



Entrapment hazards

- Make sure that rotating parts have come to a **complete standstill** before starting **any** dismantling work.

If there is no braking function the run down time can exceed two hours.

- 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 hazard

- Follow local regulations for electrical installation and earthing (grounding).
- To avoid accidental start, switch off and lock power supply before starting **any** dismantling work.



S0151201

S0151261

S0151271



Crush hazards

- Use correct lifting tools and follow lifting instructions.

Do **not** work under a hanging load.



S01512M1

S01512Y1



Noise hazards

- Use ear protection in noisy environments.



S0151291



Burn hazards

- Lubrication oil, machine parts and various machine surfaces can be hot and cause burns. Wear protective gloves.



S01512A1



Skin irritation hazards

- When using chemical cleaning agents, make sure you follow the general rules and suppliers recommendation regarding ventilation, personnel protection etc.
- Use of lubricants in various situations.



S01512D1



Cut hazards

- Sharp edges, especially on bowl discs and threads can cause cuts. Wear protective gloves.



S01512B1



Flying objects

- Risk for accidental release of snap rings and springs when dismantling and assembly. Wear safety goggles.

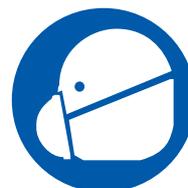


S01512C1



Health hazard

- Risk for unhealthy dust when handling friction blocks/pads. Use a dust mask to make sure not to inhale any dust.



S01512V1



2.1 Warning signs in 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

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING

Type of hazard

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

Type of hazard

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTE

NOTE indicates a potentially hazardous situation which, if not avoided, may result in property damage.



2.2 Recycling Information

Unpacking

Packing material consists of wood, plastics, cardboard boxes and in some cases metal straps.

- Wood and cardboard boxes can be reused, recycled or used for energy recovery.
- Plastics should be recycled or burnt at a licensed waste incineration plant.
- Metal straps should be sent for material recycling.

Maintenance

During maintenance oil and wear parts in the machine are replaced.

- Oil must be taken care of in agreement with local regulations.
- Rubber and plastics should be burnt at a licensed waste incineration plant. If not available they should be disposed to a suitable licensed land fill site.
- Bearings and other metal parts should be sent to a licensed handler for material recycling.
- Seal rings and friction linings should be disposed to a licensed land fill site. Check your local regulations.
- Worn out or defected electronic parts should be sent to a licensed handler for material recycling.

Scrapping

At the end of use, the equipment must be recycled according to relevant local regulations.

Besides the equipment itself, any hazardous residues from the process liquid must be taken into consideration and dealt with in a proper manner. When in doubt, or in the absence of local regulations, please contact your local Alfa Laval sales company.



2.3 Requirements of personnel

Only **skilled** or **instructed** persons are allowed to operate the machine, e.g. operating and maintenance staff.

- **Skilled person:** A person with technical knowledge or sufficient experience to enable him or her to perceive risks and to avoid hazards which electricity/mechanics can create.
- **Instructed person:** A person adequately advised or supervised by a skilled person to enable him or her to perceive risks and to avoid hazards which electricity/mechanics can create.

In some cases special skilled personnel may need to be hired, like electricians and others. In some of these cases the personnel has to be certified according to local regulations with experience of similar types of work.

2.4 Remote start

If the separator is operated from a remote position, from where it can neither be seen nor heard, the power isolation device shall be equipped with an interlocking device. This is to prevent a remote start command which could result in some liquid being fed to the separator when it is shut down for service.

The first start after the separator has been taken apart or has been standing still for a long time shall always be locally manually supervised.

2 Description

Contents

2.1 General description	19
2.1.1 Application	19
2.1.2 Design	19

2.1 General description

2.1.1 Application

The BWPX 307TGD-71 is a sediment-discharging centrifugal separator with controlled partial sediment discharge. It is of concentrator design, i.e. it separates heavy liquid phase from light liquid phase and sediment.

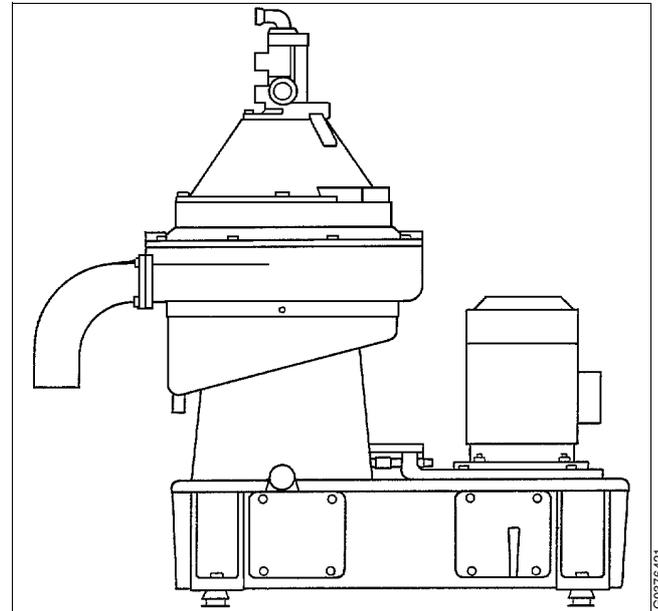
2.1.2 Design

The separator comprises a frame (H, D) consisting of a bottom and a top part with frame hood, electric motor (G), a bowl spindle (F) and a bowl (C). The separator bowl is driven by the electric motor via a flat belt power transmission (K). The motor drive is equipped with a friction coupling (I) to prevent overload.

An unbalance sensor (E) and a speed sensor (L) are equipment for monitoring the operation of the separator.

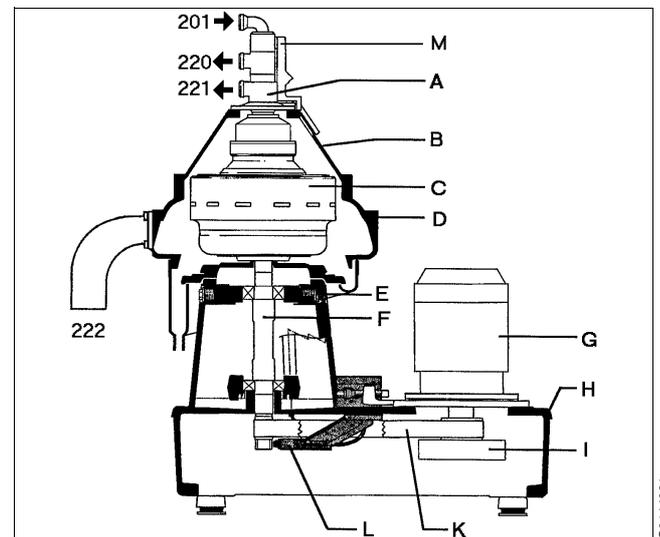
- 201. Process liquid inlet
- 220. Outlet, light phase (oil)
- 221. Outlet, heavy phase (clear water)
- 222. Sediment discharge outlet

- A. Inlet/outlet
- B. Frame hood
- C. Bowl
- D. Frame, top part
- E. Unbalance sensor
- F. Bowl spindle
- G. Electric motor
- H. Frame, bottom part
- I. Friction coupling
- K. Flat belt
- L. Speed sensor
- M. Safety device



BWPX Separator

Also available with cyclone, see “11.5 Basic size drawings” on page 169.



Separator vertical section

3 *Function*

Contents

3.1 Separating function	22
3.2 Sludge discharge function	24
3.2.1 Sludge discharge initiation	25
3.3 Concentrator and purifier principles	26
3.3.1 Flow in concentrator bowl	26
3.3.2 Flow in purifier bowl	28
3.3.3 Position of interface	29
3.3.4 Selection of gravity disc	30

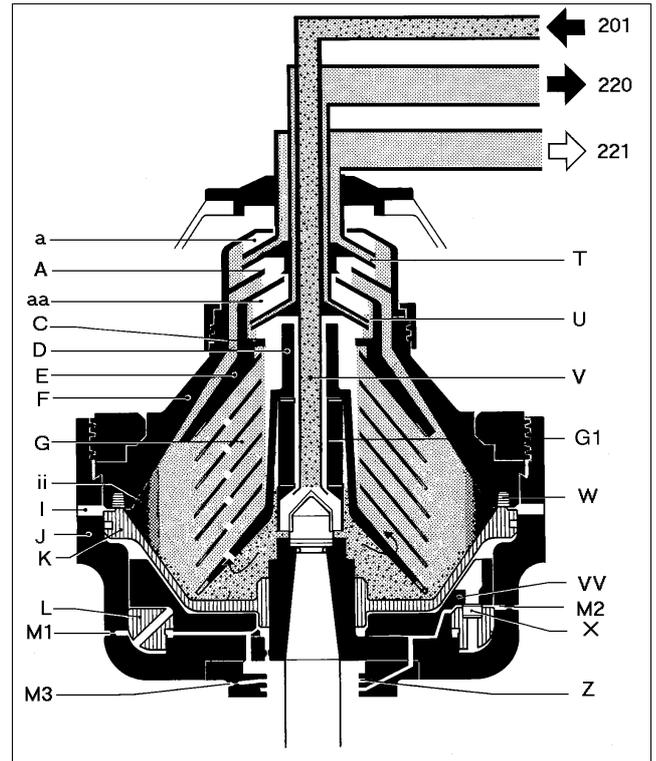
3.1 Separating function

Unseparated liquid (bilge water), is fed into the rotating bowl through the inlet pipe (V) and is discharged into the disc inlet (G1) and being distributed outward by the distributor (D). When the liquid reaches the holes of the distributor, it passes through channels which were build-up by the disc stack (G). The heavy phase together with any solid particles, are transported along the underside of the discs, outward to the periphery of the bowl, where the solid particles are deposited on the wall of the bowl. The light liquid travels inward to the centre of the bowl.

The heavy liquid then continues flowing along the upper surface of the top disc, inward to the bowl hood neck and over the gravity disc (A), to the upper paring chamber (a). Henceforth, it is pumped up by the upper paring disc (T) to the heavy phase outlet (221).

When the light liquid (oil) leaves the disc stack, it travels upward, flowing over the level ring (C) in the top disc (E) and enters the oil paring chamber aa). The rotating oil is pumped up by the stationary oil paring disc (U) and leaves the bowl through the light phase outlet (220)

- 201. Process liquid inlet
- 220. Outlet, light phase (oil)
- 221. Outlet, heavy phase (clear water)
- a. Upper paring chamber
- aa. Oil paring chamber
- A. Gravity disc
- C. level ring
- D. Distributor
- E. Top disc
- F. Bowl hood
- G. Bowl disc stack
- G1. Disc inlet
- ii. Sludge space
- I. Sludge port
- J. Bowl body
- K. Sliding bowl bottom
- L. Operating slide
- M1. Nozzle
- M2. Nozzle
- M3. Nozzle
- T. Water paring disc
- U. Oil paring disc
- V. Inlet pipe
- VV. Distributing ring
- W. Bowl hood seal ring
- X. Drain valve
- Z. Operating water ring

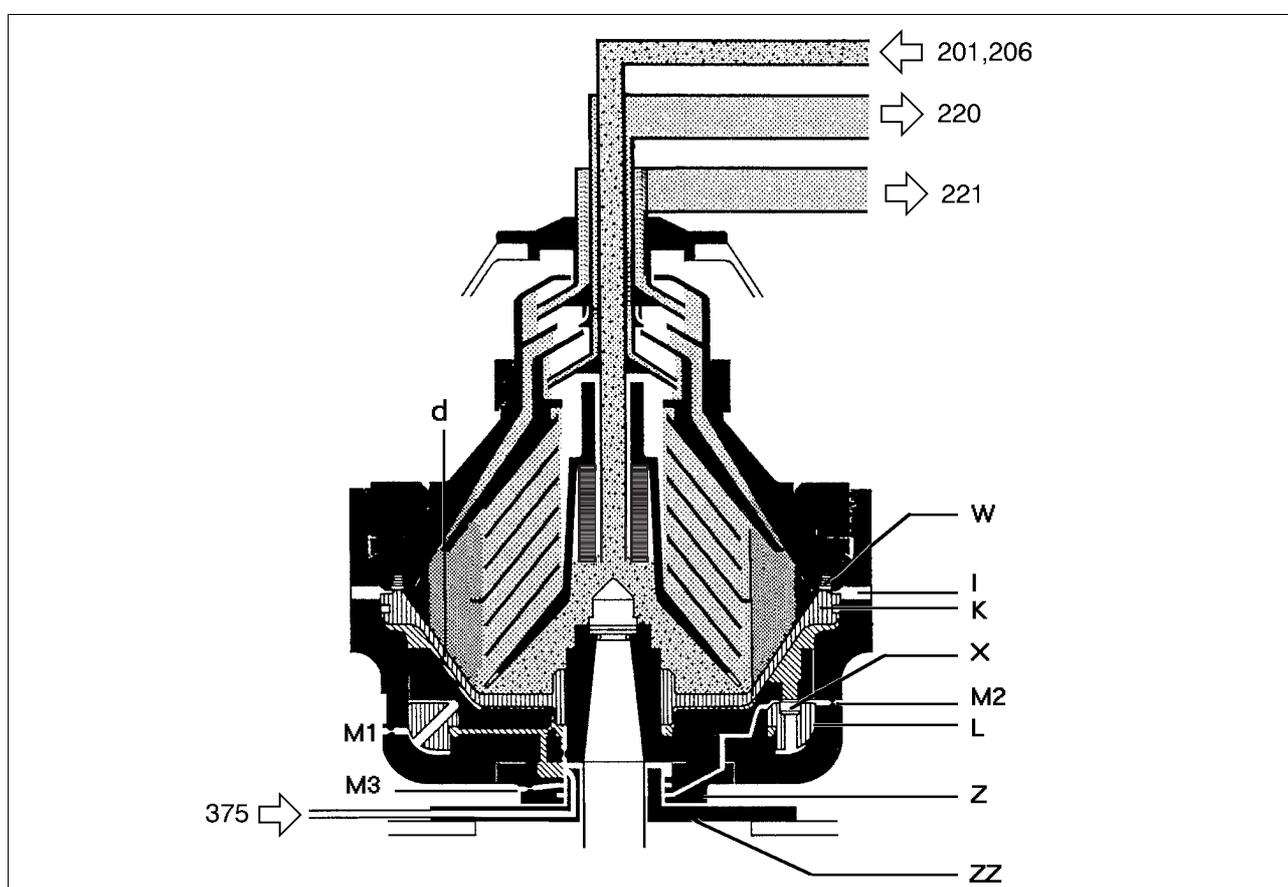


Bowl assembly

3.2 Sludge discharge function

The BWPX 307TGD-71 separator discharges a fixed volume (d) of sludge and water. When a sludge discharge occurs only sludge and water are discharged. It can, however, contain some emulsified oil.

The sludge is discharged through a number of ports (I) in the bowl wall. Between discharges these ports are covered by the sliding bowl bottom (K), which forms an internal bottom in the separating space of the bowl. The sliding bowl bottom is normally pressed upwards against a seal ring (W) by the centrifugal force exerted by the operating water underneath (see next page).



BWPX sludge discharge function

- | | | | |
|------|--|-----|----------------------|
| 201. | Inlet process liquid | M1. | Nozzle |
| 220. | Outlet, light phase | M2. | Nozzle |
| 221. | Outlet, heavy phase | M3. | Nozzle |
| 375. | Inlet, discharge and make-up liquid | W. | Bowl hood seal ring |
| d. | Discharge volume | X. | Drain valve |
| I. | Sludge port | Z. | Operating water ring |
| K. | Sliding bowl bottom | ZZ. | Distributing cover |
| L. | Operating slide | | |
| 206. | Inlet, liquid seal and displacement liquid | | |

3.2.1 Sludge discharge initiation

Sludge discharge is initiated when the preset time between sludge discharges has elapsed.

The discharge is initiated by the discharge water flow set valve (375), which for about 0,5 seconds admits bowl opening water so that it flows over the operating water ring (Z). The operating water enters the space above the operating slide (L), which moves downwards opening the drain valves (X), and the space below the sliding bowl bottom (K) is drained. The sliding bowl bottom moves downwards and sludge and water are discharged through the ports (I).

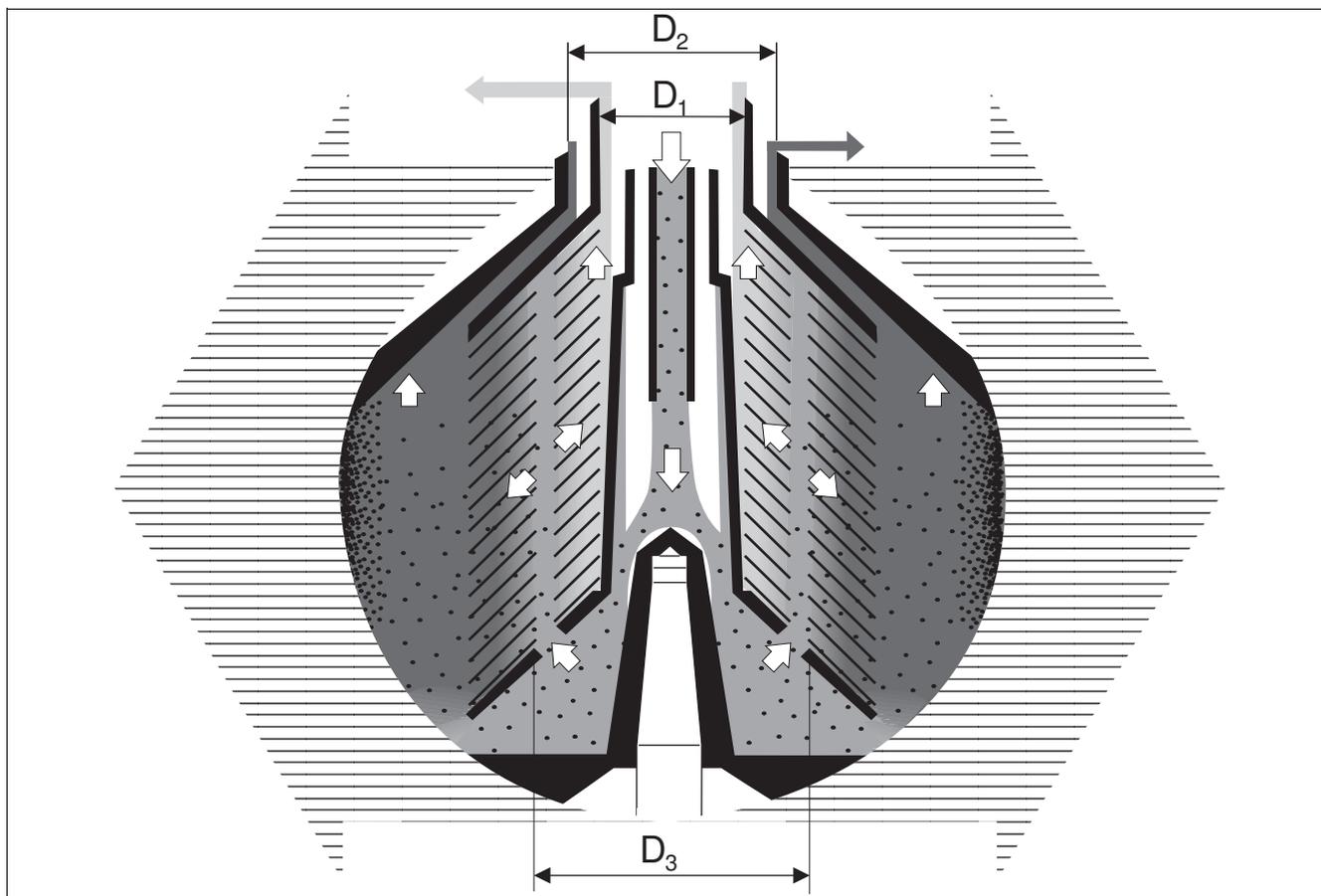
While this is happening, the operating water ring (Z) and the space above the operating slide (L) are continuously drained through their respective nozzles (M3 and M1/M2). When the discharge water above the operating slide (L) has been drained, the make-up water pushes the operating slide upwards closing the drain valves (X). The make-up water flow is open during the entire discharge cycle (about 4,5 seconds), now fills the space below the sliding bowl bottom (K) with water pressing it back to the closed position.

NOTE

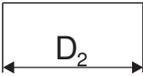
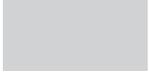
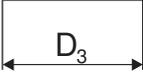
If the water supply is unstable or if the feed flow is on during discharge, the sludge discharge period stated may have to be increased. See "[11.1.3 Technical data](#)" on [page 161](#).

3.3 Concentrator and purifier principles

3.3.1 Flow in concentrator bowl



G0563721

- | | | | |
|---|--------------------|---|---------------------------------------|
|  | Centrifugal force |  | Bowl parts |
|  | Process liquid |  | D_1 = Diameter of inner outlet |
|  | Heavy liquid phase |  | D_2 = Hole diameter of gravity disc |
|  | Light liquid phase |  | D_3 = Diameter of interface |
|  | Sediment (solids) | | |

In a concentrator bowl the heavy liquid phase is the major part of the process liquid.

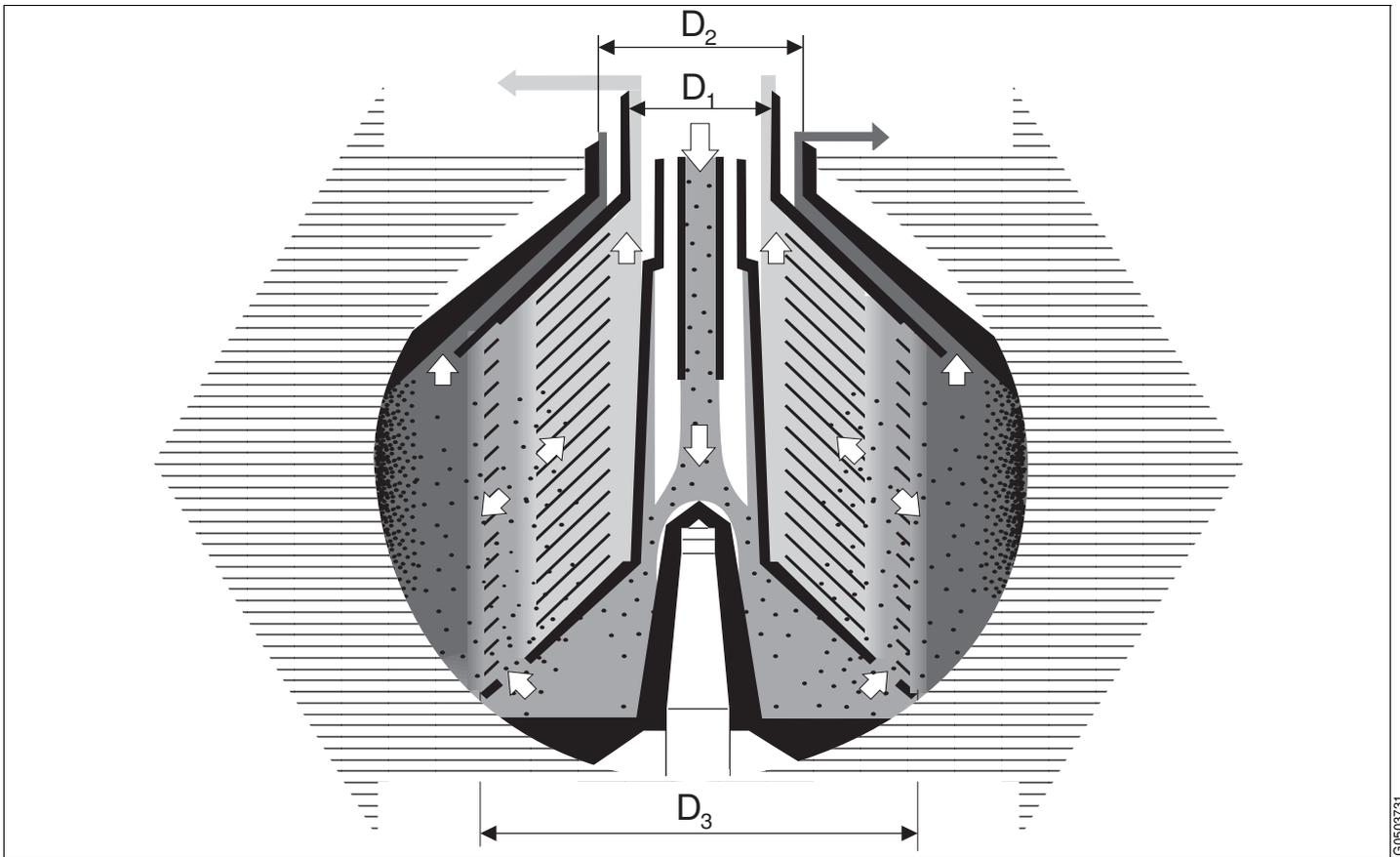
This bowl has two liquid outlets. The process liquid flows into the bowl through the centre and into the space under the distributor.

The liquid flows up through distribution holes in the distributor and the bowl discs and is divided among the interspaces between the discs, where the liquid phases are separated from each other by action of the centrifugal force. As the process starts an interface area forms between the heavy phase and the light phase.

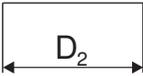
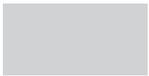
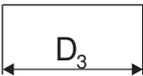
The heavy phase, which is the major part of the mixture, and any sediment move along the underside of the bowl discs towards the periphery of the bowl, where the sediment settles on the bowl wall. The heavy phase proceeds outside the top disc towards the neck of the bowl hood and leaves the bowl via the gravity disc. This is the *outer way* (dark coloured in illustration).

The light phase moves along the upper sides of the bowl discs towards the bowl centre and leaves the bowl via the hole in the top disc neck. This is the *inner way* (light coloured in illustration).

3.3.2 Flow in purifier bowl



G0503731

- | | | | |
|---|--------------------|---|--|
|  | Centrifugal force |  | Bowl parts |
|  | Process liquid |  | D_1 = Diameter of inner outlet |
|  | Heavy liquid phase |  | D_2 = Hole diameter for the heavy phase outlet, gravity disc |
|  | Light liquid phase |  | D_3 = Diameter of interface |
|  | Sediment (solids) | | |

In a purifier bowl the light liquid phase is the major part of the process liquid. This bowl has two liquid outlets. The process liquid flows through the centre and out under the distributor.

The liquid flows up and is divided among the interspaces between the bowl discs, where the liquid phases are separated from each other by action of the centrifugal force.

The heavy phase and any sediment move along the underside of the bowl discs towards the periphery of the bowl, where the sediment accumulates. The heavy phase proceeds along the upper side of the top disc towards the neck of the bowl hood and leaves the bowl via the gravity disc - *the outer way* (dark coloured in illustration).

The light phase, which is the major part of the mixture, moves along the upper side of the bowl discs towards the bowl centre and leaves the bowl via the hole in the top disc neck - *the inner way* (light coloured in illustration).

3.3.3 Position of interface

The bowl is adjusted for separation of liquid mixtures having various densities by altering the diameter (D_2) of the outlet for the heavy phase. This in turn influences the diameter of the interface (D_3).

For this purpose a number of gravity discs of various sizes is delivered with the separator. The sizes are normally stamped on the discs.

Where to locate the interface between light phase and heavy phase depends on which phase should be cleaned the most, and on the proportions between the two phases as well, see below in chapter [“3.3.4 Selection of gravity disc” on page 30](#).

3.3.4 Selection of gravity disc

The gravity disc is located inside the paring chamber cover. A gravity disc of a larger size will move the interface towards the bowl periphery, whereas a disc of a smaller size will place it closer to the bowl centre.

Where to locate the interface depends on which phase should be delivered pure, and on the proportions between the amounts of the two phases as well. Guidelines are also that the heavier or more viscous the light phase and the larger the liquid feed the smaller the diameter should be.

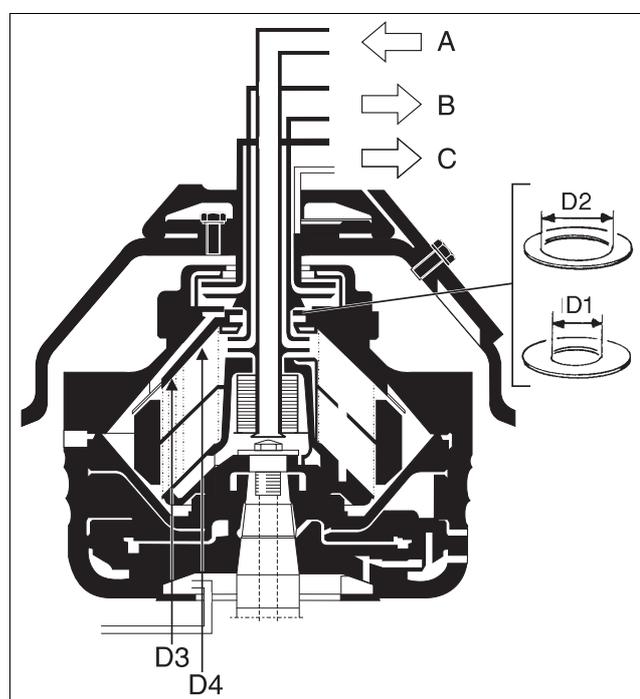
- For the concentrator the heavy phase is wanted more free from the light one, the interface should be located nearer the bowl centre (D4). However, if the gravity disc is too small the interface will form within the range of the distribution holes of the discs, and untreated liquid may be discharged through the light phase outlet.
- For the purifier the light phase is wanted more free from the heavy one, the interface should be located nearer the bowl periphery (D3).

When optimizing the separation process, keep the following directions in mind:

- If light phase is present in the heavy phase outlet before the desired throughput has been obtained, the gravity disc selected is too large. Fit a gravity disc of a smaller size (D1).

If the heavy phase is present in the light phase outlet before the desired throughput has been obtained, the gravity disc selected is too small. Fit a gravity disc of a larger size (D2).

The different sizes are normally stamped on the discs.



- A. *Process liquid inlet*
 B. *Light phase outlet*
 C. *Heavy phase outlet*

4 *Operating instruction*

Contents

4.1 Before start	32
4.2 Start and run-up	33
4.3 Operation	34
4.4 Stop	34
4.5 Emergency stop	35
4.6 Lubrication of electric motor	36

4.1 Before start

Before starting up the separator for the first time, make sure that the paring disc height adjustment is correct and that the flat belt is correctly tensioned, see check points. See “12.1 Installation” on page 198.

If any problems with the separation or mechanical function occurs, see “5 Trouble tracing” on page 37.

- Motors equipped with regreasing nipples:
When starting the motor for the first time, or after long storage of the motor, apply the specified quantity of grease until new grease is forced out of the grease outlet.
- Check that the bolts of the outlet cover and the screws of the frame hood are fully tightened.
- Check that the inlet pipe is tightened.

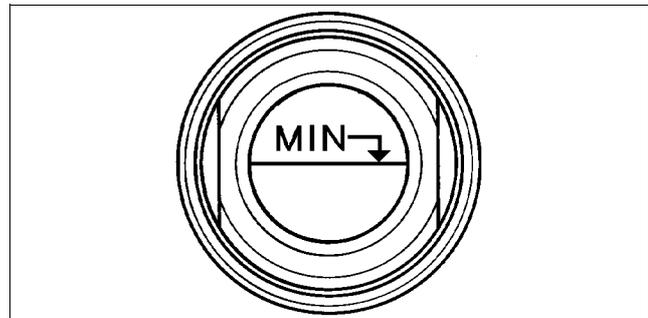


WARNING

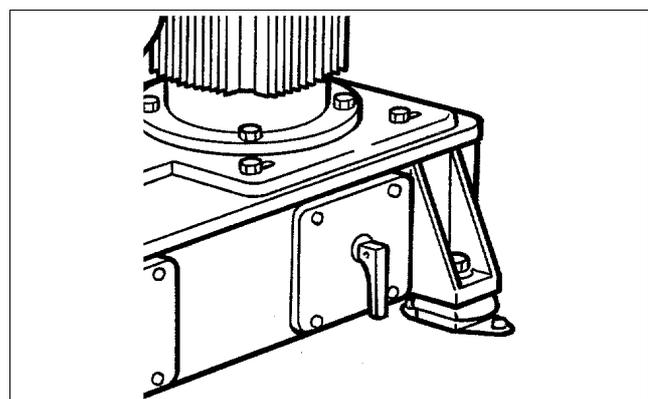
Make sure that all couplings and connections are securely tightened to prevent leakage.

Escaping steam and hot liquids can cause serious burns.

- If the separator has been dismantled
- check the assembly and the connections to make sure that they are correct.
- Check that the oil level is above the minimum level at the sightglass.
- Check that the brake is released.



50041711



G0367011

4.2 Start and run-up

- Start the separator.
- Check the direction of rotation of the bowl.
The motor fan must rotate as indicated by the arrow on the machine.



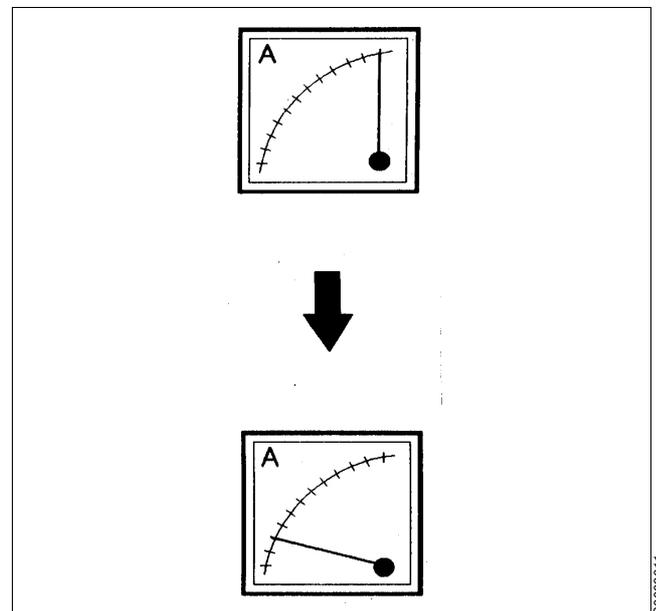
WARNING

If the direction of rotation is wrong the lock-ring can unscrew and the bowl hood spin off. Serious injury and damage to equipment can occur.

When passing through critical speeds of revolution, a higher level of vibration is normal.

Abnormal vibration of the machine during run-up may be due to incorrect assembly or poor cleaning of the bowl. Stop the machine immediately and inspect the bowl.

- Check the ammeter on the motor starter to ensure that the separator has reached full speed. During start, the ammeter reaches a peak and then slowly drops. When the friction coupling engages, the ammeter goes slowly up again and then slowly drops to a low and stable running position.
- At idling speed, open the valve for make-up water approximately 15 sec, to close the bowl.



S0009611

4.3 Operation

- Open the feed valve.
- Check that the machine has correct inlet and outlet pressures.
- Check the throughput.
- Discharge by manipulating the discharge and make-up liquid (375).

4.4 Stop

- Shut off the process liquid feed to the separator.
- Keep bowl filled with liquid during the whole stop sequence.
- Switch off the power to the separator and apply the brake.



WARNING

Do not loosen any parts on the machine until the bowl has stopped completely.

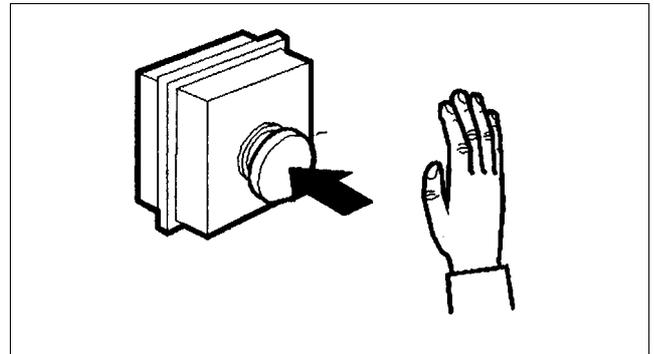
4.5 Emergency stop

If the machine begins to vibrate excessively during operation, stop it immediately by pressing the emergency stop.

Evacuate the room. The separator may be hazardous when passing through its critical speeds during run down.

Comply to following conditions:

- The bowl must be kept filled.
- Sludge ejection must not be made.
- The machine must never be restarted, if the reason for the emergency stop has not been investigated and due-care and precaution have not been taken into consideration.



Push the emergency stop if excessive vibration



WARNING

Do not discharge an excessively vibrating separator. Do not acknowledge the alarm until the separator has stopped and the danger has passed.

NOTE

After an emergency stop the cause of the fault must be found. If no cause can be found, a complete service must be carried out and all moving parts checked carefully.

For further information about service see [“6 Maintenance - General” on page 43](#).

4.6 Lubrication of electric motor

For motors equipped without permanently lubricated bearings, correct lubrication interval and recommended type of grease can be found in the manufacturer's instructions.

Manual lubrication

Regreasing while motor is running:

- Remove grease outlet plug or open closing valve if fitted.
- Be sure that the lubrication channel is open.
- Press the specified amount of grease into the bearing.
- Let the motor run 1-2 hours to ensure that all excess grease is forced out of the bearing. Close the grease outlet plug or closing valve if fitted.

Regreasing while motor is at standstill:

Regrease motors while running. If this is not possible, lubrication can be carried out while the machine is at a standstill.

- In this case, use only half the quantity of grease, then run the motor for a few minutes at full speed.
- When the motor has stopped, press the rest of the specified amount of grease into the bearing.

After 1-2 running hours close grease outlet plug or closing valve if fitted.

5 *Trouble tracing*

Contents

5.1 Separating function	38
5.2 Separator mechanical functions	40

5.1 Separating function

Cause	Remedy
A. Liquid flows out through bowl casing drain and / or sludge outlet	
See also B, below <ul style="list-style-type: none"> • Sludge discharge in progress • O-ring at paring chamber defective • Bowl hood seal ring defective or sealing surface of sliding bowl bottom damaged • Bowl speed too low • Valve (s) in heavy phase outlet line closed • Heavy phase paring disc defective 	None (normal) Renew Replace seal ring. Smooth surface on sliding bowl bottom or renew the latter Make sure current is on and brake is off, check tension, examine motor and power transmission Check Renew
B. Bowl opens unintentionally during operation	
See also A, above <ul style="list-style-type: none"> • Strainer in operating water system clogged • Insufficient supply of make-up water • Small nozzles in bowl body clogged • Small nozzle in operating water ring clogged • Square ring in sliding bowl bottom defective • Valve plugs defective • Sludge deposits on operating slide 	Clean Remedy Clean Clean Renew Renew Clean

Cause	Remedy
C. Bowl fails to open for sludge discharge	
<ul style="list-style-type: none"> • Strainer in operating water system clogged • Water flow too low • Insufficient supply of discharge water • Small nozzles in bowl body clogged • Seal ring in operating slide defective 	<p>Clean the strainer</p> <p>Check water flow. For correct discharge water flow, see chapter “11.7 Connection list” on page 176, connection No. 375.</p> <p>Remedy</p> <p>Clean</p> <p>Renew</p>
D. Unsatisfactory sludge discharge	
<ul style="list-style-type: none"> • Too long discharge interval • Sludge deposits in operating system 	<p>Clean and shorten time between discharge</p> <p>Clean</p>
E. Unsatisfactory separation result	
<ul style="list-style-type: none"> • Incorrect throughput • Bowl disc stack clogged • Sludge space in bowl filled • Bowl speed too low 	<p>Adjust</p> <p>Clean</p> <p>Clean and shorten time between discharges</p> <p>Make sure brake is off, check belt tension, examine motor and power transmission</p>

Place for notes:

5.2 Separator mechanical functions

Cause	Remedy
A. Separator vibrates during starting sequence	
Note! Some vibration is normal during the starting sequence when the separator passes its critical speeds.	
<ul style="list-style-type: none"> • Bowl out of balance due to: <ul style="list-style-type: none"> – bad cleaning – incorrect assembly – poor tightening of lock ring – bowl assembled with parts from different separators – too few discs in disc stack • Uneven sludge deposits in sludge space • Height position of paring disc or bowl spindle is incorrect • Bowl spindle bent, (max 0,04 mm) 	<p>Stop immediately by pressing emergency stop push-button or switching off power. Establish cause.</p> <p>Incorrectly tightened lock ring can involve fatal danger</p> <p>Replace discs removed</p> <p>Clean</p> <p>Stop, check and adjust</p> <p>Renew</p>
B. Separator vibrates during running sequence	
<ul style="list-style-type: none"> • Uneven sludge deposits in sludge space • Bearings damaged or worn • Vibration-dampers worn • Spindle top bearing spring broken 	<p>Clean</p> <p>Renew</p> <p>Renew dampers every three years</p> <p>Renew all springs</p>
C. Smell	
<ul style="list-style-type: none"> • Normal occurrence during start due to friction block slippage • Brake applied 	<p>None</p> <p>Release</p>

Cause	Remedy
D. Noise	
<ul style="list-style-type: none"> • Height position of paring discs or bowl spindle is incorrect • Bearings damaged or worn • Belt is slipping 	<p>Stop, check and adjust</p> <p>Renew</p> <p>Tighten belt</p>
E. Speed too high	
<ul style="list-style-type: none"> • Incorrect transmission parts (50 Hz belt pulley for 60 Hz current). 	<p>Stop immediately and rectify faults. Check frequency of power supply (50 Hz / 60 Hz). In case of overspeeding, check bowl for possible deformation. Contact your local Alfa Laval representative.</p>
F. Speed too low	
<ul style="list-style-type: none"> • Brake applied • Friction pads worn or oily • Bowl not closing or leaking • Motor failure • Bearings damaged or worn • Bearings overheated • Drive belt incorrectly tightened 	<p>Release</p> <p>Renew or clean</p> <p>Dismantle and check</p> <p>Repair</p> <p>Renew</p> <p>Renew</p> <p>Adjust</p>

Place for notes:

Cause	Remedy
G. Starting power too low	
<ul style="list-style-type: none"> • Drive belt incorrectly tightened 	Adjust
<ul style="list-style-type: none"> • Incorrect (belt pulley) transmission 	Adjust
H. Starting time too long	
<ul style="list-style-type: none"> • Brake applied 	Release
<ul style="list-style-type: none"> • Friction pads worn or oily 	Renew or clean
<ul style="list-style-type: none"> • Height position of paring discs or bowl spindle incorrect 	Stop, check and adjust
<ul style="list-style-type: none"> • Motor failure 	Repair
<ul style="list-style-type: none"> • Bearings damaged or worn 	Renew
I. Starting power too high	
<ul style="list-style-type: none"> • Incorrect belt pulley 	Stop immediately. See paragraph E
<ul style="list-style-type: none"> • Opposite direction of rotation 	Switch electrical phases
J. Stopping time too long	
<ul style="list-style-type: none"> • Brake lining worn or oily 	Renew or clean
K Water in drive housing	
<ul style="list-style-type: none"> • Bowl casing drain obstructed 	Clean and change oil
<ul style="list-style-type: none"> • Leakage at top bearing 	Renew seal ring and change oil
<ul style="list-style-type: none"> • Condensation 	Change oil

6 *Maintenance - General*

Contents

6.1	Periodic maintenance	44
6.1.1	Maintenance activities	45
6.1.2	Spare parts kits	45
6.2	Maintenance schedule	46
6.3	Lubricants	49
6.3.1	Lubrication chart, general	49
6.3.2	Recommended lubricants	50
6.3.3	Recommended lubricating oils	54
6.4	Cleaning	56
6.4.1	Cleaning agents	56
6.4.2	Cleaning of bowl discs	57
6.5	Miscellaneous maintenance	58
6.5.1	Vibration analysis	58
6.5.2	Oiling	58
6.5.3	Before shutdown	59
6.5.4	Before start-up	59

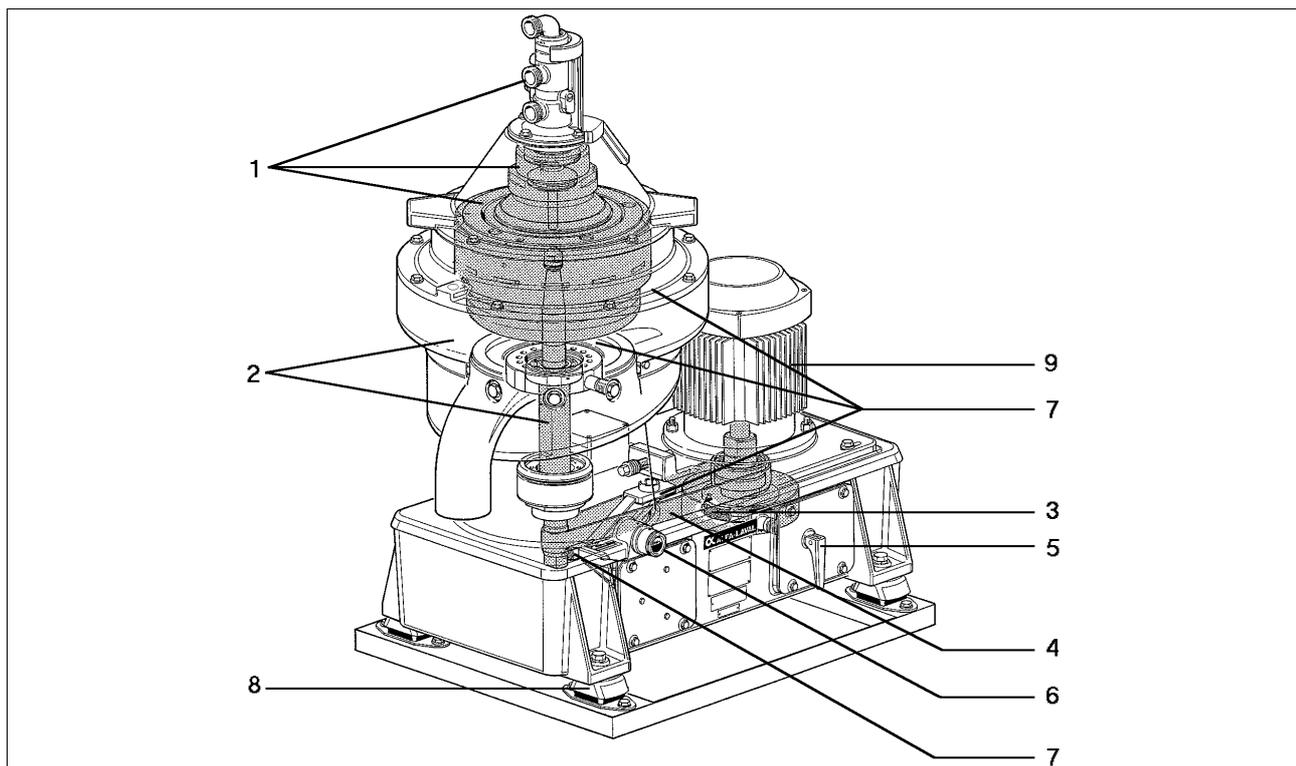
6.1 Periodic maintenance

Periodic maintenance reduces the risk of unexpected stoppages and breakdowns. A maintenance schedule is shown on the following pages in order to facilitate preventive maintenance. The illustrated positions below refer to corresponding positions in the maintenance schedule.



WARNING

Exceeding the maintenance intervals can result in serious injury and damage.



Positions relate to separator maintenance schedule

- | | |
|------------------------------------|-------------------------|
| 1. Separator bowl and inlet device | 7. Monitoring equipment |
| 2. Bowl spindle and frame | – Speed sensor |
| 3. Friction coupling | – Unbalance sensor |
| 4. Drive belt | 8. Frame feet |
| 5. Brake | 9. Electric motor |
| 6. Oil sump and oil filling device | |

6.1.1 Maintenance activities

The following directions for maintenance specify what is to be cleaned, checked and replaced with new items in accordance with the schedule for preventive maintenance.

IS; Intermediate Service

Interval: 2000 hours (3 months).

Cleaning, checking and renewal of sealing parts in bowl, inlet/outlet and separator top.

MS; Major Service

Interval: 8000 hours (1 year).

Cleaning, checking, renewal of O-rings, ball bearings and buffers for bowl spindle, O-rings for separator top part, friction blocks, flat belt, arm for brake.

Cleaning, checking and/or renewal of bottom bearing holder for bowl spindle, ball bearings for friction coupling and frame feet is to be carried out within a 4-year service interval. Spares for this service, and additional service which requires spares not included in the spare parts kits should be ordered separately as required.

6.1.2 Spare parts kits

Special kits of spares are available for periodic maintenance. These kits are designated in accordance with the separator maintenance schedule as follows:

- IS; Intermediate Service kit
- MS; Major Service kit

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

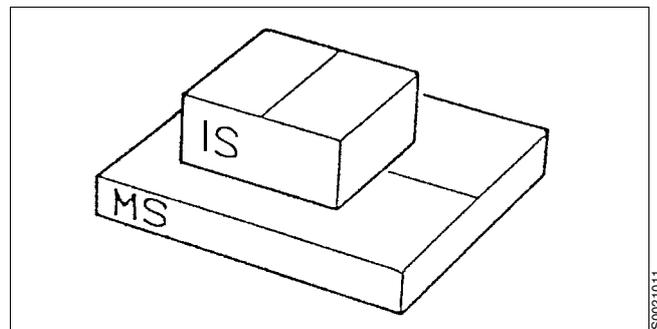
Note that the parts for IS are **not** included in the MS kit.

The contents of the spare parts kits are described in the “*Spare Parts Catalogue (SPC)*”.

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.



Spare parts kits

S0021011

6.2 Maintenance schedule

Part	Action	Maximum intervals			More information (page)
		2000 h or 3 months	8000 h or 1 year	Every 4 years	
Note! Each part must be checked for damage, corrosion and erosion every time the separator is dismantled.					144,145
1. Separator inlet / outlet, frame hood and bowl					
Inlet/outlet	Cleaning and inspection	X			65, 94
Frame hood	Cleaning and inspection	X			94, 94
Bowl body	Cleaning and inspection	X			65, 94
Bowl disc	Cleaning and inspection	X			65, 94
Bowl body nave	Checking	X			147
Discharge mechanism	Checking	X			148
Large lock ring joint	Cleaning and inspection		X		149
Guiding surfaces	Repair of galling/ Priming	Whenever necessary			152
Sliding bowl bottom erosion liner	Inspect and exchange if necessary	X			94
Disc stack pressure	Checking	X			94
Oil paring disc height adjustment	Checking		X		150
Warning sign on bowl hood	Inspection	X			

Part	Action	Maximum intervals			More information (page)	
		2000 h or 3 months	8000 h or 1 year	Every 4 years		
2. Bowl spindle and frame						
Bowl spindle top	Inspection	X			147	
Bowl spindle	Cleaning and inspection		X		86	
Operating water channel in distributing cover	Cleaning and inspection		X		86	
Fan	Cleaning and inspection		X		86	
Top bearing	Renew		X		86	
Buffer	Renew		X		86	
Bottom bearing	Renew		X		86	
Bottom bearing holder	Renew			X	86	
Oil pump	Cleaning and inspection		X		86	
Bowl spindle radial wobble	Checking		X		151	
3. Friction coupling						
Friction blocks	Renew		X ¹⁾		110	
Ball bearings	Renew			X ²⁾	110	
4. Drive belt and tightener						
Flat belt	Replacement		X		118	
Belt tightening	Tightening/Retightening		X		118	
5. Brake						
Complete arm and springs	Inspection		X ¹⁾		123	

Part	Action	Maximum intervals			More information (page)
		2000 h or 3 months	8000 h or 1 year	Every 4 years	
6. Oil sump in frame					
Oil sump	Oil change	X ³⁾			125
Oil filling device	Cleaning and inspection		X		126
7. Monitoring equipment					
Speed sensor	Checking and adjusting	Whenever necessary			127, 132, 135
Unbalance sensor	Checking and adjusting	Whenever necessary			129, 136
8. Frame feet					
Frame feet	Inspection/ Replacement			X	139
9. Electric motor					
Bearings	Renew ⁴⁾			X ²⁾	140

Note!

Interchange all used parts in the machine with the new supplied parts within the IS and MS service kits, during the periodic maintenance.

- 1) Changeable parts time interval, may be prolonged, if the separator start and stop time is less than ten (10) times per year.
- 2) If the separator is stopped and started considerably more than 10 – 20 times per year, it is advisable to replace the ball bearings before 4 years have elapsed. For an electric motor other than those supplied by Alfa Laval (ABB Motors – CES S.A; type MBT 132SC) maintenance must comply with the manufacturer's recommendations.
- 3) The oil must be changed after every operating period of 1500 – 2000 hours. When the separator is in operation for short periods, lubricating oil must be changed every 12 months, even if the total number of operating hours is less than 1500 – 2000. Check and prelubricate the spindle bearing of separators that have been out of service for 6 months or more.
- 4) The bearings are of sealed type. See [“Electric motor” on page 195.](#)

6.3 Lubricants

6.3.1 Lubrication chart, general

Alfa Laval ref. 553216-01, rev. 9

	<p>CAUTION</p> <p>Check the oil level before start. Top up when necessary. Do not overfill.</p>
---	--

Lubricating points	Lubrication	Interval
<p>The oil bath Bowl spindle bearings are lubricated by oil splash from the oil bath.</p>	<p>Lubricate with oil. For information on type of lubricant see Recommended lubricating oils. For information on lubricating oil volume: see Technical data</p>	<p>For information on oil change interval see Recommended lubricating oils.</p>
<p>Bowl spindle taper</p>	<p>Lubricate with oil. Only a few drops for rust protection.</p>	<p>At assembly.</p>
<p>Bowl Sliding contact surfaces, thread of lock nut and cap nut.</p>	<p>Lubricate with paste. For information on pastes see Recommended lubricants.</p>	<p>At assembly.</p>
<p>Rubber seal rings</p>	<p>Lubricate with grease. For information on grease see Recommended lubricants</p>	<p>At assembly.</p>
<p>Friction coupling ball bearings. <i>Not valid for rigid coupling:</i></p>	<p>The bearings are sealed and packed with grease and need no extra lubrication.</p>	<p>-</p>
<p>Electric motor</p>	<p>Follow manufacturer's instructions.</p>	<p>Follow manufacturer's instructions.</p>
<p>Threads</p>	<p>Lubricating oil, if not otherwise stated.</p>	<p>At assembly.</p>

<p>NOTE!</p> <p>If not otherwise specified, follow the supplier's instructions about applying, handling and storing of lubricants.</p>

6.3.2 Recommended lubricants

Alfa Laval ref. 553217-01, rev. 14

Lubricant recommendation for hygienic and non-hygienic applications

Lubricants with an Alfa Laval part number are approved and recommended for use.

The data in the tables below is based on supplier information.

Trade names and designations might vary from country to country. Please contact your local supplier for more information.

Paste for assembly of metallic parts, non-hygienic applications:

Part No	Quantity	Designation	Manufacturer	Remark
537086-02	1000 g	Molykote 1000 Paste	Dow Corning	-
537086-03 537086-06	100 g 50 g	Molykote G-n plus Paste	Dow Corning	-
537086-04	50 g	Molykote G-rapid plus Paste	Dow Corning	-
-	-	Gleitmo 705	Fuchs Lubritech	-
-	-	Wolfracoat C Paste	Klüber	-
-	-	Dry Moly Paste	Rocol	-
-	-	MTLM	Rocol	-

Bonded coating for assembly of metallic parts, non-hygienic applications:

Part No	Quantity	Designation	Manufacturer	Remark
535586-01	375 g	Molykote D321R Spray	Dow Corning	-
-	-	Gleitmo 900	Fuchs Lubritech	Varnish or spray

Paste for assembly of metallic parts, hygienic applications (NSF registered H1 is preferred):

Part No	Quantity	Designation	Manufacturer	Remark
-	-	Molykote D Paste	Dow Corning	-
537086-07	50 g	Molykote P-1900	Dow Corning	NSF Registered H1 (7 Jan 2004)
-	-	Molykote TP 42	Dow Corning	-
561764-01	50 g	Geralyn 2	Fuchs Lubritech	NSF Registered H1 (3 sep 2004)
-	-	Geralyn F.L.A	Fuchs Lubritech	NSF Registered H1 (2 Apr 2007) German §5 Absatz 1 LMBG approved
554336-01	55 g	Gleitmo 1809	Fuchs Lubritech	-
-	-	Gleitmo 805	Fuchs Lubritech	DVGW (KTW) approval for drinking water (TZW prüfzeugnis)
-	-	Klüberpaste 46 MR 401	Klüber	White; contains no lead, cadmium, nickel, sulphur nor halogens.
-	-	Klüberpaste UH1 84-201	Klüber	NSF Registered H1 (26 Aug 2005)
-	-	Klüberpaste UH1 96-402	Klüber	NSF Registered H1 (25 Feb 2004)
-	-	252	OKS	NSF Registered H1 (23 July 2004)
-	-	Foodlube Multi Paste	Rocol	NSF Registered H1 (13 Apr 2001)

Silicone grease/oil for rubber rings, hygienic and non-hygienic applications

Part No	Quantity	Designation	Manufacturer	Remark
-	-	No-Tox Food Grade Silicone grease	Bel-Ray	NSF Registered H1 (16 December 2011)
-	-	Dow Corning 360 Medical Fluid	Dow Corning	Tested according to and complies with all National Formulary (NF) requirements for Dimethicone and European Pharmacopeia (EP) requirements for Dimeticone or Silicone Oil Used as a Lubricant, depending on viscosity.
569415-01	50 g	Molykote G 5032	Dow Corning	NSF Registered H1 (3 June 2005)
-	-	Geralyn SG MD 2	Fuchs Lubritech	NSF Registered H1 (30 March 2007)
-	-	Chemplex 750	Fuchs Lubritech	DVGW approved according to the German KTW-recommendations for drinking water.
-	-	Paraliq GTE 703	Klüber	NSF Registered H1 (25 Feb 2004). Approved according to WRAS.
-	-	Unisilkon L 250 L	Klüber	Complies with German Environmental Agency on hygiene requirements for tap water. Certified by DVGW-KTW, WRAS, AS4020, ACS.
-	-	ALCO 220	MMCC	NSF Registered H1 (25 March 2002)
-	-	Foodlube Hi-Temp	Rocol	NSF Registered H1 (18 April 2001)

Always follow the lubrication recommendations of the bearing manufacturer.

Grease for ball and roller bearings in electric motors

Part No	Quantity	Designation	Manufacturer	Remark
-	-	Energrease LS2	BP	-
-	-	Energrease LS-EP2	BP	-
-	-	Energrease MP-MG2	BP	-
-	-	APS 2	Castrol	-
-	-	Spheerol EPL 2	Castrol	-
-	-	Multifak EP2	Chevron	-
-	-	Multifak AFB 2	Chevron	-
-	-	Molykote G-0101	Dow Corning	-
-	-	Molykote Multilub	Dow Corning	-
-	-	Unirex N2	ExxonMobil	-
-	-	Mobilith SHC 460	ExxonMobil	-
-	-	Mobilux EP2	ExxonMobil	-
-	-	Lagermeister EP2	Fuchs Lubritech	-
-	-	Rembrandt EP2	Q8/Kuwait Petroleum	-
-	-	Alvania EP 2	Shell	-
-	-	LGEP 2	SKF	-
-	-	LGMT 2	SKF	-
-	-	LGFP 2	SKF	NSF Registered H1 (17 Aug 2007)
-	-	Multis EP2	Total	-

6.3.3 Recommended lubricating oils

Alfa Laval ref. 553219-09, rev. 4

Selection of lubricating oil for belt drive HSS

Select lubricating oil type with regards to ambient temperature.

Ambient temperature (°C)	Frame temp and cooling	Oil type	Oil change interval (operating hours)
+5 to +45	N/A	Mineral lubricating oil AL 116 3157 ISO-L-HM 150 Viscosity grade: VG150 Viscosity index: VI > 90 Alfa Laval oil types: Art no 546098-81 4 litre Art no 546098-83 1 litre	1500
+2 to +65	N/A	Synthetic lubricating oil AL 116 3146 ISO-L-CTPR 220 Viscosity grade: VG220 Viscosity index: VI > 140 Alfa Laval oil types: Art no 542690-80 20 litre Art no 542690-81 4 litre	2000
+2 to +65	N/A	Hygienic synthetic lubricating oil AL 116 3158: ISO-L-CTPR 220 Viscosity grade: VG220 Viscosity index: VI > 140 Registered as NSF H1 for use in the food processing industry Conform to FDA CFR 21 178.3570, 178.3620 and/or generally regarded as safe (US 21 CFR 182)	2000

General requirements for HSS lubricating oils

- Compatible with non-ferrous metals.
- Compatible with most paints and conventional sealing materials

Oil change interval

Oil change interval is dependent on operating conditions.

