

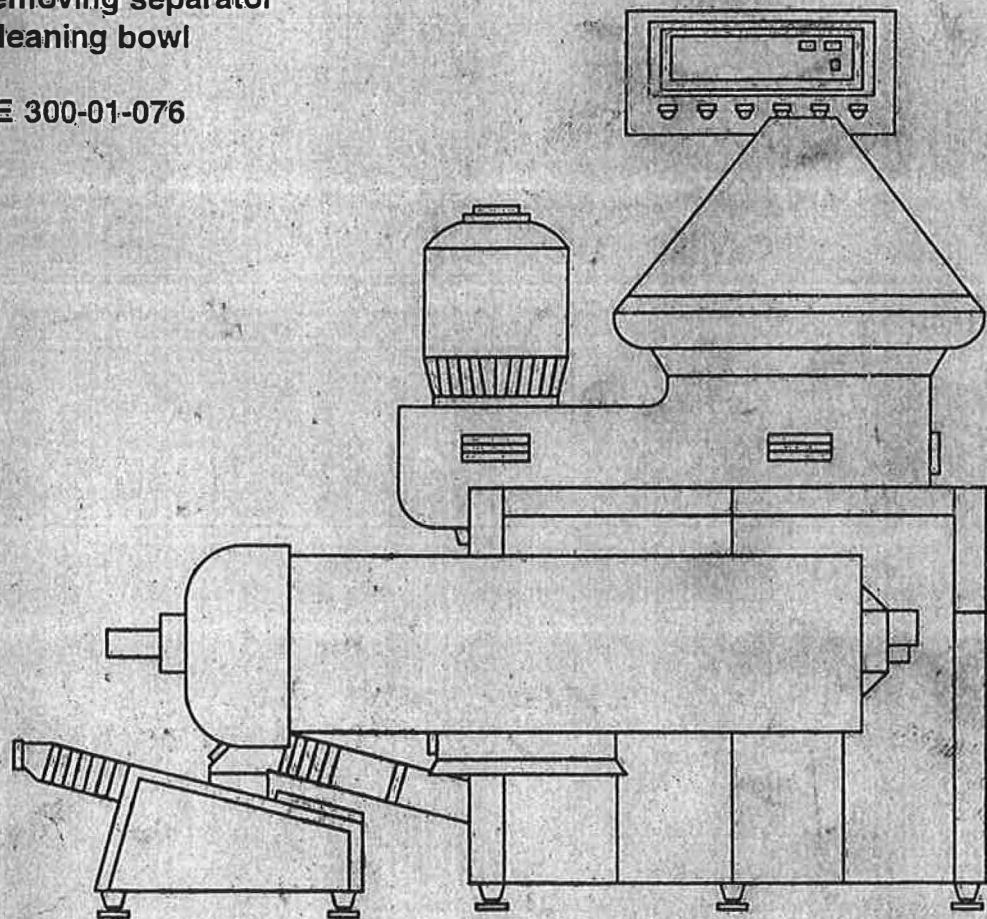
**Instruction Manual and
Parts List**

No. 1246-9001-000

Edition 0797

**Bacteria-removing separator
with self-cleaning bowl**

Model CNE 300-01-076



GEA

Process Technology
Division



Unterehmsberger
Prozesstechnik

Werner-Habig-Str.

Bei Auslieferung dieser Maschine wurde folgender Grenzwert (nach DIN 45635) nicht überschritten:

Data on noise emission 89/392/EWG

The following limit value (as per DIN 45635) was not exceeded when this machine was dispatched:

Données concernant le niveau sonore 89/392/EWG

La valeur limite suivante (selon DIN 45635) n'était pas dépassée lors de la fourniture de cette machine:

Maschine/Typ

Machine type
Type de machine: CNE 300-01-076

Nr.

No.: 17.19 G 37

Baujahr

Year of manufacture
Année de construction: 1998

Schalldruckpegel

Sound pressure level
Niveau de pression sonore $L_{pA} =$ 88 dB

Schalleistungspegel

Acoustic power
Niveau de puissance acoustique $L_{WA} =$ 105 dB
31,5 mW

Datum/Unterschrift/Pos. des Unterschreibenden

Date/Signature/Position held by the signee
Date/Signature/Position du soussigné: 02.11.98 / Kai Abmaier

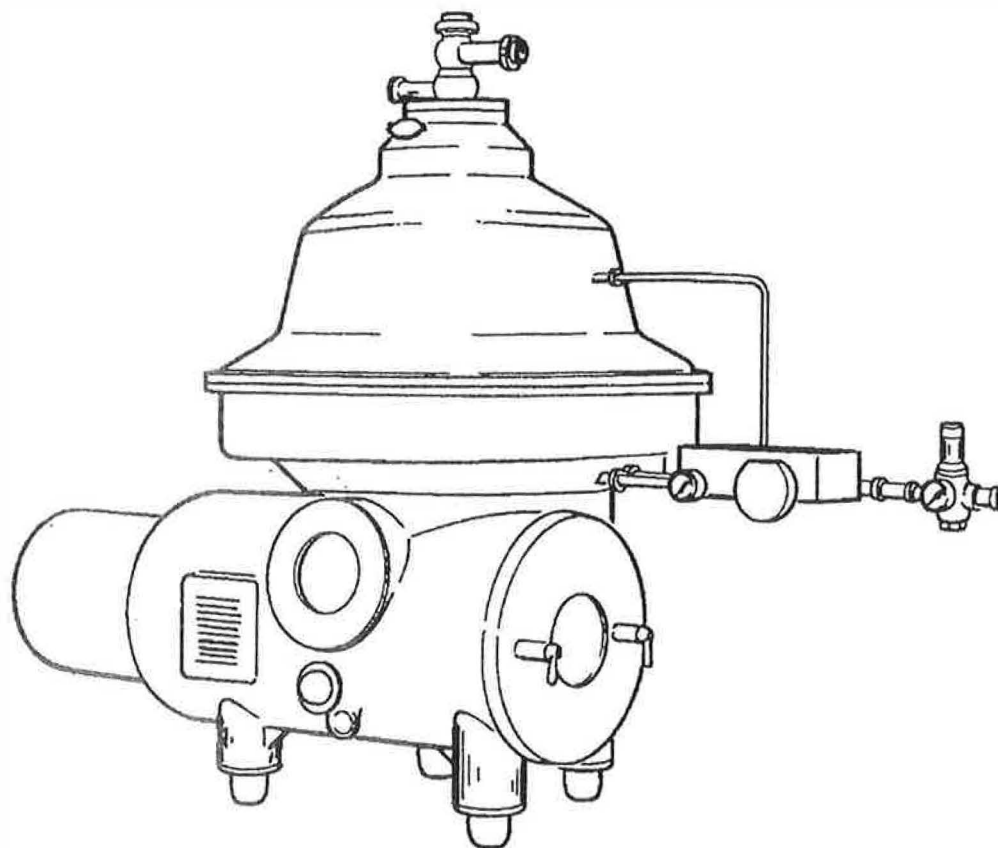


Fig. 1

Westfalia Separator AG D-59302 Oelde (F. R. Germany)			
Type	<input type="text"/>	No.	<input type="text"/>
built in	<input type="text"/>	inner Ø of bowl mm	<input type="text"/>
Rpm of bowl			<input type="text"/>
Permissible density of product to be treated			<input type="text"/>
heavy liquid kg/dm ³	<input type="text"/>	solids kg/dm ³	<input type="text"/>



Unternehmensbe
Prozesstechnik

Werner-Habig-Str

For your safety



- **Strictly adhere to instructions marked with this symbol.**
This avoids damage to the machine and other units.



- **Take special care when carrying out operations marked with this symbol -**
otherwise danger to life.

- **Observe accident prevention regulations.**
The local safety and accident prevention regulations apply unconditionally to the operation of the separator.

- **Instruction manual**
Follow only the instructions given in this manual.

- **Operate the separator only in accordance with agreed process and operating parameters.**

- **Maintain the separator as specified in this manual.**

- **Carry out safety checks on the separator -**
as described in chapter „Safety“ in this manual.

- **Liability for the function of the machine passes to the owner.**

Liability for the function of the machine passes unconditionally to the owner or operator irrespective of existing warranty periods in so far as the machine is improperly maintained or serviced by persons other than Westfalia Separator service personnel or if the machine is not applied in accordance with the intended use.

Westfalia Separator AG shall not be liable for damage which occurs as a result of non-observance of the above. Warranty and liability conditions in the Conditions of Sale and Delivery of Westfalia Separator are not extended by the above.

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1.1 Correct usage

The separator is designed

- in accordance with the chemical and physical properties of the product specified by the customer and
- in accordance with the method of application of the separator agreed with Westfalia Separator AG.

In particular, products not conforming to the specifications the nameplate may not be used.

Any mode of operation deviating herefrom is not proper and correct.

Prior to any intended deviation from the agreed operating mode, it is therefore imperative to obtain the consent of Westfalia Separator AG.

1.2 Safety stickers on the machine

The following warnings must be attached to the machine as self-adhesive stickers. The stickers must always be in perfect condition.

- Clean dirty stickers.
- Replace damaged stickers.

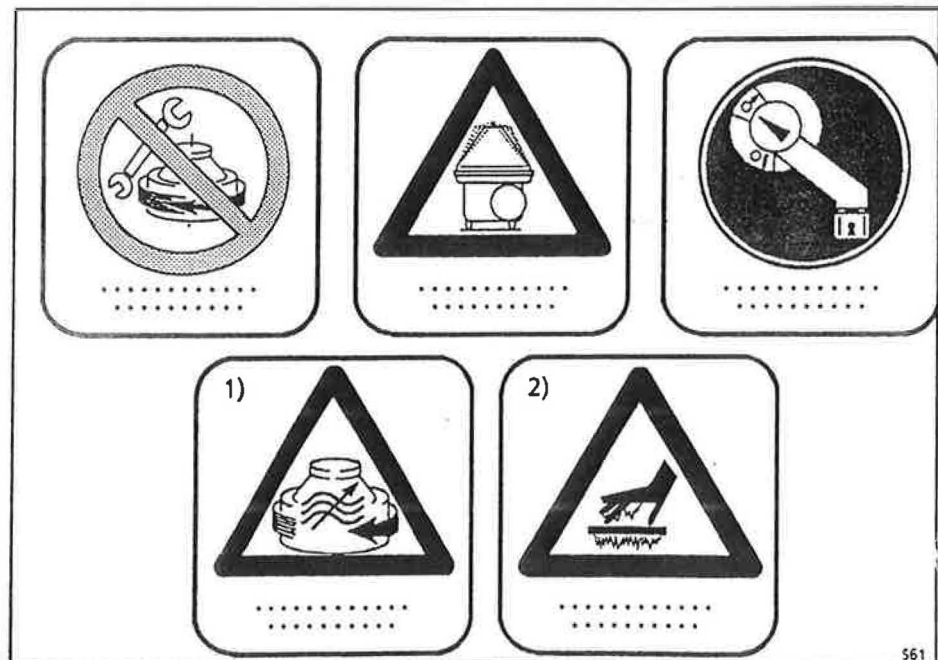


Fig.2

- 1) Only in case of operation with frequency converter
- 2) Only in case of hot operation



1.3 Basic operating principles

Separators are used for the separation of liquid mixtures or for the separation of solids out of liquids or liquid mixtures.

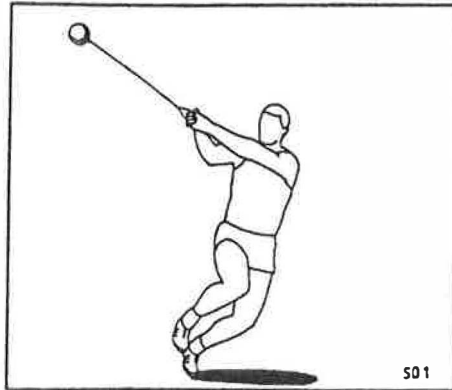


Fig. 3

High centrifugal forces are produced in the rotating bowl.

Under the influence of the centrifugal forces, separation of the liquid mixture and/or ejection of the solids particles takes place most rapidly.

The specifically heavier components are displaced to the bowl periphery, whereas the specifically lighter components are displaced towards the centre of the bowl.

The high centrifugal force is produced by very high bowl speeds. On the one hand, high bowl speeds signify high efficiency, while on the other hand, they signify high material stressing of the separator.

1.4 Bowl speed and product

The max. permissible bowl speed is an important parameter when rating the separator. It depends on the chemical and physical properties of the product such as

- temperature (if higher than 100 °C or lower than 0 °C),
- density of the fluid and solid components,
- aggressiveness of the product as regards corrosion and erosion (has influence on the selection of the bowl material).

The bowl speed is determined on the basis of these parameters allowing for an adequate safety margin.

Before using a product with properties different from those stated when placing the order, it is imperative to obtain the manufacturer's approval.

1.5 Operations on the separator

The separator works reliably, provided that it is operated and looked after in accordance with our operating Instructions.

Special attention must be given to:

- assembly
- starting
- shutting-down
- maintenance and servicing



1.5.1 Assembly

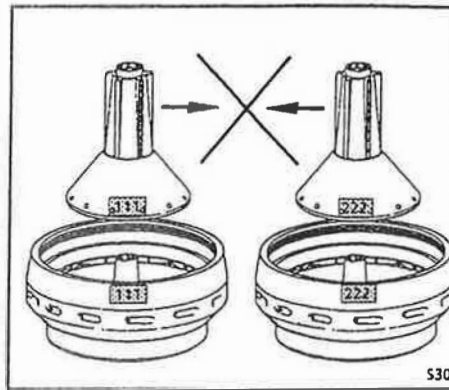


Fig. 4

- If the plant has several centrifuges, be careful not to interchange parts of different bowls since each bowl has been balanced individually. The bowl parts are marked with the serial-number of the machine or with the last three digits of the serial-number.

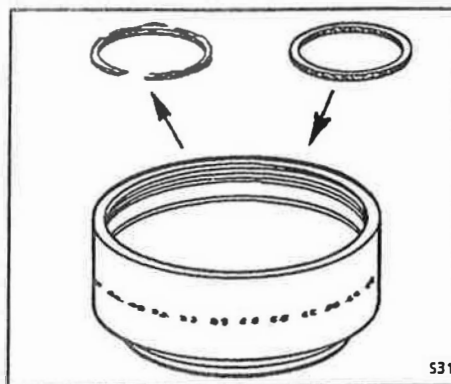


Fig. 5

- Damaged parts must be replaced immediately by new parts.

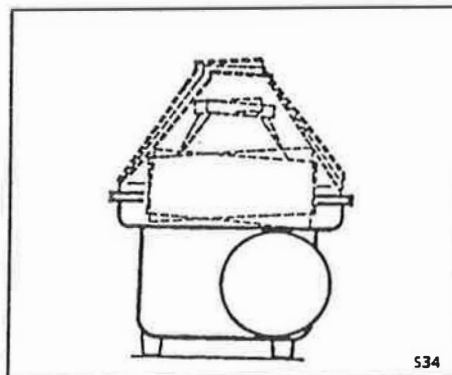


Fig. 6

- After installing spare bowl parts, the bowl must be re-balanced.

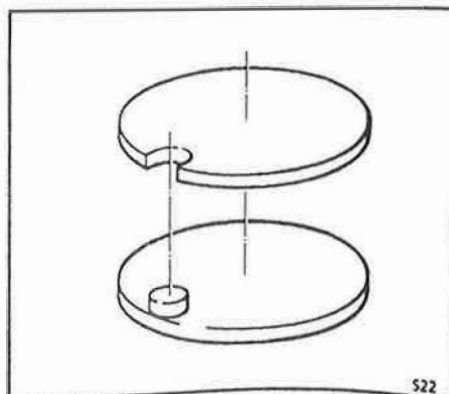


Fig. 7

- The bowl parts are arranged in fixed positions relative to one another.
- Locking devices and alignment marks must be in perfect condition. The bowl must not be operated if these locking devices and alignment marks are not in perfect condition.



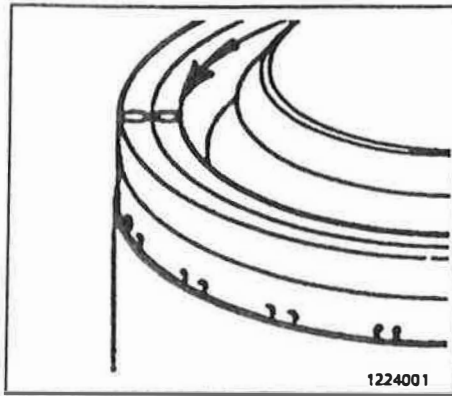


Fig. 8

- When assembling the bowl, be sure to strictly adhere to the instructions given in chapter "bowl", in order to avoid undue unbalance.
- Before starting the bowl, be sure to fit all parts.
- Tighten the bowl lock ring securely: the "O" marks on the bowl bottom or bowl top and on the lock ring must be in line with each other.

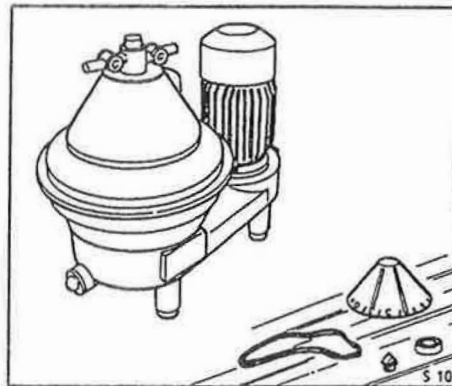


Fig. 9

- Check if the machine is completely assembled and properly installed.

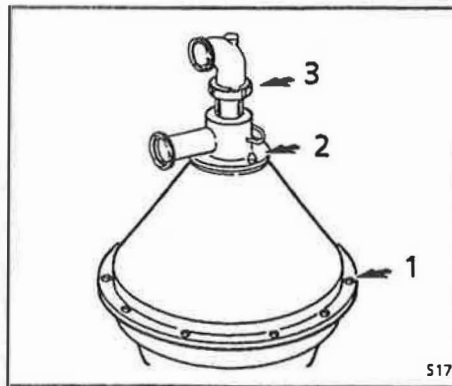


Fig. 10

- Carefully fasten hood 1, feed and discharge housing 2 and centripetal pump 3.

1.5.2 Electrical appliances

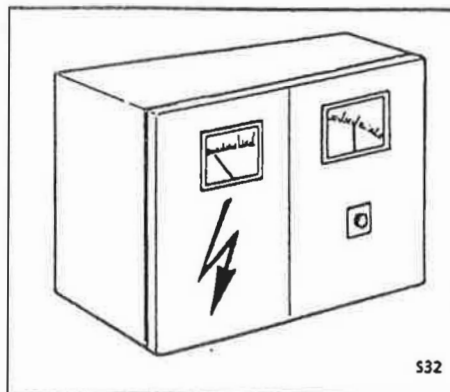


Fig. 11

- The governing accident prevention regulations apply for the electrical appliances and installations.
- The frequency and voltage of the power supply must correspond to the machine specifications.
- Carry out potential equalization.
- Observe legal regulations; e.g. in the EU:
 - Low-voltage guideline 73/23/EWG
 - Electro-magnetic compatibility 89/336/EWG.



1.5.3 Before start-up

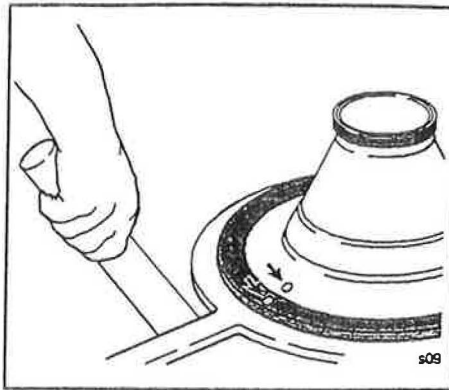


Fig. 12

- Check that the bowl lock ring has been firmly tightened.
- The "O" marks on bowl bottom or bowl top and on the lock ring must be aligned.

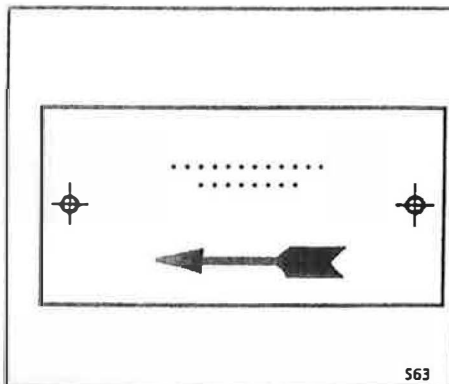


Fig. 13

- The bowl must rotate in clockwise direction (see arrow on frame or solids collector).



Fig. 14

- The separator may only be operated with protection devices conforming to EN 294. Equip solid and liquid discharges accordingly.

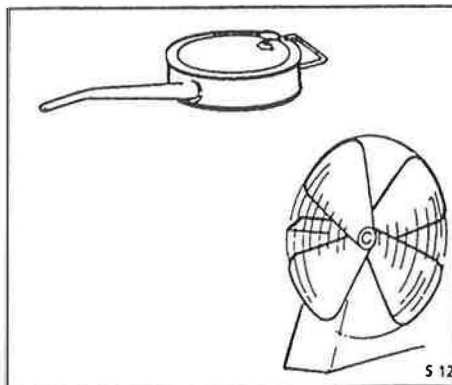


Fig. 15

- Check that the lubrication and cooling systems are serviceable.



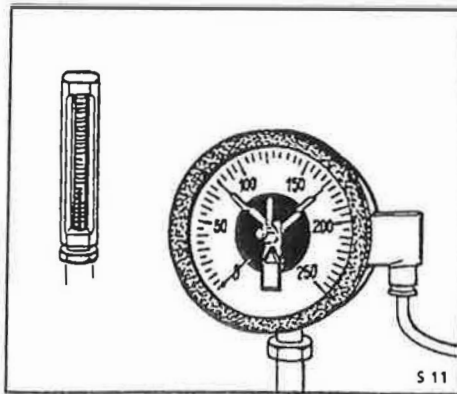


Fig. 16

- Check whether the supervisory equipment is operational and the correct limit values are adjusted.
- When hoods, concentrate collectors and vessels are pressurized, e.g. by
 - inert gas,
 - cooling,
 - steam sterilization etc.
 the pressures stated on the nameplate must not be exceeded.

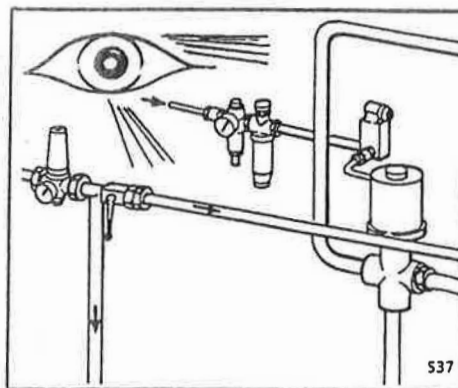


Fig. 17

- Check that the product lines are set to operation.
- Regularly check hoses for signs of ageing.
- Check sight glasses for mechanical damage.
- Replace damaged parts by parts which are as good as new.

1.5.4 Operation

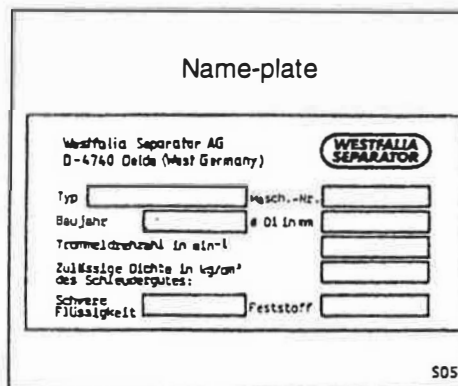


Fig. 18

- Refer to chapter »operation«.
- Note nameplate. The values for
 - bowl speed
 - density of the heavy liquid,
 - density of solids (centrifugally dry)
 are max. values and must not be exceeded.



Fig. 19

- Wear ear protection.





Fig. 20

In case of frequency converter operation:

- Do not under any circumstances manipulate the frequency converter to exceed the permissible bowl speed (see maker's nameplate).
- The separator may only be operated with an independent device for speed limiting.



Fig. 21

- Do not feed product which is categorised as explosive.
- The separator must not be used in areas where explosion protection is required.



Fig. 22

- When processing products harmful to persons, observe the pertinent safety regulations.
- Refer to the safety data sheet of the product.
- Wear protective clothing.



Fig. 23

- Stop the separator immediately if unusual noises or vibrations occur.





Fig. 24

Only in case of hot operation:

- Product-contacting parts such as
 - pipes and hoses,
 - hood,
 - solids collector
 reach temperatures over 80 °C.

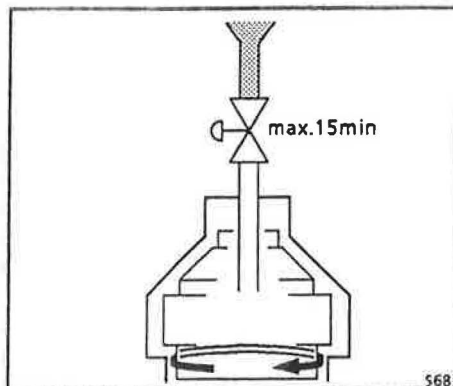


Fig. 25

- The bowl is not allowed to run without liquid supply for more than 15 minutes, as otherwise it would result in overheating of the bowl material.

1.5.5 Shut-down and »Emergency-Off«

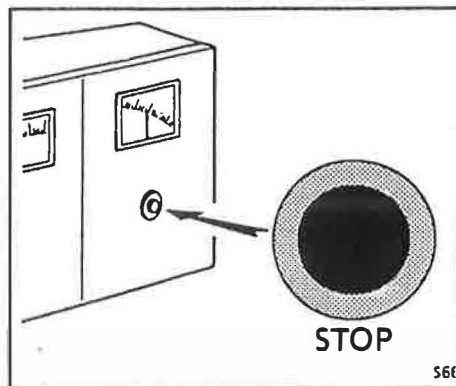


Fig. 26

- For shut-down refer to the chapter "operation".



1.5.6 Maintenance and repair

Unfavourable operating conditions may require shorter maintenance intervals. The factors listed below are unfavourable because they either attack the separator material directly or impair the lubrication/cooling system:

- aggressive product (chemical or physical)
- high product temperature
- product with grease decaying properties
- environment: temperature, dust and vapours

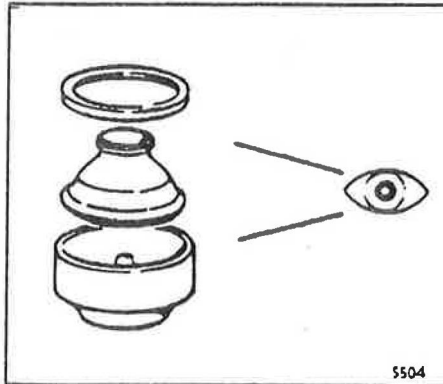


Fig. 27

Particularly stressed parts such as bearing hub, bowl hub and other bowl parts with a large outer diameter must be checked on a regular basis to ensure safe and efficient operation.

Timely maintenance and replacement of worn or damaged machine parts is essential for safe operation of the machine.



Maintenance and repair work may only be carried out by the customer to the extent as described in this instruction manual.



Maintenance and repair work not described in this manual may only be carried out by the manufacturer or by "repair shops" authorized by the manufacturer.

We, therefore, recommend in your own interest to have your separator inspected by our service engineers at regular intervals. Such inspections will keep your separator working reliable and prevent undesirable shut-downs.

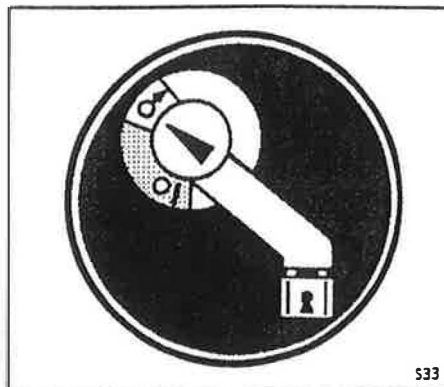


Fig. 28

Before maintenance and servicing:

- switch off all electrical appliances via the main switch,
- secure installation against unintended re-starting with locking devices.





Fig. 29

- Do not loosen any part before the bowl has come to a standstill.
- For checking standstill refer to chapter "bowl".



Fig. 30

- Do not climb onto or stand on the machine or parts of the machine.
- Make provision for and use a sturdy working platform.

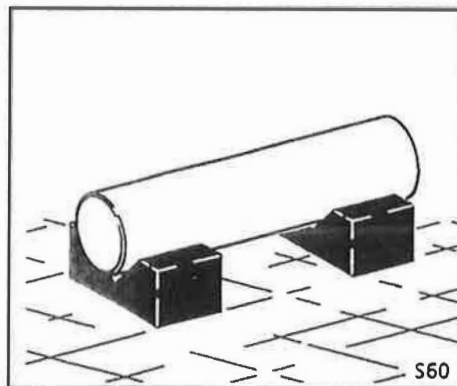


Fig. 31

- Place dismantled machine parts on a suitable base, e.g. rubber mat.
- Take steps to prevent machine parts from overturning and rolling away.

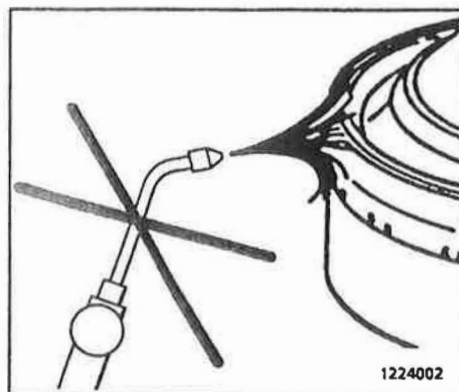


Fig. 32

- Do not heat bowl parts with the naked flame.
- Bowl parts must never be welded. This also applies for hood and solids collector parts of steam-sterilizable separators.
- Even during cleaning the bowl parts the temperature must not exceed 100 °C.



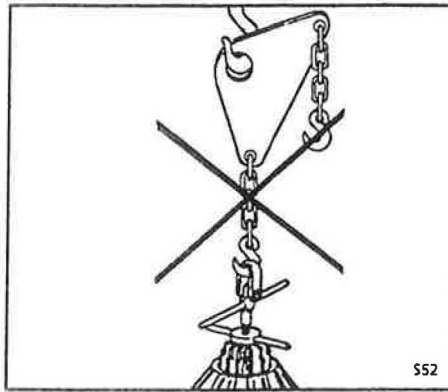


Fig. 33

- Load-carrying equipment such as lifting devices for
 - bowl or distributor,
 - chains etc.may only be used for work routines as described in this instruction manual.
- Do not use damaged or incomplete load carrying equipment.



Fig. 34

- Collect dripping oil to prevent danger of slipping or product infection.
- When handling waste oils note:
 - They can be injurious to health, depending on their chemical composition.
 - Waste oil must be disposed of in accordance with local regulations.



1.6 Corrosion

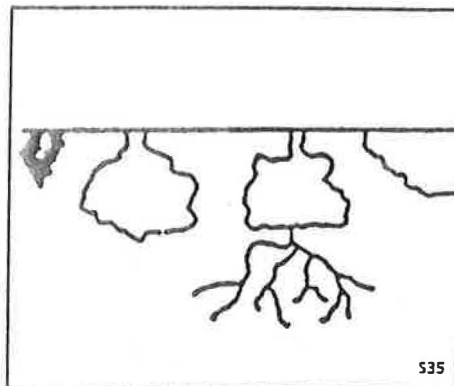
Corrosion can also affect bowl parts made of stainless steel. This corrosion can be flat-spread or pit- or crack-shaped and merits special attention.

Corrosion on stainless steel bowl material should be examined thoroughly and documented.

Flat-spread corrosion can usually be measured (reduction of wall thickness)

Pit- or crack-shaped corrosion cannot be measured without the risk of damage. At the initial stage pit-shaped corrosion is generally caused by chlorine ions.

Depending on the stressing of the part, pit-shaped corrosion can result in crack-shaped corrosion.



Possible formation of pit-shaped corrosion.

Fig. 35

Such pittings can only be investigated by a materials expert.

In case of crack-shaped corrosion attack with or without superposed flat-spread and pit-shaped corrosion on main bowl components, **the machine must be shut down immediately.**

Contact your nearest Westfalia Separator AG representative for a thorough examination.

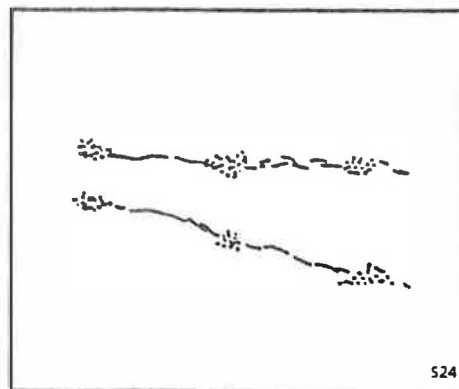


Fig. 36

Pittings

Pittings which are close together or form a linear pattern can signify crack formation beneath the surface.

Such pittings should be investigated by a materials expert.



1.7 Erosion

Erosion is caused by solid particles in the process liquid. These solid particles grind marks into the surfaces with which they come into contact.

The following factors favour the occurrence of erosion:

- hard solids particles
- high throughput capacities

The first signs of erosion should be carefully observed and documented. Erosion can deepen rapidly, thereby weakening the bowl material.

Contact your nearest Westfalia Separator representative for a thorough examination. Information on the nature of the damage can be provided by photos, plaster casts or lead molds.

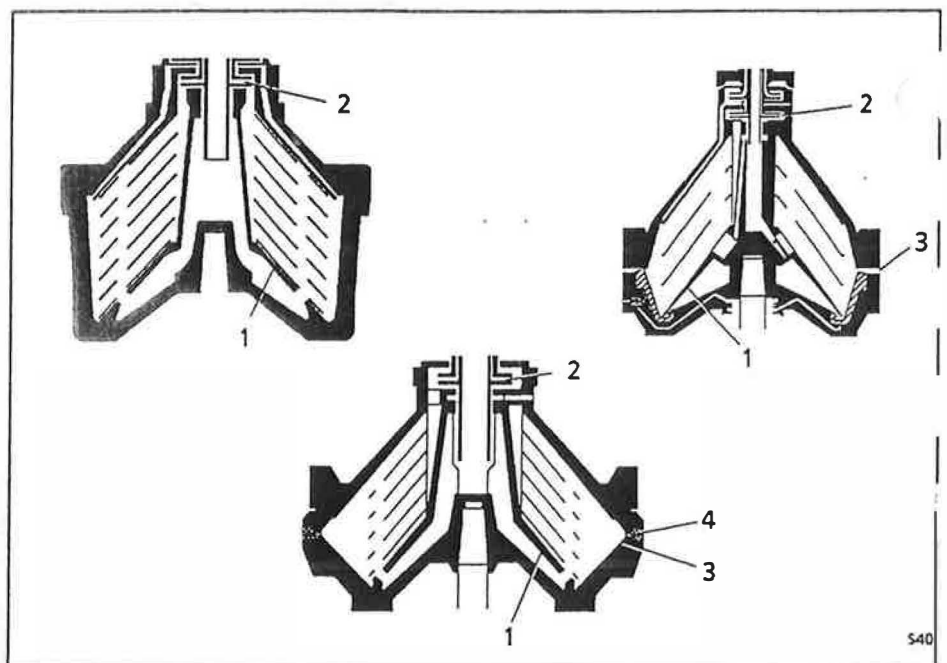


Fig.37

The surfaces most susceptible to erosion are:

- 1) the bottom of the distributor, the rising channels and the ribs,
- 2) the centripetal pump (cavitation),
- 3) all surfaces in the area of the solids discharge ports,
- 4) the nozzles.



