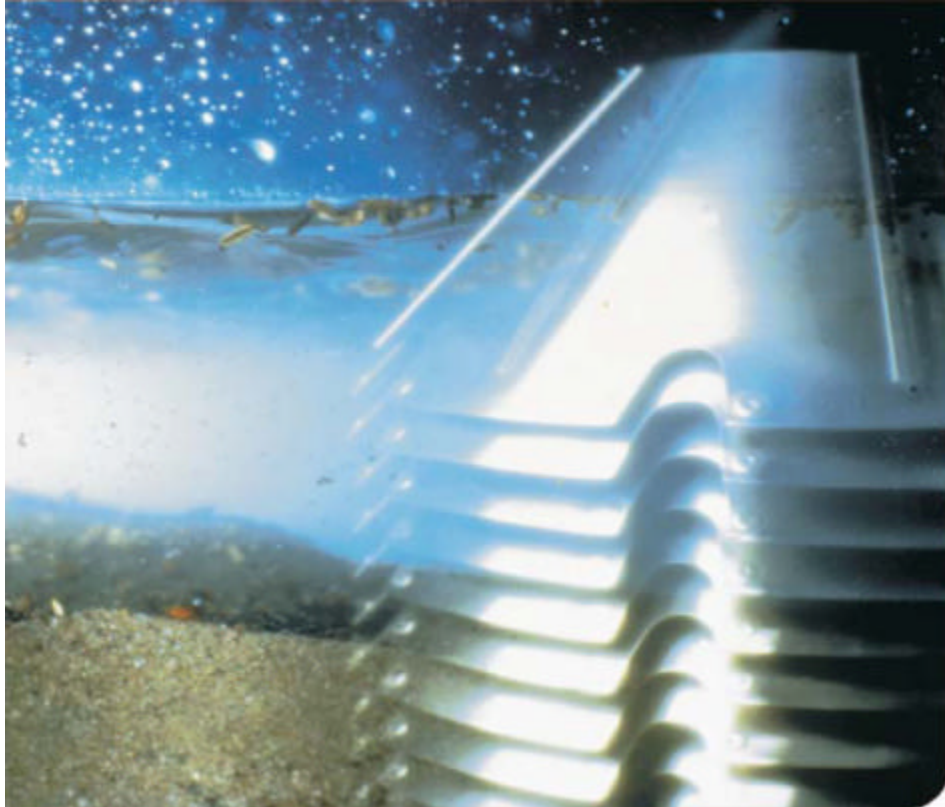


FESX 512S-35C



DATA BOOK

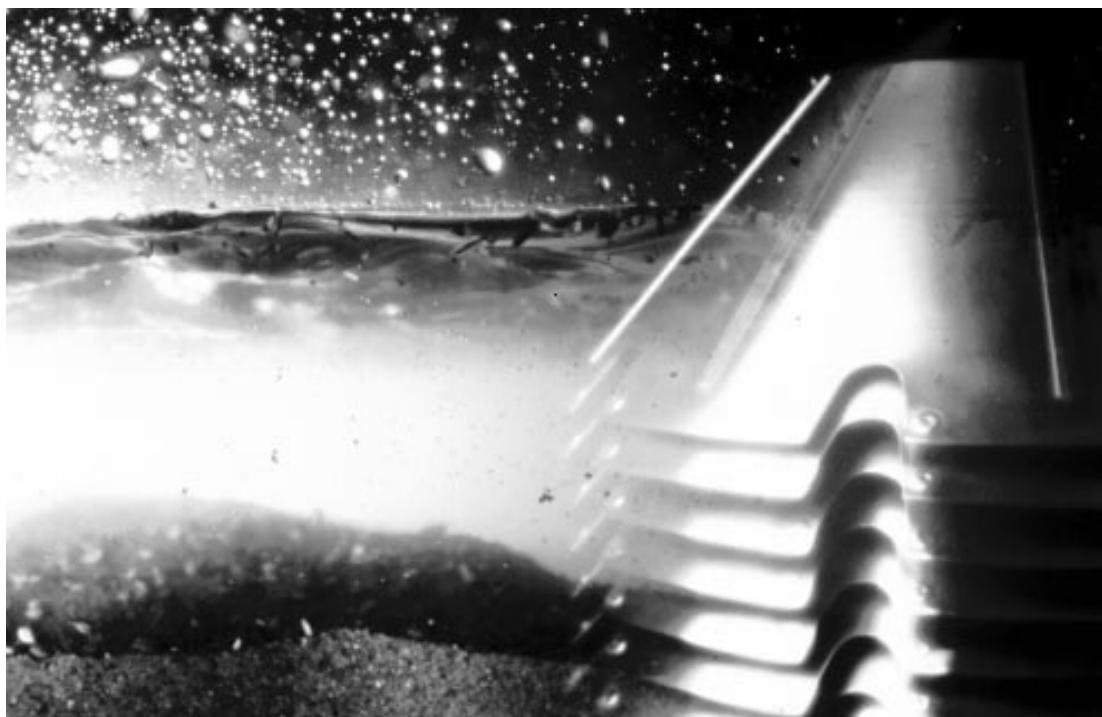
Uni Systems do Brasil Ltda

Serial No: 4158520

Drawing: 7952006

PI: 270.923

CH/FESX 512S-35CG



Separator Manual

Product No.
Book No.

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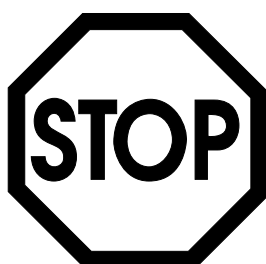
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Study instruction manuals and observe the warnings before installation, operation, service and maintenance.

Not following the instructions can result in serious accidents.

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



1 *Read this first*

This manual is designed for operators and service engineers working with the Alfa Laval separator CH/FESX 512S-35CG.

For information concerning the function of the separator, see chapter “3 Separator Basics” on page 15, and chapter “8 Technical Reference” on page 153.

If the separator has been delivered and installed by Alfa Laval as part of a processing system, this manual is a part of the system documentation. In this case, study carefully all the instructions in the system documentation.

In addition to this separator manual a *Spare Parts Catalogue, SPC* is supplied.

This separator manual consists of:

Safety Instructions

Pay special attention to the safety instructions for the separator. Not following the safety instructions can cause accidents resulting in damage to equipment and serious injury to personnel.

Separator Basics

Read this chapter if you are not familiar with this type of separator. This chapter contains the technical description and function description.

Operating Instructions

This chapter contains operating instructions for the separator only.



Separator Manual and Spare Parts Catalogue

Service Instructions

This chapter gives instructions for daily checks, cleaning, oil changes, servicing and check points.

Dismantling / Assembly

This chapter contains step-by-step instructions for dismantling and assembly of the separator for service and repair.

Trouble-tracing

Refer to this chapter if the separator functions abnormally.

If the separator has been installed as part of a processing system always refer to the trouble-tracing part of the system documentation first.

Technical Reference

This chapter contains technical data and drawings concerning the separator.

2 Safety Instructions



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

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

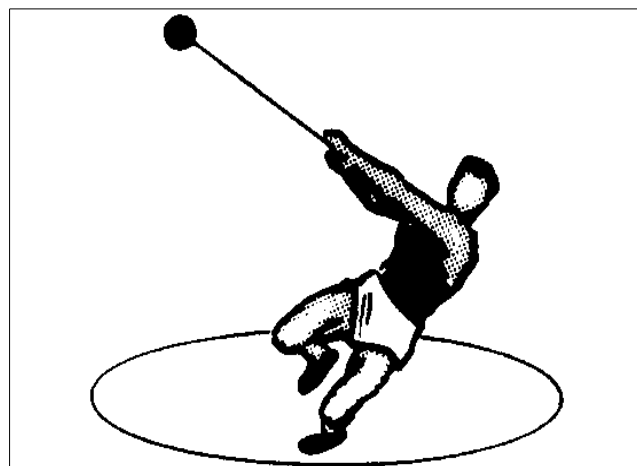
Manufacturing tolerances are extremely fine. Rotating parts are carefully balanced to reduce undesired vibrations that can cause a breakdown. Material properties have been considered carefully during design to withstand stress and fatigue.

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

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

The following basic safety instructions therefore apply:

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



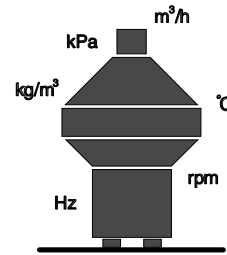


DANGER

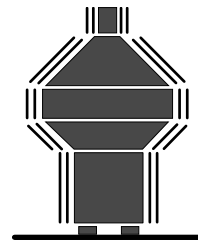


Disintegration hazards

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



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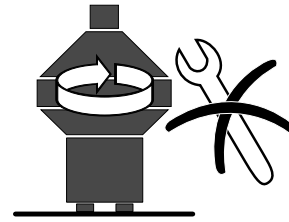
DANGER

Entrapment hazards

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

Electrical hazards

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



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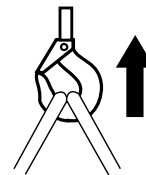
WARNING

Crush hazards

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

Noise hazards

- Use ear protection in noisy environments.



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CAUTION

Burn hazards

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

Cut hazards

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



S0055411



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Warning signs in the text

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



DANGER

Type of hazard

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



WARNING

Type of hazard

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



CAUTION

Type of hazard

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

NOTE

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



3 *Separator Basics*

Contents

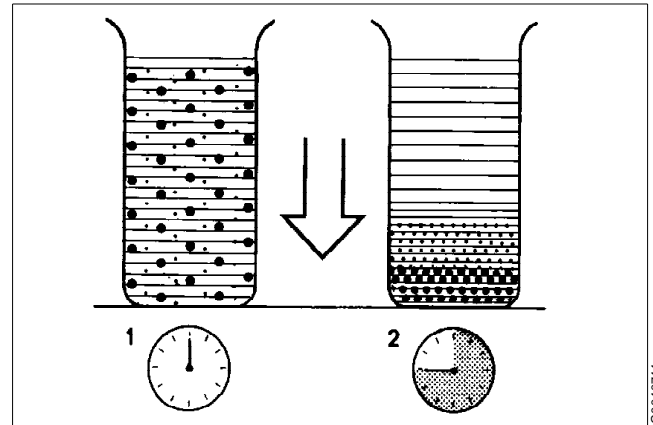
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3.1 Basic principles

The purpose of separation can be:

- to free a liquid of solid particles,
- to separate two mutually insoluble liquids with different densities while removing any solids presents at the same time,
- to separate and concentrate solid particles from a liquid.



Sedimentation by gravity

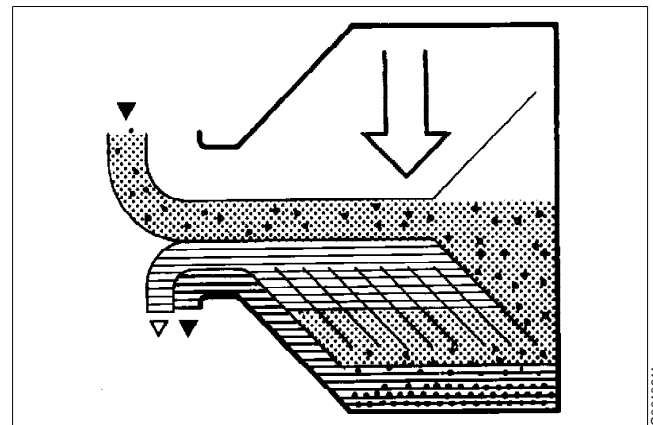
3.1.1 Separation by gravity

A liquid mixture in a stationary bowl will clear slowly as the heavy particles in the liquid mixture sink to the bottom under the influence of gravity.

A lighter liquid rises while a heavier liquid and solids sink.

Continuous separation and sedimentation can be achieved in a settling tank having outlets arranged according to the difference in density of the liquids.

Heavier particles in the liquid mixture will settle and form a sediment layer on the tank bottom.



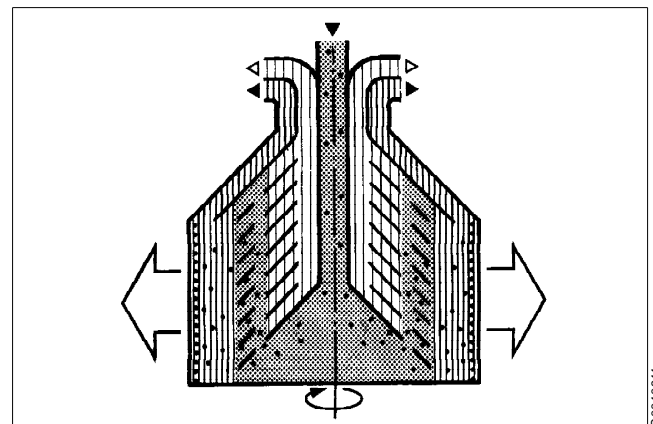
Sedimentation in a settling tank, with outlets making it possible to separate the lighter liquid parts from the heavier

3.1.2 Centrifugal separation

In a rapidly rotating bowl, the force of gravity is replaced by centrifugal force, which can be thousands of times greater.

Separation and sedimentation is continuous and happens very quickly.

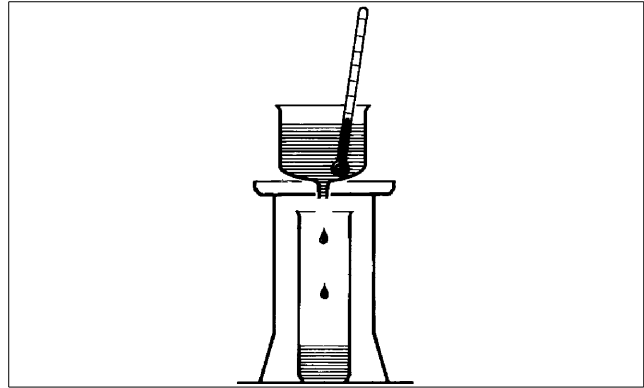
The centrifugal force in the separator bowl can achieve in a few seconds what takes many hours in a tank under influence of gravity.



The centrifugal solution

3.1.3 Separating temperatures

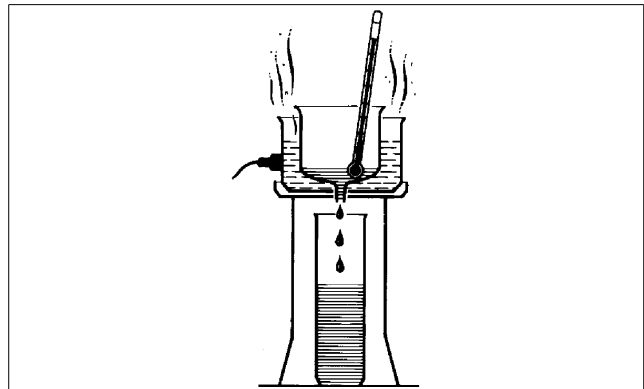
For some types of process liquids (e.g. mineral oils) a high separating temperature will normally increase the separation capacity. The temperature influences oil viscosity and density and should be kept constant throughout the separation.



High viscosity (with low temperature)

Viscosity

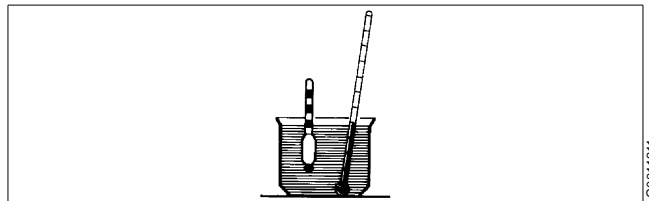
Low viscosity facilitates separation. Viscosity can be reduced by heating.



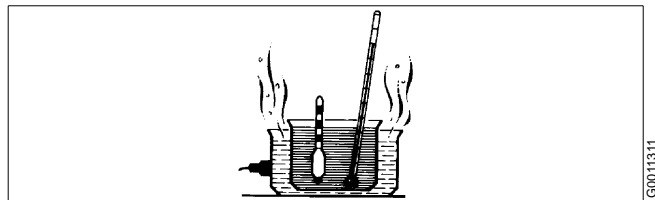
Low viscosity (with high temperature)

Density difference

The greater the density difference between two liquids, the easier the separation. The density difference can be increased by heating.



High density (with low temperature)



Low density (with high temperature)

3.1.4 Phase proportions

An increased quantity of heavy phase in a process liquid will influence the separating result through the optimum transporting capacity of the disc stack. An increased heavy phase content can be compensated for by reducing the throughput in order to restore the optimum separating efficiency.

3.1.5 Size and shape of particles

The round and smooth particle (A) is more easily separated out than the irregular one (B).

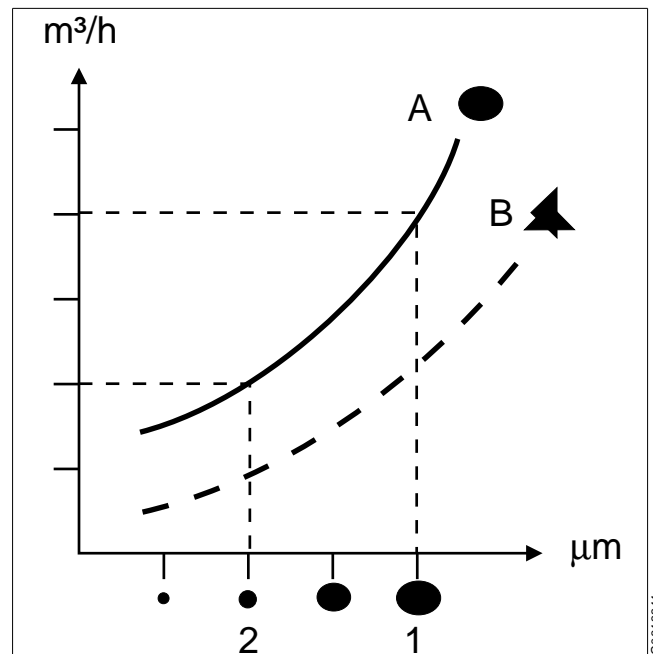
Rough treatment, for instance in pumps, may cause a splitting of the particles resulting in slower separation. Larger particles (1) are more easily separated than smaller ones (2) even if they have the same density.

3.1.6 The throughput

The throughput sets the time allowed for the separation. A better separation result can often be achieved by reducing the throughput, i.e. by increasing the settling time.

3.1.7 Disc stack

A neglected disc stack containing deformed discs or discs coated with deposits will impair the separating result.



Influence of size and shape

G0613311

3.2 Design and function

3.2.1 Overview

The separator comprises a processing part and a driving part. It is driven by an electric motor (11).

Mechanically, the separator machine frame is composed of a bottom part, a top part and a frame hood. The motor and separator are mounted on a common foundation (10) as shown in the illustration. The frame feet (7) are vibration damping.

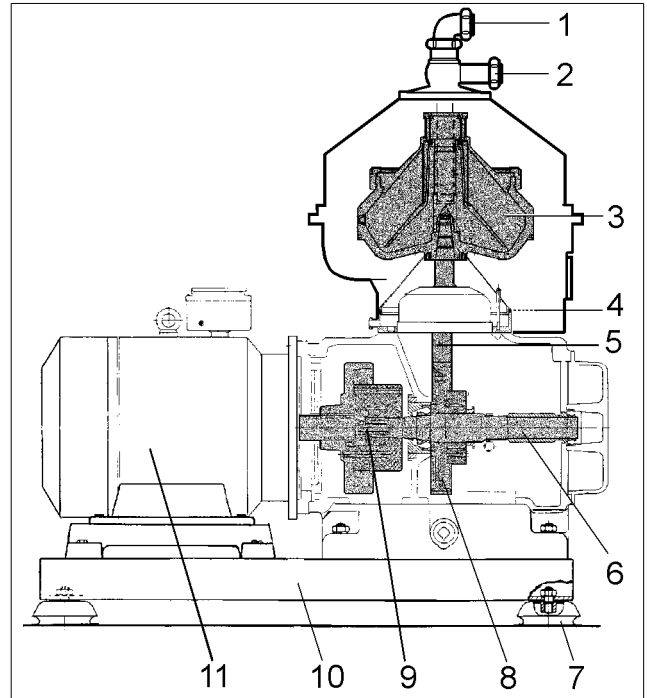
The bottom part of the separator contains the horizontal driving device (6), driving shaft with a rigid coupling (9), a worm gear (8) and a vertical spindle (5).

The bottom part also contains an oil bath for the worm gear, a brake and a revolution counter.

The frame top part and the frame hood contain the processing parts of the separator, the inlet (1), outlets (2 and 4) and piping.

The liquid is cleaned in the separator bowl (3). This is fitted on the upper part of the vertical spindle and rotates at high speed in the space formed by the frame top part and frame hood. The bowl also contains nozzles which empties the sludge from the bowl.

The main inlets and outlets are shown with connection numbers in the illustration on page 24. These numbers correspond with the numbers used in the connection list and the basic size drawing which can be found in chapter "8 Technical Reference" on page 153.



1. *Inlet device*
2. *Outlet, clean liquid*
3. *Bowl*
4. *Outlet device, sediment*
5. *Vertical driving device with bowl spindle*
6. *Horizontal driving device*
7. *Frame feet*
8. *Worm gear*
9. *Rigid coupling*
10. *Foundation*
11. *Electric motor*

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3.2.2 Mechanical power transmission

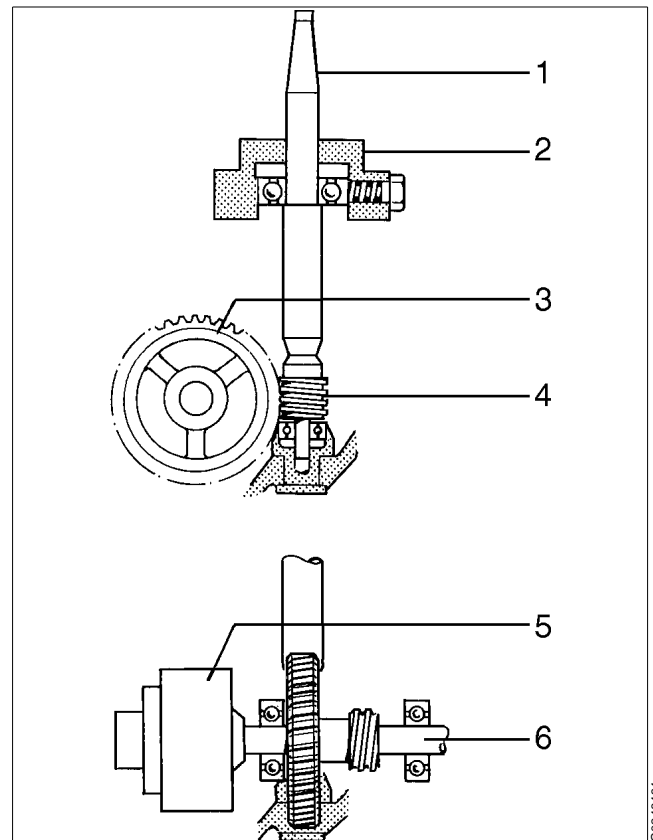
The main parts of the power transmission between motor and bowl are illustrated in the figure.

The transmission is fitted with a rigid coupling between the motor and worm wheel shaft. The motor is a special “control-torque motor”.

The worm gear has a ratio which increases the bowl speed several times compared with the motor speed. For correct ratio see chapter “8.1 Technical data” on page 155.

To reduce bearing wear and the transmission of bowl vibrations to the frame and foundation, the top bearing of the bowl spindle is mounted in a spring casing.

The worm wheel runs in a lubricating oil bath. The bearings on the spindle and the worm wheel shaft are lubricated by the oil splash produced by the rotating worm wheel.

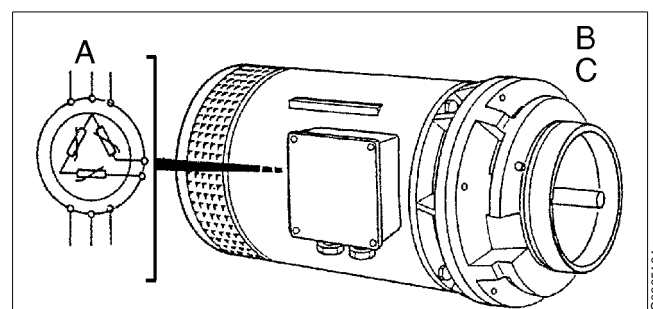


1. Bowl spindle
2. Top bearing and spring casing
3. Worm wheel
4. Worm
5. Rigid coupling
6. Worm wheel shaft

CT-motor (Control-Torque motor)

This separator has a rigid coupling and for this reason the motor must be able to endure long run-up times.

The motor supplied with the machine is of special design. Compared with a standard three phase motor with the same kW rating, it has a higher class of insulation, a higher rotor resistance and larger iron masses. These features counteract the temperature rise in the motor when starting. Furthermore, the motor is provided with thermal sensors in the form of thermistors in the stator windings. The thermistors must be connected to a special tripping device in the starter.



- A. Thermistors
- B. Run-up period: Y-connected
- C. Operation: D-connected

These special motors have been designed by Alfa Laval as “control-torque motors” - abbreviated to **CT-motors**.

These motors can normally make two starts (with separators) in succession without overheating. If the separator is slowed down immediately after two starts in succession, the motor must be allowed to cool down before it can start again. Cooling will take several hours.

The motor has been designed for star / delta starting, i.e. it must be connected in star throughout the acceleration period of the bowl. Switching from starting to operation position is normally performed by the equipment for speed monitoring.

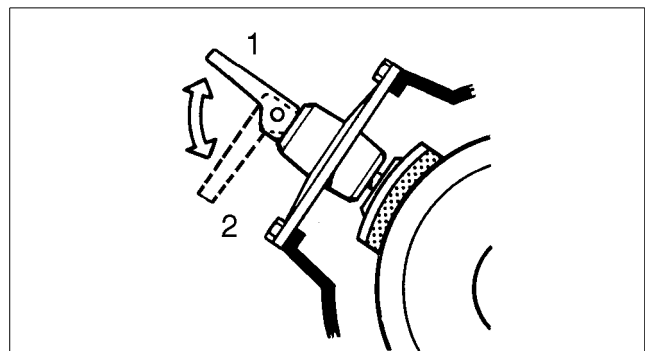
The overload protection (e.g. in the form of bimodal relays) in the starter must be connected into the D circuit. The protection must be inoperative during the run-up period.

An ammeter must be fitted near the separator or in the starter.

Brake

The separator is equipped with a brake to be used when stopping the separator. The use of the brake reduces the retardation time of the bowl and critical speeds will therefore be quickly passed.

The brake lining acts on the outside of the coupling pulley.



Applying (1) and releasing (2) of brake

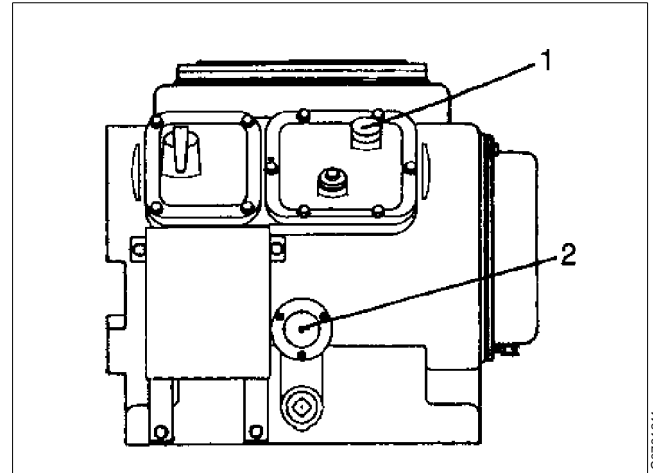
3.2.3 Sensors and indicators

Revolution counter

A revolution counter indicates the speed of the separator and is driven from the worm wheel shaft. The correct speed is needed to achieve the best separating results and for reasons of safety. The number of revolutions on the revolution counter for correct speed is shown in chapter “8.6 Revolution counter” on page 167. Refer to name plate for speed particulars.

Sight glass

The sight glass shows the oil level in the worm gear housing.

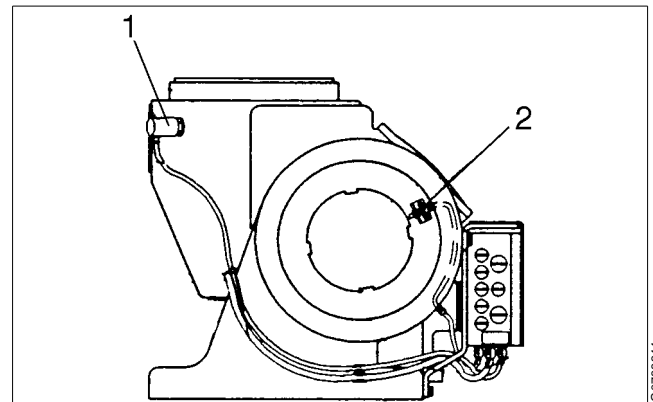


1. Revolution counter
2. Sight glass

Vibration sensor

The vibration sensor is of velocity type. The signal must be converted to a signal usable in the control system.

When any of the two limit values is exceeded appropriate countermeasures should be undertaken. The two levels are warning for unacceptable vibrations and safety stop respectively in case of extreme unbalance. The vibration levels are further described in chapter “8.4.3 Component description and Signal processing” on page 161.



1. Vibration switch
2. Speed sensor

Speed sensor

The speed sensor indicates the number of revolutions on the motor shaft. For correct speed, see “8.1 Technical data” on page 155.

3.2.4 Process main parts

Inlet and outlet device

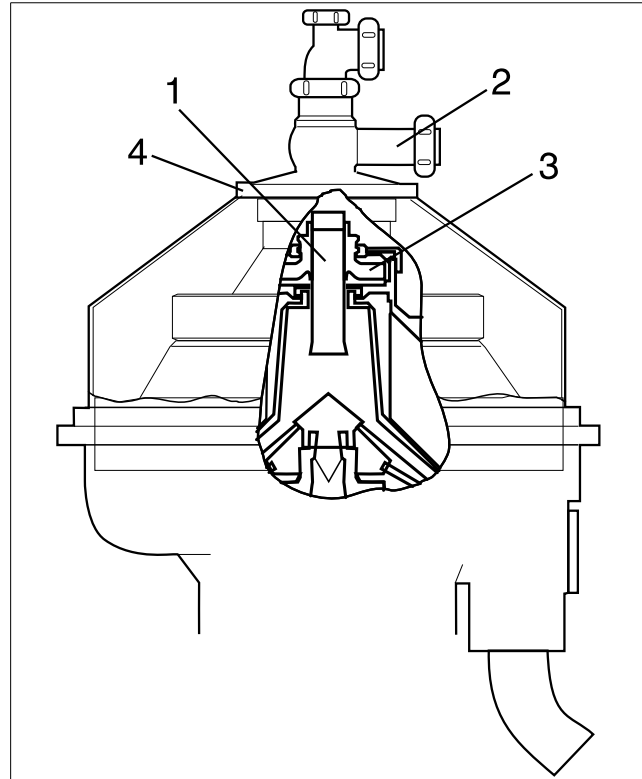
All inlet and outlet parts are stationary.

The in/outlet device comprises two pipes.

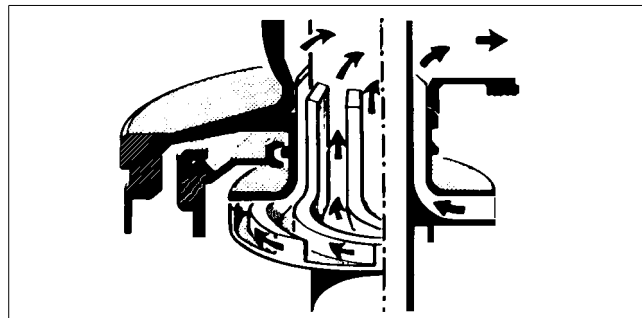
An inner pipe for the feed (1), and an outer pipe for the separated liquid (2). The outlet pipe is equipped with a paring disc (3), which is a stationary pump. The paring disc dips into the rotating liquid in the bowl and pares out liquid, i.e. the kinetic energy is converted to pressure by the paring disc.

It is essential that the paring disc is correctly positioned in relation to the bowl. The height of the entire in/outlet device can be adjusted by altering the number of adjusting rings (4).

See section "5.4.10 Height adjustment: Inlet and outlet device" on page 64.



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Paring disc

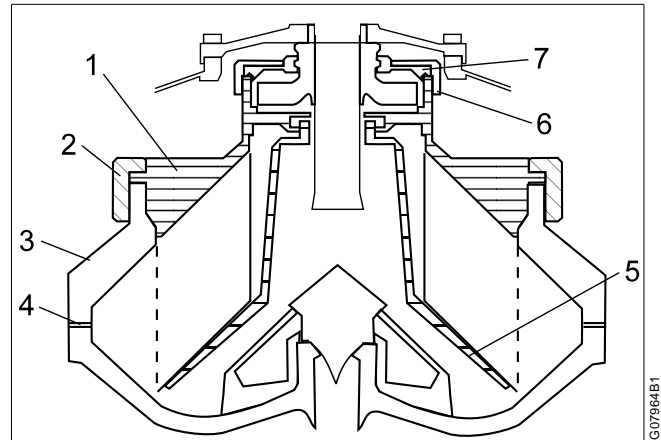
Separator bowl

The separator bowl is composed of the bowl body (3) and the bowl hood (1) which are held together by the large lock ring (2).

Discharge nozzles for the concentrate are mounted in the bowl periphery (4). Between the nozzles, wedge shaped filler pieces can be fitted to form solids pockets inside the bowl.

The distributor (5) holds the disc stack, i.e. a great number of discs between which the actual separation process takes place. To ensure that the discs are kept apart each disc has strips of spacers, caulks, on its upper side.

On the top of the bowl hood the small lock ring (6) holds the paring chamber (7) which contains the paring disc. This is the discharge device for the liquid.



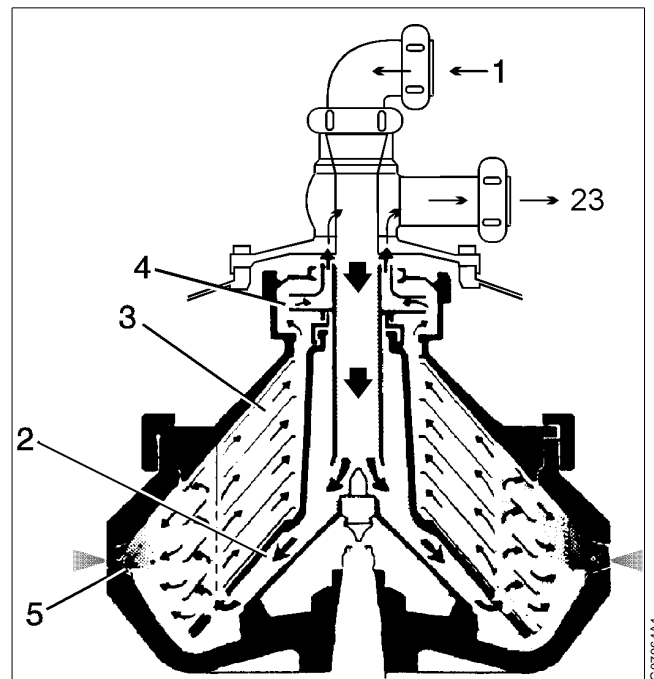
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3.2.5 Separating function

The suspension to be treated is continuously fed through the stationary inlet tube (1) into the rotating separator bowl. The suspension is accelerated to bowl speed by vanes in and under the distributor (2) before it enters the disc stack (3).

In the disc stack the particles which are heavier will separate and slide outwards along the discs. The clarified liquid moves towards the center of the bowl and exits through the paring disc (4) into the outlet pipe (23).

The particles which move towards the periphery of the bowl are guided by the filler pieces towards the nozzles (5). The particles, i.e. the solids, or concentrate, are discharged continuously towards the screen into the frame hood and then out through the outlet in frame upper part.



G07964A1

3.3 Definitions

Back pressure	Pressure in the separator outlet.
Clarification	Liquid/solids separation with the intention of separating particles, normally solids, from a liquid having a lower density than the particles.
Counter pressure	See Back pressure.
Density	Mass per volume unit. Expressed in kg/m ³ at specified temperature, normally at 15 °C .
Intermediate Service (IS)	Overhaul of separator bowl and inlet/outlet. Renewal of seals in bowl inlet/outlet.
Major Service (MS)	Overhaul of the complete separator, including bottom part (and activities included in an Intermediate Service, if any). Renewal of seals and bearings in bottom part.
Sediment (sludge)	Solids separated from a liquid.
Throughput	The feed of process liquid to the separator per time unit. Expressed in m ³ /h or litre/h.
Viscosity	Fluid resistance against movement. Normally expressed in centistoke (cSt = mm ² /second), at specified temperature.

4 *Operating Instructions*

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4.1 Operating routine

These operating instructions are related only to the separator itself. If the separator is a part of a system or module follow also the instructions for the system.

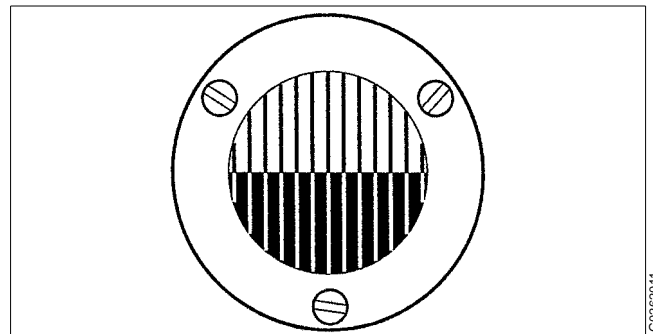
4.2 Before first start

Technical demands for connections and logical limitations for the separator is described in the chapter "8 Technical Reference" on page 153 in the documents:

- Technical data
- Connection list
- Interface description
- Basic size drawing
- Foundation drawing

Before first start the following check points shall be checked:

1. Ensure the machine is installed correctly and that feed-lines and drains have been flushed clean.
2. Fill oil in the gear housing, see "5.7 When changing oil" on page 71.
3. Fill up exactly to the middle of the sightglass. Use the correct grade of oil. The separator is delivered without oil in the worm gear housing. For grade and quality, see "8.9 Lubricants" on page 171.
4. Select suitable nozzle diameter. See "8.5 Outlet nozzles" on page 166.



Fill oil in the gear housing

4.3 Ready for start

To achieve the best separation results the bowl should be in a clean condition.

1. Make sure that the nozzle diameter suits the process liquid to be treated. See nozzle capacities in “8.5 Outlet nozzles” on page 166.
2. Check that the bolts of the frame hood are fully tightened.
3. Check that all inlet and outlet connections have been correctly made and properly tightened.

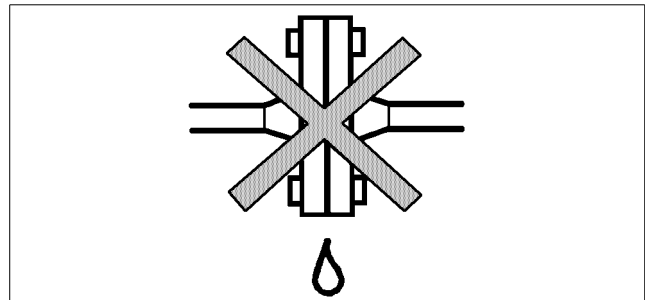


CAUTION

Burn hazards

Make sure that hose connections and flange couplings are properly assembled and tightened.

Escaping hot liquid can cause severe burns.



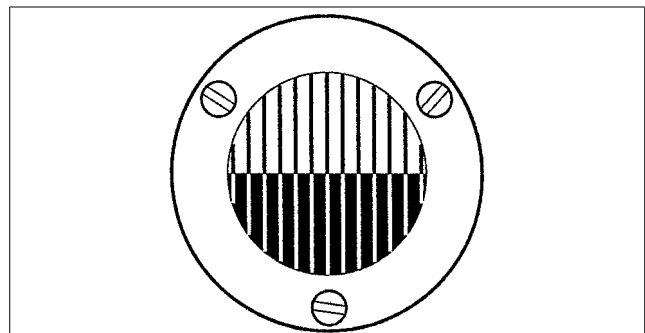
Check for leakages (not admitted)

4. Check that the oil level is exactly in the middle of the sight glass.

NOTE

During running the oil level should be slightly below the middle of the sight glass.

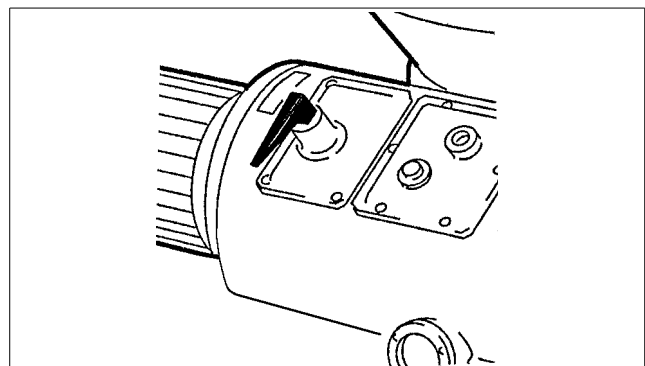
Too much or too little oil can damage the separator bearings.



Check the oil level

Fill if necessary, see “5.7 When changing oil” on page 71. See also chapter “8.9 Lubricants” on page 171, for a list of recommended oils.


5. Make sure that the brake is released.



Release the brake

4.4 Start

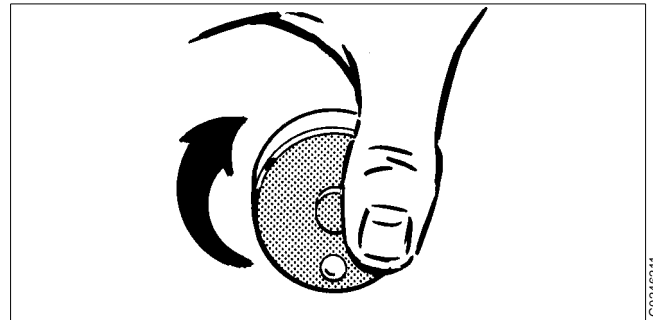
1. Start the separator.
2. Fill the bowl with safety/back up liquid. The flow must be 110% of the nozzle capacity. See "8.5 Outlet nozzles" on page 166. If the bowl and nozzles are perfectly cleaned, it is possible to start without flow.
3. Check the direction of rotation of the bowl. The revolution counter must turn clockwise.



DANGER


Disintegration hazards

When power cables have been connected, always check direction of rotation. If incorrect, vital rotating parts could unscrew.



Check for correct direction of rotation

4. Check the separator for vibration. Some vibration can occur for short periods during the starting cycle, when the separator passes through its critical speeds. This is normal and passes without danger. Try to learn the vibration characteristics of the critical speed pattern.

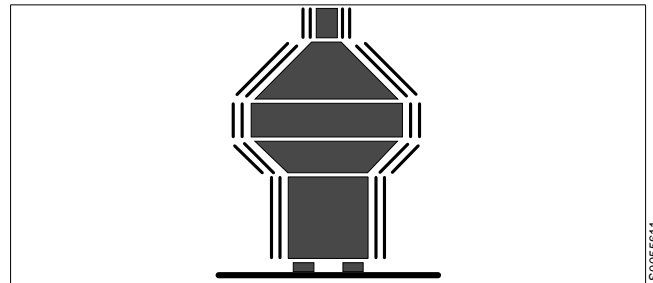


DANGER

Disintegration hazards

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


The cause of the vibration must be identified and rectified before the separator is restarted. Excessive vibration may be due to incorrect assembly or insufficient cleaning of the bowl.



Check for vibration

In the trouble-tracing chapter "7 Trouble-Tracing" on page 147, a number of causes are described that can create vibration.

5. When the machine has reached full speed replace the safety/back up liquid gradually with process liquid.




DANGER

Disintegration hazard

During start, separation and stop the bowl must be kept filled. If the feed of process liquid is interrupted supply safety/back up liquid instead.

4.5 Running



DANGER

Disintegration hazard

During separation and as long as the bowl is rotating, the liquid feed must exceed the output from the nozzles.

During operation, check

- oil level,
- speed,
- power consumption,
- throughput.

For daily condition checks, see “5.2.1 Daily checks” on page 41.

4.6 Normal stop

1. Shut off the supply of process liquid and replace it gradually with safety/back up liquid.

NOTE

Turn on the safety/back up liquid before the process liquid valve is closed. (The flow must be 110% of the nozzle capacity). See "8.5 Outlet nozzles" on page 166.

The bowl must be filled with liquid throughout the stopping period.

2. Stop the separator.
3. Apply the brake.
4. To facilitate bowl cleaning, the temperature of the safety/back up liquid should be raised and the rate of feed varied so as to fill and empty the bowl at regular intervals.
5. The outside of the bowl and the space around it are flushed through the inlet (462) during the running-down period.
6. Shut off the supply of liquid when the speed has dropped to **100 r/min**.
7. Release the brake.



DANGER

Entrapment hazards

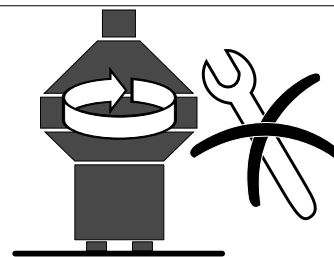
Make sure that rotating parts have come to a **complete standstill** before starting **any** dismantling work.



DANGER

Disintegration hazard


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



The separator must not be dismantled before standstill

S0051111

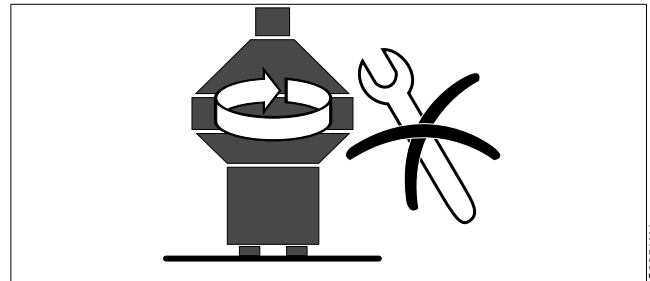
4.7 Emergency stop



DANGER

Entrapment hazards

Make sure that rotating parts have come to a **complete standstill** before starting **any** dismantling work. The revolution counter and the motor fan indicate if the separator parts are rotating or not.

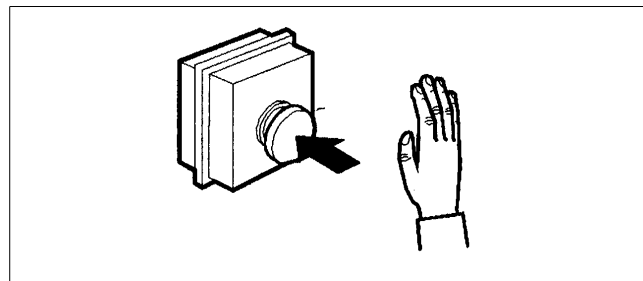


The separator must not be dismantled before standstill


If the separator begins to vibrate excessively during operation, stop it immediately by pushing the emergency stop. The separator motor is switched off.

Keep the bowl filled during the run-down to minimize the excessive vibration. (The flow must be 110% of the nozzle capacity). See "8.5 Outlet nozzles" on page 166.

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



Push the emergency stop if excessive vibration



DANGER

Disintegration hazards

After an emergency stop the cause of the fault must be identified.

If all parts have been checked and the cause remains unclear, contact Alfa Laval for advice.

5 Periodic maintenance

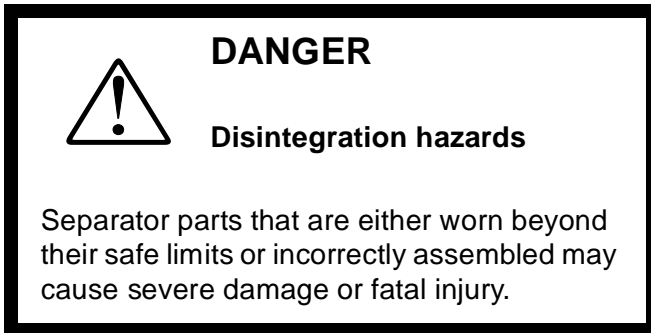
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5.1 Introduction

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



5.1.1 Maintenance intervals

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

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

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

Oil change

The oil change interval is every **2000 hours** or at least once every year if the total number of operating hours is less than **2000 hours**.

Intermediate Service (IS)

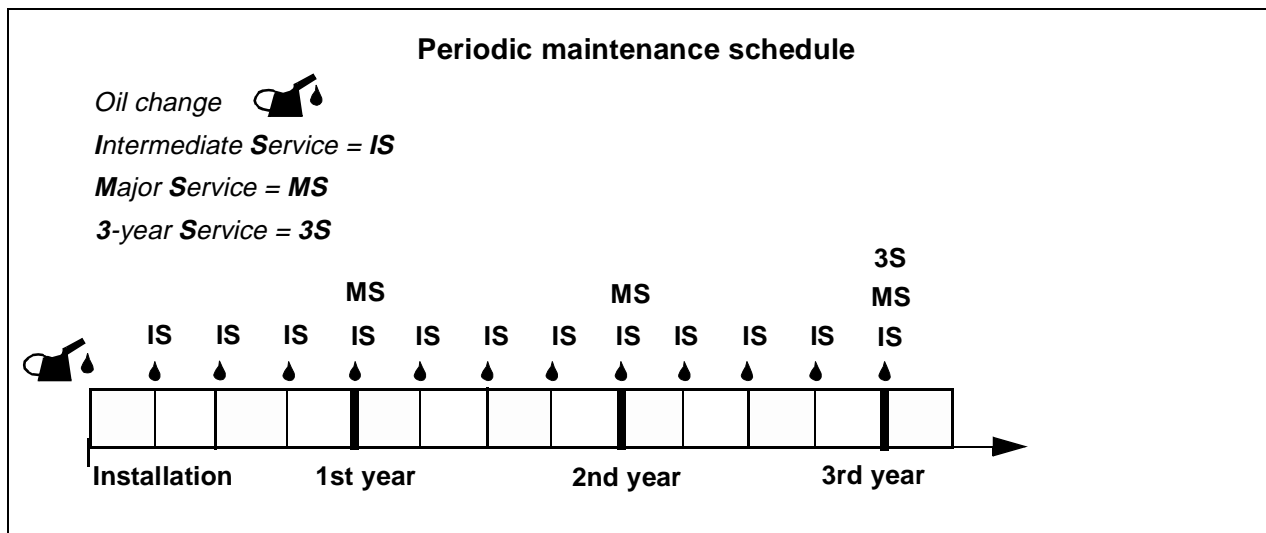
Intermediate Service consists of an overhaul of the separator bowl and inlet/outlet device every **3 months** or **2000 operating hours**. Seals in bowl and gaskets in inlet/outlet device are renewed.

Major Service (MS)

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

3-year Service (3S)

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



5.1.2 Maintenance procedure

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

An Intermediate and Major Service should be carried out in the following manner:

1. Dismantle the parts as mentioned in the maintenance log and described in chapter “6 Dismantling/Assembly” on page 81.
Place the separator parts on clean, soft surfaces such as pallets.
2. Inspect and clean the dismantled separator parts according to the maintenance log.
3. Fit all the parts delivered in the service kit while assembling the separator as described in chapter “6 Dismantling/Assembly” on page 81. The assembly instructions have references to check points which should be carried out before and during the assembly.



DANGER

Disintegration hazards

No modifications are to be made to any part of the separator by machining or any other means as this can affect material strength or alter the fine tolerances necessary for safe operation.



DANGER

Disintegration hazards

Worn, eroded or improperly **assembled** machine parts may cause severe damage. Follow maintenance instructions and check for possible damage.

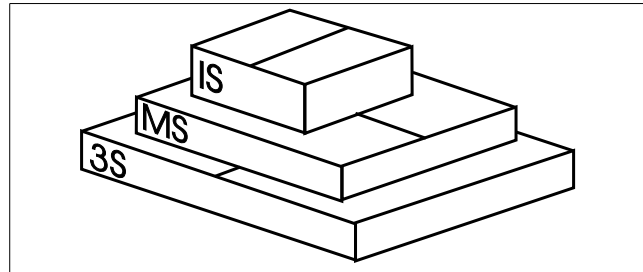
5.1.3 Service kits

Special service kits are available for Intermediate Service (IS) and Major Service (MS), as well as for servicing the frame feet (3S).

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

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

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



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

NOTE

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

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



DANGER

Disintegration hazards

Use of imitation parts may cause severe damage.

5.2 Maintenance Logs

5.2.1 Daily checks

The following steps should be carried out daily.

Main component and activity	Part	Page	Notes
Inlet and outlet			
Check for leakage	Connecting housing	–	
Separator bowl			
Check for vibration and noise		75	
Horizontal driving device			
Worm wheel shaft and gear casing			
Check	Oil level in gear housing	74	
Electrical motor			
Check for heat, vibration and noise		1)	

1) See manufacturer's instruction

5.2.2 Oil change

The oil change and check of worm gear should be carried out every **2000 hours** of operation.

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

Main component and activity	Part	Page	Notes
Horizontal driving device			
Worm wheel shaft and gear housing			
Check	Worm wheel and worm	71	
Renew	Oil ¹⁾ in gear housing	74	

1) See chapter "8.9 Lubricants" on page 171 for further information.

When the separator is running for short periods, the lubricating oil must be changed every 12 months even if the total number of operating hours is less than 2000 h.

5.2.3 Intermediate Service (IS)

Name of plant:

Local identification:

Separator: CH/FESX 512S-35CG

Manufacture No./Year:

Total running hours:

Product No:

881119-01-03

Date:

Signature:

Main component and activity	Part	Page	Notes
Inlet and outlet			
Clean and inspect	Connecting house	–	
Renew	O-rings and sealings	–	
Separator bowl			
Clean and check	Lock rings	53	
	Bowl hood	–	
	Bowl discs	68	
	Distributor	–	
	Bowl body nave	51	
	Bowl body	52	
	Nozzles and holders	59	
Check	Corrosion	47	
	Cracks	49	
	Erosion	50	
	Disc stack pressure	62	
Renew	O-rings and sealings	–	
Vertical driving device			
Clean and check	Bowl spindle taper	51	
Horizontal driving device			
Worm wheel shaft and gear housing			
Check	Worm wheel and worm	71	
Renew	Oil in gear housing	74	
	Oil drain plug packing	102	
Electrical motor			
Lubrication (if nipples are fitted)	See sign on motor	–	

Main component and activity	Part	Page	Notes
Signs and labels on separator Check attachment and legibility	Safety label on hood Direction of rotation arrow Power supply frequency	- - -	
Monitoring equipment (option) Function check	Vibration switch	75	

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

5.2.4 Major Service (MS)

Name of plant:

Local identification:

Separator: CH/FESX 512S-35CG

Manufacture No./Year:

Total running hours:

Product No:

881119-01-03

Date:

Signature:

Main component and activity	Part	Page	Notes
Inlet and outlet			
Clean and inspect	Connecting house	–	
Renew	O-rings and sealings	–	
Separator bowl			
Clean and check	Lock rings	56	
	Bowl hood	–	
	Bowl discs	68	
	Distributor	–	
	Bowl body nave	51	
	Bowl body	52	
	Nozzles and holders	59	
Check	Corrosion	47	
	Cracks	49	
	Erosion	50	
	Disc stack pressure	62	
Renew	O-rings and sealings	–	
Vertical driving device			
Clean and check	Bowl spindle taper	51	
	Buffer springs and ball bearing housing	64	
Check	Radial wobble of bowl spindle	60	
Renew	Spindle bearings, O-rings and rubber buffers	76, 106	

Main component and activity	Part	Page	Notes
Horizontal driving device			
Worm wheel shaft and gear housing			
Check	Worm wheel and worm	71	
	Radial wobble of worm wheel shaft	63	
Renew	Bearings, O-rings, sealings	76	
	Oil in gear housing	74	
Brake			
Clean and check	Spring and brake shoe	61	
Renew	Friction pad	61	
Electrical motor			
Lubrication (if nipples are fitted)	See sign on motor	–	
Signs and labels on separator			
Check attachment and legibility	Safety label on hood	-	
	Direction of rotation arrow	-	
	Power supply frequency	-	
Monitoring equipment (option)			
Function check	Vibration switch	75	
Adjustment	Speed sensor		

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

5.2.5 3-year Service (3S)

Renew the frame feet as described in “6.9 Frame feet” on page 143. The 3-year service should be carried out in conjunction with a Major Service (MS). The extent of the 3-year service is the same as for a major service plus renewing the parts included in the 3-year Service kit (3S).

5.3 Check points at Intermediate Service (IS)

5.3.1 Corrosion

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



DANGER

Disintegration hazard

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

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

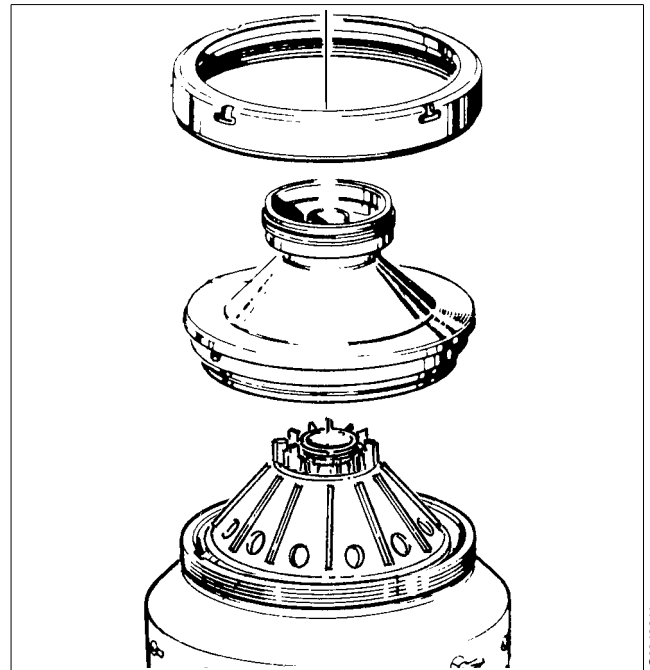
Cracks or damage forming a line should be considered as being particularly hazardous.

Non-stainless steel and cast iron parts

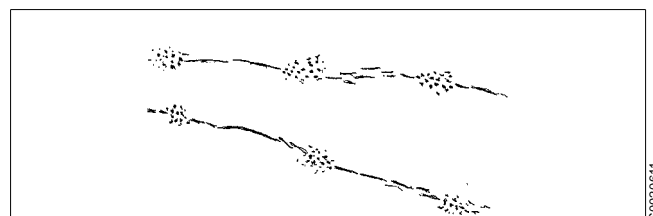
Corrosion (rusting) can occur on unprotected surfaces of non-stainless steel and cast iron. Frame parts can corrode when exposed to an aggressive environment.

Stainless steel

Stainless steel parts corrode when in contact with either chlorides or acidic solutions. Acidic solutions causes a general corrosion. The chloride corrosion is characterised by local damage such as pitting, grooves or cracks.



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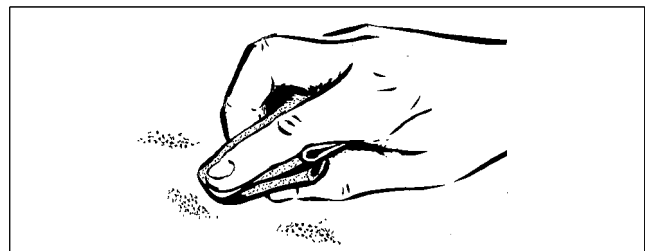
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The risk of chloride corrosion is higher if the surface is:

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

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

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



Polish corrosion marks to prevent further damage

50220511



DANGER

Disintegration hazard

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

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

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

Other metal parts


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

5.3.2 Cracks

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

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

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



DANGER

Disintegration hazard

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


Always replace a part if cracks are present.

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

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

5.3.3 Erosion

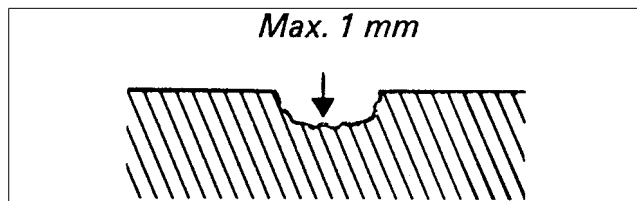
Erosion can occur when particles suspended in the process liquid slide along or strike against a surface. Erosion can become intensified locally by flows of higher velocity.



DANGER

Disintegration hazard

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



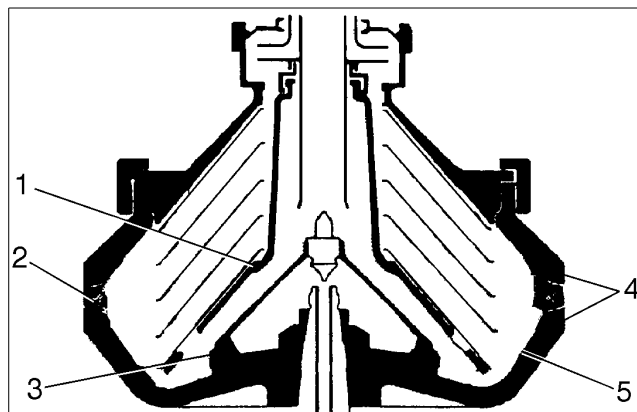
Always contact your Alfa Laval representative if the largest depth of any erosion damage exceeds 1.0 mm. Valuable information as to the nature of the damage can be recorded using photographs, plaster impressions or hammered-in lead.


