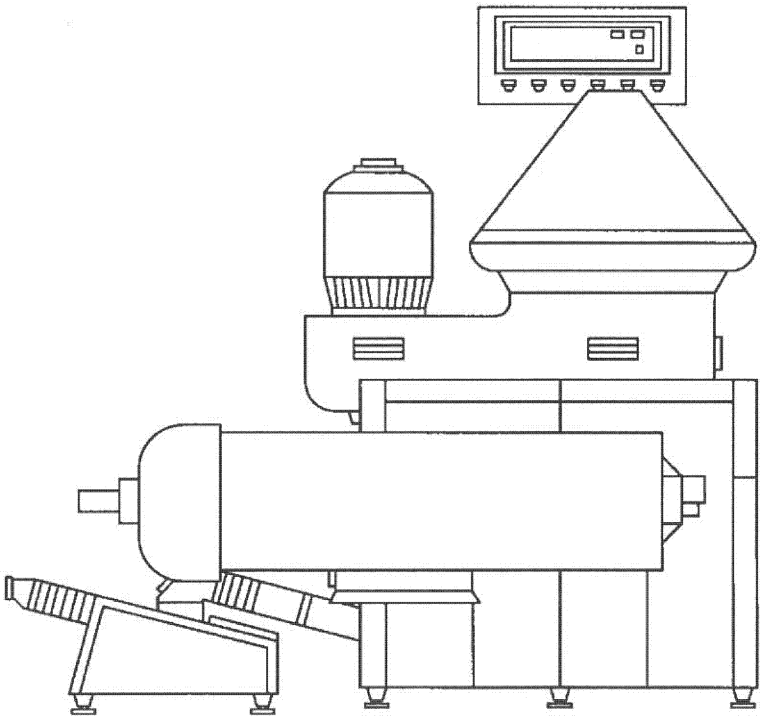
Instruction manual

No. 3398-9001-050 | Edition 0812



TRANSLATION OF ORIGINAL INSTRUCTION MANUAL
Subject to modification!

The authors are always grateful for remarks and suggestions for improving the documentation. These can be sent to:

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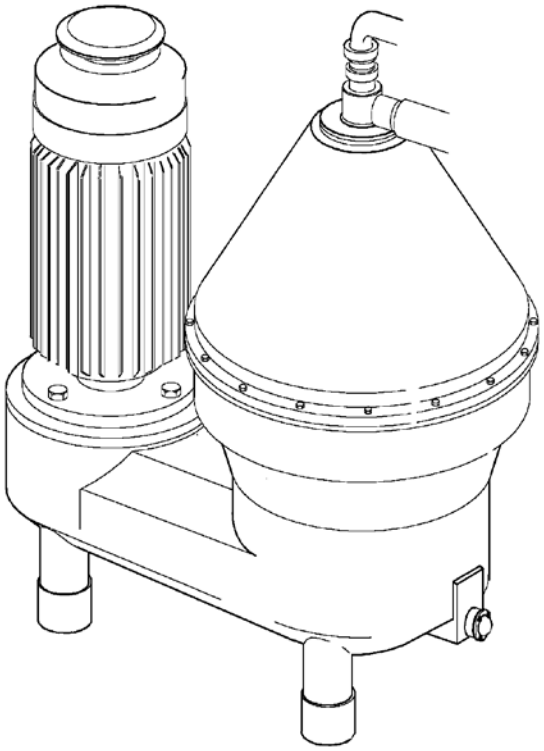

Fig. 1

GEA Mechanical Equipment
GEA Westfalia Separator Group GmbH
Werner-Habig-Straße 1, 59302 Oelde, Germany

Type		S/N:	
Year of manufacture			
Max. permissible rated bowl speed in rpm			
Max. permissible density of product in kg/dm^3			
Heavy liquid kg/dm^3		Solids kg/dm^3	
min/max throughput m^3/h			
min/max temp. of product in °C			
min/max housing pressure range in bar			

This nameplate must be filled in by the operator.
Please transfer the data from the centrifuge nameplate.

1 Fundamentals of the separator documentation

1.1 Information on content, language and user groups

Allocation of the information to the separator user groups.

The safety precautions must always be available to all persons involved in planning, installation, operation, maintenance and decommissioning and disposal of the separator. All these persons as well as the persons who assign such work must read, understand and observe such information for safety reasons.

The further information in the separator documentation is not equally important for all persons. How important the information is for the individual groups of persons depends on their field of activity.

The information on separator controls, for example, is intended for persons who plan, build or order a control system. It must be kept in mind that only adequately qualified personnel are allowed to carry out this work.

An adequate qualification always depends on the respective field of activity. For example, specialist knowledge is required for transport, maintenance and the operation of the separator in the respective field. Refer also to the notes on qualification of the personnel.

Depending on the field of application of the separator, parts of the documentation may be very important or without relevance. One example of this are the instructions relating to separators operating in explosion-hazarded areas. They are only relevant when the separator is operated in explosion-hazarded areas.

The order-specific parts list can be used for reliable identification of the separator components and as an illustrated terminology list.

All information in the documentation is initially prepared in German. The different national languages are always translations of the German original texts. For some auxiliary parts, it may be the case that no fitting instructions are available in the national language. In such cases, assembly work on the auxiliary elements is not admissible. Work on such components may only be carried out by persons specifically trained for this. In addition to an extensive specialist knowledge, adequate language skills are required. Trained and commissioned specialist personnel from Westfalia Separator meet the required conditions.

1.1.1 The aim of the separator documentation

The following information is suitable for avoiding damage to persons, machines, material and environment.

The persons occupied with the separator are supported in carrying out fundamental work on the separator. The admissible work to be carried out on the separator has been narrowed down to such an extent that safe operation of the separator is possible.

In this respect, Westfalia Separator is reliant on the cooperation of the plant operator.

Only in this way is it possible:

- That only adequately qualified personnel carry out the diverse tasks on the separator.
- That the documentation is kept and forwarded on when the separator is sold.
- That necessary supplements which arise from product observation are maintained.

Further information

If further information is required on the topics in this documentation, it can be requested from the following sources:

- Direct from Westfalia Separator in Oelde.
- From your local GEA and Westfalia Separator representative.
- Per Internet under: www.westfalia-separator.com
- Per e-mail under: Info@gea-westfalia.de

1.1.2 Structure and meaning of the safety precautions

Type and source of risk.

Possible consequences of disregarding the warnings.

– Measures for danger prevention.

Signal word

The signal word indicates a dangerous situation and its potential.

DANGER

Indicates an imminently dangerous situation which, if not prevented, will result in serious injury or death.

WARNING

Indicates a potentially dangerous situation which, if not prevented, could result in serious injury or death.

CAUTION!

Indicates a potential situation which, if not prevented, could cause slight or moderate injury.

NOTE

Indicates a situation which, if not prevented, represents a risk for machine, material and environment.

Important supplementary information.

Refer to supplementary manuals.

1.1.3 Safety rules for operating a separator

Assign only adequately trained and competent personnel with operation, maintenance and repair of the separator.

Before every start-up, ensure that all parts are fitted, completely mounted and that all connections on and around the separator are secure and tight.

Never use the separator for a purpose other than the intended and correct purpose.

Never operate the separator at a speed higher than that specified on the nameplate (rating plate).

Never ignore or acknowledge an alarm without first eliminating the cause.

Never start-up or shut-down a partially filled bowl due to the risk of unbalance.

Never loosen any part before the separator has come to a complete standstill.

- Switch off the separator before carrying out maintenance or repair work.
- Wait and check that all rotating parts are really at a standstill.
- Switch off the main switch and lock the machine to prevent it from accidentally being switched back on.

When unusual noises and / or vibrations occur, shut down the separator via “Emergency Stop” and evacuate the room.

- In these cases, never trigger an ejection.

Never heat the bowl and bowl parts with a naked flame during dismantling.

- Welding on the bowl and bowl parts is strictly prohibited.

It is prohibited to weld or machine hoods and catchers.

- The hood and solids catchers of steam-sterilizable separators are pressure vessels.

Shut down the separator immediately when damage caused by corrosion or erosion is detected on the bowl.

Adjust the disk pressure as specified in the documentation.

- An incorrect disk pressure can lead to severe unbalance.

Have the separator checked by competent, qualified personnel at least once a year in operating state and at least every 3 years in dismantled state.

Do not carry out conversions or modifications to the separator.

When working on the separator or with dangerous operating materials, always wear suitable protective gear.

Operating the separator with hot products leads to hot surfaces of hood, solids catcher and surrounding piping.

- Danger of burns.

Always flush the separator after chemical cleaning (CIP).

Regularly clean the separator, nozzles and ejection system.

- This prevents malfunctions.
- Regularly check concentrate nozzles for damage to nozzle stones and soldered joints.
- Replace damaged nozzles immediately.

Use only genuine spare parts from Westfalia Separator.

Ensure that the user information is available at all times.

Ensure that all sections of the user information, particularly the safety precautions, have been read and understood.

- Before all work on the separator.
- Before starting the separator.

Ensure that all sections of the user information, particularly the safety precautions, are applied.

1.1.4 Qualification of the personnel

Working on and with separators requires specialist knowledge.

Train and brief personnel especially for the following tasks:

- Operation, maintenance, repairs.

Clearly define responsibilities.

- Work on the separator only by commissioned and authorised personnel.

DANGER

Storage, transport, installation, operation and repair of the separator by inadequately trained personnel.

Faulty operation, assembly and handling errors can cause major damage.

- Use the service provided by GEA Westfalia Separator.
- Use basic and advanced training offers.

Westfalia Separator offers a comprehensive range of training measures.

Required knowledge and skills depend on the tasks assigned.
The plant operator is responsible for training.

The plant operator must select persons with a basic level of technical understanding and basic technical knowledge and skills. The following minimum requirements for persons working on separators are:

- Reading and understanding the signs on the separator.
- Reading and understanding the user instructions.
- General basic technical knowledge.
- Reading and understanding the instruction manual and plant operator instructions.
- Be familiar with the measures on accident prevention.
- Only reliable persons may be assigned to work on the separator.
- The minimum age for these persons is 18 years.
- Persons still undergoing training may only be deployed under supervision.

Work which goes beyond the scope of basic inspection work requires advanced knowledge and skills. Work such as:

- Planning and executing the installation.
- Fastening loads.
- Planning and executing the commissioning.
- Operating the separator with start-up and shut-down procedures.
- Cleaning the separator after assembly work.
- Maintaining the separator.
- All repair work on the separator.

- Storing the separator and its individual components during a long-term standstill.
- Decommissioning the separator before a long-term standstill or taking it out of service completely.
- Proper disposal of all process fluids and the separator.

Even more advanced specialist knowledge is required for special work on the separator. Work such as:

- All repair work on separator components and special elements of the auxiliary equipment.
- All work on the machine control, electrical and electronic systems.

Such tasks may be assigned only to specially trained persons authorised by GEA Westfalia Separator. In addition to extensive specialist knowledge, the latter work often requires proficient knowledge of German and English.

1.1.5 Service

Westfalia Separator provides comprehensive service for the following areas:

- Assembly.
- Commissioning.
- Regular maintenance.
- Repairs.
- Checking the operating status.
- Inspection in a dismantled state.
- Decommissioning for a long standstill period.
- Storage and preservation in the case of a long standstill period.
- Re-commissioning.
- Decommissioning and disposal.
- Training.

Ask about the original service from Westfalia Separator.

1.1.6 Liability

Reasons for the immediate passing of liability to the plant operator independent of existing warranty and guarantee periods.

- Improper installation by inadequately trained persons.
- Improper handling in deviation from the intended use.
- Non-observance of the user instructions.

Warranty and liability conditions in the Conditions of Sale and Delivery of Westfalia Separator are not extended by the above.

Westfalia Separator shall accept no liability for damage caused by unqualified or unauthorized personnel.

2 Technical information

2.1 Operating principles of the bowl

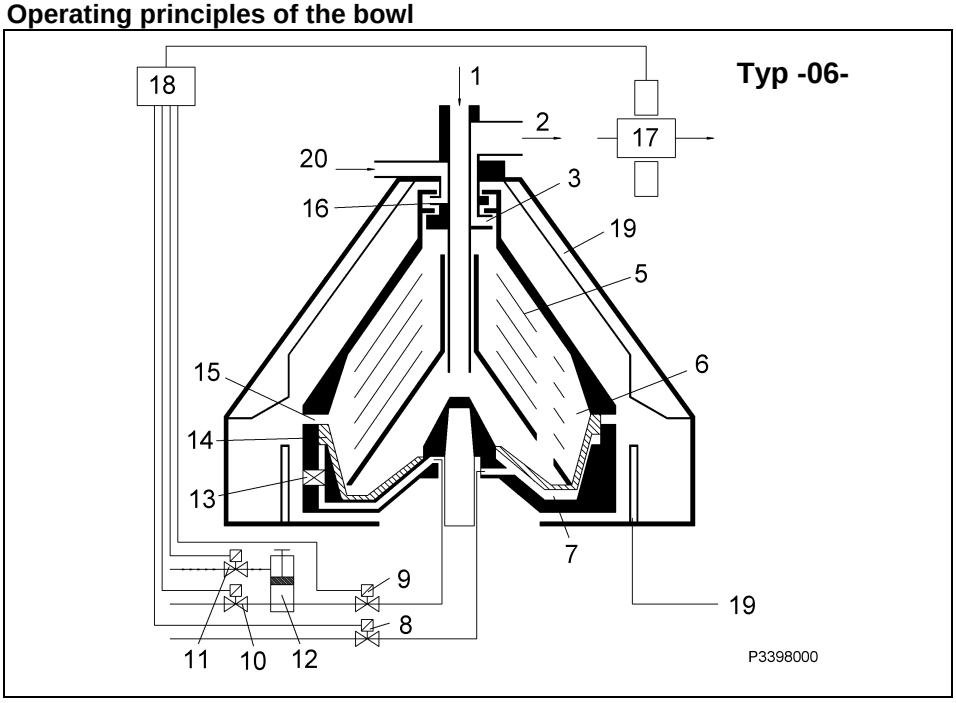

Fig. 2

1 Feed
2 Discharge
3 Centripetal pump
4 Separating disk for separating liquid
5 Disk stack
6 Solids holding space
7 Closing chamber
8 Closing water valve
9 Opening water valve
10 Filling water valve
11 Control air valve
12 Metering piston
13 Piston valve
14 Sliding piston
15 Solids discharge
16 Immersion disk (type –06-)
Sensing liquid pump (type –36-)
17 Turbidity meter (type -06-)
Flow detector (type –36-)
18 Control unit
19 Cooling medium
20 Sealing liquid feed

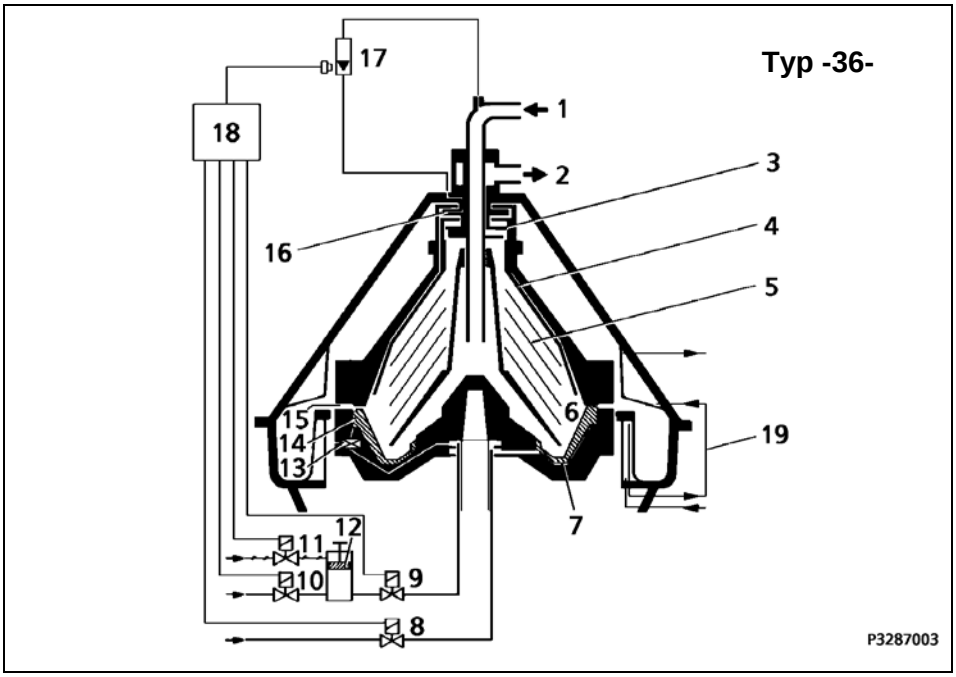

Fig. 3

Bowl with “self-thinker” system using sensing liquid

The product

- flows through feed 1 into the bowl
- and is clarified in disk stack 5.

The disc stack consists of a large number of conical discs placed on top of one another.

Due to the narrow interspaces between these disks

- the liquid is split up into thin layers and
- minimize the settling path.

The clarified liquid

- flows to the bowl center,
- then flows to the centripetal pump chamber,
- and is discharged foamfree and under pressure by the centripetal pump 3.

The solids particles

- are flung against the underside of the disc above,
- and slide down into the solids space 6.

The separated solids are ejected periodically through the solids ejection ports 15.

Solids ejection is initiated by control unit 18:

- on separator type -06-:
  time-dependent control with individual programs
- on separator type -36-:
  “Self-thinker” system by sensing the level of solids in solids space 6.

“Self-thinker” system on separator type -36-

The bowl ejections are carried out fully automatically at the optimum moment by means of the ejection system.

The “self-thinker” system works by sensing the solids level in the bowl using sensing liquid.

A small volume of sensing liquid is branched off via a separating disk 4.

The sensing liquid

- is fed to flow switch 17 via sensing liquid pump 16
- and recycled back into the feed stream.

When the liquid inlet at the outside of separating disk 4 blocks due to an accumulation of solids in solids space 6, an ejection pulse is sent to the control unit 18 (see also the control unit manual).

The diameter of the separating disk 4 (overflow edge for sensing liquid) must be adapted to the specific application.
If the separating disk is too large, the “self-think” pulse is triggered too early, i.e. when the solids space is not optimally filled.

Hydrohermetic seal

The product is sealed off from the main centripetal pump on

- **the -06- version** by means of an additional sealing disk (special design),
- **the –36 version** by means of the sensing liquid pump 16 located above the main centripetal pump.

2.2 Bowl ejection

When must the bowl be emptied?

The intervals at which solids ejections have to take place depend on the solids content and on the nature of the product. If possible, the solids holding space should not be filled to the brim.

As soon as the separation or separation efficiency starts to deteriorate, either a total ejection or partial ejection must be carried out.

During a total ejection the whole bowl contents are ejected, during a partial ejection only part of the bowl contents.

Whether partial or total ejections or a combination of both are carried out depends on the mechanical behaviour of the solids during bowl ejection.

Partial ejection

Partial ejection is a term used to denote partial emptying of the solids holding space of the bowl.
The product feed is not interrupted during partial ejections.

The amount to be ejected can be adjusted externally during operation between approx. 5 - 30 l.

For partial ejection, opening water is fed to the hydraulic system via the metering device E.

The amount of solids to be ejected is chiefly determined by the opening water volume.

The opening water volume is adjusted on the metering device.

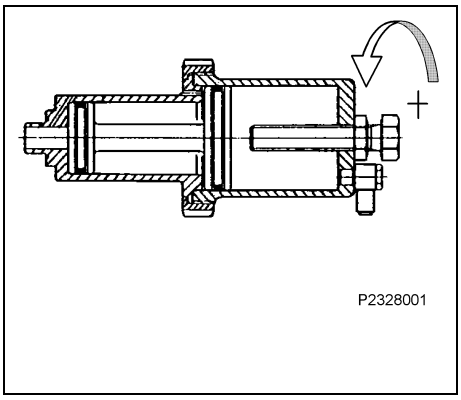

Fig. 4

Adjusting the amount to be ejected

Adjust by means of the adjusting screw of the metering device.

Reducing the ejection volume:
- Turn adjusting screw clockwise

Increase the ejection volume:
- Turn adjusting screw anti-clockwise

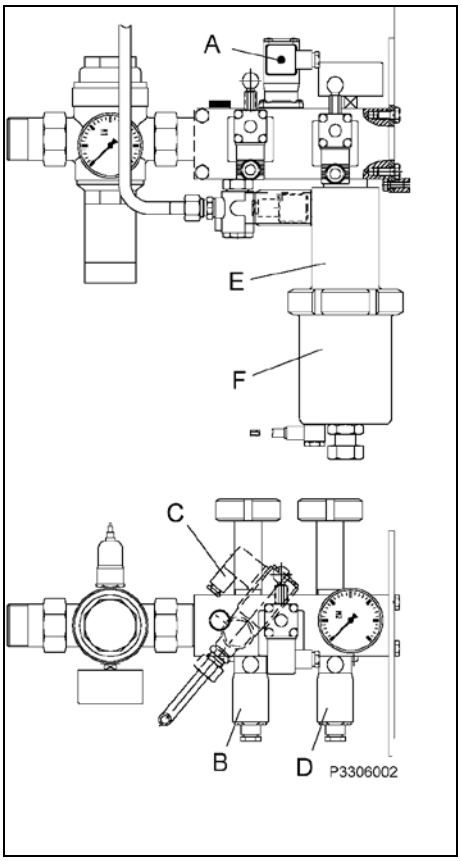

Fig. 5

Function of the metering device

The metering device E is filled with water via filling valve A after every ejection.

For partial ejection chamber F is supplied with compressed air.

Through actuating the opening water valve D the adjusted water volume is displaced by air pressure and fed to the hydraulic system of the bowl.

A Solenoid valve filling water
B Solenoid valve closing water
C Solenoid valve hood flush water
D Solenoid valve opening water
E Metering unit
F Air chamber

Program sequence

After the program time "Separation - Partial Ejection" has elapsed, a partial ejection is initiated automatically which is then repeated at identical intervals.

Before each partial ejection the solenoid valve C "Hood flush water" opens for 10 seconds. This time can be preset as the program time "Pre-flushing". Water is sprayed into the hood to prevent the solids to be ejected from sticking to the walls.

For solids ejection, the solenoid valve B “Closing water” and D “Opening water” (opening time, see section “Function diagram” in this chapter or section “Program time settings in the chapter “Operation”. This time can be preset as the program time "Partial ejection".

The solenoid valve B "Closing water" remains open for a further 5 seconds after the ejection. The time is set via "Closing". At the same time the hood flush water valve stays open for the time "Post-flushing".

The "Separation" program can be interrupted by pressing the "Partial ejection" button. A partial ejection is then triggered. After termination of this forced partial ejection, the control program automatically switches back to "Separation".

2.2.1 Total ejection

During a total ejection the whole bowl contents are ejected. In the case of a total ejection, the feed to the separator is automatically cut of by means of the product valve.

Attention!

Never initiate a total bowl ejection when the machine is vibrating severely (bowl unbalance).

Should the feed pump fail to stop automatically during a total ejection, it must be switched off manually and re-started 1 min. after total ejection.

2.2.2 Function diagram

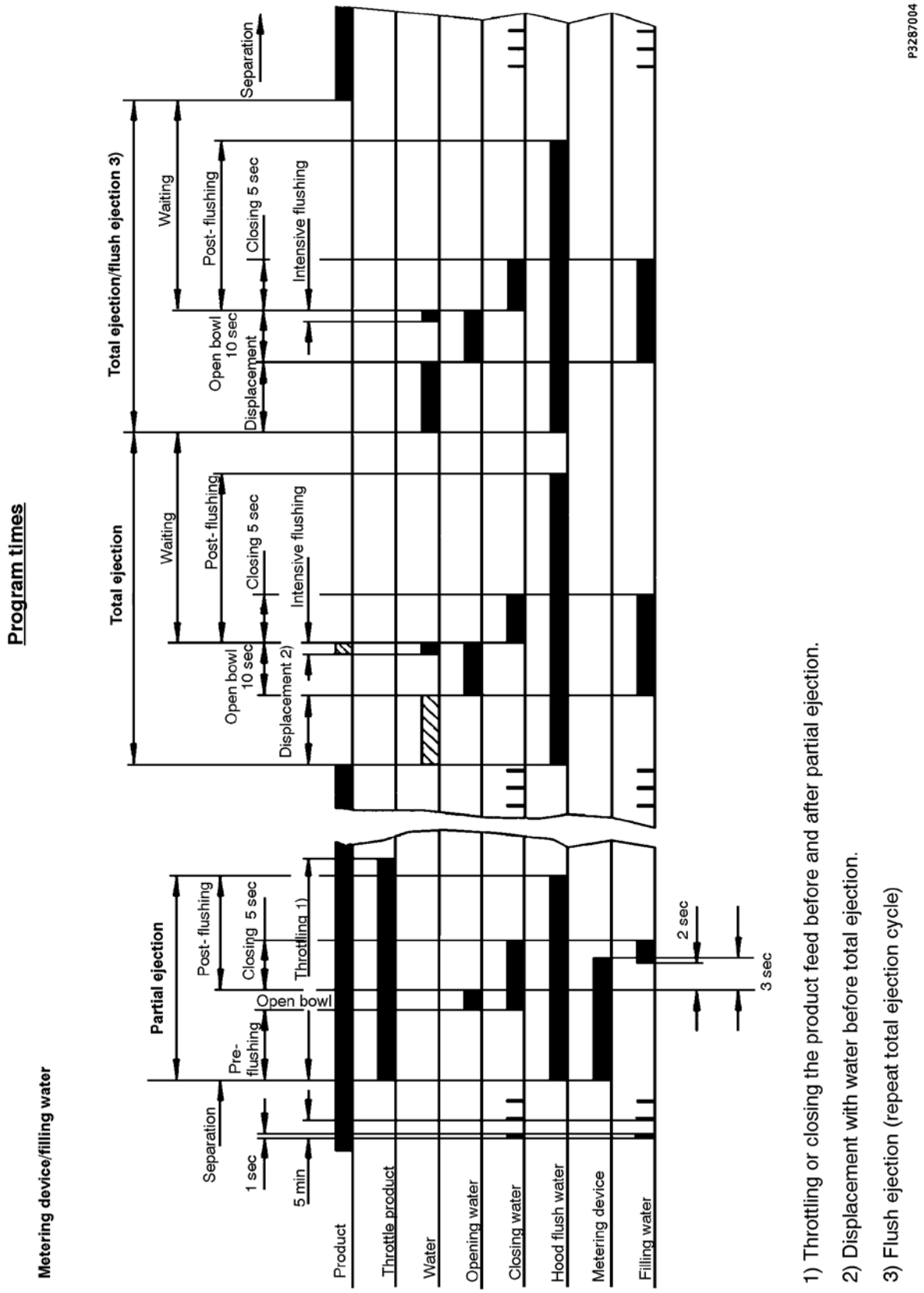

Fig. 6
Setting the program times: See control unit manual

2.3 Operating principle of the hydraulic system

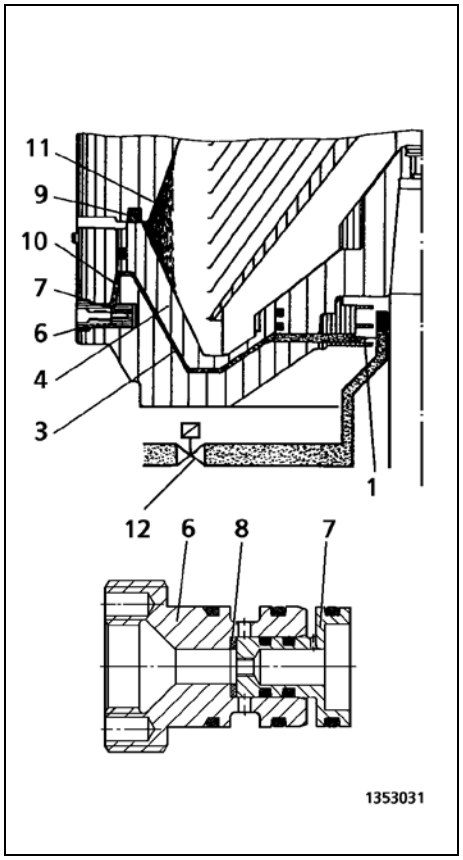

Fig. 7

Closing the bowl

After start-up and acceleration to operating speed, solenoid valve 12 for closing water opens briefly several times.
The closing-water flows into the closing chamber 3 located beneath sliding piston 4.
There is a pressure build-up in the closing chamber as a result of the rotational velocity. This generates a force in axial direction.
The sliding piston is pressed against gasket 9 of the bowl top and seals off the solids holding space 11.
The closing chamber 3 is sealed from the outside by valve piston 7.
The centrifugal force presses the valve piston against gasket 8 and closes off drain hole 10.
To make up for water losses in the closing chamber, closing water and filling water is automatically supplied for 1 second every 5 minutes.

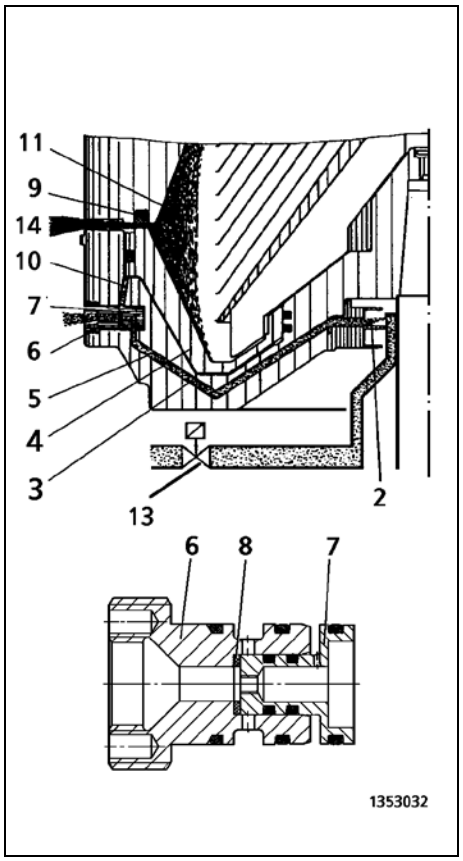

Fig. 8

Opening the bowl (ejection)

Solenoid valve 13 (opening-water) opens. Opening-water flows from injection chamber 2 through feed hole 5 to piston valve 6. The piston valve opens. The closing chamber is partially emptied in the case of a partial ejection and fully emptied in the case of a total ejection through hole 10. The pressure in the closing chamber drops. The sliding piston is pressed downwards due to the pressure acting on the top of it. The ejection ports in the bowl bottom are opened and the solids instantaneously ejected through annular gap 14.

After the ejection is completed:

- Solenoid valve 13 (opening-water) closes,
- solenoid valve 12 (closing-water) opens.

Piston valve 6 seals off drain hole 10, the closing chamber fills up with water. The sliding piston is pressed back into closed position.

2.4 Operating water connection

On separators with ejection mechanics, the operating water connection is suitable for industrial application.

Depending on the application, the operating water connections are equipped with hand or automatic valves. Before operating the separator, check the functionality and safety-relevant settings. Define the maintenance and cleaning procedures as a function of the operating conditions.

Refer to the project documentation (P&ID) for rating data such as pressure and flow rate.

Standard operating water values:

- Suspended matter in operating water: max 10 mg/l
- Particle size: max. 50 µm
- Hardness: ≤ 12 °dH separating temperature up to 55°C
  ≤ 6 °dH at separating temperatures above 55 °C

  To convert the hardness values stated use the following equation:

  $1^{o}dH = 1.79^{o}fH = 1.25^{o}eH = 17.9$ ppm $CaCO_3$
- Chloride content: ≤ 100 mg/l
- pH value: 6.5 – 7.5

2.4.1 Solenoid valves

The solenoid valves incorporated in the operating-water system are 2/2-way straight-way diaphragm valves with internal piloting.
The solenoid coil is entirely embedded in epoxy resin which ensures protection against moisture, good dissipation of heat, and perfect electrical insulation.
The valves are fully tropicalized.

Maintanance

The solenoid valves do not require special maintenance.

Electrical faults

- Shut off main valve for operating-water.

Fault	Cause	Remedies
Valve does not function.	Control unit defective.	Contact servicing staff.
	Connecting terminal on terminal strip is loose.	Tighten screw of connecting terminal.
	Coupler socket loose or leaks.	Tighten coupler socket and replace gasket, if necessary.
	Solenoid coil defective.	Replace complete solenoid head.

3 Motor connection

3.1 Three-phase AC motor

All separators are driven by three-phase motors. Depending on the construction, the following drive variants are available:

- Direct drive
  - with frequency converter
- Gear drive
  - with fluid or centrifugal clutch
  - with frequency converter
- Belt drive
  - with controlled torque motor
  - with frequency converter
  - with clutch

NOTE

The technical specifications on the motor supplied are given in the datasheets supplied with the documentation, the motor nameplate and / or the documentation of the motor manufacturer.
The switching devices must be rated for the starting current of the motor.

Starting currents
Depending on the different drive and motor types, different starting currents are required for starting a separator.

- with frequency converter approx. rated current
- with fluid or centrifugal clutch approx. 1.5 – 2 times rated current
- with controlled torque approx. 2 – 3 times rated current

Motor protection

- If the motor is equipped with a PTC thermistor, it must be connected to the corresponding tripping device.
- Lay the measuring circuit line (tripping device-motor) as a separate control line.

Attention!

Lubrication

If the motor is equipped with a re-lubricating device, it must be re-lubricated at regular intervals in accordance with the specifications of the motor manufacturer on the motor nameplate.

Motor with frequency converter (FC)

Pay attention to the following when operating the separator with frequency converter:

Attention!

- **The separator must never be started without frequency converter.**

- The frequency on the frequency converter must be selected so that the maximum admissible bowl speed is not exceeded. The admissible bowl speed is indicated on the nameplate of the separator.