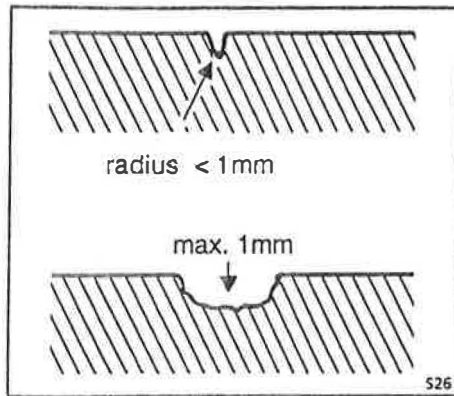


Fig. 38

Signs of erosion which you should immediately report to your nearest Westfalia Separator representative:

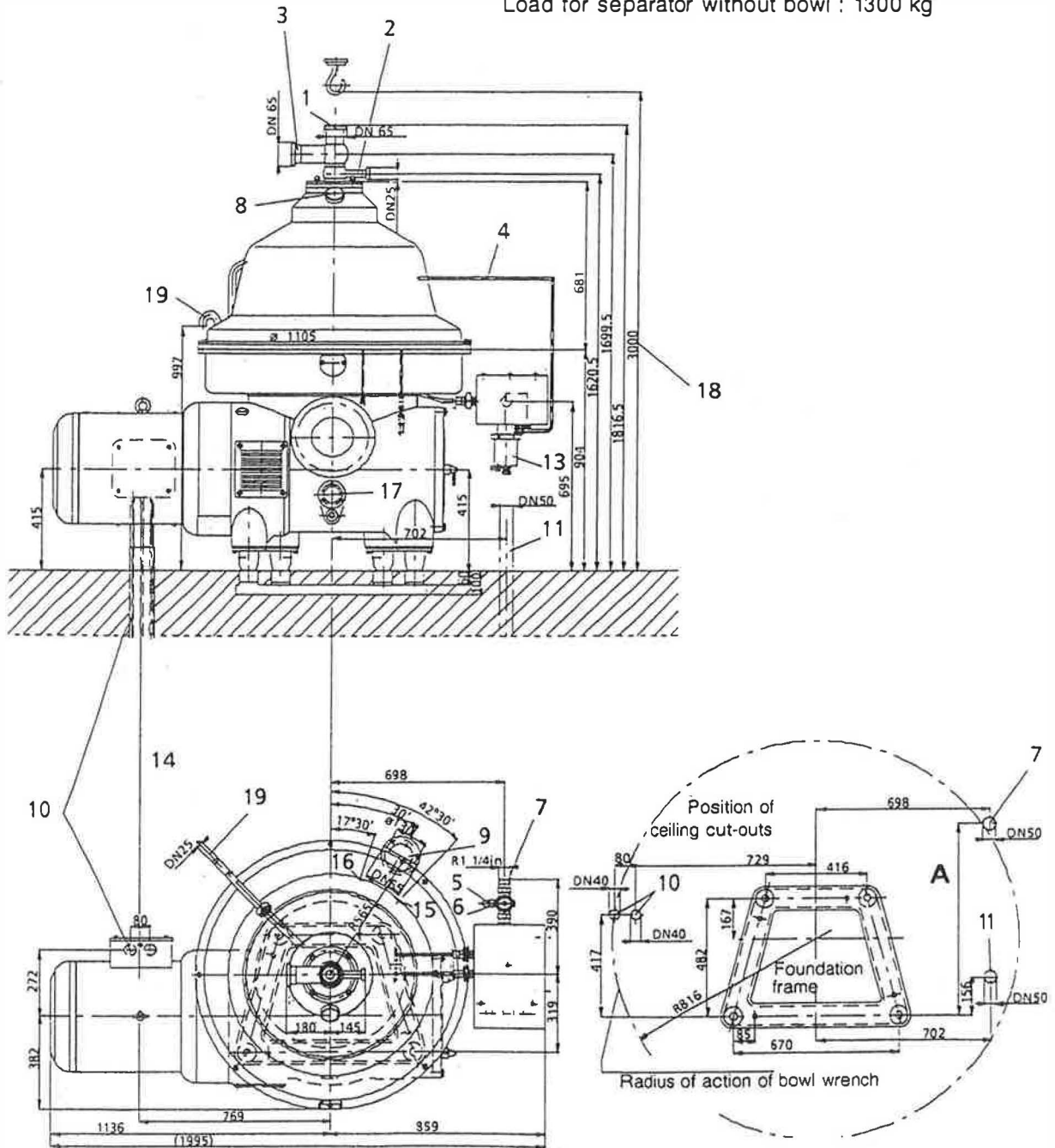
- The bottom of the erosion mark has a radius smaller than 1 mm (large notch effect).
- The depth of erosion mark exceeds 1 mm at the deepest point.



2 Installation

2.1	Transport.....	20
2.2	Installation.....	20

Load for bowl complete : 1040 kg
Load for separator without bowl : 1300 kg



A Dimension depending on fitting arrangement

P1246001

Fig. 38 - Subject to modification. Refer to project-specific dimensioned drawing!

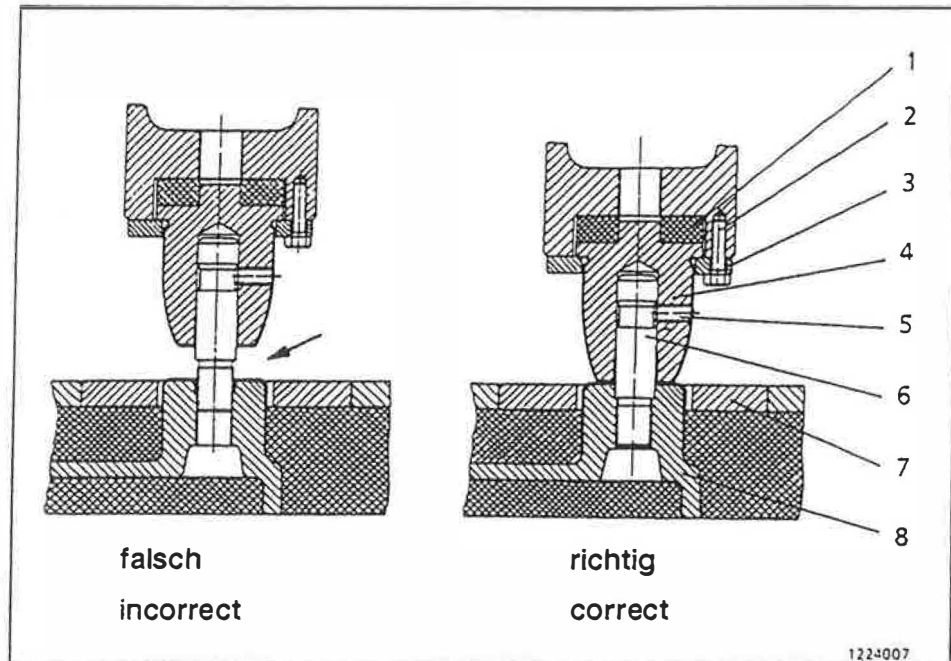


Fig. 41

- | | |
|------------------|--------------------|
| 1 Rubber cushion | 5 Threaded pin |
| 2 Screw | 6 Bolt |
| 3 Flange | 7 Floor |
| 4 Foot | 8 Foundation frame |

- Screw bolts 6 into the four mounting blocks of foundation frame 8; **make sure they are tight.**
- Embed the foundation frame in the floor 7 so that the mounting blocks of the frame protrude from the floor by about 5 mm.
- Make sure that the mounting blocks are **absolutely level.**
For fastening the foundation frame use commercially available heavy-duty plugs and hex head screws (M 16).
- By means of flanges 3 and screws 2, fasten feet 4 with fitted-on rubber cushions 1 to separator frame.
- Lift the separator onto the bolts of the foundation frame.
- Tighten threaded pins 5 with a wrench.



3.1.4 Oil change

- Make first oil change after about 250 operating hours; then change oil every 750 operating hours. However be sure not to wait longer than 6 months to change the oil.
- Each time when changing the oil, thoroughly clean gear chamber and flush it with thin-bodied oil before filling in new oil.
- Remove all metal particles from inner walls and corners of the gear chamber.
- Do not use fluffy cleaning rags or cotton waste.
- Clean sight glass.

3.2 Bowl parts

Before assembling the bowl apply a thin film of one of the lubricants specified below to threads and contact surfaces of bowl bottom, bowl top, lock rings, etc.

For separators operating in the food processing industry we recommend you to use the following lubricant:

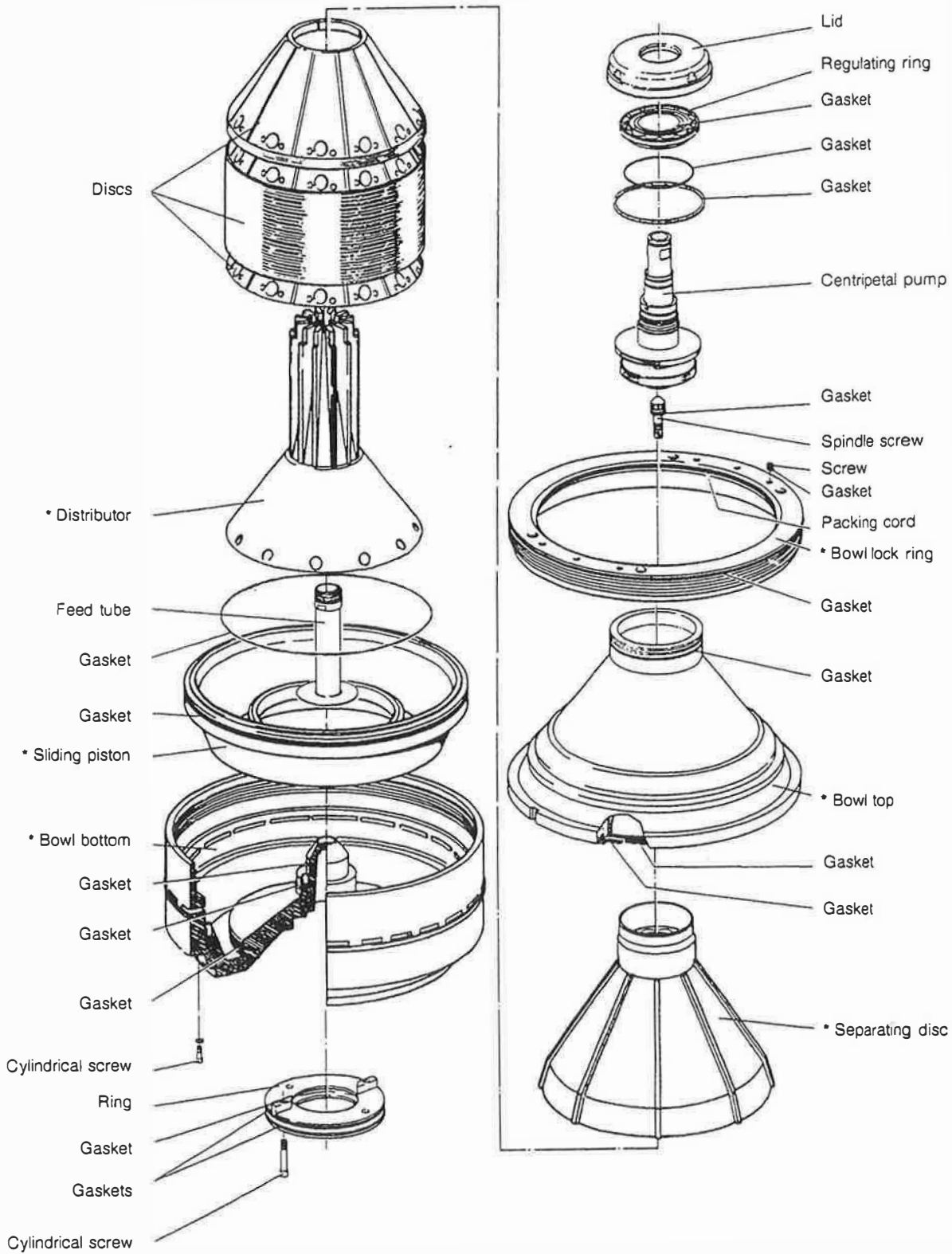
- Klüber Grease KSB 8

In addition to the above lubricant, other pastes or greases with the same properties may be used.

3.3 Motor bearings

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

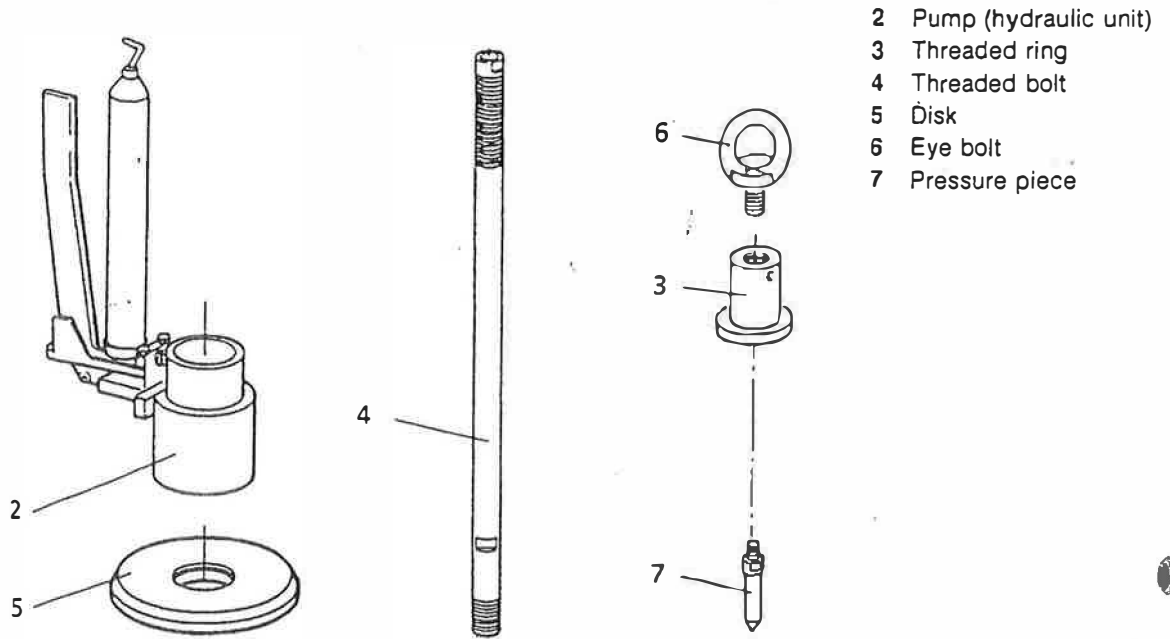
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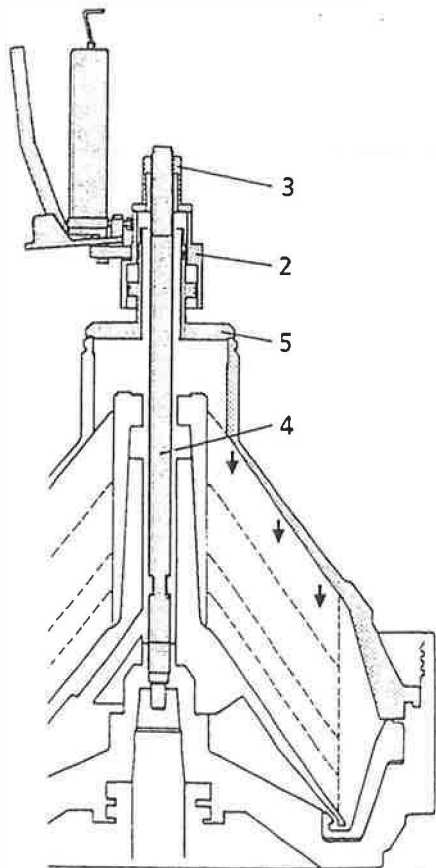
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* **IMPORTANT:** After replacing this part, the complete bowl must be re-balanced.

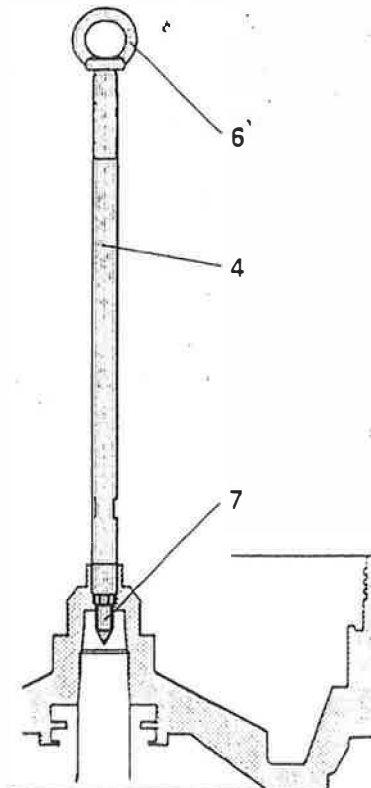
Fig. 44 Exploded view of the bowl



Compressing the disc stack



Forcing off / removing the bottom of the bowl



T1357003

Fig. 45 - Functional diagram

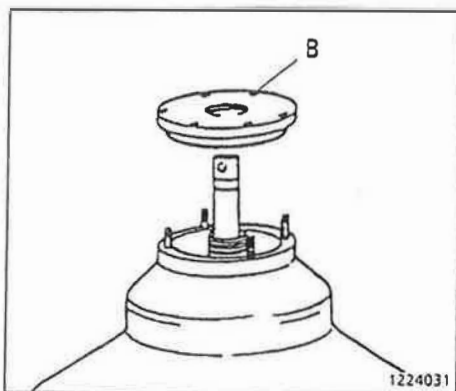


Fig. 49

- Remove the disk.

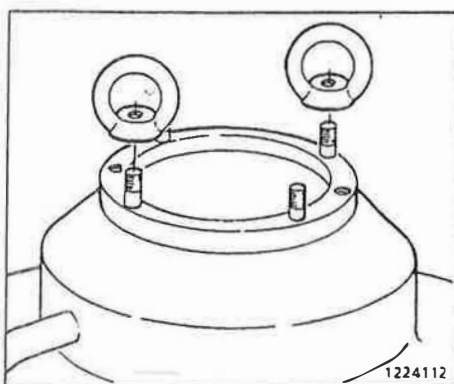


Fig. 50

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

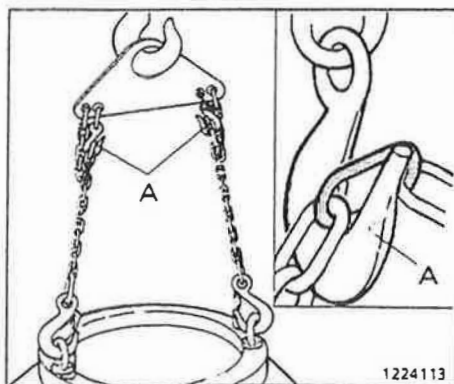


Fig. 51

- Loosen the fastening screws of the hood.
- Disconnect and remove hood flush-water line from the operating-water connection.
- Shorten the chains of the lifting device by putting an appropriate chain link crosswise on hook A (see adjacent small figure).
- Hang the shortened lifting device into the lifting-eye nuts and remove the hood.

5.3 Dismantling the bowl



NOTE:

To avoid accidents do not loosen any part before the bowl is at rest.

- Before opening the bowl, release the brake by turning the handle clockwise.
- Handle bowl parts with care.
- Replace worn gaskets immediately.
- For tools refer to chapter 13 - list of spare parts

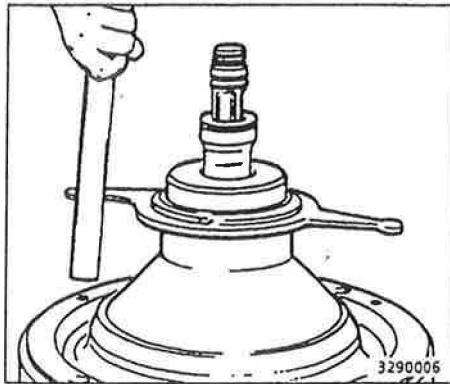


Fig. 52

- Loosen the lid by lightly tapping with the mallet against the handle of the annular wrench (**left-hand thread**).
- Remove the lid.

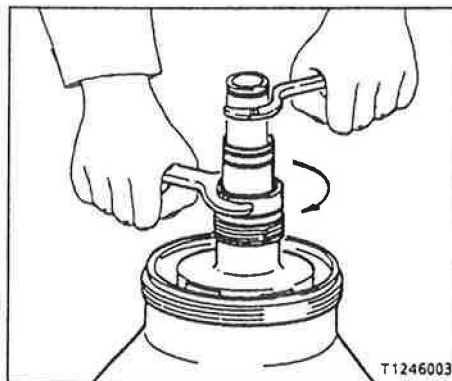


Fig. 53

- Unscrew upper centripetal pump from lower centripetal pump using a single-ended wrench and remove it (**left-hand thread**).
- While doing so, hold lower centripetal pump with single-ended wrench.

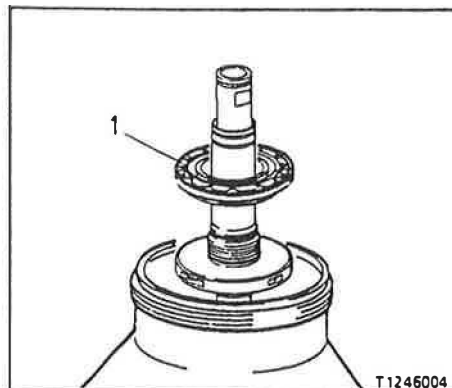


Fig. 54

- Raise lower centripetal pump and feed tube.
- Remove regulating disc 1.

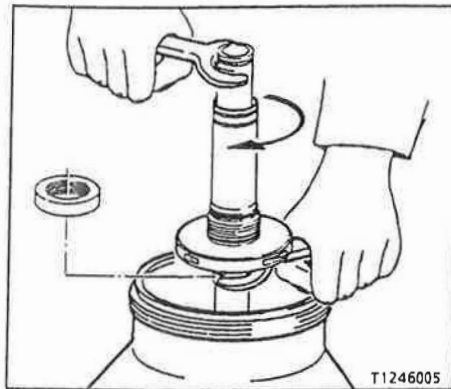


Fig. 55

- Unscrew lower centripetal pump using the single-ended wrench (**left-hand thread**).
- Screw the threaded ring onto the feed tube so that the feed tube is suspended in the distributor neck.

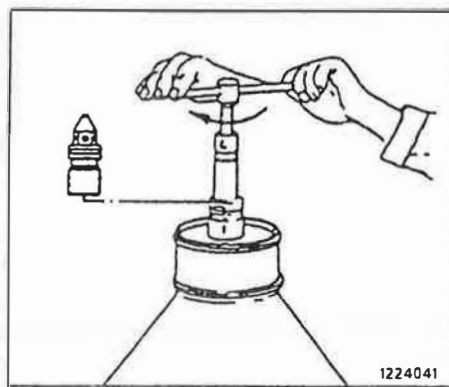


Fig. 56

- Unscrew spindle screw from bowl bottom using a socket wrench (**left-hand thread**).

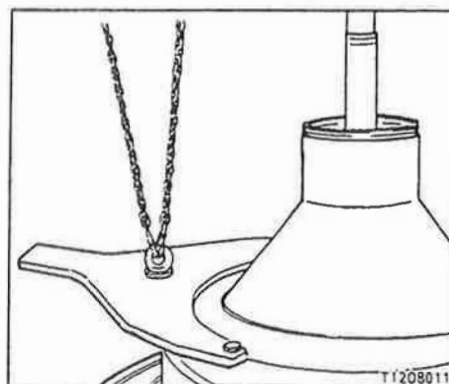


Fig. 57

- Place the wrench onto the bowl lock ring using the lifting device,
 - engage the cam and
 - tighten the two fastening screws **firmly**.

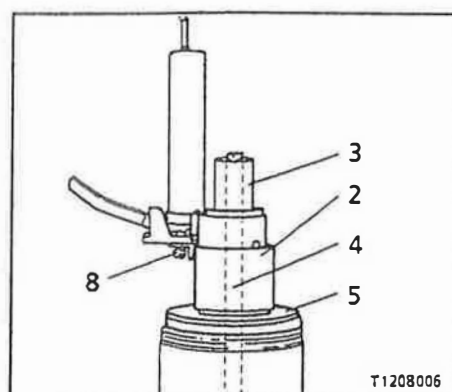


Fig. 58

Mount disc stack compressing device:

- Place disk 5 onto bowl top.
- Screw bolt 4 as far as it will go into the bowl bottom (**left-hand thread**).
- Insert hydraulic part 2 into the centering recess of the disk.
- Screw on threaded ring 3 until its upper edge is flush with end thread of bolt 4 (**left-hand thread**).



To prevent damage to threads:

- screw in threaded bolt completely,
- screw on threaded ring completely down to thread end.

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

In this case:

- Bring piston and cylinder into initial position:
 - loosen pressure relief screw 8 by two turns,
 - press the pump lever down as far as it will go,
 - screw on threaded ring 3 down to thread end.
- Tighten screw connections of the compressing device.
- Screw tight pressure relief screw 8.

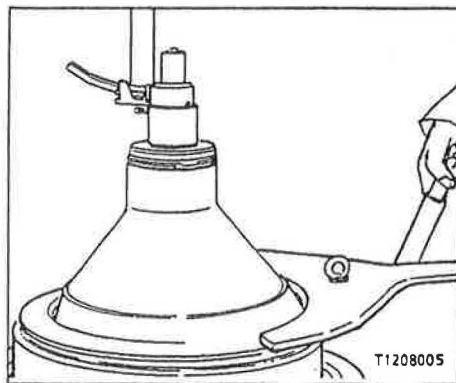


Fig. 59

- To facilitate loosening of the bowl lock ring compress the disc stack with the compressing device.

Pressure: 280-300 bar

- Loosen bowl lock ring by rapping with a mallet against the handle of the wrench (**left-hand thread**).
- Remove the wrench using the lifting device and a hoist.

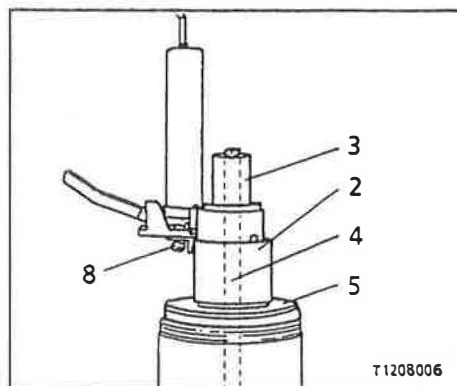


Fig. 60

Remove disc stack compressing device:

- Push lever of compressing device down as far as it will go to prevent it from springing back.
- Loosen pressure relief screw 8.
- Unscrew threaded ring 3 (**left-hand thread**).
- Remove hydraulic parts 2 and disk 5.
- Unscrew bolt 4 (**left-hand thread**).

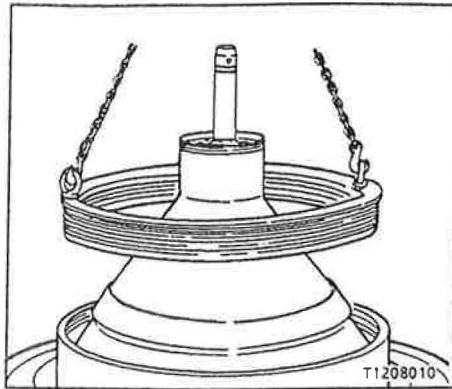


Fig. 61

- Screw two eye bolts opposite each other into bowl lock ring.
- Remove bowl lock ring using the lifting device.

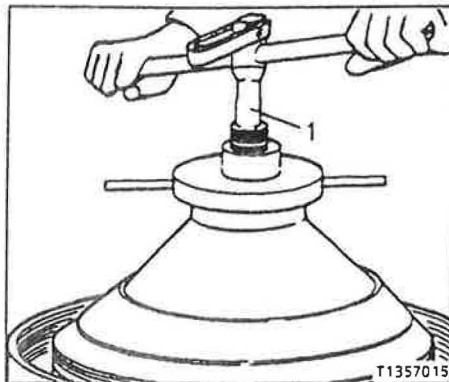


Fig. 62

- Screw lifting device 1 onto the bowl top.
- Force off the bowl top from the bowl bottom by turning the spindle clockwise and remove it.

If the separating disc is stuck to the bowl top,

- rap the bowl top with a copper or light metal hammer until the separating disc becomes loose. Do not let it drop onto the floor!
- If the separating disc cannot be removed in this way, put down the bowl top.
- Pass a brass mandrel through the **outer** holes in the upper part of the bowl top and loosen the disc by gently tapping against the mandrel.
Never place a mandrel on the inner rim of the separating disc.

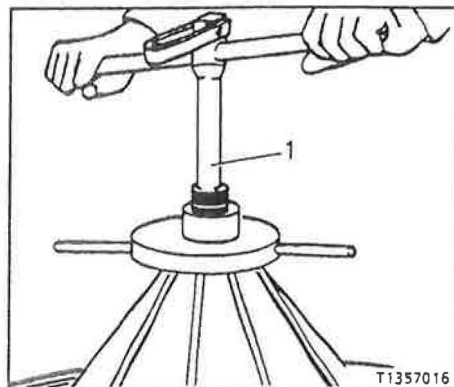


Fig. 63

- Screw lifting device 1 onto distributor.
- Press off distributor together with disc stack by turning the spindle clockwise.
- Lift out the distributor with disc stack.

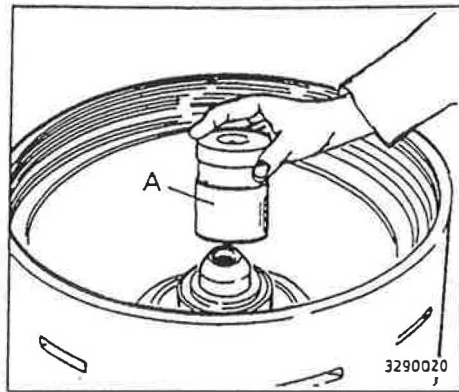


Fig. 64

- Place pressure piece A of lifting device on the hub of the bowl bottom.
- Grease outer surface of the pressure piece.

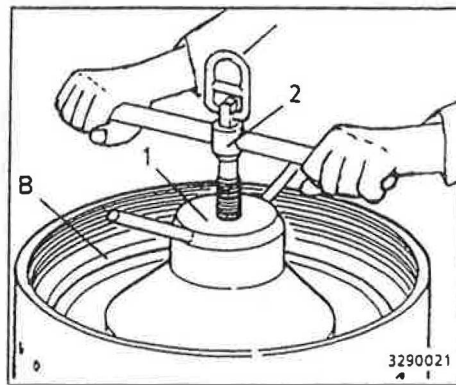


Fig. 65

- Screw lifting device 1 onto sliding piston.
- Force off the sliding piston from the bowl bottom by turning threaded spindle clockwise.
- Remove the sliding piston.
- Make sure that sealing lip B of the sliding piston does not get damaged.

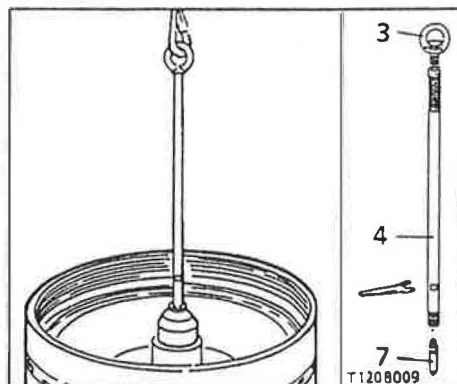


Fig. 66

Forcing off the bowl bottom:

- Screw pressure piece 7 into threaded bolt 4.
- Screw eye bolt 3 into upper bolt end 4.
- Screw the whole device into the bowl bottom **as far as it will go (left-hand thread)**.
- Force bowl bottom off the spindle cone by means of wrench SW 24, which is placed on the corresponding surface at the lower end of the bolt.

5.4 Assembling the bowl

- For lubrication of threads and guide surfaces of the bowl parts refer to 3.2.
- Replace worn gaskets immediately.
- Tools see chapter 13 - List of spare parts.

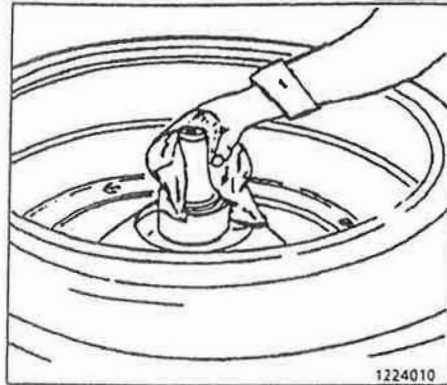


Fig. 67

- **Oil** the upper part of the spindle (cone and cylindrical guide surface for the spindle cap). The spindle cap must be able to move freely up and down on the spindle.
- **Clean and wipe dry** the conical part of the spindle with a smooth rag. Clean also the inside of the bowl thoroughly to ensure proper fitting.

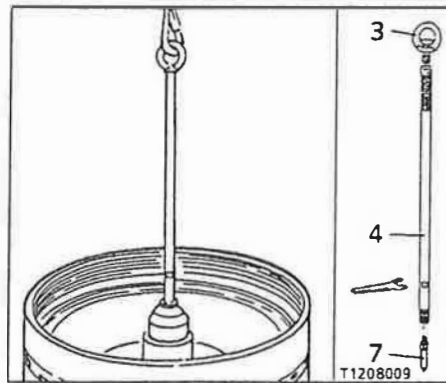


Fig. 68

Installing the bowl bottom:

- Screw pressure piece 7 into threaded bolt 4.
- Screw eye bolt 3 into upper bolt end 4.
- Screw the whole device into the bowl bottom (**left-hand thread**).
- Place bowl bottom onto the spindle
- Place open-ended wrench on the corresponding surface at the lower end of the bolt and unscrew the device.

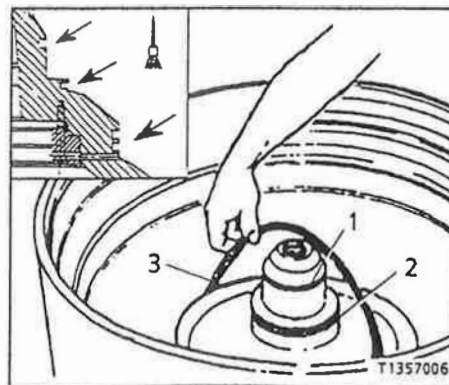


Fig. 69

- Thoroughly clean the gasket grooves in the bowl bottom and apply a **thin film** of grease.
- Insert the gaskets into the groove of bowl bottom.

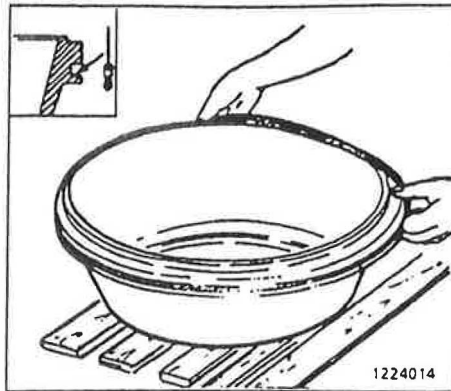


Fig. 70

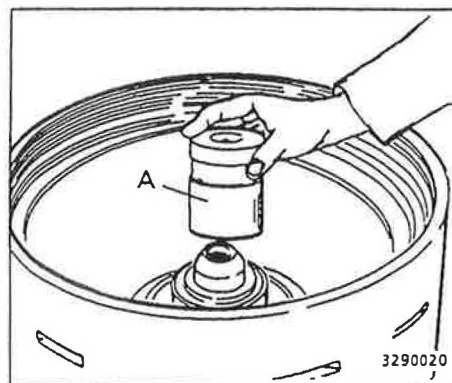


Fig. 71

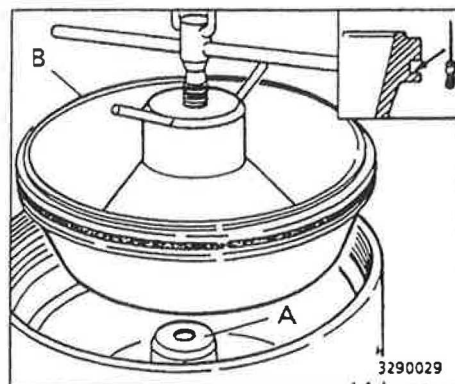


Fig. 72

- Thoroughly clean gasket groove in sliding piston and apply a **thin film** of grease.
If the gasket to be used is new, it must be stretched equally all the way around until the outer diameter almost corresponds to the outer diameter of the groove in the sliding piston.
- Insert the gasket into the groove of the sliding piston.
- Insert the gasket for the distributor base.
- Place pressure piece A of lifting device onto the hub of the bowl bottom.
- Grease guide surfaces of the sliding piston and bowl bottom.
- Insert the sliding piston using lifting device so that the „O” marks are perfectly aligned.
- Lower the sliding piston slowly by turning the jackscrew anti-clockwise until the arresting pins of the bowl bottom catch into the holes of the sliding piston.
If necessary, wriggle the piston until it snaps into position.



- Be careful not to damage sealing lip B of the sliding piston.
- After inserting the sliding piston, take out pressure piece A!

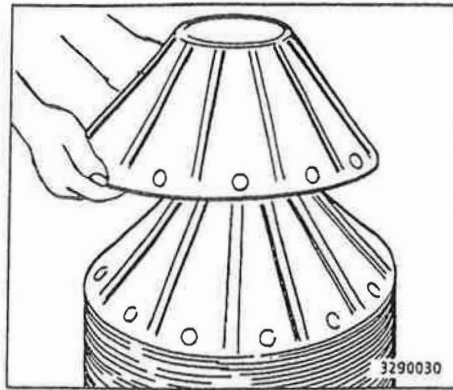


Fig. 73

- Stack the discs onto the neck of the distributor in numerical order, beginning with number 1.
- Screw lifting device onto the distributor.

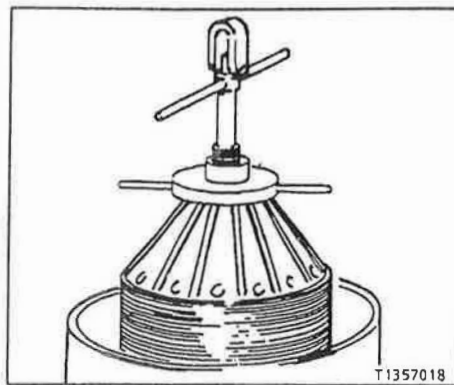


Fig. 74

- Grease contact surfaces.
- Install distributor together with discs into the bowl bottom.
The „O” marks on the bowl bottom and distributor must be aligned; the arresting pins in the bowl bottom will then catch into the holes of the distributor.

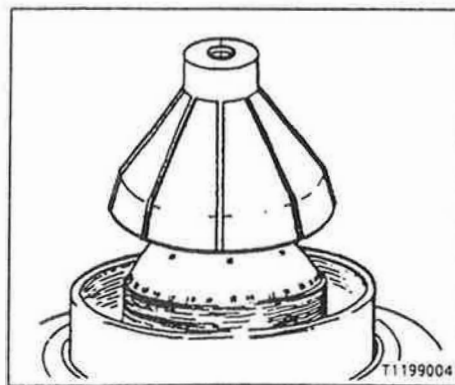


Fig. 75

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

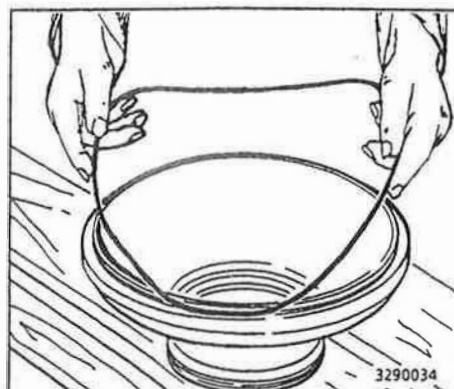


Fig. 76

- Insert gasket into groove of bowl top.
If the main bowl gasket must be replaced, refer to 5.6.
- Clean and grease guide surfaces of bowl top.

