ALFA-LAVAL

Instruction book

DETTA EXEMPLAR TILLHÖR
T B:S ARKIV
EXEMPLAR FÅR EJ LÅNAS UT

Separator

VNPX 310/410-SGD-34

In letters, telegrams, telex messages and calls state type and manufacturing No. of the machine.

Unless the manufacturing No. has been filled in on this page, the book serves purposes of general information only and neither part Nos. nor operating instructions are unreservedly applicable.

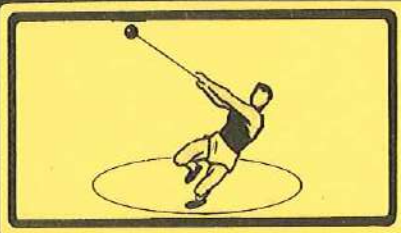
Manufacturing number:

Spec. 4283-02
Reg. 33435
Utg. 1/7902 /7912

Book No.: S 4283-02:02E

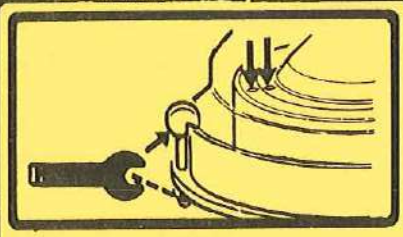
Printed in Sweden

△ SAFETY PRECAUTIONS FOR CENTRIFUGAL SEPARATORS △

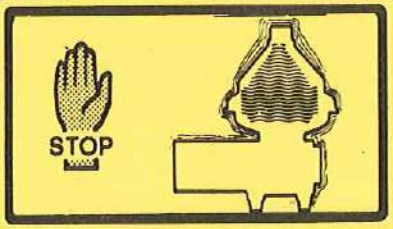


The bowl of a centrifugal separator rotates at a very high speed and great forces are generated.
To ensure your own safety, always carefully follow the instruction book(s) concerning installation, assembly of the components, operation and regular maintenance.
Always use Alfa-Laval spare parts and tools supplied with the machine.

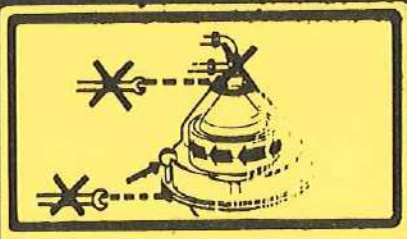
OPERATION



Never start the machine before the lock rings of the bowl inlet, outlet and other fastenings have been securely tightened. Note that the assembly marks Ø (arrowed) must be aligned or pass each other (due to thread wear) when the lock ring is fully tightened.

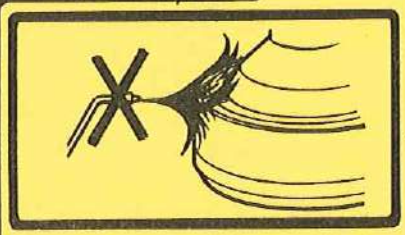


If excessive vibration occurs, IMMEDIATELY fill and keep the bowl full of liquid whilst stopping. Switch off and apply brakes, if fitted. After the bowl has stopped; dismantle, clean and check all parts carefully.



Never loosen any part of the machine until the bowl has completely stopped.

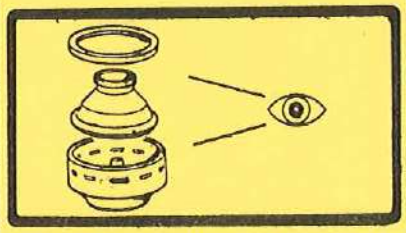
MAINTENANCE



Never heat the bowl body, bowl hood or lock ring with a naked flame.

Never carry out any welding work on the components that rotate.

Never operate the machine when the Ø assembly mark on the lock ring can pass the corresponding mark on bowl body/bowl hood by more than 25 degrees. Consult your AL representative.



Check at regular intervals for damage due to corrosion and/or erosion. If in doubt, consult your AL representative.

- Switch off and disconnect the power supply to the machine before starting any dismantling work.
- Never use the machine for separating a liquid that is more corrosive or has a higher density, temperature, different characteristics of the solids, etc. than that for which the machine has been purchased.
  In case of doubt, consult your AL representative.
- A separator bowl is balanced as a complete unit. Do not interchange the components of a bowl with those of any other machine, even if it is the same type. Make sure that no parts are left out at assembly.
- Follow the safety instructions concerning inflammable, toxic or corrosive process media and cleaning agents. Affix information and warning notices in prominent places.

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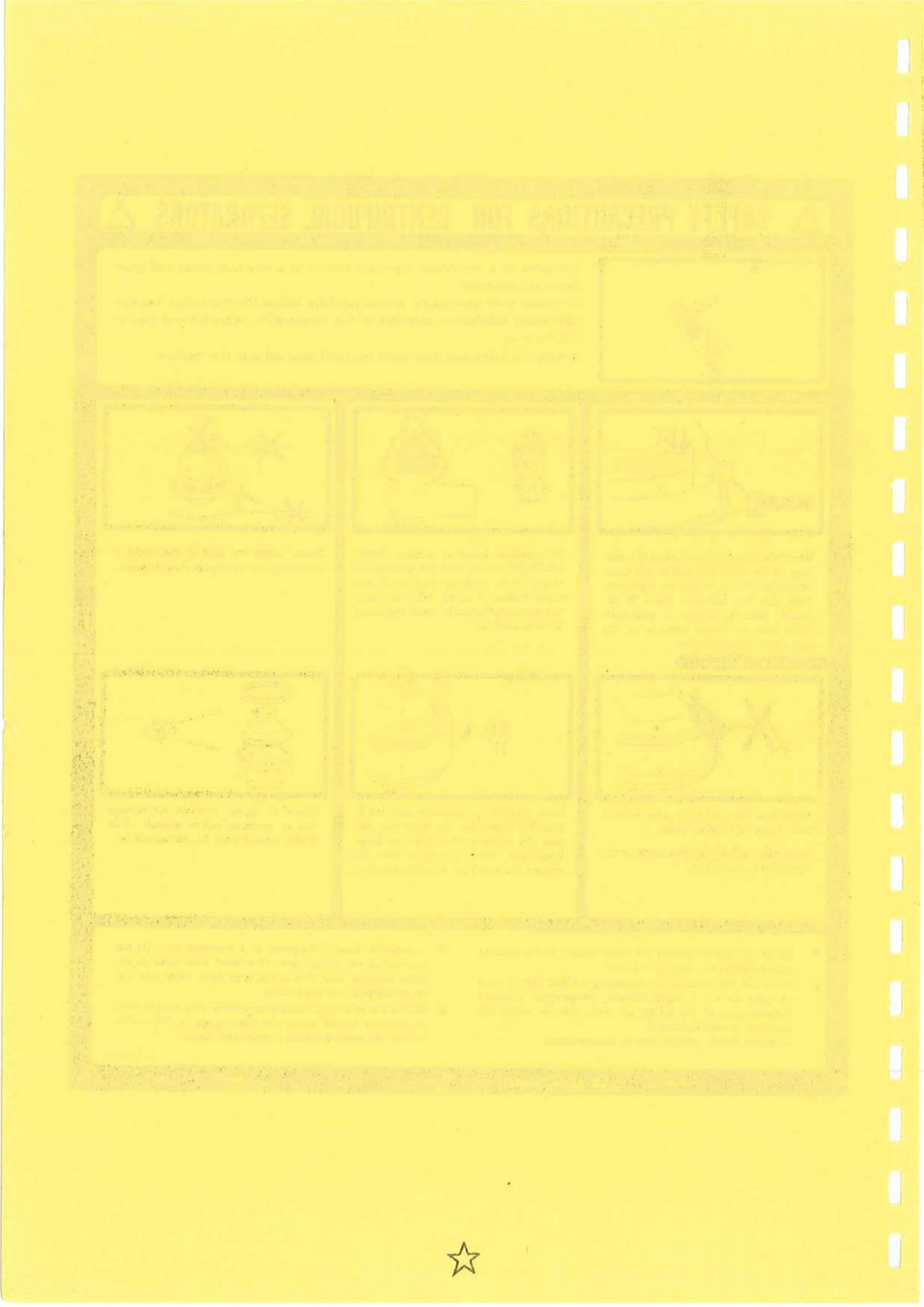
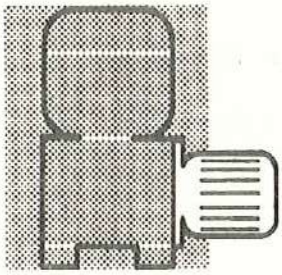
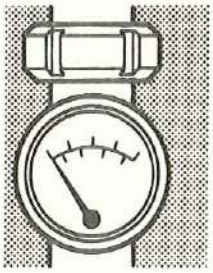
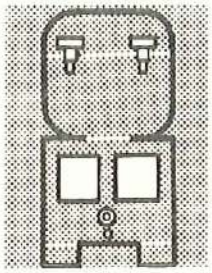
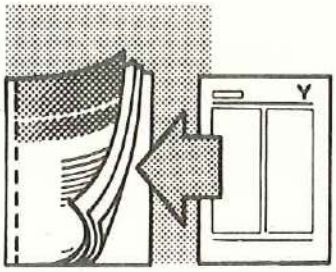
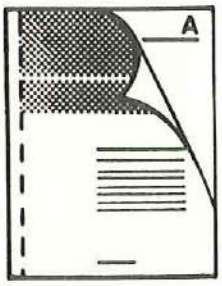












GENERAL INFORMATION

Contents - Arrangement - Supplement - Type Denomination - Manufacturing Number - Safety Standards - Lubrication - Cleaning - Special Tools - Abbreviations - Ordering Routine.

Correct installation, suitable treatment of the liquid before and after its passage through the machine, correct operation and utilisation of the machine in accordance with the directions given in this manual, regular cleaning, careful attention and methodical overhaul, are factors of great importance in ensuring optimum functioning of the machine and obtaining the desired results.

CONTENTS

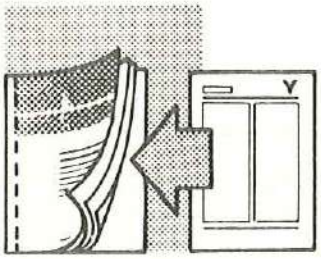
In addition to the items set out in the index, the Instruction Manual contains instructions for installation and operation, dismantling and assembly, as well as for cleaning and overhaul.
Since all the parts of the machine are identifiable from their own number, the Instruction Manual also provides a NUMBERED LIST OF PARTS (SPARE PARTS LIST).

The constructional details given in the Instruction Manual are not binding. We reserve the right to make alterations without previous notice. Constructional modifications made after delivery are not followed by new Instruction Manuals.

ARRANGEMENT

Every chapter of this manual has its own reference letter which can be found in the righthand top corner of each page. Whenever wishing to refer to a page of the Instruction Manual in any communication with us, please quote the reference letter at the head of the chapter in question, together with the reference number appearing at the foot of the page itself.

SUPPLEMENT



If the Instruction Manual concerns a machine made to special order, additional instructions are often given in Chapter Y.

Supplementary data (on treatment of the liquid, specific gravities,etc.) are often included in the technical information provided at the time of purchase.

The ALFA-LAVAL representative is always glad to give advice and information additional to that contained in this Manual.

TYPE DENOMINATION, MANUFACTURING NUMBER

It may happen that the designations on the "type" plate of the machine and on the cover of the Instruction Manual do not correspond. In such cases, the manufacturing number on the machine is applicable. The correct Instruction Manual always carries the manufacturing number appearing on the "type" plate.

SAFETY STANDARDS

Chapter K contains a list of the safety regulations which must be regarded as INDISPENSABLE. The electrical installation must be carried out by a qualified electrician who is familiar with the local safety requirements. It should be noted that the Instruction Manual does not in general include any safety instructions regarding special properties of the centrifugation liquid, such as: - inflammability, toxicity or corrosiveness.

LUBRICATION - CLEANING

In general, the assembly instructions deal only with the parts that should be cleaned or lubricated.
All the information on the lubricants or cleaning agents to be used is listed in chapters H and L.

SPECIAL TOOLS

The use of the special tools is shown in chapter F.

ORDERING ROUTINE

When ordering spare parts, always state the PART NUMBER and NAME as well as the TYPE DENOMINATION and the MANUFACTURING NUMBER of the machine as indicated on the type plate.

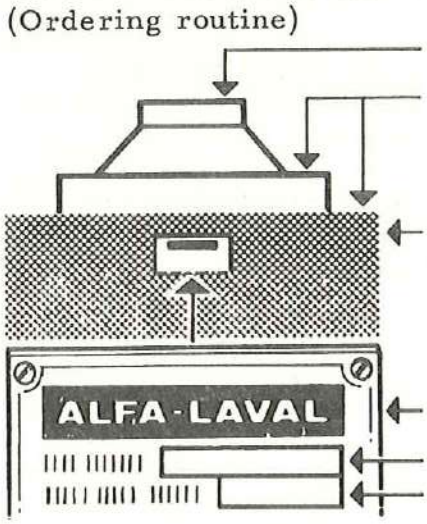
Always base the spare parts order on an Instruction Manual having the manufacturing number of the machine in question stamped on its title page.

Specimen order form

Name of part	Part number	Quantity	Remarks
mnmnmnmnmnmn	mnmn	m	
mnmnmnmnmn	mnmnm	m	
mnmnmnmnmnmn	mnmn	mn	
mnmnmnmnmn	mnmnm	mn	

Correct ordering = Correct delivery in shortest time.

(Ordering routine)



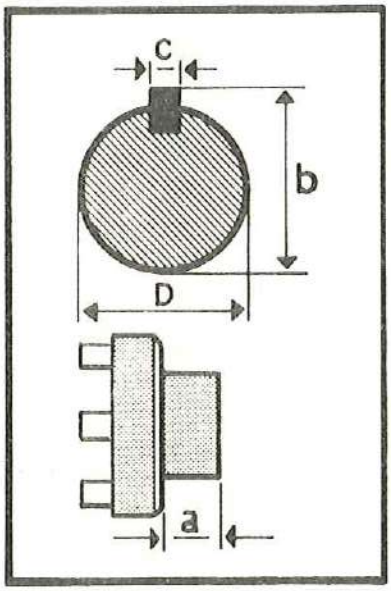
If the machine has been modified after delivery, and if the part number has not been inserted in the Instruction Manual, it will be desirable to refer to any doubts regarding the correct part number when ordering.

In such cases, exact indication of the TYPE DENOMINATION and the MANUFACTURING NUMBER marked on the type plate is especially important.

Different manufacturing numbers

If the manufacturing numbers stamped on the bowl and on the type plate differ from each other, it will be desirable to specify both of them.

Coupling pulley



Besides the part number and name (see chapter R), the b, c and D dimensions of the motor shaft should also be indicated.

When ordering a coupling pulley, also indicate the length (a) of the nave.

ABBREVIATIONS

h = hour

r.p.m. = revolutions per minute

C/S = Hz = cycles per second

Ø = diameter

SAE-class = indication of oil viscosity according to Society of Automotive Engineers.

SSU = Saybolt Seconds Universal: indication of oil viscosity.

^{o}E = Engler rating: indication of oil viscosity.

EP = Extreme Pressure: lubricants with emulsions and additives enabling them to withstand high contact pressures.

ASTM = American Society for Testing Materials.

NLGI-classes = classification of lubricating greases through penetration after treatment as prescribed by National Lubricating Grease Institute, USA.

ISO = consolidated processing standards prescribed by International Organisation for Standardizing.

Force

1 N = 0.102 kp

Mass

1 kg = 2.205 lb

Torque

1 Nm = 0.102 kpm

Length

1 mm = 0.03937 in

Power

1 kW = 1.36 hk

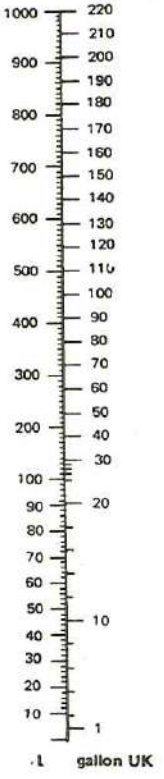
Pressure

1 MPa = 145 psi

Pressure

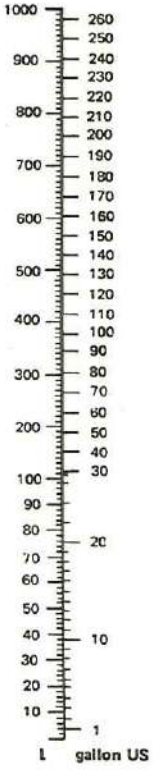
1 MPa = 10.20 kp/cm^2

Volume



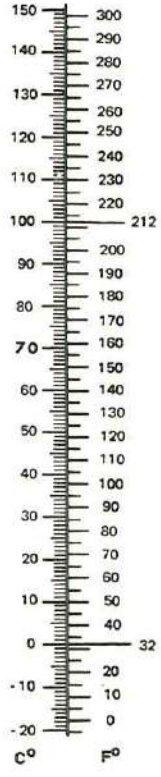
1 l = 0.220 gallon UK

Volume



1 l = 0.264 gallon US

Temperature



°C = 5/9 (°F - 32)

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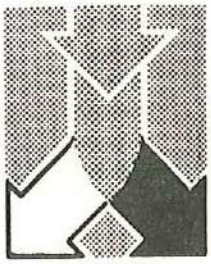


TECHNICAL INFORMATION

Function - Definitions - Factors influencing processing - Processing methods - Sludge discharge - Automated control - Adjustments - Special recommendations.

FUNCTION

The purpose of the centrifugation process is to free a liquid from foreign particles, or to separate the ingredients in a mixture of liquids.

DEFINITIONS

Throughput

This is the quantity of liquid entering the centrifuge during a given period. The throughput is usually expressed in litres per hour or m^3 per hour.

Clarification

This consists of using the machine to separate particles, usually solid ones, from a liquid with a specific gravity lower than that of the particles.

Separation

This consists of using the machine to separate two liquids mixed together, neither of which is soluble in the other, and which have different specific gravities. Solids with specific gravities higher than those of the two liquids can be separated off at the same time.