Erosion is characterised by:

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

Surface on particularly subjected to erosion are:

1. the underside of the distributor in the area of the distribution holes and the wings,
2. nozzles,
3. the outside of the bowl body,
4. the inside of the bowl body.





DANGER

Disintegration hazard

Erosion damage can weaken parts by reducing the thickness of the metal.
Replace the part if erosion can be suspected of affecting its strength or function.

5.3.4 Spindle top and bowl body nave

Impact marks on the spindle cone or in the bowl body nave can cause the separator to vibrate when running.

Rust can cause the bowl to stick firmly to the spindle cone and make dismantling very difficult.

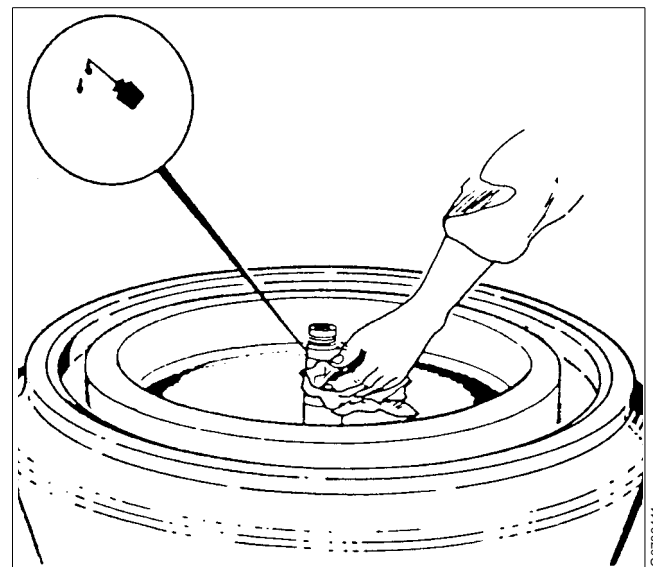
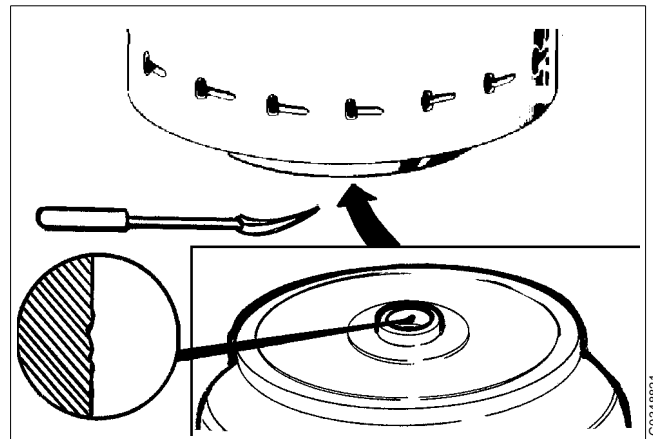
Both the spindle top and the bowl nave should be carefully inspected if the cartridge has been dismantled or if the bowl runs roughly.

1. Clean the bowl body nave and the spindle taper with a suitable degreasing agent.
2. Remove any impact marks with a scraper and/or whetstone.

NOTE

Always use the scraper with great care. The conicity must not be marred.

3. Remove any rust by using a fine-grain emery cloth of approximately 320 grade.
4. Finish with polishing paper of approximately 600 grade.
5. Whenever fitting the bowl body on the spindle first apply a few drops of oil to the spindle cone for corrosion protection reasons and then wipe it with a clean cloth.



5.3.5 Lock ring, bowl hood and bowl body

Regular priming of areas subject to excessive wear will eliminate the risk of seizure, prolong lifetime and guarantee better performance of the machine.

Threads, guiding and contact surfaces to be primed are indicated by broad lines in the illustration.

Recommended materials for the priming procedure:

- Degreasing agent
- Lubricating paste or spray Molykote D321R
- Clean rags

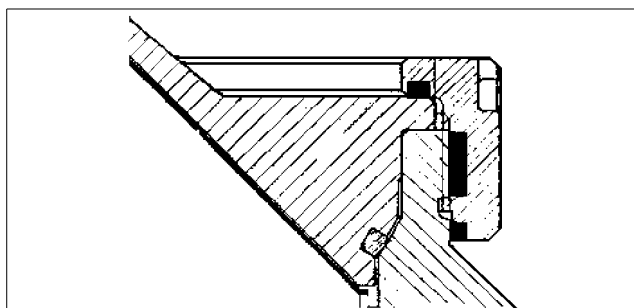
The priming procedures are valid for all surfaces to be primed but these below refer specifically to the large lock ring.

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

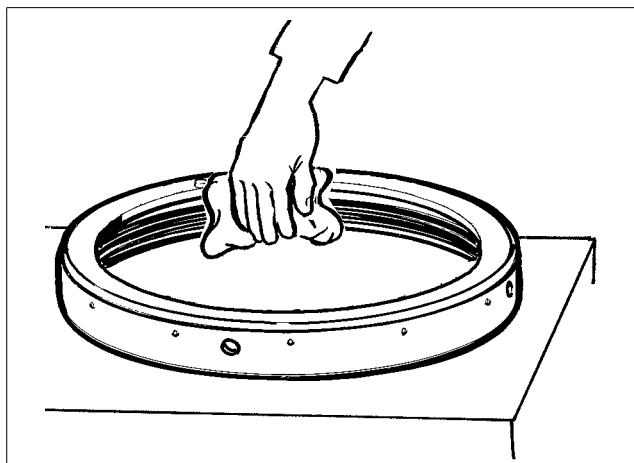
2. Apply Molykote D321R to the threads, locating and contact surfaces and let the ring dry for approximately 15 minutes.



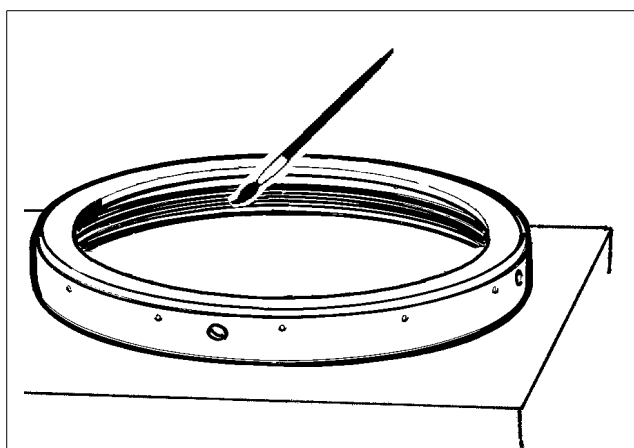
Molykote D321 R



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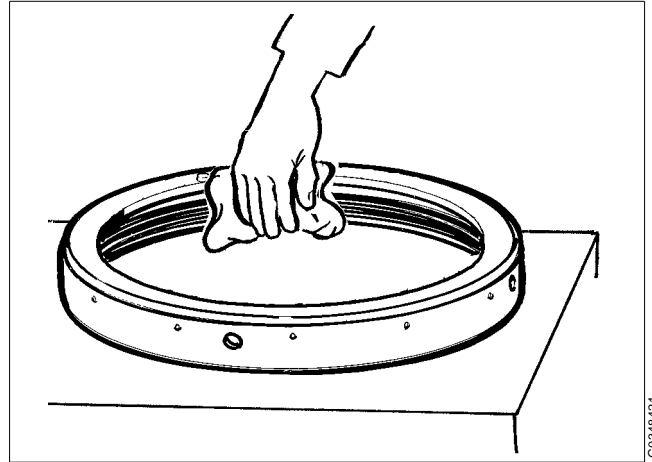


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G0348731

- Polish the Molykote into the surface with a clean rag. The black spray should look like well-polished black shoe cream when properly performed.



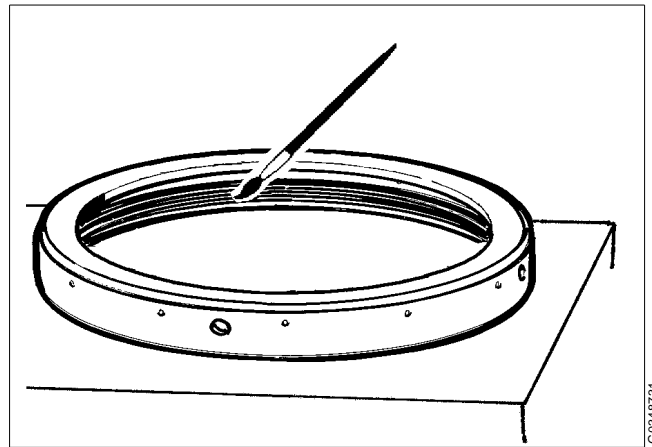
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- Apply Molykote D321R to the same surfaces of the lock ring a second time and let it dry for approximately 15 minutes.



Molykote D321 R


- Repeat the polishing procedure as above.
- Proceed in the same way with the threads of the bowl body and the locating surfaces and threads of the bowl hood.



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5.3.6 Thread check and repairing

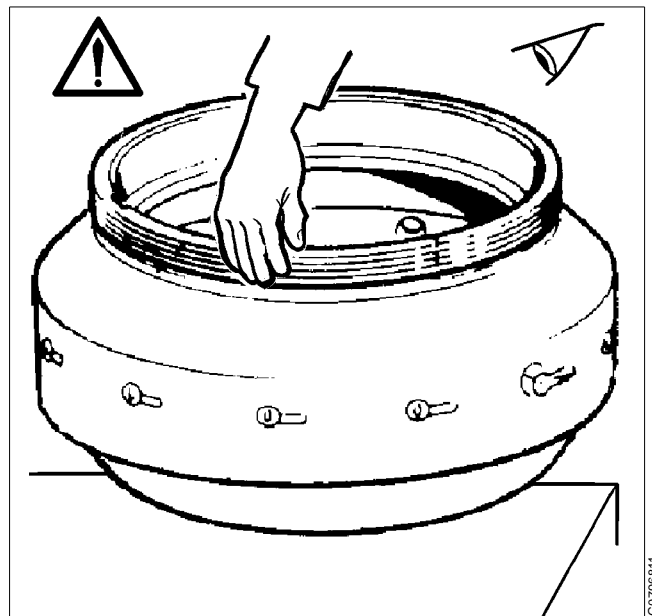
- Inspect the threads for burrs and protrusions caused by impact.



CAUTION

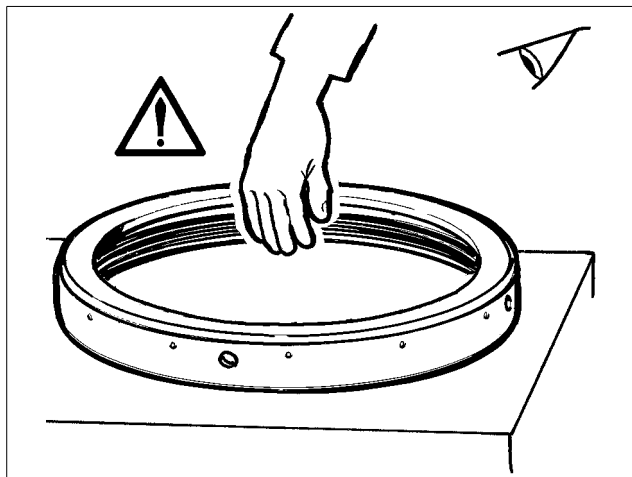
Cut hazard

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



G0796811

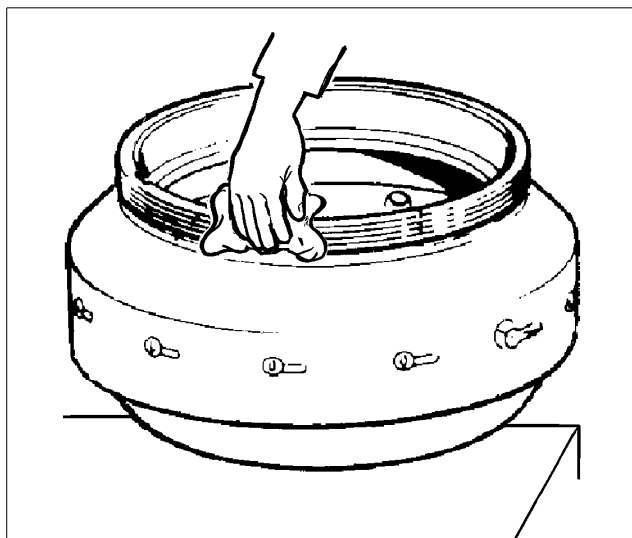
If any damage is apparent, continue by carrying out the steps below.



2. Clean the threads, contact and guiding surfaces thoroughly with white mineral spirit, cleaning kerosene or equivalent until the last clean rags being used remain unmarked.

NOTE

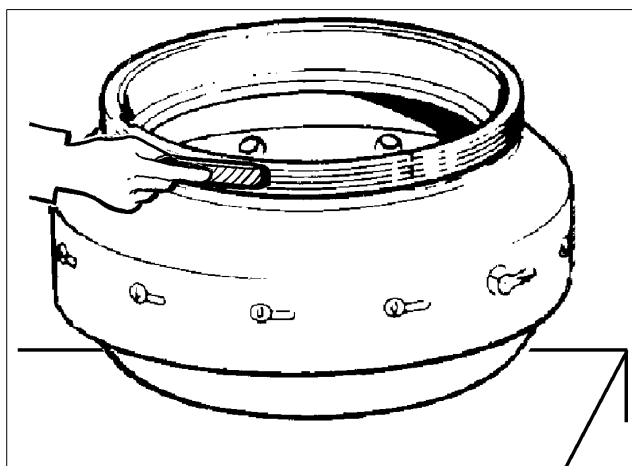
If the cleaning procedure is not carried out with great care and attention, the final results will be of minor value only.



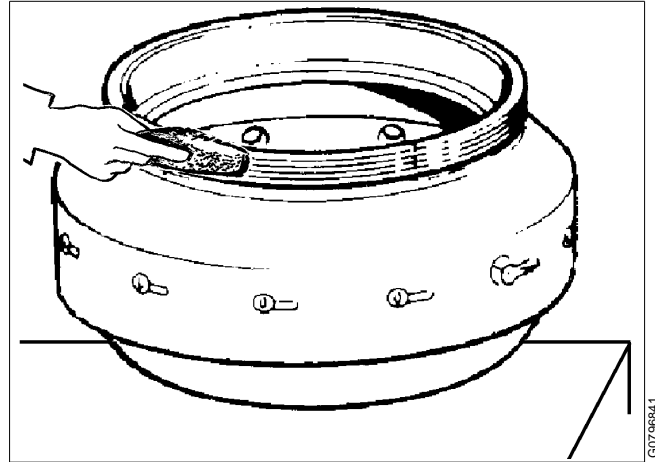
3. Remove the seizure damage material on the surface carefully by hand. Do not use rotating files or the like.

NOTE

If the seizure damage is large, first use a fine single-cut file. Use this with great care and attention otherwise more severe damage may be caused.

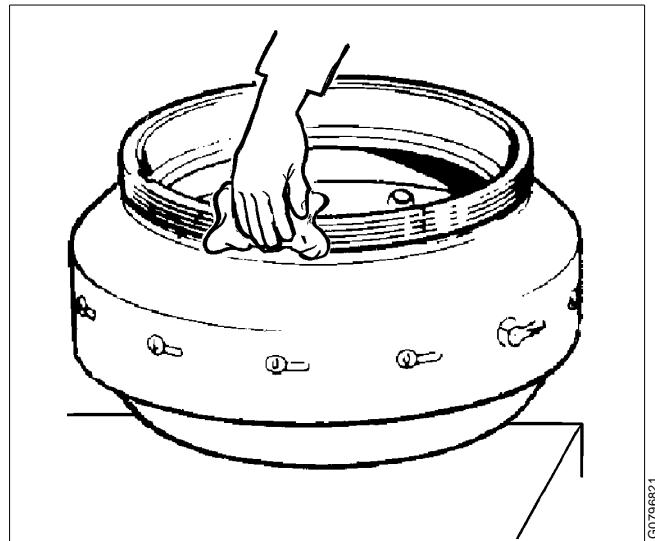


4. To smooth off the edges and to remove any burnt-in impurities, use a whetstone or a fine-grain emery cloth of approximately 240 grade.



G0796841

5. Finish the repair by polishing the damage spot with a soft, clean rag and brush wax. It is recommended that the whole area where seizure damage may occur be polished. The polishing will smooth out the complete damage and even out the deepest parts.




G0796821

6. Proceed in the same way with the large lock ring threads.

5.3.7 Checking of alignment marks

The relative positions of the alignment marks on the bowl hood and the large lock ring give a good indication of the amount of thread wear present, if an extra disc should be added or one removed, or when maintenance is required.

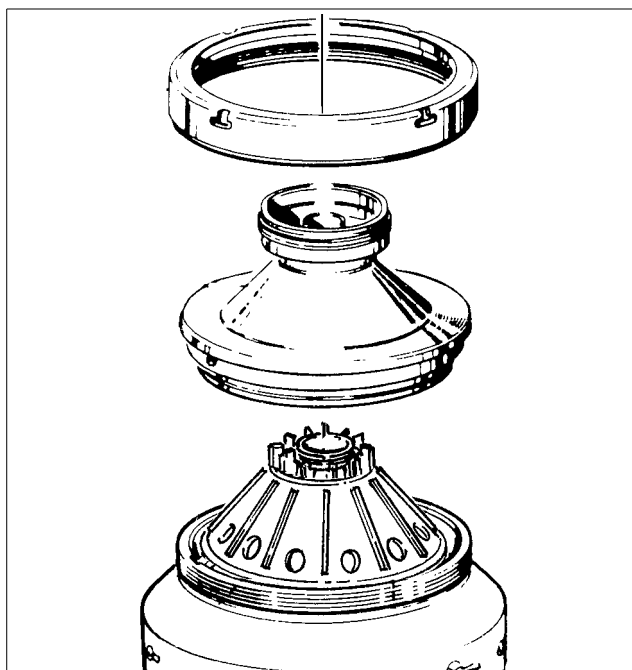


DANGER

Disintegration hazard

Wear on large lock ring thread must not exceed safety limit.

ϕ -mark on lock ring must not pass opposite ϕ -mark by more than the specified distance.

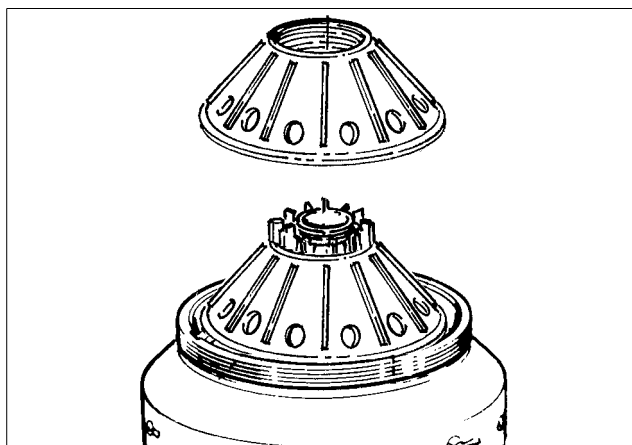


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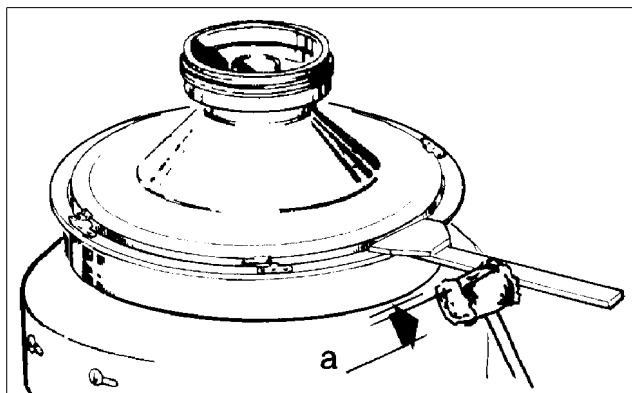
NOTE

The following procedure must only be performed when all parts have been cleaned, any damages remedied and surfaces lubricated according to lubrication instructions.

1. Remove the large lock ring and the bowl hood.
2. Remove a number of bowl discs from the disc stack to make sure that no disc stack pressure will be present in the following, or lift out the distributor with the whole disc stack.
3. Replace the bowl hood without the O-ring. Make sure that the bowl hood is properly centered and aligned in the bowl body.



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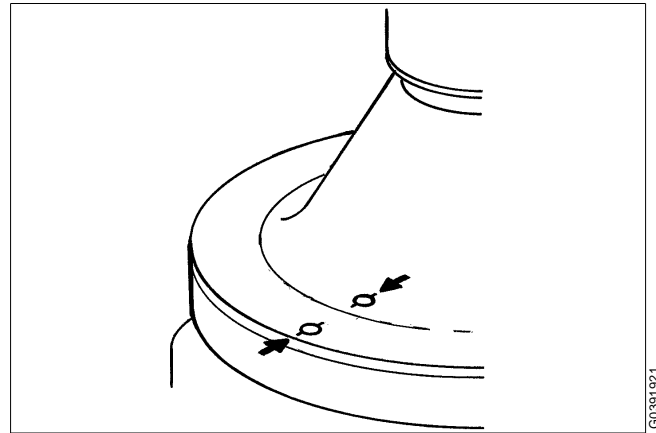
4. Screw the large lock ring onto the bowl with the lock ring spanner. Tighten by hand only. Then strike lightly with a hammer, one or two blows to make sure that the parts butt against each other.

5. Note the position of the alignment marks (ϕ) and check the alternatives (a, b, c) below

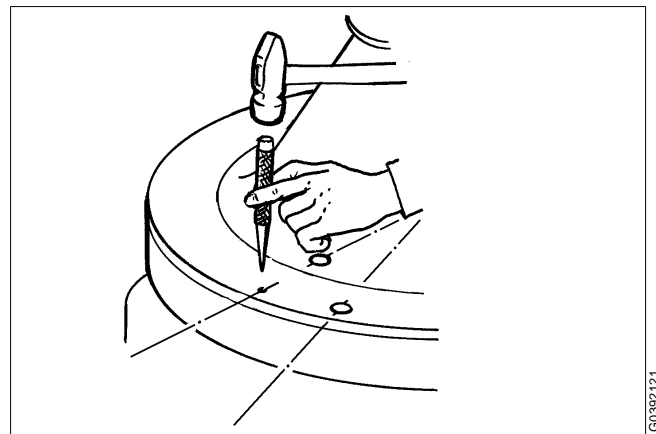
When the threads are worn, tightening the lock ring will cause the alignment mark on the lock ring to pass beyond the mark on the bowl hood.

If the marks don't align it might indicate that the parts are not properly engaged or not sufficiently cleaned.

a. In a new bowl, the alignment marks should be exactly opposite each other as shown in the illustration.



b. If the mark on the lock ring passes the mark on the bowl hood by less than 25°, a new alignment mark should be punched-in on the lock ring at the new position.

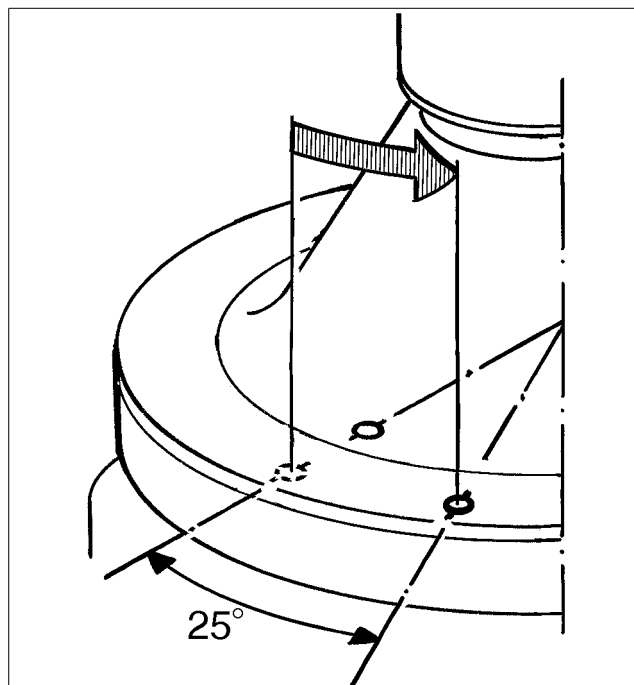


NOTE

Do not grind off the old mark but mark it in some way so that it cannot be mistaken for the new mark.

- c. When the alignment mark on the lock ring passes the original alignment mark on the bowl hood by more than 25° , an Alfa Laval representative must be contacted immediately.

If the alignment marks are illegible, contact an Alfa Laval representative immediately for determination of the extent of thread wear and for the punching of new alignment marks.



25° corresponds to 100 mm

5.3.8 Disc stack pressure

NOTE

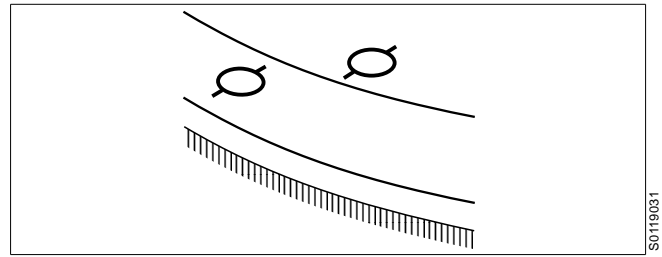
Ensure that the disc stack pressure is sufficient to maintain bowl balance.

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

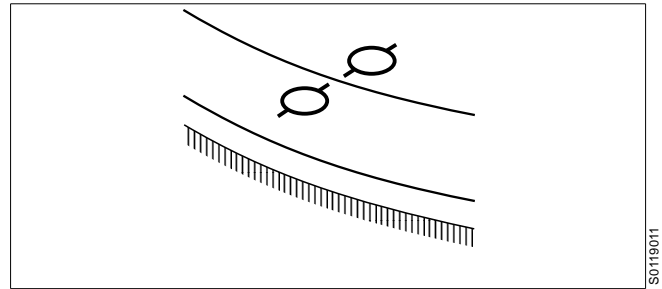
The lock ring should press the bowl hood firmly against the bowl body. The hood in turn should exert a pressure on the disc stack, clamping it in place.

1. Compress the disc stack by tightening the lock ring, see chapter "6.3.2 Assembly" on page 93.

2. Correct pressure is obtained when it is possible to tighten the lock ring so far by hand that the ϕ -mark on the lock ring is positioned 60° - 90° **before** the mark on the bowl body.
3. To achieve this, add an appropriate number of discs to the top of the disc stack beneath the top disc.
4. Advance the lock ring by giving the spanner handle some blows till the ϕ -marks are passed and the bowl is fully assembled.
5. If the ϕ -marks do not reach or pass each other, the reason could be an incorrectly assembled bowl or too many discs in the disc stack. Reassemble and check.



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5.3.9 Worm wheel and worm; wear of teeth

Same as described in “5.7.1 Worm wheel and worm; wear of teeth” on page 71 in this chapter.

5.3.10 Nozzle wear

The nozzles will erode in time. The length of time will vary due to the characteristics of the liquid separated. The conditions of the nozzles need to be checked on a regular basis. If the liquid to be separated is erosive inspect frequently. When in doubt consult your Alfa Laval representative.

Check the nozzle function as follows:

Fill the bowl body with water. An even jet of water and an equal quantity of water should run out from **all** nozzles. An irregular jet indicates that the nozzle is worn, damaged or partially blocked and needs to be replaced.

5.4 Check points at Major Service (MS)

5.4.1 Bowl spindle; radial wobble

Excessive wobble is indicated by rough bowl running.

Measure the wobble at the top of the spindle tapered end.

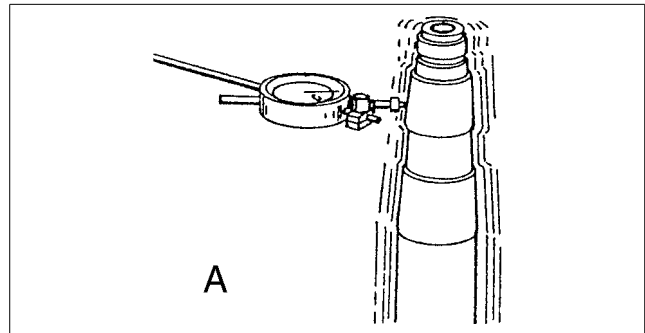
Maximum permissible radial wobble: **0,04 mm**.

First check the wobble before dismounting the spindle. If wobble is too large: replace the top and bottom bearings.

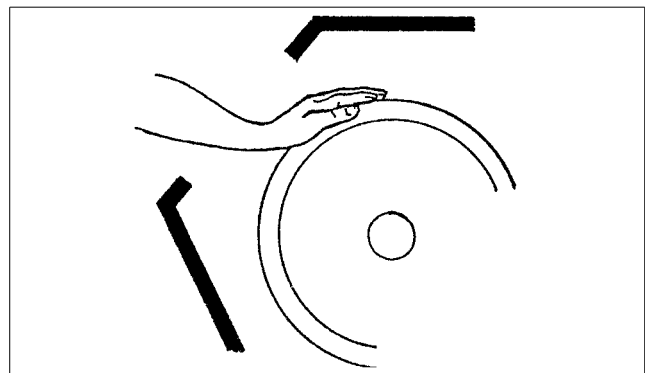
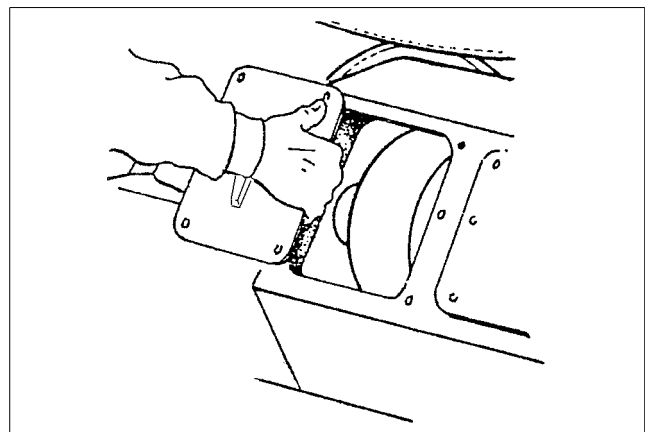
Measure again the wobble after assembly. If it is still excessive, the spindle is probably damaged and must be replaced.

Check wobbling as a preventive measure each time the spindle and top bearing have been assembled.

During reading, the spindle must be revolved by hand using the coupling drum.



A. Max. 0,04 mm

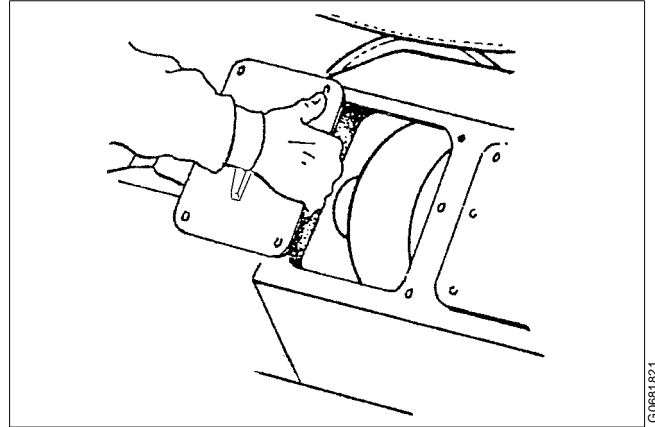


5.4.2 Brake

A worn or oily friction pad will lengthen the braking period.

If the friction pad is worn:

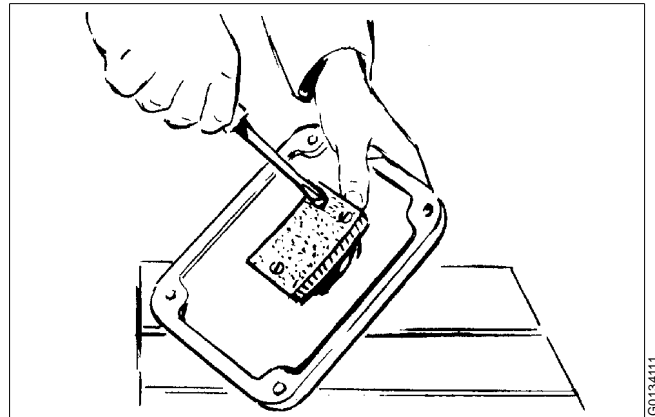
1. Remove the brake cover.



2. Remove the screws and exchange the friction pad.

NOTE

The screws are slotted in both ends.

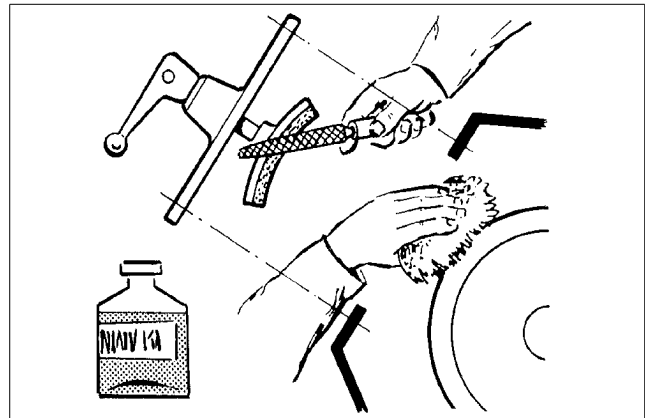


If the friction pad is oily:

1. Clean the friction pad and the coupling drum with a suitable degreasing agent.
2. Roughen the friction surface of the friction pad with a coarse file.

NOTE

Identify the cause of oily friction pad.

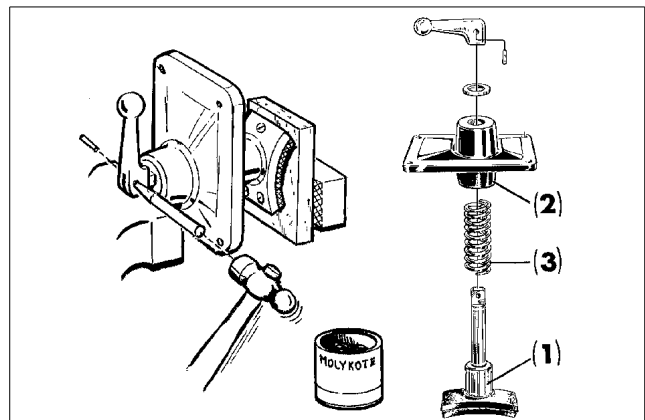


Actions when the friction pad is oily

Checking of spring and brake shoe:

Formation of rust on brake parts may cause the brake to jam.

1. Remove any rust from the surface (1) of the brake shoe and the corresponding guide surface in the cap (2).
2. Rub in Molykote Paste on the surfaces.
3. Replace the spring (3) if it has become weak. This is indicated by chattering from the spring when the brake is in released position.
4. Oil the spring when assembling.



1. Contact surface on the brake shoe for the spring
2. Guide surface in the cap for the brake shoe
3. Spring

5.4.3 Corrosion

Same as described in "5.3.1 Corrosion" on page 47.

5.4.4 Cracks

Same as described in "5.3.2 Cracks" on page 49.

5.4.5 Disc stack pressure

Same as described in "5.3.8 Disc stack pressure" on page 58.

5.4.6 Erosion

Same as described in “5.3.3 Erosion” on page 50.

5.4.7 Worm wheel and worm; wear of teeth

Same as described in section “5.7.1 Worm wheel and worm; wear of teeth” on page 71.

5.4.8 Worm wheel shaft; radial wobble

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

Clamp a dial indicator in a magnetic support and fasten it to the surface for the worm wheel guard (the gasket should be removed). Turn the worm wheel shaft by hand by rotating the brake pulley.



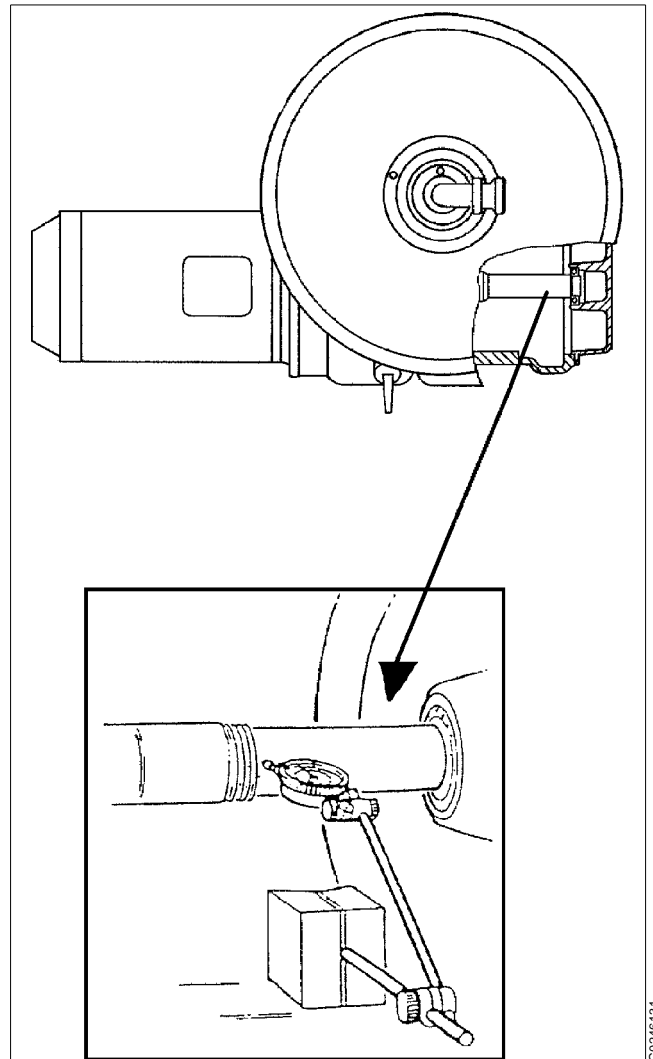
CAUTION

Crush hazards

Be careful not to get fingers trapped.

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

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



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5.4.9 Top bearing springs and ball bearing housing

Weakened or broken buffer springs as well as defective contact surfaces for the buffers on the ball bearing housing may give rise to machine vibration (rough bowl run).

Springs

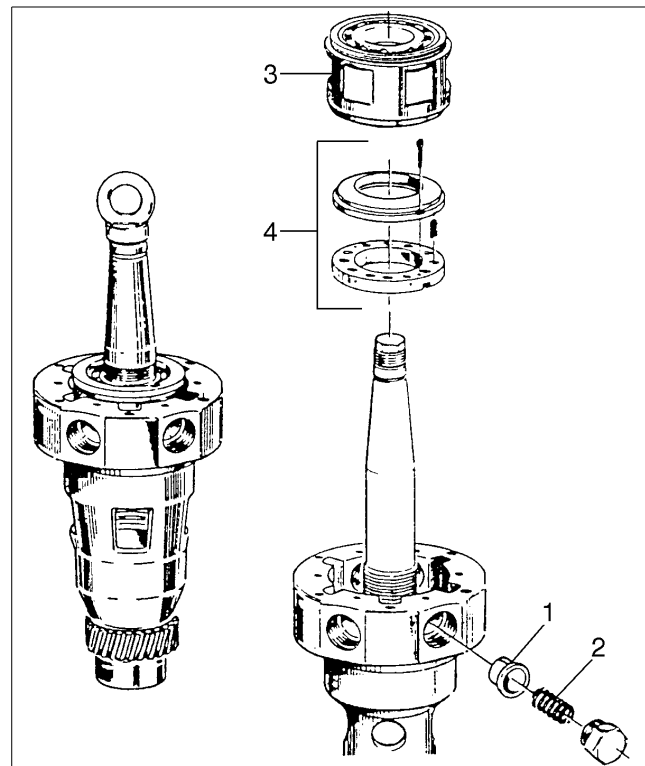
It is difficult to determine the condition (stiffness) of a spring without special instrument. So, an estimation of the spring condition must be based on the experience of the machine run before the overhaul.

It is recommended, however, that all springs are replaced at the annual overhaul.

In case of sudden spring fracture, the complete set should be replaced even if only one spring is broken.

Ball bearing housing

Examine the contact surface for the buffers (1) on the ball bearing housing (3). In case of defects (indentations deeper than **0,1 mm**) replace the housing as well as buffers and springs.



1. Radial buffer
2. Buffer spring
3. Ball bearing housing
4. Axial buffer

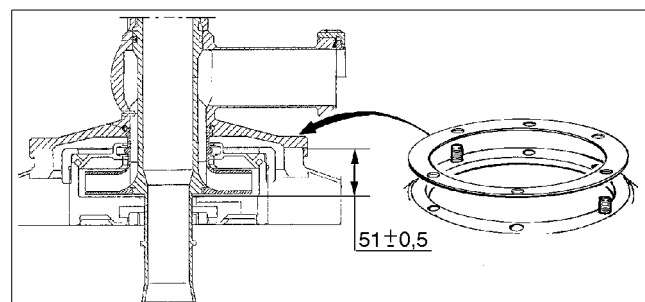
5.4.10 Height adjustment: Inlet and outlet device

Check the position of the inlet/outlet device at the time intervals prescribed in the maintenance schedule and after the replacement or reassembling of parts that can affect the height position.

During the check, the large lock ring must be firmly tightened and the frame hood screws tightened.

The check is carried out by measuring the height of the gasket top surface on the frame hood relative that of the top of the wings in the paring chamber. See illustration.

If the measure is incorrect, remove or insert another gasket. A minimum of one and a maximum of five gaskets can be installed.

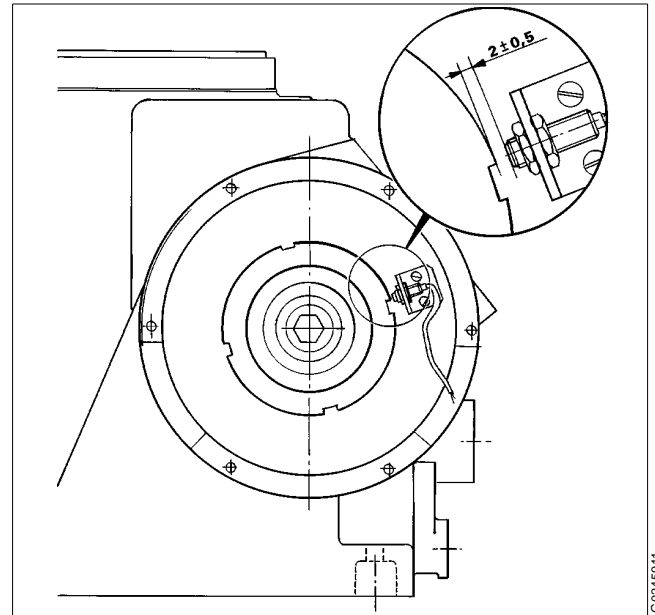


5.4.11 Adjustment of speed sensor gap

Incorrect speed sensor gap may cause faulty speed monitoring. For access to speed sensor, remove the brake cover.

The position of the speed sensor should be checked if the bowl spindle or the speed sensor has been dismantled or replaced.

- Adjust the gap between the speed sensor and the brake pulley. The gap is measured between two slots and should be **$2 \pm 0,5$ mm**.
- Tighten the speed sensor with a torque of **max. 50 Nm**.



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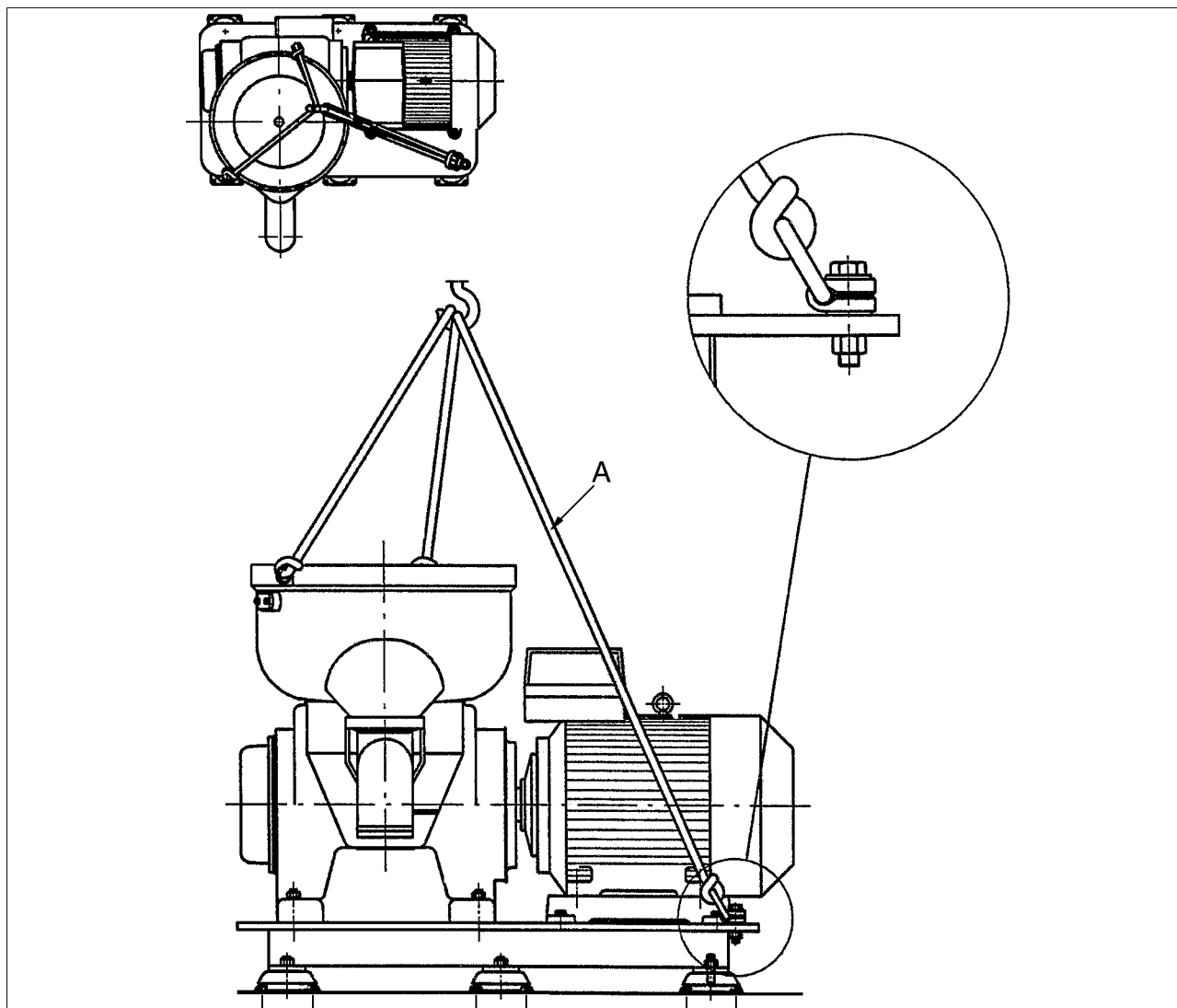
5.5 Lifting instructions

5.5.1 Separator

Before lifting the separator remove following parts:

- Inlet and outlet device
- Top cover
- Collecting cover
- Bowl

Attach three endless slings or cables to the lifting eyes. There are two fixed lifting eyes on the frame top part and one to be mounted on the common foundation (the screw must be tightened with spanner).



A. Three endless slings

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NOTE

Machine weight without inlet/outlet device, top cover, collecting cover and bowl is approx. **1200 kg**.

Weight of bowl: **320 kg**

Weight of the covers: **50 kg** together

**WARNING****Crush hazards**

Use only the **special lifting eyes** for lifting the machine. Two are fixed on the frame top part and one is to be mounted on the foundation. See illustration.

A falling separator can cause accidents resulting in serious injury to persons and damage to equipment.

5.5.2 Other parts

All heavy parts must be lifted by means of a hoist. Use endless lifting straps and a lifting hook with safety catch.

Special tools from the tool kit must be used for dismantling and assembly. The special tools are specified in the *Spare Parts Catalogue*.

NOTE

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

5.6 Cleaning

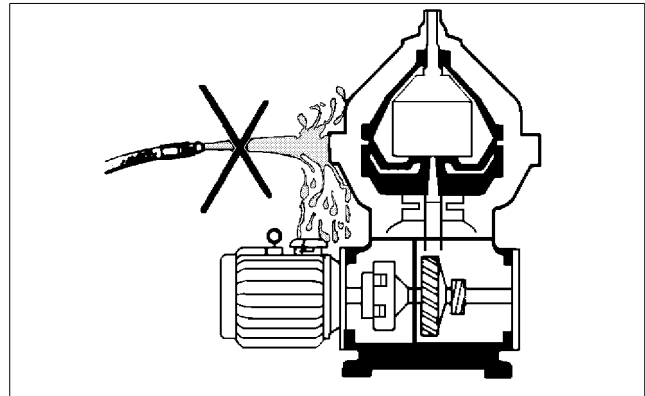
5.6.1 External cleaning

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

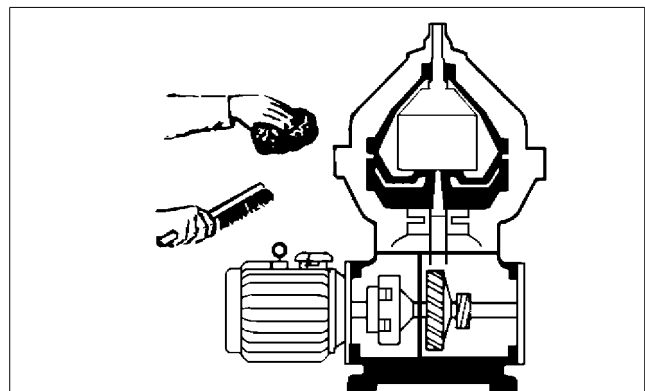
Never wash down a separator with a direct water stream. Totally enclosed motors can be damaged by direct hosing to the same extent as open motors and even more than those, because:

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

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



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




Use a sponge or cloth and a brush when cleaning

5.6.2 Cleaning agents

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

For separator bowl, inlet and outlet

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

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

For parts of the driving devices

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

Oiling (protect surfaces against corrosion)

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

5.6.3 Cleaning of bowl discs

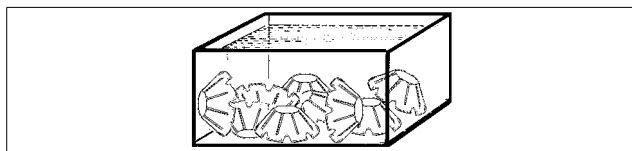
Handle the bowl discs carefully so as to avoid damage to the surfaces during cleaning.

NOTE

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

A gentle chemical cleaning is therefore preferable to mechanical cleaning.

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



Put the discs one by one into the cleaning agent



Clean the discs with a soft brush

5.7 When changing oil

5.7.1 Worm wheel and worm; wear of teeth

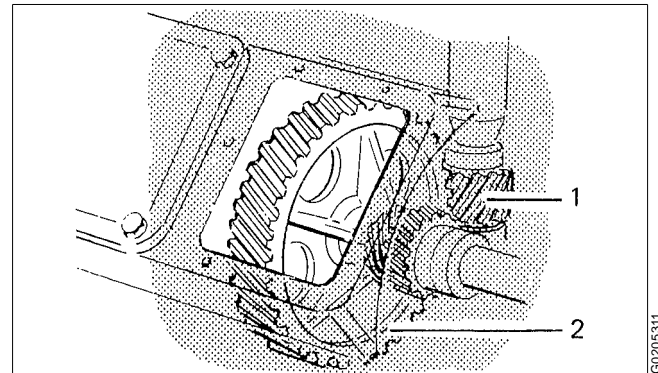
To check at each oil change

Check the teeth of both the worm wheel and worm for wear. Examine the contact surfaces and compare the tooth profiles with the “Tooth appearance examples” on page 73. The gear may operate satisfactorily even when worn to some degree.

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

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

When replacing the gear, always make sure that the new worm wheel and worm have the same number of teeth as the old ones. See chapter “8.1 Technical data” on page 155 for correct number of teeth.



1. Worm
2. Worm wheel

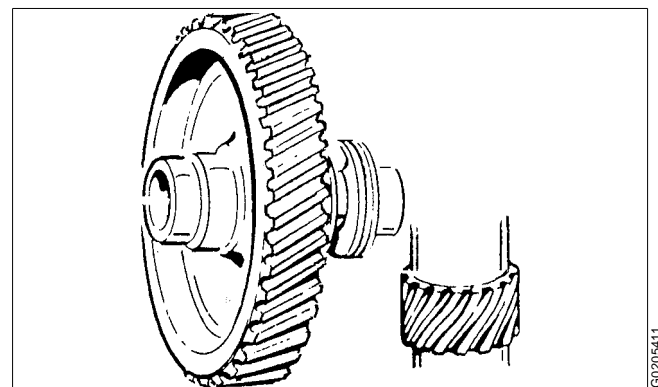
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DANGER

Disintegration hazards

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



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

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NOTE

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

Important!

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

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

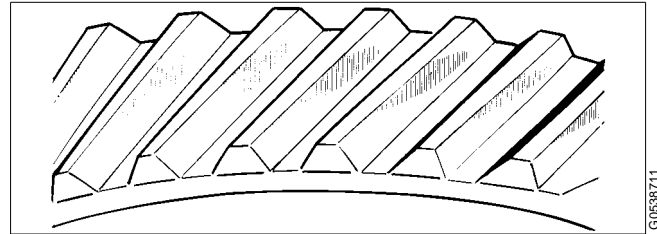
For further information, see chapter “8.9 Lubricants” on page 171.

Tooth appearance examples

Satisfactory teeth:

Uniform wear of contact surfaces. Surfaces are smooth.

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

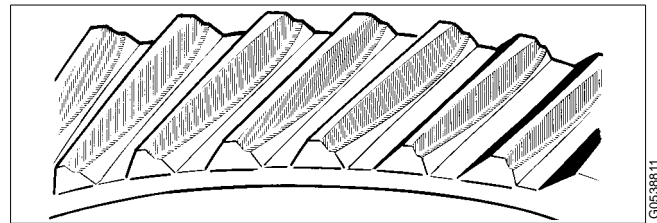


Satisfactory teeth

Worn teeth:

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

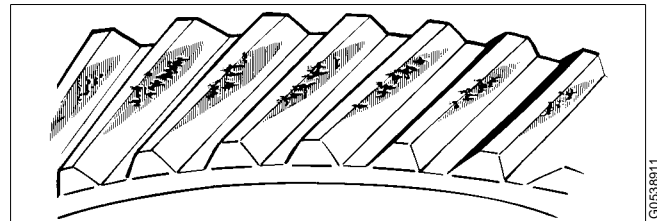
- the wear is uniform over the whole of the flank of a tooth
- and all teeth are worn in the same way.



Worn teeth

Spalling:

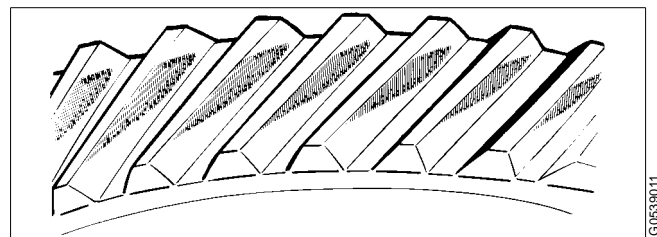
Small bits of the teeth have broken off, so-called spalling. This is generally caused by excessive load or improper lubrication. Damage of this type need not necessitate immediate replacement, but careful checking at short intervals is of imperative importance.



Spalling

Pitting:

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

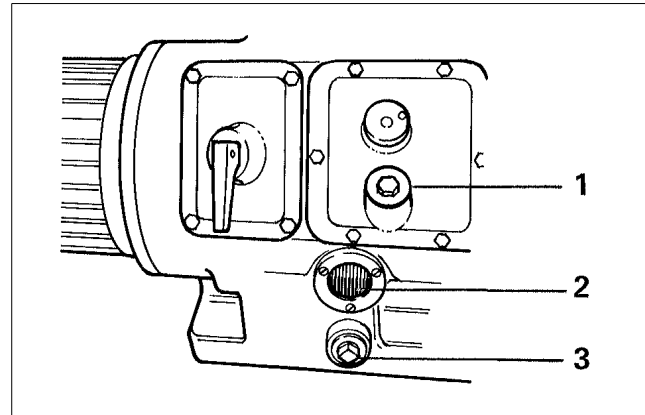


Pitting

5.7.2 Oil change procedure

NOTE

Before adding or renewing lubricating oil in the worm gear housing, the information concerning different oil groups, handling of oils, oil change intervals etc. given in chapter "8.9 Lubricants" on page 171 must be well known.



1. Oil filling plug
2. Sight glass
3. Oil drain plug

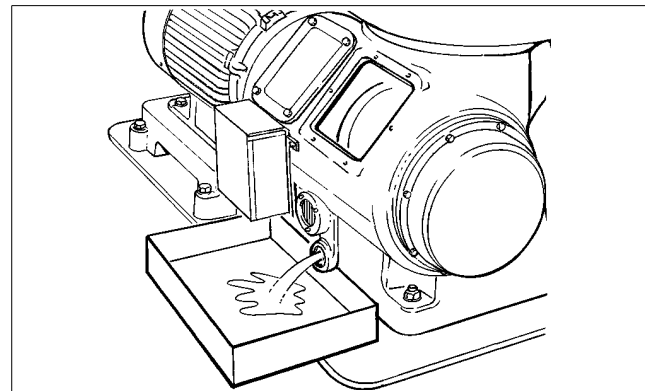
1. Place a collecting tray under the drain hole, remove the drain plug and drain off the oil.



CAUTION

Burn hazards

Lubricating oil in the worm gear housing and various machine surfaces can be sufficiently hot to cause burns.



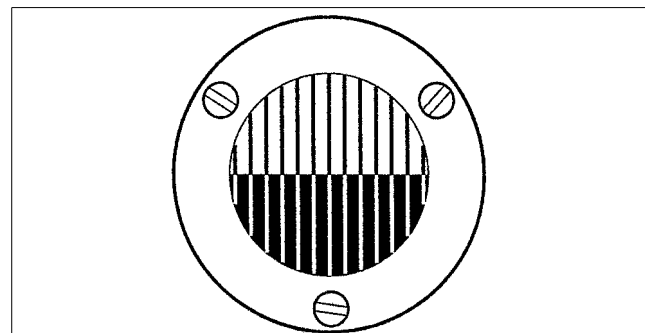
Burn hazards: The drained oil can be hot

2. Fit the drain plug with gasket and fill new oil in the worm gear housing. The oil level should be exactly in the middle of the sight glass:
Oil volume: Approx. **8 litres**.
For recommended oil brands, see "8.9.4 Recommended lubricating oils" on page 176.

NOTE

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

Too much or too little oil can damage the separator bearings.



The oil level must not be above the middle of the sight glass

5.8 Vibration

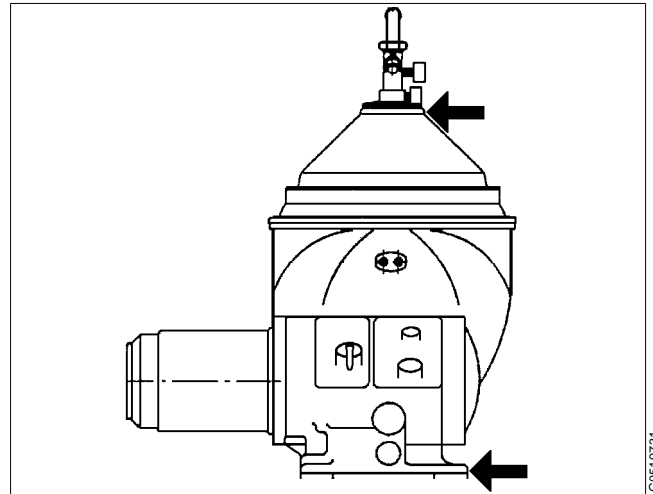
5.8.1 Vibration analysis

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

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

NOTE

The level of vibration should not exceed **14,0 mm/s** at full speed.



Measuring points for vibration analysis



DANGER

Disintegration hazards

When excessive vibration occurs, **keep liquid feed on** and **stop separator**.

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

5.9 Common maintenance directions

5.9.1 Balancing of bowl

The separator bowl is statically and dynamically factory-balanced only as a **complete unit**.

Major bowl parts cannot be replaced with new parts without rebalancing the **entire** bowl.

Bowl parts must never be interchanged from one machine to another.