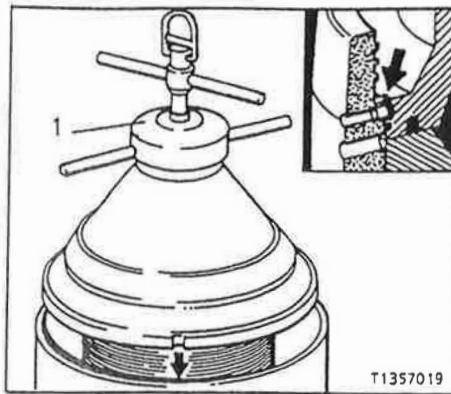


Fig. 77

- Place bowl top onto bowl bottom using lifting device 1.
- Slowly lower the bowl top by turning the jackscrew anti-clockwise. Make sure that the arresting piece of the bowl bottom catches into the groove of the bowl top. The "O" marks of both parts must be aligned.

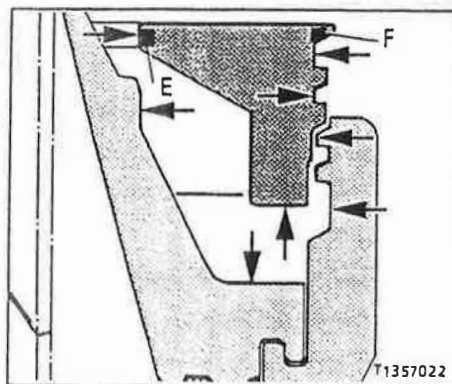


Fig. 78

- Check and grease (3.2) threads, contact and guide surfaces of bowl lock ring and bowl bottom (see arrows).
- Insert the gaskets E and F.
- For checking the disc pressure, please remove gaskets E and F.

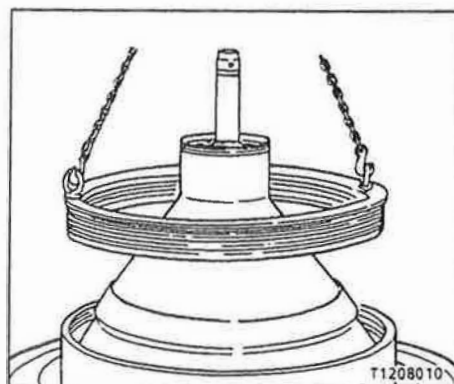


Fig. 79

- Screw two eye bolts diametrically opposite each other into the bowl lock ring.
- Place bowl lock ring onto bowl bottom using lifting device.

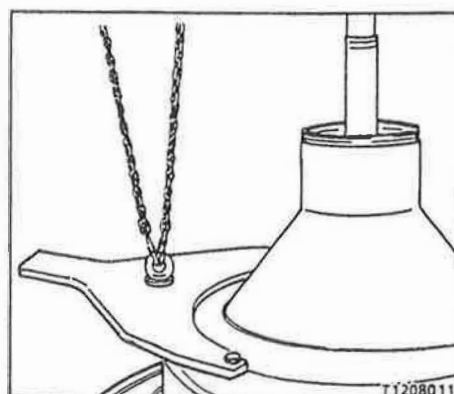


Fig. 80

- Use lifting device and hoist to place the wrench onto the bowl lock ring.
 - Engage the cam and
 - tighten the two fastening screws firmly.
- Screw down the bowl lock ring by means of the wrench (**left-hand thread**).

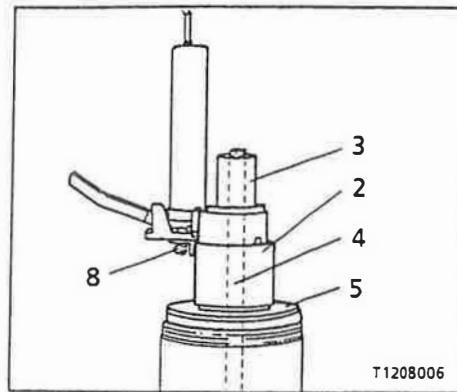


Fig. 81

Mount compressing device:

- Place disk 5 onto bowl top.
- Screw bolt 4 as far as it will go into the bowl bottom (**left-hand thread**).
- Insert hydraulic part 2 into the center recess of the disk.
- Screw on threaded ring 3 (**left-hand thread**) until its upper edge is flush with end thread of bolt 4.



To prevent damage to threads:

- screw in threaded bolt completely,
- screw on threaded ring completely down to thread end.

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

In this case:

- Bring piston and cylinder into initial position.
 - loosen pressure relief screw 8 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.
- Screw tight pressure relief screw 8.

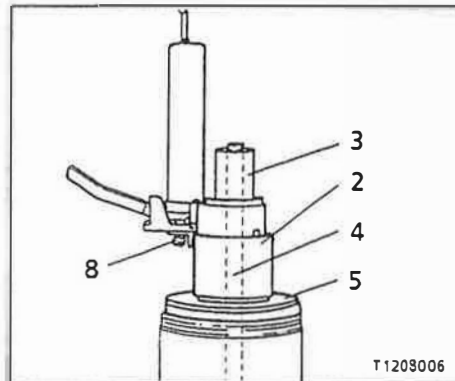


Fig. 82

Compressing the disc stack:

Pressure must be gradually applied to the disc stack until the max. disc compression of 280-300 bar is attained.

Each pressure increase should be approx. 50 bar.

- After each pressure increase, tighten bowl lock ring further.

When the max. disc compression of 280 - 300 bar 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 disc stack pressure is too low, an additional disc must be inserted.

If the maximum pressure is not attained and grease flows out of the stroke limiting hole, then bolt 4 has not been screwed far enough into the bowl bottom.

The compressing device is only ready for use again when bolt 4 and threaded ring 3 have been brought back into the position as described above.

While compressing the disc stack make sure that

- arresting piece of bowl bottom snaps into groove of bowl top and
- bowl top does not become tilted.

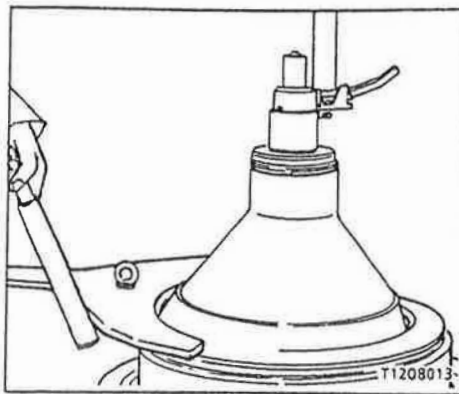


Fig. 83

- Tighten bowl lock ring by hitting with mallet against handle of wrench until „O” mark alignment of bowl bottom and bowl lock ring is obtained.
- Undo the fastening screws and remove the wrench and lifting device.

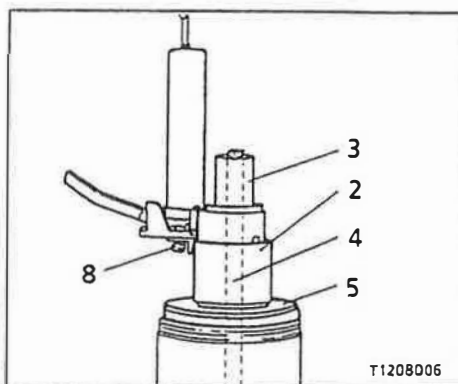


Fig. 84

Dismantle compressing device:

- Push lever of compressing device down as far as it will go to prevent it from springing back. Only then loosen pressure relief screw 8.
- Unscrew threaded ring 3 (left-hand thread).
- Remove hydraulic part 2 and disk 5.
- Unscrew bolt 4 (left-hand thread).



Fig. 85

- Unscrew the hex head screws of wrench and remove the wrench.
- Unscrew eye bolt.
- Insert the threaded rings into the lock ring and screw them in using an Allen wrench until they are flush with the lock ring.

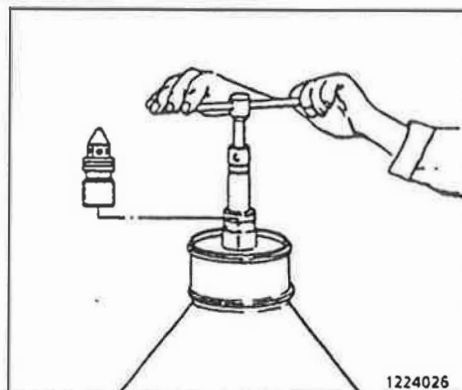


Fig. 86

- Screw spindle screw firmly into the bowl bottom (left-hand thread).

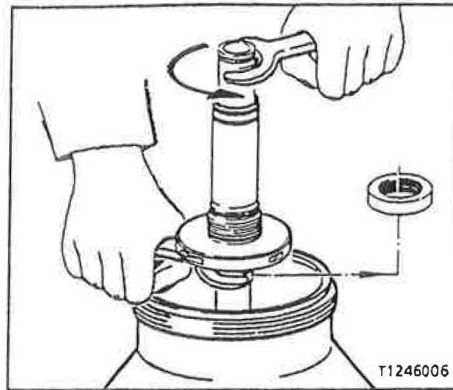


Fig. 87

- Raise the feed tube and unscrew threaded ring.
- Screw lower centripetal pump onto the feed tube (left-hand thread).

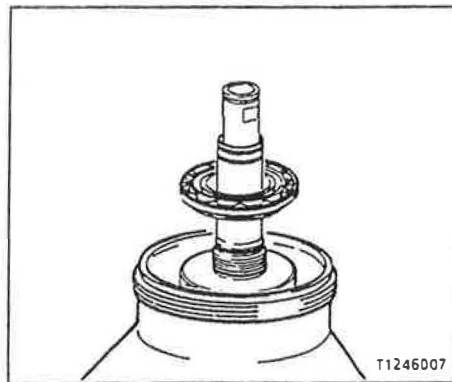


Fig. 88

- Install the regulating ring.

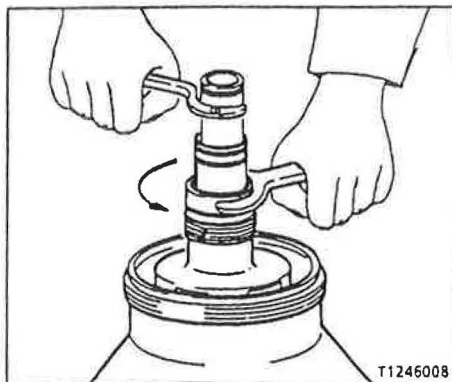


Fig. 89

- Screw upper centripetal pump onto lower centripetal pump by using the single-ended wrench (left-hand-thread).
- Tighten it as far as it will go using the single-ended wrench. While doing so, hold lower centripetal pump with wrench.

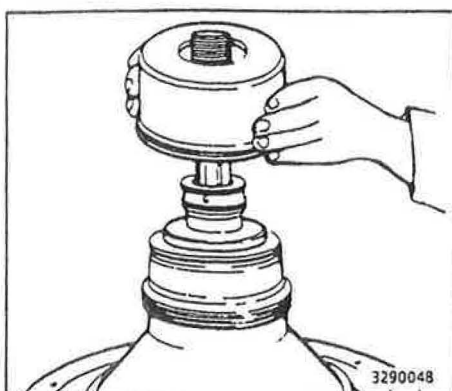


Fig. 90

- Grease threads of bowl top and regulating ring.
- Install the lid.

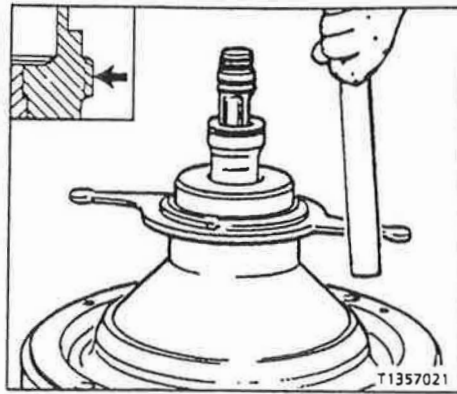


Fig. 91

- Screw on the lid by hand (**left-hand thread**) and tighten it firmly by striking the arm of annular wrench.

5.5 Assembling the feed and discharge connections

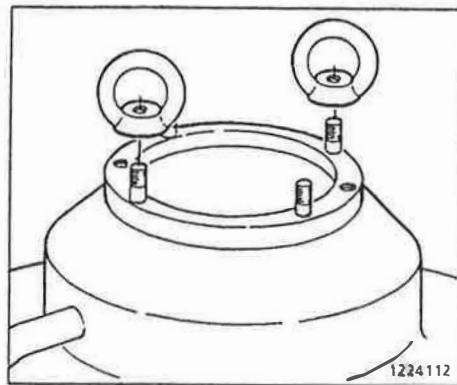


Fig. 92

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

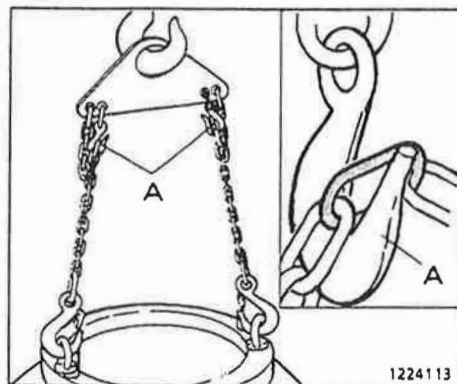


Fig. 93

- Shorten the chains of the lifting device by putting an appropriate chain link crosswise on hook A (see adjacent small figure).
- Hang the shortened lifting device into the lifting-eye nuts and place the hood onto the solids collector.
- Bolt hood and solids collector together using hex head screws.
- Connect hood flush line.

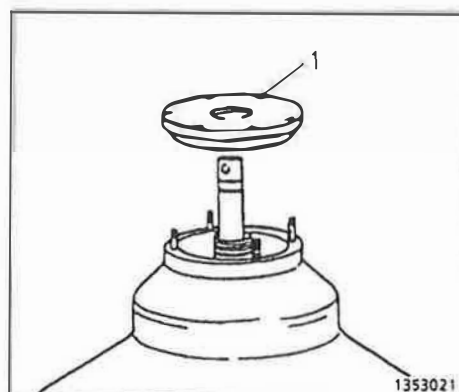


Fig. 94

- Place the disk onto the hood so that both Allen screws 1 are positioned over the respective tap holes in the hood.
Do not tighten the screws!

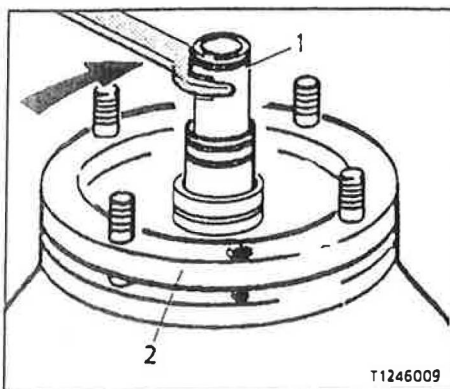


Fig. 95

- Screw upper centripetal pump nut **clockwise** into the ring 2 and tighten it **as far as it will go** using a single-ended wrench.

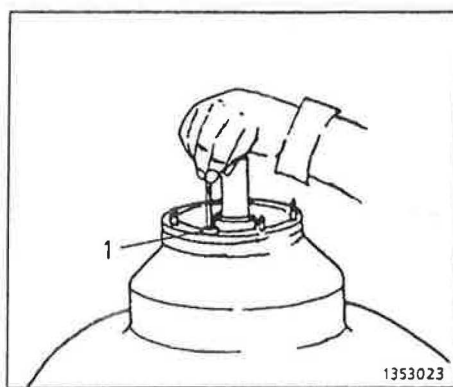


Fig. 96

- Screw the two Allen screws 1 of the disk into the hood.

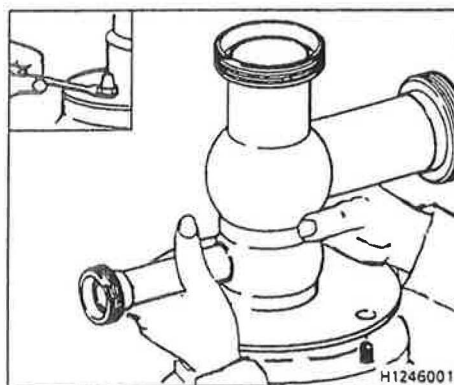


Fig. 97

- Install feed and discharge house and fasten it with cap nuts.
- Connect feed and discharge lines.

5.6 Replacing the main gasket in bowl top

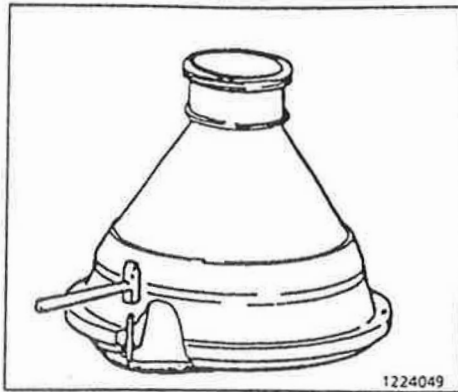


Fig. 98

Removal

- Drive out gasket from groove of bowl top with the aid of a drift pin which is supplied with the machine.
- To do this, insert the drift pin into the holes around the bowl top alternately and hammer onto the pin until the gasket becomes loose.

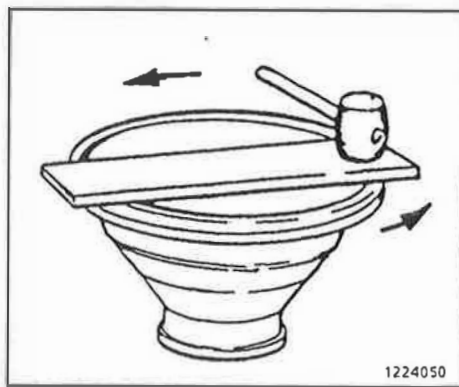


Fig. 99

Installation

- Insert gasket (with its narrow side facing the bowl top) into the clean groove of the bowl top.
- Using a smooth piece of hard wood, hammer the gasket evenly into the groove until its sealing surface protrudes from surface A by not more than 1 mm (see next figure).

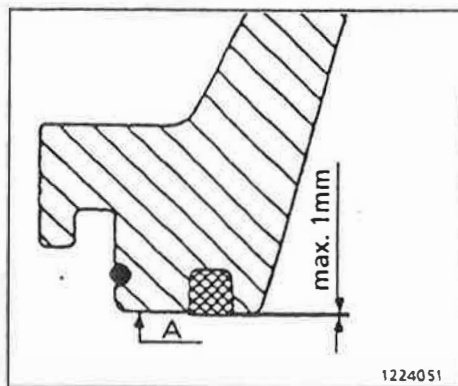


Fig. 100

IMPORTANT!

It is possible that a new gasket will be too small.

If the gasket is too small, soak it for about 5 min. in a water bath at a temperature of 70-80°C (160-175°F).

The gasket will then return to its original size.

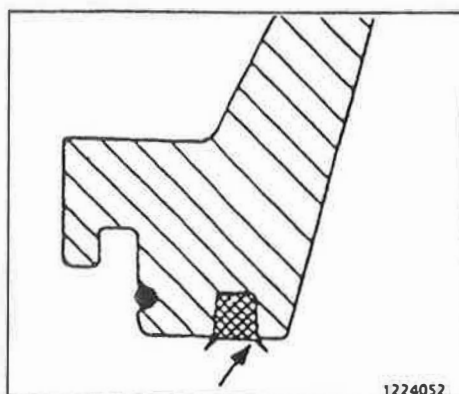


Fig. 101

After using for the first time and after the main bowl gasket has been replaced, excess material must be trimmed off with a knife after 4 weeks operation. Excess material can cause extensive damage to the gasket, leading to bowl leakage.

5.7 Removal of bowl valves

- Remove the bowl valves **once a month** for cleaning.
- At the same time, check the gaskets and replace them if necessary.

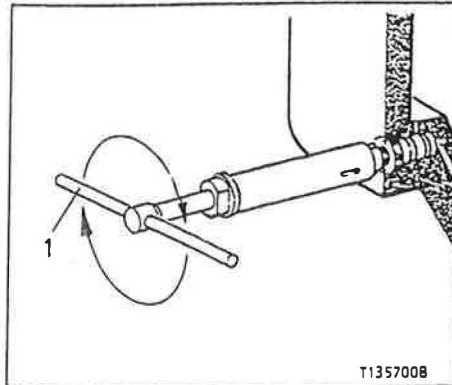


Fig. 102

- Dismount the bowl (5.2).
- Force bowl bottom off the screw cone and lift it out of the collector.
- Screw wrench 1 (for bowl valve) to the bowl valve.

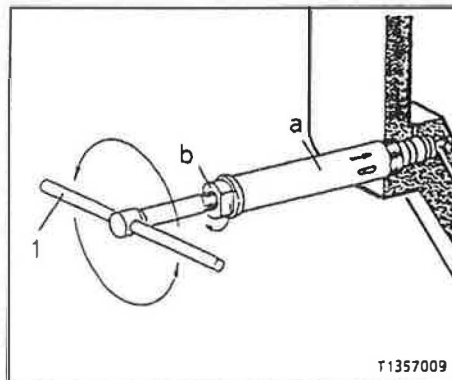


Fig. 103

- Push sleeve **a** of the wrench together with the pins into the bowl valve.
- Tighten nut **b**.
- Unscrew bowl valve from bowl bottom using socket wrench 1.

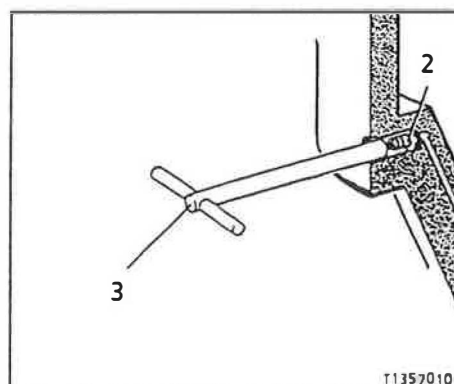


Fig. 104

If the valve piston **2** remains stuck to the bowl bottom while pulling out valve proceed as follows:

- Screw wrench 3 (for valve piston) into the valve piston 1.
- Pull valve piston out of the bowl bottom by means of the wrench.

5.8 Installation of bowl valves

For installation proceed in reverse order of removal.

NOTE:

- Moisten gaskets.
- Grease the thread.
- Screw in the valve as far as it will go. However, do **not** screw it in **too tightly**.
- The front face of the valve housing must be flush with the outer wall of the bowl bottom.

5.9 Disc stack compressing device

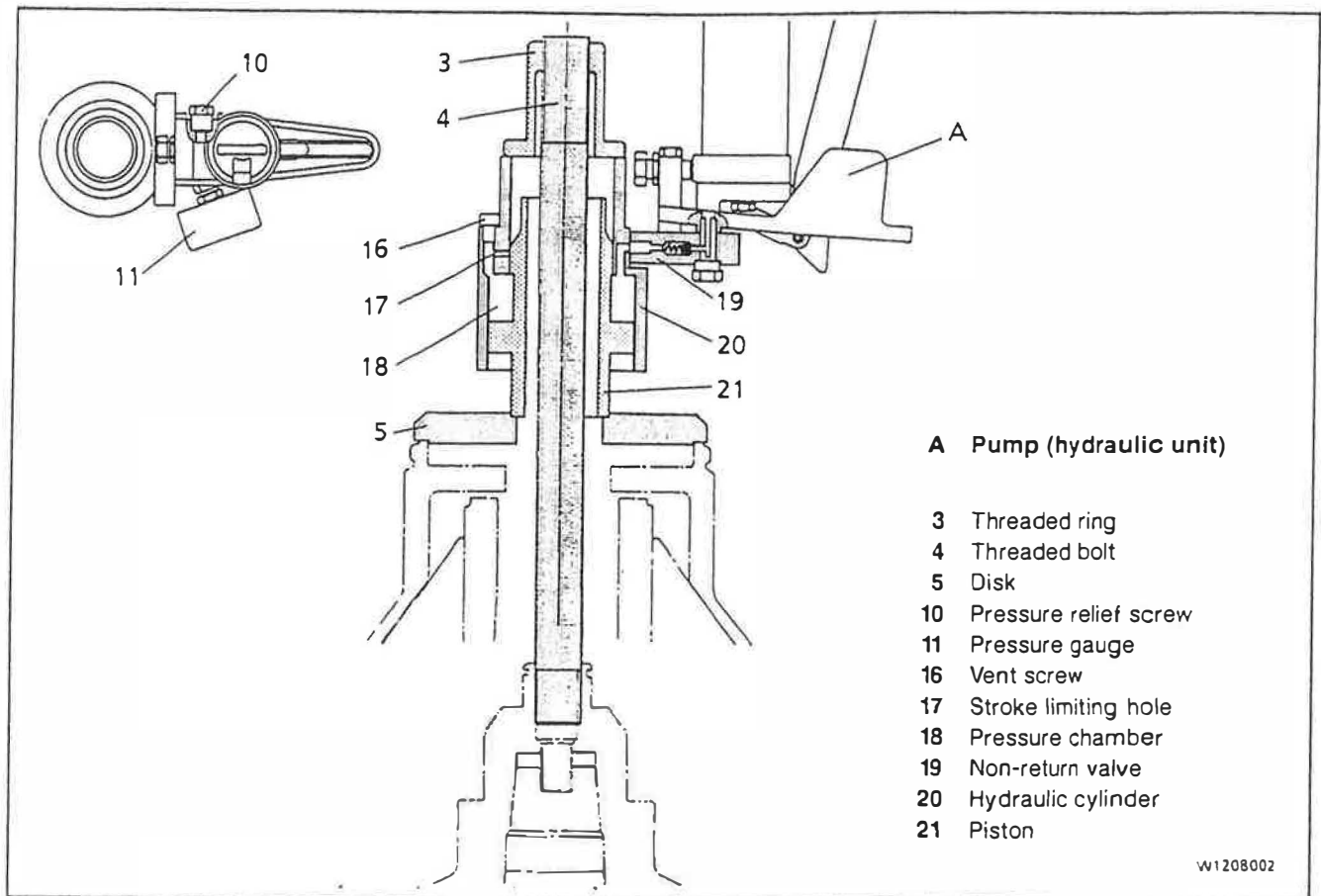


Fig. 105

Operating principles

The pump presses grease at a high pressure into pressure chamber 18.

The increase in pressure in the pressure chamber displaces piston 21 in relation to hydraulic cylinder 20.

The hydraulic part (piston, hydraulic cylinder) is bolted securely to the bowl bottom by means of bolt 4 and threaded ring 3.

When the pressure increases in pressure chamber 18, piston 21 is displaced downwards.

The force produced is transferred to the bowl top via the disk 5. The disc stack is compressed.

Required pressure: 280 - 300 bar

Maximum pressure: 320 bar

Pump

The pump produces a pressure of max. 400 bar. It consists of:

- pump head
- grease cartridge
- filling device
- non-return valve

Filling the grease cartridge

Filling of grease cartridge: 450 g special grease K2R

The grease cartridge of the compressing device is filled with special grease by delivery.

- Actuate clamp piece 13 and pull the filling device 12 upwards.
- Unscrew grease cartridge 14 from pump head 15.
- Fill in grease, approx. 450 g.
- Screw grease cartridge 14 into pump head 15.
- Actuate clamp piece 13 and push filling device 12 into grease cartridge 14.

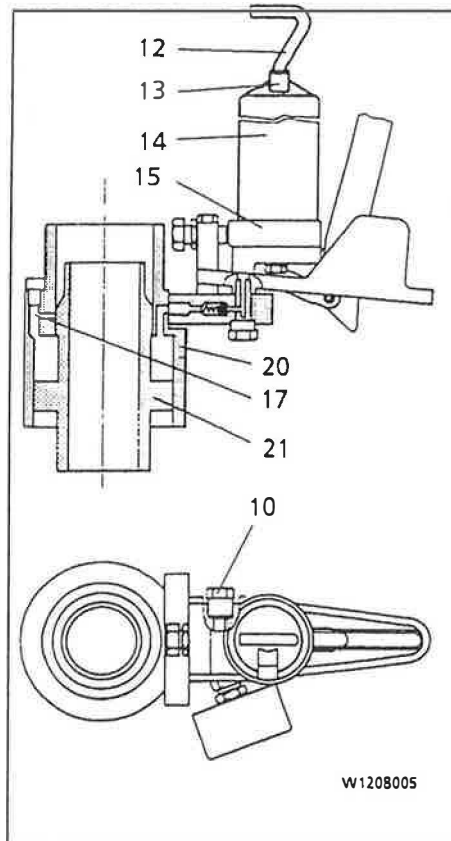


Fill the grease cartridge only with WS special grease K2R.

Malfunction

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

- Is the pressure relief screw 10 screwed in tightly?
- Is there enough K2R grease in the grease cartridge?
- Has piston 21 travelled too far out of hydraulic cylinder 20?



If yes,

- loosen pressure relief screw 10 and press piston 21 without pressure back into the hydraulic cylinder 20
- Then screw in pressure relief screw 10 again **tightly**.

Maximum stroke: 28 mm

- 10 Pressure relief screw
- 12 Filling device
- 13 Clamp piece
- 14 Grease cartridge
- 15 Pump head
- 17 Stroke limiting hole
- 20 Hydraulic cylinder
- 21 Piston

Fig. 106

- If grease discharges through stroke limiting hole 17, bolt 4 and threaded ring are not screwed into their correct end position; the stroke is too long.

6 Technical Information

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6.1 Operating principles of the bowl

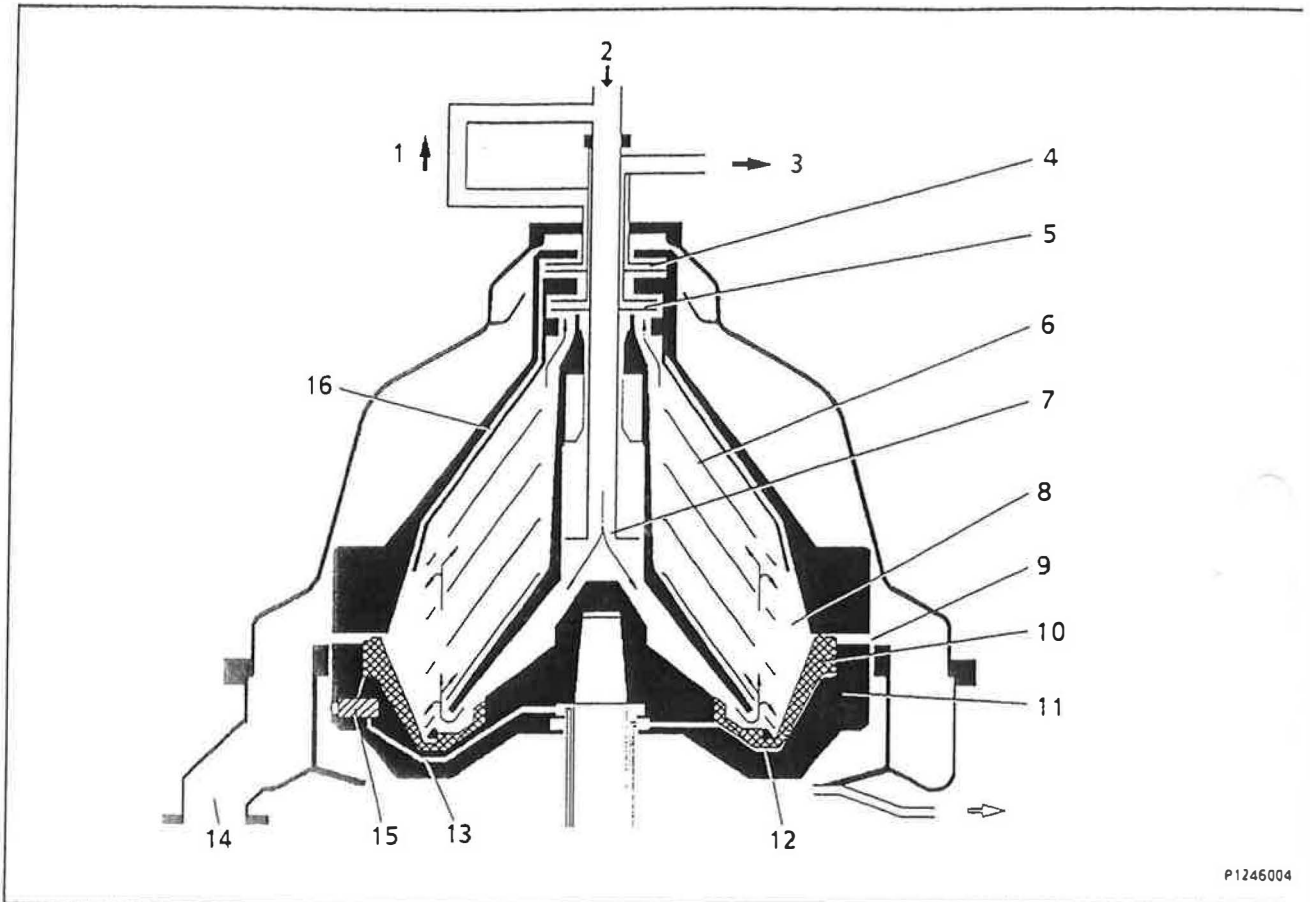


Fig. 107:

- | | |
|---|---------------------------|
| 1 Discharge, transport liquid | 9 Sediment ejection ports |
| 2 Feed | 10 Sliding piston |
| 3 Discharge, bacterially clarified product | 11 Bowl bottom |
| 4 Centripetal pump, transport liquid | 12 Closing water chamber |
| 5 Centripetal pump, bacterially clarified product | 13 Opening water duct |
| 6 Disc stack | 14 Discharge, sediment |
| 7 Hydrohermetic feed | 15 Bowl valve |
| 8 Sediment holding space | 16 Separating disc |

The separator is equipped with a self-cleaning disc type bowl.
A hydraulically movable sliding piston opens and closes the bowl.

In distributor the product is gently accelerated by the hydrohermetic feed 7 to angular velocity of the bowl and fed to the disc stack.

The disc stack consists of a number of conical discs placed one above the other. Due to the narrow interspaces between the discs the liquid is divided into thin layers thus reducing the settling path.

The product to be bacterially clarified flows into the bowl through feed (2) and is separated in disc stack (6) into a light and a heavy liquid phase. The light bacterially clarified phase flows to the centre of the bowl and the heavy phase enriched with germs flows to the bowl outer diameter.

The bacterially clarified phase is conveyed to discharge (3) under pressure and without foam by means of centripetal pump (5).

A transport liquid is conveyed via the separating disc (16) under pressure and without foam to recycle outlet (1) by means of centripetal pump (4). From here the transport liquid returns to feed (2).

The task of the transport liquid is to convey the smallest bacteria at the edge of the centrifugal field to the solids holding space (8).

The separated bacteria and solids collect in the solids holding space (8) are instantaneously ejected through ports (9).

The ejection process is initiated by a control unit.

The product is fed into and discharged from the centrifuge by means of a closed system of pipes.

6.2 Operating principles of the hydraulic system of the bowl

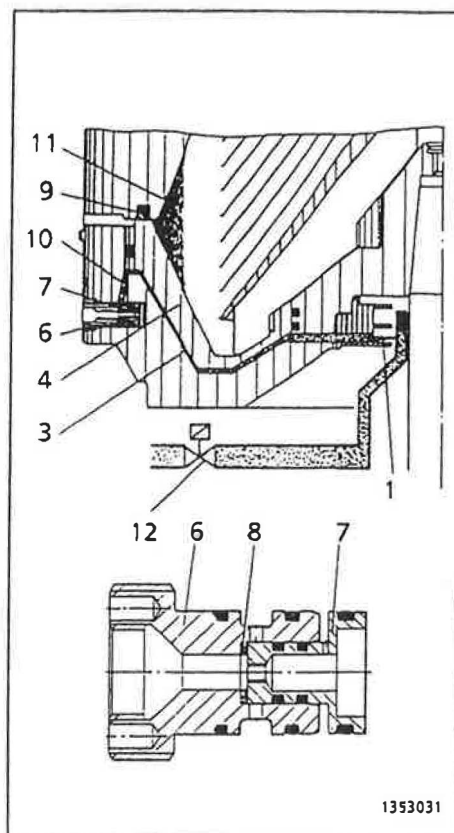


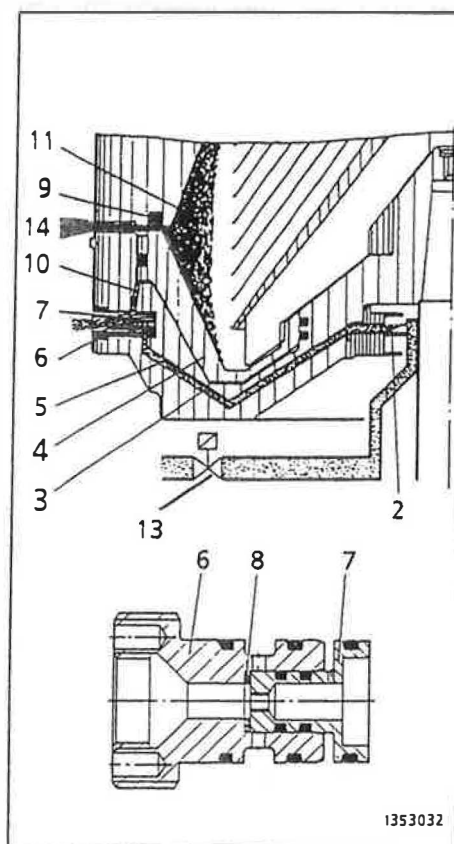
Fig. 108 - Bowl, closed

Closing the bowl

When the bowl has reached its rated speed, solenoid valve 12 for closing water is opened briefly several times.