Operating conditions	Oil change interval
In a new installation. After change of gear transmission.	200 hours
Continuous operation.	See selection of lubricating oil
When the separator is operated for short periods.	12 months
Seasonal operation	Before every operating period

Other information

Check and prelubricate spindle bearings on separators which have been out of service for 6 months or longer.

6.4 Cleaning

6.4.1 Cleaning agents

When using chemical cleaning agents, make sure to observe the general rules and supplier's recommendations regarding ventilation, protection of personnel, etc.

For separator bowl, inlet and outlet

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

Use Shell LENSITIL Centrifuge Degreaser or equivalent for cleaning of bowl discs and other bowl parts, as well as inlet and outlet parts.

For discharge mechanism

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

For parts of the transmission

Use white spirit, cleaning kerosene or diesel oil.



WARNING

Never use trichlorethylene, trichlorethane and methylene chloride. These are dangerous to personnel and the environment. Detergents with only phenols should also be avoided.

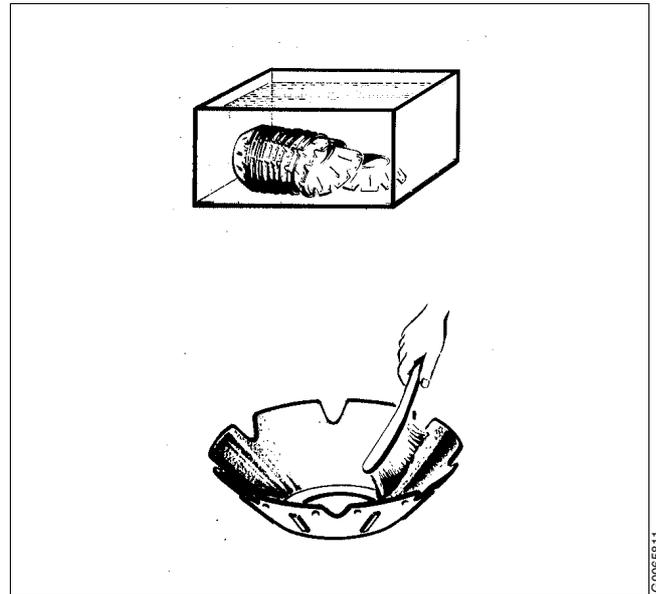
For external cleaning

Clean the exterior of the separator with a brush or a piece of rag. Do not clean with a water jet or spray.

6.4.2 Cleaning of bowl discs

Handle the bowl discs carefully so as to avoid damaging their surfaces during cleaning. Mechanical cleaning is likely to scratch the disc surfaces, causing deposits to form more quickly and adhere more firmly. A gentle chemical cleaning is therefore preferable to mechanical cleaning.

A chemical cleaning agent should dissolve the deposits quickly without attacking the material of the separator parts themselves. Shell LENSITIL Centrifuge Degreaser diluted in water satisfies these demands. Suitable concentration of approx. 25 percentage by volume and temperature 70-80 °C to be used. Note that carbon steel parts (e.g. lock rings) may be affected by the agent if submerged a long time.



Cleaning procedure

Remove the bowl discs from the distributor and place them ONE BY ONE in the cleaning agent. Let the discs remain in the cleaning agent until the deposits have been dissolved.

This will normally take between two and four hours.

Finally, clean the discs with a SOFT fibre brush.



CAUTION

Cut hazards

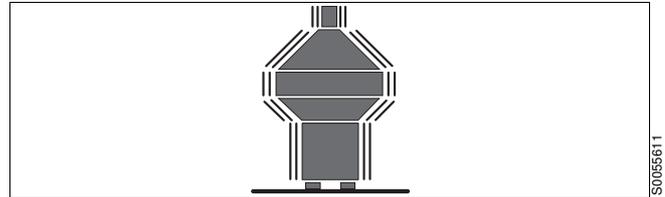
The separator bowl discs may have sharp edges and can cause cuts.

6.5 Miscellaneous maintenance

6.5.1 Vibration analysis

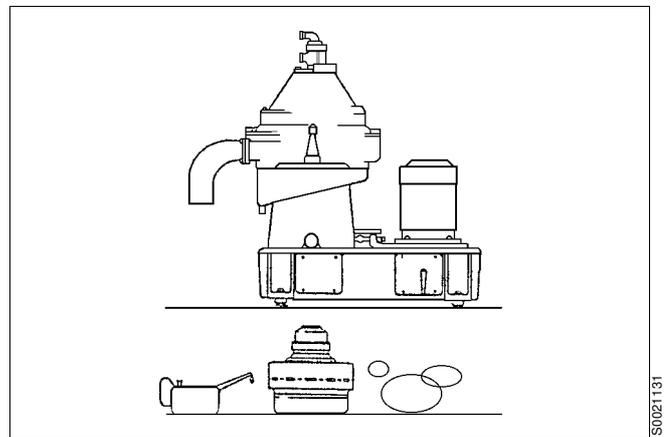
Excessive vibration or noise indicates that something is incorrect. Stop the separator and look for the cause.

If vibration analysis equipment is available, use this equipment to periodically check and record the magnitude of vibration.



6.5.2 Oiling

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.



6.5.3 Before shutdown

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

- Remove the bowl, according to chapter “[8 Maintenance - Assembly](#)” on page 85.

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. This can cause 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.
- Protect the spindle taper from corrosion by lubricating it with oil.

For storage see “[12 Installation](#)” on page 197.

6.5.4 Before start-up

- 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. In addition to IS-service: Lubricate the top bearing with 10 mil. of lubricating oil.
- If the electric motor is equipped with grease nipples; pre-lubricate according to the instructions in “[4.6 Lubrication of electric motor](#)” on page 36 and/or the manufacturers information. See “[6.3 Lubricants](#)” on page 49 for type of grease.

If the motor has no grease nipples, it is permanently lubricated. No action is needed.

- If the shut-down period has been longer than 12 months, a Major Service (MS) should be carried out.

7 Maintenance - Dismantling

Contents

7.1 General information	63
7.1.1 Tools	63
7.2 Inlet/outlet, device	64
7.2.1 Exploded views	64
7.3 Bowl – dismantling	65
7.3.1 General illustration how to remove the Retaining-ring coil.	69
7.4 Bowl spindle – dismantling	77

7.1 General information

The separator must be dismantled at regular intervals for cleaning and inspection in accordance with the maintenance schedule.

The next two chapters deal with dismantling and assembly of items connected to the bowl and the driving devices.



WARNING

Never start dismantling the separator until the bowl has come to a complete standstill.

7.1.1 Tools

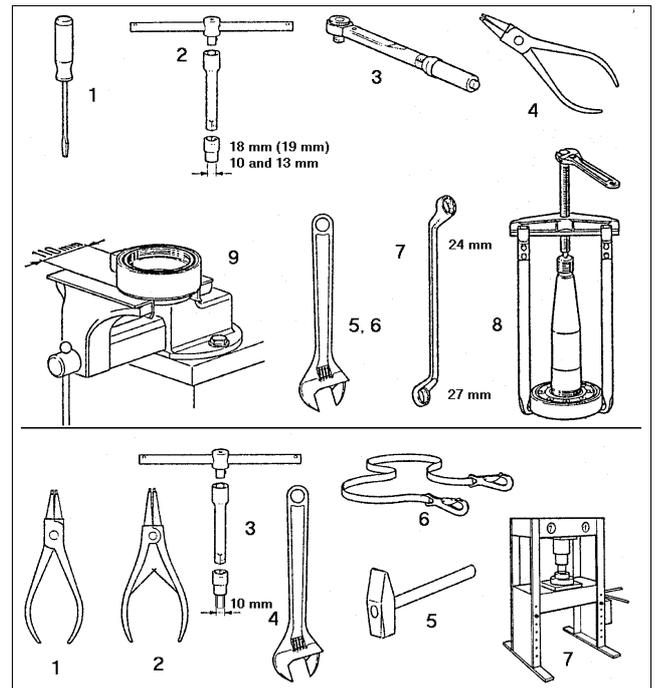
Special tools from the tool kit must be used for dismantling and assembly. Additional tools needed for dismantling and assembly but **not** included in the tool kit are shown below.



WARNING

Parts may spring up – Risk for eye injury.

Use correct tongs for dismantling and assembly of retaining rings to avoid accidental release of grip.



For bowl and bowl spindle

1. Screw driver
2. T-handle, extension rod and 10, 13, 18 and 19 mm sockets
3. Torque wrench (50 Nm)
4. Pliers for internal snap ring
5. Adjustable wrench (length approx. 400 mm)
6. Adjustable wrench or screw spanner (width of jaws 30 mm)
7. Ring spanner (24 and 27 mm)
8. Ball bearing puller
9. Vice (110 mm opening) with copper liners

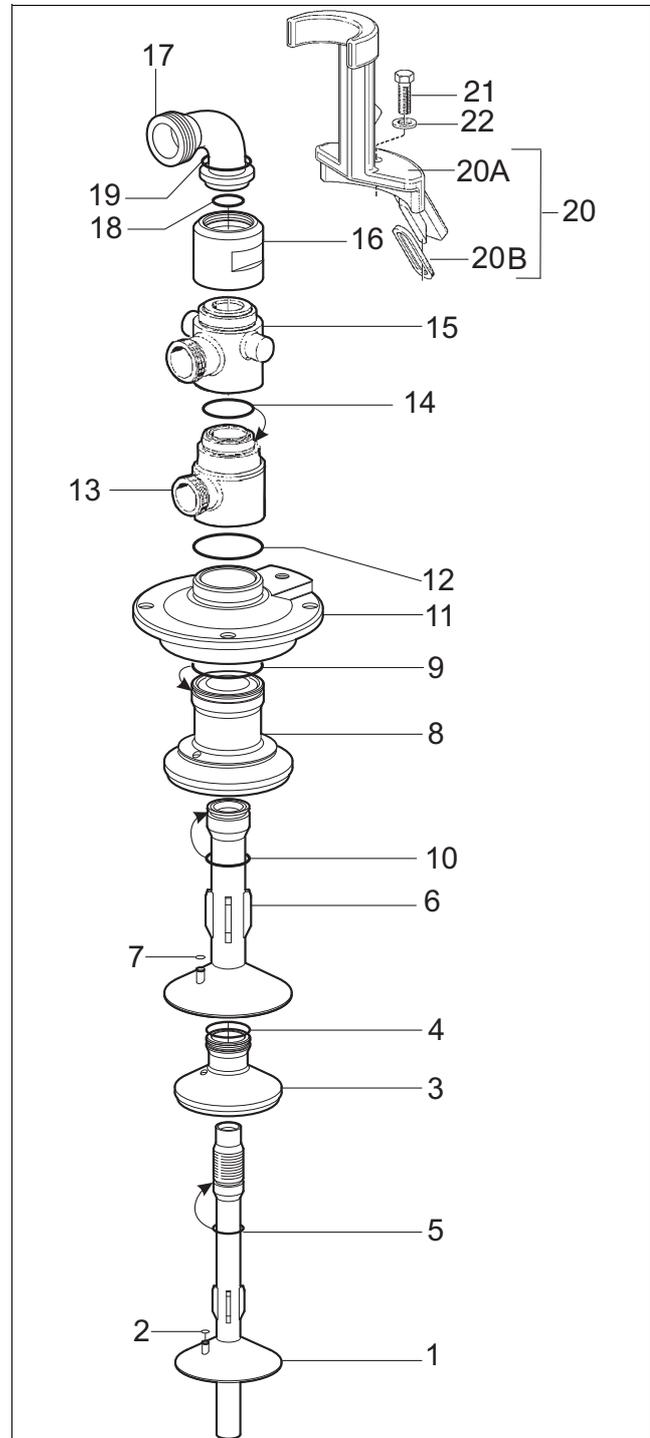
Friction coupling and flat belt

1. Pliers for internal snap ring
2. Pliers for external snap ring
3. T-handle, extension rod and socket (10 mm)
4. Adjustable wrench or spanner (width of jaws 28, 50 and 55 mm)
5. Hammer (heavy)
6. Sling (lifting capacity: min 200 kg)
7. Hydraulic press (if available)

7.2 Inlet/outlet, device

7.2.1 Exploded views

1. Inlet pipe
2. O-ring
3. Paring disc top part
4. O-ring
5. O-ring
6. Discharge pipe
7. O-ring
8. Paring disc top part
9. O-ring
10. O-ring
11. Connecting housing
12. O-ring
13. Outlet housing
14. O-ring
15. Inlet and outlet housing
16. Nut
17. Inlet bend
18. O-ring
19. Snap ring
20. Safety device
21. Screw
22. Washer



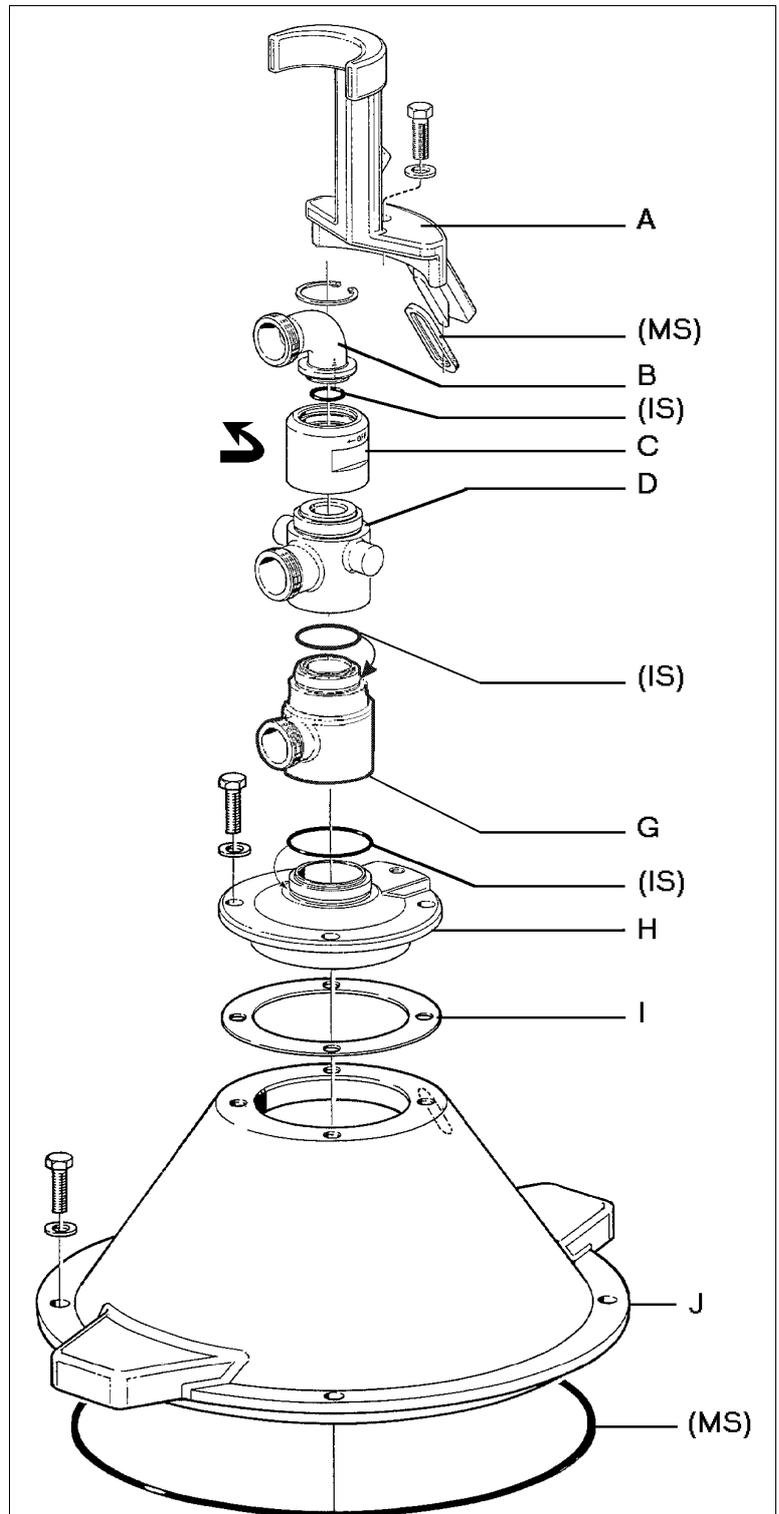
G0955221

7.3 Bowl – dismantling

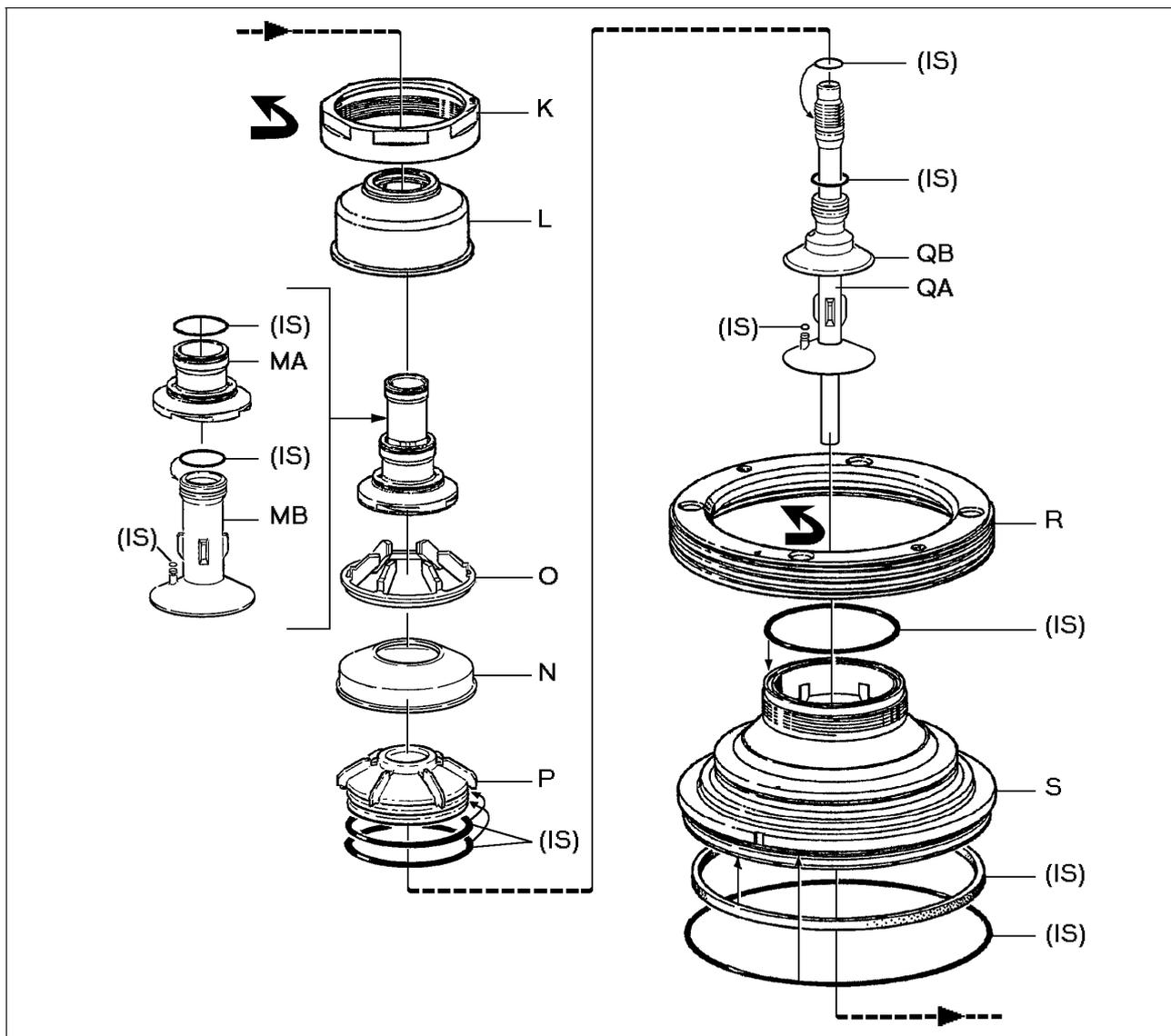
- A Safety device
- B Inlet bend
- C Nut
- D Inlet and outlet housing
- G Outlet housing
- H Connecting housing
- I Height adjusting ring
- J Frame hood

(IS) Included in Intermediate Service k
 (MS) Included in Major Service Kit

 Left-hand thread



G0374Z71

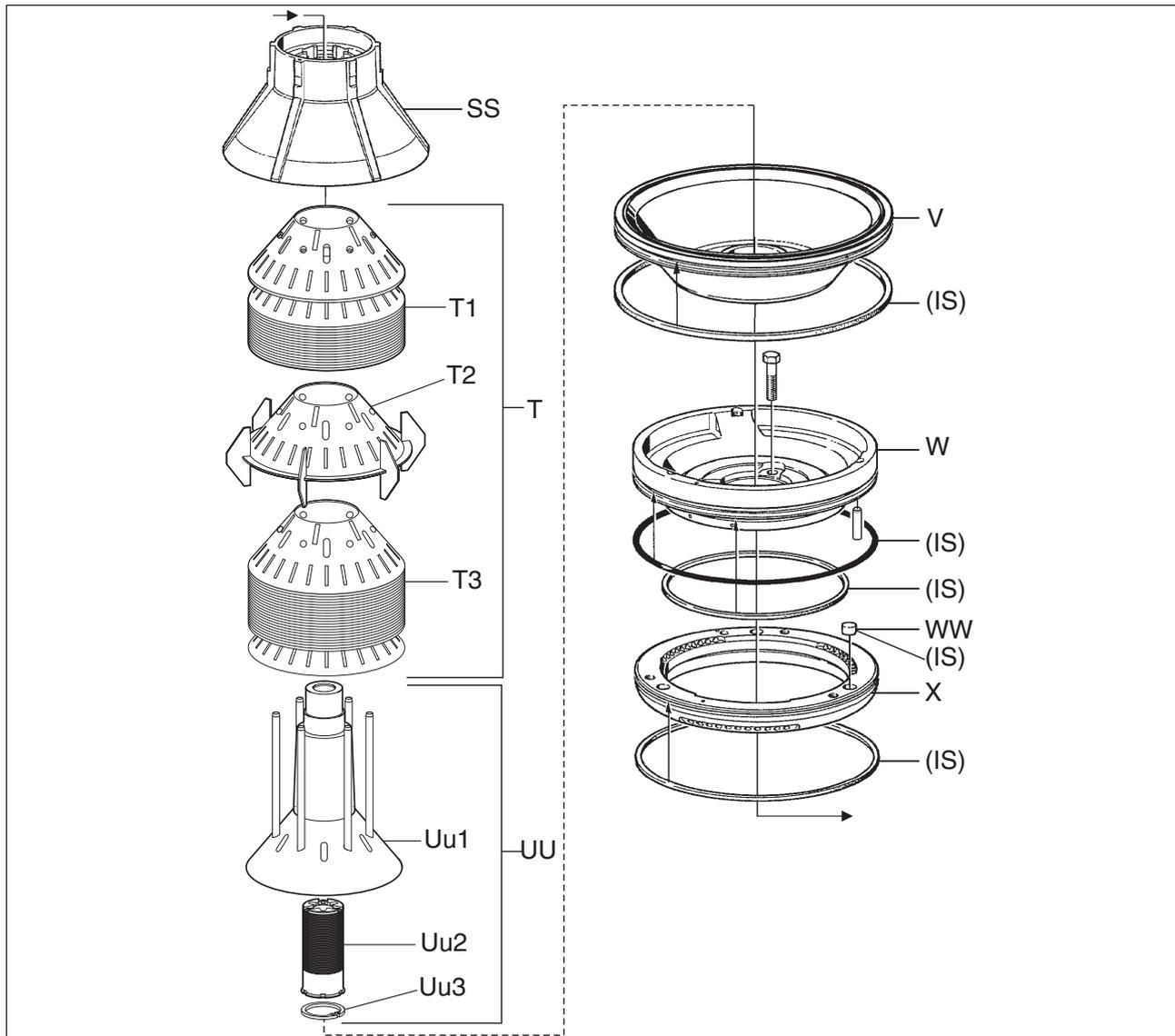


- K Small lock ring
- L Paring chamber
- MA Upper paring disc
- MB Outlet pipe
- O Wing insert
- N Gravity disc
- P Paring chamber cover
- QA Inlet pipe
- QB Paring disc top part
- R Large lock ring
- S Bowl hood

(IS) Included in Intermediate Service kit

Left-hand thread

GG372011



- SS Top disc
- T Bowl disc complete
- T1 Bowl disc (approx. 55)
- T2 Wing insert
- T3 Bowl disc (73)
- UU Distributor complete
- Uu1 Distributor
- Uu2 Disc inlet
- Uu3 Retaining ring. See: [“7.3.1 General illustration how to remove the Retaining-ring coil.”](#) on page 69
- V Sliding bowl bottom
- W Distributing ring
- WW Valve plug
- X Operating slide

(IS) Included in Intermediate Service kit

G0373931

1. Remove safety device (A) and look through the slot in the frame hood to see if the bowl still rotates.



WARNING

Do not start dismantling the separator until the bowl has come to a **complete standstill**.



CAUTION

Hot surfaces

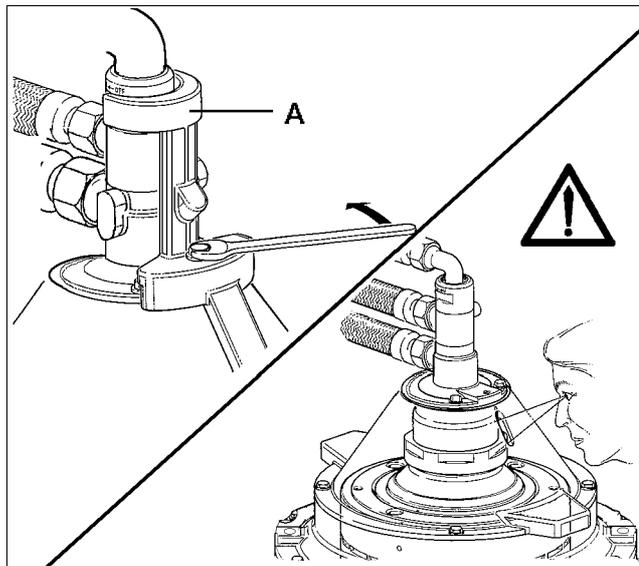
The bowl parts can remain very hot for considerable time after the bowl has come to a standstill.

2. Unscrew nut (C) clockwise and remove the inlet and outlet housing (D) and outlet housing (G), together with connecting the hoses.

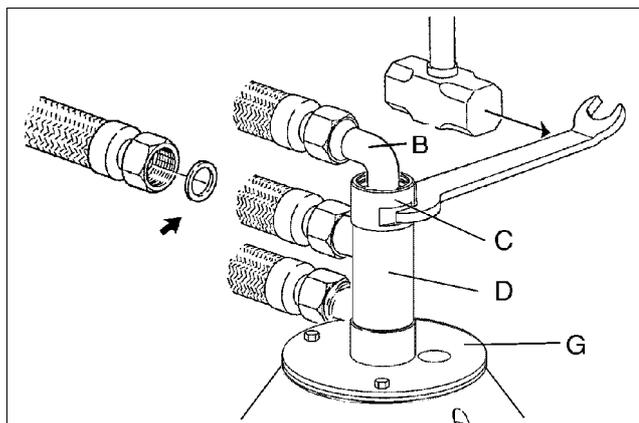
If carrying out a Major Service (MS), remove the connecting hoses and renew their packings.

In the case of complete dismantling, remove the snap ring that secures the inlet bend (B) and lift out the bend.

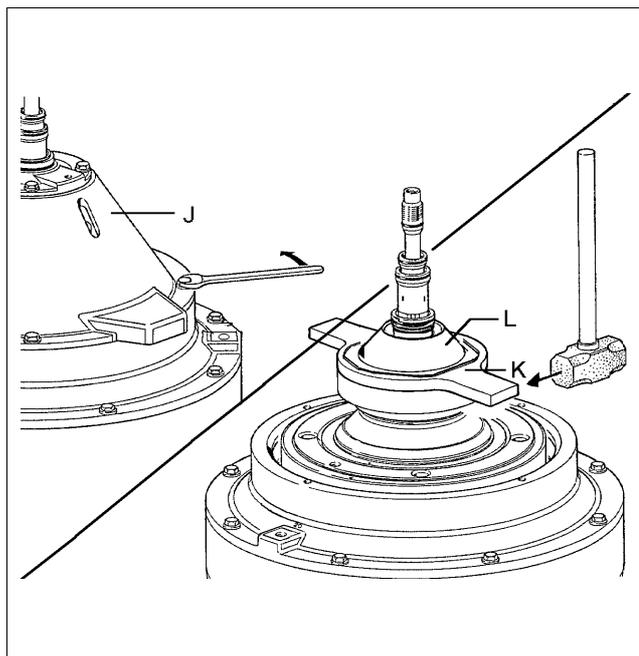
3. Lift off the frame hood (J) and unscrew the small lock ring (K) clockwise using special tool “Spanner for small lock ring”. Remove paring chamber (L).



G037391

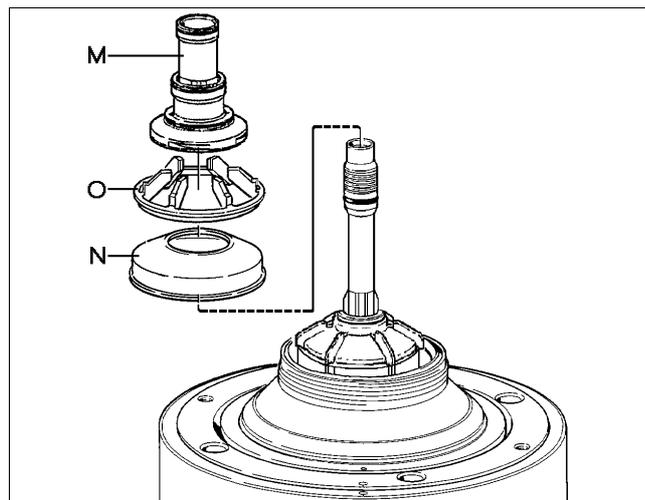


G0373891

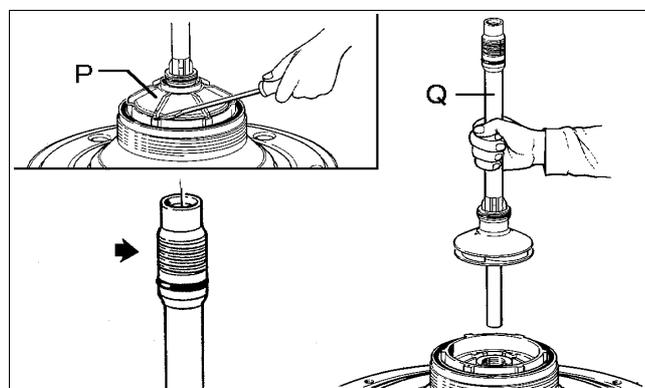


G0145921

4. Lift off the discharge pipe with paring disc (M). Remove wing insert (O) and gravity disc (N).



5. Carefully prise loose the paring chamber cover (P) with a screw driver. Remove the cover. Lift out the inlet pipe with oil paring disc (Q). Check the threads for damage and rectify if required.

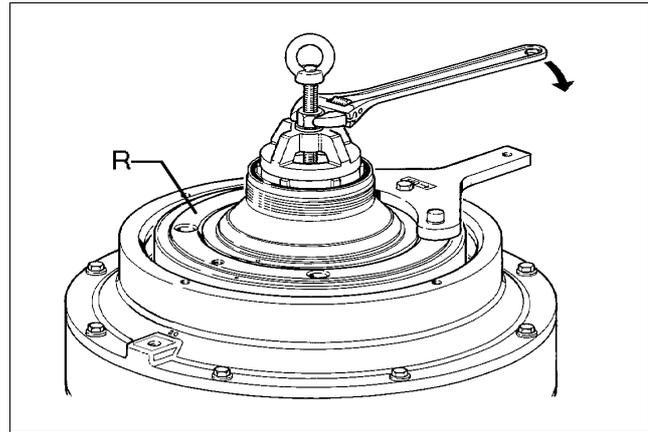


6. Preparations for unscrewing of large lock ring (R): Use the special tools “Spanner for large lock ring” and “Compression tool for disc stack”.

NOTE

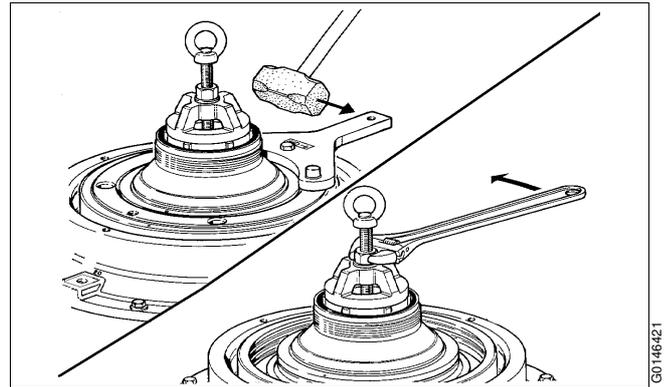
Use only the compression tool as instructed. Using substitute tools can damage components.

- Fit the spanner to the lock ring and secure it using the bolt.
- Fit the compression tool and screw the central screw down into the distributor until it stops.
- Compress the disc stack by tightening the nut of the compression tool very firmly. The disc stack pressure is relieved when it is possible to move the handle of the compression tool back and forth a couple of millimeters relative to the spanner attached to the large lock ring.

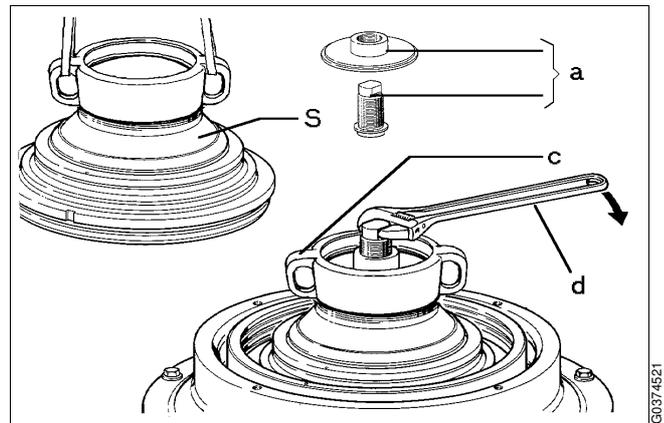


G0146321

7. Unscrew the large lock ring clockwise by striking the pin spanner with a tin hammer. Unscrew the nut of the compression tool sufficiently to decompress the disc stack.



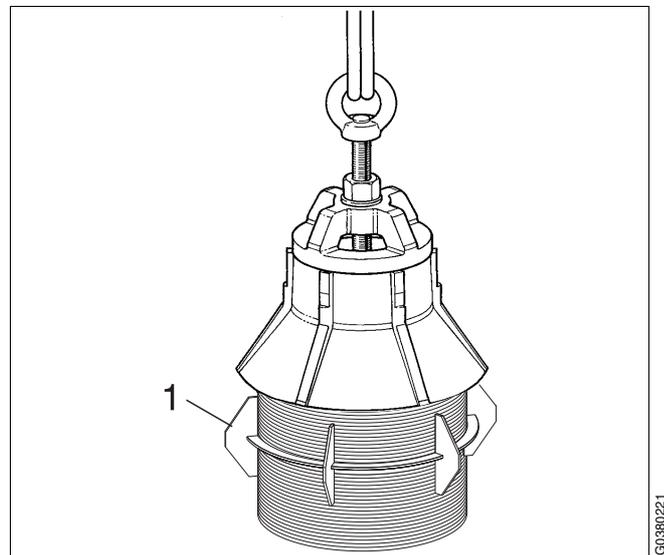
8. Lift out the bowl hood (S) by using the intended lifting tool".
- If the bowl hood sticks in the bowl body, remove the compression tool and force the bowl hood loose by using the driving-off tool.
 - The driving off tool (a) and the spanner for the small lock ring (c) are included in the tool kit.



9. Lift out distributor (UU) with bowl discs (T) and the top disc (SS). Use the "Compression tool for disc stack".

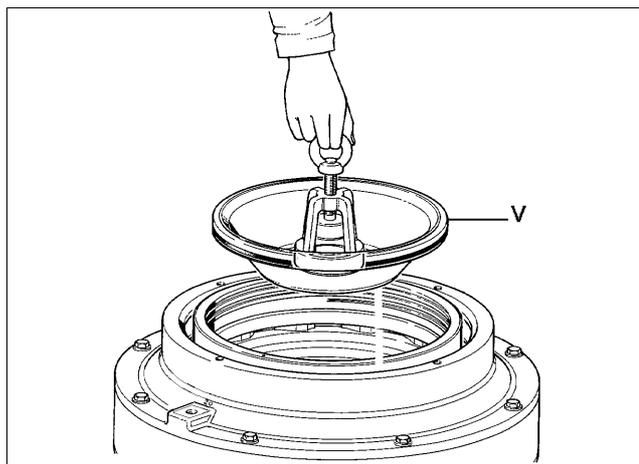
After removal, loosen the nut of the compression tool and turn the unit, with the tool still attached, upside down and strike the central screw of the tool against a firm base. This will loosen the top disc.

- Soak the bowl discs in Shell Lensitol Centrifuge degreaser or equipment. ["6.4 Cleaning" on page 56.](#)
- Number of bowl discs (T): nominal;
Below wing insert: 73
Above wing insert: 55

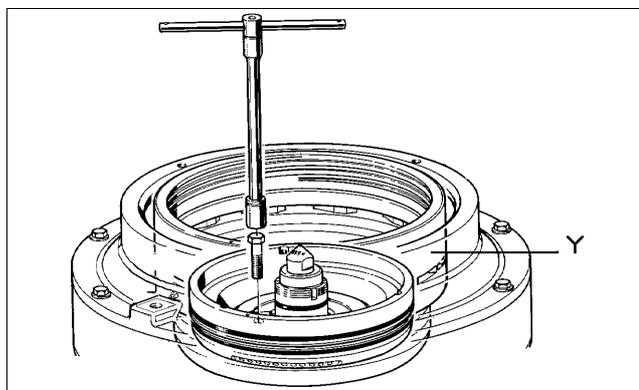


1. Wing insert

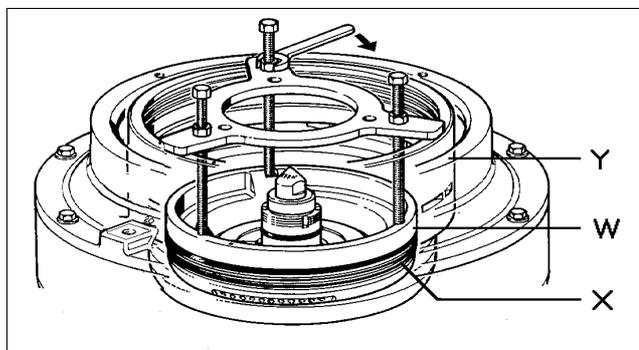
10. Remove sliding bowl bottom (V) using the special tool “Lifting tool for sliding bowl bottom”.
- Ease the sliding bowl bottom off by using the central screw of the tool.



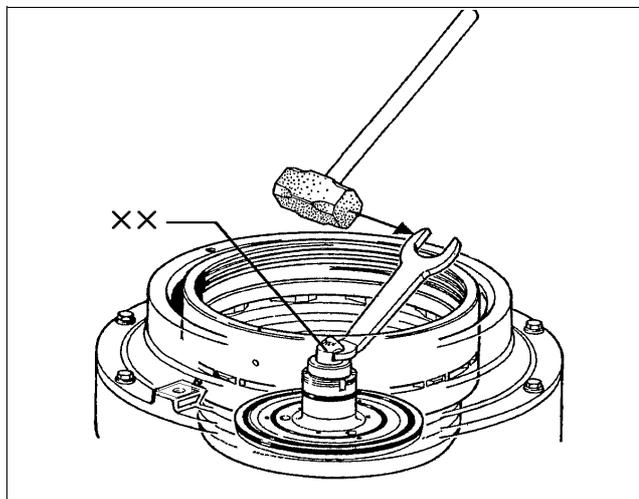
11. Remove the three screws from the bowl body (Y).



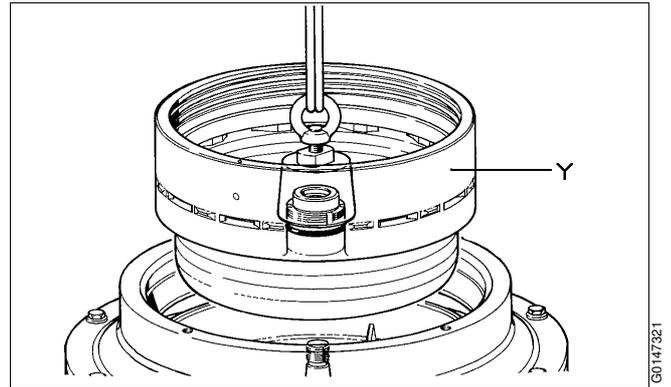
12. Place the ring of the dismantling tool on the bowl body (Y). Fasten the screws of the tool in the distributing ring (W). Loosen the distributing ring by tightening the nuts one turn at a time. Lift out the distributing ring.
13. Remove the operating slide (X). Proceed in the same way as when removing the distributing ring.



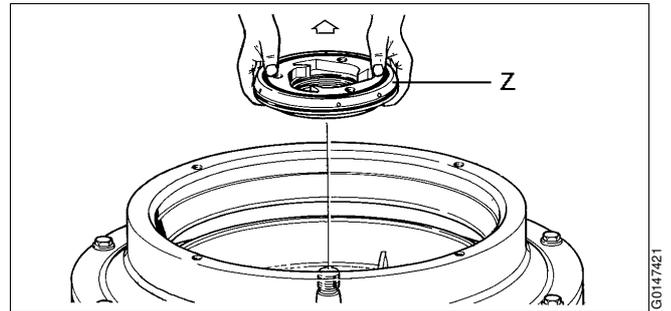
14. Unscrew the cap nut (XX) clockwise.



15. Remove the bowl body (Y) by using the special tool “Lifting tool for bowl body”.
- Unscrew the central screw as far as possible.
 - Screw the tool onto the bowl body nave.
 - Ease off the bowl body by using the central screw.
 - Lift off the bowl body.



16. Lift out the operating water ring (Z), which may have fallen down on the distributing cover in the frame, or is still in its place on the underside of the bowl body.



17. Clean all parts thoroughly.

- Remove the seal rings from the sliding bowl bottom, distributing ring, operating slide and bowl body using compressed air.



WARNING

Risk for eye injury

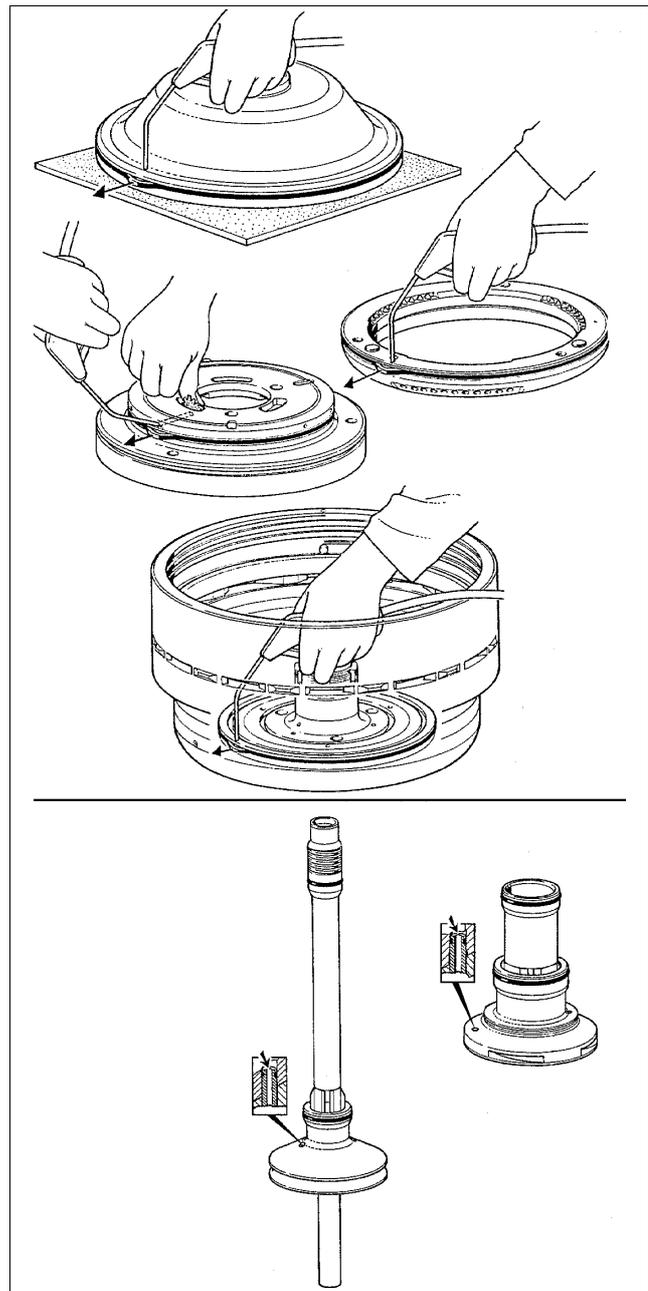
Use safety goggles

NOTE

Only one of the six radial holes in the distributing ring connect to a hole that admits compressed air.

- Check for damage, corrosion and erosion. See “10.1 Corrosion” on page 144 and “10.2 Erosion” on page 145.
- Remove any clogging in the small holes in:
 - the discharge pipe with upper paring disc (2 holes)
 - the inlet pipe with oil paring disc (2 holes)

During dismantling certain measures must be taken concerning the discharge mechanism and of the large lock ring. See “10 Maintenance - Check points” on page 143.



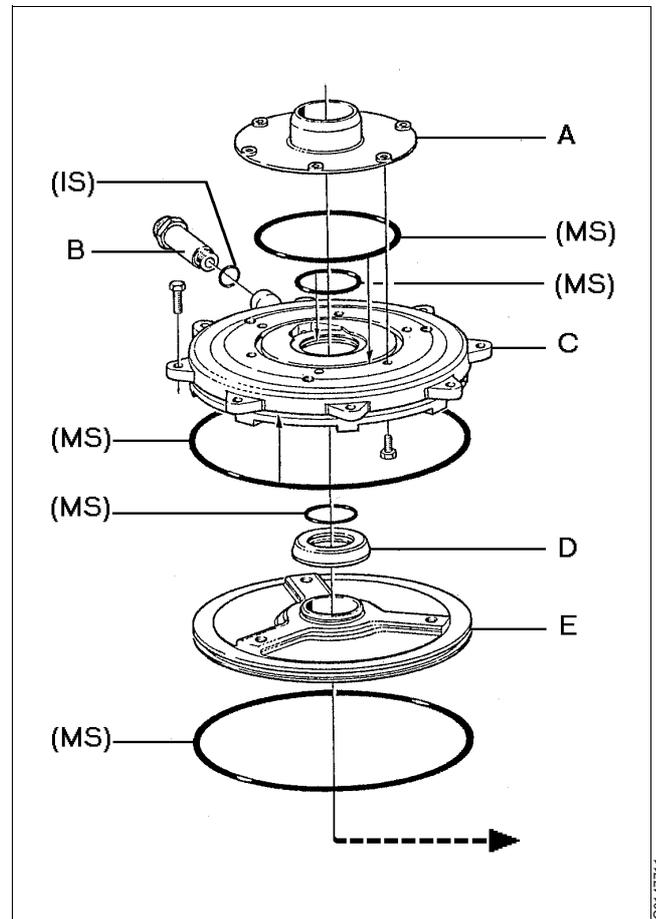
GG880311

7.4 Bowl spindle – dismantling

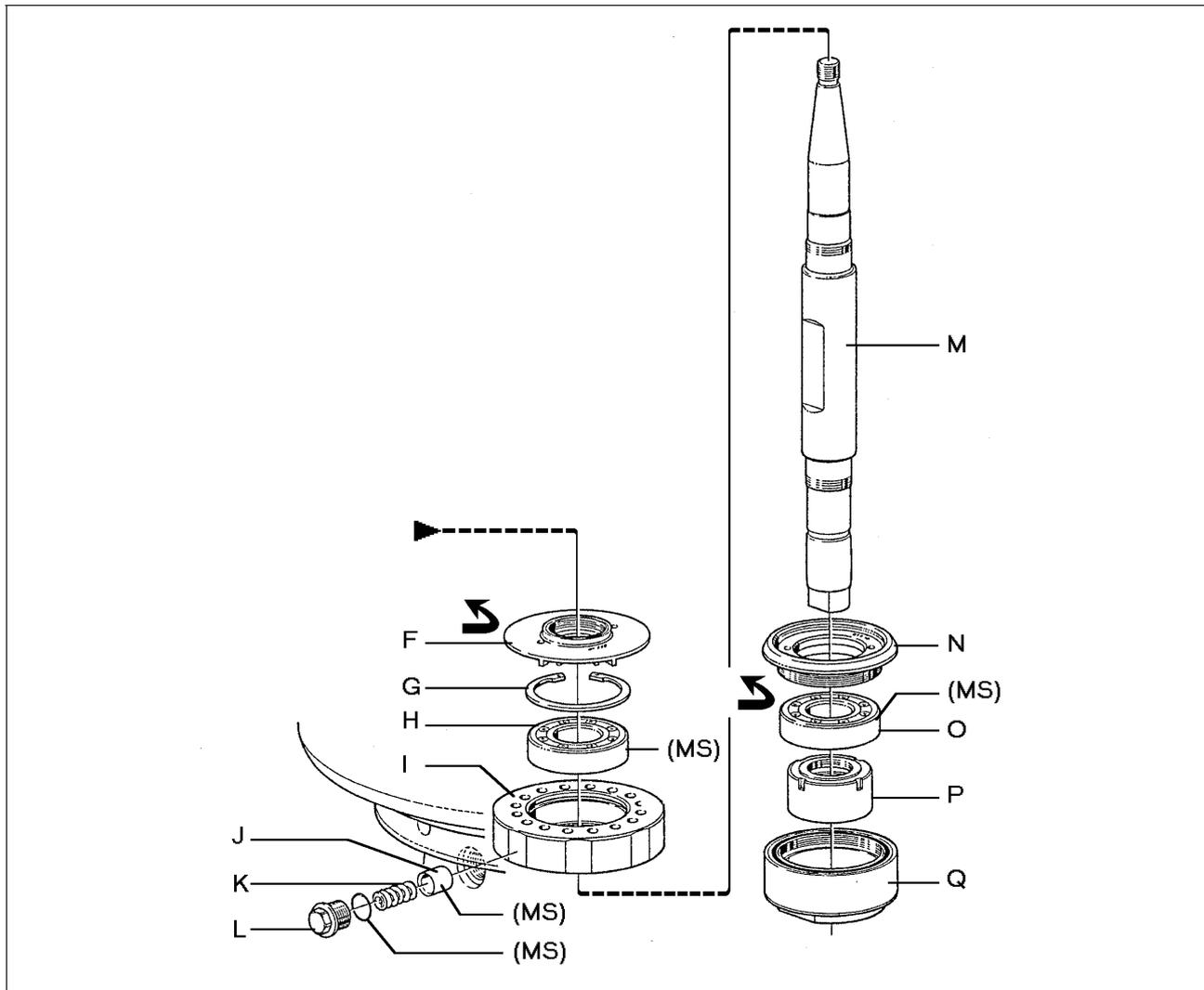
Before dismantling the bowl spindle, the inlet and outlet, frame hood, separator bowl and flat belt must be removed. Before dismantling, in the case of 8000 hours service, or if the machine has been running roughly, check the radial wobble. See [“10.7 Bowl spindle radial wobble” on page 151](#)

- A. Injection cover
- B. Nipple
- C. Distributing cover
- D. Deflector ring
- E. Top bearing cover

(IS) Included in Intermediate Service Kit
(MS) Included in Major Service Kit



G0147711

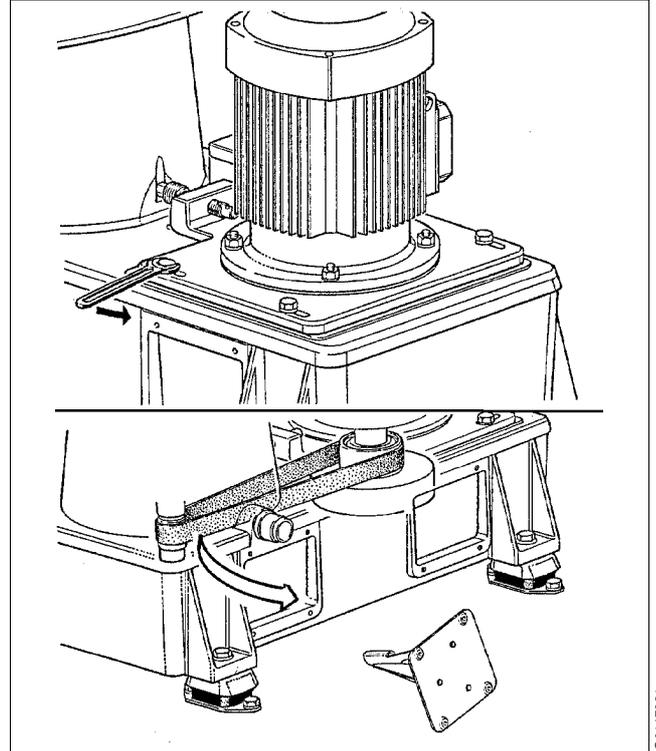


- F. Fan
- G. Snap ring
- H. Ball bearing
- I. Bearing seat
- J. Buffer
- K. Spring
- L. Screw plug
- M. Bowl spindle
- N. Lock ring
- O. Ball bearing
- P. Oil pump
- Q. Bottom bearing holder

(MS) Included in Major Service Kit

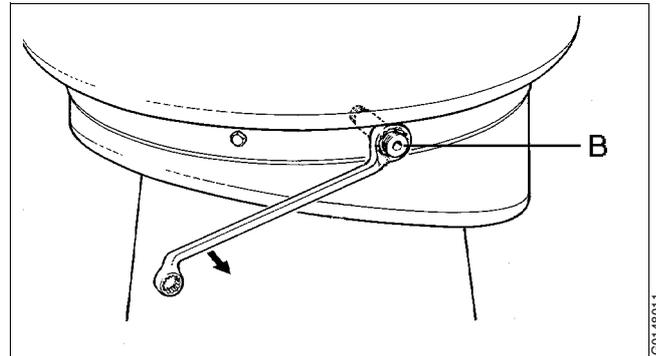
 Left-hand thread

1. Loosen the motor adapter screws, but do not remove them.
Remove the two covers from the frame bottom part. Remove the belt.



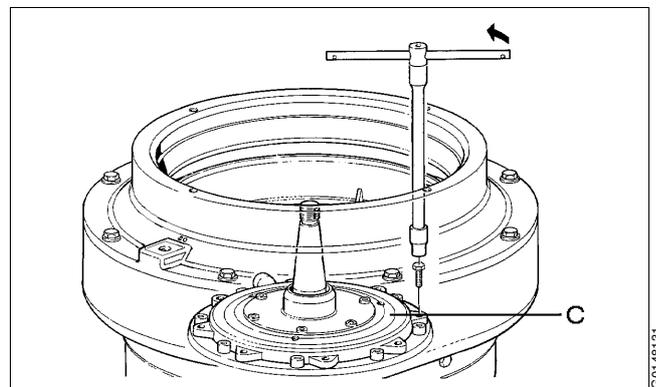
G0147821

2. Unscrew and remove the nipple (B).



G0148011

3. Remove the screws from the distributing cover (C).

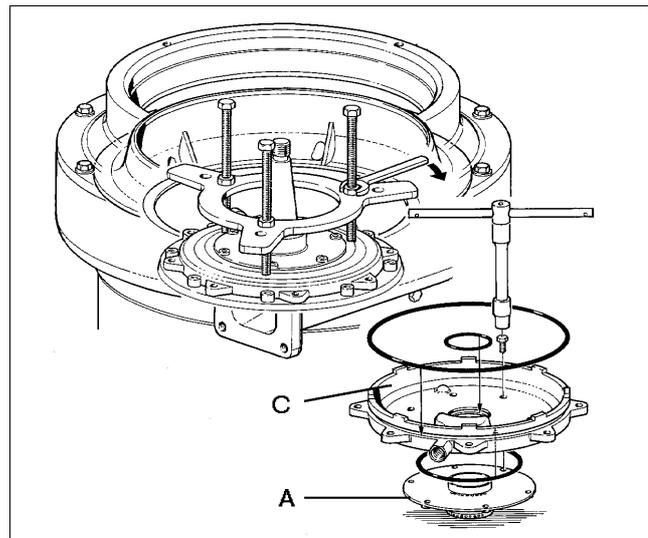


G0148131

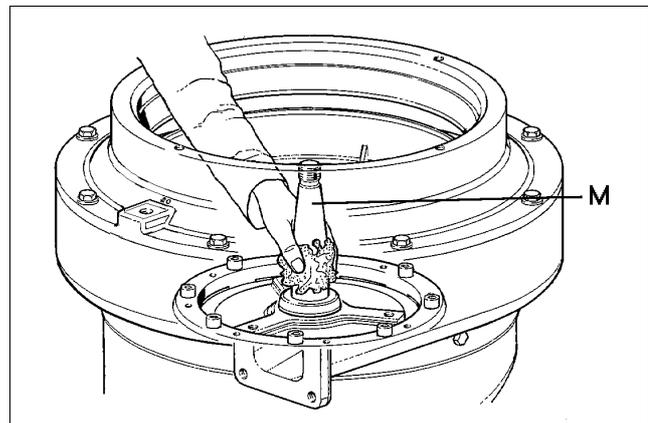
4. Place the ring of the dismantling tool on the flat surface of the sludge cover. Fasten the screws of the tool in the distributing cover.

Loosen the cover by tightening the nuts one turn at a time.

- When carrying out a Major Service (MS), renew all the O-rings in the distributing cover. For access to two of these O-rings, remove the screws of the injection cover (A). Refit the injection cover after renewing the O-rings.
- Clean the injection holes in the injection cover. Limestone deposits can be dissolved in a 10% acetic acid solution heated to 80 °C.

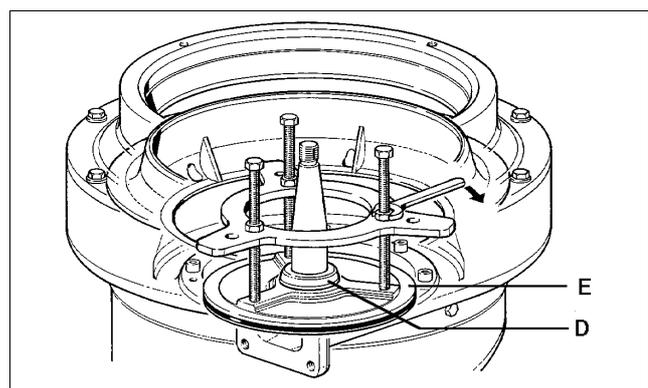


5. Wipe clean the cylindrical part of the bowl spindle (M).

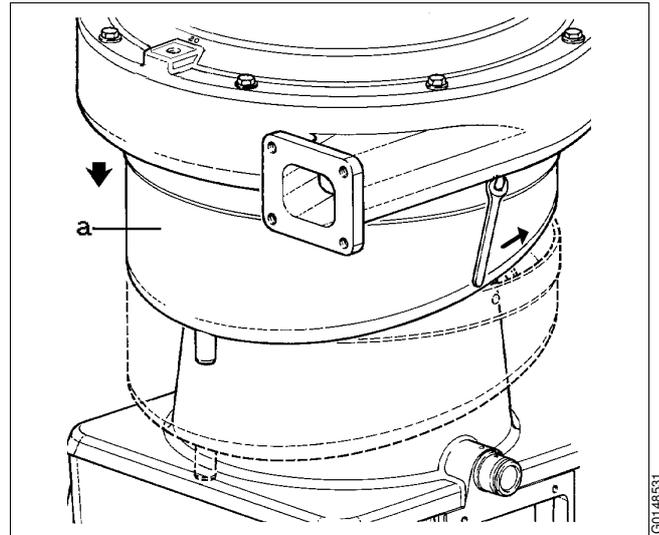


6. Place the ring of the dismantling tool on the flat surface of the sludge cover. Fasten the screws of the tool in the top bearing cover (E).