NOTE

The frequency converter is equipped with a frequency limiter to prevent the admissible bowl speed from being exceeded.
Additionally, a speed sensor is installed on the separator. The latter transmits the pulses for bowl speed monitoring to the control system. The control system switches off the separator when the ceiling speed is exceeded.
The separator may be operated only with this auxiliary device.
The ceiling speed must be set to 5% above rated speed (see separator nameplate).

Important measures to take during commissioning:

- Check the correct setting of the monitoring devices in accordance with the circuit diagram and setting instructions.
- Check the speed of the drive spindle.
- Test the safety circuit.
- Attach the following safety stickers and check that they are properly attached and in good condition.

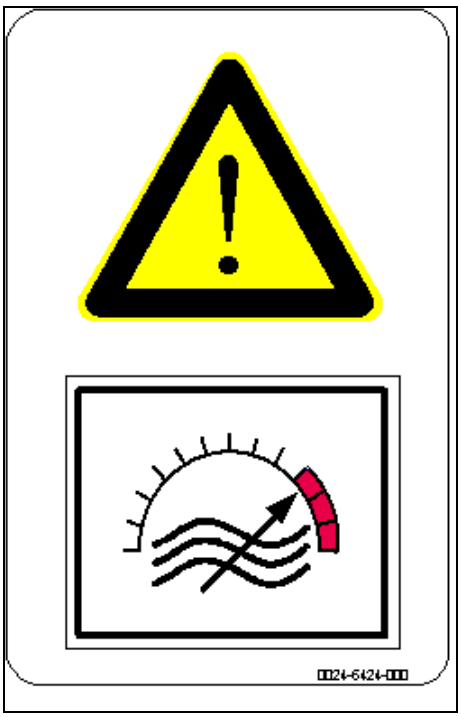

Fig. 9

- **Frequency converter operation**
- **The admissible maximum bowl speed must not be exceeded.**

CAUTION!

- **Before carrying out maintenance or repair work on the motor, bear in mind that there may still be residual voltage.**

In this connection, refer to the documentation of the frequency converter manufacturer and have safety measures implemented by suitable personnel.

3.2 Direction of rotation of the bowl

CAUTION!

The bowl must rotate in clockwise direction when looked at from above.

If the direction of rotation is wrong, the wiring of the motor power supply lead must be checked for conformity with the circuit diagram and changed accordingly. This may only be carried out by an authorized specialist.

3.3 Starting time of the bowl

NOTE

Specifications on the starting time of the bowl are given in the enclosed data sheets.

- Make sure that the bowl reaches its rated speed within the starting time and that this speed is maintained during operation.

Separators with a motor controlled by frequency converter can be re-started any time.

IMPORTANT

The following applies for separators with controlled torque motors:

Re-starting after the motor has reached a constant operating temperature is permitted only after 60 minutes.

Non-observance of this instruction can lead to overheating of the clutch or motor.

3.4 Bowl speed

The bowl speed has been defined to suit the process as a function of the densities of the centrifugally dry solids and the clarified liquid.

All components have been constructionally rated for this speed (operating speed) taking into account all safety-relevant factors.

The operating speed (bowl speed) and other important process data are specified on the separator nameplate. Alterations to the process data may also necessitate a change in operating speed.

DANGER

in the case of altering the bowl speed in deviation with the intended use:

Danger to life and limb and the environment due to machine parts flying around as the separator can be destroyed.

- The bowl speed may not be changed by the operator without appropriate consultation.
- The bowl speed stated on the separator nameplate must not be exceeded!
- The manufacturer must be contacted before changing process data.

NOTE

The manufacturer will not assume liability for damage arising from non-compliance with these instructions. This will also result in loss of warranty.

Checking the bowl speed

The bowl speed must be checked

- before initial start-up
- when drive parts are replaced that impact the bowl speed, e.g. belt pulleys or gearwheels.
-

NOTE

A test run for speed checking without fitted bowl is <u>not</u> admissible since the roller bearings need a certain minimum axial load during rotation so as not to get damaged.

The speed check may only be carried out by a qualified specialist.

- Carry out the speed check only when the hood is mounted.
- Check the speed with a suitable measuring instrument, e.g. with stroboscopic light through the inspection hatch on the hood.
- Pay attention to the direction of rotation of the bowl. It must rotate clockwise (see arrow on frame). If this is not the case, an electrician must alter the connection at the motor.
- Ensure that the admissible bowl speed is not exceeded during the test run.

3.5 Run-down time of the bowl

The run-down time of the separator bowl, from switching off to shutdown, is specified in the data sheet.

NOTE

The run-down time specified in the data sheet refers to the rated speed (see separator nameplate) with free run-down and at atmospheric pressure.

In addition to mechanical or electric brakes, the run-down time of the separator can be influenced by various process factors.

The **run-down time** specified in the data sheet specifies the **maximum time span required** until the separator bowl has stopped rotating.

CAUTION!

After the run-down time and before working on the separator:
Check that the separator is at a standstill.

Otherwise, there is a danger of injury through rotating bowl parts or discharging liquids.

- Pay attention to the safety precautions relating to “checking standstill”.

4 Bowl

4.1 Important hints

The separator bowl rotates at a very high speed.

Hence, forces are produced which can endanger the operating safety of the machine in case of

- incorrect assembly or
- inadequate cleaning of the bowl.

The instructions for assembly must therefore be followed exactly.

The following points should also be observed:


Attention!

- Before fitting the bowl parts thoroughly clean, grease or lubricate:
  - Guide and contact surfaces
  - Lock ring
- When fitting the bowl parts, make sure that the "O" marks on all parts are aligned.
- (Only then will the parts fit correctly over arresting pins and guide ribs).
- Avoid damage to bowl parts during assembly and disassembling by
  - exact positioning.
  - avoiding diagonal pull.
  - selecting the lower lifting speed of the hoist.


Caution

- Only use correctly rated, fully functional hoists.
- Do not use force to fit or remove parts.
- Before fitting gaskets, check the gaskets and gasket grooves for cleanness and wear.
- After fitting, check that the gaskets
  - are not twisted.
  - fit evenly into their grooves.
- All bowl parts
  - must be handled gently
  - and placed on a rubber mat or wooden pallet.


Caution

In the case of a plant with several separators:

- Do not interchange parts of different bowls (danger of imbalance).

The bowl parts are marked with the serial number of the machine or the last three digits of the serial number.

4.1.1 Special risks of a separator

The separator is equipped with a high-speed rotating metal bowl which represents a danger potential not to be underestimated on account of the rotational energy which can pose a danger for the installation and persons working in the installation when not properly handled.

CAUTION!

Switch off the separator before carrying out maintenance or repair work.
Wait, observe and check that all rotating parts are at a standstill.
Do not reach into the rotating drive section or bowl!
Do not loosen any part before the bowl has come to a standstill!

Risk of injury and danger to life through rotating parts.

Standstill should not be checked using only one source of information (e.g. speed indicator) but must be backed up by at least one further checking device. It must always be reckoned with that the first used standstill indication will provide false information because, for example, the electronics have failed or the belt or gear in the drive is defective.

The following options are available for checking standstill on separators depending on the version:

- Electric speed indicator
- Revolution indicator or sight glass on the gear cover of gear separators
- Optical speed check of the drive motor
- Noise check
- Vibration check

If one is not sure whether the machine is at a standstill, one must wait for the run-down time specified in the separator documentation. A subsequent check is carried out when one is sure that the machine is at a standstill.

- Visual speed check by opening the inspection ports on hood and frame

If it is possible to remove an inspection port cover, bowl standstill can be checked through it.

In addition, checking is also possible by removing the gear cover or opening the port in the drive housing on some drive versions.

If none of these possibilities is available, speed measurement of the separator must be carried out in a failsafe way. With minimum Performance Level c(PL c) according to EN 13 849-1 or one must wait until the machine has run down.

NOTE

Only when one is convinced that that the separator is at a standstill can one carry out the following checks for additional security.

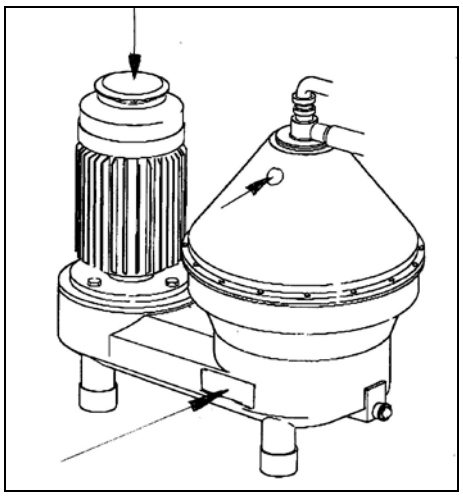

Fig. 10

Revolution visual check on machines with belt drive.

You can observe whether the machine is at a standstill at the points marked with the arrows.

We reserve the right to carry out design modifications.

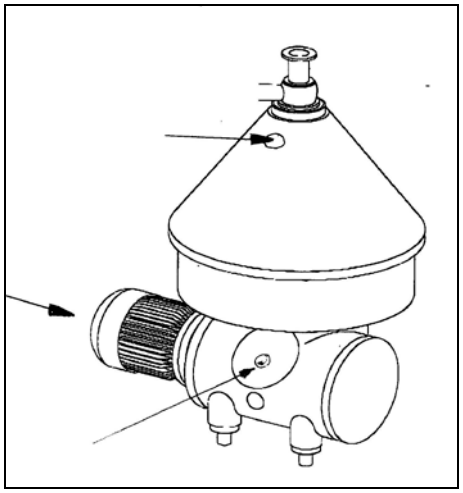

Fig. 11

Revolution visual check on machines with gear.

You can observe whether the machine is at a standstill at the points marked with the arrows.

We reserve the right to carry out design modifications.

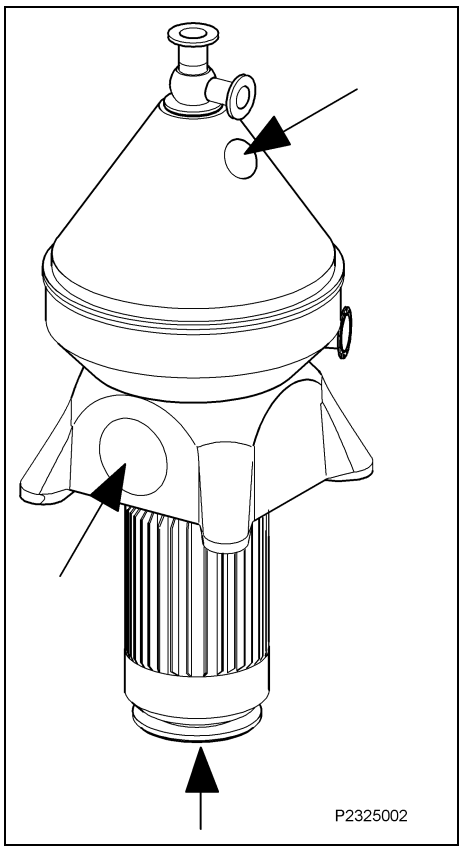

Fig. 12

Revolution visual check on machines with direct drive.

You can observe whether the machine is at a standstill at the points marked with the arrows.

We reserve the right to carry out design modifications.

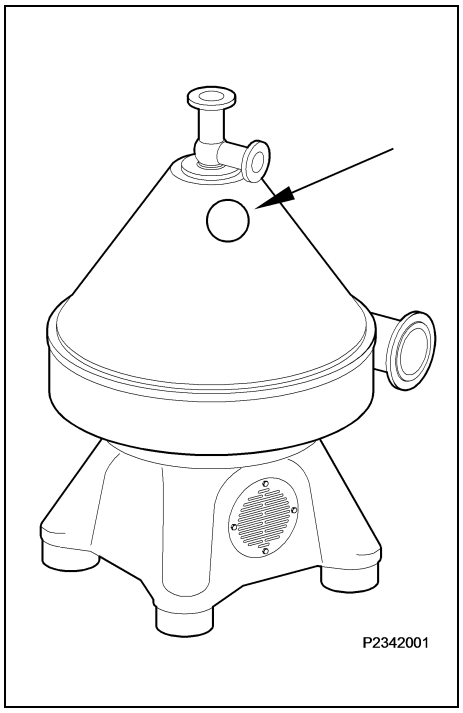

Fig. 13

Revolution visual check on machines with integrated direct drive:

You can observe whether the machine is at a standstill at the point marked with the arrow.

We reserve the right to carry out design modifications.

NOTE

Observing the motor fan on flat belt or hear machines is not a reliable method of checking standstill because the motor or fan can already be at a standstill when the separator bowl is still rotating.

During cleaning programs (steam sterilization and CIP), very high temperatures are reached on the surfaces of the separator and piping.

CAUTION!

During cleaning programs, the surfaces of the separator and pipes are very hot.

Danger of burns!

With some products, the separator has to be cooled. As a result, temperatures of up to minus 30 °C are reached on the surfaces of the separator and pipes.

CAUTION!

When the cooling is switched on, the surfaces of the separator and pipes can get very cold.

Danger of frostbite!

CAUTION!

Depending on type and installation site, hazards in the form of noise emission from the separators machine may occur. Therefore, always wear protective gear in accordance with the national regulations.

Danger of hearing damage!

CAUTION!

During all maintenance and repair work on the separator, the fittings and pipelines, there is the risk of injury due to spurting liquids, e.g. hot or caustic liquids can spurt out under pressure.

Danger of causticization of skin and eyes!

4.1.2 Safety precautions for maintenance and repair

- Observing the maintenance intervals and user information is decisive for the service life and permanent operating readiness of the separator.
- The maintenance intervals depend on the operating conditions. Especially highly stressed parts of the separator must be regularly checked. Reduce the maintenance intervals to adapt to the operating conditions!
- Timely maintenance of the separator is essential for safe operation.

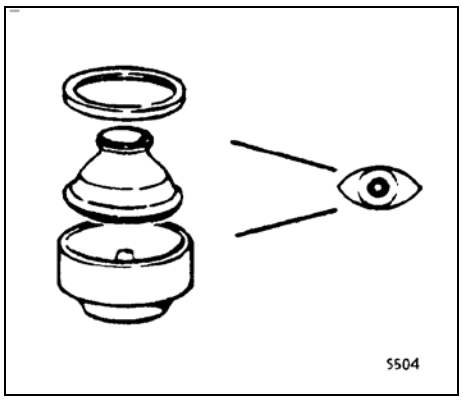

Fig. 14

Especially highly stressed parts of the separator such as
– Bowl lock ring
– Bowl bottom,
– Bowl top
must be regularly checked (at least once a year) as specified in the maintenance schedule to assure safe and efficient operation.

Fig. 15

When carrying out maintenance and repair work:

- **Do not climb onto or stand on the machine or parts of the machine!**

Danger of injury through slipping or falling down!

- Repairs to the separator may only be carried out by service technicians from Westfalia Separator or personnel trained and certified by Westfalia Separator.

Fig. 16

- During maintenance and repair work, make sure that the main switches are switched off and secured against restarting.
- Make sure that other persons do not have the possibility to start the machine before the maintenance or repair work is finished.

- Make sure that the rotating parts of the separator (drive, bowl) are at a standstill before carrying out maintenance and repair work.

- When the machine is defective, a warning sign must be attached and the separator must be secured against unauthorized starting.

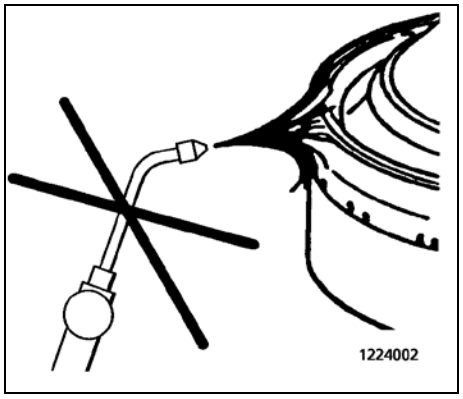

Fig. 17

- **Do not heat bowl parts with a naked flame to facilitate dismantling work.**

Structural changes in the material of the bowl parts which affect the operating safety of the machine may result!

- **Do not weld bowl parts**.

- Do not weld hood and solids catcher parts of steam-sterilizable separators.

Dismantling the bowl safely

When bowl parts are to be lifted or moved, internal, loose parts can get twisted or jammed and unintentionally be lifted or moved as well. They can then break loose in an uncontrolled way, fall down and cause serious injuries.

WARNING

When lifting of moving, parts can be dislodged from the bowl in an uncontrolled manner and fall down!

Danger of injury due to bowl parts falling down!

- Wear protective gear, e.g. safety shoes or protective helmet.
- Before dismantling the bowl, ensure that the bowl and assembly jig are aligned horizontally so that bowl parts do not jam or twist during lifting or moving.
- The order of dismantling and fitting described in this manual must be observed.
- When lifting or moving parts, ensure that no other parts, in particular internal parts, are unintentionally lifted or moved as well.
- Parts put together must be completely dismantled from each other.

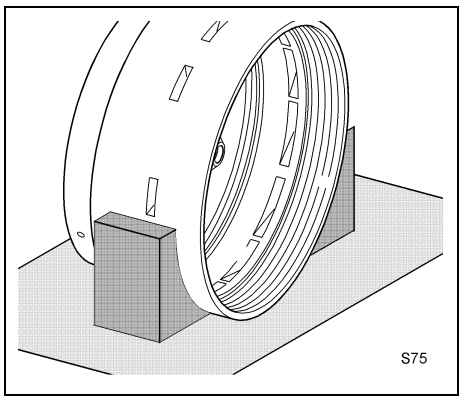

Fig. 18

- Place the dismantled separator parts on suitable surfaces (rubber, wood etc.).
- Take appropriate steps to prevent machine parts from overturning and rolling away.

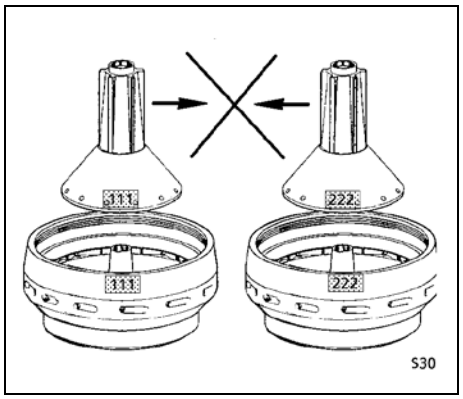

Fig. 19

- When carrying out assembly work on several separators, be careful not to interchange parts of different bowls! Each bowl must be balanced with its respective components.

The parts are marked with the serial-number of the machine or with the last three digits of the serial number.

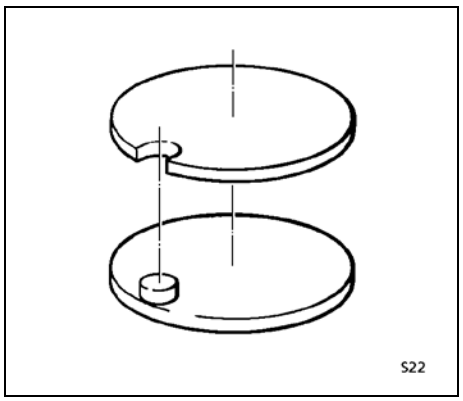

Fig. 20

- Some bowl parts must be arranged in fixed positions relative to one another.
- Locking devices and alignment marks must be in perfect condition.

The separator may not be operated when locking devices and marks on the bowl parts are damaged.

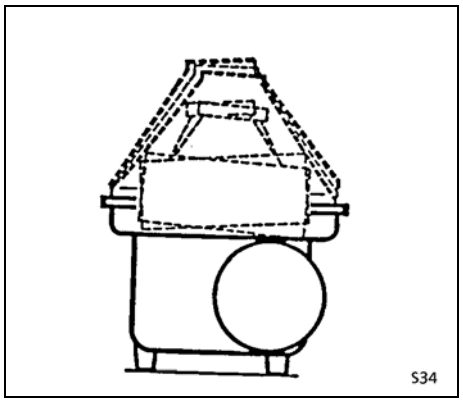

Fig. 21

- After fitting certain new bowl parts (e.g. bowl bottom, bowl top) the bowl must be re-balanced.

Bowl balancing may only be carried by specialists from Westfalia Separator or specialised workshops authorized by Westfalia Separator!

If in doubt, consult the service department of Westfalia Separator.

CAUTION!

Unqualified balancing can lead to dangerous operating states and to destruction of the separator with danger to life and limb of the personnel.

- Do not manipulate speed-altering devices such as frequency converters so that the maximum admissible bowl speed (see nameplate or “technical data” in the instruction manual) is not exceeded.
- Ensure that monitoring devices (e.g. speed sensors etc.) are not manipulated or damaged and check their function in accordance with the instructions in chapter **“Maintenance and repair – maintenance schedule**”.
- After maintenance and repair work on the separator, refit all protective devices.
- When carrying out maintenance and repair work, carry out a visual check of the separator components. Have the components checked for damage through **corrosion** and **erosion** by **authorized specialists** and proceed in accordance with the instructions in chapter **“Maintenance and repair – inspections**”.

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4.2 Bowl overview (design -06-)

Exploded view of the bowl

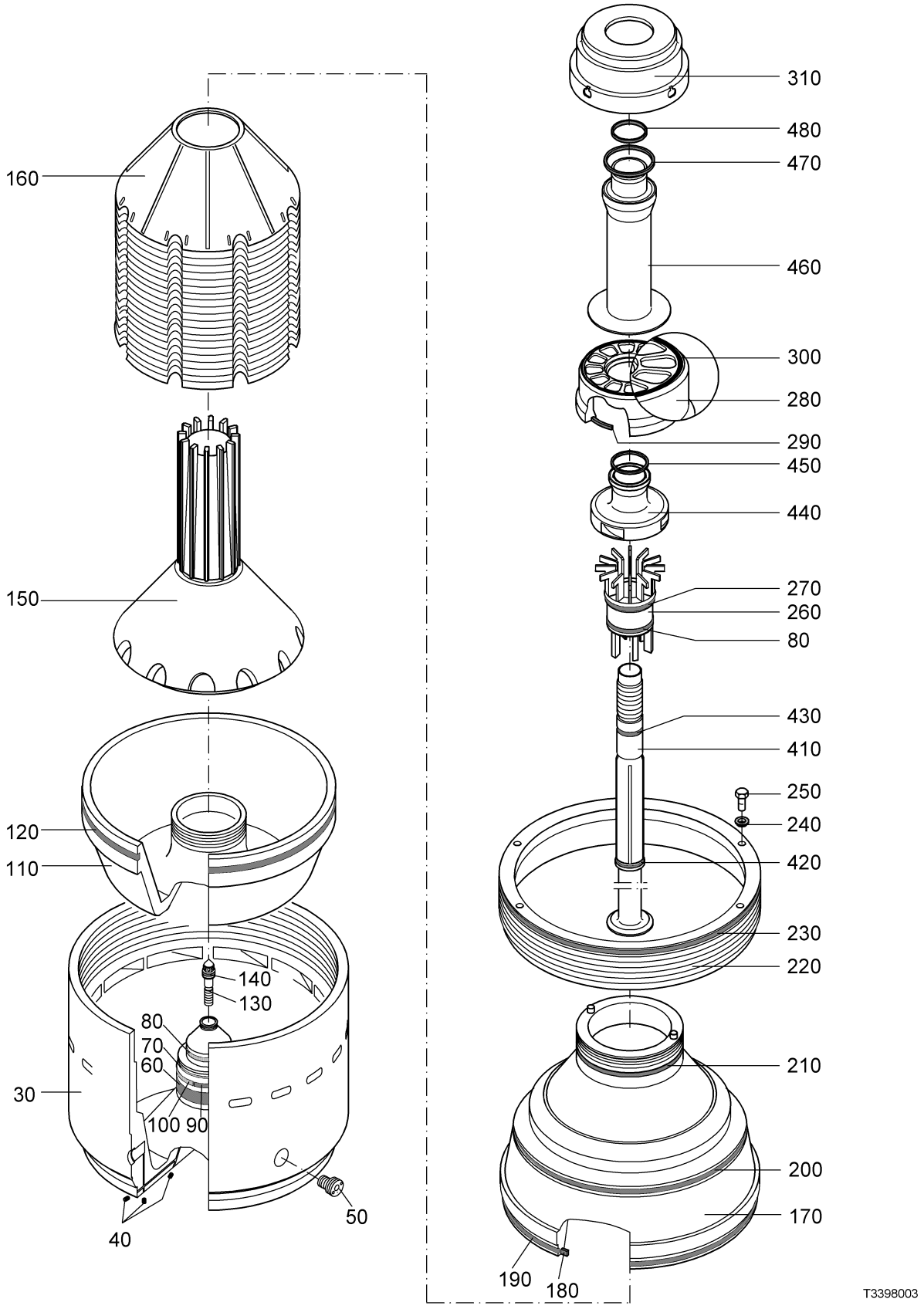


Fig. 22

Design -06-

Item		Designation
30	*	Bowl bottom
40		Threaded pin
50		Valve
60		Piston guide ring
70		Gasket
80		Gasket
90		Gasket
100		Gasket
110	*	Sliding piston
120		Gasket
130		Spindle screw
140		Gasket
150	*	Distributor
160		Disc stack
170	*	Bowl top
180		Gasket
190		Gasket
200		Gasket
210		Gasket
220	*	Lock ring
230		Gasket
240		Plug
250		Hex head screw
260		Ribbed distributor
270		Gasket
280		Centripetal pump chamber cover
290		Gasket
300		Gasket
310		Cover
410		Feed tube
420		Gasket
430		Gasket
440		Centripetal pump
450		Gasket
460		Sealing disk
470		Gasket
480		Gasket

***) When this part is replaced, the complete bowl must be rebalanced.**

4.3 Bowl overview (design -36-)

Exploded view of the bowl

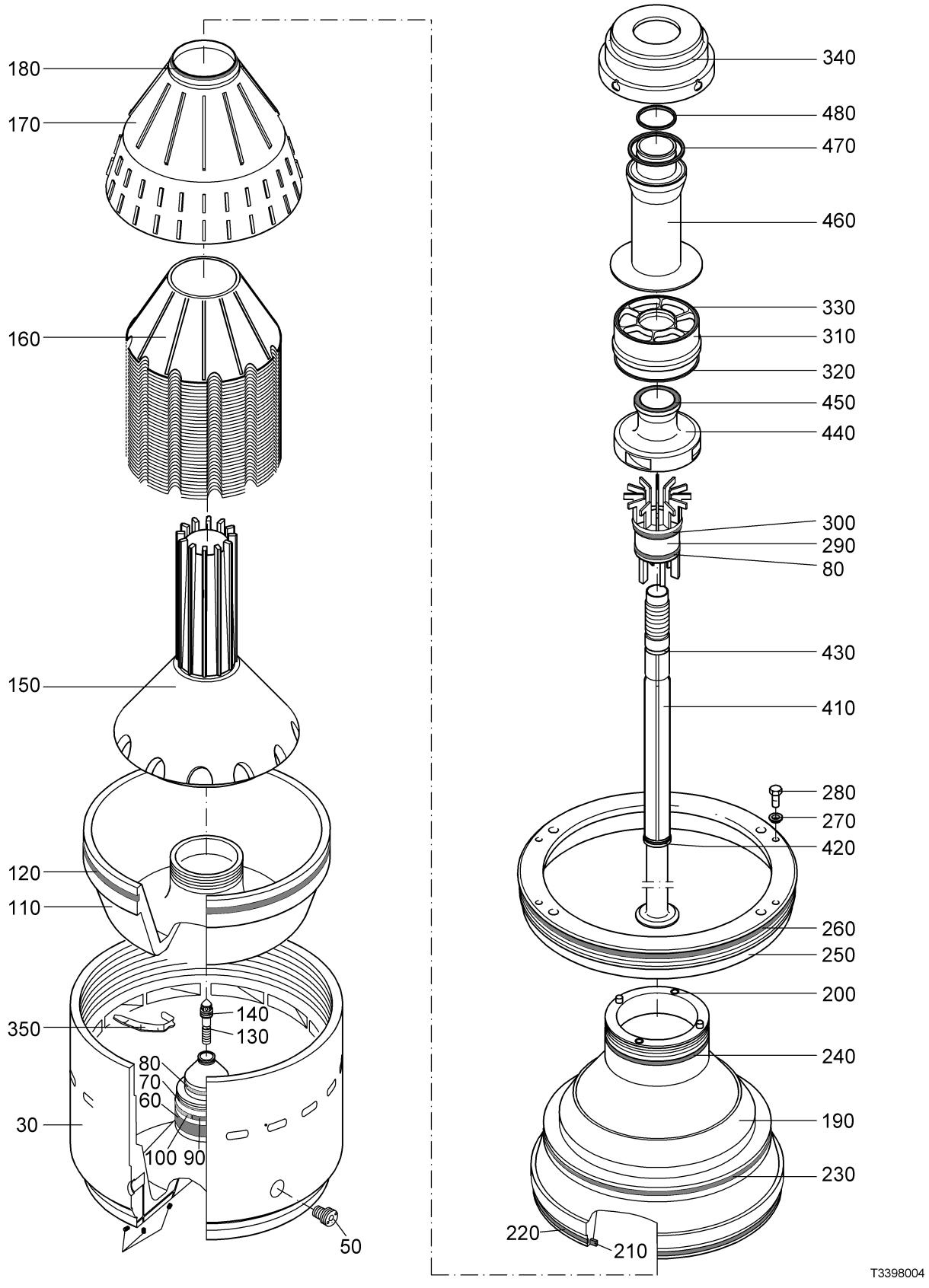


Fig. 23

Design -36-

Item		Designation
30	*	Bowl bottom
40		Threaded pin
50		Valve
60		Piston guide ring
70		Gasket
80		Gasket
90		Gasket
100		Gasket
110	*	Sliding piston
120		Gasket
130		Spindle screw
140		Gasket
150	*	Distributor
160		Disc stack
170	*	Separating disk
180		Gasket
190	*	Bowl top
200		Gasket
210		Gasket
220		Gasket
230		Gasket
240		Gasket
250	*	Lock ring
260		Gasket
270		Plug
280		Hex head screw
290		Ribbed distributor
300		Gasket
310		Centripetal pump chamber cover
320		Gasket
330		Gasket
340		Cover
350		Wear insert
410		Feed tube
420		Gasket
430		Gasket
440		Centripetal pump
450		Gasket
460		Sensing liquid pump
470		Gasket
480		Gasket

***) When this part is replaced, the complete bowl must be rebalanced.**

4.4 Removing the feed and discharge assembly

Caution!

To prevent accidents, do NOT loosen any part before the bowl has stopped completely!

Standstill of the bowl is indicated by

- the LED "bowl standstill" or
- the speed indicator in the control unit or in the motor control.

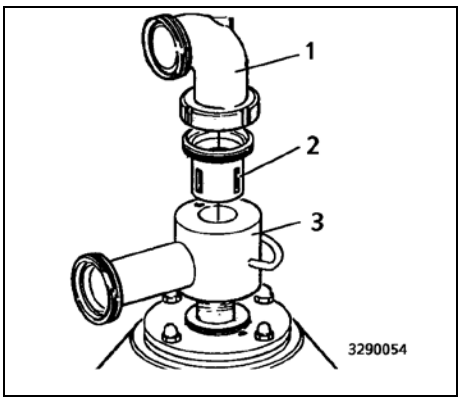


Fig. 24

- Disconnect the feed and discharge lines.
- Unscrew bend 1 if necessary.
- Unscrew connection piece 2 **(left-hand thread).**
- Remove connection housing 3.

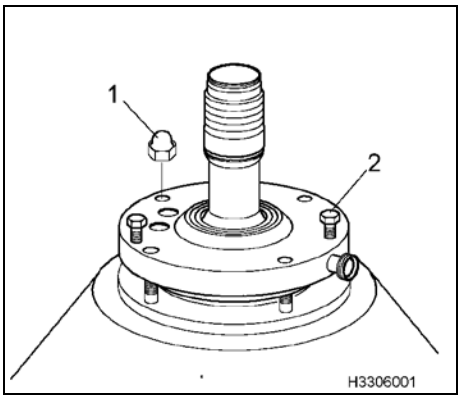


Fig. 25

- Unscrew cap nuts 1.
- Force the ring out of the guide of the hood by screwing in puller screws 2.

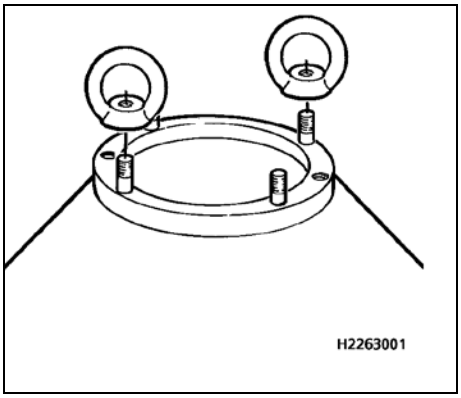


Fig. 26

- Screw two ring nuts opposite each other onto the studs of the hood.

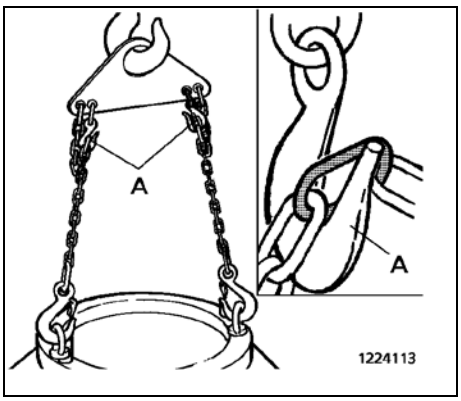


Fig. 27

- Unscrew the screws for fastening the hood.
- Disconnect and remove hood flush-water line from the operating-water connection.
- Unscrew and remove the cooling water lines.
- Shorten the chains of the lifting device.
  The chain link must be put crosswise on hook A (see adjacent small figure)!
- Hang the shortened lifting device into the lifting-eye nuts and lift off the hood.