The closing water flows into the closing chamber 3 beneath the sliding piston 4. Due to the rotation, pressure builds up in the closing chamber. This pressure creates force in axial direction which presses the sliding piston against gasket 9 of bowl top, thus closing the solids holding space 11 during the separation process. Closing chamber 3 is sealed by valve piston 7 which is pressed through centrifugal force against gasket 8 and thus closes discharge hole 10.

Operating water is supplied every minute for 1 second to ensure that in case of small operating-water losses the bowl remains closed.



- 2 Injection chamber for operating water (closing chamber)
- 3 Closing chamber
- 4 Piston
- 5 Feed hole (bowl valve)
- 6 Bowl valve
- 7 Valve piston
- 8 Gasket
- 9 Bowl gasket
- 10 Drain hole for operating water (closing chamber)
- 11 Solids holding space
- 13 Solenoid valve
- 14 Solids ejection ports

Fig. 109 - Bowl, open

Opening the bowl (ejection)

If the solenoid valve 13 (opening water) opens, operating water flows from injection chamber 2 through hole 5 to bowl valve 6.

Piston 7 of bowl valve 6 is then pushed inwards and releases the drain hole 10 so that operating water can discharge from the sealing chamber 3.

As the liquid level recedes the pressure acting on the underside of the sliding piston decreases quickly. As soon as it is smaller than the liquid pressure acting on the upper side of the sliding piston, the piston moves downwards, thus opening the solids ejection ports in the bowl bottom. The solids are ejected instantaneously through annular gap 14.

After ejection:

Solenoid valve 13 (opening water) closes, solenoid valve 12 (closing water) opens. Valve piston 7 reseals drain hole 10 and closing chamber 3 fills with operating water again.

As soon as the liquid pressure in the closing chamber is higher than the liquid pressure in the centrifugation space the sliding piston moves upwards, thus closing the bowl.

6.3 Control unit

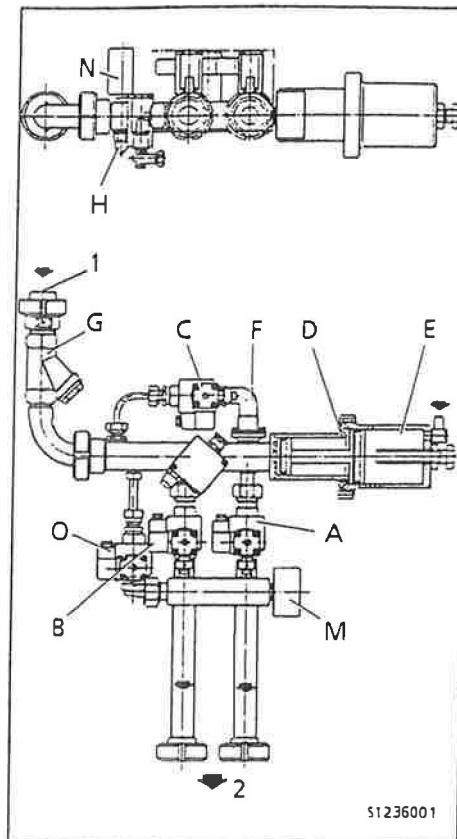
Partial sediment ejections during milk processing are initiated by the control unit in accordance with a pre-set program.

By pressing the button "Partial ejection", the program in progress can be interrupted and a partial ejection can be initiated immediately.

Total ejections and hood flushings (bowl overflow) during cleaning-in-place are initiated manually on the control unit or automatically from a separate CIP unit.

For further details refer to the instruction manual "Control unit".

6.4 Operating-water connection



- 1 Water feed
- 2 to separator
- 3 Air connection

- A Solenoid valve for opening water
- B Solenoid valve for closing and flushing water
- C Solenoid valve for filling water
- D Metering unit
- E Air chamber
- F Non-return valve
- G Strainer
- H Pressure switch
- M Pressure gauge
- N Pressure gauge
- O Solenoid valve for cooling water (clutch)

Fig. 110

- Operating-water connection: 1 in
 Operating-water pressure: Pmin. = 3.0 bar
 Pmax. = 4.0 bar
 Required operating water: 2 000 l/h
 Air pressure for metering unit: ≥ 4 - 5 bar

Standard operating-water values:

- Hardness: ≤ 12°dH at separating temperatures of up to 55°C
 ≤ 6°dH at separating temperatures above 55°C

To convert the hardness values stated use the following equation:
 $1^{\circ}\text{dH} = 1.79^{\circ}\text{fH} = 1.25^{\circ}\text{eH} = 17.9 \text{ ppm CaCO}_3$

- Chlorine ions: ≤ 100 mg/l
- pH value: 6.5 - 7.5

Clean strainer from time to time by temporarily soaking it in vinegar or hydrochloric acid. Before re-fitting rinse the strainer thoroughly with water.

6.4.1 Pressure switch

For proper functioning of the automatic control a pressure of approx. 2.5 bar is required while the closing-water valve is open. At a lower pressure the bowl will either not open or not close.

For this reason the operating-water line is provided with the **pressure switch** which, in connection with the motor control, triggers an acoustical or optical signal if the minimum pressure drops below a preset value.

The product valve closes.

6.4.2 Solenoid valves

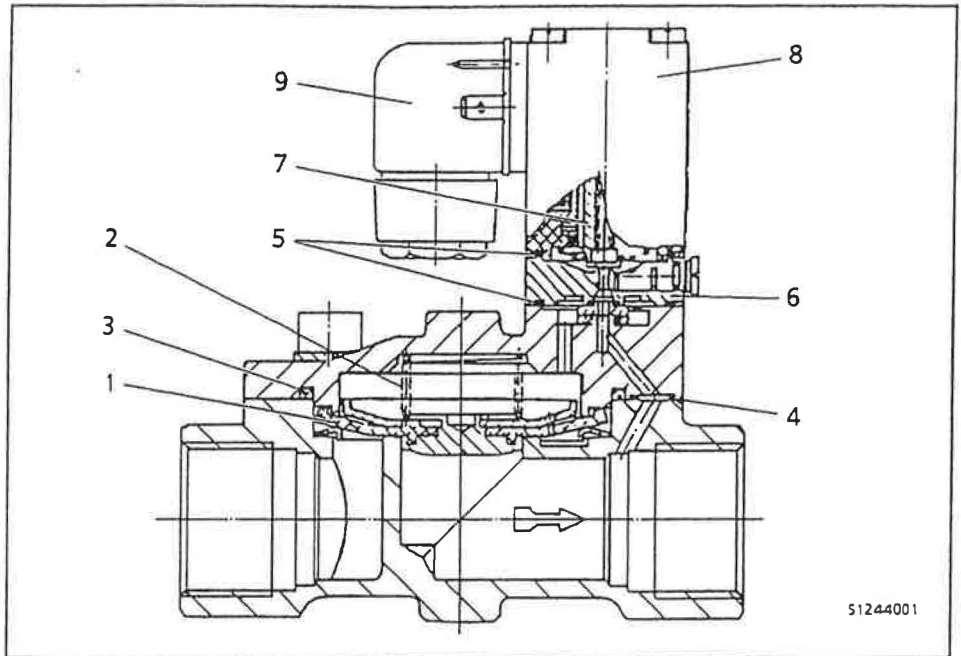


Fig. 111

- | | | | |
|---|-----------------------------|---|---|
| 1 | Diaphragm | 6 | Valve housing
(manual adjusting screw) |
| 2 | Cylindrical pressure spring | 7 | Solenoid core |
| 3 | Gasket | 8 | Solenoid head |
| 4 | Gasket | 9 | Coupler socket |
| 5 | Gasket | | |

The solenoid valves incorporated in the operating-water system are 2/2-way straight-way diaphragm valves with internal piloting. They are equipped with a manual operator (override) for testing purposes.

The adjusting screw must be adjusted manually using a screwdriver!

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.

Technical data:

Solenoid valve	Type	281	281
Part-Number		0018-5870-610	0018-5947-610
Pipe connection	R	3/4in	1/2in
Voltage	V DC	24	24
Power consumption:	pull-in	W	8
	operation	W	8
Duty cycle	%	100	100
Frequency of operations	/h	900	900
Type of enclosure	IP	65	65
Pressure range	bar	0,2 - 16	0,2 - 16
Temperature:	medium	°C	+ 100
	ambient	°C	+ 55
Cable entry (coupler socket)	Pg	9	9

Maintenance

The solenoid valves do not require special maintenance.

Locating electrical faults



- Switch off main switch.
- Shut off main valve for operating water.

Fault	Cause	Remedies
Valve does not function.	Control unit defective.	Call Service Engineer.
	Faulty wire in connecting terminal.	Replace wire.
	Connecting terminal loose on terminal strip.	Tighten screw of connecting terminal.
	Poor contact to connecting terminal.	Clean contact or replace it.
	Coupler socket loose or leaky.	Tighten coupler socket.
	Solenoid coil defective.	Replace complete solenoid head.

7 Operation

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Diagram 1

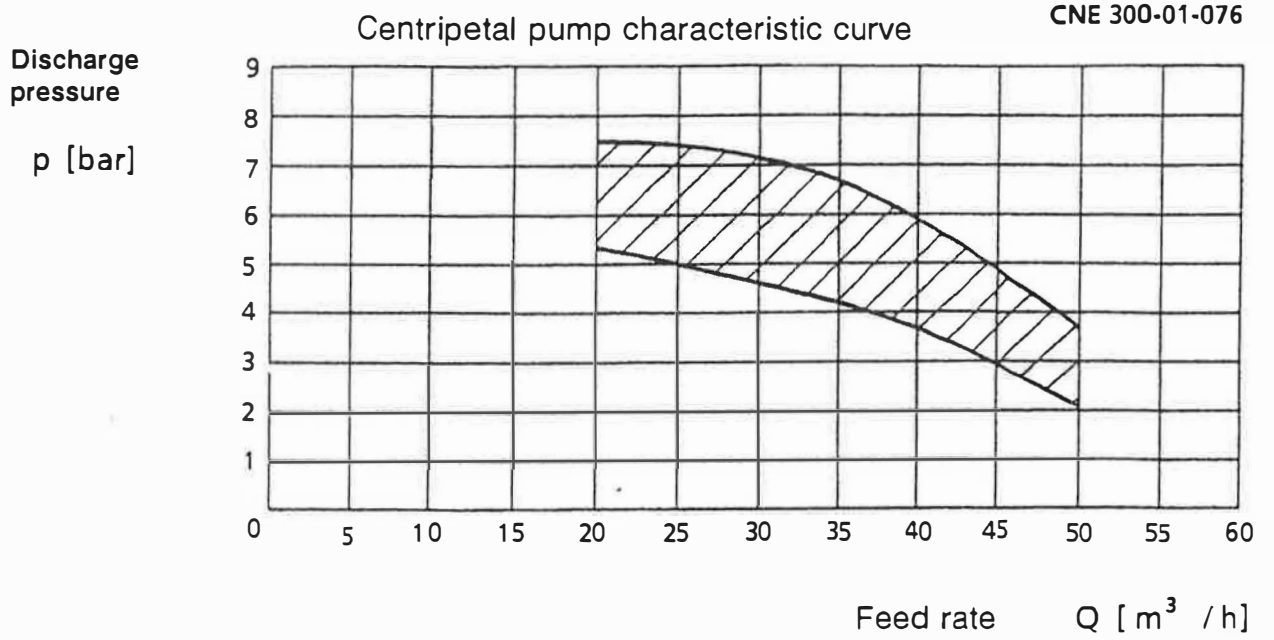
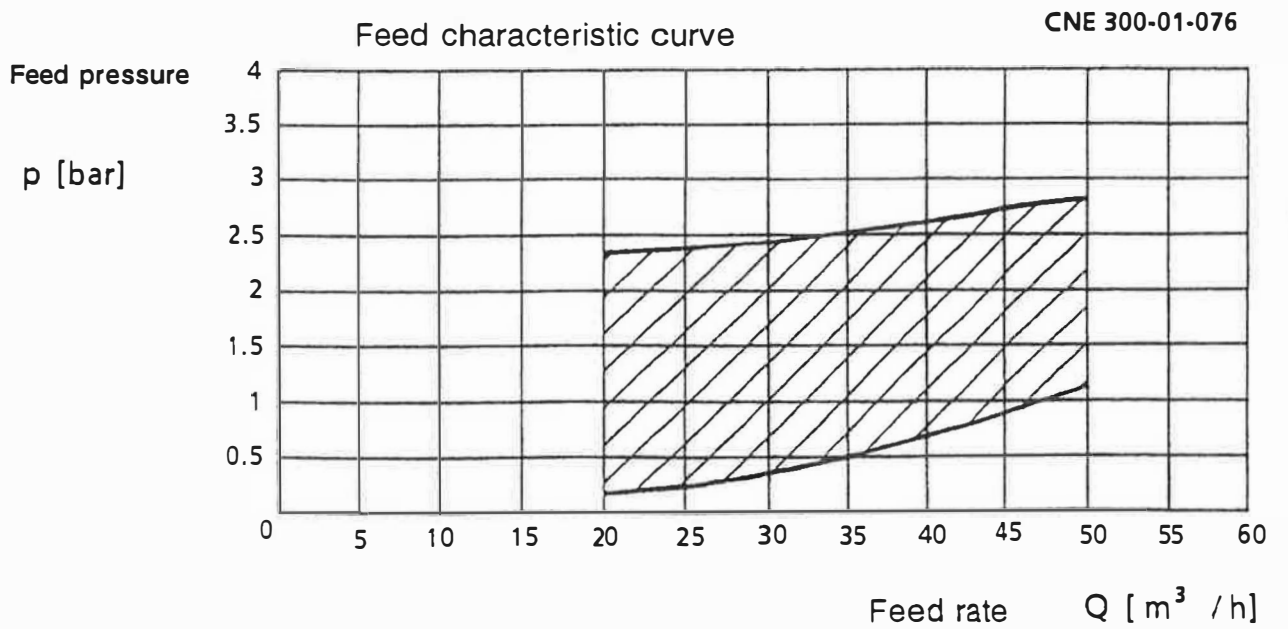


Diagram 2



P1246003

Fig. 112:

7.1 General

This chapter gives general instructions for operating the separator. However, operation of the respective machine depends on the control unit used and the arrangement of the valves.

The individual process may necessitate changes in the operating procedure.

Refer also to the instruction manual of the respective control unit.

7.2 Before start-up

check that

- brakes are released by turning handles clockwise.
- oil level is up to middle of the sight glass.
- hex head screws for fastening the hood and cap nuts for fastening the feed and discharge housing are tightened securely.
- hand shut-off valves are opened in the supply lines for:
 - operating water
 - cooling water
 - compressed air
- concentrate valve is open.
- timers on the control unit are set according to the instructions in the control unit manual to suit the respective processing conditions.
- metering unit is adjusted (see sect. 7.5.1).
- compressed air on the pressure reducer (control unit) is adjusted to 4 – 5 bar.

7.3 Starting

- Switch on main switch on control unit (position I):

The LED "control unit ON" flashes to signal that the control unit is ready for operation.

The buttons "product", "partial ejection" and "total ejection" are not released until the signal "motor in operation" is on (see LED in motor mimic diagram).

- Start motor.
After a pre-set delay time of 10 minutes, closing water is supplied automatically; the bowl closes.
- Open valve in cooling-water line for upper frame part. Feed rate is approx. 500 l/h.
- After a further two minutes water can be circulated as generally practiced in dairies.
- Switch over from water to product.
Actuate "separation" button on the control unit.
- After opening the milk feed adjust throughput and discharge pressures.
- Adjust milk discharge pressure as follows:
 - Throttle discharge pressure by means of constant-pressure valve, so that the product is discharged foamfree.
- The feed and discharge pressures must be in the working ranges marked in diagrams 1 and 2 (see fig. 112).

- If the pressures fall below the working ranges:
The hydrohermetic disk at the end of the lower feed tube rises above the liquid level. The product is therefore subjected to strong shearing forces on entering the lower distributor.
- If the pressures exceed the working ranges:
Overflow of the centripetal pump chamber occurs.
- The feed and discharge pressures are interlinked within the working ranges. A change in the discharge pressure leads to a change in the feed pressure and vice versa.

7.4 The separator in operation

Bacteria removal temperature: 40 – 60°C, depending on type of cheese

Throughput: 30 000 - 35 000 l/h.

The throughput capacity depends on the bacterial properties and on the temperature of the raw milk. Separator plants provided with a flow constrictor need not be adjusted manually every day.

Discharge pressure of milk pump:

The pressure is specified in diagram 1, e.g. the discharge pressure is approx. 5 bar given a feed capacity of 35000 l/h.

Discharge pressure of concentrate pump:

Throttle pressure in concentrate discharge line by means of regulating valve on flowmeter until the desired amount of concentrate is obtained (approx. 3 - 5% of the feed rate).

If the bowl overflows during operation, then the pressure in the downstream equipment must be reduced.

If the bowl overflows even when the milk pressure is low, check whether the gasket in the centripetal pump chamber cover is damaged.

In some cases - particularly when heat exchangers with low counter-pressure are used - it is advisable to install a throttle valve downstream of the exchanger and to set it to about 1.5 bar. This ensures that the milk is conveyed foamfree to the cheese milk tank.

The bacteria-removing separator can also be used for clarification by using a by-pass line. Then appropriate shut-off and leakage valves must be installed in the by-pass line.

When the milk is being treated, the valves in the by-pass line must be set so that, if the shut-off valves leak, the milk cannot flow back into the system.

Insufficient bacteria removal can be caused by the following:

- Change in raw milk quality, separating temperature, bowl speed or throughput capacity.
- Clogging of nozzles in the regulating disc or concentrate space on separating disc. This results in a lower concentrate output.
- Concentrate entering the milk after treatment caused through wrong positioning of leakage valve in the by-pass line.

- Separating disc is not sealed properly.
- Partial ejection is too small.
- The intervals between the partial ejections are too large.

Analysis of milk samples:

Special aseptic valves must be built in to the feed and discharge lines directly on the separator in order to take off milk samples for testing. Usual regulations for taking milk samples for bacteriological tests must be observed.

7.5 Ejection of the bowl

General

Solids ejection from the bowl must be carried out at periodic intervals in relation to the product and the process. The solids chamber of the bowl should not be filled to capacity. As soon as the separating or clarifying efficiency decreases, a partial ejection must be carried out.

7.5.1 Partial ejection

Partial ejection of the bowl during milk processing means partial emptying of the sediment space of the bowl. The product supply to the bowl is not interrupted during partial sediment ejection.

Separating time: 10 - 20 min. (depending on the raw milk quality)

Ejection volume: 8-10 kg

To initiate the ejection cycle opening water is fed to the hydraulic system of the bowl via the metering unit.

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

The quantity of opening water is adjusted at the metering unit.

For determining the ejected amount of solids, feed the bowl with water and measure the amount of liquid discharging from the solids outlet by means of a measuring bucket.

Check the ejected amount of solids during separation.

The solids ejected must be weighted as they contain a high proportion of foam.

In order to carry out a measurement of the volume discharged, the pre- and post-flushing times must be set to 3 seconds on the control unit. Since with this setting approx. 1 l water enters the partial ejection volume via the hood flushing, 1 l must be subtracted from the measured ejection volume. This value then corresponds to the volume ejected.

The partial ejection operations required during separation are carried out automatically according to a preset program by a control unit.

The operating-water consumption for pulse-like sealing-water supply is approx. 30 l/h, in addition approx. 50 l per partial ejection are required.

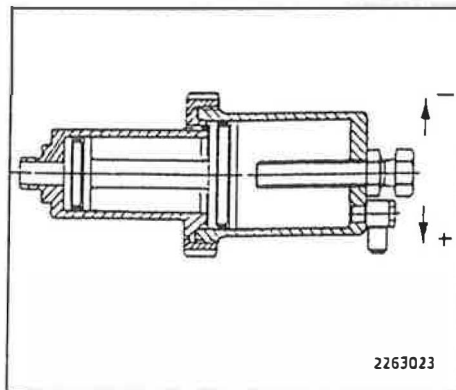


Fig. 113

Adjusting the amount of ejected solids

Adjustment by means of the regulating screw of the metering unit.

Turn regulating screw clockwise:
reduce amount of ejected solids.

Turn regulating screw anti-clockwise:
increase amount of ejected solids.

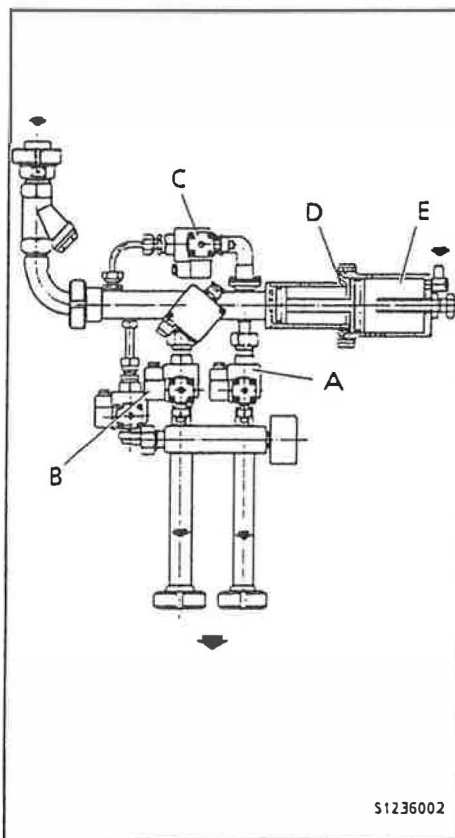


Fig. 114

Operational principles of the metering unit

The metering unit D is filled with water after every ejection cycle via the filling-water valve C.

To perform a partial solids ejection, chamber E is supplied with compressed air.

By actuating opening water valve A, the adjusted quantity of water is forced out by the compressed air and fed to the bowl.

- A Solenoid valve for opening water
- B Solenoid valve for closing/flush water
- C Solenoid valve for filling water
- D Metering unit
- E Air chamber

Program sequence

When the time "separation - partial ejection" adjusted at the respective timer has elapsed, a partial ejection takes place automatically and is repeated at regular intervals.

Before each partial ejection - this time can be set on timer "pre-flushing" - the solenoid valve B "hood flush and closing water" opens for 10 seconds. Water is injected into the hood to prevent the sediment to be ejected from sticking to the walls.

For sediment ejection the solenoid valve A "opening water" opens for 1 second. This time can be set on timer "partial ejection".

The solenoid valve B "hood flush and closing water" remains open during ejection and 20 seconds afterwards. The time this valve is to remain open after the ejection cycle can be set on timer "subsequent flushing". It should be at least 20 seconds.

The "separation" program can be interrupted by operating push button "partial ejection" whereby a partial ejection is initiated. After this enforced partial ejection the "separation" cycle re-commences.

Setting of program times:

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

Program time	
Pre-flushing	approx. 10 secs Pre-flushing hood and solids collector.
Partial ejection	1 sec Determines the opening time of the opening-water valve. This time must be longer than the period of displacement of the opening water from the metering unit. The amount of solids ejected depends on the volume adjusted in the metering unit.
Subsequent flushing	approx. 20 secs Flushing the hood and solids collector after an ejection.
Closing	5 secs Addition of closing water after an ejection.
Metering unit	3 sec Post-controlling of control air for the metering unit after partial ejection.
Filling water	2 sec Delay of the filling water supply following the partial ejection.
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.

7.5.2 Total ejection

During cleaning-in-place total ejections can only be initiated manually with the control unit. (Automatic cleaning-in-place requires a separate CIP unit, see relevant brochure.)

For initiating a total ejection, push button "total ejection" must be operated.

If the installation is correctly set up (see connection diagram), the feed pump is automatically switched off by pressing push button "total ejection" and automatically re-started approx. 1 min. after completion of the total ejection.

The interruption of the liquid supply to the bowl by switching off the feed pump is necessary for the bowl speed to recover, which drops slightly during total ejections.

Once the bowl has been filled again (observe increasing discharge pressure of separator), a further total ejection can be carried out by again pressing push button "total ejection".

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.

7.5.3 Function diagram

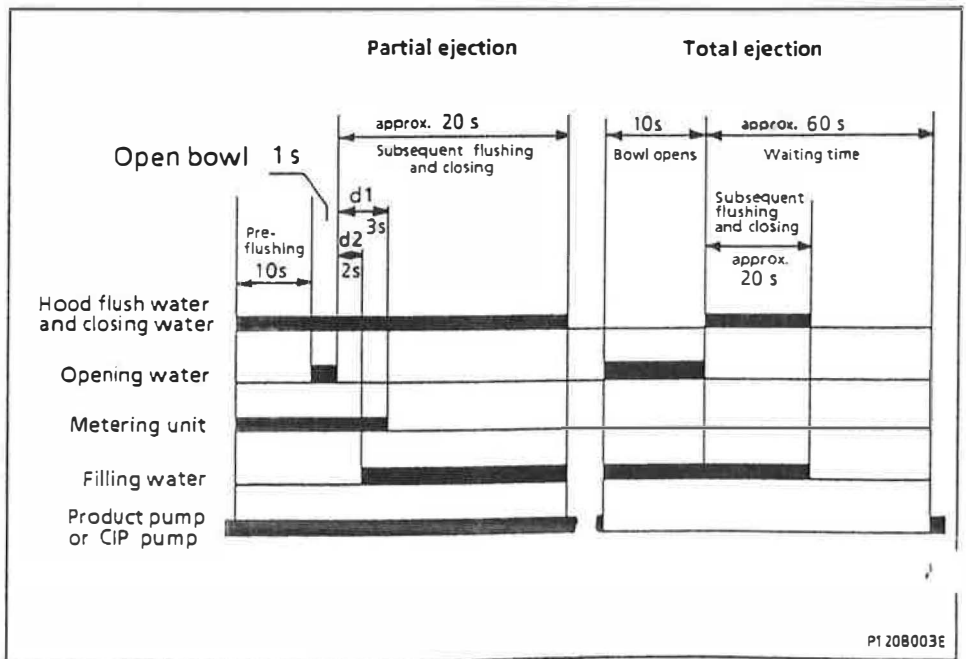


Fig. 115

Adjusting the timers: Refer to instruction manual for control unit.

8 Cleaning

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8.1 Cleaning-in-place (CIP)

The separator is generally included in the CIP cycle of the pasteurizers. For cleaning the separator, the detergents used for cleaning the pasteurizers will be adequate.

However, be sure that the last cleaning agent to be circulated is acid.

Caustic: 1.5 – 2 % concentration

Acid: max. 1 % concentration

Consult the detergent manufacturer for correct temperature.

Bear in mind that bowl parts of stainless steel will be attacked by chlorine. Therefore, make sure that detergents are free from chlorine.



Procedure:

- Switch control unit to CIP.
- Displace remaining product from the machine and flush the complete installation thoroughly with water.
- Flushing is followed by two "total ejections" accomplished by pressing the push button "total ejection" on control unit.
- Fill bowl with water between total ejections.



The CIP-program should comprise the following program steps:

- Flushing with caustic solution
- Flushing with water
- Flushing with acid solution
- Flushing with water

Each program steps ends with bowl overflow and a total ejection.

Bowl overflow is initiated by actuating the button "bowl overflow" on the control unit. By this means the constant-pressure valve in the discharge line is throttled for 10 secs and bowl overflow occurs. In this way the hood and upper bowl walls are cleaned. The function is indicated by LED.

Total ejections are performed by means of the respective button.

The commands "overflow" and "total ejection" can also be initiated automatically from an external CIP control.

To prevent damage due to corrosion, only approved cleaning agents should be used.

8.2 Bowl

Self-cleaning bowls need not be taken apart for cleaning at the end of a run, unless the nature of the separated solids makes bowl dismantling for thorough cleaning necessary.

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

The following points are particularly important:

- During the first few months of operation, the lock rings should be removed 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.
- 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.
- Place bowl parts on a rubber mat or wooden grating, never on a stone floor.
- Remove gaskets from the bowl parts and clean grooves and gaskets to prevent corrosion.
- Replace damaged gaskets. Swollen gaskets should be left to dry at 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 collector 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.



8.3 Upper section of frame

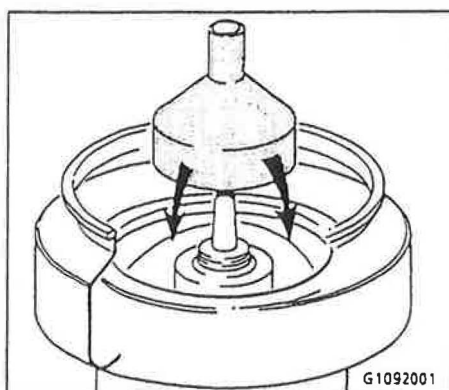


Fig. 117

- From time to time, the inside of the upper section of the frame has to be cleaned in the area below the bowl.
- After removing the bowl (see 5.3), place the splash cover over the spindle to prevent wash liquid from seeping into the drive and rendering the lubricating oil unserviceable.



Never aim a water jet directly at the separator for the purpose of cleaning. Clean it by hand with a sponge or cloth.

- 8.4 Operating-water feeding system** The small holes in the operating-water feeding device should be cleaned every 3 – 6 months.
- 8.5 Gear chamber**
- When changing oil, clean gear chamber thoroughly with kerosene.
 - Be sure to remove all metal particles from walls and corners.
 - Do not use fluffy cleaning rags or cotton waste!
- 8.6 Prior to a long-term shut-down of the separator**
- Prior to a long-term shut-down, clean the separator thoroughly (see 8.2 and 8.3).
 - The clean bowl parts and all unvarnished machine parts should be wiped dry and greased to avoid corrosion.
 - The clean grease-coated bowl should be kept in a dry place.
 - To prevent gaskets from getting brittle, keep them in a cool and dry room, protected from dust and light.
 - Drain the lubricating oil and fill gear chamber with corrosion-preventing oil, e. g. SHELL Ensis Oil 30.
Oil level must be up to middle of sight glass. Let separator run without bowl for approx. 10 minutes to make sure that all gear parts are coated with the corrosion-preventing oil.
Drain the oil. Oil upper end of spindle by hand and protect it with splash cover 406.
 - Check water shut-off devices for leakage. If necessary, remove connecting piping between faulty shut-off device and separator to avoid damage which may be caused by drip water.
 - Stop operating-water supply at the branch point of the water mains to prevent inrush of water into the separator, caused by unintended opening of the shut-off valve.
 - Before re-starting the separator, fill gear chamber with the lubricating oil specified in chapter 3. Oil level must be slightly above middle of sight glass. Then let the separator run without bowl for 10 minutes.

9 The gear parts

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9.1 Dismantling the vertical gear parts

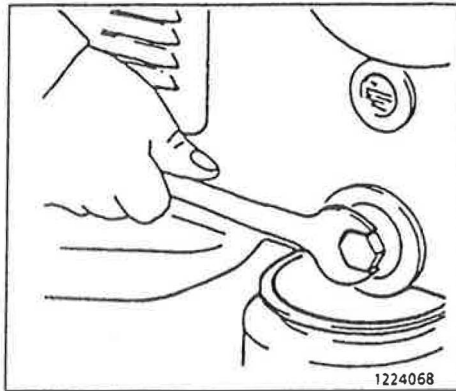


Fig. 118

- After dismantling the bowl, loosen o drain screw and drain oil into oil pan.

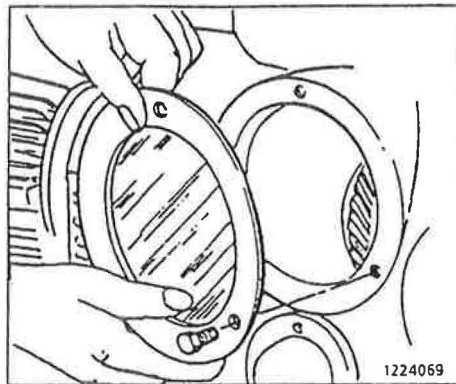


Fig. 119

- Unscrew hex head screws from gear sight glass and remove it.

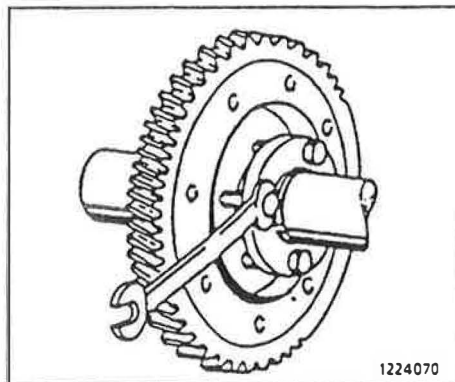


Fig. 120

- Loosen hex head screws in clamp plates of worm wheel.

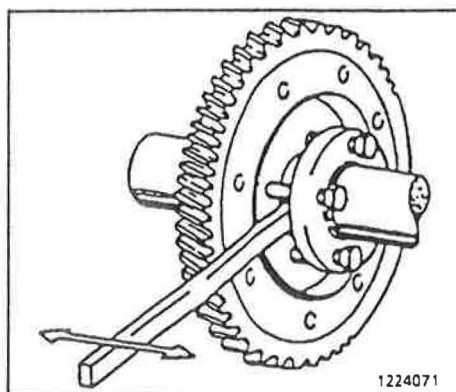


Fig. 121

- Slacken clamp plates until the worm wheel can be moved on worm wheel shaft.
- Push worm wheel to the clutch side.

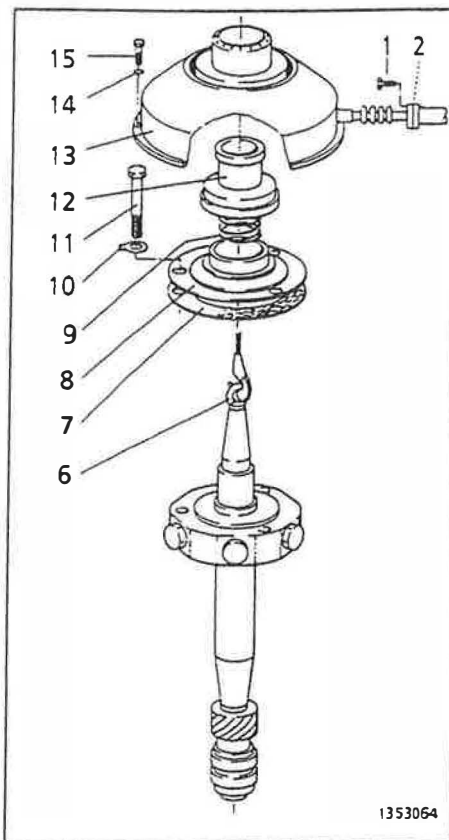


Fig. 122

- Unscrew Allen screws 1 of the operating-water connection
- Unscrew Allen screws 15 from the operating-water feeding device.
- Remove operating-water feeding device 13.
Make sure that the gasket 2 does not get lost or damaged.
- Remove spindle cap 12.
- Straighten tab washer 10.
- Unscrew hex head screws 11.
- Remove protective cap 8 and spindle spring 9.
- Screw spindle lifting device 6 into taphole of spindle.
- Pull off spindle together with neck bearing bridge assembly.

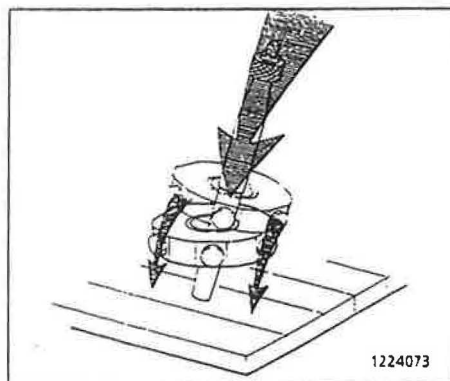


Fig. 123

- To remove neck bearing bridge, hold spindle in inverted position, upper end down, and tap it against a wooden block.

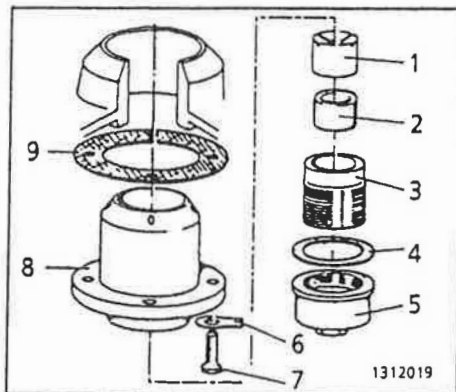


Fig. 124

- Unscrew bottom bearing cap 5 and remove gasket 4.
 - Unscrew bottom bearing threaded piece 3 and remove it together with spring column 2 and bottom bearing pressure piece 1.
- In case the bottom bearing housing 8 must be replaced:
- straighten tab washers 6,
 - unscrew hex head screws 7.
 - Screw two screws 7 into the tapholes of bottom bearing housing
 - force out bottom bearing housing by pressing it downwards.