Loosen the cover by tightening the nuts one turn at a time. Lift off the cover together with the deflector ring (D).



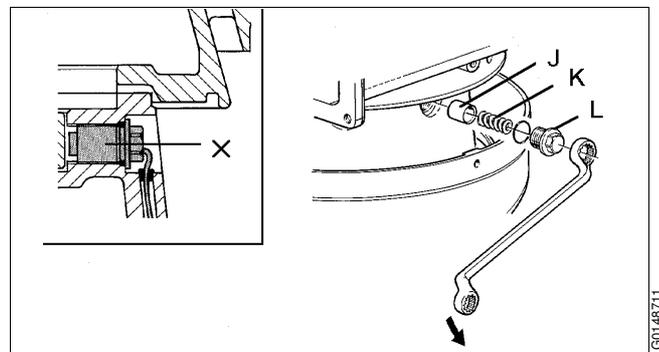
- Remove the three screws from the collecting ring (a) and lower the ring.



G0148531

- Unscrew and remove the screw plugs (L), springs (K) and buffers (J).

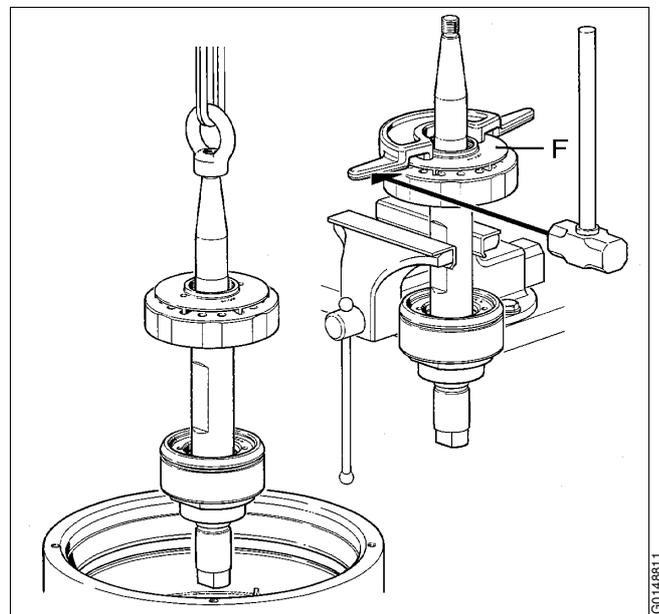
NOTE
The unbalance sensor (X) (if any) must **not** be removed.



G0148711

- Lift out the bowl spindle.
- Unscrew and remove the fan (F).

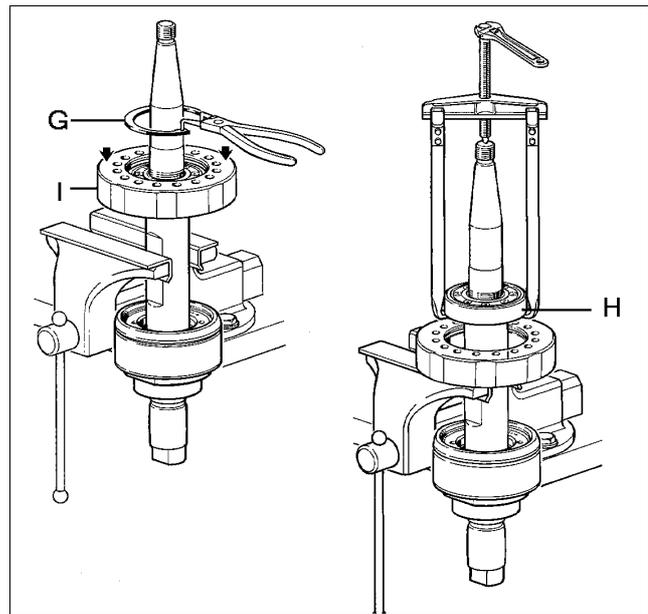
NOTE
Left-hand thread.



G0148811

11. Remove snap ring (G) and lower bearing seat (I). If necessary, tap carefully on the bearing seat with a soft hammer.

12. Pull off and discard the ball bearing (H).



13. Clamp the bottom bearing holder (Q) in the vice and unscrew the lock ring (N).

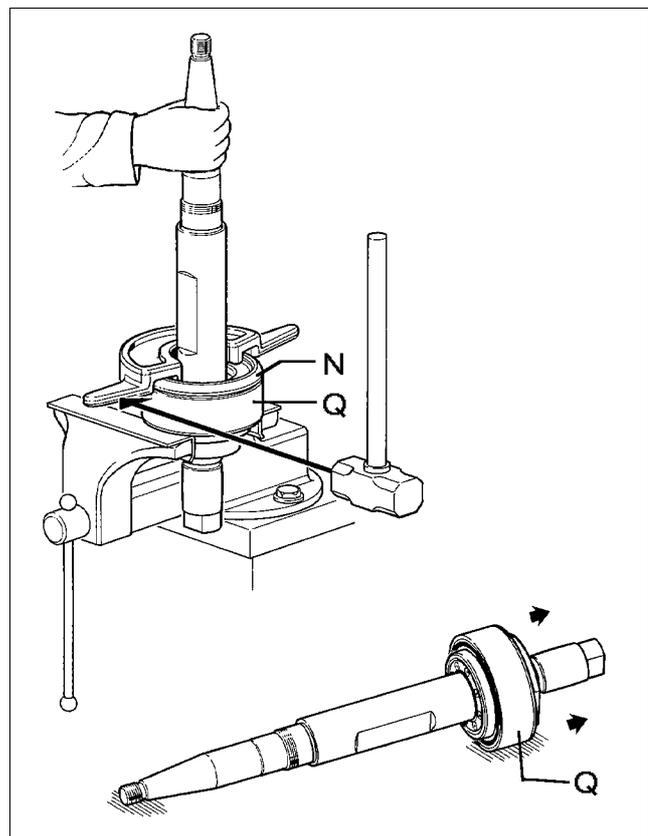
NOTE

Left-hand thread.

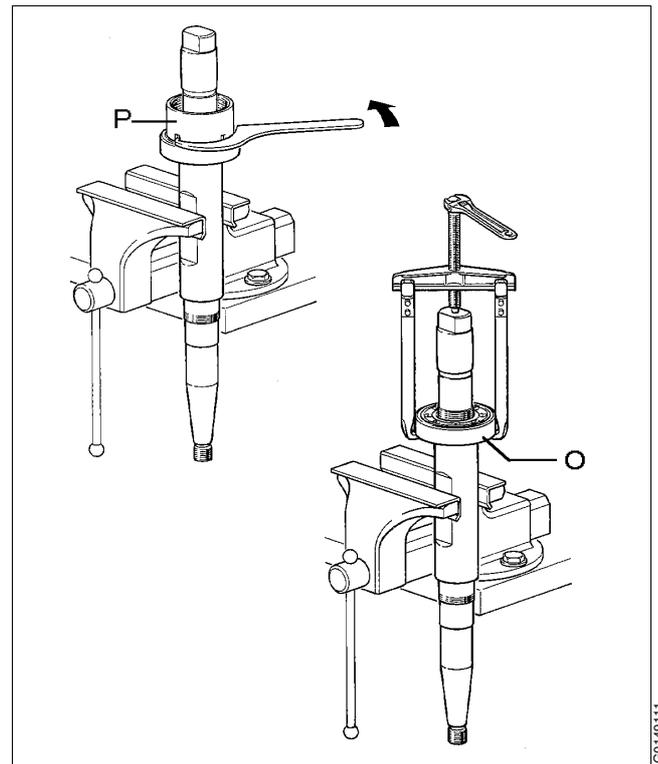
Remove the bottom bearing holder (Q) by hand. Be very careful not to damage its race surfaces, unless the bottom bearing holder is to be replaced.

NOTE

The bottom bearing holder must be renewed every 4 years.



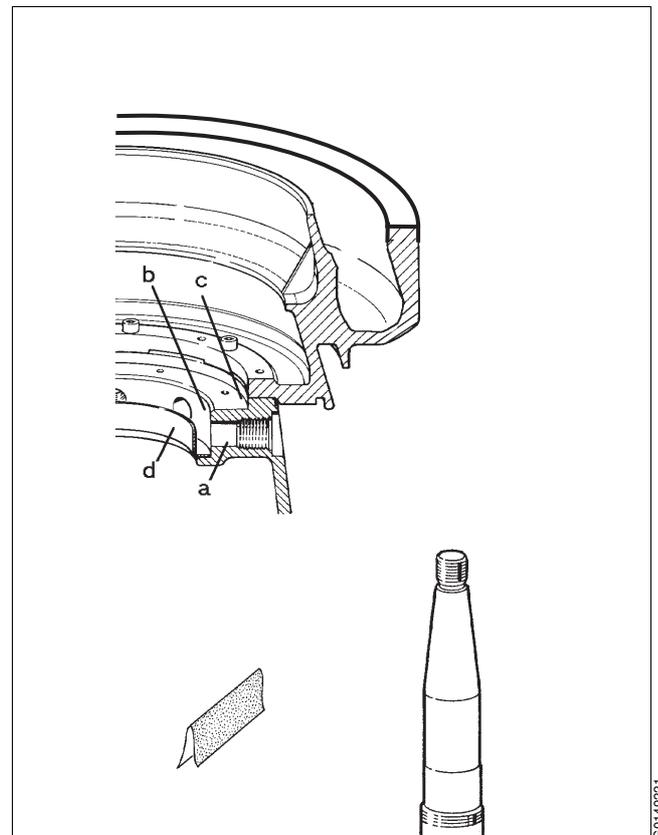
14. Turn the bowl spindle upside down and unscrew and remove the oil pump (P).
15. Pull off and discard the ball bearing (O).



16. Clean all dismantled parts thoroughly in a degreasing agent.
 - Pay special attention to the buffer seats (a), space (b) and surfaces (c) and (d) in the frame.
 - Check for damage and/or corrosion on the spindle top. Remove any lime deposits on the spindle top with a **very fine-grain** emery cloth. See “10.1 Corrosion” on page 144

NOTE

Presence of black deposits on the spindle parts can indicate that another lubricating oil should be used, see “6.4 Cleaning” on page 56



1. Secured with Loctite 242

MS Included in Major Service Kit

8 *Maintenance - Assembly*

Contents

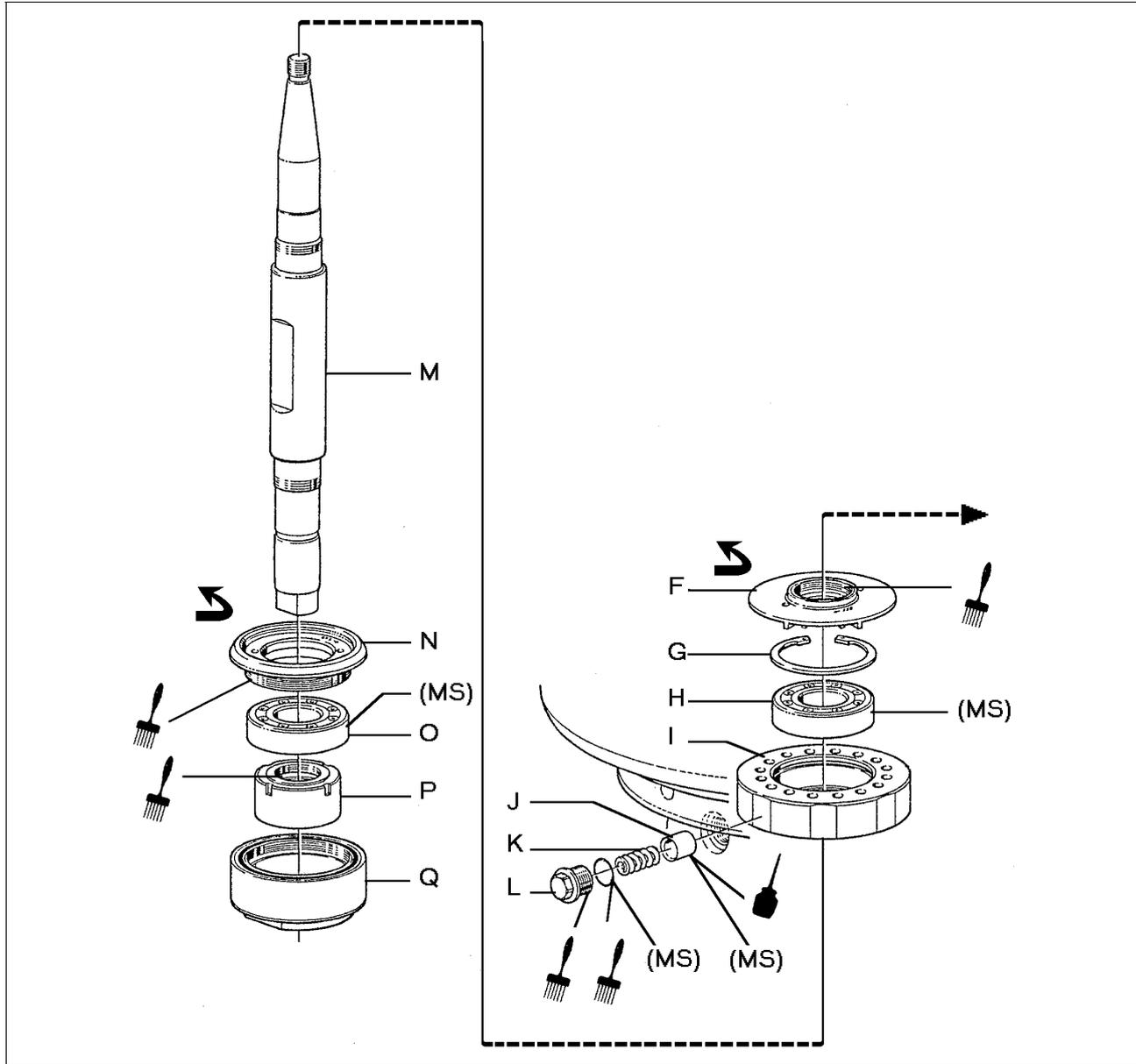
8.1 Bowl spindle – assembly	86
8.2 Bowl – assembly	94
8.2.1 General illustration how to set in the Retaining-ring coil	96

NOTE

Renew all parts included in the IS- and MS-kits.

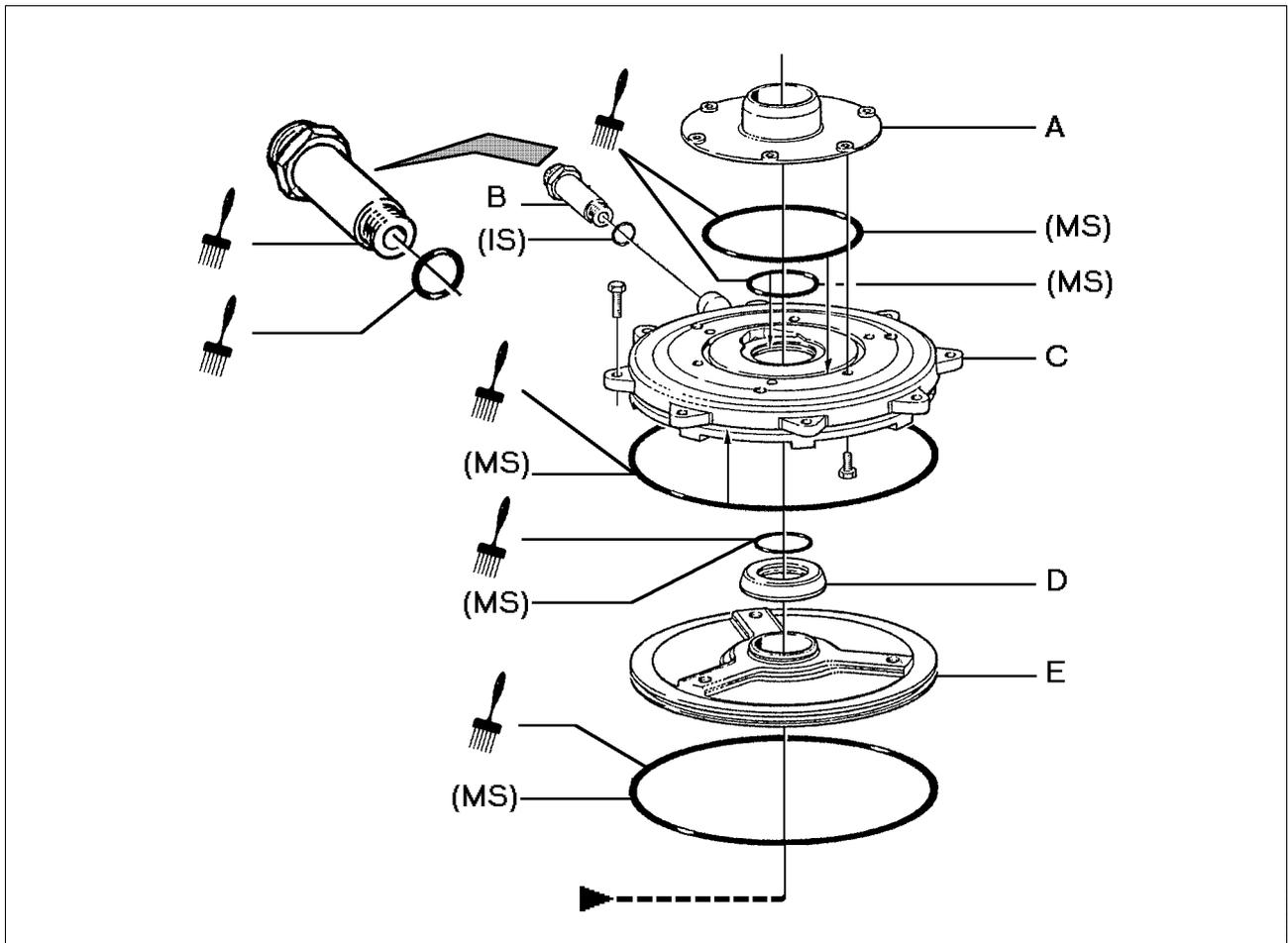
The O-rings and other sealing rings should be lubricated with grease of silicone type, see [“6.3.2 Recommended lubricants”](#) on [page 50](#).

8.1 Bowl spindle – assembly



- | | | | | | |
|----|--------------|------|-------------------------------|---|---|
| F. | Fan | M. | Bowl spindle | ↺ | Left-hand thread |
| G. | Snap ring | N. | Lock ring | 🖱 | Molykote 1000 Paste or equivalent lubricating paste |
| H. | Ball Bearing | O. | Ball bearing | 🖱 | |
| I. | Bearing seat | P. | Oil pump | 🖱 | |
| J. | Buffer | Q. | Bottom bearing holder | 🖱 | |
| K. | Spring | (MS) | Included in Major Service Kit | 🖱 | |
| L. | Screw plug | | | 🖱 | Oil |

G0148622



G0398411

- A. Injection cover
- B. Nipple
- C. Distributing cover
- D. Deflector ring
- E. Top bearing cover

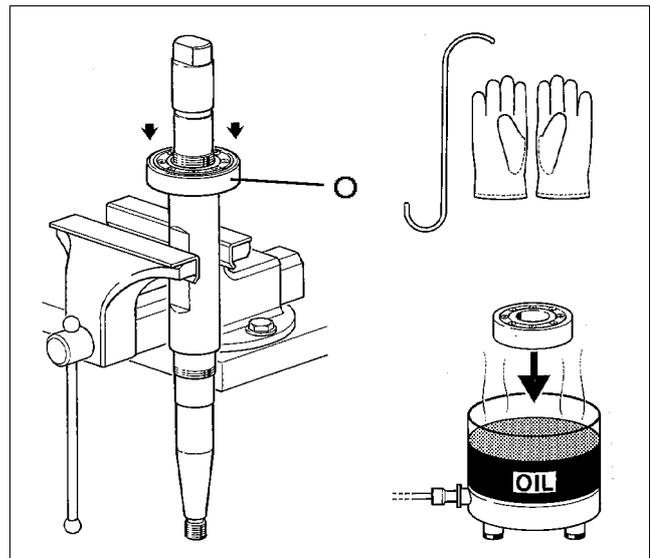
-  Molykote 1000 Paste or an equivalent lubricating paste
-  Oil

- (IS) Included in Intermediate Service Kit
- (MS) Included in Major Service Kit

1. Heat a new ball bearing (O) in clean oil to max. 100 °C. Fit the bearing.

NOTE

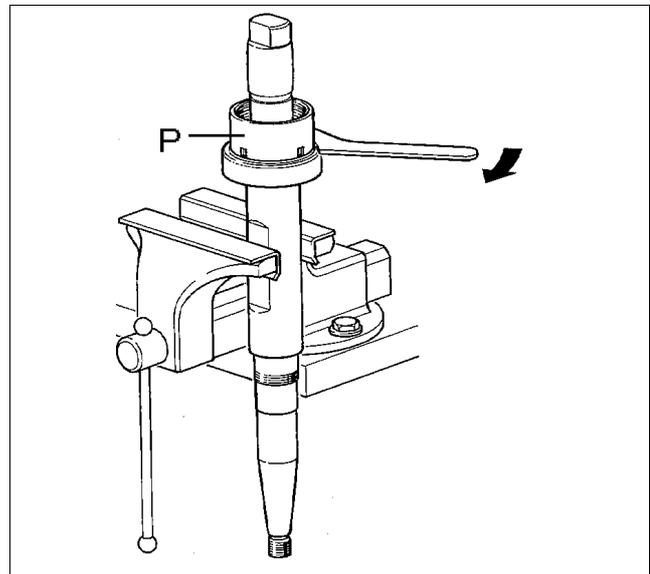
Never refit a used ball bearing.



2. When the bearing has cooled down, tighten the oil pump (P).

NOTE

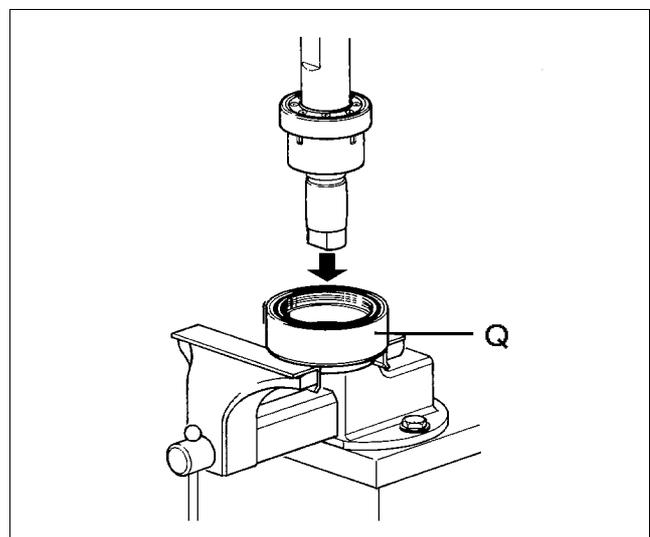
Clean the threads of the oil pump before assembly.



3. Lightly clamp the bottom bearing holder (Q) in the vice and lower the spindle.

NOTE

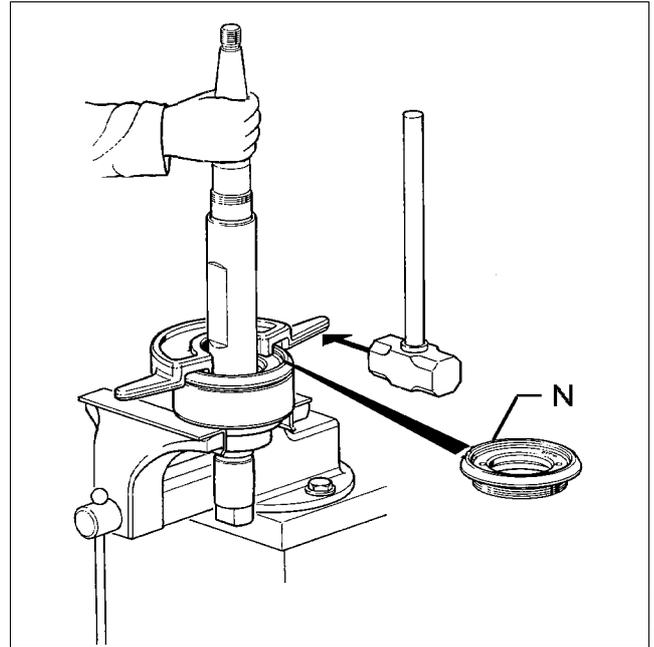
Clamping too tightly can deform the holder preventing the ball bearing from entering it.



4. Fit and tighten the lock ring (N).

NOTE

Left-hand thread.



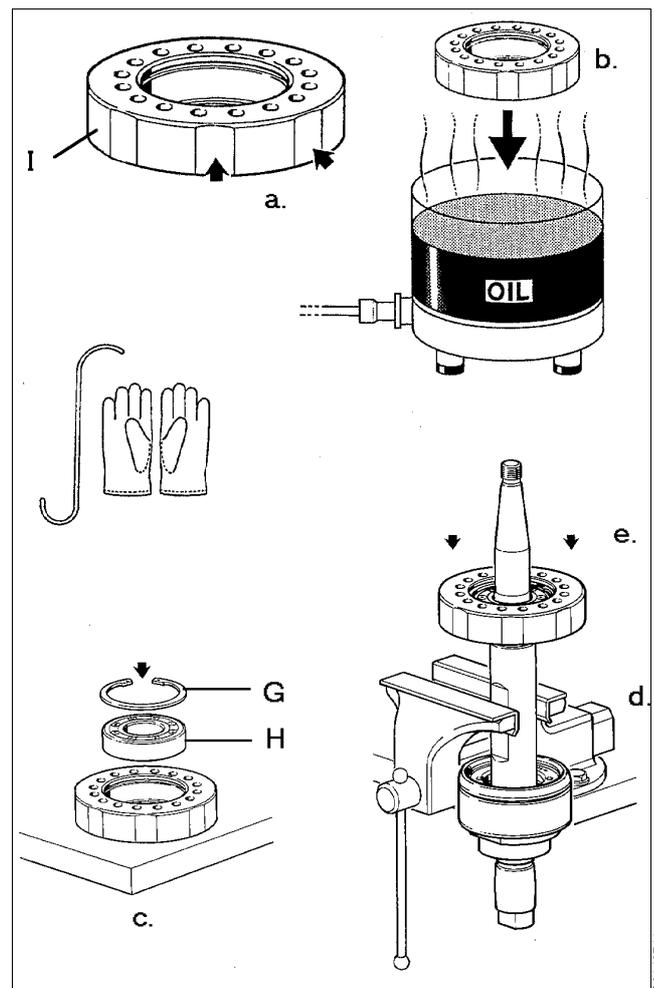
G0149631

5. Fit the ball bearing (H). Proceed as follows:

- Examine the contact surfaces for the buffers on the bearing seat (I). If they are damaged, carefully remove any high spots on the surface using a fine single-cut file.
- Heat the bearing seat in clean oil to max. 100 °C.
- Fit a new ball bearing (H) in the bearing seat and lock it with snap ring (G). Heat the assembled unit in clean oil to max. 100 °C.
- Clamp the vice over the upper flats of the bowl spindle.
- Lower the heated unit until the ball bearing rests on the shoulder of the bowl spindle.

NOTE

Never refit a used ball bearing.

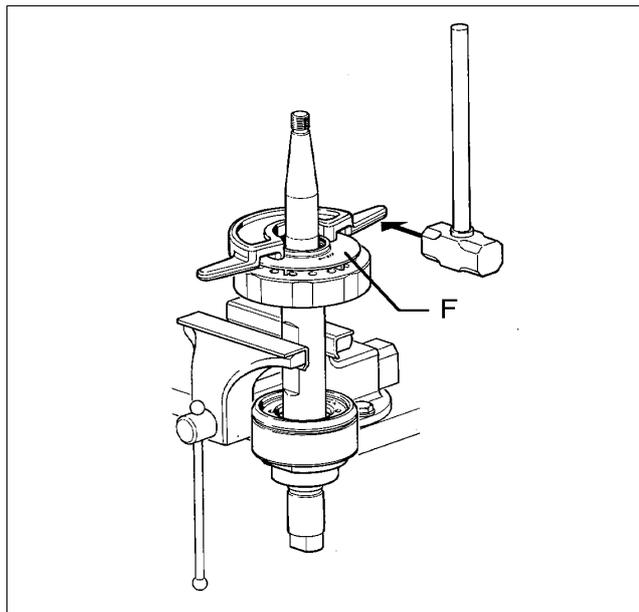


G0149711

- When the heated unit has cooled down, screw on and tighten the fan (F).

NOTE

Left-hand thread.

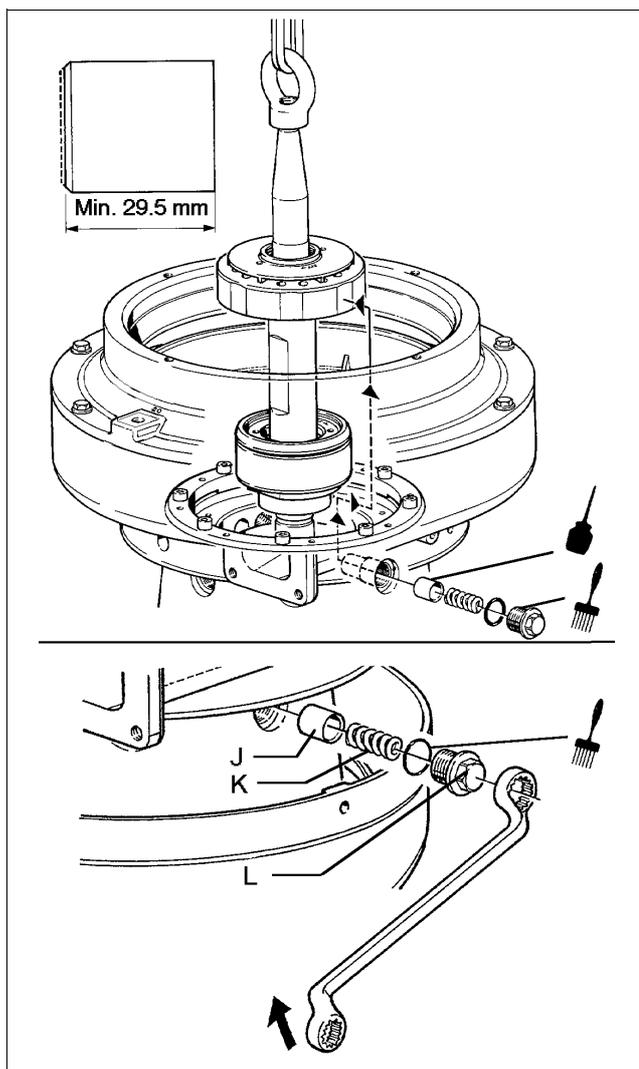


- Check the springs (K). If any are broken or worn, the complete set of springs must be renewed, even if only one spring is broken. Inspect the buffers (J). If any are worn down to a total length of 29,5 mm or less, or if more than half of a buffer surface that is in contact with bearing seat (I) is covered with small cavities (pittings), renew the complete set of buffers.

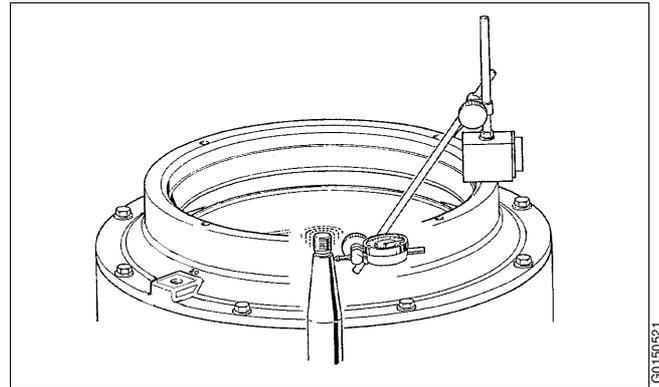
- Lower the bowl spindle carefully into the separator frame. Take care to bring the flats of the bearing seat directly in front of the buffer holes.

Tap the spindle top with a tin hammer to ensure that the spindle reaches its correct bottom position. Rotate the spindle by hand and check that it rotates freely.

- Apply oil to the buffers by placing them in an oil bath. Fit the buffers and springs. Fit the O-rings and tighten the screw plugs (L) crosswise a few turns at a time. Finally tighten firmly all around.

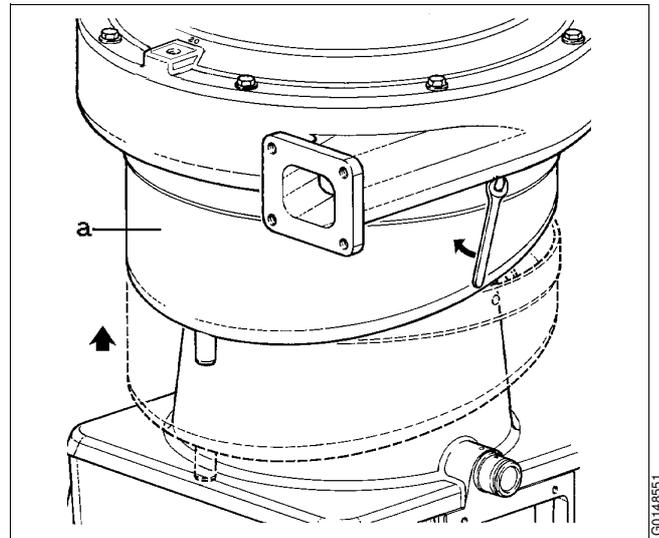


10. Check the radial wobble in the case of 8000 hours service or if the spindle has been dismantled/assembled due to the separator running roughly. See “10.7 Bowl spindle radial wobble” on page 151.



G0150521

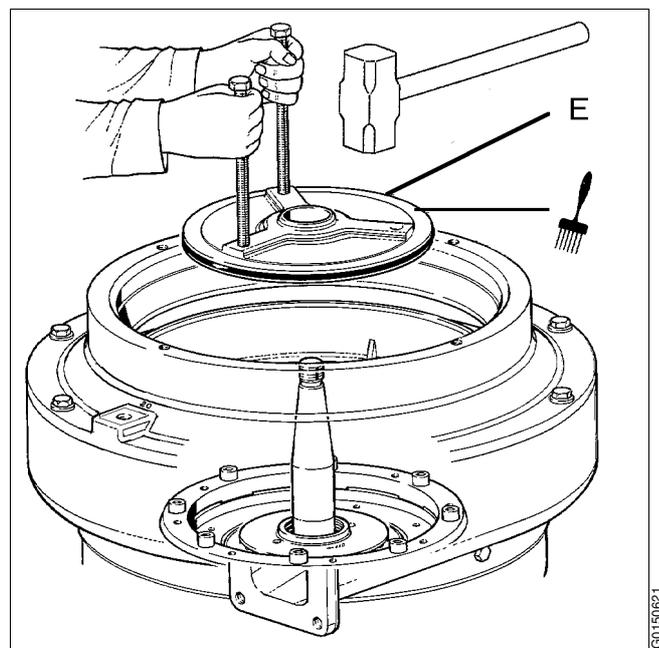
11. Lift up the collecting ring (a) and tighten its three screws.



G0148551

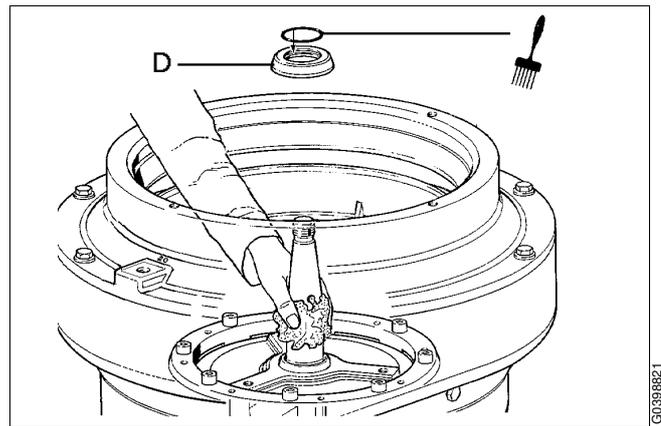
12. Place the top bearing cover (E) with its O-ring in position by using two of the dismantling tool screws. When in position, tap around the cover with a tin hammer to ensure a proper fit. Rotate the spindle by hand and check that it rotates freely.

 *Molykote 1000 Paste or equivalent lubricating paste*

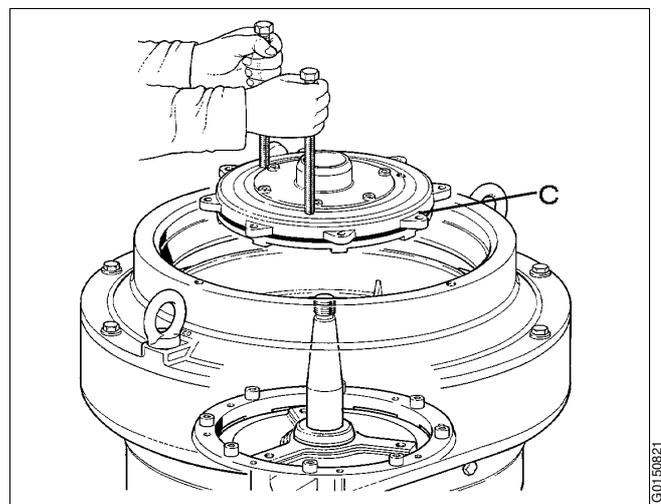


G0150621

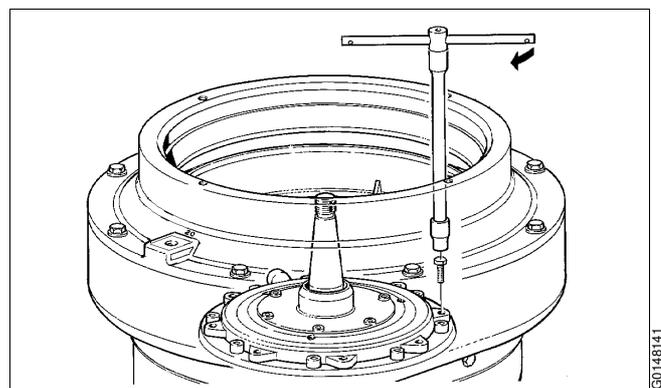
13. Wipe clean the cylindrical part of the bowl spindle. Fit the deflector ring (D) with O-ring. Rotate the spindle by hand and check that it rotates freely.



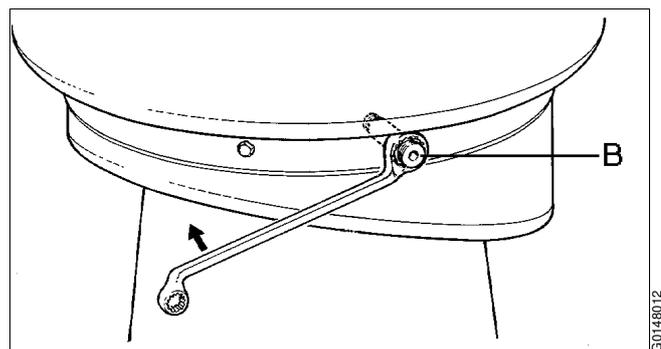
14. Place the distributing cover (C) with its O-rings in position by using two of the dismantling tool screws. Check that the injection cover (A) is fitted to the distributing cover.



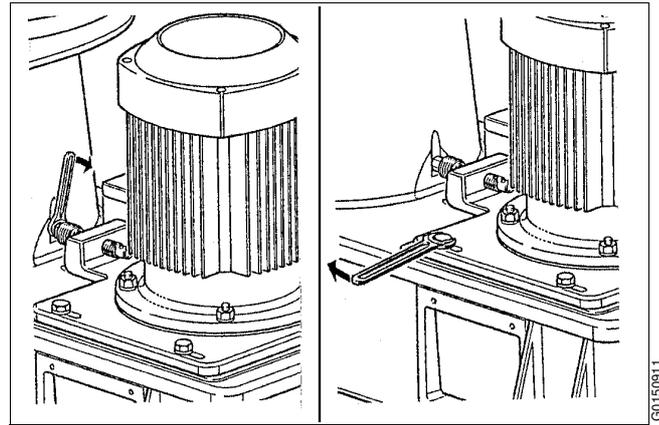
15. Tighten the screws of the distributing cover lightly crosswise. Finally tighten firmly all around. Rotate the spindle by hand and check that it rotates freely.



16. Fit and tighten the nipple (B) with the O-ring.



17. Fit and tighten the flat belt, See [“9.2 Flat belt”](#) on page 118.



GO150911

8.2 Bowl – assembly

The separator bowl is assembled in the reverse sequence to dismantling.

Ensure that measurements have been taken according to following Check Points.

- “10.4 Discharge mechanism” on page 148
- “10.3 Bowl spindle cone and bowl body nave” on page 147.

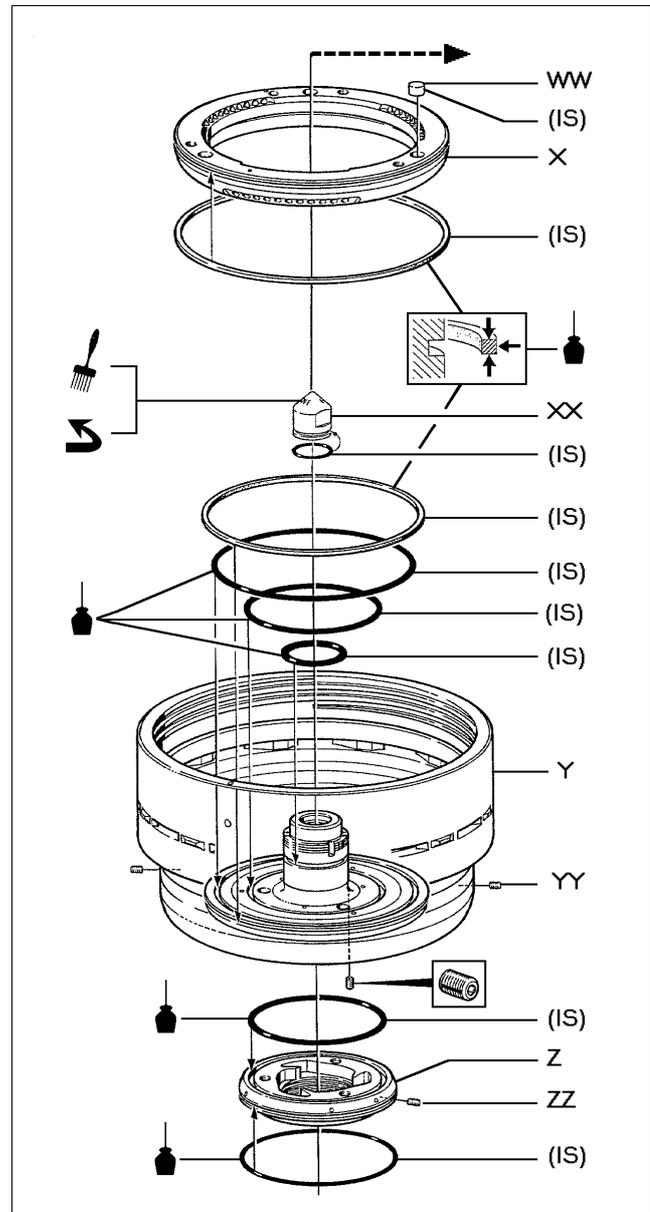
NOTE

Bowl parts must never be interchanged from one separator to another. The bowl parts of each separator are stamped with the separator manufacturing number or the last three digits of that number.

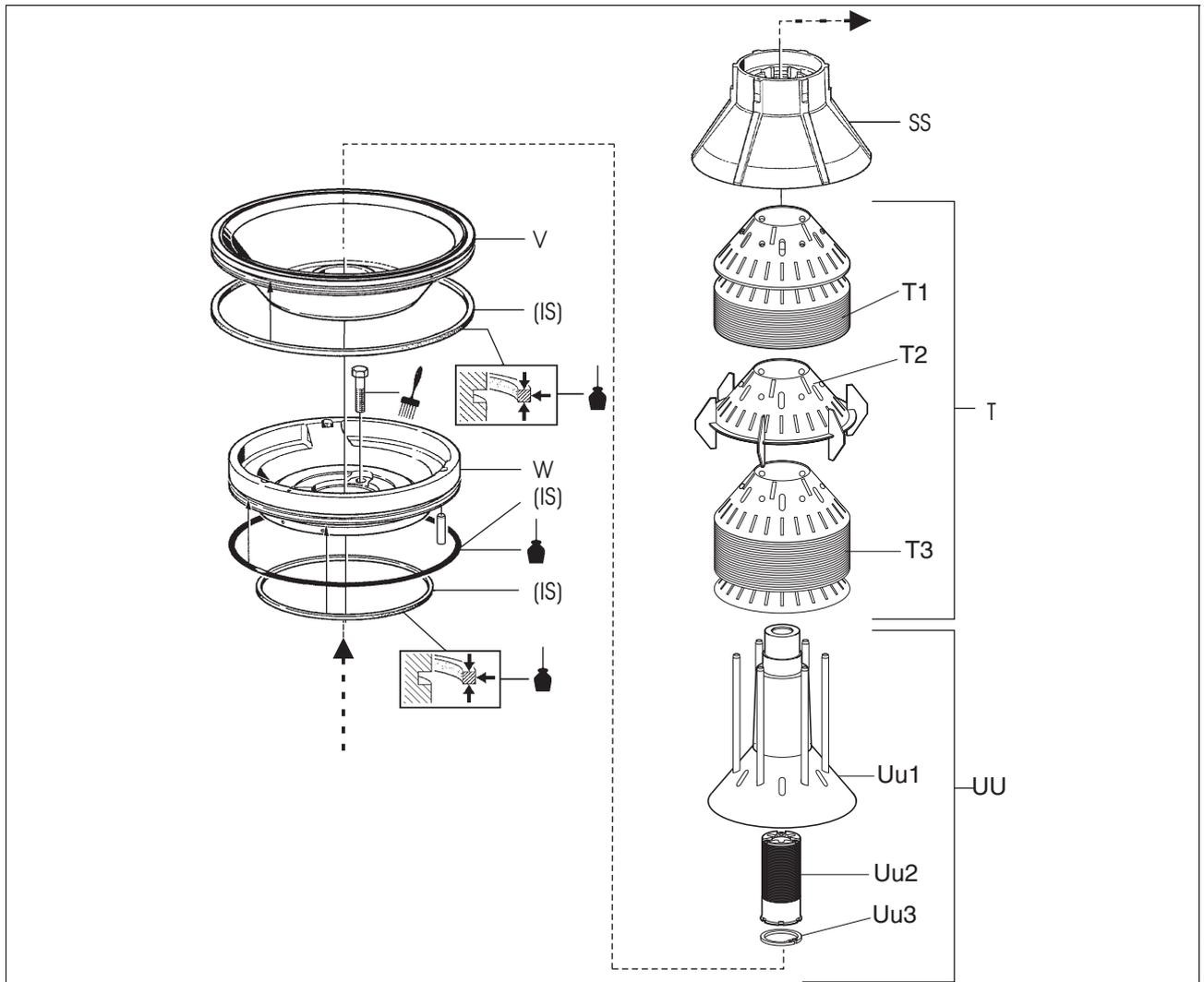
- WW Valve plug
- X Operating slide
- XX Cap nut
- Y Bowl body
- YY Nozzle
- Z Operating water ring
- ZZ Nozzle

(IS) Included in Intermediate Service kit

-  Left-hand thread
-  Molykote 1000 Paste or an equivalent lubricating paste
-  Oil



GC400821



- SS Top disc
- T Bowl disc complete
- T1 Bowl disc (approx. 55)
- T2 Wing insert
- T3 Bowl disc (73)
- UU Distributor complete
- Uu1 Distributor
- Uu2 Disc inlet
- Uu3 Snap ring
- V Sliding bowl bottom
- W Distributing ring

(IS) Included in Intermediate Service kit

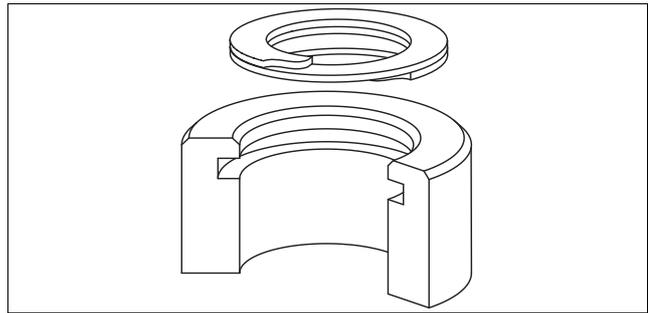
 Molykote 1000 Paste or equivalent lubricating paste

 Oil

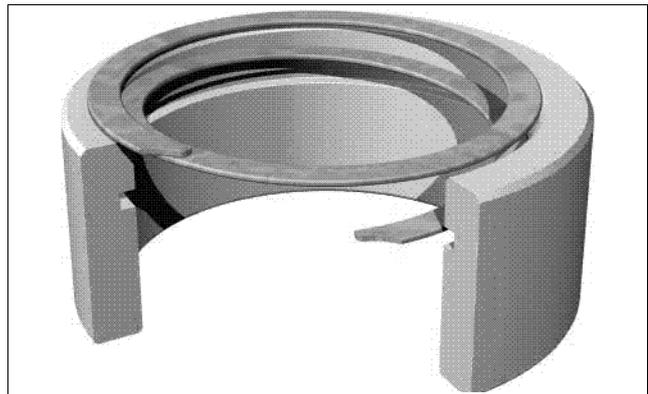
6040731

8.2.1 General illustration how to set in the Retaining-ring coil

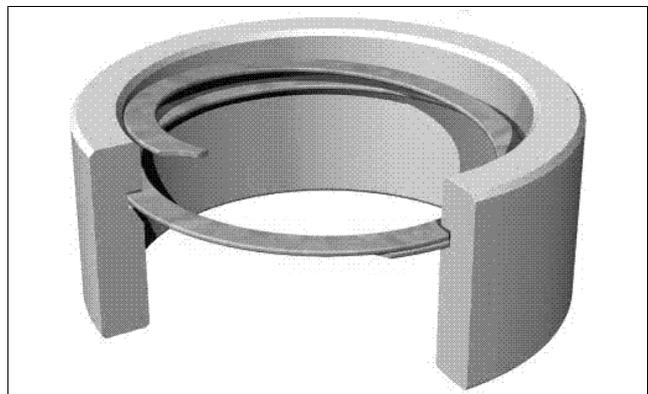
1. Separate the ring coils and insert one end of the ring into the groove. The groove is located in all of the six wings inside the distributor.
2. Wind the ring until it is located in two or three wings.
3. Pressing down around the circumference until the entire ring is inserted into the groove.



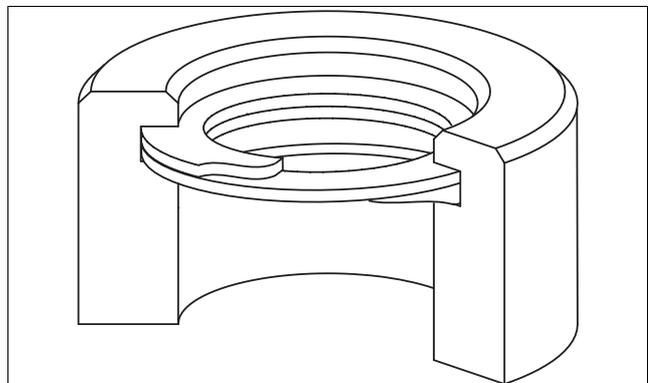
G1029811



G1029821



G1029831



G1029841

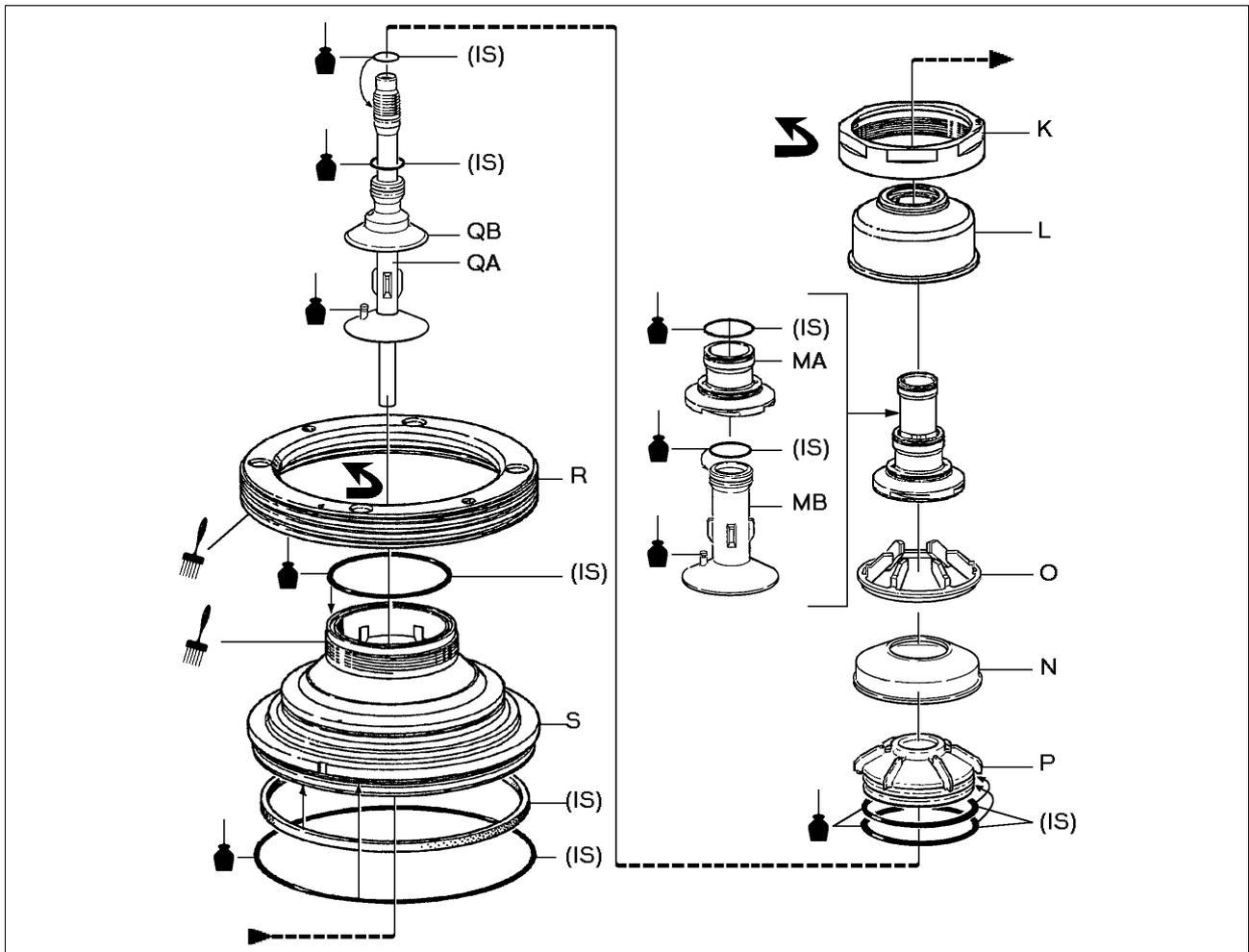


WARNING

Risk for serious cuts.

Sharp edges inside the distributor can cause serious cuts.

It is highly recommended to wear protective gloves.



G0401111

- K Small lock ring
- L Paring chamber
- MA Upper paring disc
- MB Outlet pipe
- O Wing insert
- N Gravity disc
- P Paring chamber cover
- QA Inlet pipe
- QB Paring disc top part
- R Large lock ring
- S Bowl hood

(IS) Included in Intermediate Service kit

-  Left-hand thread
-  Molykote 1000 Paste or an equivalent lubricating paste
-  Oil

- A Safety device
- B Inlet bend
- C Nut
- D Inlet and outlet housing
- E Pressure gauge
- G Outlet housing
- H Connecting housing
- I Height adjusting ring
- J Frame hood

(IS) Included in Intermediate Service kit

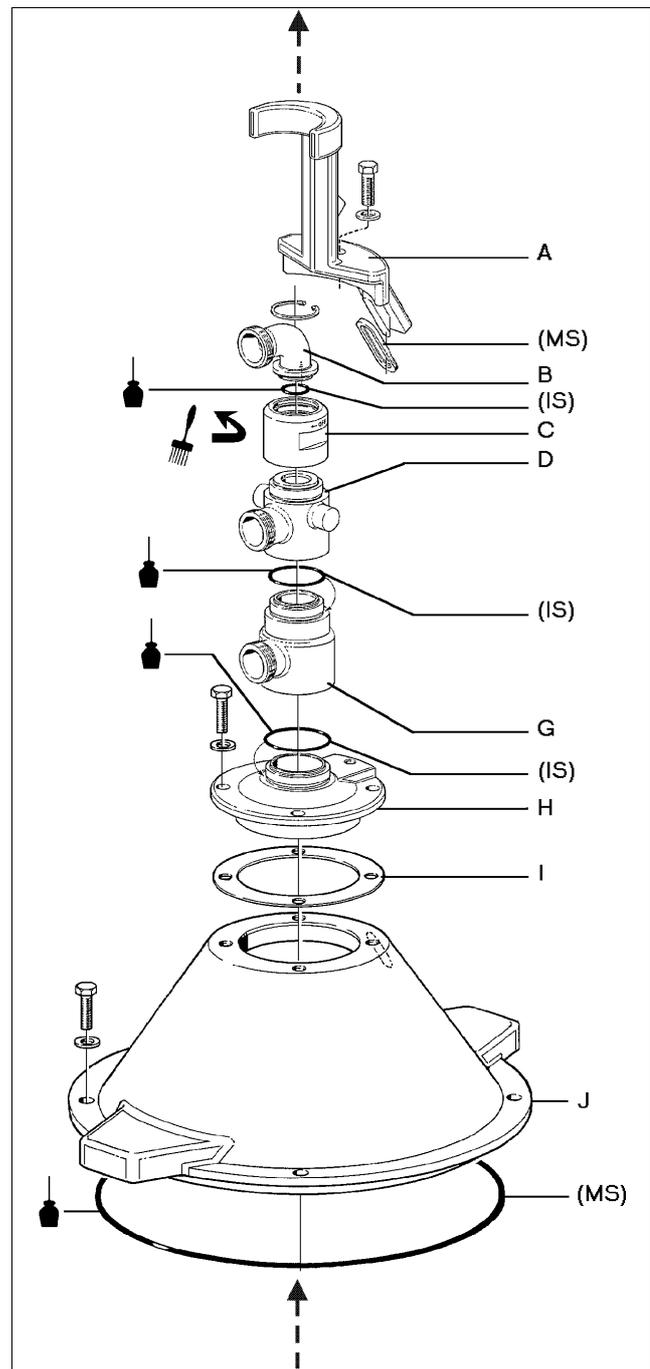
(MS) Included in Major Service Kit

 Left-hand thread

 Molykote 1000 Paste or an equivalent lubricating paste

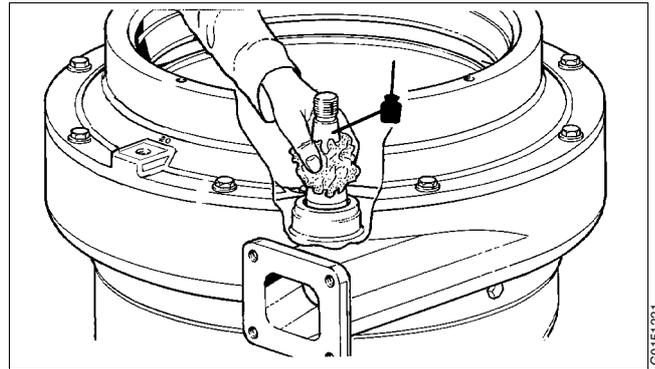
Loctite 242

 Oil



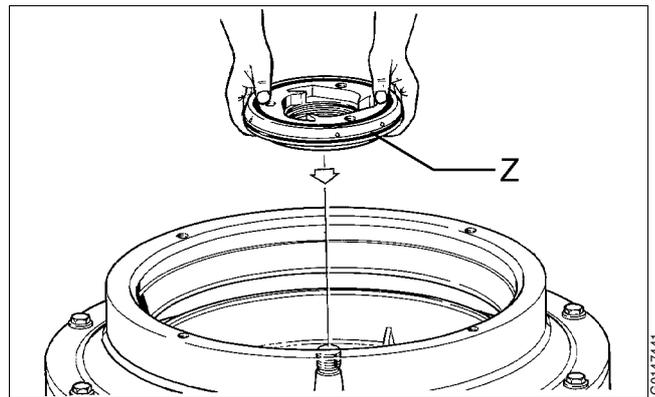
G0400651

1. Wipe clean the spindle top and the conical nave in the bowl body (Y). Apply a few drops of oil to the tapered end of the spindle, smear it over the surface and wipe with a clean cloth.