Concentration

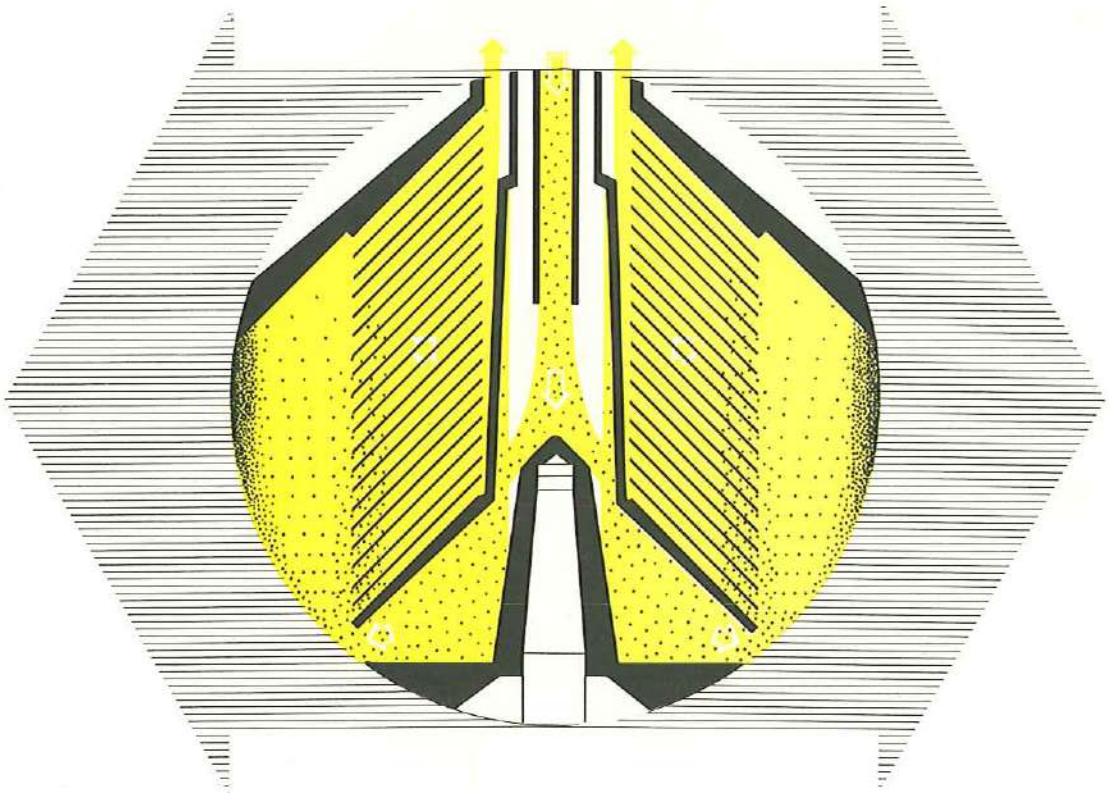
This is a process in every way similar to that of "Separation", and is put into effect when the light phase in the mixture is present in virtually minimal quantities as compared with the heavy phase.
The principles applying to operating, regulating, etc. which are set out in the Manual in relation to "separation" are therefore equally applicable for the process of "concentration".

Emptying of the bowl	Emptying of the bowl takes place while it is in operation; the contents of the bowl being ejected through slots located in the actual wall of the bowl.
Total discharge	Total emptying of the bowl. During this process, intake of the product to be separated must be suspended.
Partial discharge	Partial emptying of the bowl. During this process, it is not essential to suspend intake of the product to be separated.

FACTORS INFLUENCING SEPARATION PROCESS

Different specific gravities	The centrifugal force acts on all particles in proportion to their specific gravity. This applies both to solid and fluid particles. The greater the difference in specific gravity, the easier the separation process.
Shape and size of particles	The larger the particle, the quicker the sedimentation. The particles to be separated must not be so small that they allow the mixture to reach an almost colloidal state. Smooth and round particles are more easily separated than those which are irregular or long in shape. Rough treatment, as in pumps, can break up the particles and thus reduce their size and the speed of separation.
Viscosity	The more fluid a liquid is, the quicker the separation process and the better the separation; that is to say, low viscosity improves the separation results. The viscosity can in many cases be reduced by heating. High viscosity reduces the throughput.
Separation time	If the separation is unsatisfactory, the throughput must be reduced. A low throughput normally gives a better separation result.

CLARIFICATION



Centrifugal force

Bowl parts

Liquid

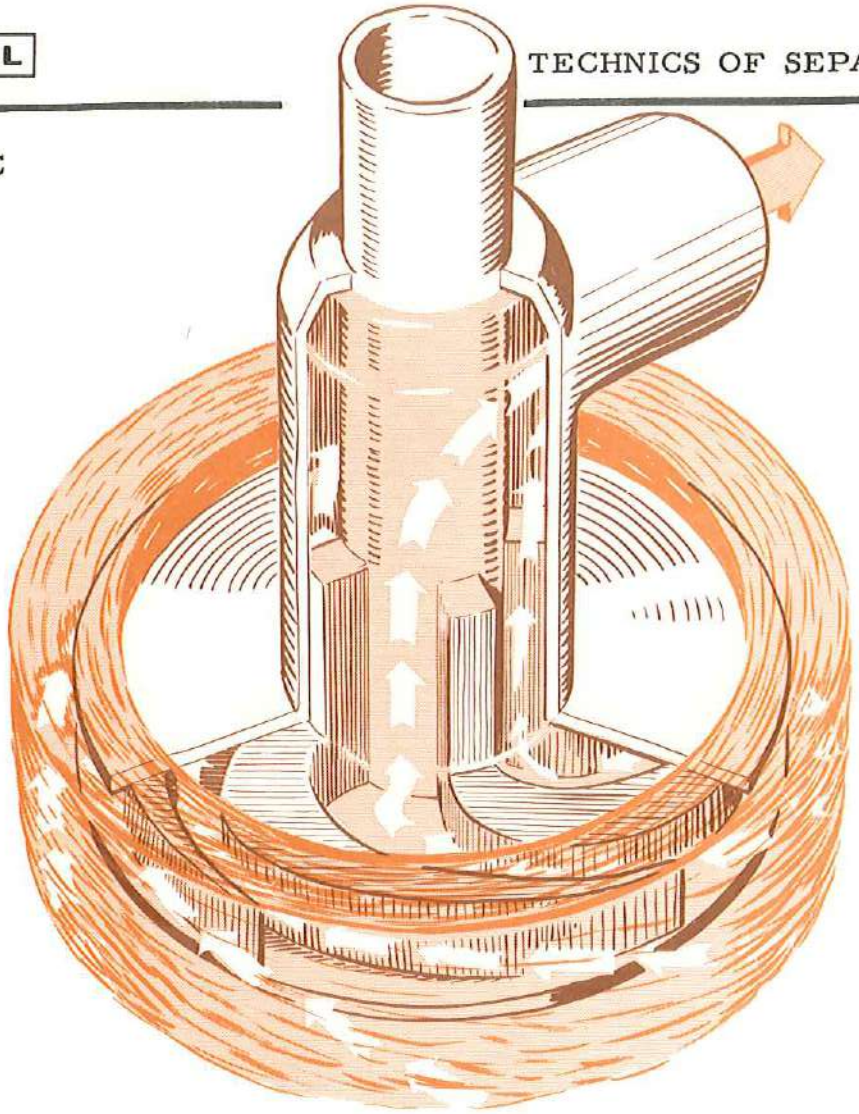
Solids

Clarifier bowl

This bowl has one outlet. The process liquid flows through the distributor to the interspaces between the bowl discs. Through the action of the centrifugal force the heavy particles move along the underside of the discs towards the bowl periphery, where they settle on the bowl wall. The liquid proceeds towards the bowl centre and discharges through the bowl hood.

The course of separation can be influenced e.g. by changes in the viscosity (rise in separating temperature) or in the throughput.

PARING DISC



The paring disc has for its object to discharge the liquid under pressure.

The liquid rotates, driven by the rotating paring chamber, in the form of a ring around the paring disc. This dips radially, to a greater or smaller depth, into the rotating liquid ring, which exerts a pressure rising rapidly with increasing diameter. The pressure produced by the paring disc is composed partly of the "centrifugal pressure" prevailing at the periphery, partly of the kinetic energy of the rotating liquid ring which is converted more or less completely into pressure energy.

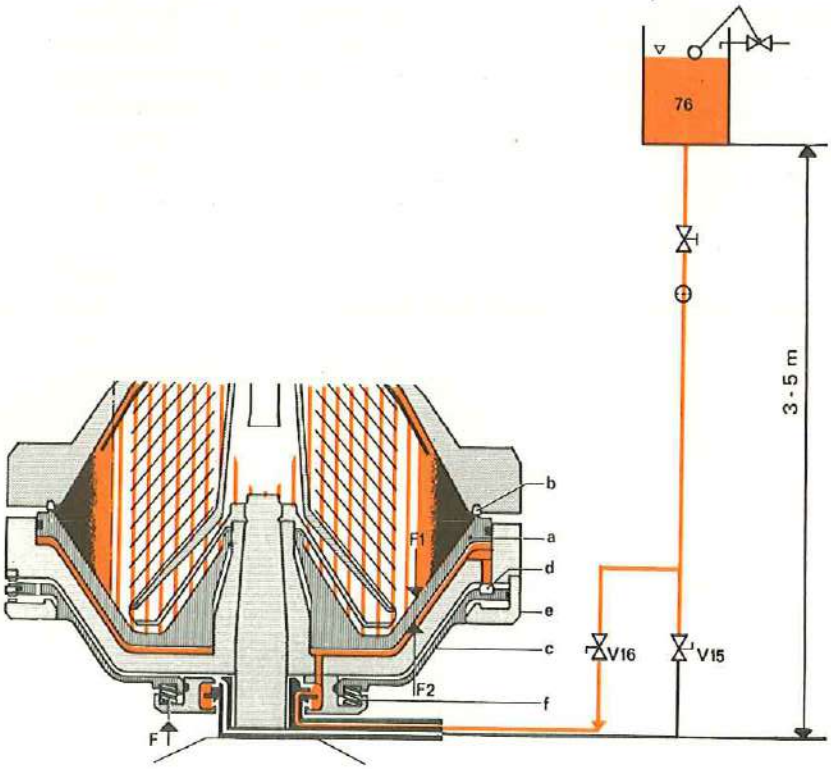
When the throughput is small and there is no back pressure in the discharge line, the inner diameter of the liquid ring will practically equal the outer diameter of the paring disc. If the liquid must overcome a back pressure, such as a high delivery head or pressure-absorbing apparatuses, the diameter of the liquid ring in the paring chamber will diminish until the back pressure is neutralized. Thus the paring disc will pump out all liquid fed to the paring chamber (notwithstanding the back pressure) up to the highest pressure the paring disc can produce at this liquid quantity.

(cont.)

SLUDGE DISCHARGE

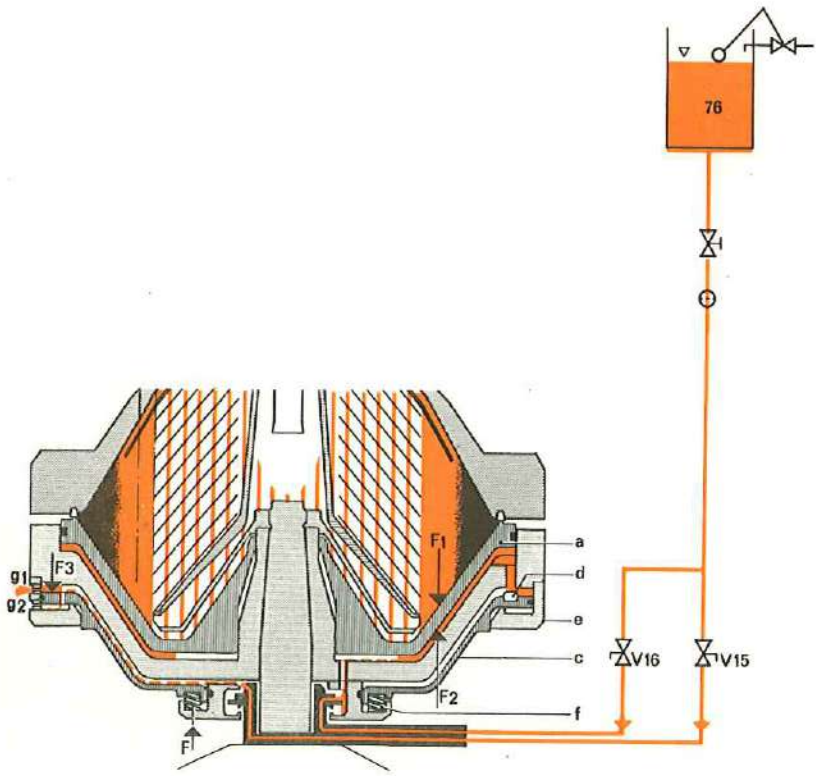
The sludge discharge (residue, sediment) takes place through the slots located in the walls of the bowl. Between one discharge and another, such slots are kept closed by the sliding bowl bottom. The sliding bottom is pushed upwards against a seal ring by the pressure of the operating liquid acting on its underside. As the bowl rotates, this pressure increases with the distance from the axis of rotation, as a result of the centrifugal force. The operating liquid exerts an upward pressure that exceeds the downward pressure from the liquid being processed, for the reason that the underside of the sliding bowl bottom has a larger pressure area than the surface of the upper side.
A special distributing device makes the operating liquid (water) flow in from beneath the bowl.

Operating procedure
for sludge discharge



BEFORE EJECTION

Valve V16 is open.
The space beneath the sliding bowl bottom (a) is full.
The sliding bottom (a) is pressed against the seal ring (b), since the F_2 force is greater than the F_1 force.
The movable flange (c) keeps the drainage valves (d) closed, through the F force produced by the spiral springs (f).



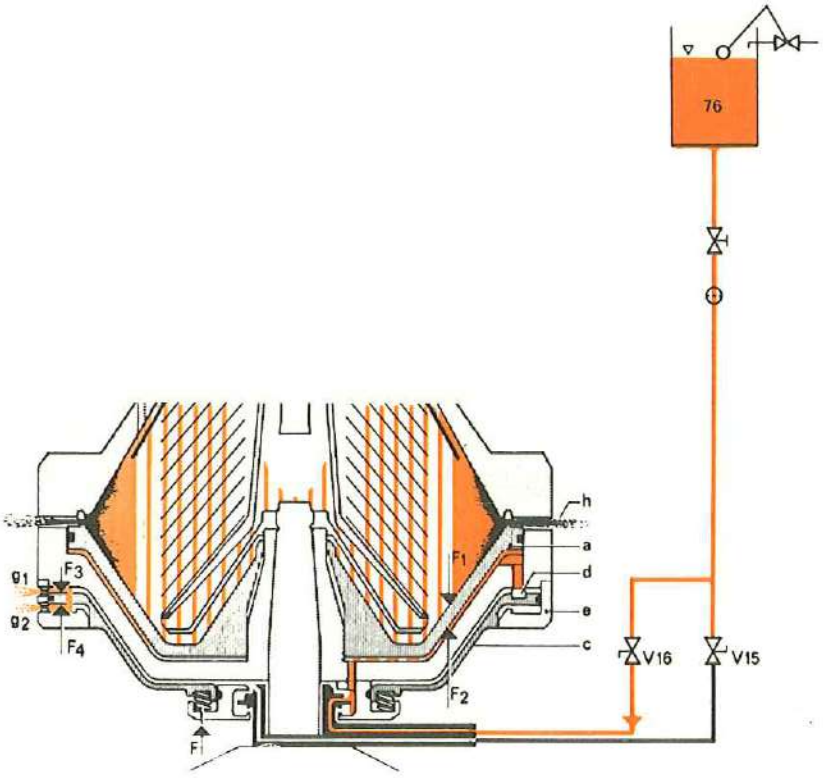
INITIATION OF EJECTION

Valve V16 is open.
Open valve V15.
The dosing ring chamber (e) above the movable flange is filled.
The force of the liquid (F_3) exceeds the force of the spring (F).
The movable flange (c) is displaced downwards, thus opening the drainage valves (d).

The space beneath the sliding bowl bottom (a) is drained and the F_2 force is reduced.

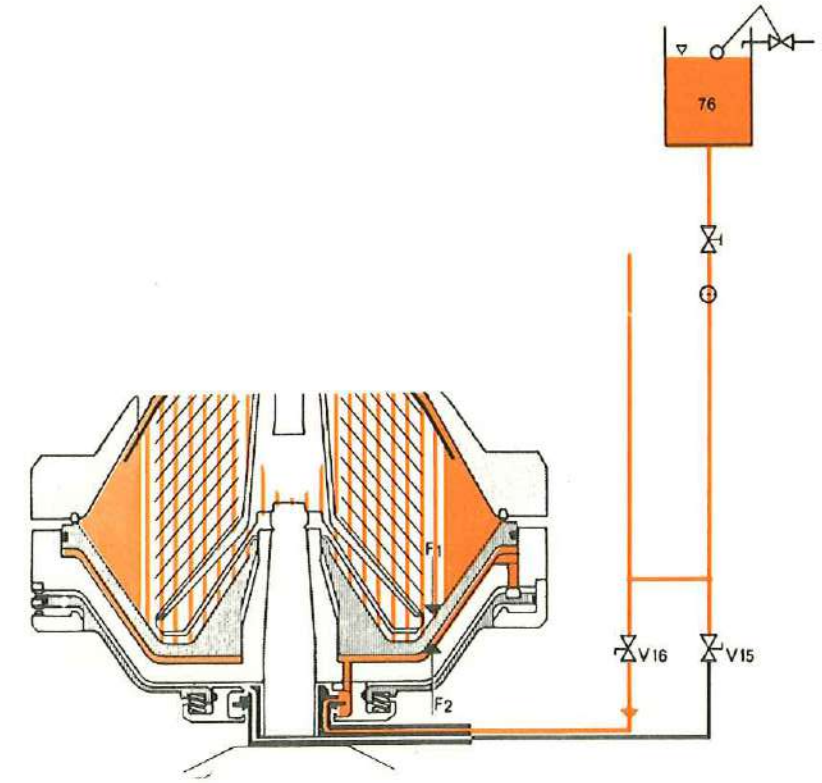
The flow issues from the nozzle g1 whilst the excess passes into the chamber lying below the movable flange (C).

(Sludge discharge)



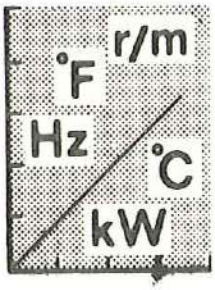
EJECTION

The space beneath the sliding bowl bottom (a) empties, and force F_2 becomes less than force force F_1.
The sliding bowl bottom (a) is displaced in a downwards direction, and ejection of the solid matter takes place through the small apertures (h) located in the bowl wall.
Close valve V15.
The dosing ring chamber (e) beneath the operating slide (c) has begun to fill, and force F_4 combined with the force of the spring (F) is greater than that of F_3.
The movable flange is displaced in an upwards direction, and closes the drainage valves (d).
The dosing ring chambers (e) are drained through the nozzles g_1 and g_2.
The space beneath the sliding bowl bottom (a) fills up from the tank of operating water (76).
Force F_2 increases.
The separation space above the sliding bowl bottom (a) fills up.
Force F_1 increases.