9.1.1 Removal of ball bearing and worm

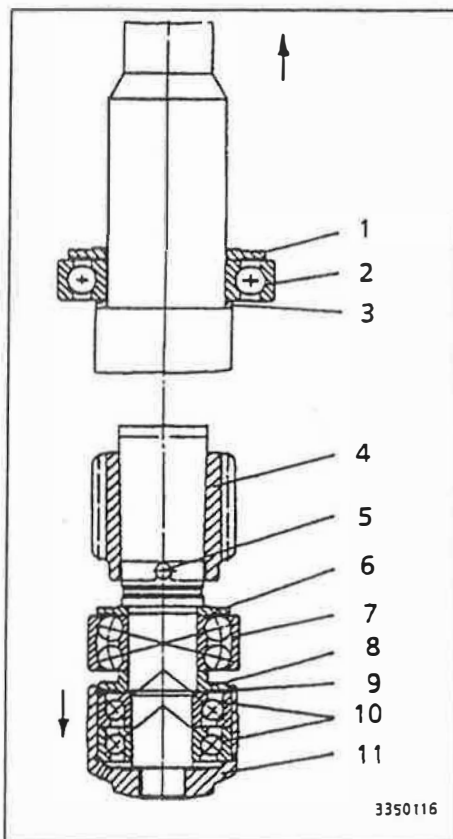


Fig. 125

- Pull out the following componen. using a commercially available puller:
 - Ball bearing protection ring 8, angular contact ball bearings 10 and bottom bearing housing 11,
 - Ball bearing protection ring 6 and pendulum ball bearings 7
 - Worm 4 (before removal, knock out cylindrical notched pin 5)
 - Grooved ball bearings 2 and ball bearing protection ring 1
- Lift off ring 3.
- Press snap ring 9 out of the groove of bottom bearing housing 11.
- Remove angular contact ball bearing 10 from bottom bearing housing 11.

9.2 Re-assembly of vertical gear parts

When re-assembling the vertical gear parts proceed in reverse order of removal (9.1).

Important hints:

When installing the vertical gear parts bear in mind the following:

- Thoroughly clean gear chamber before installing the vertical gear parts (8.5).
- Check ball bearings of worm spindle before re-fitting.
- Use only high-precision ball bearings (see list of spare parts).
- For safety reasons, the ball bearings of the worm spindle must be replaced every 5000 operating hours.
- Before fitting ball bearing and ball bearing protection ring 1 onto the spindle, heat these parts in oil to approx. 80 °C.
- The two angular contact ball bearings 10 must always be replaced together. Note that the angular contact ball bearings may be loaded axially in one direction only. They must be fitted so that the broad shoulder of the inner ring of the bearing is on top.

Faulty mounting will inevitably result in damaged to bearings.

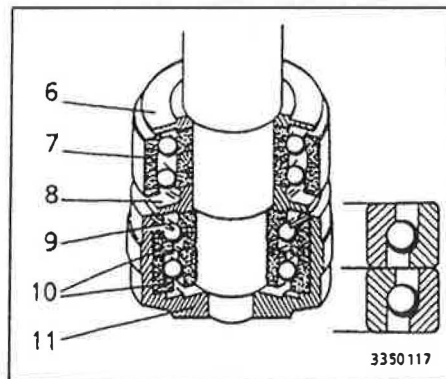


Fig. 126

For re-assembly proceed as follows:

- Slide the heated angular contact ball bearings onto the spindle.
- Slip snap ring 9 over the ball bearings.
- Let ball bearings cool down.
- Fit bottom bearing pressure housing 11 over the ball bearings.
- Press snap ring 9 into the groove of the bottom bearing pressure housing.

- When installing a new worm, the worm wheel assembly must be replaced at the same time.
- After installation of the vertical gear parts the height of the fitted bowl must be checked and re-adjusted, if necessary (9.3).

9.2.1 Assembling the neck bearing bridge

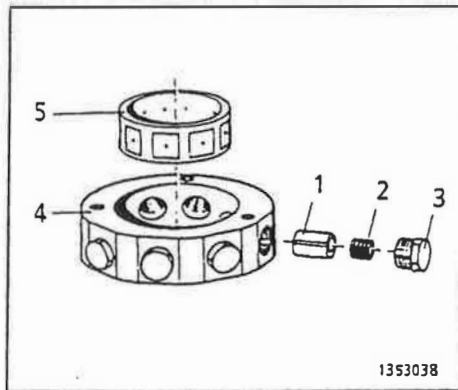


Fig. 127

- Insert pressure ring 5 in neck bearing bridge 4 in such a manner that the recesses of the pressure ring face the tapholes of the neck bearing bridge.
- Insert neck bearing springs 2 into spring pistons 1.
- Grease spring pistons thoroughly.
- Screw threaded plugs 3 with spring pistons 1 and neck bearing springs 2 into neck bearing bridge, and tighten them.

9.2.2 Fitting the spring column into the bottom bearing

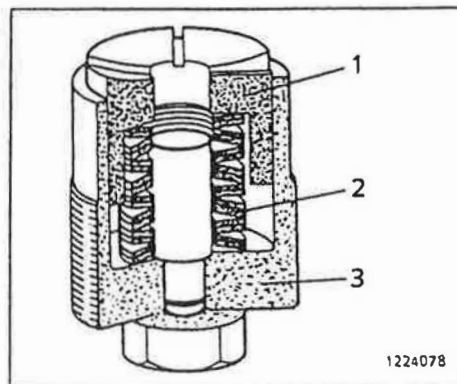


Fig. 128

- Slide cup springs 2 onto bolt of bottom bearing threaded piece as illustrated in the adjacent figure.
- Insert bottom bearing pressure piece 1 into bottom bearing threaded piece, sliding it over the cup springs.

9.2.3 Installing the worm spindle

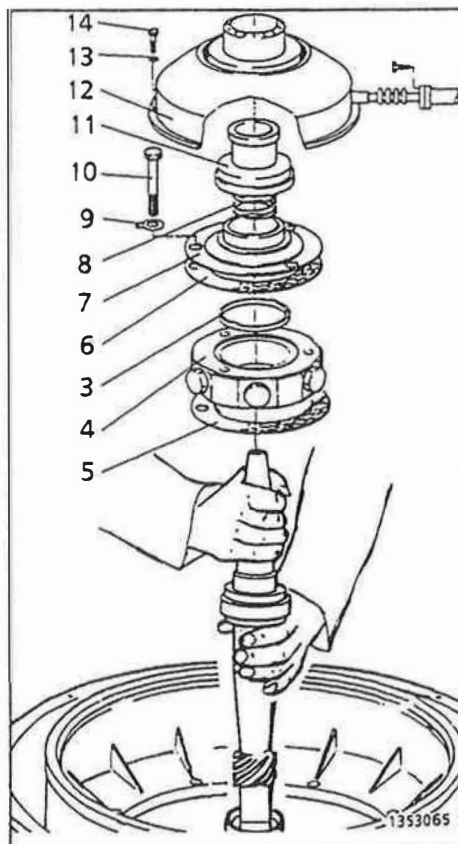


Fig. 129

- Install worm spindle without neck bearing bridge. It must be possible to install the worm spindle without having to rap on the upper spindle end, and to move the built-in spindle axially by hand. If this is not the case, smooth the inside of the bottom bearing housing with a fine emery cloth.
- Insert gasket 5, neck bearing bridge 4 and distance ring 3.
- Check dimension between distance ring and neck bearing bridge (see following figure).
- Fit gasket 6, protective cap 7, spindle spring 8 and spindle cap 11.
- Screw in hex head screws 10, with lock washers 9 underneath, tighten and secure them.
- Install operating-water feeding device 12 and it tighten with hex head screws 14 and lock washers 13 placed underneath.

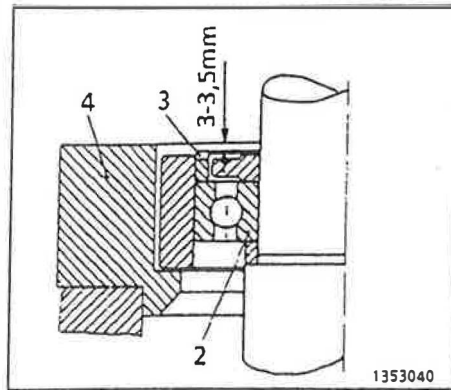


Fig. 130

- Before installing the neck bearing protection cap check if the distance between the cams of distance ring 3 and neck bearing bridge 4 is 4 3 - 3.5 mm .

Distance between cam-distance ring and neck bearing bridge:

< 3 mm - File cams to proper dimension.

> 3.5 mm - Raise cam by welding or order a new distance ring from the factory stating the dimension of the required cam height.

Note that after tightening the neck bearing protection cap, the distance ring 3 and hence, the ball bearing 2 will be under pressure until the spring column in the bottom bearing is compressed by the weight of the bowl.

9.3 Bowl Height

The bowl height is adjusted at the factory before the separator is shipped.

9.3.1 Inspection

The bowl height must be checked for re-adjustment

- before the first start of the separator,
- after re-assembling the vertical gear parts,
- after exchanging the bowl,
- after exchanging the centripetal pump,
- as soon as the centripetal pump shows any grinding marks.

Prerequisite to correct bowl height adjustment is that

- the bowl is properly closed,
(the "O" marks on bowl lock ring and on bowl bottom must be in line with each other.)
- the hood is properly seated on the solids collector,
- the fastening screws of the hood are tight,
- the upper centripetal pump is screwed onto the lower centripetal pump as far as it will go,
- the centripetal pumps are screwed into the disk as far as it will go.

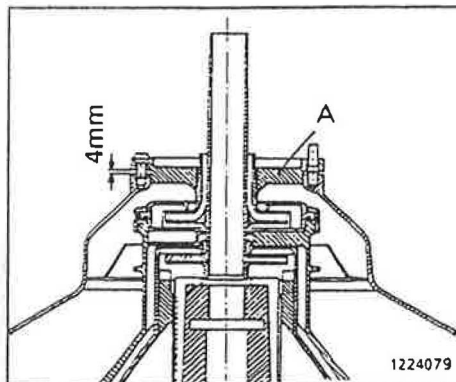


Fig. 131

The bowl height is correct when the disk A with screwed-in centripetal pumps can be raised by about 4 mm. Otherwise the bowl height has to be re-adjusted.

Distance between disk and hood

- < 4 mm, bowl is too low.
- > 4 mm, bowl is too high.

9.3.2 Adjusting

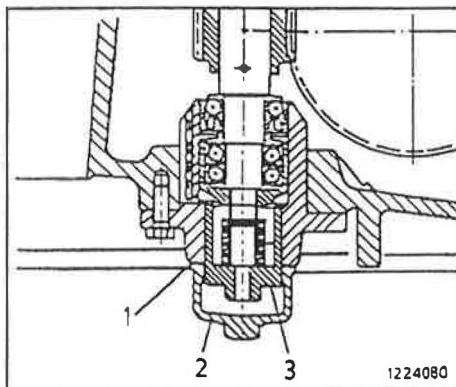


Fig. 132

- Unscrew bottom bearing cap 2 and remove gasket 1.
- Adjust bowl to correct height by turning bottom bearing threaded piece 3 (1 revolution = 2 mm).
- Bowl is too low, turn bottom bearing threaded piece clockwise.
- Bowl is too high, turn bottom bearing threaded piece counter-clockwise.

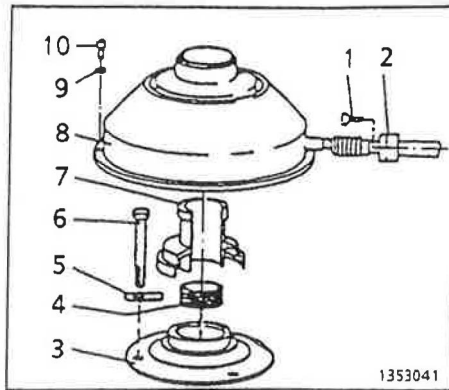


Fig. 133

If the bowl must be adjusted by more than 1 mm, proceed as follows:

- Remove the bowl (5.3).
- Unscrew Allen screws 1 and 10.
- Remove operating-water feed 8.
- Remove spindle cap 7.
- Unscrew hex head screws 6.
- Straighten tab washer 5.
- Remove neck bearing protection cap 3.
- Turn bottom bearing threaded piece clockwise until the bowl is correctly adjusted.

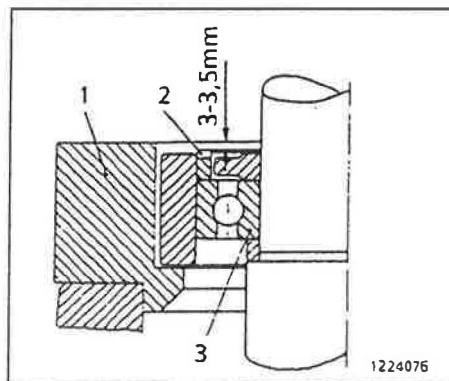


Fig. 134

Each time the bowl has been lowered or raised, check the clearance between cam of distance ring 2 and neck bearing bridge 1.

Specified dimension: 3 - 3.5 mm

This check is not required if it has been made after re-assembling the vertical gear parts and the bowl had not to be raised by more than 1 mm.

Clearance between cam of distance ring and neck bearing bridge:

- < 3 mm - File cams to proper dimension.
- > 3,5 mm - Raise cam by welding or order a new distance ring from the factory, stating the required cam height.

Then re-install the dismantled parts.

Note, that after tightening the neck bearing protection cap, the distance ring 2 and, hence, the ball bearing 3 will be under pressure until the spring column in the bottom bearing is compressed by the weight of the bowl.

9.4 Removal of the horizontal gear parts

Work on electric lines may only be carried out by a qualified electrician under observation of the safety regulations.

For removal of the horizontal gear parts proceed according to the following sections:

9.4.1 Removing the motor

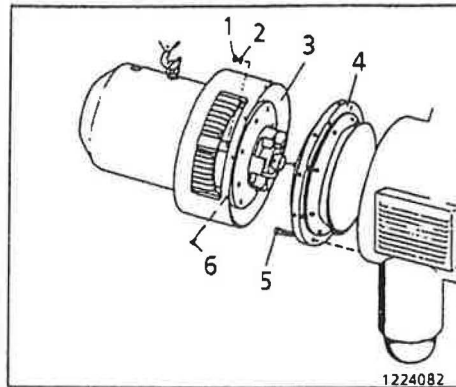


Fig. 135

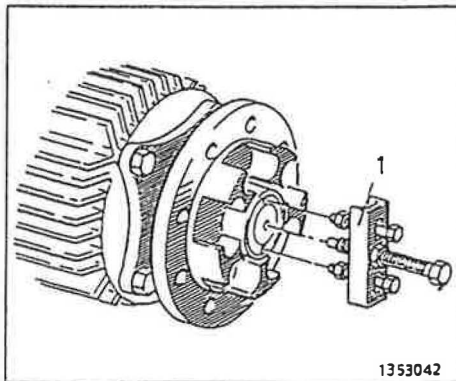


Fig. 136

- Disconnect the motor.
- Unscrew hex head screws 6 and move cover 3 sideways.
- Suspend motor in hoist and tighten carrying rope.
- Unscrew hexagon nuts 1 through opening of cover which can be turned on the flange. Take off lock washers 2.
- By means of hoist lift off the motor together with the cam hub.
- Withdraw cam hub from motor shaft end using pulling device 1.

9.4.2 Removing the fluid clutch

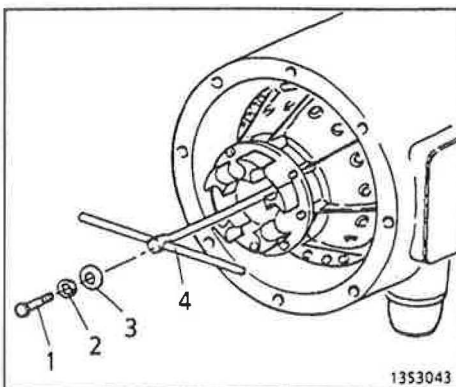


Fig. 137

After removing the motor:

- Loosen hex head screw 1 using torque wrench.
- Note tension of cup spring 3!
- Unscrew hex head screw, remove washer 2 and cup spring.
- To remove fluid clutch from cone of worm wheel shaft use tool 4.

9.4.3 Worm wheel shaft

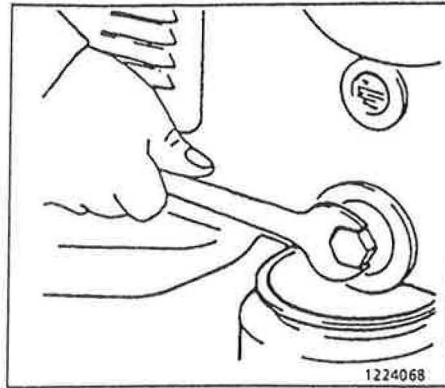


Fig. 138

- Loosen oil drain screw and drain oil into oil cup.

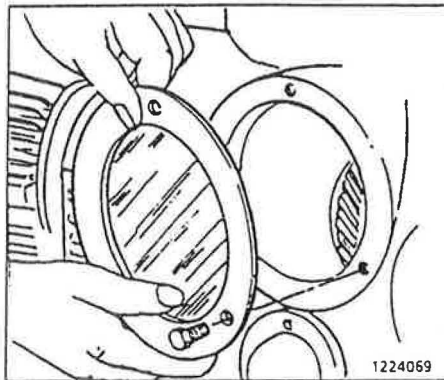


Fig. 139

- Unscrew hex head screws from gear sight glass and remove sight glass.

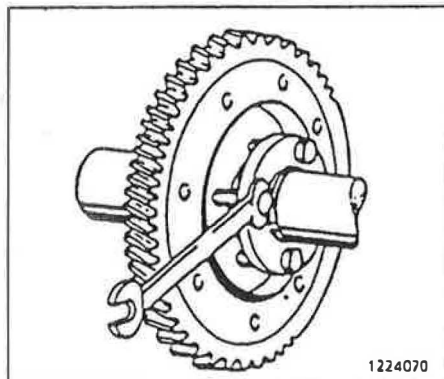


Fig. 140

- Loosen hex head screws in clamp plate of worm wheel.

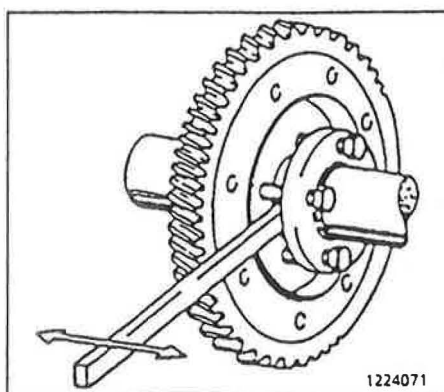


Fig. 141

- Slacken clamp plate until worm wheel can be moved on the worm wheel shaft.
- Push worm wheel to the clutch side.

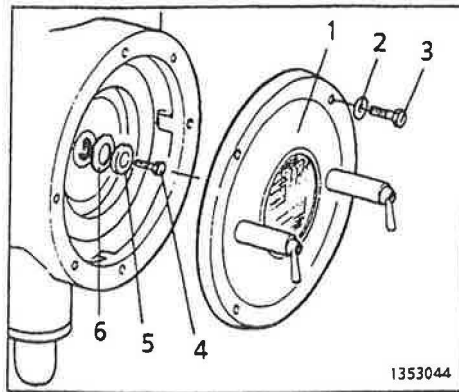


Fig. 142

- Unscrew hex head screws 3 (washers 2) and remove fan cover 1.
- Unscrew hex head screw 4 from worm wheel shaft. Note tension of cup spring!
- Remove centering disc 5 and cup spring 6.

Tools:

Torque wrench
Hexagon socket
SW 24 mm

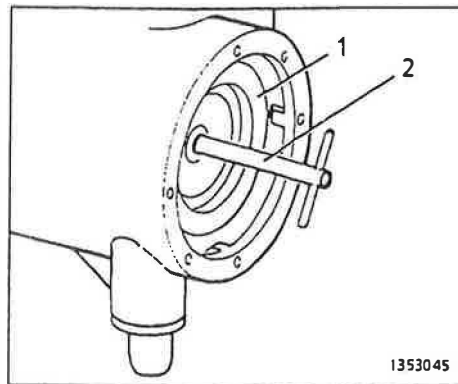


Fig. 143

- Remove brake pulley 1 from cone of worm wheel shaft using device 2 (fluid clutch/brake pulley).

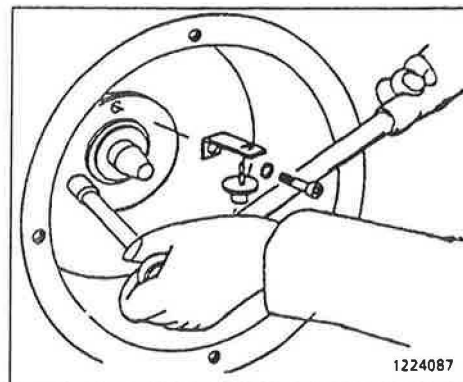


Fig. 144

- Unscrew Allen screws from bearing cover (brake side)
- Remove holder and proximity switch.

Tools:

Torque wrench
Hexagon socket
SW 8 mm

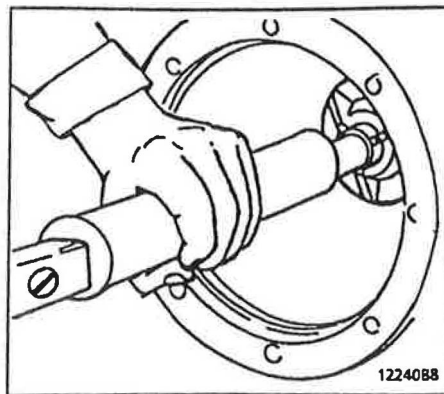


Fig. 145

- Drive out worm wheel shaft together with ball bearing, nut and bearing cover towards **brake side** using a hammer and wooden block. When the shaft has completely loosened from the ball bearing on the motor side,
- remove the worm wheel shaft by hand; while doing so, hold the worm wheel, to prevent damage to the gear teeth.
- Take the worm wheel assembly out of the gear housing.

9.4.4 Grooved ball bearing (motor side)

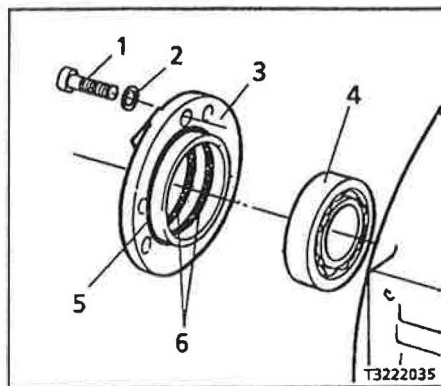


Fig. 146

For removing the bearing refer to assembly drawing, sect. 9.5.

- Unscrew hex head screws 1 and remove lock washers 2.
- Remove bearing cover 3 with felt rings 6 and gasket 5.
- Hold a brass mandrel against inner ring of ball bearing, and
- hammer it lightly to drive out the ball bearing 4.

9.4.5 Angular contact ball bearing (brake side)

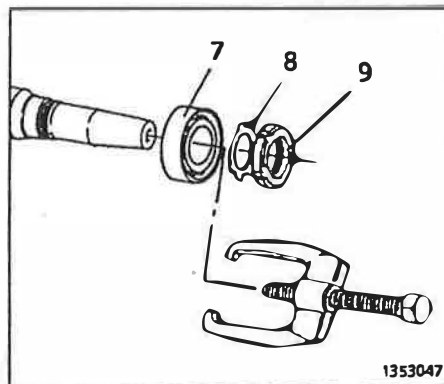
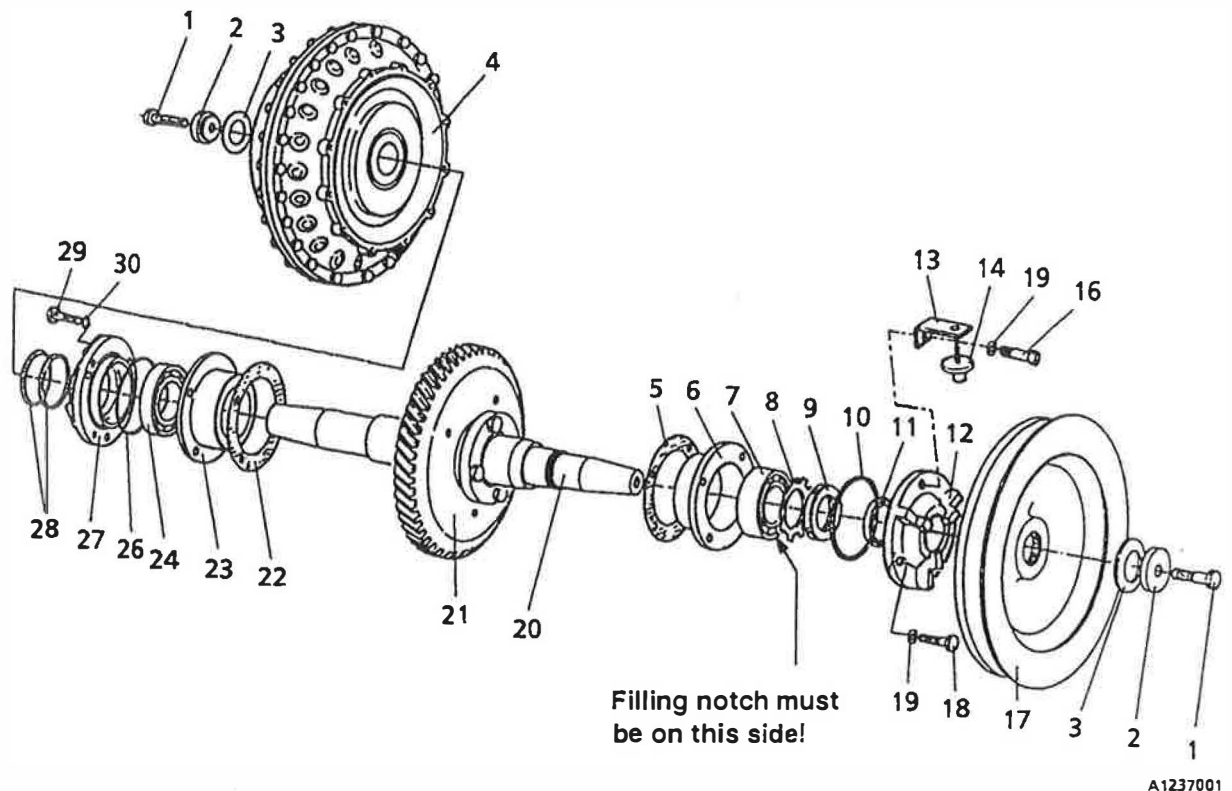


Fig. 147

- Lift tab of washer 8 out of groove of nut 9.
- Unscrew grooved nut using pivoted hook wrench.
- Remove tab washer 8.
- Withdraw angular contact ball bearing 7 from the worm wheel shaft using a commercially available pulling device.

9.5 Re-assembly of horizontal gear parts



A1237001

Fig. 148

Note:

For reasons of safety, replace ball bearings of worm wheel shaft every 10 000 operating hours.

- When fitting the angular contact ball bearing 7 onto the worm wheel shaft, make sure that the filling notch of the bearing faces the bearing cover.
- Install tab washer 8 and grooved nut 9.
After having tightened nut 9, bend one tab of washer into a groove of the nut. Ensure that the tab does not extend beyond the outer diameter of the nut.
- Install worm wheel assembly with clamp plate 21 so into gear housing that the screw heads of the clamp plate are directed towards the brake side.
- The worm wheel has been balanced in the factory as complete assembly. To avoid unbalance, the clamp plates and the toothed rim must, therefore, not be rotated on the wheel body and component parts must not be replaced individually.
- When the toothed rim is worn and needs replacement, the entire worm wheel assembly 20 with clamp plates must be replaced. The worm of the worm spindle should be replaced at the same time.
- Introduce the worm wheel shaft 20 into the separator frame from the brake side, and slide on the worm wheel.
- Place a hard wooden block against the worm wheel shaft and tap it lightly with a hammer until the angular contact ball bearing 7 is tightly seated in the housing!



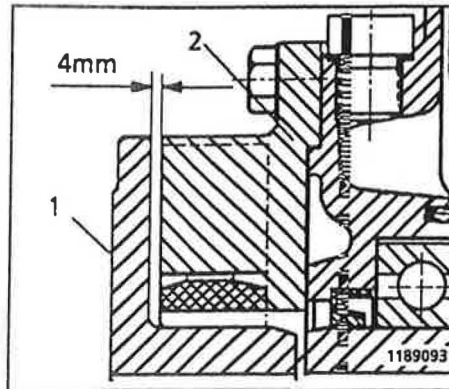


Fig. 151

When installing the motor, make sure that

- there is a distance of **4 mm** between cam hub 1 and fluid clutch 2.

After exchanging:

- the motor
 - the cam hub
 - the fluid clutch
 - the worm wheel shaft
- the distance must be checked.

If necessary,

- adjust the distance by displacing the cam hub on the motor shaft, and
- drill a new hole into the motor shaft for the threaded pin.

- Fill gear chamber with oil specified in chapter 3 until oil level is slightly above middle of sight glass.
- Check spindle speed with a hand tachometer and check direction of rotation of bowl (see 4.3).
- To run in new gear parts (worm wheel, worm) let the separator run - without bowl - for about **one hour**.

During this time switch the motor on and off several times.

- Install bearing cover 12 with inserted sealing ring 11 and gasket 10.
- Bolt bearing cover 12 and holder 13 of proximity switch 14 together by means of Allen screws 16 and 18 (with lock washers 19 underneath).

Required torque 45 Nm.

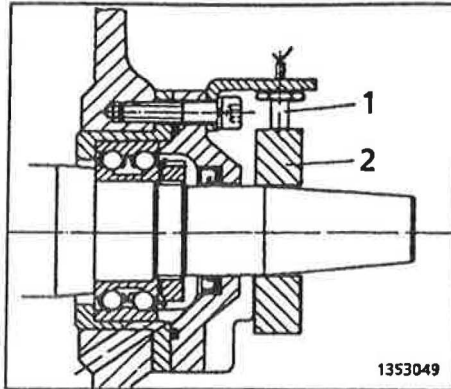


Fig. 149

- Re-adjust proximity switch 1 with the aid of adjusting ring 2.

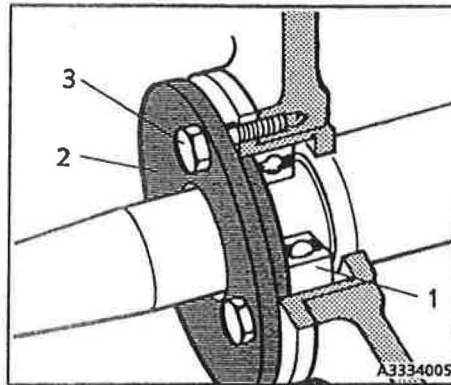


Fig. 150

- Fit grooved ball bearing 1 (clutch side) into the bearing housing.
- Pull grooved ball bearing 1 ever against the shoulder of the worm wheel shaft using
 - mounting device 2 and
 - hex head screws 3.
- Unscrew hex head screws 3.
- Remove mounting device 2.

- Replace bearing cover 27 including felt rings 28 and gasket 26 and tighten evenly with hex head screws 29 (lock washer 30 placed underneath).
- Move worm wheel towards brake side until it rests against shoulder of worm wheel shaft. This will ensure proper positioning of the toothed rim with reference to the worm.

- Fasten worm wheel 21 securely on the worm wheel shaft 20 by tightening the screws in the two clamp plates evenly and crosswise.

Required torque: 45 Nm

- Before installing the fluid clutch and the brake pulley:
 - apply a thin film of grease to the tapered ends of the worm wheel shaft. Then clean and wipe dry the tapered ends with a rag.
 - Clean the inside of the hubs of the fluid clutch and brake pulley carefully.
- The fluid clutch and the brake pulley must be firmly clamped to the worm wheel shaft, accomplished by tightening the hex head screws 1 of the clutch and brake pulley with the torque wrench.

Required torque: 150 Nm

- Be sure to fit cup springs 3 under the disks 2.

10 Fluid clutch

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10.1 General

The fluid clutch (Turbo Clutch) gradually brings the bowl to its rated speed eliminating premature wear on gear parts and on motor.

The motor power is transmitted by means of a closed oil circuit between a primary wheel driven by the motor shaft and a secondary wheel driving the worm wheel shaft of the separator.

The oil level in the fluid clutch must be up to the mark of the oil level indicator plate to ensure that the bowl comes up to its rated speed within its starting time (see sect. 4.3).

When *less oil* is filled in, slippage in the clutch will be too great and starting time of the bowl too long. If the clutch contains *too much oil*, the starting time of the bowl will be too short, resulting in overload of motor and gear.

The oil in the clutch has to be changed every 10 000 working hours. It should be changed when the ball bearings of the worm spindle and of the worm wheel shaft are being replaced.

The clutch requires

approx. 6.5 litres of oil when using a 1 455 rpm motor

approx. 5.25 litres of oil when using a 1 745 rpm motor.

For checking the oil level, proceed according to the instructions in sect. 10.2.

Be sure to use only the type of oil specified in sect. 10.4.

10.2 Checking the oil level

- The oil level has to be checked before the initial start-up of the separator and every time after re-filling of oil.
- Furthermore, the oil level should be checked once a month since in the course of time small oil losses may occur.
- Before checking the oil level, make sure oil has cooled down.

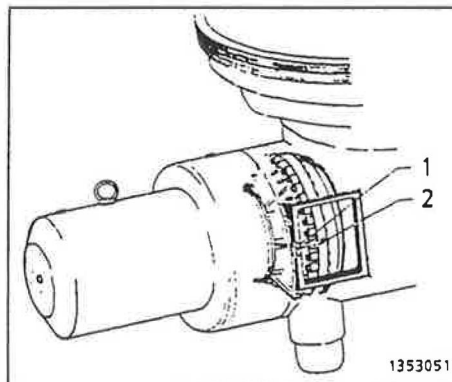


Fig. 153

Brand new separator

Mark on oil level indicator plate 1 must be in line with lower edge of taphole 1; Oil level must be up to the lower edge of taphole 2.

If a replacement clutch is installed, the existing oil level indicator plate is no longer valid and must be re-adjusted according to the instructions given in chapter "separator with replacement clutch."

For checking the oil level, proceed as follows:

The separator still has its original clutch:

- Remove the ventilation grid so that the oil level indicator plate can be seen.
- Bring the clutch into such a position that threaded plug 2 can be removed without oil flowing out.
- Unscrew threaded plug with a wrench.
- Then turn clutch until lower edge of taphole is in line with mark on oil level indicator plate.

In this position, the oil level in the clutch must be up to the lower edge of the taphole, so that the oil begins to overflow. If this is not the case, refill oil (see 10.3).

The separator has a replacement clutch:

- If the clutch is replaced, then the original oil level indicator plate is no longer valid.
- The clutch has been filled with the correct amount of oil if the peak power consumption when the machine is starting up reaches a level which is twice as high as the rated power consumption.
- If an exact measurement of power consumption is not possible, then the correct amount of oil can be determined by measuring the speed of the horizontal drive shaft in the separator.

When the separator is operating at its rated throughput, the shaft should be rotating at

1 420 rpm (mains frequency 50 Hz) or at

1 710 rpm (mains frequency 60 Hz).

- If the peak power consumption or the speed of the shaft is much higher than these figures, then there is too much oil in the clutch; if they are much lower than these figures, then there is not enough.
- Once the correct amount of oil has been established, the oil level indicator plate must be re-set accordingly.

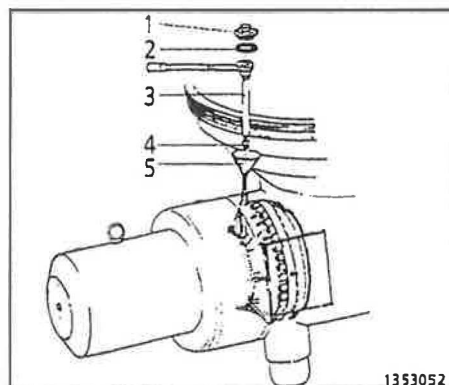
10.3 Re-filling of oil

Fig. 154

- Unscrew lock screw 1.
- Use wrench 3 to unscrew oil fill screw 4.
- Fill in oil using tunnel 5.
- Check oil level again (see 10.2).
- **Tightly** screw in lock screw. Be sure to place gasket 2 underneath.

10.4 Type of oil

For filling the fluid clutch use only

steam turbine oil TDL 32 according to DIN 51515.

This oil complies with the following specifications:

<i>Designation:</i>	Lubricating oil TDL 32 (according to DIN 51515) (steam turbine oil with additives giving increased protection against corrosion and increased resistance to aging)
Kinematic viscosity:	32 ± 3.2 mm ² /s (cSt) at 40° C
Density at 15° C:	max. 0.900 g/ml
Pour point:	≤ -6° C
Corrosive effect on	
- copper:	degree of corrosion 2 - 100 A3 (according to DIN 51759)
- steel:	degree of corrosion 0 - A (according to DIN 51585)
Aging characteristics:	Increase of the neutralization number after 1 000 h max. 2.0 mg KOH/g oil (according to DIN 51587)

The following branded oil meets this requirement:

SHELL Turbo Oil T 32.

Steam turbine oils TDL 32 of other brands may be used, provided they have a open flash point according to Cleveland of approx. 210° C which is contrary to DIN 51515.

Each separator is supplied with an amount of TDL 32 oil which is sufficient for on-filling.