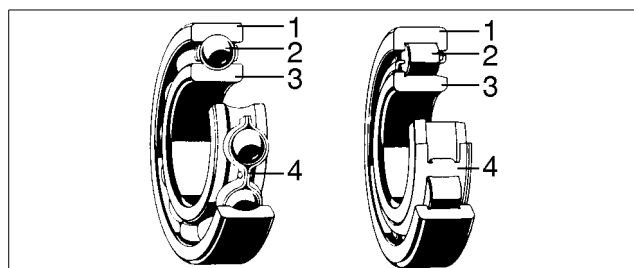
5.9.2 Ball and roller bearings

Special-design bearings for the bowl spindle

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

Only Alfa Laval genuine spare parts should be used.

A bearing that in appearance looks equivalent to the correct may be considerably different in various respects: inside clearances, design and tolerances of the cage and races as well as material and heat treatment.



1. *Outer race*
2. *Ball/roller*
3. *Inner race*
4. *Cage*

NOTE

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

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

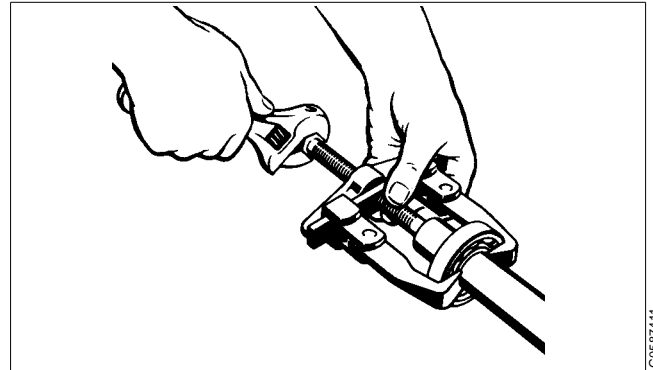
Dismantling

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

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

NOTE

Do not hit with a hammer directly on the bearing.



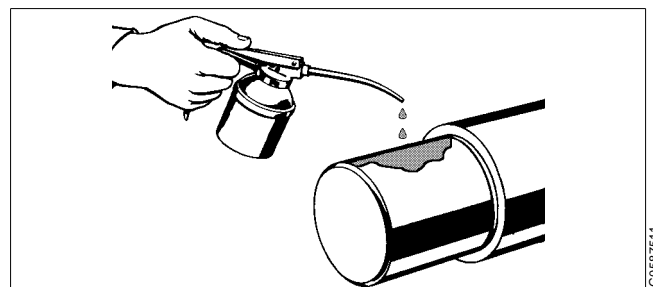
For bearings where no driving-off sleeve is included in the tool kit, use a puller when removing bearings

Cleaning and inspection

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

Assembly

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



Clean and oil the bearing seating before assembly

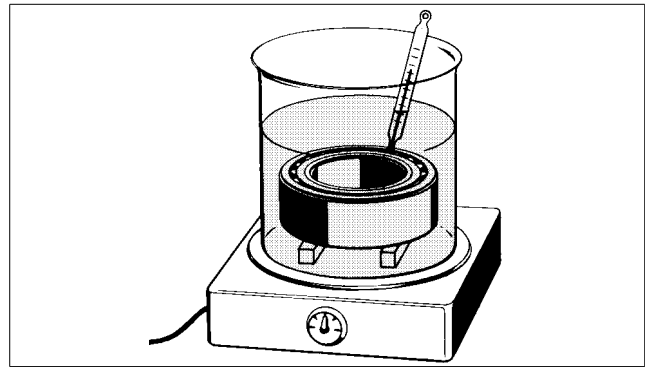
- When assembling ball bearings, the bearings must be heated in oil to **max. 125 °C**.

NOTE

Heat the bearing in a clean container.

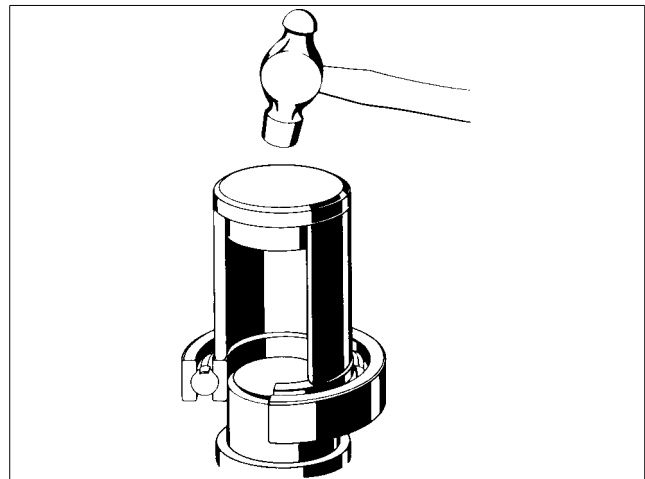
Use only clean oil with a flash point above **250 °C**.

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



The bearing must not be in direct contact with the container

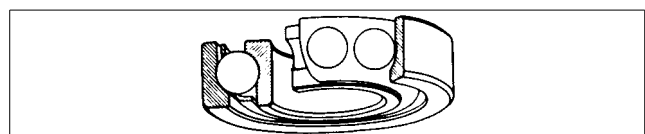
- There are several basic rules for assembling cylindrical bore bearings:
 - Never directly strike a bearing's rings, cage or rolling elements while assembling. A ring may crack or metal fragments break off.
 - Never apply pressure to one ring in order to assemble the other.
 - Use an ordinary hammer.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



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

Angular contact ball bearings

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



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

5.9.3 Before shutdowns

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

- Remove the bowl, according to instructions in chapter “6 Dismantling/Assembly” on page 81.

NOTE

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

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

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

6 Dismantling/Assembly

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6.1 Introduction

6.1.1 General directions

The separator must be dismantled regularly for cleaning and inspection.

The recommended intervals are stated in chapter "5.1.1 Maintenance intervals" on page 37.

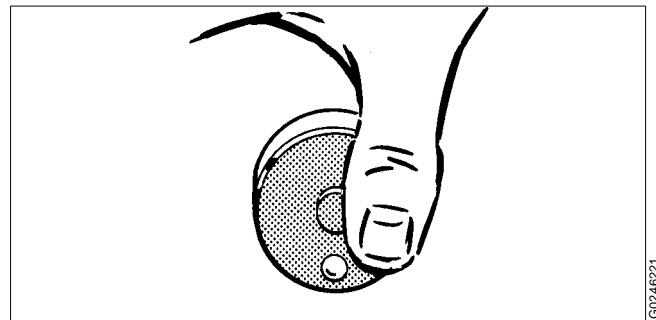


DANGER

Entrapment hazard

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

The revolution counter and the motor fan indicate if separator parts are rotating or not.



The revolution counter indicates if the separator still is rotating

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

These parts must be handled carefully.

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

NOTE

Never interchange bowl parts

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

6.1.2 References to check points

In the text you will find references to the Check point instructions in chapter 5. The references appear in the text as in the following example:

✓ Check point

“5.3.8 Disc stack pressure” on page 58.

In this example, look up check point Disc stack pressure in chapter 5 for further instructions.

6.1.3 Tools

Special tools from the tool kit must be used for dismantling and assembly. The special tools are specified in the *Spare Parts Catalogue*.

NOTE

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

6.2 Machine top part with inlet device

6.2.1 Frame top part: Dismantling



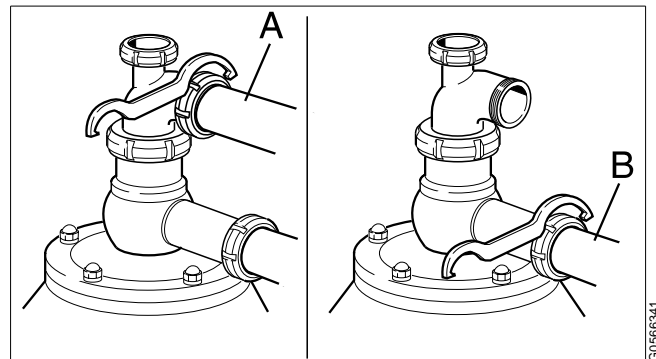
DANGER

Entrapment hazard

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

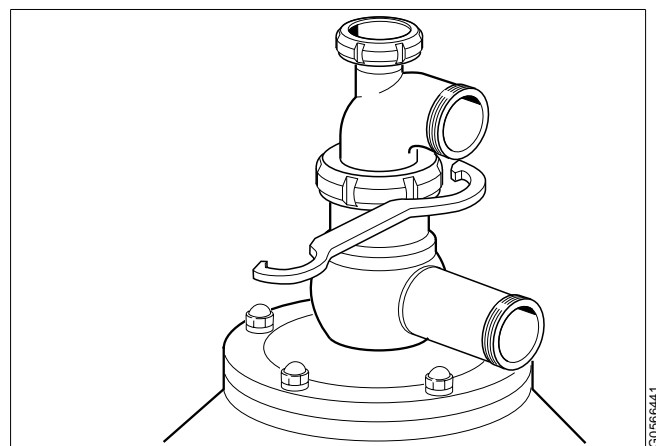
The revolution counter and the motor fan indicates if separator parts are rotating or not.

1. Disconnect the feed inlet (A) and the outlet pipe (B).
Use hook spanner.



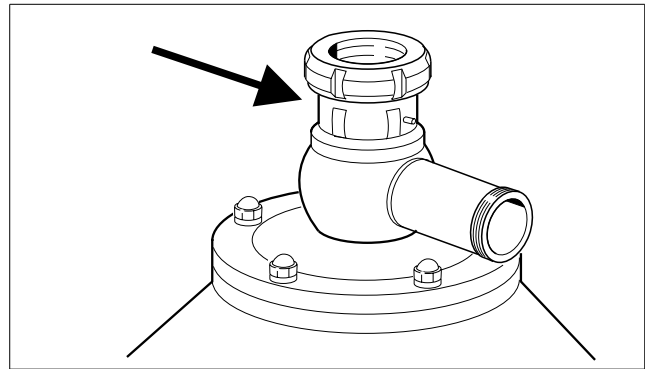
G0566341

2. Disconnect the inlet housing using the hook spanner.
Remove the inlet housing.



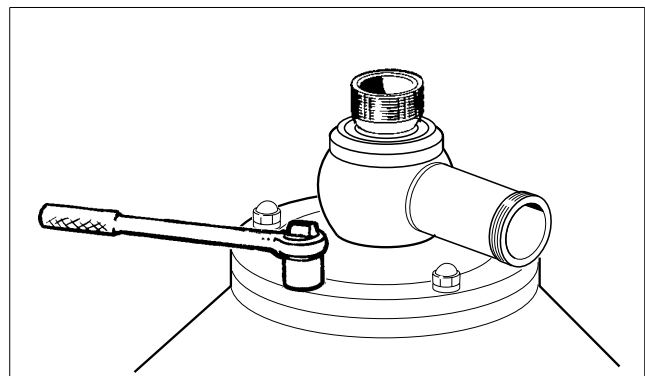
G0566441

3. Unscrew and remove the nut holding the vertical inlet pipe using the hook spanner.
Note! Left hand thread!



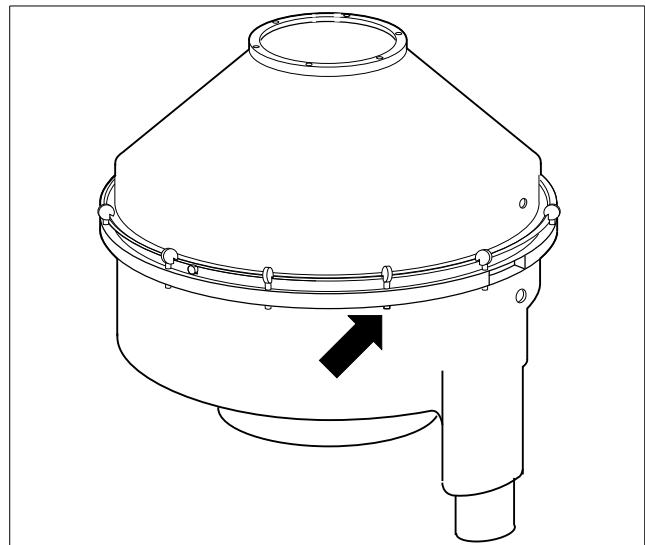
G0377441

4. Remove the cap nuts holding the outlet housing.
Use the 24 mm socket and ratchet spanner for the nuts.
Remove the outlet housing.



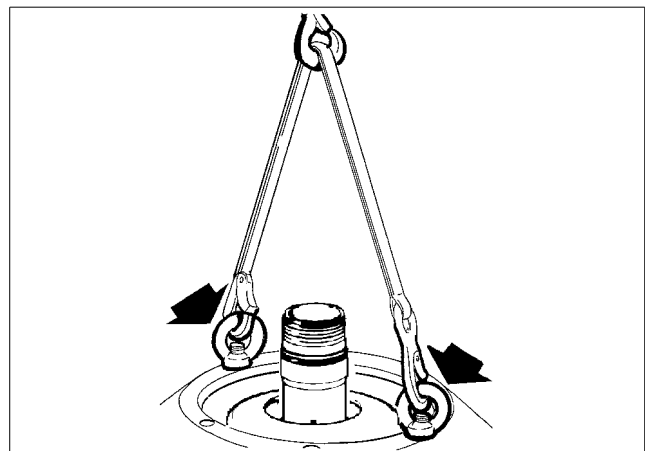
G0666531

5. Loosen the nuts under the twelve hook screws in the frame hood and turn the hooks.



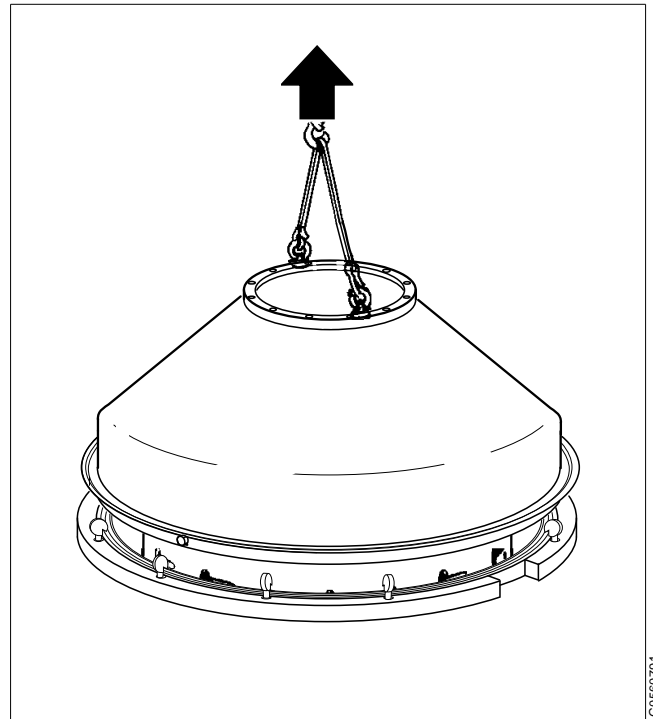
G0783141

6. Fasten the two lifting eyes onto the frame hood.
Fit a lifting strap with snap hooks.



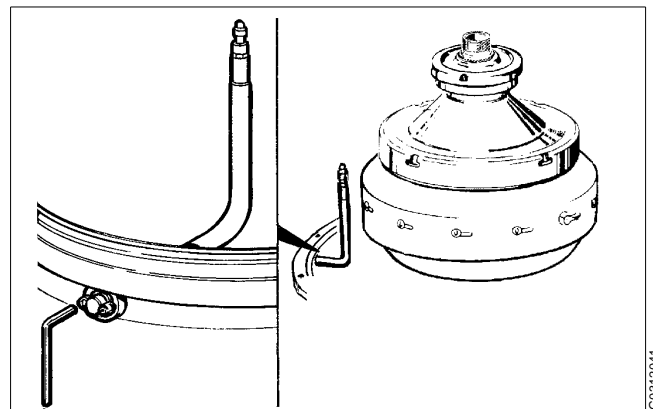
G0311721

7. Lift off the frame hood.



G0560791

8. Some machines are provided with a nozzle monitoring system as optional equipment. In this case, remove the two screws and the microphone sensor unit before lifting the bowl. Use a 6 mm key for the hex socket screws.




G0312041



6.2.2 Exchange of nozzles

Removal of nozzle



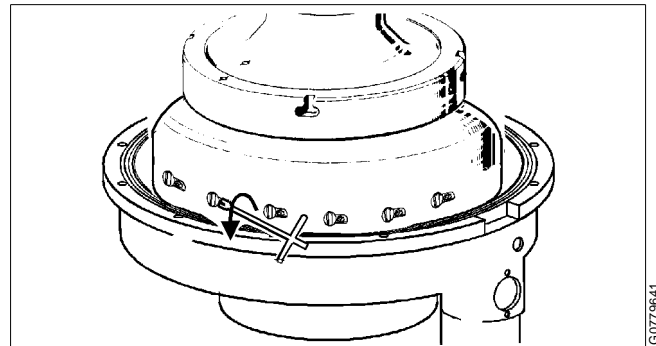
DANGER

Entrapment hazard

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

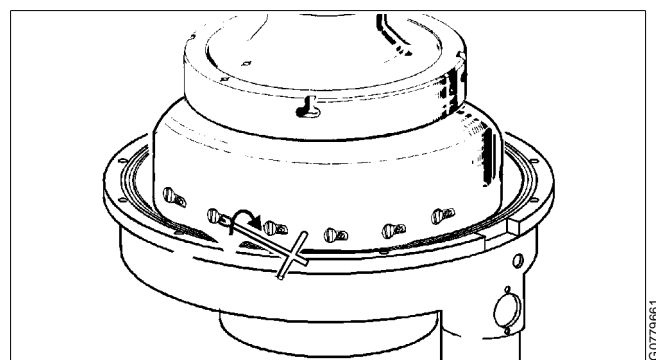
The revolution counter and the motor fan indicates if separator parts are rotating or not.

1. Follow “6.2.1 Frame top part: Dismantling” on page 85, step 1 - 7.
2. Using the nozzle tool, unscrew and remove the nozzle.



Fitting of nozzle

1. Using the nozzle tool, fit and tighten the nozzle and its gasket.



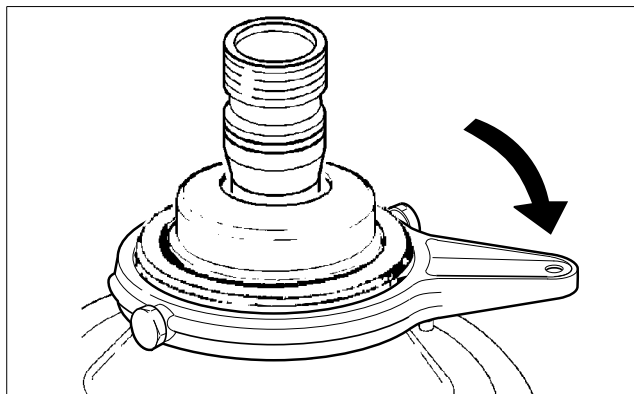
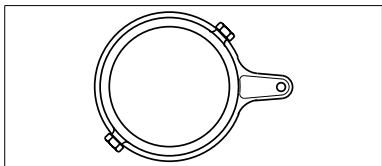
2. Follow “6.3.2 Assembly” on page 93, step 13 - 21.

6.3 Separator bowl

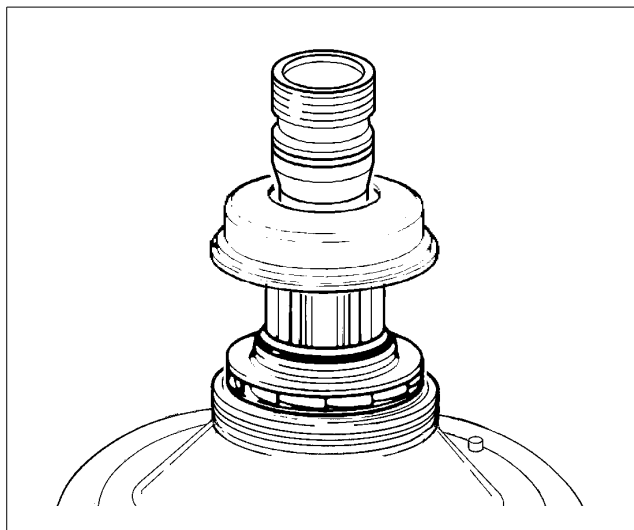
6.3.1 Dismantling

1. Unscrew the small lock ring clockwise and remove it. Use spanner and the tin hammer.

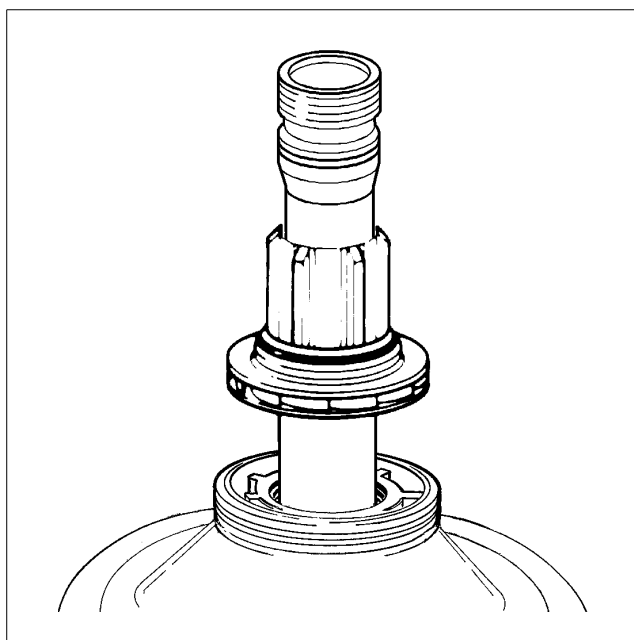
Note: Left-hand thread.



2. Remove the paring chamber cover.



3. Remove the inlet pipe with paring disc.



4. Unscrew the large lock ring with the lock ring spanner.

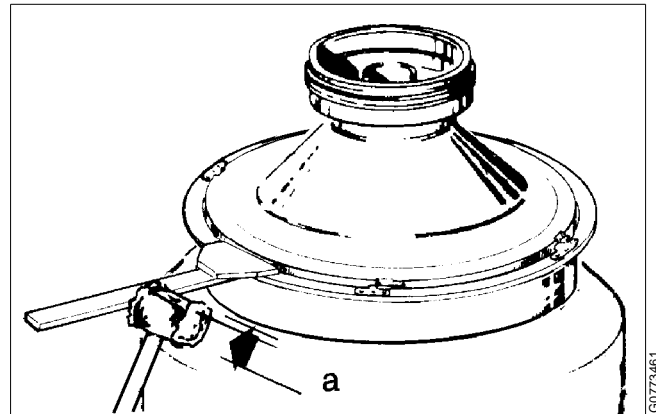
Note: **Left-hand thread!**

Remove the large lock ring.

NOTE

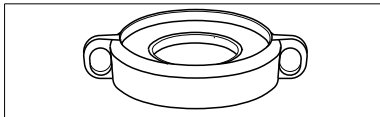
The large lock ring must be placed resting on a flat horizontal surface to avoid distortion.

Only slight distortion can make it impossible to refit.

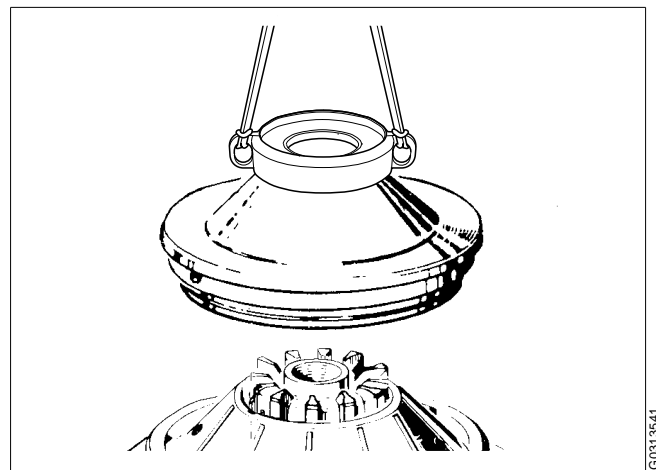


G0773461

5. Remove the bowl hood. Use the lifting tool for the bowl hood, lifting sling and hoist.



S0107411



G0313541

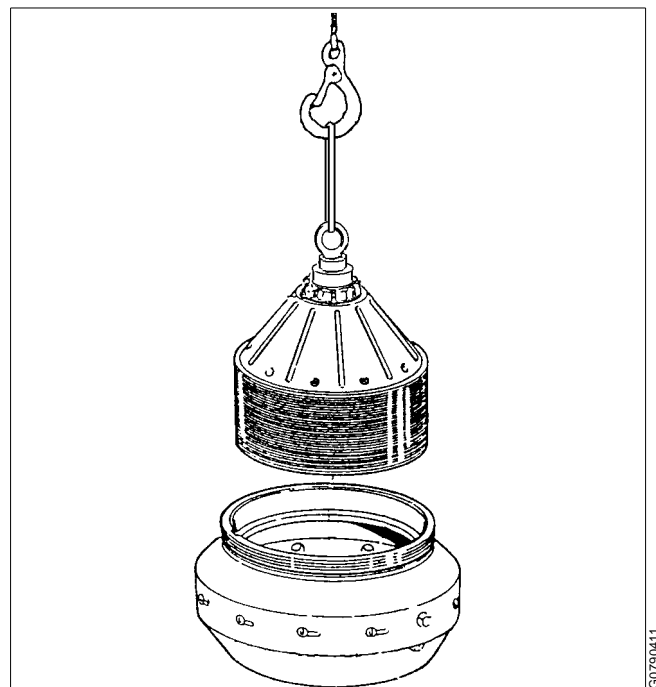
6. Fit the special lifting tool to distributor and lift it of together with the disc stack.



CAUTION

Cut hazard

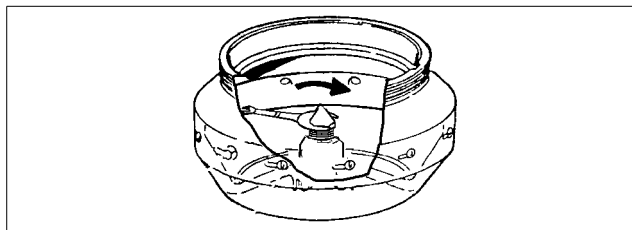
Sharp edges on separator discs may cause cuts.



G0790411

7. Loosen and remove the cap nut.

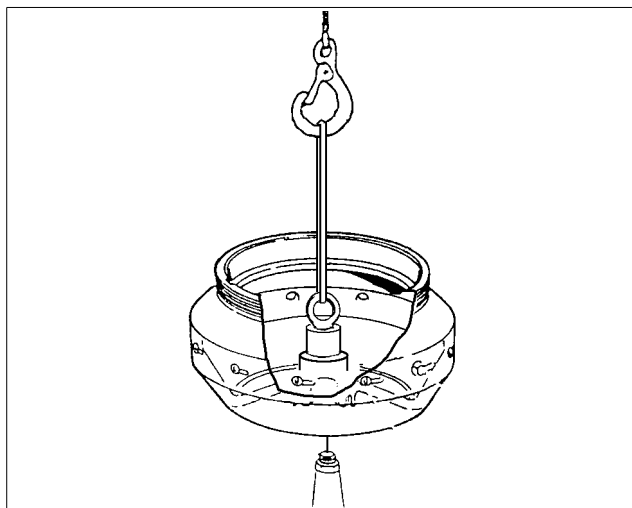
Left-hand thread!



G0790221

8. Fit the special tool to bowl body. Loosen the bowl body from the tapered end by screwing down the lifting eye nut.

9. Lift out the bowl.



G0790311

NOTE

Do not forget to loosen the bowl body from the tapered end of the bowl spindle by means of the central screw.



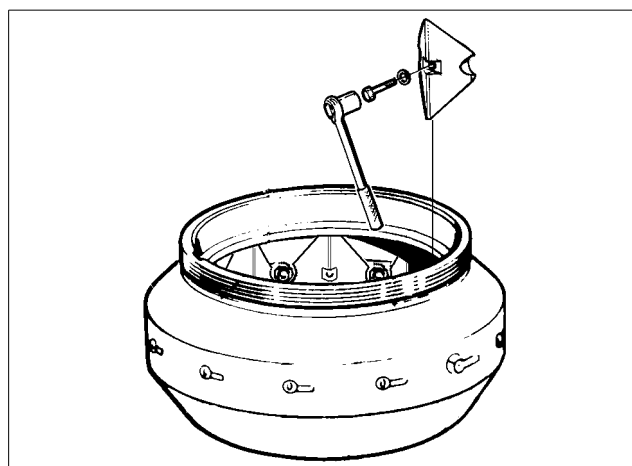
WARNING

Crush hazard

Support the bowl body when turning to prevent it from rolling.

Bowl with fillerpieces.

10. Clean out product from bore, loosen the screw and lift out the filler piece. The gasket under the screwhead is to be renewed.



G0314241

6.3.2 Assembly

✓ Check points

- “5.3.1 Corrosion” on page 47.
- “5.3.2 Cracks” on page 49.
- “5.3.3 Erosion” on page 50.
- “5.3.4 Spindle top and bowl body nave” on page 51.
- “5.3.5 Lock ring, bowl hood and bowl body” on page 52.
- “5.3.7 Checking of alignment marks” on page 56.
- “5.3.10 Nozzle wear” on page 59.

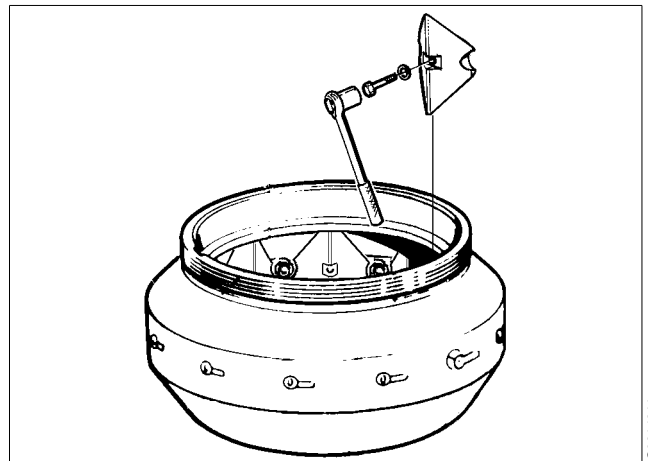
NOTE

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

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

When assembling make sure that the bowl parts are placed in position defined by the guides. Be careful not to damage the guides when handling the bowl parts.

1. Fit the well cleaned fillerpieces (if any) and new gaskets under the screw head.



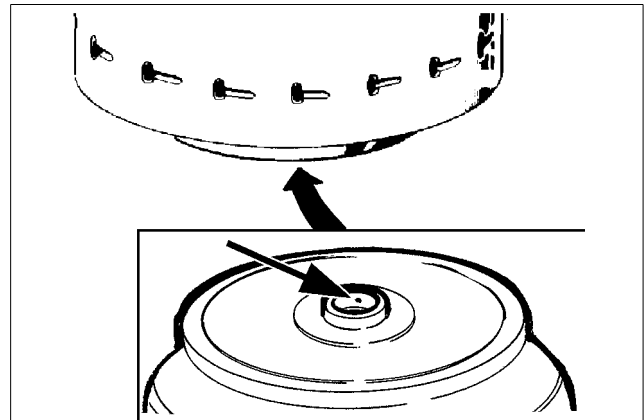
G0314241

2. Fit the lifting tool to bowl body.
3. Clean the conical hole in the bowl body thoroughly before mounting. Apply a few drops of oil to the spindle cone for corrosion protection reasons and then wipe it with a clean cloth.

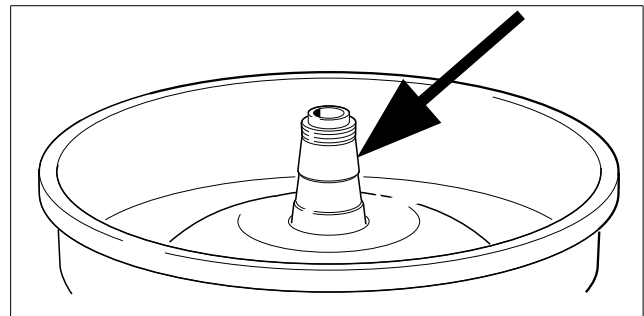
**WARNING****Crush hazard**

Use correct lifting tools and follow lifting instructions.

Do **not** work under hanging load.

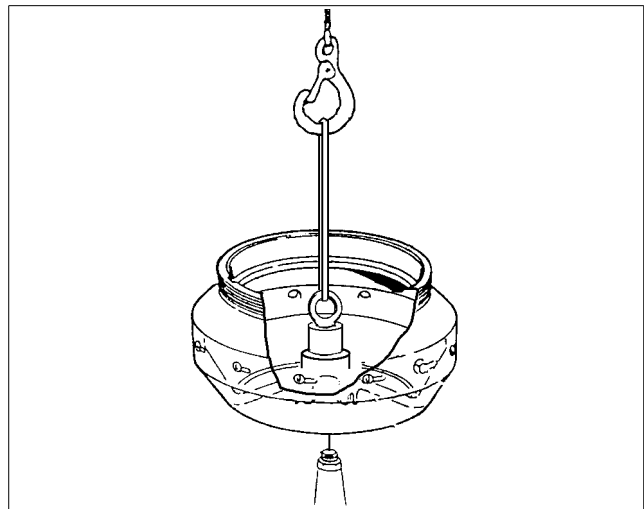


G0348831



G0348941

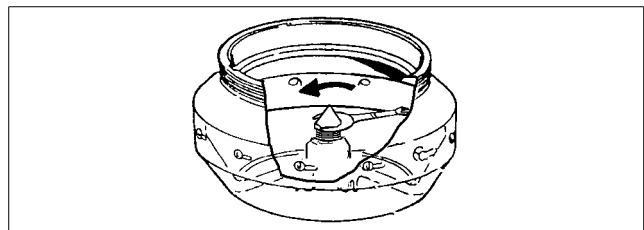
4. Fit the bowl body to the bowl spindle nave.



G0790311

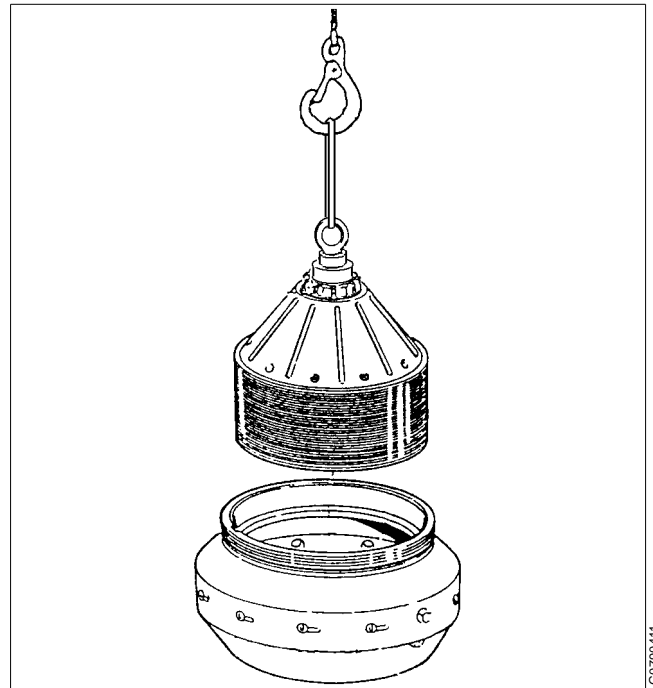
5. Fit and tighten the cap nut firmly.

Left-hand thread!



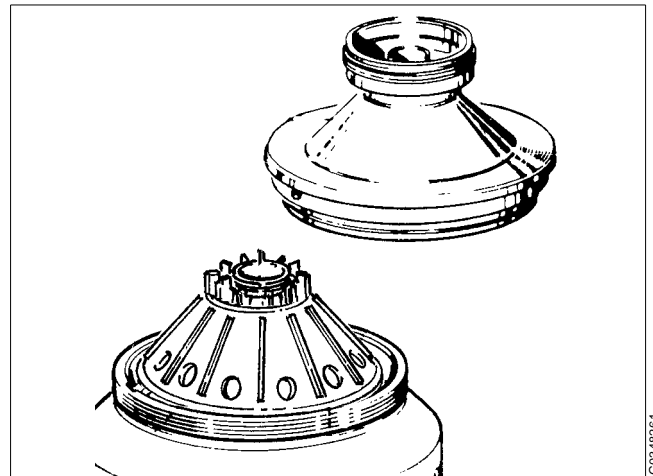
G0790211

6. Fit the bowl discs to the distributor. Then fit the special lifting tool and lift the assembly to the bowl body.
Align the drill mark on distributor rib with drill mark on the bowl body lug.
Maintain sufficient lift to enable the distributor and disc stack to be turned by hand until it drops in to position.



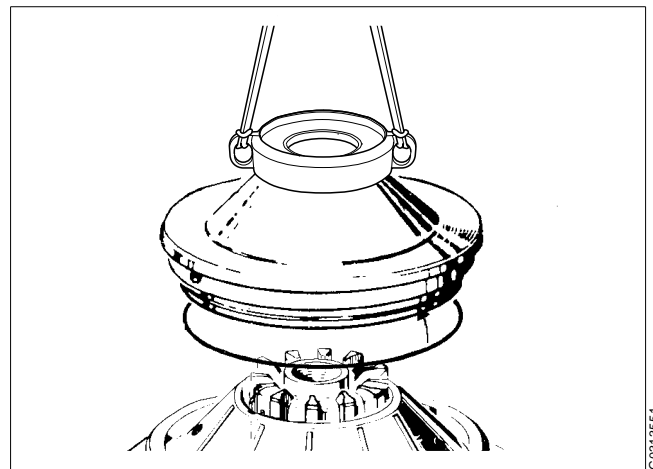
G0790411

7. Lubricate the guide surfaces on the bowl body and the bowl hood (Molykote paste 1000). For further instructions, see "8.9 Lubricants" on page 171.



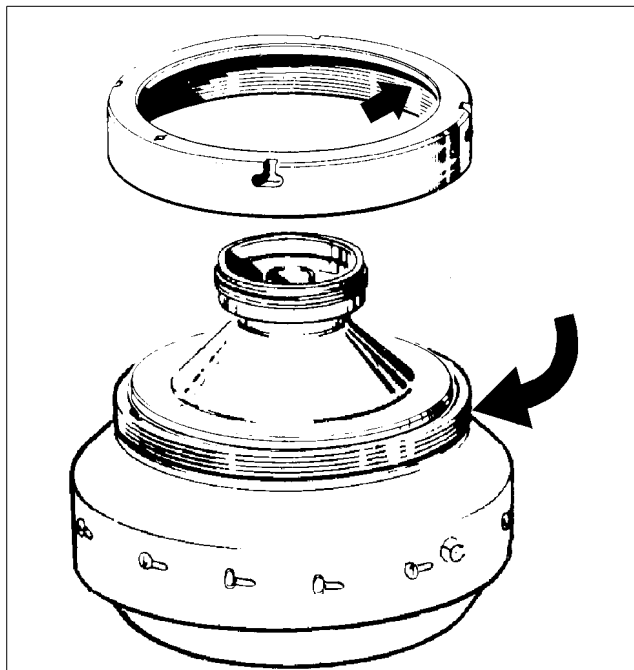
G0348261

8. Lubricate and fit the new large O-ring for the bowl hood.
9. Fasten the lifting tool and a lifting sling.
Lower the bowl hood into position slowly.
Align the guide lug on the bowl hood with the way in the bowl body.
Remove the lifting tool.

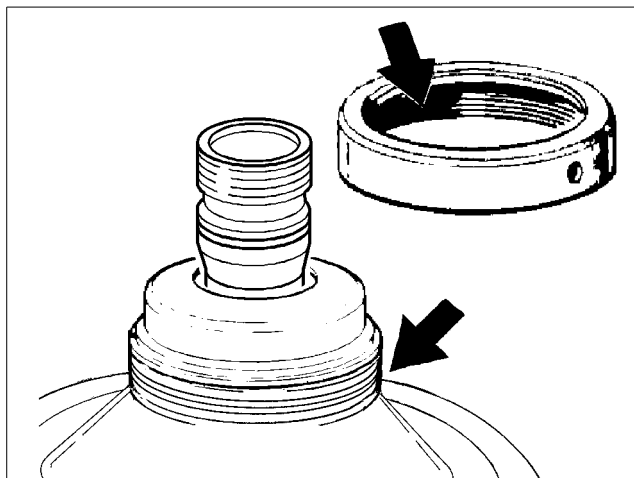


G0313551

10. Lubricate the threads of the bowl body and the large lock ring. (Molykote paste 1000).



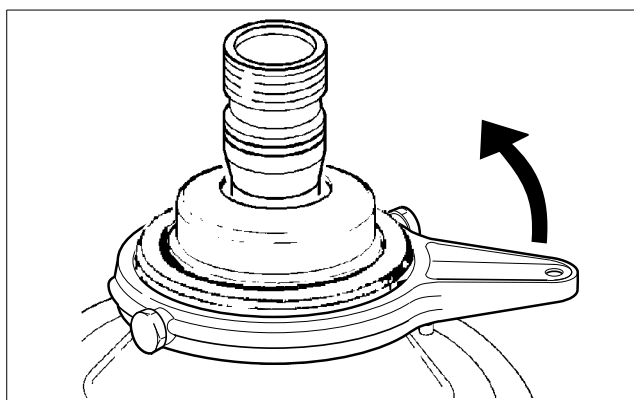
11. Lubricate the small lock ring and the bowl hood threads (Molykote 1000 paste).



12. Fit the tool for the small lock ring and tighten.

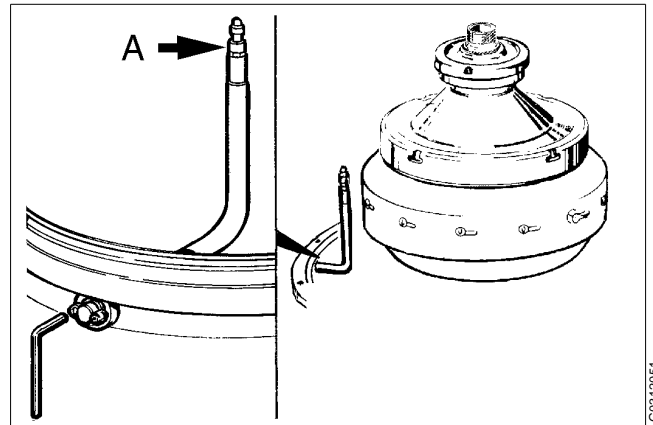
Note: Left-hand thread.

Remove the tool.



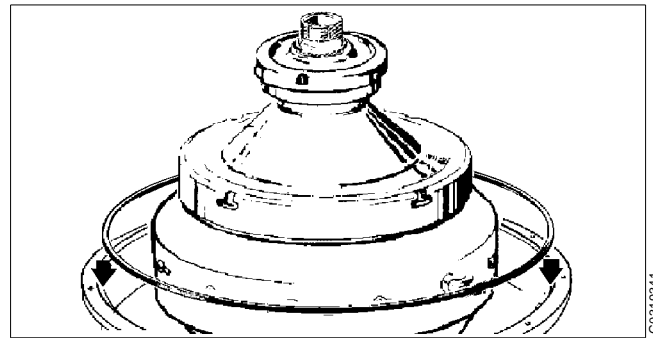
13. Refit the microphone sensor unit for the nozzle monitoring system (if fitted). Use a 6 mm key for hex socket screws.

If necessary, fit a new wear sleeve (A).



G0312051

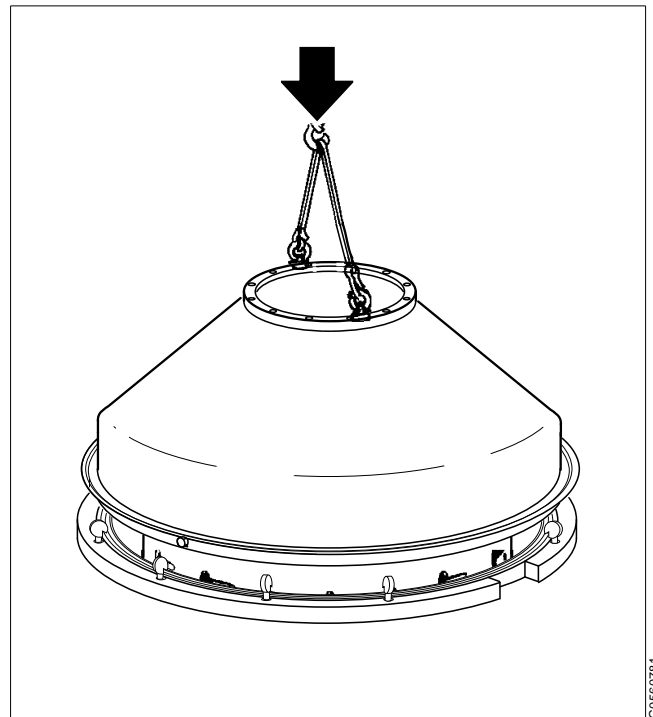
14. Check the O-ring in the frame bottom part and if necessary, change.



G0319341

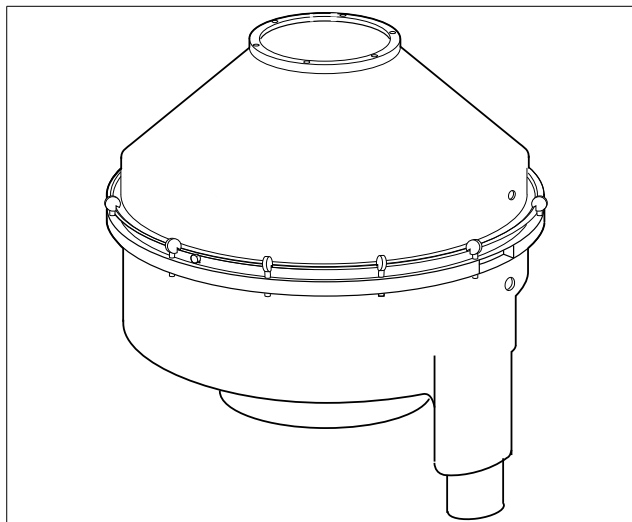
15. Screw the two lifting eyes into the top of the frame hood.

Using the hoist and sling, refit the frame hood.

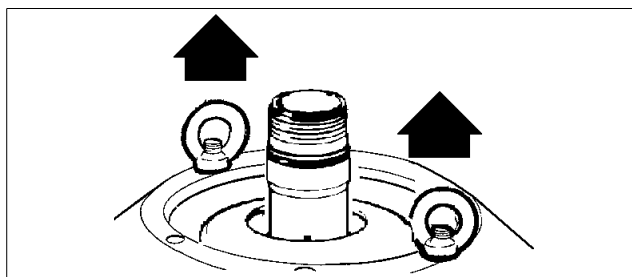


G0560781

16. Fasten the twelve hook screws in the frame hood.



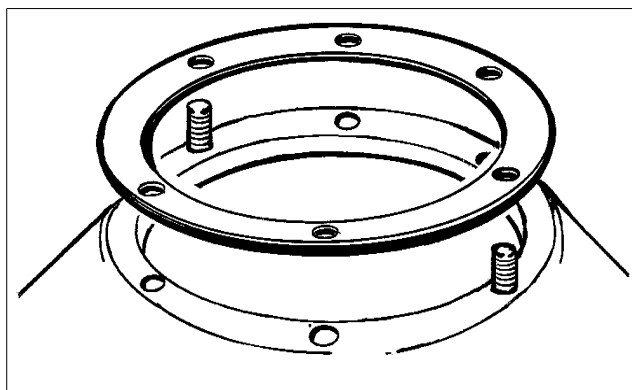
17. Remove the two lifting eyes.



18. Refit the height adjustment gaskets (1-5), if they have been removed.

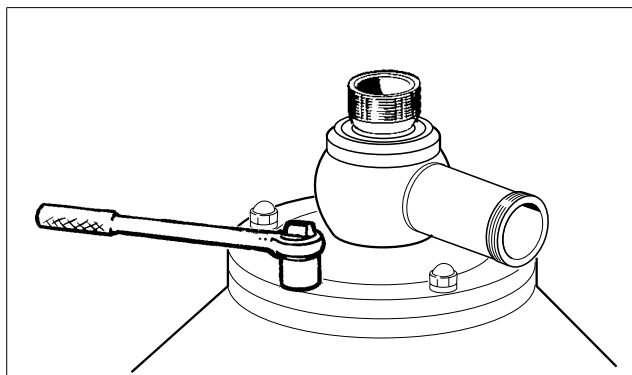
NOTE

Measure (and adjust if necessary) the height of the frame hood relative to the top of the wings in the paring chamber. See "5.4.10 Height adjustment: Inlet and outlet device" on page 64.



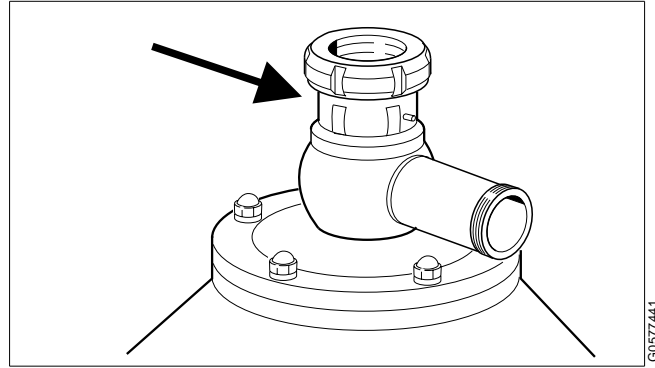
19. Lubricate and fit the new O-ring for the outlet housing.

Fit the outlet housing and tighten the six cap nuts. Use the 24 mm socket and ratchet spanner.

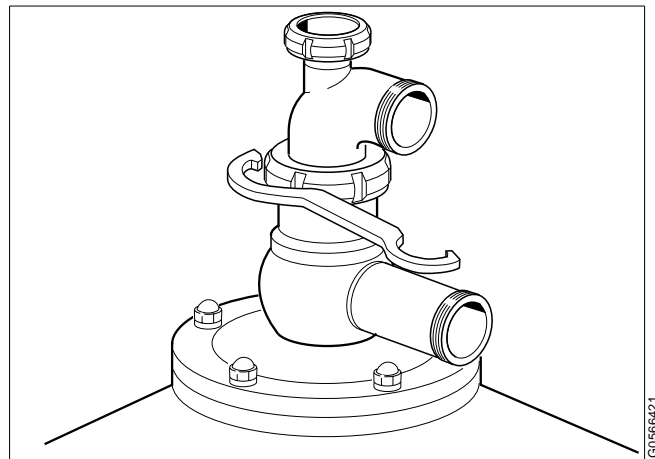


20. Fit and tighten the nut holding the inlet pipe using the hook spanner.

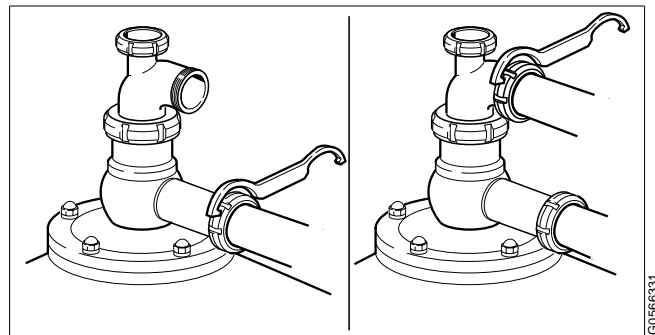
Note: Left hand thread!



21. Fit the inlet housing and tighten the coupling nut with the hook spanner.

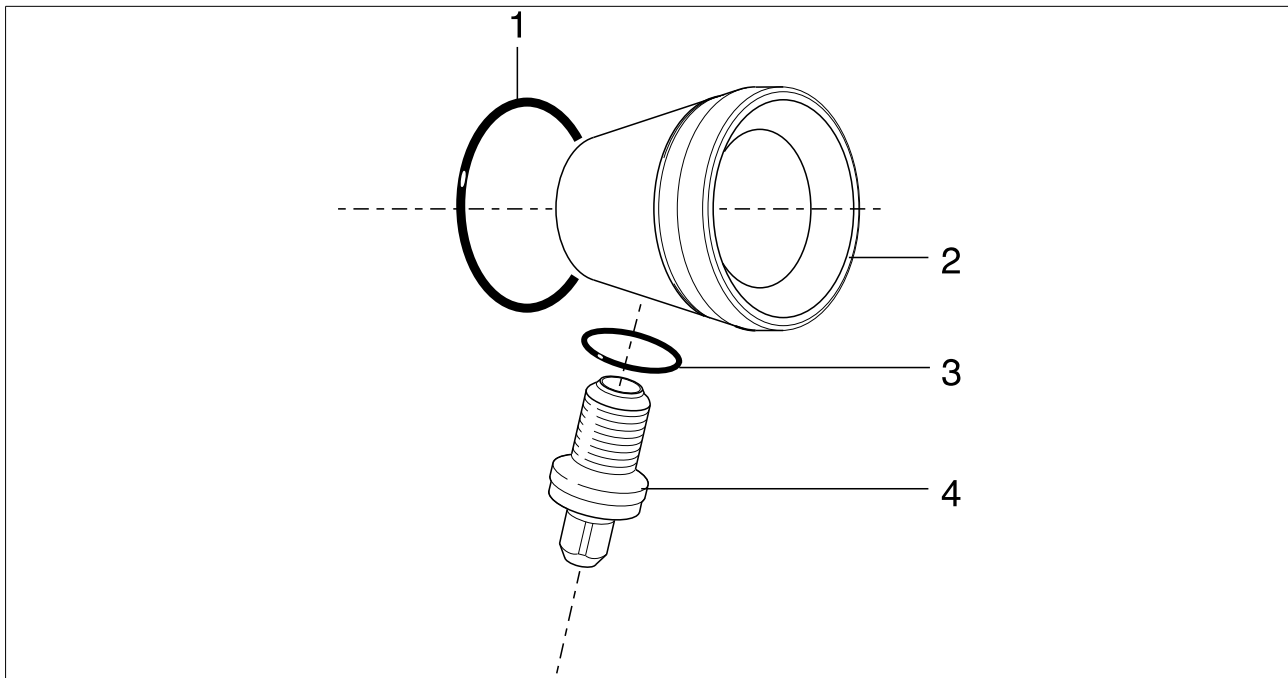


22. Fit and tighten the nut on the inlet and outlet pipes with the hook spanner.



6.4 Nozzles

6.4.1 Exploded view



1. O-ring
2. Bushing
3. Packing
4. Nozzle

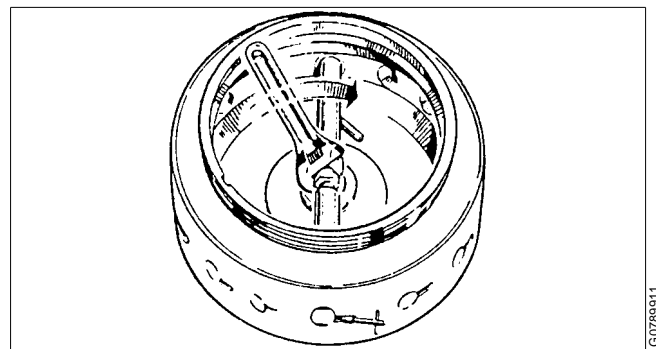
G0790811

6.4.2 Dismantling

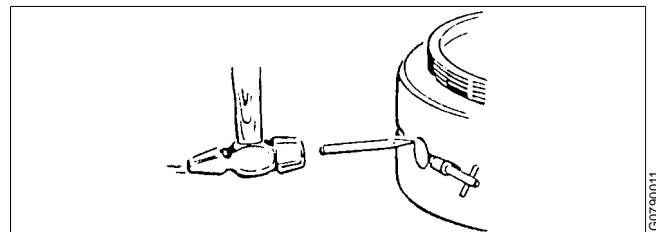
1. Unscrew the nozzle.
2. Force out the bushing into the bowl body interior.

6.4.3 Assembly

1. Clean the bushing seat.
2. Put the seal ring in the groove of the new bushing and push the latter into the bushing seat.
3. Screw home the mounting tool and push in the tool sleeve in the bushing as far as possible.
4. Place the mounting tool in the bowl body between the new bushing and the diametrically opposite one. Turn the hexagon screw of the tool until the bushing has entered its seat.
5. Secure the bushing by upsetting its upper and lower edges over the bowl body.
6. Screw in the nozzle with packing applied.