AFTER EJECTION

Force F_2 is greater than force F_1.
The sliding bowl bottom (a) is forced into the closed position.
Ejection has been completed.



DATA

Supplementary data (e.g. weights) are included in the technical information supplied when the machine is acquired.

DETAILS OF MOTOR

Power required

Output of motor: 22 KW (30 HP)

	Power consumption KW	HP
- throughput: 16 m^3/h (approx.)	18.5	25

SPEED (r.p.m.)

The speed specified for the worm wheel shaft, which should not be exceeded, is stamped on the machine's type plate.

WORM WHEEL SHAFT	50 Hz motor 1420-1500	60 Hz motor 1700-1800
Motor transmission	1420-1500	1700-1800
Revolution counter	118-125	142-150

LUBRICATING OIL

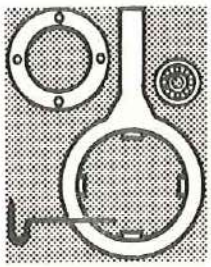
Depends on running temperature - see lubrication charts.

ACCELERATION TIME

From 0 to full bowl speed: about 4 minutes.

OPERATING LIQUID

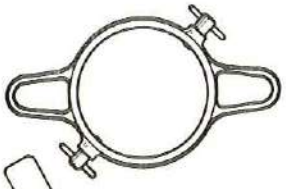
Low pressure operating liquid: 0.4 - 0.5 kg/cm^2.



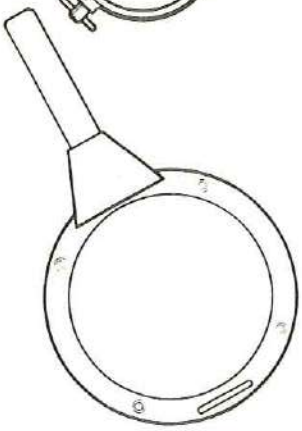
SET OF TOOLS

It is desirable for the special tools to be hung up ready to hand (in the place reserved for cleaning), as near to the machine as possible. If a tool has a lefthand thread or is used for a joint requiring screwing in an anti-clockwise direction, special reference is made to this in the dismantling and re-assembly instructions. Where righthand threads are concerned, no indication of this is given.

TOOLS FOR BOWL

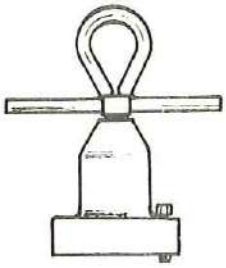


Spanner for small ring
-- 519226-80



Spanner for large ring
-- 71889

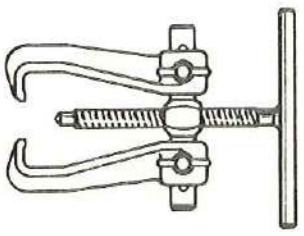
Lead mallet
-- 64324



Screw with handle
-- 520555-80

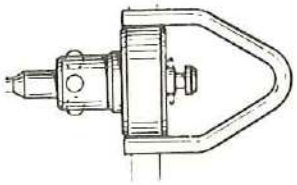
Tool for lifting bowl body
-- 524301-81

TOOLS FOR BOWL SPINDLE



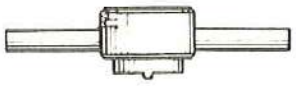
Ball bearing extractor
-- 73850

Extractor flange
-- 65375



Distributor extractor
-- 74387

Tool for lifting distributor support
-- 519219-80



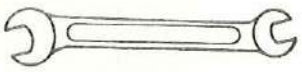
Toothed spanner for lifting sliding bowl bottom and ring of paring disc for operating liquid
-- 516774-80

Extractor for bottom buffer
-- 37682

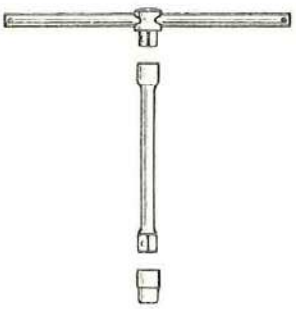
Punch for extracting hood seal ring
-- 71194

Punch
-- 532611-01

Pulleys spanner
-- 73800

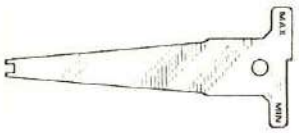


Screw spanner
19/24
-- 42354

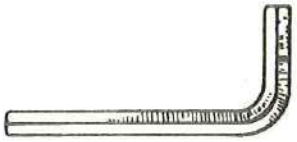


Handgrip
-- 72243
Extension
-- 72244

Polygonal head
24 mm--73085
17 mm--527353-04

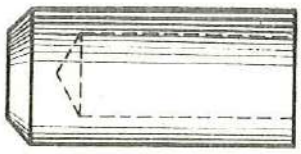


Templet for paring disc height adjustment
-- 536931-01

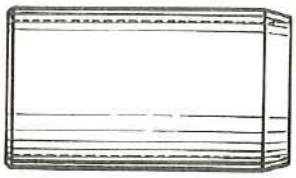


Spanner for hexagonal hollow-headed screws
8 mm -- 66416
6 mm -- 63366

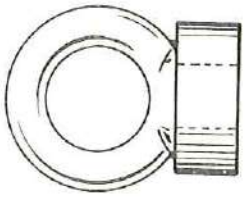
ADDITIONAL TOOLS NOT INCLUDED IN "STANDARD SET" NORMALLY ISSUED
(Supplied only when SPECIFICALLY REQUESTED.)



Sleeve for assembling clutch bearings
-- 65374
Guide-pin for motor and extraction of sealing flange (2)
-- 526718-01



Extractor for upper ball bearing
-- 65379

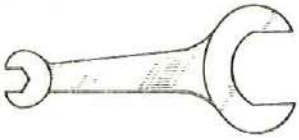


Eyebolt for extracting bowl spindle
-- 68996

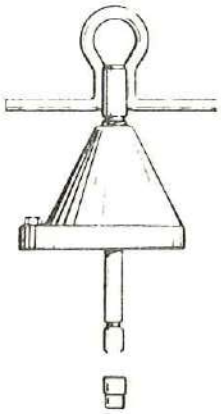
GENERAL PURPOSE TOOLS

Punches:
Small -- 2279
Large -- 37666

Screwdriver
-- 66772



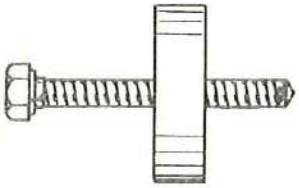
Screw spanners
15/46 -- 520550-02
15/55 -- 520551-02



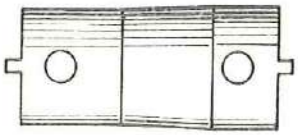
Stud screw with handgrip
-- 517731-80

Body extractor
-- 519216-84

Polygonal head
14 mm -- 73376
19 mm -- 73377



Coupling nave extractor
-- 523249-80



Toothed spanner for nuts
-- 72719

The set of spares listed below includes only parts belonging to the machine's standard equipment. The spare parts for special equipment are to be found with the description of these in chapter X. In both cases, it is generally desirable always to hold stocks of the parts. Avoid incorrect ordering, and in all cases follow the routines set out in chapter A.
The figure in brackets indicates the quantity (if more than one).

STANDARD SPARE PARTS SET

HORIZONTAL EQUIPMENT

223412-21	Rubber ring for seal ring flange seat
73547	Seal ring for horizontal shaft

HOOD

528096-01	Adjustment ring (2)

BOWL

67575	Rubber ring for sliding bowl bottom (2)
223412-56	Rubber ring for springs seating (2)
67587	Rubber ring for bowl hood (2)
223412-56	Rubber ring for mobile flange (2)
42154	Rubber ring for sliding bowl bottom (2)
223401-77	Rubber ring for bowl hood (2)
71440	Bowl gasket
537864-03	Plug valve (3)

ADDITIONAL TOOLS NOT INCLUDED IN "STANDARD SET" NORMALLY ISSUED
(Supplied only when specifically requested.)

BOWL, COMPLETE (for components see chapter I)

515133-02	Nozzle (2)
71181	Spring for movable flange (5)

FRICTION JOINT AND WORM WHEEL SHAFT (for components see chapter P)

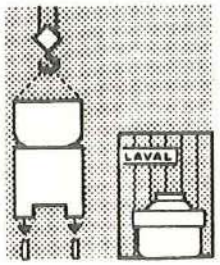
71627	Supplementary lining (3) incl. 9 No. 8341 screws

BOWL SPINDLE

66191	Spring for buffer collar (6)
65190	Driver worm screw
	Ball bearings for:
65186	Top worm screw (SKF 6015M)
65187	Bottom worm screw (SKF 6014M)
60992	Top collar (SKF 6213M)
8419	Thrust bearing (SKF 225147M)
63000	Base oscillator (SKF 2308M)
	Rubber rings for:
64104	Collar cover
65201	Protection sleeve (2)

FRAME PARTS (for components see chapter S)

518859-82	Paint for touching-up (1/8th litre)
65227	Complete brake lining with 3 screws No. 8341
	Rubber rings for:
223404-18	Top of apparatus (3)
67566	Collar diaphragm
68085	Check valve
74067	Check valve
67675	Cover
223406-86	Inlet device (2)
	Packings for:
536775-01	Distributor ring
530208-01	Inlet device height adjustment ring (2)
38710	Seal ring for revolution counter (2)



INSTALLATION

This chapter deals with the assembly of the machine and the action to be taken before it is used for the first time. The ALFA-LAVAL representative will always be glad to provide further advice and information.

DIMENSIONED DRAWING

All measurements needed for the installation are given in the dimensioned drawing. The relevant reference numbers are shown below. (The list applies to several types of separator, and thus includes more reference numbers than are to be found in the drawing.)

1 Feed
2 From heater
3 To heater
4 Light effluent
5 Heavy effluent
6 Solid effluent
7 Overflow liquid
8 Drainage
9 Auxiliary liquid for liquid seal

10 Auxiliary liquid for liquid seal
11 Auxiliary liquid
12 Flushing liquid
13 Self-emptying
14 Air or other gas (except steam)
15 Operating liquid
16 Operating liquid
17 Cooling air
18 Cooling air
19 Ventilation

20 Ventilation
21 Return flow
22 Electrical connections
23 Effluent
24 Raw material
25 Treated raw material
26 Steam
27 Waste liquid
28 Flushing liquid
29 Reagent

30 Flushing liquid
31 Hydraulic sealing liquid
32 Hydraulic sealing liquid
33 Hydraulic sealing liquid
34 Hydraulic sealing liquid
35 Waste liquid
36 Ventilation
37 Air or other gas (except steam)
38 Water feed
39 Outlet for bowl emptying

40 Inlet
41 Outlet
42 Concentrate
43 Operating liquid
44 Ventilation
45 Air or other gas (except steam)
46 Waste liquid
47 Constant pressure valve
48 Flow meter
49 Shut-off valve

50 Control valve
51 Flow indicator
52 Sight glass
53 Electrical connections
54 Brake handle
55 Revolution counter
56 Oil filling plug
57 Oil gauge glass
58 Oil drain plug
59 Waste liquid

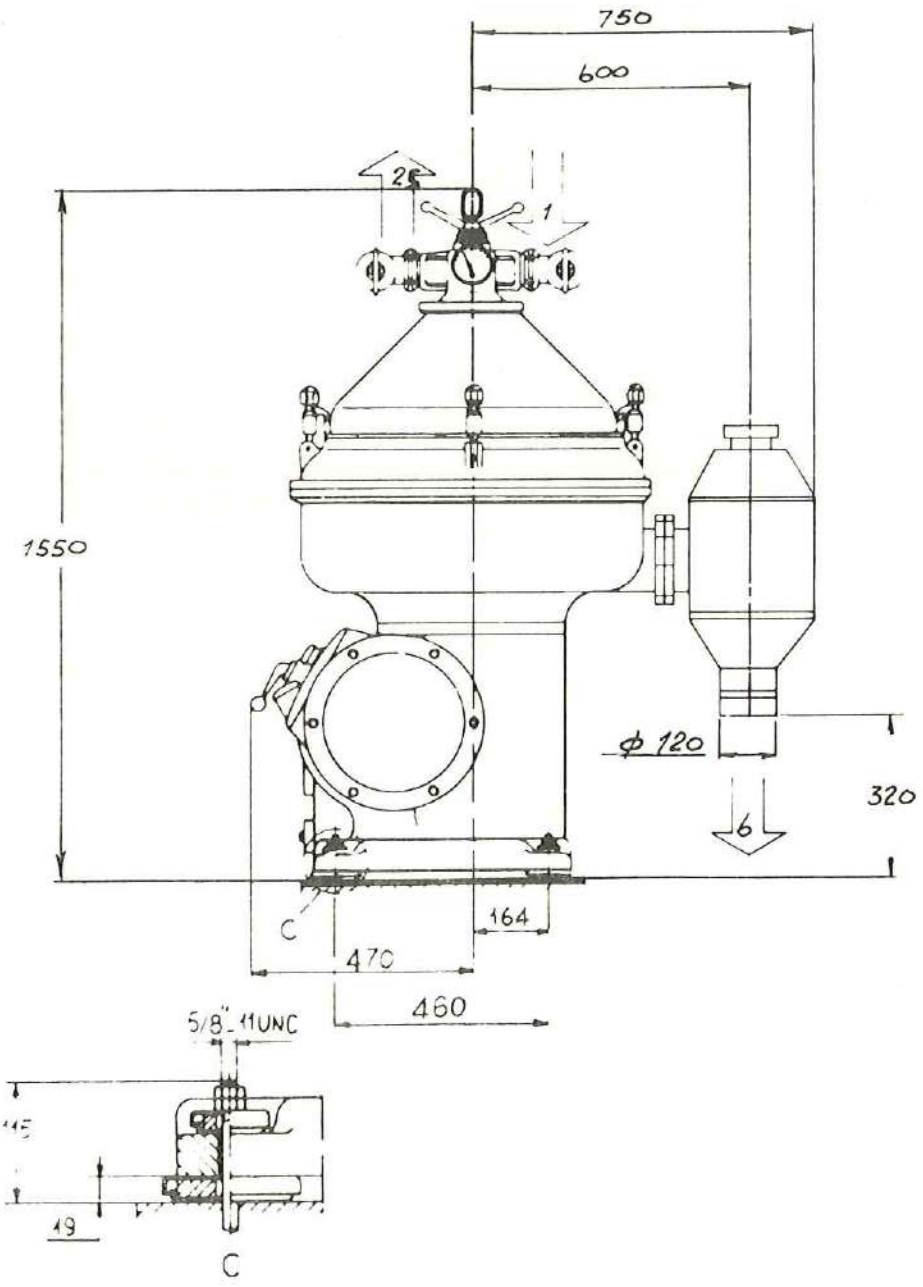
60 Closure valve
61 Feed pump
62 Filter
63 Light phase feed
64 Heavy phase feed
65 Light effluent
66 Heavy effluent
67 Hydraulic sealing liquid
68 Air or other gas (except steam)
69 Protective gas

70 Protective gas
71 Electrical connections
72 Cream
73 Thermometer
74 Filter
75 Steam pre-heater
76 Operating water tank
77 Sediment tank
78 Sediment tank
79 Softening filter

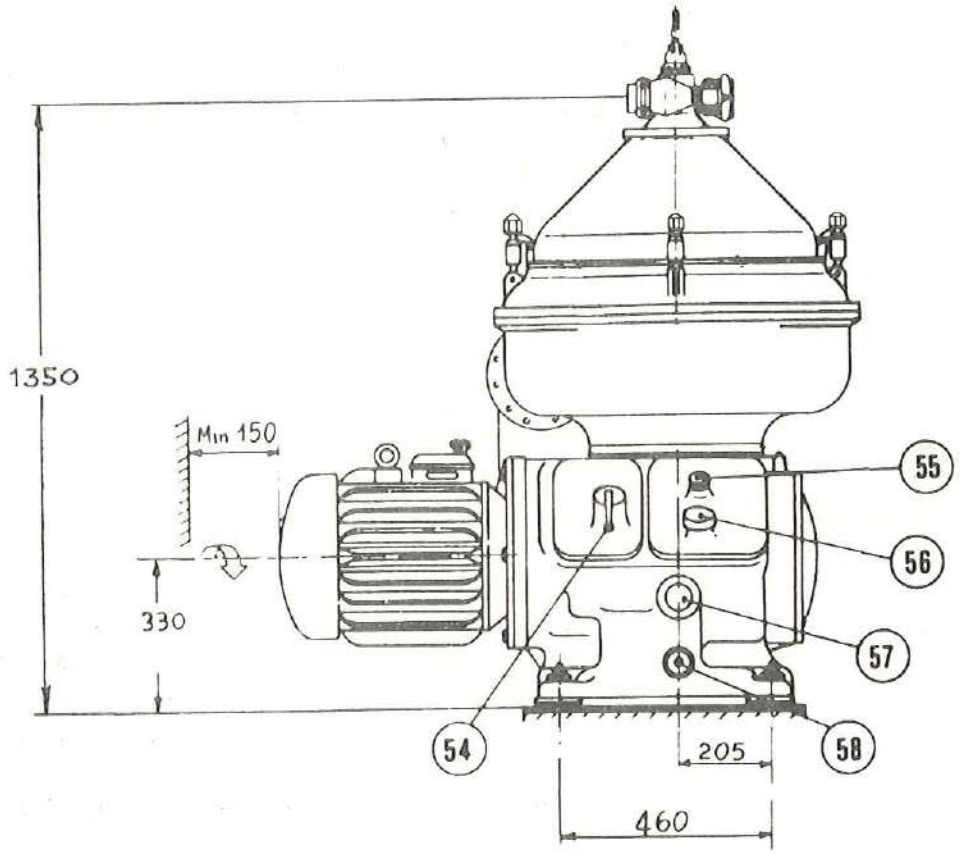
80 Condensation water
81 Interface control
82 Feed and discharge pump
83 Discharge pump
84 Three-way valve
85 Plate heat exchanger
86 Skimmed milk
87 Whey
88 Bowl emptying
89 Draw-off

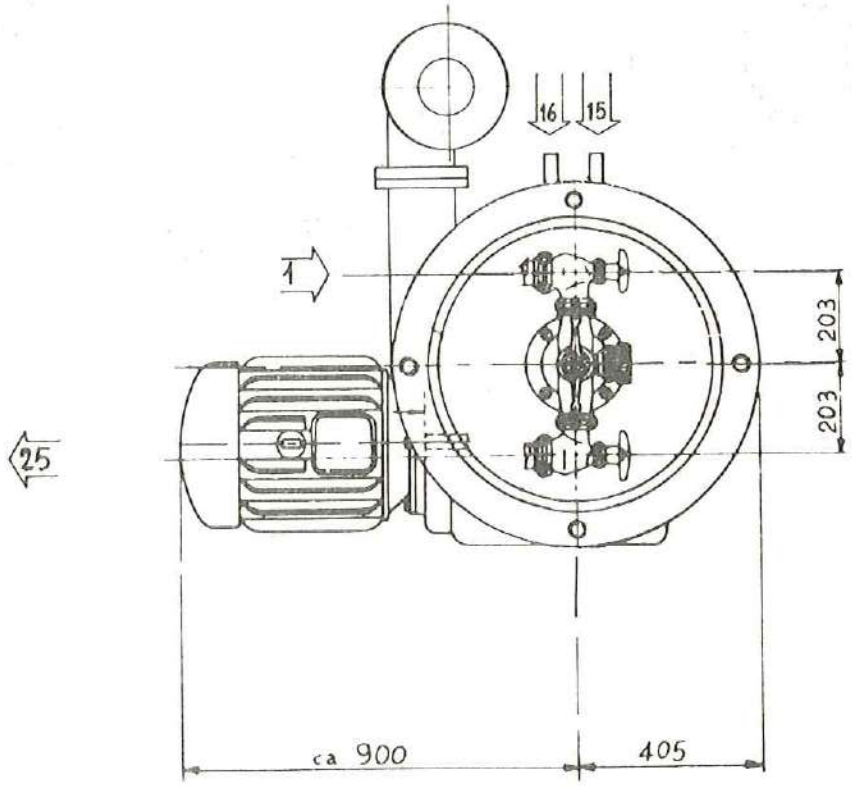
90 Flow nozzle
91 Flow-control valve
92 Flushing liquid
93 Hydraulic sealing liquid
94 Check valve
95 Pressure regulator
96 Pressure gauge
97 Fixed throttling
98 Pilot liquid
99 Indicator gas

100 Cooling liquid
101 Compressed air
102 Vibration switch
103 Oil level switch
104 Protective gas
105 Protective gas



It is essential that the base be completely flat - see chapter S.
This will allow uniform discharge of the ventilation air, and so reduce the temperature of the lubricating oil.
The gap between base and centrifuge must be equal to the thickness of the buffers (18 to 20 mm).