4.5 Dismantling the bowl

- Handle bowl parts with care.
- For tools, see order-specific parts list.

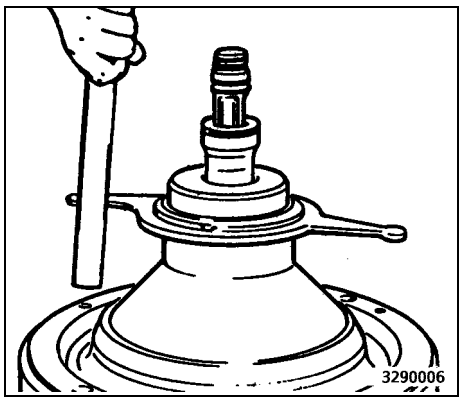


Fig. 28

- Loosen the lock ring by lightly tapping the handle of the annular wrench **(left-hand thread).**

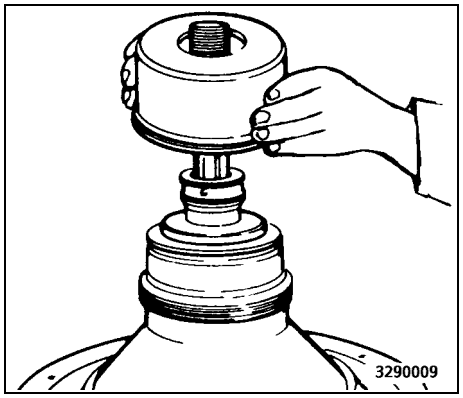


Fig. 29

Caution

- Remove the cover.

  Note:
  The centripetal pump chamber cover can fall out of the cover.

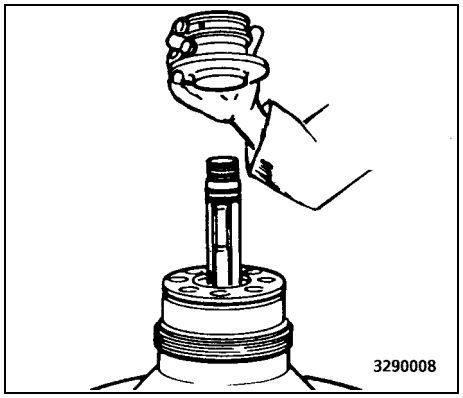


Fig. 30

Only on -06- with hydrohermetic seal or -36- (“self-thinker” system):

- Remove the sensing liquid pump.

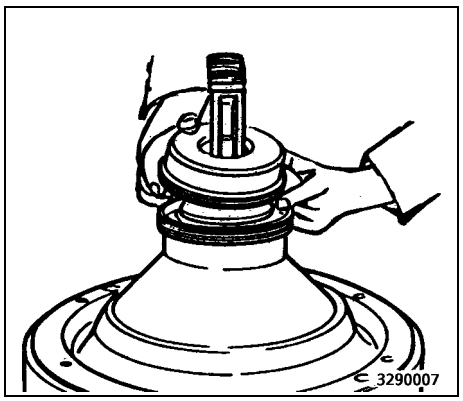


Fig. 31

Only on -06- with hydrohermetic seal or -36- (“self-thinker” system):

- Lift off the centripetal pump chamber cover.

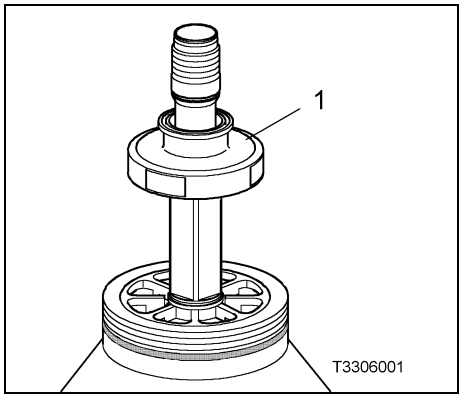


Fig. 32

- Lift off centripetal pump (1).

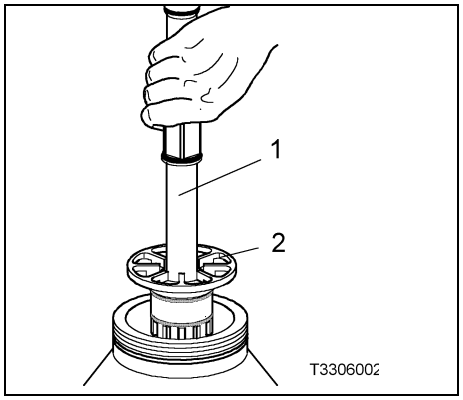


Fig. 33

- Lift out feed tube (1) with ribbed distributor (2).

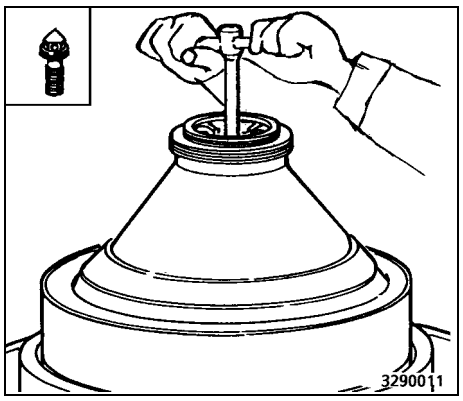


Fig. 34

- Unscrew spindle screw with the wrench **(left-hand thread).**

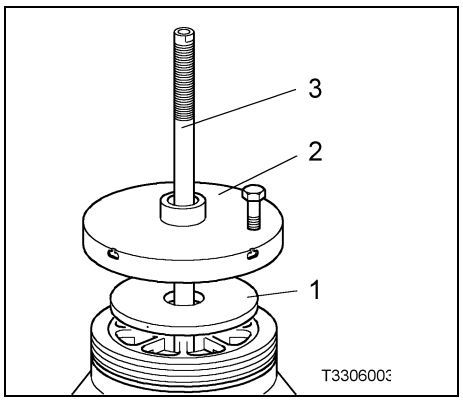


Fig. 35

- Place disc (1) on the distributor.
- Screw the threaded sleeve (2) onto the bowl top **(left-hand thread).**
- Screw in threaded bolt (3) **(left-hand thread).**

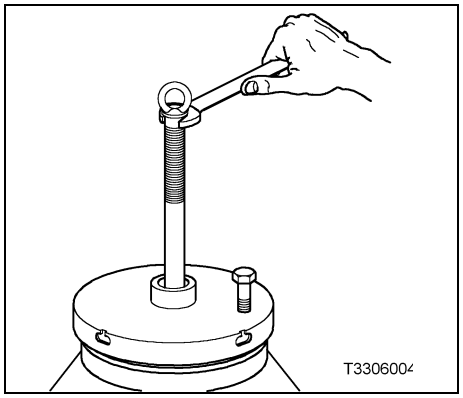


Fig. 36

- Force the bowl off the spindle cone by turning the threaded bolt counter-clockwise.
- Screw the eye bolt onto the threaded spindle.

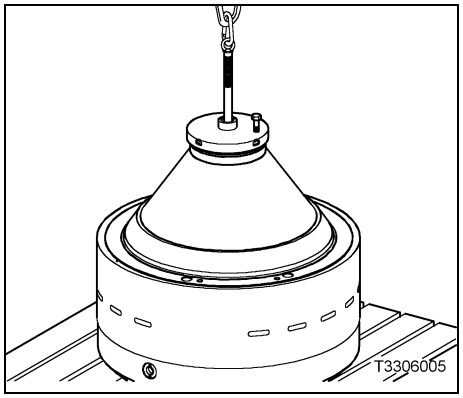


Fig. 37

- Lift out the bowl and place it on a rubber mat or wooden pallet for further dismantling.
- Unscrew the ring nut from the threaded spindle.

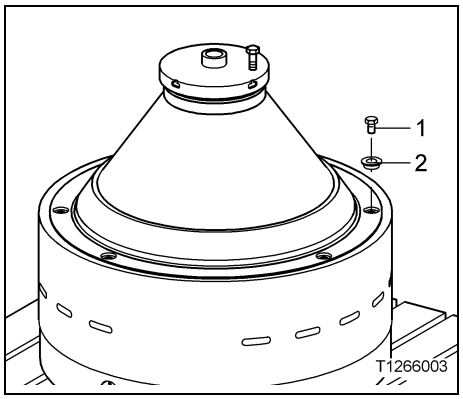


Fig. 38

- Unscrew hex head screw (1) with plug (2) out of the bowl lock ring.

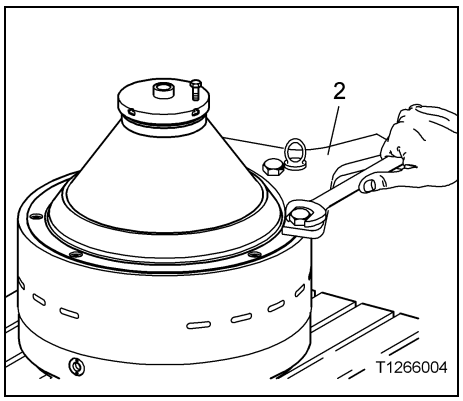


Fig. 39

- Assemble pin spanner (2); screw the screws of the pin spanner in tightly. **The "O" marks must be visible. After a number of blows against the pin spanner, check firm seating of the screws, re-tighten screws if necessary!**

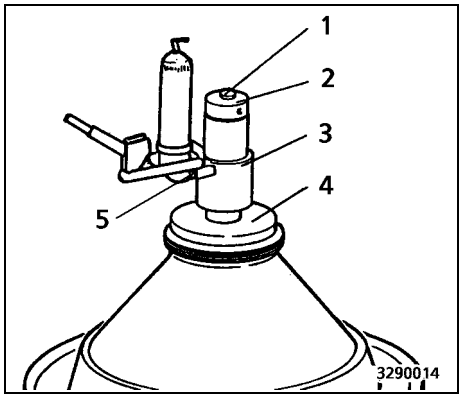


Fig. 40

Mounting the compressing device

- Screw threaded bolt (1) into the bowl bottom **(left-hand thread) as far as it will go.**
- Insert hydraulic part (3) into the centering recess of the threaded sleeve.
- Screw on threaded ring (2) until its upper edge is flush with end thread of bolt (1) **(left-hand thread).**

To prevent damage to threads:

IMPORTANT

- **Screw in threaded bolt completely.**
- Screw on the threaded ring until its upper edge is flush with the end thread of the bolt.

If the threaded ring cannot be screwed down completely, then the piston and the cylinder of the compressing device are too far apart.

In this case:

- Bring piston and cylinder back into initial position:
  - Loosen pressure relief screw (5) by two turns.
  - Press the pump lever down as far as it will go.
  - Screw on threaded ring down to thread end.
- Tighten screw connections of the compressing device.
- Close pressure relief screw (5).

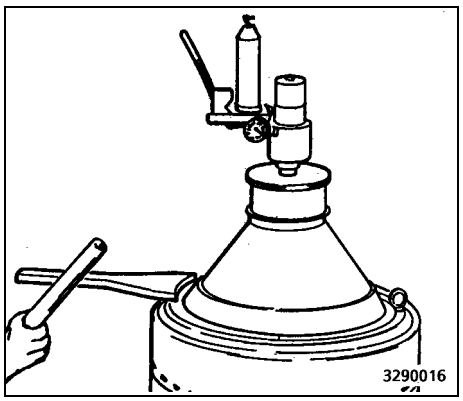


Fig. 41

- Compress the disc stack to facilitate loosening of the bowl lock ring.
  Max. compression: See data sheet
- Loosen the bowl lock ring by hammering against the handle of the wrench with a mallet **(left-hand thread).**

If the lock ring is jammed tight, loosening can be considerably facilitated by heating the upper part of the bowl bottom with steam or hot water. Do not use any other sources of heat, e.g. blow torch or welding torch.

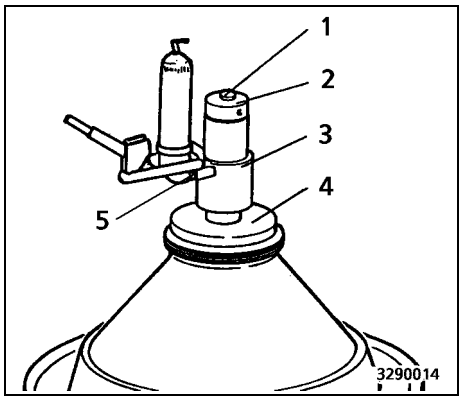


Fig. 42

Dismantling the compressing device:

- Move pump lever down as far as it will go to prevent it from jumping back.
- Loosen pressure relief screw (5).
- Unscrew threaded ring (2) **(left-hand thread).**
- Take off hydraulic part (3).
- Unscrew threaded sleeve (4).
- Unscrew threaded bolt (1) **(left-hand thread).**

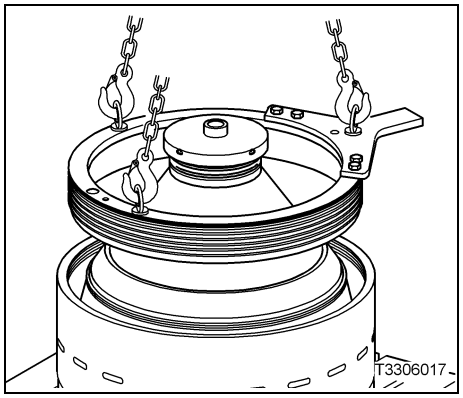


Fig. 43

- Loosen and lift off the bowl lock ring **(left-hand thread).**

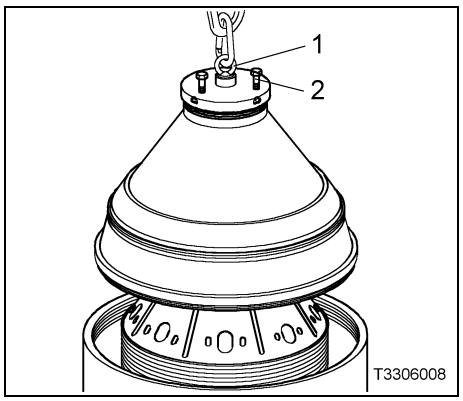


Fig. 44

- Screw in eye bolt (1).
- Push off the bowl top by turning hex head screws (2) clockwise.
- Lift off the bowl top with the aid of the hoist.
- Lift the disc off the distributor.

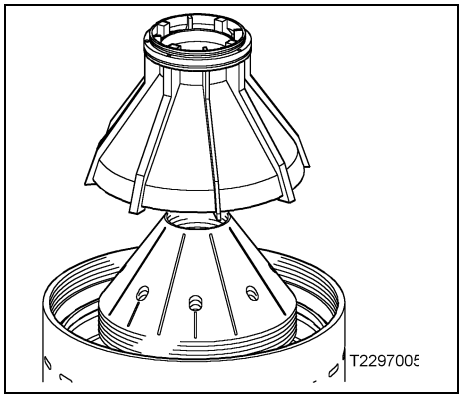


Fig. 45

For type -36- (“self-thinker” system) only:

- Lift off the separating disk.

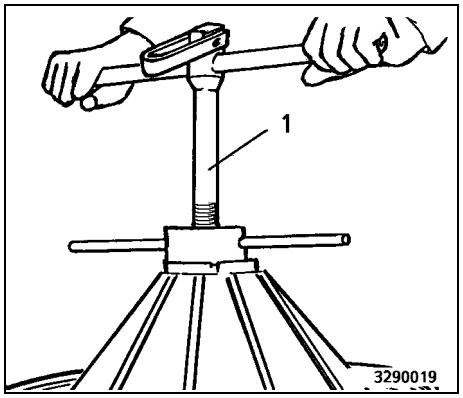


Fig. 46

- Screw lifting device (1) into the distributor **(left-hand thread)**.
- Push off the distributor, together with the disc stack, by turning the spindle to the right.
- Lift out distributor and disc stack.

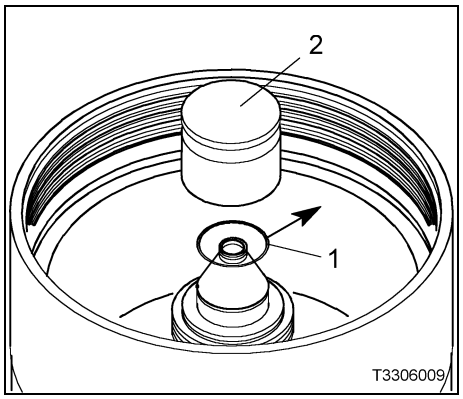


Fig. 47

- Take out gasket (1).
- Place pressure piece (2) of lifting device for sliding piston onto hub of bowl bottom.
- Grease outer surface of the pressure piece.

Attention

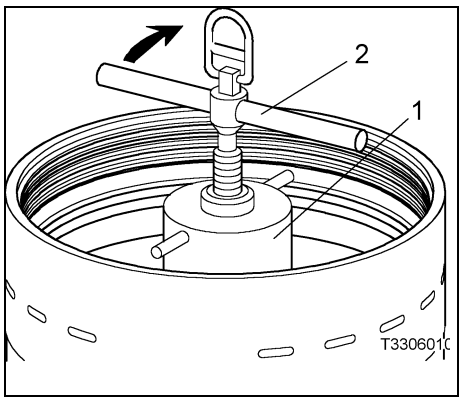


Fig. 48

- Screw lifting device (1) onto the sliding piston **(left-hand thread).**
- Force sliding piston off the bowl bottom by turning threaded spindle (2) clockwise.
- Lift off sliding piston.
- Make sure that the sealing lip of the sliding piston does not get damaged.

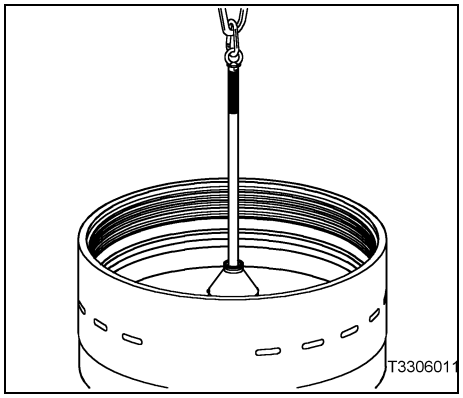


Fig. 49

- Screw threaded spindle into the bowl bottom **(left-hand thread).**
- Transport the bowl bottom.

4.6 Turning the bowl bottom

Besides better handling, there are the following reasons for turning the bowl bottom:

- Flushing out the bowl bottom with water. (better drainage)
- Cleaning the cone.
- Renewing the plugs.
- No need to work under suspended loads.
- Cleaning operating water holes.
- Dismantling and fitting the operating water receiving ring. (Fitting new gaskets)

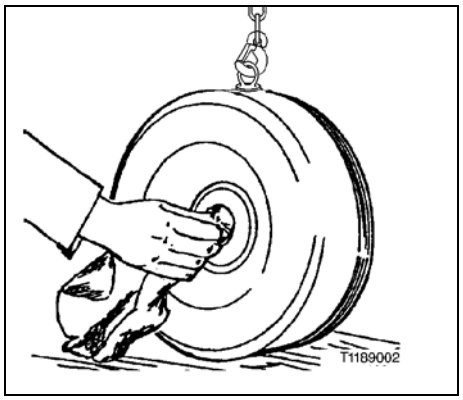


Fig. 50

- Screw the eye bolt into one of the valve holes of the bowl bottom on the floor **as far as it will go**.
- Turn the bowl by means of the hoist.

4.7 Assembling the bowl

- Handle bowl parts with care.
- Assemble the bowl on a rubber mat or wooden pallet.
- Replace worn gaskets.
- Lubricate the threaded areas and guide surfaces of the bowl parts.
- For tools, see order-specific parts list.

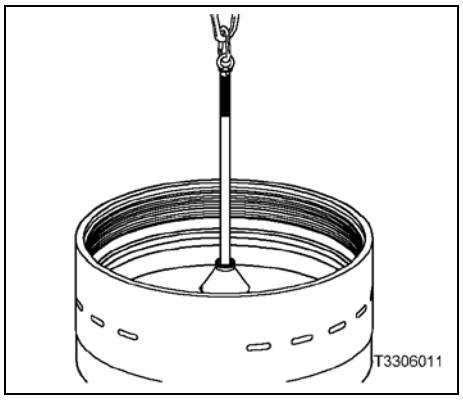


Fig. 51

- Transport the bowl bottom using the threaded spindle.

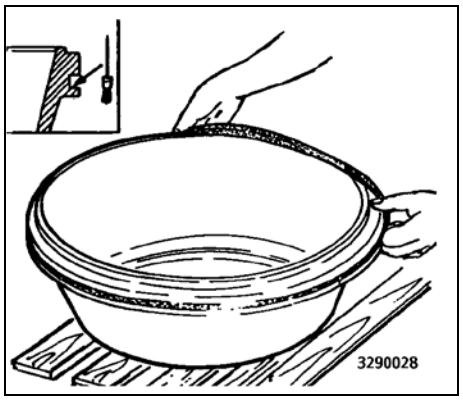


Fig. 52

- Thoroughly clean gasket groove in the sliding piston and apply a thin coat of grease.
- Insert gasket into the groove of the sliding piston.

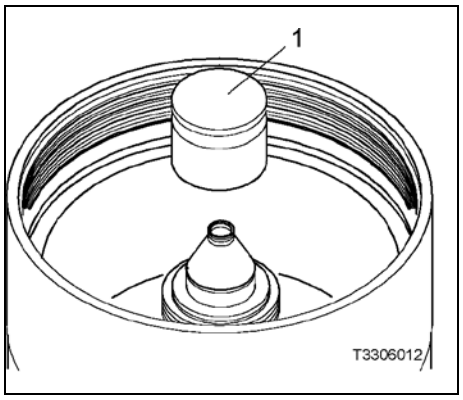


Fig. 53

- Place pressure piece (1) of lifting device for sliding piston onto hub of bowl bottom.

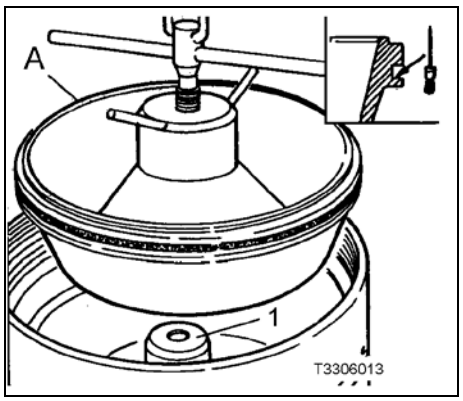


Fig. 54

- Grease guide surfaces of the sliding piston and bowl bottom.
- Insert the sliding piston using the lifting device so that the "O" marks are perfectly aligned.
- Lower the sliding piston slowly by turning the jackscrew counter-clockwise until the arresting pins of the bowl bottom catch into the holes of the sliding piston. If necessary, jolt the piston until it snaps into position.

Attention

- **Fit the gasket in the sliding piston.**
- **Make sure that the sealing lip (A) of the sliding piston does not get damaged.**

- After fitting the sliding piston
  - remove the lifting device,
  - Take out pressure piece (2).

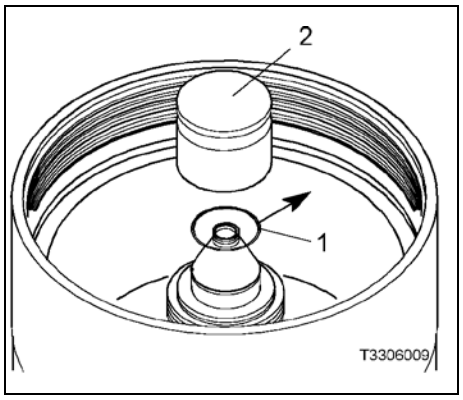


Fig. 55

- Fit gasket (1).

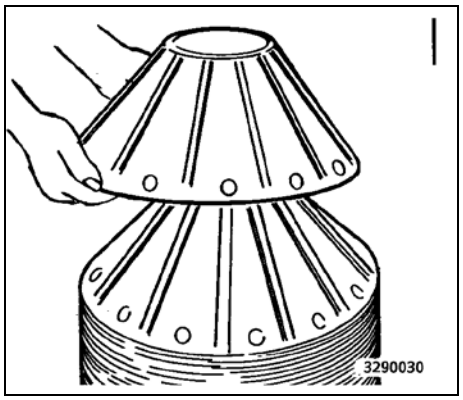


Fig. 56

- In the case of numbered disk stacks, stack the disks onto the neck of the distributor in numerical order, beginning with number 1.

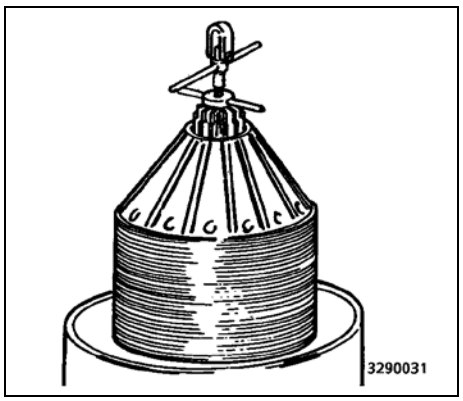


Fig. 57

- Grease contact surfaces.
- Install distributor and stacked discs in the bowl bottom.

  Ensure that the "O" marks on the bowl bottom and distributor are aligned; the locking pins in the bowl bottom will then engage in the holes of the distributor.

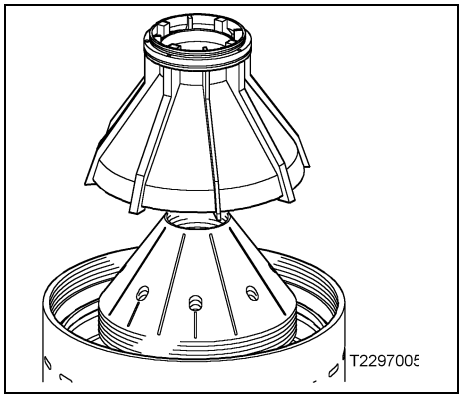


Fig. 58

For type -36- (“self-thinker” system) only:

- Mount separating disk with fitted gaskets.

  Make sure the "O" marks on separating disk and on bowl bottom are in line with each other.

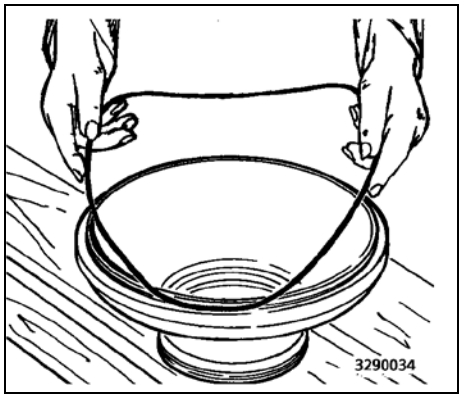


Fig. 59

- Place the bowl top on a wooden or rubber base so that the cylindrical pin is exposed.
- Insert the gaskets in the grooves of the bowl top.

  If the main bowl gasket has to be replaced, see chapter “Replacing the bowl top gasket”.
- Clean and grease guide surfaces of the bowl top.

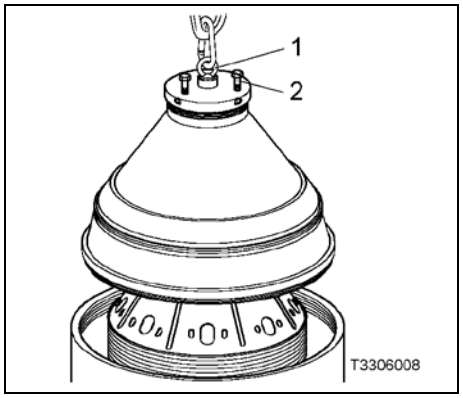


Fig. 60

- Screw threaded sleeve (2) of the compressing device onto the bowl top **(left-hand thread)**.
- Screw in eye bolt (1).
- Lower the bowl top slowly.
  Ensure that the arresting piece of the bowl bottom engages in the groove of the bowl top.
  The "O" marks on both parts must be aligned.

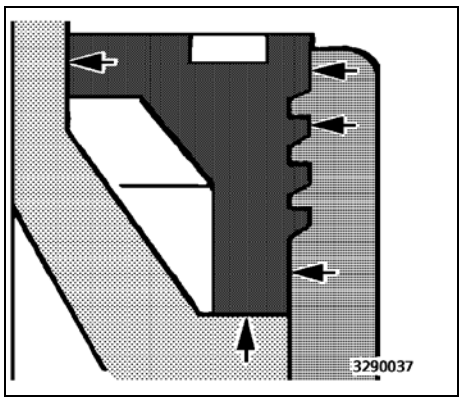


Fig. 61

- Check and grease threads as well as contact and guide surfaces (see arrows).

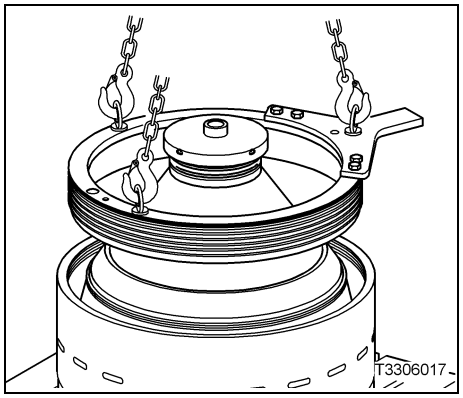


Fig. 62

- Place bowl lock ring on bowl bottom using eyebolts and lifting device.
- First screw in the bowl lock ring by hand using the pin spanner **(left-hand thread)**.

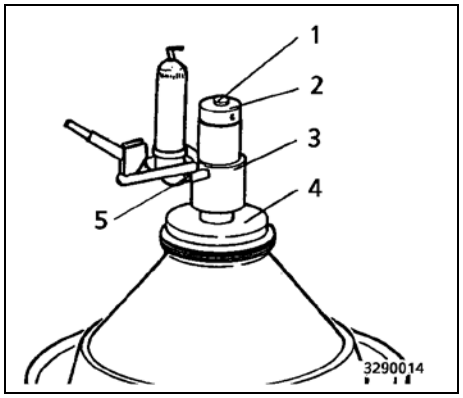


Fig. 63

Mounting the compressing device

- Screw threaded bolt (1) into the bowl bottom **(left-hand thread) as far as it will go.**
- Insert hydraulic part (3) in the centering recess of threaded sleeve (4).
- Screw on threaded ring (2) until its upper edge is flush with end thread of bolt (1) **(left-hand thread).**

To prevent damage to threads:

Caution

- **Screw in threaded bolt (1) completely.**
- **Screw on threaded ring (2) until the end thread of the threaded rod (1) is flush with the upper edge of threaded ring (2).**

If the threaded ring cannot be screwed down completely, then the piston and the cylinder of the compressing device are too far apart.
In this case:

- Bring piston and cylinder back into initial position:
  - Loosen pressure relief screw (5) by two turns.
  - Press the pump lever down as far as it will go.
  - Screw on threaded ring down to thread end.
- Tighten screw connections of the compressing device.
- Close pressure relief screw (5).

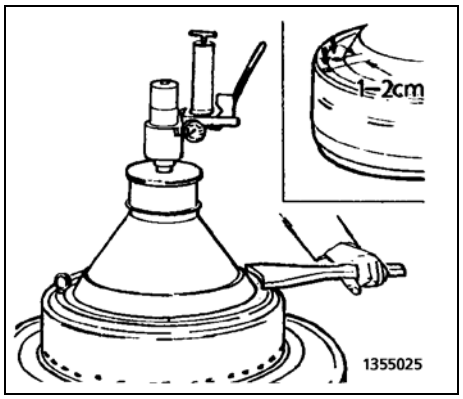


Fig. 64

Compressing the disc stack
Pressure must be gradually applied to the disk stack until the max. disk compression is attained, see data sheet.
Each pressure increase should be approx. 50 bar.
After each pressure increase, tighten bowl lock ring further.
When the max. disk compression of (see data sheet) has been reached, the "O" mark on the bowl lock ring must be approx. 1 -2 cm apart from the "O" mark on the bowl bottom.

If the disk pressure specified in the data sheet is not attained and grease flows out of the stroke limiting hole, bolt (1) has not been screwed far enough into the bowl bottom.
The compressing device is not ready for use again until threaded bolt (1) and threaded ring (2) have been brought into the required end position.

When compressing the disc stack, make sure that the locking piece of the bowl bottom snaps into the groove of the bowl top and that the bowl top does not tilt when lowered.

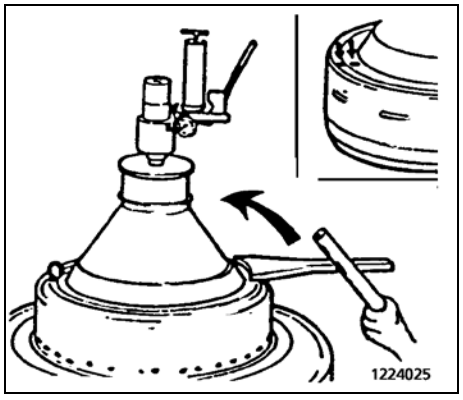


Fig. 65

- Tighten bowl lock ring by rapping the handle of the pin spanner with the striker pin **to obtain "O" mark alignment (left-hand thread)**.

- If the lock ring can be tightened by hand up to the “O” mark at the disk compression (see datasheet), add a spare disk or compensating disk.
- In the case of newly-fitted disc stacks, the pressure in the disc stack can slacken due to settling of the discs. For this reason, check the pressure in the disc stack several times using the procedure described above.
  – At least once a month in the first 3 months.