G0768911



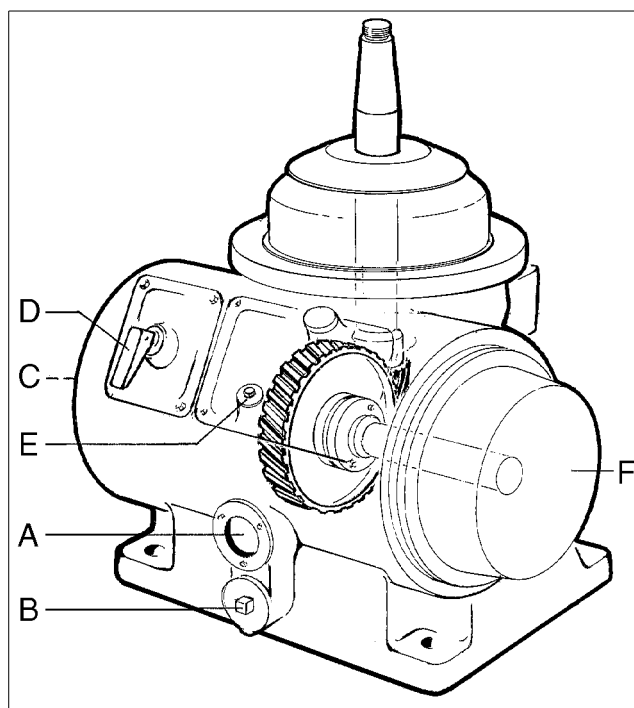
G0790011

6.5 Machine bottom part

6.5.1 Exploded views

Overview

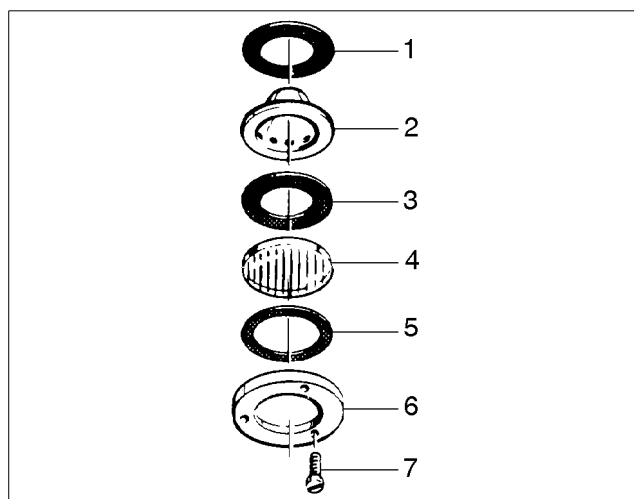
- A. Oil glass
- B. Oil plug
- C. Grating
- D. Brake
- E. Revolution counter
- F. Bearing shield



G077721

Oil glass

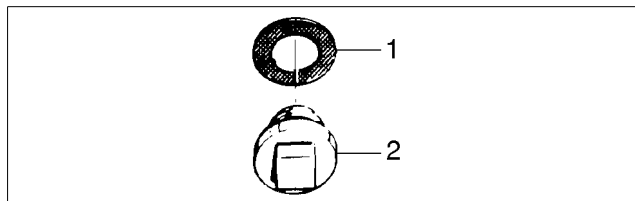
- 1. Gasket
- 2. Screen
- 3. Gasket
- 4. Glass
- 5. Rectangular ring
- 6. Fixing plate
- 7. Screw



G0654621

Oil plug

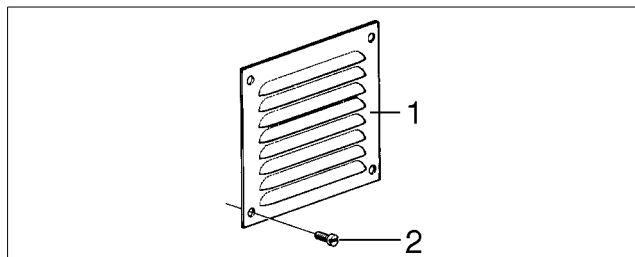
1. Gasket
2. Drain screw



G 0654721

Grating

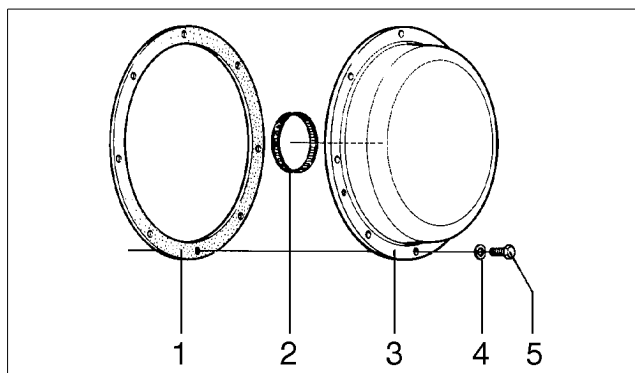
1. Grating
2. Screw



G 0655131

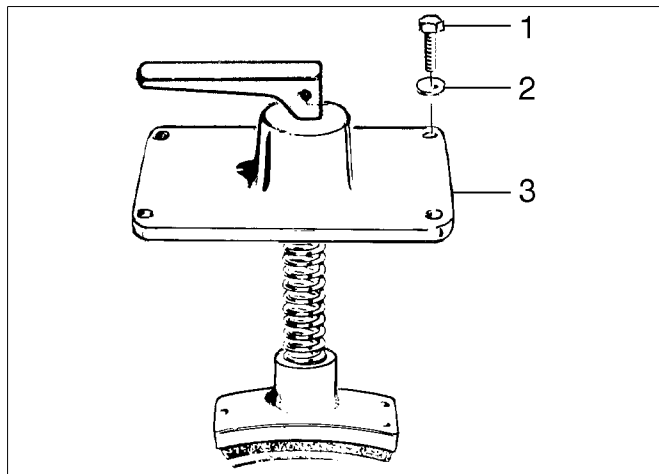
Bearing shield

1. Gasket
2. Tolerance ring
3. Bearing shield
4. Washer
5. Screw



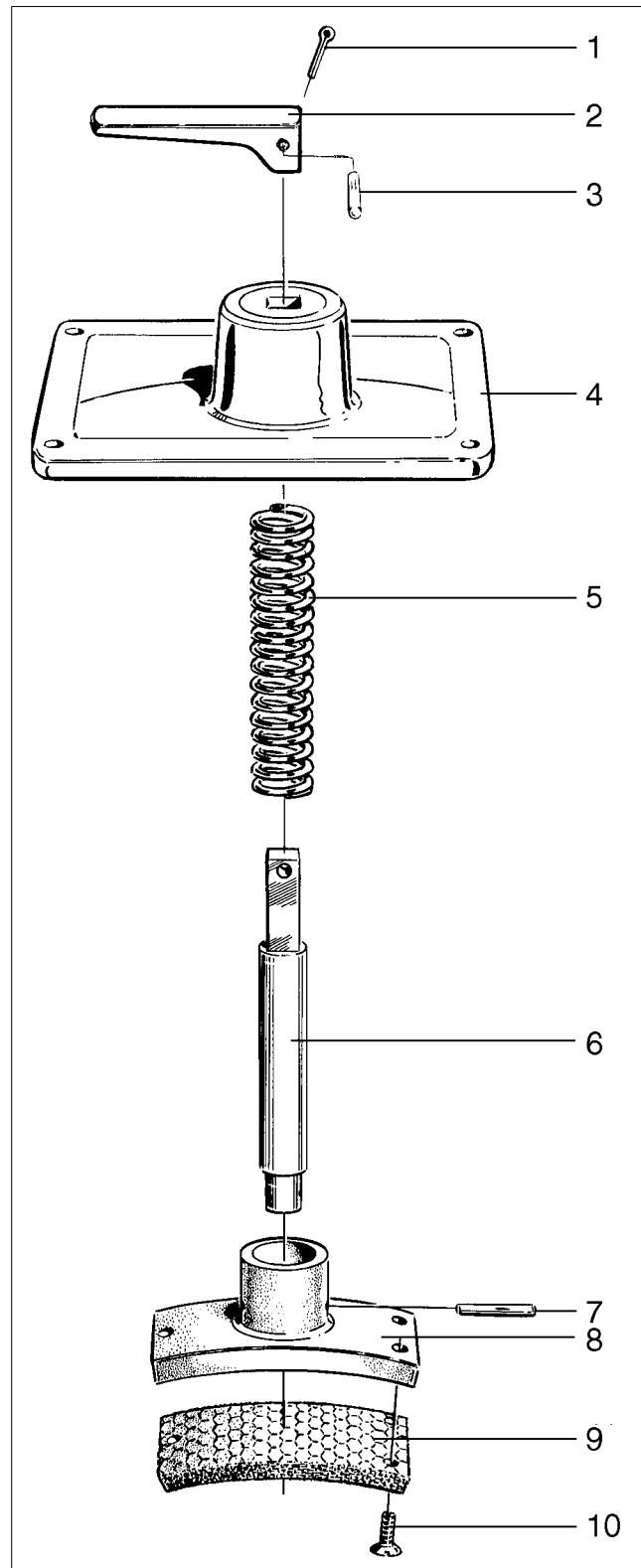
G 0655051

Brake



G0654841

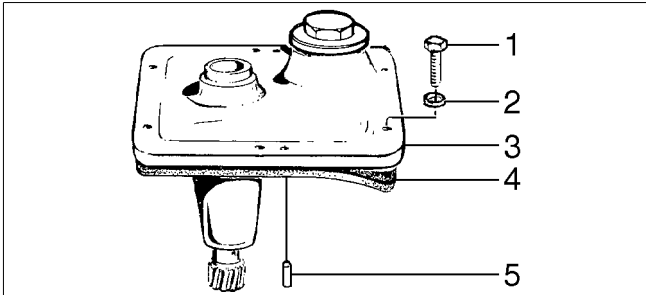
- 1. Screw
- 2. Washer
- 3. Guard



G0712531

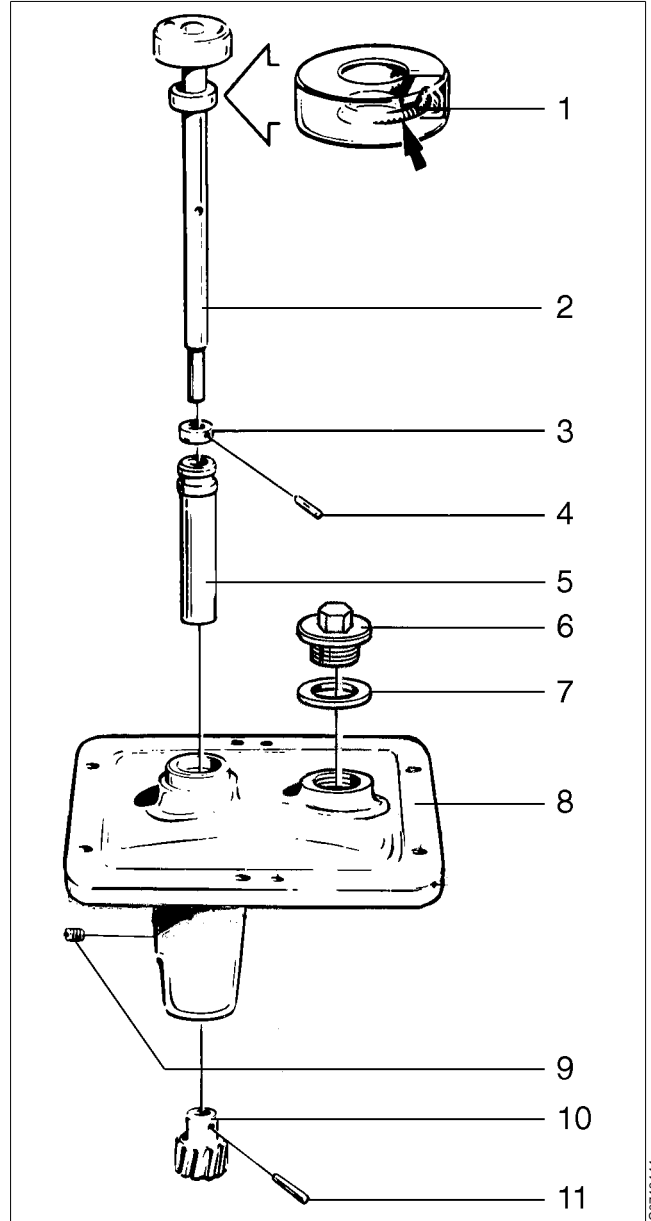
- 1. Split pin
- 2. Handle
- 3. Slotted pin
- 4. Guard
- 5. Spring
- 6. Spindle
- 7. Cylindrical pin
- 8. Brake shoe
- 9. Friction pad
- 10. Screw

Revolution counter



G0654941

- 1. Screw
- 2. Washer
- 3. Worm wheel guard
- 4. Gasket
- 5. Cylindrical pin

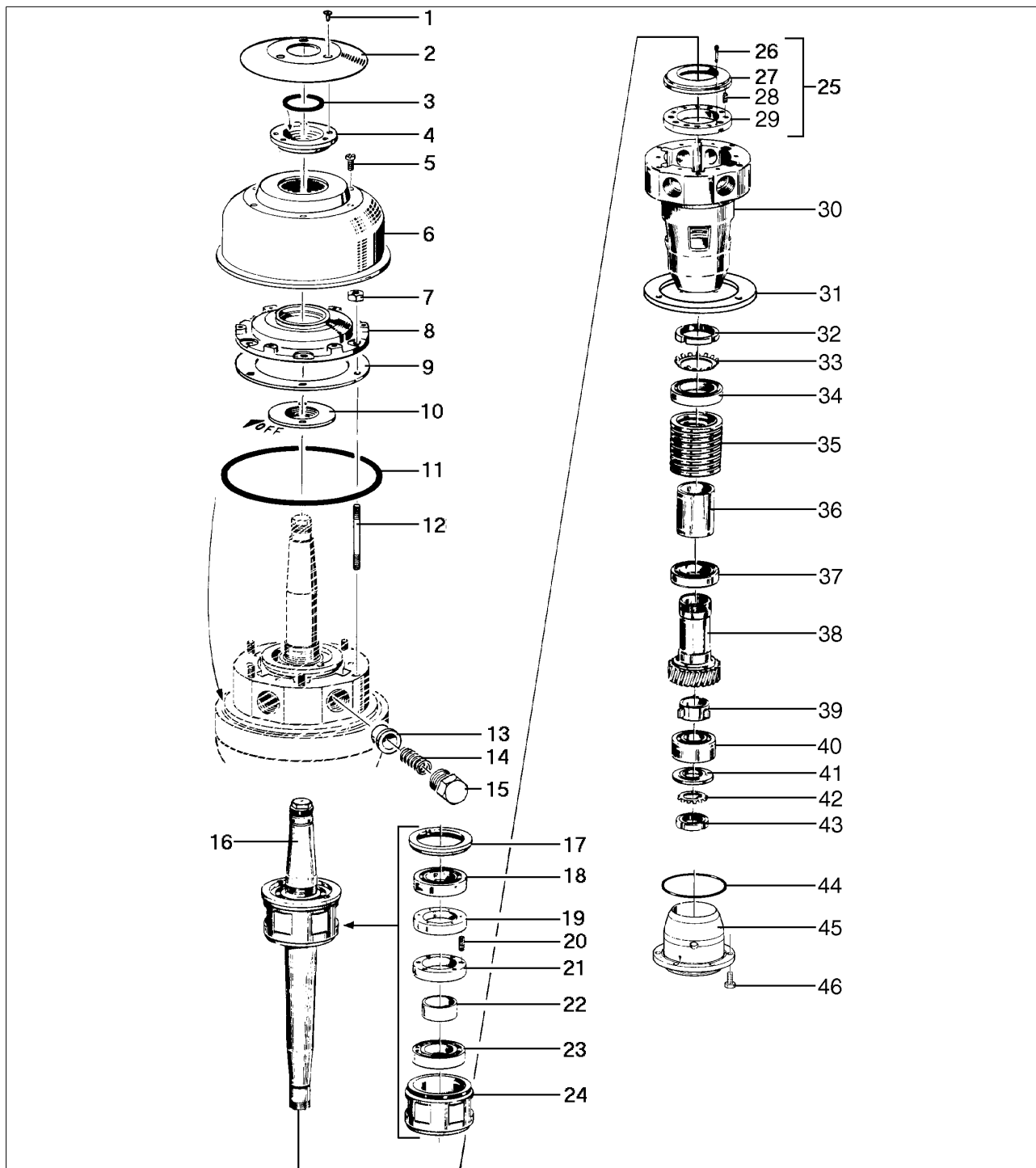


G0713141

- 1. Seal ring
- 2. Revolution counter shaft
- 3. Stop ring
- 4. Slotted pin
- 5. Bushing
- 6. Plug
- 7. Gasket
- 8. Worm wheel guard
- 9. Stop screw
- 10. Gear wheel
- 11. Taper pin

6.6 Vertical driving device


6.6.1 Exploded view



G0788611

1. Screw
2. Protecting plate
3. O-ring
4. Protecting collar
5. Screw
6. Guard
7. Nut
8. Cover for spring housing
9. Gasket
10. Oil fan
11. O-ring
12. Stud bolt
13. Buffer
14. Spring
15. Screw plug
16. Bowl spindle
17. Lock ring
18. Ball bearing
19. Spring support
20. Spring
21. Spring support
22. Spacing sleeve
23. Ball bearing
24. Ball bearing housing
25. Buffer
26. Split pin
27. Wear ring
28. Spring
29. Spring support
30. Spring casing
31. Gasket
32. Round nut
33. Lock washer
34. Ball bearing
35. Spring
36. Spacing sleeve
37. Ball bearing
38. Worm
39. Conveyor
40. Ball bearing
41. Washer
42. Lock washer
43. Round nut
44. O-ring
45. Bottom bearing housing
46. Screw

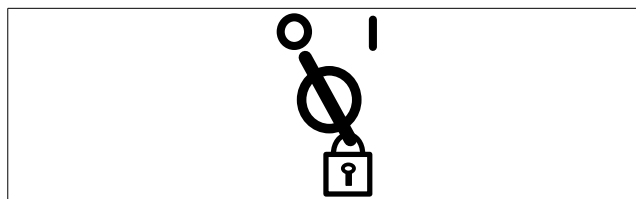
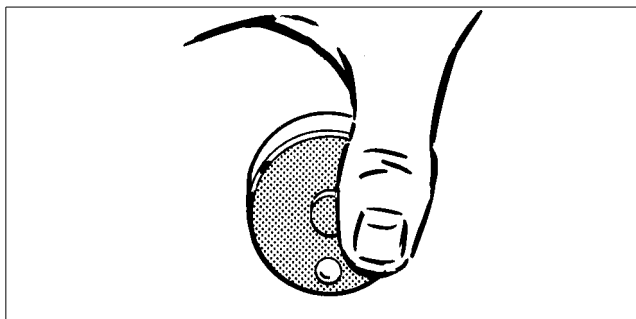
6.6.2 Dismantling




DANGER

Entrapment hazards

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



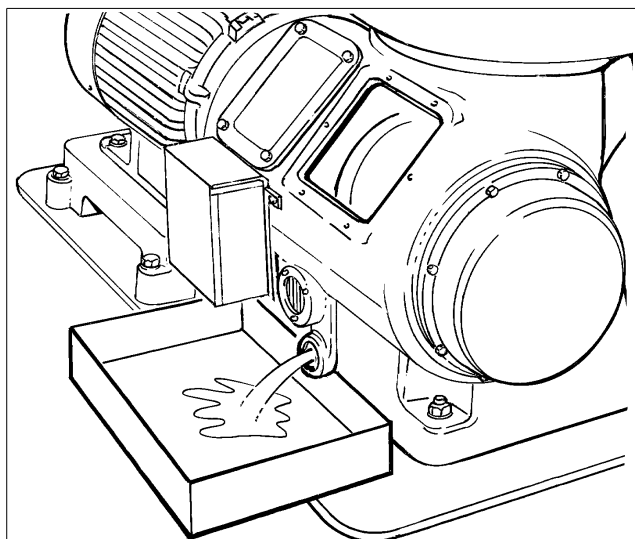
1. Drain off the oil from the gear housing.



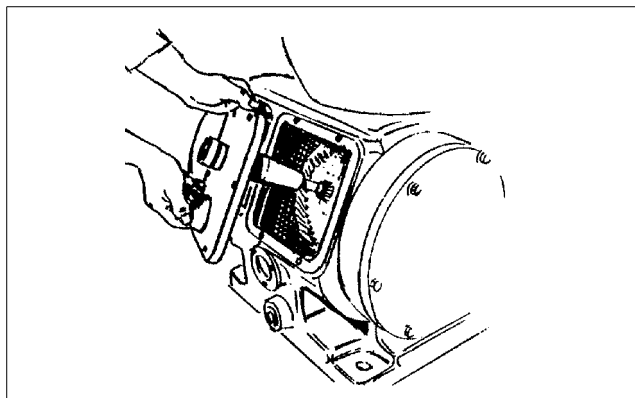
CAUTION

Burn hazards

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



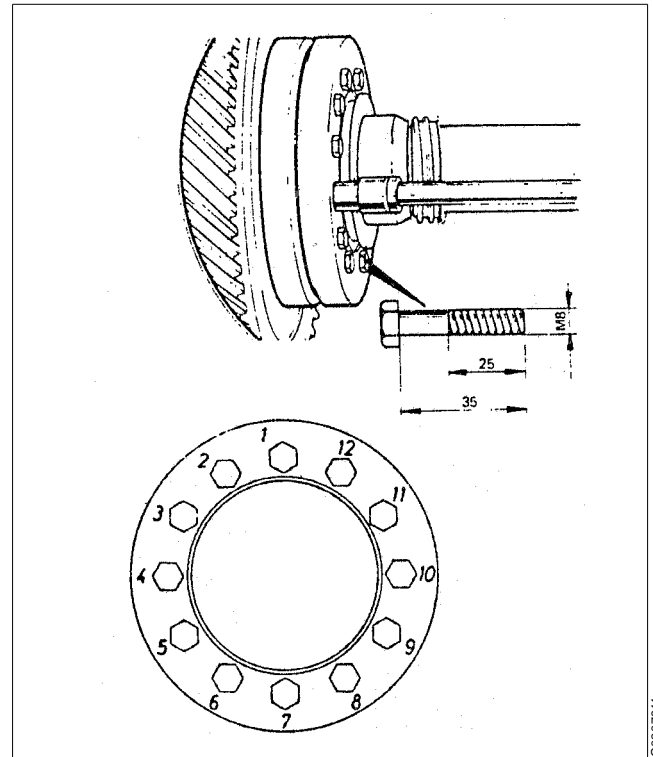
2. Remove the cover before starting any dismantling. Check the teeth of the worm wheel and worm for wear. See "5.7.1 Worm wheel and worm; wear of teeth" on page 71.



- On the horizontal driving device, loosen the screws in the clamping element uniformly and in the order shown in the figure. In the first round, do not loosen them more than 1/4 turn to avoid wryness in the clamping rings. Do not unscrew the screws entirely.

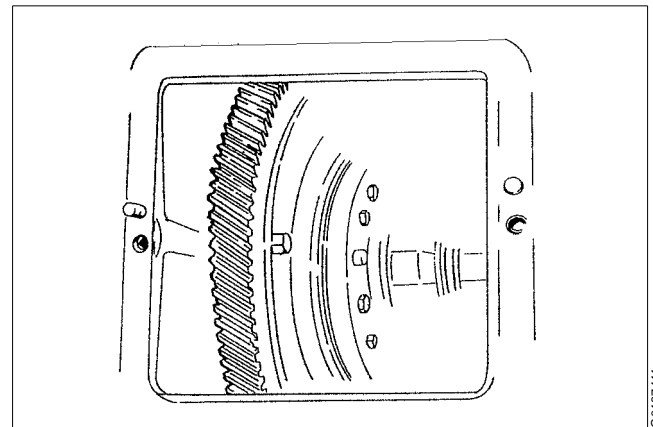
**CAUTION****Crush hazard**

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



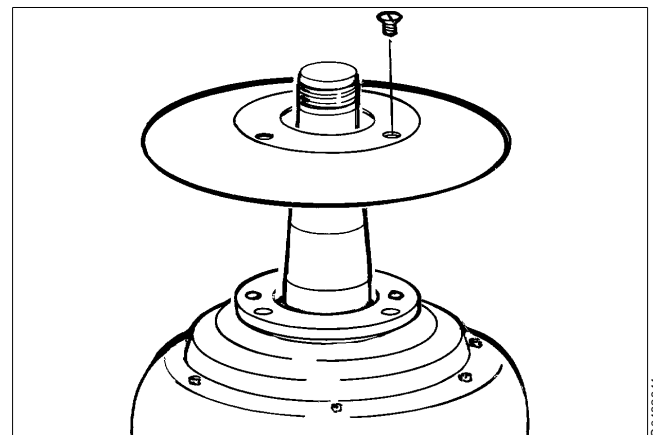
G0207911

- Push the worm wheel with the clamping element aside.



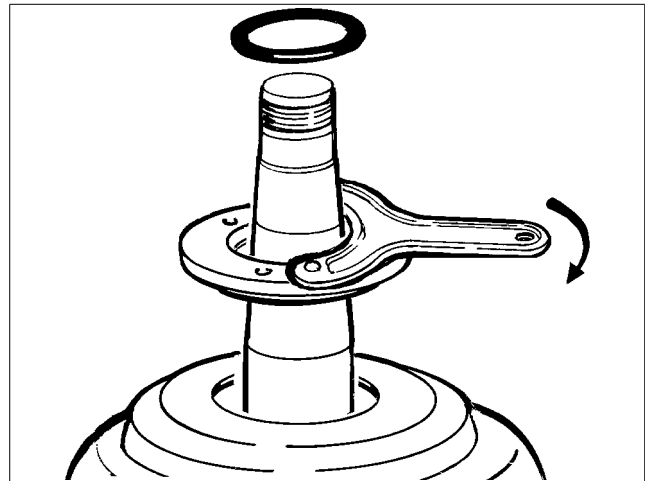
G0187411

- Remove the three screws and remove the protecting plate.



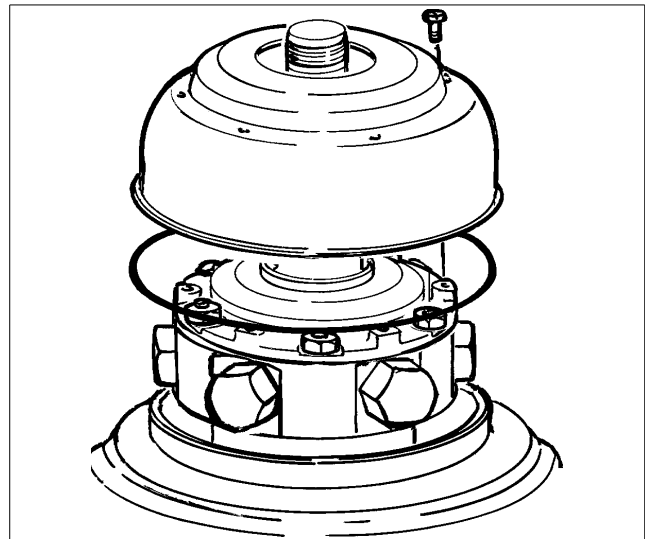
G0482811

- 6. Remove the O-ring. Remove the throw-off collar with the special tool.



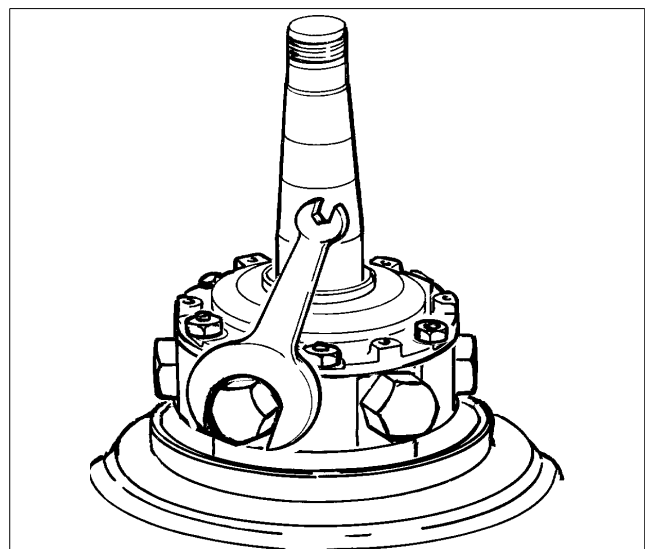
G0482911

- 7. Unscrew the six screws. Remove the protecting hood and the O-ring.



G0483011

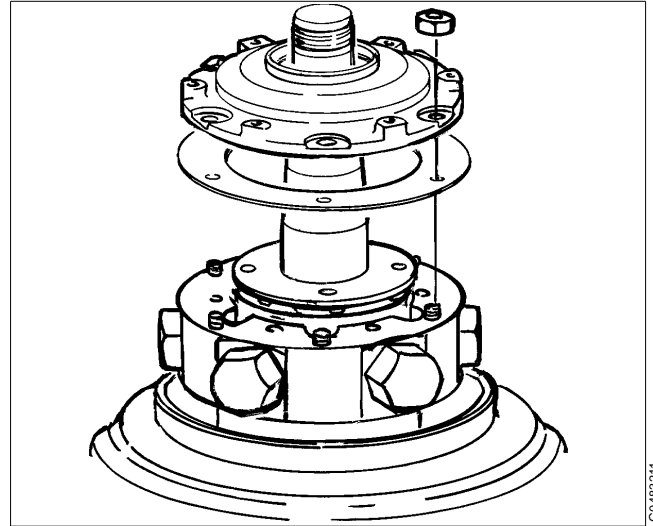
- 8. Loosen the screw plugs half-a-turn using the spanner and a hammer.



G0483111

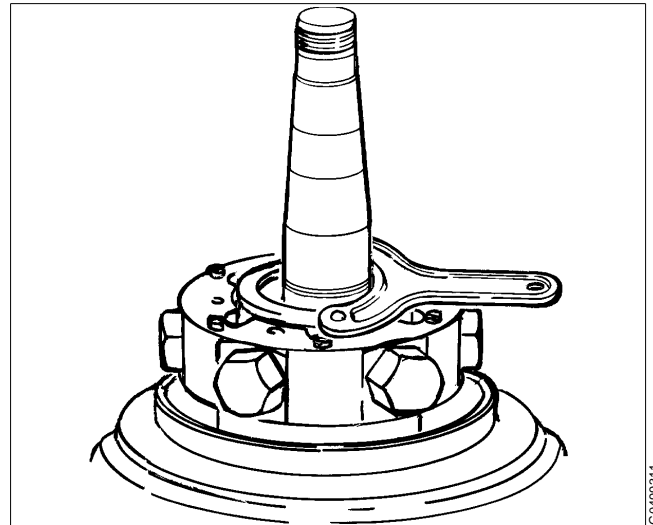
9. Unscrew the six nuts and remove the spring housing cover and packing.

Note! The nuts are locked with Loctite.

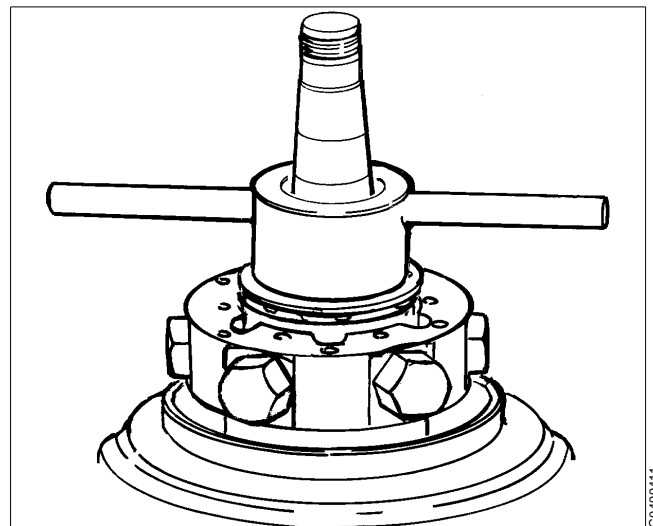


10. Unscrew the oil fan clockwise.

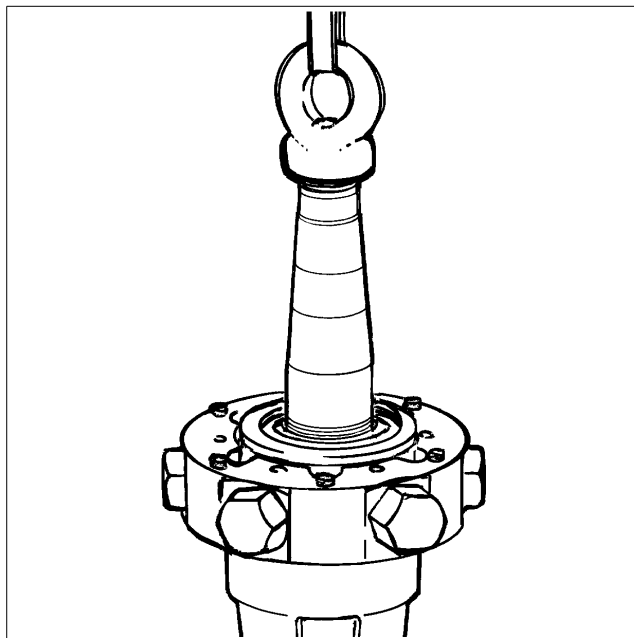
Left-hand thread!



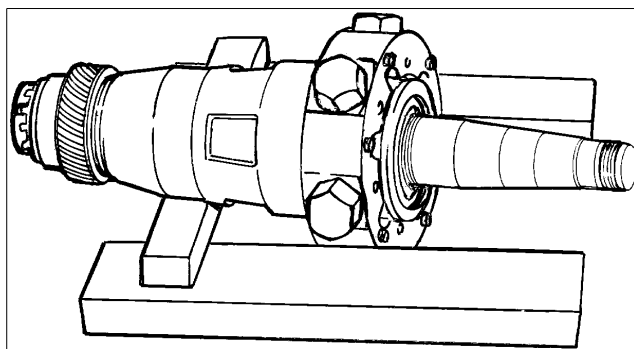
11. Loosen the lock ring half-a-turn counter-clock-wise.



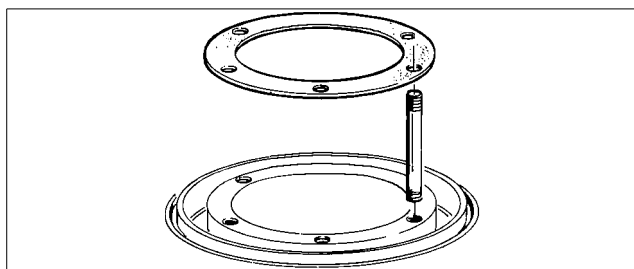
12. Fit the lifting eye bolt. Lift out the spindle unit carefully and place it horizontally.



13. Use some pieces of wood for support.

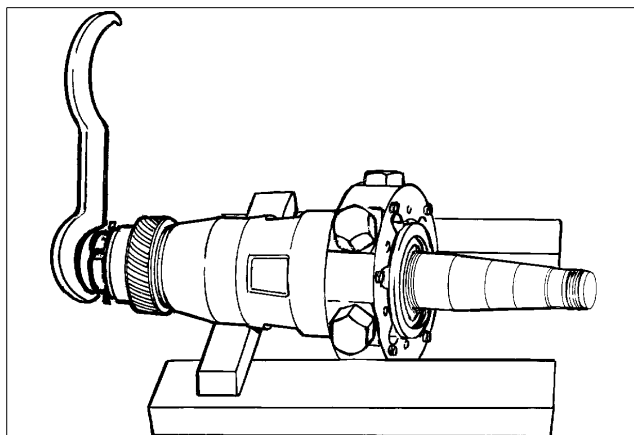


14. Remove the packing.

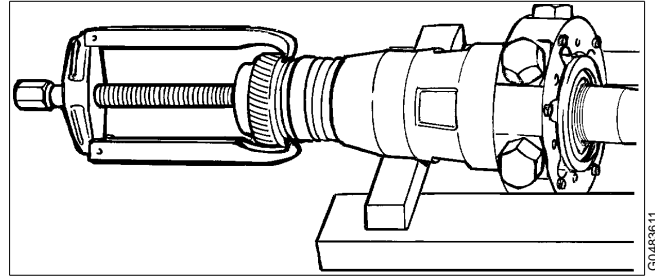


15. Make a wooden support to be used during certain sub-operations.

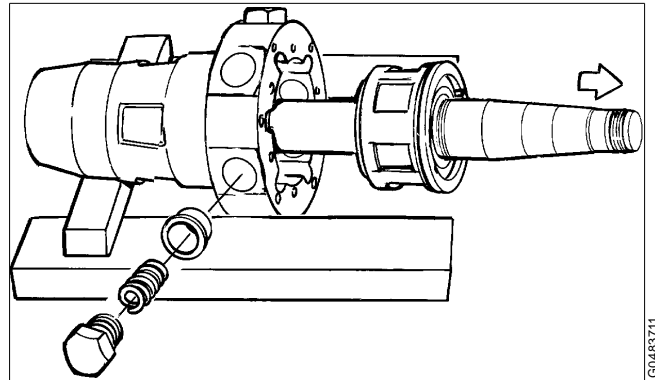
Open the lock washer and loosen the nut using the hook key.



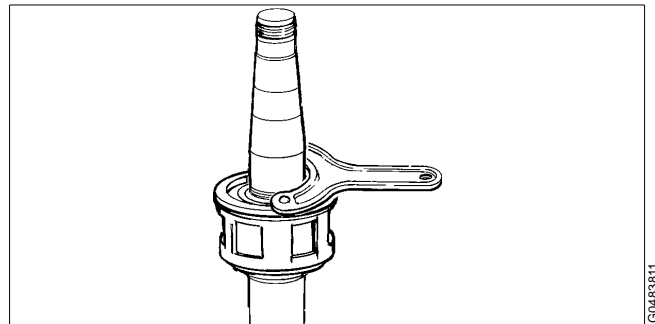
16. Pull off the worm complete with spring and ball bearings with a puller. The ball bearing and conveyor will also become loose.



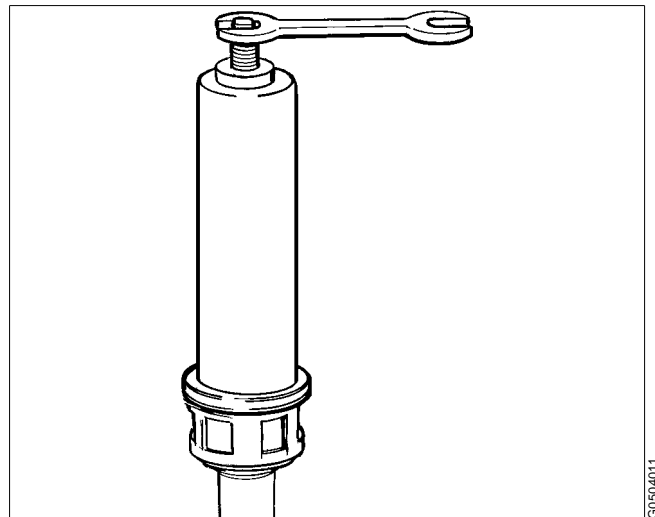
17. Remove plugs, springs and buffers. Pull out the spindle unit with ball bearing housing from the spring holder.



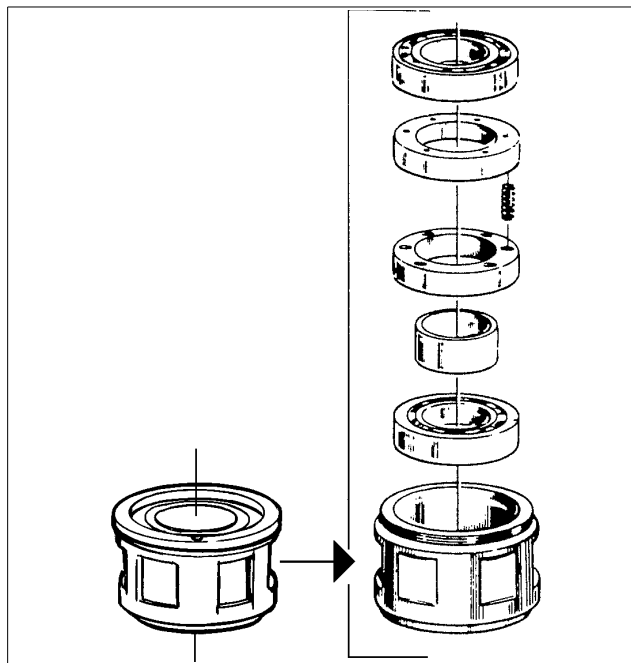
18. Remove the lock ring.



19. Remove the ball bearing housing with bearings using the puller.

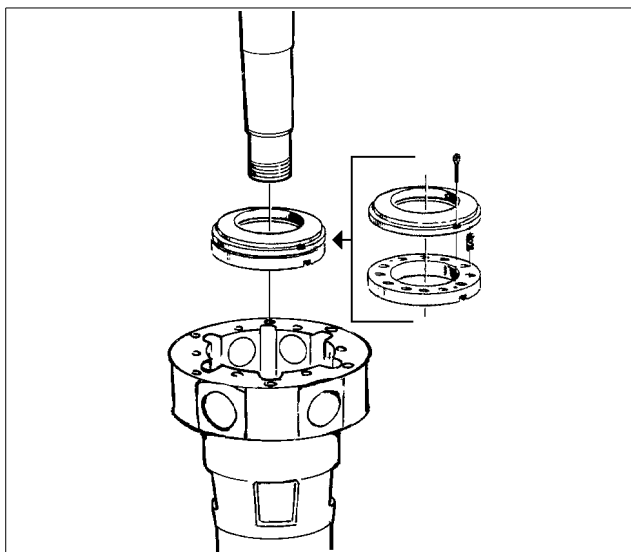


20. Push out ball bearing, spring support, springs, spring support, spacing sleeve and ball bearing.



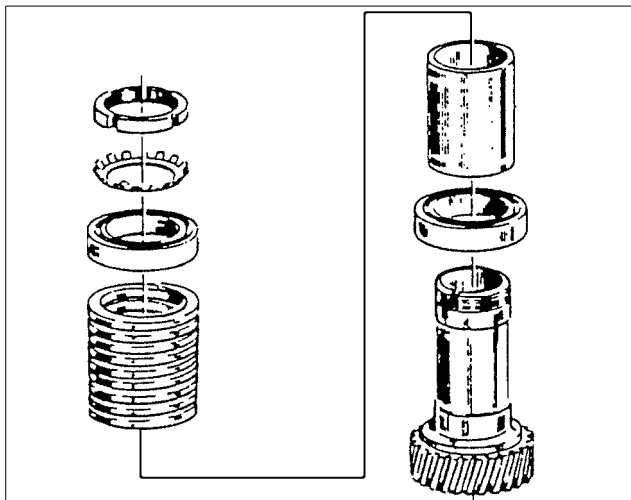
G0483911

21. Remove the axial buffer.



G0486111

22. Open the lock washer and loosen the nut. Knock loose the bearing from the worm using the special tool. Remove round nut, lock washer, ball bearing, spring, spacing sleeve and ball bearing.



G0484121

6.6.3 Assembly

✓ Check points

- “5.3.1 Corrosion” on page 47.
- “5.3.2 Cracks” on page 49.
- “5.3.3 Erosion” on page 50.
- “5.7.1 Worm wheel and worm; wear of teeth” on page 71.
- “5.3.4 Spindle top and bowl body nave” on page 51.

NOTE

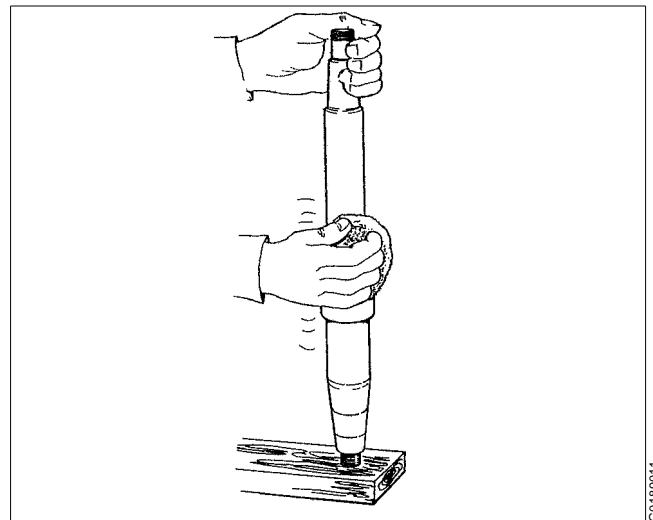
The bearings used for the bowl spindle are specifically designed to withstand the speed, vibration, temperature and load characteristics of high-speed separators.

Do not use other bearings than those stated in *Spare Parts Catalogue*.

Use of other bearings can cause serious breakdown which could result in injury or damage to health and equipment.

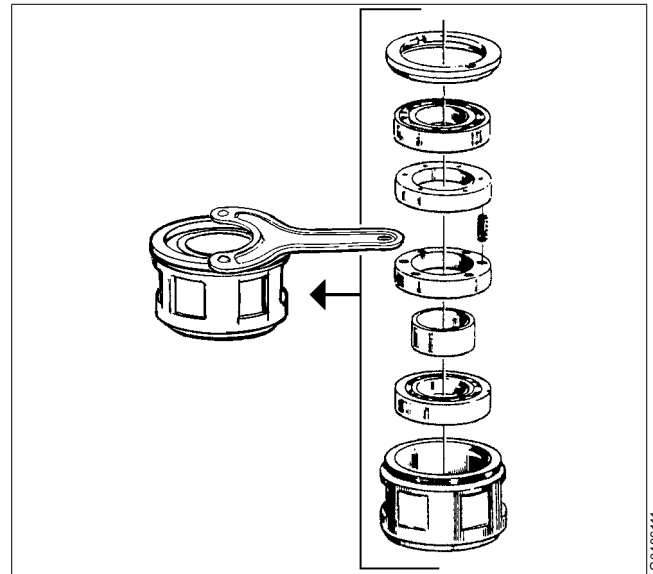
Do not refit a used bearing. Always replace it with a new one.

1. Wipe off and oil the bearing seat before fitting the ball bearing.



G0189011

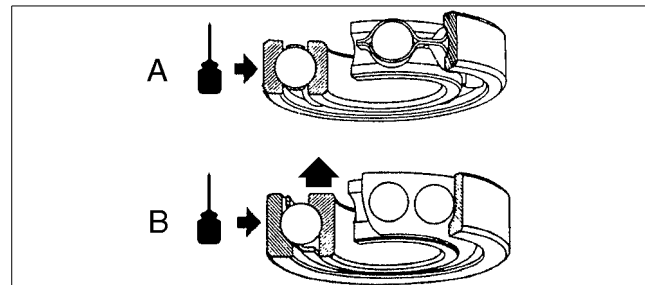
- Fit the ball bearing, spacing sleeve, spring support, springs, spring support and ball bearing in the ball bearing housing.



G048611

Note! The deep groove ball bearing (A) is to be mounted in the upper housing and the angular ball bearing (B) in the lower one.

Note! Turn the angular ball bearing (B) the right way - **IMPORTANT!** The wider shoulder of the inner race must face upwards.



G048601

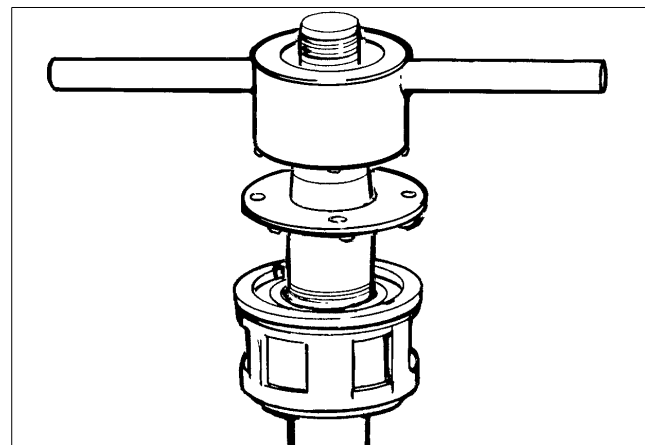
- Heat the complete unit to **125 °C**.

NOTE

If any doubt how to mount roller bearings in a correct way, see the detailed description in chapter "5.9.2 Ball and roller bearings" on page 76.

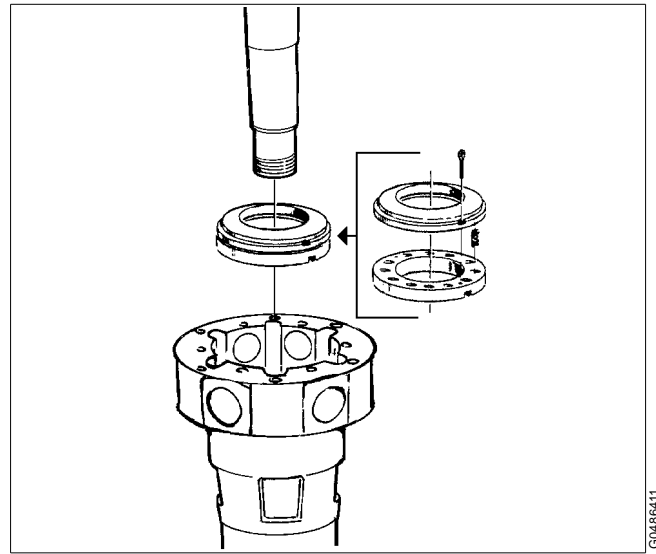
- Fit the unit on the spindle while still hot. Lock with the oil fan.

Left-hand thread!

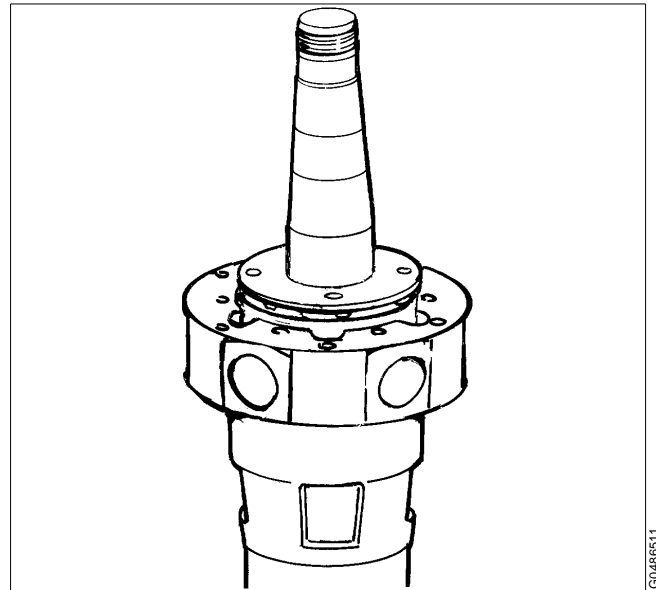


G048631

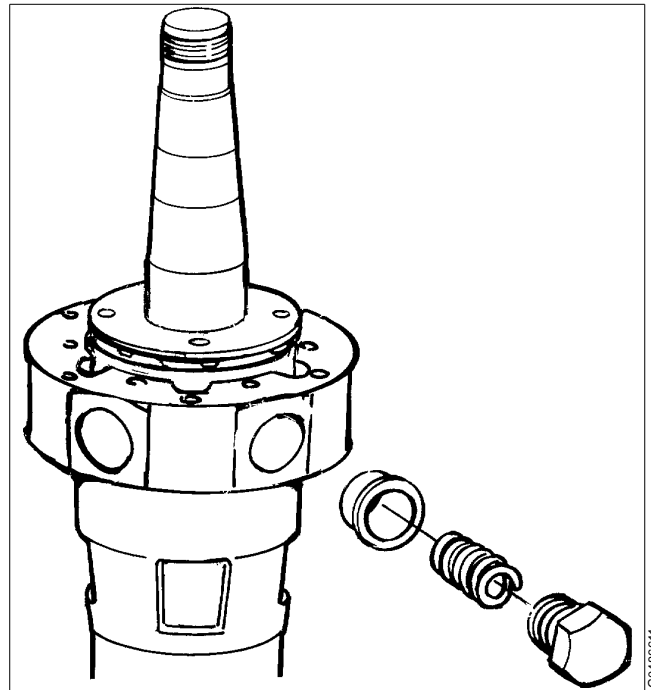
5. Fit the axial buffer in the spring housing.
It is recommended to support the spring housing so the spindle is free below.



6. Place the spindle unit in the spring housing.

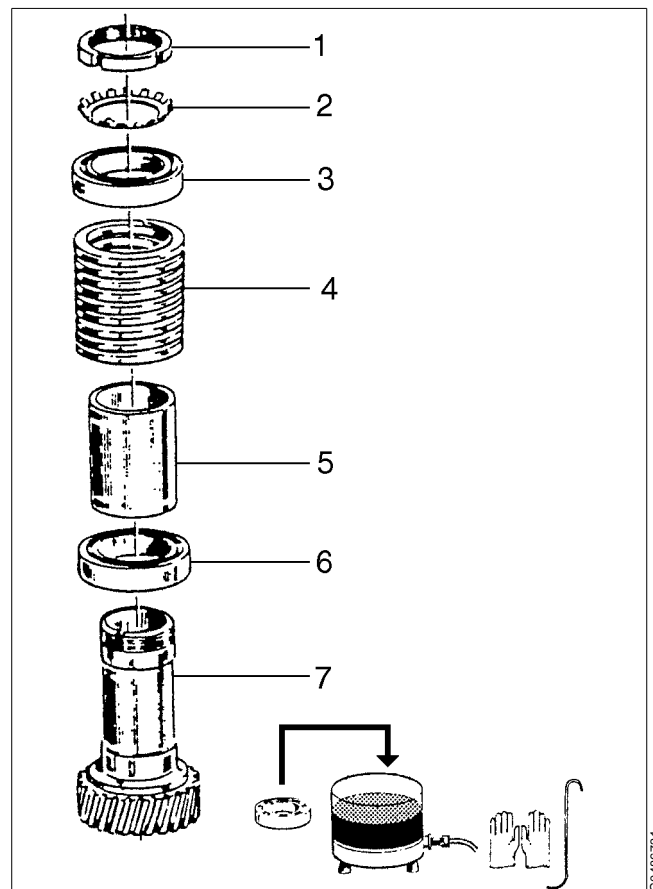


7. Fit buffers, springs and screw plugs.

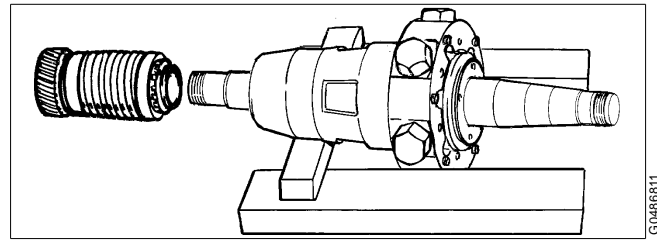


8. Heat ball bearings (3) and (6) to **125 °C**.

Fit the ball bearing (6), spacing sleeve (5), spring (4), ball bearing (3), lock washer (2), and round nut (1) onto worm and lock with washer.

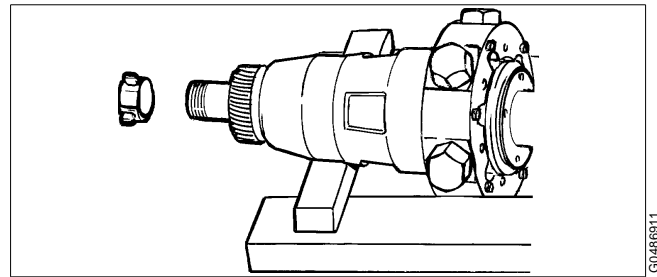


9. Fit the worm with spring component to the spring housing.



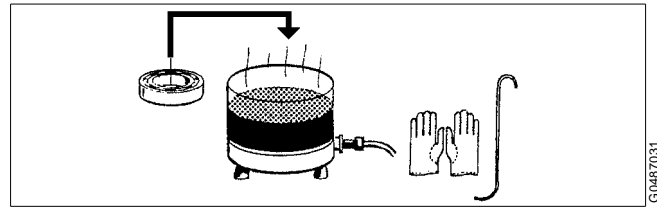
G0486811

10. Fit the conveyor with the drill marks facing the threads of the spindle.



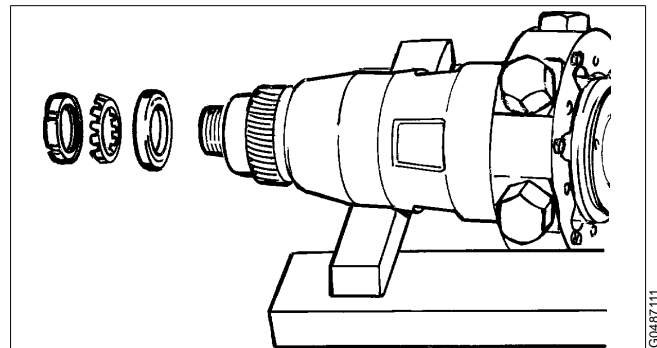
G0486911

11. Heat the ball bearing to **125 °C** and fit it to the spindle.



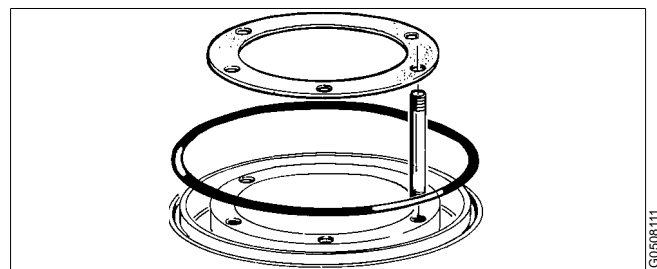
G0487031

12. Fit the intermediate washer, the lock washer, the round nut and lock the washer.



G0487111

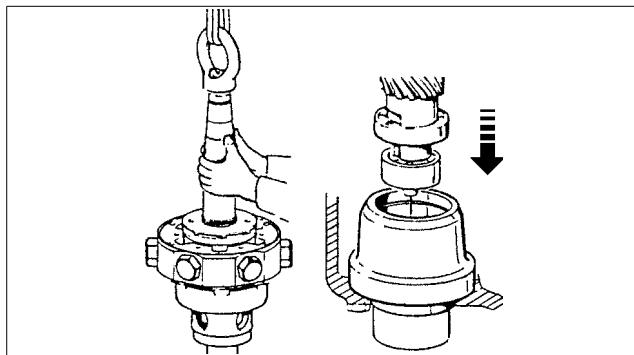
13. Fit a new packing and O-ring. If the stud bolts have been removed, refit them and lock with Loctite 270.



G0508111

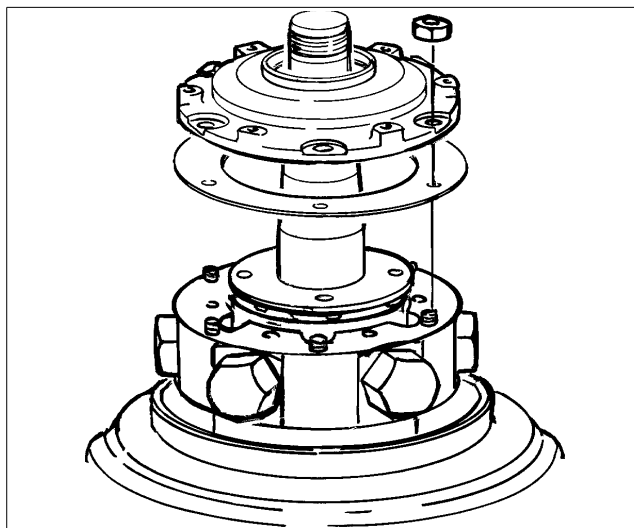
14. Fit the lifting eye on the spindle top. Carefully lower the spindle into the frame.

Guide the bottom bearing into the bottom sleeve. If it does not completely enter its seat, tap the spindle top gently with a tin hammer.



G0487311

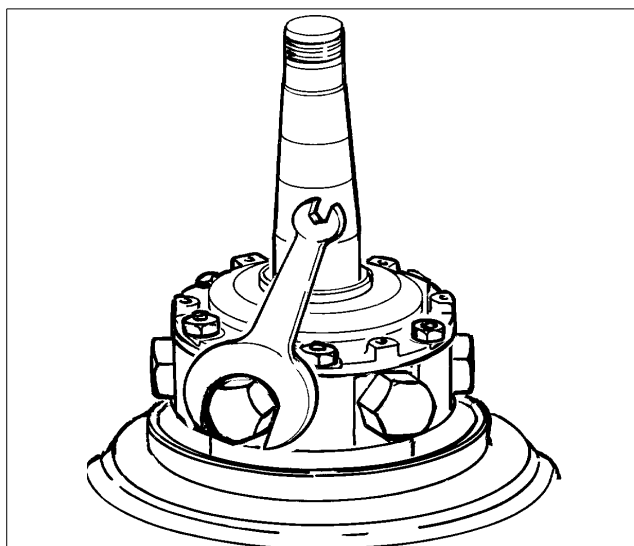
15. Fit the packing and spring housing cover. Secure the spindle unit in the frame with the nuts. Lock them with Loctite 242.



G0483211

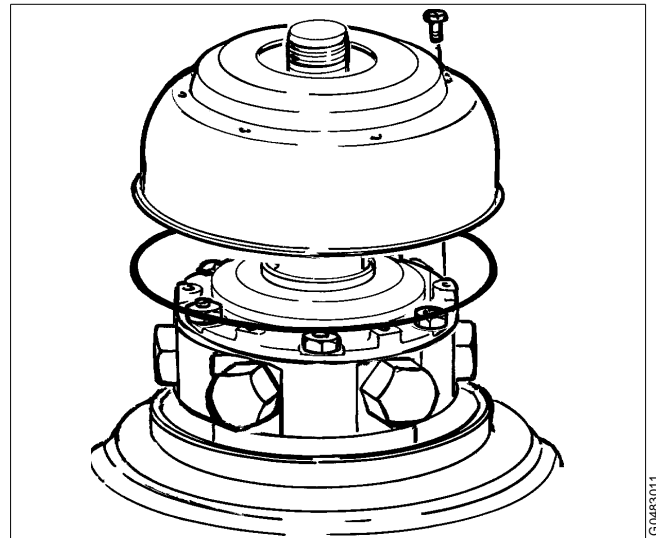
16. Knock down the spindle with a few taps on the spindle top with a tin hammer. Tighten the screw plugs.

Rotate the spindle a few turns to make sure that there is no obstruction.



G0483111

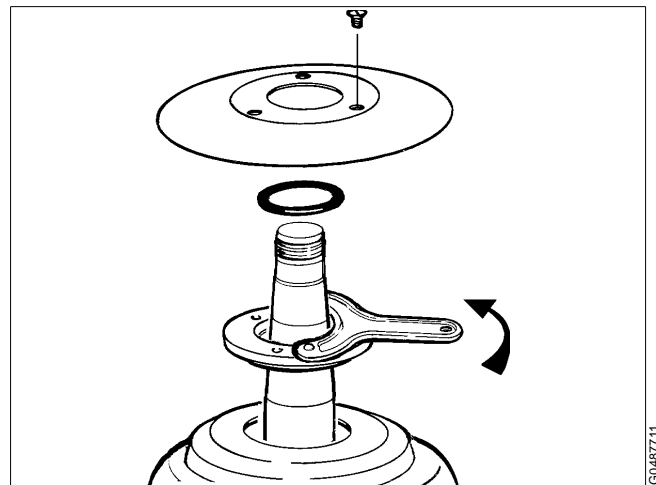
17. Fit the protecting hood.