G0151221

2. Place the operating water ring (Z) on the distributing cover in the frame.

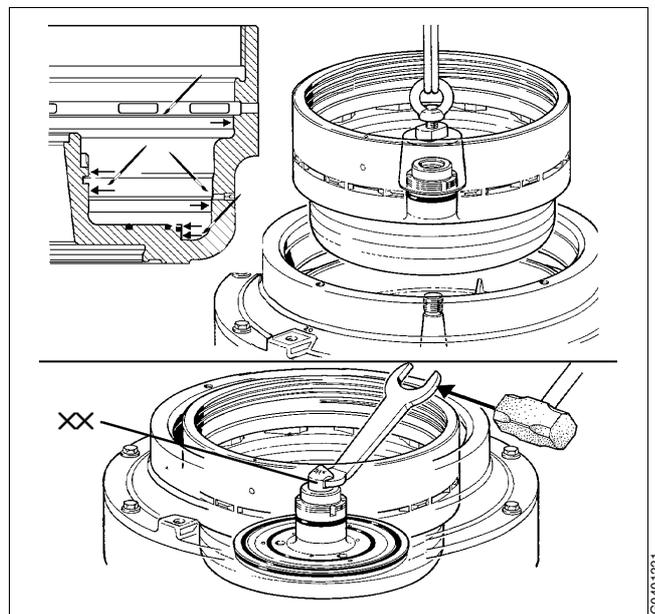


G0147441

3. Fit the bowl body on the spindle. Proceed as follows:

- Attach the lifting tool to the bowl body nave. Screw down the central screw of the tool, then lower the bowl body until the screw rests on the spindle top. Use a hoist.
- Screw out the central screw so that the bowl body sinks onto the spindle.
- Lubricate the guiding surfaces with slide lacquer Molykote D321 R. For correct procedure, see chapter “10.8.2 Priming of guiding surfaces” on page 153

4. Screw cap nut (XX) counter-clockwise on to the spindle. Tighten firmly.



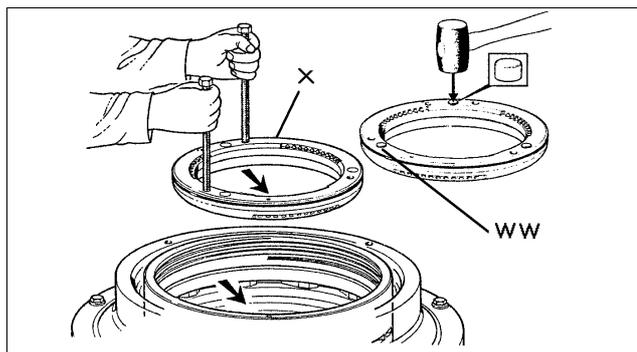
G0401221



Slide lacquer Molykote D321R

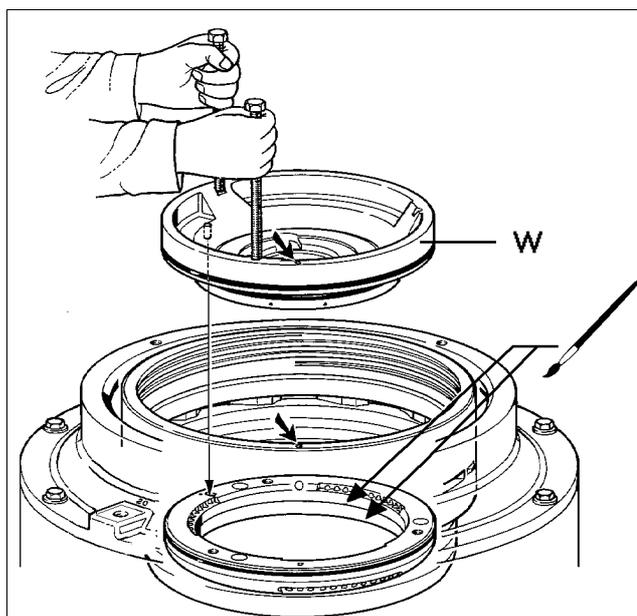
5. Place the operating slide (X) in the bowl body using two of the dismantling tool screws.

- The drill mark on the operating slide must be in line with the assembly mark of the bowl body.
- Check that the seal ring lies concentric in its groove.
- When replacing the valve plugs (WW), use a rubber mallet.

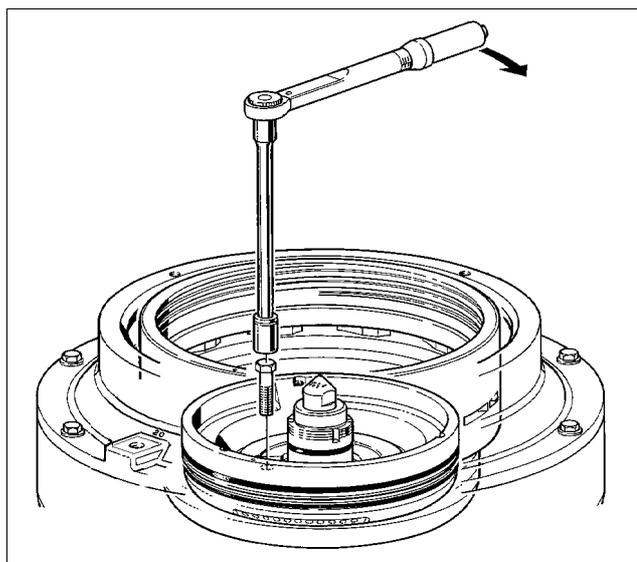


6. Fit the distributing ring (W) using two of the dismantling tool screws.

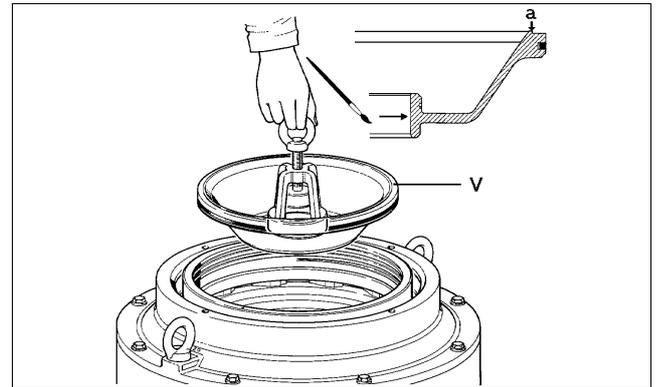
- Check that the seal rings lie concentrically in their grooves.
- Rotate the distributing ring so that its drill mark is in line with the assembly mark on the bowl body. When lowering the ring, its guide pin will then enter the hole in the operating slide.
- Lubricate the guide surface (see picture) of the operating slide with slide lacquer (Molykote D321 R). For correct procedure, see chapter “10.8.2 Priming of guiding surfaces” on page 153.



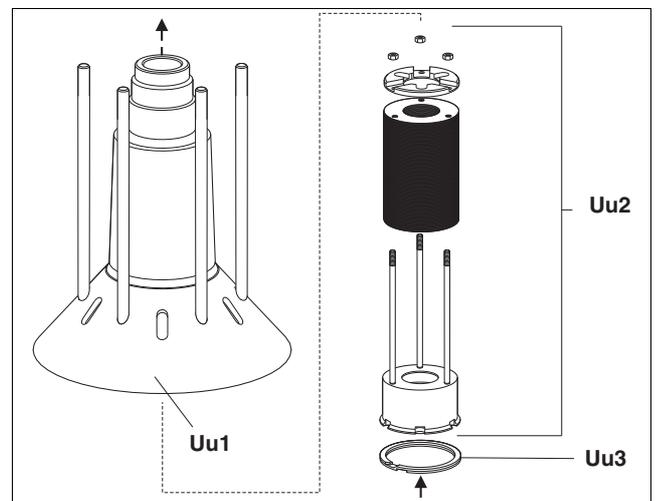
7. Rotate the bowl body slowly to align the three screw holes in the bottom exactly above the holes in the operating water ring (only one position is possible). Tighten the screws.
Tightening torque: **50 Nm ±5 Nm**.



8. Inspect the sealing edge (a) of the sliding bowl bottom liner (V). If damaged through impact, corrosion or erosion or in other way, the liner and the O-ring should be renewed.
- Lubricate the guiding surface of the sliding bowl bottom with slide lacquer Molykote D321 R. For correct procedure, see chapter [“10.8.2 Priming of guiding surfaces”](#) on page 153.
- Fit the sliding bowl bottom. Check that its seal ring lies concentrically in its groove.
9. Normally, the disc inlet, (Uu2) (fitted inside the distributor) should not be dismantled. However, if the discs seem to be clogged, flush the inlet with a cleaning liquid, see [“6.4.1 Cleaning agents”](#) on page 56. If necessary, dismantle the parts as illustrated for cleaning.
10. Detailed information on how to remove and install the retaining-rong (Uu3)



G0401311



G03739D1

UU = distributor complete

**WARNING****Risk for serious cuts.**

Sharp edges, especially from the retaining-ring coil which can result to serious cuts. It is highly recommended to Wear protective gloves.

11. Assemble the bowl disc with its top disc, wing insert and distributor (SS-UU).

Number of bowl discs (T), nominal;

Below wing insert: 73

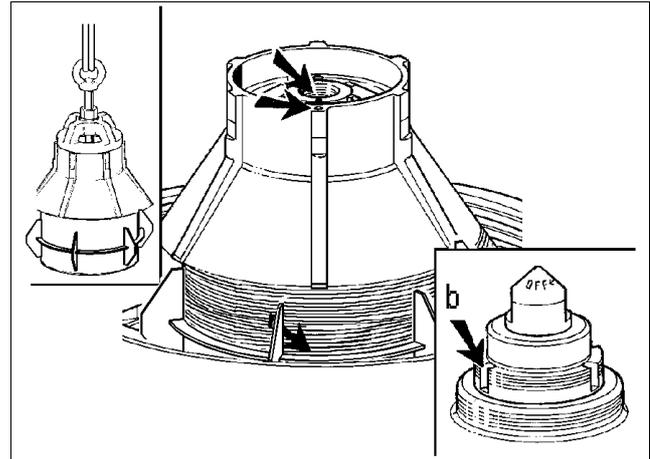
Above wing insert: 55

Lower the unit into the bowl body.

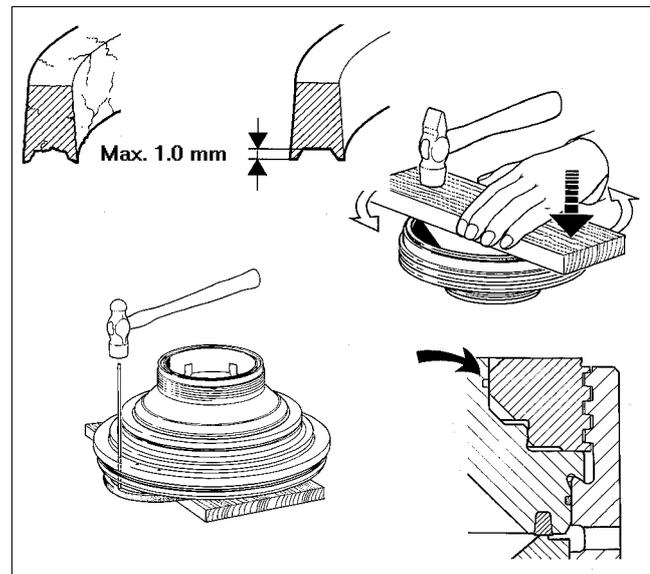
- Make sure that the drill mark on the top disc is in line with the drill mark on the distributor.
 - When lowering the unit, make sure that the drill marks are in line with the assembly mark on the bowl bottom. The two drill marks and the assembly mark must be properly aligned to enable the wings in the underside of the distributor to enter the recesses (b) of the bowl body nave.
 - Make sure that the pins in the distributor fit properly into the holes of the top disc.
12. Renew the bowl hood seal ring at each intermediate service (IS), or if the ring is damaged or indented more than 1 mm.
- Press the ring into the groove using a flat board (1"x4"), and a hammer. If the ring has contracted, place in hot water, (70-80 °C, for about 5 min). If it is too large, dry at 80-90 °C for about 24 hours.

NOTE

No O-ring should be in the groove indicated by the arrow in the adjacent illustration.



G0377921

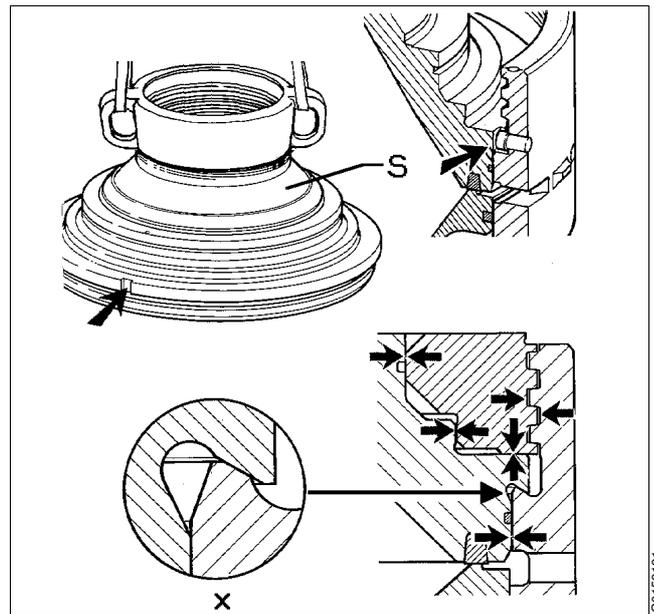


G0152011

13. Fit the bowl hood (S). The guide lug on the bowl body must enter the recess in the hood. Apply lubricating paste on the lock ring threads, contact and guiding surfaces (see arrows in lower illustration).

NOTE

Make sure that the surfaces of the dovetail slot (X) are undamaged and thoroughly cleaned. These surfaces *must not* be lubricated.



14. Screw on the large lock ring (R) counter-clockwise by hand as far as possible. Fit the spanner to the lock ring and secure it with the screw.

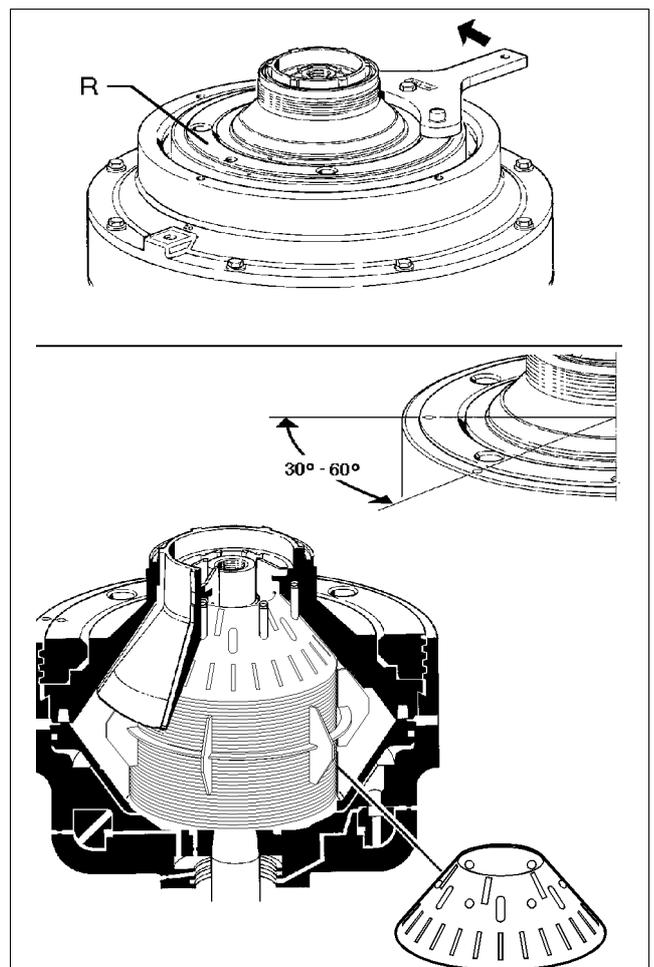
Checking disc stack pressure:

- Check disc stack pressure every 8000 hours service (Major Service).

Position the bowl hood on top of the disc stack. Tighten the large lock ring by hand. The assembly mark of the lock ring should be positioned 30° to 60° ahead of the corresponding mark of the bowl body. If not add or remove a sufficient number of discs.

NOTE

Insufficient pressure on the disc stack can affect the bowl balance, and thus cause excessive vibration of the separator.



G0152121

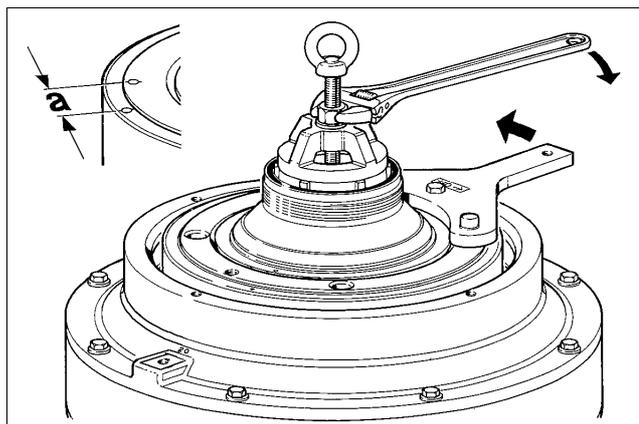
G0372331

15. Fit the compression tool and screw the central screw down into the distributor until it stops.

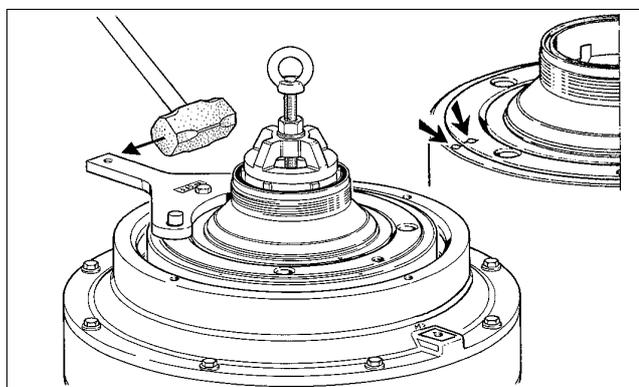
NOTE

Not using the compression tool can cause serious damage.

- Compress the disc stack by tightening the nut of the compression tool. Gradually tighten the large lock ring by hand. Finally, tighten the nut of the compression tool very firmly. The pressure of the disc stack is relieved when it is possible to move the handle of the compression tool back and forth a couple of millimetres relative to the spanner attached to the large lock ring.
 - When the pressure on the disc stack is relieved, it is normally possible to tighten the large lock ring by hand until its assembly mark is positioned slightly ahead, (about 5 mm) of the corresponding mark on the bowl body (distance “a” in the illustration).
16. Tighten the large lock ring until it is flush with the bowl body. In a new bowl the marks now will be in line with each other, (see illustration).



G0152321



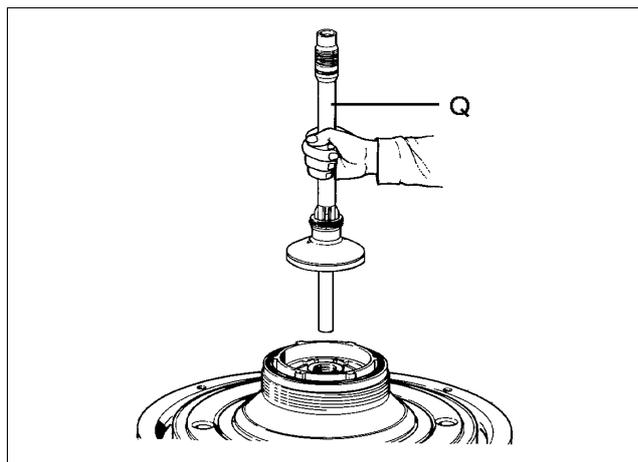
G0164521



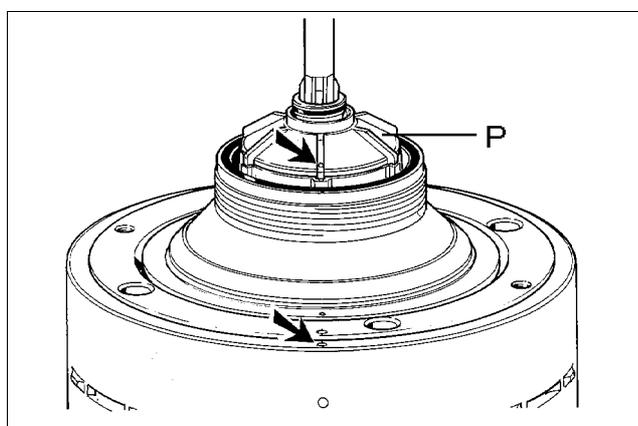
WARNING

The assembly marks must not pass each other more than 25°. See “10.5 Large lock ring joint” on page 149.

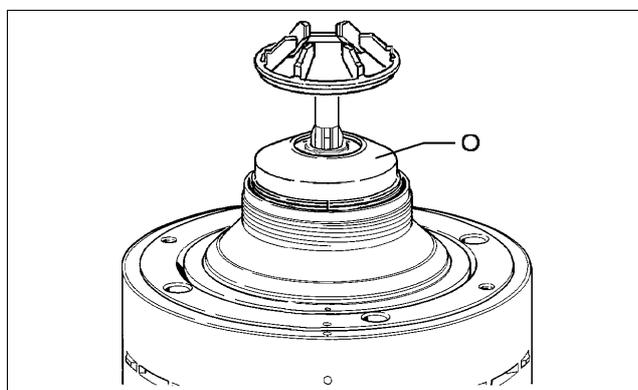
17. Place the inlet pipe with its oil paring disc (Q) in the bowl.



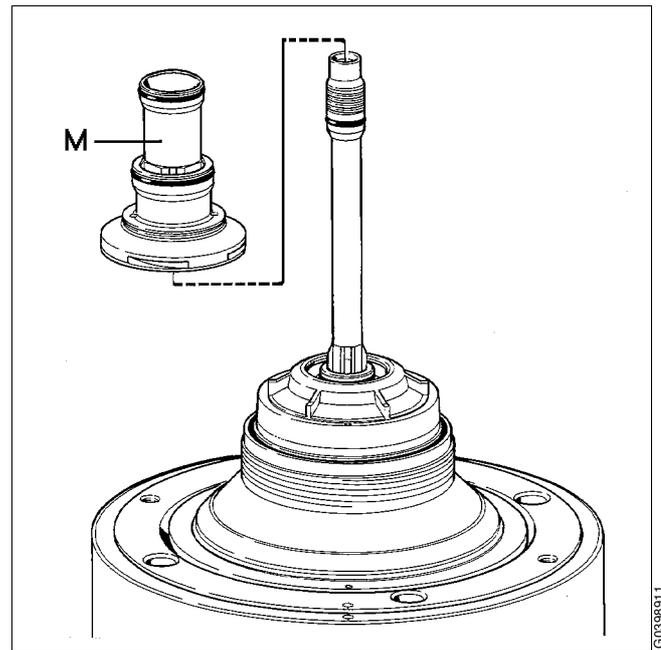
18. Fit the paring chamber cover (P). The drill mark on the cover must be in line with the assembly mark on the bowl body.



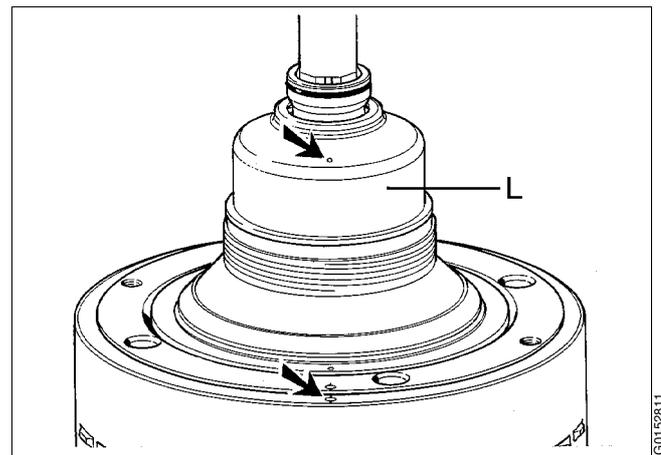
19. Fit the gravity disc and the wing insert.



20. Place the discharge pipe with the paring disc (M) in correct angular position on the inlet pipe.

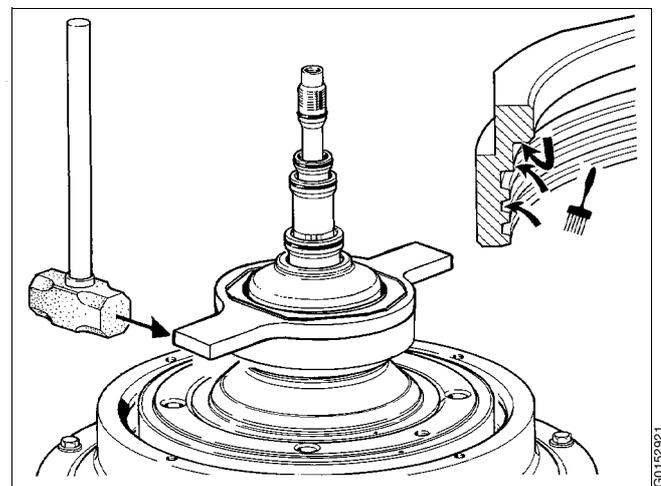


21. Fit the paring chamber (L). The drill mark on the chamber must be in line with the assembly mark on the bowl body.

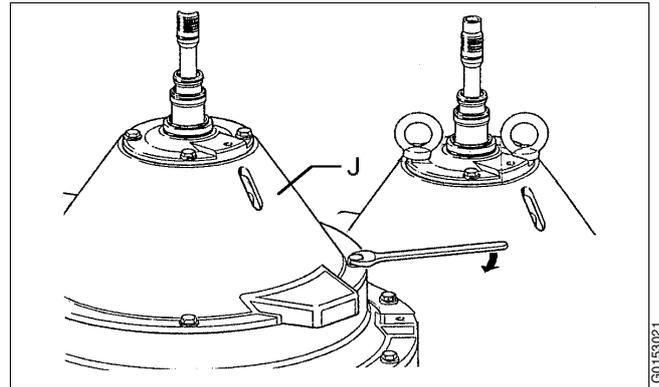


22. Tighten the small lock ring (K) counter-clockwise.

- Apply a thin layer of lubricating paste to the threads and the contact and locating surfaces.



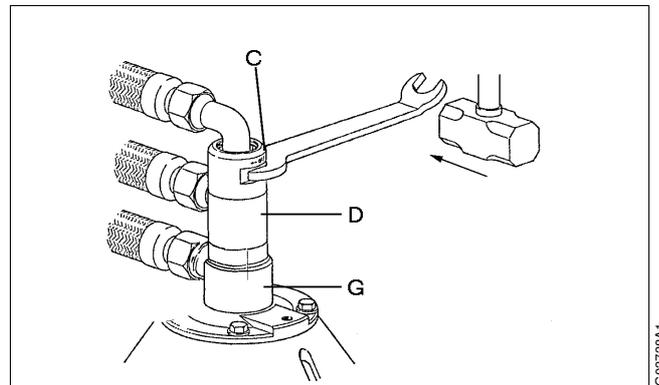
23. Fit the frame hood (J). Two lifting eye bolts (M12) should be screwed into the holes in the hood to be able to lift the hood with a hoist.



24. Fit outlet housing (G) and inlet and outlet housing (D).

Tighten nut (C) counter-clockwise on the inlet pipe.

- Apply a thin layer of lubricating paste to the threads and on contact and locating surfaces.

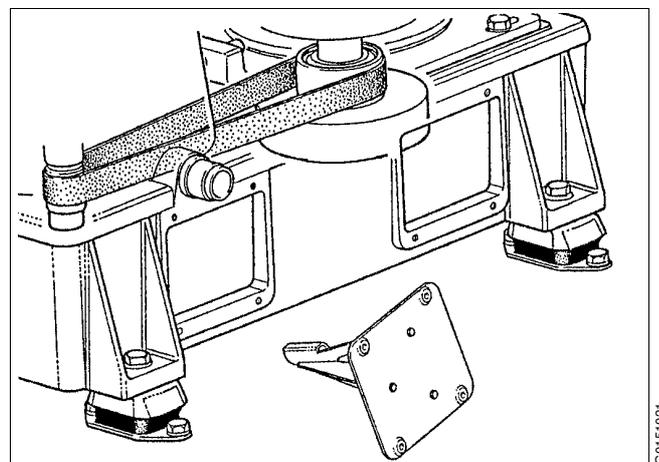


WARNING

Take due-care and precaution for finger jam when removing or fitting the belt.

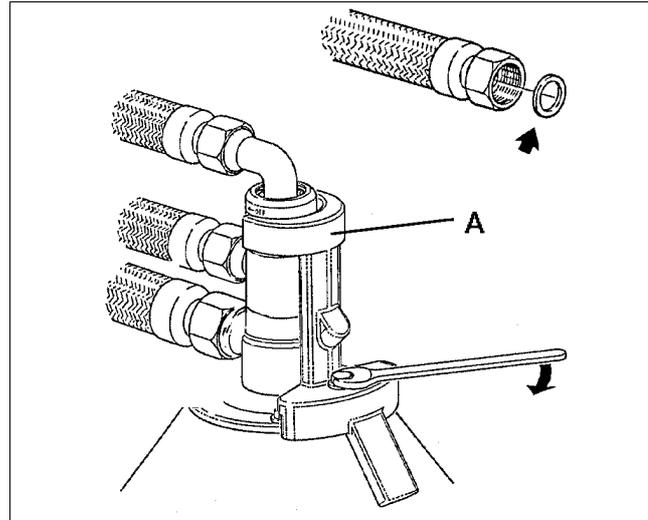
25. After the nut has been tightened, rotate the bowl by means of the flat belt or the friction coupling. If the bowl does not rotate freely or if a scraping noise is heard, incorrect bowl assembly or incorrect height adjustment of the oil paring disc can be the cause. See [“10.6 Paring disc height adjustment” on page 150](#).

26. Fit the two covers on the frame bottom part.

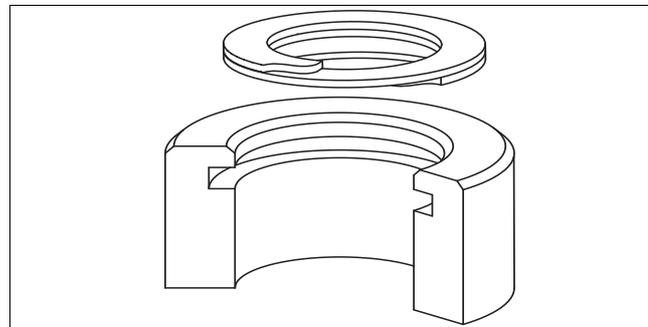


27. Fit the safety device (A).

- Make sure that the gasket on the safety device is in position (glue it with Loctite 407).
- Fit the connecting hoses in position if they have been removed. Be sure to fit in their rectangular rings.



G0380531



G 1029811

9 Maintenance – Other

Contents

9.1 Friction coupling	110
9.1.1 Dismantling of friction blocks or cleaning of pads	111
9.1.2 Assembly of friction coupling	114
9.2 Flat belt	118
9.3 Cover with brake	123
9.4 Oil change	125
9.5 Oil filling device	126
9.6 Mounting of speed sensor and junction box	127
9.7 Mounting of unbalance sensor and junction box	129
9.8 Speed sensor	132
9.9 Checking of speed sensor fitting	135
9.10 Unbalance sensor	136
9.10.1 Renewal of unbalance sensor	137
9.10.2 Checking of unbalance sensor electrical function	138
9.11 Frame feet	139
9.12 Electric motor	140

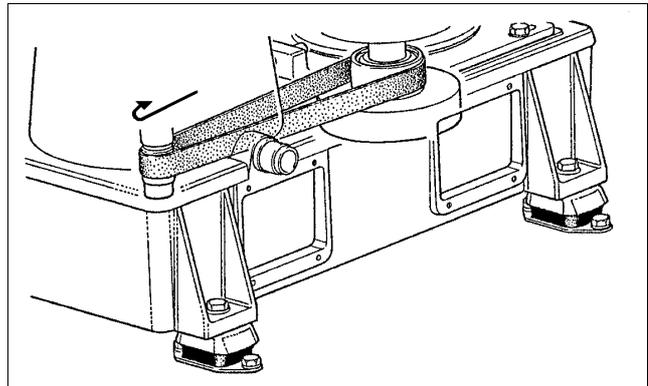
9.1 Friction coupling

If the separator does not attain full speed within about 5 minutes, the friction pads or the coupling may be worn or greasy. The friction blocks (G) must then be renewed or thoroughly cleaned of grease. or the pads be properly cleaned from grease.



WARNING

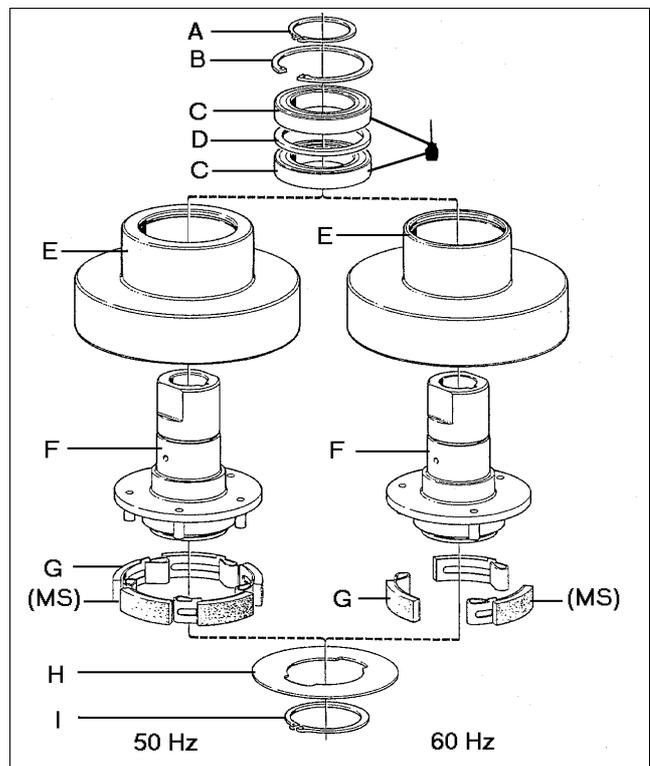
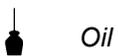
Never start dismantling the friction coupling until the separator bowl has come to a complete standstill.



G0401821

- A. Snap ring
- B. Snap ring
- C. Ball bearing
- D. Spacing ring
- E. Belt pulley
- F. Coupling hub
- G. Friction block with pad
- H. Cover
- I. Snap ring

(MS) Set of friction blocks included in Major Service Kit



G015311

9.1.1 Dismantling of friction blocks or cleaning of pads

Greasy pads can be an indication that the ball bearings have run hot and grease has oozed past the plastic membranes.

1. Remove the motor adapter screws.
2. Remove the two covers from the frame bottom part. Remove the belt.



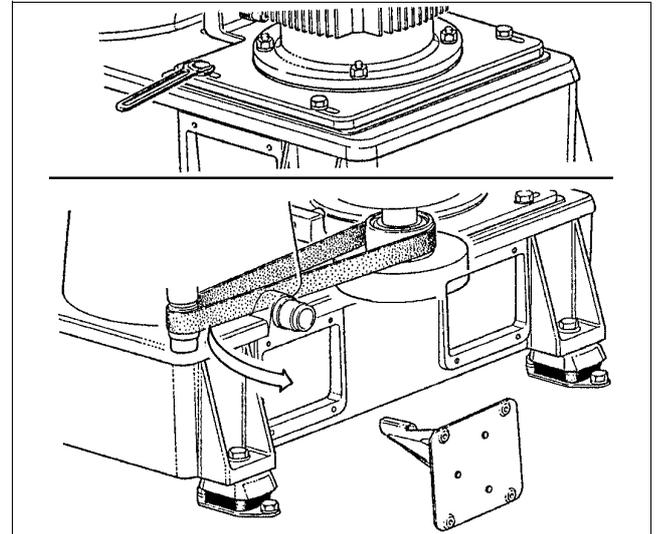
WARNING

Take due-care and precaution for finger jam when removing or fitting the belt.



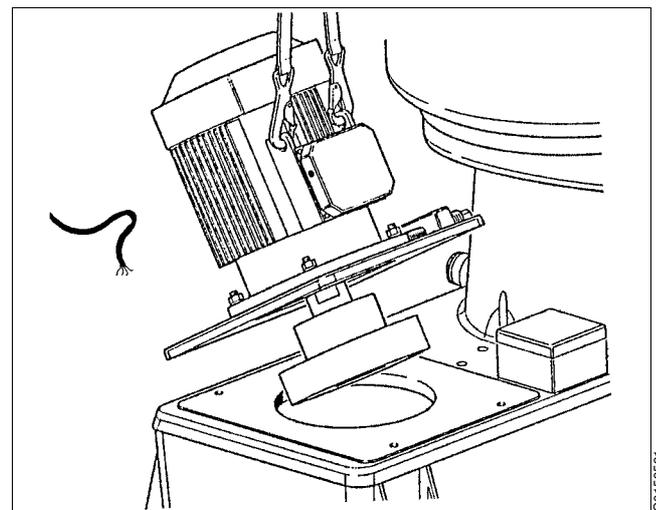
WARNING

Prevent damage to cable by disconnecting it.



G0153421

3. Use the sling and remove the motor together with its adapter and the friction coupling.
 - Weight of motor including adapter and friction coupling: approx. 80 kg.
 - Place motor on a wooden pallet or similar.
 - Do not place motor on top of separator frame.



G0153521

4. Remove the snap ring (I), cover (H) and friction blocks (G).



WARNING

Risk for eye injury by flying snap ring

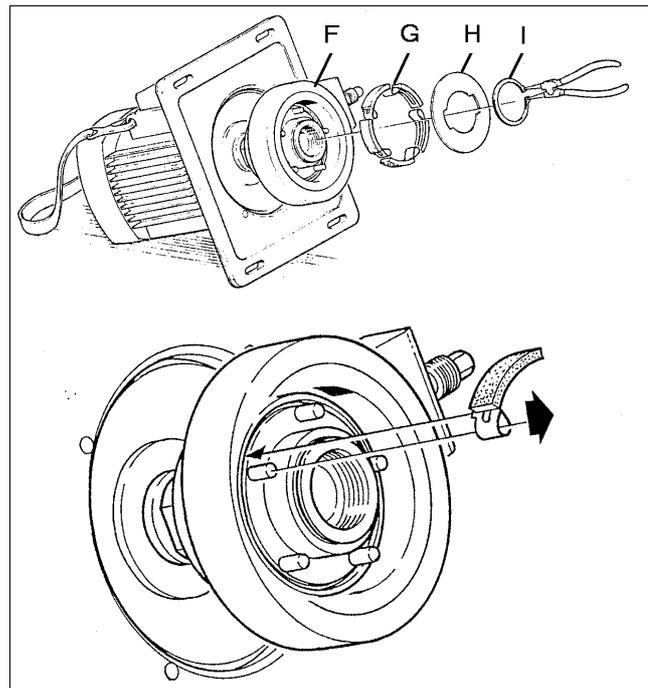
Use the correct pliers for dismantling and assembly of snap ring to avoid accidental release.

Clean the pins of coupling hub (F) and apply a thin film of lubricating paste on the pins. If too much paste is applied, the surplus will collect in the friction coupling and can cause operating problems.

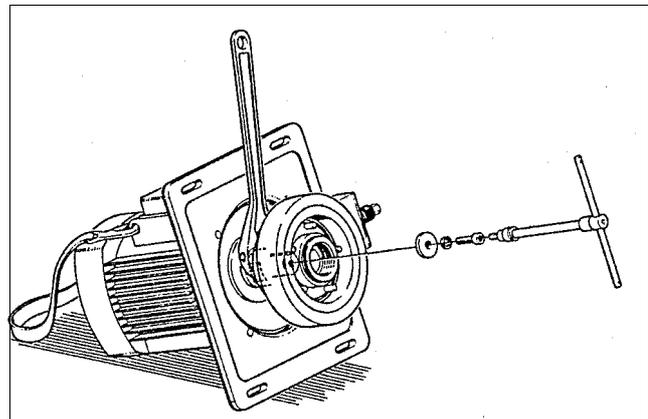
- If the pads are worn: Fit new friction blocks (G). **Renew all blocks even if only one is worn.**
- If the pads are only greasy: Clean the pads and the inside of belt pulley (E) using a degreasing agent.

Complete dismantling of friction coupling

5. Remove the screw, spring washer and washer from the end of the motor shaft.



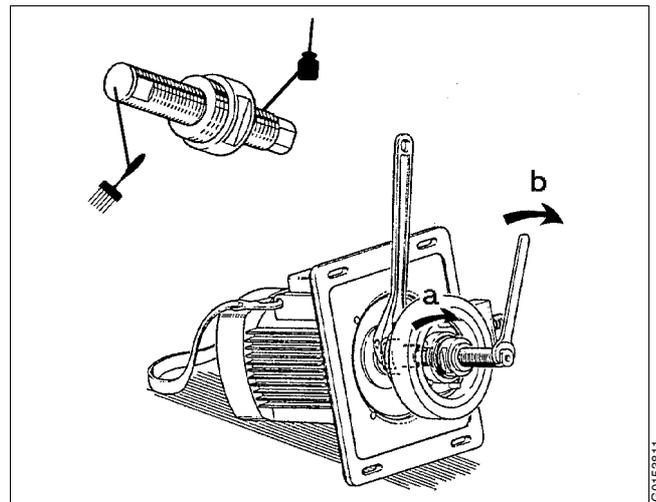
G0153611



G0153711

6. Lubricate and (a) fit the mounting and dismantling tool and (b) ease off the friction coupling.

Weight of coupling is approx. 18 kg.



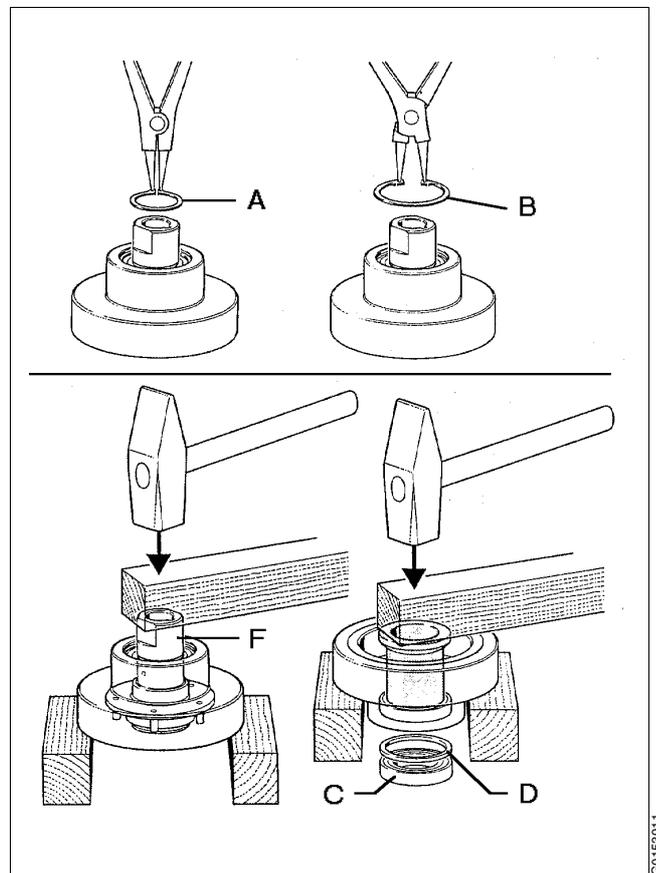
7. Remove the snap rings (A) and (B) and drive off the coupling hub (F).



WARNING

Risk for eye injury by flying snap ring

Use the correct pliers for dismantling and assembly of snap ring to avoid accidental release.



Turn the coupling the other way round and drive off the ball bearings (C) and the spacing ring (D) by using the mounting tool (turned upside down). Discard the bearings.

8. Clean all parts in a degreasing agent and thoroughly check for wear and corrosion.

9.1.2 Assembly of friction coupling

1. Slip the belt pulley (E) over the coupling hub (F) and place them on a firm and level foundation.
 - Apply a thin film of oil on the external and internal surfaces of the ball bearings, if necessary.



WARNING

If the belt pulley must be renewed, check that the new pulley has the correct diameter (d). An incorrect pulley will cause the separator bowl to run at the wrong speed

2. Press the ball bearings (C) down one at a time in the coupling hub, preferably using a hydraulic press. Place the spacing ring (D) between them. See sequence in illustration.

NOTE

Never refit used ball bearings.

The ball bearings must not be heated as they are packed with grease and sealed with plastic membranes.

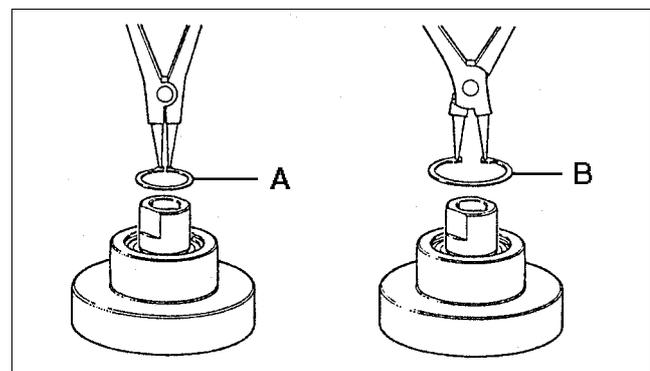
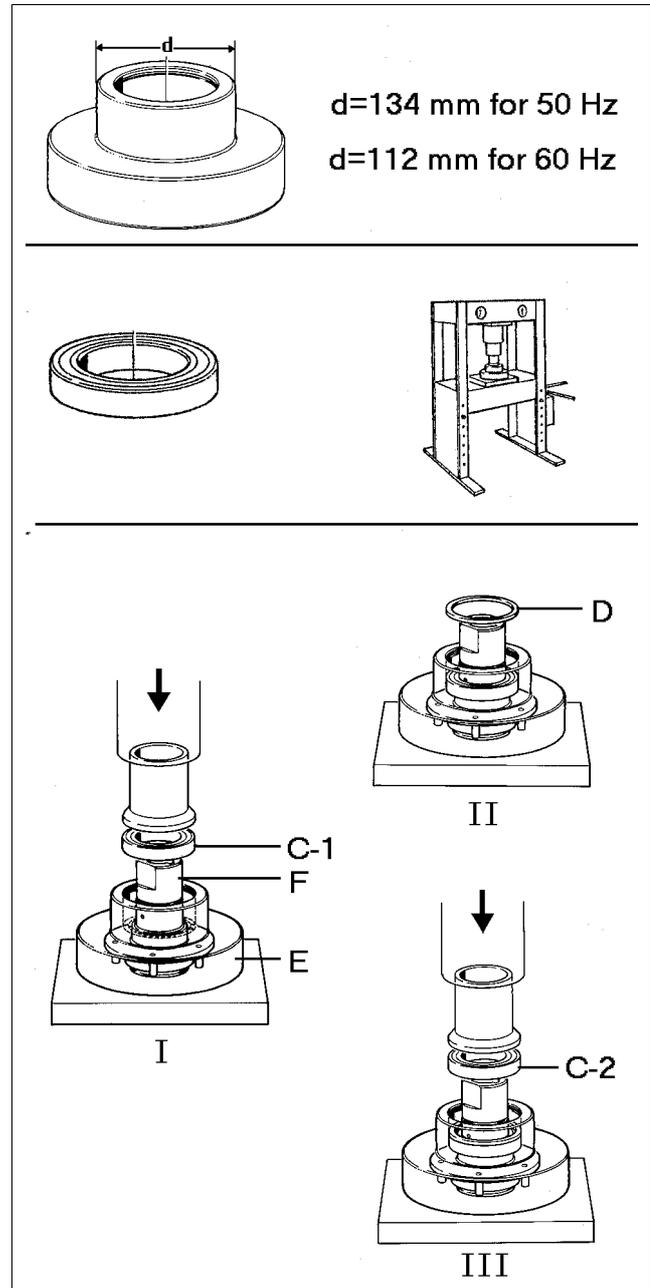
3. Fit the snap rings (A) and (B).



WARNING

Risk for eye injury by flying snap ring

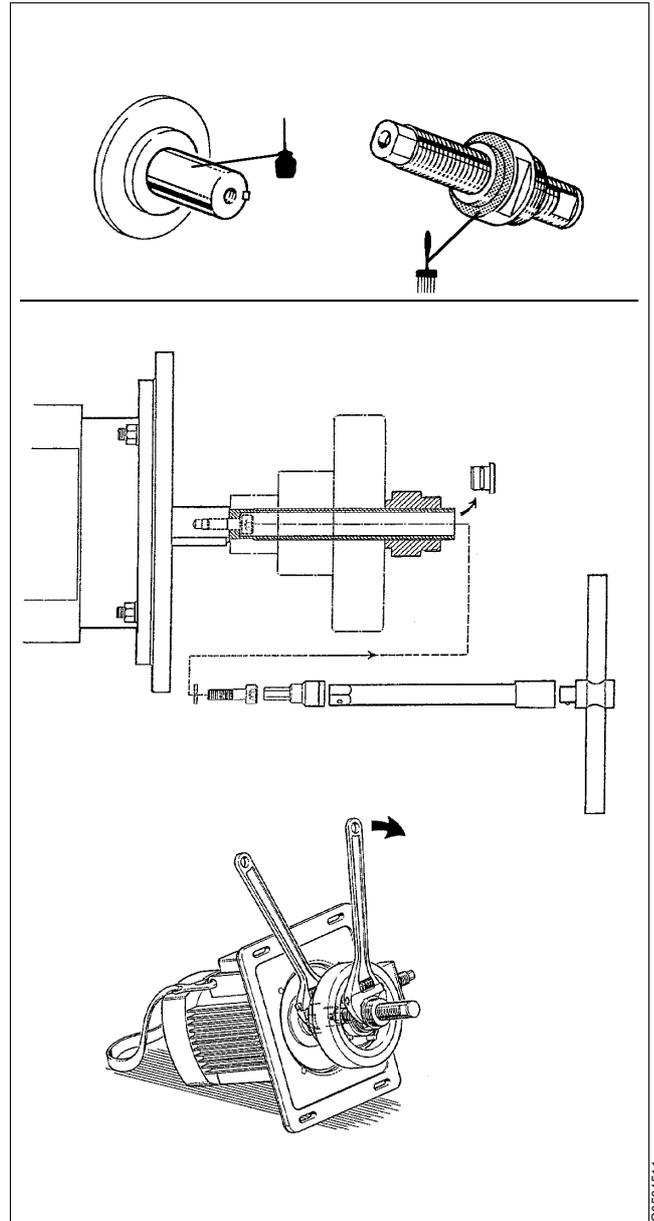
Use the correct pliers for dismantling and assembly of snap ring to avoid accidental release.



G0154012

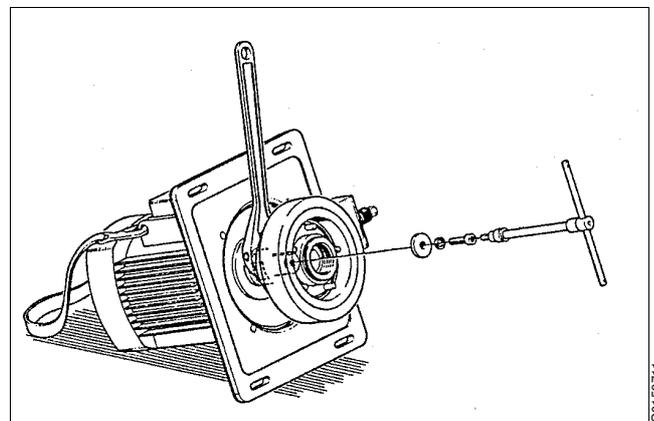
G0154111

4. Use the mounting and dismantling tool when pressing the friction coupling onto the motor shaft.
 - Clean the motor shaft and apply a thin oil film on it.
 - Apply lubricating paste to the tool nut surface that slides on the coupling hub when pressing.
 - Fasten the sleeve of the tool to the motor shaft by means of the screw that attaches the friction coupling to the motor. Press the friction coupling onto the shaft.



G0534511

5. Fit the screw with washer and spring washer to secure the friction coupling.



G0153711

Fitting of friction blocks

6. Fit friction blocks (G).

NOTE

The guide lug of the friction block must enter in the circular groove of the coupling hub. In this position, the guide lug limits the deflection of the friction block, thus preventing excessive wear on the pad.

7. Place the cover in position and secure it with the snap ring.

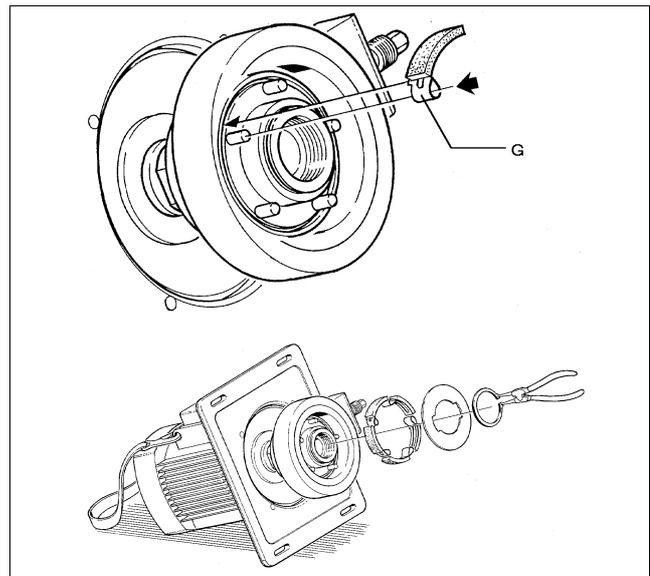


WARNING

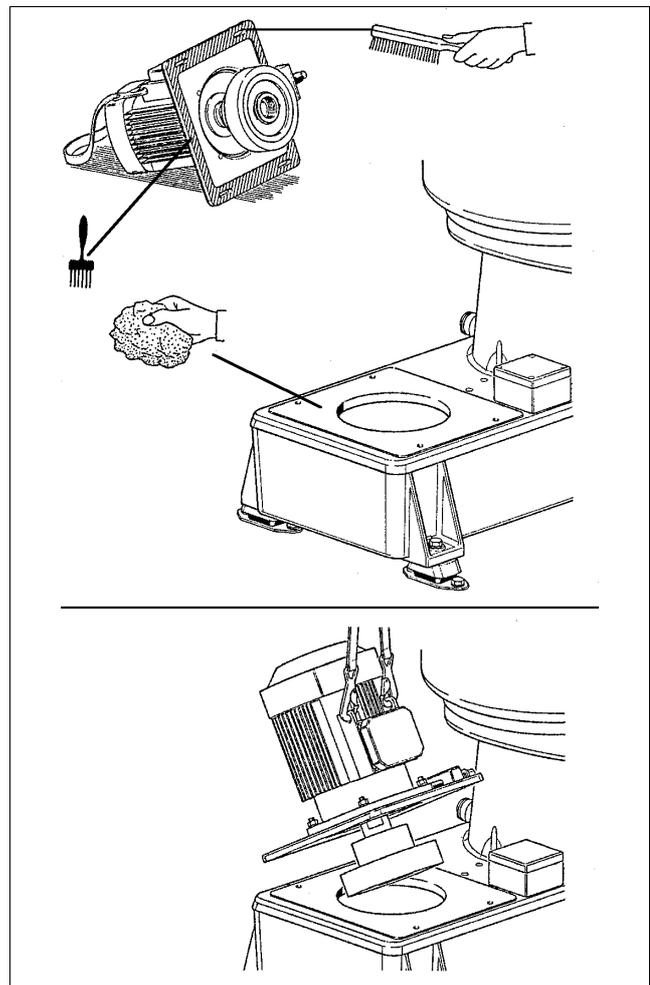
Risk for eye injury by flying snap ring

Use the correct pliers for dismantling and assembly of snap ring to avoid accidental release.

8. Degrease and clean the contact surfaces of the separator frame and motor adapter. Lubricate the motor adapter and lower the motor with adapter and friction coupling into position.



G0154311



G0154411

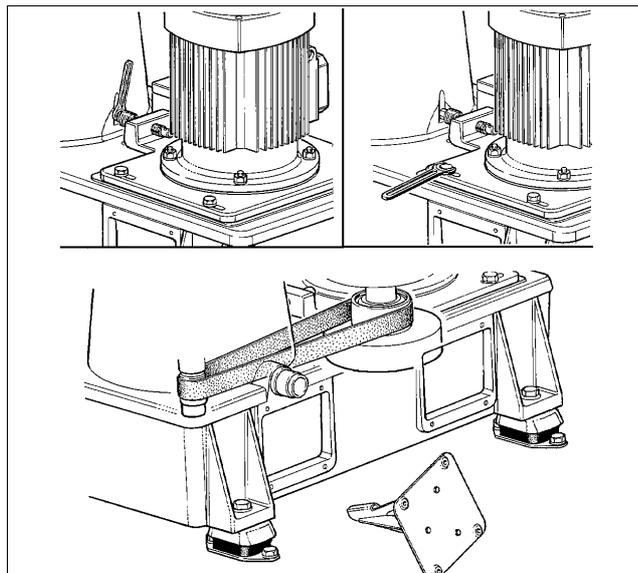
9. Fit and tighten the flat belt, see “9.2 Flat belt on page 118”.

**WARNING**

Take due-care and precaution for finger jam when removing or fitting the belt.

NOTE

A new belt must be retightened twice after fitting.



G0154521

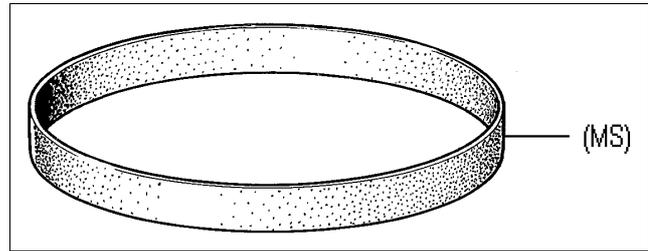
10. Fit the two covers on the frame bottom part.

9.2 Flat belt

The flat belt must be removed for dismantling of the bowl spindle and the friction coupling, or for replacement with a new belt.

A new belt must be retightened **twice**:

1. after 30 minutes. The separator **must not** be started until the retightening has been made.
2. after approximately 24 hours of operation.



MS Included in Major Service Kit.

NOTE

Do not start the separator unless the flat belt has been retightened after 30 minutes. If starting, the belt may slip and be damaged.

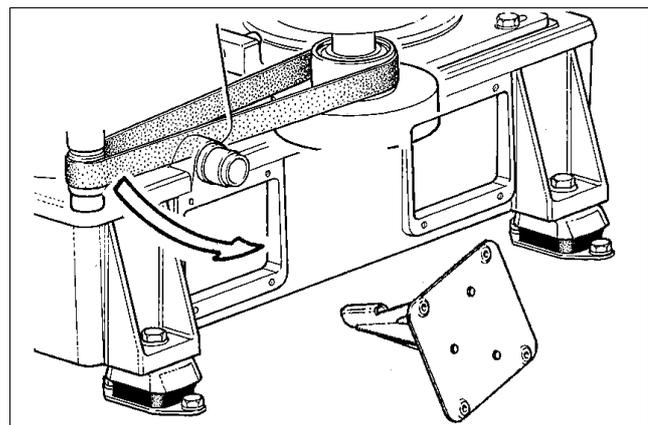
Belt replacement



WARNING

Do not start replacing the belt until the bowl has come to a complete stand still.