1350
Min 150
330
55
56
57
54
58
205
460


16
15
1
25
203
203
ca 900
405

UNPACKING

When unpacking the machine, take care not to scratch the metallic or painted surfaces.
Use the packing list to check that all the parts have been duly unpacked.

FOUNDATION

The foundation must be solid and flat (finished concrete). The bolt dimensions, distances between bolts, etc., are indicated in the scale drawing. The distance from the nearest wall should not be less than that indicated in the scale drawing. Arrange the pipes, pumps and other apparatus so that they are easily accessible for inspection.

ERECTION OF FRAME

See chapter S.

LUBRICATION

Do not start the machine without oil in the gear housing. See chapter H.

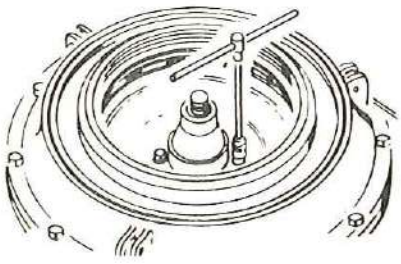
HEIGHT ADJUSTMENT

Check as described in chapter L.

BOWL
INLET. OUTLET

Dismantle and (if necessary) clean all parts in contact with the liquid; see chapter I. Make sure that the seal rings are fitted into their seatings (in some cases these are packed separately in the packing crate).

The seal ring in the lower edge of the bowl hood must be well protected against possible damage.
The hood should therefore be placed on a soft base such as wood or rubber.



Unscrew the three distributor ring screws inserted in the upper part of the device controlling intake of the operating water. This upper part is then secured to the bowl body with these screws.

If the cap nut has been fitted on to the bowl spindle, unscrew it (clockwise) before fixing the bowl body itself.

Before starting up the machine, the bowl should be completely assembled as directed in chapter I.

MOTOR ASSEMBLY

See chapter R.

CONNECTION TO MAINS

Connect the motor to the mains so that the bowl rotates in a CLOCKWISE DIRECTION.

NOTE. The machine must never be started up before the complete bowl has been fixed on to the spindle and the worm gear housing filled with the specified quantity and quality of lubricating oil. If the machine is run at full speed, it is essential to fix the hood as well.

ACCESSORIES

For the installation of accessories etc., see chapter X.

PIPING

Fit the piping with flexible connections, so that the vibrations of the machine are not transmitted to the piping.

HYDRAULIC CONTROL SYSTEM	The hydraulic control system makes it possible for a constant volume of sludge to be partially discharged.
OPERATING LIQUID	Water may be used as the operating liquid. Hard water will involve a risk of calcareous deposits which can obstruct the small channels in the operating liquid system, and lead to interruptions of the running. Adding a decalcifying agent, or inserting a softening filter into the operating liquid system can stop the calcareous precipitations.
OPERATING LIQUID FEED SYSTEM	The operating system is not responsive to variations introduced into the volume of liquid. It is desirable to install an open tank fed from the mains, from which a pump then feeds the operating system at a constant pressure.
AUTOMATION	The sludge discharge cycle can be automated; see special instructions for programmed discharge of sludge (automatic control).

COMPLETELY AUTOMATED SYSTEM

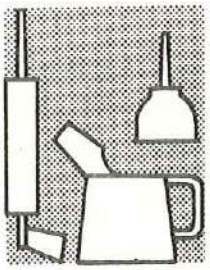
In connection with automation of the operating liquid system, it is preferable, and in some cases necessary, also to automate other operations related to the sludge discharge (such as interruption of the bowl input).

If the automatic system is included in the equipment supplied, the installation and operation of this system should be carried out in accordance with the instructions for programmed discharge (automatic control); alternatively, consult an ALFA-LAVAL representative regarding choice of the suitable equipment.

CHECKING

Before putting the machine into service, check the installation and take particular care to ensure:

- that the wormwheel shaft rotates at the specified speed and that the bowl rotates in the correct direction,
- that the anchoring bolts are tightened in accordance with the directions given in chapter S,
- that the instructions headed "BEFORE STARTING" in chapter K have been followed.



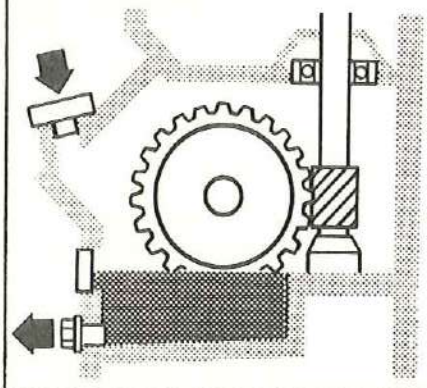
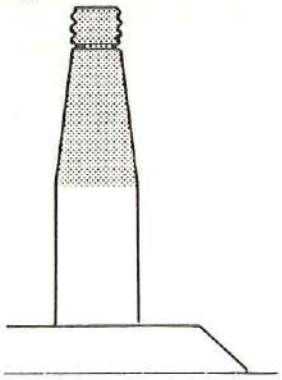
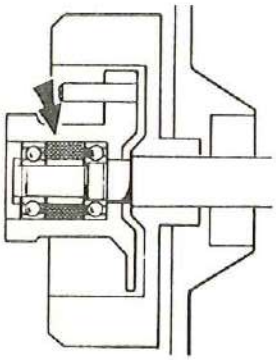
LUBRICATION

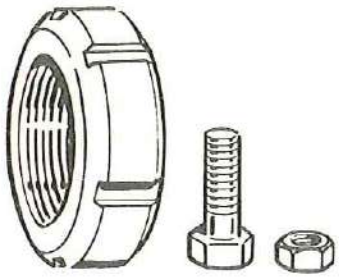
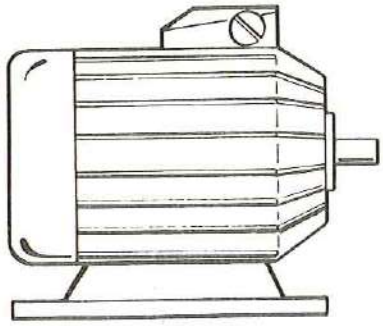
The references to certain brands of lubricating oil should be taken only as examples of suitable lubricants. They do not therefore exclude the use of other brands having equivalent properties.

ABBREVIATIONS - See chapter A.

The machine is delivered without oil in the worm gear housing. It must not be put into operation unless it has been duly provided with the specified quantity and quality of oil. A change of temperature in the product for processing may make it necessary to replace the oil with another of a different type (see Table on page 38).

All lubricants, oil or grease, must be kept in closed containers; so that any penetration by dust or moisture is completely prevented, and the oxidising effect of the air reduced to a minimum. The storage premises should be cool and dry.

LUBRICATION POINT	LUBRICANT	TIME-SCHEDULE
Worm gear housing 	Separation temperature 15-70°C (60-160°F) = SAE 40. 70-95°C (160-205°F) = EP 1 Ambient temperature minimum 10°C (50°F) Quantity of oil: 12 l (2.6 UK gallons)	Fill before first running, till oil level is above half-way mark on sight glass. First change after 200 h of running. Then after every 1000 hours of running; likewise before restarting after machine has remained idle for a long period. Clean before changing.
Threaded top of bowl spindle 	Molybdenum disulphide paste Oil Grease	Before each time bowl body is fitted on to spindle, but at least once a month. Smear lightly to avoid slipping but sufficiently to avoid seizure.
Coupling nave 	All greases recommended for ball bearings	Replace the grease once a year, when likewise cleaning the bearings and their seats. Grease the bearings and fill the space around the spacing sleeve to approx. one third.

LUBRICATION POINT	LUBRICANT	TIME-SCHEDULE
Other machine parts 	Stainless steel parts: Molybdenum disulphide paste, EP or equivalent lubricating grease. Steel parts: Oil as recommended for worm gear housing.	Before each assembly. But note that the clutch cone must NEVER be lubricated.
Motor 	Follow instructions of supplier of motor.	Follow instructions of supplier of motor.
Seal ring of bowl and other bowl parts	See special instructions on following pages.	See special instructions on following pages.

LUBRICANTS

Lubricating oil for worm gear drive housing

For choosing the type of lubricating oil, follow the recommendations given in the lubrication Table.

The types of oil listed in the Table should meet the quality requirements set out below. In cases of doubt, consult an authorized ALFA-LAVAL representative.

Always use mineral lubricating oil of top quality.

SAE oils

Type of oil	Maximum viscosity		Minimum viscosity index	Minimum liquidity temperature °C (°F)
	SSU at 212°F	°E at 100°C		
SAE 10W	210 at 100°F	1.5-2 at 50°C	-	-20 -4
SAE 20	45-58	1.4-1.8	80	-10 +14
SAE 30	58-70	1.8-2.1	80	-10 +14
SAE 40	70-85	2.1-2.5	80	-10 +14
SAE 50	85-110	2.5-3.2	80	-10 +14

EP oils

EP 1 Table	EP 2 Table
BP Energol Gear 300 EP	BP Energol Gear 425
Caltex Meropa Lubricant 3	Caltex Meropa Lubricant 3
Esso Pen-O-Led EP 3	Esso Pen-O-Led EP 3
Gulf EP Lubrificant 75	Gulf EP Lubrificant 115
Mobil Compound DD	Mobil Compound EE
Shell Macoma 72	Shell Macoma 75
Castrol Alpha 617	Castrol Alpha 717

Note

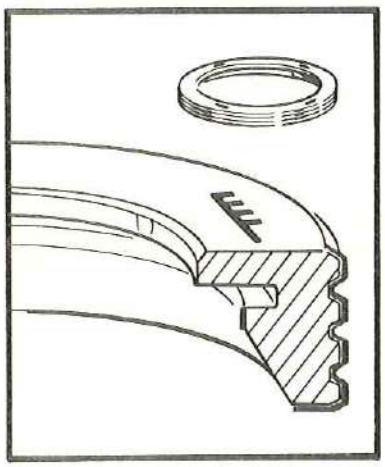
Oils with additives, such as the special cylinder lubricants for Diesels which contain ammine (generally used in heavy oil marine engines), and automobile lubricating oils of "multigrade" type, should not be used.

(Lubricants)

Molybdenum disulphide pastes	Examples: Molykote Paste C Rocol Anti-Scuffing Paste
Molybdenum disulphide greases	Examples: Molycote BR-2 Molycote BR-3 Oily ricino-polyethylene or ricino-ethylene pastes are particularly recommended for machines used in food industries or where dark-coloured lubricants are not suitable.
Greases for ball bearings	For ball bearings, always use a lithium grease with a high degree of saponification which comes within NLGI classifications usable at temperatures of more than 100°C (212°F). Slipping point about 180°C (356°F), as specified in standards ASTM D 566-44. Examples: BP Energrease 2 or 3, Caltex Starfak Premium Grease 2 or 3, Castrol Spheerol AP Grease 2 or 3, Esso Beacon Grease 2 or 3, Gulfcrown Grease 2 or 3, Mobilux Grease 2 or 3, Shell Alvania Grease 2 or 3.
Lubricating greases. Consistent greases	Always use one of the greases recommended for ball bearings.
Oil	Use the oil recommended for worm gears.

Bowl

Before every assembly, thoroughly clean the threads of lock rings, the bowl body and hood, and the contact surfaces between these parts. If necessary, these should be cleaned with a cloth moistened with detergent (see chapter L). After cleaning, lubricate them as specified in one of the alternatives below.

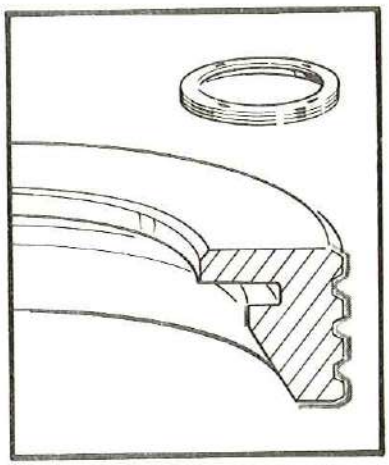


Alternative 1

When the bowl lock ring is made of stainless steel or Monel metal and the bowl body and/or hood are made of stainless steel, the lock ring carries the symbol shown in the adjoining drawing. In this case, the following lubrication procedure is recommended:

1. SMEAR the whole surface with molybdenum disulphide paste (MOLYKOTE). Always smear new parts in the same way as those which have lost their original protective layer through having been operated or subjected to thorough cleaning.

2. LUBRICATION - After having smeared on a protective layer of paste, lubricate with molybdenum disulphide grease. Lubrication should be carried out whenever the fixing ring has to be reassembled. For machines used in the food industry, or in cases where dark-coloured lubricants cannot be used, ricino-polyethylene or ricino-polytetrafluoroethylene pastes are recommended.

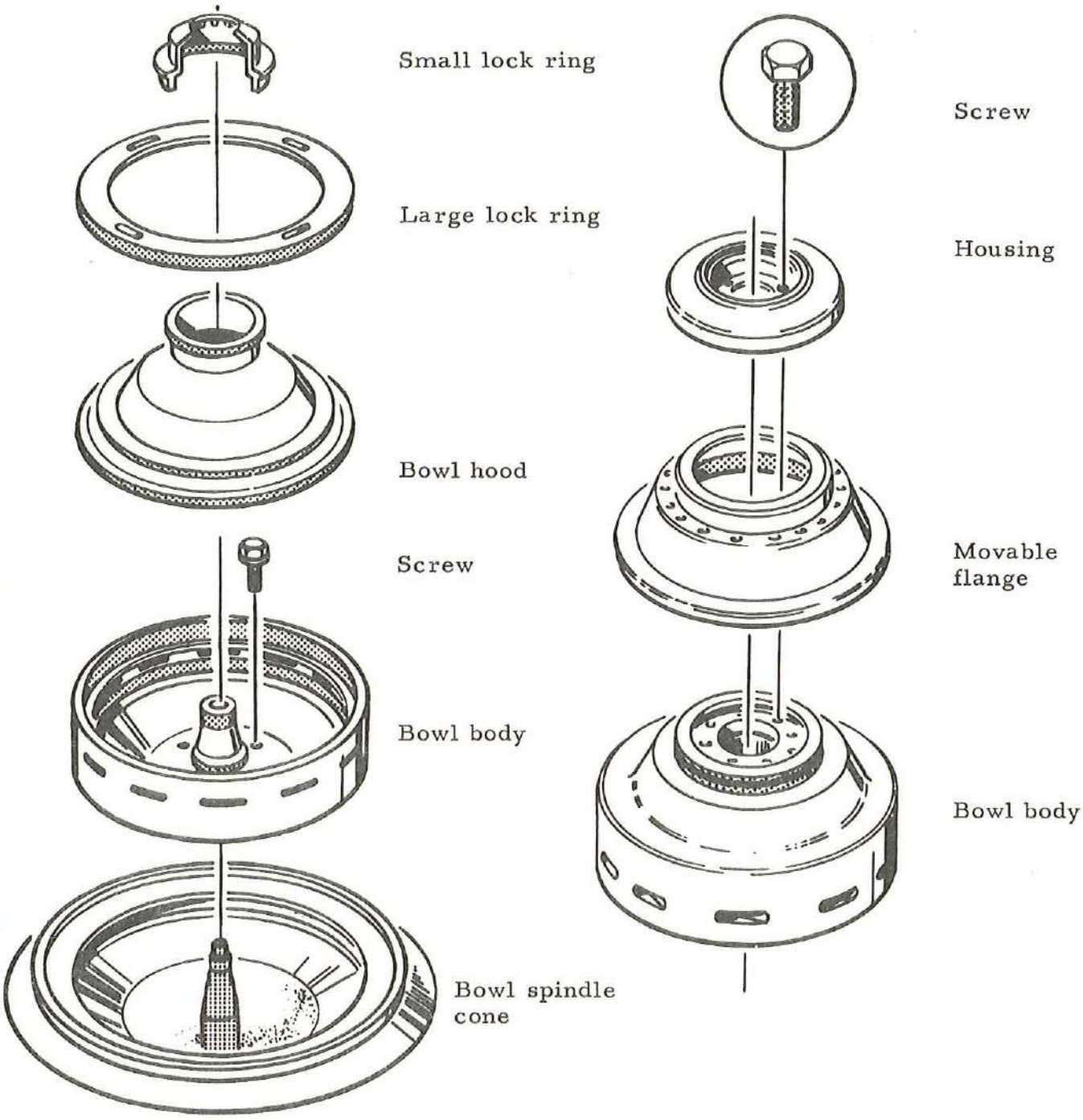


Alternative 2

If the lock ring is made of carbon steel, it is unnecessary to smear it with protective paste. Lubrication alone will suffice. For lubricants, note the following points:

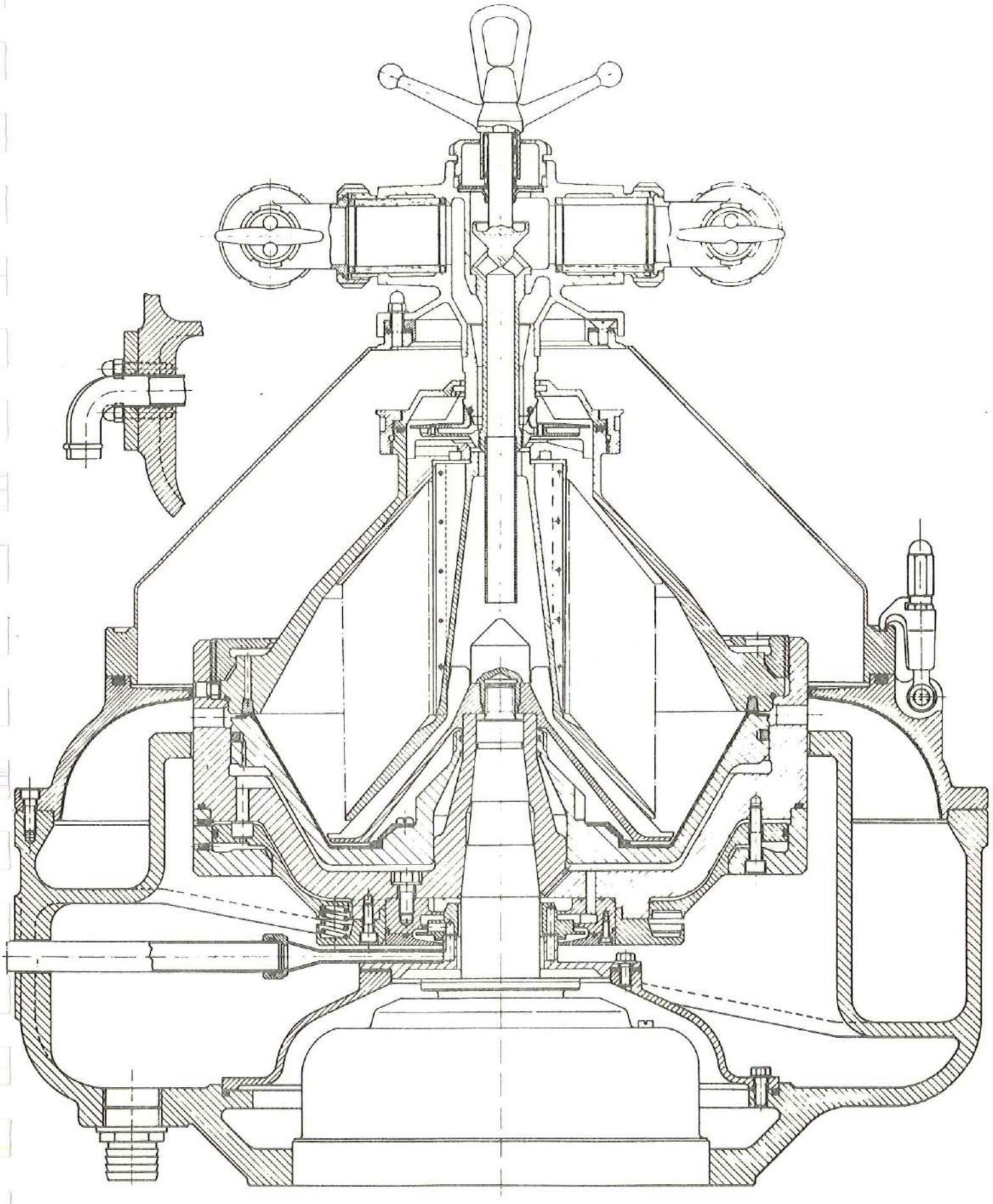
If practical experience shows that there are no counter-indications, the lubricants used can be consistent grease, the oil specified for the worm gears, castor oil, tallow or paraffin oil.

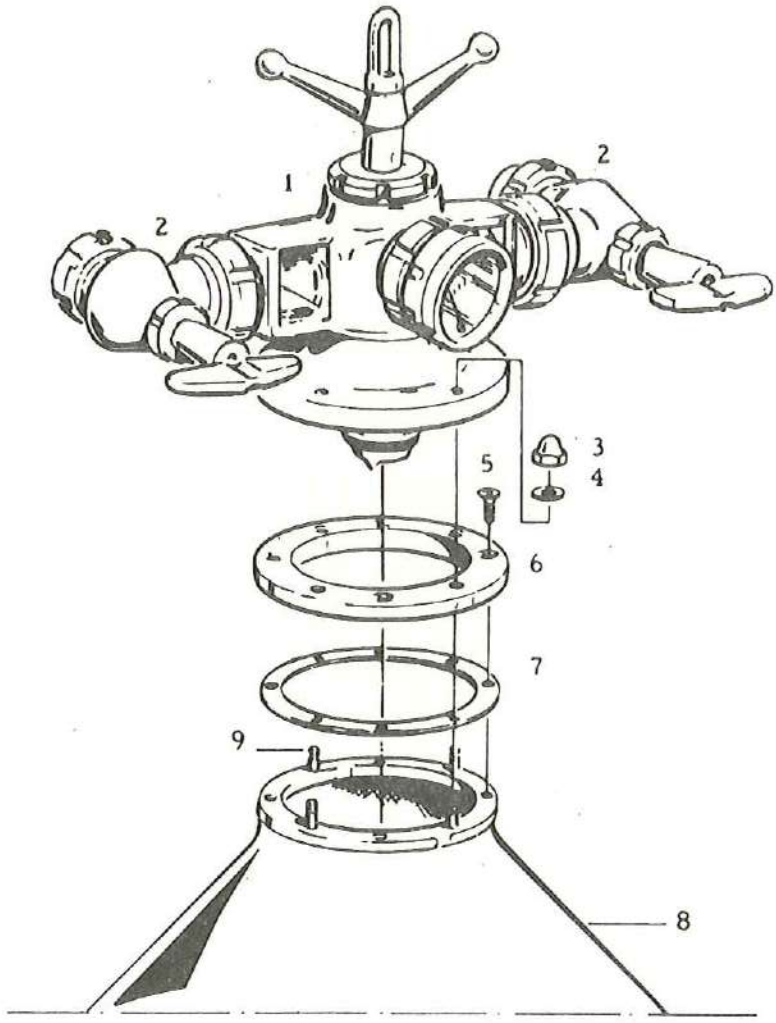
If a tendency to seizing is observed, the procedure described in Alternative 1 should be followed.



All the surfaces spotted on these drawings must be cleaned and lubricated before the parts are assembled.

Comply with the special instructions on the preceding page.





Parts list:

1 Feed and discharge device
-- see chapter X

2 Regulating valve (2)
-- see chapter X

3 Cap nut (4)
-- 72947

4 Washer (4)
-- 223101-34

5 Screw (4)
-- 2212608-03

6 Guide ring
-- 527971-01

7 Height adjusting ring (1-7)
-- 528096-01

8 Hood
-- 7005500-80

9 Stud bolt (4)
-- 67912

DISMANTLING

Before dismantling, make sure that the bowl is completely immobile. This can be checked from the revolution counter.
The dismantling operations giving access to the bowl should be carried out in the following manner:

- Slacken the coupling pulleys of the feed and discharge pipes,
- Unscrew the paring disc from the inlet pipe, turning the handwheel CLOCKWISE until the pressure of the spring no longer pushes it upwards,
- Slacken the clamp bolts and remove the hood from the frame.

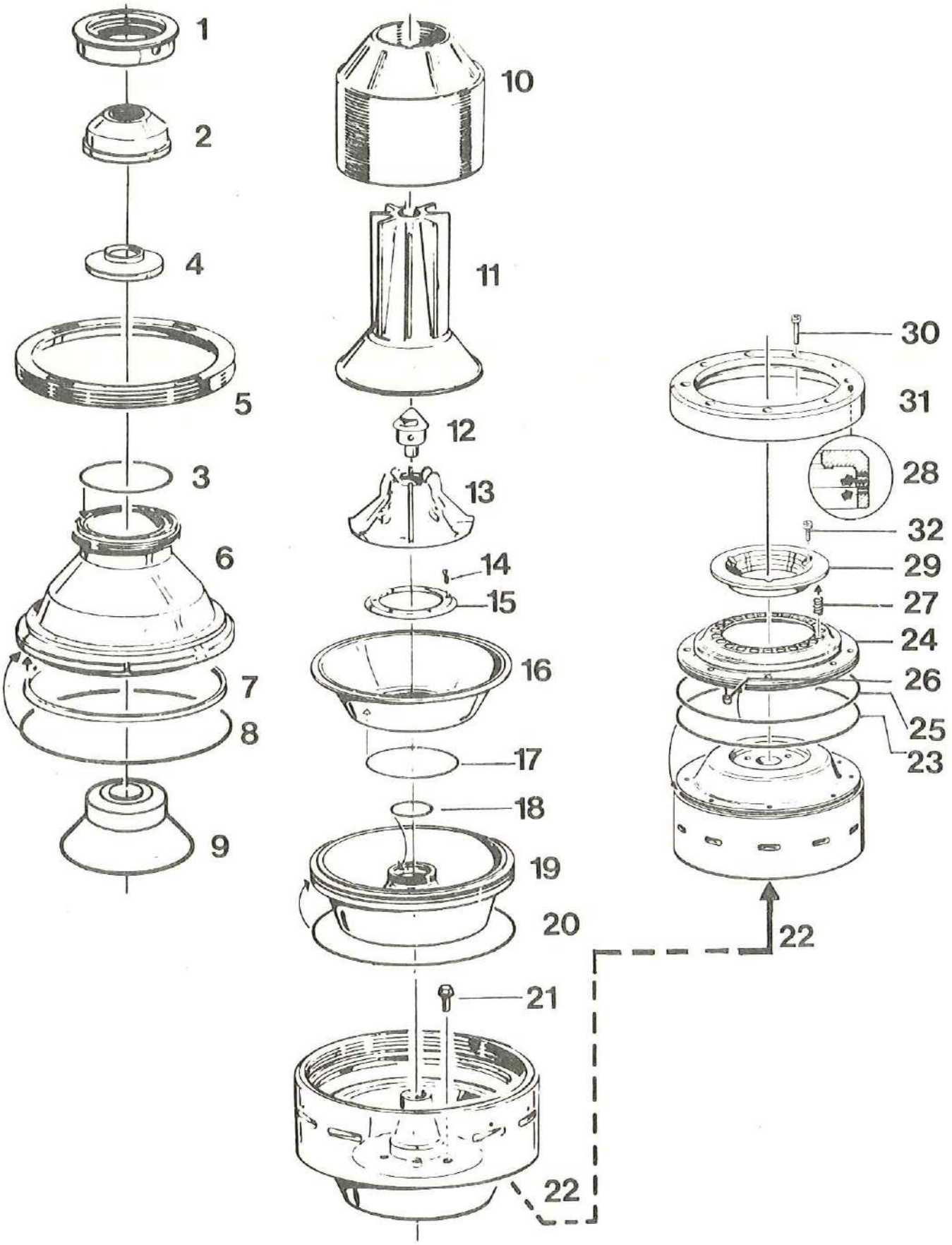
ASSEMBLY

Clean all the parts. Carefully lubricate the threads and contact surfaces. Make sure that the thread of the inlet pipe is well lubricated and that the lock ring has been properly inserted and is free from defects.

Lock the hood to the frame with the clamp bolts.

Connect the feed and discharge pipes.

Turn the handwheel downwards in an ANTICLOCKWISE direction until the threads of the inlet pipe and the paring disc are engaged, and then lock it at the bottom.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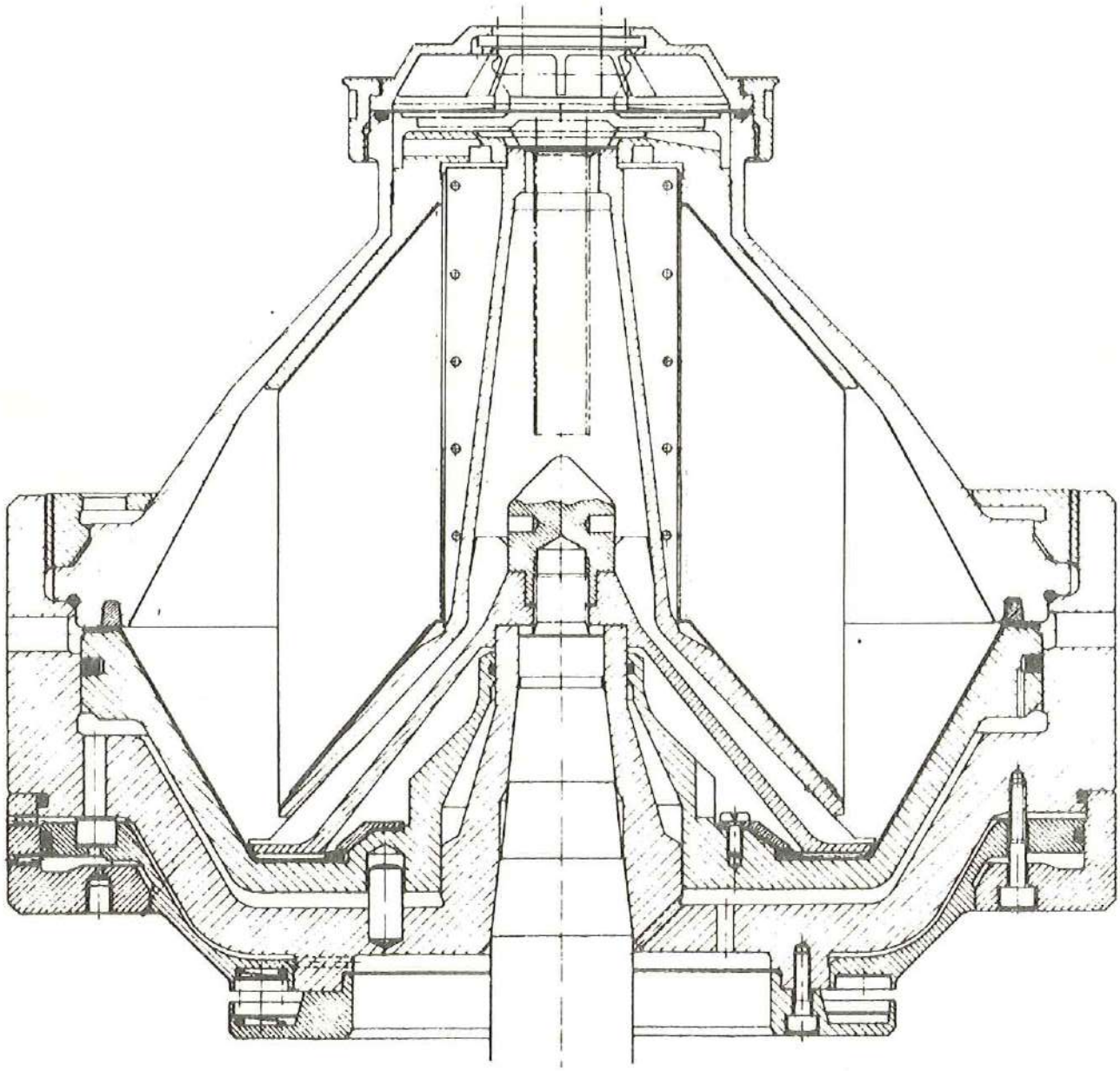
Ref.	Part No.	Quantity	Part name
	7006551-81	1	Bowl, complete
1	7005763-03*	1	Small lock ring
2	7005773-04*	1	Paring chamber
3	223401-77	1	Rubber ring
4	7005772-81	1	Paring disc
5	518782-04*	1	Large lock ring
6	518701-02*	1	Bowl hood
7	71440	1	Sealing packing
8	67587	1	Large rubber ring of bowl hood
9	7006133-04*		Top disc
10	7006533-80		Intermediate disc
11	7005775-03*		Distributor, complete
12	7005971-01	1	Bowl fixing nut
13	7005970-02*	1	Distributor support
14	2211724-23	6	Screw
15	518513-01	1	Flange ring
16	532961-01	1	Sliding bowl bottom lining
17	65133	1	Rubber ring
18	42154	1	Small rubber ring for sliding bowl bottom
19	540313-01*	1	Sliding bowl bottom
20	67575	1	Sealing ring for sliding bowl bottom
21	536773-01	3	Fixture screw for operating water system
22	540318-80*	1	Bowl body
23	223412-56	1	Bowl body sealing ring
24	540320-01	1	Operating slide
25	223412-56	1	Operating slide sealing ring
26	537864-03	3	Plug valve
27	71181	18	Spring
28	515133-02	2	Nozzle
29	536746-01	1	Spring housing
30	221721-19	9	Screw
31	7006547-01*	1	Dosing ring
32	221716-13	3	Spring housing screw

* Replacement of these items requires re-balancing of the bowl. Send the COMPLETE bowl to an ALFA-LAVAL agent.



CLEANING, OVERHAUL, LUBRICATION

Before carrying out the assembly procedure, clean the parts in contact with the liquid carefully; especially the seal rings, movable surfaces, guiding and contact surfaces, and threads.

Follow the respective instructions in chapters L and H.

REPLACEMENT OF PARTS

Each bowl constitutes a balanced assembly which becomes unbalanced if the parts marked with an asterisk (*) against their list number are replaced without the bowl being re-balanced.

GUIDES

When carrying out the assembly, make sure that the parts are placed in the correct positions indicated by the guides. Take care also that the guides themselves are not damaged.

PACKINGS SEAL RINGS

Check that the seal and packing rings are free from defects, and also make sure that the corresponding grooves and sealing surfaces are thoroughly cleaned.