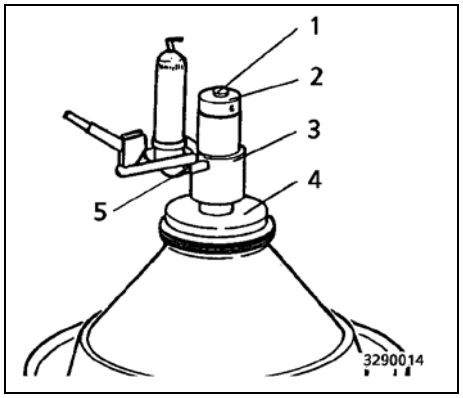


Fig. 66

Dismantling the compressing device

- Move pump lever of compressing device down as far as it will go to prevent it from jumping back. Only then undo pressure relief screw (5).
- Unscrew threaded ring (2) **(left-hand thread).**
- Take off hydraulic part (3).
- Unscrew threaded bolt (1) **(left-hand thread).**

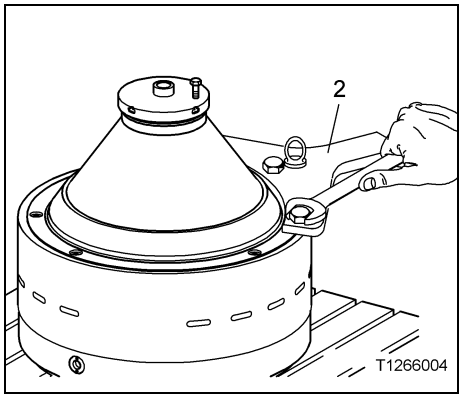


Fig. 67

- Unscrew the hex head screws of the pin spanner (2) and remove it.

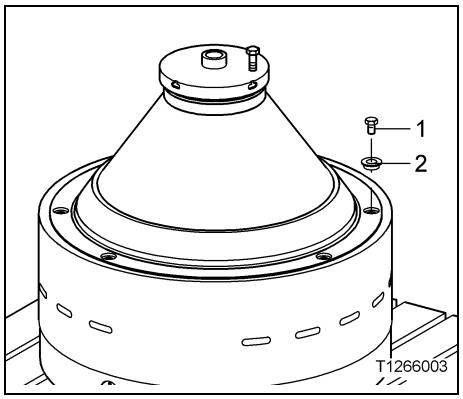


Fig. 68

- Fit plug (2) with screws (1) and tighten.

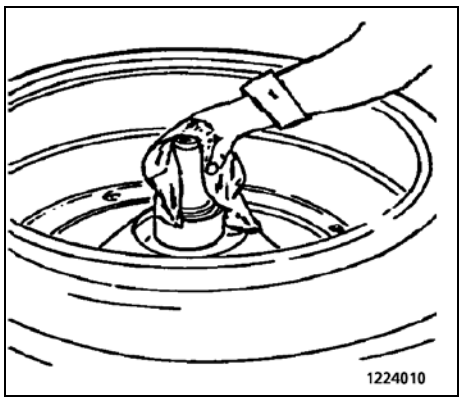


Fig. 69

- Before setting the bowl on the separator spindle, oil the upper part of the spindle (thread and cone).
- **Clean and dry** the conical part of the spindle and the inside of the bowl hub with a cloth to ensure proper fitting.

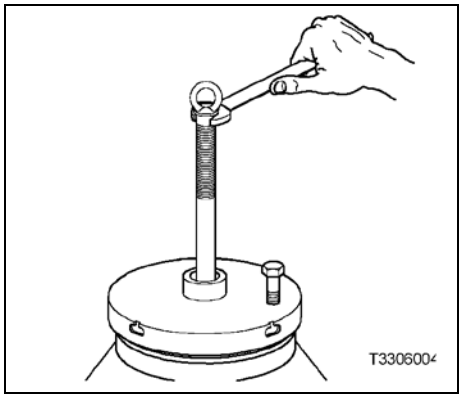


Fig. 70

- Screw the eye bolt onto the threaded bolt.

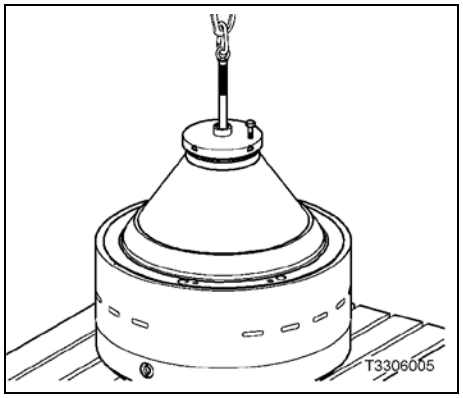


Fig. 71

- Lower the bowl on the spindle.
- Dismantle the device.

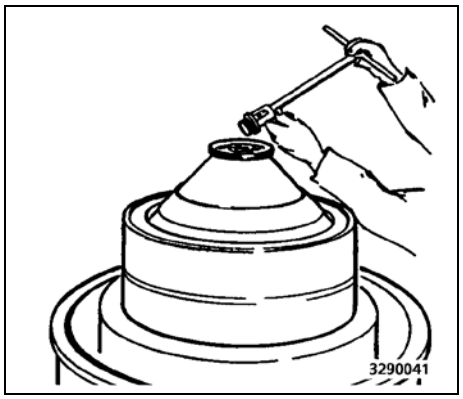


Fig. 72

- Screw spindle screw with gasket inserted firmly into the spindle **(left-hand thread)**.

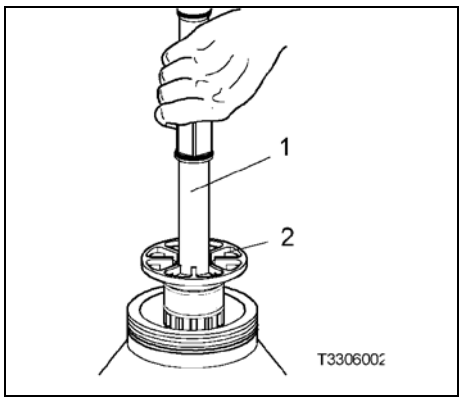


Fig. 73

- Fit feed tube (1) and ribbed distributor (2) with fitted gaskets.

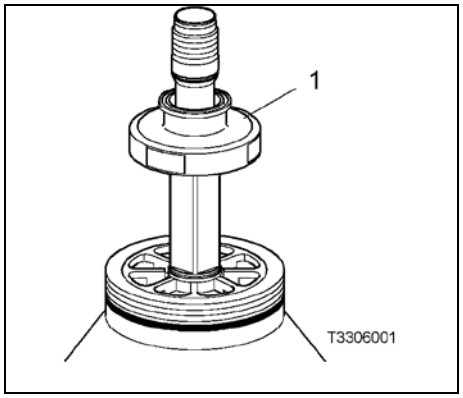


Fig. 74

- Mount centripetal pump (1) with fitted gasket.

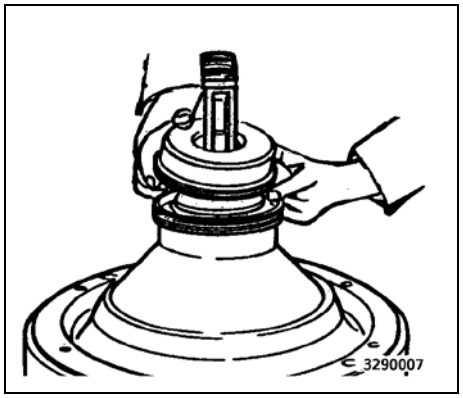


Fig. 75

Only on –06- with hydrohermetic seal or –36- (“self-thinker” control):

- Place on centripetal pump chamber cover with inserted gasket.

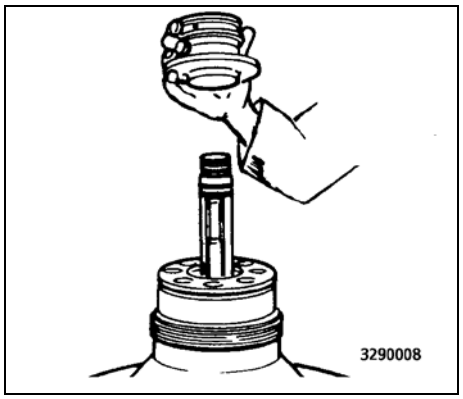


Fig. 76

Only on –06- with hydrohermetic seal or –36- (“self-thinker” control):

- Fit sensing liquid pump with fitted gaskets.

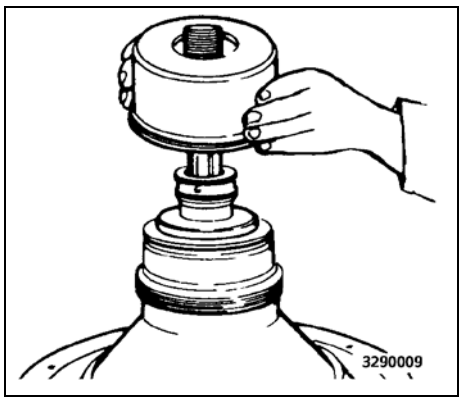


Fig. 77

- Place on centripetal pump chamber cover with inserted gasket.
- Clean and apply a thin coat of grease to the threads on bowl top and in the locking cover.
- Insert gasket into bowl top.
- Screw on cover by hand **(left-hand thread).**

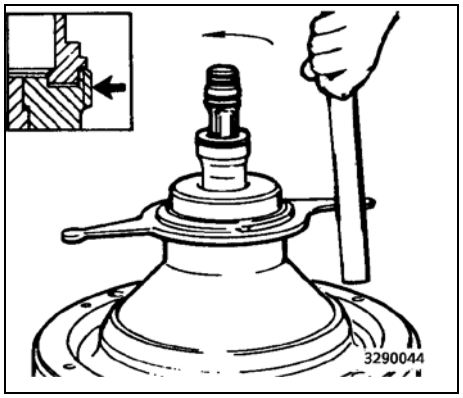


Fig. 78

- Tighten the cover by hammering against the handle of the annular wrench **(left-hand thread).**

4.8 Assembling the feed and discharge connections

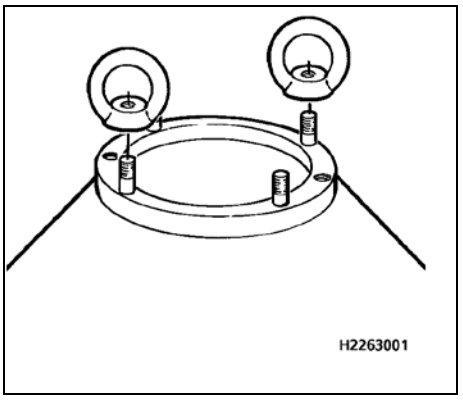


Fig. 79

- Screw two ring nuts opposite each other onto the studs of the hood.

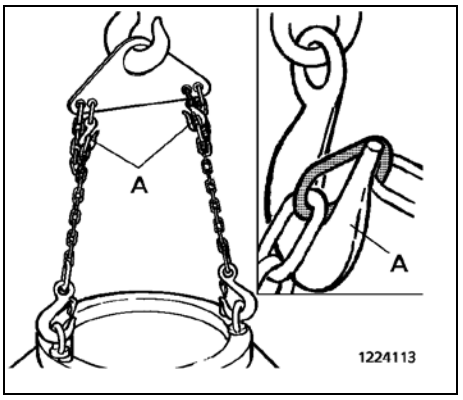


Fig. 80

- Shorten the chains of the lifting device.
  The chain link must be put crosswise on hook A (see adjacent small figure)!
- Hang the shortened lifting device into the lifting-eye nuts and place the hood on the solids catcher.
- Bolt hood and solids catcher together using hex head screws.
- Connect hood flush line.
- Connect the cooling lines.

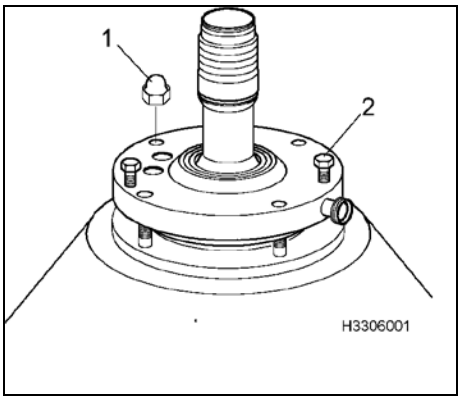


Fig. 81

- Unscrew the puller screws.
- Place on ring with inserted gasket. **Pay attention to correct positioning!**
- Screw on cap nuts tightly.

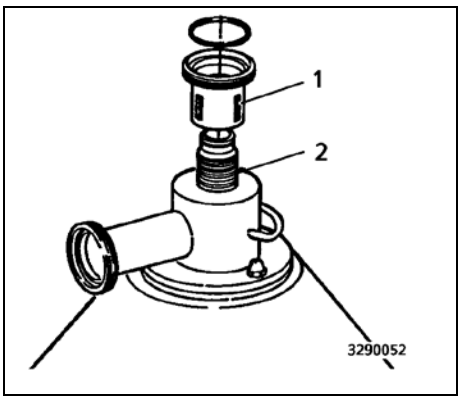


Fig. 82

- **Lightly** grease the threads on the centripetal pump and in the connection piece.
- Screw connection piece 1 onto centripetal pump 2 and fasten tightly **(left-hand thread)**.

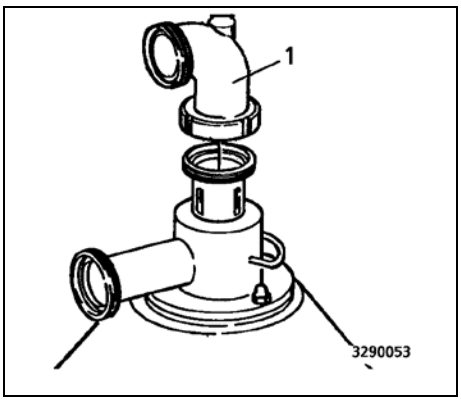


Fig. 83

- Mount pipe bend 1 and bolt tight.
- Connect the feed and discharge lines.

4.8.1 Replacing the main gasket in bowl top

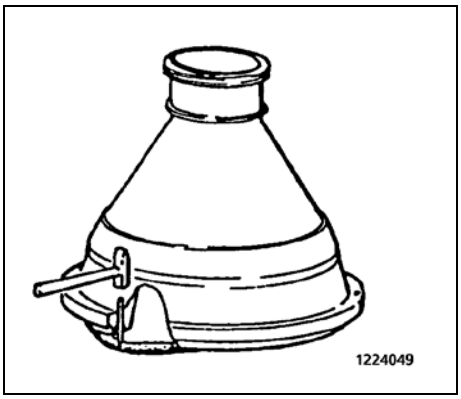


Fig. 84

Removal

- If the bowl top has orifices for a pin punch, drive out the gasket out of the bowl top groove, using a pin punch
- If the bowl top has venting holes, lever the gasket out of the bowl top groove without damaging the groove.

NOTE

Perfect functioning of the ejection system can only be assured when damage to the gasket groove is prevented while removing the gasket.

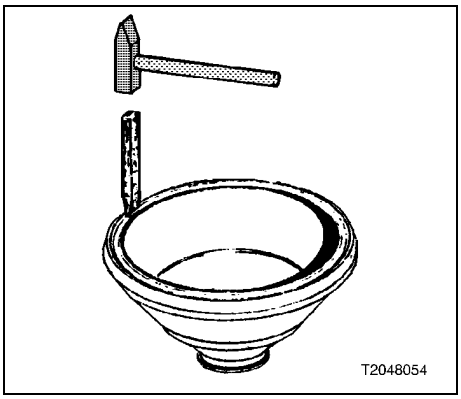


Fig. 85

Fitting

- Check the gasket and the groove for damage.
- Insert the gasket in the cleaned groove of the bowl top (with the narrow side towards the bowl top).
- Use an appropriate tool to drive the gasket into the groove crosswise and evenly, until it rests on the bottom of the groove.

NOTE

Perfect functioning of the ejection system can only be assured when impermissible roughness or mechanical damage to the gasket is prevented during fitting.

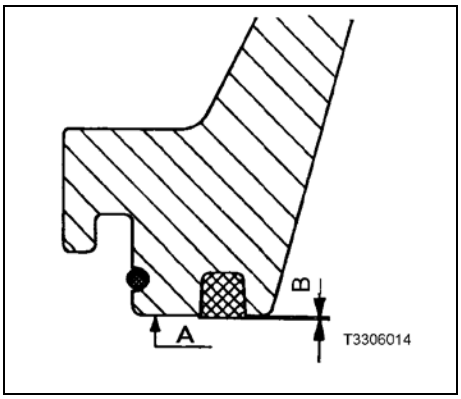


Fig. 86

If the gasket cannot be driven down to the bottom of the groove, it should normally not protrude over the surface “A” of the bowl top by more than 1 – 1.5 mm (height “B”).
During the first operation, after a 15 minutes’ warm-up run (without product), it can be pressed into its final position by performing several total ejections (without product).

NOTE

When installing a new polyamide gasket, the gasket diameter is normally smaller than the groove diameter.
To facilitate fitting of the gasket, soak it for about 5 min. in a water bath at a temperature of 70 - 80°C (160 -175°F).
It will resume its original dimensions after cooling.

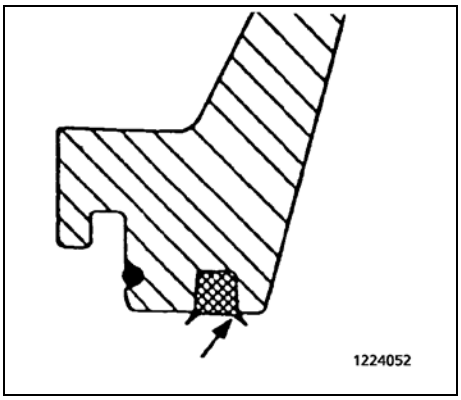


Fig. 87

Please observe the main bowl gasket after the first use and each time when having replaced it.
If the gasket has protruding edges after about 4 weeks' operation, remove them with a knife.
Excessive protruding edges can cause extensive damage to the gasket, leading to bowl leakage.

NOTE

Humidity might cause the main bowl gasket to swell and to become too large. If this has happened, it can be dried at 70 - 80 °C (160 - 175 °F).

4.8.2 Wear inserts (option)

The wear insert protect the highly stressed bowl material in the area of the solids ejection ports against wear .

Attention

It is absolutely necessary to keep a regular check of the wear inserts and to replace them in good time.

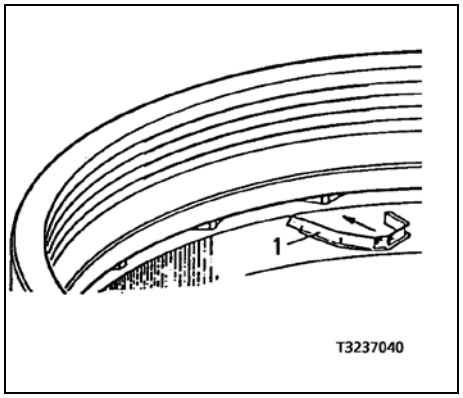


Fig. 88

Removal:

- Bend the nose at the end of wear insert 1 backwards.
- Tap the wear insert carefully inwards.

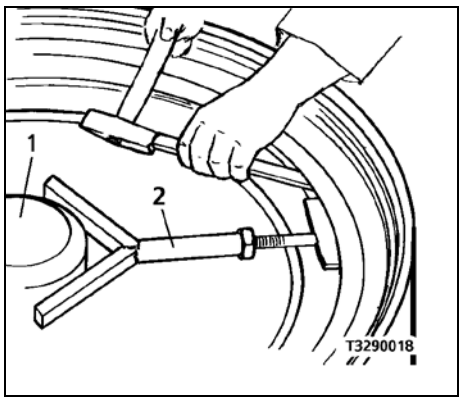


Fig. 89

Fitting:

- Apply pressure piece 1 (sliding piston).
- Install the wear insert. The wear insert must perfectly rest against the bowl wall.
- Insert the tensioning device between pressure piece and wear insert and tighten slightly.
- Carefully bend the nose of the wear insert.

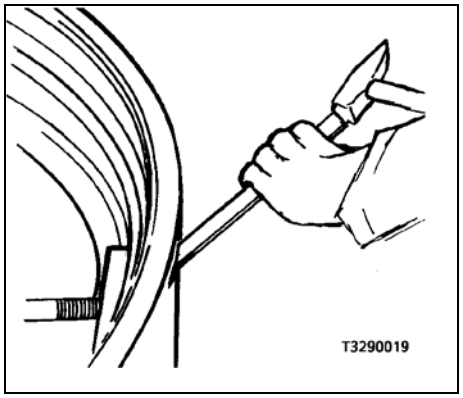


Fig. 90

- Bend the wear insert carefully inwards.

4.9 To disassemble bowl valves

- Remove and clean bowl valves in accordance with maintenance plan.
- For tools, please refer to order-related spare parts list.

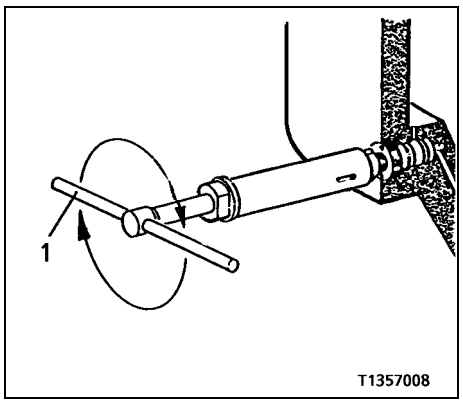


Fig. 91

- Screw socket wrench (1) into the bowl valve.

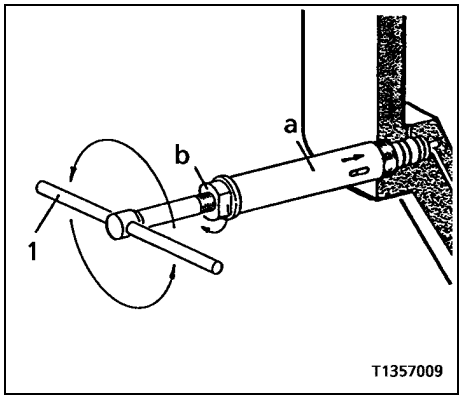


Fig. 92

- Insert sleeve (a) of the socket wrench with the pins into the drill holes of the bowl valve.
- Tighten collar nut (b).
- Unscrew bowl valve with socket wrench (1) from the bottom part of the bowl.

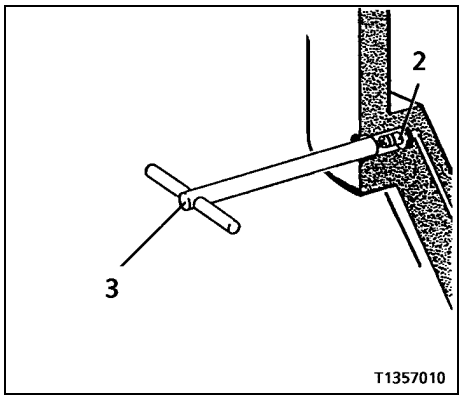


Fig. 93

If the valve piston (2) sticks in the bottom part of the bowl when it is being removed:

- Screw wrench (3) into the valve piston.
- Remove valve piston (2) from the bottom part of the bowl with wrench (3).

- Check seal and sealing rings and replace, if necessary.

4.10 To install bowl valves

- In order to install the sealing rings, use tools in accordance with the order-related spare parts list.

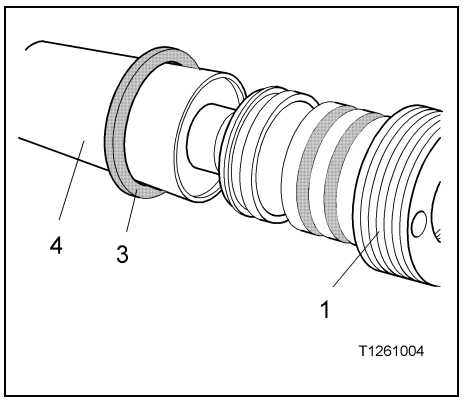


Fig. 94

- Widen the sealing ring (3) over the arbor (4) and insert in valve housing (1).

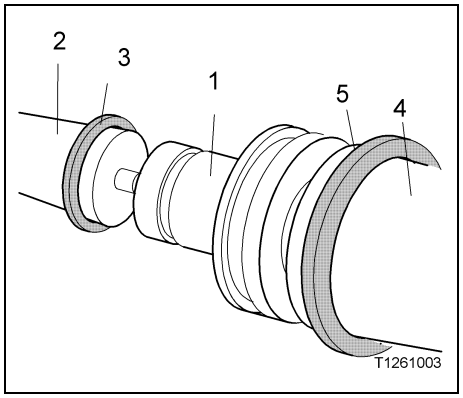


Fig. 95

- Widen sealing ring (3) and (5) over the arbor (2) and (4) and insert in valve piston (1).

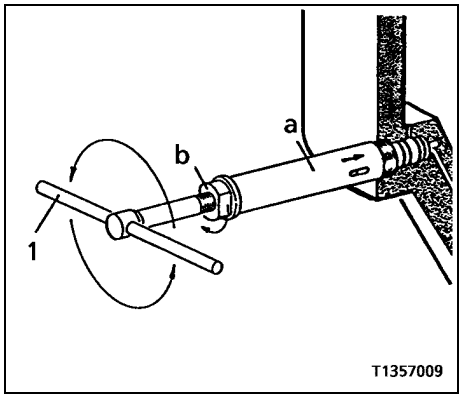


Fig. 96

- Apply grease to thread and sealing rings.
- Screw socket wrench into the bowl valve, insert sleeve (a) with pins into the drill hole of the bowl valve.
- Tighten collar nut (b).
- Screw in bowl valve until it goes no further, do not overtighten.
- The face of the valve housing must be flush with the external wall of the bottom part of the bowl.
- Loosen collar nut (b).
- Push back sleeve (a).

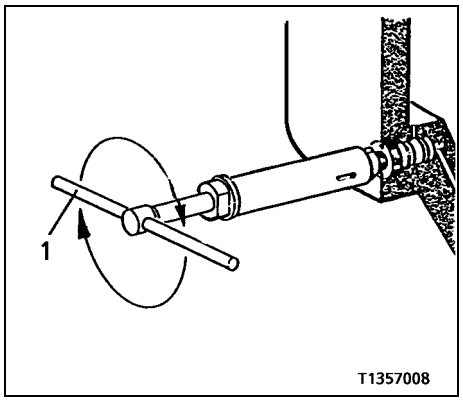
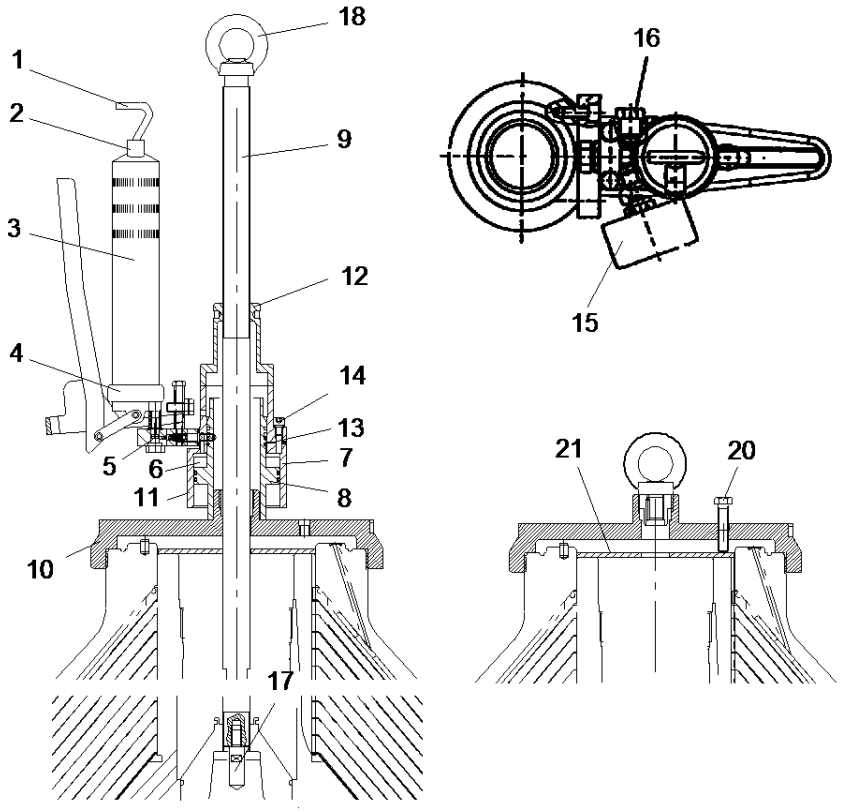


Fig. 97

- Unscrew socket wrench (1) from the bowl valve.

4.11 Disc stack compressing device



1 Filling device
2 Clamping piece
3 Grease cartridge
4 Pump head
5 Non-return valve
6 Pressure chamber
7 Hydraulic cylinder
8 Annular piston
9 Threaded bolt
10 Threaded sleeve
11 Hydraulic part
12 Threaded ring
13 Stroke limiting hole
14 Vent screw
15 Pressure gauge (0-600 bar)
16 Pressure relief screw
17 Pressure piece
18 Eye bolt
20 Forcing screw for bowl top
21 Disk

Fig. 98

Operating principles

The pump presses grease at a high pressure into pressure chamber (6).

The increase in pressure in the pressure chamber displaces piston (8) in relation to hydraulic cylinder (7).

The hydraulic part (11) (piston, hydraulic cylinder) is bolted securely to the bowl bottom by means of threaded bolt (9) and threaded ring (12).

When the pressure increases in pressure chamber (6), piston (8) is forced downwards.

The force produced is transferred via threaded sleeve (10) on to the bowl top. The disc stack is compressed.

Disk-stack compression: see datasheet

Pump

It consists of:

- Pump head
- Grease cartridge
- Filling device
- Non-return valve

Filling the grease cartridge

Cartridge filling: 450 g special grease K2R

The grease cartridge of the compressing device is filled with special grease before shipment.

- Actuate clamp piece (2) and pull filling device (1) upwards.
- Unscrew grease cartridge (3) from pump head (4).
- Fill in grease, approx. 450 g.
- Screw grease cartridge (3) into pump head (4).
- Actuate clamp piece (2) and push filling device (1) into grease cartridge (3).

Fill the grease cartridge only with WS special grease K2R.

If there is no build-up of pressure, the following must be checked:

- **Is pressure relief screw (16) screwed in tightly?**
- **Is there enough K2R grease in the grease cartridge?**
- **Has piston (8) travelled too far out of hydraulic cylinder (7)?**

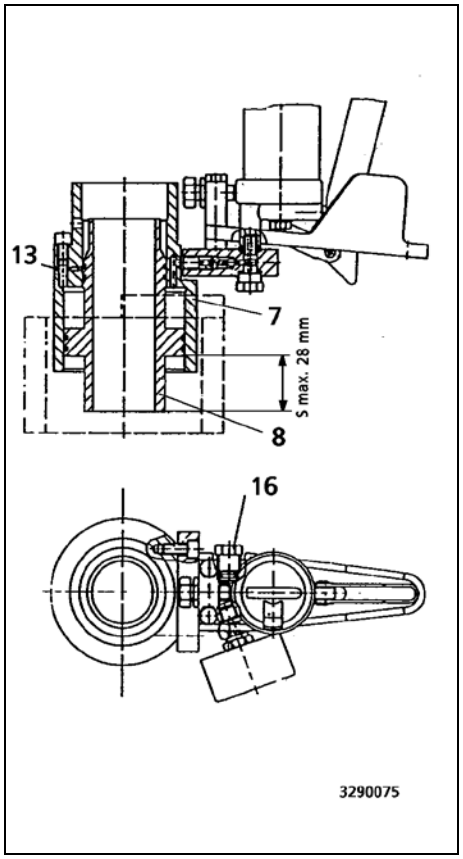


Fig. 99

If yes:

- Unscrew pressure relief screw (16) a little way.
- Press piston (8) back into hydraulic cylinder (7). This must be done in the absence of pump pressure.
- Re-tighten pressure relief screw (16) **firmly**.

7 Hydraulic cylinder
8 Annular piston
16 Pressure relief screw
13 Stroke limiting hole

- If grease oozes out through the stroke limiting hole (13), threaded bolt (9) and threaded ring (12) have not been screwed into their final position, and the stroke is too long.

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5 Drive

5.1 Drive

All work on the drive may only be carried out by **specialists authorized by Westfalia Separator.**

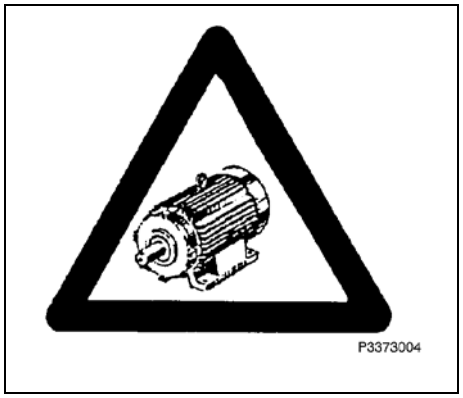

Fig. 100

- Before carrying out maintenance or repair work on the motor, bear in mind that there may still be residual voltage.
- For this purpose,
  - read the operating instructions given by the manufacturer of the frequency converter,
  - have the appropriate measures taken by specially trained staff.

Caution

During all work on the drive, disconnect the power to the separator and secure against re-starting!
Replace damaged gaskets immediately!

Before removing separator parts, their fitting position must be marked. This eliminates later problems caused by fitting the part in the wrong position.

Before fitting, the grease must be removed from all contact surfaces of the slide-ring packings.

Attention!

Since slide-ring packings are easily destructible, they may only be fitted by specially trained personnel.

Safety risks can arise from the use of non-genuine spare parts. In addition, the durability of such parts is frequently significantly lower which leads to a higher maintenance requirement and lower availability!

Attention!

Therefore, only genuine original spare parts may be used!