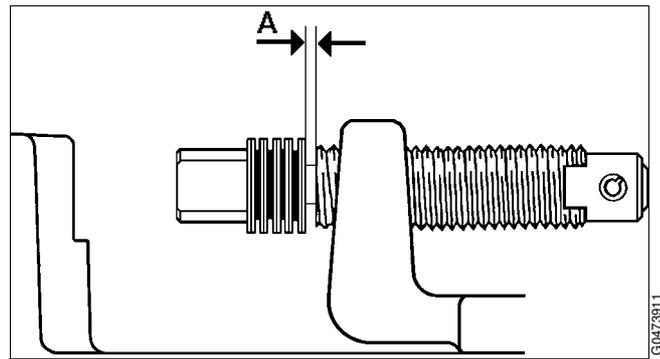
1. Remove the two covers from the frame bottom part.



2. Check that the belt tightener is in backward position.

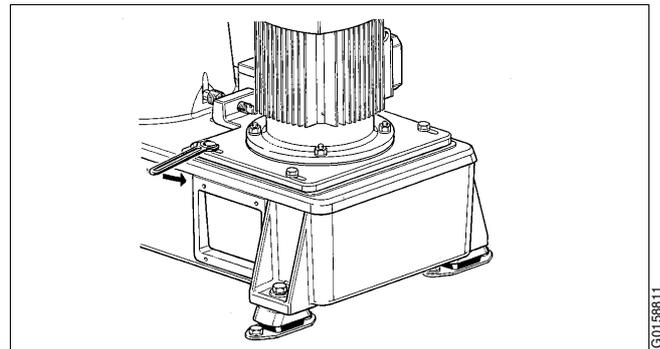
NOTE

Pay attention to the air gap “A” between the cup springs and the threaded sleeve. The measure “A” must not exceed 0,5 mm. Otherwise a correct belt tightening will be impossible.



G0473911

3. Loosen and remove the motor adapter screws.



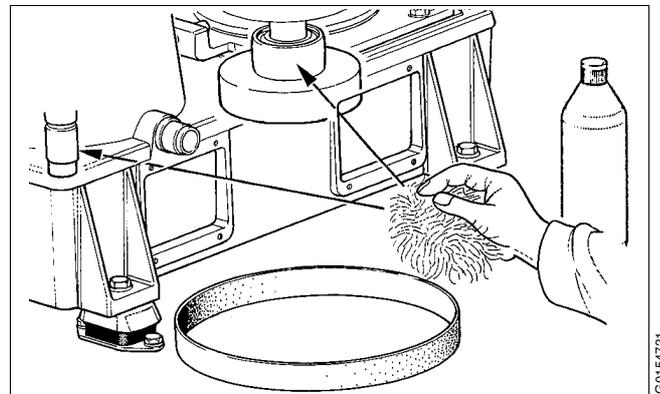
G0158611

4. Remove the existing belt and clean the raceways of the bowl spindle and the friction coupling by using a degreasing agent. Wipe the raceways with a clean rag after cleaning.
 - Exercise the greatest possible cleanliness. There must be no dirt, oil or grease on the raceways.



WARNING

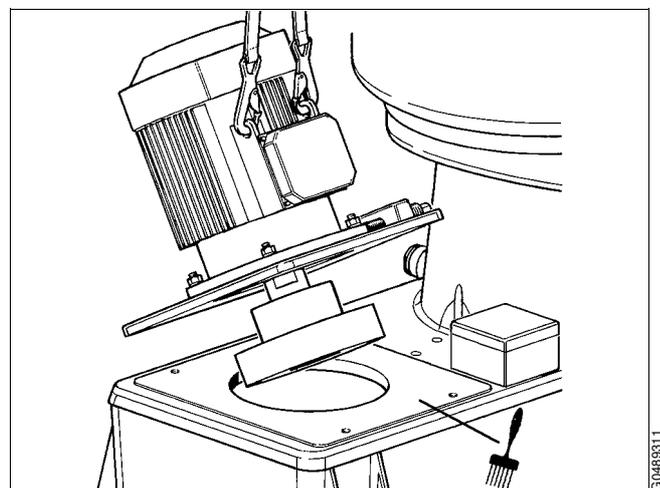
Take due-care and precaution for finger jam when removing or fitting the belt.



G0154721

5. Lift the motor together with adapter and friction coupling and check that there is a sufficient film of Molykote 1000 Paste, or an equivalent lubricating paste, between the adapter and the frame surface.
Lower the motor after checking and put back the screws without tightening. Weight of motor including adapter and friction coupling: approx. 80 kg.

 *Molykote 1000 Paste (a thin layer should be rubbed into the surface).*



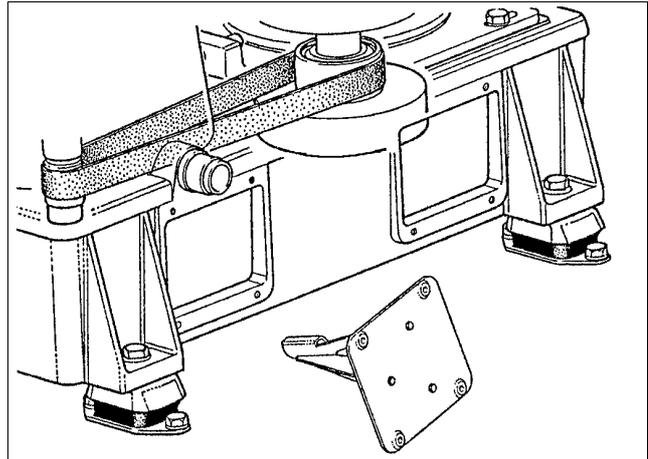
G0489311

6. Fit a new belt. Start on the motor side. Tighten the belt by moving the motor backwards by hand. Pull the belt around a few turns by hand.



WARNING

Take due-care and precaution for finger jam when removing or fitting the belt.

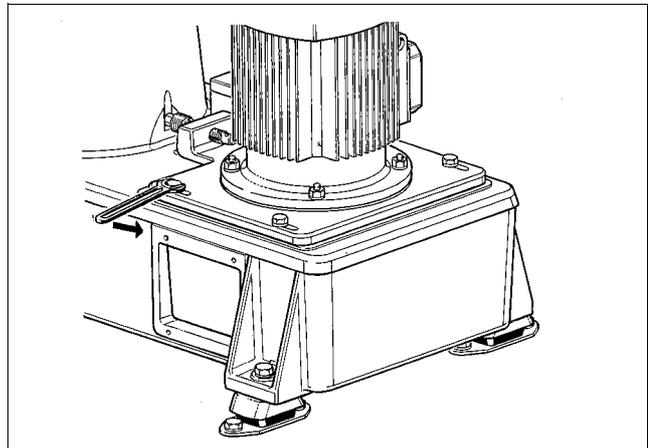


G0151021

7. Tighten the belt as described below.

Tightening of flat belt

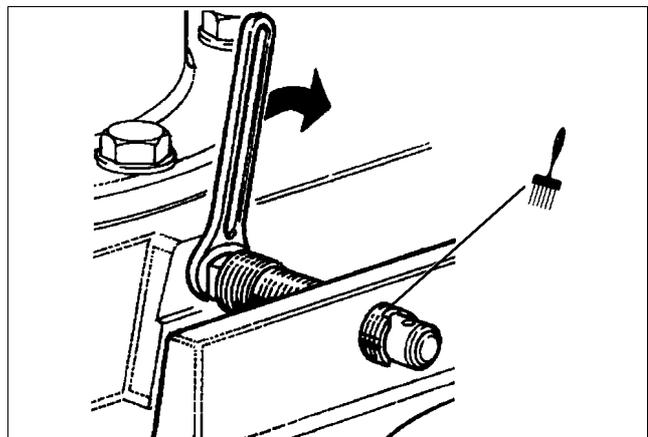
1. Loosen but do not remove the motor adapter screws (if not already done).



G0158811

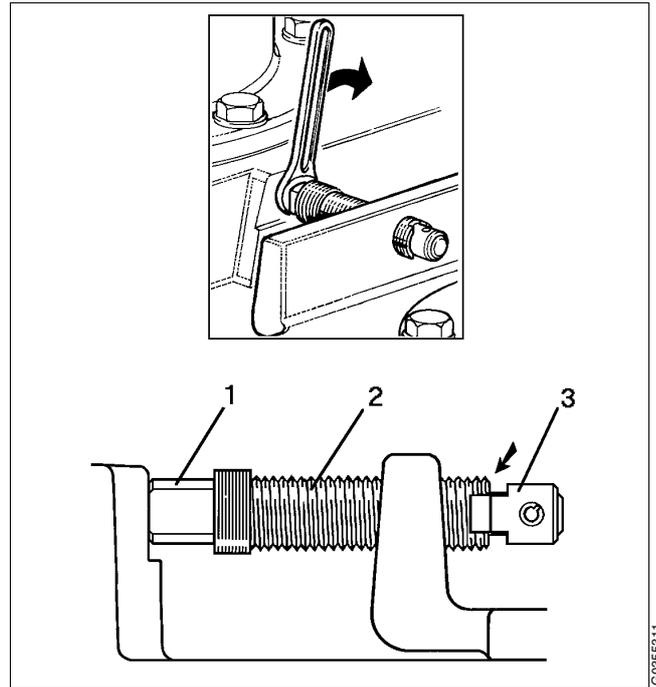
2. Rotate the belt tightener by rotating the shaft until it makes contact with the frame pad. The threads should be lubricated with Molykote 1000 paste or similar.

 *Molykote 1000 Paste (a thin layer should be rubbed into the surface).*



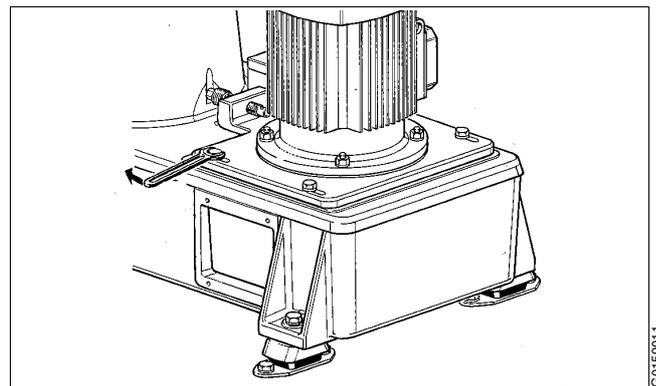
G0468811

3. Tighten shaft (1) further until the threaded sleeve (2) and dog (3) are disengaged. “Shake” the motor by hand several times during this operation in order to overcome the friction between the motor adapter and the frame.



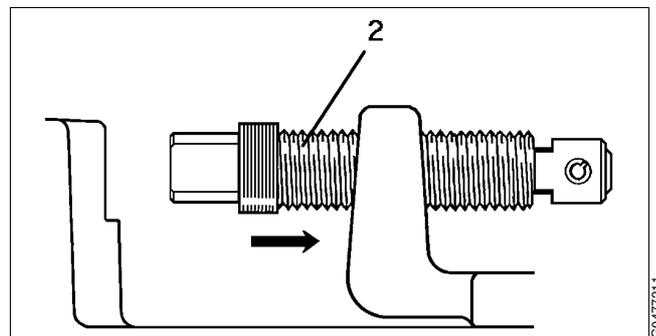
G0355311

4. Tighten the motor adapter screws.



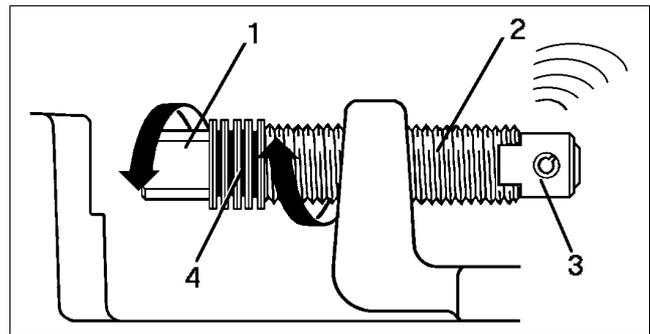
G0159011

5. Loosen the belt tightener by rotating the threaded sleeve (2) backwards.



G0477211

6. Rotate the shaft (1) relative to the threaded sleeve (2) until the threaded sleeve (2) and dog (3) are engaged again with a clicking sound.



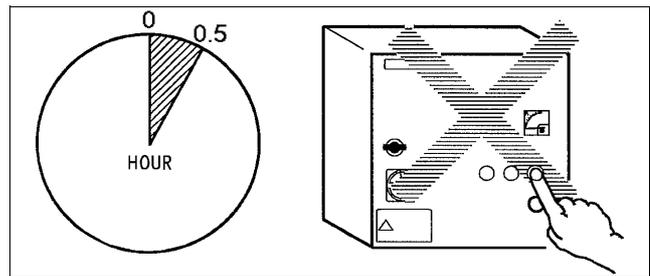
NOTE

If the cup springs (4) are not decompressed they will lose their tension and correct belt tightening will be impossible.

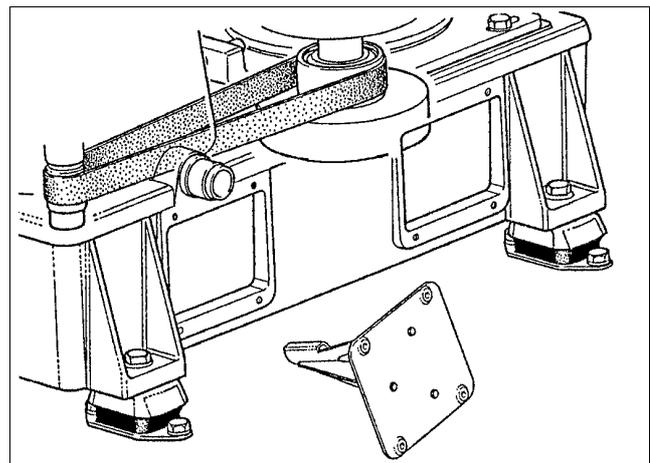
7. Let the belt stay in this position for at least 30 minutes *without* starting the separator. Then repeat steps 1-6 above.

NOTE

Do not start the separator unless the flat belt has been retightened after 30 minutes. If starting, the belt may slip and be damaged.



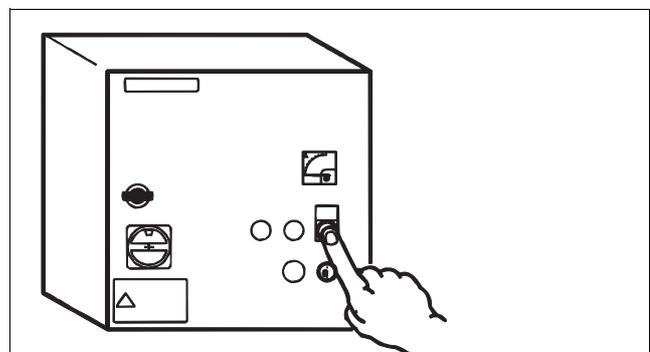
8. Fit the two covers on the frame bottom part.



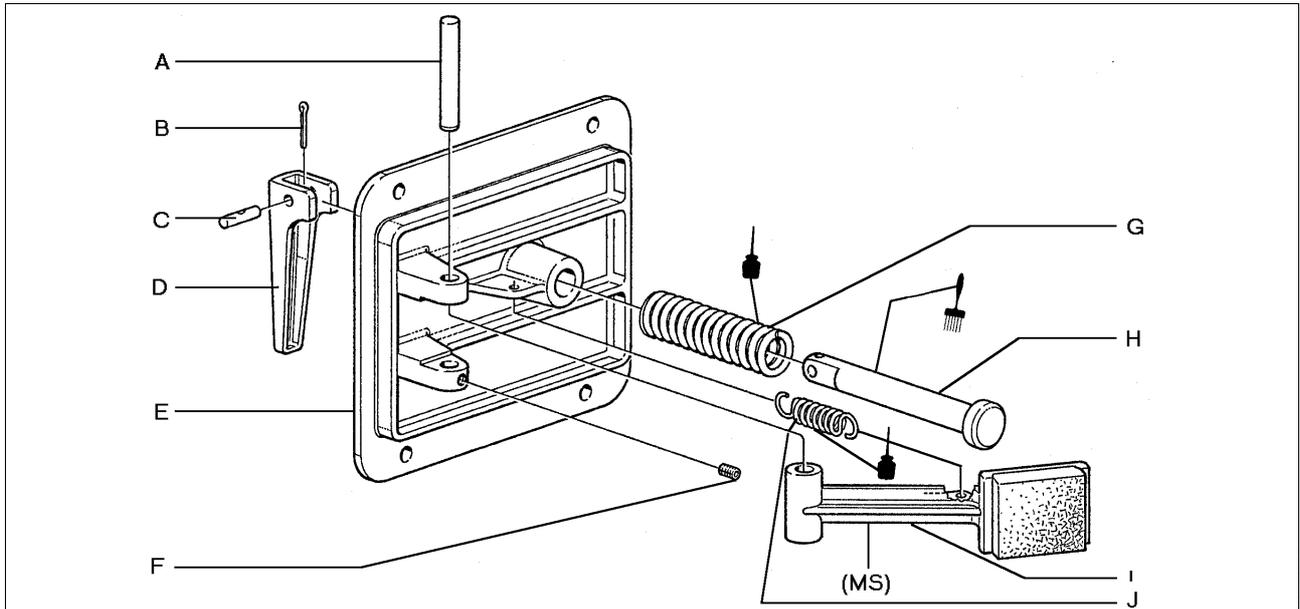
9. The separator may now be started.

NOTE

The belt must be retightened according to steps 1-6 above when the separator has been in operation approximately 24 hours after the belt change.



9.3 Cover with brake



G015501

- A. Cylindrical pin
- B. Split pin
- C. Cylindrical pin with hole
- D. Handle
- E. Cover
- F. Set screw
- G. Compression spring
- H. Shaft
- I. Arm, complete, with friction element
- J. Tension spring

(MS) Included in Major Service Kit



Oil

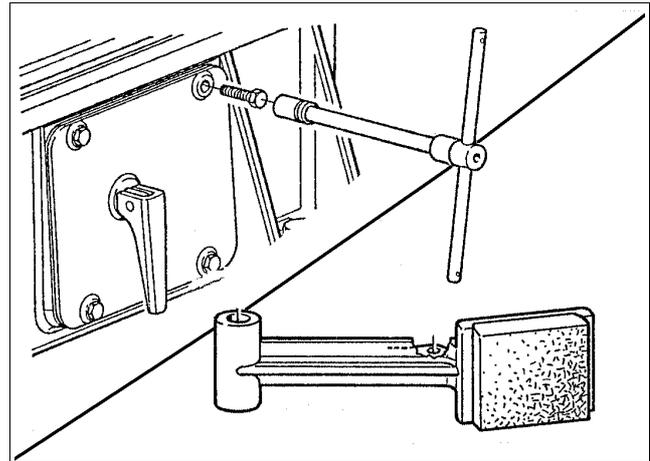


Molykote 1000 or equivalent lubricating paste

Checking of friction element

A worn or oily friction element will lengthen the stopping time. Remove the cover together with the brake. Inspect the friction element.

- If the friction element is worn: Replace the complete arm together with friction element (I).
- If the friction element is oily: Clean the element and its surfaces in contact with the belt pulley with a suitable degreasing agent.

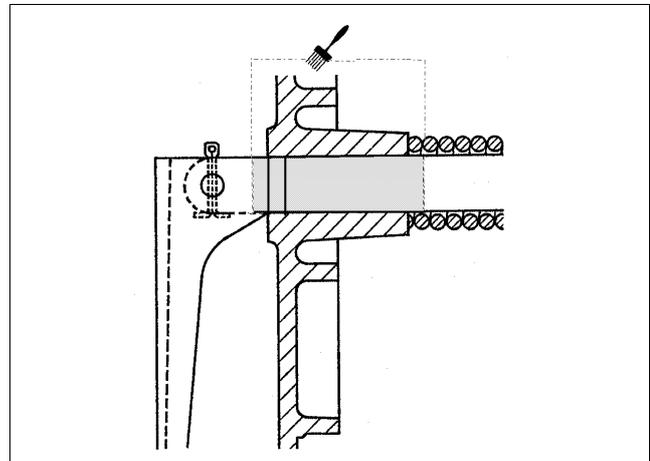


G0155111

Checking of cover (E), shaft (H) and springs (G) and (J)

Rust can form on the brake parts and cause the brake to jam.

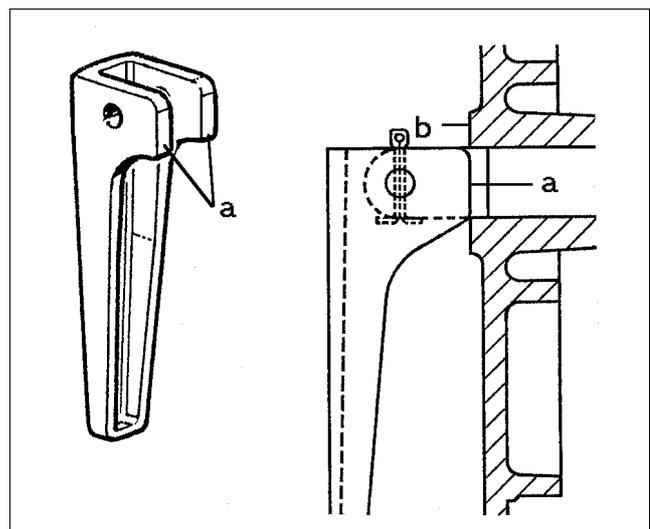
- Remove any rust from the shaft and the corresponding guide surface on the cover. Rub the surface of the shaft with lubricating paste along the area shown in the illustration. Renew the springs if they have become weak. Oil the springs when assembling.



G0155211

Checking of cover fitting

After the cover has been fitted on the frame bottom part, release the brake and rotate the bowl slowly by hand. If a scraping noise is heard, the friction element is probably touching the motor belt pulley - surfaces (a) on handle (D) are not flush with the surface (b) on the cover (E). Loosen the cover and fit correctly.

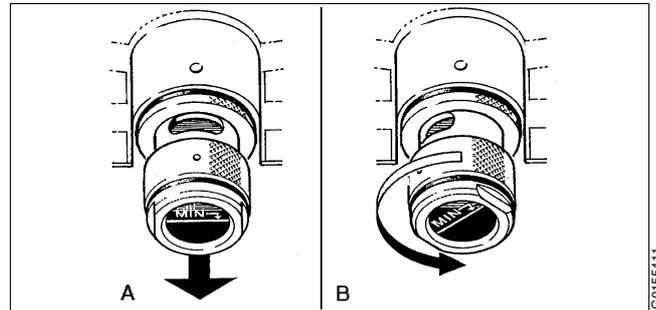


G0155311

9.4 Oil change

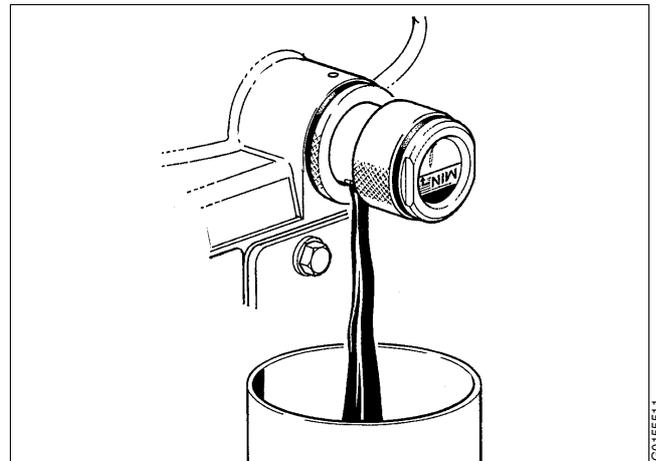
The separator should be level and at a standstill when oil is filled or the oil level is checked. The oil level is lower at standstill than in operation. The MIN-line refers to the oil level at standstill.

1. To drain the oil, place a container under the oil filling device. Pull out the oil filling device (A) and turn it half a turn (B).

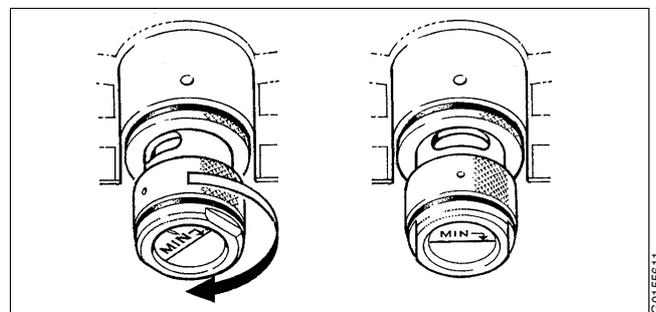


NOTE

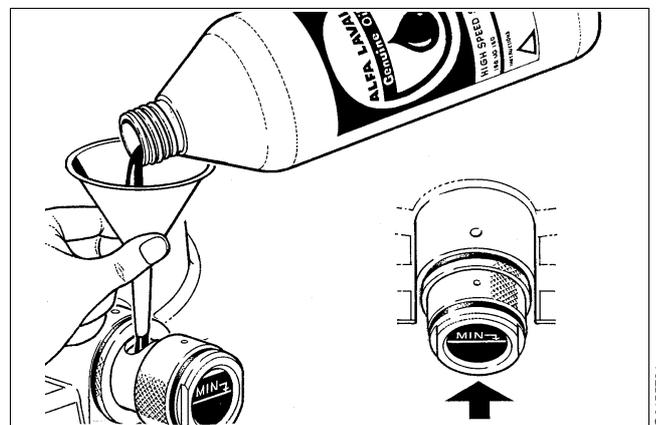
When changing from one oil group to another, the frame housing and the spindle parts must first be thoroughly cleaned.



2. Turn the oil filling device back to the position shown in (A).



3. Fill the sump of the frame housing with new oil.
 - Oil quantity: **approx. 2 litres.**
 - For correct oil quality, see [“6.3 Lubricants”](#) on page 49.
4. Push in the oil filling device.

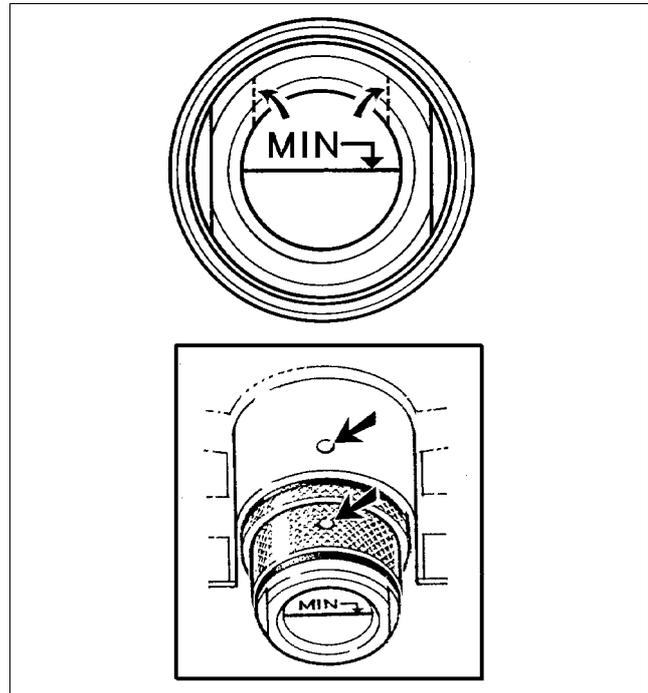


9.5 Oil filling device

After draining off the oil (as described on previous page), unscrew nipple (4) and pull off the oil filling device. Then open up the round safety wire (6) and pull off the nipple (4).

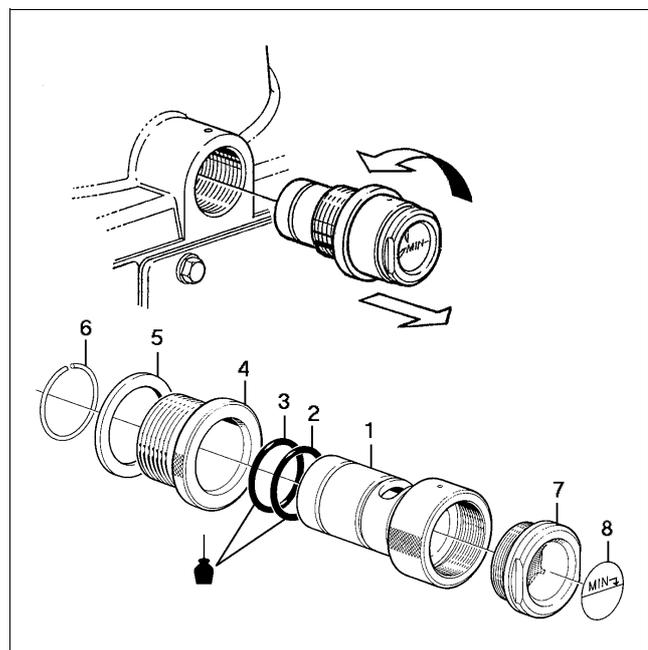
If plate (8) is to be renewed, wipe the sight glass with a degreasing agent and fit the new plate (self-adhesive) on the outside of the sight glass (7). Mark its position relative to the recess in sleeve (1).

Assemble the device and fit it in the frame. Note that the mark on sleeve (1) must be positioned opposite the mark on the frame. Fill the sump with new oil - see "9.4 Oil change" on page 125.



G0155811

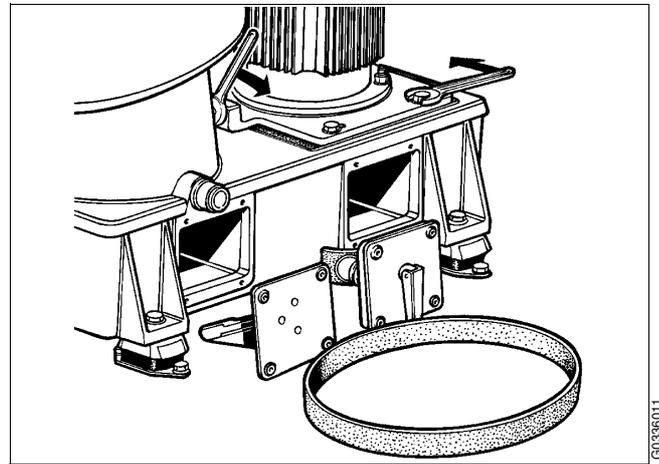
1. Sleeve for oil filling
2. O-ring
3. O-ring
4. Nipple
5. Sealing ring
6. Round safety wire
7. Sight glass
8. Plate



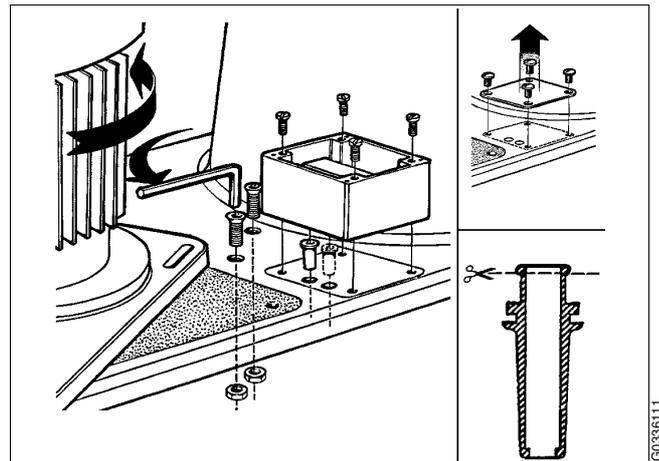
G0401411

9.6 Mounting of speed sensor and junction box

1. Remove the two covers from the frame lower part.
2. Remove the motor adapter screws and loosen the belt tightener. Remove the flat belt.



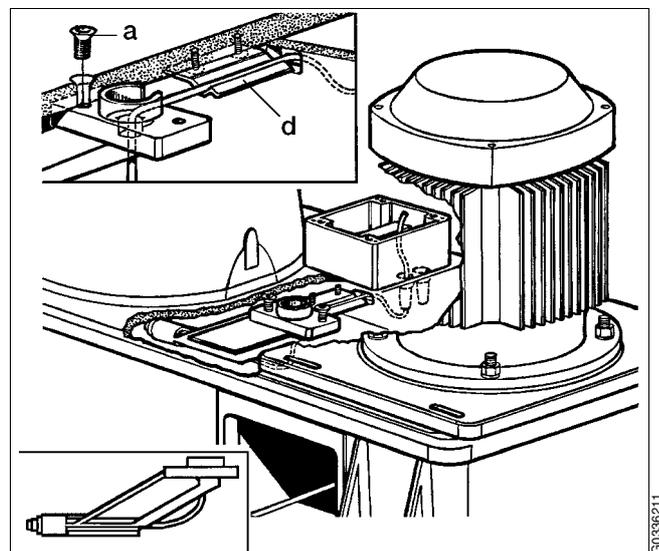
3. Turn and pull back the electric motor in order to uncover two countersunk cap head screws. Remove the two screws with nuts. Discard the nuts.
4. Remove the plate covering the cable holes, cut and fit the bending protections as in the illustration. Mount the junction box.



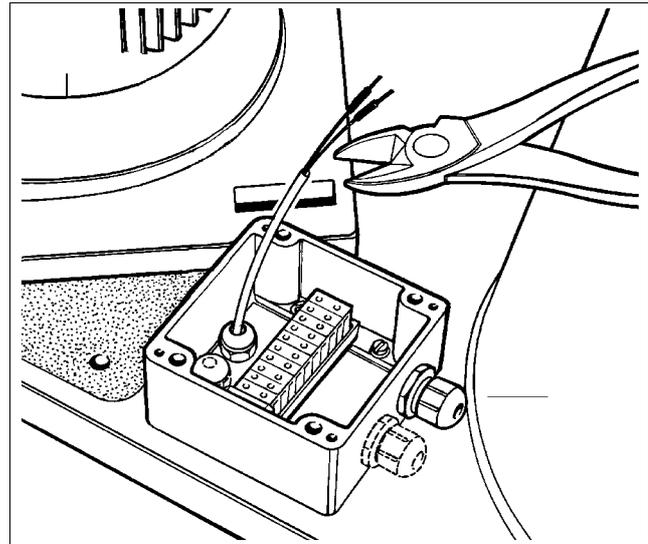
NOTE

One of the bending protections is for the unbalance sensor.

5. Fit the speed sensor on the inside of the frame lower part. Secure it with the two countersunk cap head screws (a).
6. Put the cable onto the cable holder (d), then through the web and in to the junction box through the inner cable bush.
7. Make sure that the speed sensor is correctly positioned, see [“9.9 Checking of speed sensor fitting” on page 135](#).

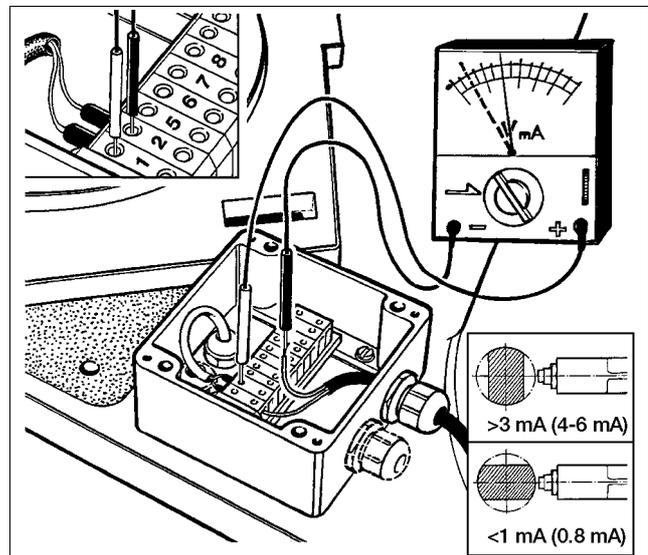


8. Thread the cable gland onto the cable and secure the gland using a socket wrench.
9. Cut the cables about 110 mm from the cable gland and fit cable clips. Mark and connect the cables:
 - Blue cable marked 1 to terminal 1.
 - Brown cable marked 2 to terminal 2.
10. Connect the cable terminals to the corresponding terminals in the separator control unit. See the installation instructions for the control unit.



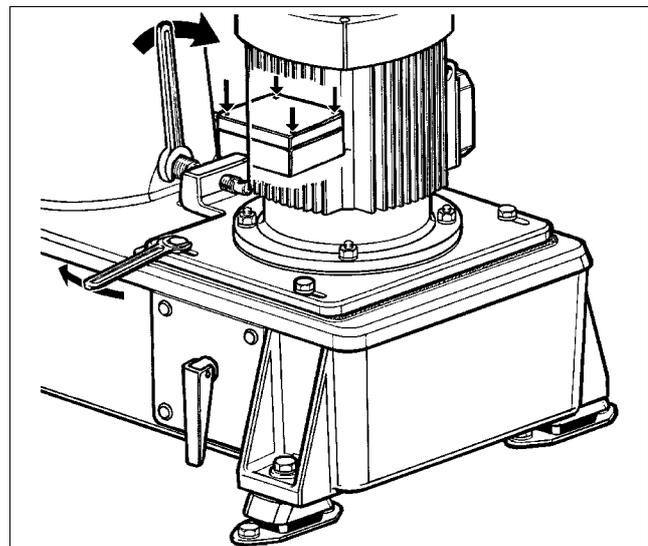
G0336311

11. With the separator control unit turned on, check the electric signal to the speed sensor by measuring the voltage across terminals 1 (–) and 2 (+). Measure also the current in series in positions “Far” and “Near”, see [“9.9 Checking of speed sensor fitting”](#) on page 135.



G0336411

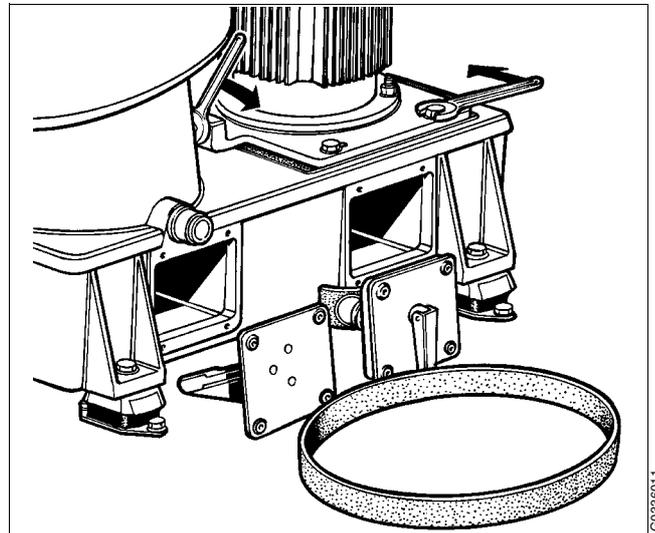
12. Fit the cover on the junction box.
13. Fit and tighten the flat belt, see [“9.2 Flat belt”](#) on page 118.
14. Fit the two covers on the frame lower part.



G0336511

9.7 Mounting of unbalance sensor and junction box

1. Remove the two covers from the frame lower part.
2. Loosen the motor adapter screws and the belt tightener. Remove the flat belt.

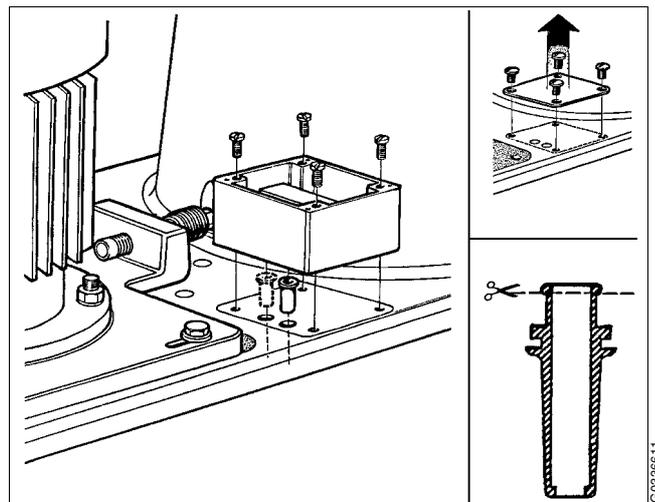


3. Remove the plate covering the cable holes, cut and fit the bending protections as in the illustration.

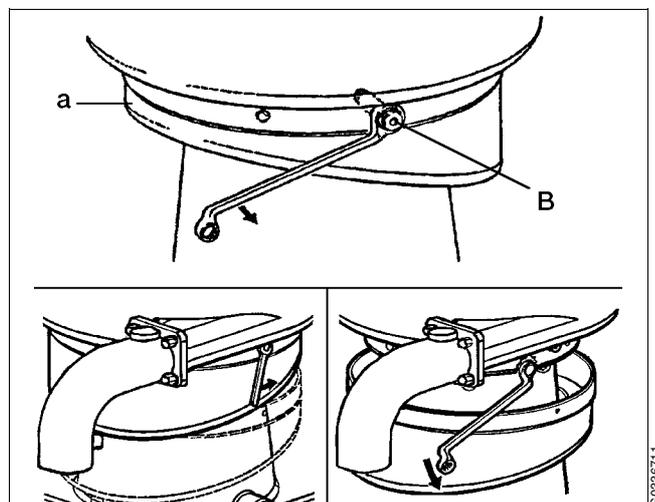
Mount the junction box.

NOTE

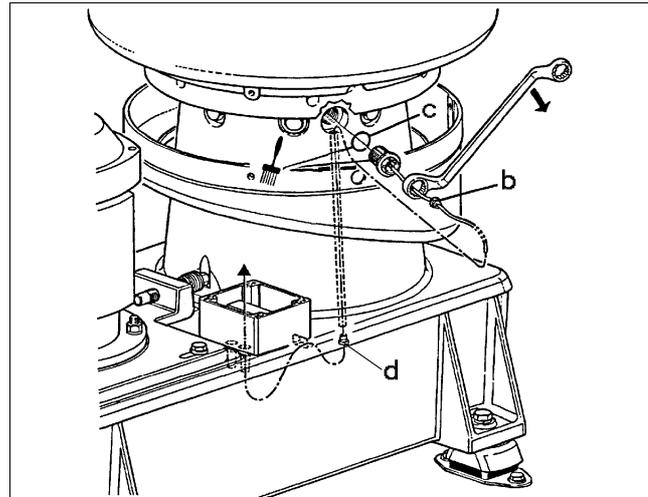
One of the rubber bushings is for the speed sensor.



4. Remove the nipple (B) of the operating water inlet.
5. Remove the three screws from the collecting ring (a) and lower ring.
6. Remove the plastic plug from the screw plug where the sensor is to be mounted. Then remove the screw plug by using a 24 mm cap key.

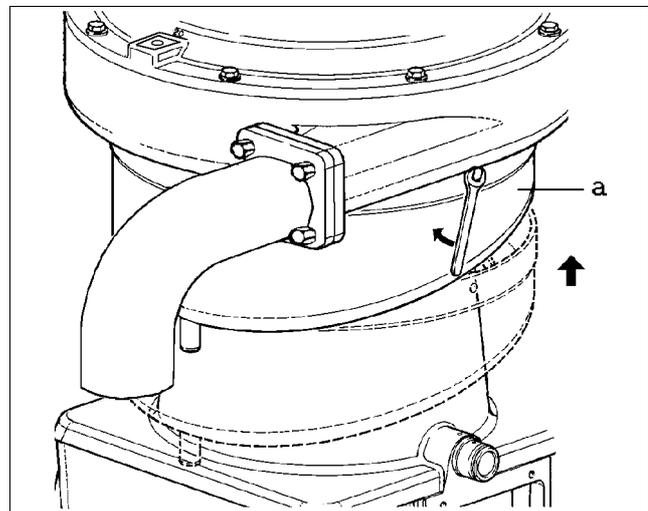


7. Apply Molykote 1000 Paste or equivalent to the threads of the sensor.
Make sure to fit the O-ring (c).
Fit and tighten the unbalance sensor.
8. Slip the upper lead-through bushing (b) onto the cable and pull the cable through the protecting tube in the frame. Fit the lower lead-through bushing (d) and pull the cable through the web and into the junction box outer bush.
Put the lead-through bushings in place.



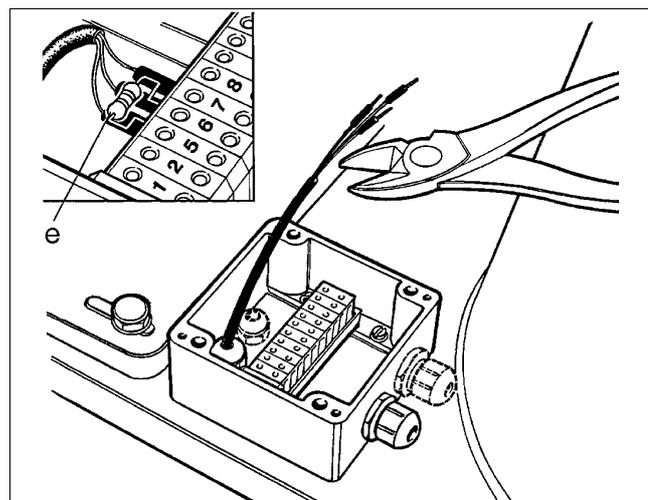
G0156222

9. Lift up the collecting ring (a) and tighten the three screws.
Fit the nipple of the operating water inlet.



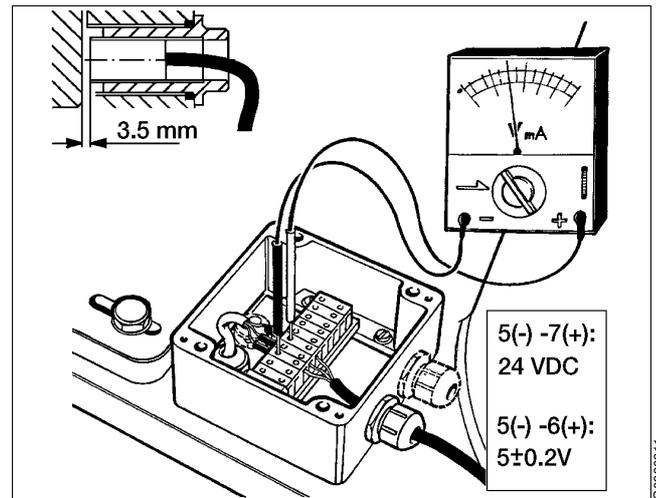
G0148541

10. Thread the cable gland onto the cable and secure the gland using a socket wrench.
11. Cut the cables about 110 mm from the cable gland and fit cable clips. Mark and connect the cables:
 - Blue cable marked 5 to terminal 5.
 - Black cable marked 6 to terminal 6.
 - Brown cable marked 7 to terminal 7.
12. Connect a 470 Ohm (1/4 W) resistor (e) between terminals 5 and 6.

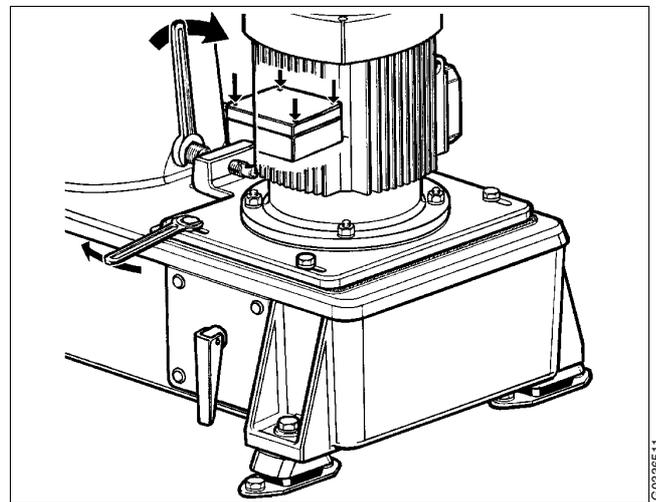


G0036621

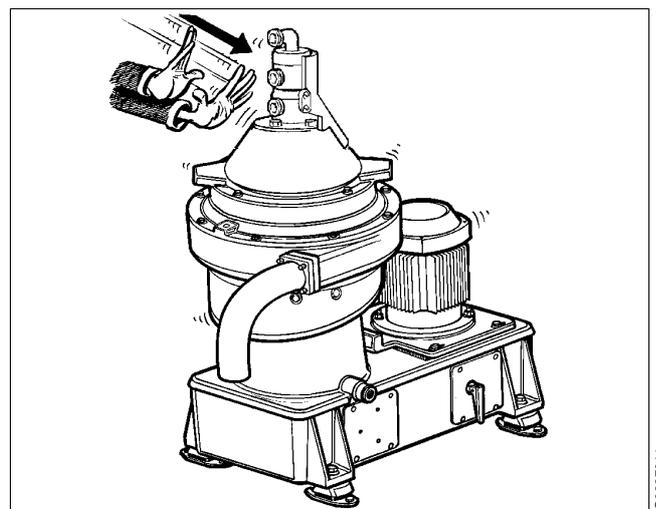
13. Connect the terminals to corresponding terminals in the separator control unit.
14. With the separator control unit turned on check the electric signal to the unbalance sensor by measuring the supply voltage across terminals 5 (–) and 7 (+) and the output voltage across terminal 5 (–) and 6 (+), see “9.10.2 Checking of unbalance sensor electrical function” on page 138.



15. Fit the cover onto the junction box.
16. Fit and tighten the flat belt, see “9.2 Flat belt” on page 118.
17. Fit the two covers on the frame lower part.



18. Shake the separator from side to side to ensure that the unbalance alarm function is active.



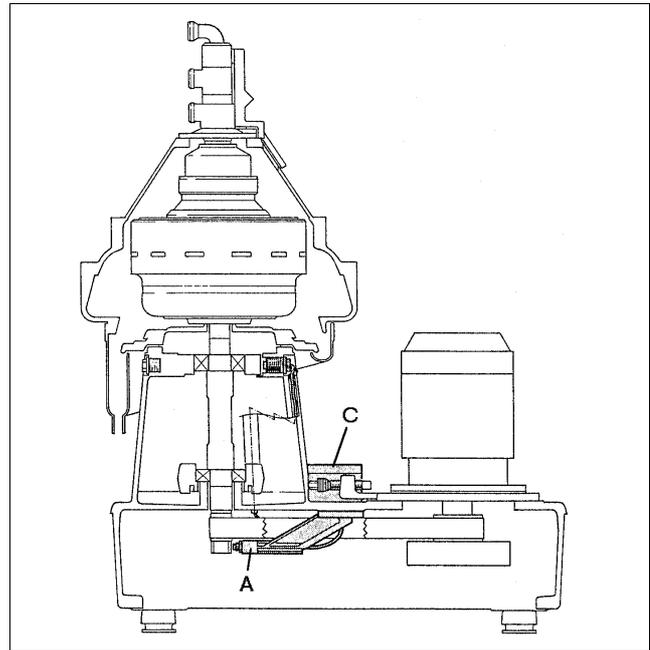
9.8 Speed sensor

The speed sensor is delivered as a complete unit. If the sensor has been damaged or if the current is outside the specified limits replace the complete speed sensor, see “[Checking of electrical function](#)” on page 134. The speed sensor should not be adjusted.

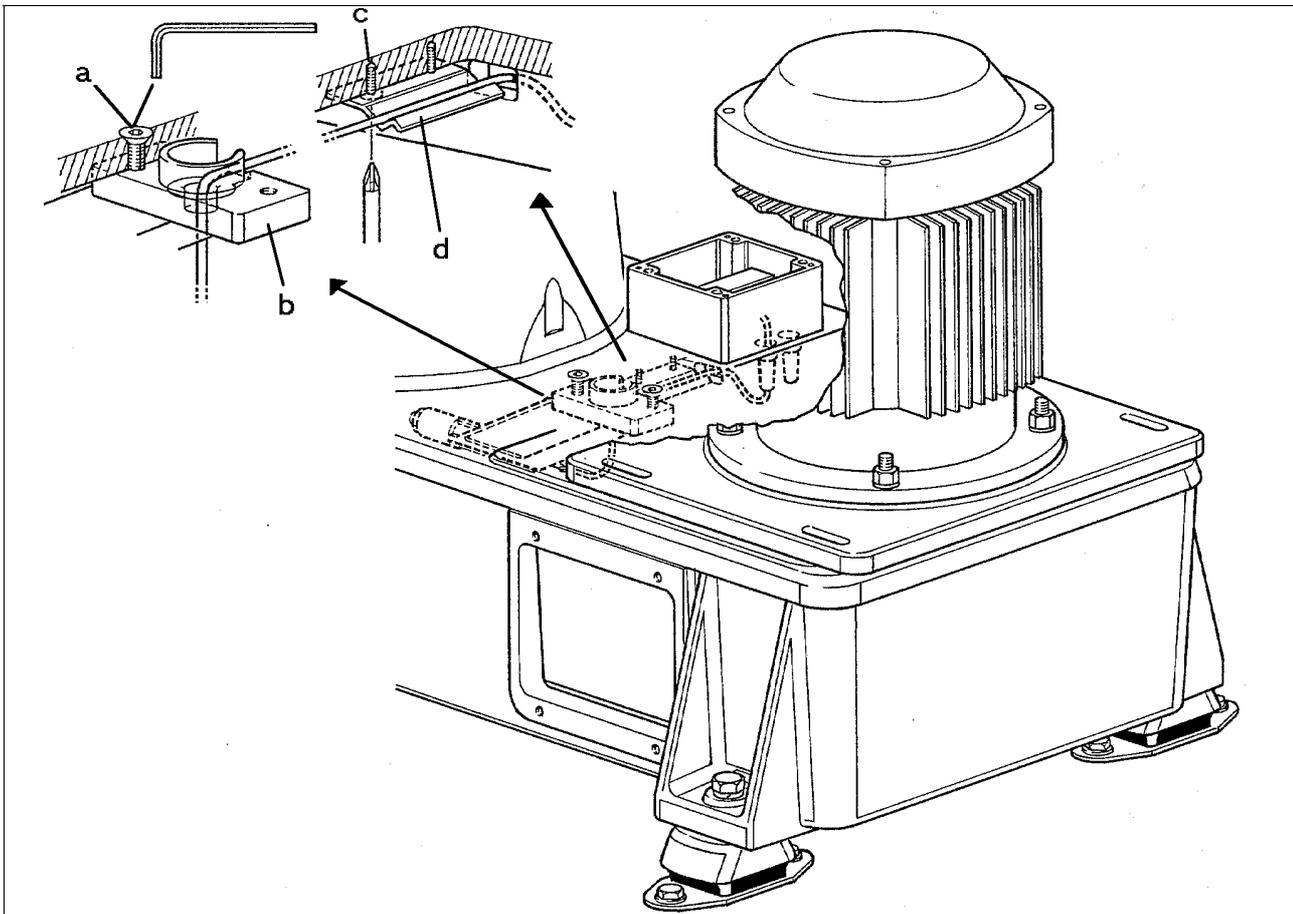
- If the speed sensor is not installed at delivery, see chapter “Mounting of optional speed sensor and junction box” and “Interconnection diagram” for correct installation.

- A. Speed sensor
- C. Junction box

- a. Countersunk screw (5 mm)
- b. Speed sensor holder
- c. Cross-headed screws
- d. Cable holder



G0144012

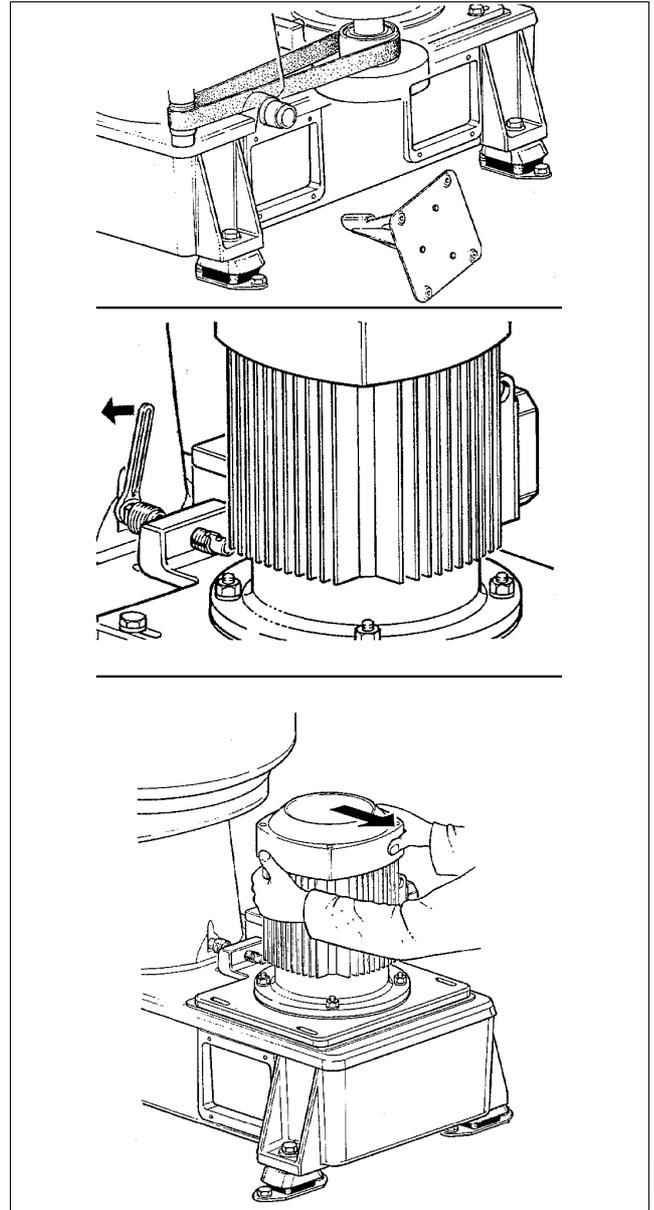


G0156011

Complete speed sensor

Replacement of speed sensor

1. Remove the two covers from the frame bottom part.
2. Remove the motor adapter screws.
3. Loosen the belt tightener by rotating it backwards. Remove the flat belt.
4. Push the motor of together with its adapter backwards to uncover the two screws (a) holding the complete speed sensor (b).
5. Disconnect the cables from the sensor at terminal 1 and 2 in the junction box.
6. Loosen the two screws (c) holding the cable holder (d) a maximum of two turns to facilitate removal and fitting of the cable.
7. Remove the two screws (a) holding the complete speed sensor.
8. Fit a new complete speed sensor. After its screws have been tightened, check the fitting according to Checkpoint [“9.9 Checking of speed sensor fitting”](#) on page 135.
9. Pull the cable through the separator bottom part and into the junction box. Connect the cable, see [“11.13 Interconnection diagram”](#) on page 193.
Tighten the cable holder screws.
10. Check the electrical function, see below.
11. Fit and tighten the flat belt, see [“9.4 Oil change”](#) on page 125”.
12. Fit the two covers on the frame bottom part.



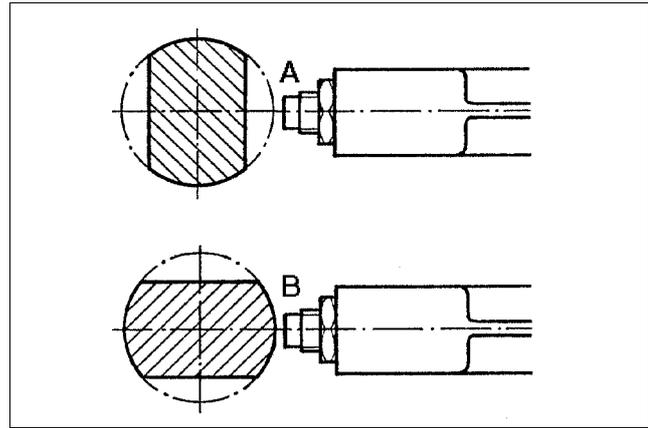
Checking of electrical function

Check that the speed sensor is correctly connected to the junction box. The speed sensor can be checked using a universal test instrument. With the control unit turned on:

- There should be a voltage of about 8V DC across the terminals 1 (-) and 2 (+) in the junction box.
- Disconnect the cable to the control equipment at terminal 2. Connect a mA-meter in series, i.e. (-) to terminal 2 and (+) to the cable end and measure the current.

With the sensor in position “Far” (A), the current should be more than 3 mA (typically 4 – 6 mA).

With the sensor in position “Near” (B) the current should be less than 1 mA (typically 0,5-0,8 mA).



G015621

9.9 Checking of speed sensor fitting

Check every 8000 operating hours or 12 months.