10.5 Dismantling

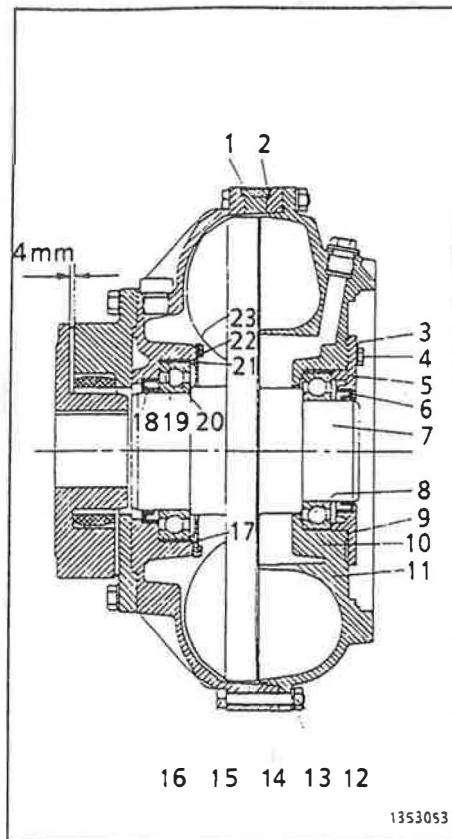


Fig. 155

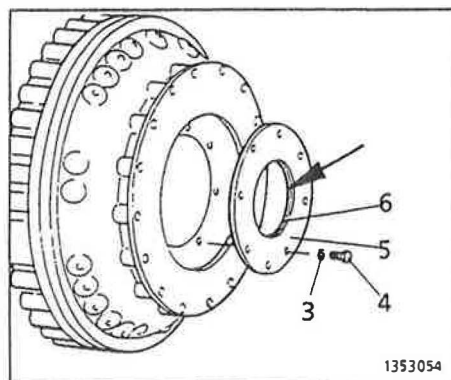


Fig. 156

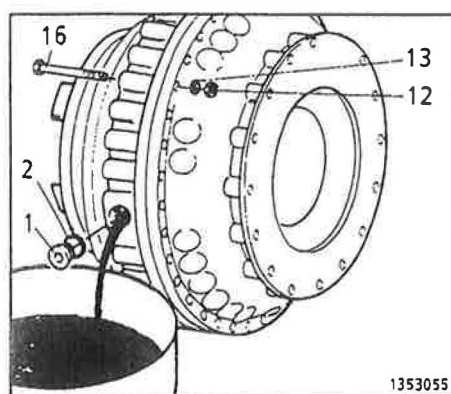


Fig. 157

As a rule, the fluid clutch must be sent to the factory for repair.

This ensures perfect functioning of the repaired clutch.

If required, a replacement clutch can be provided.

If, in exceptional circumstances, the fluid clutch must be dismantled on site, first check the sealing ring 6 and replace it if necessary.

Removing the sealing ring 6

- Unscrew screws 4 with spring washers 3 and remove sealing ring cover 5.
- Press out the sealing ring using a screwdriver.
- The sealing ring must be replaced if its sealing lip is no longer soft and pliable.

Removing the sealing ring 18 and ball bearings

- Unscrew threaded plug 1 together with gasket 2 and let oil drain.
- Unscrew hexagon nuts 12 and remove screws 16 with spring washers 13.

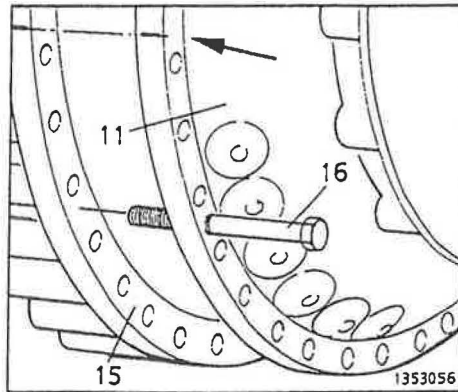


Fig. 158

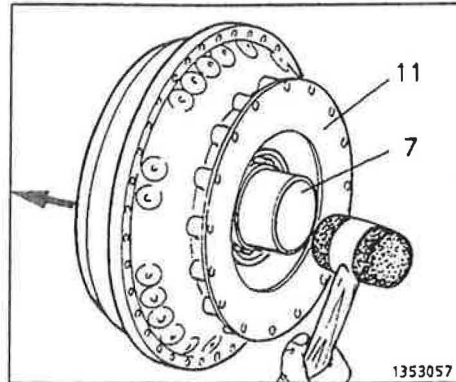


Fig. 159

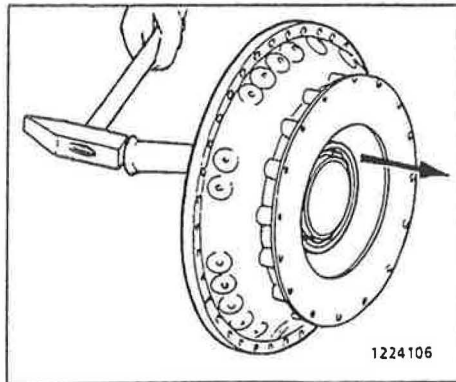


Fig. 160

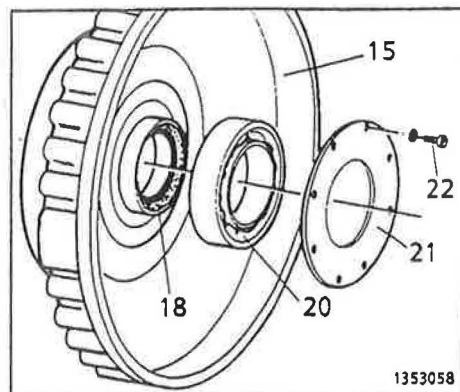


Fig. 161

- Press primary wheel off the clutch casing 15 by threading two of the screws 16 into the tapholes of primary wheel 11. Secondary wheel remains in primary wheel.
- **Be sure to mark** both primary wheel 11 and clutch casing 15 **before taking them apart**, so that, when being re-assembled, these parts will be brought back into their original position.
- Separate primary wheel 11 from secondary wheel 7 by rapping with a rubber hammer against hub of secondary wheel. Ball bearing 8 remains in primary wheel 11.
- Use mandrel and hammer to drive ball bearing 8 out of primary wheel 11.
- Unscrew screws 22 from clutch casing 15 and remove oil retaining ring 21.
- Drive ball bearing 20 and sealing ring 18 out of the clutch casing using mandrel and hammer.

10.6 Re-assembly

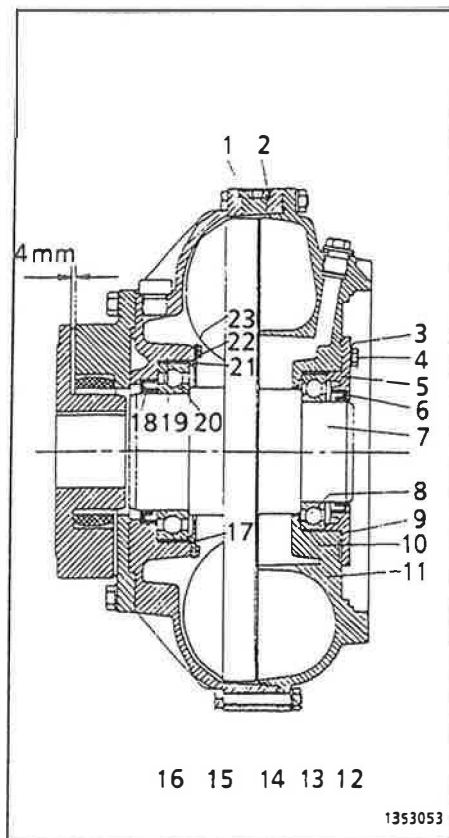


Fig. 162

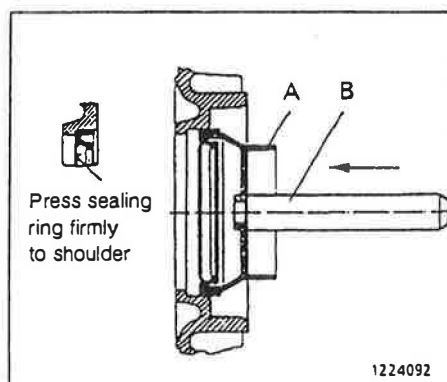


Fig. 163

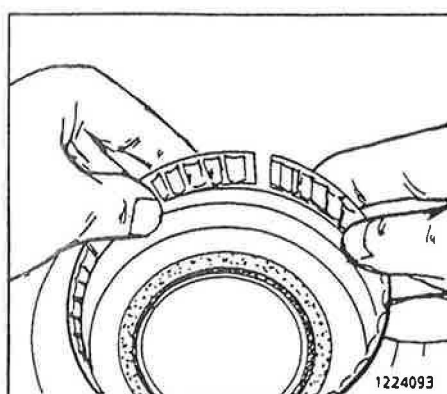
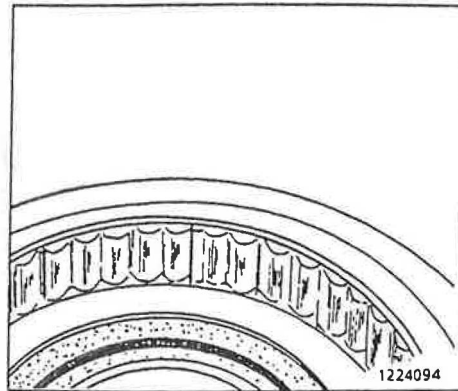


Fig. 164

For re-assembly of the fluid clutch, proceed in reverse order of dismantling.

The following should be kept in mind:

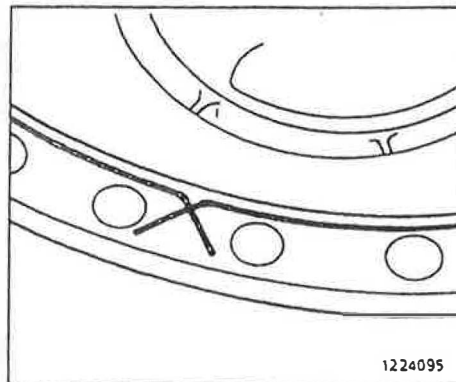
- Moisten sealing rings.
- Press sealing ring 18 into the clutch casing and sealing ring 6 into sealing ring cover 5. To do this, use special tool.
- The bolt B of the tool can be screwed into either side of the tool. This allows using the tool for mounting both sealing rings.
- Insert spacer ring 19 in clutch casing and spacer ring 10 in primary wheel 11.



- The bevelled edge of each ring must snap into the groove of the bearing neck. This will ensure that the spacer rings cannot move axially.

Fig. 165

- Press ball bearing 20 into clutch casing and ball bearing 8 into primary wheel. Check if the ball bearings pressed into the spacer rings have an absolutely tight fit. If this is not the case, the spacer rings have to be replaced. If necessary, return the clutch to the factory for repair.
- Apply some oil-resistant sealing compound (Atmosit or Kermon) to oil retaining ring 21. Then fasten ring to clutch casing with screws 22. Be sure to fit lock washers.
- Insert gasket 9 in groove of primary wheel 11. Then fasten cover 5 to primary wheel with screws 4. Be sure to fit spring washers.
- Press secondary hub with secondary wheel 7 into clutch casing. The surfaces contacting the sealing rings 18 and 6 must be perfectly smooth to ensure oil-tightness of the fluid clutch. If necessary, re-polish contact surfaces.



- Place Teflon packing cord 14 on sealing surface of clutch casing as shown in figure. Make sure cord ends are crossed. To keep the cord in its place, coat it with grease. Sealing surfaces of primary wheel and clutch casing must be in perfect condition; they must not be coated with a sealing compound.

Fig. 166

- Press primary wheel on secondary hub so that the marks on primary wheel and on clutch casing are in line. Then screw primary wheel and clutch casing together.



After repair the clutch has to be rebalanced.

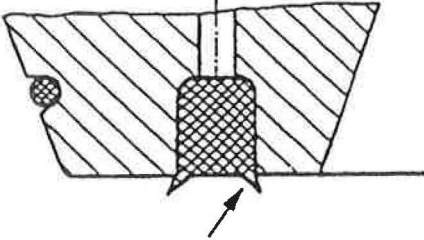
- After re-installing the clutch, fill with oil.

11 Trouble shooting

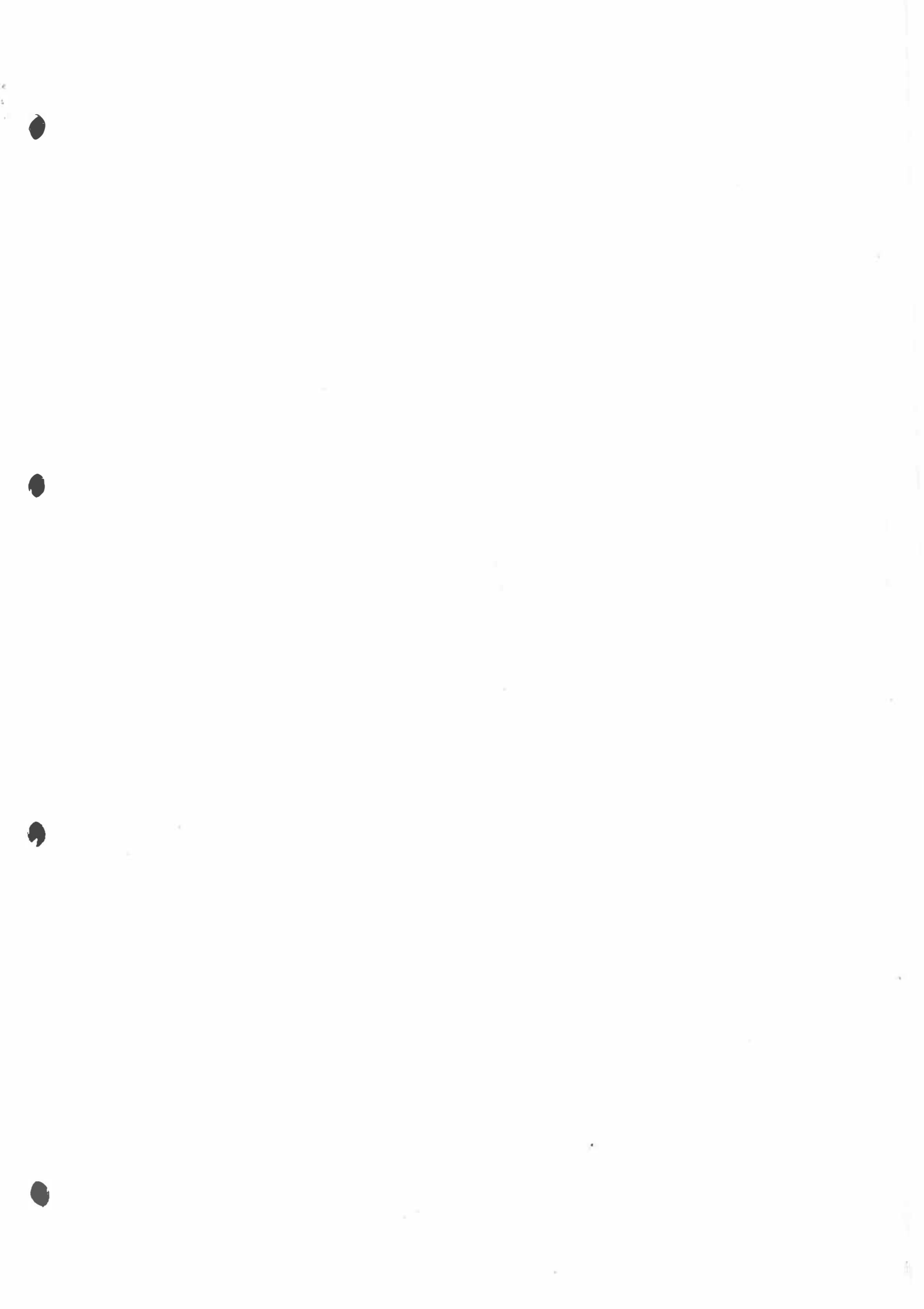
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11.2 Fault detection - Ejection 106

11.1 Fault detection - Mechanical function

Fault	Possible causes	Remedies
<p>The bowl does not come up to rated speed or takes too long to do so (see 4.3).</p>	<p>Brakes are on.</p>	<p>Release brakes by turning handles clockwise.</p>
	<p>Motor is incorrectly connected.</p>	<p>See wiring diagram.</p>
	<p>The fluid clutch does not contain enough oil or clutch is leaky.</p>	<p>Refill oil (see 10.3). Re-tighten nuts of screws on clutch. If sealing rings and do not seal properly, ask for a reconditioned clutch in exchange for your clutch.</p>
	<p>Bowl is too high or too low and, therefore, rubs against centripetal pump.</p>	<p>Adjust to proper bowl height (see 9.3).</p>
	<p>Clamp plates are not tight enough; worm wheel slips on shaft.</p>	<p>Tighten long hex head screws on worm wheel evenly and <i>firmly</i>. Tighten crosswise, by single turns, with a torque of 45 Nm.</p>
	<p>Product feed valve is open.</p>	<p>Close product feed valve.</p>
<p>The bowl speed drops during operation.</p>	<p>The fluid clutch does not contain enough oil.</p>	<p>Refill oil (see 10.3).</p>
	<p>Motor speed drops during operation.</p>	<p>Inspect motor and line voltage.</p>
	<p>Main bowl gasket in bowl top is damaged.</p>	<p>Replace the gasket (see sect. 5.7).</p>
	<p>Gaskets in bowl valves 5 are damaged; the bowl loses sealing water.</p>	<p>Replace gaskets (see 5.8). The bowl can be kept closed temporarily by opening the solenoid valve B for closing water manually.</p>
<p>The bowl comes up to rated speed too quickly (in less than 8 minutes). Motor pulls too high a starting current.</p>	<p>The clutch contains too much oil.</p>	<p>Check oil level (see 10.2). Drain excess oil.</p>

Fault	Possible causes	Remedies
<p>Uneven run of the separator.</p>	<p>Incomplete solids ejection. The remaining solids have deposited unevenly in the bowl.</p>  <p style="text-align: right;">1224096</p>	<p>Perform several partial ejections (7.5.1). If this does not improve conditions, close the bowl and fill it with water to attenuate the increased vibrations occurring during slowing-down of the bowl.</p> <p>Stop the separator. Apply brakes. If bowl is leaking, leave feed open. Clean bowl thoroughly.</p> <p>Remove protruding edges of bowl gasket with a knife (see sketch).</p>
	<p>Bowl is not properly assembled or, if plant has several separators, parts of different bowls may have been interchanged.</p>	<p>Assemble bowl properly (see 5.2).</p>
	<p>Tension of disc stack has slackened.</p>	<p>Make sure bowl lock ring is screwed on tightly (see 5.2). Check disc count. If necessary, add spare disc or compensating disc.</p>
	<p>Bowl is damaged and, therefore, out of balance.</p>	<p>Send bowl to factory or authorized factory repair shop. Do not attempt to make your own repairs. Never weld or solder. Bowl is made of heat-treated steels.</p>
	<p>Neck bearing springs are weak or broken.</p>	<p>Replace all 9 neck bearing springs.</p>
	<p>Ball bearings are worn.</p>	<p>Replace damaged bearings.</p> <p>IMPORTANT: When replacing, use only the high precision ball bearings as specified in the Parts List.</p>

Fault	Possible causes	Remedies
<p>Uneven run of the separator (cont'd.).</p>	<p>Gear parts are in bad condition as a result of</p> <ol style="list-style-type: none"> 1. normal wear, 2. premature wear caused by: <ol style="list-style-type: none"> a) lack of oil * b) oil of too low a viscosity, * c) metal abrasives present in the lubricating oil due to the following possible causes: <ul style="list-style-type: none"> - viscosity of oil is too low, - oil has not been changed in time, - gear chamber has not been cleaned, d) replacement of one gear part only, instead of both parts. <p>*) in general, recognized by blue tempering colour of gear parts.</p>	<p>Clean gear chamber thoroughly (see 8.5).</p> <p>Replace damaged gear parts (see 9.1 and 9.4).</p> <p>Change oil (see chapt. 3).</p> <p>If necessary, change oil more often.</p>
<p>Bowl lock ring is difficult to loosen.</p>	<p>Bowl has not been dismantled at regular intervals (see 8.2).</p>	<p>Unscrewing of the bowl lock ring can be very much facilitated by blocking the bowl, which is accomplished by putting wedges between bowl bottom and solids collector.</p>



11.2 Fault detection - Ejection

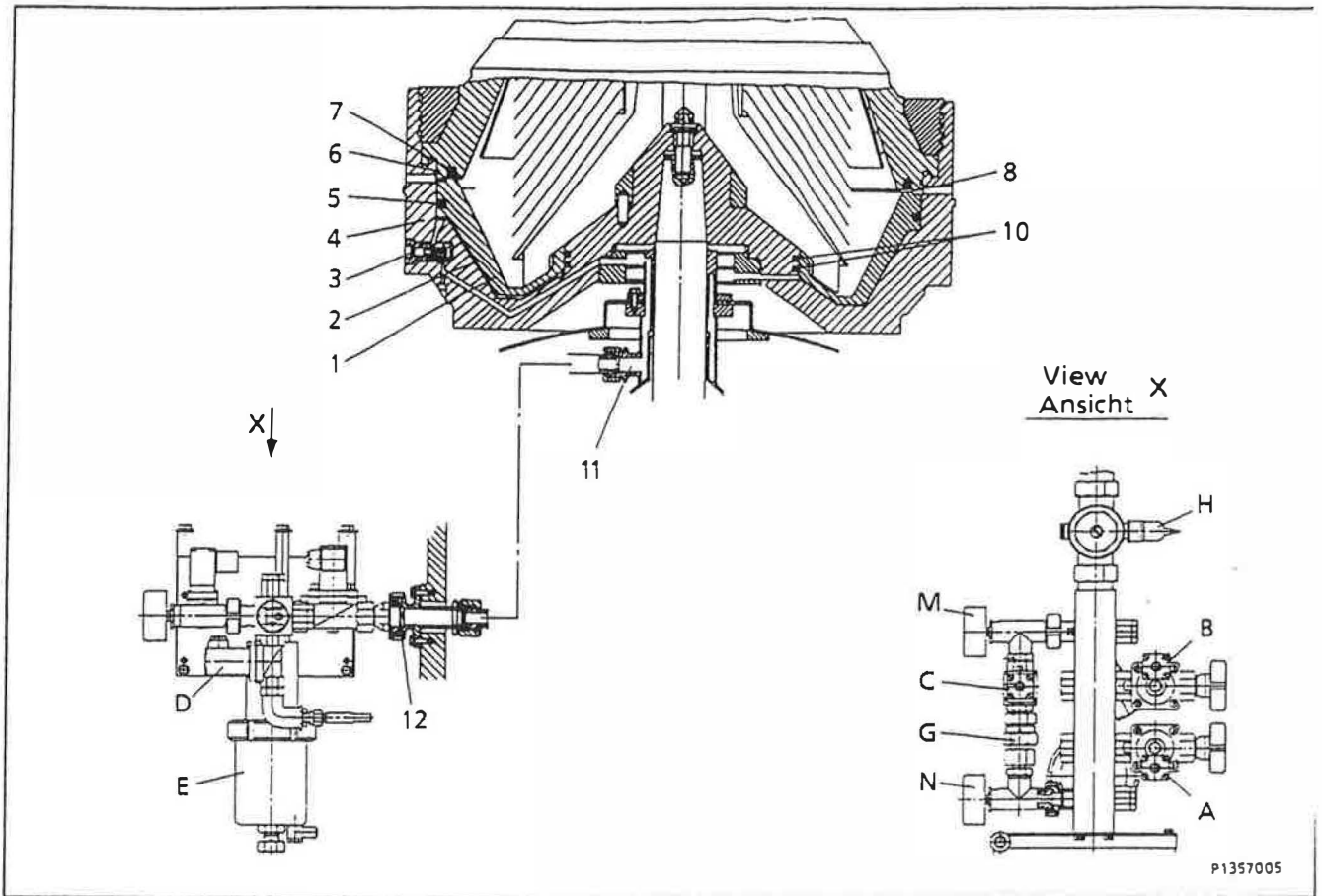


Fig. 167 - Bowl hydraulic system

- | | | | |
|----|----------------------------------|---|---|
| 1 | Sliding piston | A | Solenoid valve for opening water |
| 2 | Closing chamber | B | Solenoid valve for closing and flushing water |
| 3 | Bowl valve | C | Solenoid valve for filling water |
| 4 | Bowl bottom | D | Solenoid valve for cooling water |
| 5 | Gasket (sliding piston) | E | Metering unit |
| 6 | Gasket (bowl top) | G | Non-return valve |
| 7 | Main bowl gasket | H | Pressure switch |
| 8 | Sealing surface (sliding piston) | M | Pressure gauge |
| 10 | Gaskets (bowl bottom) | N | Pressure gauge |
| 11 | Operating-water feed | | |
| 12 | Gasket (operating water) | | |

Fault	Possible causes	Remedies
<p>The bowl does not close at all.</p> <p>IMPORTANT: In this case switch off feed pump immediately.</p>	<p>The amount of closing water fed to the bowl is insufficient because</p> <p>a) the water pressure in the supply line to the operating-water connection is too low (see 6.4).</p> <p>b) the water discharge holes in the top of the operating-water feed 11 are clogged with scale.</p>	<p>a) Check pressure in water supply line. The pressure should be at least 2.5 bar. Check also if there is sufficient closing-water coming in. The closing-water valve opens for 60 seconds after the separator has reached its operating speed and after each solids ejection. During this time the amount of discharging closing water should be measured at the operating-water discharge. The closing-water must discharge at a rate of 550 l/h. Closing water can be supplied as often as you like by switching on and off the main switch on the control unit.</p> <p>b) Clean discharge holes.</p>
	<p>Strainer in operating-water line is clogged.</p>	<p>Clean strainer.</p>
	<p>Gaskets of bowl valves 3 are damaged.</p>	<p>Remove valves (see 5.8). Install new gaskets.</p>
	<p>Gasket 5 in sliding piston is damaged or its edges have been frayed through the up- and down movement of the piston.</p>	<p>Replace damaged gasket. If, however, only the edges of the gasket are frayed and the gasket is not damaged otherwise, it can be re-used after grinding it off with an emery wheel.</p>
	<p>The operating-water feed 11 is clogged.</p>	<p>Clean operating-water feed.</p>

Fault	Possible causes	Remedies
<p>The bowl does not close and open properly.</p>	<p>Gasket 5 in sliding piston does not fit properly at all points of the guide surfaces, thus failing to seal properly.</p>	<p>If necessary, stretch gasket. Before installing the gasket, <i>lightly</i> grease groove in sliding piston.</p>
	<p>Gasket 7 in bowl top is damaged.</p>	<p>Replace gasket (see 5.6).</p>
	<p>Gaskets 10 in bowl bottom have not been inserted or are damaged.</p>	<p>Insert gaskets or replace them.</p>
	<p>Gasket 5 in sliding piston is uneven in height.</p>	<p>Replace gasket. The difference in height on a gasket must not exceed 0.25 mm.</p>
	<p>Sealing surface 8 of sliding piston is damaged.</p>	<p>Replace the sliding piston.</p>
<p>The bowl does not open at all or not completely.</p>	<p>Dirt or rubber particles have settled between sliding piston 1 and bowl bottom 4.</p>	<p>Clean bowl parts. Round off edges of gaskets. Replace damaged gaskets. Grease guide surfaces with the special lubricating paste supplied.</p>
	<p>Sealing chamber 2 between bowl bottom and sliding piston is soiled.</p>	<p>Remove sliding piston 1 and clean sealing chamber.</p>
	<p>The drill holes in bowl valves 3 are clogged.</p>	<p>Remove the valves (see 5.8) and clean them.</p>
	<p>The bowl receives no or too little opening water for the following reasons (check gauge M does not indicate):</p> <ul style="list-style-type: none"> a) non-return valve is dirty or defective, b) solenoid valve A or C is defective, c) air pressure for metering unit is too low, d) control periods of solenoid valves are not adjusted correctly. 	<p>Clean or replace non-return valve.</p> <p>Replace solenoid valve.</p> <p>Increase air pressure to ≥ 4.5 bar.</p> <p>Check adjusting periods of timers on control unit (see function diagram).</p>

12 Lubrication and maintenance schedule

12.1	Lubrication chart.....	110
12.2	Maintenance schedule.....	111

12.1 Lubrication chart

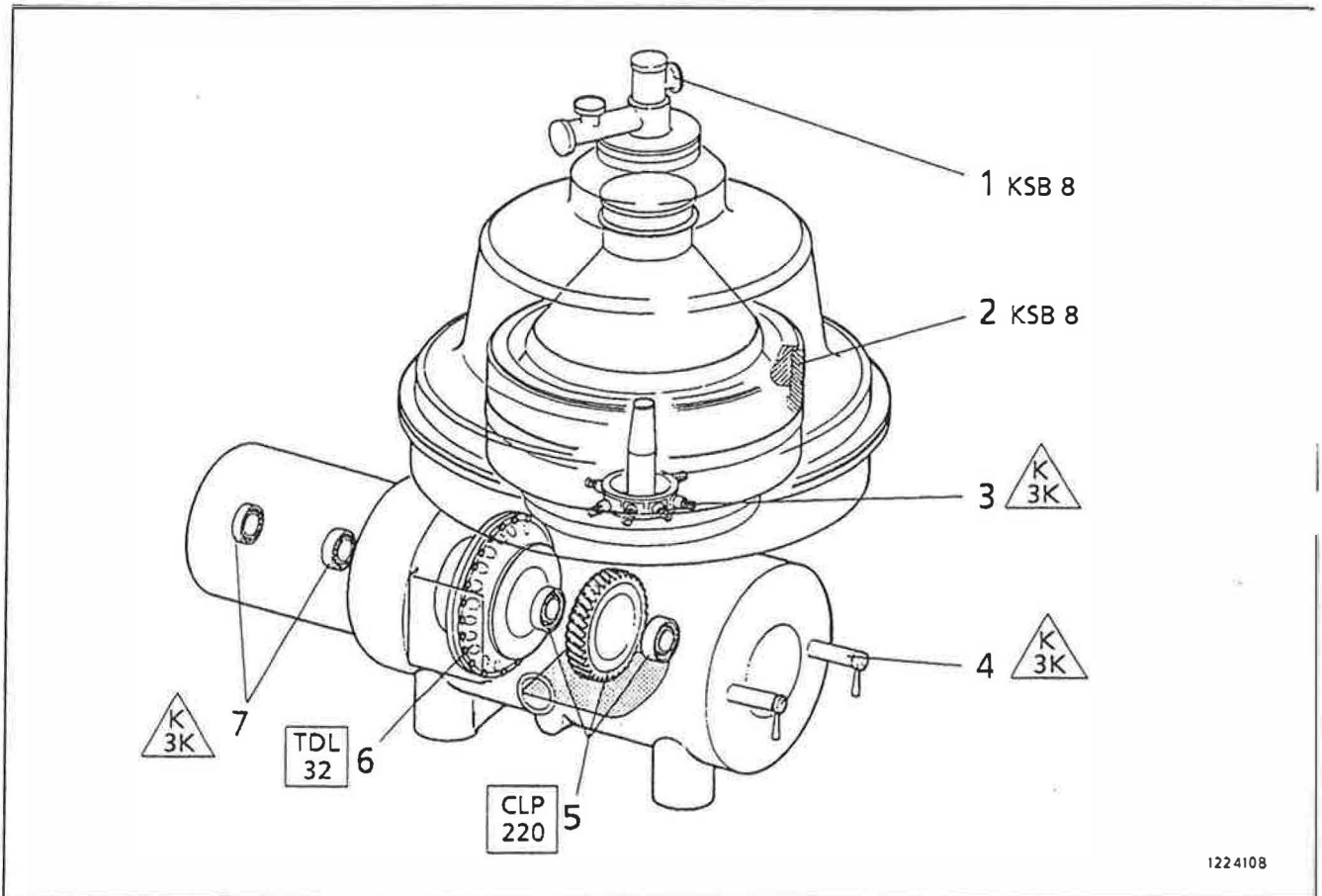


Fig. 168

No. in Fig.	Lubricant		Frequency of lubrication		Amount of lubricant	Lubrication point
	DIN	ISO	per year	after operating hours		
1	Klüber Grease KSB 8			when necessary	10 cm ³	Threads and fittings
2	Klüber Grease KSB 8			before each assembly	150 cm ³	Threads and sliding surfaces of bowl
3	Roller bearing grease K3K		2x	1 500	20 cm ³	Neck bearing springs and spring pistons
4	Roller bearing grease K3K		2x	1 500	10 cm ³	Manually-operated parts (brake bolt, valves, etc.)
5	Lubricating oil CLP 220 DIN 51502	CC 220	2x	750	5 500 cm ³	Gear chamber
6	Steam turbine oil TDL 32 DIN 51515			10 000	6 250 cm ³	Fluid clutch
7	Roller bearing grease K3K			according to manufacturer's instructions	according to manufacturer's instructions	Motor bearings

12.2 Maintenance schedule**Daily**

- Check oil level of gear chamber.

Every 250 operating hours

- First oil change after initial start-up (see 3.1).
- Check oil level of the fluid clutch.
- Clean bowl valves (5.7).

Every 750 operating hours

- Oil change and thorough cleaning of gear chamber. **
- Clean strainer in operating-water line. **

Every 1 500 operating hours

- Dismantle bowl and clean also holes and chambers of the hydraulic system. *
- Check threads of lock rings for erosion and corrosion.
- Check bowl gaskets. *
- Lubrication of hand-operated parts such as brake bolt, valves, etc. **
- Check starting time and rated speed. **
- Check neck bearing springs and spring pistons. **
- Check brake linings. **

Every 3 000 operating hours

- Check gearing of worm wheel gear. ***
- Check spaces between solids ejection holes.
- Clean discharge holes in operating-water feeding system.

Every 5 000 operating hours

- Replace ball bearings on spindle.
- Replace neck bearing springs.

Every 10 000 operating hours

- Replace ball bearings on worm wheel shaft.
- Change oil in fluid clutch.

Whenever dismantling

- Grease bowl lock ring and guide and sliding surfaces of bowl parts.

According to manufacturer's instructions

- Grease motor ball bearings.

* every 3 months - at the latest

*** every year

** every 6 months - at the latest

13 List of parts**Important hints for ordering parts**

To ensure correct delivery when ordering parts, please state the following:

Model of the separator	see name-plate e. g. CNE 300-01-076
Serial-No.	see name-plate e. g. 1692-278
Description	see List of Parts e. g. Separating disc
Part-No.	see List of Parts e. g. 1201-6650-000
Bowl Serial-No.	see bowl lock ring and bowl bottom (only required when ordering bowl parts).

Part-Numbers ending with letter "L" (e. g. 5649-4246-L) designate parts which are available in different designs for the separator concerned.