18. Fit the throw-off collar.

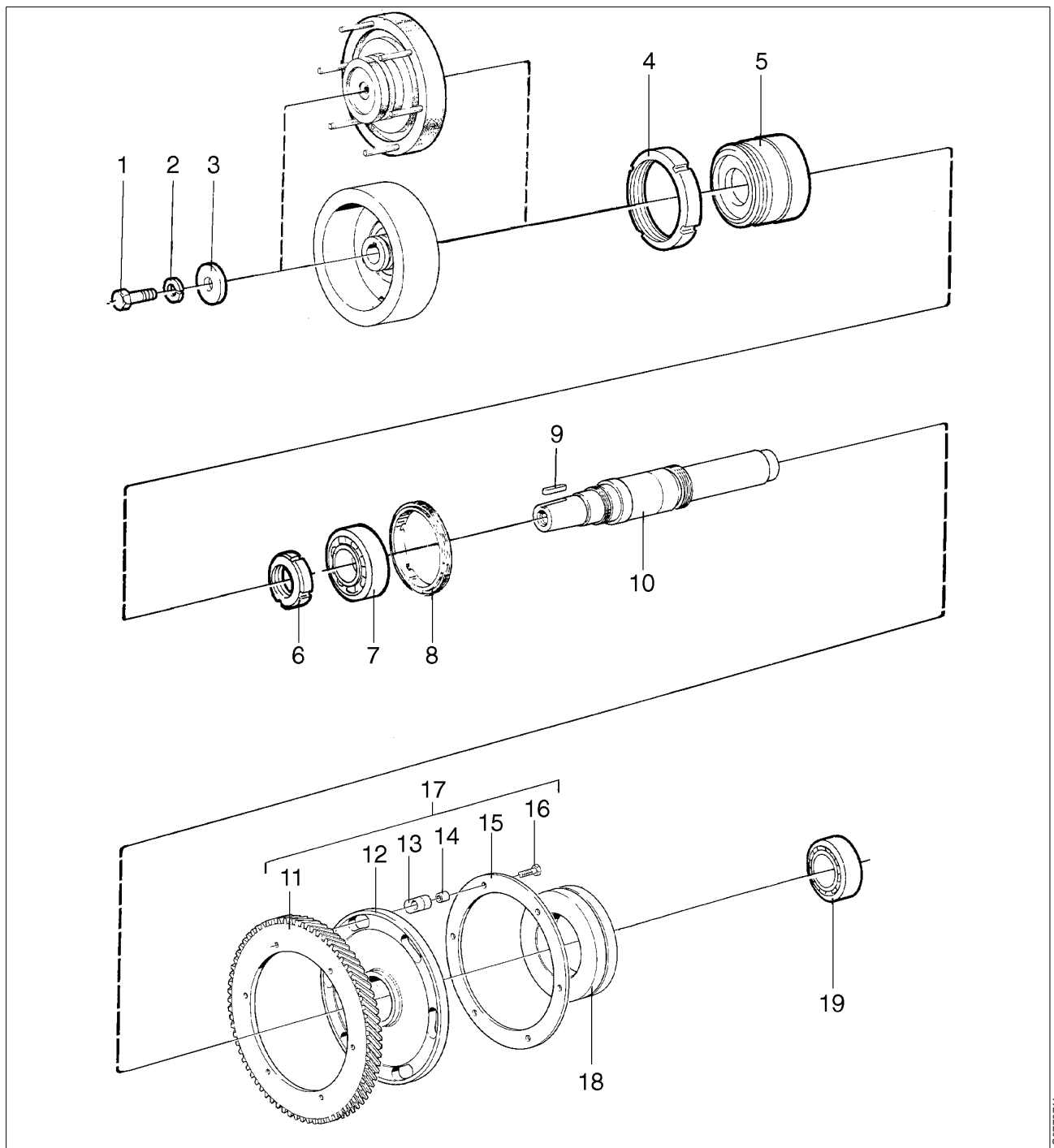
Left-hand thread!

Fit the O-ring and protecting plate. Rotate the spindle again to make sure that there is no obstruction.



6.7 Horizontal driving device

6.7.1 Exploded view



G0778711

1. Screw
2. Spring washer
3. Washer
4. Round nut
5. Bearing housing
6. Round nut
7. Ball bearing
8. Lock ring
9. Flat key
10. Worm wheel shaft
11. Gear rim
12. Nave
13. Buffer
14. Sleeve
15. Ring
16. Screw
17. Worm wheel
18. Clamp element
19. Ball bearing

6.7.2 Dismantling



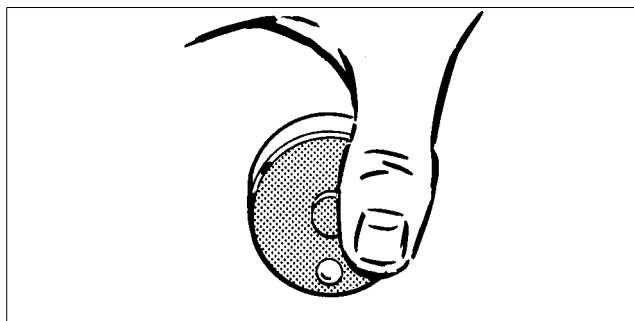
DANGER

Entrapment hazards

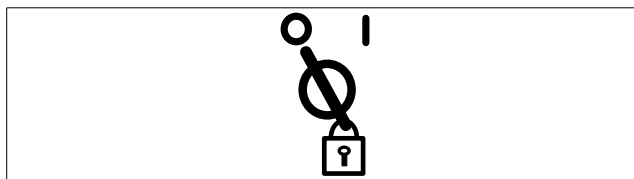
1. Make sure that rotating parts have come to a **complete standstill** before starting **any** dismantling work.

The revolution counter and the motor fan indicates if separator parts are rotating or not.

2. To avoid accidental start, switch off and lock power supply before starting **any** dismantling work.



G0246221



S0051011

The parts must be handled carefully. Don't place parts directly on the floor, but on a clean rubber mat, fibreboard or a suitable pallet.

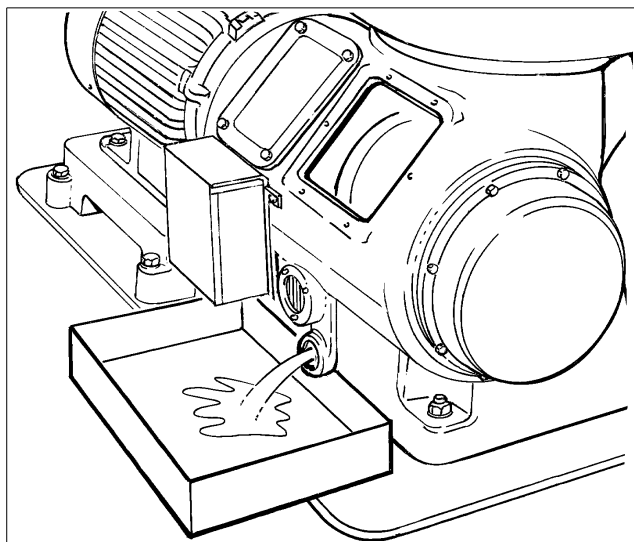
1. Drain the oil from the worm gear housing.



CAUTION

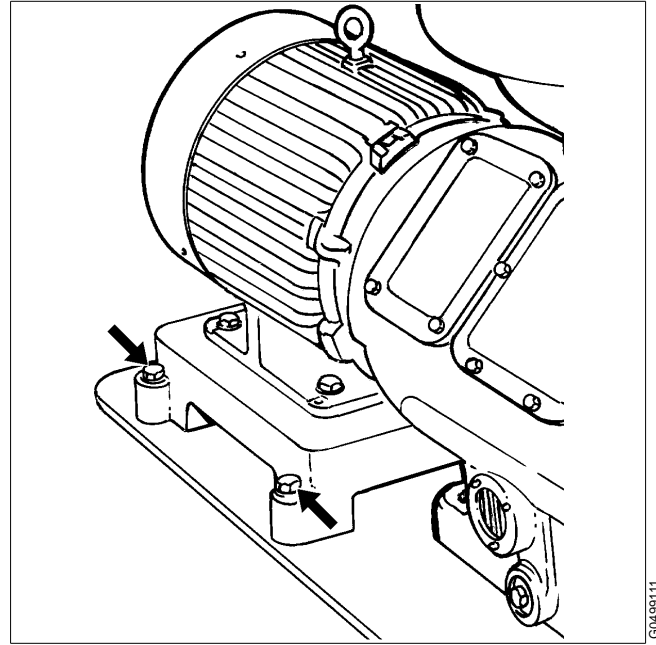
Burn hazards

Lubricating oil in the worm gear housing and various machine surfaces can be hot and cause burns.



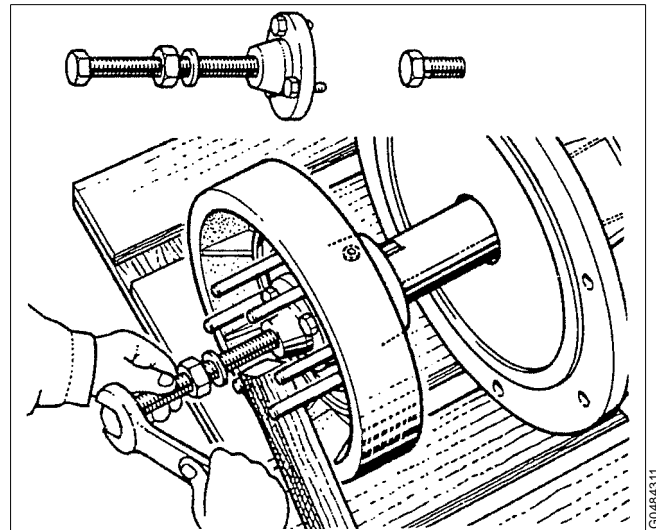
G0484211

2. Remove the motor. See "6.8 Motor" on page 136.



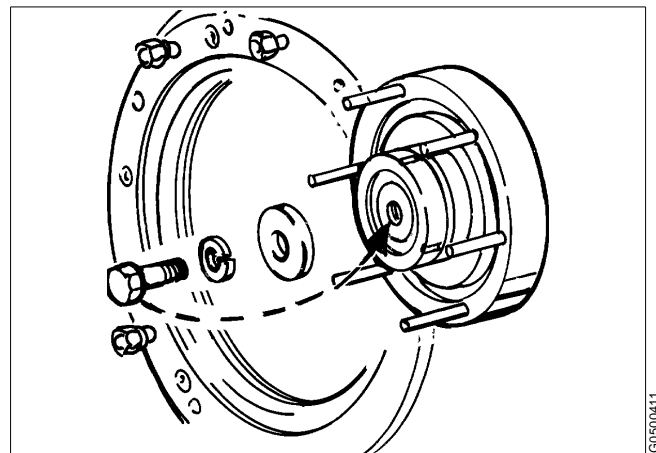
G0489111

3. If the brake pulley is worn out and needs to be replaced loosen the lock screw. Fit the screw from the worm wheel shaft on the motor shaft and apply some grease to the screw head. Fit the special puller tool using the three screws. Apply some grease to the threads of the special screw tool. Screw it into the puller tool and pull the coupling off.



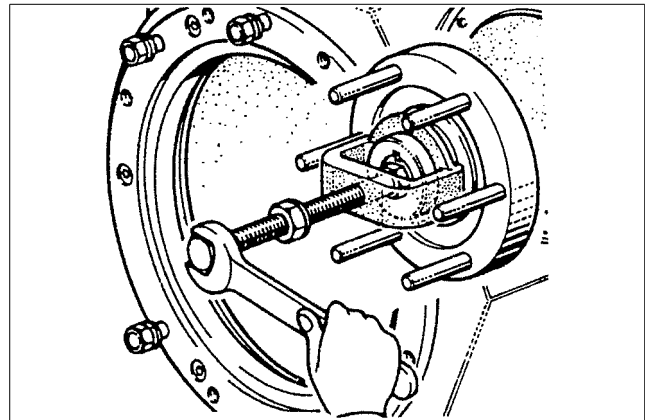
G0484311

4. Remove the washer and spring washer. Fit the screw again and use it as protection for the shaft when the coupling is pulled off.



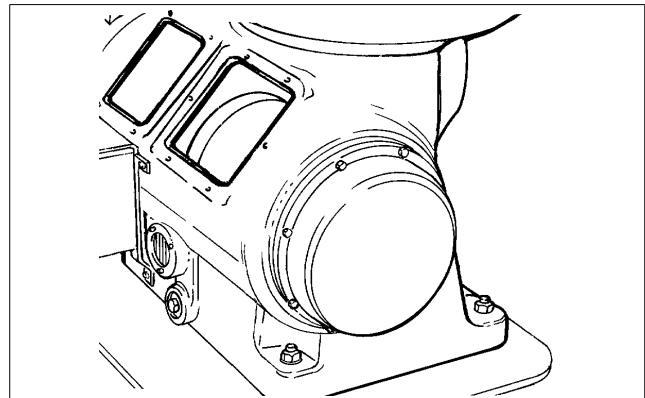
G0500411

- Fit the puller tool and pull off the coupling.



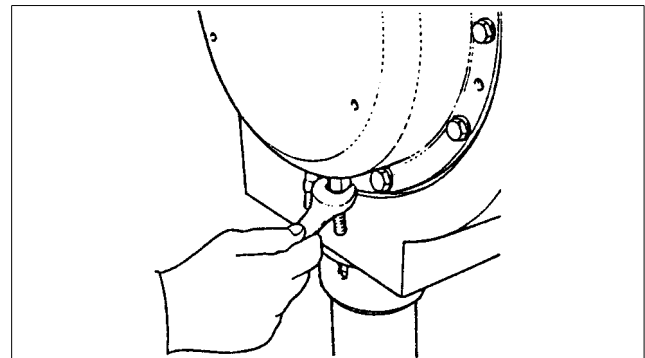
G0484411

- Remove the covers.



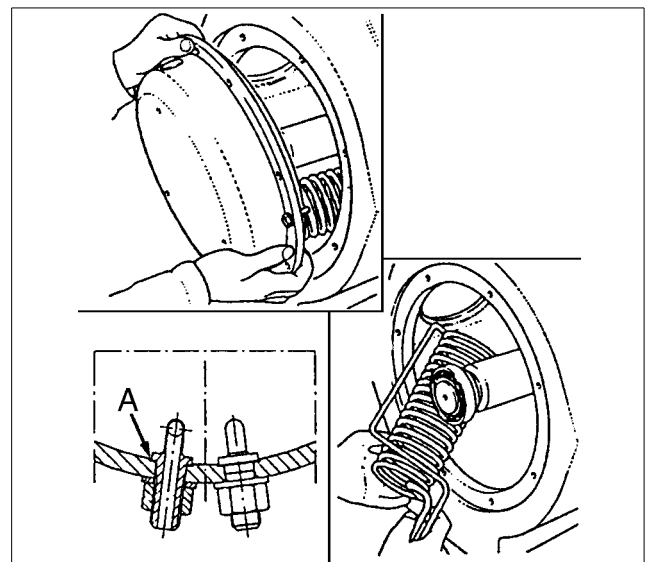
G0500511

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




G0797911

- Remove the bearing shield. Ease it off by means of two of the fastening bolts.



G0798011



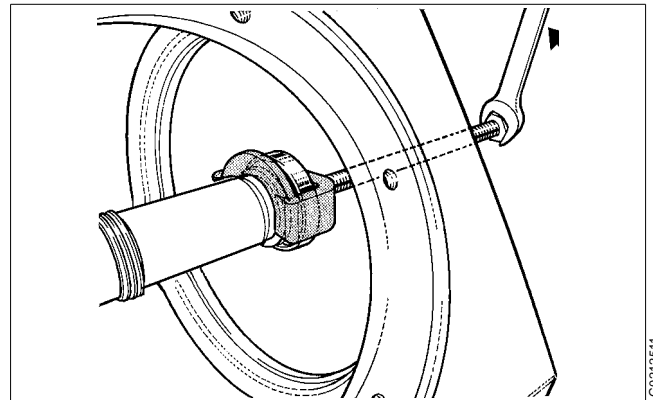
CAUTION

Crush hazards

The shield is quite heavy. Hold the shield firmly or use two longer screws as guide pins so as not to drop it during dismantling.

- Lift out the cooling coil. Take care of the sealings (A).

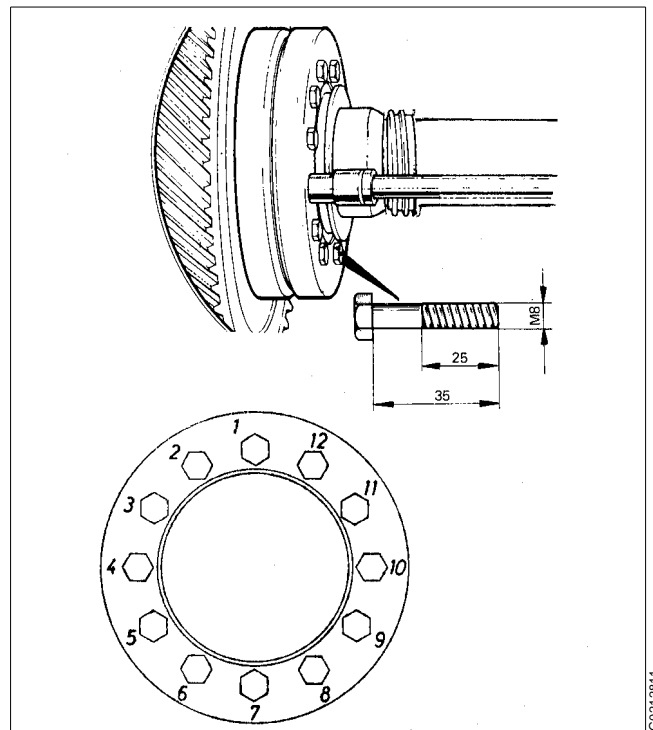
11. Fit the puller tool and pull off the ball bearing.



G0212511

12. Loosen the clamp screws uniformly and successively around the clamping rings in the order shown in the illustration. At the first round, do not loosen them more than 1/4 turn to avoid twisting the clamping rings. Do not screw out the clamp screws entirely.

13. Remove the clamping element and the worm wheel.



G0212811



CAUTION

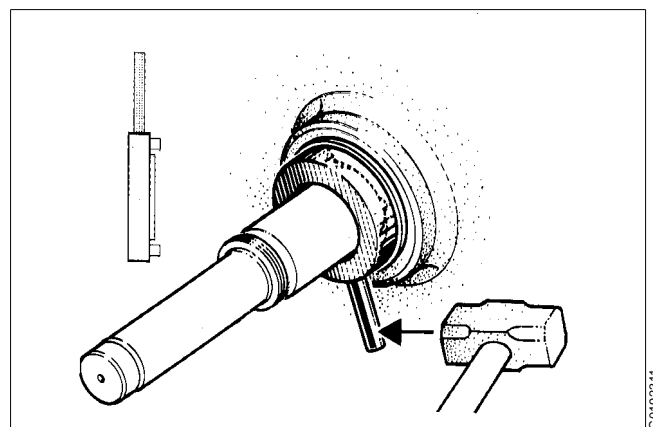
Crush hazards

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

Be careful not to get fingers trapped.

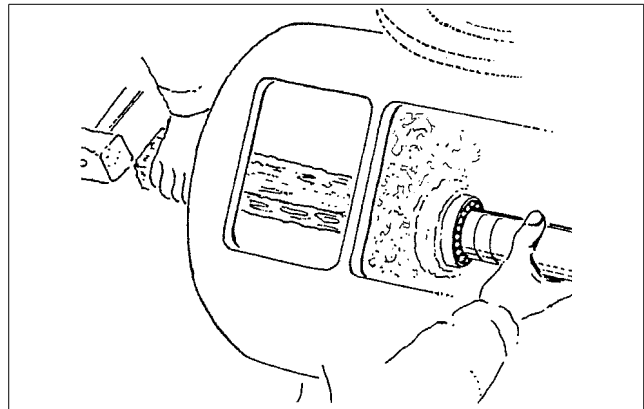
14. Remove the lock ring.

Left-hand thread!

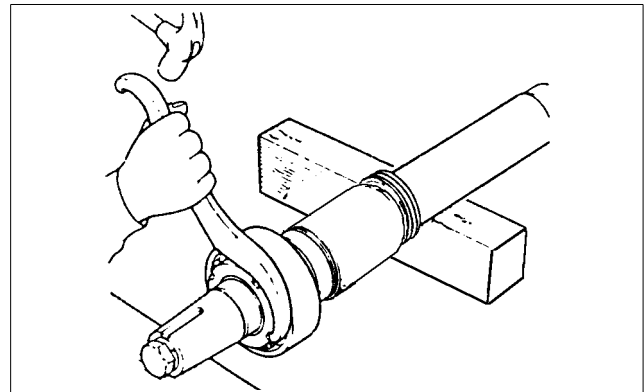


G0192311

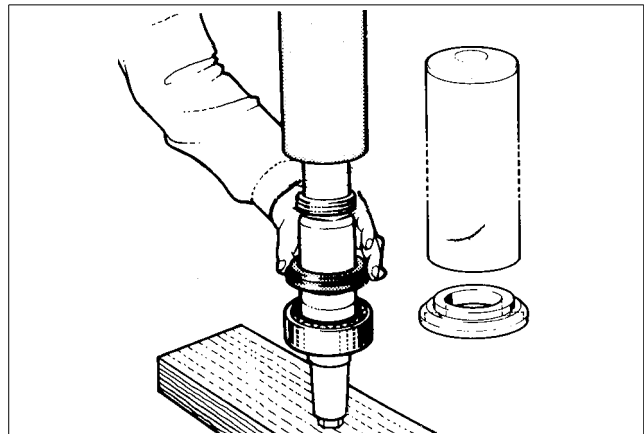
15. Knock the worm wheel shaft loose using a piece of wood and a tin hammer. Do this using light blows from the motor side.



16. Unscrew the round nut.



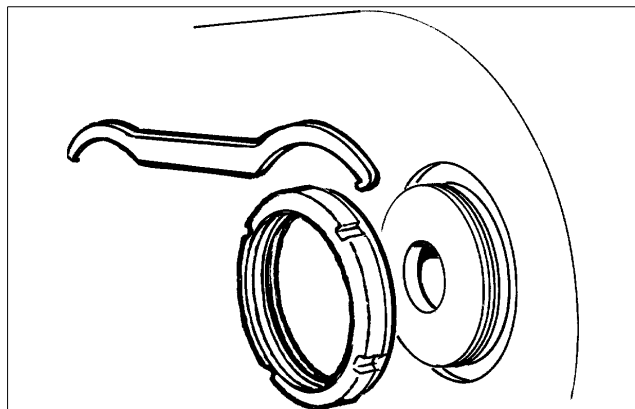
17. Dismantle the ball bearing. Turn the tool while doing this to avoid damage to the shaft. The pressure should be applied to the inner race of the ball bearing.



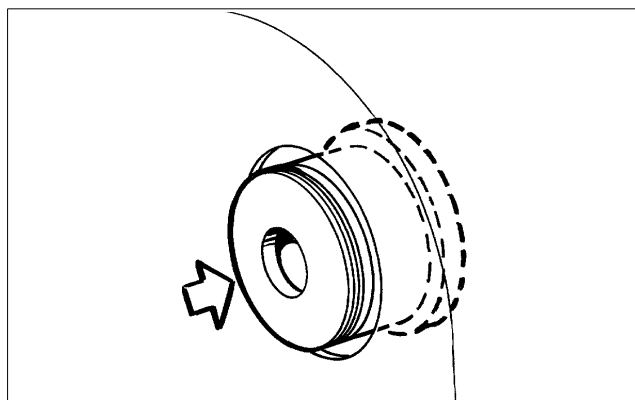
Bearing housing

The bearing housing should only be removed if it is necessary fit a new one or when the separator is being reconditioned.

18. Remove the lock ring.



19. Knock the bearing housing out from the motor side.

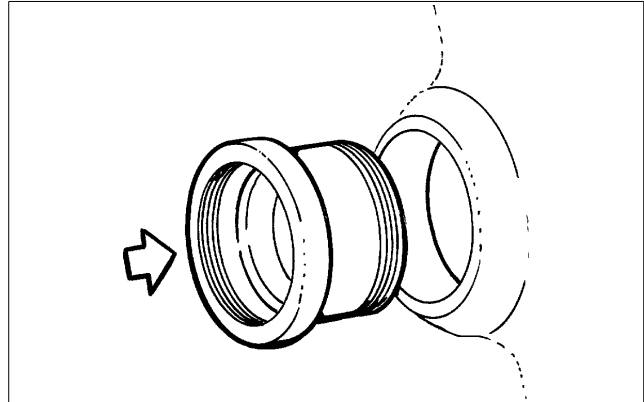


6.7.3 Assembly

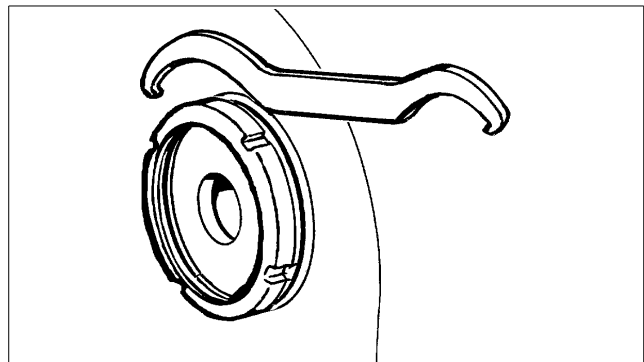
✓ Check points

- “5.3.1 Corrosion” on page 47.
- “5.3.2 Cracks” on page 49.
- “5.3.3 Erosion” on page 50.
- “5.3.9 Worm wheel and worm; wear of teeth” on page 59.
- “5.4.2 Brake” on page 61.

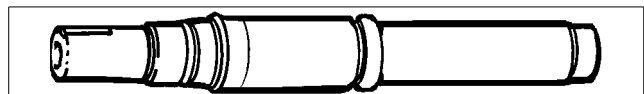
1. Apply Loctite 242 to the guide surface of the bearing housing and fit it to the frame if it has been removed.



2. Lock the bearing housing with the lock ring.



3. Clean and oil the bearing seat on the worm wheel shaft.



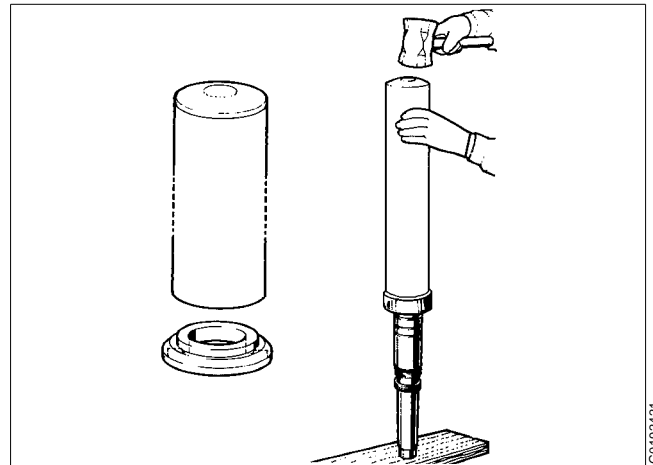
- Fit the ball bearing in cold condition by using the special bearing mounting tool.

NOTE

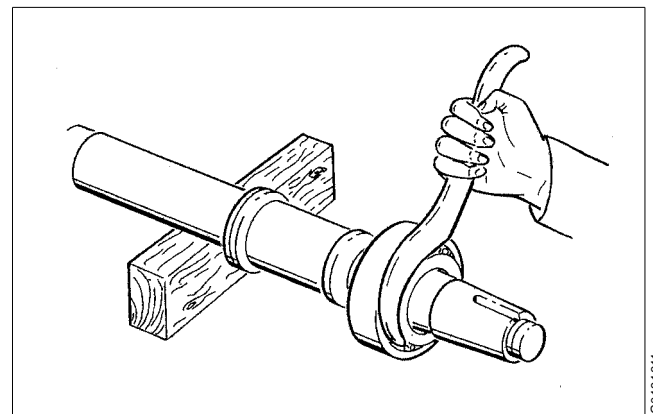
This procedure is recommended by Alfa Laval, but the ball bearing may also be assembled in hot condition. Then heat to **max. 90 °C** in a heating cabinet.

DO NOT heat this ball bearing in oil.

- Lock the ball bearing in its position by tightening the nut.

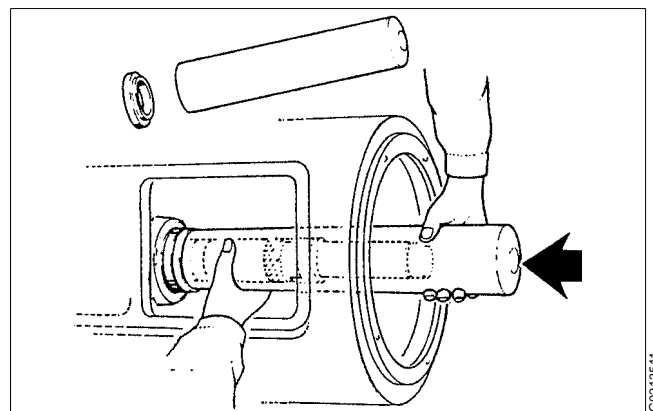


G0192421



G0191611

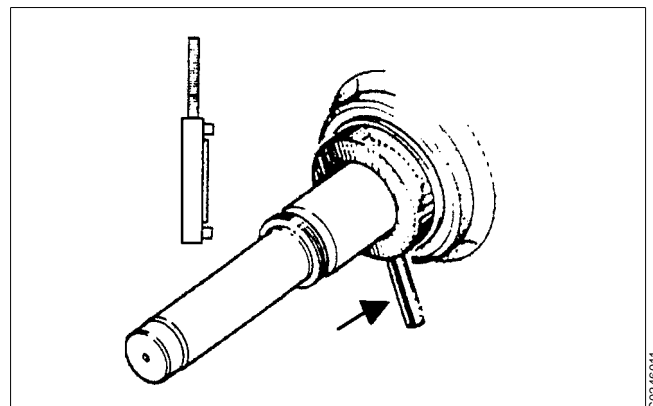
- Clean the bearing seat in the frame and oil the outer race of the ball bearing. Force the worm wheel shaft into its position in the frame so that the ball bearing enters correctly into its seat. Use the mounting sleeve and the ring forcing the outer race of the ball bearing.



G0213511

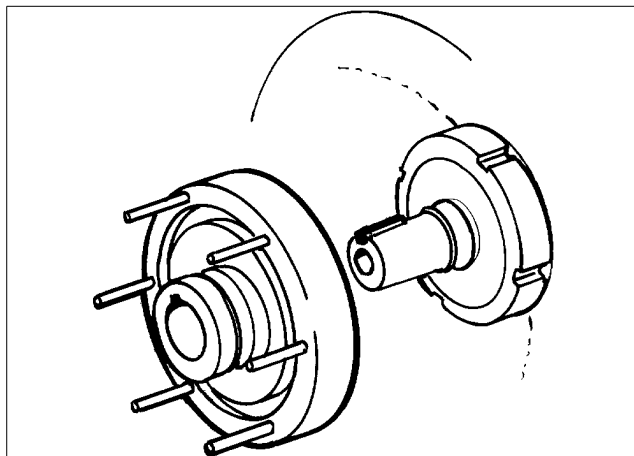
- Fit the lock ring. Tighten it with the pin spanner.

Left-hand thread!



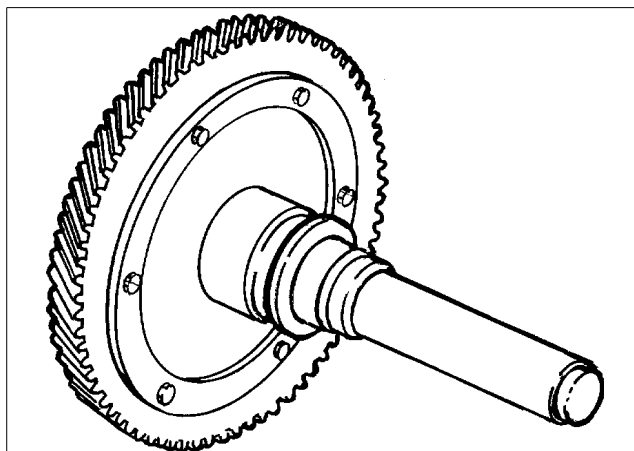
G0246011

8. Fit the coupling pulley on the worm wheel shaft. Make sure that the key enters the recess in the pulley. Lock the coupling disc in its position by means of the plain washer, spring washer and centre screw.



G0605811

9. Clean all surfaces thoroughly. Push the worm wheel into its position on the shaft.
10. When fitting a new gearing, always ensure that the new parts have the correct number of teeth. See "8.1 Technical data" on page 155.

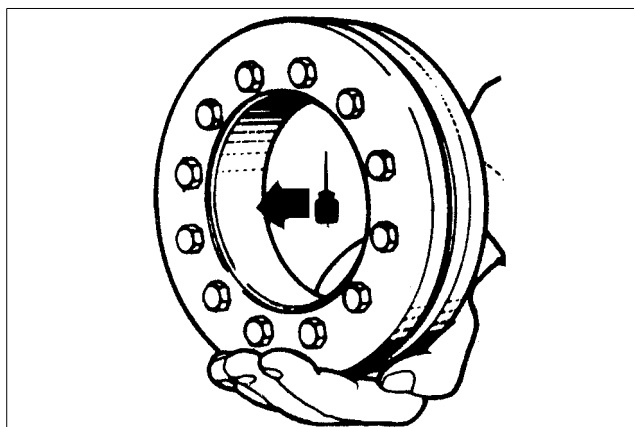


G0605711

**DANGER****Disintegration hazard**

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

11. Clean the inner surface of the nave of the clamping element and oil it. The oil must be of the same quality as that used in the gear housing. Slip the clamping element on to the worm wheel.



G0213811

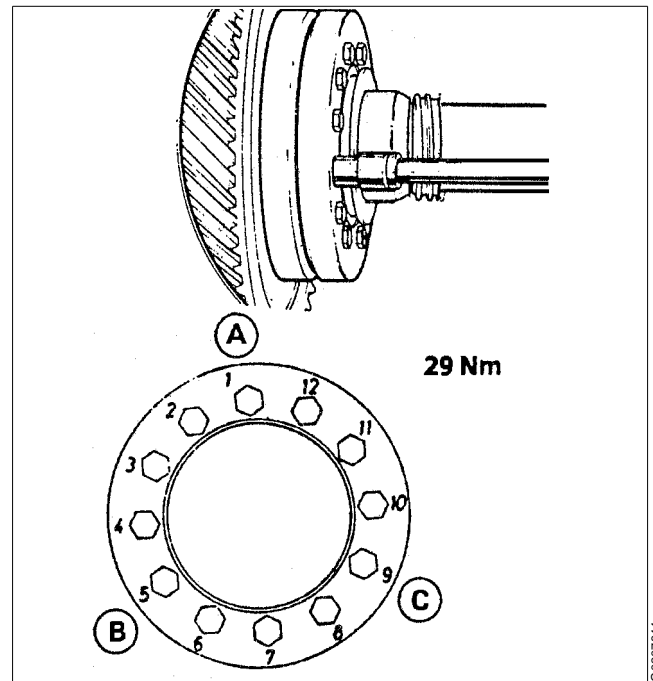
12. First tighten the three clamp screws A, B and C (see figure), but only so that clamping element just sticks on the worm wheel shaft.

Then tighten the clamp screws uniformly and successively around the clamping ring in order (1-12) as shown in the figure. Do not tighten crosswise.

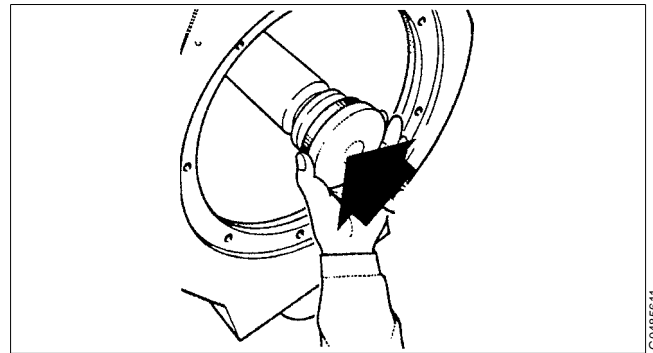
Tightening torque: **29 Nm**.

This must be repeated several turns around until full torque on every screws is reached.

Check continuously that the clamping rings remain parallel.



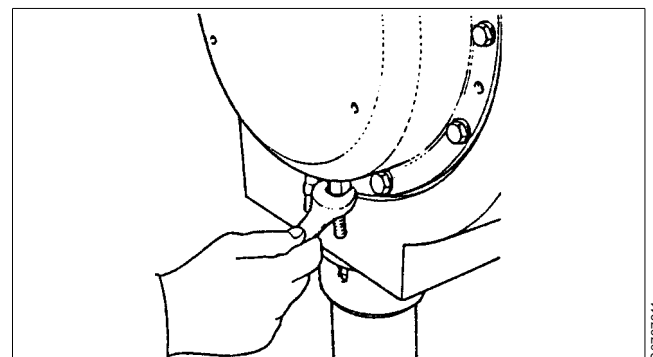
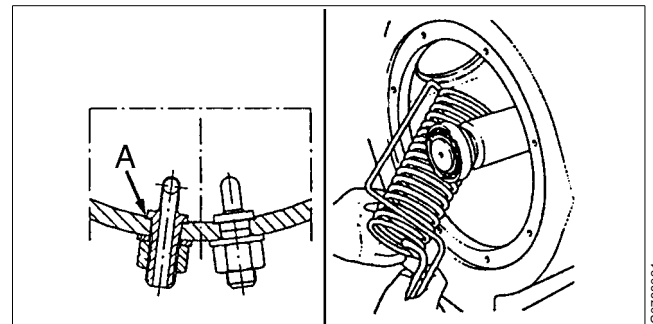
13. Heat the ball bearing in oil or in a heating cabinet. Fit the bearing. When it has cooled down, use the mounting disc and strike a few blows on the latter to make sure that the bearing is in the correct position. Use the tin hammer.



14. Make certain that the worm gear housing and the magnet of the cooling coil have been properly cleaned.

Fit new gaskets (A) onto the cooling coil tubes and insert the coil.

15. Clean the bearing seat in the end shield.
16. Make sure the tolerance ring in the shield is correctly fitted.
17. Fit the sealings onto the cooling coil tubes. Fit the gasket on the bearing shield and fit the shield. If necessary, force the shield into position by tightening the screws in the shield, or knock carefully with a tin hammer against the central part of the shield.
18. Fit the bearing shield cover and the nuts and washers of the cooling coil connections.



19. Lubricate the motor shaft with Molykote 1000 paste. Knock the disc on to the motor shaft as far as possible using a piece of wood and a hammer.

Screw the mounting tool into the motor shaft as far as it goes and apply some grease to its washer. Then fit the tubular socket over the large nut and turn the screw until the coupling disc is in position. Lock with the lock screw.

20. Check the three elastic plates. Clean or change, if needed.

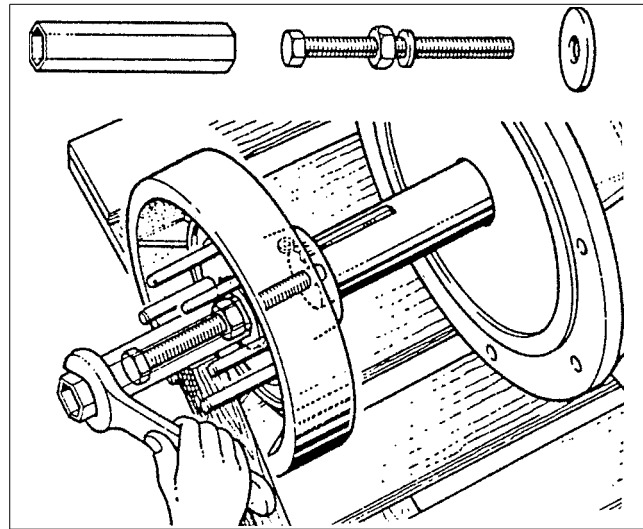
Fit the plates.

21. Before mounting the motor, check the axial play of the elastic plates. Measure the distances "a" and "b". The difference should be $35 \pm 0,5$ mm.

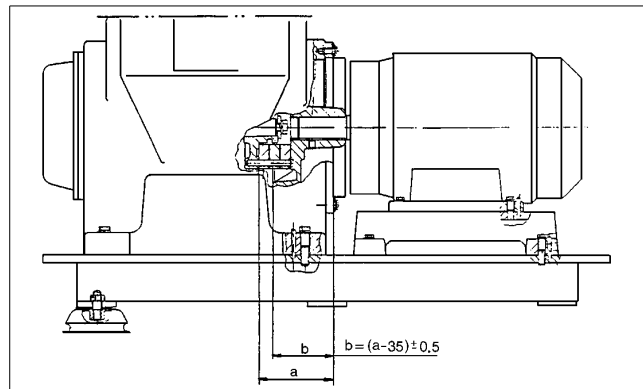
$$b = a - 35 \pm 0,5 \text{ mm}$$

22. Fit the motor. See "6.8 Motor" on page 136.

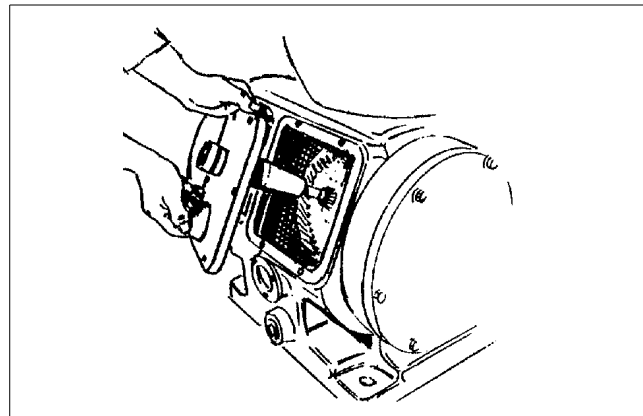
23. Fit the brake cover and revolution counter cap and their gaskets.



G0485911



G0790111

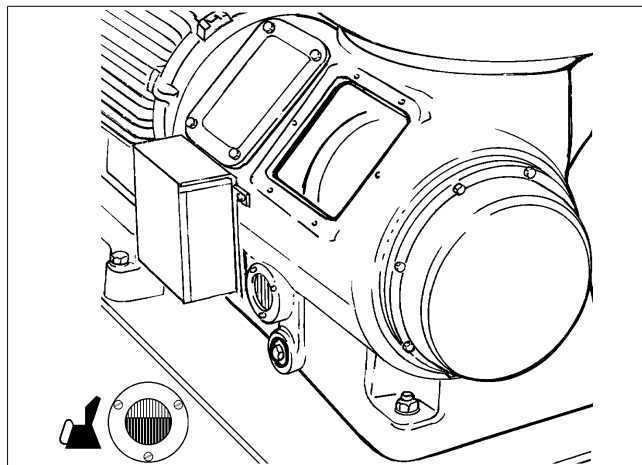


G0127911

24. Pour oil into the worm gear housing. the correct level is exactly in the middle of the sight glass.

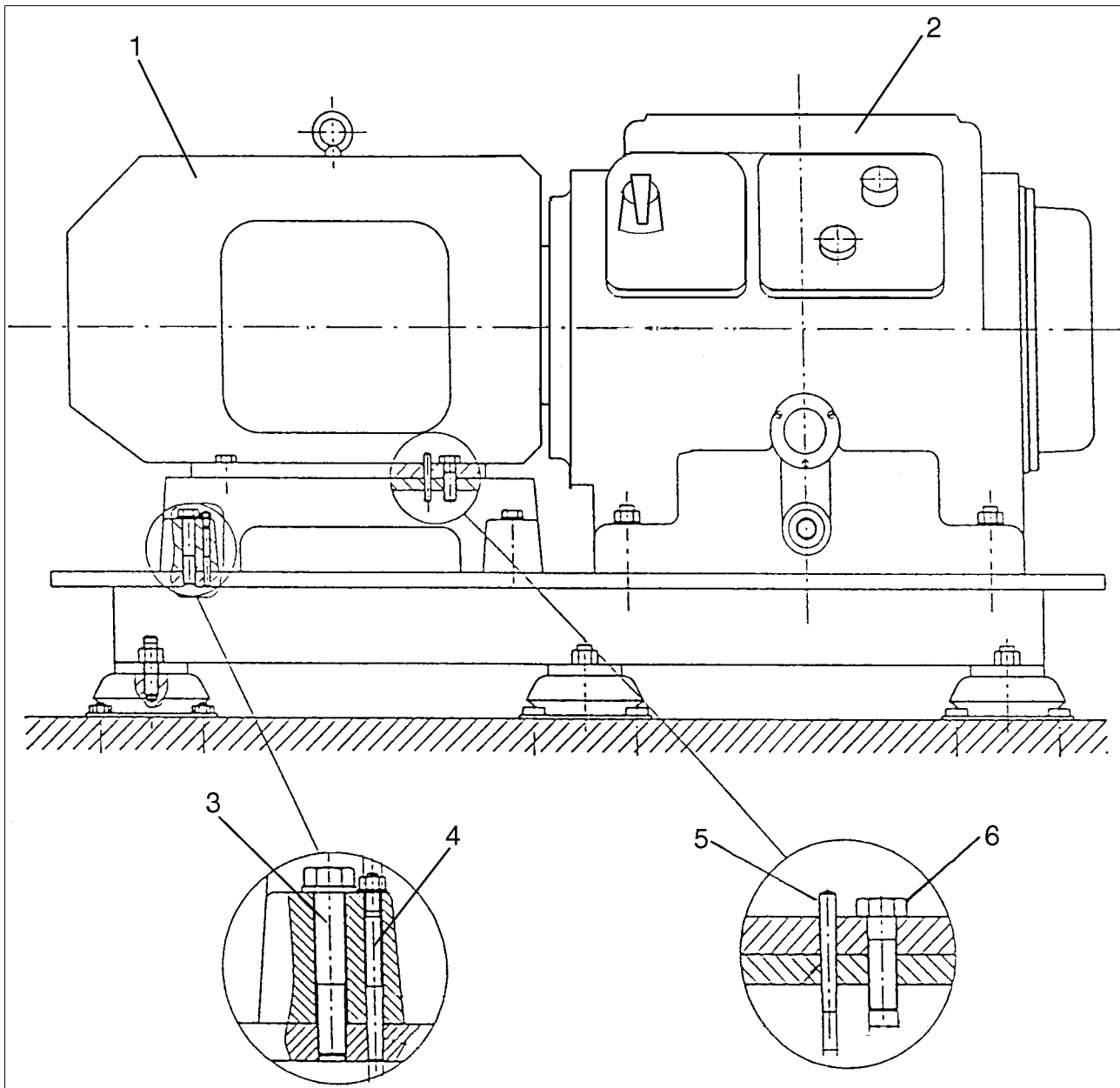
Oil volume: **8 litres**

Oil quality: see "8.9.4 Recommended lubricating oils" on page 176.



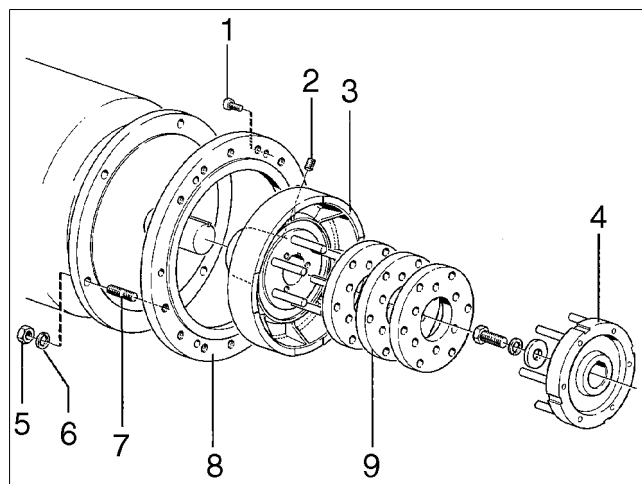
6.8 Motor

6.8.1 Drawings



1. Motor
2. Bottom frame
3. Screw
4. Taper pins
5. Taper pins
6. Screw

1. Screw
2. Screw
3. Brake pulley
4. Coupling disc
5. Nut
6. Washer
7. Stud bolt
8. Motor adapter
9. Elastic plate



6.8.2 Dismantling



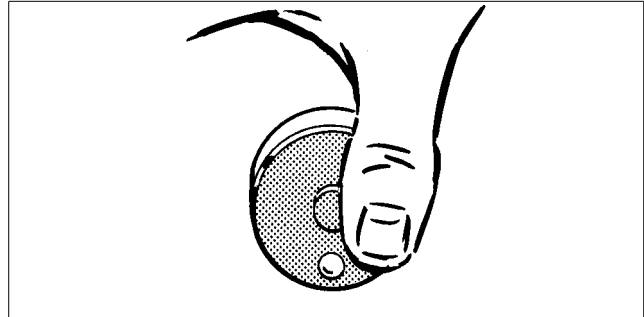
DANGER

Entrapment hazards

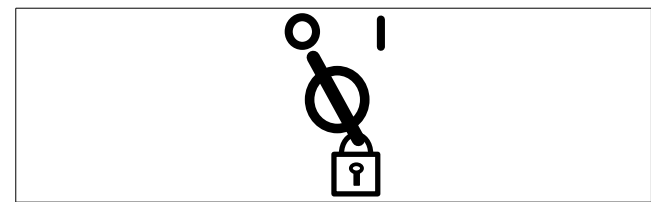
1. Make sure that rotating parts have come to a **complete standstill** before starting **any** dismantling work.

The revolution counter and the motor fan indicates if separator parts are rotating or not.

2. To avoid accidental start, switch off and lock power supply before starting **any** dismantling work.

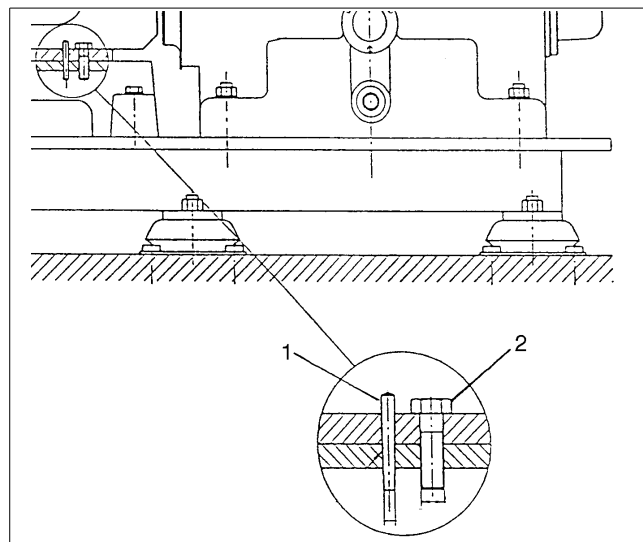


G0246221



S0051011

1. Loosen the electric cables to the motor.
2. Remove the two taper pins (1).
3. Unscrew the four screws (2) in the motor feet.

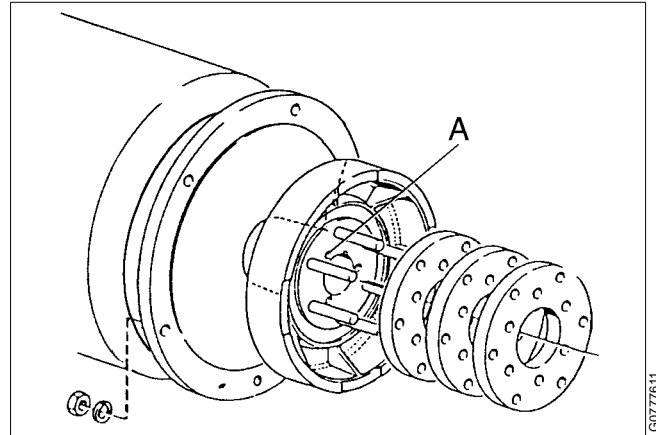


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1. Taper pin
2. Screw

4. Hook up the motor in a hoist.
5. Lift the motor slightly.
6. Pull out the motor from the separator frame and lift it away.

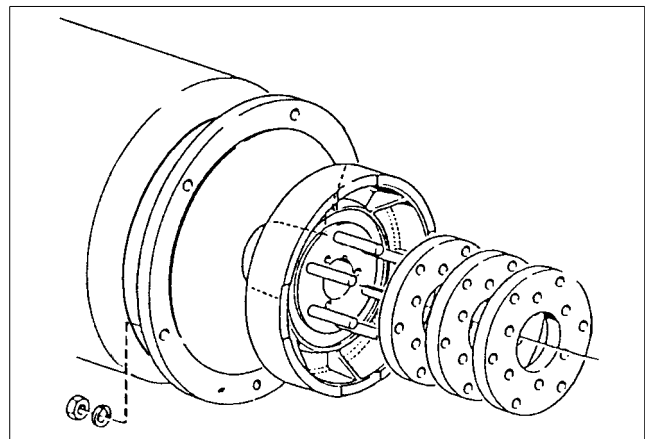
7. Remove the three elastic plates.
8. If brake pulley has to be dismantled, use the special dismantling tool together with a washer to protect the threaded hole (if any) in the motor shaft. See "6.7.2 Dismantling" on page 124.



A. Position of the three holes for the puller tool

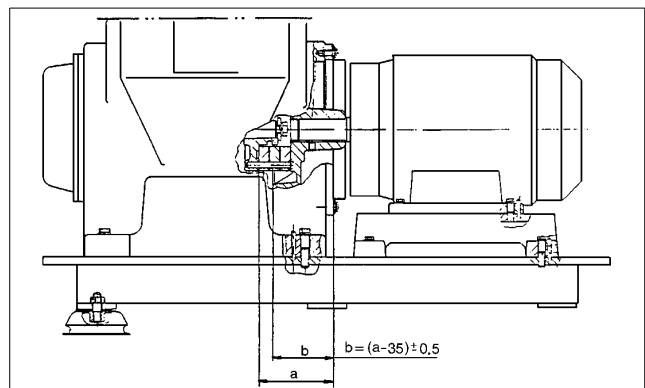
6.8.3 Assembly

1. Fit the brake pulley on the motor shaft. Make sure that the key in the motor shaft enters into the recess in the nave of the brake pulley.
2. Put a **2 mm** washer on each pin on the brake pulley in order to get the right distance between the elastic plates.
3. Check the condition of the three elastic plates. Clean or fit new ones, if needed.



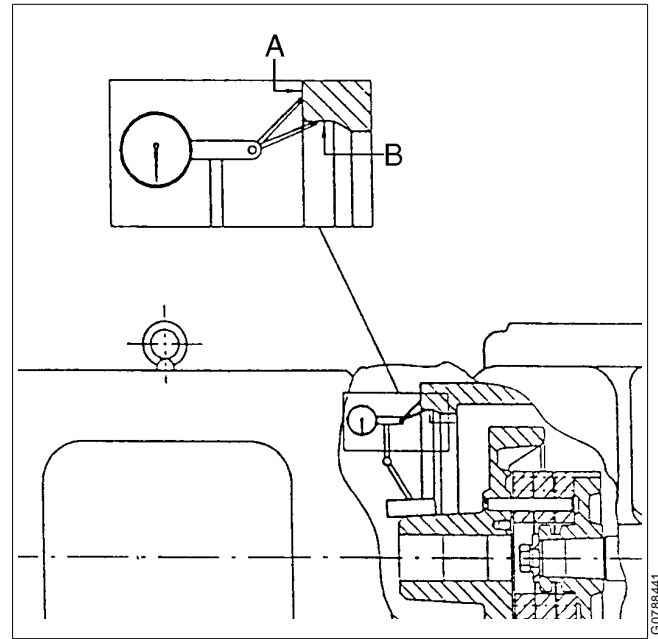
4. Before mounting the motor, check the axial play of the elastic plates. Measure the distances "a" and "b". The difference should be **$35 \pm 0,5$ mm**.

$$b = a - 35 \pm 0,5$$

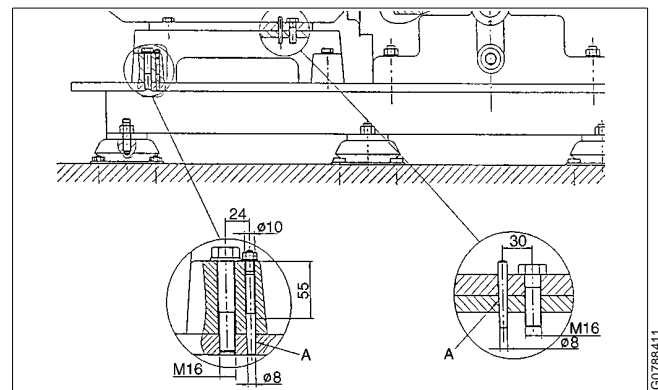


5. Lift the motor base onto the foundation plate.
6. Lift the motor onto the motor base and slide the motor into position.

7. Align and center the motor on the motor base.
Indicate for axial run-out on surface (A) and height on surface (B) with a dial indicator until run-out is less than **0,1 mm**.
Adjust by gently tapping the motor.
Mark for drilling of both motor and motor base.



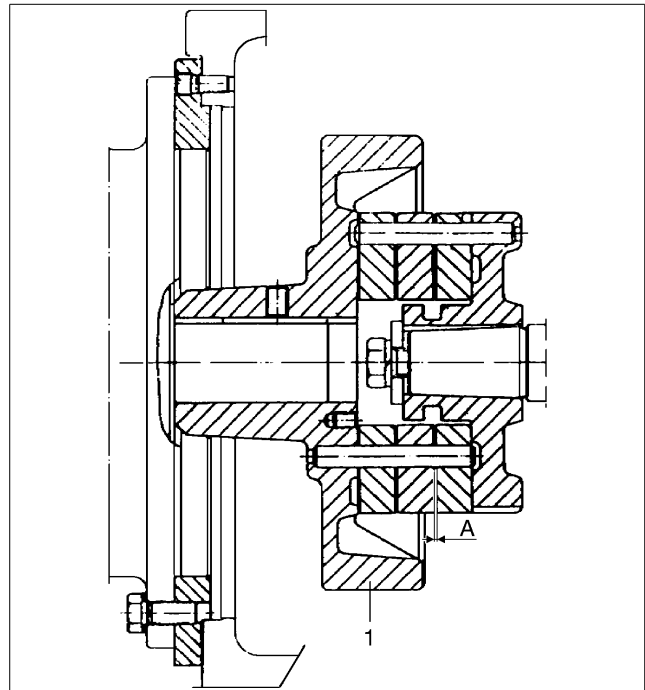
8. Lift off the motor and the motor base, drill and thread **M16** threads in the foundation plate and motor base.
9. Position the motor base on the foundation plate and secure it with the bolts.
Remove the distance washers from brake pulley.
10. Lift on the motor and tighten the bolts by hand.



11. Place a dial indicator with a magnetic base on the nave of the pulley as shown in the figure
Indicate for axial run-out on surface (A), adjust by tapping gently on the motor until run-out is less than **0,1 mm**.
Indicate for height on surface (B), adjust the height by adding shims underneath the motor until run-out is less than **0,1 mm**.

A. Conicity 1:50

12. When the motor is correctly aligned, is the axial play (A) 4 ± 2 mm between two of the flexible plates. The measure can be adjusted by moving the pulley (1) axially on the motor shaft.
13. Tighten the bolts for the motor and recheck axial and vertical run-out with the dial indicator.

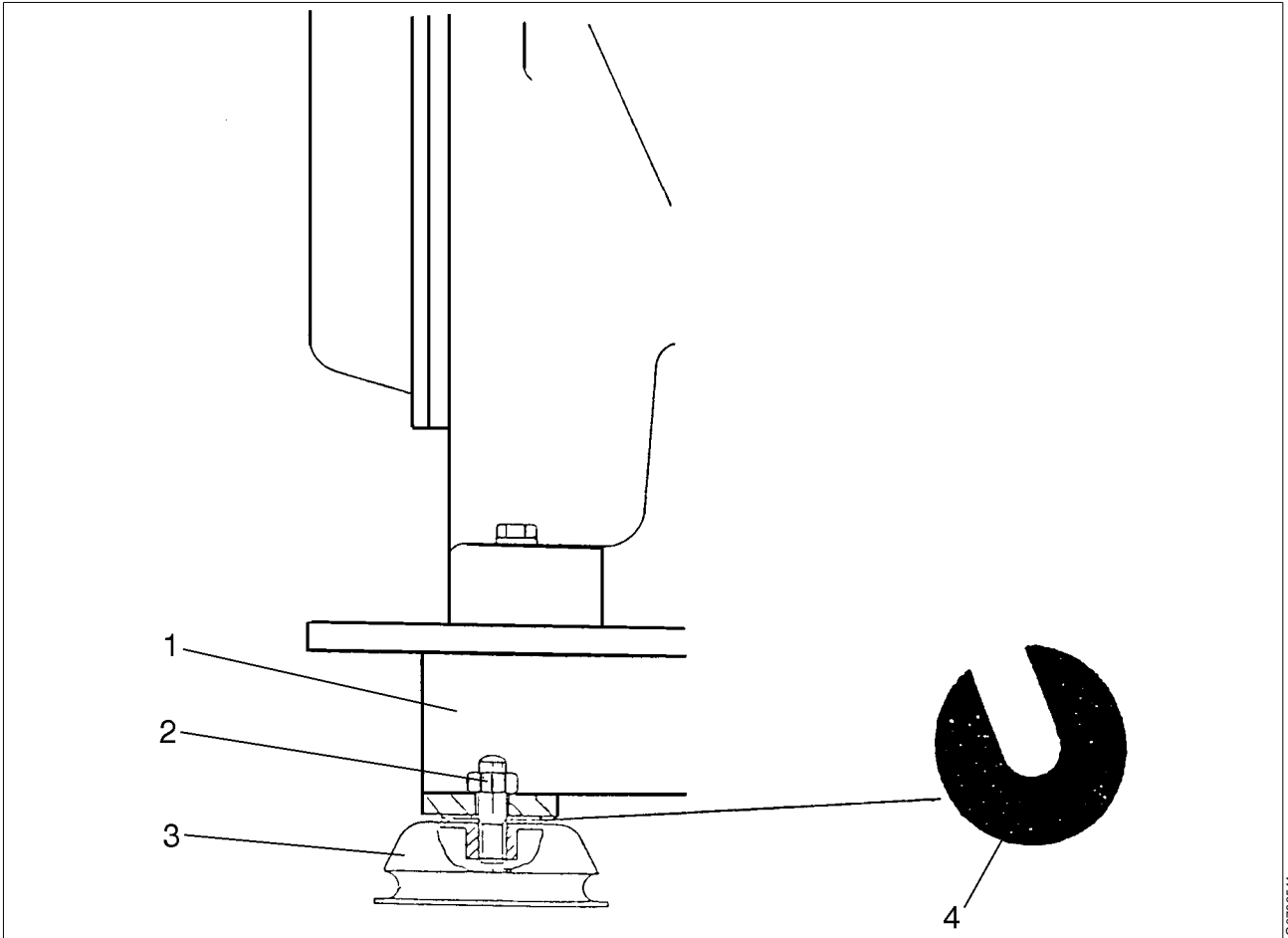


Where to measure the axial play (A) in the rigid coupling

14. Drill two $\varnothing 8$ mm holes at opposite corners through two of the motor feet on the motor and the motor base. Taper the holes with a reamer and tap the tapered pins into place.
15. Drill two $\varnothing 8$ mm holes at opposite corners through two of the motor base feet and the foundation plate.
Note! The foot in the motor base is hollow and the holes must be drilled through the material.
16. Widen the two holes with $\varnothing 10$ mm drill to a depth of **55 mm** and taper the lower part of the holes with a reamer. Tap the tapered pins into place.
17. Connect the electrical cables to the connection box.