Incorrect fitting of the speed sensor can cause faulty speed monitoring.

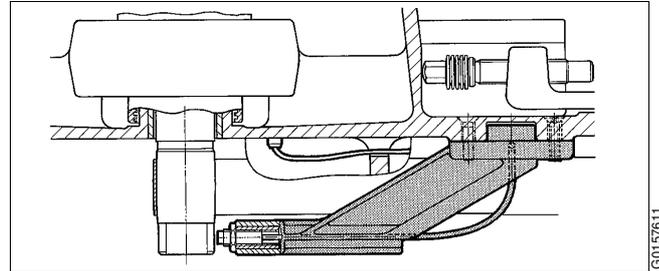
Fitting must be checked whenever the speed sensor has been removed or renewed.

- Check that the speed sensor head is directly in line with the centre line of the bowl spindle. Maximum deviation ± 3 mm. Use a mirror when checking.

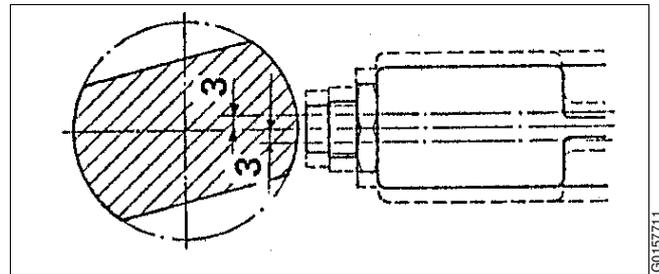
- Check that the height is correct. The sensor head must be positioned within the milled area (a) of the bowl spindle.
- Check that the distance between the speed sensor head and the bowl spindle is $2 \pm 0,5$ mm.

NOTE

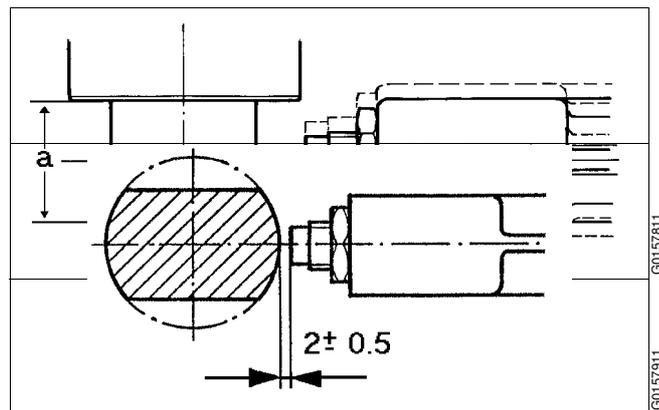
If the distance between the speed sensor head and the bowl spindle deviates from the above measurements, replace the speed sensor or contact an Alfa Laval representative.



G0157611



G0157711



G0157811

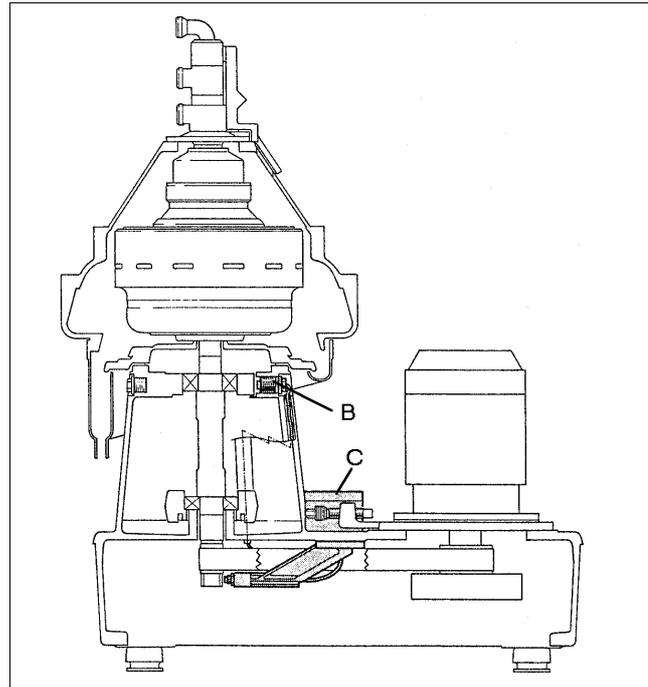
G0157911

All dimensions in mm

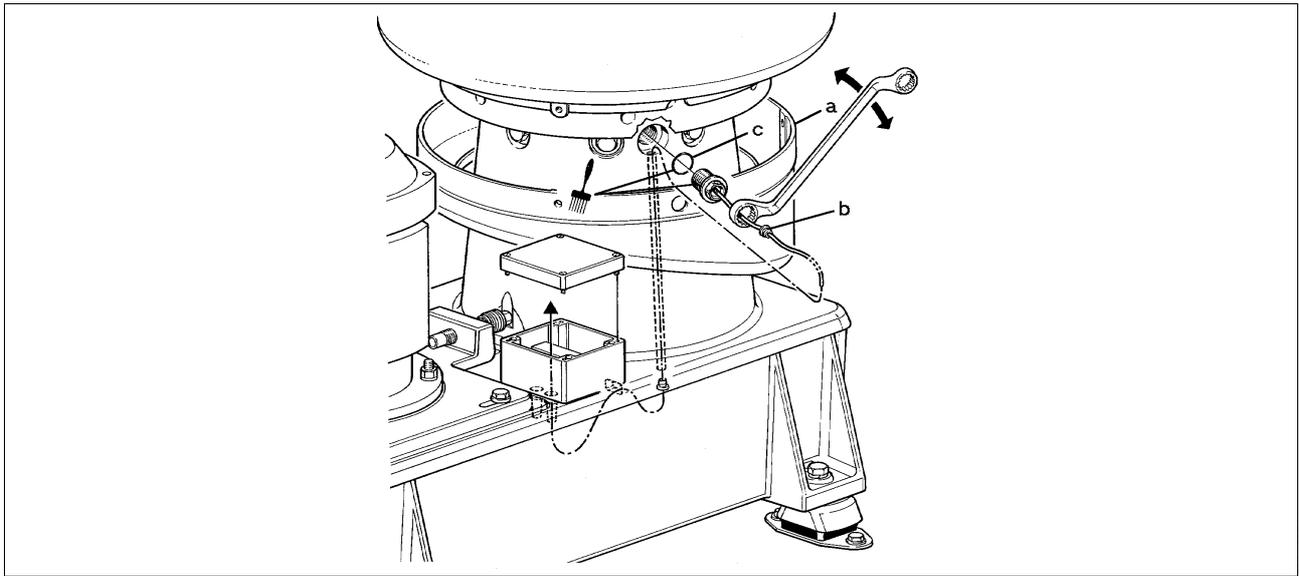
9.10 Unbalance sensor

The unbalance sensor is delivered as a complete unit. In the case of incorrect operation, replace the complete unbalance sensor. The unbalance sensor should not be adjusted. To replace the unbalance sensor proceed as follows.

- If the unbalance sensor is not installed at delivery, see “[9.7 Mounting of unbalance sensor and junction box](#)” on page 129 and “[11.13 Interconnection diagram](#)” on page 193.



B Unbalance sensor
C Junction box



G0156311

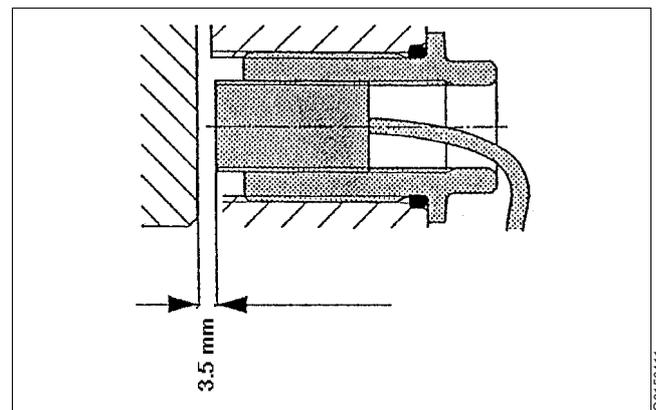
- a. Collecting ring
- b. Lead-through bushing
- c. O-ring

 Molykote 1000 Paste or an equivalent lubricating paste

9.10.1 Renewal of unbalance sensor

Refer to illustration.

1. Remove the three screws from the collecting ring (a) and lower the ring.
2. Disconnect the sensor cables on terminals 5, 6 and 7 in the junction box, loosen the cable gland and pull out the sensor cable.
3. Remove the upper bushing (b).
4. Unscrew and remove the unbalance sensor by using a 24 mm cap key.
5. Apply Molykote 1000 or equivalent to the threads of the sensor.
6. Fit and tighten a new unbalance sensor. Make sure to fit its O-ring (c).



G0156411

7. Slip the upper lead-through bushing (turned the correct way) on to the cable and pull the cable through its protecting tube in the frame and connect it to the junction box, see drawing in chapter “[11.13 Interconnection diagram](#)” on page 193.
Place the upper bushing in position.
8. Lift up the collecting ring (a) and tighten its three screws.
9. Fit the operating water inlet pipe.
10. Check that the resistor is kept in place across the terminals 5-6.
11. Check the electrical function, (see below).

9.10.2 Checking of unbalance sensor electrical function

Make sure that the unbalance sensor is correctly connected to the junction box, see drawing in chapter “[11.13 Interconnection diagram](#)” on page 193.

Also make sure that there is a 470 Ohm resistor mounted across the terminals in the junction box.

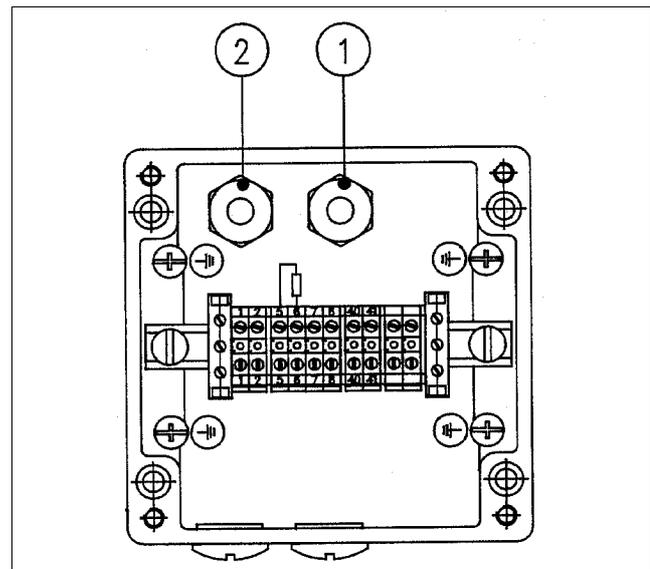
First measure the supply voltage. There should be 24V DC across the terminals 5 (–) and 7 (+).

Measure the output voltage with a volt meter connected to terminal 5 (–) and to terminal 6 (+) in the junction box. The voltage should normally be $5 \pm 0,2$ V corresponding to a distance of 3,5 mm between the bowl spindle assembly and the sensor.

Shake the separator bowl assembly from side to side and check that there is a change in the output signal.

NOTE

If the output voltage deviates from the above values owing to an incorrect distance between the bowl spindle assembly and the sensor, renew the unbalance sensor or contact an Alfa Laval representative.



1. Speed sensor cable gland
2. Unbalance sensor cable gland

G0156511

9.11 Frame feet

Lift the separator when replacing the frame feet.

- Use two endless slings, each certified for lifting min 1,0 ton (2,200 lbs.).
- Length of each sling: min. 2,0 m.

NOTE

Always remove the bowl before lifting the separator.

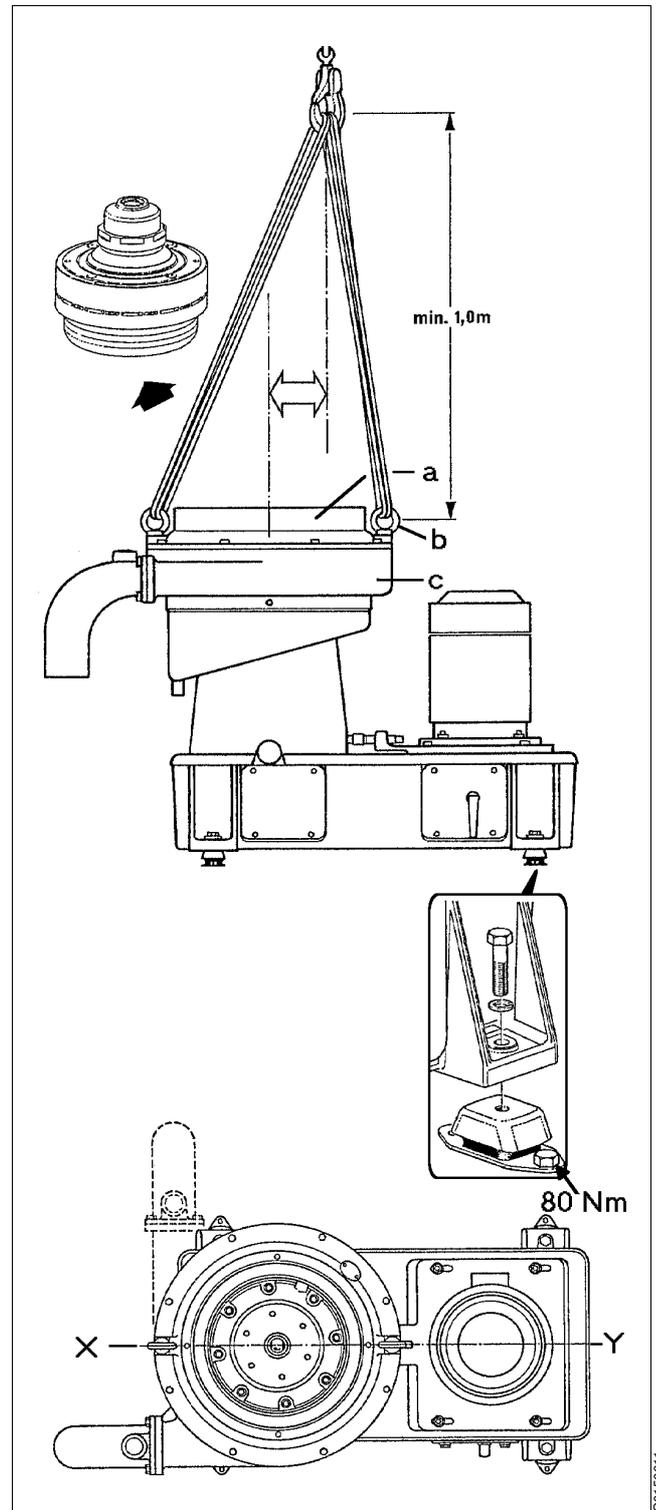
1. Remove the separator bowl, see “7.3 Bowl – dismantling” on page 65.
2. Check that the two lifting eye bolts (b; M20) are securely tightened in frame ring (a).
Lifting capacity: 1,2 tons for a single eye bolt.

NOTE

The eye bolts (b) must always be positioned along the x-y axis of the separator. Frame ring (a) must still stay in its original position irrespective of the position of the frame top part.¹⁾ (c).

¹⁾ If the frame ring has been removed apply Loctite 242 on its screws before tightening.
Tightening torque: **45 Nm ±5 Nm**.

3. Thread the slings through the lifting eyes and fit to the hook of the hoist.
4. When lifting and moving the separator, ensure normal safety precautions for lifting large heavy objects.
5. Remove the existing frame feet.
6. Fit the new feet. Tightening torque **80 Nm**.
7. Place the separator in its original position and assemble the separator bowl, see “8.2 Bowl – assembly” on page 94.



9.12 Electric motor

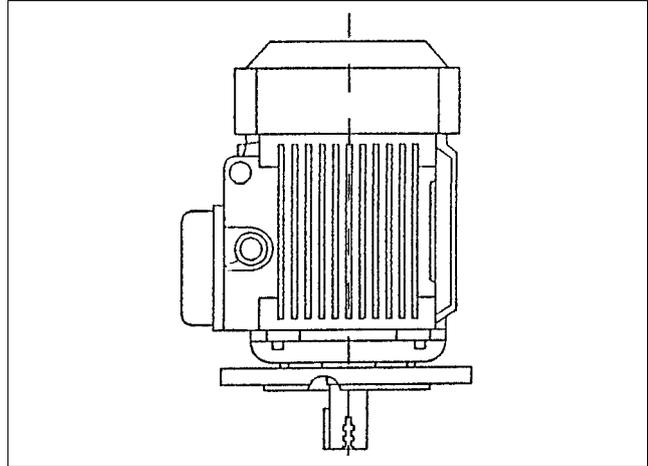
This instruction refers to the following motor only:

- ABB Motors CES S.A.
Type: M2AA 132 SB



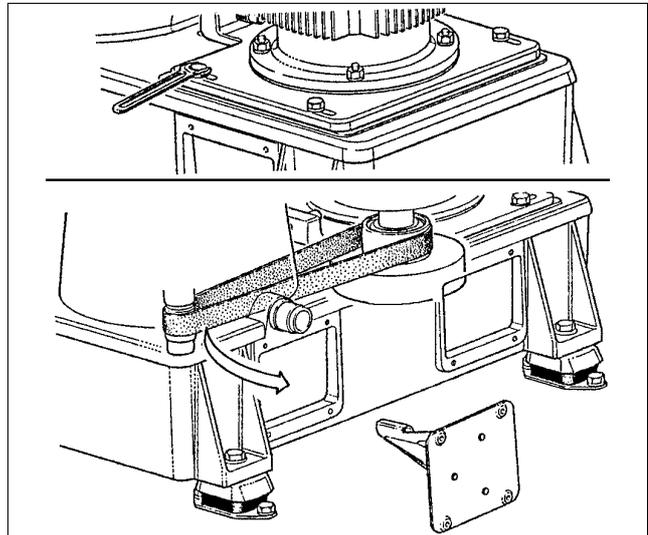
WARNING

Never start dismantling the motor until the bowl has come to a complete standstill.



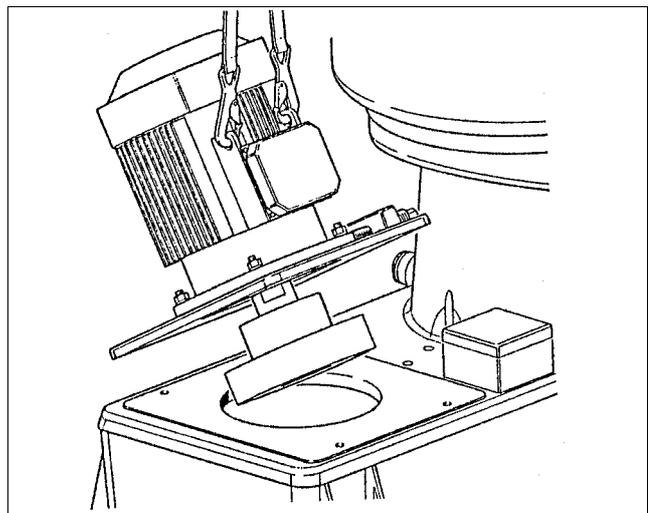
G022361.1

1. Remove motor adapter screws.
2. Remove the two covers from the frame bottom part. Remove the belt.



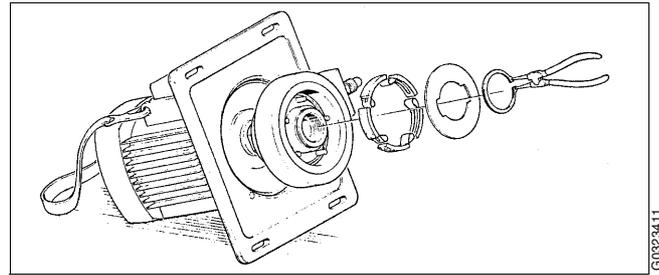
G0153421

3. Use the sling to lift and remove the motor with adapter and friction coupling.
 - Weight of motor including adapter and friction coupling: approx. 80 kg.

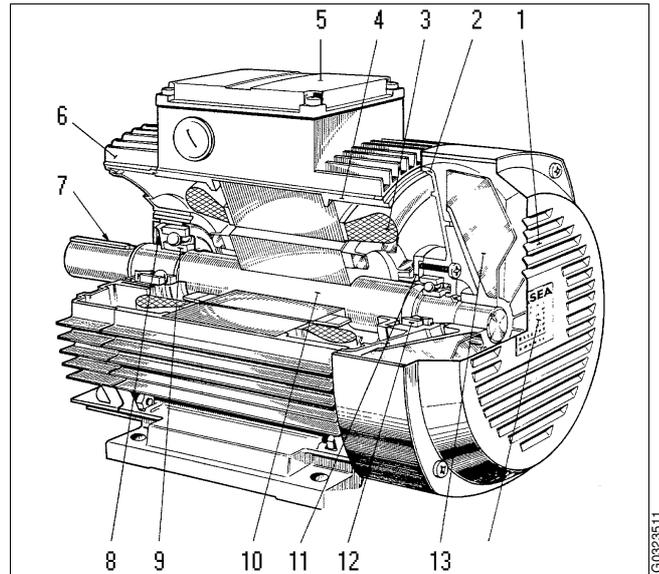


G0153512

4. Remove the friction coupling and the motor adapter.
 - See “9.1.1 Dismantling of friction blocks or cleaning of pads” on page 111.



5. Dismantle the motor bearings in the following way:
 - a. Remove the fan guard (1).
 - b. Pull off the fan (13) and remove the front-end shield (2).
 - c. Remove the key (7) and the rear-end shield (6).
 - d. Pull out the shaft and rotor (10) and renew the ball bearings (9 and 12).



NOTE

Use original bearings only.

The bearings must be totally enclosed, see “11.14 Electric motor” on page 195.

6. Reassemble the electric motor in the opposite order.
7. Fit the adapter and friction coupling to the motor. Fit the motor to the frame bottom part. See “9.1.2 Assembly of friction coupling” on page 114.

1. Fan guard
2. Front-end shield
3. Stator winding
4. Stator frame
5. Terminal box
6. Rear-end shield
7. Key
8. Sealing ring
9. Rear bearing
10. Shaft and rotor
11. Front inner bearing cover
12. Front bearing
13. Fan

10 Maintenance - Check points

Contents

10.1 Corrosion	144
10.2 Erosion	145
10.3 Bowl spindle cone and bowl body nave	147
10.4 Discharge mechanism	148
10.5 Large lock ring joint	149
10.6 Paring disc height adjustment	150
10.7 Bowl spindle radial wobble	151
10.8 Guiding surfaces	152
10.8.1 Repair of galling (friction) marks	152
10.8.2 Priming of guiding surfaces	153

10.1 Corrosion

Corrosive attacks on bowl parts, particularly the bowl body, bowl hood and large lock ring, must be watched with the utmost care. If corrosive attacks deeper than 1 mm are suspected, contact your Alfa Laval representative.

Parts of non-stainless steel and cast iron

Corrosion (rusting) occurs as a rule on unprotected components of non-stainless steel and cast iron exposed either to the process liquid or an aggressive atmosphere.

Replace the parts when corrosion is evidently jeopardizing their strength, relative location and play, or general function.

Parts of stainless steel, etc.

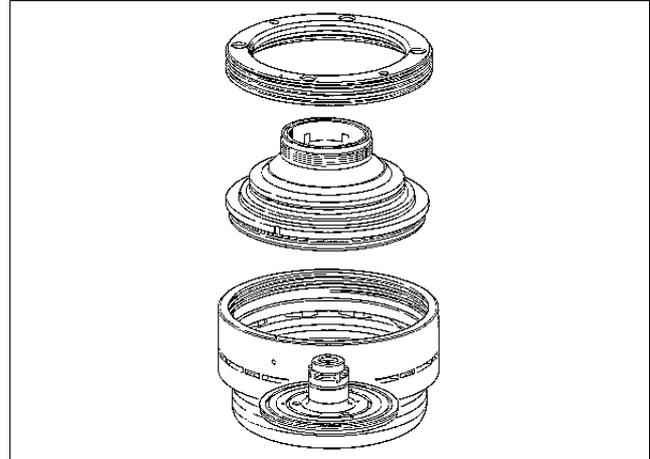
In certain circumstances corrosion can occur even on stainless bowl parts. The risk of attack will increase when the surface is isolated from the surroundings by a layer of solids.

Corrosive attacks on stainless steel are not easily detected. This applies for instance to attacks made by chlorides which may first appear merely as small dark spots.

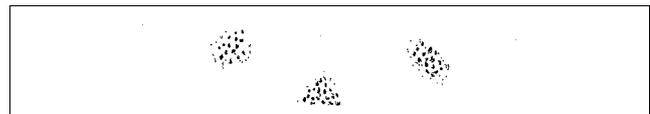
- *Polish* such dark spots with a fine-grain abrasive cloth. In most cases this will prevent further attacks.
- Under certain conditions corrosion on stainless steel can result in deeper attacks (so-called pits) to which special attention must be given.

Pits lying close together or forming a regular pattern such as a straight or curved line may indicate that cracking has begun beneath the surface of the material. Such pits should be examined by a materials expert and checked by means of crack-indicating agents. In these cases always consult an Alfa Laval representative.

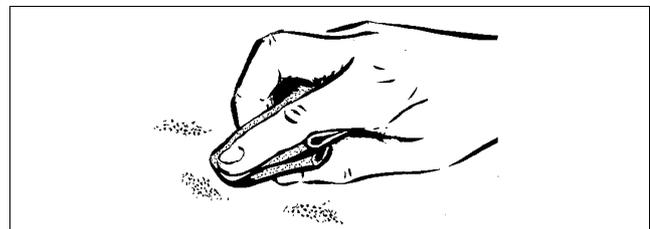
- Always watch carefully any corrosive attacks found on stainless steel. Record all observations.
- In unfavourable circumstances, even components of copper alloy and light metal, etc. can become susceptible to corrosion and must, therefore, be kept under observation.



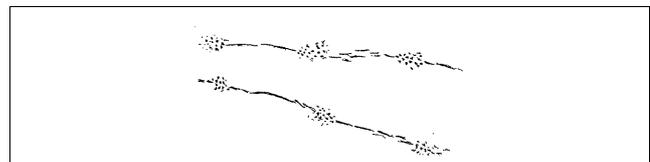
S0020711



S0020411



S0020511



S0020611

10.2 Erosion

Erosion can occur, for instance, when particles suspended in the process liquid slide along a surface or strike against a surface while passing through the bowl.

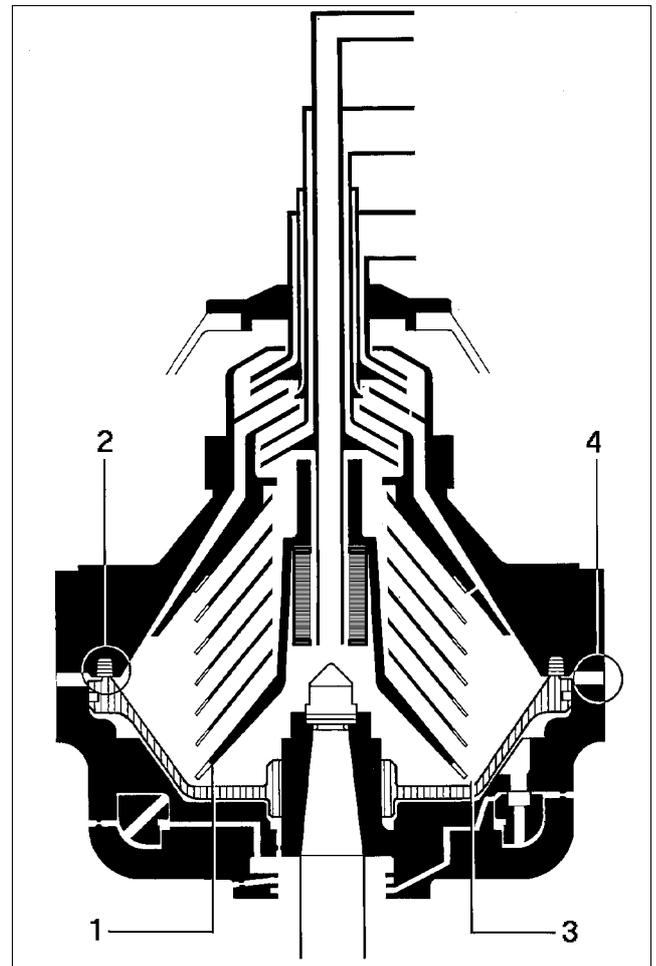
Erosion by sliding is characterized, by burnished tracks on the surface of the material, and impact erosion by dents and pits that have a granular and shiny surface.

Erosion is intensified in some places by high local flow rates. Surfaces particularly subjected to erosion are:

- the underside of the distributor around the distribution holes and the wings (1).
- the sealing edge of the sliding bowl bottom and the seal ring in the bowl hood (2). Check the liner.
- the surface of the sliding bowl bottom that faces the conical part of the distributor (3).
- the bowl wall sections ("pillars") between the sludge ports in the bowl body (4). Check the wear liners.

Always carefully observe any signs of erosion damage. It may deepen rapidly and weaken the bowl parts by reducing metal thickness.

Pay special attention to the bowl wall sections ("pillars") between the sludge ports, especially when working conditions are such as to involve a risk of severe erosion and/or corrosion.

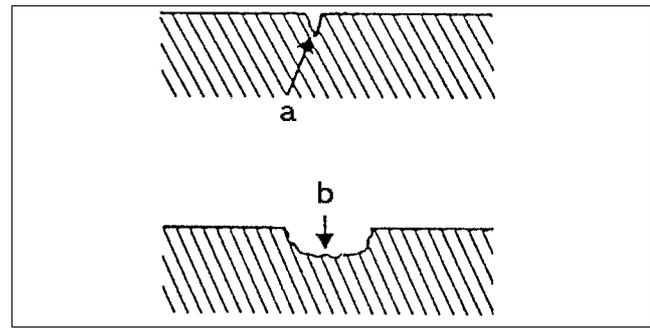


G0158031

If one or more of the following observations are made, consult our representative:

- if the bottom radius of the erosion track is less than 1 mm in the narrowest place, or that coarse scratches are present,
- if the greatest depth of a track exceeds 1 mm,
- if the bowl wall sections between the sludge ports have defects presumably caused by corrosion.

Valuable information on the nature of the damage can be given by photos, plaster-casts or hammered-in lead impressions.



- a. *Radius < 1 mm*
 b. *Depth max. 1 mm*

G0158111



WARNING

Disintegration hazards

Erosion damage can affect component safety. Keep erosion damage within safety limits, (max 1 mm). Inspect frequently if process liquid is erosive.

10.3 Bowl spindle cone and bowl body nave

Check every 2000 operating hours or 3 months

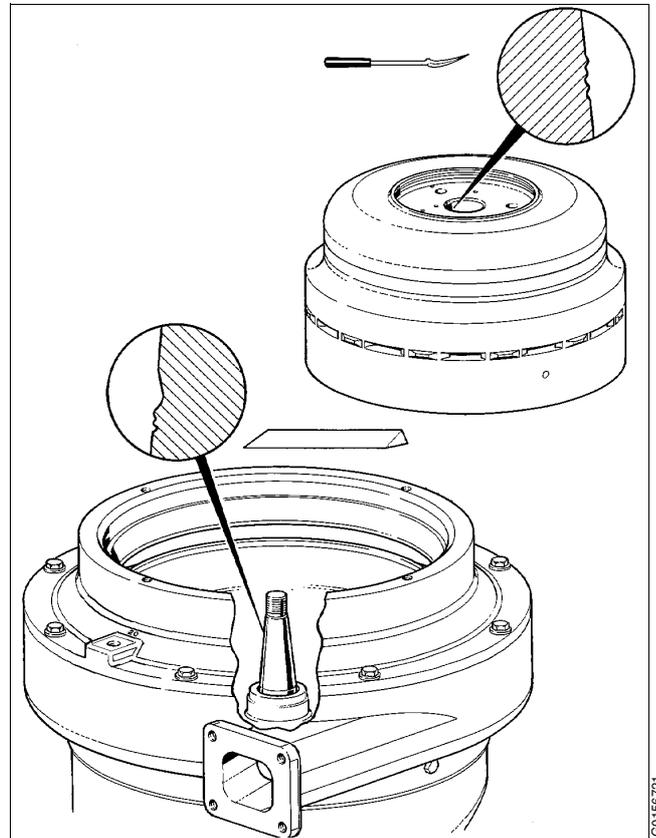
Impact marks on the spindle cone and/or in the nave can cause out-of-centre running.

Heavy corrosion can cause the bowl to stick firmly to the spindle cone and seriously hinder the next dismantling.

- Remove any local impact marks using a scraper and/or a 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 the scraper with great care. The conicity must not be marred.



10.4 Discharge mechanism

Check at each dismantling

Thoroughly clean and inspect the parts. Pay special attention to important surfaces (A, B and C). If necessary, polish with steel wool.



WARNING

Dirt and limestone deposits in the discharge mechanism can cause a poor discharge function or no discharge at all. This could result in unbalance and breakdown.

Inspect surfaces indicated "A", "B" and "C" for burrs and galling (friction marks).

Repair if necessary. See ["10.8 Guiding surfaces"](#) on page 152.

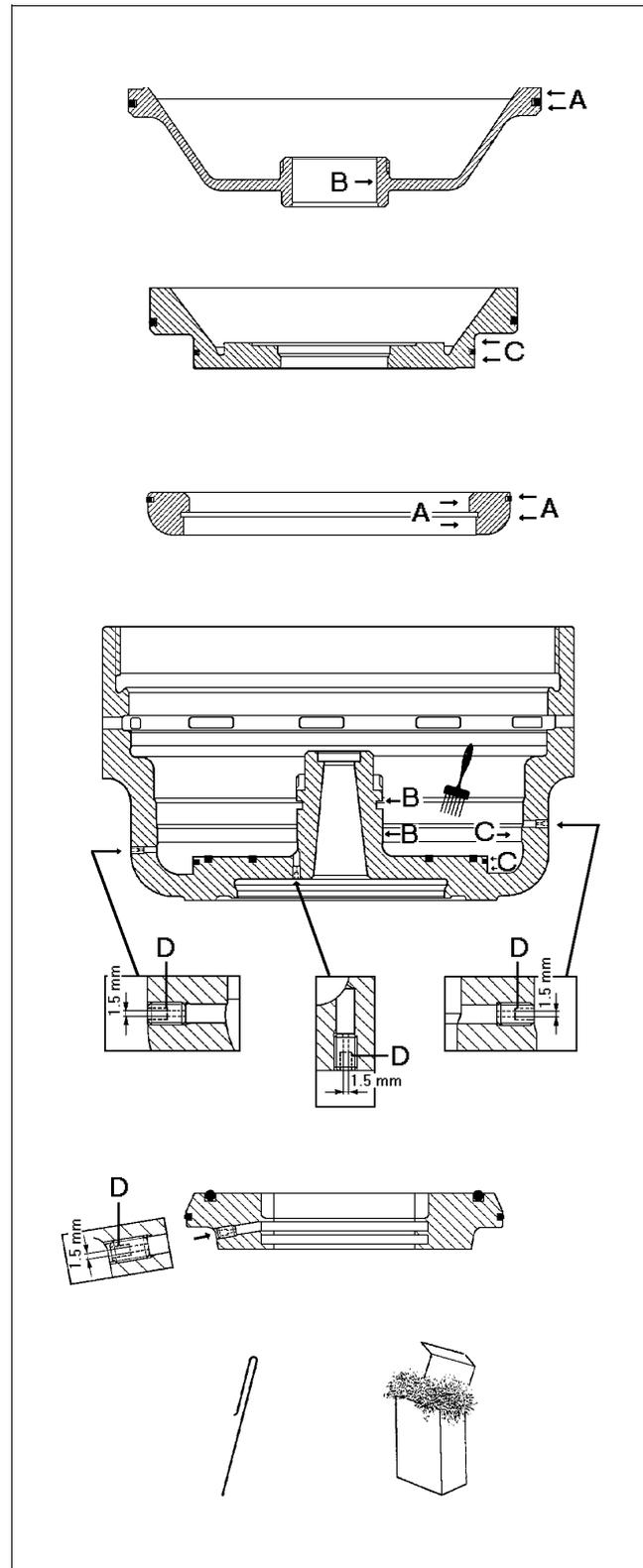
Lubricate surfaces indicated "B" and "C" with Molykote 1000 Paste or equivalent.

Check every 2000 – 4000 operating hours

Clean nozzles (D) using soft iron wire or similar. Note that lime deposits can be dissolved in a 10% acetic acid solution heated to 80 °C.

Use Loctite 242 on the threads if the nozzles have been removed or replaced.

Carefully wipe the parts clean.



G0156821

10.5 Large lock ring joint

Check every 8000 operating hours or 12 months

Excessive wear or impact marks on threads, guide and contact surfaces of the lock ring, bowl hood and bowl body can cause serious damage by galling (severe friction marks).

- Clean the threads as well as contact and guiding surfaces with a suitable degreasing agent.
- Lubricate threads, guiding and contact surfaces of the lock ring with Molykote 1000 Paste or an equivalent lubricating paste.

Damage

Positions of threads, contact and guiding surfaces are indicated by arrows in the adjacent illustration. Check for burrs and protrusions caused by impact.



CAUTION

Cut hazards

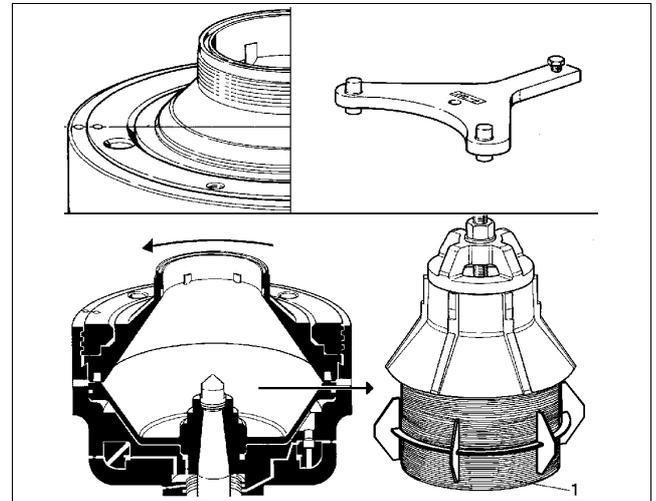
Sharp edges on lock ring threads can cause cuts.

If damage is observed, rectify using a whetstone or fine emery cloth (Recommended grain size 240).

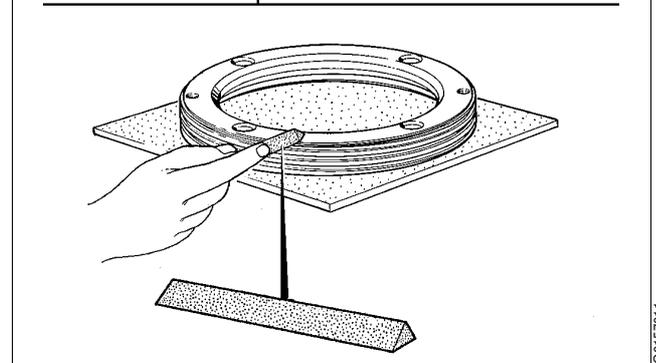
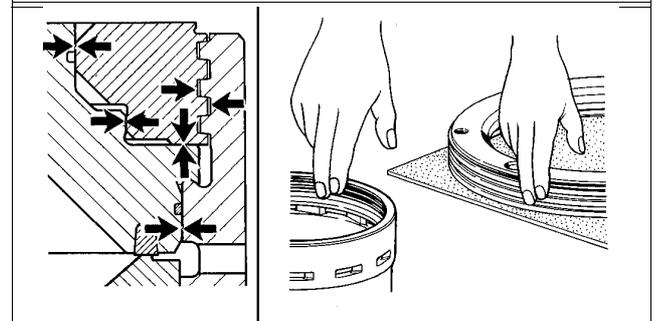
- Polish and prime threads and surface as described under [“10.8 Guiding surfaces”](#) on page 152.

Wear

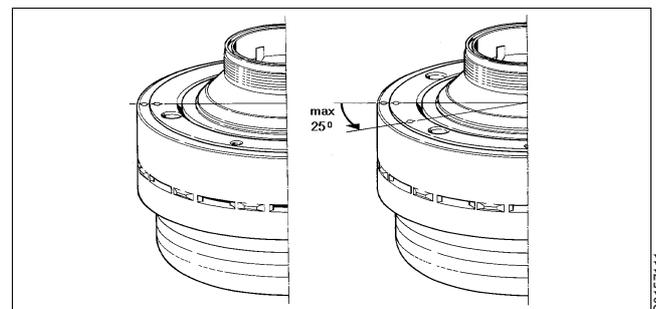
Check the thread condition by tightening the lock ring after removing the disc stack (1) from the bowl. In a new bowl the alignment marks on the lock ring and the bowl body are directly in front of each other. If the mark on the lock ring passes the corresponding mark on the bowl body by 25°, an Alfa Laval representative must be contacted.



G0402321



G0157011



G0157111

10.6 Paring disc height adjustment

Check every 8000 operating hours

NOTE

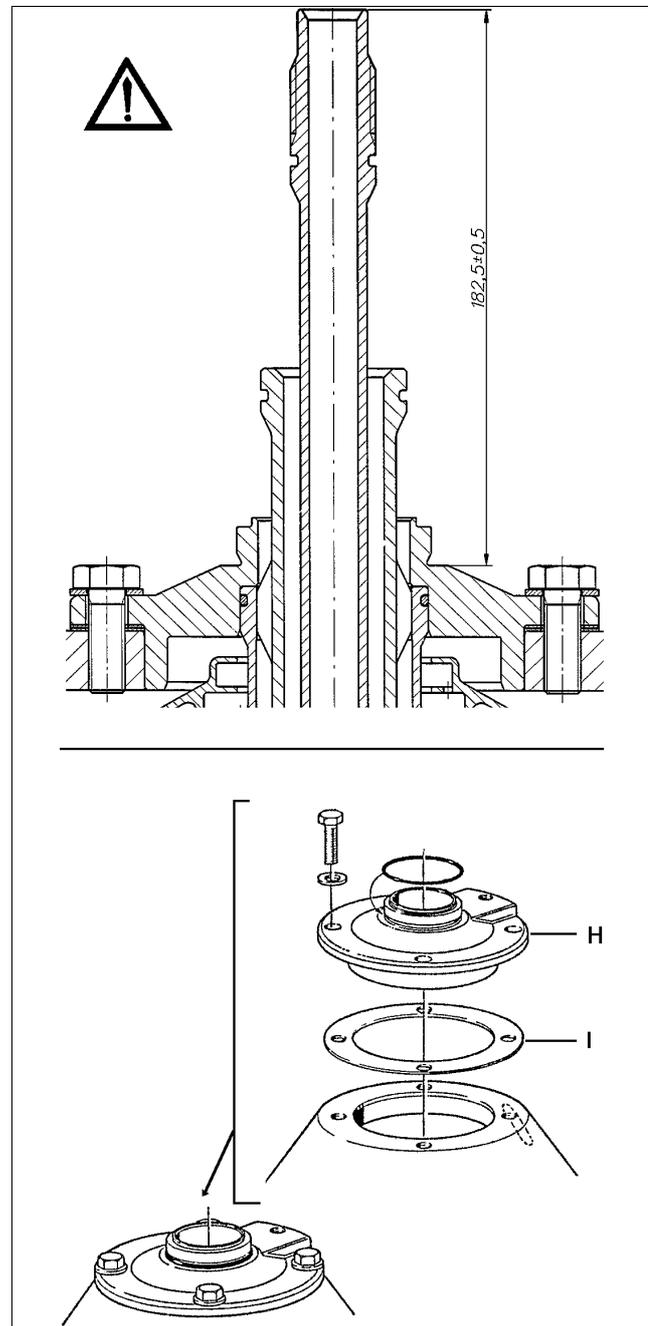
Incorrect height adjustment can cause the paring disc to scrape against paring chamber cover, (see illustration).

The adjustment of the paring disc should be checked if the bowl spindle has been dismantled or the bowl has been renewed.

- Assemble the bowl and the inlet and outlet device with the exception of the outlet housing, inlet and outlet housing, nut, inlet bend and safety device. Make sure that the screws for the connecting housing (H) are properly tightened.
- Measure the height as shown in the adjacent illustration. Adjust the distance by adding or removing height adjusting rings (I) after connecting housing (H) has been removed.
- Fit the connecting housing and assemble the inlet and outlet device.

With inlet and outlet parts mounted:

- Rotate the bowl spindle by pulling the flat belt by hand. If it does not rotate freely or if a scraping noise is heard, incorrect height adjustment or incorrect fitting of the inlet pipe can be the cause.



Measurement in mm

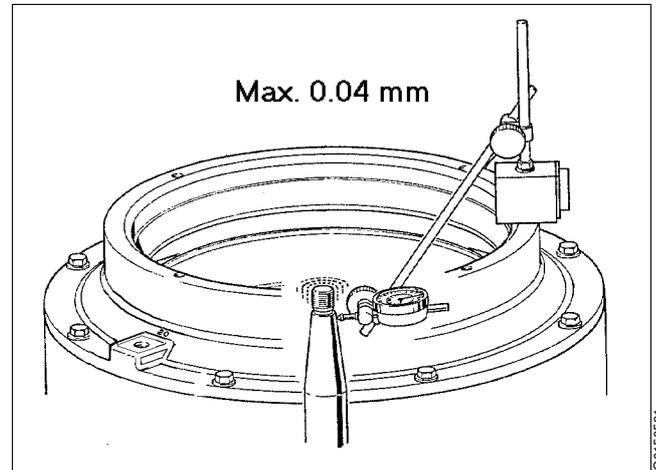
10.7 Bowl spindle radial wobble

Check every 8000 operating hours

Excessive spindle wobble can be the cause of the separator running roughly (vibration).

Bowl spindle wobble must be measured if the bowl spindle has been dismantled or if the separator runs roughly.

- Fit a dial indicator in a support and fasten it as illustrated.
- Remove the two covers from the frame bottom part for access to the flat belt. Use the flat belt to turn the spindle.



WARNING

Take due-care and precaution for finger jam when removing or fitting the belt.

- Permissible radial wobble: max. 0,04 mm.

NOTE

If the wobble is excessive the cause can be an incorrectly tightened belt.

- Fit the two covers on the frame bottom part.

10.8 Guiding surfaces

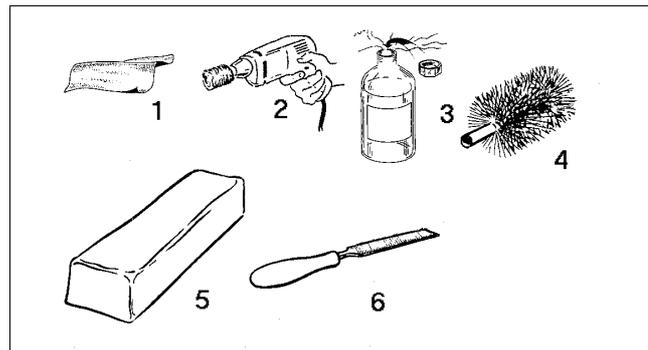
10.8.1 Repair of galling (friction) marks

To be performed whenever necessary

Gall marks (friction marks) can appear on guiding surfaces of the bowl discharge mechanism and on the threads, guide and contact surfaces of the large lock ring.

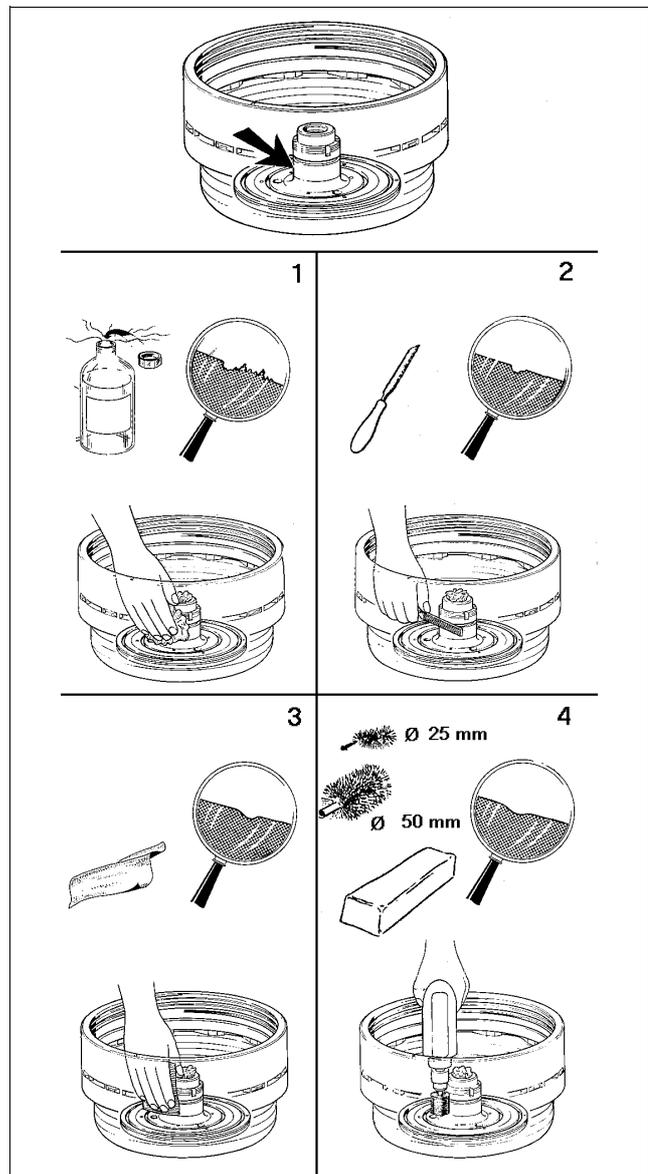
The example below describes the repair of the guiding surface of the bowl body nave.

1. Clean the surface thoroughly with a degreasing agent, e.g. white spirit. This is important! Mask the nave hole during the treatment.
2. If the galling is very severe, first use a fine single-cut file. The file should be used carefully so that the damage is not made worse. Remove the high spots on the surface only - not the undamaged material.
3. A fine-grain 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 can occur is polished. Polishing will help smoothen the whole of the damaged area, even in the deepest parts. Carefully wipe the surfaces and the grooves clean after polishing.
5. Prime the repaired area with lubricating spray (see "10.8 Guiding surfaces" on page 152).



Recommended tools for correcting galling

1. Emery cloth (240 grade)
2. Drilling machine
3. Degreasing agent
4. Fibre brush
5. Brush wax (600 grade)
6. Very fine single cut file



10.8.2 Priming of guiding surfaces

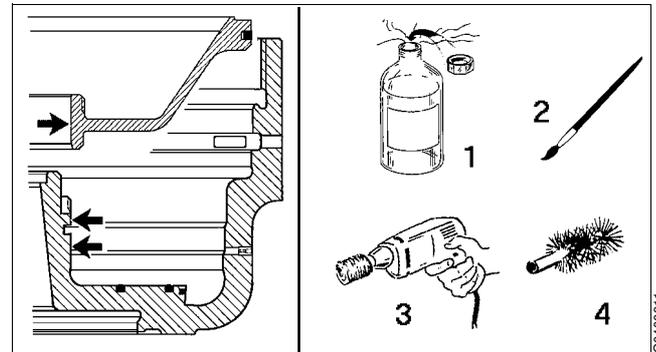
To be performed whenever necessary

Recommended agents for priming procedure



CAUTION

Follow the manufacturer's safety instructions when using the Molykote D321 R slide lacquer.

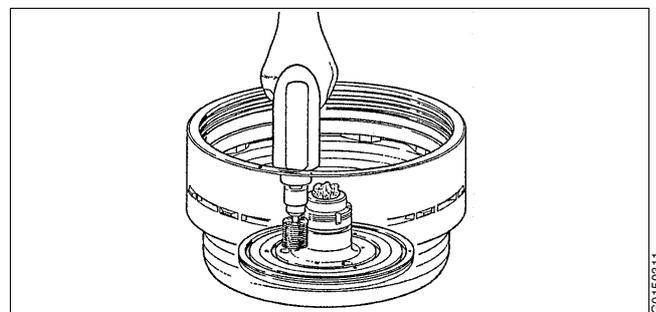
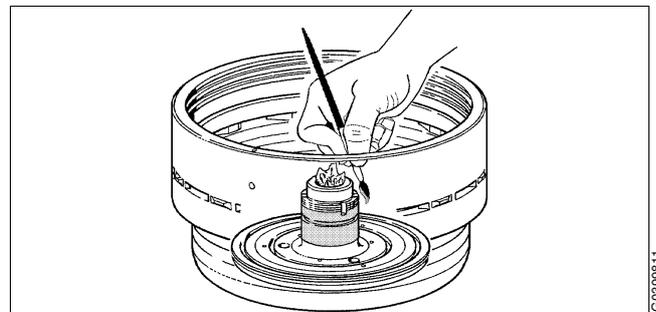
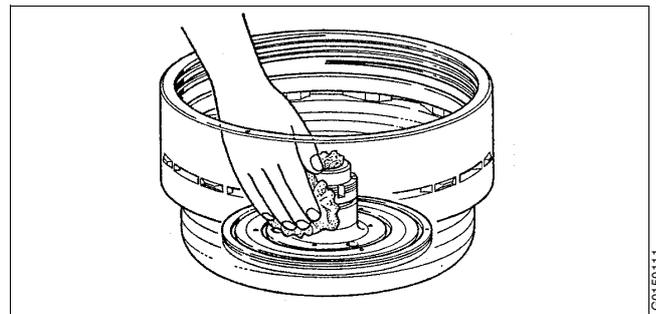


1. *Degreasing agent*
2. *Slide lacquer Molykote D321 R*
3. *Drilling machine*
4. *Fibre brush*

1. Clean the surfaces thoroughly with a degreasing agent and dry them off. Mask the nave hole during the treatment.
2. Apply Molykote D321 R onto the surfaces and let dry for approx. 15 minutes.
3. Use a fibre brush to polish the film into the surfaces. The black film should look like well-polished leather when properly performed.
4. Apply slide lacquer to the surfaces *a second time* and let dry for approx. 15 minutes.
5. Polish the film again to a black shining surface which will now last about one year.

Proceed in the same way with the corresponding surface on the sliding bowl bottom nave.

Apply Molykote 1000 paste or equivalent lubricating paste on to the surface after priming.



11 Technical references

Contents

11.1 Product description	156	11.10 Operating water interface	182
11.1.1 Declaration	157		
11.2 Technical data	159	11.11 Demand specification, service water	183
11.3 Px sealing diagram	160	11.12 Unbalance sensor kit	184
		11.12.1 Unbalance sensor	186
11.4 Power consumption	161	11.13 Speed sensor kit	187
11.5 Performance data, in-and outlet device	164	11.13.1 Speed transmitter, complete	189
		11.13.2 Inductive sensor	190
11.6 Basic size drawings	167	11.14 Interconnection diagram	191
11.6.1 With sludge bend	167	11.14.1 Connection dimensions and external wiring recommendation	192
11.6.2 With sludge bend right side	169		
11.6.3 With cyclone	171	11.15 Electric motor	193
11.7 Foundation drawing	173	11.16 Identification and safety signs on machine	194
11.8 Connection list	174		
11.9 Interface description	176		
11.9.1 Scope	176		
11.9.2 References	176		
11.9.3 Definitions	176		
11.9.4 Goal	177		
11.9.5 Description of separator modes	177		
11.9.6 Handling of connection interfaces	178		

11.1 Product description

Alfa Laval ref. 9019332, rev. 3

NOTE

The separator is a component, operating in an integrated system, including a monitoring system. If the technical data in the system description does not coincide with the technical data in this instruction manual, the data in the system description is the valid one.

Product number:	881139-07-03
Separator type:	BWPX 307TGD-71
Application:	Cleaning of bilge water
Technical design:	Concentrator. Belt drive. Sealings available in Nitrile. Optiflow™ inlet

Operational limits

Feed temperature: ± 0 to $+100$ °C

Ambient temperature: $+5$ to $+55$ °C

Acidity of feed: \geq pH 5

Discharge intervals: Min. 1 minute max. 4 hours.

Maximum allowed density of operating liquid: 1000 kg/m³.

Maximum light phase density, mineral oil/freshwater separation:
 950 kg/m³ @ 15 °C.

Max. allowed speed: 8400 r/min

Not to be used for liquids with flashpoint below 60 °C.

Risk for corrosion and erosion have to be investigated in each case by the application centre.

11.1.1 Declaration - EU

Alfa Laval ref. 591985, rev. 12

This declaration is issued under the sole responsibility of the manufacturer.

Manufacturer: Alfa Laval Technologies AB

Manufacturer address: Alfa Laval Technologies AB, Box 74. SE-221 00 Lund- Sweden.

Type:.....

Product specification:.....

Configuration number:.....

Serial number:.....

Declaration of Incorporation of Partly Completed Machinery

The machinery complies with the relevant, essential health and safety requirements of:

Designation	Description
2006/42/EC	Machinery Directive

The following essential requirements of 2006/42/EC are applied and fulfilled:

1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5, 1.1.6, 1.1.7, 1.2.3, 1.2.4, 1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.3.7, 1.3.8, 1.3.9, 1.5.1, 1.5.2, 1.5.4, 1.5.5, 1.5.6, 1.5.8, 1.5.9, 1.5.11, 1.5.15, 1.6.1, 1.6.3, 1.6.4, 1.6.5, 1.7

To meet the requirements the following standards have been applied:

Designation	Description
EN 60204-1:2018	Electrical equipment of machines, part 1: General requirements
EN ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction
ISO 3744:2010	Acoustics - Determination of sound power levels of noise sources using sound pressure

EU Declaration of Conformity

The machinery complies with the following Directives:

Designation	Description
2014/30/EU	Electromagnetic Compatibility
2011/65/EU	Restriction of the use of certain hazardous substances in electrical and electronic equipment

To meet the requirements the following standards have been applied:

Designation	Description
EN IEC 63000:2018	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

The technical construction file for the machinery is compiled and retained by the authorized person Fredrik Nytomt within the Business Unit High Speed Separators, Alfa Laval Technologies AB, Box 74. SE-221 00 Lund, Sweden. By reasoned request all relevant technical documentation will be sent by post to national authorities.

This machinery is to be incorporated into other equipment and must not be put into service until it has been completed with starting/stopping equipment, control equipment, auxiliary equipment. e.g. valves, according to the instructions in the technical documentation, and after the completed machinery has been declared in conformity with the directives mentioned above, in order to fulfill the EU-requirements.

Signed for and on behalf of: Alfa Laval Technologies AB

Place:

Date of issue:

Signature:

Name:

Function:

Entity

11.1.2 Declaration - UK

Alfa Laval ref. 591985, rev. 12

This declaration is issued under the sole responsibility of the manufacturer.

Manufacturer: Alfa Laval Technologies AB

Manufacturer address: Alfa Laval Technologies AB, Box 74. SE-221 00 Lund- Sweden.

Type:.....

Product specification:.....

Configuration number:.....

Serial number:.....

Declaration of Incorporation of Partly Completed Machinery

The machinery complies with the relevant, essential health and safety requirements of:

Supply of Machinery (Safety) Regulations 2008

The following essential requirements are applied and fulfilled:

1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5, 1.1.6, 1.1.7, 1.2.3, 1.2.4, 1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.3.7, 1.3.8, 1.3.9, 1.5.1, 1.5.2, 1.5.4, 1.5.5, 1.5.6, 1.5.8, 1.5.9, 1.5.11, 1.5.15, 1.6.1, 1.6.3, 1.6.4, 1.6.5, 1.7

To meet the requirements the following standards have been applied:

Designation	Description
EN 60204-1:2018	Electrical equipment of machines, part 1: General requirements
EN ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction
ISO 3744:2010	Acoustics - Determination of sound power levels of noise sources using sound pressure

UK Declaration of Conformity

The machinery complies with the following Regulations:

Designation	Description
Electromagnetic Compatibility Regulations 2016	
The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012	

To meet the requirements the following standards have been applied:

Designation	Description
EN IEC 63000:2018	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

The technical construction file for the machinery is compiled and retained by the authorized person Fredrik Nytomt within the Business Unit High Speed Separators, Alfa Laval Technologies AB, Box 74. SE-221 00 Lund, Sweden. By reasoned request all relevant technical documentation will be sent by post to national authorities.

This machinery is to be incorporated into other equipment and must not be put into service until it has been completed with starting/stopping equipment, control equipment, auxiliary equipment. e.g. valves, according to the instructions in the technical documentation, and after the completed machinery has been declared in conformity with the egulations mentioned above, in order to fulfill the UK-requirements.