After assembly, check that the ring is lodged in its SEATING and that it is adhering evenly to it.

THREADS AND DISC PRESSURE

Check the threads of the lock rings and the pressure of the discs at regular intervals. See chapter L.

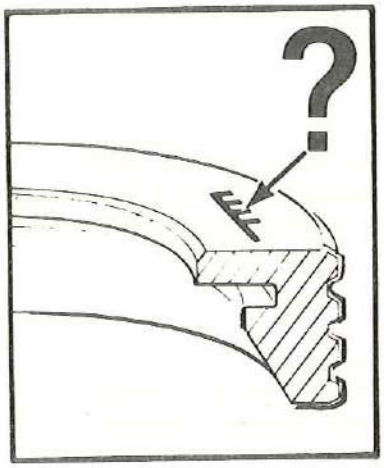
CORROSION EROSION

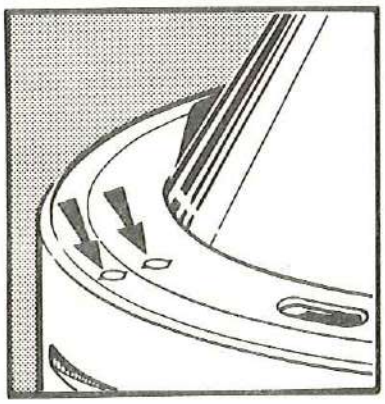
Liquids with aggressive properties, and likewise liquids containing rough particles, can cause damage through corrosion or erosion. If such undesirable effects are observed, consult the ALFA-LAVAL agent.

DISMANTLING
ASSEMBLY

The bowl is assembled and dismantled with the help of the special tools, in the order shown in the drawing illustrating the dismantled parts. The parts should be placed on a soft, dry and level surface. The bowl rotates clockwise, and the main parts therefore have lefthand threads.

LOCK RINGS





The lock rings have lefthand threads, and are therefore unscrewed in a CLOCKWISE direction. The large lock ring is loosened by striking the handle of the special spanner with a lead mallet or similar tool.

Before every assembly, clean and lubricate the threads of the lock rings and the surfaces in contact with the bowl hood and the bowl body. It may happen, especially with new machines, that some seizing is observed. This occurs when the lubrication is neglected, or some unsuitable lubricant is used. Careful lubrication of these surfaces will prevent unnecessary wear on threads and contact surfaces.

Tighten the lock rings in an ANTI-CLOCKWISE direction until a tight seal is obtained with the small ring, and in the case of the large ring until the bowl hood is FIRMLY fixed to the bowl body itself and the "Ø" signs are in line with each other (see drawing).

The lock ring should press the hood against the bowl body so that perfect adherence is obtained. It should also keep the distributor pressed against the bowl body, so that all the discs are firmly clamped. For final tightening, strike the spanner handle with a lead mallet or similar instrument (but NEVER extend the length of the spanner handle).

Note: For checking the disc set pressure and inspecting threads, see chapter L.

Bowl hood

Lift the bowl hood with the lifting tool. To make this easier, screw the tool's central screw downwards.

If the hood does not take up the correct position during the assembly, this means that some part already fitted is out of position and that a recheck should be made.

The seal ring fitted to the underside of the hood should not be removed unless it is being replaced. See chapter L, "Overhaul of bowl".

Disc set
Distributor

Lift the distributor together with the set of discs. The pin of the extractor should be lowered during the operation.

Make sure that the discs are superimposed on each other in progressive numerical order, with No. 1 at the bottom.

Cap nut

The cap nut has a lefthand thread and is therefore unscrewed in a CLOCKWISE direction. Lubricate the thread and the contact surface before reassembling. Screw the nut right down.

Sliding bowl bottom

The sliding bowl bottom is inserted into and extracted from the bowl body with the tool provided. Handle it with great care, to avoid damaging the sealing rim. If the sealing surface lying against the bowl hood needs improving in order to obtain better adherence, it can be adjusted by turning; provided that the sliding bowl bottom does not have an anti-erosion lining. See chapter L, "Bowl overhaul".

If the sliding bottom is fitted with an anti-erosion lining, check that this shows no signs of erosion or similar wear. To prevent the same points being permanently exposed to erosive influences, turn the lining by 5 to 10^{o} from time to time.

Bowl body

The bowl body does not normally need to be dismantled except for protective lubrication of the spindle cone - see chapter L "Bowl Cleaning" - or for dismantling the sludge discharge mechanism.

The screws in the bowl body must be unscrewed and removed before using the lifting tool. It is also advisable to detach the distributing ring with a punch. The bowl body is extracted from the spindle cone with the central screw of the lifting tool.

Clean and lubricate the central hole in the cone and the conical end of the spindle before reassembling the bowl body. But apply the lubricant sparingly, since excessive lubrication may cause slipping of the bowl on the spindle.

Hydraulic discharge mechanism

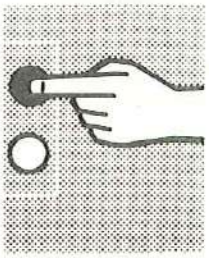
When the bowl body is dismantled, it is advisable to dismantle the actual bowl discharge mechanism, in order to lubricate and clean the channels and nozzles.

The movable flange is lifted with two screws that hold the bowl springs in place. The flange should be handled with great care. Assembly and dismantling in an oblique position, or unevenly, or the use of force, usually lead to distortion, and consequently to serious operating disturbances.

The valve plugs should only be removed when they are replaced. The nozzles and channels should be carefully cleaned.

Lubricate the movable flange and likewise the surface of the bowl body over which the flange moves.

See that the screws securing the spring housing flange and the dosing ring are equally tight.



OPERATION

DATA - see chapter C.

SPECIAL EQUIPMENT - see chapter X

SAFETY REGULATIONS

In all centrifugal separators the bowl rotates at a very high speed, normally between 100 and 150 revolutions per SECOND. The forces released are therefore such that it is essential to adhere strictly to the Instruction Manual as regards assembling the parts, starting up and stopping, and overhauls.

In this connection, remember particularly:

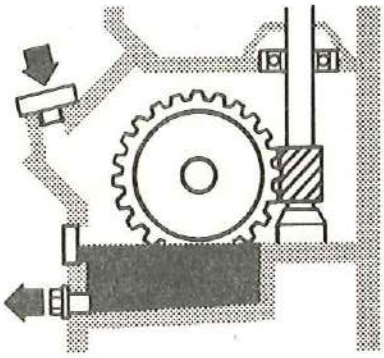
- to screw the bowl lock ring (lock rings) well home,
- to secure the frame carefully, as well as the product inlet and outlet connections,
- to check the speed,
- not to loosen any part of the machine until the bowl has stopped rotating,
- that the bowl body, bowl hood and lock ring must never be heated with an open flame in order to dismantle them,
- that the machine must never be used for processing liquids with a higher density (or temperature and suspension properties) than that for which the machine was originally designed. Always therefore consult an ALFA - LAVAL representative before using the machine for processing liquids other than those for which it has been devised.

BEFORE STARTING UP

Check particularly:

- that the brake is disengaged,
- that the hood is properly secured,
- that the oil level in the worm gear housing is above the middle of the gauge glass.

OIL LEVEL



The oil level must not fall below the rim of the gauge glass.
If the glass is curved, position it so that the curve runs vertically.
Keep the glass clean. Otherwise, on the inside of the glass, the line which forms can be mistaken for the level of the oil.
If the machine has been shut off (during the night, for instance), give the discharge plug a few turns to loosen it and discharge any deposits of water.

STARTING UP

Start the motor and wait until the bowl attains maximum velocity.

ACCELERATION PERIOD

Shortly after starting, the bowl may begin to vibrate more than normally.

The cause of this is usually a lack of balance resulting from poor cleaning of the bowl.
Shut off the machine and clean the bowl if the vibrations are very considerable.
Heat is generated in the clutch coupling during the running-up, especially when the pads on the friction blocks are new, causing smoke and a smell of burning. This is all normal and has no importance.

CLOSING THE BOWL

Before closing the bowl, check the number of revolutions on the revolution counter against the table shown in chapter C.

The acceleration period indicated in chapter C may vary; depending, for example, on the condition of the clutch pads.

Close the bowl and open the operating liquid valve.

FEED

Clarification

Use the feed valve to regulate the throughput so that the desired degree of clarification is obtained.

Then use the product outlet valve to regulate the back-pressure arising from elimination of the air bubbles.

Take particular care to see that the feed intake is constant.

SLUDGE DISCHARGE

Before each discharge, it is essential to interrupt the product intake almost completely, and to resume this only 7 to 8 seconds after discharge has been carried out; thus enabling the bowl to regain its full rotation speed.

The frequency of the discharges is directly related to the percentage of solid matter which the product contains, and to the level fixed for the throughput per hour. To avoid stoppages and interruptions of the running, it is advisable to carry out frequent discharges.

Bowl discharges are only partial and take place at a constant volume. That is to say, only part of the contents of the bowl is discharged.

It is of the utmost importance to be able to ascertain what proportion of solid matter the process product contains, and to regulate the frequency of the discharges and hourly throughput in accordance with this proportion.

CLEANING THE BOWL BY RINSING

The bowl need not be dismantled after every processing run if it can be adequately rinsed out before being stopped.

In some cases, it is sufficient to shut off the intake of the process liquid, introduce a rinsing agent such as water, and operate the sludge discharge mechanism a few times. In other cases, however, a suitable detergent must be added to the rinsing liquid, and a larger number of discharges completed.

If the product to be processed contains substances that can cause corrosion or adhesive sludges, it is particularly important to give the bowl a thorough rinse. Residues from corrosive liquids can be neutralized by adding suitable counter-agents to the rinse. A procedure suitable for the job in hand can be worked out from practical tests, and its effectiveness checked when the bowl is dismantled.

The check should be concentrated primarily on the intermediate discs.

If a detergent is used, the last discharge or discharges must always be carried out with a pure rinsing liquid that contains no additives.

If there has been a long period of inactivity between runs of the machine, the bowl should be cleaned by hand. See chapter L.

Note. If the machine begins to vibrate excessively, this can mean that the bowl has not been properly cleaned. In such cases, the machine must be stopped for manual cleaning and the rinsing procedure re-examined from the outset.

Symptoms	Cause	Remedy
Machine vibrations	1. Moderate vibrations normally occur at the critical number of revolutions during the acceleration and slowing down periods.	None.
	2. Unbalanced bowl due to:–ineffective cleaning; faulty assembly; wrongly tightened lock ring; bowl assembled with parts from different machines.	Stop immediately to ascertain fault. Badly tightened lock ring is a serious danger.
	3. Foundation rubber washers have lost elasticity.	Renew rubber washers. See that these are renewed every 2 years.
	4. Top bearing spring broken.	Replace all collar springs.
	5. Foundation too weak.	Reinforce foundation.
Speed too low Acceleration period too long	1. Brake engaged.	Disengage brake.
	2. Clutch pads are worn out or dirty from oil or grease.	Replace or clean all pads.
	3. Drop in mains voltage.	Check mains voltage. (D.C.)
	4. Damaged ball bearing.	Identify and replace defective ball bearing.
	5. Other machine faults.	Stop immediately. Check that bowl can be turned by hand.
	6. Motor faults.	Replace or repair motor.
Starting power of motor too low	1. Ammeter reading wrong.	
	2. Clutch pads are worn out or dirty from oil or grease.	See–Speed too low.
Starting power of motor too high	1. Ammeter reading wrong.	
	2. Motor fault.	Replace or repair motor.
	3. Damaged ball bearing.	Identify and replace defective ball bearing.
	4. Other machine defects.	See–Speed too low.
Water present in oil bath	1. Condensation.	Drain water.
	2. Seal rings not tight or badly fitted.	Replace seal rings and fit them correctly.
	3. Leakage through top bearing.	Replace seal rings and fit them correctly.
Noise in worm gear housing	1. Oil quantity wrong.	Check quality and quantity.
	2. Worm wheel or worm screw worn.	Replace worn parts. Replacement of complete gear is generally advisable.
	3. Damaged or worn ball bearing.	Replace ball bearing.
Noise from clutch	1. Normal when staring and stopping due to sliding of friction blocks.	None.
	2. Faulty play between coupling disc and rubber joint.	Adjust.
	3. Speed too low.	See–Speed too low
Smell	1. Normal on starting and stopping, when sliding of friction blocks emits smell of burning.	None.
	2. Heating of ball bearing.	Check machine and identify spot. Replace ball bearing.
	3. Motor overheated.	Trace cause. Adjust maximum current, if any.
Rasping noise	1. Wrong height adjustment.	Stop and adjust–See chapter L.
Clarification:- Poor clarification	1. Unsuitable separation temperature.	
	2. Sludge space overloaded.	Empty bowl more frequently.
	3. Throughput too high.	Reduce input.
Bowl is clogged with sludge	1. Cleansing with unsuitable water or inadequate cleansing.	
	2. Sludge too viscous.	Empty bowl more frequently.
	3. Frame clogged with sludge.	Clean frame and reduce interval between discharges. Flush sediment casing during discharge cycle.
	4. Sludge tank overfull.	Empty sludge tank and clean bowl body. Check whether solid particles have clogged the bowl's intermediate discs.
Too much process liquid in sludge	1. Feed not shut off during total discharge.	
	2. Leakage between bowl hood and sliding bowl bottom.	Check. Change packing. If necessary, smooth the sliding bottom on a lathe.
	3. Bowl not completely closed.	Check the process liquid system, and any automatic controls fitted.

CONTROL SYSTEM

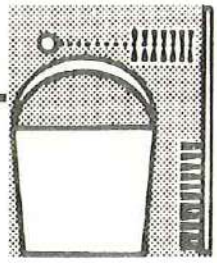
If the bowl does not shut after discharge, or fails to open after a discharge impulse, or opens spontaneously during running, check the intake of the operating liquid. Trace the fault systematically, following the course of the operating liquid stage by stage.

If the supply and pressure of the operating liquid are in order, the intake system and the movable flange of the bowl should then be examined. If the machine is automatically controlled, continue the investigation by examining the automatic control system.

In most cases the trouble is caused by faulty assembling, dented parts, insufficient lubrication, or worn or distorted seal rings.

If on the other hand the cause lies in obstructed channels or nozzles, inserting a metal gauze with a closer mesh into the filter in the operating liquid system can prevent this from occurring again.

When the obstruction is caused by chalky deposits, it may be necessary to use a suitable decalcifying filter for preventing the formation of incrustations.



CLEANING. OVERHAULS

It has proved very difficult in practice to indicate how often cleaning should be carried out, and how detailed overhauls should be.

Nevertheless, by following the instructions given in this chapter it should not be difficult to draw up a suitable working routine related to the particular local conditions present.

The ALFA-LAVAL representative will always be glad to give further advice and information.

GENERAL ADVICE

During cleaning and overhauls, always follow strictly the instructions given in this manual regarding dismantling, lubrication and reassembling procedures.

Set of spares

Make it a habit to inspect and replenish the set of spares (and tools) once a year. It is advisable to carry stocks of the parts most subject to wear.

Interruptions of service

If the machine has to be taken out of service for some time, the parts in contact with liquids should be lubricated. Preferably, the bowl should be removed from the spindle. The seal rings should be taken out, and kept flat, not hung up. If the machine has remained idle for some time, drain off the condensed water from the worm gear housing.

The time intervals set out below refer to continuous running. If the specified number of operating hours is not attained during the respective period, this can be correspondingly extended. It is imperative, however, to carry out a complete overhaul at least every three years.

OPERATING HOURS	
Every 24 hours	Check on running Behaviour of machine. Power consumption. Oil level in worm gear housing. Observation of discharged liquids. Temperature. Throughput. Sludge tank. Level in operating liquid tank, and pressure. Automatic control system, if any (indicator lamps).
Every 200 hours (weekly)*	Gear housing Check oil and top up if necessary. Drain off any condensations. Further action Check speed. Trace leaks.
Every 750 hours (monthly)*	Bowl Dismantling of bowl and complete cleaning of its internal parts. Thorough cleaning of lock rings, lubrication of same, and oiling of nave hole at base of bowl. Check on seals. Clean and oil bowl spindle cone aperture. Control system Check flow and pressure of operating liquid. Check discharge interval of automatic control device. Filters and strainers Clean and check.
Every 1000 hours (every two months)*	Gear housing Cleaning and oil change. (In case of overhaul of new installations after 300 hours of running and in seasonal operations before every working period.) Bowl Dismantle and clean mechanism for discharging sludge from bowl. Check springs, seals and sludge outlet parts. Check for erosion.
Every 6000 hours (annually)*	Complete overhaul, cleaning and lubrication. Bowl check Pressure in set of discs. Lock ring packings. Corrosion and other structural damage. Transmission Dismantle bowl spindle, clutch coupling and worm wheel shaft. Check particularly ball bearings and gear; likewise suspension springs and buffers. Change pads of friction blocks. Renew grease in nave. Frame Renew brake lining. Touch up paint. Check elasticity of vibration dampers and mounting of machine.

* With continuous running

CLEANING AGENTS

Machine parts	Use kerosene, white spirit, mineral spirit or other solvents with equivalent properties. If the detergent is not suitable for the product to be processed, the bowl and the inlet and outlet parts in contact with the process liquid can if required be cleaned with a soda or triphosphate of soda solution, or with any other degreasing agent with an alkaline base. Benzine or benzol may also be used for metal parts. But in that case the cleaning should be done in the open air in order to avoid the risk of explosions, and because benzol vapours are dangerous when inhaled.
Seal rings	Wipe with a cloth soaked in one of the detergents mentioned above.
Coupling pads and brake lining	Trichlorethylene should be used for cleaning these parts and the corresponding friction surfaces. Note that this should be done with attention to safety precautions (ventilation), and preferably in the open air.
Discharge mechanism	Any chalky deposits on the control system components can be dissolved in a solution containing about 10% acetic acid heated to about 80°C (175°F).

BOWL CLEANING

How often the bowl should be stopped, dismantled and cleaned must be learnt from experience.
This depends, among many other things, on the type of sludge contained in the liquid being processed, and likewise on the condition of the filters and strainers inserted in the machine's feed system. Improperly fitted or defective strainers let through large particles which become inserted between the bowl discs. If this should happen, the discs should be cleaned one by one. When deciding the intervals between dismantlings, attention should also be paid to the possibility that the lock ring is tending to stick to the bottom of the bowl. It is difficult to specify how often the lock ring needs to be unscrewed for lubrication, as this depends partly on the lubricant used and partly on the care with which the lubrication has been carried out. Initially, the bowl spindle cone should be lubricated at least once a month, to prevent the bottom of the bowl from sticking to the spindle.