6.9 Frame feet

See also "8.13.4 Foundations" on page 194.



- 1. *Foundation plate*
- 2. *Nut*
- 3. *Frame foot*
- 4. *Adjusting washer*

G0788511

6.9.1 Dismantling

Applicable when removing the separator from one place to another.

1. If the separator has to be removed loosen the frame foot nuts.
2. Lift off the separator according to “5.5 Lifting instructions” on page 66.

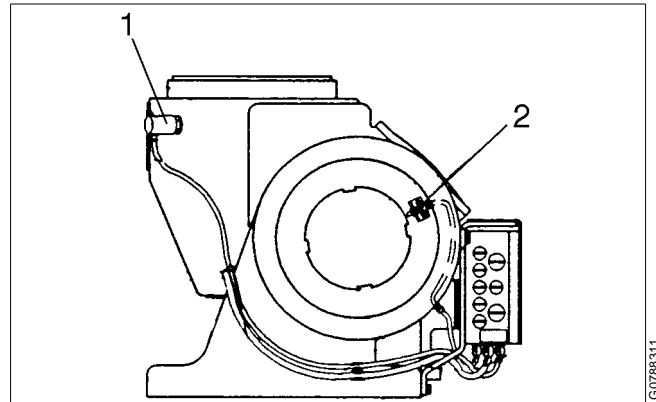
6.9.2 Assembly

1. Place the separator in its position.
2. Mark out the foundation positions for screw holes for the anchoring bolts.
3. Remove the separator and drill the holes.
4. Mount the anchoring bolts on the foundation.
5. Place the separator with its foundation on the anchoring bolts. Place the bowl in the separator frame.
6. Check horizontal alignment of the foundation plate. If necessary, add adjusting washers to get the frame horizontal.

For max. horizontal deviation see chapter “8.10.1 Foundation drawing” on page 178.

6.10 Monitoring kit

See "8.3 Connection list" on page 158.



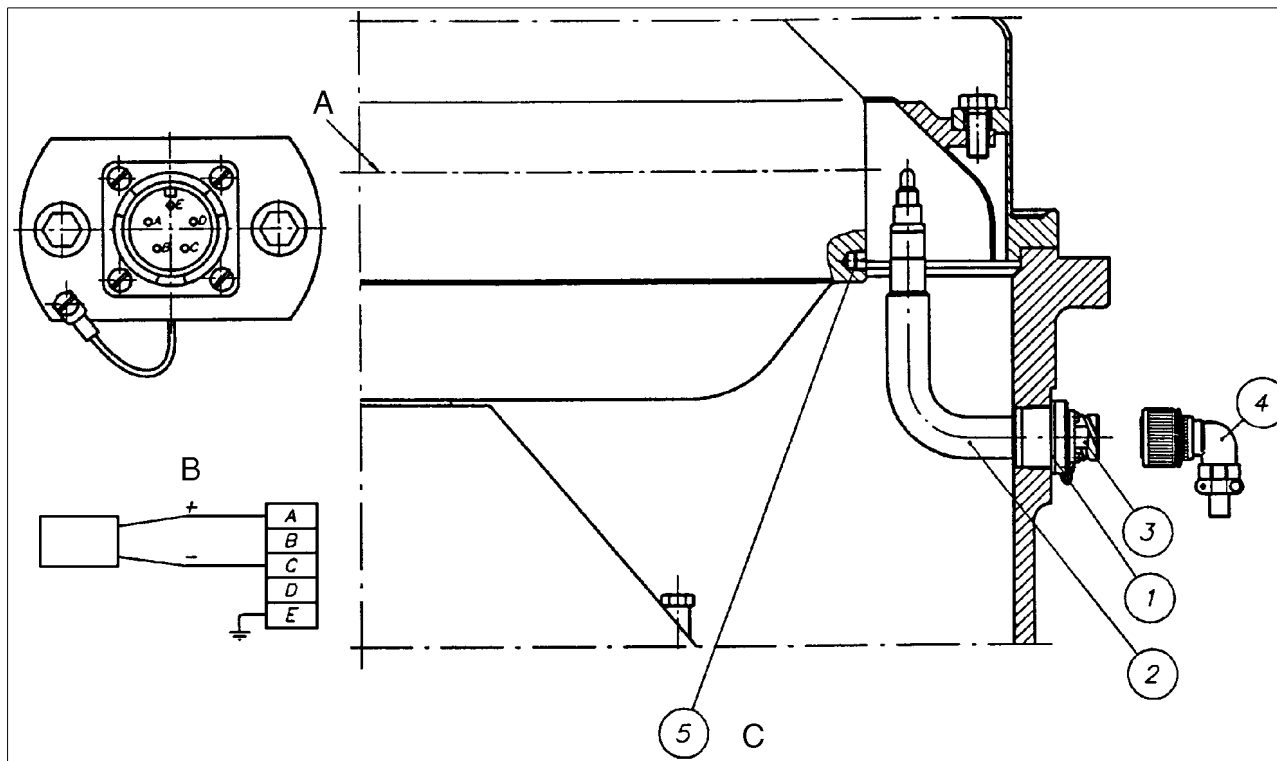
G0768311

1. *Vibration sensor*
2. *Speed sensor*

6.11 Microphone arm, kit (option)

See also "8.3 Connection list" on page 158.

Alfa Laval ref. 553035 rev. 0



1. Washer
2. Microphone arm (erosion protected)
3. Screw
4. Sleeve plug
5. Magnet (secured with Loctite 242)
- A. Nozzle center line
- B. Circuit diagram for item 2
- C. Locked with Loctite 242

G0794211

7 *Trouble-Tracing*

Contents

7.1 Mechanical faults	149
7.2 Clarification faults	151



7.1 Mechanical faults

Indication	Cause	Remedy
Machine vibrates	Moderate vibrations normally occur at the critical number of revolutions during the running up and retardation periods.	None.
	Bowl out of balance due to: <ul style="list-style-type: none"> • poor cleaning of clogged nozzles, • incorrect assembling, • badly tightened lock ring, • bowl assembled with parts from different machines. 	Stop immediately and establish the cause. Badly tightened lock ring involves fatal danger.
	Vibration damping rubber washers have lost elasticity.	Renew rubber washers.
	Top bearing spring broken.	Exchange all springs.
	Disc stack pressure too low.	Add disc(s).
	Bearings damaged or worn.	Fit new bearings.
	Foundation too weak.	Reinforce foundation.
Speed too high	Tachometer reading wrong.	Check by means of revolution counter.
	Incorrect transmission.	Stop immediately. Check that proper transmission is used in view of motor speed.
	The motor speed is not appropriate.	Stop immediately and provide a motor with correct speed.
Speed is too low Running up time too long	Brake applied.	Release the brake.
	Voltage drop in mains.	Check mains voltage.
	Ball bearing damage.	Locate and exchange defective bearing.
	Other machine defects.	Stop immediately. Check that bowl can be rotated by hand.
	Motor defect.	Exchange or repair motor.
	Incorrect transmission ratio.	Stop immediately.

Indication	Cause	Remedy
Starting power too low	Ammeter reading incorrect.	
Starting power too high	Ammeter reading incorrect.	Exchange or repair motor.
	Motor defect.	
	Brake applied.	Release the brake.
	Ball bearing damaged.	Locate and exchange defective bearing.
	Other machine defects.	See – Speed is too low.
Retardation time too long	Brake lining worn or oily.	Exchange or clean lining.
Water in worm gear housing	Condensation.	Drain water and change oil.
	Water flushing by external cleaning.	Drain water and change oil.
	Leakage via top bearing.	Exchange seal rings and packings. Change the oil.
Noise from worm gear housing	Oil quantity Incorrect.	Check quantity and quality.
	Worm wheel or worm worn.	Exchange worn parts. Exchange of complete gear in generally advisable.
	Ball bearing worn or damaged.	Exchange bearing.
Noise from rigid coupling	Incorrect play between coupling disc and brake pulley.	Adjust.
	Speed too low.	See – “Speed too low”.
Smell	Brake applied.	Release the brake.
	Bearing running hot.	Feel over machine and locate spot. Exchange bearing.
	Motor overheated.	Trace cause. Adjust overcurrent relay, if any provided.

7.2 Clarification faults

Indication	Cause	Remedy
Light phase contains too much solids	Throughput too high.	Reduce rate of feed.
	Nozzle clogged.	Clean all nozzles.
	Nozzle diameter too small.	Fit nozzles with larger hole diameter.
Solid phase contains too much light phase	Throughput too low.	Increase the rate of feed.
	Nozzles worn or have too large diameter.	Fit new nozzles.

8 *Technical Reference*

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8.1 Technical data

Alfa Laval ref. 560864, rev. 0



DANGER

Disintegration hazards

Use the separator only for the purpose and parameters (type of liquid, rotational speed, temperature, density etc.) specified in this chapter and in the Purchase order documents.

Consult your Alfa Laval representative before any changes outside these parameters are made.

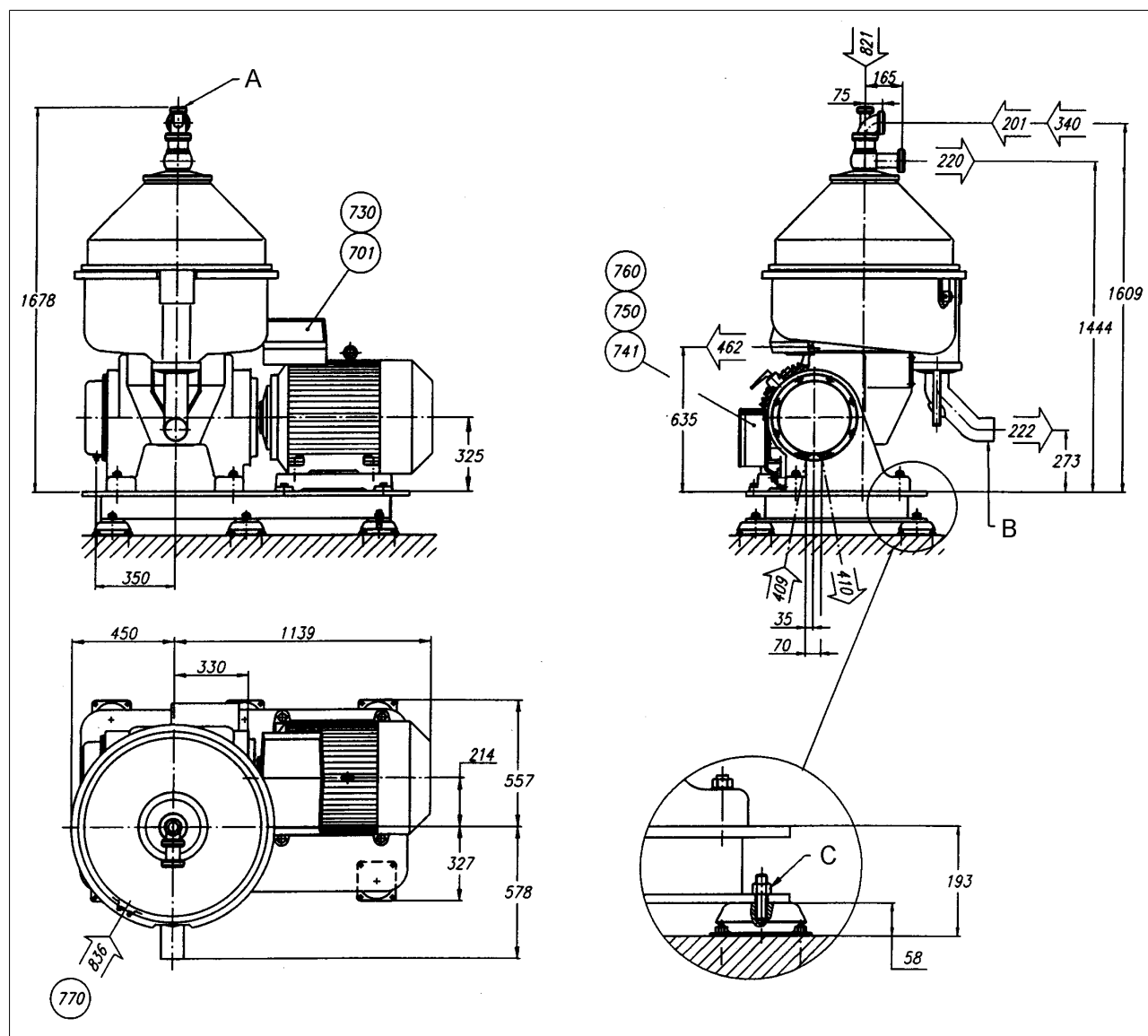
Product number	881119-01-03	
Separator type	CH/FESX 512S-35CG	
Bowl speed max	4800/4765	rev/min 50 Hz / 60 Hz
Speed motor shaft max	1500/1800	rev/min 50 Hz / 60 Hz
Gear ratio	96:30/90:34	50 Hz / 60 Hz
Hydraulic capacity	70	m ³ /h
Max. nozzle flow with water	23	m ³ /h
Max density of sediment/feed	1700/1200	kg/m ³
Feed temperature	0/100	min/max °C
Ambient temperature	+5 to +55	°C
Weight of separator	1700	kg (without motor)
Motor power	37/55	kW
Power consumption	6/55	kW (idling/at max. capacity)
Starting time	3/5	minutes (min/max)
Stopping time with brake	4/7	minutes (min/max)
Lubricating oil volume	8	litres
Max running time empty bowl	180	minutes
Sound press level	87	dB(A)
Vibration level max. according to PF	9/14	mm/sec (new sep/sep in use)
Alarm levels for vibration monitor	6/8	mm/sec (1st/2nd)
Bowl max inner diameter	555	mm
Bowl volume	31	litres
Bowl weight	320	kg

There are no other material than stainless steel in contact with process liquid.

8.2 Basic size drawing

8.2.1 Separator excl. connections

Alfa Laval ref. 561984, rev 0

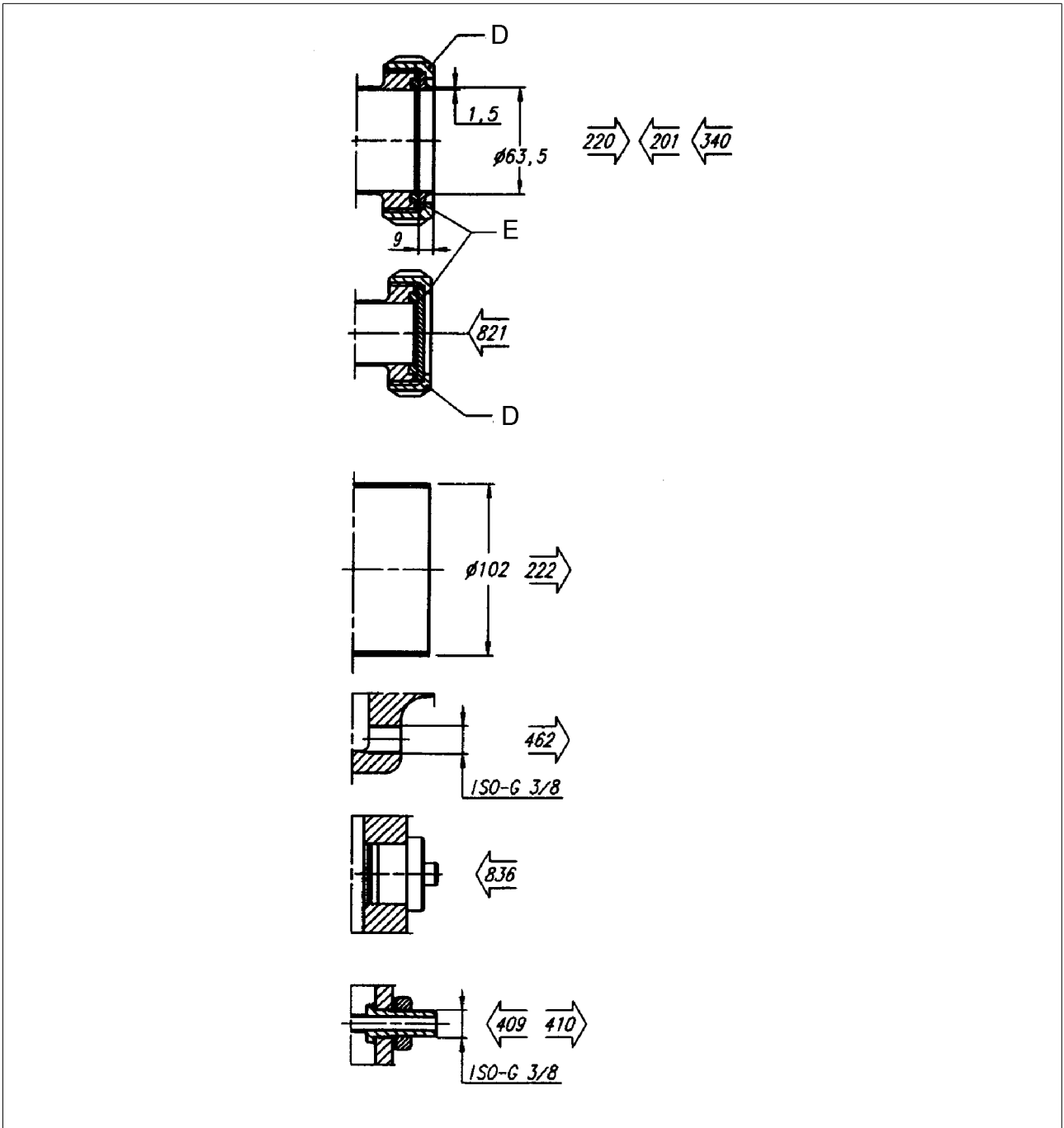


- A. Maximum horizontal displacement ± 20 mm
 B. Maximum vertical displacement ± 10 mm
 C. Tightening torque 200 Nm

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8.2.2 Dimensions of connections

Alfa Laval ref. 561984, rev 0



Data for connections see “8.3 Connection list” on page 158.

All connections to be installed non-loaded and flexible.

G0869821

8.3 Connection list

Alfa Laval ref. 561983, rev. 0

No.	Description	Requirements / limits																						
201	Inlet for product <ul style="list-style-type: none"> Allowed temperature Max. allowed density Max. allowed flow 	0-100 °C 1200 kg/m ³ 70 m ³ /h																						
220	Outlet for clarified liquid <ul style="list-style-type: none"> Max. allowed flow 	70 m ³ /h The outlet should be installed in such a way that you can not fill the outlet with sludge (open outlet).																						
222	Outlet for solid phase <ul style="list-style-type: none"> Max. allowed sediment density Max. allowed flow <table> <tr> <td>Nozzle dimension</td> <td>Nozzle flow</td> </tr> <tr> <td>0,80 mm</td> <td>3,0 m³/h</td> </tr> <tr> <td>0,90 mm</td> <td>3,8 m³/h</td> </tr> <tr> <td>1,00 mm</td> <td>4,7 m³/h</td> </tr> <tr> <td>1,15 mm</td> <td>6,2m³/h</td> </tr> <tr> <td>1,30 mm</td> <td>7,9 m³/h</td> </tr> <tr> <td>1,45 mm</td> <td>9,9 m³/h</td> </tr> <tr> <td>1,60 mm</td> <td>12,0 m³/h</td> </tr> <tr> <td>1,80 mm</td> <td>15,2 m³/h</td> </tr> <tr> <td>2,00 mm</td> <td>18,7 m³/h</td> </tr> <tr> <td>2,25 mm</td> <td>23,0 m³/h</td> </tr> </table>	Nozzle dimension	Nozzle flow	0,80 mm	3,0 m ³ /h	0,90 mm	3,8 m ³ /h	1,00 mm	4,7 m ³ /h	1,15 mm	6,2m ³ /h	1,30 mm	7,9 m ³ /h	1,45 mm	9,9 m ³ /h	1,60 mm	12,0 m ³ /h	1,80 mm	15,2 m ³ /h	2,00 mm	18,7 m ³ /h	2,25 mm	23,0 m ³ /h	1700 kg/m ³ 23 m ³ /h The outlet should be installed in such a way that you can not fill the sediment outlet with sludge (open outlet).
Nozzle dimension	Nozzle flow																							
0,80 mm	3,0 m ³ /h																							
0,90 mm	3,8 m ³ /h																							
1,00 mm	4,7 m ³ /h																							
1,15 mm	6,2m ³ /h																							
1,30 mm	7,9 m ³ /h																							
1,45 mm	9,9 m ³ /h																							
1,60 mm	12,0 m ³ /h																							
1,80 mm	15,2 m ³ /h																							
2,00 mm	18,7 m ³ /h																							
2,25 mm	23,0 m ³ /h																							
340	Inlet for safety/back up liquid <ul style="list-style-type: none"> Min. flow 	26 m ³ /h																						
409	Inlet for water to oil cooler. <ul style="list-style-type: none"> Consumption Pressure 	80-100 litres/h max. 50 kPa																						
410	Outlet from oil cooler.	Open																						
462	Drain of frame top part.	Should be possible to drain liquids by gravity.																						
701	Motor for separator <ul style="list-style-type: none"> Allowed frequency variation Momentarily during max. 5 sec. 	±5% ±10%																						
730	Temperature sensor motor winding Type	PTC-thermistors 190 °C																						

No.	Description	Requirements / limits																					
741	Speed sensor for motor shaft (option) <ul style="list-style-type: none"> • Type • Supply voltage, nominal • With sensor activated (near metal) • With sensor not activated (far from metal) • Number of pulses per revolution 	See interface description Inductive proximity switch 8 V ≤ 1 mA ≥ 3 mA 4																					
750	Unbalance sensors, vibration. (Option) <ul style="list-style-type: none"> • Type • Sensitivity, (f=80 Hz, $R_L \geq 1$ MΩ) • Internal impedance 	See interface description Velocity transducer 100 mV/mm/s 4 kOhm, $\pm 5\%$																					
760	Cover interlocking switch <ul style="list-style-type: none"> • Type • Switch rating, resistive load max. 	<table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="3" style="text-align: center;">Mechanical switch</td> </tr> <tr> <td style="width: 33%;"></td> <td style="text-align: center;">AC</td> <td style="text-align: center;">DC</td> </tr> <tr> <td style="text-align: center;">12 V</td> <td style="text-align: center;">75 VA</td> <td style="text-align: center;">7 W</td> </tr> <tr> <td style="text-align: center;">24 V</td> <td style="text-align: center;">200 VA</td> <td style="text-align: center;">7 W</td> </tr> <tr> <td style="text-align: center;">48 V</td> <td style="text-align: center;">280 VA</td> <td style="text-align: center;">9 W</td> </tr> <tr> <td style="text-align: center;">127 V</td> <td style="text-align: center;">500 VA</td> <td style="text-align: center;">13 W</td> </tr> <tr> <td style="text-align: center;">230 V</td> <td style="text-align: center;">550 VA</td> <td style="text-align: center;">-</td> </tr> </table>	Mechanical switch				AC	DC	12 V	75 VA	7 W	24 V	200 VA	7 W	48 V	280 VA	9 W	127 V	500 VA	13 W	230 V	550 VA	-
Mechanical switch																							
	AC	DC																					
12 V	75 VA	7 W																					
24 V	200 VA	7 W																					
48 V	280 VA	9 W																					
127 V	500 VA	13 W																					
230 V	550 VA	-																					
770	Nozzle monitoring transducer (option) <ul style="list-style-type: none"> • Type 	Nozzle jet transducer																					
821	Plugged connection without function																						
836	Connection for sensor, nozzle supervision																						

8.4 Interface description

Alfa Laval ref. 557279, rev.3

8.4.1 General

In addition to the Connection List this document describes limitations and conditions for safe control, monitoring and reliable operation. At the end of the document a function graph and running limitations are found.

8.4.2 Definitions

Stand still (Ready for start) means:

- The machine is assembled correctly.
- All connections are installed according to Connection list, Interconnection diagram, Motor drive data and Interface description.

Start means

- The power to the separator motor is on.
- The bowl must be kept filled.
- The acceleration is supervised to ensure that a certain speed has been reached within a certain time.

The start procedure continues until the Y-D switch-over has been made and a stabilization period has passed (about 1 minute). See document Motor drive data.

Normal stop means

- Stopping of the machine at any time with brake applied.
- The bowl must be kept filled.

Safety stop means

The machine must be stopped in the quickest and safest way due to vibration or process reasons.

Comply to following conditions:

- The bowl must be kept filled.
- The machine must not be restarted before the reason for the Safety stop has been investigated and action has been taken.

In case of emergency condition in the plant, the machine must be stopped in a way that is described in EN 418.

8.4.3 Component description and Signal processing**Hydraulic connections****Inlet for product 201**

The product flow to the machine can start when the stabilizing period after Y-D switch over has run out. When product flow starts it replaces the safety/back up liquid. This should be done gradually during **10 to 60 seconds**. When the product flow stops it must immediately be replaced by safety/back up liquid to avoid unbalance in the separator bowl.

The particle size in the product flow must not exceed 80% of the installed nozzle diameter, to minimize the risk of clogged nozzles, which can cause unbalance in the separator bowl.

Inlet for safety/back up liquid 340

The machine must never be run without the bowl being completely filled with liquid. The safety/back up liquid is e.g. to compensate for a possible loss of feed flow to the separator. The safety/back up liquid must be activated instantly otherwise there is a potential risk for critical unbalance due to an uneven build up of solids. Solid build ups can be caused by clogged nozzles etc.

In order to provide safety/back up liquid instantly the pipe length between safety/back up liquid valve and the separator should be as short as possible. The safety/back up liquid should be used during the start period, from **0 r/min** to normal running speed. If the separator bowl has been opened and manually cleaned it may be possible to start the machine without safety/back up liquid.

The safety/back up liquid must always be used during stopping sequence, from normal running speed until the bowl is completely stopped.

The safety/back up liquid flow must never be less than **110%** of the flow from the installed nozzles. In some applications the nozzles wear and the nozzle flow will increase. In those applications the safety/back up liquid flow must be increased with time.

Electric connections

Separator motor 701

The separator is equipped with a 3-phase Y-D started motor. The motor is of control torque type and built for a long starting time. The starting equipment must be dimensioned for twice the rated current of the motor and the overload relay must only be connected in the D-line.

Motor Temperature Sensor 730

The separator motor is equipped with three thermistor sensors, one in each winding. The sensors are connected in series and should be connected to a thermistor relay that trips the starting equipment when the temperature exceeds the tripping level, stated in Connection list.

Speed Sensor 741 (option)

Proximity sensor of inductive type according to DIN 19234 (NAMOUR) standard giving the number of pulses per revolution of the bowl as stated in the Connection list. The bowl speed is calculated from the gear ratio and the **r/min** of the motor shaft.

When supplied with rated voltage the sensor gives a current signal with a size depending if the position of the sensor head is near the metal surface or in front of a groove (non-metal).

Speed signal during start:

- The turnover to D should occur at **93-96%** of the synchronous speed.
- The machine must be stopped and an alarm must be given when the speed for D-turnover has not been reached within **1,3x**the starting time, specified in Technical Data.

Speed signal during normal operation:

Normal operation condition is considered to have been achieved **1 minute** after D-turnover. During normal operation the speed is allowed to vary within speed limits specified below:

- When the synchronous speed exceeds more than **5%**, the machine must be stopped and a high speed alarm must be given.
- When the speed falls to **7%** below the synchronous speed for a period longer than **1 minute**, a low speed alarm signal must be given.
- In case of sudden lack of pulses from the speed sensor an alarm, speed sensor failure, must be given. When this alarm is valid, the stop phase must be controlled by a timer.

Vibration Sensor 750 (option)

The vibration sensor is of velocity type. The signal has to be converted in a special transducer, in which the signal is compared with preset limit values. When the preset limit values are exceeded appropriate countermeasures have to be performed. The two levels are warning for acceptable vibrations and Safety stop respectively in case of extreme unbalance.

Vibration signal during start (bowl speed range of 0 - 95% of synchronous speed):

In case of a vibration signal exceeding set point for immediate safety stop during **3 seconds** the machine must be stopped and an alarm should be given. The setpoint value is given in the document Technical data.

Vibration signal during normal operation:

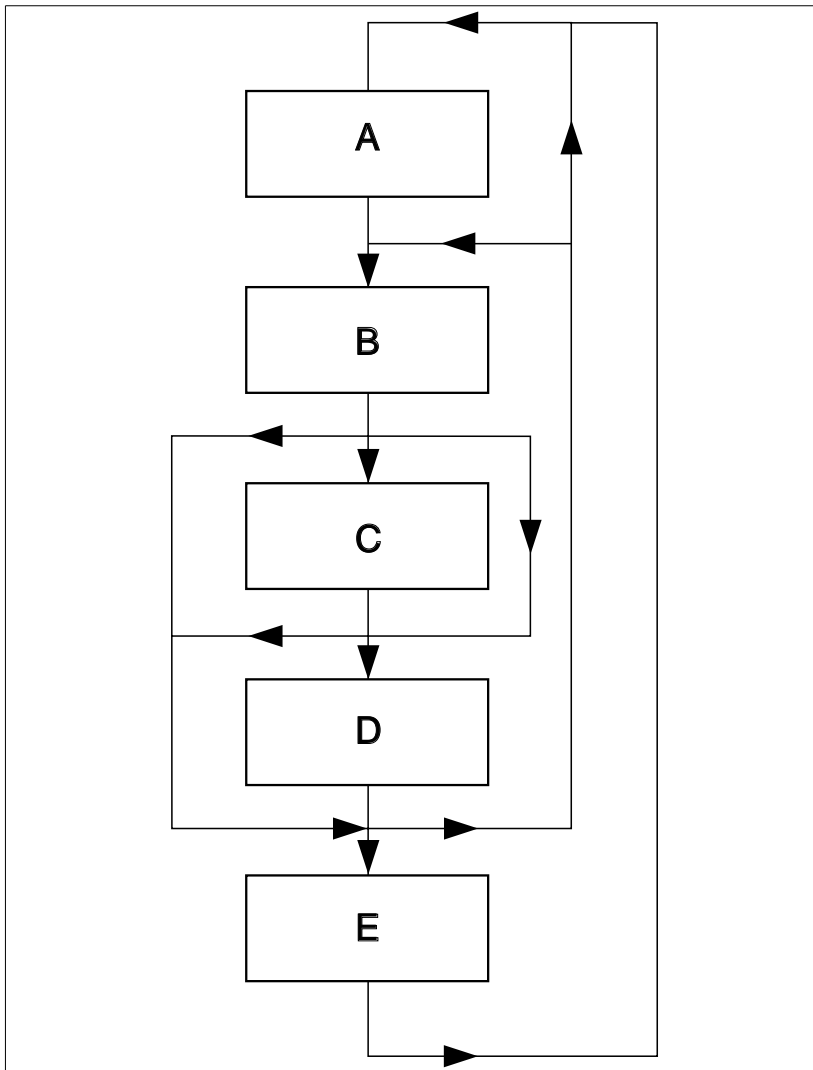
Two levels of vibration are considered for this machine:

1. In case of a signal exceeding set point for warning during **3 seconds**: A warning alarm shall be given. The machine shall be stopped manually with a normal stop sequence and the reason of the vibration investigated.
2. In case of a signal exceeding set point for immediate safety stop during **3 seconds** following actions must be taken: Immediate Safety automatic stop of the machine including alarm for too high vibrations.

Nozzle monitoring transducer 770 (option)

The machine can be equipped with a nozzle monitoring device. The tip of the transducer is located in the nozzle flow. The bowl is equipped with a permanent magnet giving a triggering signal for **r/min** of the bowl. If the flow from the nozzles becomes blocked the monitor gives a signal to the control system and action should be taken.

8.4.4 Function graph and running limitations



- A. *Stand still*
- B. *Starting mode*
- C. *Running mode*
- D. *Stop mode*
- E. *Safety stop mode*

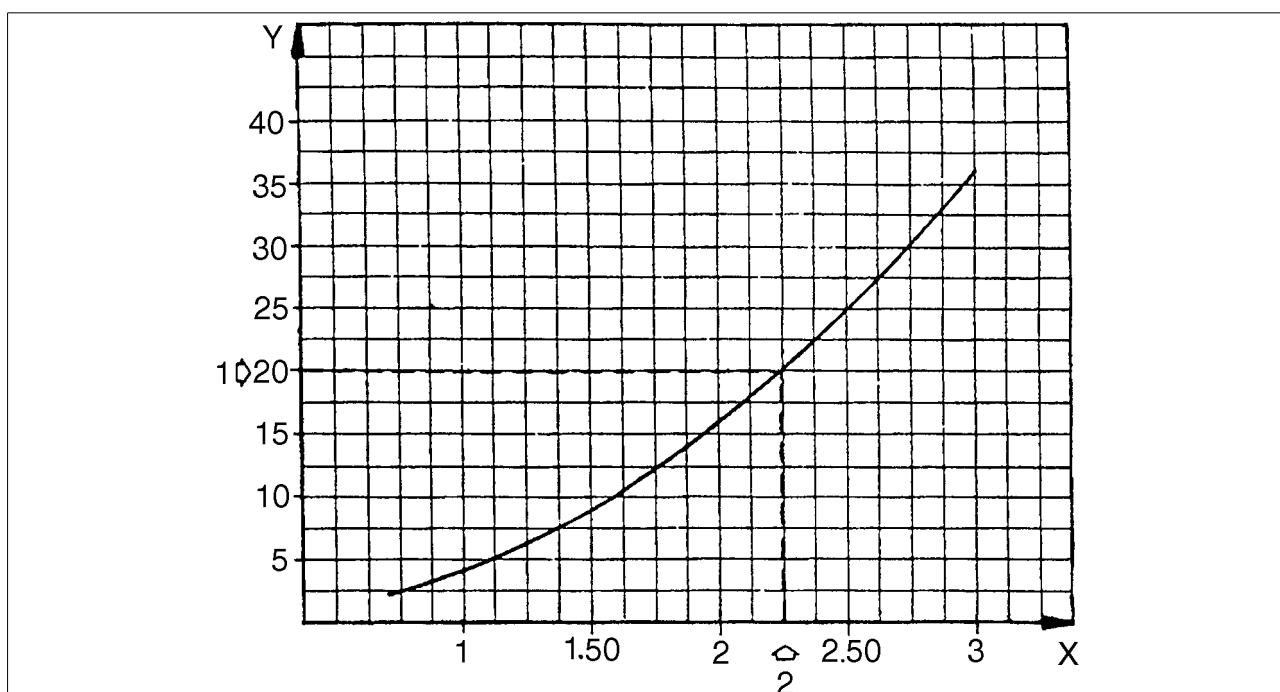
8.5 Outlet nozzles

The size of the hole diameter of the nozzles must be selected according to the amount of liquid fed to the machine, the proportion of solid phase in the feed, and the quantity.

The size of solid particles must not exceed 80% of installed nozzle diameter. In order not to get a too large flow of solids it is possible to plug up to six nozzles. Note! The plugs should be fitted diametrically opposite each other.

During the running up and stop period the safety/backup liquid must never be less than 110% of the flow from the installed nozzles.

8.5.1 Choice of nozzle diameter



$Y =$ Flow through nozzles in m^3/h
 $X =$ Nozzle orifice diameter in mm

The graph, which applies to operation with water shows how the flow through the nozzles increases with increasing orifice diameter in the nozzles.

Example: The flow through nozzles is assumed to be 20 m³/h (item 1). The diagram shows that nozzles having an orifice diameter of 2,25 mm should be tried (item 2). Choose the nearest standard diameter.

8.6 Revolution counter

The prescribed motor shaft speed (see“8.1 Technical data” on page 155), which must not be exceeded, can be checked by counting the number of revolution during one minute on the revolution counter. The relationship between the motor shaft speed and the revolution counter is as follows:

Power	50 Hz	60 Hz
Motor shaft	1420 - 1500 r/min	1700 - 1800 r/min
Rev. counter	118 - 125 r/min	142 - 150 r/min

8.7 Compressed air

Alfa Laval ref. 553407, rev. 1

The air supply to pneumatic instruments such as transmitters, controllers, converters, relays etc. must be of such a quality that satisfactory function is ensured for a reasonable time.

To this end three conditions must be fulfilled:

1. Dirt in the form of solid particles down to a size below 10 micron (0,01 mm) must be removed from the air. This is preferably done by means of special filters or reducing valves provided with filters.
2. Oil is always transferred to the compressed air from oil-lubricated compressors and must be removed to the highest possible degree. It constitutes a serious contamination, which it is difficult to remove from the instruments. Special filters or oil separators must, therefore, be provided before the instruments. In small plants, oil-free compressors can be used as an alternative.
3. In the compressed-air system a condensation takes place at various rates, depending on the moisture content at the air inlet, the temperature before and after the compressor, partially lower temperature in any cold zones passed by the pipe (outdoor, cellar etc.) and the like.

The air must thus be dried with regard to the lowest temperature existing after the drying device, so that condensate in the instruments is avoided. Note that the air will also be cooled through expansion after passing constrictions and nozzles in the instruments, with condensation as a result. In view of the above, the following must be observed:

At the inlet to an instrument, the dew point of the compressed air should lie at least 10 °C below the lowest ambient temperature. This is usually obtained by using an absorption drier of suitable capacity. If the air contains much water, provide a primary separator before the filter.

Air filters should be placed so as to be easily surveyable and accessible in order to facilitate daily condition checks, and exchange of the filter cartridge.

Alfa Laval accepts no liability for consequences arising from unsatisfactorily purified compressed-air supplied by the customer.

8.8 Water quality

Alfa Laval ref. 553406, rev. 3

Specific requirements regarding the quality of water

Water is used in the separator for several different functions: Discharge-mechanisms, liquid seals, as cooling media and for flushing.

Bad quality of the water can with time cause erosion, corrosion and/or operating problems in the separator and must therefore be treated to meet certain demands.

The following requirements are of fundamental importance.

- 1.1 Turbidity-free water, solids content < 0,001% of volume.

Deposits must not be allowed to form in certain areas in the separator.

- 1.2 Max particle size 50 μ m.

2. Total hardness \leq 180 mg CaCO₃ per litre.

Chalk deposits can build-up if the water is hard (corresponds to 10 °dH or 12,5 °E). Increased operating temperature accelerates the chalk built-ups.

3. Chloride content \leq 100 ppm NaCl (equivalent to 60mg Cl/l).

Chloride ions contribute to corrosion on the separator surfaces 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. A chloride concentration above 60 mg/l is not recommended.

4. pH > 6

Increasing acidity (lower pH) increases corrosion; this is accelerated by increased temperatures and high chloride ion content.

For test methods, contact any Alfa Laval representative.

If these demands cannot be met, the water should be pretreated according to Alfa Laval's recommendations.

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



8.9 Lubricants

8.9.1 Introduction

The machine is delivered without oil in the worm gear housing. It must not be started unless oil in the quantity and of the quality prescribed has been supplied. A change of the separating temperature can make it necessary to replace the oil by oil of a different type. Lubricants, oil as well as grease, must be kept in clean, closed cans to prevent penetration of dust and moisture and to reduce the oxidizing effect to the air as far as possible. The storing room should be dry and cool.

Lubrication chart

Alfa Laval ref. 553216 - 01, rev. 5

Lubricating points	Type of lubricant
Bowl spindle ball bearings and buffers are lubricated by oil mist.	Lubricating oil as specified in "Recommended lubricating oils".
Bowl spindle taper.	Lube oil, only a few drops for rust protection.
Buffers of bowl spindle.	Lube oil.
Bowl. Sliding contact surfaces and pressure loaded surfaces such as lock rings, threads of lock rings, bowl hood, and cap nut.	Pastes as specified in "Recommended lubricants". If not specified otherwise, follow the supplier's recommendation about method of application.
Rubber seal rings.	Grease as specified in "Recommended lubricants".
Friction coupling ball bearings.	The bearings are packed with grease and sealed and need no extra lubrication.
Electric motor.	Follow manufacturer's instructions.
Lubricating point, specific instructions Instructions related to a specific design of the machine, refer to the general assembly drawings of the separator.	
	Note! Some application processes demand special lubrication.

8.9.2 Alfa Laval Lubricating Oil Groups

Alfa Laval ref. 553216 - 01, rev. 5

- **Group A oil:** a high quality gear oil on paraffin base with stable AW (Anti Wear) additives.
- **Group B oil:** a high quality gear oil on paraffin base with stable EP (Extreme Pressure).
- **Group D oil:** a synthetic base oil with additives stable at high operating temperatures.
- **Group E oil:** Characteristics as a group D-oil but suitable at a higher operation power (≤ 55 kW).

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

Always use clean vessels when handling lubricating oil.

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

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

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

NOTE

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

**CAUTION**

Check the oil level before start.
Top up when necessary.
Oil volume = 8 litres.

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

Applying, handling and storing of lubricants

- Always be sure to follow lubricants manufacturer's instructions.

**CAUTION****Skin irritation hazard**

Personnel handling the oil must be instructed in its use (e.g. the possible risk of skin irritation, dermatitis). Ask for and follow the instructions from the oil supplier.

Spray should only be used in well ventilated localities.

8.9.3 Recommended lubricants

Alfa Laval ref. 553217 - 01, rev. 3

Pastes and bonded coatings for food applications

Manufacturer	Designation	Alfa Laval No.	Application
Gleitmolybdän	Gleitmo 580	561764-01	Lockrings
Dow Corning	TP42		
Gleitmolybdän	Gleitmo 580	561764-01	Screw joints, pins, etc
Dow Corning	Molykote D		
Lubrication Engineers	LE 4025		
Klüber	46 MR 401		
Gleitmolybdän	Gleitmo 805		

Pastes and bonded coatings for non-food applications

Manufacturer	Designation	Alfa Laval No.	Application
Gleitmolybdän	Gleitmo 705 K or 805 K varnish 901 Gleitmo Paste G rapid	537086-04	All pressure loaded surfaces
Dow Corning	Molykote paste 1000	537086-02	
	spray D321 R	535586-01	
	varnish D321 R	535586-02	
Rocol	Antiscuffing paste (ASP)		
Klüber	Wolfracoat C paste		
Russian Standard	VNII NP 232		
	Gost 14068-90		

Alfa Laval ref. 553217 - 01, rev.3

Silicone grease

Manufacturer	Designation	Alfa Laval No.
Dow Corning	Molykote 111 compound	
	100 g	539474-02
	25 g	539474-03
Gleitmolybdän	Silicone paste 750	
Wacker	Silicone Paste P (vacuum paste)	

Greases for ball and roller bearings

Manufacturer	Designation	Alfa Laval No.
BP	Energrease MMEP2	
	Energrease LS2	
Castrol	Spheerol SW2 EP	
	Spheerol EPL2	
Chevron	Duralith grease EP2	
Exxon	Beacon EP2	
Mobil	Mobilith SHC 460	
	Mobilux EP2	
Gulf	Gulflex MP2	
Q8	Rembrandt EP2	
Shell	Cailithia EP Grease T2	
	Alvania EP Grease 2	
	or R.A	
SKF	LGEP2 or LGMT2	
Texaco	Multifak AF B2	
	Multifak premium 2,3	
Russian Standard	Fiol 2M, Litol 24 TU 38.201.188 – latest edition	

8.9.4 Recommended lubricating oils

Alfa Laval ref. 55 32 19 - 20, rev. 0

Type of frame: **X10** with motor 25-55 kW.

One group of lubricating oils is approved. It is designated as lubricating oil group E. The numerical value after the letter states the viscosity grade.

The corresponding commercial oil brands, see chapter "8.9.5 Recommended oil brands" on page 177.

Ambient temperature °C	Alfa Laval lubricating oil group	Time in operation Oil change interval
Between 0 and +65	E/320	2000 h

Note!

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

8.9.5 Recommended oil brands

Alfa Laval ref. 55 32 18 - 14, rev 0

Alfa Laval Lubricating oil group E	
Viscosity grade VG ¹⁾	320
Viscosity index VI ²⁾	> 92
Supplier	Designation
Alfa Laval	558129-01 (4 litres)

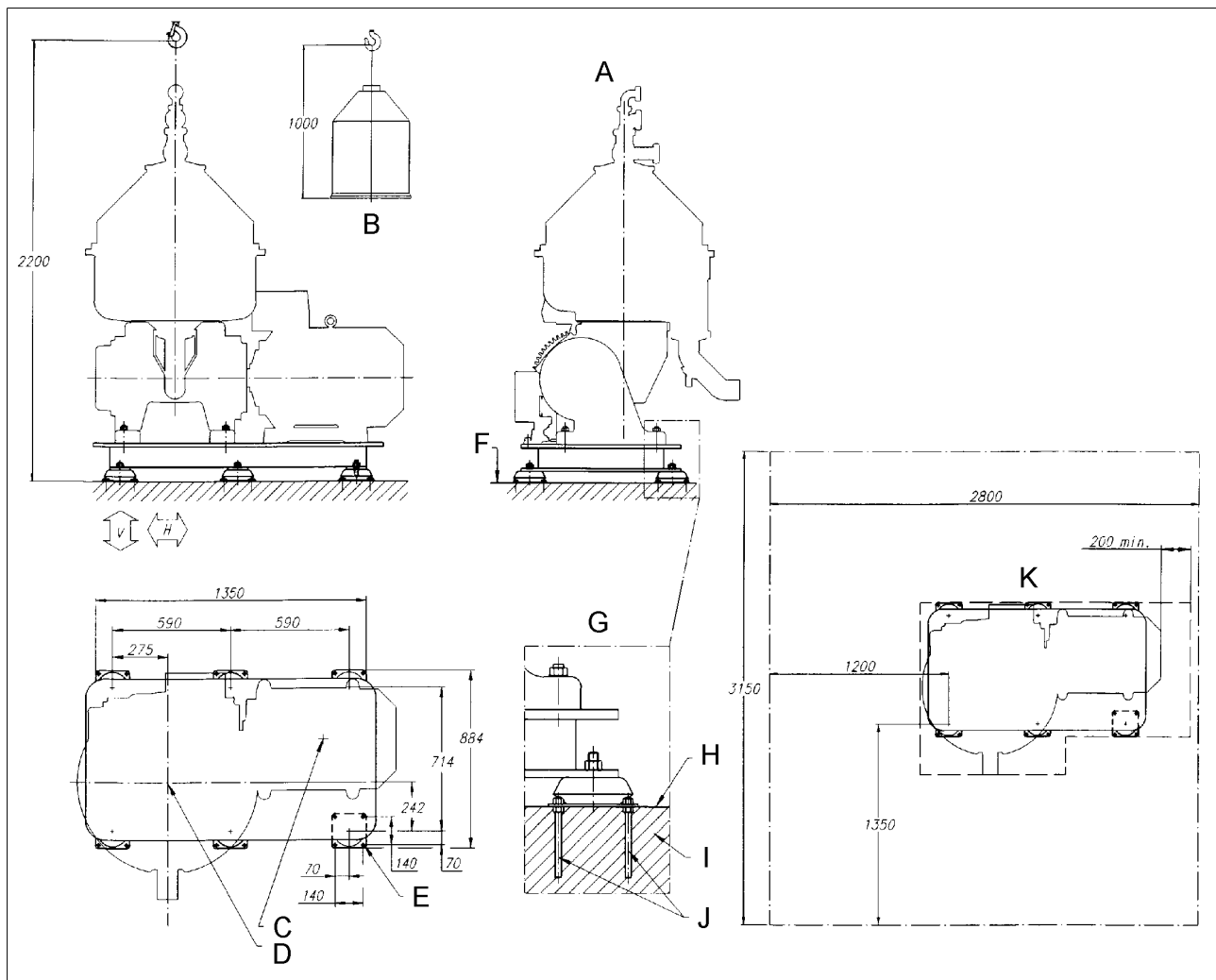
1) According to ISO 3448/3104

2) According to ISO 2909

8.10 Other drawings

8.10.1 Foundation drawing

Alfa Laval ref. 561682, rev. 0

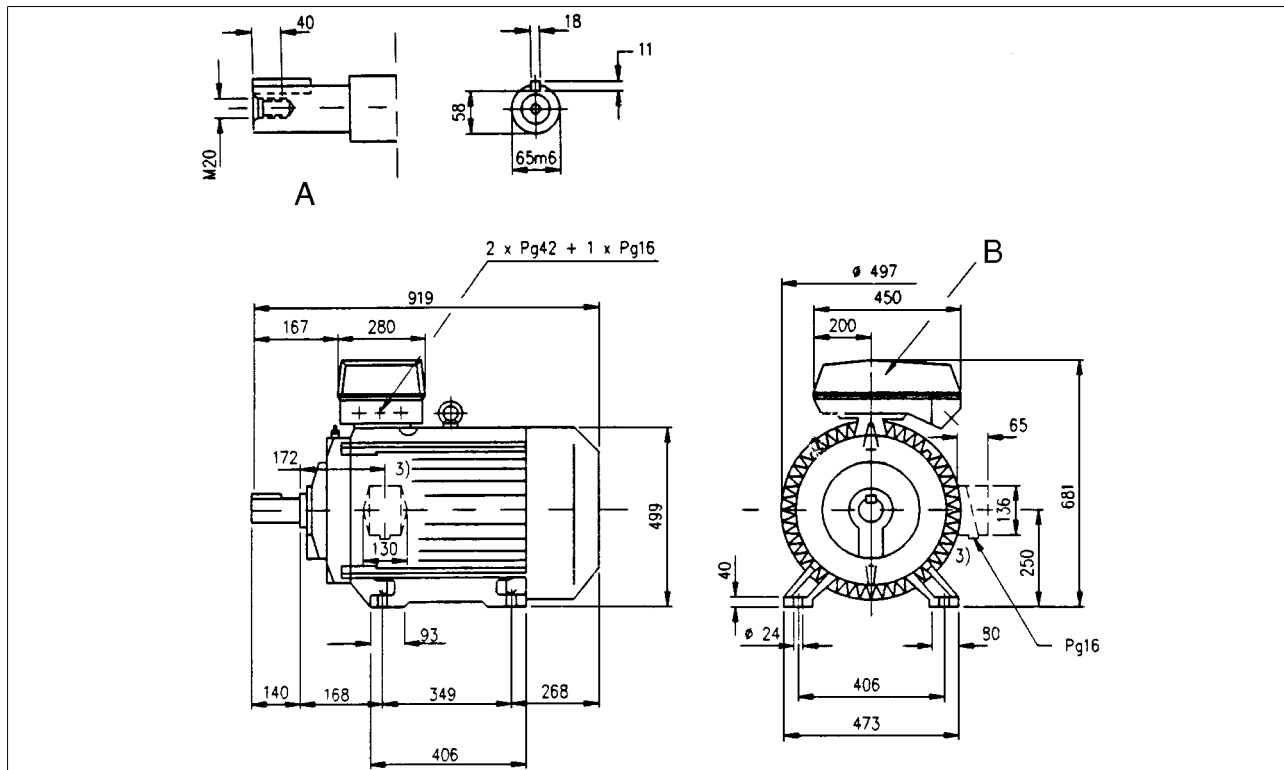


G0860011

A. Min.lifting capacity required when doing service 1700 kg	- · - · - · - ·	Recommended free floor space for unloading when doing service
B. Max. height of largest component incl. lifting tool Recommended speed for lifting: Low speed 0,5-1,5 m/min High speed 2-6 m/min	- - - - -	No fixed installation within this area)
C. Center of motor		Vertical force not exceeding 34 kN/foot*
D. Center of separator bowl		Horizontal force not exceeding 34 kN/foot*
E. 24 holes Ø 12 for anchorage.		
F. Horizontal max. deviation 0,4°		
G. Installation according to stated foundation forces		
H. Floor level		Total static load max. 22 kN
I. Structural concrete		
J. Anchor bolts		
K. Service side		* For guidance only. Based on estimates and unverified calculations.

8.10.2 Electric motor

Alfa Laval ref. 551827, rev. 2



A. Shaft dimensions
B. Turnable terminal box

Type of mounting (IEC 34-7)	Degree of protection (IEC34-5)
IM 1001	IP 55

- Manufacturer** ABB Motors AB
- Manufacturers drawing** HXUR 1 SE 87-05
- Standards** IEC 34-1, IEC 72
- Size** 250 M
- Type** HXR250MB 4 B3
- Weight** 410 kg
- Poles** 4
- Insulation class** F
- Bearings** DE 6315/C3, NDE 6313/C3
- Method of cooling** IC 41 (IEC 34-6)
- Specification** Totally enclosed CT-motor for star-delta starting

Article No	Output kW	Speed RPM	Freq Hz	Voltage V	Current A	Pow.fac cos φ	I_{st} / I ¹⁾	Therm ²⁾ °C	Note
551827-01	55	1467	50	380 D	102	0,88	1,5	190	
551827-02	55	1472	50	415 D	93	0,86	1,7	190	
551827-03	55	1467	50	220 D	176	0,88	1,5	190	
551827-04	55	1467	50	440 D	88	0,88	1,5	190	
551827-05	55	1467	50	500 D	78	0,88	1,5	190	
551827-06	55	1467	50	660 D	59	0,88	1,5	190	
551827-07	55	1467	50	200 D	194	0,88	1,5	190	
551827-08 ³⁾	55	1772	60	220 D 440 D	176 88	0,88	1,7	190	D-par D-ser
551827-09 ³⁾	55	1774	60	230 D 460 D	168 84	0,87	1,9	190	D-par D-ser
551827-10	55	1772	60	575 D	67	0,88	1,7		CSA-plated
551827-11	55	1772	60	380 D	102	0,88	1,7	190	
551827-12	55	1772	60	440 D	88	0,88	1,7	190	
551827-13	55	1772	60	220 D	176	0,88	1,7	190	
551827-14	55	1772	60	460 D	84	0,87	1,9	190	
551827-15	55	1772	60	230 D	168	0,87	1,9	190	
551827-16	55	1772	60	480 D	81	0,87	1,9	190	
551827-17	55	1467	50	400 D	97	0,88	1,5	190	
551827-18	55	1467	50	690 D	56	0,88	1,5	190	

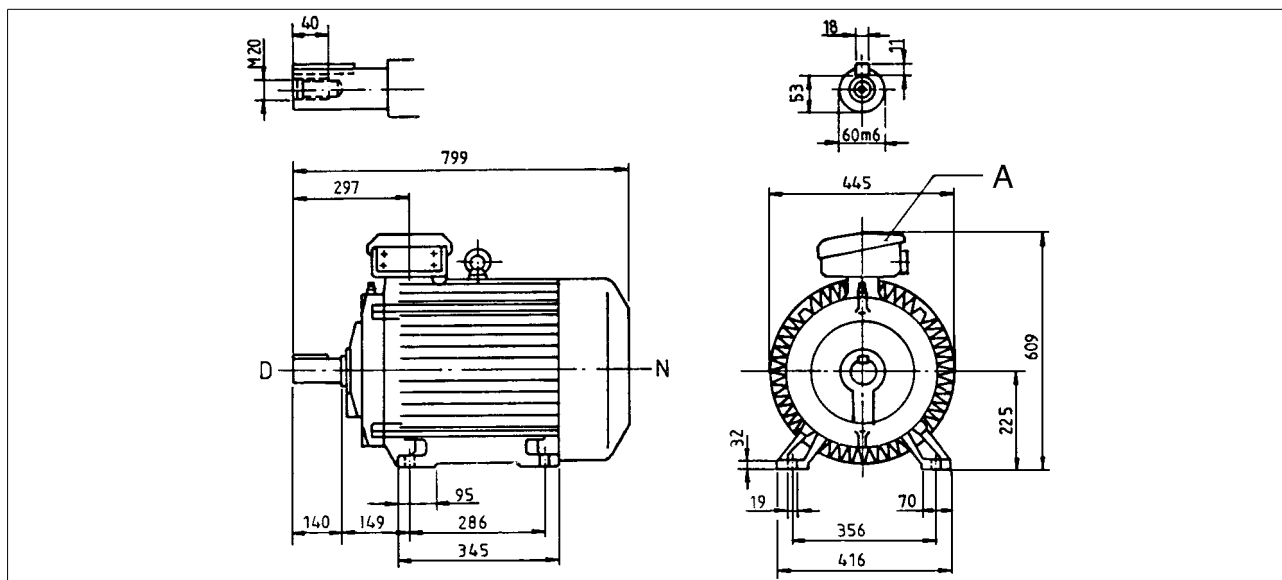
1) I_{st} / I = starting current / rated current at star-delta starting.

2) Thermistors tripping temperature.

3) Separate terminal box for thermistors, variants -08 and -09 only.

8.10.3 Electric motor

Alfa Laval ref. 551693, rev. 0



A. Turnable

Type of mounting (IEC34-7)	Degree of protection (IEC34-5)
IM 1001	IP 54

Manufacturer Strömberg

Manufacturers drawing

Standards IEC 34-1, IEC 72

Size 225 S

Type HXUR/W 452 G2 B3

Weight 290 kg

Poles 4

Insulation class F

Bearings DE 6313/C3 – NDE 6312/C3

Method of cooling IC 0141 (IEC 34-6)

Specification Totally enclosed CT-motor for star-delta start

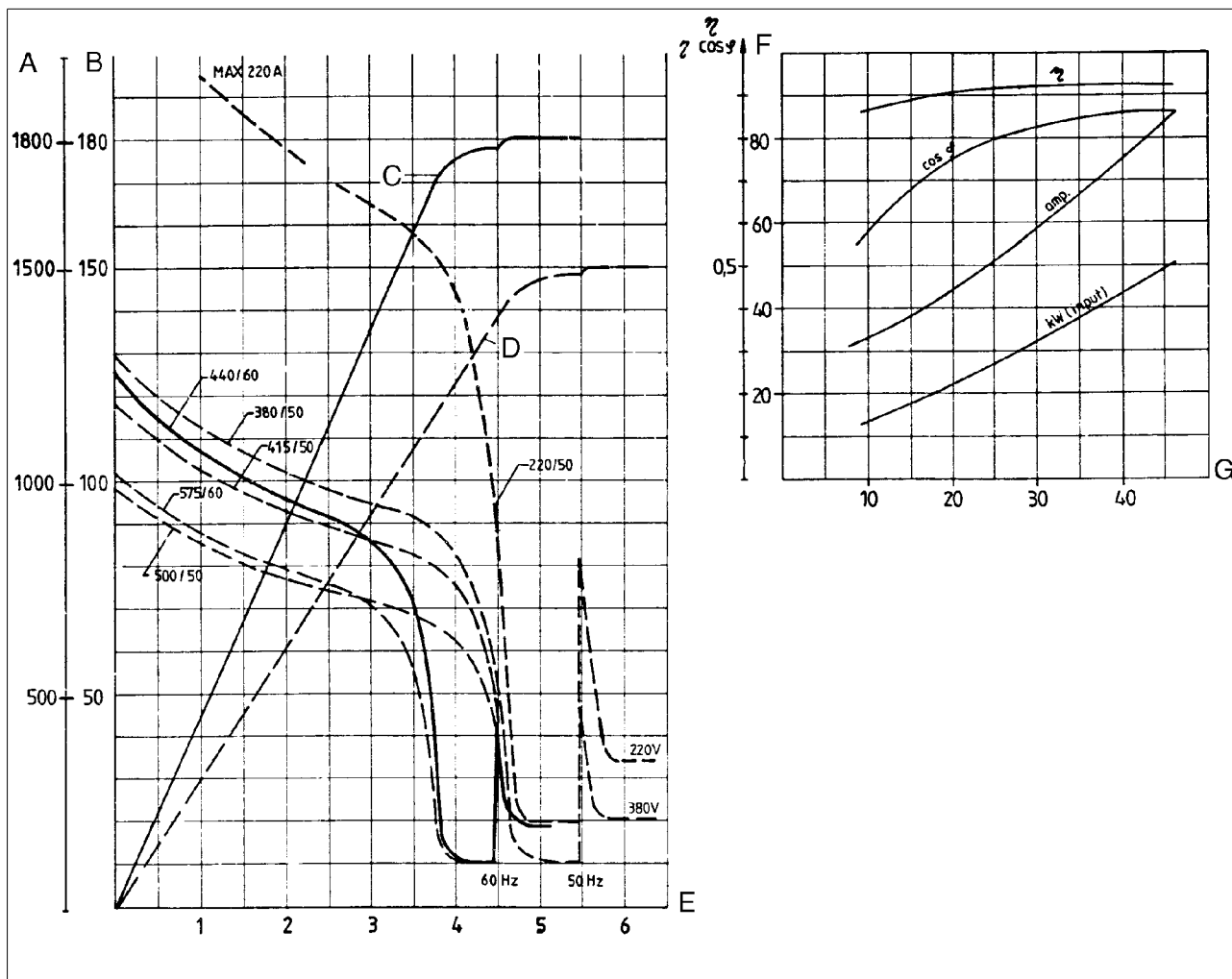
Article No	Output kW	Speed RPM	Freq Hz	Voltage V	Current A	Pow.fac cos φ	st / ¹⁾	Therm ²⁾ °C	Note
551693-01	37	1470	50	380 D	71	0,86	1,8	180	
551693-02	37	1476	50	415 D	66	0,84	2,1	180	
551693-03	37	1470	50	220 D	122	0,86	1,8	180	
551693-04	37	1470	50	440 D	61	0,86	1,8	180	
551693-05	37	1470	50	500 D	54	0,86	1,9	180	
551693-06	37	1470	50	660 D	41	0,86	1,8	180	
551693-07	37	1474	50	200 D	135	0,85	2,0	180	
551693-08	37	1775	60	220 D 440 D	122 61	0,86	2,1	180	D-par D-ser
551693-09	37	1778	60	230 D 460 D	118 59	0,85	2,3	180	D-par D-ser
551693-10	37	1775	60	575 D	47	0,86	2,1	180	CSA-plated

1) $I_{st} / I =$ max. starting current /rated current at star-delta starting.