Signed for and on behalf of: Alfa Laval Technologies AB

Place:

Date of issue:

Signature:

Name:

Function:

Entity

11.1.3 Technical data

Alfa Laval ref. 569929, rev. 3

Weight of separator (without motor):	613	kg
Motor power:	7,5	kW
Power consumption, idling:	2,7	kW
Max. power consumption, start-up:	12,5	kW
Start time min./ max.:	4,5/ 6,5	minutes
Stop time min./ max.:	5/ 12,5	minutes
Stop time without brake, average:	40	minutes
Max. running time without flow, bowl empty/ filled:	300/ 300	minutes minutes
Sound power:	9,9	Bel(A)
Sound pressure:	83	dB(A)
Vibrations, separator in use:	9	mm/s
Lubricating oil volume:	2	litres
Motor speed, synchronous, 50/ 60 Hz:	3000/ 3600	r/min
Gear ratio, 50/60 Hz:	134:48/ 112:48	
Bowl speed, synchronous, 50/60 Hz:	8375/ 8400	r/min
Max. bowl inner diameter:	314	mm
Fixed discharge volume:	2,1	litres
Min. discharge interval:	1	minutes
Max. density of operating liquid:	1000	kg/m ³
Min./Max. feed temperature:	0/ 100	°C
Bowl liquid volume:	6,1	litres
Sludge volume:	3,0	litres
Max. density feed/sediment:	1100/ 1368	kg/m ³
Bowl weight:	134	kg
Jp reduced to motor shaft, 50/60 Hz:	18,35/ 12,82	kgm ²
Motor weight, IEC/NEMA	42 / 76	kg
Bowl body material:	AL 111 2398-02	

11.2 Px sealing diagram

Alfa Laval ref. 569920, rev. 1

The diagram illustrates the operational conditions required under which satisfactory sealing can be expected in solids-ejecting PX-type centrifugal separators.

No aspects of separation capabilities are included in the diagram.

The Y-axis shows the density of the sediment, i.e. the density of the solids/liquid mixture that accumulates at the bowl periphery during operation. Accordingly, this is a lower value than that of the density of the solid particles only.

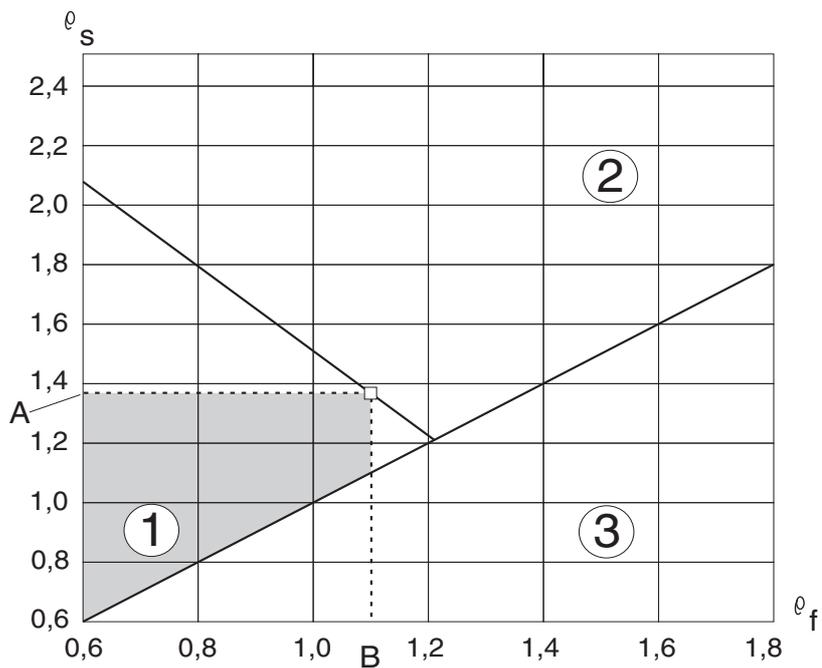
The X-axis shows the density of the feed. The shaded area called the “Operational envelope” illustrates the permissible combinations of densities where no leakage should occur.

ρ_s = Sediment density (kg/m³)
 ρ_f = Feed density (kg/m³)

- 1 = Admitted operational area
- 2 = Sealing not possible within this area
- 3 = Non physical area (feed density higher than sediment density)

A = Reference density for wet solids (1368 kg/m³)
 B = Reference density for feed (1100 kg/m³)

Note!
 Maximum allowed operating liquid density: 1000 kg/m³)

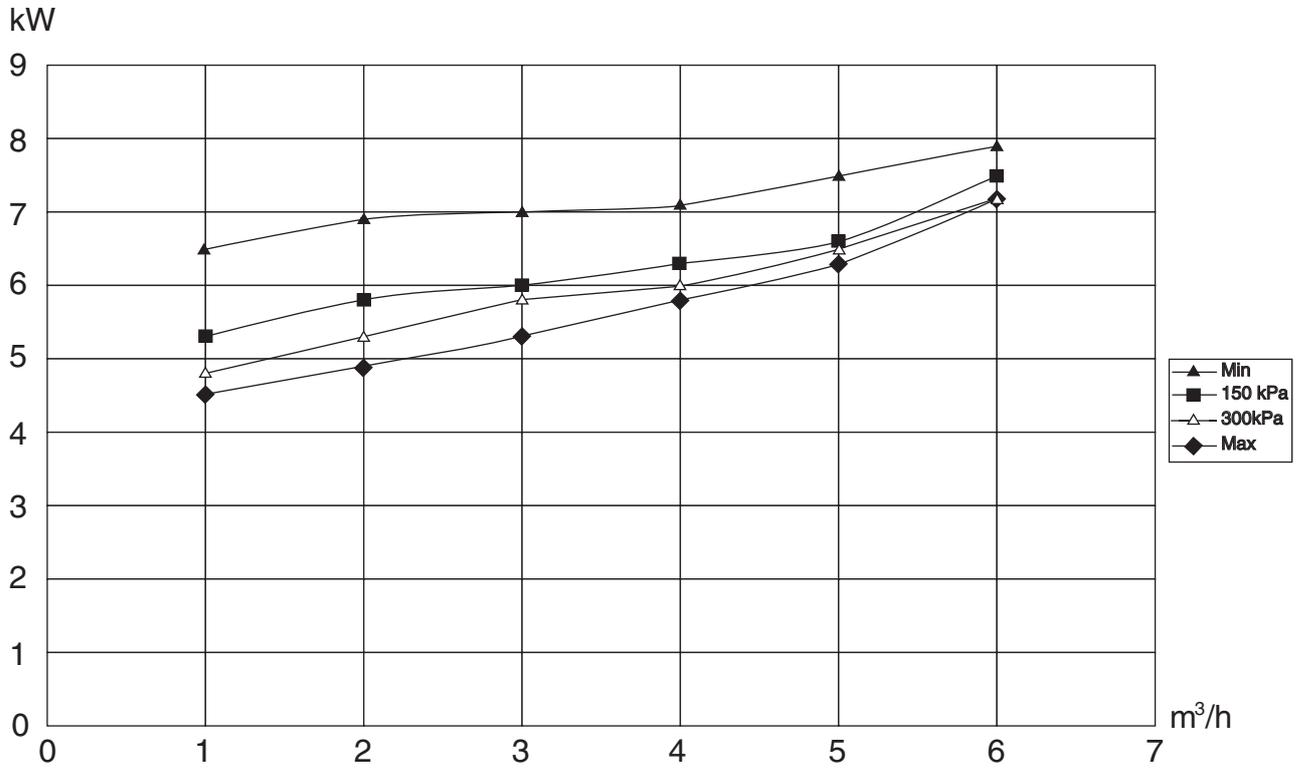


G0953091

11.3 Power consumption

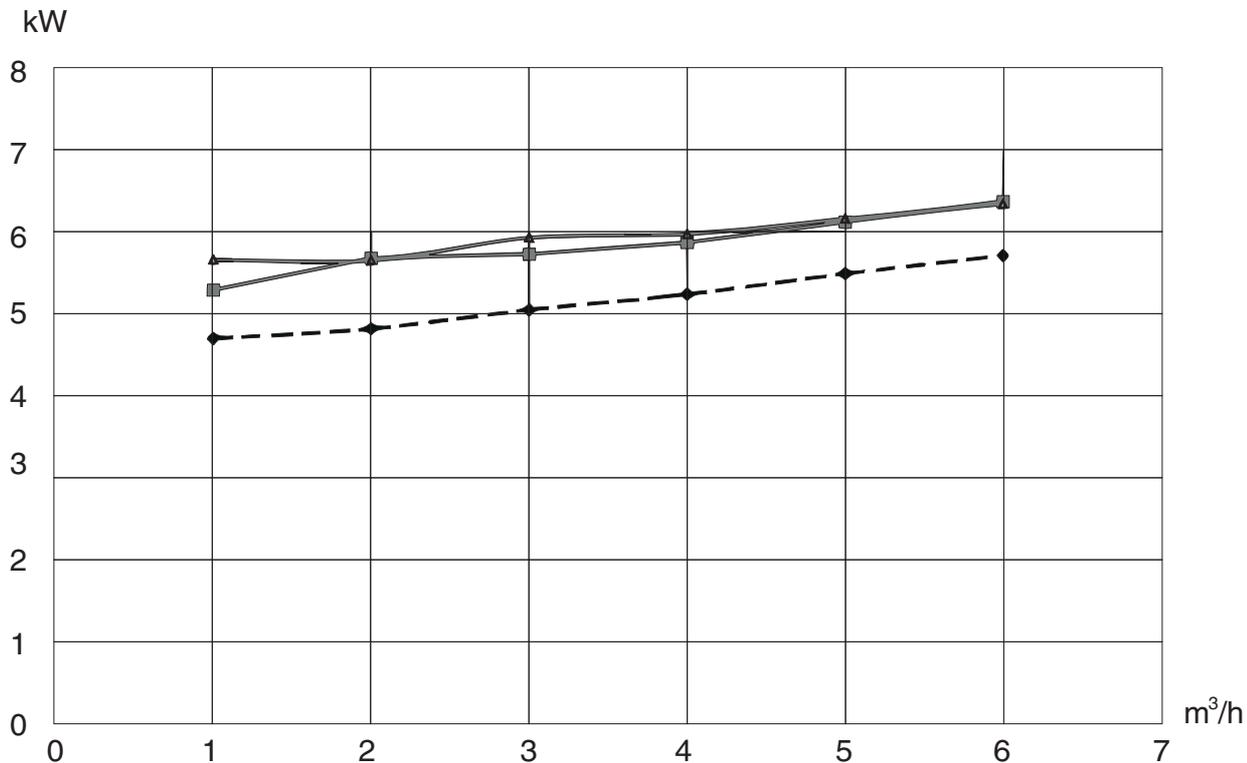
Alfa Laval ref. 570740, rev. 0

Power consumption as a function of heavy phase throughput and counter pressure



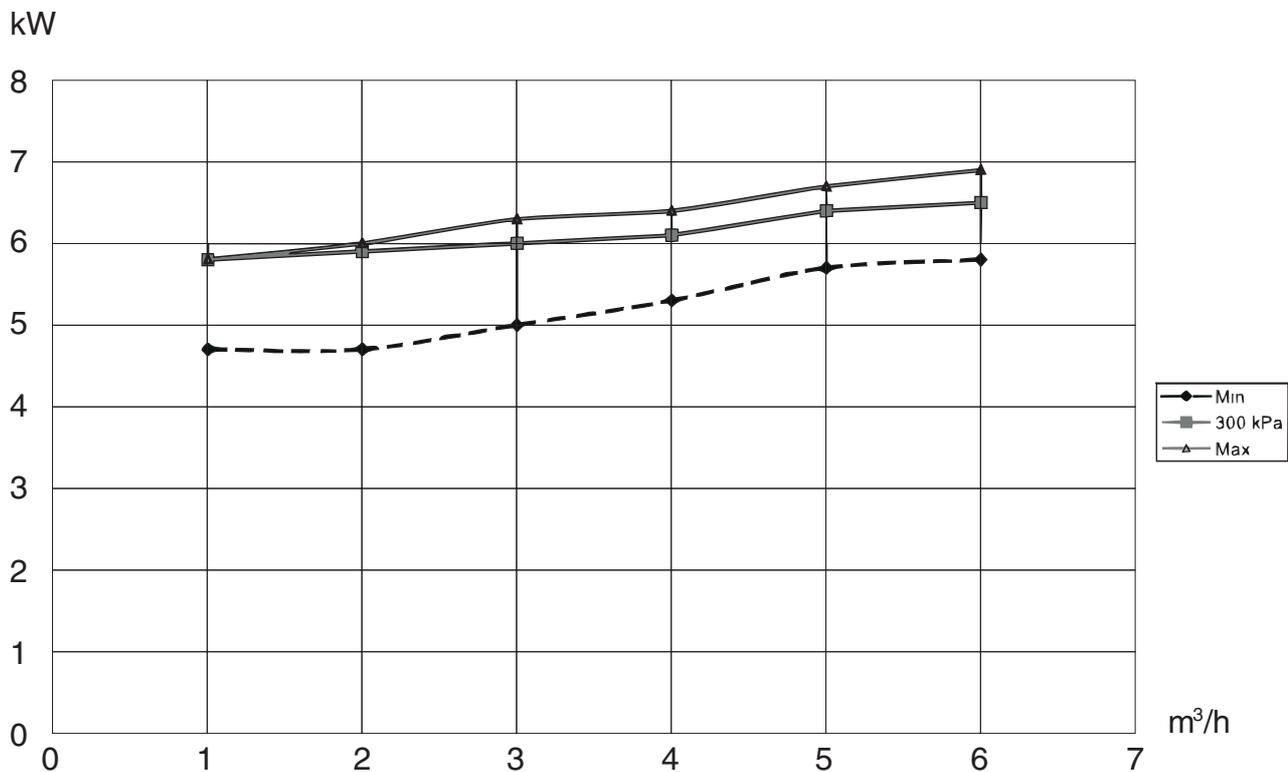
G09606L1

Power consumption as a function of light phase throughput and counter pressure. 10 cSt



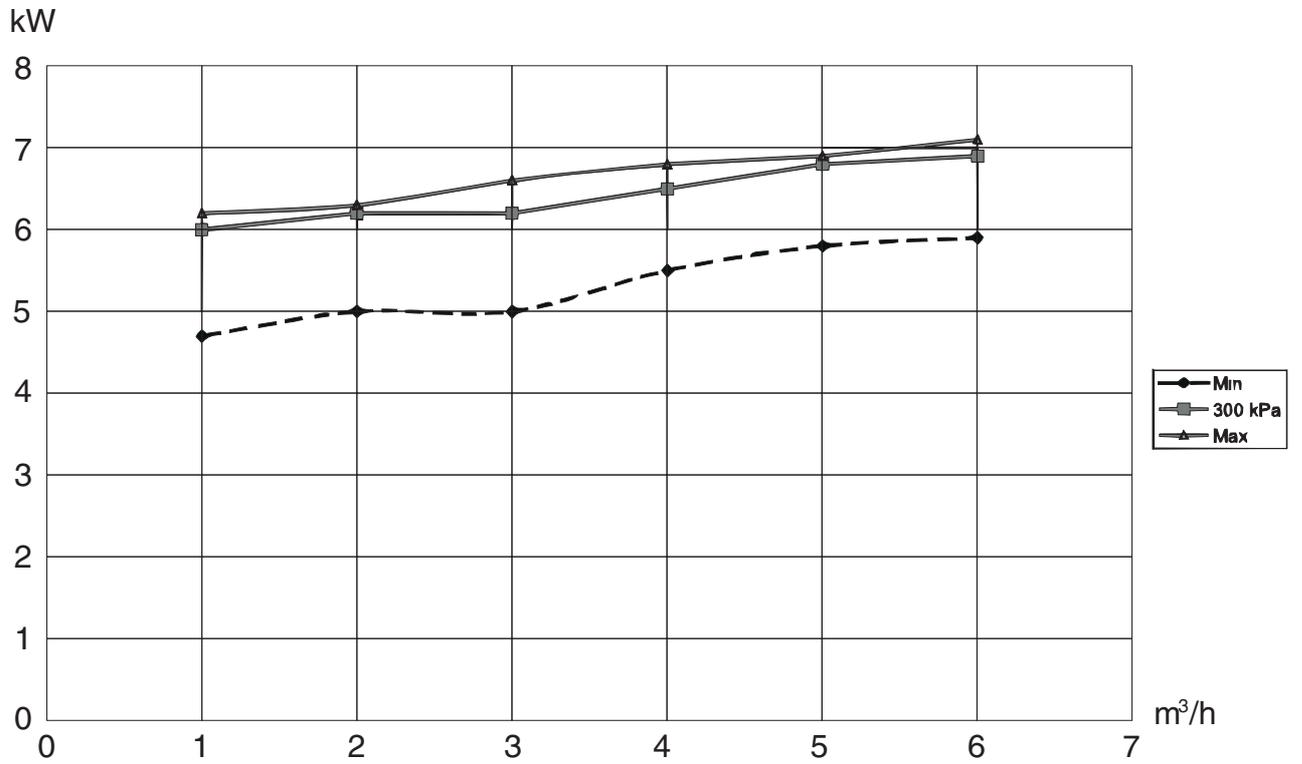
G09606M1

Power consumption as a function of light phase throughput and counter pressure. 30 cSt



G09606N1

Power consumption as a function of light phase throughput and counter pressure. 48 cSt

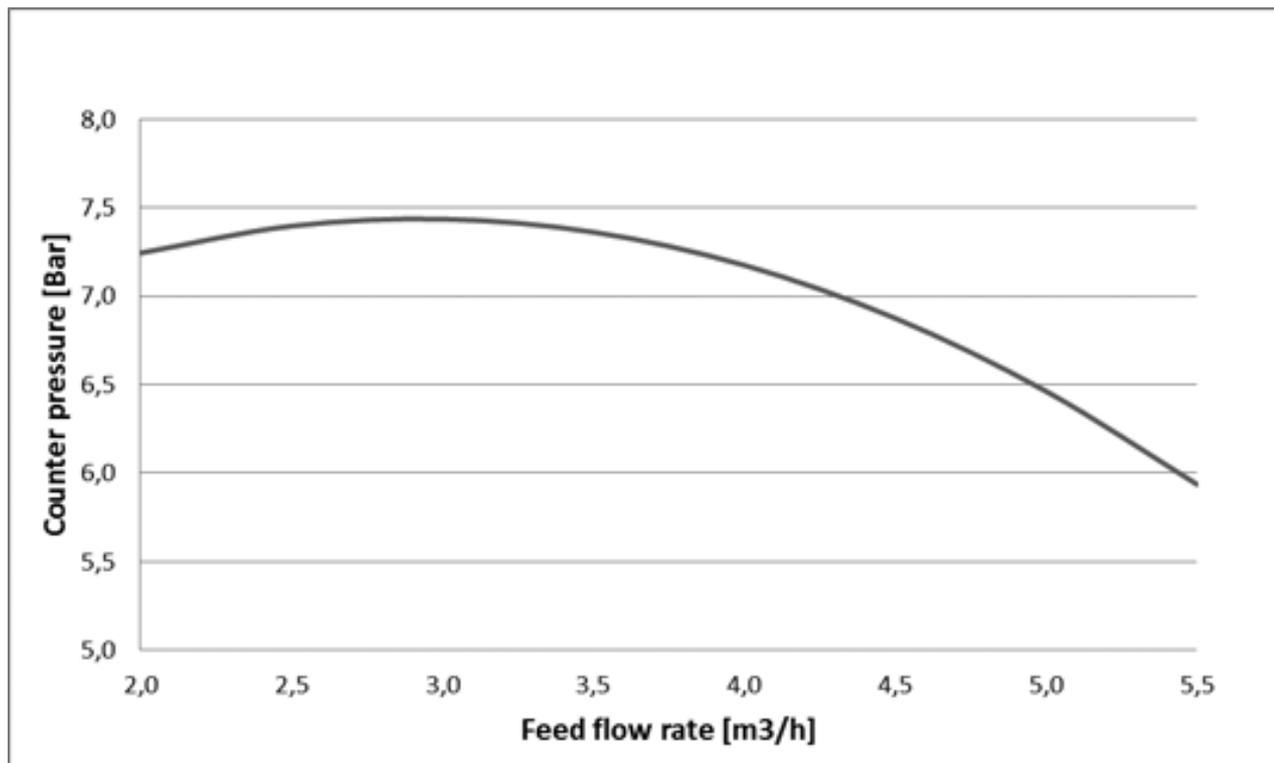


G0950601

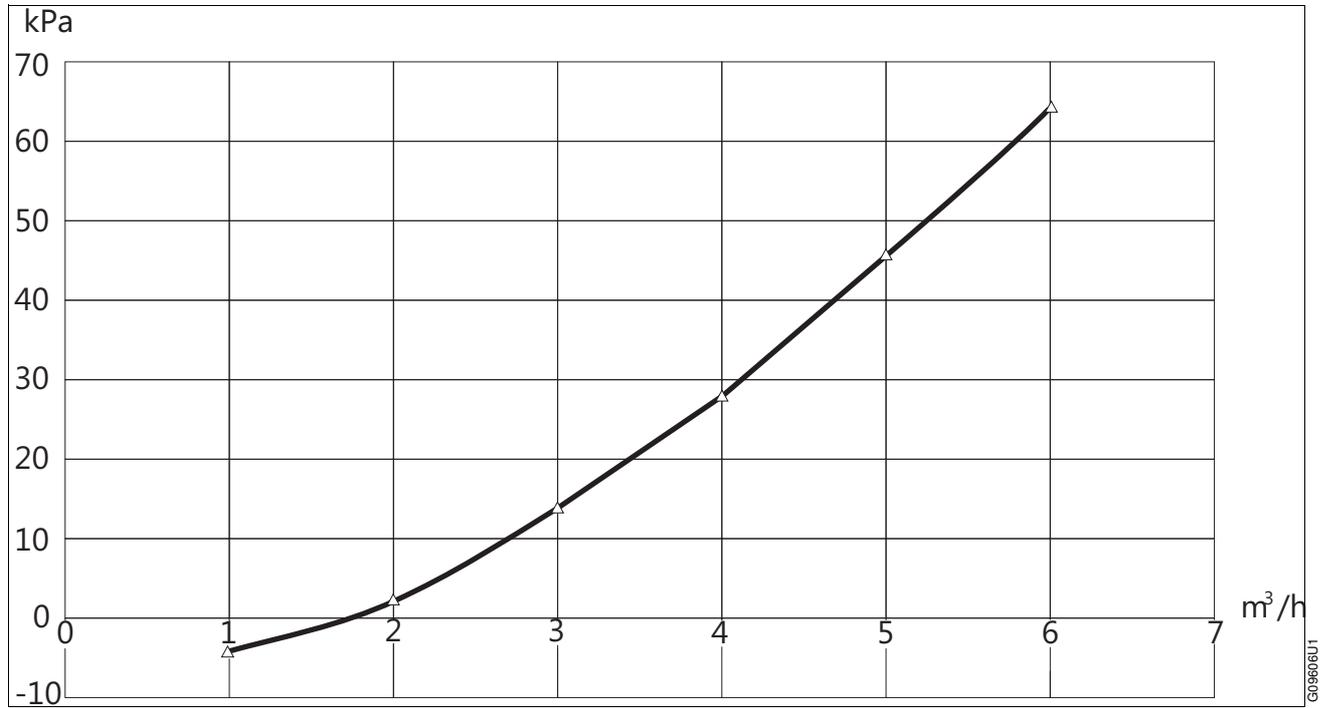
11.4 Performance data, in-and outlet device

Alfa Laval ref. 570738, rev. 1

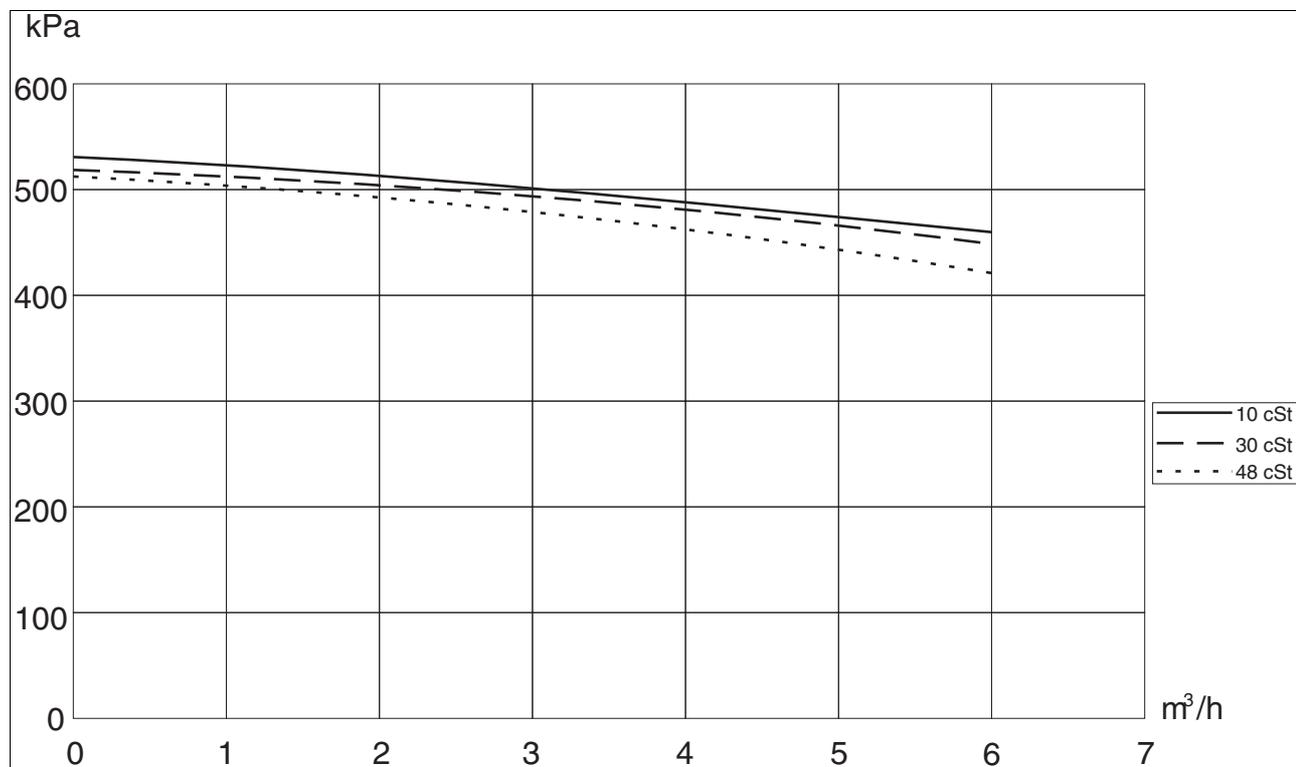
Maxium heavy phase counter pressure as a function of throughput



G09608T1

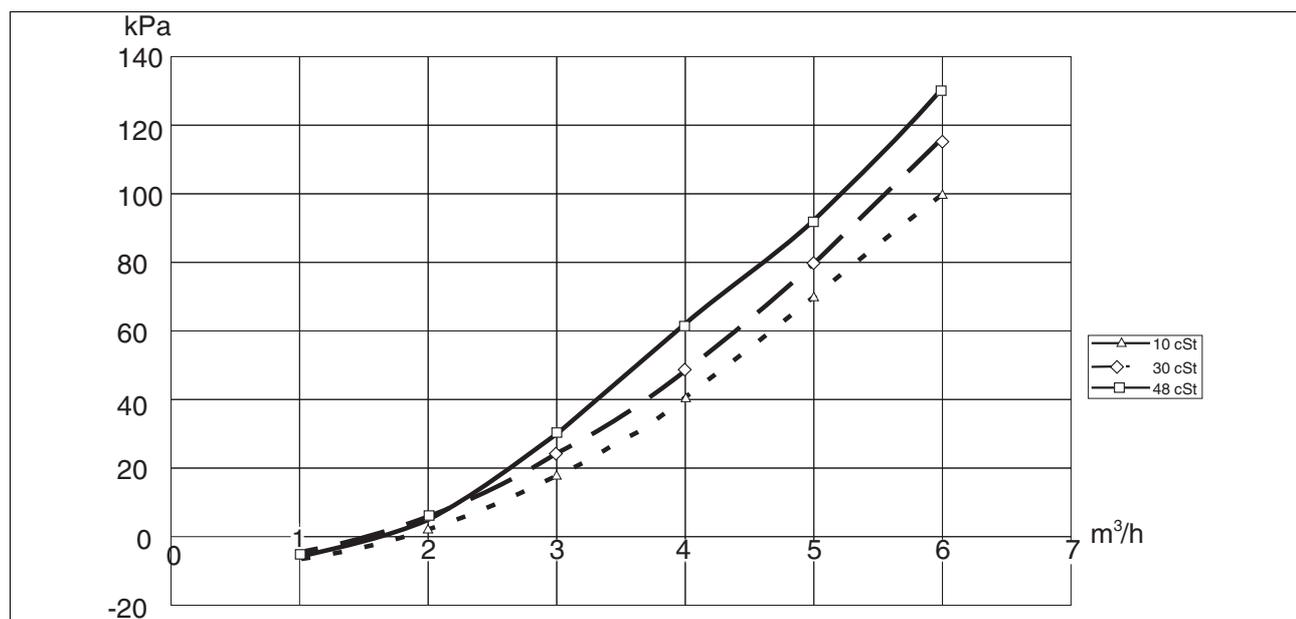
Inlet pressure as a function of heavy phase throughput

Maximum light phase counter pressure as a function of throughput and viscosity



CG9606J1

Inlet pressure as a function of heavy phase throughput

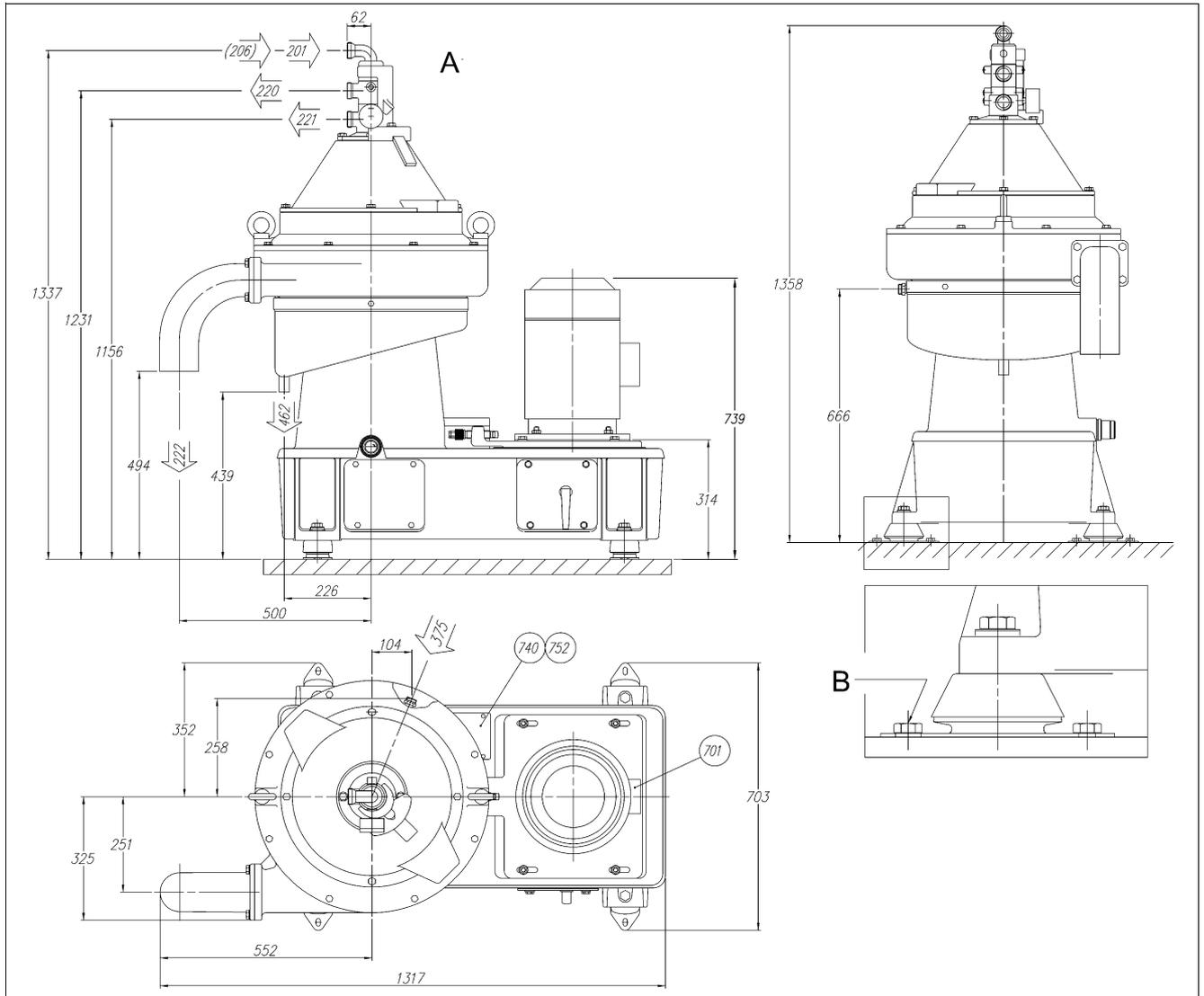


CG9606K1

11.5 Basic size drawings

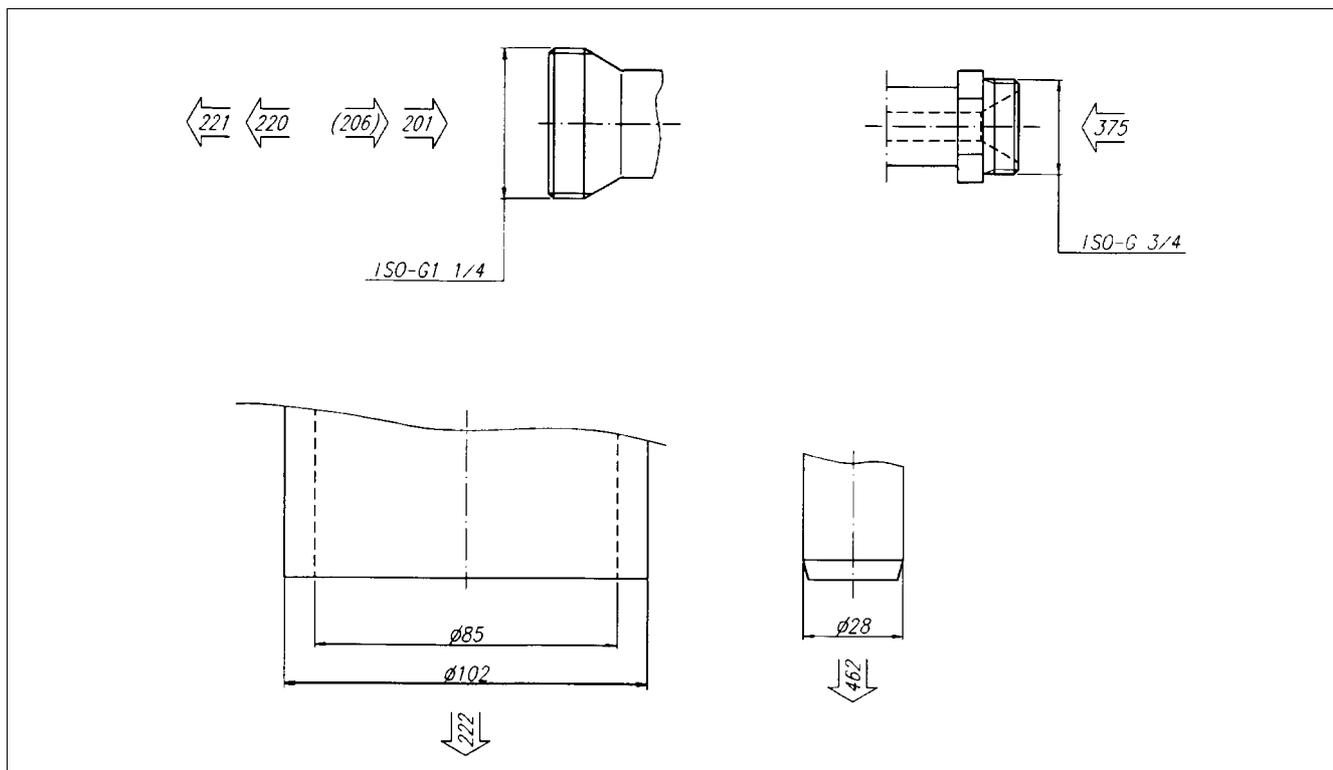
11.5.1 With sludge bend

Alfa Laval ref. 9019334, rev. 2



- A Connections 201, (206), 220 and 221 are turnable
- B Tightening torque: 80 Nm

G09422E1



G094221

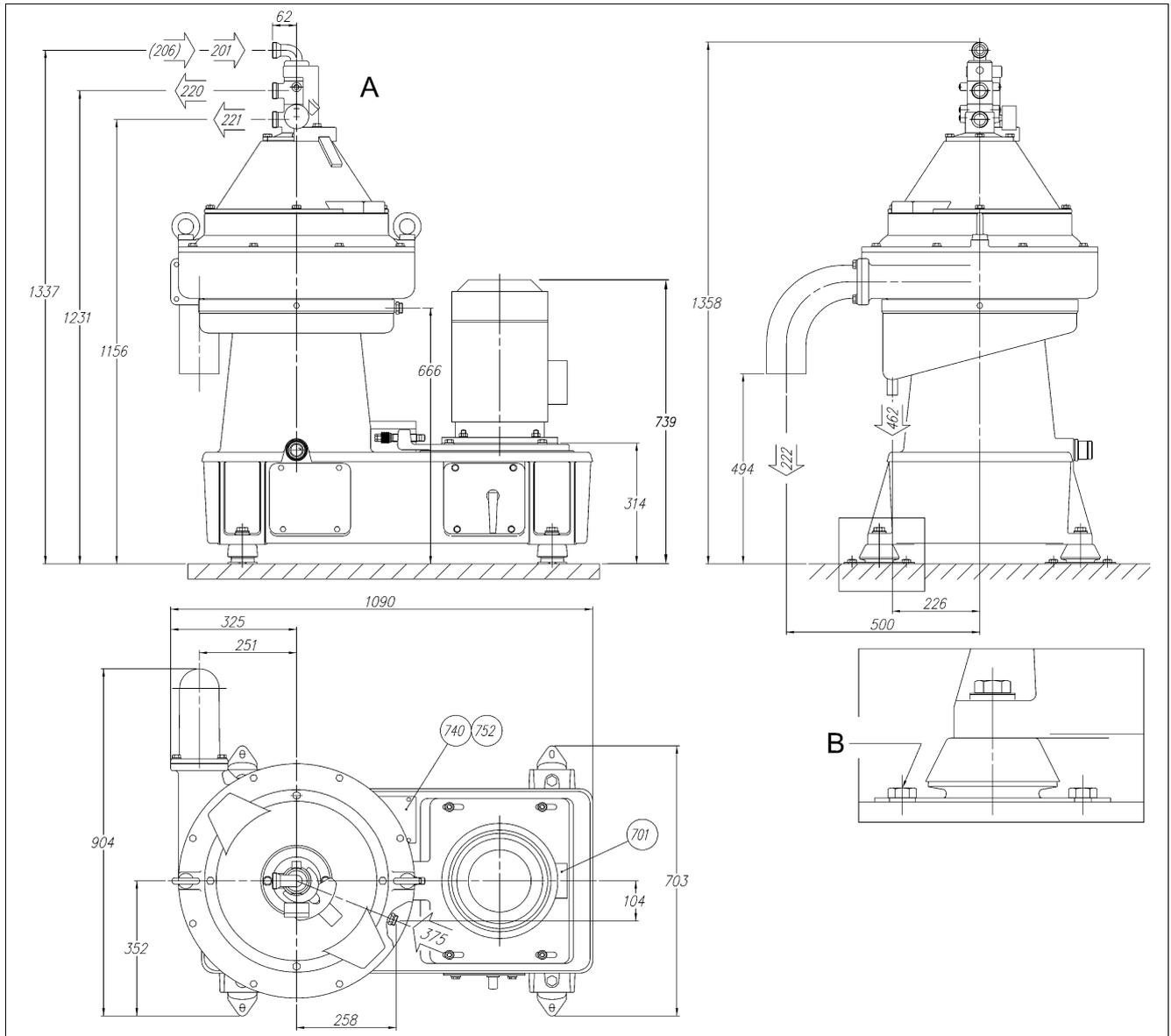
All connections to be installed non-loaded and flexible.

All dimensions are nominal. Reservation for individual deviations due to tolerances.

Data for connections, see chapter "11.7 Connection list" on page 176.

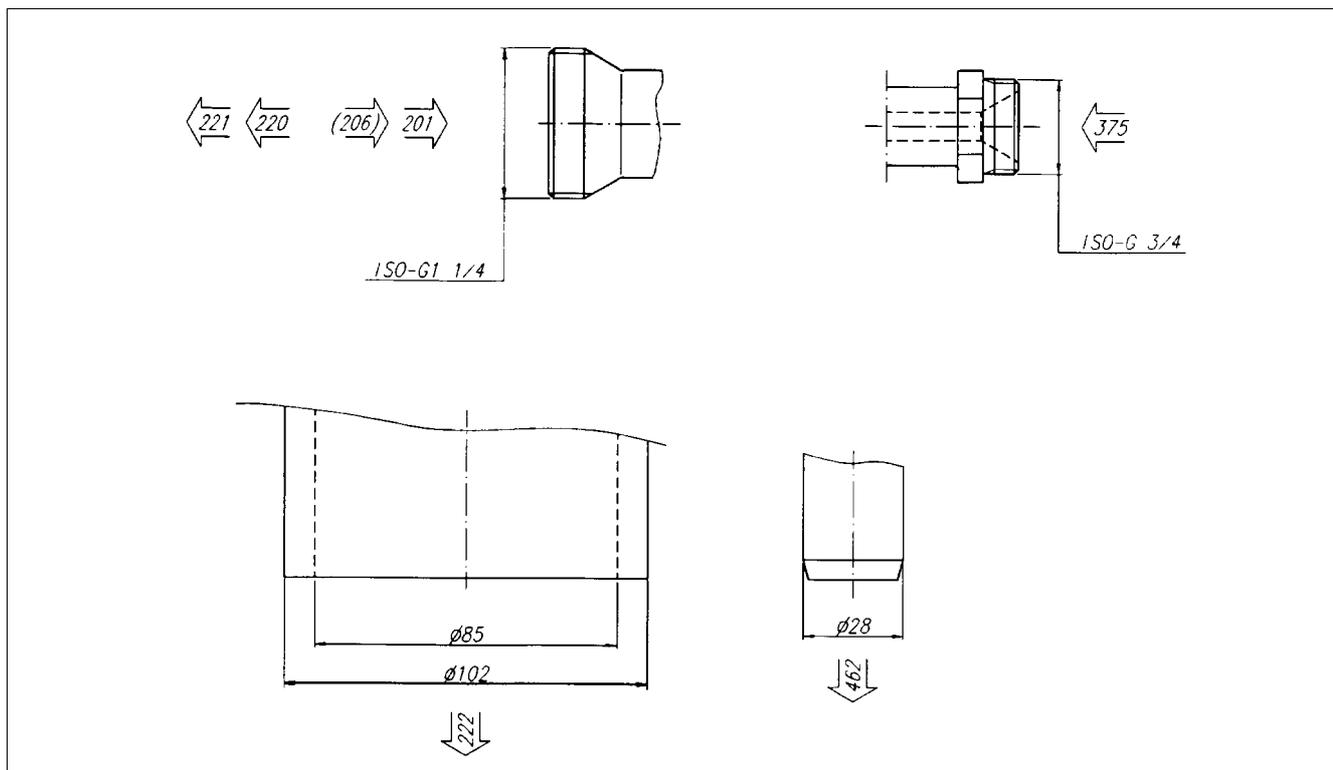
11.5.2 With sludge bend right side

Alfa Laval ref. 9019338, rev. 1



- A** Connections 201, (206), 220 and 221 are turnable
- B** Tightening torque: 80 Nm

G09422F1



G094221

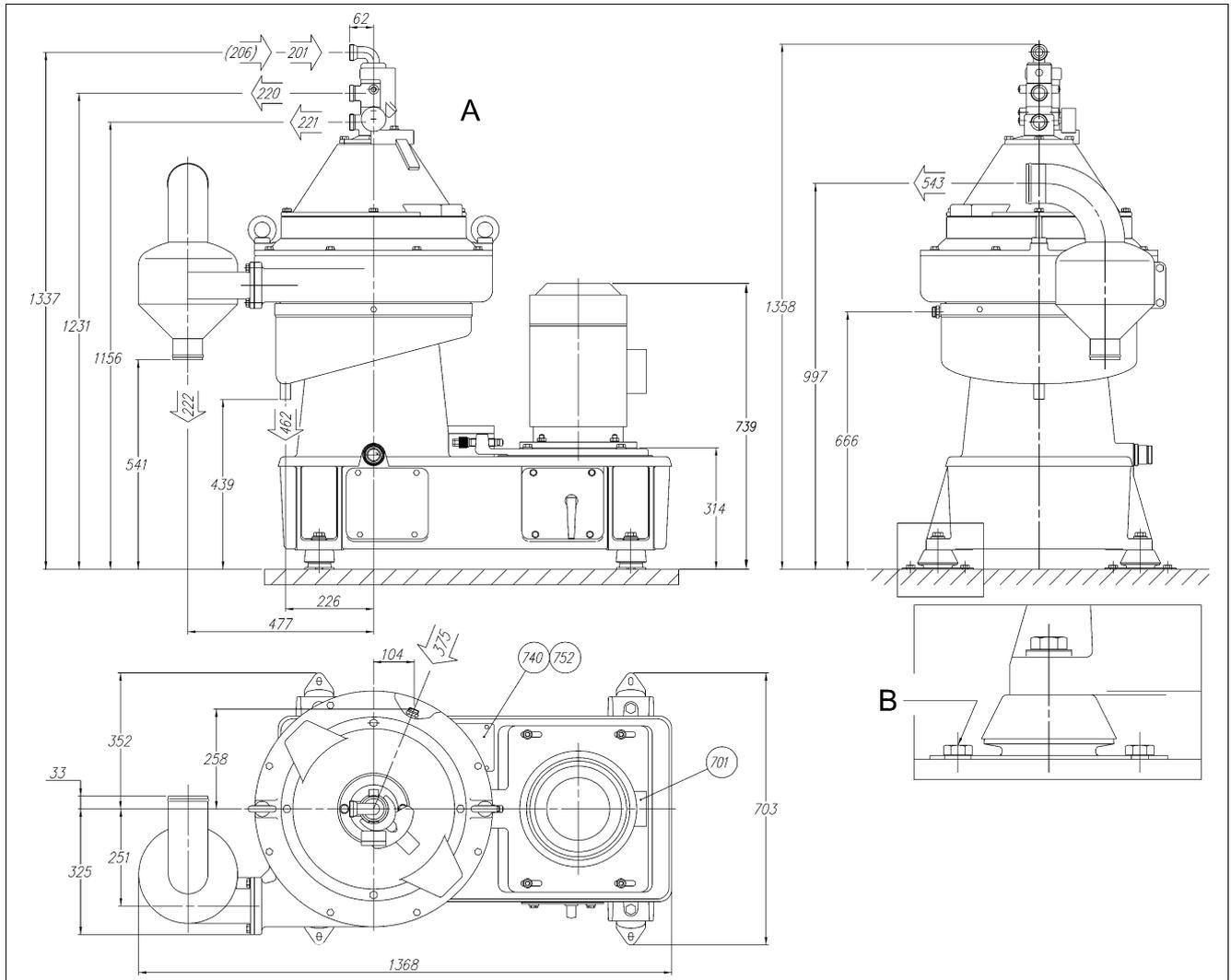
All connections to be installed non-loaded and flexible.

All dimensions are nominal. Reservation for individual deviations due to tolerances.

Data for connections, see chapter "11.7 Connection list" on page 176.

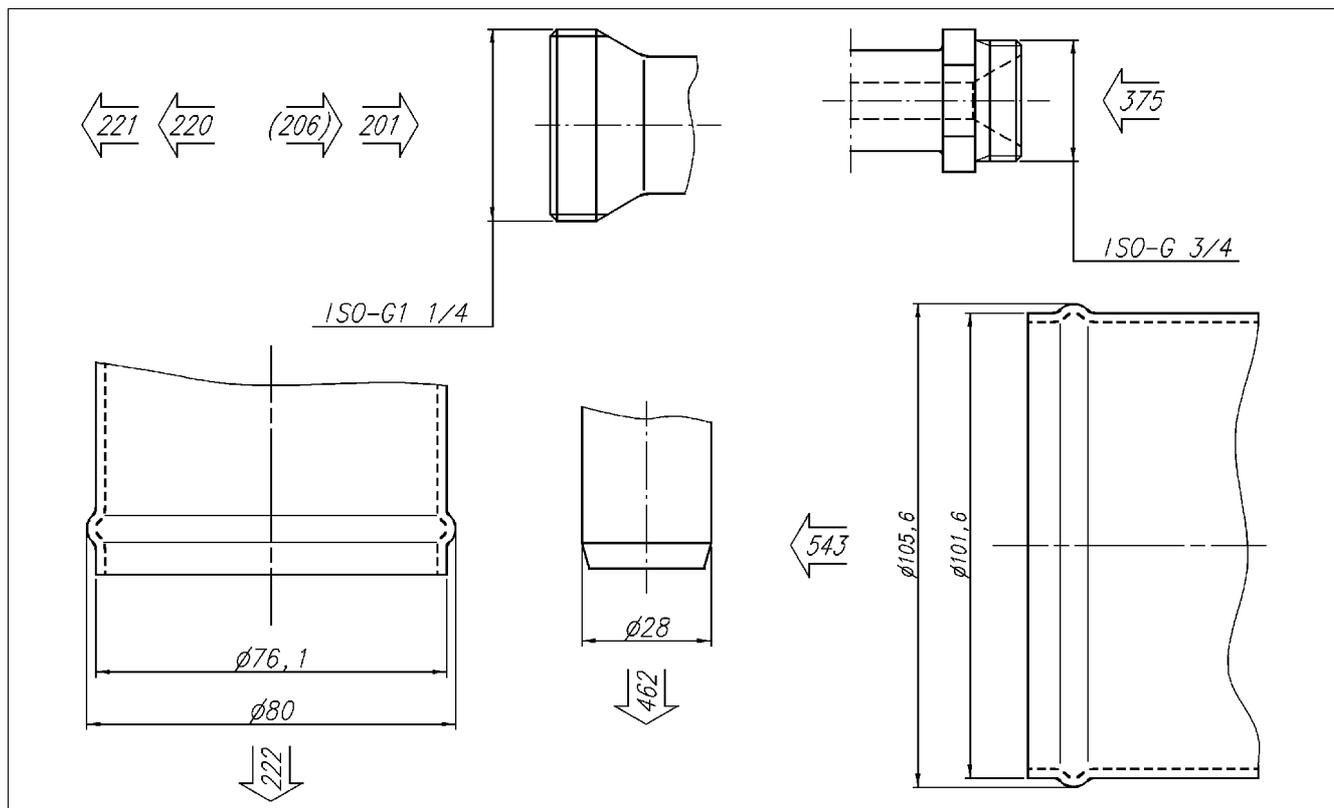
11.5.3 With cyclone

Alfa Laval ref. 9019335, rev. 1



- A Connections 201, (206), 220 and 221 are turnable
- B Tightening torque: 80 Nm

G09422G1

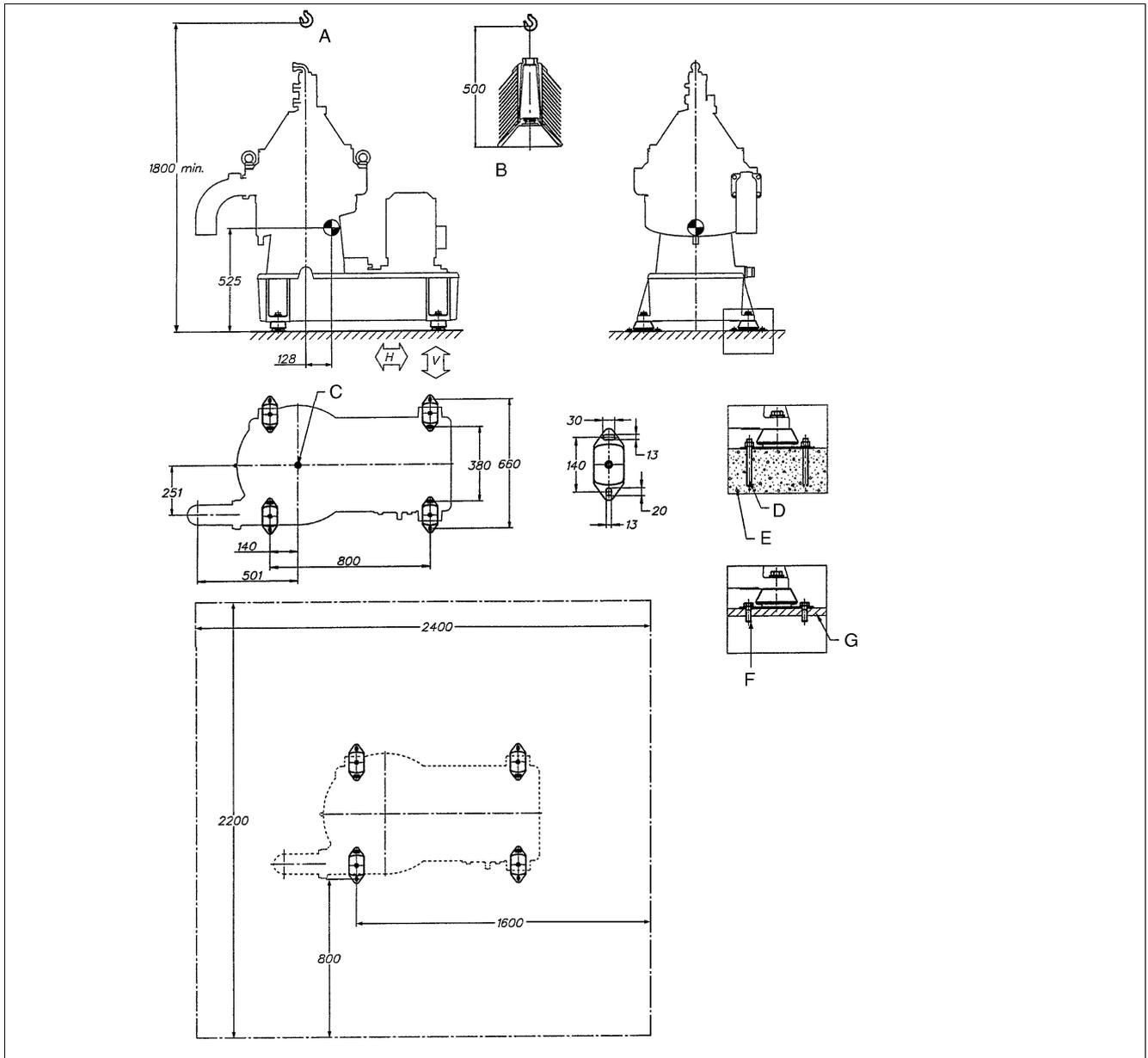


All connections to be installed non-loaded and flexible.

Data for connections, see chapter "11.7 Connection list" on page 176.

11.6 Foundation drawing

Alfa Laval ref. 554571, rev. 1



- A. Min. lifting capacity 1000 kg
 - B. Max. height of largest component incl. lifting tool
 - C. Centre for lifting device
 - D. Adhesive anchor cartridge e.g. Hilti HEA 12 x 110
 - E. Structural concrete
 - F. Screw M12, properly class 8.8
 - G. Steel
- Recommended free floor space for unloading when doing service
 - Min. access area for overhead hoist (no fixed piping within this area)
 - ⊕ Centre of gravity (without motor)
 - ⌞ Vertical forces not exceeding 6 kN/foot
 - ⌞ Horizontal forces not exceeding 13,7 kN/foot

G0761211

11.7 Connection list

Alfa Laval ref. 9019339, rev. 0

Connection No.	Description	Requirements/limits
201	Inlet for process liquid	
(206)	Inlet for liquid seal and displacement liquid – Flow, set valve: – Quality requirements:	See “Operating water interface” on page 184 12 -18 l/min See “Demand specification, service water” on page 185
220	Outlet for light phase – Capacity:	See “Performance data, in-and outlet device” on page 166
221	Outlet for heavy phase – Capacity:	See “Performance data, in-and outlet device” on page 166
222	Outlet for solid phase – Discharge volume: – Interface:	See “Technical data” on page 161 The outlet from the sludge cover must always be arranged to prevent the cover from being filled up with sludge.
375	Inlet for discharge and make-up liquid – Discharge water flow, set valve: – Make-up water flow, set valve: – Quality requirements: – Temperature:	See “Operating water interface” on page 184 16,5 ± 3,3 litres/minutes 5,5 - 1,1 litres/minutes See “Demand specification, service water” on page 185 Max. 80 °C
462	Drain of frame top part, lower	
543	Ventilation cyclone	
701	Motor for separator – Allowed frequency variation:	±5% (momentarily during maximum 5 seconds: ±10%)

Connection No	Description	Requirements/limits
740	Speed sensor for bowl spindle – Type: – Supply voltage, nominal: – Current consumption: - with sensor activated (near metal): - with sensor not activated (far from metal) – Number of pulses per revolution:	“11.8 Interface description” on page 181 Inductive proximity switch 8 V ≤1 mA ≥3 mA 2
752	Position transducer for bearing holder – Type: – Supply voltage: – Operation range (mild steel): – Output voltage within sensing range: – Load resistance, R_L :	“11.8 Interface description” on page 182 Inductive analogue sensor. 15 to 30 V DC 2 to 5 mm 1 to 9 V DC 470 ohms

11.8 Interface description

Alfa Laval ref. 9019340, rev. 2

11.8.1 Scope

This document gives information, requirements and recommendations about operational procedures and signal processing for safe and reliable operation of the separator. It is intended to be used for designing auxiliary equipment and control system for the separator.

11.8.2 References

This *Interface Description* is one complementary document to the separator. Other documents that contain necessary information are as follow:

- *Interconnection Diagram*
- *Connection List*
- *Technical Data*
- *Operating Water Interface*

Standards referred to are:

- EN ISO 13850 Safety of machinery - Emergency stop equipment, functional aspects - Principles of design.
- EN ISO 14118 Safety of machinery - Prevention of unexpected start-up.

11.8.3 Definitions

For the purpose of this document, the following definitions apply:

- **Synchronous speed:** The speed the machine will attain when it is driven by a three phase squirrel-cage induction motor and there is no slip in the motor and the drive system.
- **Full speed:** The synchronous speed minus normal slip.

11.8.4 Goal

Information and instructions given in this document are aimed at preventing situations such as the following:

Situation	Effect
Unbalance caused by uneven sediment accumulation in the bowl.	Too high stress on bowl and bearing system which might cause harm.
Too high bowl speed.	Too high stress on bowl which might cause harm.
Access to moving parts.	Can cause injury to person who accidentally touches these parts.
Insufficient cleaning of separator.	Unsatisfactory product quality.
Bowl leakage.	Product losses.

Control and supervision can be more or less comprehensive depending on the type of used control equipment. When a simple control unit is used it would be impossible or too expensive to include many of the functions specified here while these functions could be included at nearly no extra cost when a more advanced control unit is used. For this reason functions that are indispensable or needed for safety reasons to protect the machine and/or personnel are denoted with *shall* while other functions are denoted with *should*.

11.8.5 Description of separator modes

For control purposes the operation of the separator should be divided into different modes. The normally used modes are described below but other modes might exist.

It is assumed that:

- The separator is correctly assembled.
- All connections are made according to Connection List, Interconnection Diagram, Motor Drive Data and Interface Description.
- The separator control system is activated.

If the above conditions are not fulfilled, the separator is unready for operation.

STANDSTILL means:

- The power to the separator motor is off.
- The bowl is not rotating.