5.1.1 Special risks of a separator

The separator is equipped with a high-speed rotating metal bowl which represents a danger potential not to be underestimated on account of the rotational energy which can pose a danger for the installation and persons working in the installation when not properly handled.

CAUTION!

Switch off the separator before carrying out maintenance or repair work.
Wait, observe and check that all rotating parts are at a standstill.
Do not reach into the rotating drive section or bowl!
Do not loosen any part before the bowl has come to a standstill!

Risk of injury and danger to life through rotating parts.

Standstill should not be checked using only one source of information (e.g. speed indicator) but must be backed up by at least one further checking device. It must always be reckoned with that the first used standstill indication will provide false information because, for example, the electronics have failed or the belt or gear in the drive is defective.

The following options are available for checking standstill on separators depending on the version:

- Electric speed indicator
- Revolution indicator or sight glass on the gear cover of gear separators
- Optical speed check of the drive motor
- Noise check
- Vibration check

If one is not sure whether the machine is at a standstill, one must wait for the run-down time specified in the separator documentation. A subsequent check is carried out when one is sure that the machine is at a standstill.

- Visual speed check by opening the inspection ports on hood and frame

If it is possible to remove an inspection port cover, bowl standstill can be checked through it.

In addition, checking is also possible by removing the gear cover or opening the port in the drive housing on some drive versions.

If none of these possibilities is available, speed measurement of the separator must be carried out in a failsafe way. With minimum Performance Level c(PL c) according to EN 13 849-1 or one must wait until the machine has run down.

NOTE

Only when one is convinced that that the separator is at a standstill can one carry out the following checks for additional security.

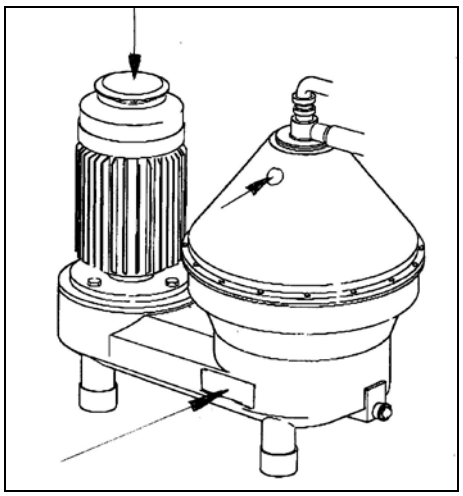

Fig. 101

Revolution visual check on machines with belt drive.

You can observe whether the machine is at a standstill at the points marked with the arrows.

We reserve the right to carry out design modifications.

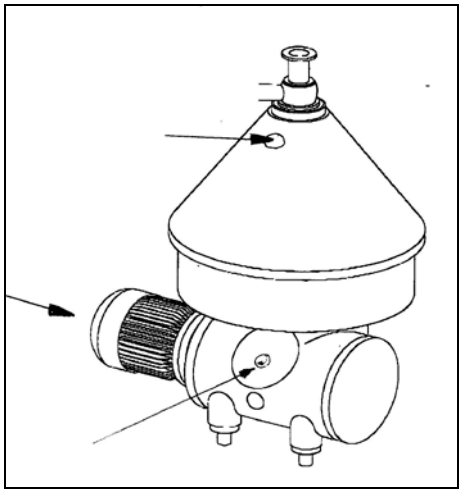

Fig. 102

Revolution visual check on machines with gear.

You can observe whether the machine is at a standstill at the points marked with the arrows.

We reserve the right to carry out design modifications.

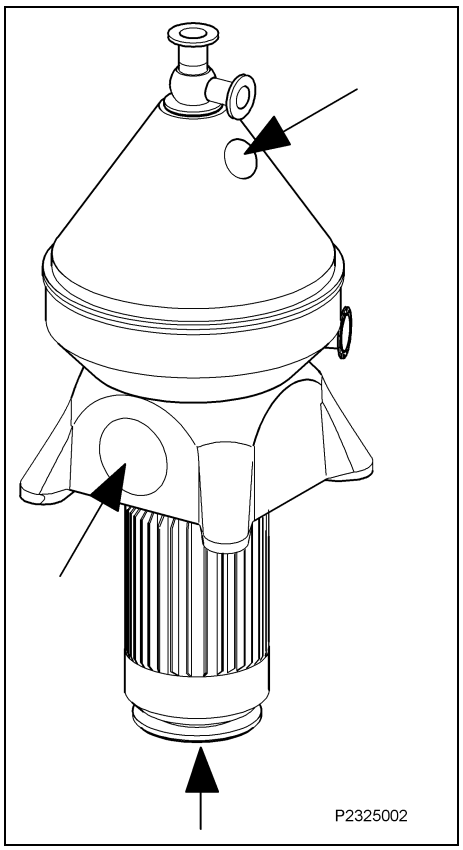

Fig. 103

Revolution visual check on machines with direct drive.

You can observe whether the machine is at a standstill at the points marked with the arrows.

We reserve the right to carry out design modifications.

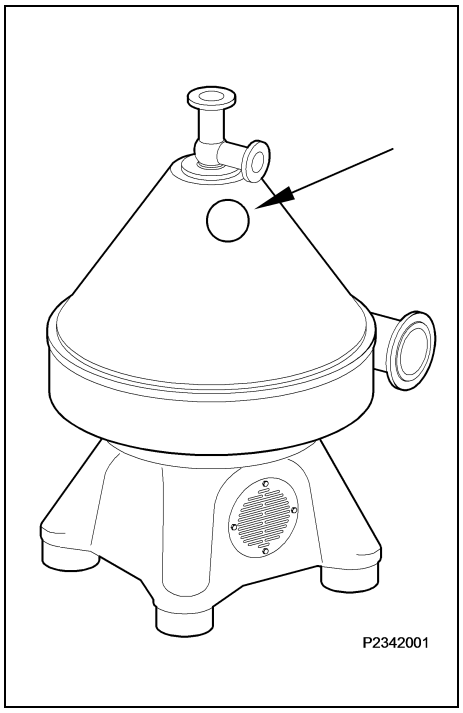

Fig. 104

Revolution visual check on machines with integrated direct drive:

You can observe whether the machine is at a standstill at the point marked with the arrow.

We reserve the right to carry out design modifications.

NOTE

Observing the motor fan on flat belt or hear machines is not a reliable method of checking standstill because the motor or fan can already be at a standstill when the separator bowl is still rotating.

During cleaning programs (steam sterilization and CIP), very high temperatures are reached on the surfaces of the separator and piping.

CAUTION!

During cleaning programs, the surfaces of the separator and pipes are very hot.

Danger of burns!

With some products, the separator has to be cooled. As a result, temperatures of up to minus 30 °C are reached on the surfaces of the separator and pipes.

CAUTION!

When the cooling is switched on, the surfaces of the separator and pipes can get very cold.

Danger of frostbite!

CAUTION!

Depending on type and installation site, hazards in the form of noise emission from the separators machine may occur. Therefore, always wear protective gear in accordance with the national regulations.

Danger of hearing damage!

CAUTION!

During all maintenance and repair work on the separator, the fittings and pipelines, there is the risk of injury due to spurting liquids, e.g. hot or caustic liquids can spurt out under pressure.

Danger of causticization of skin and eyes!

5.1.2 Safety precautions for maintenance and repair

- Observing the maintenance intervals and user information is decisive for the service life and permanent operating readiness of the separator.
- The maintenance intervals depend on the operating conditions. Especially highly stressed parts of the separator must be regularly checked. Reduce the maintenance intervals to adapt to the operating conditions!
- Timely maintenance of the separator is essential for safe operation.

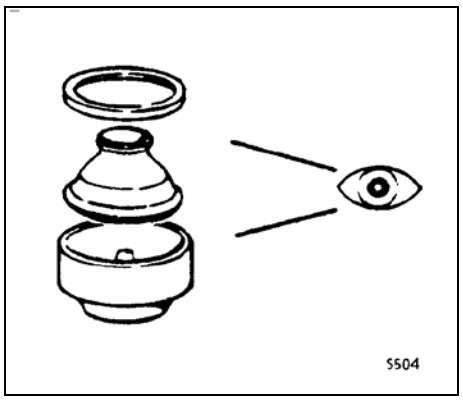

Fig. 105

Especially highly stressed parts of the separator such as
– Bowl lock ring
– Bowl bottom,
– Bowl top
must be regularly checked (at least once a year) as specified in the maintenance schedule to assure safe and efficient operation.

Fig. 106

When carrying out maintenance and repair work:

- **Do not climb onto or stand on the machine or parts of the machine!**

Danger of injury through slipping or falling down!

- Repairs to the separator may only be carried out by service technicians from Westfalia Separator or personnel trained and certified by Westfalia Separator.

Fig. 107

- During maintenance and repair work, make sure that the main switches are switched off and secured against restarting.
- Make sure that other persons do not have the possibility to start the machine before the maintenance or repair work is finished.

- Make sure that the rotating parts of the separator (drive, bowl) are at a standstill before carrying out maintenance and repair work.

- When the machine is defective, a warning sign must be attached and the separator must be secured against unauthorized starting.

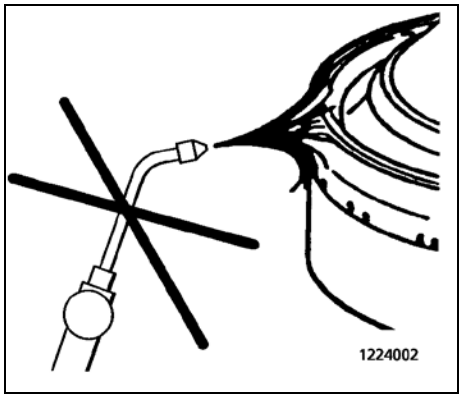

Fig. 108

- **Do not heat bowl parts with a naked flame to facilitate dismantling work.**

Structural changes in the material of the bowl parts which affect the operating safety of the machine may result!

- **Do not weld bowl parts**.

- Do not weld hood and solids catcher parts of steam-sterilizable separators.

Dismantling the bowl safely

When bowl parts are to be lifted or moved, internal, loose parts can get twisted or jammed and unintentionally be lifted or moved as well. They can then break loose in an uncontrolled way, fall down and cause serious injuries.

WARNING

When lifting of moving, parts can be dislodged from the bowl in an uncontrolled manner and fall down!

Danger of injury due to bowl parts falling down!

- Wear protective gear, e.g. safety shoes or protective helmet.
- Before dismantling the bowl, ensure that the bowl and assembly jig are aligned horizontally so that bowl parts do not jam or twist during lifting or moving.
- The order of dismantling and fitting described in this manual must be observed.
- When lifting or moving parts, ensure that no other parts, in particular internal parts, are unintentionally lifted or moved as well.
- Parts put together must be completely dismantled from each other.

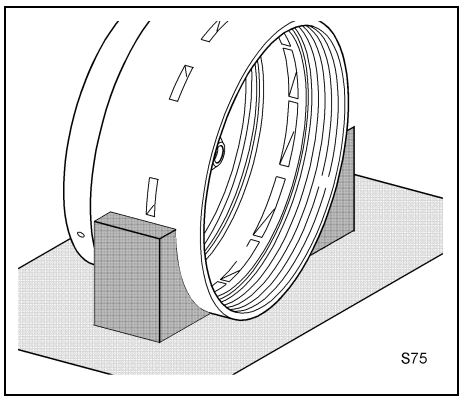

Fig. 109

- Place the dismantled separator parts on suitable surfaces (rubber, wood etc.).
- Take appropriate steps to prevent machine parts from overturning and rolling away.

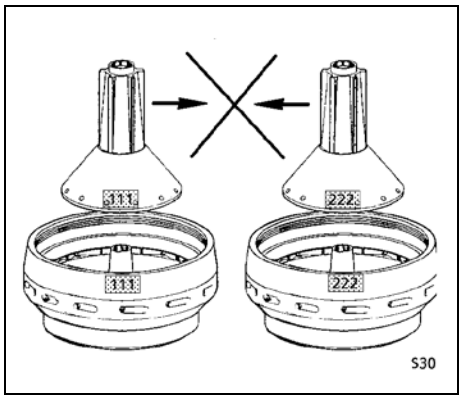

Fig. 110

- When carrying out assembly work on several separators, be careful not to interchange parts of different bowls! Each bowl must be balanced with its respective components.

The parts are marked with the serial-number of the machine or with the last three digits of the serial number.

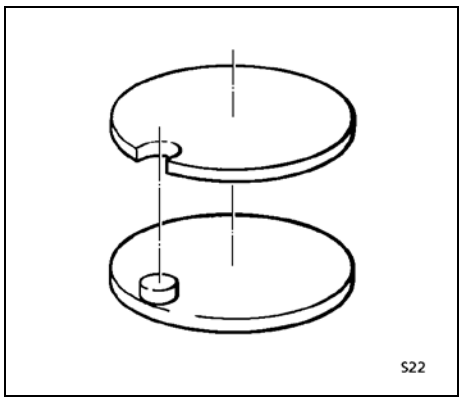

Fig. 111

- Some bowl parts must be arranged in fixed positions relative to one another.
- Locking devices and alignment marks must be in perfect condition.

The separator may not be operated when locking devices and marks on the bowl parts are damaged.

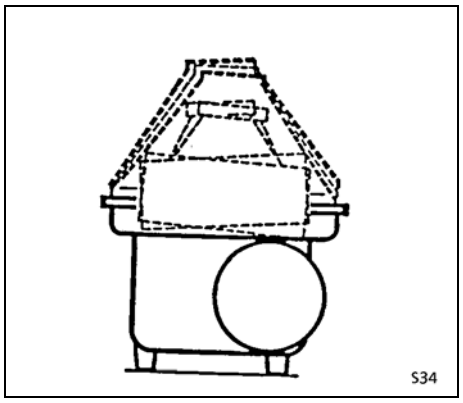

Fig. 112

- After fitting certain new bowl parts (e.g. bowl bottom, bowl top) the bowl must be re-balanced.

Bowl balancing may only be carried by specialists from Westfalia Separator or specialised workshops authorized by Westfalia Separator!

If in doubt, consult the service department of Westfalia Separator.

CAUTION!

Unqualified balancing can lead to dangerous operating states and to destruction of the separator with danger to life and limb of the personnel.

- Do not manipulate speed-altering devices such as frequency converters so that the maximum admissible bowl speed (see nameplate or “technical data” in the instruction manual) is not exceeded.
- Ensure that monitoring devices (e.g. speed sensors etc.) are not manipulated or damaged and check their function in accordance with the instructions in chapter **“Maintenance and repair – maintenance schedule**”.
- After maintenance and repair work on the separator, refit all protective devices.
- When carrying out maintenance and repair work, carry out a visual check of the separator components. Have the components checked for damage through **corrosion** and **erosion** by **authorized specialists** and proceed in accordance with the instructions in chapter **“Maintenance and repair – inspections**”.

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5.2 Replacing the flat belt

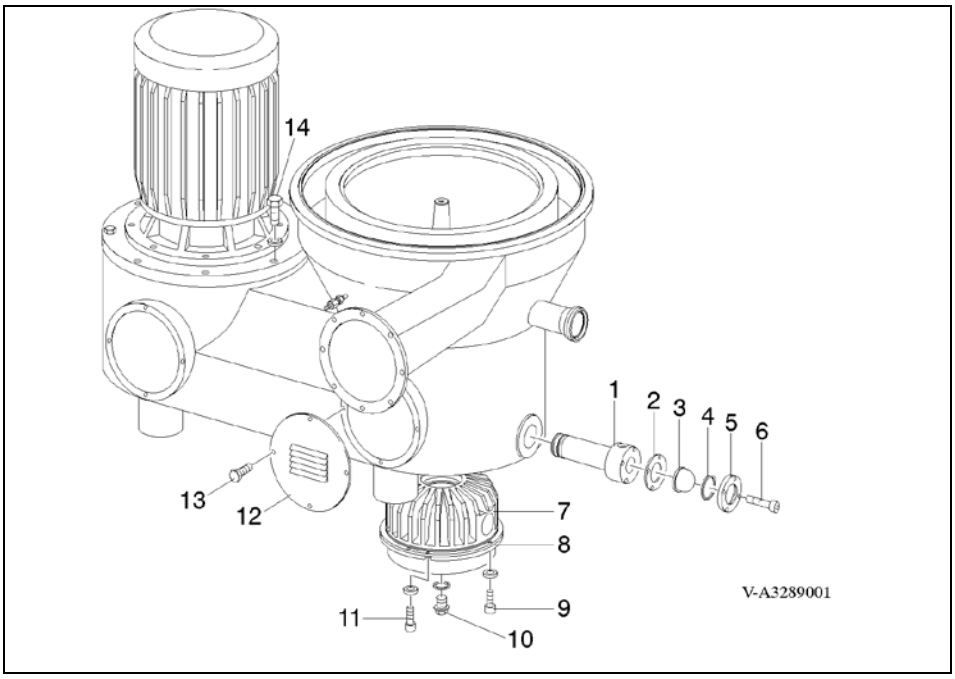

Fig. 113

Removal

- Loosen oil drain screw 10 and let oil drain.
- Remove oil return housing 1.
- Remove oil pan 7, 8:
  - Unscrew hex head screws 9 and remove lower part of oil pan 8.
  - Unscrew hex head screws 11 and remove upper part of oil pan 7.
- Unscrew hex head screws 13 and remove ventilation grid 12.
- If necessary, loosen electrical connections.
- Unscrew fastening screws 14 from intermediate flange of motor.

Alternatively, the spindle assembly with supporting disk can be dismantled for replacing the flat belt (see section “Removing the spindle assembly with supporting disk”).

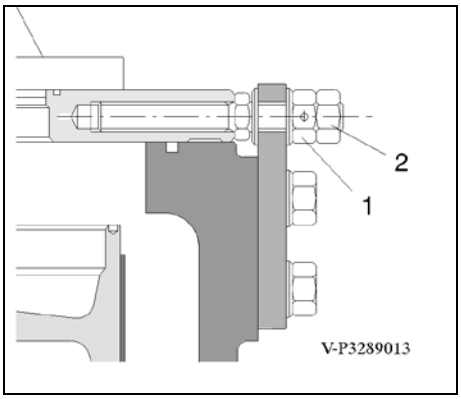

Fig. 114

Slacken flat belt:

- Undo lock nut 2.
- Turn adjusting nut 1 anti-clockwise until the flat belt can be taken off.
- Remove the flat belt.
- Clean the pulley faces with a suitable cleaning agent.

IMPORTANT

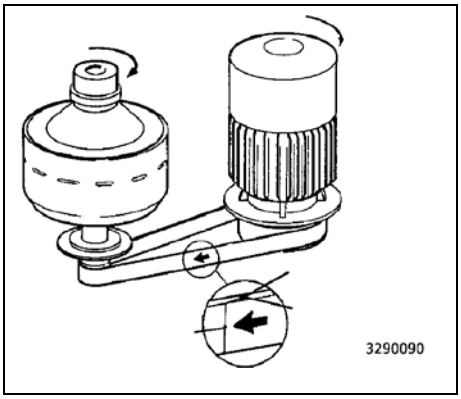

Fig. 115

Fitting

- Place on the new flat belt.

The arrow on the flat belt must point in the direction of rotation.
The outer belt joint then reaches the flat belt pulley **before** the inner belt joint.

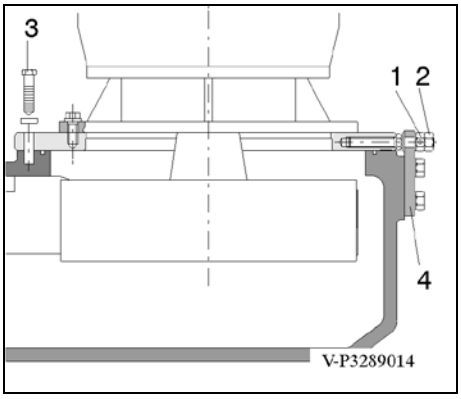

Fig. 116

- Tensioning the flat belt:

Turn adjusting nut 1 clockwise until the motor intermediate flange rests against plate 4.

When tensioning the belt rotate the belt from time to time so that the belt stays in the correct position and the force is distributed equally along the whole of the belt.

Screw in tightening screws 3 on the intermediate flange.

Tighten lock nut 2.

Fit the following parts in reverse order of removal:

- Oil pan
- Oil return housing
- Ventilation grid

Finally:

- Replace gasket on oil drain screw.
- Fill in new oil (see chapter “Lubrication” section oil quality and the datasheet “Oil quantity”).

5.3 Fitting and removing the motor

Danger of injury through running machine!

Before carrying out work on drive and drive components:

Caution

– Set the main switch of the separator to "OFF".
– Disconnect power to the motor control and
– secure both against switching back on!

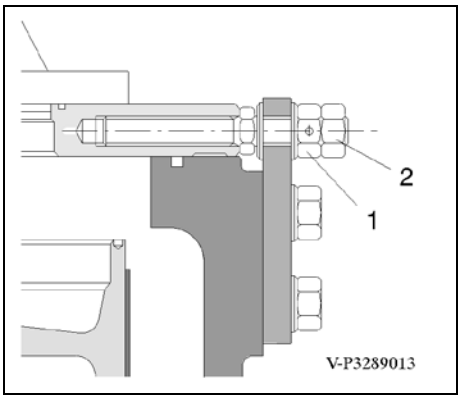

Fig. 117

- Undo lock nut 2.
- Turn adjusting nut 1 anti-clockwise until the flat belt can be taken off.
- Remove the flat belt.

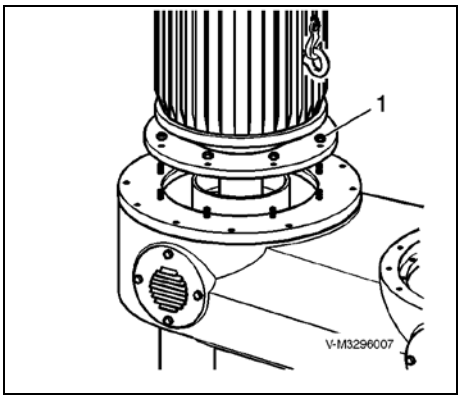

Fig. 118

- Disconnect the electrical connections.
- Remove hexagon nuts 1.
- Lift off the motor with the aid of the hoist.
  Leave the intermediate flange on the frame.

For fitting the motor, proceed in the opposite order from removal.

- After fitting the motor, check the direction of rotation of the motor (see chapter “Motor connection” or the instructions in the safety brochure.

5.4 Removing the spindle assembly and supporting disk

Attention

Protect the speed sensor against damage!

- Before removing the spindle assembly, undo the clamp screw of the speed sensor and pull out the speed sensor.
- The holder can be left in position!

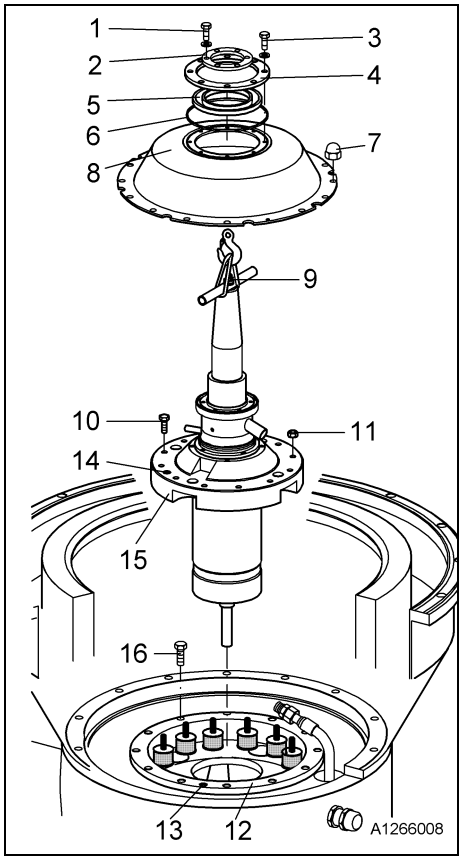

Fig. 119

Spindle assembly

- Remove flat belt or leave it slack in the frame.
- Unscrew hex head screws 1 with gasket and remove ring 2.
- Unscrew hex head screws 3 with gasket and remove ring 4.
- Lift seal 5 and gasket 6 off guard plate 8.
- Unscrew cap nuts 7 and remove guard plate 8.
- Remove the hoses from the connections.
- Unscrew hex head screws 10 and hexagon nuts 11 (rubber-metal cushion).
- Thread four screws (M12x90) into the puller threads 14 of the bearing housing 15.
  Force the bearing housing 15 off the supporting disk 12 by alternately and evenly tightening the screws.
- Screw spindle lifter 9 into the threaded hole of the spindle and lift out the spindle unit.

Supporting disk

- Unscrew hex head screws 16.
- Screw in four of the screws into the puller threads 13 of supporting disk 12.
- Force the supporting disc 12 off the frame by tightening the screws alternately and evenly.

5.5 Removing the spindle together with the supporting disk

Attention

Protect the speed sensor against damage!

- Before removing the spindle assembly, undo the clamp screw of the speed sensor 10 and pull out the speed sensor 10.
- The holder can be left in position!

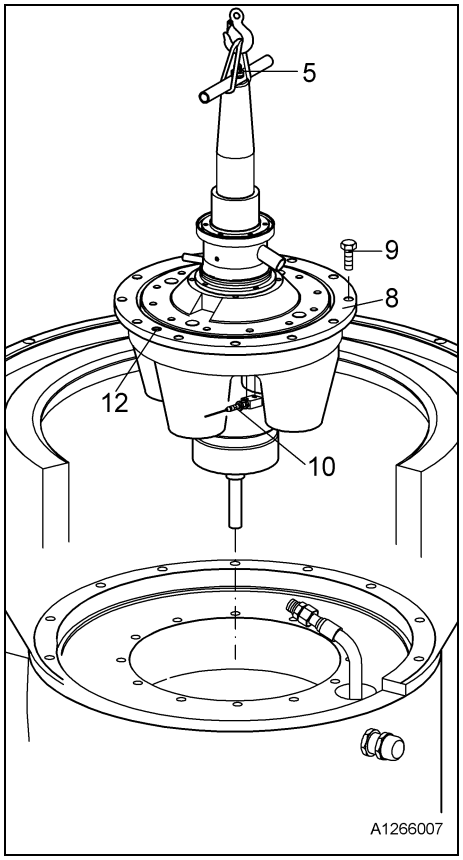

Fig. 120

As an alternative to the previous section, the spindle unit can also be removed together with the supporting disk.

- Remove wear insert 3 (see previous section).
- Disconnect the hoses from the connections.
- Unscrew hex head screws 9 (for supporting disk).
- Screw in four of the screws into the puller threads 12 of supporting disk 8.
- Force the complete spindle unit off the frame by alternately tightening the screws.
- Lift out the spindle unit with supporting disk, bearing housing and operating-water feeding device with spindle lifter 5.

5.6 Removing the belt pulley

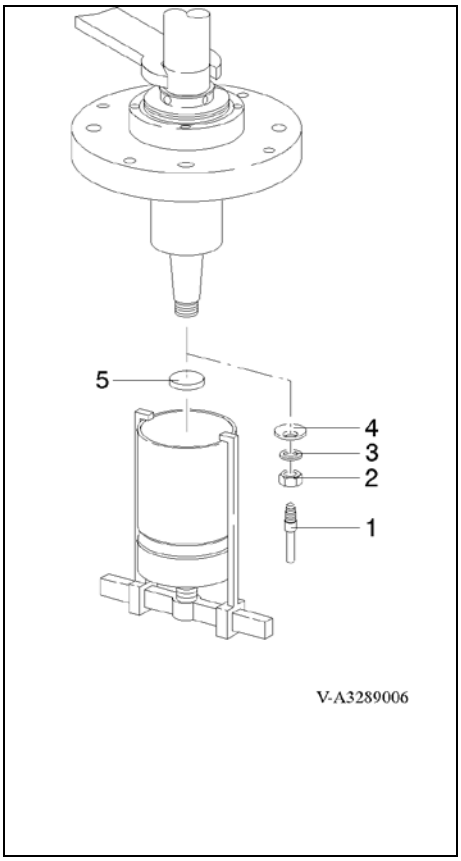

Fig. 121

- Unscrew the suction pipe 1 from the spindle.
- Unscrew hexagon nut 2, washer 3 and cup spring 4.
- Mount pressure disk 5 to protect the spindle.
- Pull the belt pulley off the spindle using a commercially available puller.

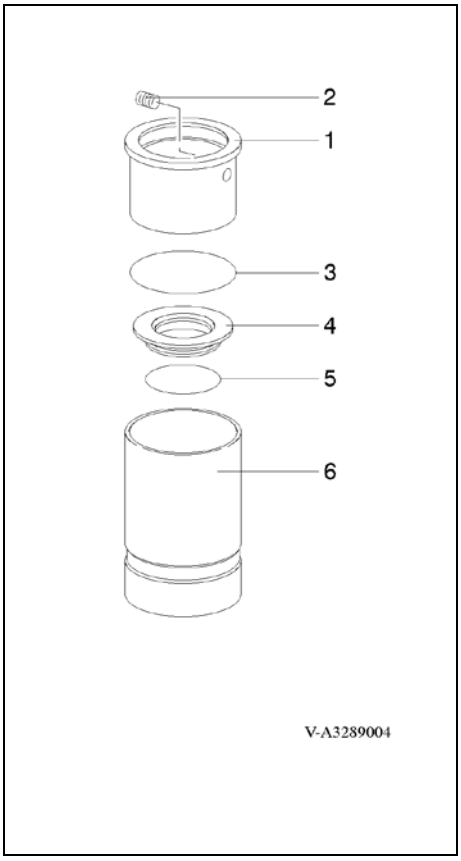

Fig. 122

Dismantling the belt pulley

- Loosen threaded pin 2.
- Pull sleeve 1 out of belt pulley 6.
- Take out oil slinger ring 4. If necessary, press the ring through the oil drain holes in the belt pulley with the aid of a screwdriver.

5.7 Dismantling the spindle assembly

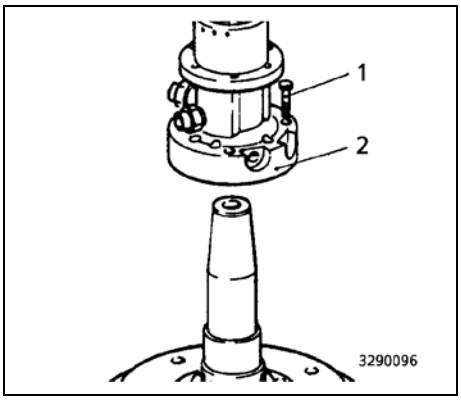

Fig. 123

- Unscrew hex head screws 1.
- Screw two hex head screws into the tapholes of the operating water feeding system.
- Force off the operating water feeding device 2 by evenly tightening the hex head screws.

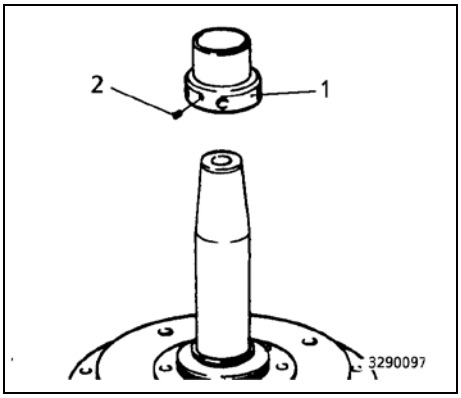

Fig. 124

- Undo threaded pin 2.
- Remove sleeve 1.

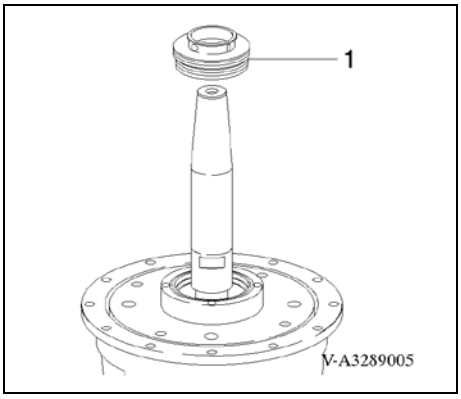

Fig. 125

- Open the pressure ring 1 with the hook wrench.
- Remove pressure ring 1.

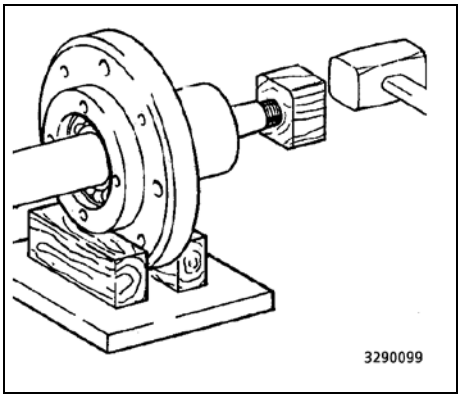

Fig. 126

- Carefully drive out the spindle together with the bearings by hitting with a hammer.
  To do this, place a wooden block against the spindle.
- Drive out the spindle until the angular contact ball bearings have become dislodged from their seats.
- Remove the spindle.

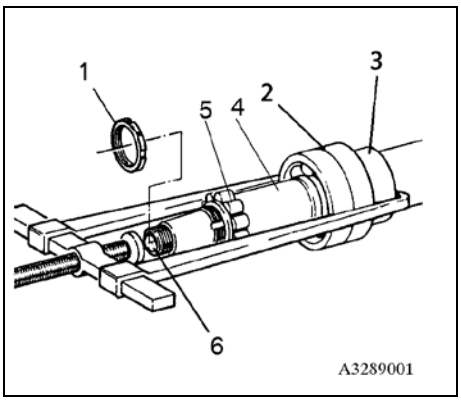

Fig. 127

- Undo the Allen screw in the grooved nut 1.
- Unscrew the grooved nut using a pivoted hook wrench.
- Mount pressure disk to protect the spindle 6.
- Pull angular contact ball bearing 2, distance sleeve and cylindrical roller bearing 5 off the spindle using a commercially available puller.