The intervals between lubrications can also be extended in the light of experience.

If the liquid for processing contains salt water, or the sludge is corrosive (because it contains acids or salts), the bowl must be washed out with plentiful supplies of flushing liquid and repeated drainings immediately the operation cycle is completed - and at least once a day.

Discharge parts

Clean the control parts whenever the bowl is removed from the spindle.

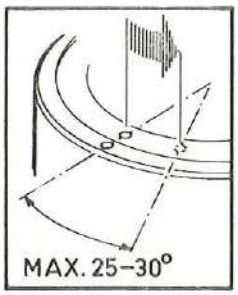
Clean the channels, nozzles and control system. The hardness of the water will determine how often cleaning must be carried out.

BOWL OVERHAUL

Replacement of parts

The bowl parts marked with an asterisk (*) on the explanatory drawing in chapter I can be replaced only by an authorised ALFA-LAVAL agency since their replacement requires rebalancing. The COMPLETE bowl must therefore be sent in. Other parts can be replaced on the spot.

Thread checking



Lock ring with external thread

Lock ring with internal thread

In a new bowl, the guide marks (Ø) should be exactly in line with each other. In course of time, these marks may become displaced through the threads becoming worn. When the (Ø) mark on the lock ring becomes displaced by more than 25-30° in relation to the other mark, an authorized ALFA-LAVAL representative should be consulted. The thread should be checked at least once a year, proceeding as follows:

Unscrew the large lock ring and remove the distributor together with the set of discs. Remove the outer seal ring of the bowl hood, fit the hood and screw on the lock ring. Tighten the large lock ring anti-clockwise until the bowl body is in tight contact with the hood. Measure the angle.

Note. When the indicating marks cannot be clearly made out, punch them in again (upon the same spot).

Disc set pressure

If the lock ring can be tightened with the spanner, without resistance, until the hood lies tightly against the bowl body, the pressure should be increased by adding an extra disc (included in the set of spares) on top of the set of discs.

Every two months

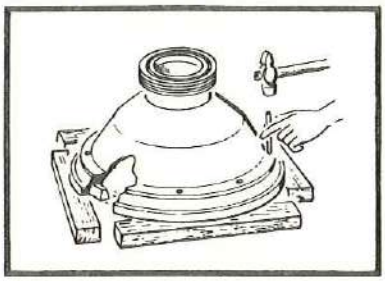
Bowl erosion check.

Every year

Bowl corrosion check.

Bowl hood seal ring

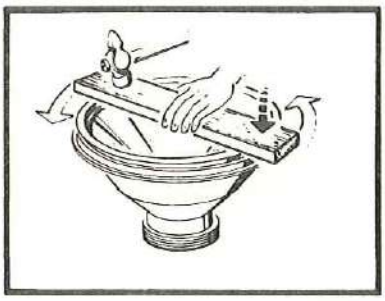
When changing the seal ring, extract it from its seating in the hood with a punch; inserting this alternately in the holes provided for this purpose.



Press the seal ring into the groove using a levelled board placed across the ring.

Strike the board without too much force, and with it correctly positioned above the ring, on each side in turn.

Turn the board round, a little at a time, so as to push the ring into the groove as evenly as possible.



If a new ring is only gripping on the outside because it has too large a diameter, this is due to moisture absorption having dilated it. The ring can regain its correct dimensions after being dryed for about 24 hours at a temperature of 80° to 90° (in a drying oven). If the ring is too narrow, immerse it in hot water at a temperature of 70° to 80° for about 8 hours.

POWER TRANSMISSION

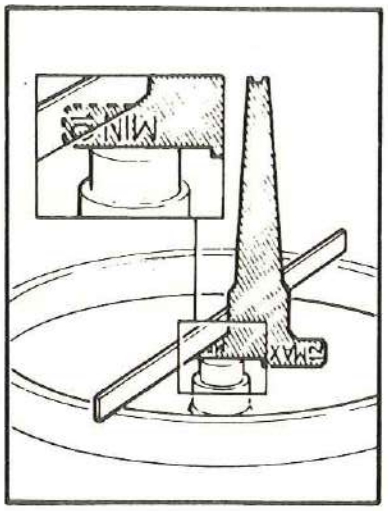
Bowl spindle	When overhauling the bowl spindle, also check particularly carefully the hole in the nave of the bowl, the conical part of the spindle and the height adjustment.
Clutch coupling	Check the bell housing, friction blocks and brake lining.
Brake	Roughen the surfaces of the pads with a file. Remember that the pads should all be changed together, even when only one of them is worn out.
Worm wheel shaft Worm screw	When changing the worm wheel, the worm screw should be changed as well; that is to say, the complete couple.
Oil sump	Clean the oil sump of the worm wheel and refill with new oil.
FRAME	Check the rubber washers of the anchorings. Renew them every two years. Clean the top part of the frame within which the bowl rotates.

HEIGHT ADJUSTMENT

The height levels should be checked during the annual inspection and after any replacement of parts that affect the height setting.

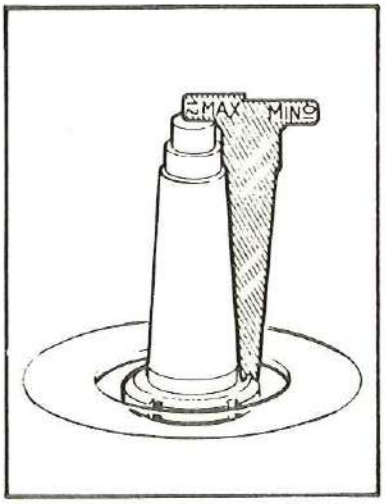
The tolerances are restricted, and it is therefore essential that all parts are well cleaned and free from slime.

BOWL SPINDLE



Remove the seal ring from the ring of the frame.
Lay a ruler across the frame ring.
Pass the narrowest part of the control templet, marked MIN (10 mm), between the ruler and the end of the spindle.
There will be a little play between the control templet and the ruler, but not enough to admit the widest part of the templet marked MAX (12 mm). The height setting is adjusted with adjustment rings (see chapter P).

Height control of distribution ring



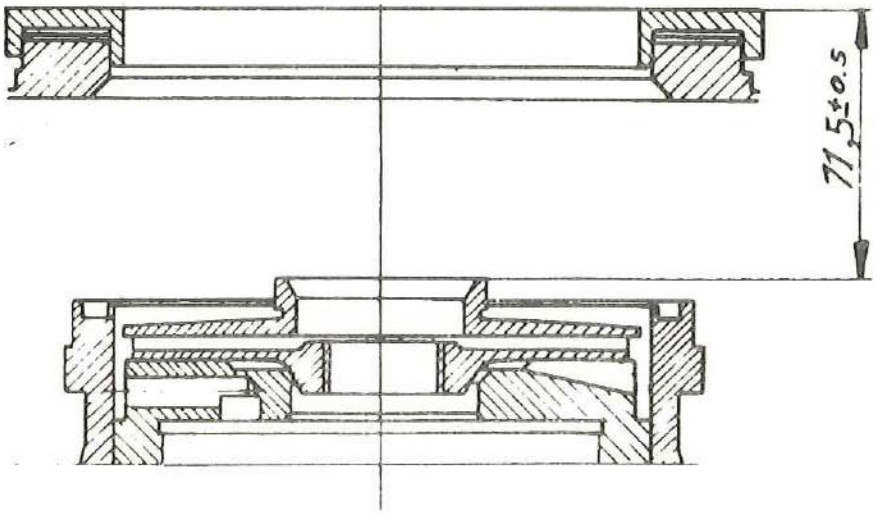
Position the control templet on the end of the spindle so that the measurement figure 177.3 is facing towards the spindle.
There should be a little play between the lower part of the templet and the level of the distribution ring.
Turn the templet until the 178.3 measurement figure is facing towards the spindle.
There should now be a little play between the templet tongue and the top of the spindle, otherwise the distributing ring is being positioned too low.
The height setting is regulated by the height adjusting rings fixed below the base of the control device. See "Distribution device" in chapter S.

Height control of bowl paring disc

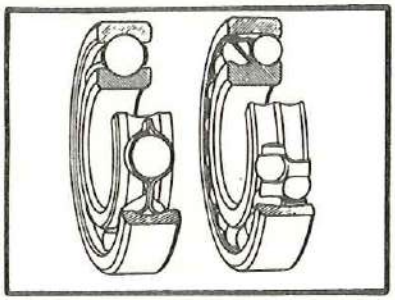
Assemble the bowl without the small lock ring.
Tighten the large lock ring until the bowl hood is firmly fixed to the bowl body, as indicated in chapter I.
Fit the frame hood and fasten it with the clamping screws.
Dismantle the feed and drainage system.

Height adjustment rings

Place a ruler across the opening in the hood. Use a slide gauge to measure the distance between the upper rim of the paring disc and the top surface of the guide ring. This should correspond to the measurement shown in the diagram. For adjustment, the adjusting rings are used. (See chapter I, "Feed and Discharge".)

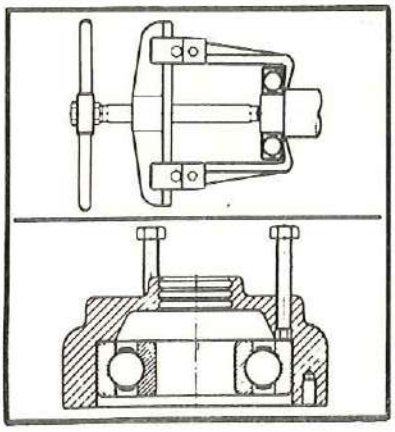


BALL BEARINGS. ROLLER BEARINGS



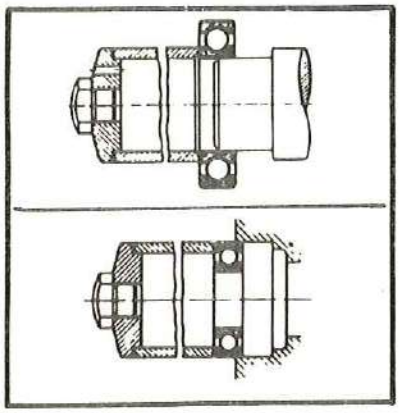
Use the greatest cleanliness when handling roller bearings.

Avoid unnecessary dismounting of bearings. They may suffer damage, or impurities may get into them during the handling.



Dismounting

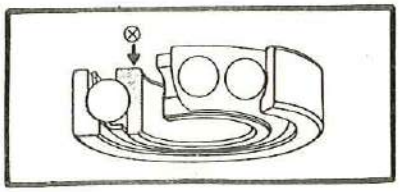
Detach the bearing from its seat by pressing against the race having the tightest fit. Use a puller or special tool. Thus, apply the pressure to the inner race when the bearing sits tightly on the shaft, and to the outer race when the bearing is tightly fitted in the housing respectively.
Arrange dismounted bearings and other parts in assembling order to avoid confusion.
Check the shaft end and the bearing seat in the housing for damage indicating that the bearing has rotated on the shaft, and in the housing respectively. Replace the damaged part, if the faults cannot be remedied by polishing or in some other way.



Fitting

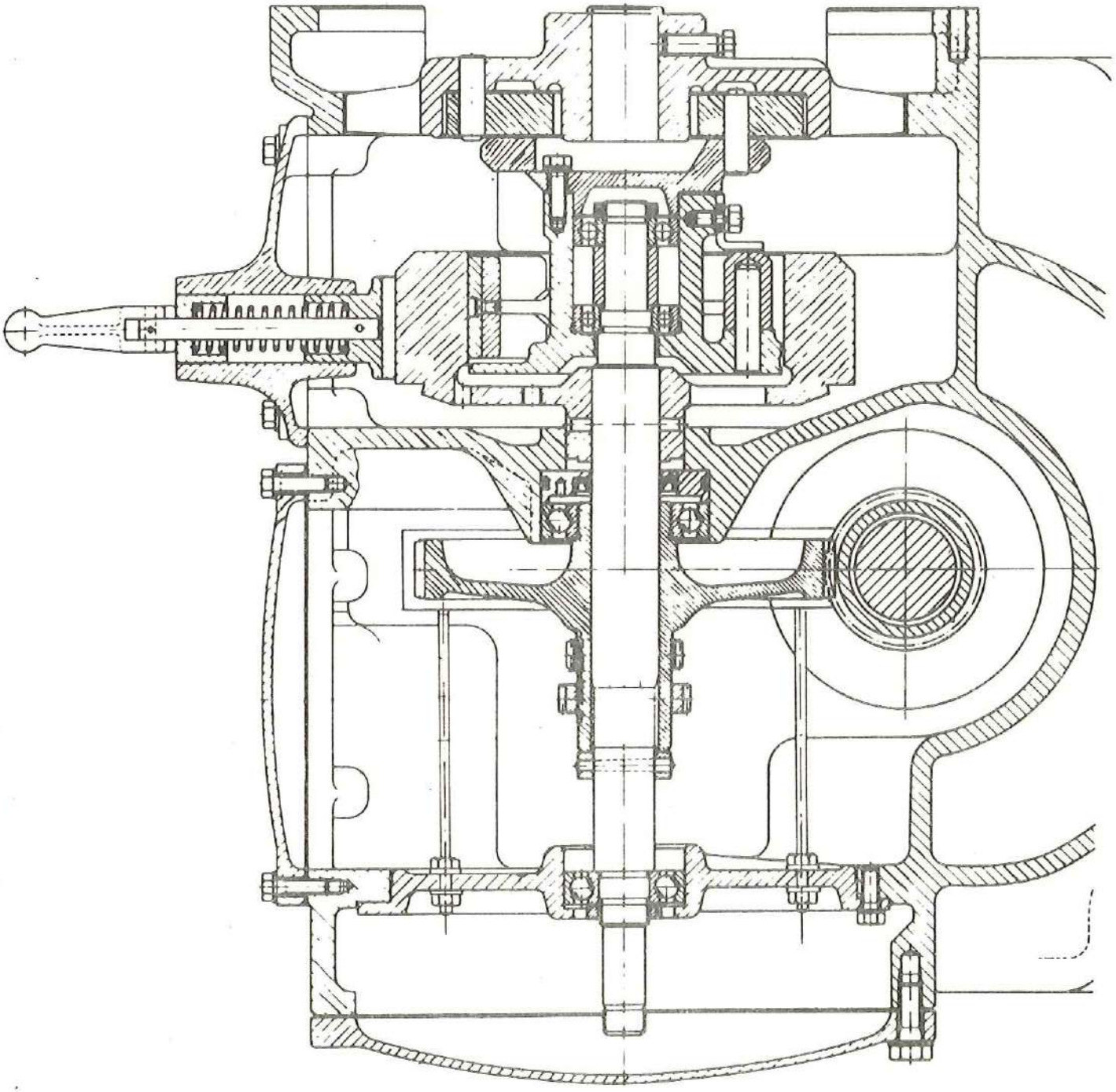
Leave new bearings in original wrapping until ready to fit. The anti-rust agent protecting a new bearing need not be removed.

Fit a bearing on a shaft by pressure applied to the inner race and in a housing by pressure applied to the outer race. Use a suitable piece of pipe or a metal drift and a hammer. Never strike the bearing directly.
Bearings sitting with tight fit on a shaft should be heated in oil before assembly. The oil temperature should not exceed 100 ^{o}C. Never leave the bearing in the oil bath longer than required for throrough heating.



Angular contact ball bearings

Always fit single-row angular contact ball bearings with the stamped side of the inner race facing the axial load.

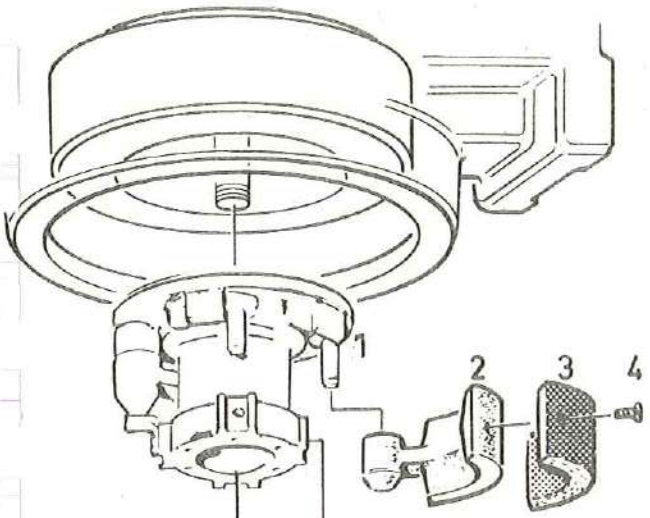


DISMANTLING AND ASSEMBLY

Dismantle and reassemble the parts in the sequence shown in the illustrations on the following pages, and using the special tools available.

In addition to the specific instructions given, always remember the following points:

- Cleanliness and precision are essential.
- Make sure that all seal rings and gaskets are intact.
- Replace spring washers whenever necessary.
- Replace all clutch pads, even if only one of them is worn.
- Oily clutch pads should be degreased as directed in chapter L, and roughened with a file.
- Avoid unnecessary dismantling of ball bearings.
- Follow the instructions given in chapter L for fitting of roller bearings.
- Tighten ring nuts with the appropriate spanners, and secure them with lock washers.
- The worm gear housing should be cleaned and refilled with new oil after any run that may have introduced impurities.
- Follow the instructions for cleaning and overhauls in chapter L, and the lubrication instructions in chapter H.



1. Complete nave -- 65152
2. Friction block with pads and screws
   50 Hz -- 74313
   60 Hz -- 74315
3. Pad (3) -- 71628
4. Screw (9) -- 8341
5. Holding bracket (3) -- 65158
6. Spring washer (3) -- 40040
7. Screw (3) -- 73801

Ball bearing
-- 8726 (SKF 6206*)

Spacing sleeve
-- 38160

Ball bearing
-- 7026 (SKF 6305*)

Lock washer
-- 38159 (SKF MB 5)

Round nut
-- 67472 (SKF KM 5)

Packing
-- 38164

Coupling pulley
-- 65155

Spring washer (6)
-- 40040

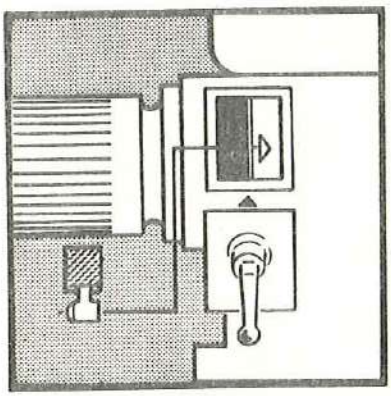
Screw (6)
-- 72933

Rubber coupling disc
-- 60571

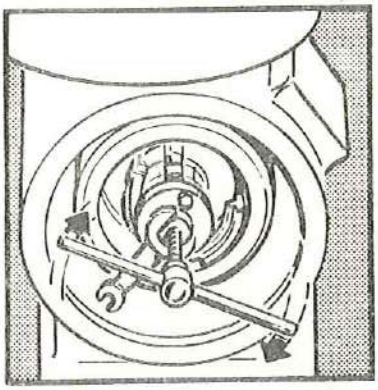
* Or equivalent bearing of other make.