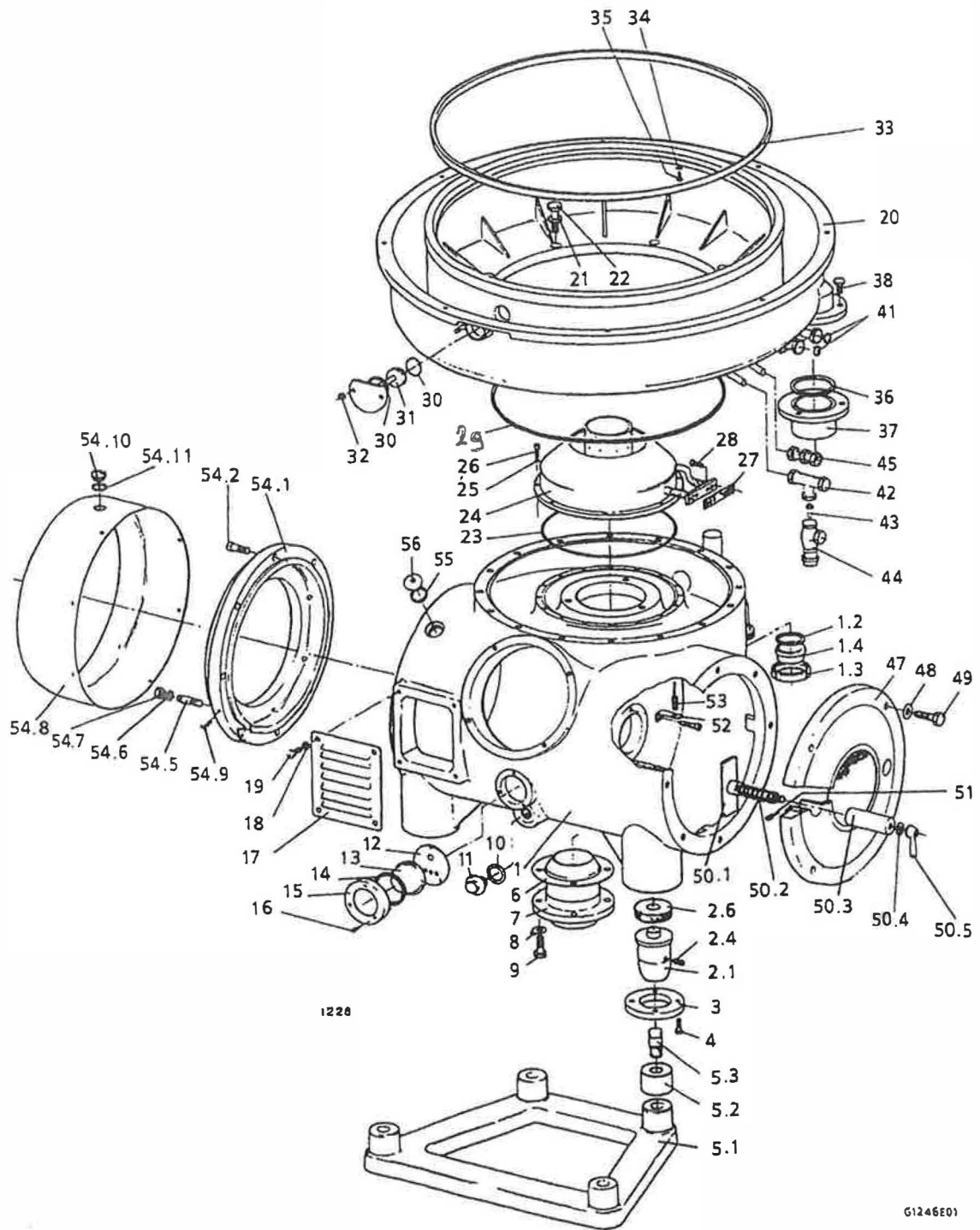


Fig. 1: Frame

Pos.	Part-No.	Qty.	Part description	Dimensions
-	1246-1100-010	1	Frame, complete	
1	1166-1006-030	1	Lower section of frame	
-	1165-1122-010	1	Discharge pipe, complete	
1.2	0007-2211-750	1	Gasket DIN 11851	G 50
1.3	0013-2845-300	1	Grooved coupling nut DIN 11851	F 50
1.4	0018-3955-300	1	Cone connection DIN 11851	D 50
2	2315-1015-010	4	Foot, complete	
2.1	2315-1011-000	4	Foot, stainless steel coated	
2.4	0019-6387-400	4	Threaded pin DIN 915	AM 12x28
2.6	0021-3018-750	4	Rubber cushion	30x92x20
3	0001-0516-300	4	Flange	80
4	0019-6937-400	12	Hex head screw ISO 4017	M 10x30
5	3170-1020-010	1	Foundation frame, complete	
5.1	3170-1003-010	1	Foundation frame	
5.2	0026-2031-300	4	Cap	75x50
5.3	3157-1033-000	4	Bolt	
6	0004-5793-770	1	Gasket	130x204x0.3
7	3050-1112-020	1	Bottom bearing housing	
8	0026-5894-600	4	Tab washer DIN 93	17
9	0019-7038-150	4	Hex head screw ISO 4017	M 16x45
10	0004-5294-780	1	Gasket	27x48
11	0019-0840-400	1	Screw plug	R 3/4
12	0004-5406-750	1	Gasket	110x3
13	0001-0027-830	1	Sight glass	80-70
14	0004-5056-780	1	Gasket	70x80x1.5
15	0001-0022-400	1	Sight glass housing	72
16	0019-6845-400	3	Hex head screw ISO 4017	M 6x25
17	3050-1085-010	1	Ventilation grid	
18	0026-1371-400	4	Washer DIN 125	13
19	0019-6966-400	4	Hex head screw DIN 933	M 12x20
20	1246-1018-010	1	Solids collector	
21	0004-2290-400	8	Gasket	16.7x24x1.5
22	0019-6200-400	8	Allen screw DIN 912	M 16x35
23	0007-2571-750	1	Gasket	297/4
24	1355-1297-000	1	Operating-water feeding device	
25	0026-1325-300	8	Lock washer DIN 127	B 8
26	0019-6124-400	8	Allen screw DIN 912	M 8x2
27	1233-1277-000	1	Gasket	
28	0019-6142-400	4	Allen screw DIN 912	M 10x20
30	0007-2597-750	2	Gasket	50x4
31	1246-1183-000	1	Plug	
32	0013-0278-300	2	Hexagon nut DIN 934	M 8

29

0007-2954-750

1

Gasket

590 x 4

Pos.	Part-No.	Qty.	Part description	Dimensions
33	0007-3386-840	1	Gasket	804x826x18
34	0026-1323-300	16	Lock washer DIN 127	B 5
35	0019-6097-300	16	Allen screw DIN 91212	M 5x35
36	0007-2113-750	1	Gasket	94x104x6
37	1226-1045-000	1	Pipe connection	
38	0019-6968-300	3	Hex head screw ISO 4017	M 12x25
41	0007-2208-750	2	Gasket DIN 11851	G 25
42	0018-3246-400	1	T-type union DIN 2353	QL 10
43	1355-1448-000	1	Pipe	
44	0018-1365-690	1	Pressure relief valve	DN 1/2in - 0.5 bar
45	0018-4482-400	1	Straight union DIN 2353	EL 10
47	3170-1065-010	1	Ventilating plate	
48	0026-1335-400	4	Washer DIN 125	17
49	0019-6608-400	4	Hex head screw ISO 4014	M 16x60
50	3170-1043-000	2	Brake, complete	
50.1	3170-1031-000	2	Brake bolt	
-	0021-4096-850	2	Brake lining	50x150x6
-	0026-1263-550	8	Rivet DIN 661	4x16
-	0026-1086-400	2	Cylindrical pin DIN 7	6H8x14
50.2	0006-4208-160	2	Cylindrical pressure spring	29x3.5x83
50.3	0021-3537-300	2	Brake housing	32x42x123
50.4	0004-1914-720	2	Gasket	17.5x25.5x2
50.5	0021-3514-300	2	Handle	M 16
51	0019-9063-150	2	Threaded pin DIN 916	AM 8x10
52	1168-1192-000	1	Angle	
53	0005-0964-000	1	Proximity switch NJ 2-11-SN-G	
54	1166-1021-000	1	Intermediate flange, compl.	
54.1	1166-1028-000	1	Intermediate flange with lining	
54.2	0019-6202-150	8	Allen screw DIN 912	M 16x45
54.5	0019-7726-150	8	Stud DIN 939	M 16x40
54.6	0026-1330-190	8	Lock washer DIN 127	A 16
54.7	0013-0282-400	8	Hexagon nut DIN 934	M 16
54.8	1166-1475-060	1	Cover	
54.9	0019-6839-300	8	Hex head screw DIN 933	M 6x10
54.10	0005-0226-300	1	Screw plug	Pg 21
54.11	0007-2501-750	1	Gasket	23x3
55	0007-2229-750	1	Gasket	40/48x5
56	0019-1748-400	1	Screw plug	
-	0005-3534-900	1	Support KR 6	G5
-	0019-2233-400	1	Cheese head screw ISO 1207	M 5x12
-	0005-3538-900	1	Cable tape	180x5

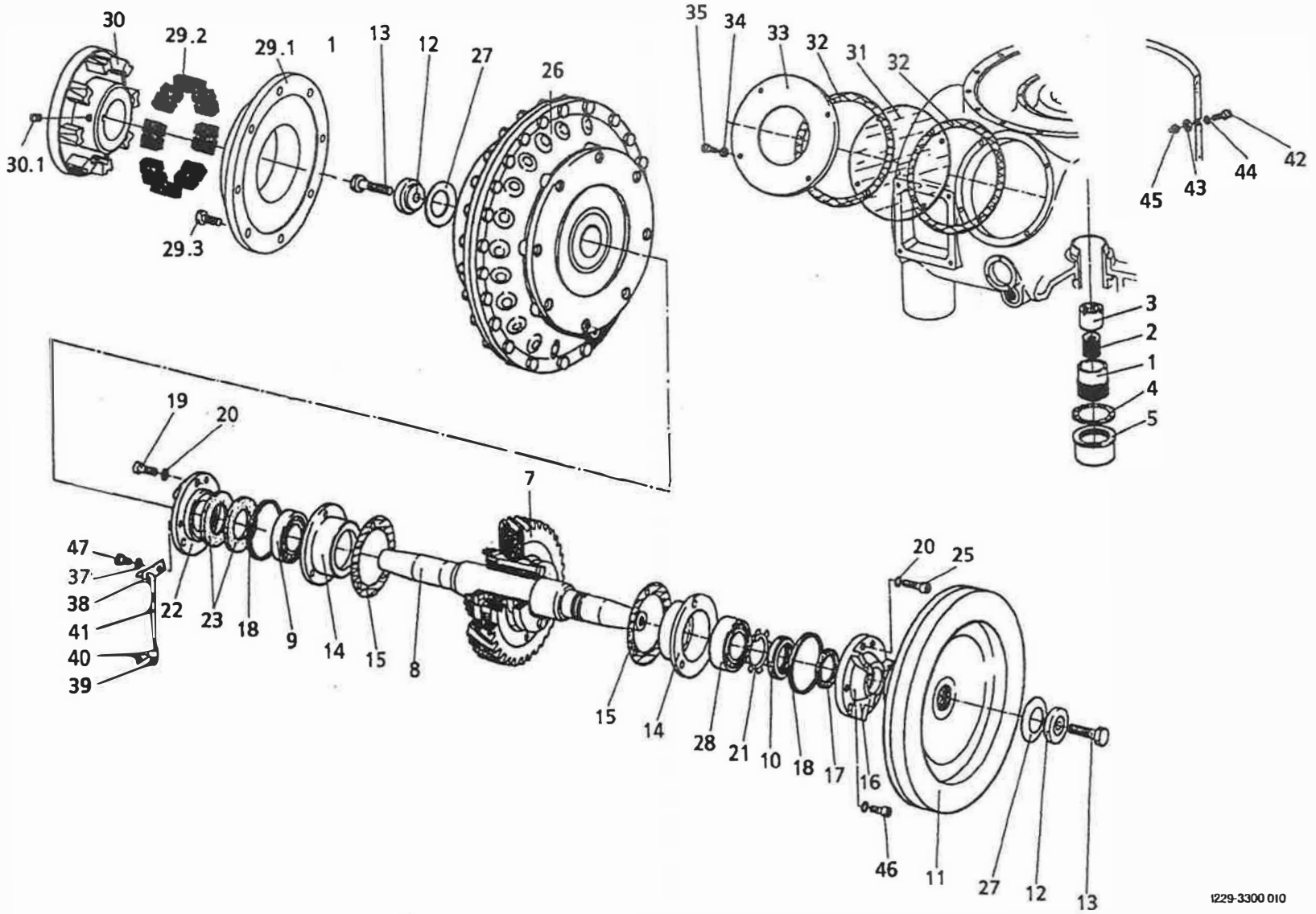


Fig. 3

1229-3300 010

Pos.	Part-Number	Quantity		Part Description	Dimensions
-	1229-3300-010	1		Gear, complete	
1	0010-8002-040	1		Bottom bearing threaded piece, compl.	80
2	0006-4440-160	1		Spring column, compl.	A 45x48
3	0010-8001-200	1		Bottom bearing pressure piece	80
4	0004-2221-780	1		Gasket	80x108x1.5
5	0010-8003-210	1		Bottom bearing cap	80
-	see page 121	1		Worm spindle, complete	
7	1166-3449-020	1	Ⓜ	Worm wheel assembly (50 Hz)	
8	2231-3400-020	1		Worm wheel shaft	
9	0011-6210-000	1		Angular contact ball bearing DIN 625	6210 J
10	0013-0448-090	1		Grooved nut	M 50x1.5
11	1229-3368-000	1		Brake disk, complete	
12	0026-1834-030	2		Centering disc	14.5x55
13	0019-9371-150	2		Hex head screw DIN 960	M 14x1.5x60
14	1166-3131-000	2		Bearing housing	
15	0004-2559-780	2		Gasket	99x140x1
16	2231-3375-020	1		Bearing cover	
17	0004-5566-750	1		Gasket DIN 3760	A 45x65x8
18	0007-1996-750	2		Gasket	96x4
19	0019-6146-150	3		Allen screw DIN 912	M 10x35
20	0026-1337-300	6		Lock washer DIN 127	B 10
21	0026-0915-170	1		Tab washer DIN 5406	MB 10
22	2231-3375-010	1		Bearing cover	
23	0004-1957-830	2		Felt ring DIN 5419	50
25	0019-6149-300	1		Allen screw DIN 912	M 10x50
26	see page 125	1		Fluid clutch, complete	422 K-TSF
27	0006-4404-010	2		Cup spring	70x40.5x5
28	0011-3210-470	1		Grooved ball bearing DIN 628	3210
29	1166-3259-000	1		Set of clutch connecting parts	
29.1	1166-3283-010	1		- Claw flange	
29.2	1166-3393-000	1		- Set of coupling components	
29.3	0019-6970-150	8		- Hex head screw	M 12x30
30	1166-3389-L	1	Ⓜ	Cam hub, complete	
30.1	0019-8984-150	1		- Threaded pin DIN 914	M 10x25
31	0001-0925-870	1		Sight glass	322x8
32	0004-5762-700	2		Gasket	273x318x2
33	1166-1157-020	1		Ring	
34	0026-1371-400	4		Washer DIN 125	13
35	0019-6970-400	4		Hex head screw ISO 4017	M 12x30
-	see page 122	1		Neck bearing bridge assembly with covering	
37	0026-1369-030	2		Washer DIN 433	10.5
38	1166-3710-010	1		Nozzle, compl.	
39	0019-2507-400	1		Pan head screw ISO 1580	M 6x10
40	0018-1276-400	1		Pipe clip	5,5
41	0018-0585-848	1		Pipe	6x1
42	1166-3308-000	1		Threaded piece	
43	0013-1023-250	1		Lock nut EN 10242	P 4 – 3/8in
44	0007-2184-750	1		Gasket	15/22x3
45	0018-3725-600	1		Screwed hose connection	R 1/4in/4x6
46	0019-6147-150	2		Allen screw DIN 912	M 10x40
47	0019-6929-400	1		Hex head screw ISO 4017	M 10x10

Ⓜ Important: Worm or worm spindle and worm wheel assembly must always be replaced at the same time

Ⓜ When ordering this part, please state diameter of motor shaft end and width of key.

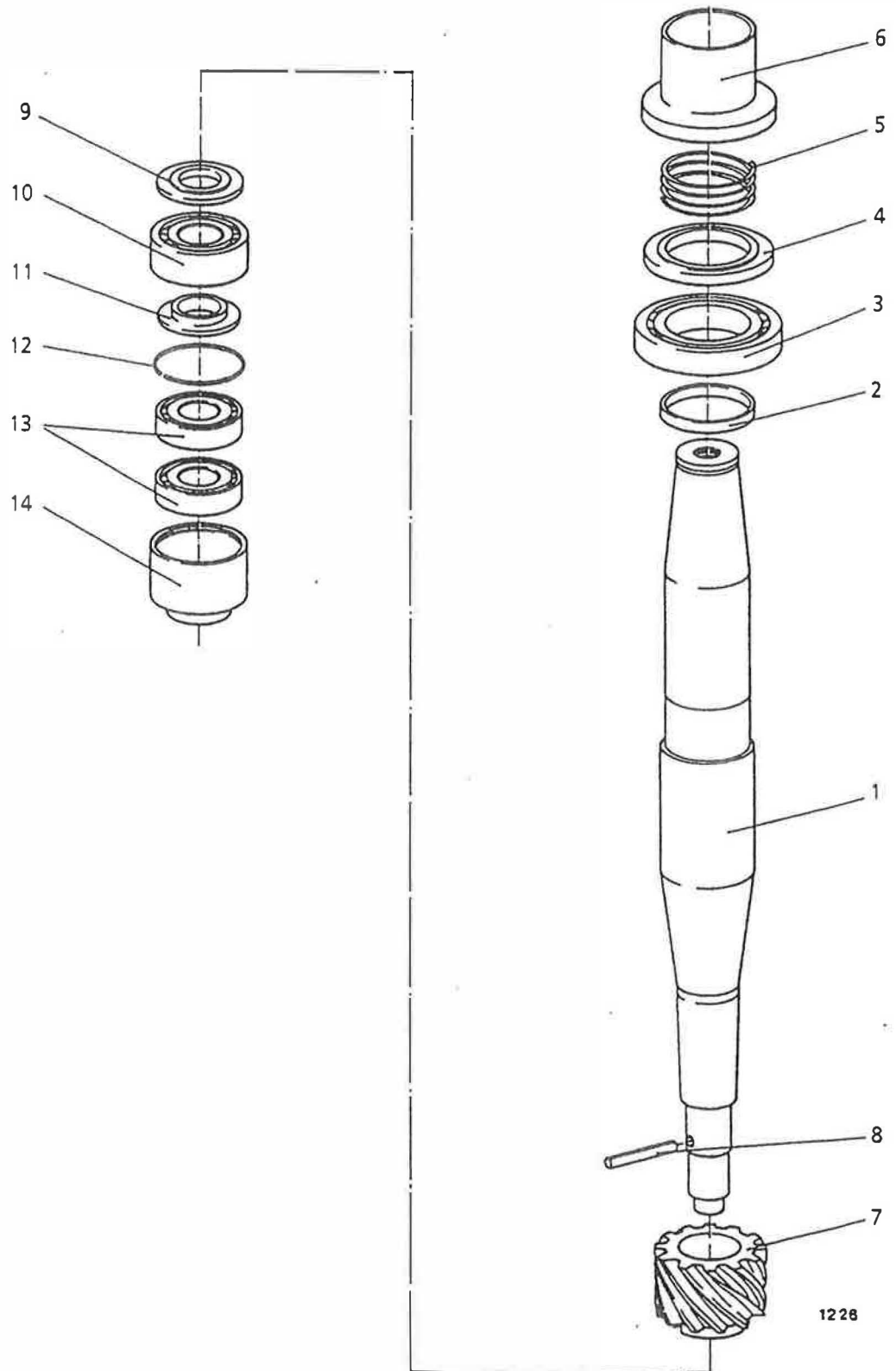
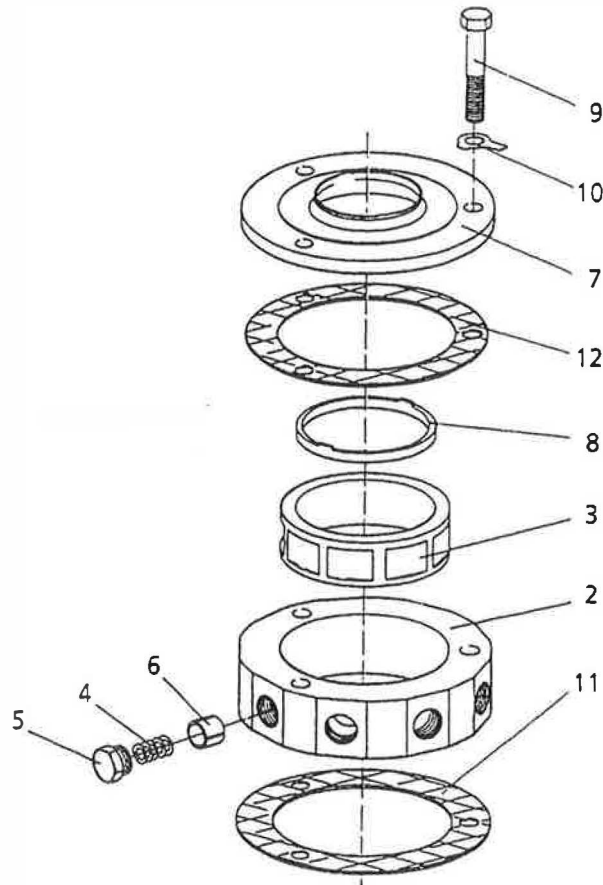


Fig. 4: Worm spindle

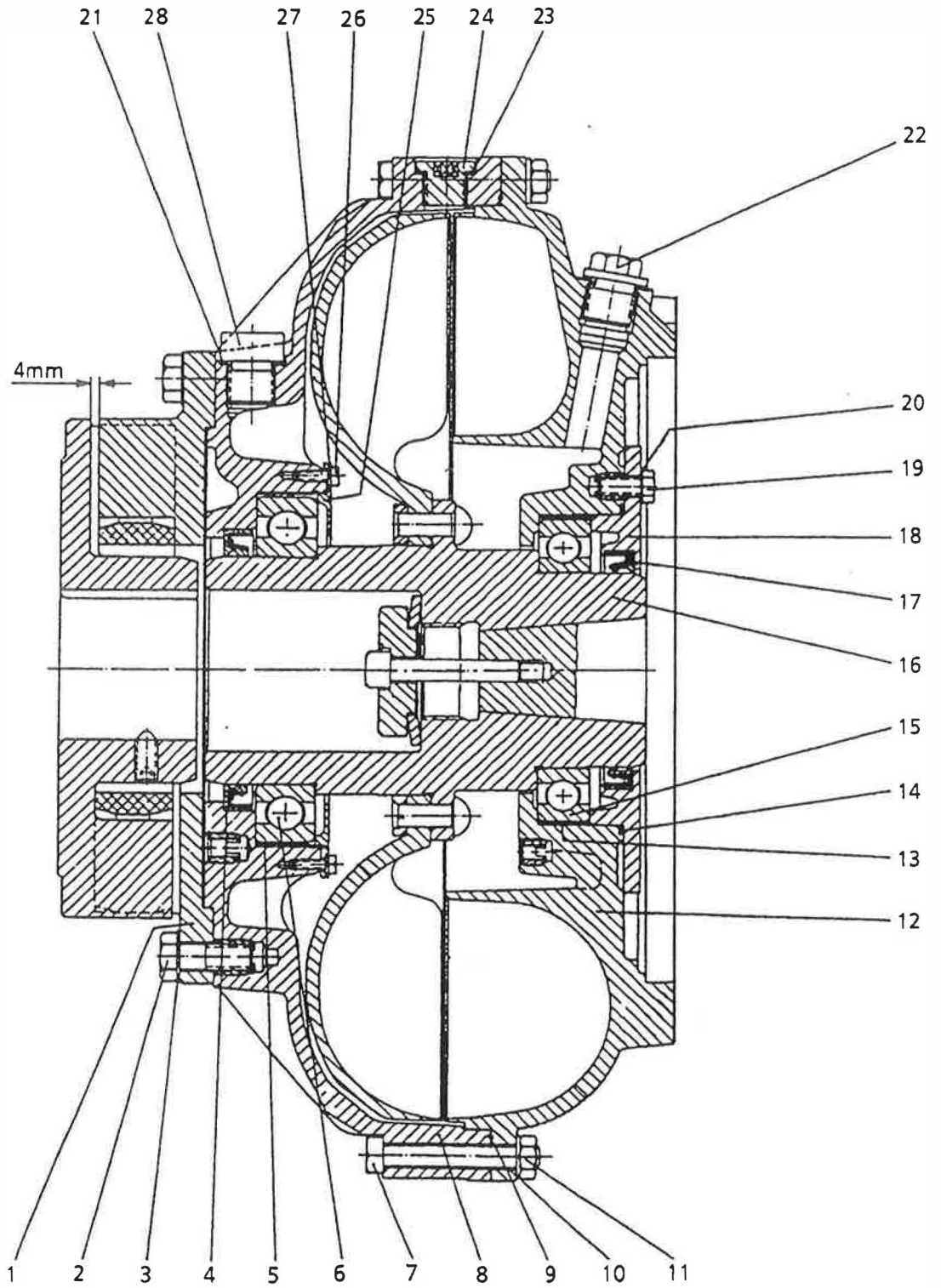
Pos.	Part-No.	Qty.	Part description	Dimensions
-	1226-3429-010	1	Worm spindle assembly (50 Hz)	
1	1226-3410-000	1	Spindle	
2	0008-7512-010	1	Ring 75	
3	0011-6215-110	1	Grooved ball bearing DIN 625	6215 P 6
4	0008-7508-000	1	Ball bearing protection ring 75	
5	0006-4311-160	1	Cylindrical pressure spring	86.5x5.5x28.5
6	0008-7501-730	1	Spindle cap 75	
7	1166-3423-000	1	Worm (50 Hz)	
8	0026-1563-120	1	Cylindrical notched pin ISO 8740	10x70
9	0008-4008-020	1	Ball bearing protection ring 40	
10	0011-2308-120	1	Pendulum ball bearing DIN 630	2308 MP6
11	0008-4008-030	1	Ball bearing protection ring 40	
12	0026-2109-170	1	Snap ring 78	
13	0011-7307-100	2	Angular contact ball bearing DIN 628	7307 BECBM - P6
14	0010-8012-020	1	Bottom bearing pressure housing 80	



1224E04

Fig. 5: Neck bearing bridge

Pos.	Part-No.	Qty.	Part description	Dimensions
-	0008-7500-010	1	Neck bearing bridge assembly with covering	
1	0008-7510-000	1	Neck bearing bridge assembly	
2	0008-7506-030	1	Neck bearing bridge	
3	0008-7507-050	1	Neck bearing pressure ring	
4	0006-4380-090	1	Set of neck bearing springs	
5	0019-1423-030	9	Threaded plug	
6	0026-2226-110	9	Spring piston	
7	0008-7502-050	1	Cover	
8	0008-7509-000	1	Distance ring	
9	0019-6616-150	3	Hex head screw DIN 931	M 16x100
10	0026-5897-600	3	Lock washer DIN 463	17
11	0004-5854-770	1	Gasket	205x250x0.3
12	0004-5851-770	1	Gasket	176x235x0.3



A1237E06

Fig. 6: Fluid clutch

Pos.	Part-No.	Qty.		Part description	Dimensions
-	1166-3280-190	1		Fluid clutch, complete	
-	1166-9904-170	1		Set of spare parts	
1	-	1	*	Cam flange	
2	0019-6971-150	8		Hex head screw DIN 933	M 12x35 8.8
-	0019-1141-300	8		Threaded insert	M 12x18
3	0026-0772-170	8		Spring washer DIN 137	B 12
4	0004-2913-830	1		Sealing ring	105x130 BAFS
5	0026-0182-170	1		Spacer ring ANS	160/163x26
6	0011-6021-400	1		Grooved ball bearing DIN 625	6021 M/C4
7	0019-6518-150	36		Hex head screw DIN 931	M 10x70 8.8
8	-	1	*	Clutch casing	ø470
9	0004-2385-858	1		Packing cord	ø1x1400 mm
10	0026-0771-170	36		Spring washer DIN 137	B 10
11	0013-0279-150	36		Hexagon nut DIN 934	M 10 - 8
12	-	1	*	Primary wheel	ø470
13	0026-0180-170	1		Spacer ring AN	140/143x24
14	0007-2944-830	1		Gasket	140/3
15	0011-6018-400	1		Grooved ball bearing DIN 625	6018 M/C4
16	-	1	*	Secondary hub with secondary wheel	ø 425
17	0004-2912-830	1		Sealing ring	90x110
18	-	1	**	Sealing ring cover	
19	0019-6903-150	8		Hex head screw DIN 933	M 8x20 8.8
-	0019-1139-300	8		Threaded insert	M 8x12
20	0026-0770-190	8		Spring washer DIN 137	B 8
21	0007-1741-280	1		Gasket DIN 7603	A 22x29
22	1166-1161-000	1		Hex head collar screw	M 24x1.5x16
-	0019-1142-300	2		Threaded insert	M 24x1.5x18
23	0007-1740-280	4		Gasket DIN 7603	A 18x24
24	0019-1490-000	2		Threaded plug	M 18x1.5x15
-	0019-1137-300	2		Threaded insert	M 18x1.5x18
25	3158-3287-010	1		Oil retaining ring	ø119/192x4.5
26	0019-2234-030	8		Cheese head screw DIN 84	AM 5x16 4.6
27	0026-0750-170	8		Lock washer DIN 7980	5
28	0019-1551-090	1		Oil fill plug	
-	0019-0861-000	2		Threaded plug	M 18x1.5x15

* When this part needs replacement, the complete clutch must be returned to the factory for repair. Instead of the part-number, state the number in figure (first column).

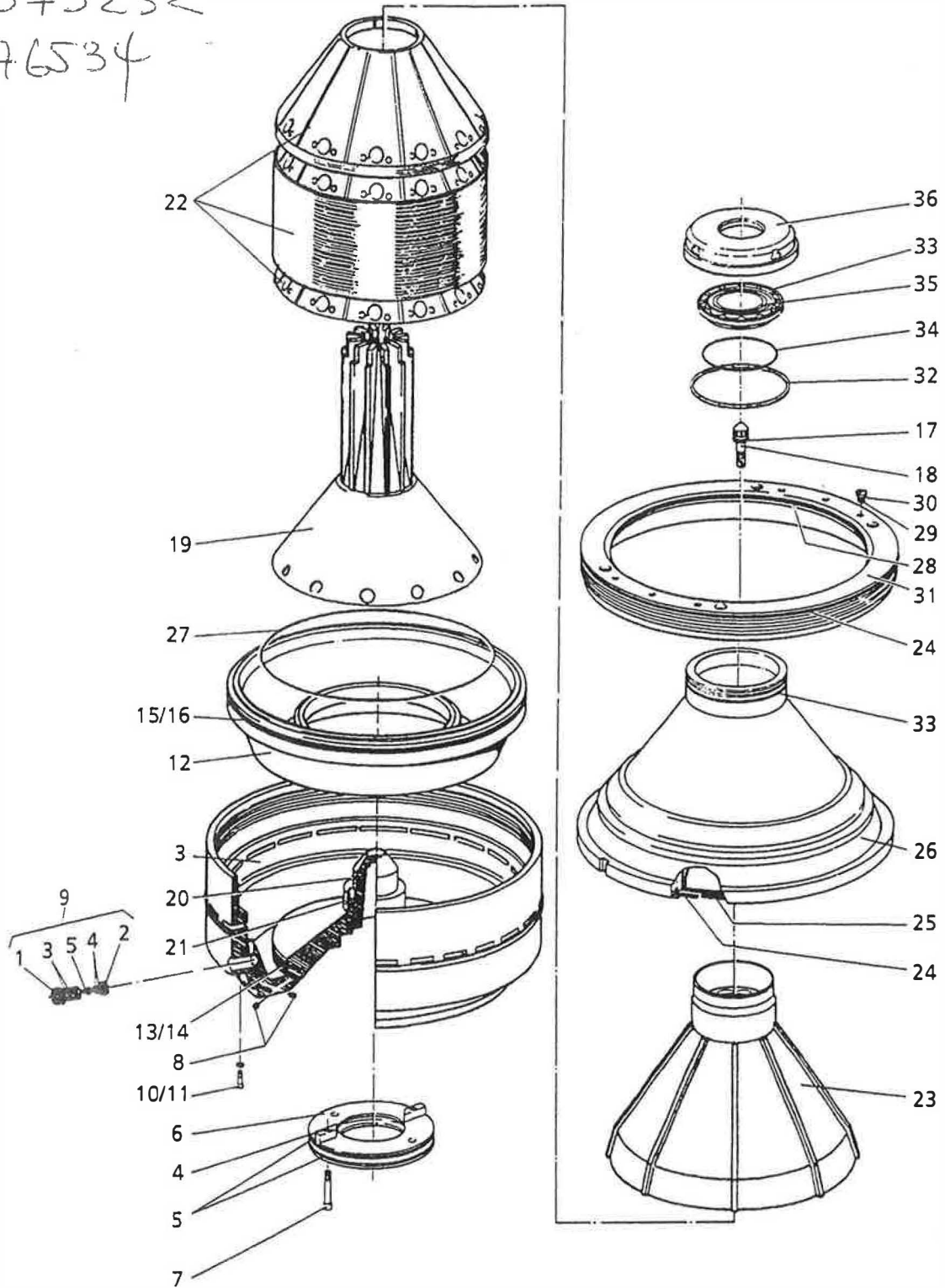
** Instead of the part-number, state the number in figure (first column).

Pos.	Part-No.	Qty.		Part description	Dimensions
-	1246-6600-010	1		Bowl, complete	
3	1357-6604-010	1	*	Bowl bottom, complete	
4	0007-3155-750	4		Gasket	11x4
5	0007-2707-750	2		Gasket	225x3
6	1357-6597-020	1		Ring	
7	0019-6148-300	4		Allen screw DIN 912	M 10x45
8	0019-6324-400	4		Threaded pin DIN 913	M 10x10
9	3159-6280-040	2		Valve, compl.	
9.1	3159-6281-000	2		Valve housing	
9.2	3159-6276-010	2		Valve piston	
9.3	0007-2923-760	4		Gasket	9.3x2.4
9.4	0007-2920-760	8		Gasket	23.3x2.4
9.5	0004-2341-940	2		Gasket	6x9.9x10.5
10	0004-2288-400	2		Gasket	U7.3x10.2x1
11	0019-6105-400	2		Allen screw DIN 912	M 6x12
12	1246-6501-000	1	*	Sliding piston	
13	0007-3273-850	1		Gasket	335x339x6.7
14	0007-3271-750	1		Gasket	320x6
15	0007-3266-750	1		Gasket	650x10
16	0007-3274-850	1		Gasket	688x696x11.8
17	0007-2077-600	1		Gasket	30x5
18	0019-0947-400	1		Spindle screw	M 22x1.5-LH
19	1246-6620-010	1	*	Distributor, complete	
20	0007-2066-750	1		Gasket	124x6
21	0007-2023-600	1		Gasket	172x6
22	1357-6660-010	1		Disc stack, compl.	
-	1357-6662-010	1		Bottom disc	
-	1357-6663-020	222		Disc	
-	1357-6663-030	10		Disc	
23	1246-6650-010	1	*	Separating disc	
24	0007-1756-760	1		Gasket	665x5
25	0007-1789-840	1		Gasket	639.5x16.5
26	1246-6611-000	1	*	Bowl top	
27	0007-2713-760	1		Gasket	448x458x5
28	0004-2364-608			Packing cord	
29	0007-2507-600	4		Gasket	16x3.5
30	1357-6161-000	4		Screw	M 16
31	1357-6631-000	1	*	Lock ring	S 755x14-LH
32	0007-1802-750	1		Gasket	195x3.5
33	0007-2029-750	2		Gasket	189.3x5.7
34	0007-2825-750	1		Gasket	165x4
35	1246-6726-000	1		Regulating ring	
36	1246-6632-000	1	*	Lid	

* This part can only be replaced by one of our factory engineers or by a special repair shop authorized by us because of special re-fitting to machine and possible re-balancing of bowl.

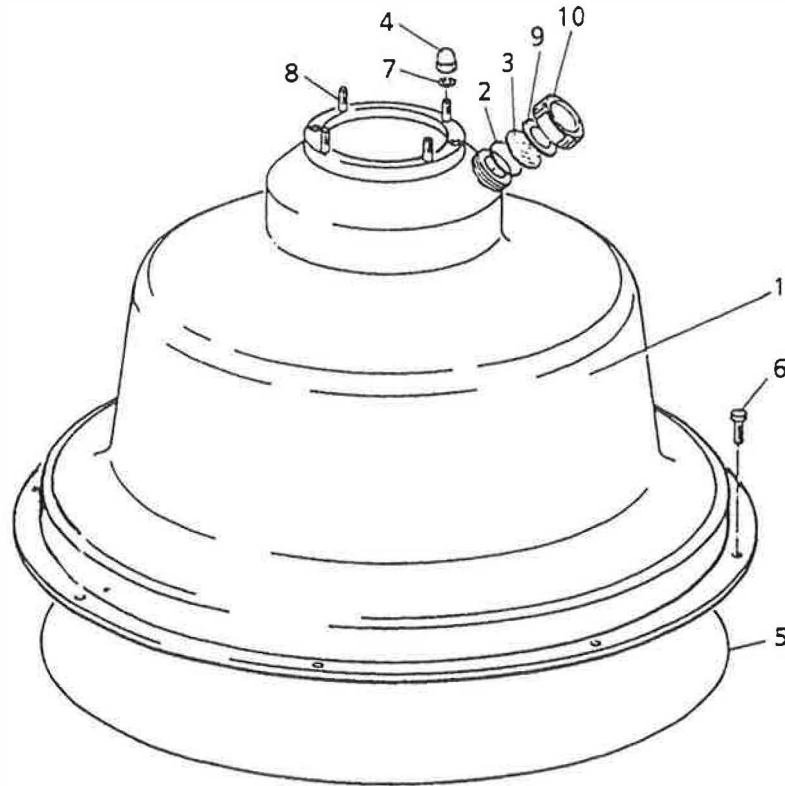
** This part is included in the previous complete part, but it is also available as separate item.