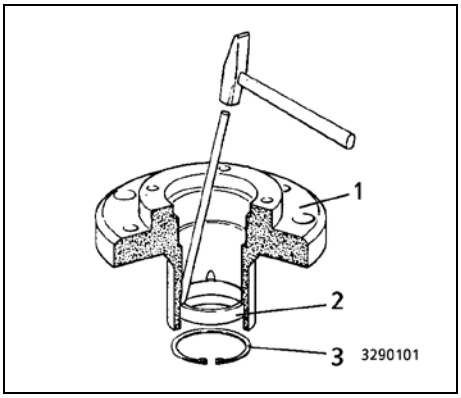

Fig. 128

- Use pliers to remove retaining ring 3 from the bearing housing 1.
- Drive the outer ring of the cylindrical roller bearing 2 out of the bearing housing **(do not twist)**.

5.8 Replacing the rubber-metal bushes and vibration absorbers

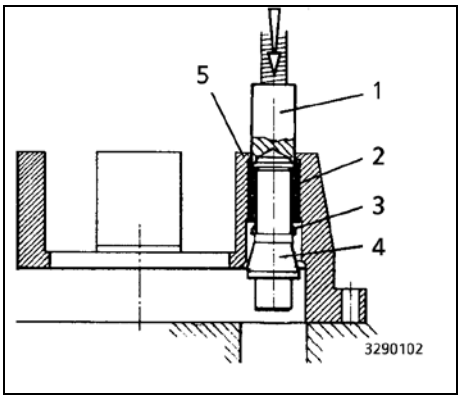

Fig. 129

Removal

- Place bolt 1 on ring 5.
- Press rubber-metal bush 2 together with bolt 4 out of the guide of the supporting disk.

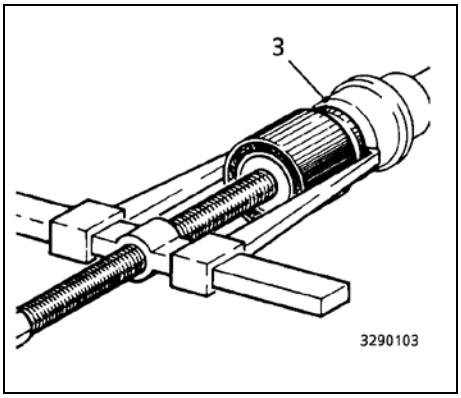

Fig. 130

- With the aid of a commercially available puller, withdraw rubber-metal bush over ring 3.

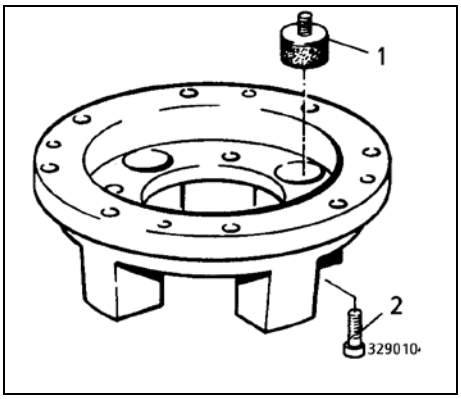

Fig. 131

- Unscrew hex head screws 2.
- Remove rubber-metal cushions 1.

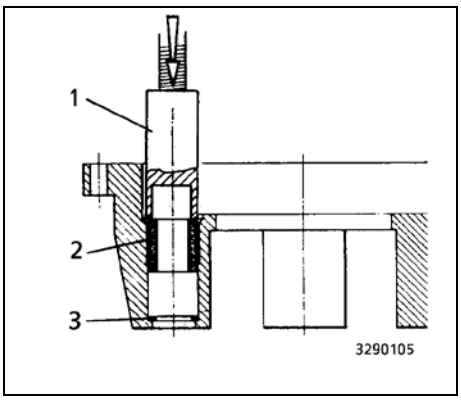

Fig. 132

Fitting

- Insert ring 3.
- Place bolt 1 on the outer ring of the rubber-metal bush.
- Press rubber-metal bush 2 into the supporting disk.

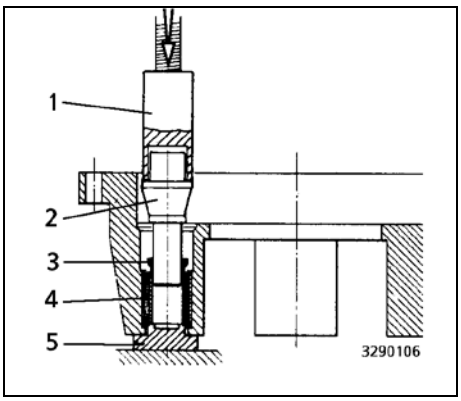

Fig. 133

- Place ring 3 on bolt 2.
- Insert disc 5 between inner ring of the rubber-metal bush and the base.
- Press bolt 2 with bolt 1 into the rubber-metal bush.

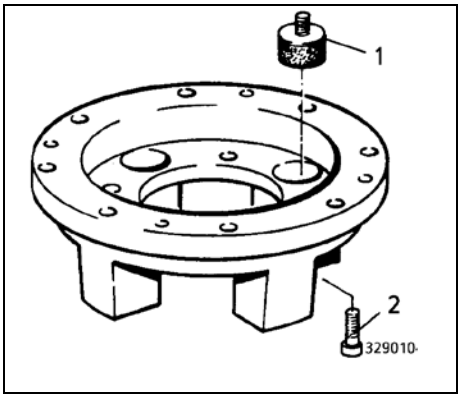

Fig. 134

- Secure rubber-metal cushions 1 with hex head screws 2.

5.9 Assembling the spindle assembly

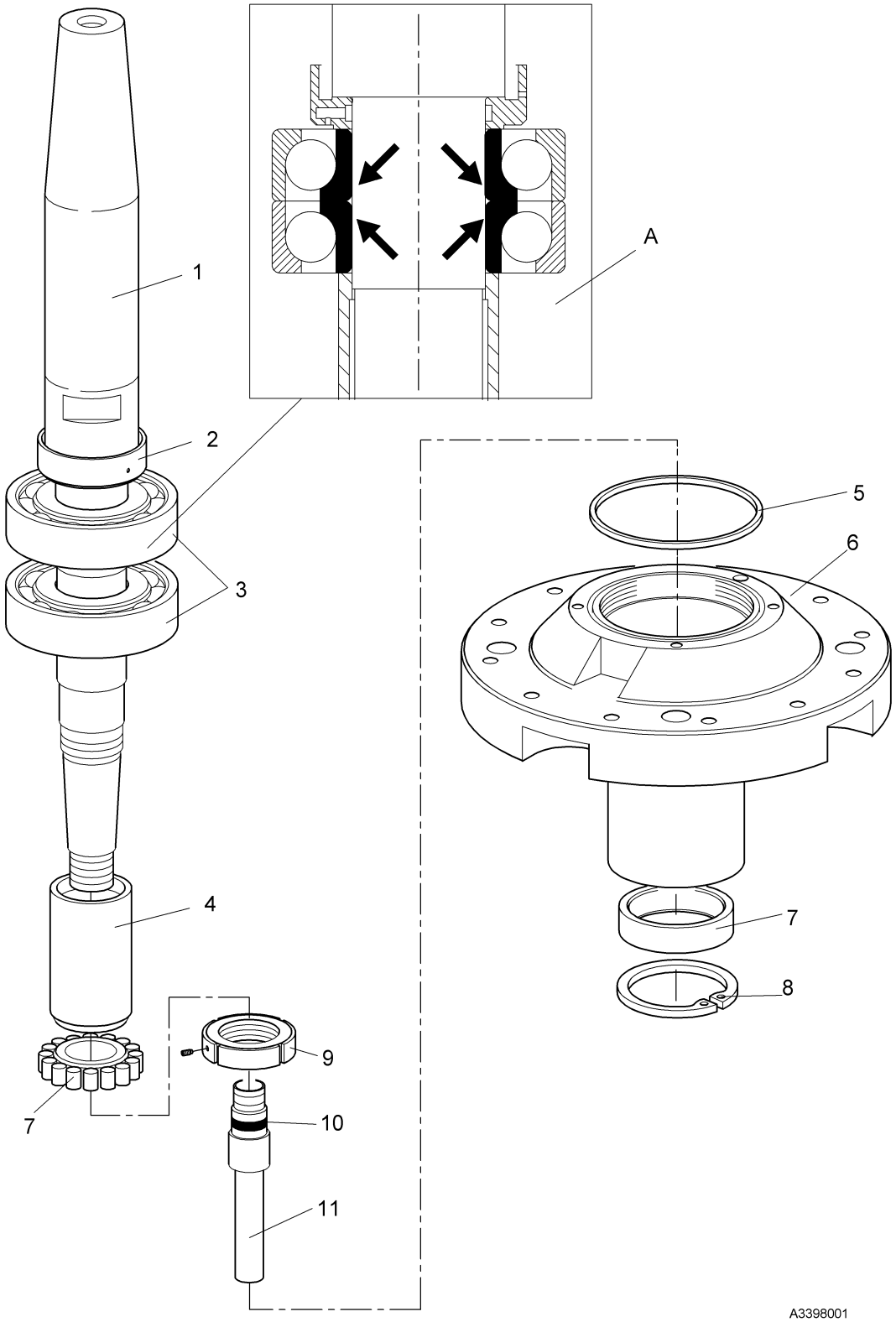

Fig. 135

Pay special attention to the following points before assembly:

- The holes in spindle 1, in oil guide ring 2 and in suction pipe 11 must be absolutely clean.
- Check condition of angular contact ball bearing 3 and cylindrical roller bearing 7 before fitting. If the bearings show the slightest sign of damage, they have to be replaced at the latest after the operating hours specified in the maintenance schedule.
- Use only bearings as specified in the order-specific parts list.
- The two angular contact ball bearings 3 and the inner ring of the cylindrical roller bearing 7 must be heated up in oil to approx. 80°C before fitting them on the spindle.
- The two angular contact ball bearings 3 must always be replaced together.
- The bearings must be fitted so that the broad shoulders of the inner bearing rings (see arrow) are placed against each other.
- Faulty mounting will inevitably result in irreparable damage to the bearings.

Assembly:

- Mount parts 2 to 4 in the order shown.
- After mounting the bearings and inner raceway of the cylindrical bearing 7, tighten grooved nut 9 and secure with Allen screws.
- Bolt tight the suction pipe 11 with gasket 10.
- Press the outer ring of bearing 7 into the cleaned bearing housing 6.
- Fit retaining ring 8 and gasket 5 in the bearing housing.
- Fit the pre-assembled spindle 1 in the bearing housing 6.

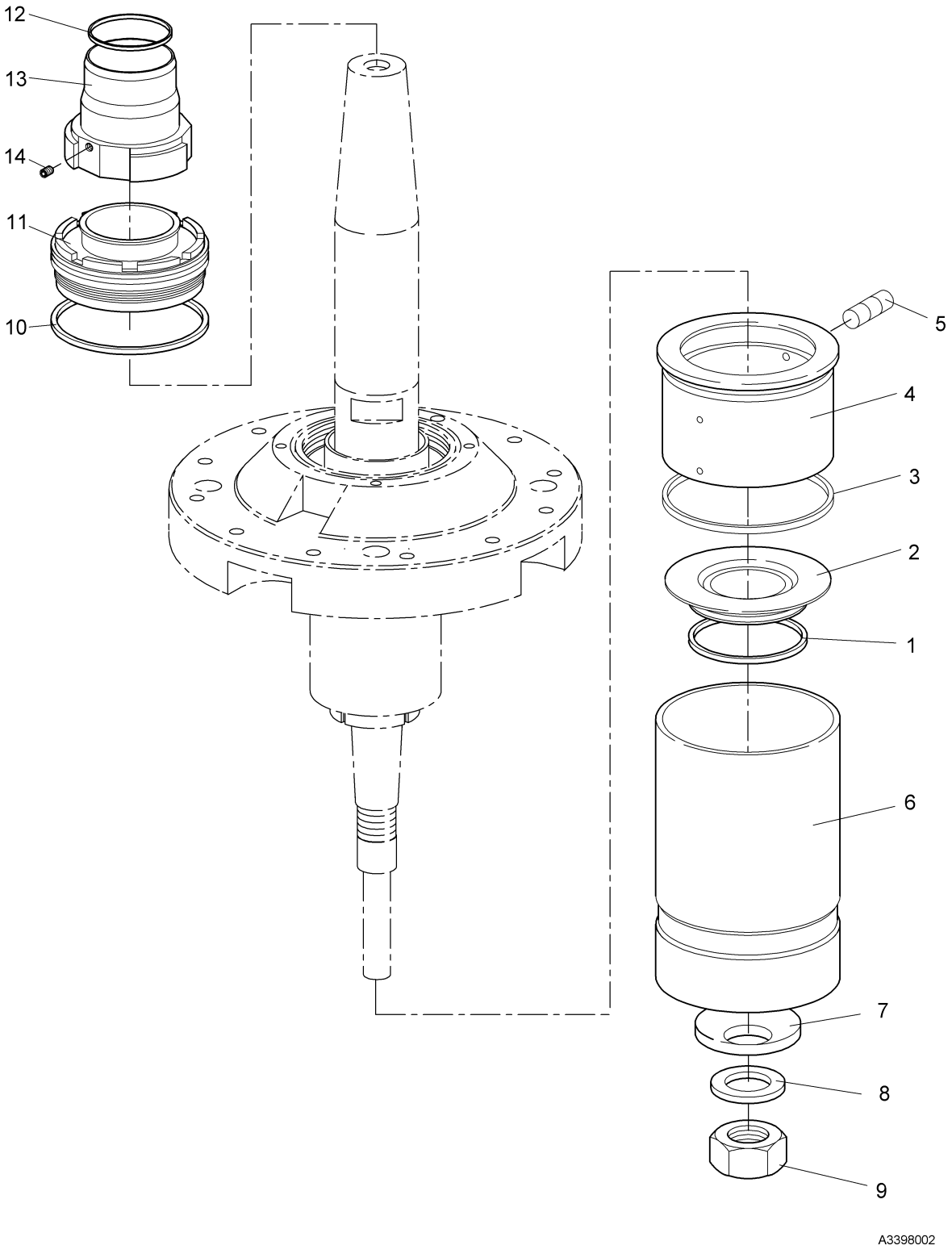

Fig. 136

- Slide the pressure ring 11 with fitted gasket 10 over the spindle and bolt it tight in the bearing housing.
- Slide sleeve 13 with gasket on to the spindle.
- Screw threaded pin 14 into the spindle.

Assembling the belt pulley

- Insert gasket 1 in the groove of oil slinger ring 2.
- Press the oil slinger ring 2 in the groove of belt pulley 6.
- Insert gasket 3 into the groove of sleeve 4.
- Slide sleeve 4 into the belt pulley 6.
- Tighten the threaded pin 5.

Before fitting the belt pulley

  – Clean the cone of the spindle and belt pulley,
  – Spray the spindle cone evenly and thinly with Molykote D-321R spray.
  – Let it dry for 10 – 15 minutes.

- Fit belt pulley 6, cup spring 7 and washer 8 and bolt tight with hexagon nut 9. **Torque: 250 Nm**

5.10 Fitting the spindle assembly and supporting disk

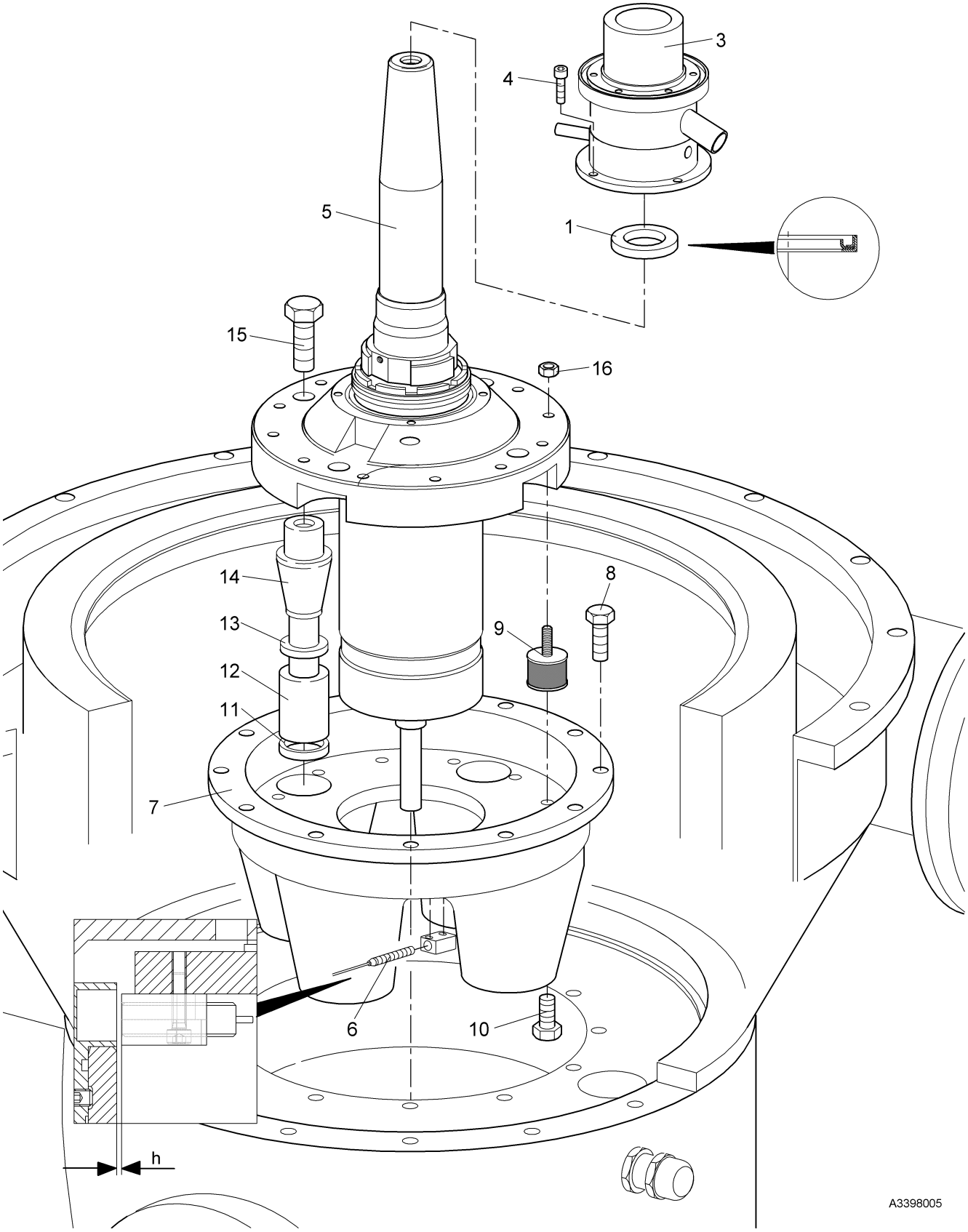

Fig. 137

Fitting the supporting disk

- Fit vibration absorbers (11-14) and rubber-metal cushions (9 - 10) as described in the section “Replacing the vibration absorbers and rubber-metal cushions”.
- Mount supporting disk (7) and fasten with hex head screws (8).

Fitting the spindle

- Screw the spindle lifter into the threaded hole of the spindle and lift out the spindle assembly. Slowly lower the spindle assembly into the frame onto the rubber-metal cushions.
- Bolt spindle assembly to the rubber-metal cushions (9) with hexagon nuts (16).
- Screw hex head screws (15) into the bolts (14) of the vibration absorbers.

Attention

Note:
The radial packing ring (1) must be fitted so that the sealing lip is directed to the bowl when the connection housing is fitted.

- Mount the upper housing (3) with mounted radial packing ring (1) and bolt to the bearing housing with screws (4).
- Slide proximity switch (6) into the holder as far as it will go and clamp tight with lock screw.

Switching distance **h: 2 mm ± 0.2**

- Use the feeler gauge to check switching distance h: 2 mm ± 0.2 and re-adjust if necessary; then tighten the holder with the two Allen screws.

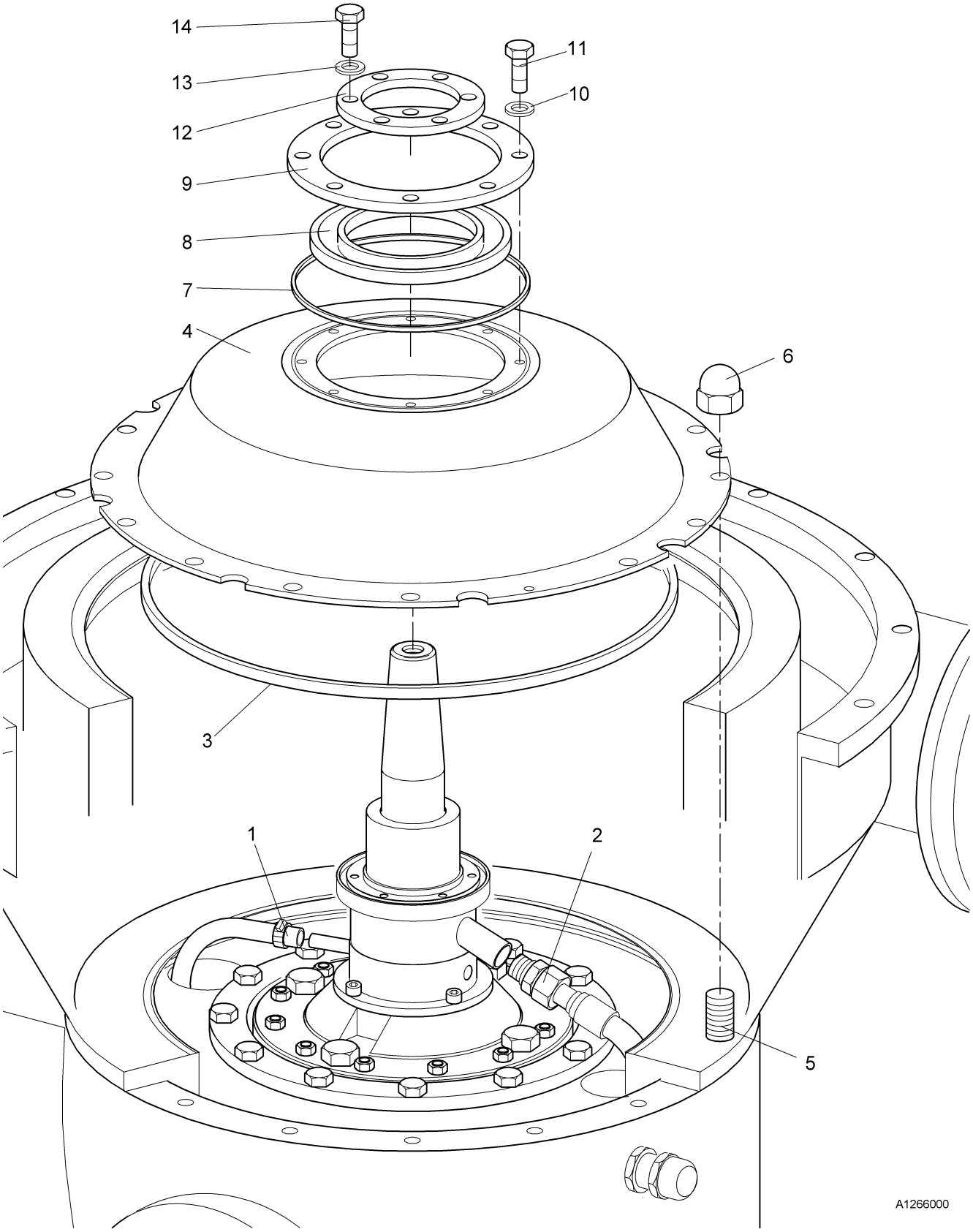

Fig. 138

- Attach hoses (1) and (2) to the connections.
- Mount protective hood (4) with fitted gasket (3) and screw with cap nuts (6) on threaded pins (5).
- Insert gasket (7) and membrane (8) in the protective hood.
- Mount ring (9) and bolt tight with hex head screws (11) and gaskets (10).
- Mount ring (12) on the upper part of the operating water feeding device and bolt tight with hex head screws (14) and gaskets (13).
- Slide on the flat belt and tension as described in section “Replacing the flat belt”.

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6 Operation

6.1 Before start-up

- **Note:**
  - Process-related deviations are possible (refer to project-specific data).
  - Instruction manuals (control unit, frequency converter, valve block, motor...)
  - Safety precautions in chapter 1.
  - Only feed product which conforms to the specifications on the nameplate.
- **Check that**
  - the machine has been correctly assembled.
  - the screws for fastening the hood and connection housing are tight.
  - centripetal pump with connection piece is tight.
  - frame drains are not blocked.
  - oil level is up to the middle of the sight glass.
- Open hand shut-off valves in the supply lines for:
  - operating water,
  - control air,
  - brake water,
  - cooling liquid,
  - (hood-) flush water,
  - sealing medium (-06- hydrohermetic),
  - CO_2 (optional),
  - additional supply lines.
- Fill siphon (when cooling medium does not run off via siphon)
- Actuate „reset" key.
- Open the hand shut-off valves in the feed and discharge of the separator.
- Check that
  - the specified pressures are indicated on the respective pressure gauges for
  - operating water,
  - control air.

6.2 Start-up

- Press function key "Separator I".
  - Signal “start-up” on.
  - Signal "Bowl standstill" on the control unit goes out as soon as the drive rotates.
  - The bowl speed and current consumption of the main motor are displayed on the control unit.
  - After the starting time has elapsed (see data sheet), the device signals “Operating readiness”.
  - The control panel indicates the machine no-load current.
  - The operating speed of the separator is reached.
    (see separator nameplate)
  - Constant pressure valves, if fitted, fed with control air.
- Check oil return through sight glass when fitted. If an external lube oil unit is used, a flow detector monitors the oil flow.
- If severe vibrations occur during start-up, stop the separator immediately via "Emergency-Stop" and check when the bowl is at rest whether the bowl is correctly assembled and thoroughly cleaned. The bowl must, for example, not contain residual filling during start-up.

NOTE

Separators equipped with a vibration monitoring system are monitored for inadmissibly high mechanical vibrations and automatically stopped when exceeding the limit value stage 2.

CAUTION!

Never initiate a total ejection when the separator is vibrating severely.

6.2.1 Closing the bowl

After switch-over from start-up to operation 2 total ejections are automatically performed to close the bowl. When this program is not activated, 2 total ejections must be performed manually by means of function key.

To make up for closing water losses, operating water is automatically supplied for 1 second every 5 minutes.
(This setting is normally adequate, but can be altered as is the case with all program times).

Closing water supply is indicated by a signal on the control unit.

6.3 Stopgap water

After start-up the system automatically switches to stopgap water. After approx. 10 minutes stopgap water is automatically fed into the bowl at 5 minute intervals.
This periodic stopgap water prevents overheating of the bowl (70 litres = bowl contents).

Stopgap water is also supplied after interruption of water, product or CIP.

The sealing medium feed for the -06- hydrohermetic design is continuous or pulsed.

6.4 Water run after start-up

- Check that the program times have been adjusted on the control unit in accordance with the operating conditions (see section “Program time settings” and control unit manual).
- Feed water to the separator.
- Check the bowl for leakage through the sight glass on the ejection vessel or the ejection vessel discharge.
  - at the pump discharge or
  - by removing the spray ball on the vessel. **Use only cold water in this case and ensure that no ejection can be triggered (danger of scalding or caustication - refer also to the documentation for the vessel).**

- In case of bowl leakage, stop water run and operate key "Total ejection".
- Re-fill bowl with water and check again if bowl is watertight.

If the bowl cannot be sealed after several attempts,

- operate "Total ejection" key.
- Let bowl run warm for **max. 15 minutes without supplying water.** The polyamide gasket will adapt to the opposite surface of the ejection system.
  - Then fill the bowl with water again and check if it is watertight.
  - If the bowl still leaks,
- Shut down the separator.
- Dismantle and check the bowl **after standstill** (polyamide gasket, gaskets of the hydraulic system, etc.).
- The ejection process is indicated in the valve symbols.
- In order to establish bowl leakage:
  - If necessary, cut off the supply of sealing medium for the hydrohermetic system,
  - Ensure that the bowl does not overflow due to an excessively high centripetal pump discharge pressure.

6.5 Product mode

- Press „Product ON" key:
  - Switch on the separation program.
  - When switching over from water mode or stopgap water to product mode, a total ejection or displacement takes place depending on the setting.
  - Supply of the sealing medium for the –06- hydrohermetic version.
    When adding sealing medium for the hydrohermetic system in intervals, a

continuous flow of sealing medium is required during ejections when adding closing water.

– After the program time "Waiting" has elapsed, the product feed valve opens and switch-over from sewer to product in the separator discharges takes place.

- Switch on the product pump (if applicable).
- Adjust throughput capacity
  – by means of feed control valve,
  – by adjusting the hand regulating valve.
- The throughput capacity of the separator depends on the desired degree of purity of the clarified liquid. The degree of purity depends on the viscosity and, hence, on the temperature of the process liquid. It further depends on the difference in densities of the carrier liquid and of the solids as well as on the size and nature of the solids to be removed.

If the particle size of the solids is very small and if the density of the solids is almost equal to that of the carrier liquid, then the hourly capacity has to be reduced to extend the retention time of the product in the bowl.

When the solids loading in the clear phase is too high, the throughput capacity must be reduced.

IMPORTANT

Increase the discharge backpressure in the clear phase discharge until it is discharged foamfree.
(Regulate the constant pressure valve by adjusting the control air on the pressure reducer of the valve cabinet).

IMPORTANT

The discharge backpressure in the clear phase discharge may not exceed this value (overflow). This value is capacity-dependent.

Note:
When the throughput capacity is changed, the discharge backpressure must be checked and re-adjusted if necessary.

- During partial ejection the product feed remains open. In the case of high throughput capacities, the product feed must be throttled during and after the partial ejection to avoid hammering in the pipes and to enable the machine to pick up speed.

The separating program including the partial and total ejections is automatically controlled by the control unit.

By operating the "Partial ejection" or "Total ejection" keys the program in progress can be interrupted and an ejection initiated immediately. The partial ejection starts with flushing the hood and throttling the throughput capacity via the regulating valve in the product feed.

The program sequence is displayed by messages on the control unit.

6.5.1 Function diagram

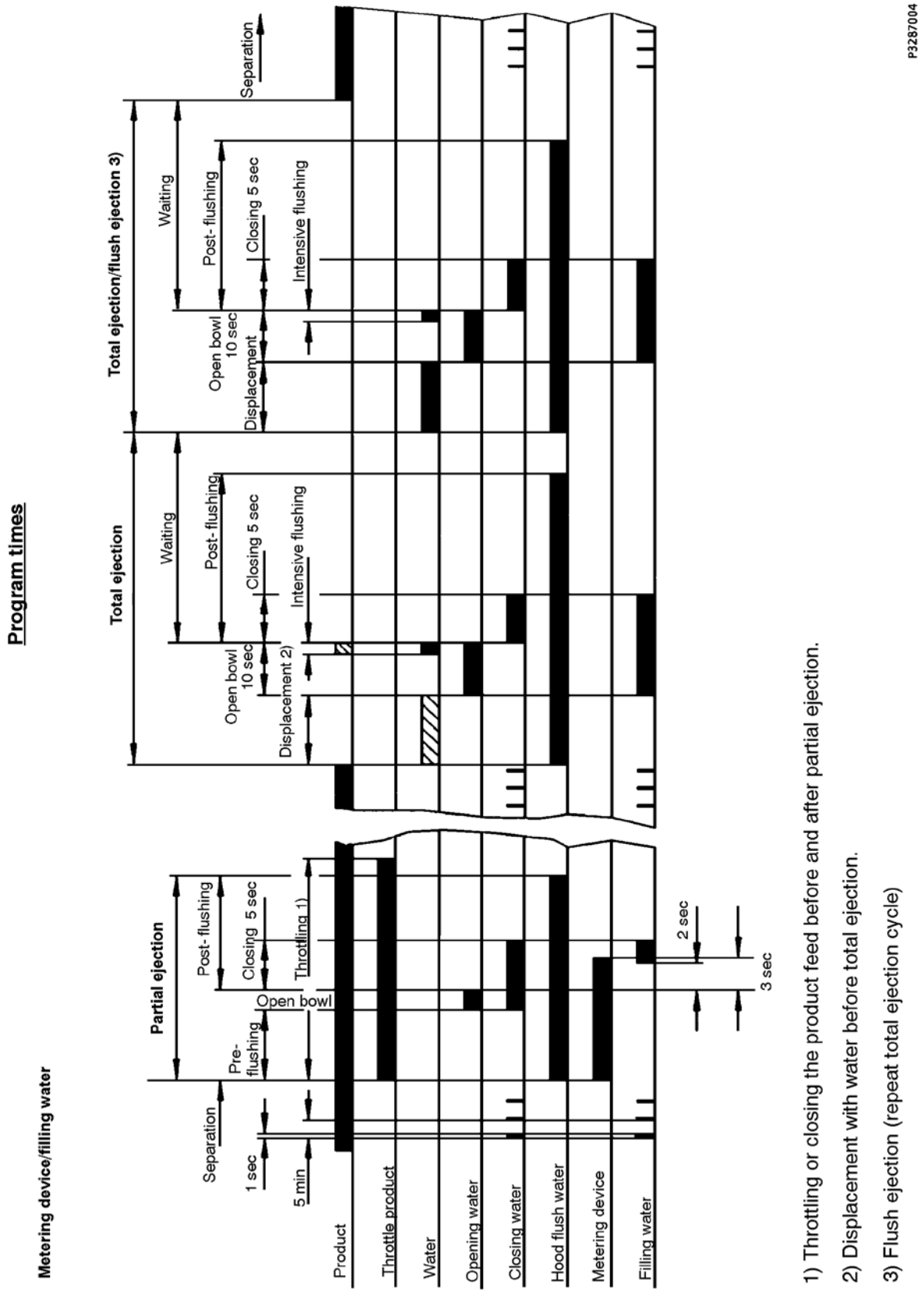

Fig. 139

Setting the program times: See control unit manual

6.5.2 Program adjustment

After the program time "Separation - Partial ejection" has elapsed a bowl ejection is carried out automatically.