2) Thermistors tripping temperature if applicable.

8.10.4 Motor drive data

Alfa Laval ref. 55 17 76



- A. Speed (r/min)
- B. Current (amp.)
- C. Motor speed 60 Hz
- D. Motor speed 50 Hz
- E. Time (minutes)
- F. amp.
kW(input)
- G. kW (output)

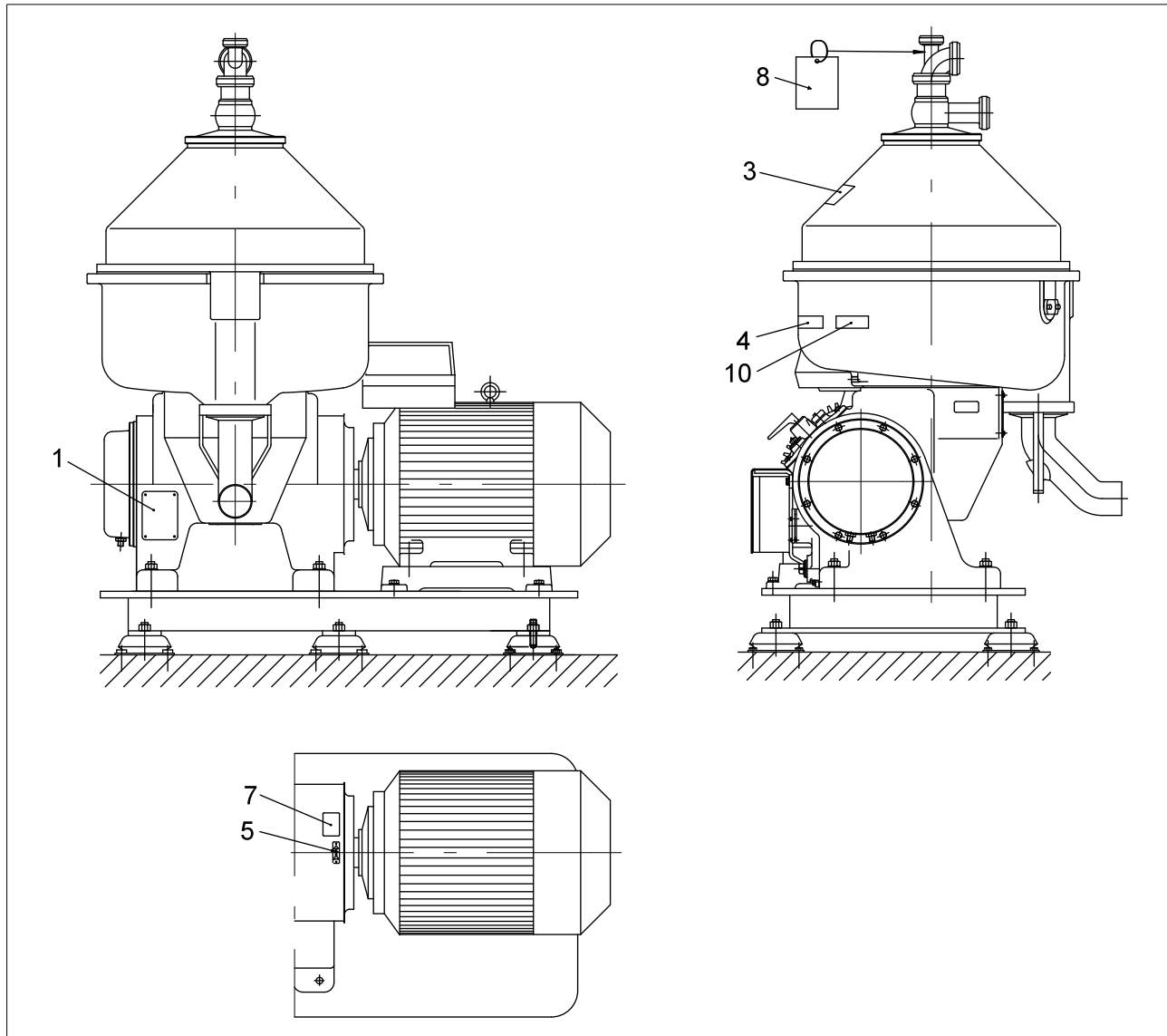
_____ Measured
 - - - - - Calculated

Motor data at 380V 50 Hz according to Strömberg motor data sheet.									
Min. cable area: See also local codes.									
η and $\cos \varphi$ valid for 50 Hz. Values for 60 Hz about 0,5% higher.									
Idling power input=6 kW.									
Moment of inertia 12,95 kgm ² (bowl spindle)									
Bowl speed max. 4805 rpm. motor 1500 or 1800 rpm.									
Motor AL-No.	kW	Manufact.	Type	No. of poles	r/min 50 Hz	r/min 60 Hz	η	$\cos \varphi$	Ms (Y)
551693	37	Strömberg	HXUR/W 452 G2	4	1470	1775	92 %	0,86	110 Nm

U (V)	I (A)	Fuse (A)	Cable mm ² min. Cu	Cable mm ² min. Al
380/50	71	80	35	50
415/50	65	80	35	50
500/50	54	63	25	35
440/60	61	80	35	50
575/60	47	63	25	35
220/50	122	160	95	120

8.11 Machine plates and safety labels

Alfa Laval ref. 561678, rev. 0



G0875011

1. Machine plate

Separator	CH/FESX 512S-35CG
Manufacturing serial No./ Year	XXXX
Product No.	881119-01-03
Machine top part	546587-33
Bowl	537865-
Machine bottom part	549996-27/28 (50/60 Hz)
Max. speed (bowl)	4800 r/min (50 Hz), 4765 r/min (60 Hz)
Direction of rotation (bowl)	←
Speed motor shaft	1500 r/min (50 Hz), 1800 r/min (60 Hz)
El. current frequency	50/60 Hz
Recommended motor power	37 kW
Max. density of feed	1200 kg/m ³
Max. density of sediment	1700 kg/m ³
Process temperature min./max.	0/100 °C



S0061411

3. Safety label

Text on label:

DANGER

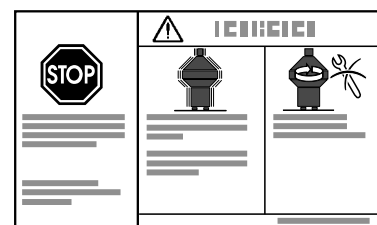
Read the instruction manuals **before** installation, operation and maintenance. Consider inspection intervals.

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.



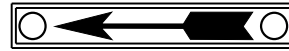
S0061521

4. Name plate

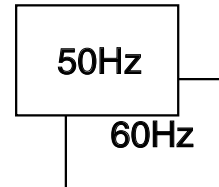
S0063211

5. Arrow

Indicating direction of rotation of horizontal driving device.



S0066821

7. Power supply frequency

S0063111

8. Lifting instruction

Text on label:

Read instruction manual before lifting.

10. Warning sign

Text on label:

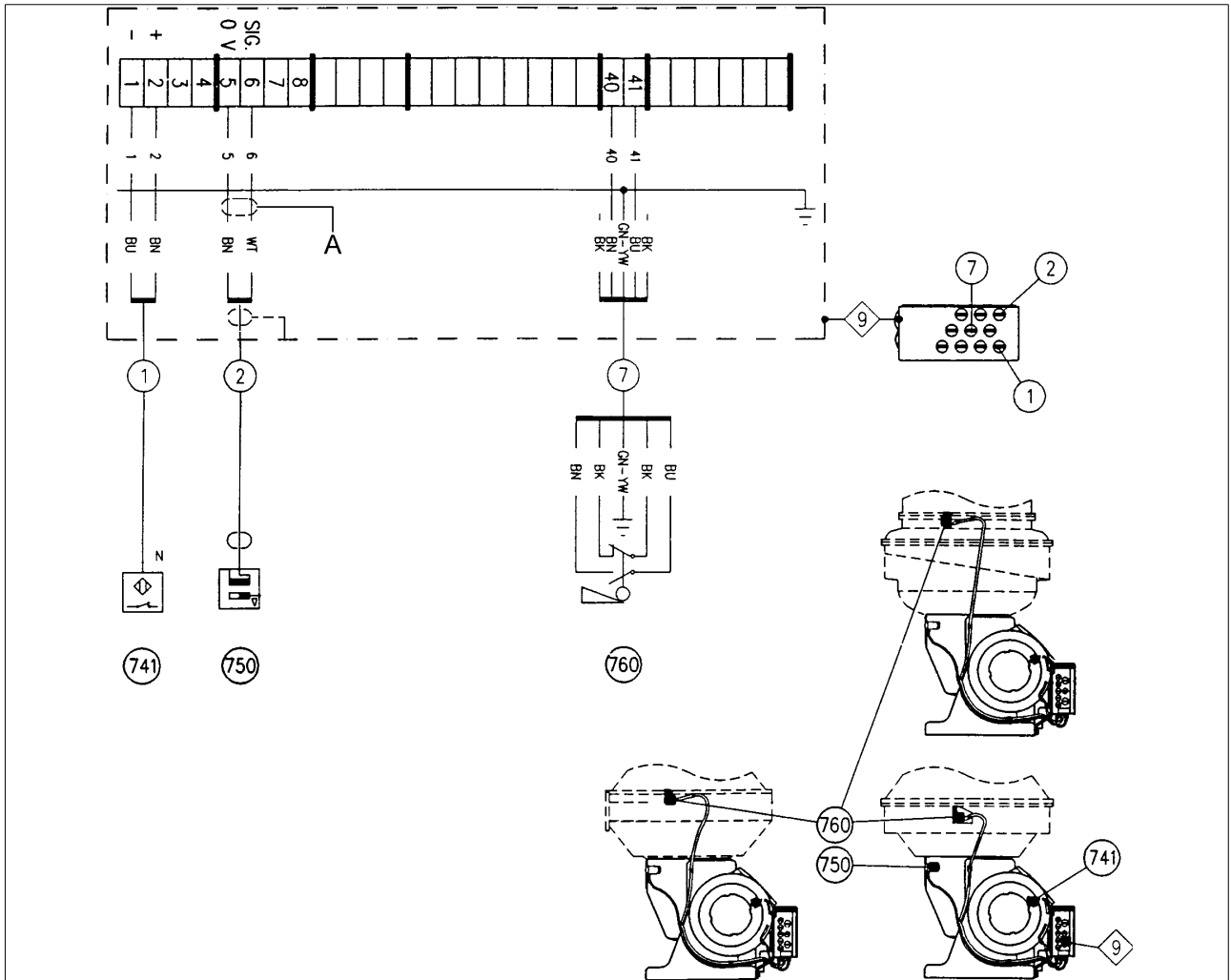
**DANGER
Disintegration hazards**

During separation and as long as the bowl is rotating, the liquid feed must **exceed** the output from the nozzles.

See instruction manual!.

8.12 Interconnection diagram

Alfa Laval ref. 553632, rev. 2



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*

- A. *Ferrit core*
- 9. *Junction box*
- 741. *Speed sensor (motor shaft speed)*
- 750. *Vibration sensor*
- 760. *Interlocking switch (frame top part)*
Normally open when cover not fitted.

G0636051

8.13 Storage and installation

8.13.1 Introduction

Most of the installation instructions are *Specifications*, which are compulsory requirements. These specifications are sometimes completed with non-compulsory *Recommendations*, which could improve the installation quality.

Additional installation information, such as drawings, connection lists and interface description, can be found previous in this chapter.

8.13.2 Storage and transport of goods

Storage

Specification

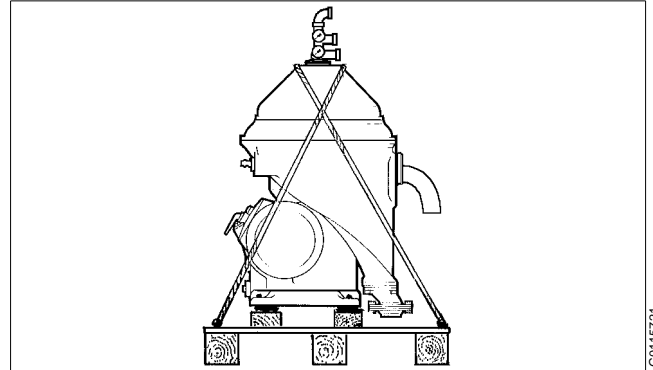
Upon arrival to the store, **check all components and keep them:**

1. Well stored and protected from mechanical damage and theft.
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 different types of protection:

- Fixed on a pallet.

The separator must be stored in a storage room well protected from mechanical damage and theft and also dry and protected from rain and humidity.

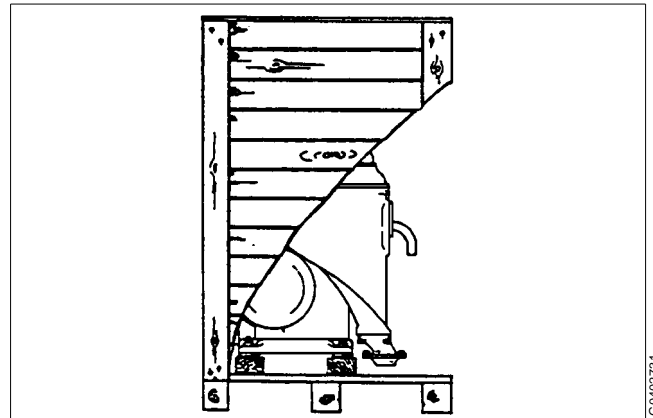


G0115721

Fixed on a pallet

- In a wooden box which is not water tight.

The separator must be stored dry and protected from rain and humidity.



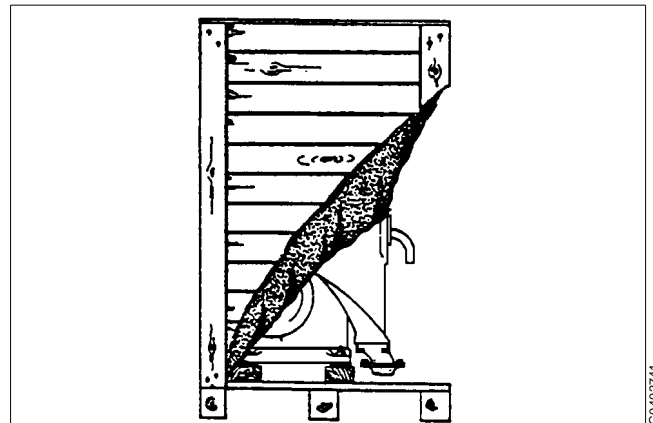
G0402731

In a wooden box which is not water tight

- In a special water-resistant box for outdoor storage.

The separator and its parts have been treated with an anti-corrosion agent. Once the box has been opened, store dry and protected from rain and humidity.

The packaging for outdoor storage is only to special order.




G0402741

In a special water-resistant box for outdoor storage

Transport

Specification

- During transport of the separator, the **bowl must always be removed from the machine.**
- When lifting a separator it must always be **hung securely.** See chapter “5.5 Lifting instructions” on page 66.



WARNING

Crush hazards

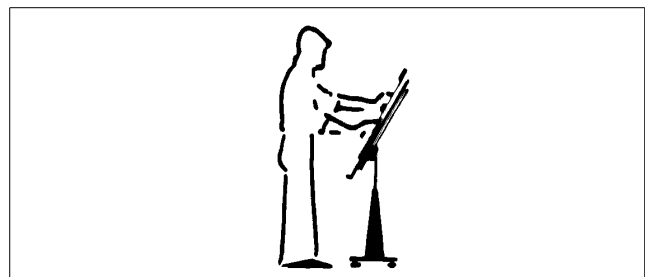
Use correct lifting tools and follow lifting instructions.

- During erection, all inlets and outlets to separators and accessories must be covered to be protected from dirt and dust.

8.13.3 Planning of installation

Introduction

The space required for one or more separators can be calculated by consulting the drawings in the chapters “8.2 Basic size drawing” on page 156, “8.10.1 Foundation drawing” on page 178 and instructions for ancillary equipment, electrical and electronic equipment and cables.

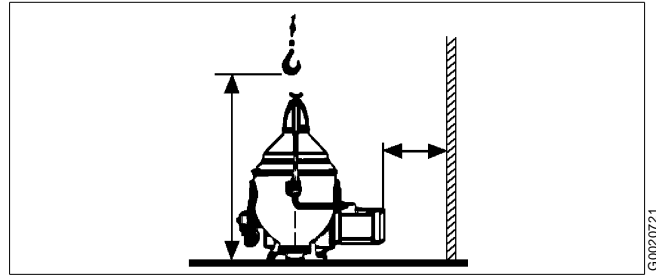


Check the drawings when planning the installation

Important measurements

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

Plan your installation with sufficient room for the controls and operation so that instruments are easily visible. Valves and controls must be within convenient reach. Pay attention to space requirements for maintenance work, work benches, dismantled machine parts or for a service trolley.



Suitable space must be obtained for the maintenance work

Space for separator

The separator shall be placed in such a way that suitable space for maintenance and repair is obtained.

Specification

- See chapter “8.10.1 Foundation drawing” on page 178 for the service space required with the separator installed.

Recommendation

- The spanner for the large lock ring should have sufficient space to make a complete turn without touching any of the ancillary equipment surrounding the separator.

Lifting height for transport of bowl

Specification

- A minimum height is required to lift the bowl, bowl parts and the bowl spindle, see chapter “8.10.1 Foundation drawing” on page 178.

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 assembled separator.

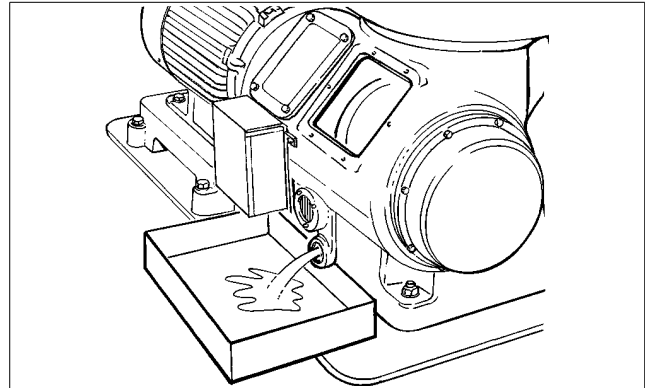
Space for oil changing

Specification

The plug for gearbox oil draining must not be blocked by floor plate arrangement, etc.

Recommendation

- It should be possible to place a portable collecting tray under the gearbox drain plug for changing oil.



Place the separator in such a way that makes the oil change easy

8.13.4 Foundations



WARNING

Crush hazard

Use correct lifting tools and follow lifting instructions. See “5.5 Lifting instructions” on page 66.

Do **not** work under hanging load.

Specification

- The separator should be installed at floor level, see chapter “8.10.1 Foundation drawing” on page 178.
- The separator must be installed on a strong and rigid foundation to reduce the influence of vibrations from adjacent machinery.
- Fit the separator frame as follows (see also “6.9 Frame feet” on page 143):
 - a. Fit the frame feet without adjusting washers to the frame.
 - b. Place the separator in its position.
 - c. Mark out on the foundation positions for screw holes for the anchoring bolts.
 - d. Remove the separator and drill the holes.

- e. Mount the anchoring bolts on the foundation.
- f. Lift the separator over the anchoring bolts.
- g. Check horizontal alignment of the foundation plate. If necessary, add adjusting washers to get the frame horizontal.
- h. Fit the bowl.

8.13.5 Preparations before first start

Technical demands for connections and logical limitations for the separator can be found in this chapter:

- Technical data
- Connection list
- Interface description
- Basic size drawing
- Foundation drawing.

Before first start the following shall be checked:

1. Ensure that pipes and drains have been flushed clean.
If not, flush the pipe system. Open valves and flush the pipe system to remove any chips, welding beads etc. left from installation.
Check that drains are not blocked.
2. Check that safety water system has been installed.
3. Check all pipes and electrical connections.
4. Install the separator and ensure that the separator is installed correctly.



DANGER

Disintegration hazard

When power cables have been connected, always check direction of rotation. If incorrect, vital rotating parts could unscrew causing disintegration of the machine.

Reader's Comment Form

Dear reader,

It is our ambition to produce as useful and instructive manuals as possible. Should you have any comments (positive or negative) regarding this manual, please note them down and send them to us. You can do this by copying this page and sending it by fax, or you could mail it, or hand it over to your local Alfa Laval representative.

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Fax: +46 8 53065029.

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Company:

Address:

City:

Country:

Product:

CH/FESX 512S-35CG

Book No.:

1271013-02 V2

Date:

	Yes	No
Is it easy to find what you are looking for by using the table of contents?	<input type="checkbox"/>	<input type="checkbox"/>
Are the chapter and section headings clear and adequate?	<input type="checkbox"/>	<input type="checkbox"/>
Is the information presented in the correct order for your purposes?	<input type="checkbox"/>	<input type="checkbox"/>
Does the information in the manual cover your needs?	<input type="checkbox"/>	<input type="checkbox"/>
Is it easy to understand the instructions in the manual?	<input type="checkbox"/>	<input type="checkbox"/>
Is the terminology sufficiently explained?	<input type="checkbox"/>	<input type="checkbox"/>
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Your comments:

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Country:

Product:

CH/FESX 512S-35CG

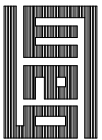
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1271013-02 V2

Quantity:

Date:

Comments:



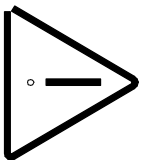
WEG INDUSTRIAS - AUTOMAÇÃO



SAO PAULO BRASIL

ALFA LAVAL LTDA

ATENÇÃO:



EMC

1. LIGAR O MÓDULO DESUMIDIFICADOR (QUANDO EXISTIR) A UMA FONTE INDEPENDENTE, MESMO ANTES DE ENERGIZAR O PAINEL, PARA EVITAR FORMAÇÃO DE UMIDADE EM SEU INTERIOR.
2. EXECUTAR CONVENIENTE ATERRAMENTO DO PAINEL. O SISTEMA DE ATERRAMENTO DEVE ESTAR CONFORME IEC 298 E IEC 61000-5-2 (EMC). A RESISTÊNCIA DE ATERRAMENTO DEVERÁ SER <10Ω. O CABO NEUTRO NÃO PODE SER UTILIZADO PARA ATERRAR O PAINEL. A MALHA DA FIAÇÃO BLINDADA DE SINAL DEVE SER ATERRADA EM APENAS UMA DAS EXTREMIDADES.
3. COM O OBJEITO DE EVITAR INTERFERÊNCIAS EM EQUIPAMENTOS SENSÍVEIS (TERMOPARES, PCS, CLPs, REDES) A FIAÇÃO DE MOTORES/SERVOMOTORES (EXTERNA AO PAINEL) QUE SÃO ACIONADOS POR INVERSORES DEVE ESTAR INTERNA A UM ELETRÓDUTO METÁLICO OU SEAL TUBE (INCLUINDO FIO TERRA) EXCLUSIVO PARA CADA MOTOR. O ELETRÓDUTO DEVERÁ SER ATERRADO EM AMBAS AS EXTREMIDADES
4. THE EARTHING/GROUNDING SYSTEM MUST BE ACCORDING IEC 298 AND IEC 61000-5-2 (EMC).
5. AO REALIZAR UMA MANUTENÇÃO, É OBRIGATÓRIO DESLIGAR A CHAVE SECCIONADORA OU DISJUNTOR PRINCIPAL.
6. ESTE PAINEL É FABRICADO PARA OPERAR EM 380V OU 440V. VERIFICAR A TENSÃO DE ALIMENTAÇÃO NECESSÁRIA E EXECUTAR OS AJUSTES CONFORME DESCRITO NAS FOLHAS 1 E 3 DO DIAGRAMA ELÉTRICO

CLIENTE: ALFA LAVAL LTDA

SISTEMA: CENTRÍFUGA

MODELO FESX-512

PROJETO N°: XXXXXXXX/XX-PROO

TENSÃO DA REDE

380V

440V

STATUS:

CONHECIMENTO

CERTIFICADO

AS BUILT

MONTAGEM

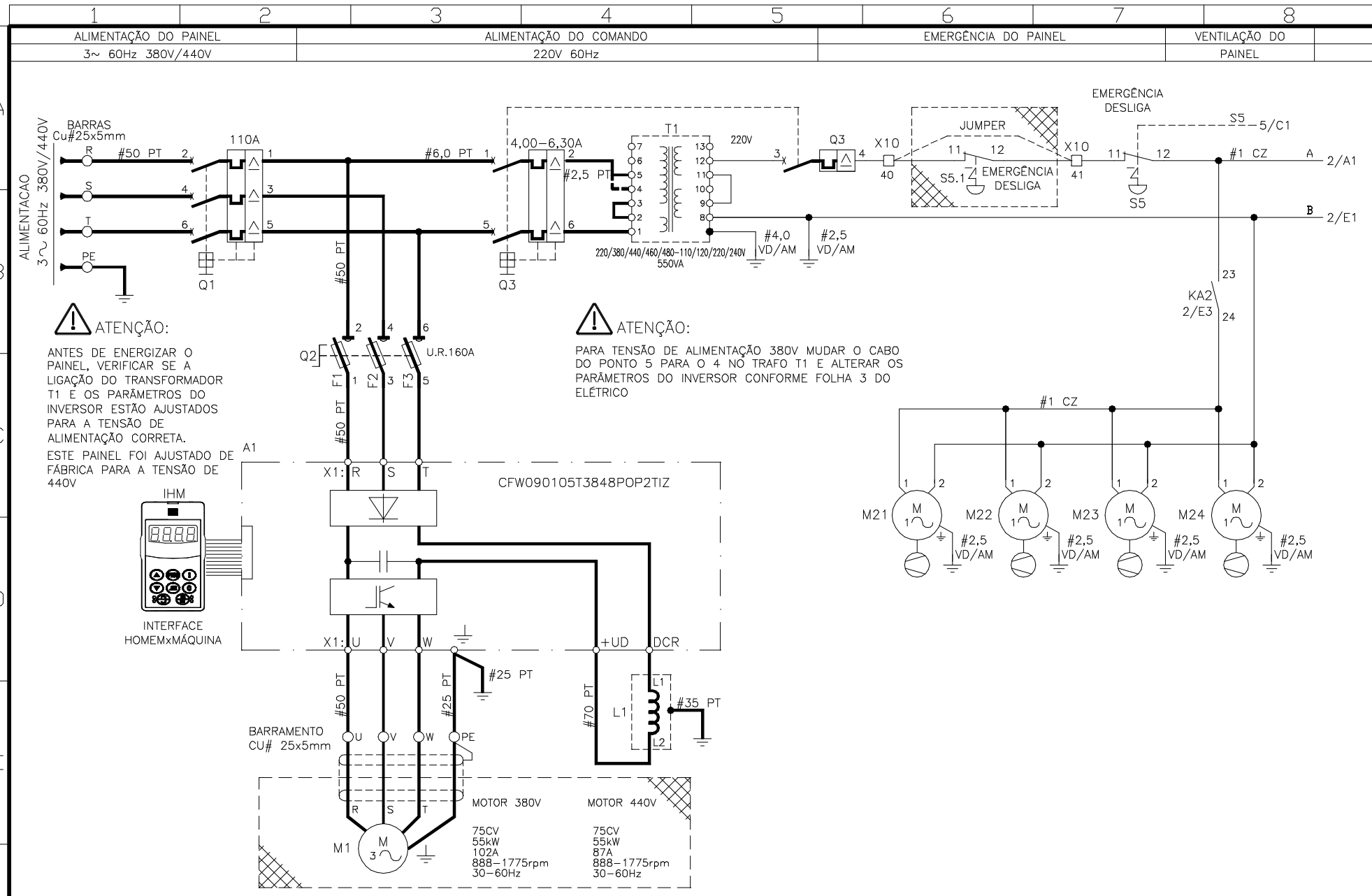
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ME	DESENHO(S) MECÂNICO(S)	XXXXXXXX/XX-ME	3	
RM	RELAÇÃO DE MATERIAS	XXXXXXXX/XX-RM	2	
RB	RÉQUA(S) DE BORNES	XXXXXXXX/XX-RB	3	
CP	CONJUNTO DE PLAQUETAS	XXXXXXXX/XX-CP	1	
SB	SIMBOLOGIA	CONF. NORMA IEC-617		

DATA:

PROJETO: Charles

LIBERAÇÃO: Kretzer



MOD. 0074 Rev. 07/97

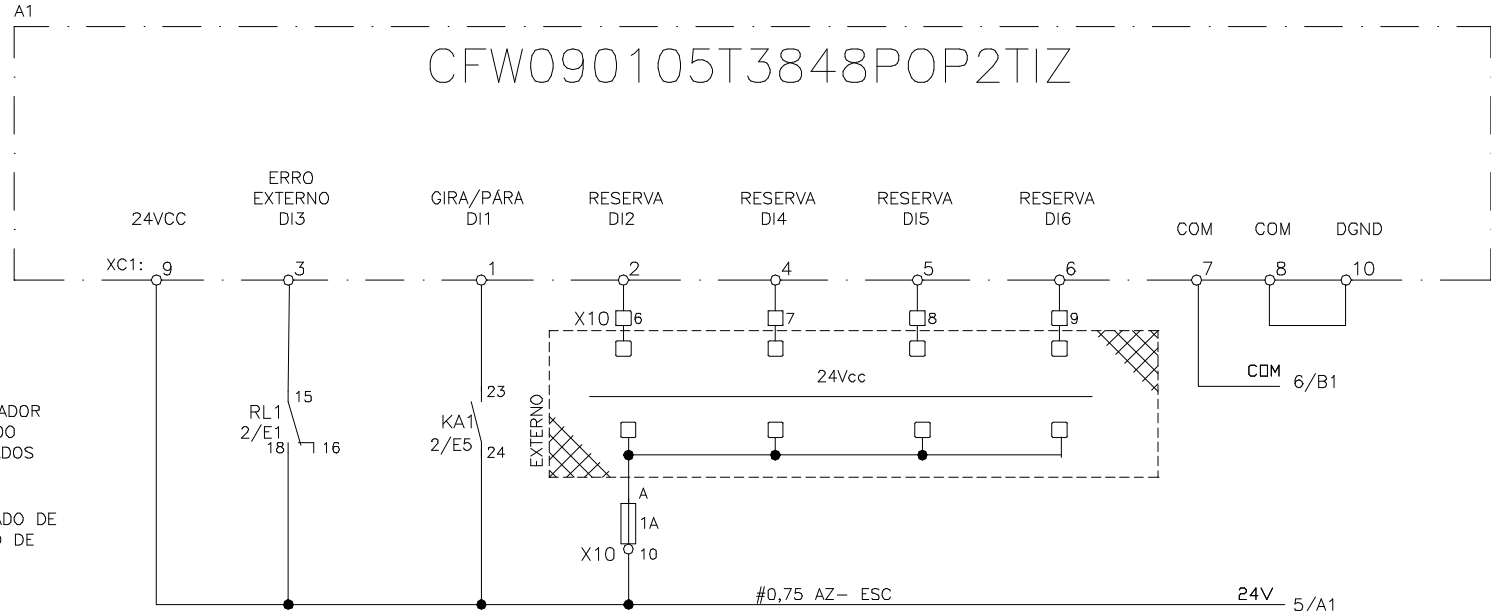
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										ALFA LAVAL LTDA				
										EXECUTADO		CENTRÍFUGA FESX-512		AL
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										LIBERADO		CFW090105T3848POP2TIZ		00
										DATA LIBER.		DIAGRAMA MULTIFILAR		
RLM	LOC	RESUMO DAS MODIFICACOES				EXECUTADO	LIBERADO	DATA LIBER.	INDICE	LIBERADO				
PRJ	PCP	PRC	MON											

1 2 3 4 5 6 7 8

INVERSOR DE FREQUÊNCIA

CFW090105T3848POP2TIZ

⚠ ATENÇÃO:
 ANTES DE ENERGIZAR O PAINEL, VERIFICAR SE A LIGAÇÃO DO TRANSFORMADOR T1 E OS PARÂMETROS DO INVERSOR ESTÃO AJUSTADOS PARA A TENSÃO DE ALIMENTAÇÃO CORRETA.
 ESTE PAINEL FOI AJUSTADO DE FÁBRICA PARA A TENSÃO DE 440V



PRÉ-PROGRAMAÇÃO 440V

PARÂMETROS A1
Software: Ve3.27
P100 10s
P133 888rpm
P134 1800rpm
P156 112A
P157 92A
P158 51A
P211 1=Ativo
P213 600s
P223 0=Horário
P224 1=DI
P225 0=Inativo
P226 0=Horário
P228 0=Inativo
P263 1=Gira/Pára
P264 2=Sem Função
P265 4=Sem Erro
P267 0=Sem Função
P268 0=Sem Função
P280 0=Sem Função
P288 90rpm
P295 18=105.0A
P296 3=440V/460V
P400 440V
P401 87A
P402 1770rpm
P404 21=75CV

CLIENTE 440V

PARÂMETROS A1
Software: Ve3.27
P100
P133
P134
P156
P157
P158
P211
P213
P223
P224
P225
P226
P228
P263
P264
P265
P267
P268
P280
P288
P295
P296
P400
P401
P402
P404

PROGRAMAÇÃO 380V

PARÂMETROS A1
Software: Ve3.27
P100 10s
P133 888rpm
P134 1800rpm
P156 112A
P157 92A
P158 51A
P211 1=Ativo
P213 600s
P223 0=Horário
P224 1=DI
P225 0=Inativo
P226 0=Horário
P228 0=Inativo
P263 1=Gira/Pára
P264 2=Sem Função
P265 4=Sem Erro
P267 0=Sem Função
P268 0=Sem Função
P280 0=Sem Função
P288 90rpm
P295 18=105.0A
P296 1=380V
P400 380V
P401 102A
P402 1770rpm
P404 21=75CV

CLIENTE 380V

PARÂMETROS A1
Software: Ve3.27
P100
P133
P134
P156
P157
P158
P211
P213
P223
P224
P225
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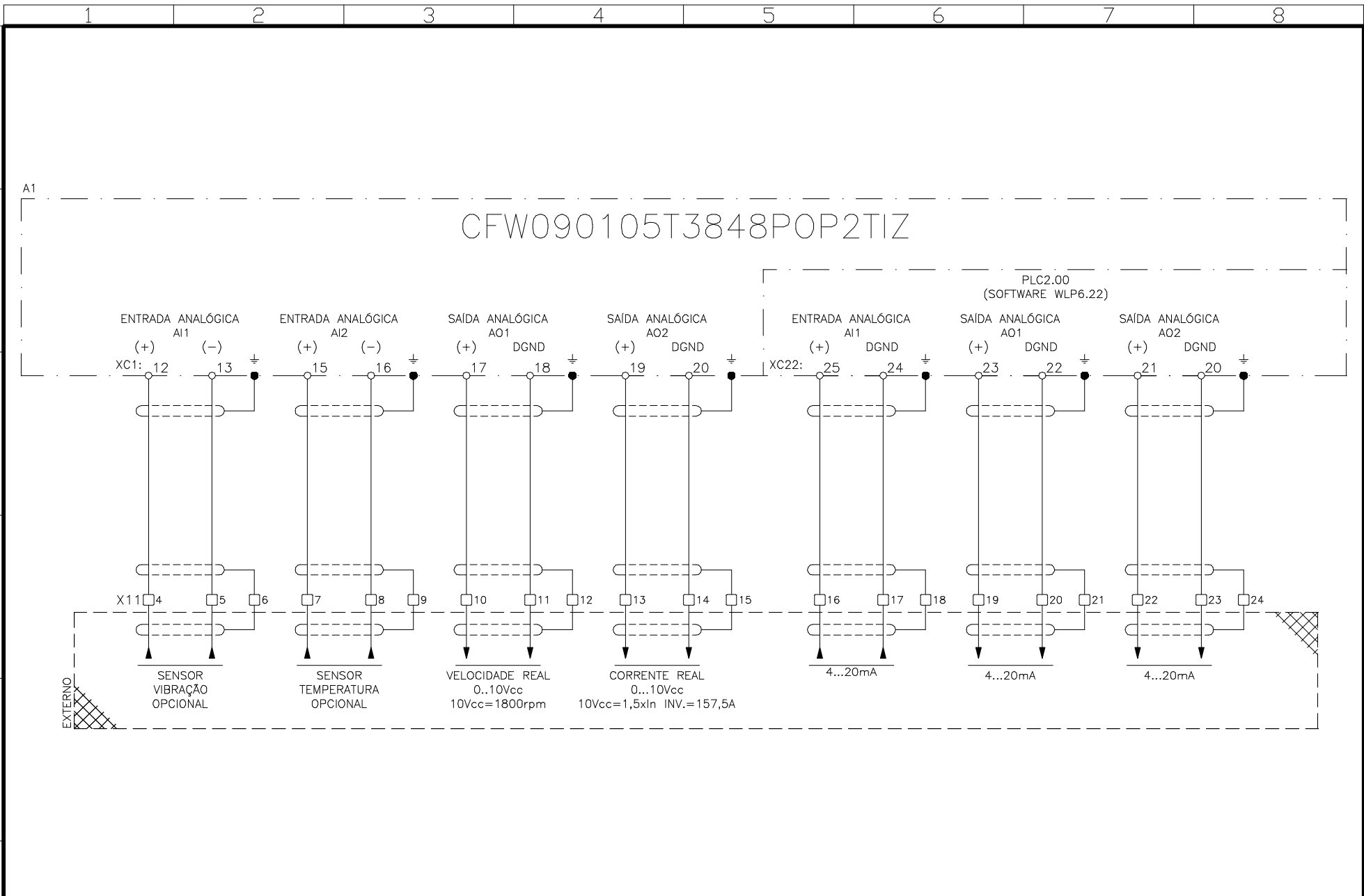
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MOD. 0074 Rev. 07/97

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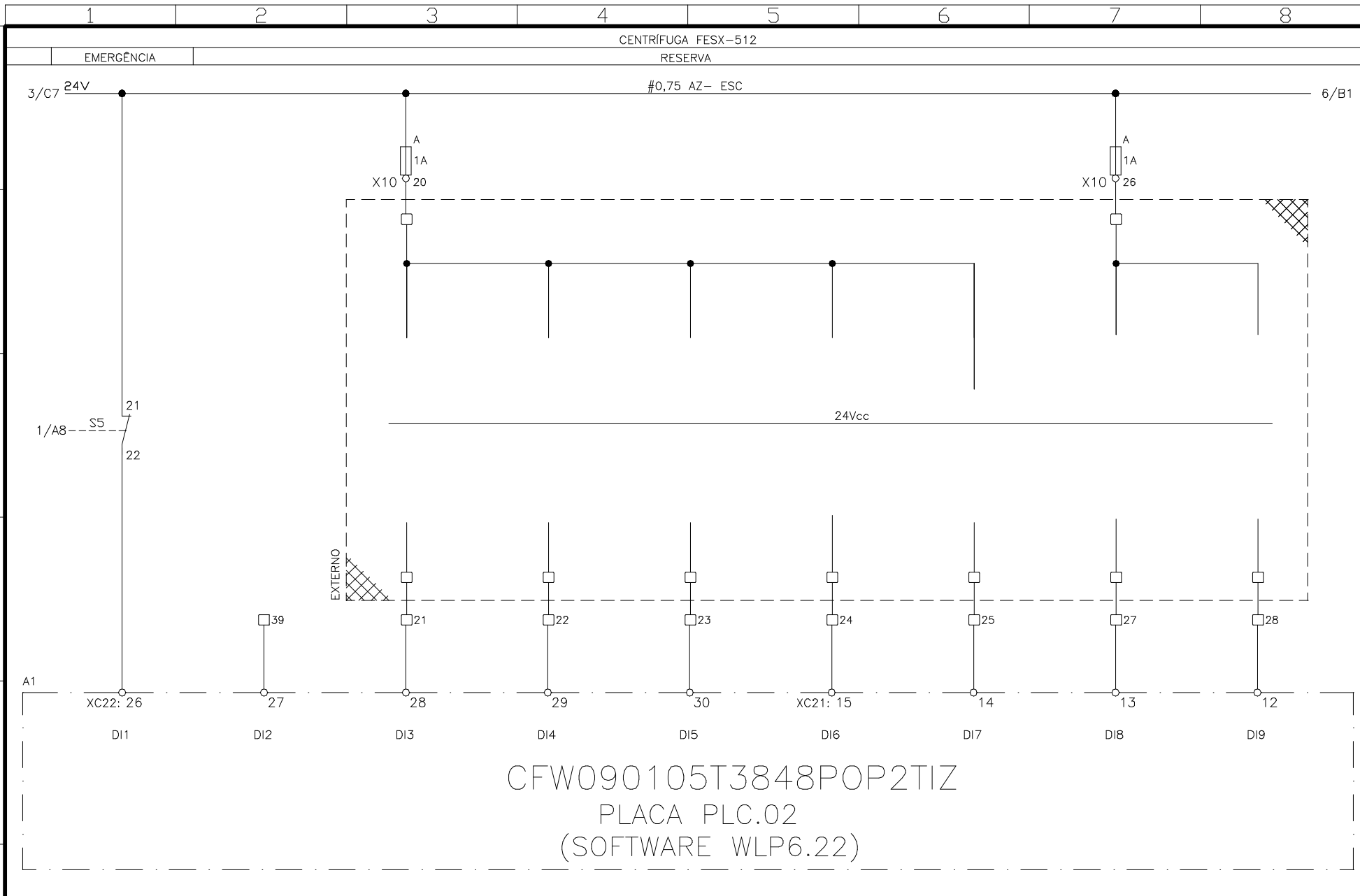
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	CENTRIFUGA FESX-512	
		SAO PAULO BRASIL
		AL
	CFW090105T3848POP2TIZ	00
	DIAGRAMA MULTIFILAR	FL. 3
		DE 7 FLS.



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PRJ	PCP	PRC	MON																				

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	CFW090105T3848POP2TIZ	00	
	DIAGRAMA MULTIFILAR	FL. 4 DE 7 FLS.	



CFW090105T3848POP2TIZ
 PLACA PLC.02
 (SOFTWARE WLP6.22)

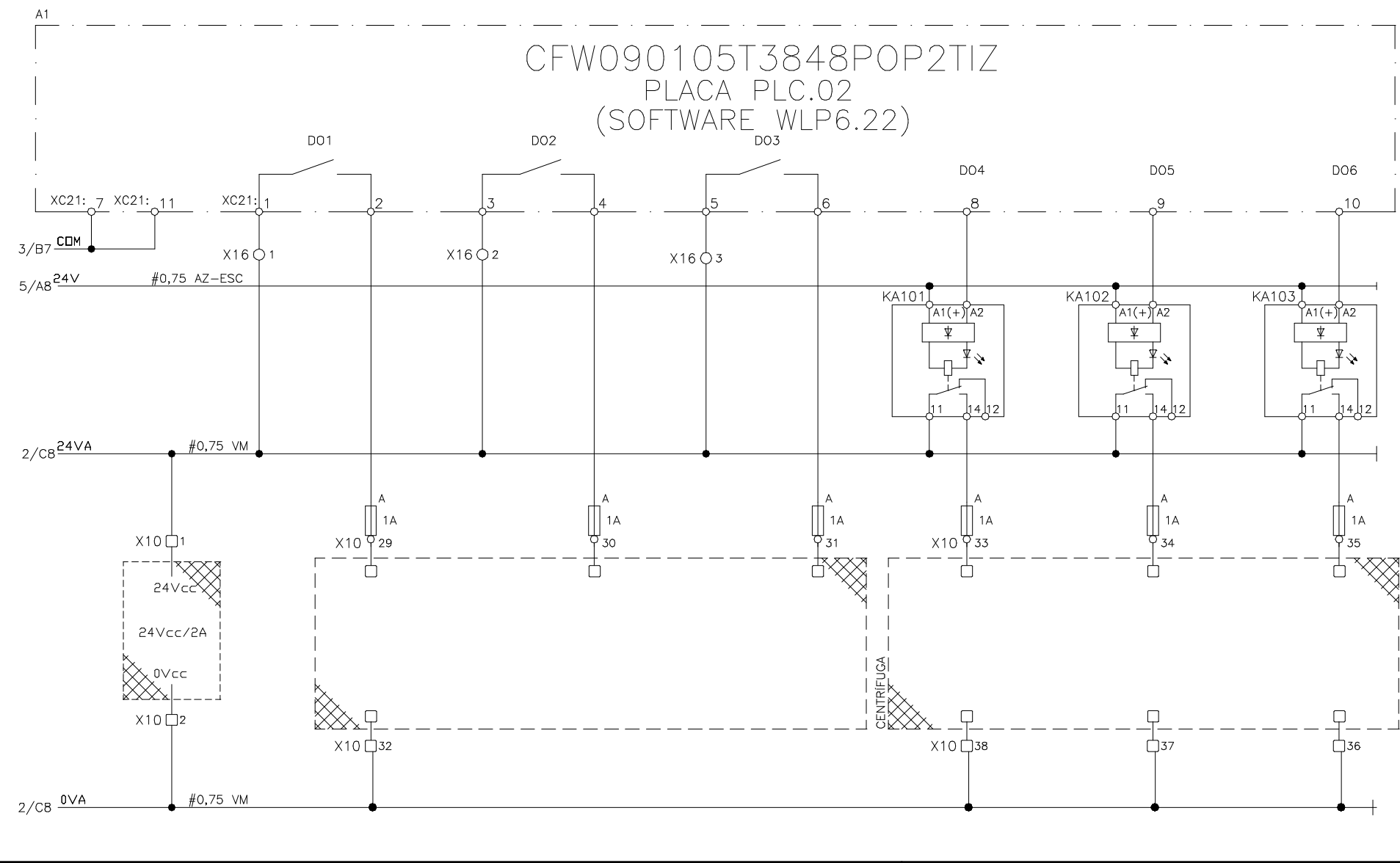
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				DATA LIBER.	

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		CENTRIFUGA FESX-512			
		CFW090105T3848POP2TIZ		00	FL. 5
		DIAGRAMA MULTIFILAR			DE 7 FLS.

CENTRIFUGA FESX-512
RESERVA

CFW090105T3848POP2TIZ
PLACA PLC.02
(SOFTWARE_WLP6.22)



MOD. 0074 Rev. 07/97

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				REVISÃO DURANTE FABRICAÇÃO	Charles Kretzer		13/12/07	01	Charles Kretzer	

CLIENTE: **ALFA LAVAL LTDA**

CENTRIFUGA FESX-512

SAO PAULO BRASIL AL

FL. 6 DE 7 FLS.

00

1 2 3 4 5 6 7 8

MÓDULO DESUMIDIFICADOR E ILUMINAÇÃO DO PAINEL

A

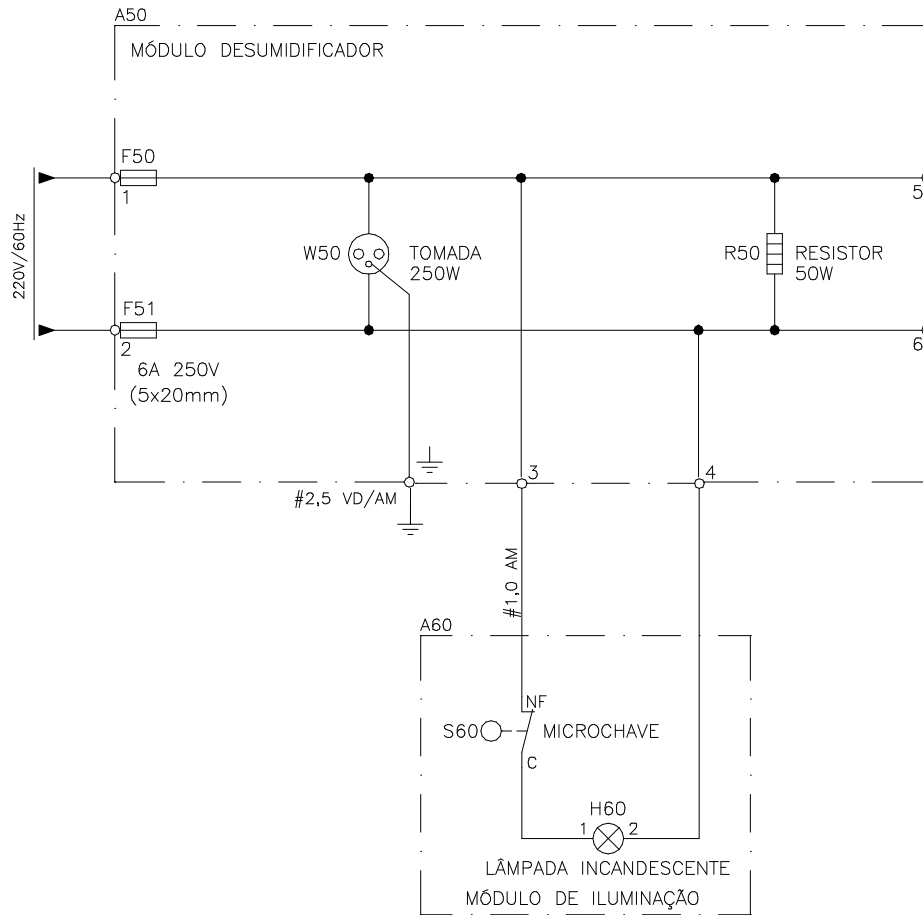
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C

D

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MOD. 0074 Rev. 07/97

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								EXECUTADO	Charles
								VERIFICADO	Kretzer
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CLIENTE:

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CENTRÍFUGA FESX-512

SAO PAULO BRASIL

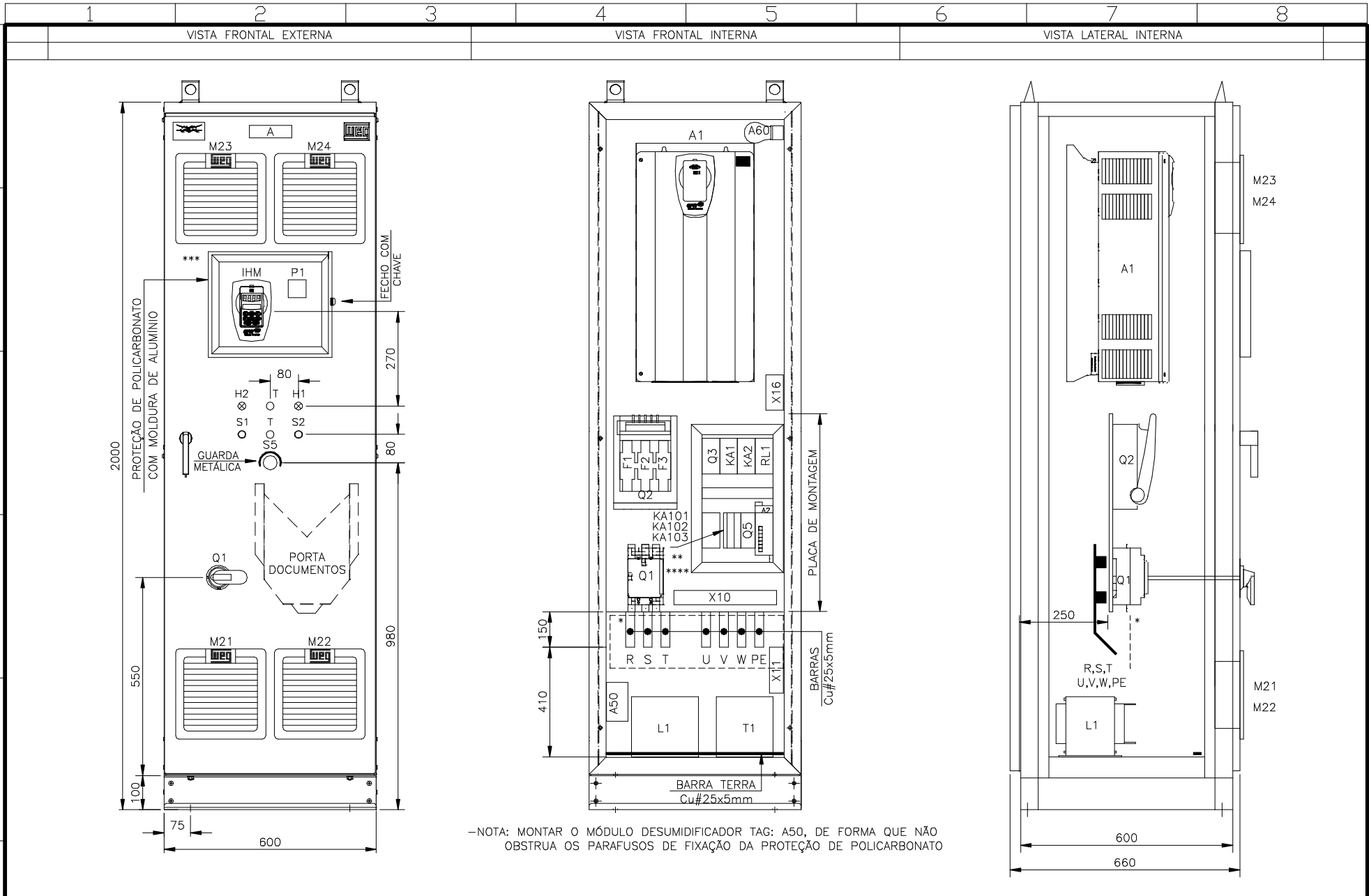
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MÓD. DESUM./ILUM.

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00

FL. 7 DE 7 FLS.



-NOTA: MONTAR O MÓDULO DESUMIDIFICADOR TAG: A50, DE FORMA QUE NÃO OBSTRUA OS PARAFUSOS DE FIXAÇÃO DA PROTEÇÃO DE POLICARBONATO

MOD. 0074 Rev. 07/97

										CLIENTE: ALFA LAVAL LTDA							
										EXECUTADO <i>Charles</i>		SAO PAULO		BRASIL		AL	
										VERIFICADO <i>Netzer</i>		CENTRÍFUGA FESX-512		FL. 1		00	
RESUMO DAS MODIFICACOES										CFW090105T3848POP2TIZ		LAYOUT		DE 3 FLS.			
RLM	LOC									EXECUTADO	LIBERADO	DATA LIBER.	INDICE	LIBERADO	DATA LIBER.		
PRJ	PCP	PRC	MON														

DADOS CONSTRUTIVOS:

- PINTURA COR CINZA RAL 7032
- BASE E ESTRUTURA COR CINZA RAL 7022
- PLANO DE PINTURA WAU-01
- EMBALAGEM : 0760.5226
- PALLET : 0760.0011
- PAINEL TIPO : PNW-02 20.066
- PROFUNDIDADE : 660mm (TOTAL)
- ENTRADA E SAIDA DE CABOS POR BAIXO
- BARRAMENTOS ESTANHADOS E ISOLADOS COM TERMOENCOLHÍVEL
- PLACA DE MONTAGEM NA COR LARANJA
- BARRAMENTOS IDENTIFICADOS:
R;U: AZUL
S;V : BRANCO
T;W : VIOLETA
PE: VERDE
- OS VENTILADORES M23 E M24 DEVERÃO TRABALHAR COMO EXAUSTORES
- PREVER GRELHA PARA PROTEÇÃO CONTRA TOQUES NOS VENTILADORES M21 E M22 E EXAUSTORES M23 E M24
- CANALETAS 30x80mm NA COR CINZA
- TODOS OS COMPONENTES DEVERÃO SER IDENTIFICADOS COM CRACHÁ
- A LIGAÇÃO PARA A PORTA DEVERÁ SER ENVOLTA EM TUBO ESPIRALADO
- AS EMENDAS DE TODAS AS CANALETAS DEVERÃO SER FEITAS EM ÂNGULO DE 45°
- A PLACA PLC2.00 DO INVERSOR A1 DEVERÁ SAIR DE FÁBRICA COM O SOFTWARE WLP6.22
- *** MOLDURA
* PROTEÇÃO DE POLICARBONATO PERFORADO
- IHM-INTERFACE
HOMEMxMÁQUINA
T-TAMPÃO

**

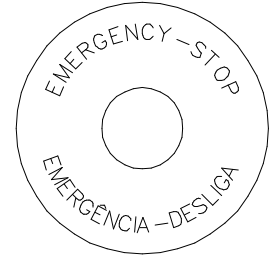
ATENÇÃO:
AO INICIAR UMA MANUTENÇÃO,
DESLIGAR O DISJUNTOR
GERAL (Q1) E O
AUXILIAR (Q2).

100

LETRA: 6x4mm BRANCA
FUNDO: VERMELHO
QTDADA: 1
ITEM: 0500.7802

CENTRÍFUGA
FESX-512

TAG: A
TIPO: 20W
QTDADA: 1
ITEM: 0500.7755



TAG: S5
TIPO: APE
QTDADA: 1
ITEM: 035500150

ATENÇÃO:
ANTES DE ENERGIZAR O PAINEL
VERIFICAR A TENSÃO DE
ALIMENTAÇÃO PARA QUAL ESTE
ACIONAMENTO DEVERÁ SER
AJUSTADO. VER FOLHAS
1 E 3 DO DIAGRAMA ELÉTRICO

100

LETRA: 6x4mm BRANCA
FUNDO: VERMELHO
QTDADA: 1
ITEM:

LIGADO

TAG: H1
TIPO: 17W
QTDADA: 1
ITEM: 0500.7771

LIGA

TAG: S1
TIPO: 17W
QTDADA: 1
ITEM: 0500.7771

DEFEITO

TAG: H2
TIPO: 17W
QTDADA: 1
ITEM: 0500.7771

DESLIGA

TAG: S2
TIPO: 17W
QTDADA: 1
ITEM: 0500.7771

⚠ ATENÇÃO:
PREENCHER A TENSÃO
DE ALIMENTAÇÃO
(380V OU 440V)

WEG
WEG AUTOMAÇÃO
CP.470-89.256-900-MARACÁ DO SUL-SC
CECMF 79.670.501/0003205 IND. BRAS.