WS. 01203 576534
RS 666494 1 313366
MG 373232
576534



T1246E03

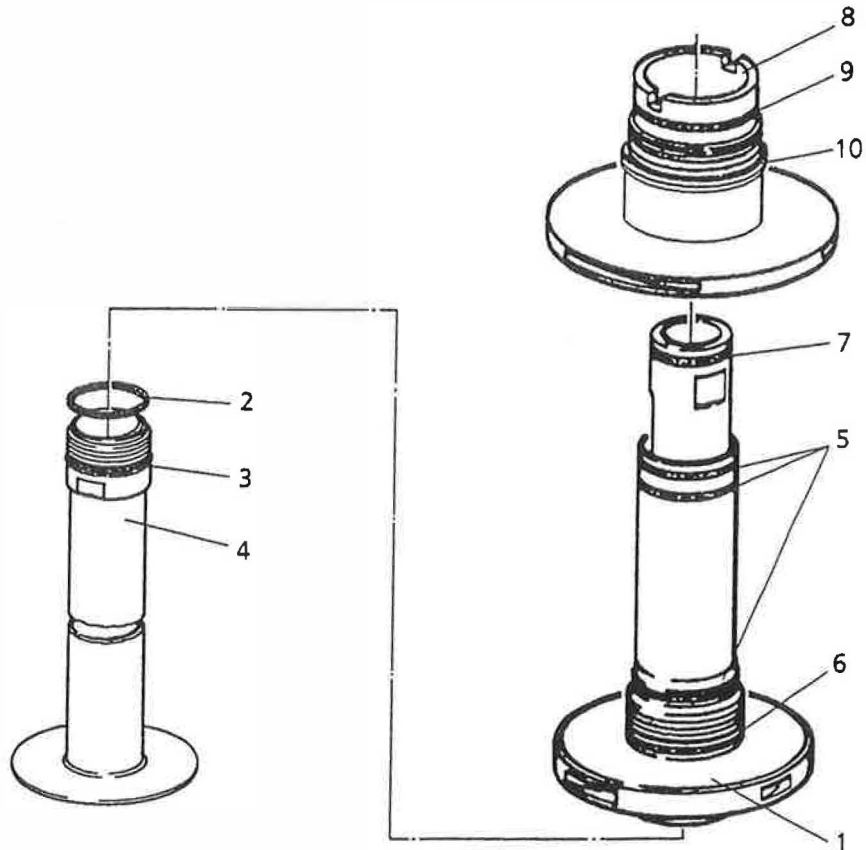
Fig. 7: Bowl



H1224E01

Fig. 9: Hood

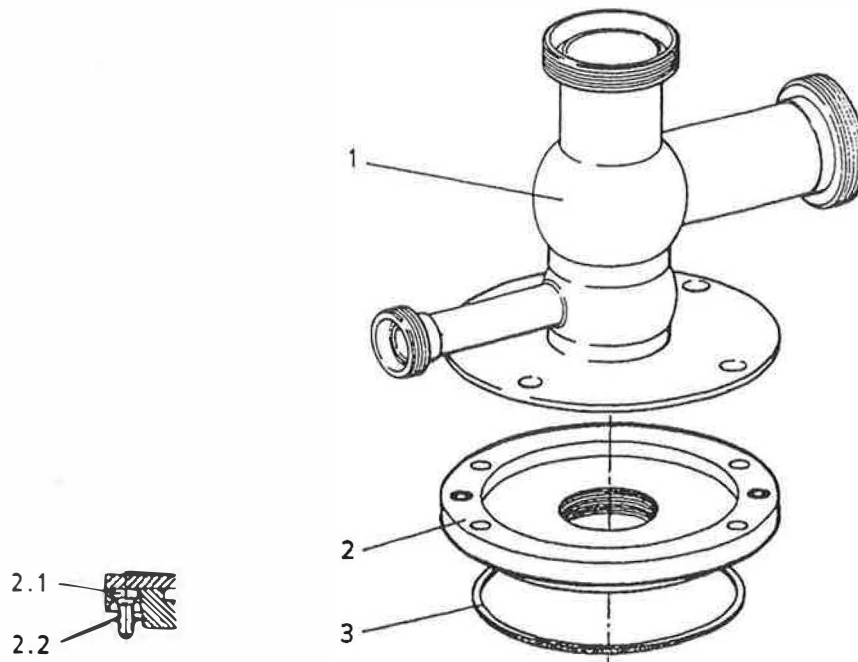
Pos.	Part-No.	Qty.	Part description	Dimensions
-	1226-7759-030	1	Hood, complete	
1	1226-7765-030	1	Hood	
2	0007-1905-750	1	Gasket	45x4
3	0001-0963-820	1	Inspection cover	55x10
4	0013-0406-400	4	Hexagon nut DIN 1587	M 12
5	0004-2364-758	1	Packing cord	8x8x3300
6	0019-6971-400	8	Hex head screw ISO 4017	M 12x35
7	0026-0165-400	4	Washer DIN 433	13
8	0019-7668-400	4	Stud DIN 939	M 12x35
9	0004-1796-760	1	Gasket	45x60x2
10	0013-0034-300	1	Grooved coupling nut	40



T1246E02

Fig. 8: Centripetal pump

Pos.	Part-No.	Qty.	Part description	Dimensions
-	1246-2213-020	1	Double centripetal pump, compl.	
1	1246-2241-020	1	Lower centripetal pump	
2	0007-2666-750	1	Gasket	42x52x5
3	0007-2730-750	1	Gasket	46.2x3
4	1357-2246-000	1	Feed tube	
5	0007-2592-750	3	Gasket	53x3.5
6	0007-2052-750	1	Gasket	60x3.5
7	0007-1780-750	1	Gasket	38x4
8	1246-2252-000	1	Upper centripetal pump	
9	0007-1800-750	1	Gasket	68x4
10	0007-2601-750	1	Gasket	80x4.5

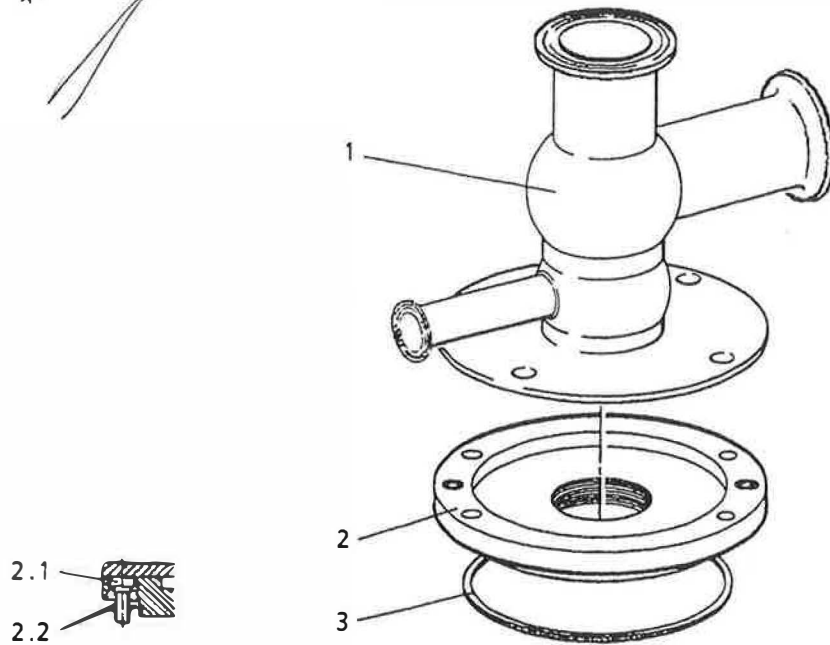


H1246E01

Fig. 10: Feed and discharge connection (standard design)

Pos.	Part-No.	Qty.	Part description	Dimensions
-	1246-2296-010	1	Feed and discharge connection, complete Standard design	
1	1246-2301-000	1	Connection housing	
2	1357-2217-000	1	Ring, complete	
2.2	0019-8372-400	2	Allen screw DIN 6912	M 10x20
2.3	0026-1044-400	2	Cylindrical pin DIN 7	3h8x16
3	0007-2023-750	1	Gasket	172x6
			<u>Pipe connection parts</u>	
-	0018-4261-300	2	Cone connection piece DIN 11851	D 65
-	0013-2846-300	2	Grooved coupling nut DIN 11851	F 65

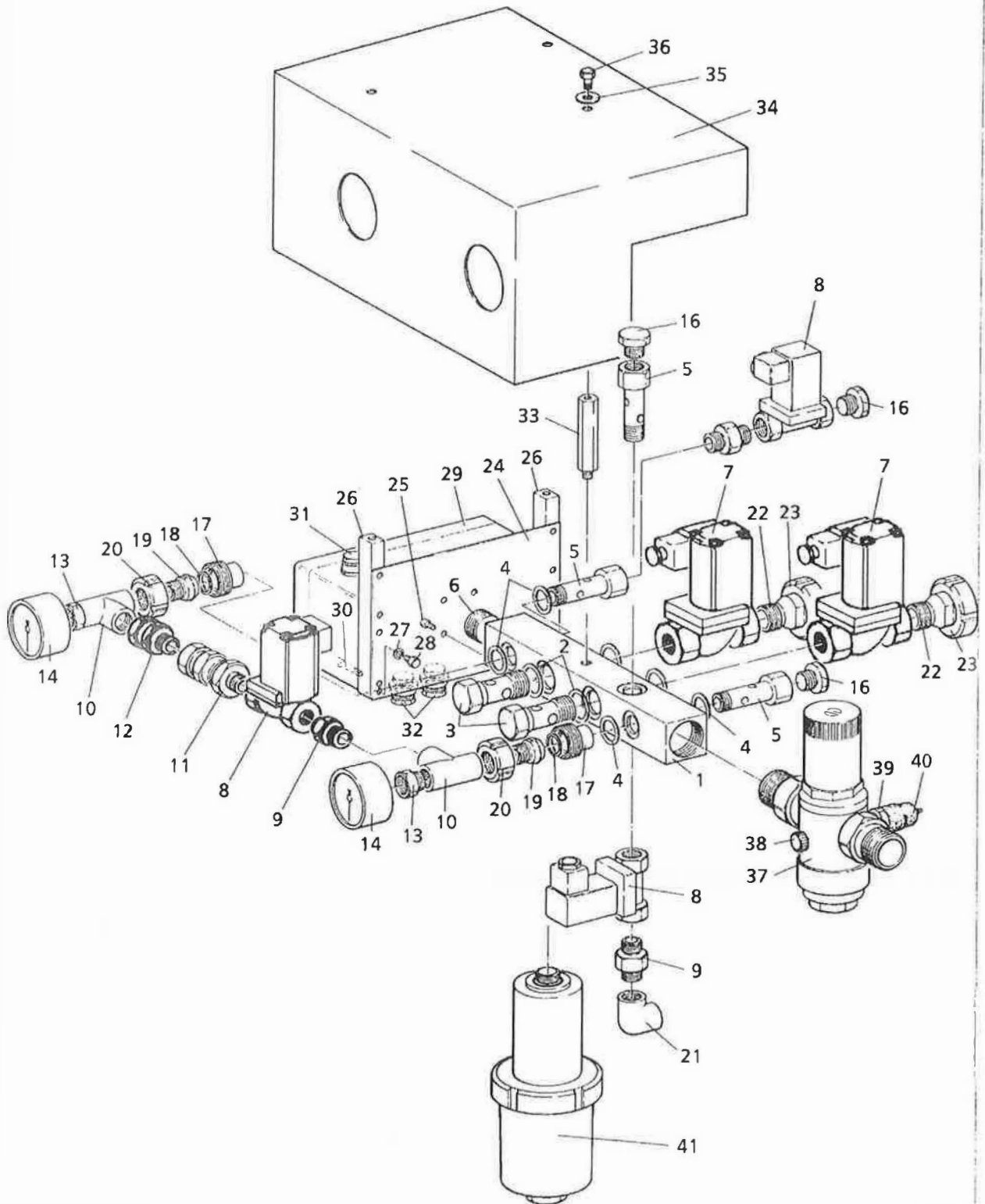
NOT USED
AT RUISLIP. *CKH*



H1246E02

Fig. 11: Feed and discharge connection (centrico design)

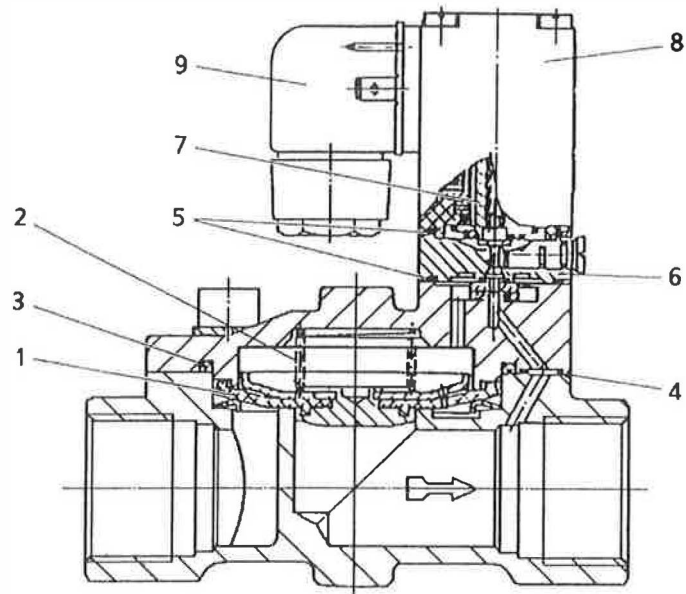
Pos.	Part-No.	Qty.	Part description	Dimensions
-	1246-2296-020	1	Feed and discharge connection, complete	
			Centrico design	
1	1246-2301-010	1	Connection housing	
2	1357-2217-000	1	Ring, complete	
2.2	0019-8372-400	2	Allen screw DIN 6912	M 10x20
2.3	0026-1044-400	2	Cylindrical pin DIN 7	3h8x16
3	0007-2023-750	1	Gasket	172x6
			Pipe connection parts	
-	0018-2218-300	4	Connection piece ISO 2852	2.5in Tri-Clamp
-	0007-2898-700	2	Gasket ISO 2852	B 2.5in
-	0018-1901-300	2	Clamping ring	2 1/2in Tri-Clamp
-	0007-3429-600	1	Gasket ISO 2852	B 25mm
-	0018-1898-300	1	Clamping ring	1 1/2in Tri-Clamp



S1244E01

Fig. 1 B2

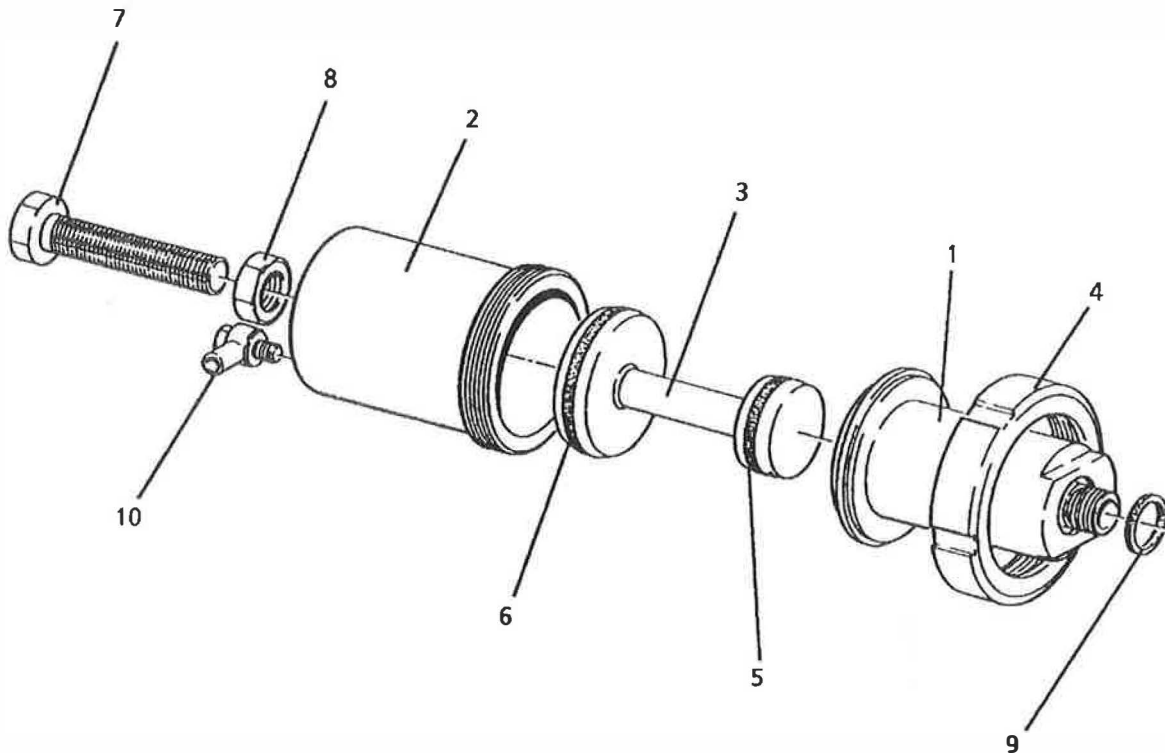
Pos.	Bestellnummer	Menge	Bezeichnung	Maße
–	8134-2110-400	1	Steuerwasseranschluß vollst.	
1	8134-2319-100	1	Verteiler	
2	0004-5982-300	4	Usitring	U28,7x35x2
3	8134-2161-040	2	Schraube	
4	0004-2891-300	6	Usitring	U22,7xx30x2
5	8134-2161-050	3	Schraube	R1/2in
6	0019-0653-400	1	Gewindestopfen	R1inx20
7.1	0018-5870-610	1	Magnetventil vollst. (für Schließwasser)	3/4in
7.2	0018-5870-610	1	Magnetventil vollst. (für Öffnungswasser)	3/4in
8.1	0018-5947-610	1	Magnetventil vollst. (für Füllwasser)	1/2in
8.2	0018-5947-610	1	Magnetventil vollst. (für Haubenspülwasser)	1/2in
8.3	0018-5947-610	1	Magnetventil vollst. (für Kühlwasser)	1/2in
9	0018-0965-400	3	Doppelnippel	R1/2in
10	0018-0116-400	2	T-Stück DIN 2987	1/2in
11	0018-5936-400	1	Rückschlagventil	
12	0018-4819-600	1	Einschraubstutzen	
13	0018-5168-400	2	Reduzierstutzen	
14	0001-0299-610	1	Druckmeßgerät DIN 16063	0-6 bar
15	0001-1196-400	1	Druckmeßgerät DIN 16063	0-16 bar
16	0019-0559-300	2	Gewindestopfen	R1/2in x15
17	0018-5937-400	2	Aufschraubgewindestutzen	15-R1/2in
18	0007-2521-750	2	Dichtring DIN 11851	G 15
19	0018-4573-400	2	Einschraub-Kegelstutzen	15-R1/2in
20	0013-2842-300	2	Nutüberwurfmutter DIN 11851	F 15
21	0018-0004-300	1	Winkel DIN 2987	1/2in
22	0018-5286-400	2	Einschraub-Kegelstutzen	25-R3/4in
23	0013-2842-300	2	Nutüberwurfmutter DIN 11851	F 25
24	8134-2208-150	1	Platte	
25	0019-6840-400	4	Sechskantschraube ISO 4017	M 6x12
26	8134-2059-040	2	Distanzstück	
27	0026-1382-300	6	Scheibe DIN 125	
28	0019-6841-300	6	Sechskantschraube ISO 4017	M 6x16
29	0005-3492-280	1	Klemmenkasten	
30	0019-6111-400	4	Zylinderschraube DIN 912	M 6x30
31	0005-0203-630	15	Verschraubung	C4PG11
32	0005-0206-630	3	Verschraubung	C4PG21
33	8134-2059-030	1	Distanzstück	
34	8134-2355-090	1	Schutzkasten	
35	0026-0439-300	3	Scheibe	8,4x25x2
36	0019-6900-300	3	Sechskantschraube ISO 4017	M 8x12
37	0018-1742-650	1	Wasserdruckminderer	
38	0019-1492-400	1	Gewindestopfen	R1/4
39	0005-0672-900	1	Druckwächter	1-10 bar
40	0005-3595-700	1	Schutzkappe	
41	siehe Seite 145	1	Dosierzylinder vollst.	



S1244E02

Fig 183

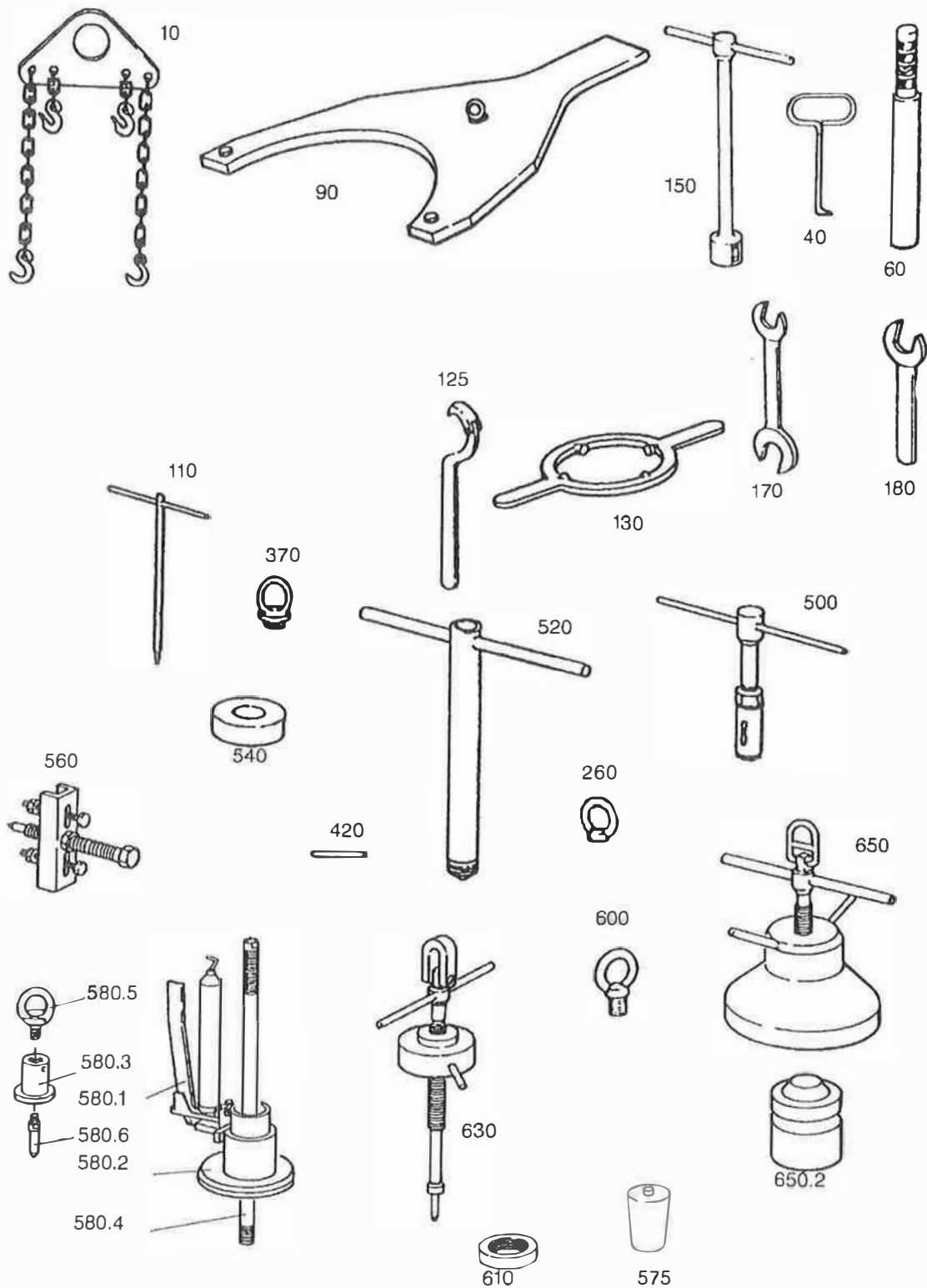
Pos.	Bestellnummer		Menge	Bezeichnung	Maße
—	0018-5870-610	0018-5947-610	1	Magnetventil vollst.	24 VDC
1	0018-5870-820	0018-5947-820	1	Membrane	
2	0018-5870-000	0018-5947-010	1	Druckfeder	
3	0007-2927-820	-	1	Dichtring	
4	0007-2987-820	0007-1754-820	1	Dichtring	
5	0007-1753-820	0007-1753-820	1	Dichtring	24x1,5
6	0018-5947-030	0018-5947-030	1	Gehäuse (für Handbetätigung)	
7	0018-3695-000	0018-3695-000	1	Magnetkern	
8	0018-5947-060	0018-5947-060	1	Magnetkopf	24 VDC
9	0018-5118-010	0018-5118-010	1	Gerätesteckdose	



2263E10

Fig 184

Pos.	Bestellnummer	Menge	Bezeichnung	Maße
-	8134-2202-030	1	Dosiergerät vollst.	
1	8134-2311-130	1	Gehäuse	
2	8134-2311-140	1	Gehäuse	
3	8134-2279-020	1	Kolben	
4	0013-2846-300	1	Nutüberwurfmutter DIN 11851	F65
5	0007-3202-750	1	Dichtring	43,8x54,46x5,3
6	0007-3203-750	1	Dichtring	69,2x79,86x5,33
7	0019-9435-400	1	Sechskantschraube ISO 8676	M20x1,5x100
8	0013-0319-400	1	Sechskantmutter DIN 936	M 20x1,5
9	0007-1941-750	1	Dichtring	25x2,5
10	0018-3732-280	1	Winkelschlauchverschraubung	G1/4in – 6x8,3

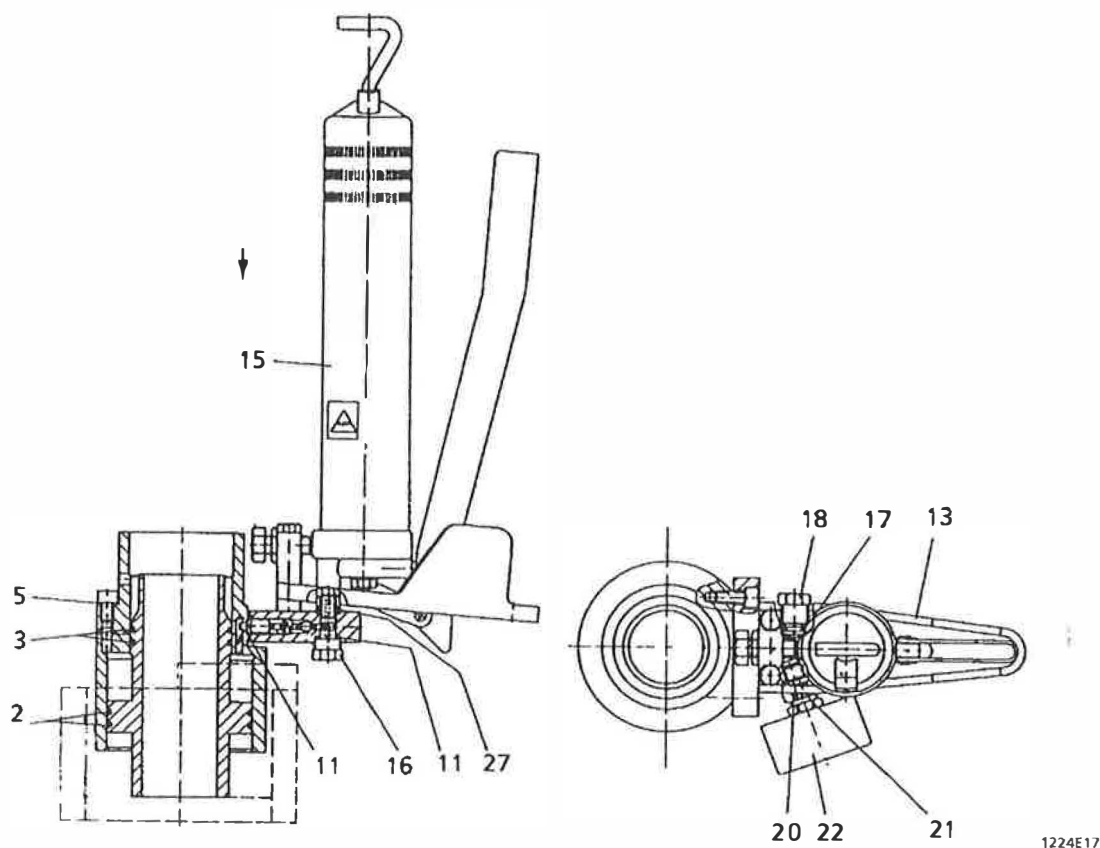


1246 9900 010

Fig.186

Pos.	Bestellnummer	Menge	Bezeichnung	Maße
-	1246-9900-010	1	Satz Werkzeuge	
10	0003-0065-030	1	Einsatzheber(Trommelverschlussring/ Haube)	350KG
40	0003-0156-000	1	Haken(Trommel)	180X27
60	0003-0200-000	1	Schlagbolzen (Einlaufrohr/Greifer)	42X420
90	0003-0343-000	1	Stiftschlüssel (Trommelverschlussring)	606,2X20
110	0003-3727-030	1	Schlüssel (Kolbenventil)	M4
125	0003-3846-000	1	Gelenkhakenschlüssel	90-155
130	0003-4002-000	1	Ringschlüssel (Greiferkammerverschlussring)	226
150	0003-4193-030	1	Steckschlüssel (Verschlusschraube)	24
170	0003-4222-320	1	Schlüssel DIN 3110	36X41
180	0003-4223-320	1	Einmaulschlüssel DIN 894	46
260	0013-0388-030	2	Ringmutter (Haube)	M12
370	0019-5384-050	2	Ringschraube DIN 580	M16
420	0026-1605-030	1	Zylinderstift	5H8X100
500	1165-9895-010	1	Steckschlüssel (Kolbenventil)	
520	1166-9910-010	1	Abziehvorrichtung (Kupplung/brems- scheibe)	
540	1168-9823-000	1	Einstellring (Fühler für Drehzahlüberwa- chung)	
560	1171-9910-000	1	Abziehvorrichtung (Nockennabe)	
575	1235-9860-010	1	Montagevorrichtung (Montagewerkzeug, Kolbenventil)	
580	1246-9820-000	1	Pressvorrichtung	
580.1	siehe Seite 151	1	- Hydraulik vollst.	
580.2	1246-9939-000	1	- Scheibe	
580.3	1235-9851-020	1	- Gewinding	
580.4	1235-9877-060	1	- Gewindebolzen	
580.5	0013-0392-030	1	- Ringmutter DIN 582	M20
580.6	1357-9935-000	1	- Druckstück	
600	1354-9982-000	1	Ringschraube	
610	1357-9851-000	1	Gewinding (Einlaufrohr)	
630	1357-9970-000	1	Aushebevorrichtung (Verteiler)	
650	3287-9960-000	1	Aushebevorrichtung (Kolbenschieber)	
650.2	3287-9935-000	1	- Druckstück	

Pos.	Bestellnummer	Menge	Bezeichnung	Maße
	1225-9901-000		Satz Zubehörteile	
30	0003-0277-800	1	Ölfangschale	2,7L
100	0015-0014-080	5	Schmieröl	CLP220-2,5LG
110	0015-0050-090	2	Schmieröl DIN 51515	L-TD32-5L
120	0015-0113-020	4	Schmierfett	KS88-50GG
130	0015-0121-000	1	Wälzlagerfett DIN 51825	K3K-0,85KG



1224E17

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Pos.	Bestellnummer	Menge	Bezeichnung	Maße
–	1235-9770-000	1	Hydraulik vollst.	
2	0007-2608-750	2	Dichtring	85x3,5
3	0007-2052-750	2	Dichtring	60x3,5
5	0004-1918-550	1	Dichtung	8x13x2
11	0004-2108-760	2	Dichtung	10,4x17x2
13	1231-9931-000	1	Halter	
15	0003-3017-000	1	Handhebelpresse vollst.	12638-125
16	1167-9916-020	1	Hohlschraube	R1/8IN
17	0007-2508-750	1	Dichtring	10,3x2,4
18	1167-9916-000	1	Gewindestopfen	
20	0004-5266-550	1	Dichtung	12,2x17x2
21	0007-2099-850	1	Dichtring	5x11x4
22	0001-0277-600	1	Druckmeßgerät DIN 16063	0-600bar
27	0004-2111-760	1	Dichtung	10,5x16x2,5

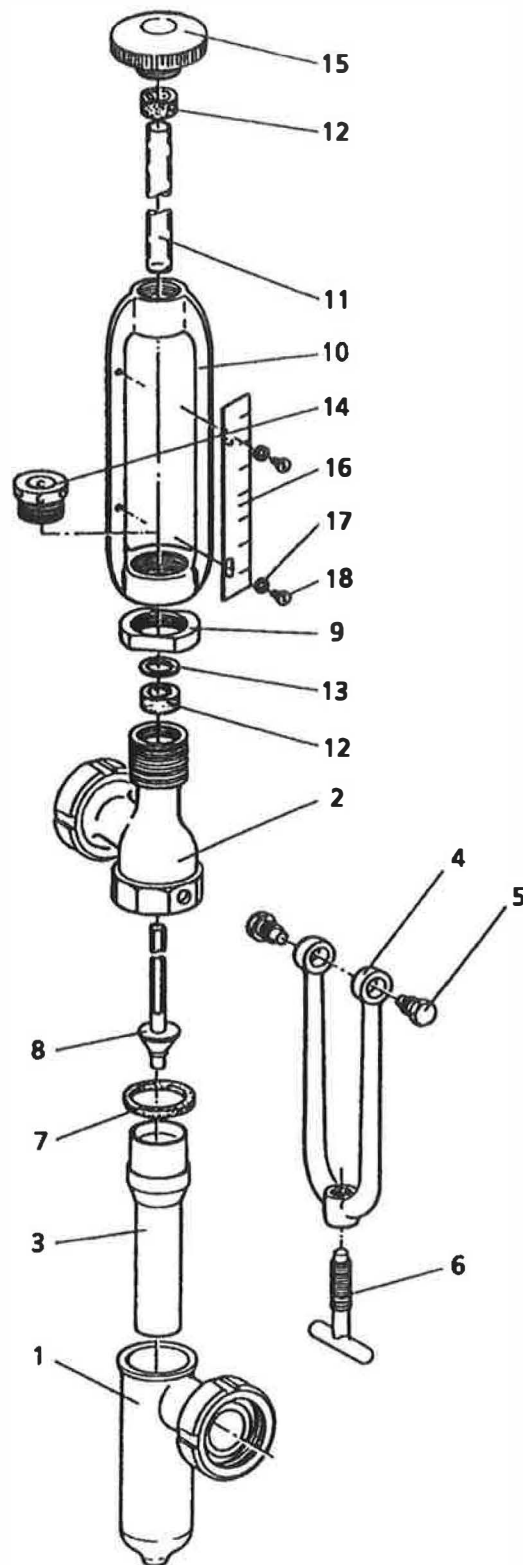


Fig.172

H1233E01

Pos.	Bestellnummer	Menge	Bezeichnung	Maße
-	8020-2045-010	1	Durchflußmesser vollst. (Milch) Meßbereich: 50 - 350 l/h	
1	8020-2001-110	1	Einlaufbecher	
2	8020-2003-070	1	Auslaufrohr	
3	8020-2006-010	1	Meßrohr	
4	8020-2004-000	1	Klemmbügel	
5	0019-0170-400	2	Sechskantschraube m. Zapfen	12x17,5
6	0019-0002-640	1	Knebelschraube	12x33,5
7	0007-2209-750	1	Dichtring DIN 11851	G 32
8	8020-2012-000	1	Gewichtskegel	
9	0013-3010-300	1	Zweiflächenmutter	M 35x1,5
10	8020-2002-000	1	Zwischenstück	
11	0001-0083-890	1	Schauzylinder	
12	0007-2298-750	2	Dichtring	13,5x22x10
13	0026-1375-300	1	Scheibe	
14	0019-1380-300	1	Gewindehülse	
15	0019-1732-400	1	Sternschraube	
16	8020-2017-000	1	Skala 50 bis 350 l/h	
17	0004-5261-720	2	Dichtung	4,8/9x1
18	0019-2478-300	2	Flachkopfschraube DIN 85	M 4x8

Constant-Pressure Valve with Diaphragm (air-controlled)

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(Open-Closed Valve)

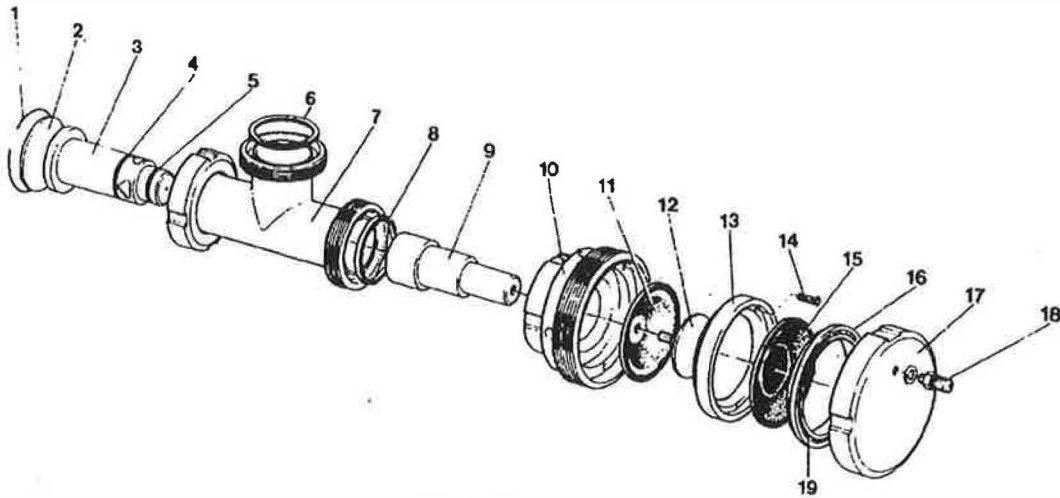


Fig. 7

No. in Fig.	Part - No. Valve sizes			Qty.	Part Description
	NW 40, 1 1/2"	NW 50, 2"	NW 65, 2 1/2"		
-	8268-2310-340	8267-2310-290	8266-2310-370	1	Constant-pressure valve assembly
1	0026-1485-170	0026-1489-170	0026-1490-170	1	Snap ring *
2	0004-2058-700	0004-2067-700	0004-2069-700	1	Gasket *
3	8268-2163-070	8267-2163-070	8266-2163-050	1	Throttling piece
4	0007-2285-750	0007-2301-750	0007-2289-750	1	Gasket
5	0007-2921-750	0007-2410-830	0007-2984-750	1	Gasket
6	0007-2210-750	0007-2211-750	0007-2212-750	1	Gasket
7	0018-1646-400	0018-1647-400	0018-1648-400	1	T-piece
8	0007-2210-750	0007-2211-750	0007-2212-750	1	Gasket
9	8268-2279-060	8267-2279-030	8266-2279-020	1	Slide
10	8268-2331-040	8267-2331-030	8266-2331-000	1	Housing
11	0004-2311-750	0004-2311-750	0004-2311-750	1	Diaphragm 90
12	8268-2247-010	8268-2247-010	8268-2247-010	1	Disc
13	8268-2257-020	8268-2257-020	8268-2257-020	1	Ring
14	0019-9389-400	0019-9389-400	0019-9389-400	6	Countersunk screw M5x12 DIN 7991
15	0004-2312-750	0004-2312-750	0004-2312-750	1	Diaphragm 105
16	8268-2257-030	8268-2257-030	8268-2257-030	1	Ring
17	0013-3298-300	0013-3298-300	0013-3298-300	1	Blind nut 90
18	0018-3724-600	0018-3724-600	0018-3724-600	1	Hose coupling R 1/8"
19	0007-1989-750	0007-1989-750	0007-1989-750	1	Gasket 87/3

* After shipment and before fitting the constant-pressure valve into the pipe line, this part has to be removed.