Due to the interlinkage of the timers "Separation - Partial ejection" and "Separation - Total ejection" the state of the last-mentioned timer decides whether the next ejection will be a partial or total ejection.

If at the end of the program time "Separation - Partial ejection" the program time "Separation - Total ejection" has not elapsed, a partial ejection is carried out; if, however, the program time has elapsed, a total ejection takes place according to preselection.
The setting of the two program times is decisive for the ejection type which will be carried out by the control unit.

Combined partial ejections and total ejections

a) Set program timer ”Separation – Partial ejection” to the separation time possible **between two partial ejections**.
b) Set program timer ”Separation – Total ejection” to the running period at the end of which the next following ejection has to be a **total ejection** .

Total ejections only

a) Set program timer ”Separation – Partial ejection” to the separation time possible between two **total ejections**.
b) Set program timer ”Separation – Total ejection” to **1 minute.**

Partial ejections only

a) Set program timer ”Separation – Partial ejection” to the separation time possible between two **partial ejections**.
b) Set program timer ”Separation – Total ejection” to the maximum period of 999 minutes.

With this adjustment a total ejection takes place after 999 minutes at the earliest.

6.5.3 Determining the separation time

This is the interval between two ejections required to optimally fill the solids holding space. This period depends on the solids volume ejected per unit of time and can be calculated accordingly.

With time-dependent control the clarification time depends on:

- the solids loading in the product feed to the separator,
- the size of the solid holding space in the bowl,
- the throughput capacity of the clarifer.

The solids holding space of the bowl can only be fully utilized for partial ejections when the solids loading in the feed remains **absolutely constant**. If the solids content fluctuates, a reduced solids holding space volume must be allowed for (empirical value for low fluctuations: 80 %) in order to avoid the accumulated solids from extending into the disk stack.

Example for calculating the clarification time:

Given:	solids content in % by vol.	f = 1.0 %
	solids holding space	G = 21 l
	throughput capacity	M = 60 000 l/h
Wanted:	clarification time	t = ? min

The clarification time to be set is calculated as follows:

for partial ejection (at „0.8 G" *):

$$t = \frac{0.8 \times G}{M \times f} \times 60 \times 100 = \frac{60 \times 100 \times 0.8 \times 10.0}{10\,000 \times 1.0} = 4.8 \text{ min}$$

for total ejection (at „G" *):

$$t = \frac{G}{M \times f} \times 60 \times 100 = \frac{60 \times 100 \times 10.0}{10\,000 \times 1.0} = 6.0 \text{ min}$$

* 0.8 G = 80% utilization of the solids holding space

Note:

In the case of process-dependent ejection control, the program timer „separation - partial ejection" must be set so high that a bowl ejection is process-dependent, and time-dependent only if the process-dependent control pulse is not activated (see note in section 6.5.4).

6.5.4 Process-dependent control

In addition to time-dependent ejection control, „photoelectric" control is also possible when a photoelectric sensor is fitted in the separator discharge line which reacts to turbidity.

This device triggers a control pulse as a function of the solids filling volume in the bowl. This pulse initiates a bowl ejection just as if the program time „Separation - partial ejection" had elapsed in time-dependent control so that, as far as the program settings are concerned, the instructions in section 6.5.2 apply here too.

Note:

In the case of process-dependent ejection control, the program time „Separation - partial ejection"

- must be set longer than the maximum separating time to be expected between two bowl ejections,
- but **not** longer than the admissible dwell time in the bowl for the separable solids

so that a time-dependent bowl ejection is performed only when the process-dependent control pulse is not given and a bowl ejection must be performed.

6.5.5 Adjusting the program times:

Program times**... secs** are process-related and must be set before start-up.

Program time	
Pre-flushing	approx. 10 sec Pre–flushing hood/solids catcher; throttle or close product feed before the ejection.
Partial ejection	2 sec This determines the opening time of the opening water valve. This time must be longer than the displacement time of the opening water from the metering unit. The ejected solids volume depends on the preset volume in the metering unit.
Post-flushing	approx. 20 s Flushing the hood and solids catcher after an ejection.
Closing	5 - 7 secs Closing water addition after an ejection.
Metering device	3 secs Post–controlling of the control air for the metering unit after partial ejection.
Filling water	8 secs Delayed filling water supply after partial ejection (metering piston).
Total ejection	10 secs (not variable) Addition of opening water during total ejection.
Waiting	approx. 20 secs Waiting time after total ejection for speed recovery of bowl.
Continued running of solids pump	approx. 5 s Running time of solids pump when min. level probe is not submerged.
Pulse delay	approx. 5 - 10 secs Delay of bowl ejection after self–thinker control system has responded.
Pulse suppression	approx. 30 secs (setting: wbowl filling time) Suppression of ejections which could occur after bowl ejections due to spurious turbidity of the clear phase. (“self-thinker” system)
Throttling or closing of product feed after partial ejection	approx. 5 s In case of high throughput rates, the product feed has to be throttled during, and after the partial ejection.

Displacement	approx. 10 secs Displacement of liquid in the bowl at the beginning of a total ejection, e. g. with water. The water pressure is also decisive for the period of the displacing efficiency.
Intensive flushing	... sec (Setting: <10 sec) Supply of **water or product** to the open bowl during total ejection. Thorough flushing with water takes place when operating with displacement and during flush ejection. **Thorough flushing with product** takes place when operating **without** displacement.
Product displacement	approx. 30 secs Switching–over of separator discharges from product to sewer after product displacement.

6.6 Water run before CIP or shutting down

- Switch off automatic ejection control system.
- Press the "Water/product/CIP OFF" function key.
  - Product feed valve closes.
  - Separation program off.
- Switch off product pump.
- Change-over from product to water in feed.
  The automatic valves in the solids vessel, if installed, are switched over from solids tank to sewer
- After product displacement change-over from product to sewer takes place in the separator discharge.
- Initiate 2 - 3 total ejections manually on the control unit to flush the residual solids from the bowl.

Attention!

Fill the bowl with water between the total ejections.

6.7 Chemical cleaning at operating speed (CIP)

If required e.g. for sanitary reasons, chemical cleaning at operating speed (CIP = Cleaning In Place) can be performed. This has to be determined and decided by the plant operator.

During CIP cleaning liquids are pumped through the centrifuge. This process is controlled automatically or manually.

- Make sure that no CIP liquid can get into the product.
- Do not exceed maximum permissible pressures e.g. for sight glasses or compensators in the CIP cycle.
- Pay attention to the max. pressure stated on the built-in components.
- Never include sight glass units installed in pipe lines into CIP cycles, nor otherwise expose them to pressure.
- Sight glasses installed in product lines that are cleaned with CIP liquids must be checked for damage and wear at regular intervals.
- Be sure only to use detergents recommended by GEA Westfalia Separator.
- Strictly adhere to concentrations recommended by the detergent manufacturer and by GEA Westfalia Separator.
- Do not use detergents containing chlorine because chlorine attacks bowl parts made of stainless steel.
- Carefully remove any leaked-off detergent at once.
- Strictly adhere to applicable rules and regulations for handling acids and caustics.

DANGER

Leakage of CIP liquid

Danger of injury through dangerous caustics and acids!
Risk of suffering burns by hot liquids.

- When working on or around a centrifuge be sure to wear acid resistant protective clothing, safety shoes, gloves, and safety goggles.
- Take special care.

If it is intended to clean the hood chamber the concentrate collector and outer bowl surfaces with overflowing cleaning liquid:

- Initiate forced overflow by throttling the valve in the discharge line or - on separators with double centripetal pump – for at least one liquid phase.

The cleaning effect depends on:

- the product treated
- the detergent and its concentration
- the CIP period and temperature.

For perfect cleaning results close cooperation between the plant operator, the detergent manufacturer and GEA Westfalia Separator is required.

The plant operator must:

- check the effectiveness of the cleaning process even when using detergents and cleaning cycles recommended by GEA Westfalia Separator
- adapt the process to the specific requirements of the product treated

6.8 Shut-down (Normal Off)

- Press function key "Separator 0".
- Product feed pump off.
  - Product feed valve closes.
  - Braked run-down of separator through frequency converter with feedback facility.
  - Signal "operation" goes out.
  - Total ejection takes place.
  - Valves in the separator discharges are open (control air bled from constant pressure valves).
  - Signal "bowl standstill".

Caution

Do not loosen any part of the separator before the bowl is at a standstill.

6.9 Run-down (overspeed)

- Product feed valve closes.
- Main motor OFF.
- Switch-over in the separator discharges from product path to sewer.
- Valves in the separator discharges are open (control air bled from constant pressure valves).
- Separation program OFF.

At bowl standstill

- Signal "bowl standstill".

Caution

Do not loosen any part of the separator before the bowl is at a standstill.

- After shut-down through overspeed before renewed start-up
  - open and clean the bowl.
  - check programmed output frequency on the frequency converter,
  - check transmission ratio of the drive,
  - check speed limit value setting on the operator panel,
  - check control electronics on the frequency converter.

6.10 Shut down self-cleaning separators via emergency stop

The emergency-stop switch ensures functional safety in the event of an emergency or hazard.

It ensures that processes are stopped as quickly as possible and that all moving parts come to a standstill as quickly as possible.

Power is still connected to the separator and all additional equipment when the emergency-stop switch is operated. The functionality of all components is retained even when the separator has come to a complete standstill.

Power must be disconnected manually.

Emergency stop shut-down can be initiated:

- by vibration stage 2,
- by vibration stage 1 after 5 minutes,
- manually.
  The EMERGENCY-STOP switch is located on the switching cabinet.
  Precise details concerning the position of the EMERGENCY-STOP switch can be found in the electrical documentation.
  The switching cabinet is installed in line with the specifications of the operator.
  The position of the EMERGENCY-STOP switch is therefore described in the operating instructions of the operator.
- Product feed valve closed.
  – If the product feed is not to be used as shut-down liquid.
- Shut-down liquid valve open
  – The quantity of liquid depends on the size of the machine, and should be calculated as 20 x bowl volume/h.
  – The operator is responsible for providing an adequate quantity of shut-down liquid.
- If necessary, discharge shut-down liquid at an appropriate point by switching-over valve in the separator discharge, possibly into the sewage system.
- Valve in separator discharge open (control air releases pressure from constant pressure valve).
- With a frequency transformer with a retarding option, retarded discharge of the separator.
  – Wait for message “Bowl standstill”.

Caution

The bowl rotating at high speed poses danger to life and a risk of accidents. Severe vibrations can eject parts which have become detached from the machine.

When the bowl is at a standstill:

- Shut-down liquid valve closed.
  – Check bowl standstill.
  – Secure separator so that it cannot be restarted inadvertently.

IMPORTANT! Before the separator is restarted if the shut-down process (emergency stop) has been triggered automatically as a result of vibration:

- Open, check and clean bowl, check drive and replace all defective parts.
- Follow safety measures when maintenance work is being carried out.

6.11 After shut-down

- Close the hand shut-off valves in the feed and discharge of the separator.
- Close hand shut-off valves in the supply lines for
  - operating water,
  - control air,
  - cooling liquid,
  - hood flush water,
  - sealing medium for hydrohermetic system (design -06- hydrohermetic),
  - CO_2 (optional).
- Check that the automatic bowl ejection system is switched off.

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7 Trouble shooting

7.1 Trouble shooting

Caution!

- **Observe the safety precautions**
- **Do not carry out troubleshooting and work on the separator until the bowl is at a standstill and the installation has been switched off.**
- **Exercise special care during troubleshooting which can only be carried out when the separator is running.**

7.2 Mechanical function

Fault	Possible causes	Remedies
The bowl does not come up to rated speed or takes too long to do so.	Motor is incorrectly connected.	Check connection
	The frame drain is blocked. Liquid or dirt has accumulated in the frame pot, thereby braking the bowl.	Check the operating water discharge, liquid must run off freely. Clean the frame beneath the bowl.
	Flat belt is slipping because it is oily or slack.	Change the flat belt (see chapter “Drive“).
	Product feed is open.	Close product feed.
The bowl speed drops during operation.	Motor speed drops during operation.	Check motor and line voltage.
	Bowl leaks (current consumption is too high).	Check the gaskets in the sliding piston, bowl top and bowl bottom.
	Flat belt slips.	Change the flat belt (see chapter “Drive“).
	Main bowl gasket in bowl top is damaged.	Replace gasket (see chapter “Bowl“).
	Gaskets in bowl valve are damaged; the bowl loses sealing water.	Replace gaskets (see chapter “Bowl“).

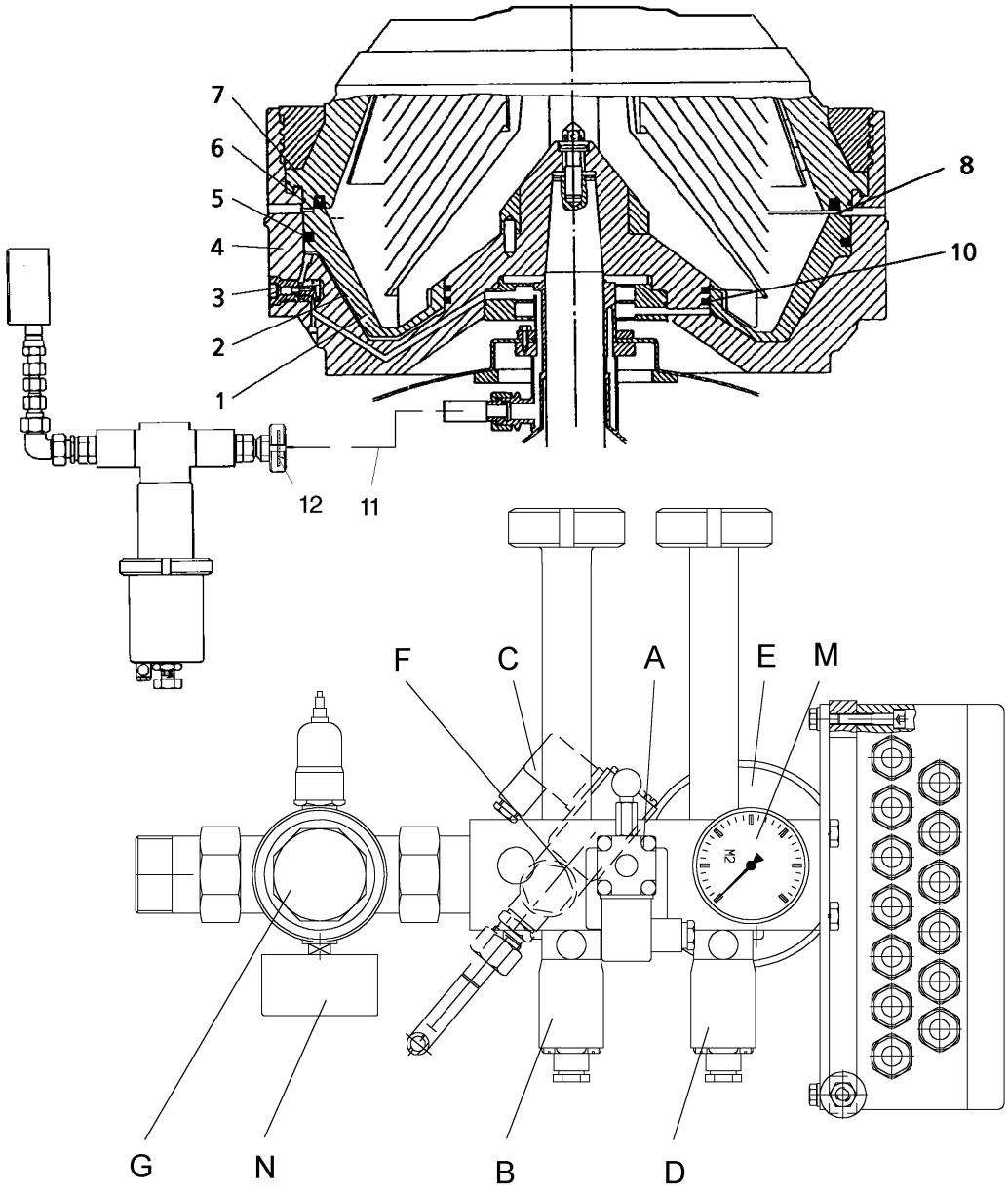
Fault	Possible causes	Remedies
Uneven run of the separator.	Bowl is out of balance. **Causes:**	For pos. 1 -4: Stop the separator immediately. Open the water feed. **The bowl may not be emptied** as otherwise the vibrations occurring during run-down would intensify.
	1) Solids have deposited unevenly in the bowl and are partially not ejected because • solids structure is too firm, • solids are fibrous or contain coarse impurities, • solids are earthy or sandy or cake together, • ejection intervals are too long.	Clean the bowl (see chapter “Bowl”). Pre-strain the product. Readjust on control unit. Shorter ejection intervals.
Uneven run of the separator.	2) Bowl is not correctly assembled or parts of different bowls have been interchanged.	Correctly assemble the bowl (see chapter “Bowl”).
	3) Tension of disc stack has slackened.	Make sure bowl lock ring is screwed on tightly enough (see chapter “Bowl”). **A loose lock ring can endanger life.** Check number of disks. If necessary, add spare disk or compensating disk.
	4) The bowl is damaged and, therefore, out of balance.	Send the bowl to the factory for repair. Do not make your own repairs. **Do not weld or solder as this would weaken the bowl material – danger to life!**

Fault	Possible causes	Remedies
Uneven run of the separator. (Cont'd)	Rubber-metal cushions in drive are fatigued.	Change the rubber-metal cushions (see chapter "Drive").
	Vibration absorbers in drive are fatigued.	Replace rubber-metal cushions (see chapter "Drive").
	Angular contact ball bearings or cylindrical roller bearings are worn.	Replace damaged bearings. **CAUTION:** Use only bearings as specified in the Parts List.
	Angular contact ball bearings or cylindrical roller bearings are damaged due to inadequate lubrication because the suction pipe in the spindle is clogged.	Replace damaged bearings. Clean the lubrication system (see chapter "Cleaning")
Discharging operating water is dirty.	The ejected solids are too concentrated with the result that they cannot discharge from the solids catcher into the cyclone. Solids rise in the catcher and flow over into the frame to the operating water discharge.	Perform several successive total ejections manually on the control unit to flush free the solids catcher. Shorten the ejection intervals. Increase the ejection volume.
	Damming in solids catcher because • max. level probe in cyclone gives no signal, • min. level probe is defective, • Solids pump has failed.	Check level probes and solids pump.
Current consumption too high.	Bowl leaks.	Check the gaskets in the bowl top, sliding piston and bowl bottom.
	Solenoid valve for closing water defective.	Check solenoid valve.
Oil monitoring alarm	Oil level is too low.	Top up oil.
	Oil lines blocked.	Remove spindle assembly (see chapter "Drive"). Clean suction pipe and lube oil hole in the drive spindle. Clean the feed and discharge lines of the external lube oil unit. Refer to manual of external lubricating oil unit.

7.3 Separating function

Fault	Possible causes	Remedies
Clarifying efficiency not adequate.	Unsuitable separating temperature.	
	Solids space in bowl overfilled.	Shorten the ejection intervals.
	Disk stack blocked.	Clean disk stack. Modify washing program.
	Throughput capacity too high.	Reduce throughput capacity.
	Backpressure too high. Distributor overflows.	Adjust a lower discharge pressure.
	Distributor neck soiled.	Clean distributor neck.
Bowl blocked with solids.	Solids concentration too high.	Shorten the ejection intervals. Dismantle and clean the bowl (see chapter “Cleaning”)
	Consequence:	
	• Solids catcher and cyclone too full.	Empty solids catcher and clean bowl walls.
	• Operating water discharge clogged. Frame pot filled with concentrate.	Clean frame. Shorten the ejection intervals. Flush frame hood during the partial ejection.
	Upstream protective strainer damaged.	Replace protective strainer.
Ejected solids contain too much process liquid.	Ejection volume too high.	Reduce amount of ejected solids.
	Ejection intervals too short.	Prolong ejection intervals.
	Bowl leaks.	See following pages.
	Bowl overflow	Throttle centripetal pump less. Feed in less sealing liquid. Feed in less flush liquid.

7.4 Discharge function



1 Sliding piston
2 Closing chamber
3 Bowl valve
4 Bottom part of bowl
5 Sealing ring (sliding piston)
6 Sealing ring (bowl cover)
7 Bowl main sealing ring
8 Sealing edge (sliding piston)
10 Sealing rings (bottom part of bowl)
11 Operating water feed
12 Sealing ring (operating water)

A Solenoid valve filling water
B Solenoid valve closing water
C Solenoid valve hood flushing water
D Solenoid valve opening water
E Metering device
F Non-return valve
G Water pressure reducer
M Pressure gauge opening water
N Pressure gauge closing water

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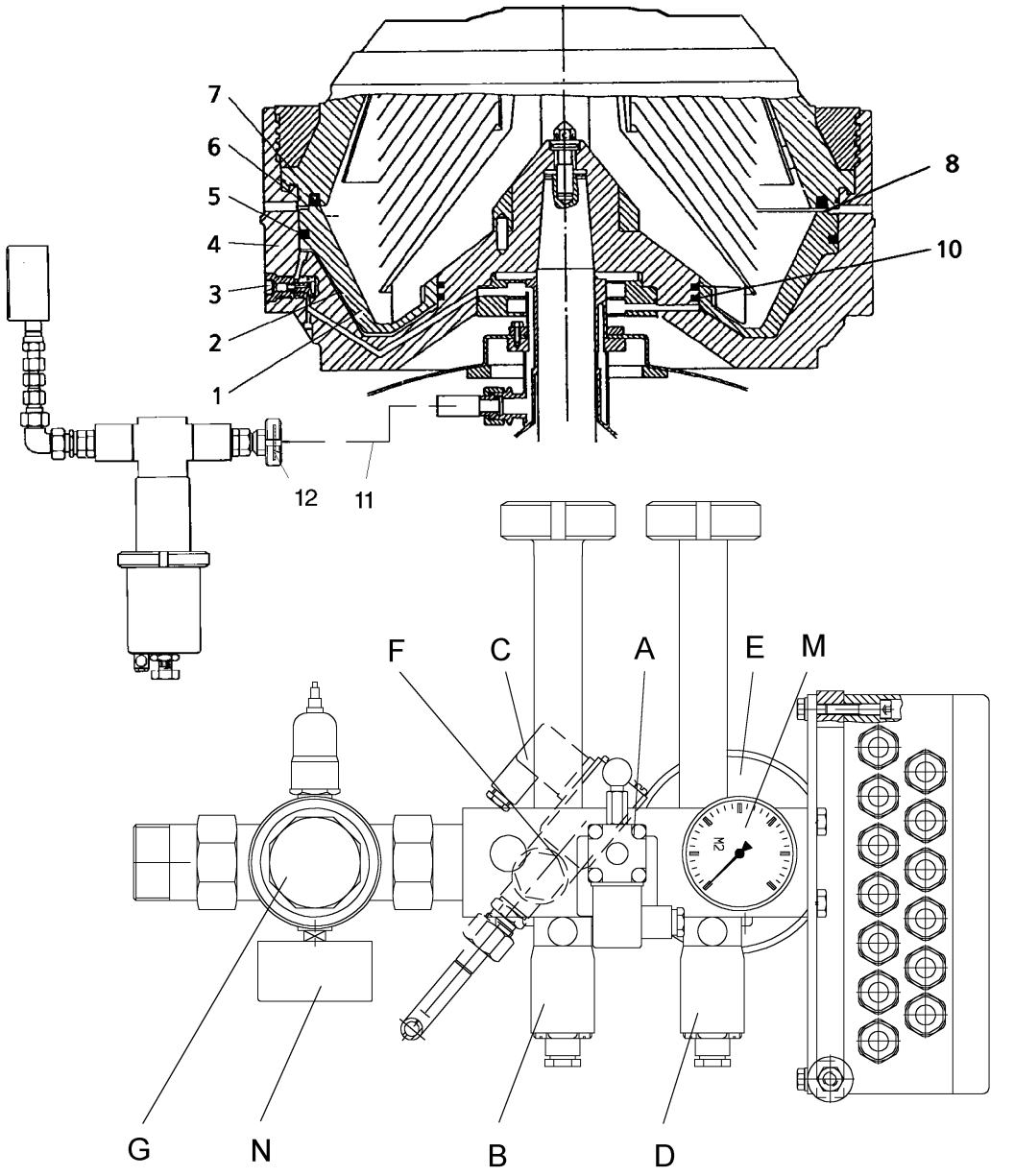
Fig. 140

Problem	Possible causes	Remedy
The bowl does not close. **IMPORTANT:** In this case, close product feed or interrupt separating programme.	Insufficient operating water is supplied because	
	- The water pressure in the feed to the operating water connection is too low.	Check line pressure. The pressure when the valves are open must be at least 2 bar.
	- Water discharge holes in the head of the operating water feed (11) are clogged in certain areas as a result of scale.	Clean drill holes.
	- The strainer in the water pressure reducer (G) of the operating water line is clogged.	Clean strainer
	- The operating water feed (11) is not tight.	Check lines, screw connections, sealing rings.
	- Operating water feed (11) is clogged.	Clean operating water feed.
	Sealing ring (12) is damaged or has not been inserted.	Replace damaged sealing ring or insert sealing ring.
	Sealing rings or seal in the bowl valves (3) are defective.	Remove valves (see 4.9). Replace damaged sealing rings or seal.
	Sealing ring (5) in the sliding piston is damaged, or the edges have frayed (due to abrasion caused by the up and down motion of the sliding piston).	Replace damaged sealing ring. If only the edges of the sealing ring are frayed, although the sealing ring is otherwise undamaged, use an abrasive disc to smooth the edges and reuse the sealing ring.



1 Sliding piston
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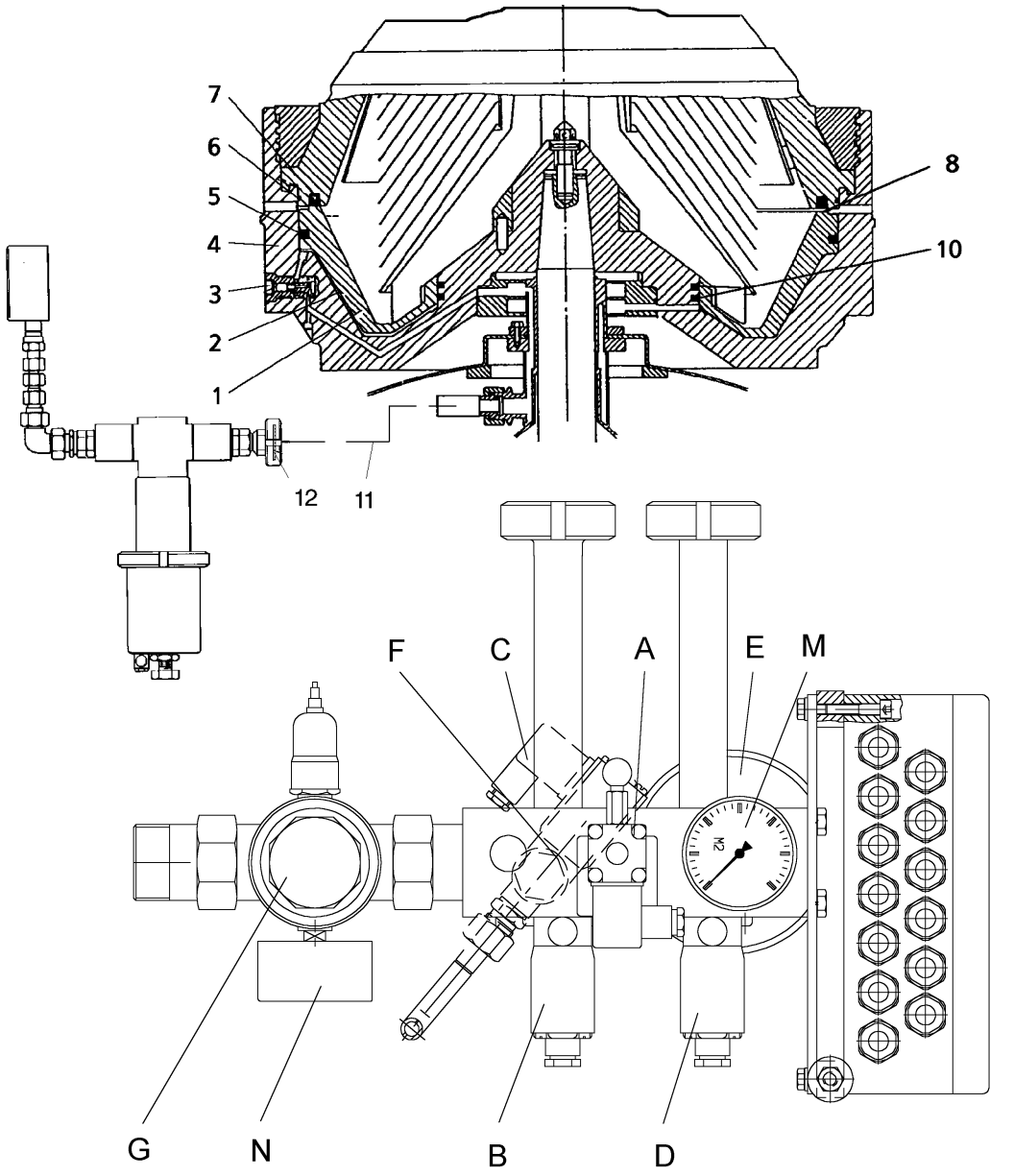
D Solenoid valve opening water
E Metering device
F Non-return valve
G Water pressure reducer
M Pressure gauge opening water
N Pressure gauge closing water

P330600

Fig. 141

Problem	Possible causes	Remedy
The bowl does not close and open properly.	The sealing ring (5) in the sliding piston is not flush at all points with the external guide surfaces due to centrifugal force.	Stretch sealing ring with excessive tension. Before the sealing ring is inserted, apply a **small** amount of grease to the groove in the sliding piston.
	Sealing ring (7) in the bowl cover is damaged.	Replace sealing ring (see 4.8.1).
	Sealing rings (10) in the bottom part of the bowl are damaged or have not been installed.	Insert or renew sealing rings.
	Height of sealing ring (5) in the sliding piston is out of tolerance.	Insert sealing ring of correct size. The differences in height on one sealing ring must not exceed 0.25 mm.
	The sealing edge (8) of the sliding piston is damaged.	Replace sliding piston.
The bowl does not open at all or does not open completely.	Dry dirt or rubber flakes have settled between the guides of the sliding piston (1) and the bottom part of the bowl (4).	Clean bowl parts. Round edges on sealing rings. Replace damaged sealing rings; apply lubricating grease to guides in accordance with the lubricating plan.
	The closing chamber (2) between the bottom part of the bowl and the sliding piston is clogged.	Replace sliding piston (1) and clean closing chamber.
	The drill holes of the bowl valves (3) are clogged.	Remove valves (see 4.9). Clean drill holes.
	The bowl does not receive any opening water or does not receive sufficient opening water (control pressure gauge (M) does not indicate) for the following reasons:	
	- The non-return valve (F) is clogged or defective.	Clean or replace non-return valve.
	- Solenoid valve (A) or (D) is defective.	Replace solenoid valve.
	- Air pressure for metering device (E) is too low.	Increase air pressure to > 4 bar.
	- Incorrect settings for the opening times of the solenoid valves.	Check programme times on the control unit (see function diagram).



1 Sliding piston
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A Solenoid valve filling water
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E Metering device
F Non-return valve
G Water pressure reducer
M Pressure gauge opening water
N Pressure gauge closing water

P330600

Fig. 142

Problem	Possible causes	Remedy
The bowl opens during the separation process.	Solenoid valve (B) is defective.	Check solenoid valve.
	No closing water pulses.	Check control unit and closing water valve.
	Solids density too high.	Check solids density (for max. density, see type plate)

7.5 Troubleshooting

Caution!


Caution

- **Observe the safety precautions**
- **Do not carry out troubleshooting and work on the separator until the bowl is at a standstill and the installation has been switched off.**
- **Exercise special care during troubleshooting which can only be carried out when the separator is running.**

Malfunction	Automatic responses	Cause	Remedy
Vibration stage 1 NAH 22.5 % = 4.5 mm/s t > 10 sec	Total ejection. Visual and audible alarm. A delay time of 5 minutes runs simultaneously. If the inbalance is eliminated during this time, "Emergency-Stop" is triggered automatically.	Bowl imbalance because solids have deposited unevenly in the bowl or have been unevenly ejected.	While the bowl is full, perform several partial ejections by pressing the function key.
		Bowl is not properly assembled or (if plant has several separators) parts of different bowls have been interchanged.	Assemble the bowl correctly.
		Bowl is damaged.	Send the bowl to the plant for repair. Do not carry out own repairs. **Do not weld or solder as this would weaken the bowl material - danger to life!**
		Product deposits between bowl bottom and frame.	Remove deposits.
		Compression of disc stack has slackened.	Check that the bowl lock ring is screwed on tight (4.7). **A loose lock ring endangers life!** Check number of disks. If necessary, add spare disk or compensating disk.
		Vibration absorbers or rubber metal bushes in drive are fatigued.	Replace vibration absorbers or rubber-metal bushes (5.8).
		Angular contact ball bearings or cylindrical roller bearing are defective due to: - normal wear, - inadequate lubrication.	Replace damaged bearings. **ATTENTION:** Use only bearings with a special specification (see parts list)! Clean the suction pipe of the spindle. Clean the lubricating system.