STARTING means:

- The power to the separator motor is on.
- The bowl is rotating and accelerating.

RUNNING means:

- The power to the separator motor is on.
- The bowl is rotating at full speed.
- *RUNNING* is a collective denomination for a number of sub modes which e.g. can be:
 - *STANDBY*: Separator is in a waiting mode and not producing.
 - *PRODUCTION*: Separator is fed with product and producing.
 - *CLEANING*: Separator is fed with cleaning liquids with the intention to clean the separator.

STOPPING means:

- The power to the separator motor is off.
- The bowl is rotating and decelerating.
- *STOPPING* is a collective denomination for a number of sub modes which e.g. can be:
 - *NORMAL STOP*: A manually or automatically initiated stop.
 - *SAFETY STOP*: An automatically initiated stop at too high vibrations.
 - *EMERGENCY STOP*: A manually initiated stop at emergency situations. This stop will be in effect until it is manually reset.

11.8.6 Handling of connection interfaces

Electrical connections

701 Separator motor

The separator is equipped with a 3-phase squirrel-cage induction motor

There shall be an emergency stop circuit designed according to EN ISO 13850 and a power isolation device according to EN ISO 14118.

There shall be a start button close to the separator that shall be used for first start after assembly of the separator.

There should be a counter to count number of running hours.

There should be a current transformer to give an analogue signal to the control unit about the motor current.

740 Speed sensor

The separator is equipped with a proximity sensor mounted at the lower end of the bowl spindle. The spindle is equipped with numbers of grooves giving numbers of impulses per revolution.

The sensor is of inductive type according to the DIN 19234 (NAMUR) standard. When supplied with a rated voltage it gives a current signal with a size depending of the position of the sensor head is near the shaft (metal) surface or above the grove (non-metal).

When the sensor is connected to certified switching devices, it may be used for Ex-applications.

Processing in *STARTING*:

- An alarm must be given and the machine must be stopped if 95% of the synchronous speed has not been achieved within 5 minutes.

Processing in *RUNNING*:

- Normal operation condition is considered to have been achieved 1 minute after 95% of synchronous speed has been reached. (The 1 minute waiting time is for the operating water system to obtain stable conditions.)

During normal operation the speed is allowed to vary within the speed limits specified below:

- When the synchronous speed is exceeded with more than 5%, the machine must be stopped and an alarm must be given.
- When the speed falls below 7% of the synchronous speed for a longer period than 1 minute, a low speed alarm signal must be given.

752 Position transducer for bearing holder

For indication of any abnormal unbalance in order to perform appropriate countermeasures, the separator has been equipped with a sensor monitoring the radial position of the upper bearing holder.

The analogue inductive sensor gives a current output corresponding to the distance between the upper bearing holder and the sensor.

In the junction box there is a resistor connected across the current output that gives a voltage signal to the control system.

The output voltage is direct proportional to the radial position of the spindle. In normal conditions, i.e. the spindle in centre position, the output voltage should be 5 volt corresponding to a distance of 3,5 mm.

Processing in *RUNNING*:

- When the unbalance signal amplitude (peak to peak) exceeds a value of 1 volt corresponding an unbalance (peak to peak) of 0,3 mm, a warning alarm should be given and the machine should be stopped manually in order to investigate the reason for the unbalance.
- When the unbalance signal amplitude (peak to peak) exceeds a value of 2 volt, corresponding to an unbalance amplitude (peak to peak) of 0,6 mm, the following actions must be taken:
 - Immediate safety stop of the machine including alarm for extreme unbalance
 - Blocking of the discharge system (discharge must not be performed).
 - Keeping the bowl filled.
 - When the output signal level exceeds 10 volt a sensor failure alarm should be given.

Fluid connections

Complementary information is given in [“11.7 Connection list” on page 176](#).

201 Inlet

Processing in *STANDSTILL*:

- Shall be closed.

Processing in *STARTING*:

- Should be closed. Bowl will be open and empty or closed and filled depending on if start is done from *STANDSTILL* or *STOPPING*.

Processing in *RUNNING*:

- Could be closed or open.
- Shall be open at discharges.

Processing in *CLEANING*:

- A sequence of cleaning liquids should be fed to the separator. The flow rate should be as high as possible and preferably not less than the production flow rate.

Processing in *NORMAL STOP* or *EMERGENCY STOP*:

- Could be closed or open but the bowl should be filled unless the stop is initiated in *STARTING*.

Processing in *SAFETY STOP*:

- Could be closed or open but the bowl shall be filled unless the stop is initiated in *STARTING*.

220 and 222 Outlets

Processing in *STANDSTILL*:

- Could be closed or open.

Processing in other modes:

- Shall be open.

11.9 Operating water interface

Alfa Laval ref. 568464, rev. 1

Closing of bowl after start-up.

Make-up water period: 22 sec.

Discharge:

Discharge water period: 0,5 seconds.

Make-up water period (after discharge): 6,5 seconds. (Discharge and make-up periods to be connected (without interruption).)

Operating water level maintenance.

To maintain the operating water level supply make-up water for 2 seconds every 15 minutes.

11.10 Demand specification, service water

Alfa Laval ref. 553406, rev. 11

Operating water is used in the separator for several different functions: e.g. to operate the discharge mechanism, to lubricate and cool mechanical seals.

Poor quality of the operating water may cause erosion, corrosion and/or operating problem in the separator and must therefore be treated to meet certain demands.

NOTE

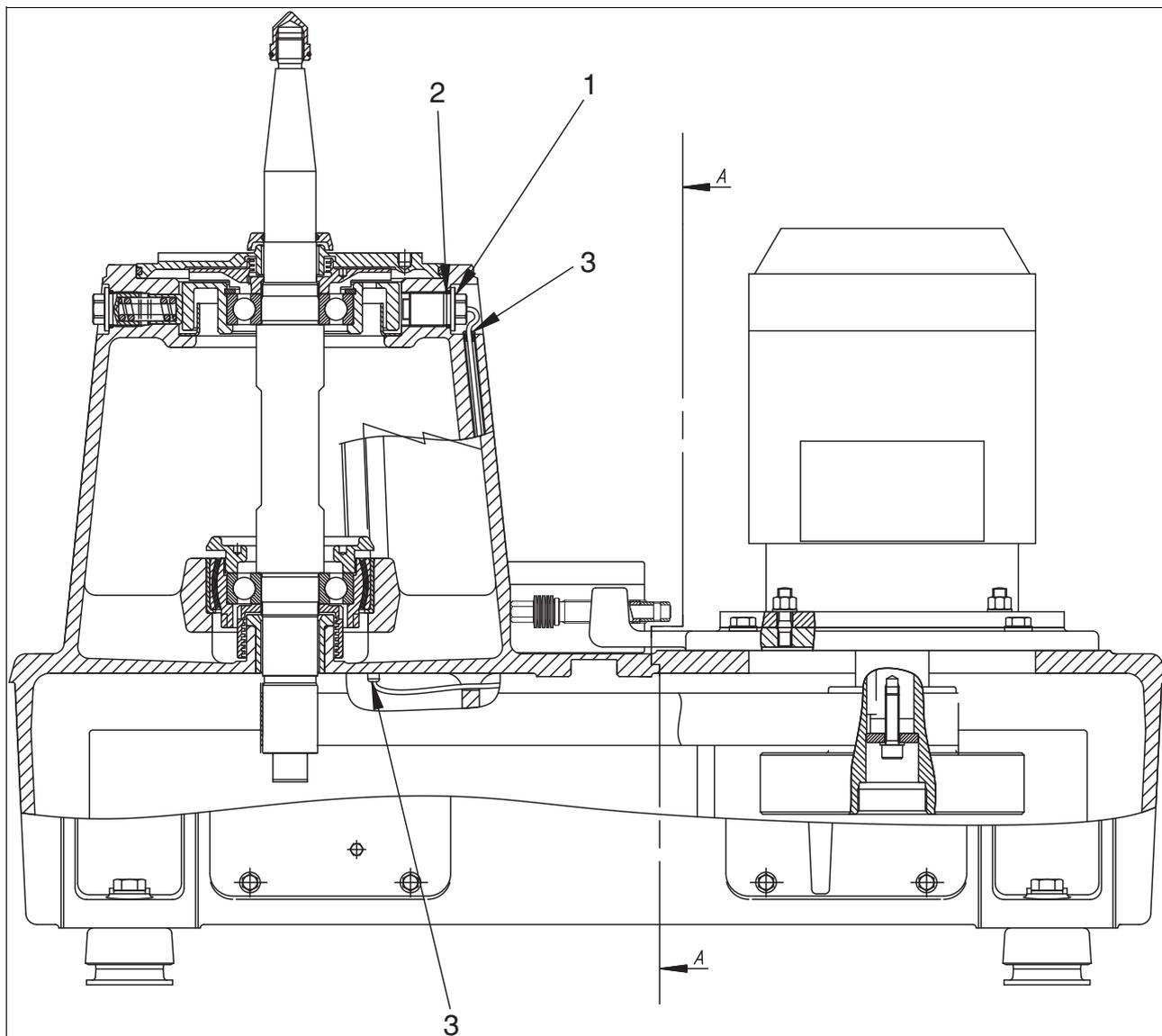
Alfa Laval accepts no liability for consequences arising from unsatisfactorily purified operating water supplied by the customer.

The following conditions must be fulfilled

1. Clean water with turbidity 0,2 NTU/FNU, according to standard ISO 7027-1 "Water quality – Determination of Turbidity – Part 1: Quantitative methods".
Because deposits must not be allowed to form in certain areas in the separator.
2. A maximum particle size of 50 µm
3. A total hardness of less than 180 mg CaCO₃ per litre, which corresponds to 10°dH or 12.5°E. Hard water may with time form deposits in the operating mechanism. The precipitation rate is accelerated with increased operating temperature and low discharge frequency. These effects become more severe as the hardness of the water increase.
4. A chloride content of max 100 ppm NaCl (equivalent to 60 mg Cl/l)
A chloride concentration above 60 mg/l is not recommended.
Chloride ions contribute to corrosion on the separator surface in contact with the operating water, including the spindle. Corrosion is a process that is accelerated by increased separating temperature, low pH, and high chloride ion concentration.
5. pH>6
Increased acidity (lower pH) increases the risk for corrosion; this is accelerated by increased temperature and high chloride ion content.

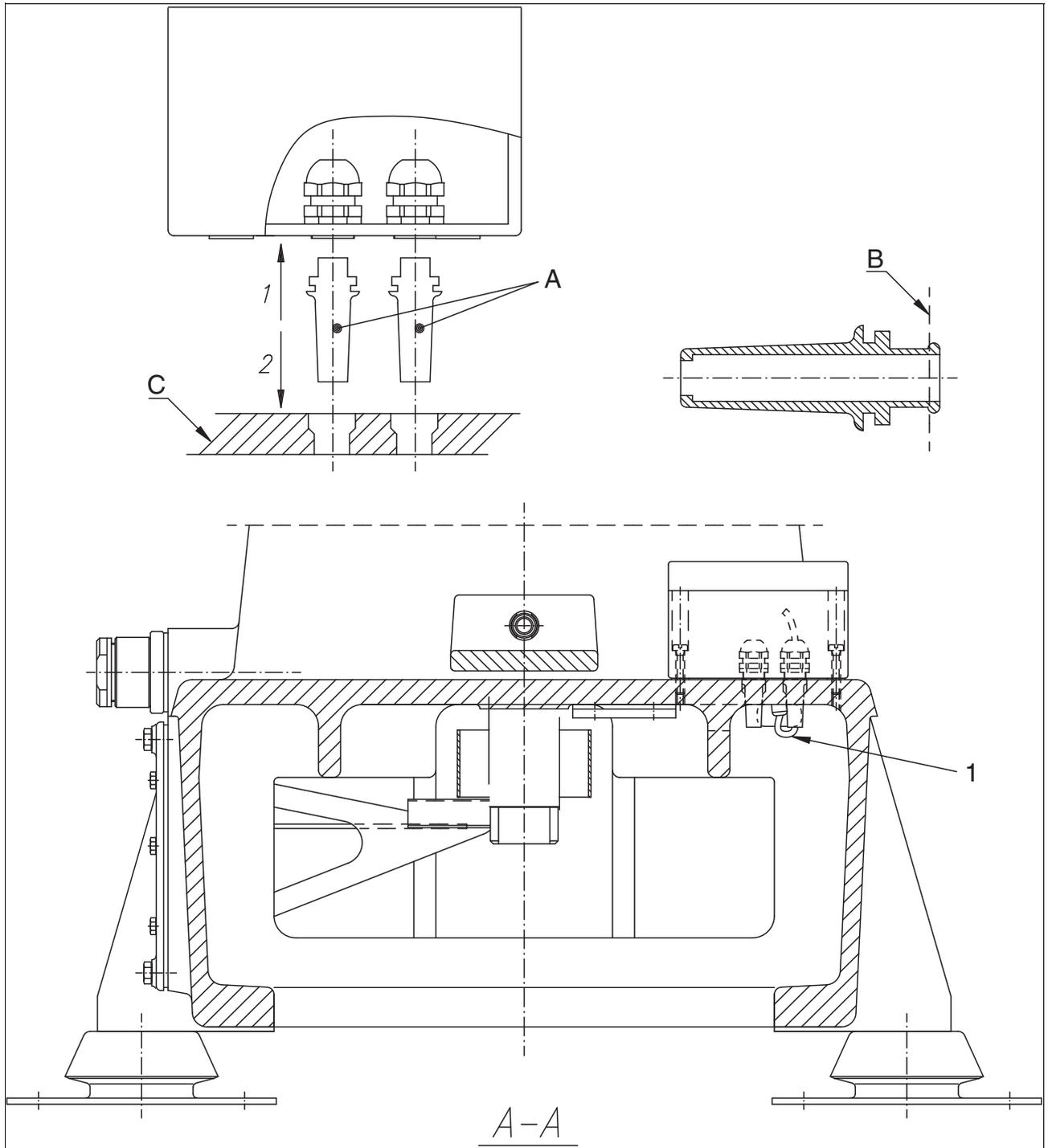
11.11 Unbalance sensor kit

Alfa Laval ref. 553664, rev. 0



1. Unbalance sensor
2. O-ring
3. Lead-through bushing

G0156441

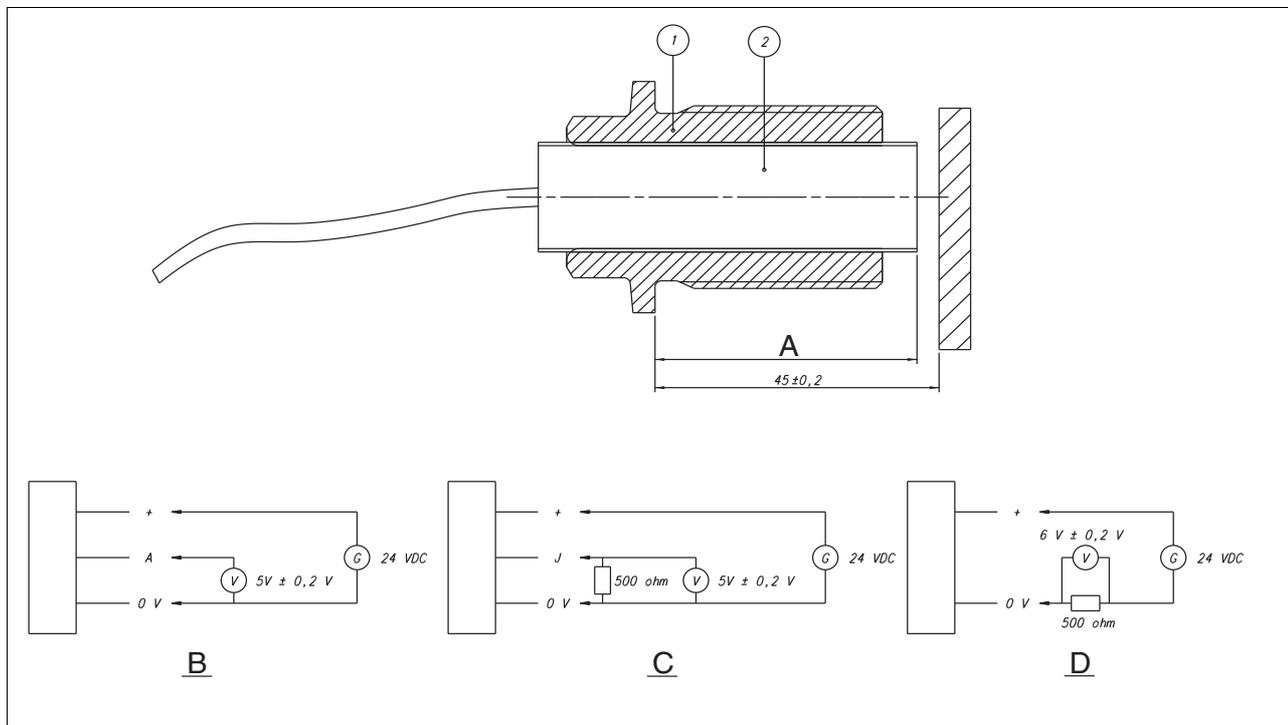


- A. Item (A).
- B. **Note:** 1) Item (A) to be cut at site before mounting.
- C. Separator frame.

Note: 2) Item (A) to be installed into cable gland before final installation onto the separator.

11.11.1 Unbalance sensor

Alfa Laval ref. 547865, rev. 6



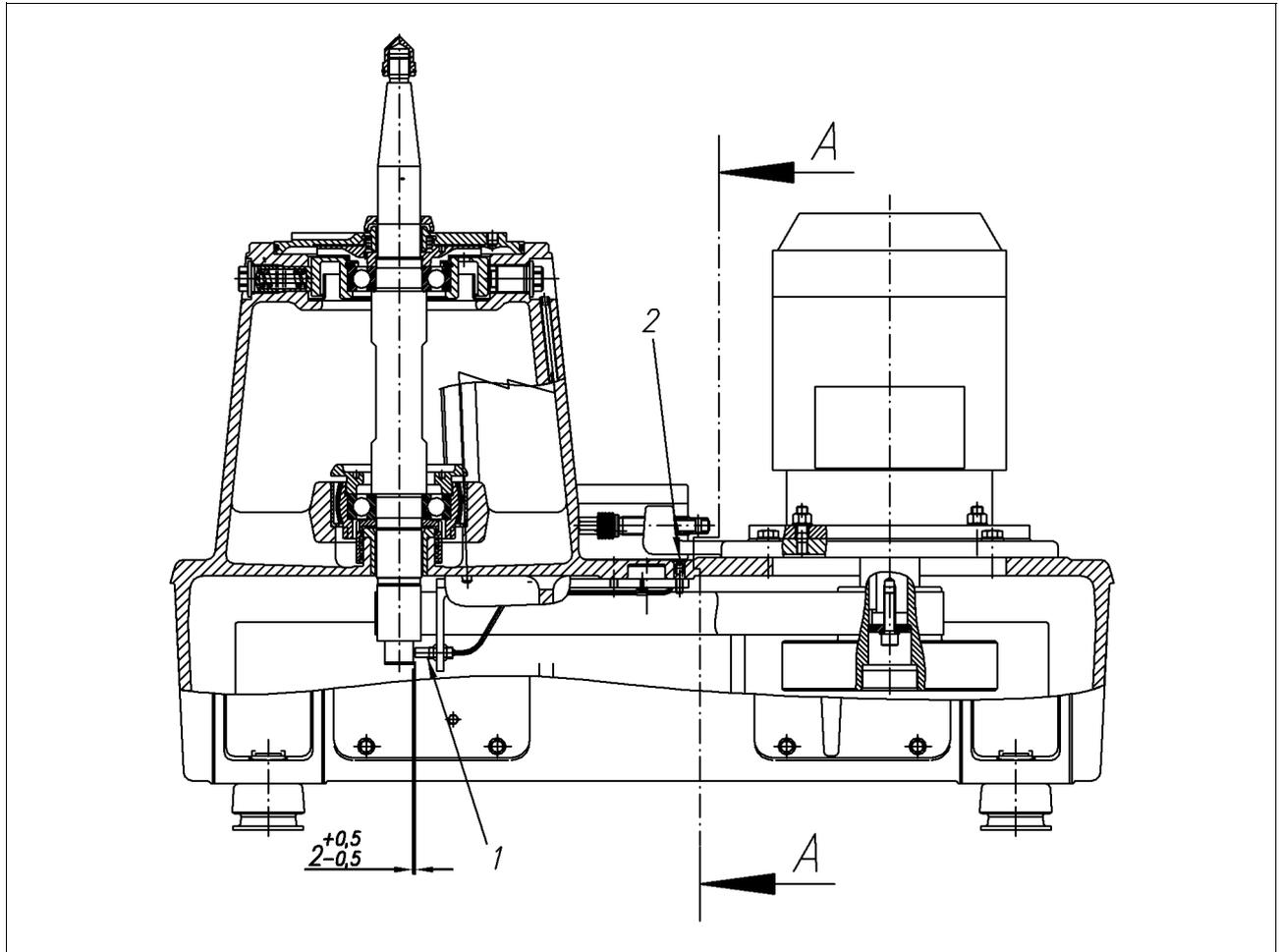
- A. $L \pm 0,5$ checking dimension
- B. Refers to 547865-80 $L = 41,5$
- C. Refers to 547865-81 $L = 41,5$
- D. Refers to 547865-82 $L = 42$

See "9.6 Mounting of speed sensor and junction box" on page 127.

G01564C1

11.12 Speed sensor kit

Alfa Laval ref. 553663, rev. 1

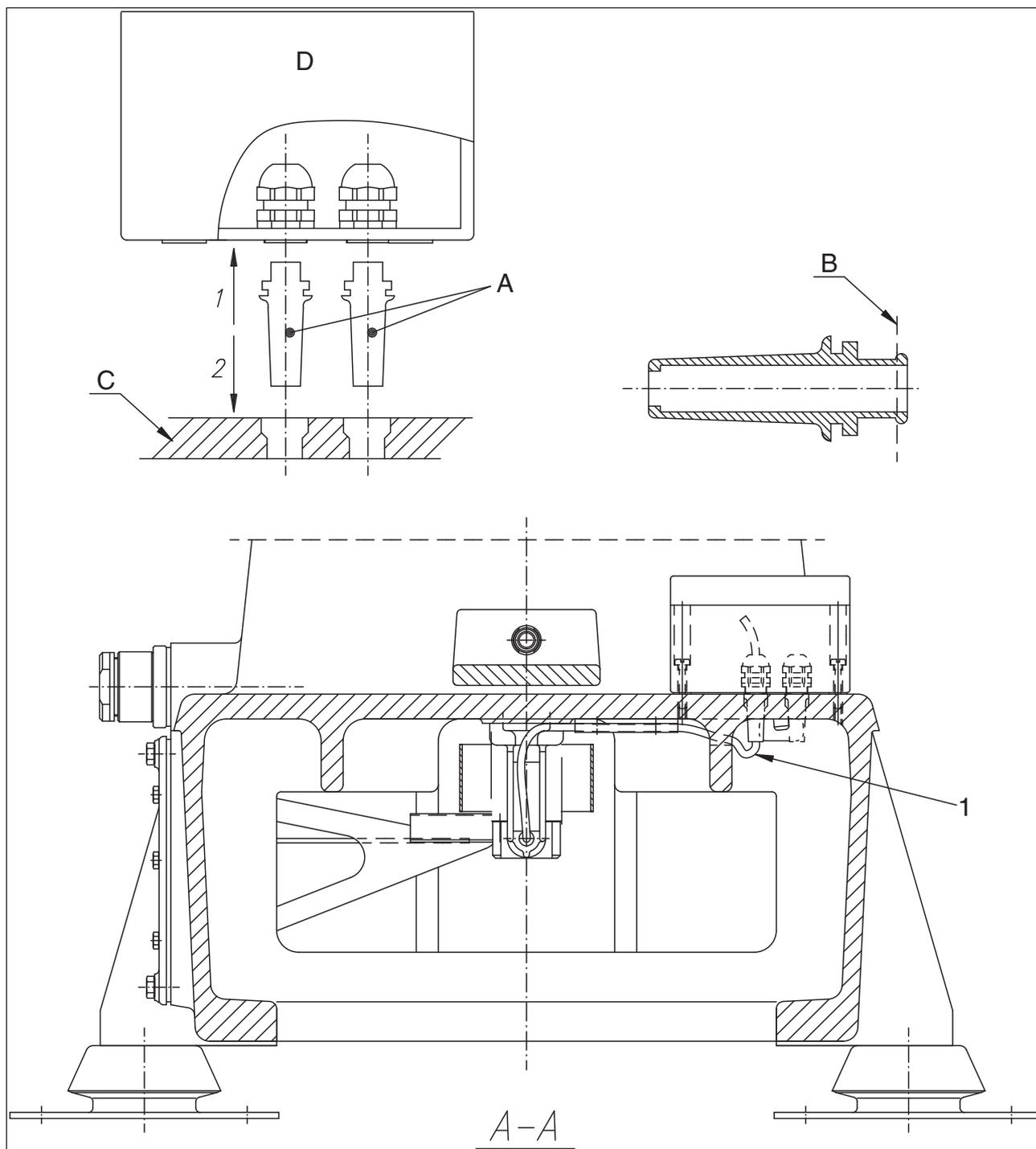


1. Speed transmitter ($2 \pm 0,5$)

2. Countersunk cap screw.

See [“9.8 Speed sensor” on page 132.](#)

G0156411



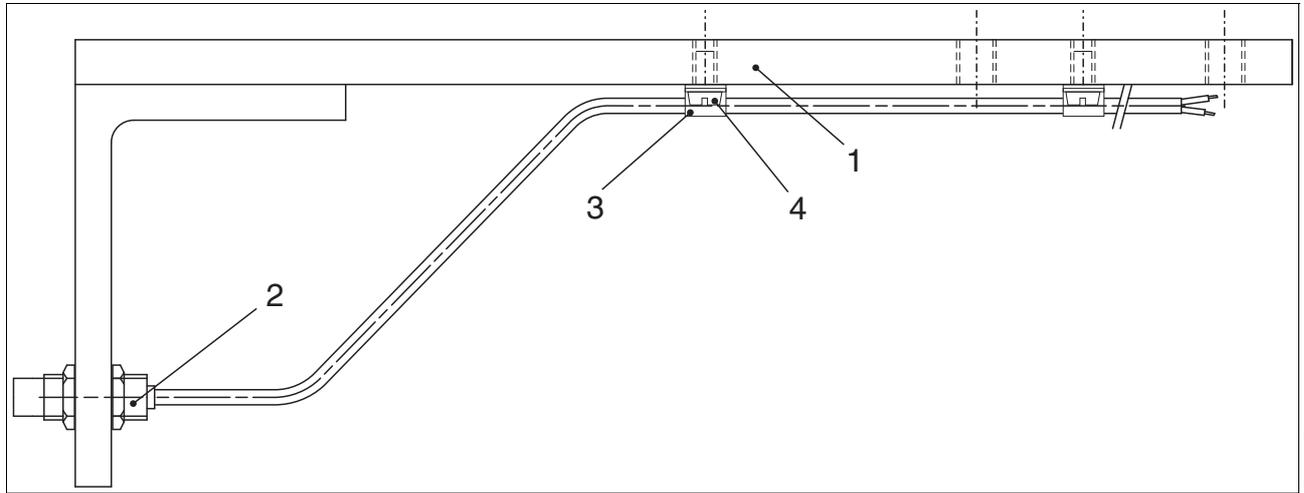
- A. Item (A).
- B. **Note:** 1) Item (A) to be cut at site before mounting.
- C. Separator frame.
- D. Junction box.

Note: 2) Item (A) to be installed into cable gland before final installation onto the separator.

See “9.6 Mounting of speed sensor and junction box” on page 127.

11.12.1 Speed transmitter, complete

Alfa Laval ref. 585441, rev. 1



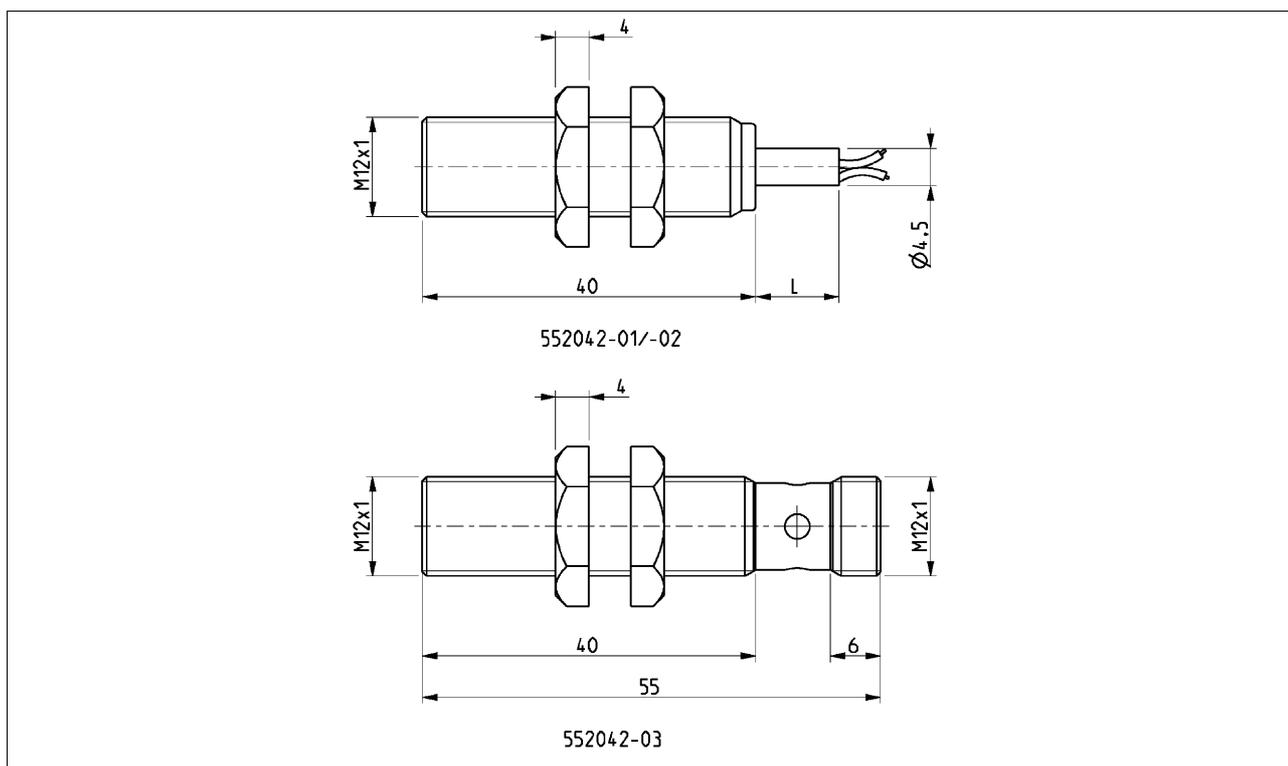
1. Holder.
2. Inductive sensor.
3. Cable clamp
4. Screw

See [“9.9 Checking of speed sensor fitting”](#) on page 135.

11.12.2 Inductive sensor

Alfa Laval ref. 552042, rev. 8

Electrical and Mechanical data:
according to manufacturers data sheet.



552042-01
552042-02

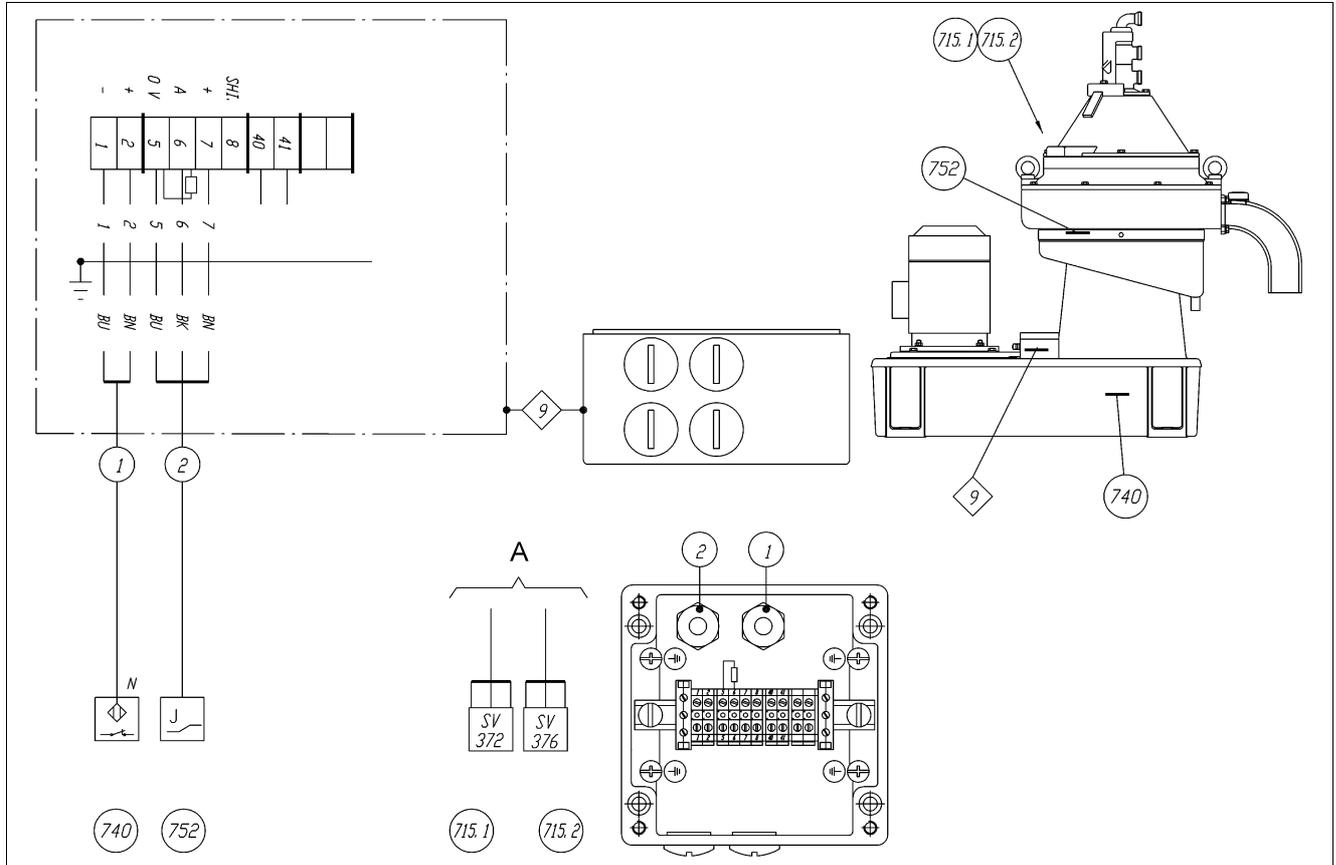
552042-03
Cable length 10 m

Cable length 2 m
V1 connector/M12

G0636221

11.13 Interconnection diagram

Alfa Laval ref. 9019341, rev. 0



A. = To control equipment

740 Speed sensor (bowl speed)

752 Unbalance sensor (position trans. bearing holder)

715.1 Discharge valve (SV 372),

715.2 Make up liquid valve (SV 376),

9 Junction box

Attention: All wires to be cut to appropriate length to match respective earth connection terminal. Wire ends to be marked with "PARTEX" PA01 (1,2,5,6,7) and PA02 (40,41) (yellow with black marking) and fitted with ferrules with insulated collar. Wire ends 7 BK-BK to be insulated with transparent shrinking tubing.

Wire colour codes:

BK = Black

BN = Brown

BU = Blue

GN-YW = Green-Yellow

BK-YW = Black-Yellow

YW = Yellow

WT = White

RD = Red

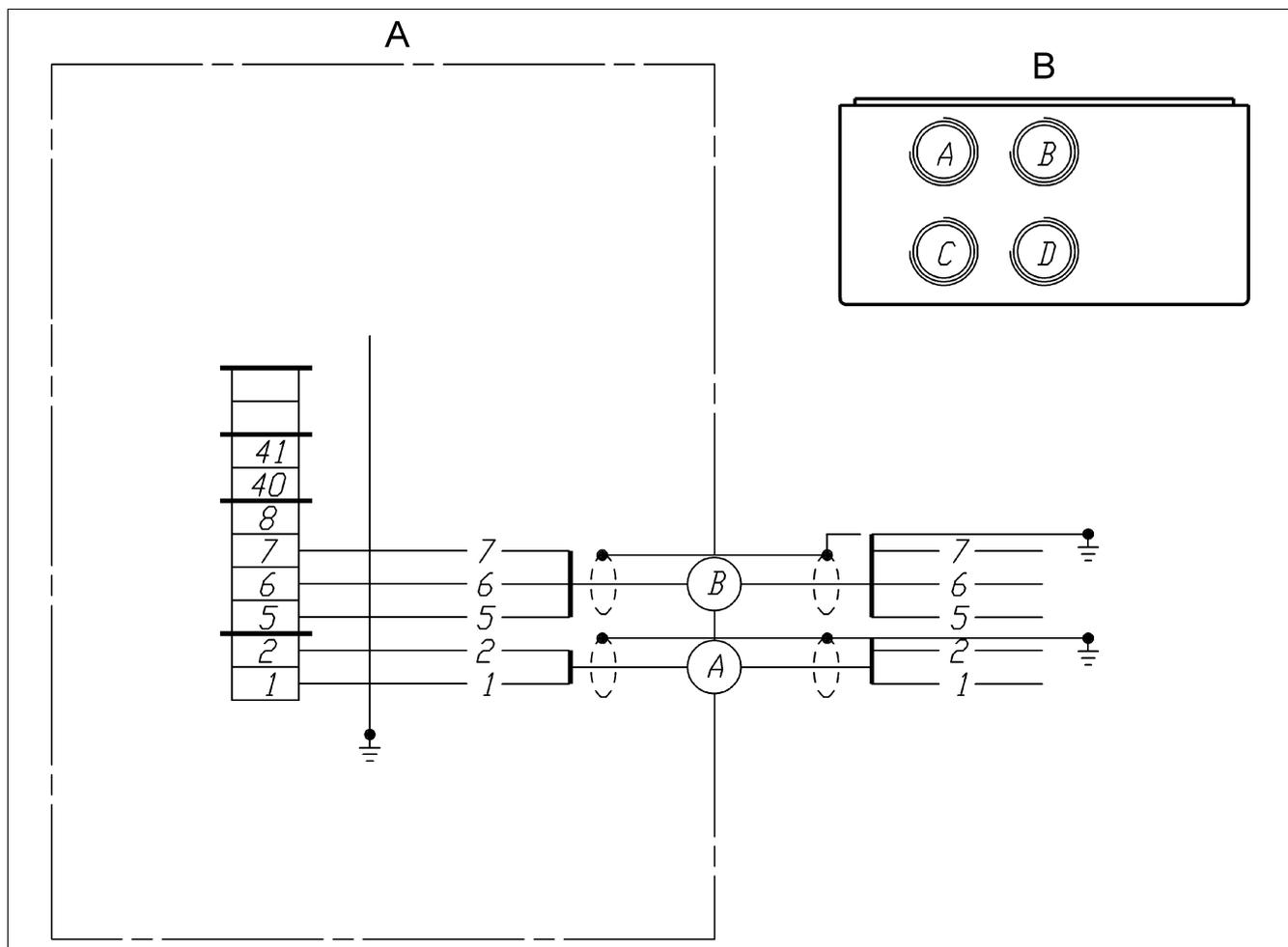
SHI. = Shield

SIG. = Signal

TRANS = Transparent

Items shown are not included in all separators. See product specification.

11.13.1 Connection dimensions and external wiring recommendation



G054 1231

A. Connection box on separator

B. Connection box on separator

Item	Connection
A	Pg 13,5
B	Pg 13,5
C	Pg 13,5
D	Pg 13,5

11.14 Electric motor

For information regarding motor specifications, see motor plate.

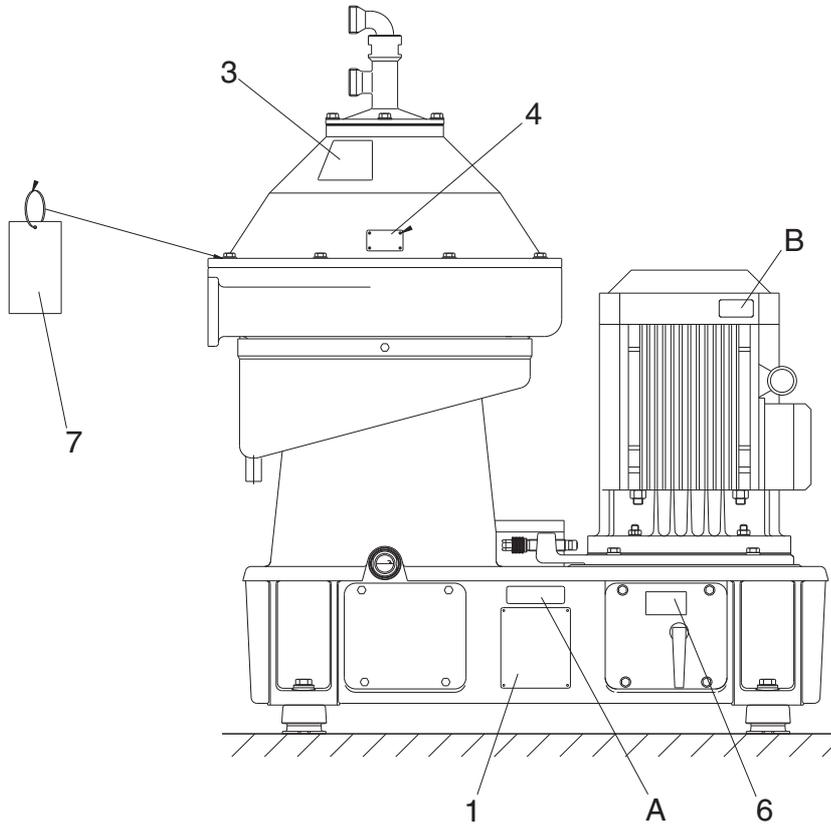
For further information see motor manufacturer's documentation.

NOTE

For complete information about motor variants, please contact your Alfa Laval representative.

11.15 Identification and safety signs on machine

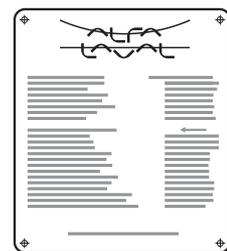
Alfa Laval ref. 568056, rev. 0



1. Machine plate

Separator
 Manufacturing serial No / Year
 Product No
 Machine top part
 Bowl

Machine bottom part
 Bowl speed, synchronous
 Direction of rotation (bowl)
 Motor speed, synchronous
 El. current frequency
 Motor power
 Max. density of feed
 Max. density of sediment
 Max. density of operating liquid
 Process temperature min./max.



G0955111

S0061411

3. Safety label:

Text on label:

WARNING:

Read the instruction manuals **before** installation, operation and maintenance. Consider inspection intervals.

Failure to strictly follow instructions can lead to fatal injury.

If excessive vibration occurs, **stop** separator and **keep bowl filled** with liquid during rundown.

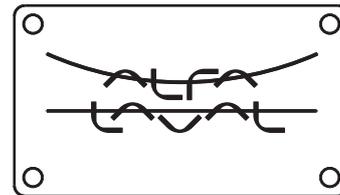
Out of balance vibration will become worse if bowl is not full.

Separator must **stop rotating** before **any** dismantling work is started.



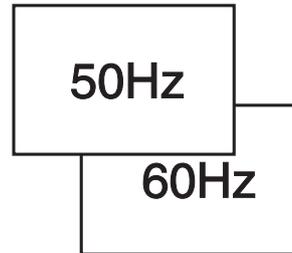
S00690NT

4. Name plate:



S0063211

6. Power supply frequency:



S0063111

7. Label

Text on label:

Read the instruction manual before lifting.

A. Space for label indicating representative.

B. Space for additional label as specified in the order.



S0069111

12 Installation

Contents

12.1 Installation	198
12.1.1 Planning of installation	198
12.1.2 Important measurements	198
12.2 Storage of goods	199
12.3 Transport of goods	201
12.4 Service space	202
12.4.1 Space for separator	202
12.4.2 Space for lifting of bowl	202
12.5 Foundation	203

12.1 Installation

12.1.1 Planning of installation

The spaces required for one or more separation systems can be calculated by consulting the dimension drawings and instructions for ancillary equipment, electrical and electronic equipment and cables equipment.

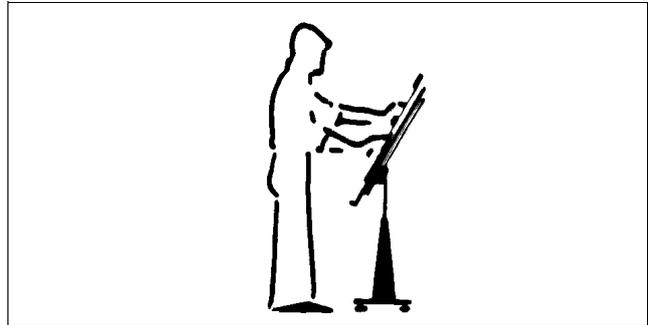
12.1.2 Important measurements

Important measurements are the minimum lifting height for lifting tackle, shortest distance between e.g. driving motor and bulkhead, free passage for dismantling and assembly, and for maintenance and operation.

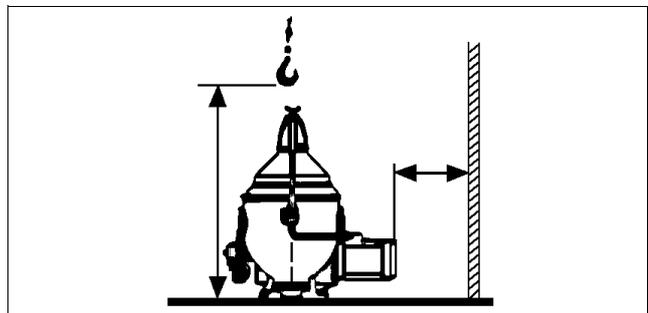
Plan your installation with sufficient room for control and operation so that instruments are easily visible, valves and controls are within convenient reach. Pay attention to space for maintenance work, work benches, floor space for machine parts or for a service trolley.

Small-sized separators are easier to operate and service when mounted on an elevated foundation.

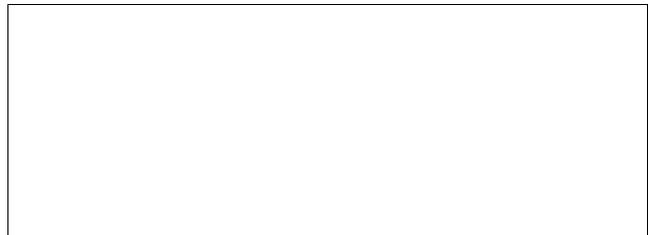
In case of larger-sized separators, the use of permanent or portable stages or platforms may prove necessary to facilitate operation and maintenance.



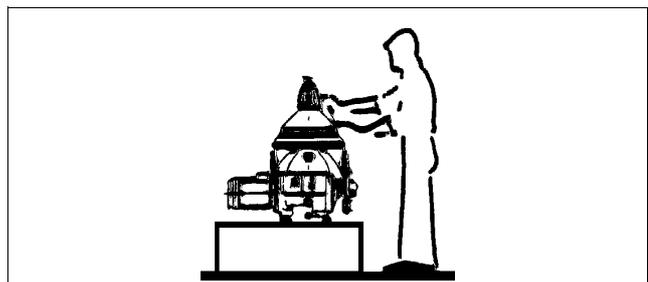
G0020611



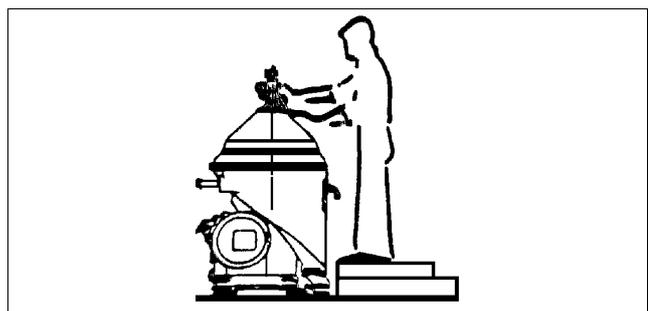
G0020711



G0020811



G0020911



G0021011

12.2 Storage of goods

Before storing a separator that has been in operation, make sure to drain any parts containing water, such as Operating water module (if any), Operating water system and Cooling jackets.

Specification

To avoid wrongly delivered goods it is important that all purchasing is correctly done.

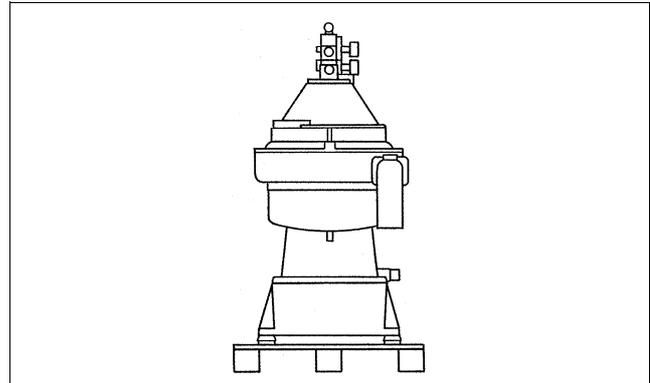
Upon arrival at the store, check all components and keep them:

1. well stored and protected from mechanical damage,
2. dry and protected from rain and humidity,
3. organized in the store in such a way that the goods will be easily accessible when installation is about to take place.

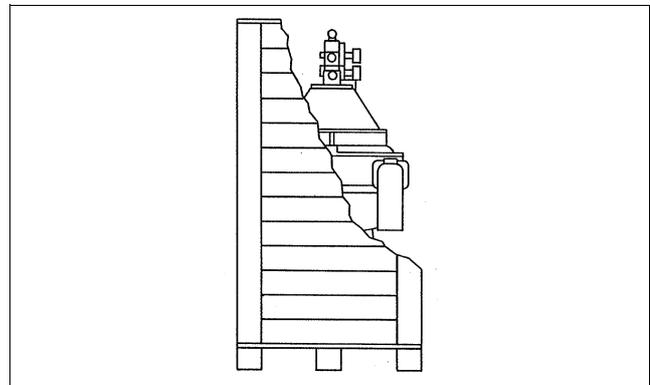
A separator can be delivered with either of three types of protection:

- Fixed on a pallet.

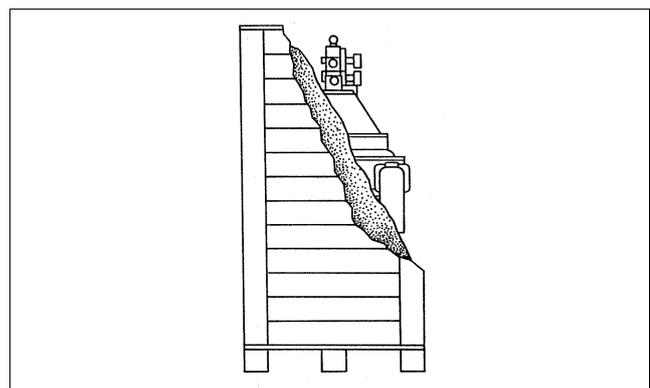
The separator must be stored in a storage room and protected as per item 1 and 2.



- In a wooden box which is not water tight.
The separator must be stored as per item 2.



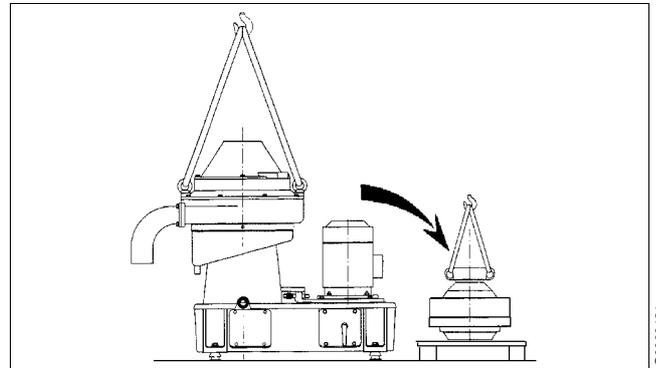
- In a special rain protected box for outdoor storage.
The separator and its parts have been treated against corrosion. Whenever the box has been opened, store as per item 2.
The protection for outdoor storage is available only on special order.



12.3 Transport of goods

Specification

- When transporting a separator the bowl must always be taken out for separate transport.
- When lifting a separator the correct sling must be used. Using the wrong lifting method may cause damage.
- Weight of separator (with motor, without bowl) approx. 600 kg.



G0000131

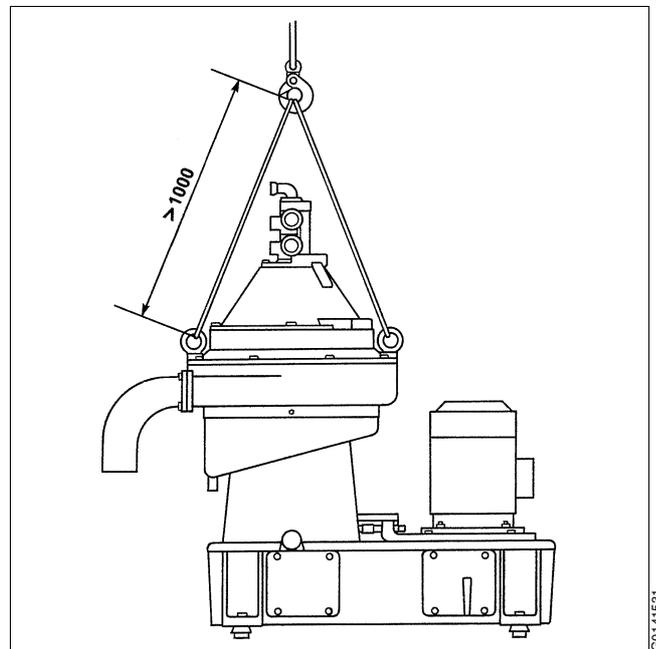
Recommendation



Before the equipment is installed the equipment should be well-protected to avoid mechanical damage, water, oil and paint stains.

During assembly, all inlets and outlets to separators and accessories must be covered to be protected from dirt and particles.

- After the separator has been lifted into position, the lifting eyes must be removed.



G0141531

12.4 Service space

12.4.1 Space for separator

The separator must be installed in such a way that there is a suitable space surrounding it for maintenance and repair.

Specification

- Service space required for the separator.
See “11.6 Foundation drawing” on page 175.

Recommendation

The spanner for the large lock ring should be given free space to make a complete turn without touching any of the ancillary equipment surrounding the separator.

Ensure that it is possible to reach the bottom end bearing on the bowl spindle without tilting or lifting the whole separator.

12.4.2 Space for lifting of bowl

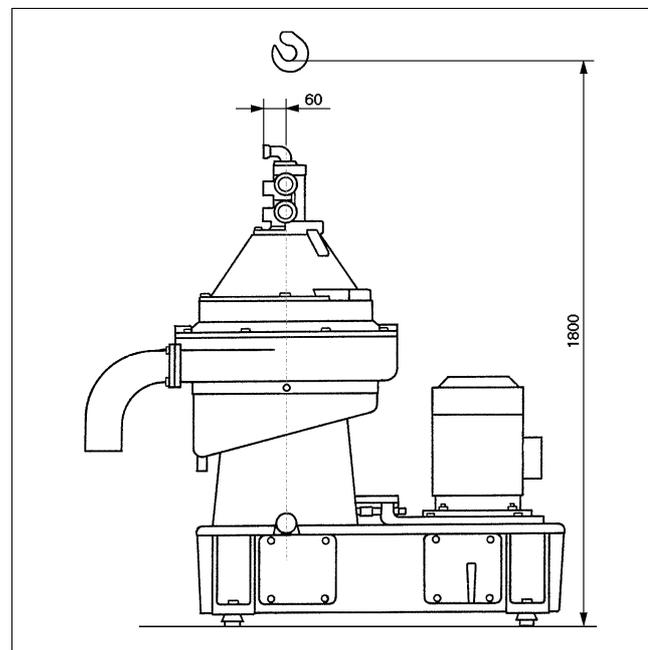
Specification

- A minimum height is required to lift the bowl and the bowl parts, see the measure in the illustration.

Refer also to chapter “11.6 Foundation drawing” on page 175.

Recommendation

When two or more separators are installed, the lifting height may have to be increased to enable parts from one separator to be lifted and moved over an adjoining fully-assembled separator.



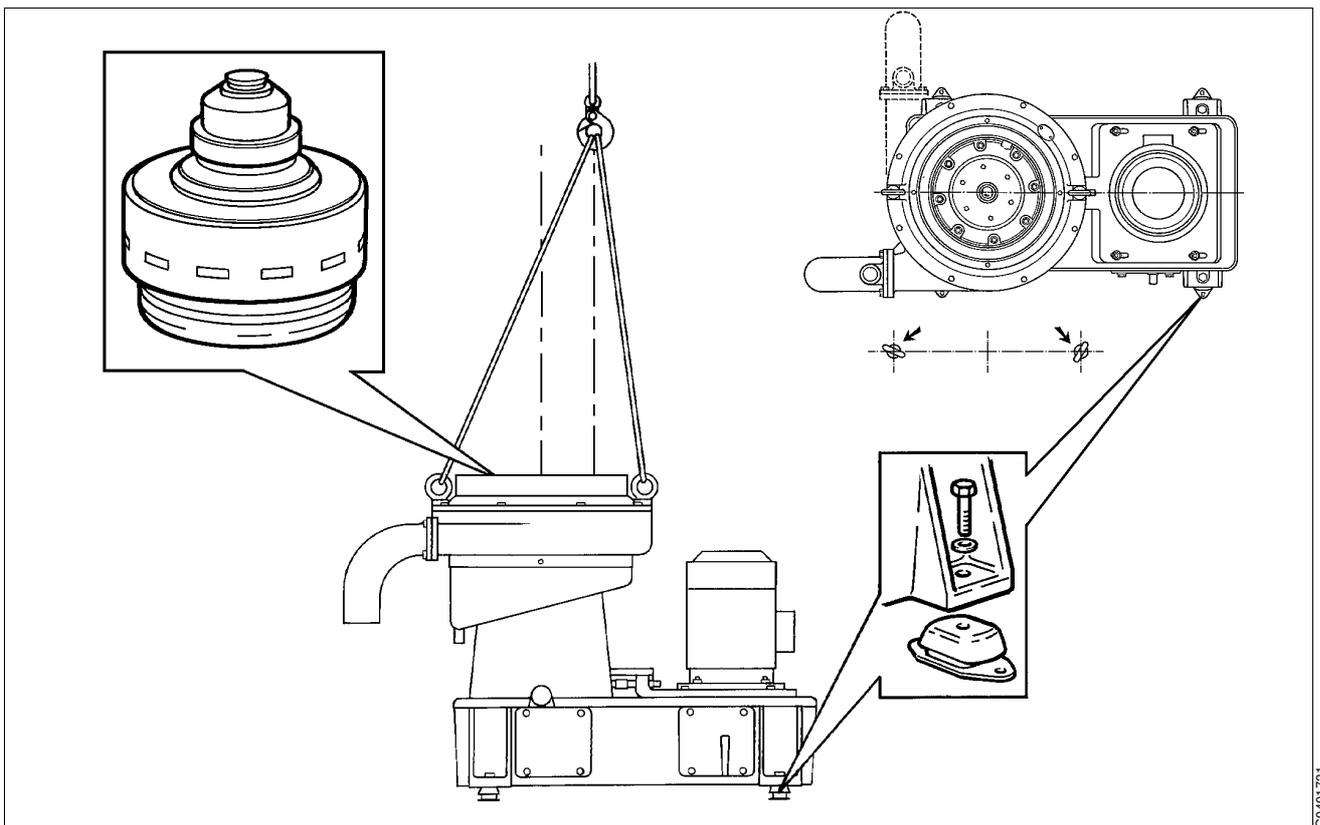
G0141681

12.5 Foundation

Specification

- The separators can either be installed at the floor level or on a platform.
- The separator must be installed on a strong and rigid foundation exposed to a minimum of vibrations produced by adjacent machinery.
- Mount the separator frame on the foundation as follows:
 - Place the separator frame in the correct position
 - Check that all separator feet are resting on the foundation. If necessary fit height adjusting washers.

Refer also to the foundation drawing.



G0401721