MODELO:
CFW090105T3848POP2TIZ

ENTRADA: CA V 105 A 60 Hz	SAIDA: CA V 105 A 3-204 Hz
------------------------------------	-------------------------------------

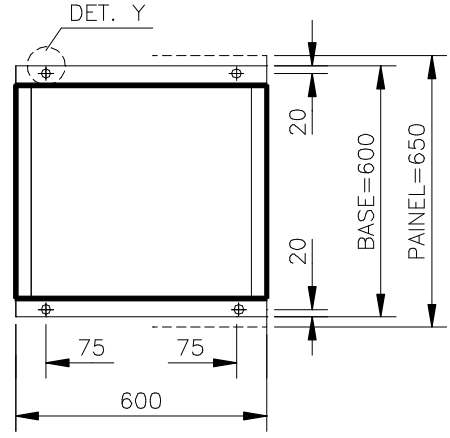
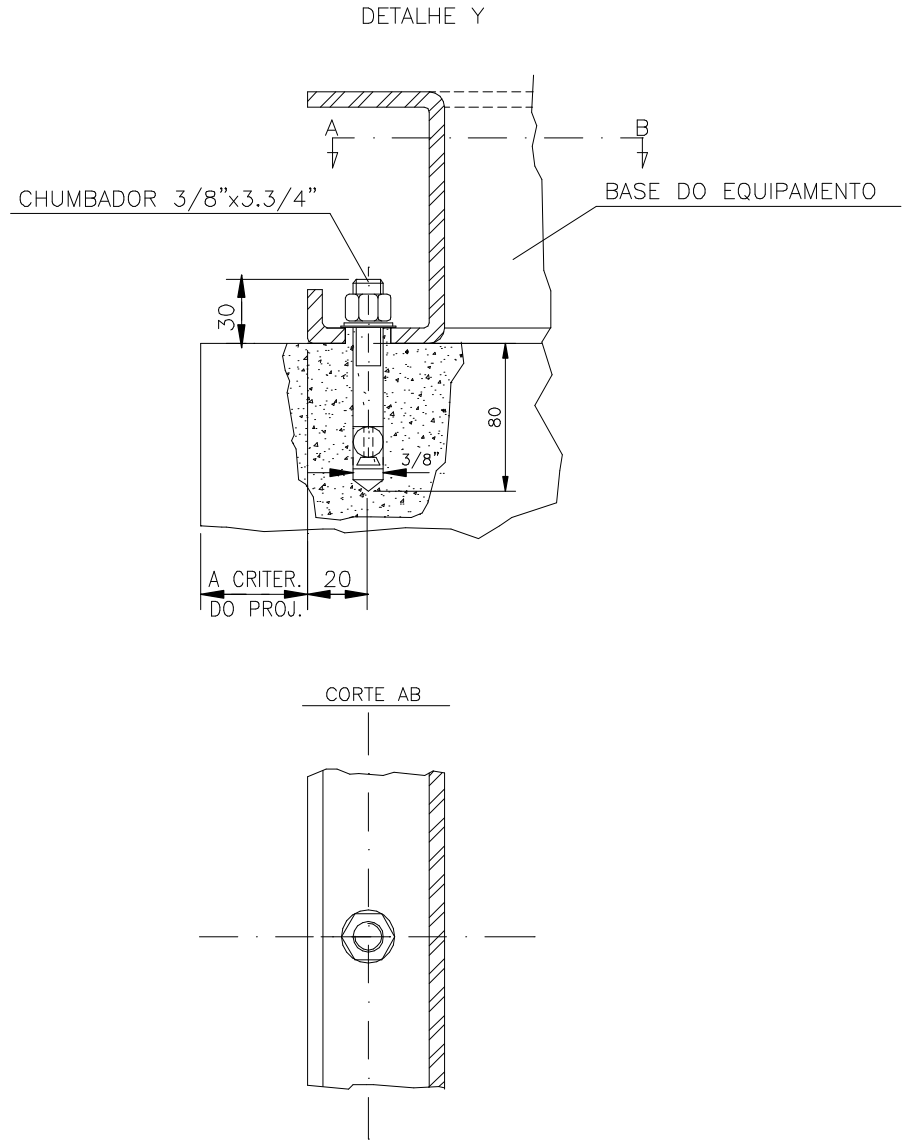
CAMPO: - Vcc - Acc
COMANDO: 220Vca 60Hz
lcc sim: - kA
GRAU DE PROTECAO: IP54
CLASSE DE TENSÃO: 0,6 kV

N.SERIE:
C.BARRA:

MOD. 0074 Rev. 07/97

						CLIENTE:		ALFA LAVAL LTDA						
								CENTRÍFUGA FESX-512		SAO PAULO BRASIL		AL		
								CFW090105T3848POP2TIZ		00		FL. 2		
								LAYOUT		DE 3 FLS.				
RLM	LOC	RESUMO DAS MODIFICACOES				EXECUTADO	LIBERADO	DATA LIBER.	INDICE	LIBERADO				
PRJ	PCP	PRC	MON							DATA LIBER.				

NOTAS: 1-RETIRADO DA NORMA TBG-269a.
 2-A CARGA DE TRACAO MAXIMA ADMISSIVEL POR
 CHUMBADOR, EM PISO DE CONCRETO, E DE 2800kgf.



MOD. 0074 Rev. 07/97

										=	+
										EXECUTADO VERIFICADO	<i>Charles</i>
										LIBERADO	<i>Kretzer</i>
RLM	LOC	RESUMO DAS MODIFICACOES			EXECUTADO	LIBERADO	DATA LIBER.	INDICE	LIBERADO	DATA LIBER.	
PRJ	PCP	PRC	MON								

CLIENTE: **ALFA LAVAL LTDA**

CENTRÍFUGA FESX-512

SAO PAULO BRASIL AL

CFW090105T3848POP2TIZ

SISTEMA DE FIXAÇÃO

00

FL. 3
DE 3 FLS.

MOD. 0074 Rev. 07/97

1	2		3		4		5		6		7		8	
QUANT.:					RELACAO DE MATERIAIS		EQUIPAMENTO:						00000000	
REFERENCIA	QUANTIDADE		ITEM	DESCRICAO										FABRICANTE
PLAQUETAS	1		10613463	- PLAQUETA DE ACRILICO CONFORME DESENHO 039140A/07-CP00 FOLHA 1/1, COM FUNDO AZUL MÉDIO - MUNSELL 7,5 PB 3/10, COM DESENHO BRANCO										FQ
KA101;KA102;KA103	3		10050745	BORNE RELE, ALIM.: 24VCC, COM RELE DE CONTATO DE POTENCIA, COD.: 38.51.7.024.0050										FINDER
S5	1		10046967	BOTAO EMERGENCIA, COM TRAVA GIRATORIA, COR VERMELHA, 2NA+2NF, PLAQUETA DE ADVERTÊNCIA APE, FLANGE DE 3 POSIÇÕES AF3, TIPO: CJ BEG+2BC11+AF3+APE										WEG
P/S5	1		10411836	GUARDA METÁLICA BAIXA PARA BOTÃO EMERGENCIA										WEG
S1	1		10045330	BOTAO PULSADOR 1NA+1NF, VERDE, TIPO: CJ BF2+BC11										WEG
S2	1		10045329	BOTAO PULSADOR 1NA+1NF, VERMELHO, TIPO: CJ BF1+BC11										WEG
P/IHM	1		10050233	CABO HMI REMOTA CFW-09 05M										TEC-MASTER
CANALETAS	5		10304551	CANALETAS 30X80mm (LARGURA X ALTURA), NA COR CINZA, ABERT.LAT.8P TIPO: HELADUCT HD 8P COM 2M										HELLERMANN
Q2	1		10412048	CHAVE SECCIONADORA TRIPOLAR SOB CARGA, 0,6KV, TIPO: XLP1 - 250A										ABB
CHUMBADOR	4		10416567	CHUMBADOR 3/8" x 3.3/4" TIPO: BP-995										FQ
M23;M24	2		10576014	CONJUNTO DE EXAUSTÃO VNW-250 AV-F 220V										WEG
M21;M22	2		10077682	CONJUNTO DE VENTILAÇÃO VNW-250 AV-F 220V										WEG
KA1;KA2	2		10045575	CONTATOR AUXILIAR 220V 60HZ TIPO: CAWM4.40										WEG
P/KA1;KA2	2		10409766	BLOCO ANTI-PARASITA TIPO: BAMRC6 130/250V 50/60HZ										WEG
P/KA1;KA2	8		10356473	BLOCO DE CONTATO NA TIPO: BCXMF10 1NA										WEG
A1	1		10587025	CONVERSOR DE FREQUÊNCIA MODELO: CFW090105T3848POP2TIZ										WEG
Q3	1		10409817	DISJUNTOR MOTOR MPW25 4,00-6,30A										WEG
Q1	1		10187177	DISJUNTOR TRIPOLAR TERMOMAGNETICO, Icu: 80KA EM 380V, 80KA EM 440V, 65KA EM 500V, IN:110A, TENSÃO NOMINAL 690VCA/250VCC, MANOPLA ROTATIVA NA PORTA COM EIXO DE 430MM, 1 CONTATO NAF, TIPO: DWA160L-110-3+430-1000										WEG
A2	1		10416703	FONTE DE ALIMENTACAO MONOFASICA, ENTRADA: 100-240V, 50/60HZ, SAIDA: 24V/2A, MODELO: PS-06										WEG
F1;F2;F3	3		10192307	FUSIVEL NH ULTRA-RÁPIDO 160A TIPO.: C320369										FERRAZ/LINDER
L1	1		10049802	INDUTOR A SECO, CORRENTE NOMINAL: 121ACC, INDUTANCIA: 321 uH, CORRENTE DE PICO: 168 ACC, CORRENTE RMS: 126A, CLASSE DE ISOLACAO: 0,6kv, IP-00, COM BARRA.										FQ
PAINEL	1			INVOLUCRO PARA PAINEL L39140A00										WEG
IHM	1		10413509	KIT PARA IHM-09 KMR-CFW-09										WEG
Q5	1		10045266	MINIDISJUNTOR MONOPOLAR TERMOMAGNETICO 16A 50/60HZ TIPO: MBW-C16										WEG
A60	1		10094211	MODULO DE ILUMINACAO										WEG
P/A60	1		10412063	LAMPADA INCANDESCENTE 220V/60W										FQ
A50	1		10054248	MODULO DESUMIDIFICADOR COM TOMADA, 220V, 50/60Hz, RESISTOR DE 50W, FUSIVEL DE 6A										WEG
MOLDURA	1		10304550	MOLDURA DE ALUMINIO COM VISOR DE POLICARBONATO, MODELO 2, ESPECIAL, AxL: 300X350mm										TASCO
**	1		10412190	PLAQUETA DE ACRILICO DE ADVERTENCIA CONFORME DESENHO 0500.7802										FQ
H1;H2;S1;S2	4		10192374	PLAQUETA TIPO: 17W										MURR
A	1		10192372	PLAQUETA TIPO: 20W										MURR
X16	1		10050765	RB039140A_01 - REGUA DE BORNES MONTADA, TAG.: X16										CABUR
RL1	1		10075636	RELÉ PTC RPW PTC 24-240V CA/CC										WEG
X10	1		10614093	RÉGUA DE BORNES MONTADA, TAG: X10										CABUR
X11	1		10612842	RÉGUA DE BORNES MONTADA, TAG: X11										CABUR
H2	1		10046349	SINALEIRO DIFUSO ALIM. 187-242VCA COM LED AMARELO TIPO: CJ SD3+BIDL220VAC 3										WEG
H1	1		10046343	SINALEIRO DIFUSO ALIM. 187-242VCA COM LED VERMELHO TIPO: CJ SD1+BIDL220VAC 1										WEG
T;T	2		10185878	TAMPAO REDONDO; 22,5MM; TIPO: ATR										WEG

										=		+		CLIENTE:	
										EXECUTADO		Charles		ALFA LAVAL LTDA	
										VERIFICADO		Kretzger		CENTRIFUGA FESX-512	
										LIBERADO				SAO PAULO BRASIL	
										DATA LIBER.				AL	
RESUMO DAS MODIFICACOES										EXECUTADO		LIBERADO		FL. 1	
PRJ PCP PRC MON										DATA LIBER.				DE 3	



00

MOD. 0074 Rev. 07/97

	1	2	3	4	5	6	7	8
	QUANT.:			RELACAO DE MATERIAIS	EQUIPAMENTO:			0000000
A	REFERENCIA	QUANTIDADE	ITEM	DESCRICAO				FABRICANTE
	P1	1	10304552	TOTALIZADOR DE HORAS ELETROMECHANICO, 220Vca, 60Hz, MOD: DH				COEL
	T1	1	10416618	TRANSF. MONOF. RELIGAVEL, RELACAO: 220/380/440/460/480-110/120/220/240V, POTENCIA: 550VA, 0,6KV, 50/60HZ, REF.: TP550 (CONFORME NORMA TES-329AU)				FQ
B								
C								
D								
E								

		=		+		CLIENTE:							
		EXECUTADO		Charles		ALFA LAVAL LTDA							
		VERIFICADO		Kretzer		CENTRIFUGA FESX-512							
RLM	LOC	RESUMO DAS MODIFICACOES				EXECUTADO	LIBERADO	DATA LIBER.	INDICE	LIBERADO	DATA LIBER.	SAO PAULO BRASIL AL	
PRJ	PCP	PRC	MON									00	FL. 2
													DE 3



1 2 3 4 5 6 7 8

A



ATENÇÃO:

NÃO CASO DE EQUIPAMENTOS COM CONVERSORES, RECOMENDAMOS CUIDADOS ESPECIAIS NA INSTALAÇÃO DA FIAÇÃO DE SINAIS ELETRÔNICOS (BLINDADOS E/OU < 24V) COM RELAÇÃO A INTERFERÊNCIAS ELETROMAGNÉTICAS. AS MESMAS DEVERÃO ESTAR SEPARADAS DAS FIAÇÕES DE FORÇA/COMANDO. VER INSTRUÇÕES ESPECÍFICAS NO MANUAL DO CONVERSOR.

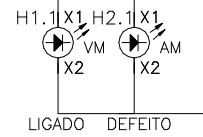
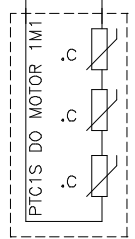
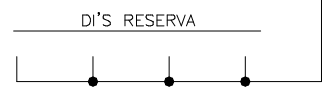
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ITEM: 10614093

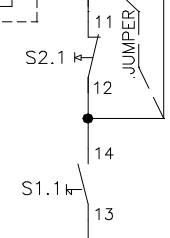
* SFR.4/6+FU 1A 250V

REGUA.:X10	FOLHA DO ELÉTRICO	6		RESERVA			3			3			2														
	TIPO	HMM.2/4										*	HMM.2/4														
	BITOLA mm²	1					1			0.750		1															
	JUMPER	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	BORNE N°	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19							

24Vcc 0Vcc



LIGADO DEFEITO



ATENÇÃO:

VERIFICAR A TENSÃO DE ALIMENTAÇÃO PARA QUAL ESTE ACIONAMENTO DEVERÁ SER AJUSTADO. VER FOLHAS 1 E 3 DO DIAGRAMA ELÉTRICO



ALIMENTAÇÃO 3 ~ 60Hz 380V/440V

MOD. 0074 Rev. 07/97

RESUMO DAS MODIFICAÇÕES										EXECUTADO			LIBERADO			DATA LIBER.			INDICE			LIBERADO			DATA LIBER.			CLIENTE: ALFA LAVAL LTDA			CENTRÍFUGA FESX-512			SAO PAULO BRASIL			AL			FL. 1			DE 3 FLS.				
RLM		LOC		PRJ		PCP		PRC		MON																																					
EXECUTADO																								Charles			VERIFICADO			Kretz			CFW090105T3848POP2TIZ			RÉGUA DE BORNES			00			FL. 1			DE 3 FLS.		

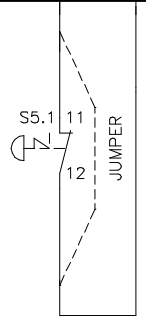
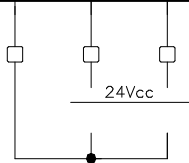
1 2 3 4 5 6 7 8

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ITEM: 10614093

*SFR.4/6+FU 1A 250V

REGUA::X10	FOLHA DO ELETRICO	5										6						5	1			
	TIPO	*	HMM.2/4					*	HMM.2/4					*	HMM.2/4		HMM.2/4					
	BITOLA mm ²	0.750	1					0.750	1					0.750	1		0,5					
	JUMPER	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	BORNE N°	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40



C

ITEM: 10614093

REGUA::X10	FOLHA DO ELETRICO	RESERVA																				
	TIPO																					
	BITOLA mm ²																					
	JUMPER	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
	BORNE N°	42	43	44	45	46	47	48														

D

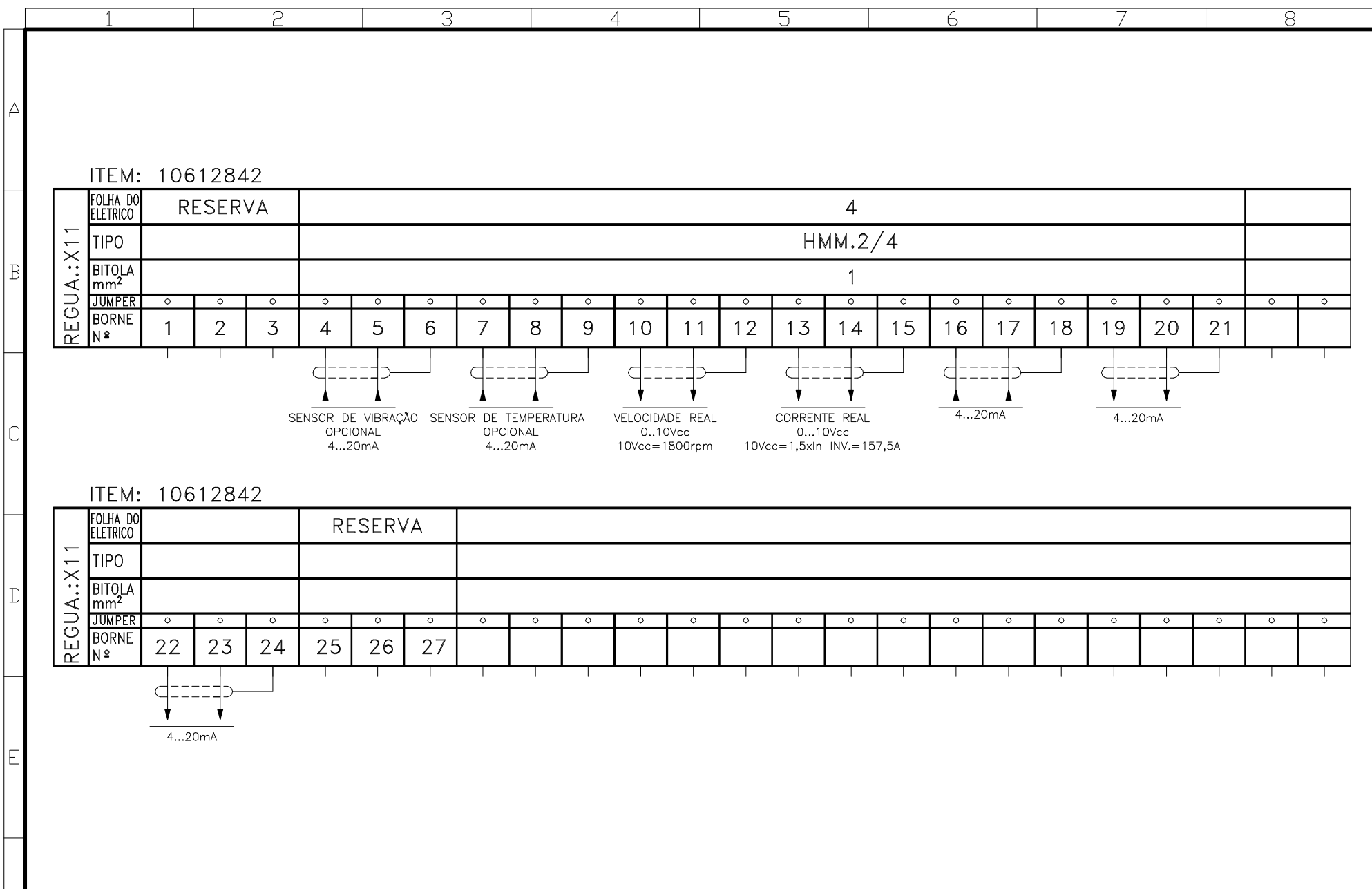
E

F

MOD. 0074 Rev. 07/97

RLM	LOC	RESUMO DAS MODIFICACOES										EXECUTADO	LIBERADO	DATA LIBER.	INDICE	LIBERADO	DATA LIBER.		
PRJ	PCP	PRC	MON																
															EXECUTADO	Charles			
															VERIFICADO	Charles			
															LIBERADO	Kretzer			
															DATA LIBER.				

CLIENTE:	ALFA LAVAL LTDA			
	CENTRIFUGA FESX-512		SAO PAULO BRASIL	AL
CFW090105T3848POP2TIZ	RÉGUA DE BORNES		00	FL. 2
				DE 3 FLS.



ITEM: 10612842

REGUA::X11	FOLHA DO ELETRICO	RESERVA																					
	TIPO																				4		
	BITOLA mm ²																				HMM.2/4		
	JUMPER																				1		
BORNE N°	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21		

ITEM: 10612842

REGUA::X11	FOLHA DO ELETRICO	RESERVA																					
	TIPO																						
	BITOLA mm ²																						
	JUMPER																						
BORNE N°	22	23	24	25	26	27																	

MOD. 0074 Rev. 07/97

RLM		LOC		RESUMO DAS MODIFICACOES								EXECUTADO		LIBERADO		DATA LIBER.		INDICE	
PRJ	PCP	PRC	MON																

CLIENTE:		ALFA LAVAL LTDA		 	
		CENTRIFUGA FESX-512			
		SAO PAULO BRASIL		AL	
		CFW090105T3848POP2TIZ		00	
		RÉGUA DE BORNES		FL. 3 DE 3 FLS.	

1	2	3	4	5	6	7	8
QTDE: xx	CONJUNTO DE PLAQUETAS DE ACRILICO				FABRICAR CONFORME NORMA TBG-480AU	CODIGO N.º 10613463	

A

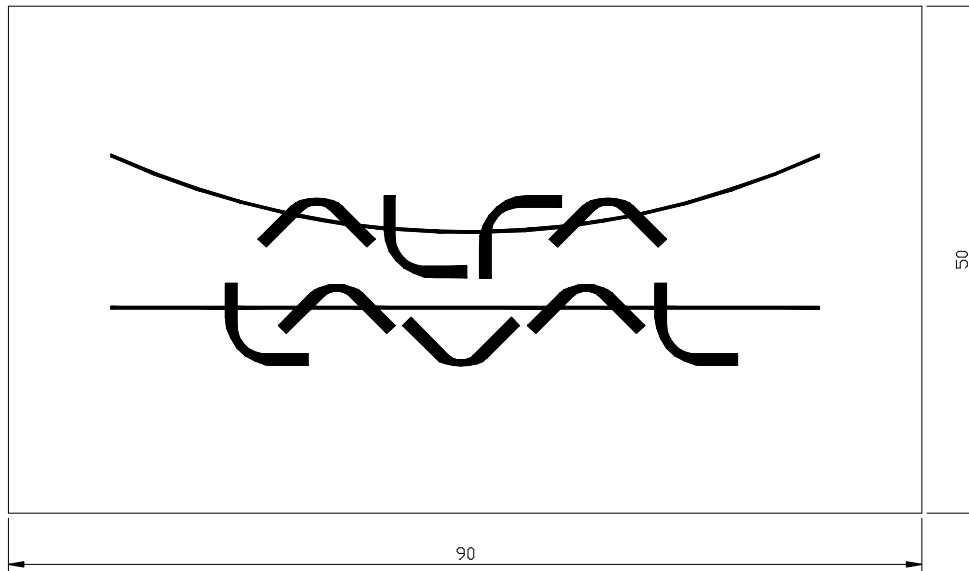
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D

E

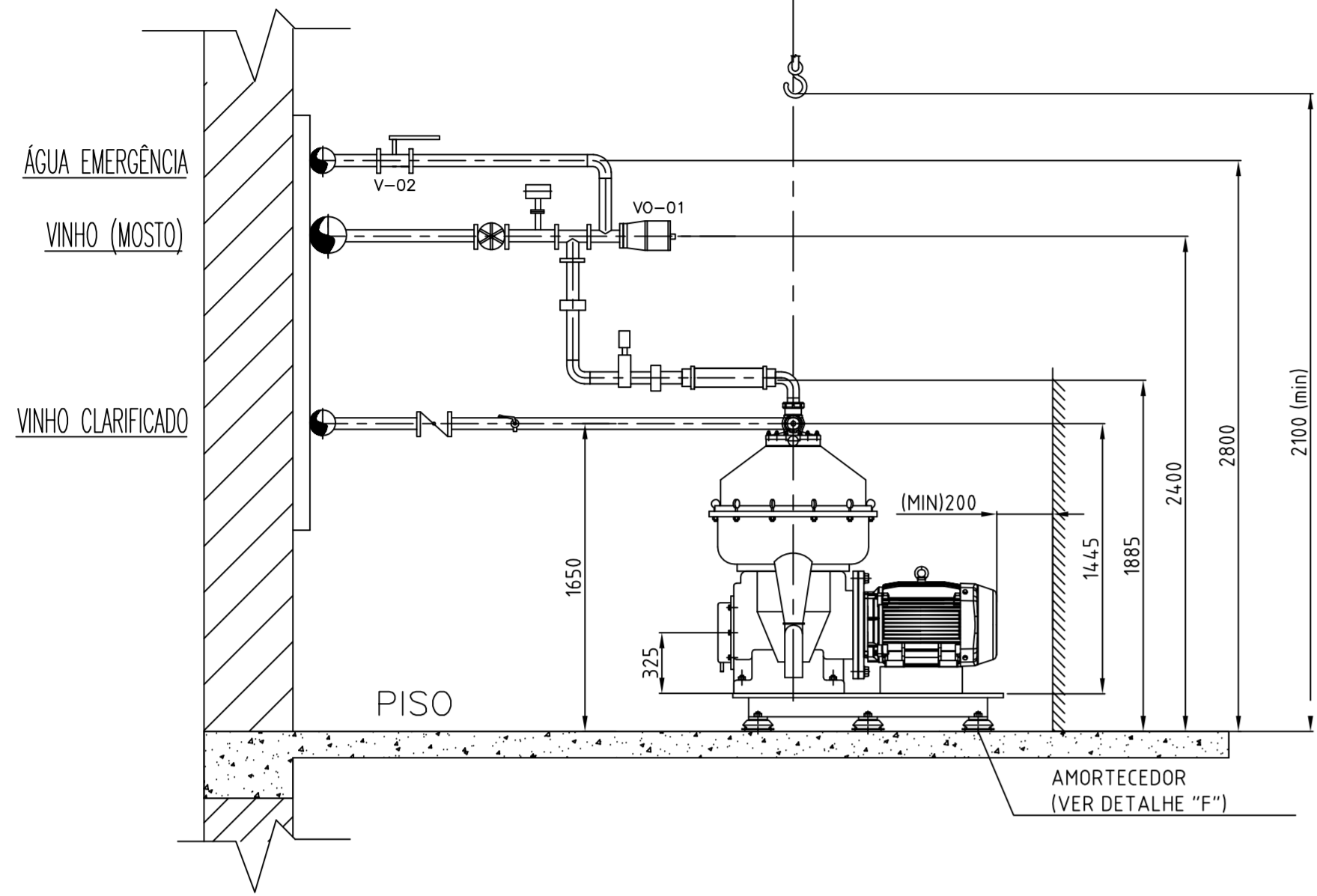
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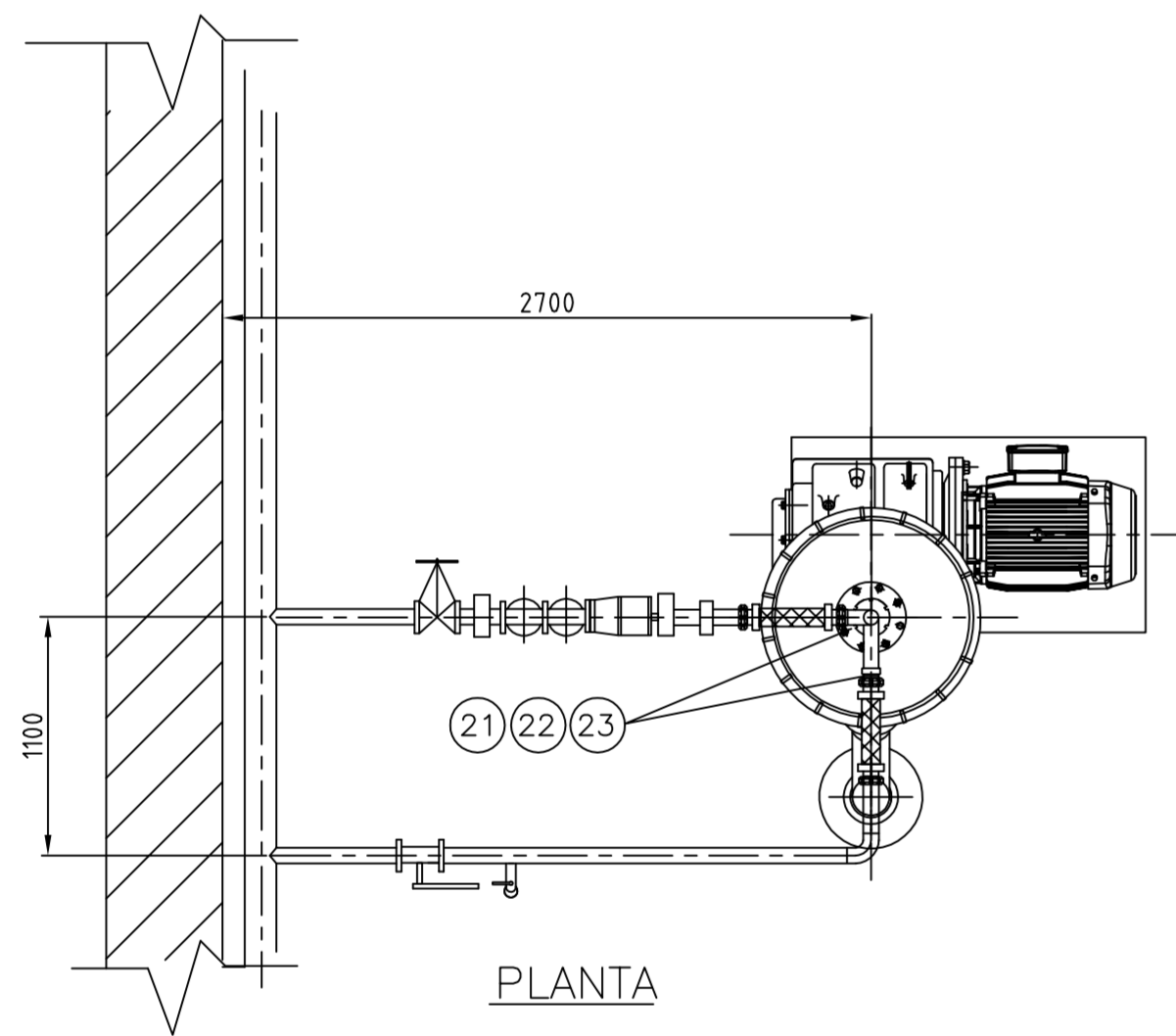
FUNDO: COR AZUL MÉDIO - MUNSELL 7,5 PB 3/10
DESENHO: COR BRANCA

MOD. 0074 Rev. 07/97

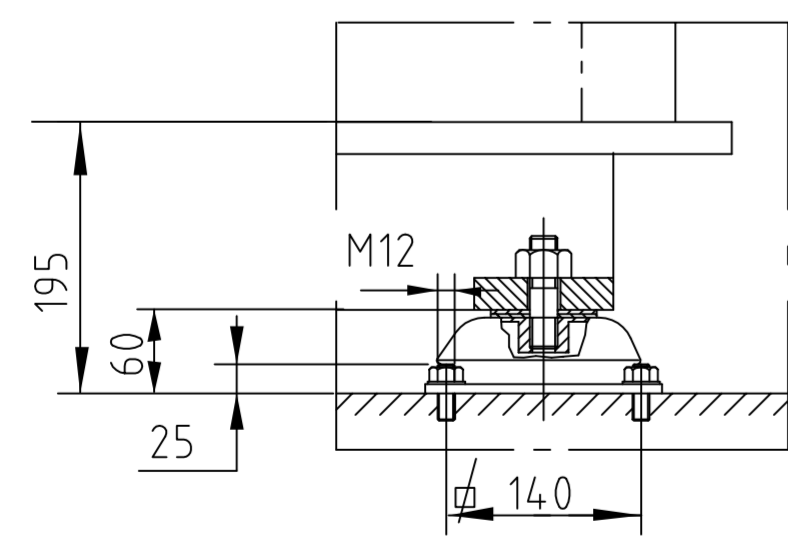
										=		+		CLIENTE:		ALFA LAVAL LTDA							
										EXECUTADO		Charles		CENTRÍFUGA FESX-512		SAO PAULO		BRASIL		AL			
										VERIFICADO		Kretzer		CFW090105T3848POP2TIZ		00		FL. 1					
RESUMO DAS MODIFICACOES										EXECUTADO		LIBERADO		DATA LIBER.		INDICE		LIBERADO		DATA LIBER.		DE 1 FLS.	
RLM	LOC									PRJ	PCP	PRC	MON										



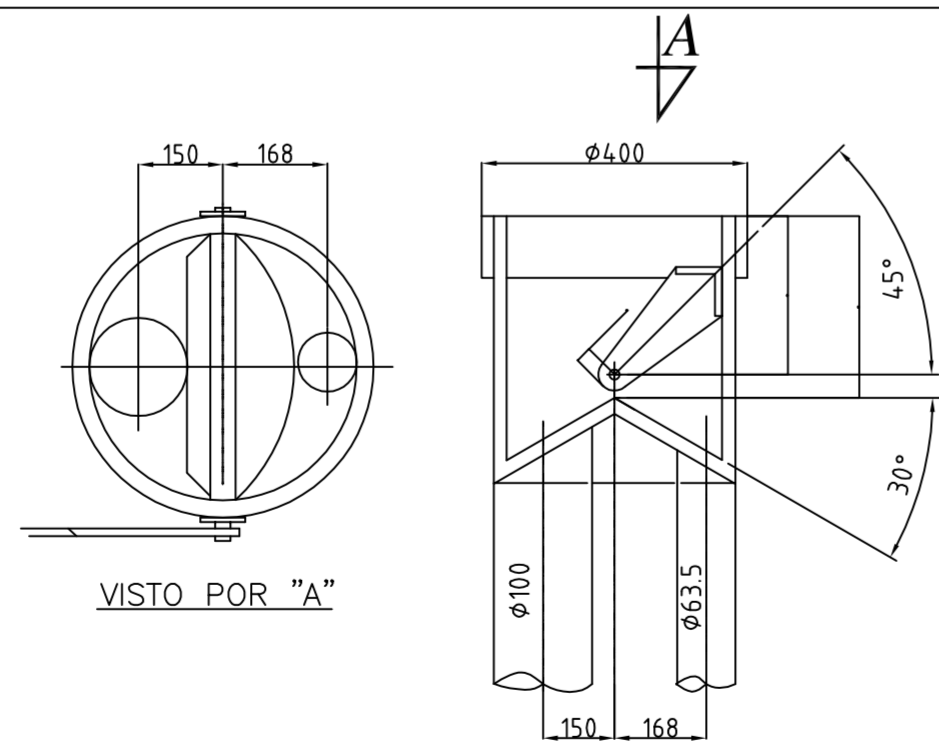
ELEVAÇÃO



PLANTA

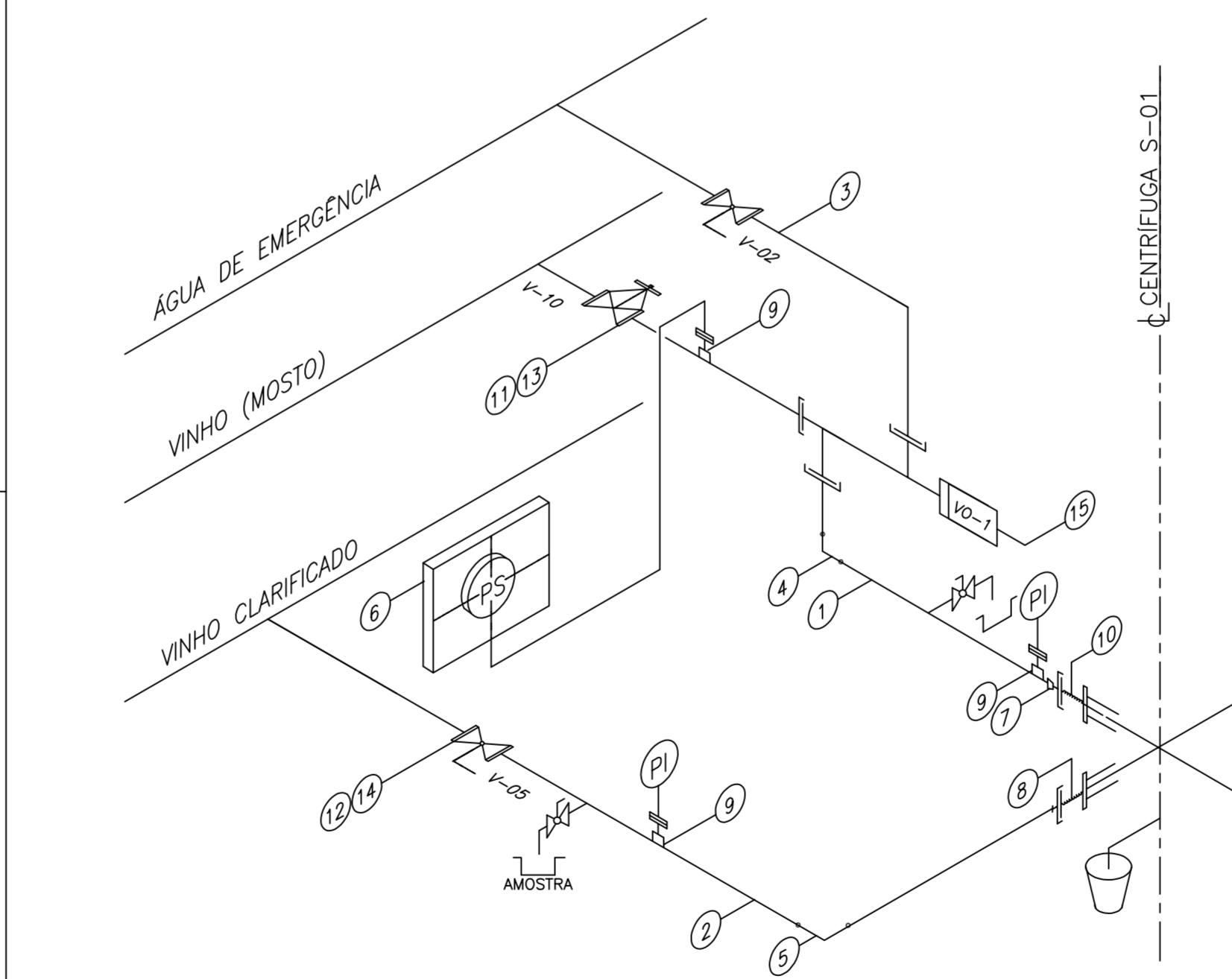


AMORTECEDOR (DETALHE "F")

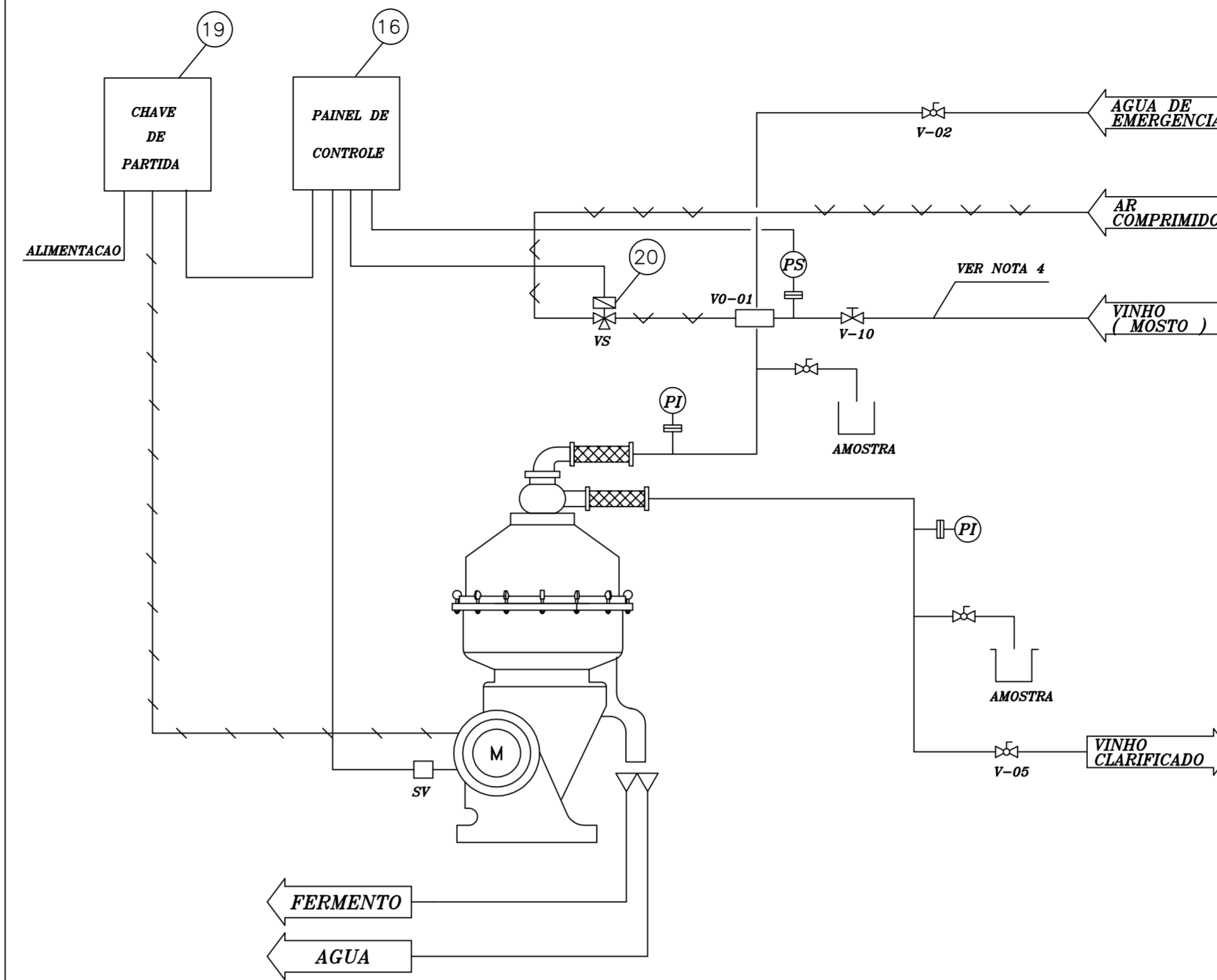


FUNIL (FORNEC. DO CLIENTE)

FLUXOGRAMA



ISOMÉTRICO



NOTAS:

- 1 Válvula SIGMA modelo Ø3" com flange ANSI B-16.5 150# com diafragma em "HIPALON" (p/ REG. VAZÃO V-10) "OMEL" ou similar
- 2- Manômetro Ø100 escala de 0 a 4 kgf/cm21 c/selo e diafragma Ø1/2" NPT
- 3- Válvula Borboleta Ø2 1/2" entre flanges cl acionamento manual, corpo de ferro nodular, eixo e disco INOX 316, carretel de vedação em "HIPALON" (V-05) Permanentemente aberta.
- 4- A pressão neste ponto deverá ser 14 mCA mín. (entr. de vinho)
- 5- Vazão através da linha de água de emergência: 20 m3/h, capacidade do tanque de água de emergência: 10 m3 por máquina (só para emergência) diferença mínima entre o fundo do tanque e bocal de entrada da máquina: 5 metros
- 6- Instalação nominal dimensionada: 95 m3/h
- 7- SV- sensor de vibração (opcional)
- 8- Deverá ser previsto sistema de manutenção do nível da água de emergência no tanque permanentemente
- 9- Itens 17,18 e 19 definidos pelo projeto e sendo fornecido com a centrífuga
- 10- Válvula V01: NF no vinho e NA na água.
- 11- Opcionalmente o painel de controle poderá ser fornecido com partida por soft-start ou estrela triângulo, alterando nestas condições a carcaça do motor
- 12- Válvula Borboleta Automatica V-04 Deve ser NA.

LEGENDA:

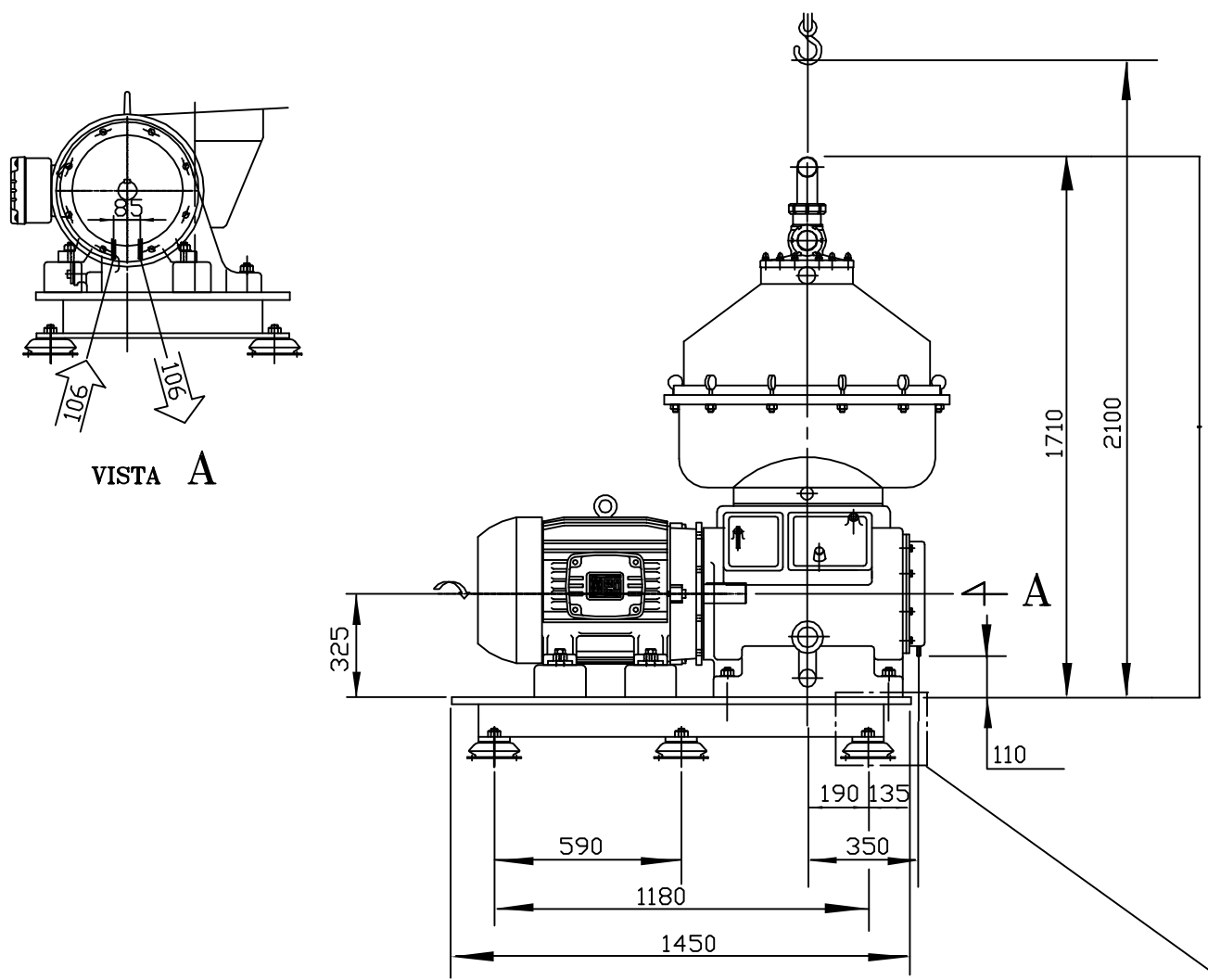
- Linha de Ar Comprimido
- Linha Elétrica de Controle
- Linha Elétrica Monofásica

23	2	191005	MACHO SMS 2 1/2"
22	2	190617	PORCA SMS 2 1/2"
21	4	190605	ANEL DE VEDAÇÃO SMS 2 1/2"
20	1	7957901-02	VALVULA SOLENOIDE #1/4" NPT 3 VIAS APDE
19	1	7958158-80	CHAVE DE PARTIDA VFD
18	-	-	-
17	-	-	-
16	1	7958200-80	PAINEL DE CONTROLE P/ AGUA DE EMERGENCIA
15	1	0381C3522U	V0-1 VALV. PNEUM. SRC-SMS-76-21-20 3M SMS G/ UNIÃO COMPLETA
14	2	-	PESTANA #63.5 mm INOX AISI 304
13	2	-	PESTANA #76 mm INOX AISI 304
12	2	-	FLANGE #65 DN 16 DIN 2633
11	2	-	FLANGE #80 DN 16 DIN 2633
10	1	7913272-08	MANGUEIRA TRANSPARENTE ESPIRAL L: 435 mm
9	3	-	LUBA # 1/2"NPT INOX AISI 304
8	1	7913272-08	MANGUEIRA TRANSPARENTE ESPIRAL L: 435 mm
7	1	7916365-07	REDUÇÃO CONCENTRICA #76x63.5 mm
6	1	757203136	PRESSOSTATO 0 A 5 kgf/cm2 BSP 3/4" APDE
5	1	7592138-01	CURVA #63.5 mm
4	1	7592185-01	CURVA #76 mm
3	-	-	TUBO #2" SCH.40 ASTM A120
2	-	1535530-010	TUBO #63.5 mm
1	-	1535530-038	TUBO #76 mm

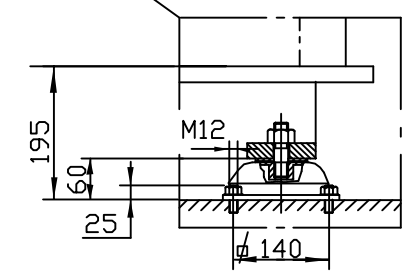
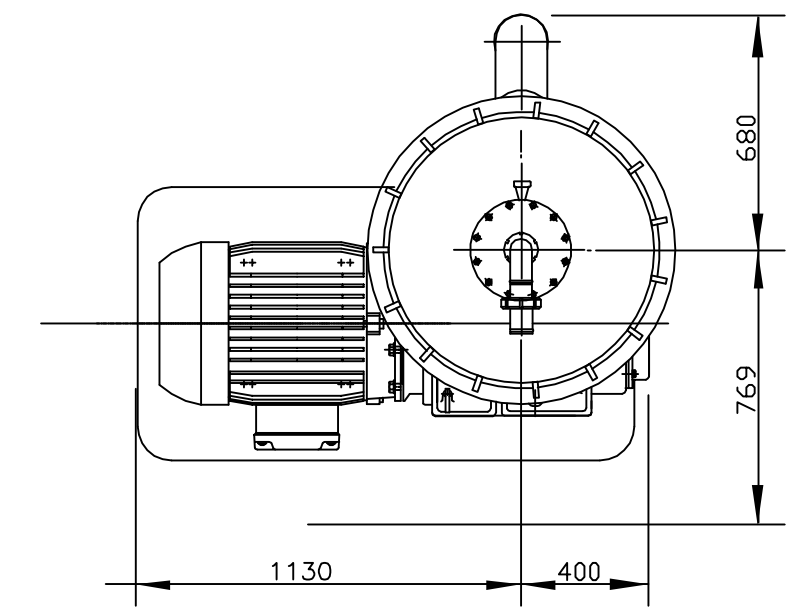
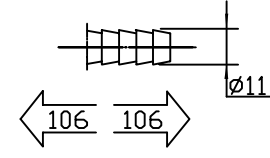
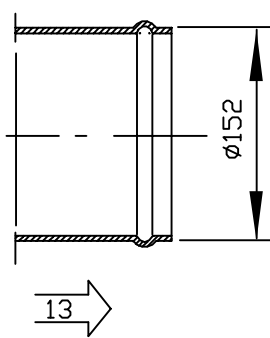
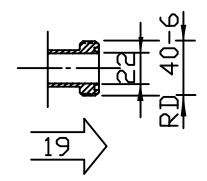
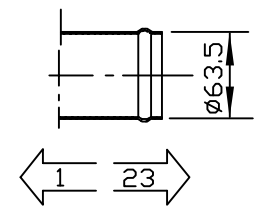
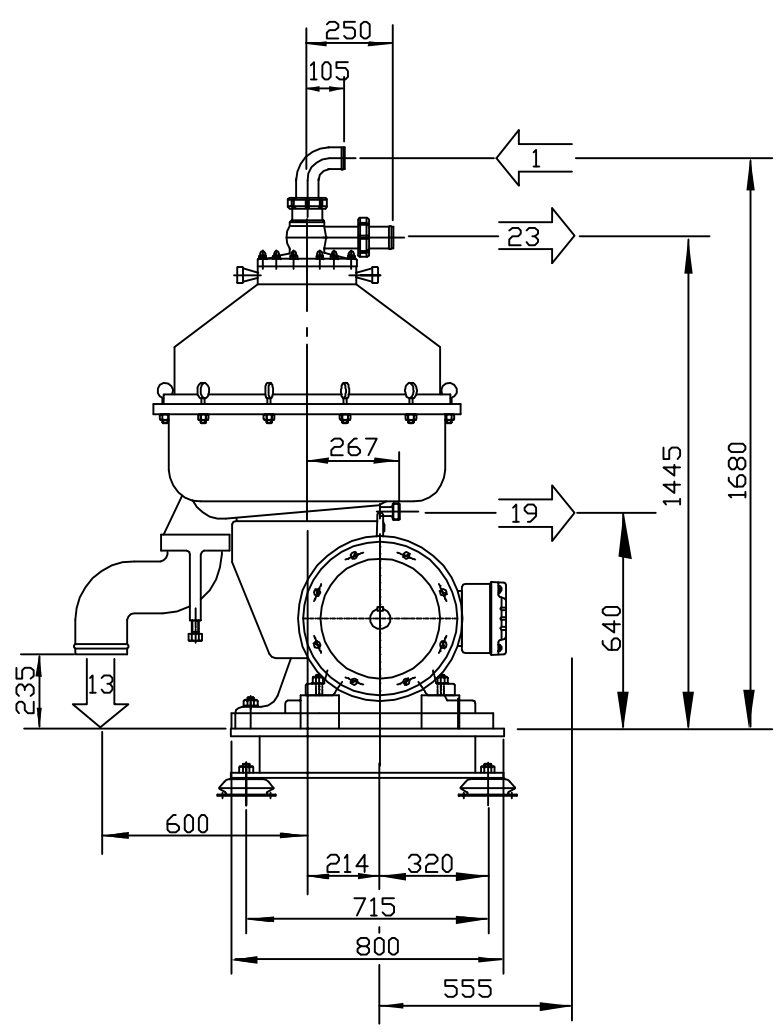
Item	Qte	ARTIGO NUMERO	NOME / DESIGNACAO	MATREM BRUTO	MODELO N°	/NOTA			
Rev No		Revision text				Date	Drawn	Checked	Approved
KIT DE EMERGENCIA (OPCIONAL) FORNECIMENTO DO CLIENTE 75720696 7958158-80									
Title: DESENHO DE INSTALAÇÃO FESX 512S 35C									
Proj. No		Proj. Type	Proj. Name						
-		PLS.	PADRÃO						
Dimensions without tolerances: ISO 2768-M or ISO 13920-B Size A1 Location Alfa Laval Brasil									
Date	05.05.08	Drawn	STEVE	ISO method E	Scale	1:30	Drawing No	7950555 06	
Checked	W.M.	Approved	W.M.	Sheet					

Rev N°	Revisao/Revision	Data Date	Revisado Revised	Contr Checked	Aprovado Approved
01	Cancela e substitui com data 12/03/86	18/10/90	V.R.S.	L.R.R	-
02	Revisão geral	25/06/91	L.R.R	RAMOS	-
03	Revisão geral e substitui para documento eletrônico	05/12/02	A.C.F	A.C.F	R.M
04	Alteração no conjunto da água de emergência	11/03/04	A.C.F	A.C.F	R.M
05	Inclusão da Valv.schut off na água de emergência	06/05/05	F.M.	W.M.	W.M.
06	Alt. da legenda e o des. da maquina	05/05/08	W.M.	W.M.	W.M.

Only to the extent expressly permitted by law, the information contained herein may constitute a contractual obligation on our part.



VISTA A



DIBUJOS VALIDO PARA SEIS (6) EQUIPOS
 Nº FABRICACION
 4158419
 4158420
 4158421

SUMINISTRO

- MOTOR ELECTRICO EXD - 440V
- PANEL DE LA PARTIDA COM INVERSOR DE LA FRECUENCIA WEG
- JUEGO DE LA HERRAMIENTAS ESPECIALES
- 3 JUEGOS EXTRA DE BOQUILHAS POR EQUIPOS

IDENTIFICACIÓN DE ENTRERROSCAS Y DE PRODUCTOS	
1	ALIMENTACION
13	SALIDA DE LA LEVADURA
19	VENTILACION
23	SALIDA DEL CALDO CLARIFICADO
106	AGUA DE ENFRIAMENTO

REEMPLAZO DIBUJO NR: Replaces drawing N°	Reparar/Revision	Data Date	Reparar Revised	Contr Checked	aprobar Approved
Rev N°					

CAPACIDAD HIDRAULICA: 95 m ³ /h	CONTENIDO NETO: 1950 kg	ESCALA 1:10
MODELO: FESX 512S 35C C/ MOTOR APDE 440V		
PI.NR. 270.923/08	ITEM NR. 01	DATA 20/03/08 DES. BRUNO CONTR. F.B. APROV. R.M.
CLIENTE: UNI-SYSTEM DO BRASIL LTDA		NUMERO DE FABRICACION MIRRAR FACTURA REEMPLAZO DIBUJO NR: DIBUJO REPASSO 00. 7952006

CERTIFICADO DE TESTE DE CENTRIFUGAS



Equipamento novo <input checked="" type="checkbox"/> SIM		Equipamento reformado/conserto <input type="checkbox"/>								
Modelo: FESX 712BX 35 C		Data: 12-03-09	Nº da MO: 0150400	Nº P.I: 0270923						
Cliente: UNI SYSTEMS		Aplicação:		TAG-6001-B						
Nº de Série: 4158420		Montada como: Purificadora ? Concentradora ? Clarificadora ?								
Tempo teste	Nº discos	Liq. Teste	Temperatura (°C)	Desvio Eixo Rotor						
2 HORAS	82	AGUA	Ambiente	0,02						
Alt. Eixo Rotor	Alt. Disco Imp.Desc	Alt. Rotor	Diam Anel Nível	Diam. Disco Grav						
51,5	-----	-----	-----	-----						
MOTOR										
Marca	Tipo	Potência (cv)	Nº Série	Tensão (V)	Corrente (A)	Frequência (HZ)	R.P.M.	Isolam.	Prot.	
WEG	225 S/M	55(75)	1003651049	220/380/440	176/102/88	60	1775	H	IP55	
*BOMBA										
Marca	Tipo	Potência (cv)	Nº Série	Tensão (V)	Corrente (A)	Frequência (HZ)				
-----	-----	-----	-----	-----	-----	-----				
DESEMPENHO E PERFORMANCE										
Pontos	1	2	3	4	5	6	MAX _____ mm/s (RMS mm/seg)			
<i>Após a partida</i>	3,3	5,9	1,2	2,5	0,5	1,8				
<i>Após 60 minutos (com produto)</i>	4,1	4,2	2,7	2,1	0,6	1,7				
<i>Após giro de 90º no rotor (com produto)</i>	4,1	6,4	2,8	2,2	0,6	2,3				
<i>Após 120 minutos (termino)</i>	4,5	5,8	2,5	1,9	0,6	1,8				
PARTIDA DO EQUIPAMENTO ATRAVES DE:										
Painel de Teste (inversor ou direta)	X	Painel da separadora (somente para transformação ou novos)		Inversor		Horímetro		Inicial		
				Soft - starter				Final		
				Estrela/Triângulo		Fabricante do painel:				
PRODUÇÃO										
Contra - Pressão (bar)	Rotação do Motor (rpm)		Contagiro (rpm)		Corrente (A)		Tensão (V)			
	1775		150		54,8		440			
Tempo de partida (seg)	Tempo Parada c/ Freio (seg)		Tipo de óleo utilizado			Vazão (m³/h)				
APÓS TESTE			BALANCEAMENTO							
Teste Mecânico			Rotor completo		Plano 1		Plano 2			
Sist. Freio					Ângulo	Massa (g)	Ângulo	Massa (g)		
Flanges Tubul.										
Inspeção Visual			Balanceamento realizado por:				Data:			
Coroa			MONTAGEM							
Pinhão			Montagem realizada por:				Data:			
Nº DE CORRIDA										
EIXO VERTICAL	PINHÃO	COROA	ESTRUTURA	C. ROTOR – TAMPA ROTOR		DISTRIBUIDOR	A. FECHAMENTO	A. PEQUENO		
R3681		R3749	SR214	AVW.10993 -- AGW 3437		R3513	AZW0805			
Teste realizado por:			Responsável /Setor			Inspetor Cliente				
						Nome:				
						RG ou matricula				
Observações:										