Malfunction	Automatic responses	Cause	Remedy
Vibration stage 2 NAH 35 % = 7 mm/s t > 5 sec	Visual and audible alarm. Shut down via "Emergency-Stop".	See Stage 1	Open and clean the bowl. If the bowl is not dirty and is mounted correctly, check the drive (bearings and damping).
Speed < min. SIAL	Visual and audible alarm. Separating program off. Product feed valve closes.	Start-up time is longer than specified in the datasheet.	See fault “The bowl does not come up to rated speed or takes too long to do so”.
		Speed drop due to overload	See fault “Overcurrent”.
Lubrication FAL	Visual and audible alarm. After 5 minutes: - Main motor off. - Separating program off. - Product feed valve closes. - Total ejection.	Lube oil flow interrupted. Lubricating oil level too low. Suction pipe or lubricating oil bores in the spindle blocked.	Check the lubricating system. Check the supervisory system. Dismantle the spindle assembly. Clean the suction pipe and bore in the spindle.
Overcurrent IAH	Visual and audible alarm. Separating program off. Product feed valve closes.	Motor overloaded or defective.	Reduce capacity, reduce discharge pressure, check that bowl doesn’t leak.
		Single-phase mode	Check motor power supply cable.
		Ejection interval too short.	Extend ejection intervals, throttle or close product feed during partial ejection.
		Bowl leaking	See water mode after start-up
		Drive defective.	Check drive.
		Solenoid valve for control water defective.	Check solenoid valve.
		Bowl rotating in solids.	**At standstill:** Check whether solids discharge is blocked, clean solids catcher and tank.

Malfunction	Automatic responses	Cause	Remedy
Motor temperature TAH	Visual and audible alarm. Main motor off. Separating program off. Product feed valve closes. Total ejection.	Motor overloaded. Motor defective.	Check drive. Check motor.
		Cable fracture between PTC and evaluating unit.	Replace cable.
		Drive defective.	Check drive.
		Outside temperature too high.	Reduce capacity.
		Inadequate motor cooling or none at all.	Check whether motor ventilation system is dirty.
The bowl does not come up to rated speed or takes too long to do so.		Motor is incorrectly connected.	Check connection
		Run-up time (frequency converter) was altered.	Program in accordance with parameter list.
		Incorrect speed limit value setting on operating unit	Correct setting.
		The operating water discharge is blocked. Liquid or dirt has collected in the lower section of the solids catcher, thereby braking the bowl.	Clean siphon and solids collector.
		Flat belt is slipping because it is oily or slack.	Replace flat belt (5.1).
		Belt pulley sliding on the spindle.	Check fastening (see 5.4).
		Product feed is open.	Close product feed.

Malfunction	Automatic responses	Cause	Remedy
Exceeding max. speed	Visual and audible alarm. Shut down (overspeed).	Output frequency at frequency converter programmed too high.	Program the correct output frequency.
		Control electronics frequency converter defective.	Check frequency converter.
		Incorrect speed limit value setting on control unit.	Correct setting.
		Incorrect transmission ratio	Fit correct belt pulley.
Solids pump IAH	Visual and audible alarm. Product feed valve closes. Solids pump off. Separating program off.	Motor overloaded. Single-phase mode. Pump defective. Motor defective.	Check motor. Check solids pump.
Ejection monitoring (The alarm responds if an ejection is not accompanied by an increase in current. Bowl speed drops during ejections. The bowl is brought back up to operating speed by increased current consumption.)	Visual and acoustic alarm. Separation program off. Product feed valve closes.	Water pressure too low. Water filter blocked. Operating water line leaks. Nozzles of the operating water feeding system blocked. Hydraulic system of the bowl defective. Operating water valve defective.	Initiate a solids ejection with prior displacement by pressing the key ”Total ejection”. Closely observe the ammeter. Check water pressure. Clean filter in control water line. Check that control-water line is leaktight. Clean nozzles and holes in control-water feed system. Check control water valve. If this is not successful, shut down the separator! Check the hydraulic system of the bowl and replace gaskets if necessary.
Level probe max. LAH t > 5 sec	Visual and audible alarm. Separating program off. Product feed valve or water valve closes. Solids pump on.	Bowl leaks. Solids pump doesn't deliver or output too low. Solids discharge blocked. Ejection frequency too high. Delay time set too short. Sensitivity of the level relay is too high. Level probe min. has not responded.	Check whether - bowl leaks, - solids discharge is blocked, - ejection frequency too high. Check solids pump. Check delay time setting. Check connection of the resistance range of the level probe max. on the level relay. Check connection of the resistance range of the level probe min. at the level relay.

Control water t > 5 sec	Visual and audible alarm. Separating program off. Product feed valve closes.	Water pressure < P_{min} or water supply failed.	Check the water supply. Clean filter in pressure reducer. If the water pressure drops so far that the required water pressure does not return within the maximum possible separating time and no ejection is possible, the separator must be shut down and the bowl cleaned by hand. (If the permissible retention time of the solids in the bowl is exceeded – product–dependent –, the solids will harden and be ejected unevenly from the bowl. The result is then likely to be severe imbalance during ejection).
Photoelectric control system	Visual and acoustic alarm. After elapse of ”Impulse suppression” program time renewed bowl ejection.	Poor clarifying efficiency of the separator because the solids concentration in the product is too large for the adjusted throughput. Bowl has not ejected (bowl hydraulics). Bowl has not closed after ejection (bowl hydraulic system). Operating water pressure too low (see 2.4). Operating water failed. Solenoid valve for control water defective. Light emitter failed. Photoelectric detector failed. Sight glasses dirty. Optical path in sensor too large. Liquid too dark. Measuring transducer defective. CU range of the measuring transducer set too low. Malfunction in control unit. Line disconnection between control unit and connector on sensor.	Reduce throughput capacity. Initiate total ejection. Check photoelectric control system. Check discharge backpressure of the constant pressure valve.

8 Cleaning

8.1 Chemical cleaning (CIP)

After each separation cycle, chemical cleaning (CIP = **C**leaning **i**n **P**lace) can be carried out at operating speed.

- For this purpose, the
  - cleaning liquids are circulated through the separator and the connected piping system in accordance with a pre-set program.
  - dislodged residues are spun into the solids holding space of the bowl and discharged into the concentrate collector through the nozzles.
- By throttling the valve in the discharge line of the medium heavy phase
  - the bowl is brought to overflow and
  - a cleaning effect of the hood chamber is achieved.
- The cleaning effect depends on
  - the fed product,
  - the duration of CIP.

IMPORTANT

Pay special attention to the project-specific instruction manual!

CAUTION!

Wear the prescribed personal protective equipment during all cleaning operations.

Risk of injury through hot, caustic liquids under pressure.

Only approved detergents may be used to avoid corrosion damage.

Note:

Do not use detergents containing chlorine as chlorine attacks bowl parts made of stainless steel.

8.2 Cleaning the bowl by flushing

Bowl flushing is carried out during operation to ensure a constant separating efficiency and at maximum throughput capacity during continuous operation.

Flushing is required:

- once a shift, at least once a day,
- when the separating performance deteriorates,
- when the separator is to be shut down.

Interruption of the product feed takes 2 – 3 minutes for each flushing.

Repeat the flushing procedure (if required).

Discharge

- Close product feed,
- open the flush water valve at the same time,
- switch-over from flush water to product.

When the separator is shut down after flushing:

- Close product feed,
- open the flush water valve at the same time,
- switch off the separator motor.
- The bowl is supplied with water until standstill.
- Fill the bowl with water so that the solids remaining in the bowl do not cake.

8.3 Cleaning the bowl.

Cleaning of the bowls after separation is only required when the nature of the separated solids necessitates it.

Experience will show how often the bowl has to be cleaned.

NOTE

For this cleaning procedure the bowl has to be dismantled. Refer to the instructions and descriptions in the chapter “Bowl”.

These operations may only be carried out by authorized personnel.

The following points should be kept in mind:

- During the first few months of operation, the lock rings should be removed approximately every two weeks for greasing the threads to prevent seizing.

  Later on, the greasing intervals may be extended.
  However, the bowl should be dismantled at least every two months for thorough cleaning of the inner bowl parts.

IMPORTANT

Never use metal scrapers or metal brushes for cleaning the discs and bowl parts.

- All bowl parts have fine tolerances; it is therefore important that all parts are cleaned thoroughly and are free from burrs.
- Remove the gaskets from the bowl parts.
  Clean grooves and gaskets to prevent corrosion.
- Replace damaged or very swollen gaskets immediately.
  Swollen gaskets should be left to dry in a warm place so that they can regain their original dimensions and can be re-used.
- Carefully clean the small holes in bowl bottom and the two bowl valves for the supply and discharge of the operating-water to ensure trouble-free performance of the solids ejections.
- Clean and wipe dry guide surfaces and threads of bowl parts and grease them.
- Spindle cone and inside of bowl hub should be oiled and then wiped clean and dry with a smooth rag.
- The solids catcher and solids collector bottom should also be cleaned every time.
- Re-assemble bowl immediately after cleaning.
  Otherwise the bowl parts must be protected against dust and dirt.

8.4 Frame

When cleaning the frame:

- Never expose the machine to a direct water jet. It must be cleaned by hand, with a sponge or cloth.
  This applies especially to the motor, even if it is enclosed.

8.5 Operating water feeding device

- The strainer in the water pressure reducer and the small holes in the operating water feeding device should be cleaned when necessary.

8.6 Oil pan, spindle, suction pipe

The oil pan must be cleaned:

- after several oil changes, in any case after the number of operating hours specified in the maintenance schedule when changing the ball bearings,
- when the oil has to be changed because water or dirt has seeped into the drive.
- when there is a decrease in the oil circulation (to be seen through sight glass). In this case, the drive has to be cleaned as well.

Procedure:

- Remove the oil pan and spindle assembly as specified in the chapter “Drive”.
- Clean oil pan with kerosene.
  Do not use fluffy cloths or cotton waste.
  Finally flush oil pan with thin-bodied oil.
- Before re-installing the spindle, check the holes in suction pipe and spindle. If necessary clean the holes with brushes.

8.7 Note on cleaning work on disks

When mounting the disks, they are centrically guided over the distributor neck.

If disks are dismantled in connection with servicing / manual cleaning and are stacked on one another outside the distributor, it must be ensured that the onical disk surfaces do not slide into each other.

To avoid damage, the disks should also be stacked centrically.

8.8 Note on cleaning work on hoods

The following instructions must be followed during cleaning and maintenance work on hoods.

Caution

- **Load suspension devices such as lifting devices for bowl or hood may only be used correctly and properly and for the intended purpose only. This means that work must be carried out as described in the separator manual.**
- **Do not use damaged or incomplete load carrying equipment.**

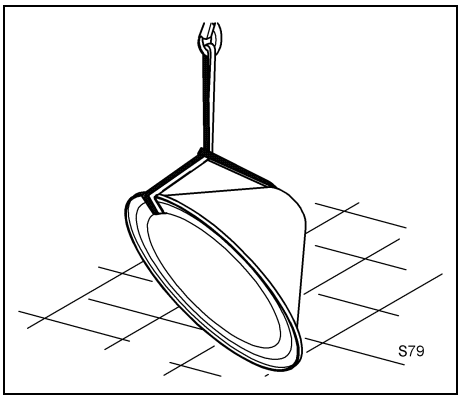

Fig. 143

Special safety precaution when turning over the hood:

- Unintended swinging or overturning of the hood must be prevented.
- Use the carrying straps as illustrated.
- The minimum lifting capacity of the carrying strap must be double as high as the weight of the hood even under consideration of the application conditions.

8.9 Clean operating water holes

In the case of unfavourable operating conditions

– e.g. calcium deposits

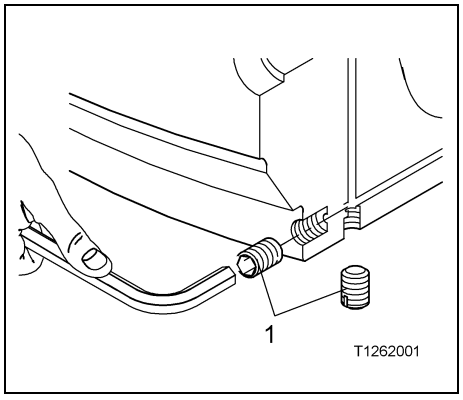

Fig. 144

- Unscrew threaded pins (1).
- Clean operating water holes.
- Insert threaded pins (1) with Loctite 638.
  Important:
  Provide the correct amount of time for hardening! Use Loctite Activator in order to speed up the hardening process.

9 Lubrication and maintenance

9.1 Lubricating system

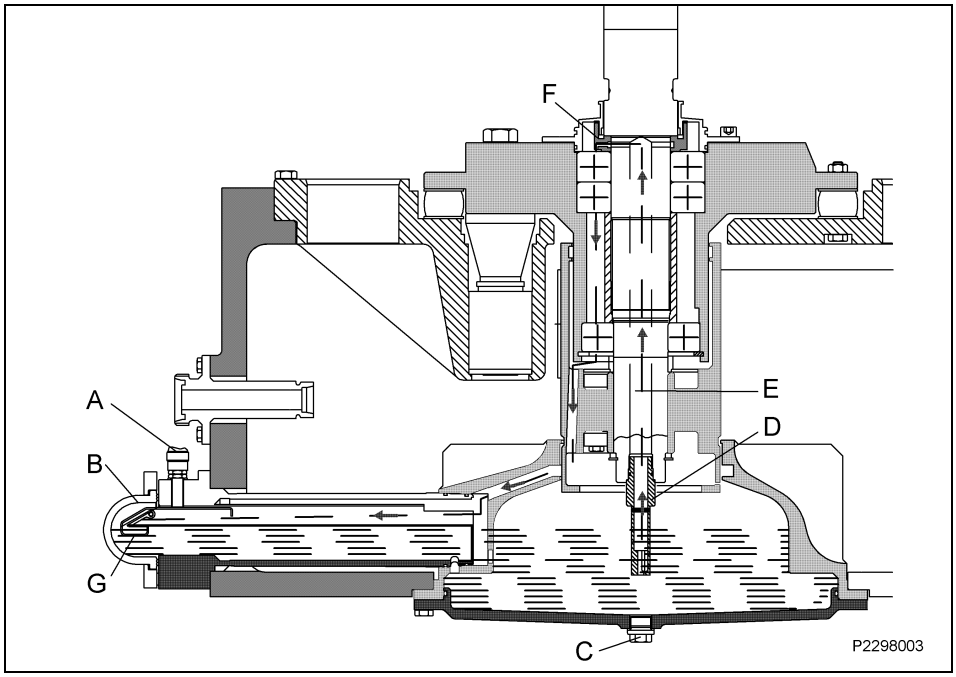

Fig. 145

A Proximity switch
B Sight glass
C Oil drain screw
D Suction pipe
E Drive spindle
F Oil guide ring
G Rocker

All bearings of the separator are automatically lubricated from a central oil bath.

An oil pan is flanged beneath the spindle.
The oil is sucked through a pipe screwed into the drive spindle.
It is fed to the cylindrical roller bearing and the angular contact ball bearings via a central bore.

The oil return can be observed through sight glass B.

9.1.1 Oil monitoring

The oil circulation is monitored during operation by an electronic proximity switch.

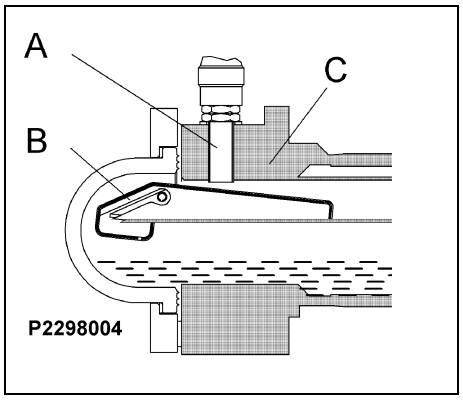

Fig. 146

The gear oil is collected in the reservoir of rocker B until it eventually overflows.
The collected oil presses the counterweight of the rocker upwards beneath proximity switch **A**.

• Fig. 146: Switching status 0 “Alarm” Rocker not actuated (reservoir empty)

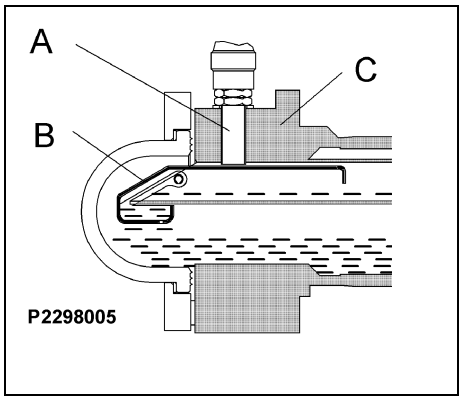

Fig. 147

The proximity switch **A** transmits a signal to a control with whose aid the oil flow is monitored (see Fig. 147).

If the oil flow is interrupted, the oil flows through a small hole out of the reservoir and the rocker **B** falls back into its final position (see Fig. 146). The proximity switch switches and the control outputs an error message.

Fig. 147: Switching status 1 „no alarm“ Rocker actuated (reservoir filled).

Adjusting the oil monitoring

Following assembly or in the event of switching problems, the proximity switch **A** must be adjusted as follows:

- Actuate rocker B by hand to attain the switching status shown in Fig. 147 .
- Turn proximity switch **A** downwards until it makes contact with the sheet metal of the rocker.
- Turn back the proximity switch by precisely one revolution and arrest it in order to adjust the required distance of 1 mm.
- Then check the switching function.
  - Switching status 1 “no alarm” Rocker actuated (reservoir filled)
  - Switching status 0 “Alarm” Rocker not actuated (reservoir empty)
- The proximity switch can be electrically connected by a qualified electrician in place of the old optical level probe. Pay attention to correct polarity!

9.1.2 Oil quantity

Attention!

Do not forget to top up in good time!

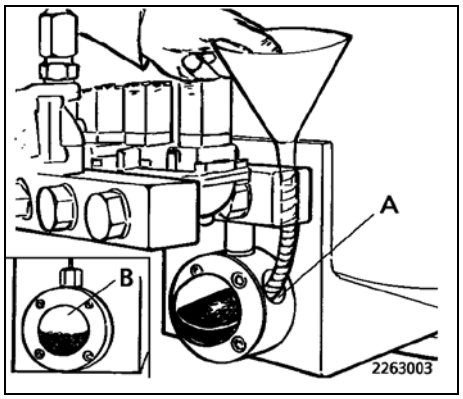

Fig. 148

- Before starting the separator for the first time fill in oil through filler screw "A".

The filling amount is specified in the datasheet under “Oil quantity for gear chamber”.

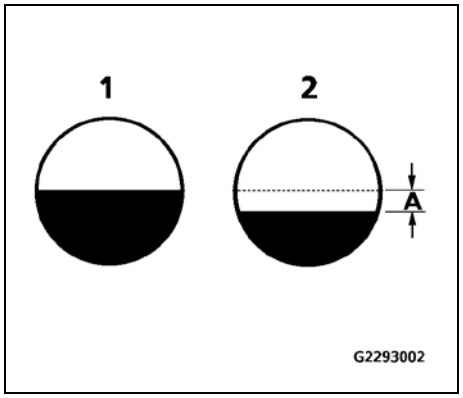

Fig. 149

Oil level:

- At standstill (1) up to middle of sight glass.
- During operation (2) approx. 10 mm below middle of sight glass (Dimension "A").

  Attention:

  Do not fill in oil during operation above the specified measure as otherwise oil will be pressed out of the machine.

Attention!

Never let the bowl run without bowl.

When rotating without bowl, the spindle will be raised by the centrifugal force acting on the balls of the angular contact ball bearings which, in turn, might cause damage to the bearings.

9.1.3 Oil quality

As lube oil use only gear oils with the WS part number stated in the parts list or on the data sheet.

NOTE

Do NOT use motor vehicle gearbox or engine oils.

9.1.4 Oil check

- Check oil level daily!

Attention!

From time to time undo oil drain screw and check whether the oil contains water.

- If the oil shows a milky colouring (emulsification) an immediate oil change is necessary.

9.1.5 Oil change

- The operating hours up to the first oil change and the subsequent oil change intervals are specified in the “Maintenance Schedule”.

NOTE

Change the oil at the latest as specified in the “maintenance schedule” even if the operating hours specified for an oil change have not been reached.

- Whenever changing the oil, clean the lubricating oil chamber thoroughly with thin-bodied oil.
- Do not use fluffy cleaning rags or cotton waste!
- Clean sight glass.

9.2 Motor bearings

Instruction manual

For lubrication of the motor bearings, refer to the instructions of the manufacturer (see motor plate).

9.3 Bowl parts

Before assembling the bowl, coat the threads, guide and contact surfaces on bowl parts such as:

- Bowl bottom,
- sliding piston,
- bowl top,
- lock rings, etc.

with the lubricating pastes or greases specified in the parts list.

NOTE

- **Use only lubricants tested by Westfalia Separator for use on separators.**
  The use of non-genuine parts leads to:
  – safety risks,
  – less durability of these parts,
  – reduced availability of the separator,
  – increased maintenance requirement.

In this case, Westfalia Separator shall assume no liability or warranty.

During assembly, note:

Attention!

Do not bring gaskets made from the special material EPDM (ethylene-propylene-diene-caoutchouc) in contact with mineral oils and greases. Consequence in the event of contact: Swelling of the gaskets

- EPDM-compatible silicon greases can be used for these gaskets to facilitate assembly.
- The greased surfaces must be free from sand and filings. Otherwise the surfaces can become scored.
- When cleaning, check the threads, contact and guide surfaces for impact marks. Impact marks will result in scoring.

9.4 Lubrication schedule

Lubricant	Lubrication interval	Lubricant qty.	Lubrication point
W.S.F assembly grease 0015-0119-000 / 1 kg 0015-0119-010 / 100 g (with NSF-H1 certificate)	As required	Apply thin coat	Bowl lock ring Gaskets All threads, fittings and contact surfaces as well as manually operated parts like brake bolts, valves, tools etc.
Silicon vacuum grease 0015-0117-030 / 100 g (with NSF-H1 certificate)	As required	Apply thin coat	All EPDM gaskets (If applicable)
as per manufacturer specs on motor nameplate	Accord. to manufact. instruct.	Accord. to manufact. instruct.	Motor bearings
Lubricating oil see Parts List,	See maintenance schedule	See data sheet	With oil pan or external lubricating oil unit depending on design
Roller bearing grease 0015-0121-000 / 1 kg	As required	Apply thin coat	Neck bearing springs, spring pistons and pressure surface of the clutch shoe backup. (If applicable)
Clutch oil 0015-0050-090 / 5 l	See maintenance schedule	In accordance with specs in the documentation	Fluid clutch (If applicable)
Lubricating oil 0015-0027-010 / 1 l (with NSF-H1 certificate)	As required	In accordance with specs in the documentation	Annular piston / annular valve (if applicable)

The use of untested lubricants leads to:

- Safety risks
- Less durability of the parts
- Reduced availability of the separator
- Increased maintenance requirement

Use only lubricants for separators that have been tested and approved by GEA Westfalia Separator.
GEA Westfalia Separator shall accept no liability or warranty if untested lubricants are used.

Take the usual precautionary measures whenever working with lubricants. Silicon greases in particular can act as separating agents in case of carry-over.

9.4.1 Handling instructions for W.S.F. assembly grease

Product information

W.S.F. assembly grease is a fully synthetic, water-resistant adhesive grease for the food and pharmaceutical industries.

This lubricant forms a reliably isolating lubricating film between the components to be mounted and prevents cold shut.

W.S.F. assembly grease may not be used for EPDM sealing materials. Use silicon vacuum grease (as per lubrication schedule) for mounting EPDM sealing materials.

W.S.F. assembly grease is used for

- during bowl assembly
  - Bowl bottom – threads for bowl lock ring
  - All screwed connections (except for screws with liquid screw locking adhesive)
  - Bowl top – sliding surface for bowl lock ring
  - Threads on the centripetal pump chamber lock ring
  - Sliding surface on the sliding piston **(not for EPDM seals)**
- Frame
  - Screwed connections on spindle bearing housing
  - Hub elements / worm wheel shaft – motor shaft
  - All screwed connections
  - Screwed connections for hood solid catcher
  - Centripetal pump, feed and discharge assembly, feed tube, ring **(not for EPDM seals)**
  - Spring pistons on neck bearing bridges
  - Threads on pipe joints
  - Threads of puller screws / tools

Handling instructions for W.S.F. assembly grease

- Clean surfaces. Remove water, detergent or old grease residues.
- Apply the assembly grease in a thin, closed film over the entire surface of the component.
- Apply a coat of assembly grease to the threads of screwed connections over the entire circumference.
- **Pay attention to working hygiene!**
  Re-seal open containers after use. Do not contaminate containers.

Example:

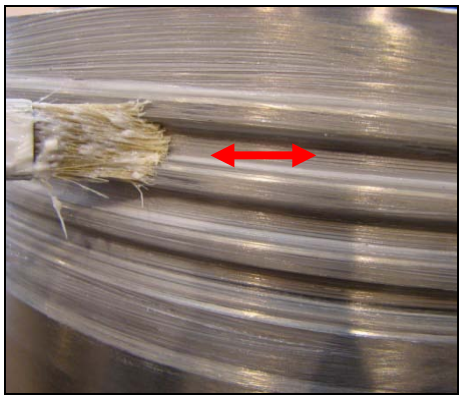

Fig. 150

- Clean and dry the surface of the component.
- Apply the assembly grease with a fine brush.
  Ensure that the lubricating film is thin and closed.

9.4.2 Handling instructions for silicon vacuum grease

Product information

The silicon vacuum grease is a fully synthetic grease on silicon oil basis for the food and pharmaceutical industries.

The silicon vacuum grease is particularly suitable for assembling EPDM sealing materials.

IMPORTANT!
The product contains silicon and pay not be used for applications in coating technique or surface coating.

The silicon grease is resistant against cold and hot water as well as against disinfectant and cleaning solutions.
it is suitable for lubrication of components with material pairing. Plastic/metal, plastic/plastic, ceramic/ceramic and ceramic/plastic.

The product is not suitable for the lubrication of roller and friction bearings with the material pairing steel/steel.

The grease is likewise suitable for pressing and pulling aids for O-ring seals and gaskets **(in particular for EPDM seals)**.

The silicon vacuum grease is used:

- during bowl assembly
  - Sliding surface and sealing surface on the sliding piston when using EPDM seals.
- Frame
  - Gasket on spindle cap
  - Gasket on pipe joints (EPDM)
- In pipe fitting
  - Threads and gasket on sterile unions

Handling instructions for silicon vacuum grease

- Clean surfaces. Remove water, detergent or old grease residues.
- Apply the silicon vacuum grease in a thin, closed film over the entire surface of the component.
- **Pay attention to working hygiene!**
  Re-seal open containers after use. Do not contaminate containers.

Example:

Fig. 151

- Clean and dry the surface of the component.
- Wear gloves when applying grease. (Pay attention to working hygiene!)
- Apply the silicon vacuum grease in a thin, closed film over the entire surface of the component.

9.5 Maintenenance schedule for separators with a remote monitoring system (WeWatch) (option).

The remote monitoring system (WeWatch) is not part of the standard scope of delivery of the separator. To be able to utilize the benefits of a condition monitoring system, it must be ordered from GEA Westfalia Separator and the separator must be equipped accordingly.

A preventive maintenance strategy can be applied by the condition monitoring system "WeWatch" from GEA Westfalia Separator. The latter offers the possibility of constant fusing of data of defined parameters that have a direct influence on the availability of the installation.

In conjunction with regular preventive maintenance intervals, it ensures condition-oriented repair and maintenance. The early identification of wear and long-term trends provides important information in advance so that both parties have the possibility of defining the best solutions with respect to safety, availability of the plant and cost control.

Condition monitoring also gives the opportunity to choose a proactive service approach and provides valuable information for the root cause analysis.

A customized maintenance program forms the basis of the service level agreement to achieve maximum reliability, availability, safety, cost control and efficiency of the centrifuge installation. It ensures maintenance of the maximum installation value and the continuous application of state-of-the-art technology. In this way, additional benefits and budget safeguards are optimized.

The needs and expectations of the plant operator determine the degree of participation of GEA Westfalia Separator in the service and maintenance work.

Independently from the "WeWatch" condition monitoring, some checks set out in the service level agreement must be carried out daily by the plant operator or persons commissioned by him:

- Check installation and process parameters.
- Observe vibration and noises
- Check oil level in oil vessel
- Check oil circulation

For separators with slide ring packings:

- Check the slide-ring packings for leakage.

For nozzle type separators:

- Check the nozzles for blockage.

If a fault or damage is detected during checking:

- Do not start the separator or, if it is rotating, shut it down immediately
- Eliminate the fault before putting the machine back into operation
- Replace damaged elements immediately
- Avoid safety risks.

In case of problems or when having questions:

- Use the helpdesk and the training sessions offered by GEA Westfalia Separator.

For further information, contact your local GEA Westfalia Separator branch.

This maintenance schedule is applicable to separators from GEA Westfalia Separator which are not provided with the "WeWatch remote monitoring system and for which no service level agreement has been concluded.

9.6 Maintenance schedule belt drive

Basic information on maintenance

- If a fault / damage is detected during checking
  - Eliminate the fault before putting the machine back into operation
  - Replace damaged elements immediately.
  - Avoid safety risks,
- Maintenance instructions for all separator models with belt drive
- Not all instructions listed are applicable for every machine.
  - Follow the instructions only when the relevant part is fitted.
  - In the case of problems, consult Westfalia Separator.
  - Make use of training offers.

Daily

- Check oil level in oil vessel and oil circulation.
- Check smoothness of running.
- Check installation and process parameters.
- Check the slide-ring packings for leakage.
- Check the nozzles for blockage.
  - Observe the vibration values.
- Check the nozzle diameters.
  - Observe the current consumption of the separator.

whenever dismantling

- Check load suspension devices for wear or damage.
- Grease the bowl parts.
  - Lock rings
  - Contact surfaces
  - Guide surfaces
- Check the safety stickers.
- Check the nozzles / nozzle diameters.
  - wear
- Check the bush and radial packing rings in the feed system.
  - wear
  - running-in marks
- Check wear inserts for damage

After the first 250 operating hours / after 6 weeks at the latest

- First oil change after commissioning
- Thoroughly clean the drive chamber and oil vessel.
- Clean the oil sight glass.
- Clean bowl valves.

Every 1000 operating hours / after 6 months at the latest

- If **mineral oil** is used as lubricant:
  - Oil change
  - Thoroughly clean the drive chamber and oil vessel.
- Clean the oil sight glass.
- Check the strainer in the operating liquid line.
- Check wear inserts for firm seating and wear

Every 3000 operating hours / after 6 months at the latest

- If **synthetic oil** is used as lubricant:
- or **mineral oil or food grade oil is used in conjunction with an external oil unit** (oil unit with electrically driven oil pump):
  - Oil change
  - Thoroughly clean the drive chamber and oil vessel.
- Clean the strainer in the operating liquid line.
- Clean the operating liquid feed system.
- Dismantle and thoroughly clean the bowl.
- Also thoroughly clean
  - all bores in the bowl
  - valves
  - chamber of the hydraulic system.
- Clean the discharge holes of the operating water feeding system.
- Check the threads of the lock rings.
  - Erosion
  - Corrosion
- Replace the maintenance label.
- Check all safety-relevant bowl assemblies:
  - Bowl bottom
  - Bowl top
  - Bowl lock ring

- Check wear inserts for firm seating and wear
- Check hoses and hose pipes.
- Replace bowl gaskets.
- Grease manually operated parts.
  - brake bolts
  - valves
- Check start-up time.
- Check rated speed.
- Check the brake linings.
- Check the vibration level.
- Check cones
  - bowl and spindle
- Check the safety markings.
- Check the clutch shoes
  - wear
- Check neck bearing springs and spring pistons

Every 6000 operating hours / after 1 year at the latest

- If **synthetic oil is used in conjunction with an external oil unit** (oil unit with electrically driven oil pump):
  - Oil change
  - Thoroughly clean the drive chamber and oil vessel.
- Replace oil filter.
- Replace roller bearings of drive shaft.
- Check bearing seats.
- Check cable connections on motor.
- Check seal /diaphragm in the frame guard.
- Replace rubber-metal bushes of drive.
- Replace vibration absorbers of drive.
- Replace the neck bearing springs / spring pistons / neck bearing pressure ring
- Replace the clutch shoes.
- Replace the drive belt.
- Replace wear inserts.
- Replace drive seals.

Every 18000 operating hours / after 3 years at the latest

- Have the load suspension devices checked by an authorized specialist every 3 years or in accordance with the pertinent standards and guidelines of the national associations in the country of operation.
- Check rubber-metal cushions beneath the feet.
- Check the vibration pickups.
- Check control cabinet and controls.

Accord. to manufact. instruct.

- Grease motor roller bearings.
  - Note motor nameplate.
- Replace motor roller bearings.
  - Note motor nameplate.
  - After 40,000 operating hours / 5 years

Supplement

- Keep to the maintenance intervals specified in the maintenance schedule,
  - even if the specified operating hours have not been reached.
- The maintenance intervals specified are for standard applications.
- The intervals are more frequent when the load increases.
  - special environmental conditions
  - special products
  - hot operating conditions
- Replace damaged elements immediately.
- The instruction **“all xxxx operating hours”** means
  - Carry out specified maintenance procedures after the time specified.
  - Carry out maintenance after the multiple of the time specified.
  - e.g. every 2000, 4000, 6000 etc. operating hours.

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GEA Mechanical Equipment

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