First dismantle drive mechanism

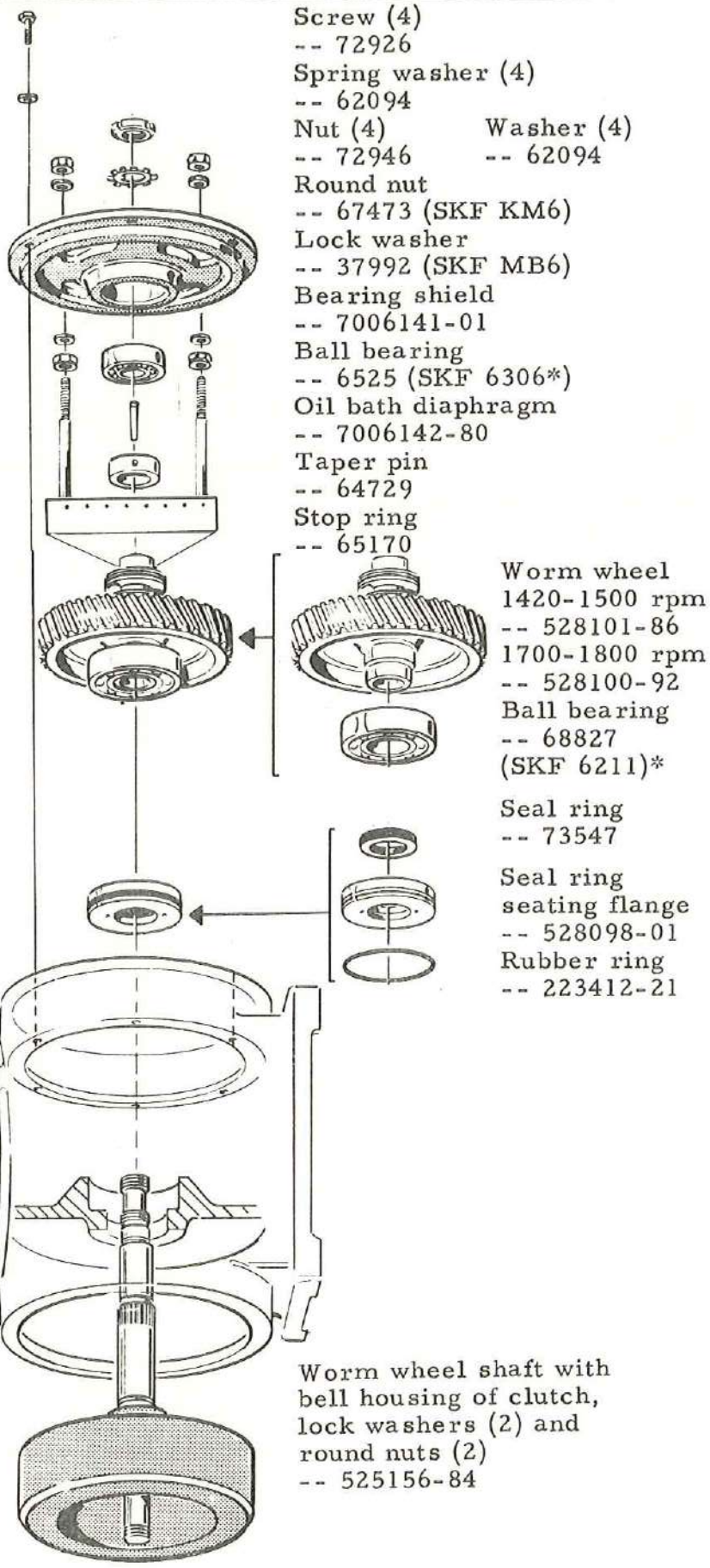
The friction blocks can be removed without any need to dismantle the rest of the clutch.



When the blocks are assembled they should move freely, and the holding brackets should be fitted into the special groove in the nave to prevent the blocks from slipping out of their pins.



The illustration shows how the nave is removed from the shaft. To assemble, first fit the nave on to the shaft and then the inner ball bearing. Fill one-third of the area around the spacing sleeve with ball bearing grease.
To push the bearings home, use the special tool.



Screw (4)
-- 72926
Spring washer (4)
-- 62094
Nut (4) Washer (4)
-- 72946 -- 62094
Round nut
-- 67473 (SKF KM6)
Lock washer
-- 37992 (SKF MB6)
Bearing shield
-- 7006141-01
Ball bearing
-- 6525 (SKF 6306*)
Oil bath diaphragm
-- 7006142-80
Taper pin
-- 64729
Stop ring
-- 65170

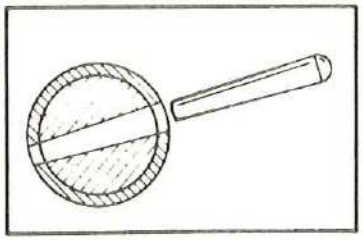
Worm wheel
1420-1500 rpm
-- 528101-86
1700-1800 rpm
-- 528100-92
Ball bearing
-- 68827
(SKF 6211)*

Seal ring
-- 73547

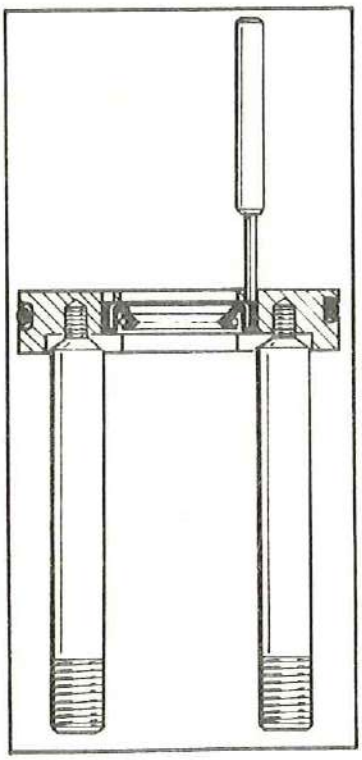
Seal ring
seating flange
-- 528098-01
Rubber ring
-- 223412-21

Worm wheel shaft with bell housing of clutch, lock washers (2) and round nuts (2)
-- 525156-84

First dismount the motor, clutch and side-cover of frame.

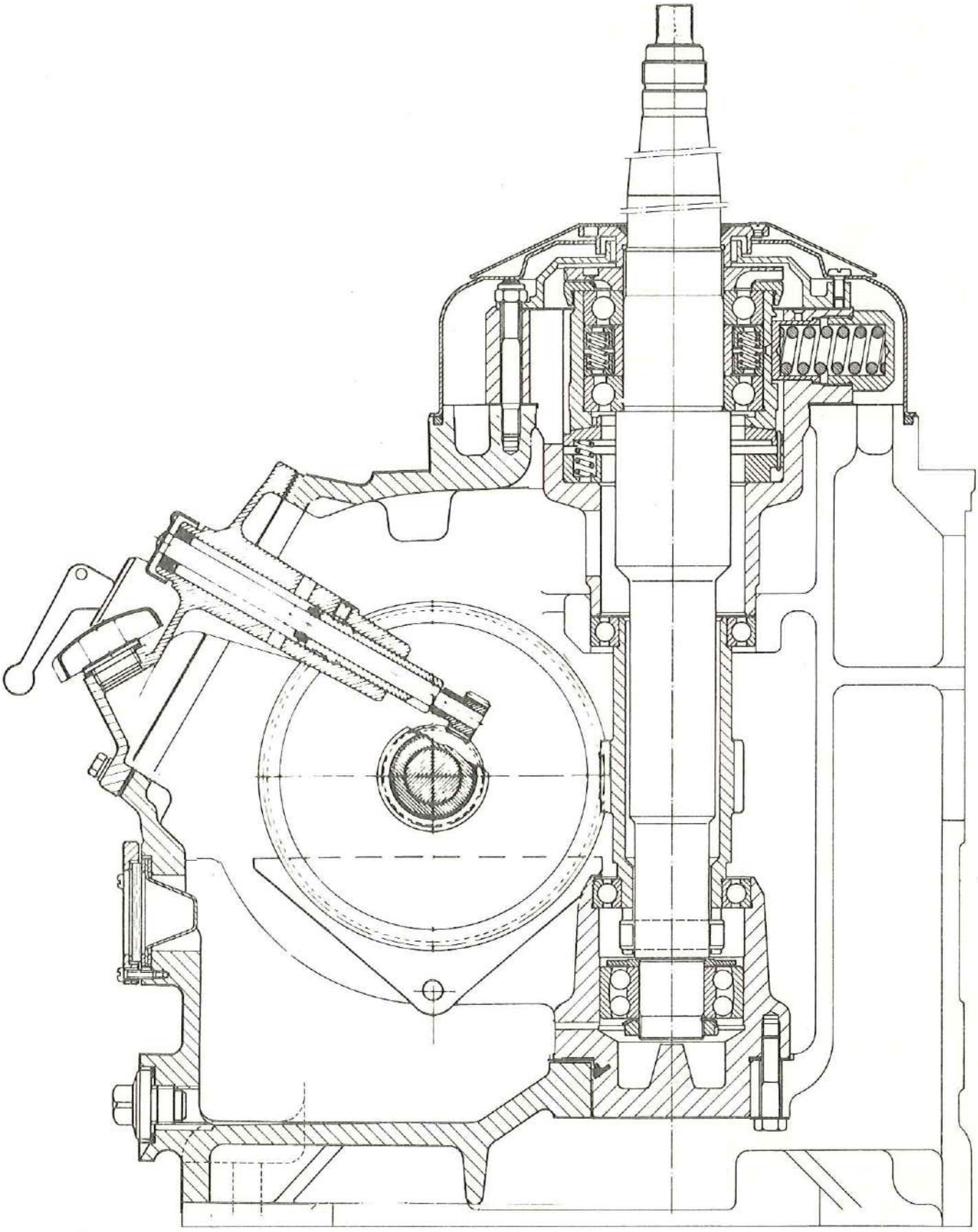


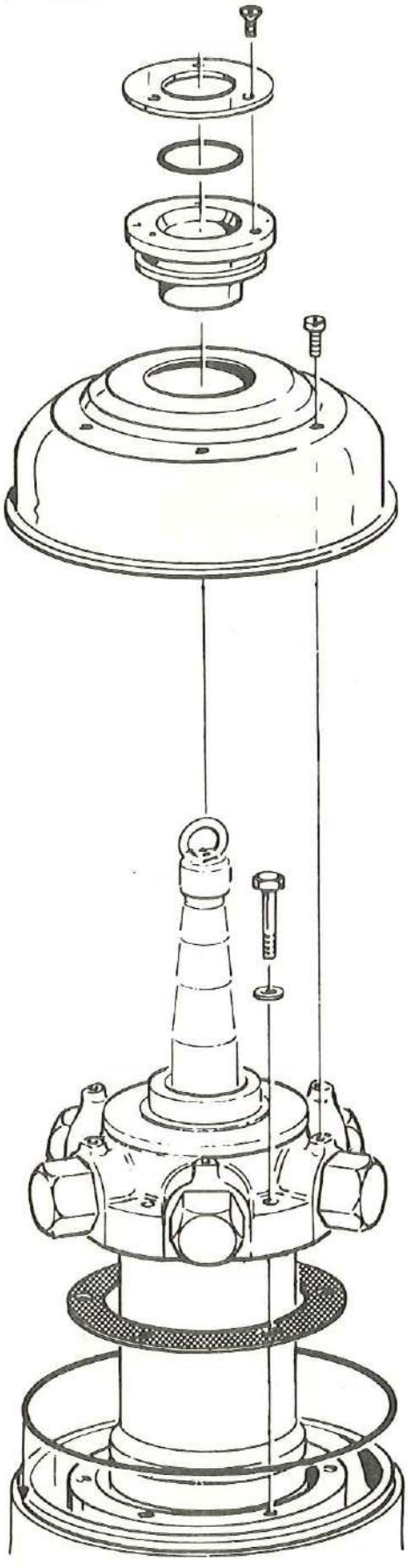
Align the stop ring correctly when fitting - both the hole and the pin are tapered (taper 0.02). If there is any play, the hole must be reamed.



Use the two motor guide pins to extract the seal flange from the shaft. When assembling, make sure that the seal ring is turned as shown in the illustration.

* Or equivalent bearing of other make.





Screw (3)
-- 2212601-05
Small cap
-- 68919

Rubber ring
-- 65201

Protective coupling
-- 521659-02

Screw (6)
-- 2211723-08

Collar cap
-- 65199

Screw for lifting eyebolt (6)
-- 72936

Washer (6)
-- 62094

Gasket
-- 65192

Rubber ring
-- 64104

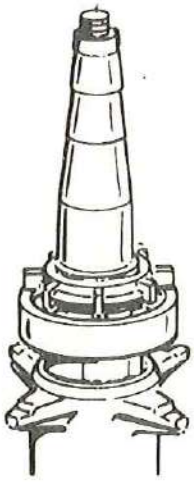
ASSEMBLY AND DISMANTLING OF COMPLETE BOWL SPINDLE

To obtain access to the bowl spindle for dismantling it, dismantle the bowl body and the paring disc device for the operating liquid.

It is preferable to loosen the plug screws in the collar while the spindle is still fixed to the frame.

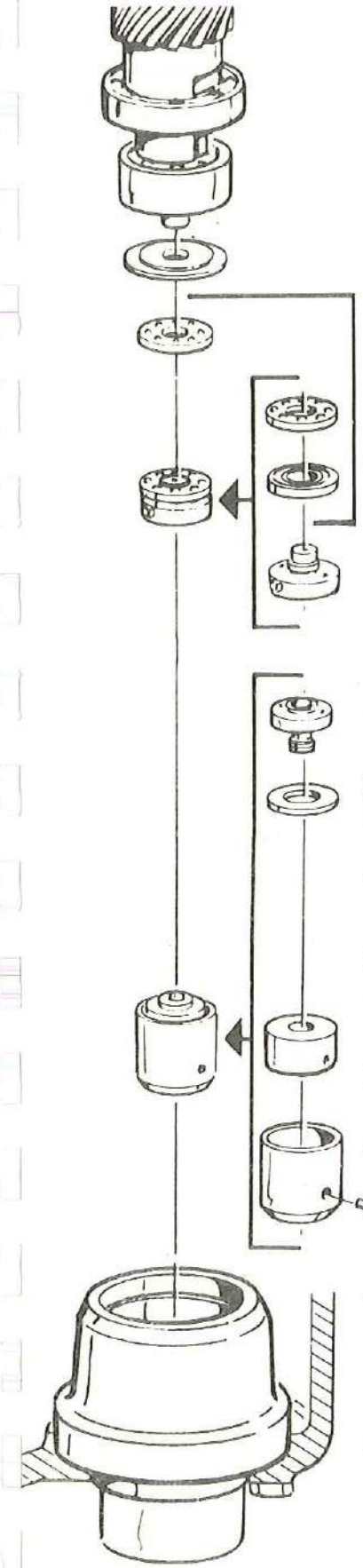
Before the bowl spindle can be lifted out, the worm wheel must be moved along its shaft in order to disengage the worm screw.

To facilitate removal, screw up the lifting eyebolt.



When the bowl spindle has to be fitted on to the frame, the ball bearings housing and the collar body should not be assembled. (See illustrations.)
Make sure that the bottom ball bearing is correctly fitted into the base bushing.

The flat surfaces of the housing of the collar ball bearing should face the buffers. After assembling, make sure that the bowl spindle turns when the worm wheel is rotated. Check the height setting (see chapter L).



DISMANTLING AND REASSEMBLY OF BOTTOM BEARING OF BOWL SPINDLE

The complete bowl spindle should be dismantled to make the parts accessible for dismantling.

There is normally no need to dismantle the parts unless these have to be changed or the bowl spindle needs height adjustment.

For dismantling, use the lifting-eye-bolt.

Note. The top ring of the thrust ball bearing, like the guide washers, is firmly fixed to the bowl spindle. Remember to turn the ball bearing ring into the correct position when carrying out the assembly.

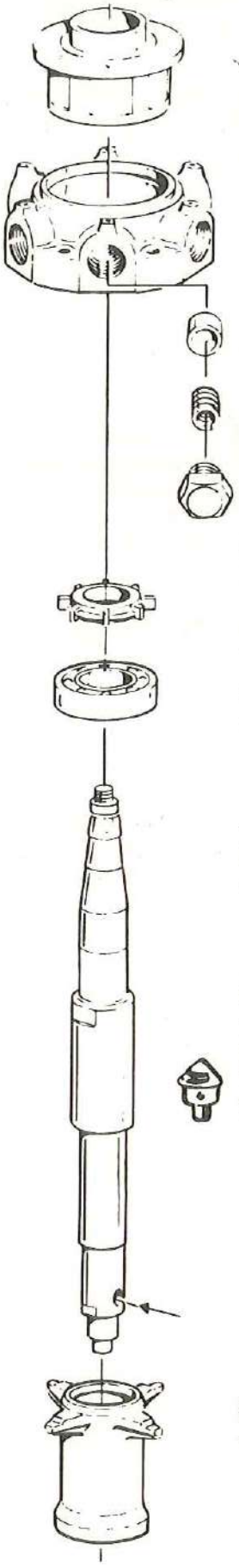
The bottom ring of the thrust ball bearing is firmly fixed to the thrust washer. Use a punch to remove the ring, inserting it in turn into the holes provided in the washer for this purpose.

To loosen the spacing sleeve from the lower end of the bearings housing, push the slotted pin into the inside of the housing.

Turn the ball ring to the correct position, and make sure that the thrust washer guide pin is inserted into the groove at the lower end of the bearing housing.

* Or equivalent bearing of other make.

COMPLETE BOWL SPINDLE for 1420-1500 rpm and 1700-1800 rpm



Ball bearing housing --541219-01

Collar body -- 65191

Buffer (6) -- 65196

Spring (6) -- 66191

Plug-screw (6) -- 70347

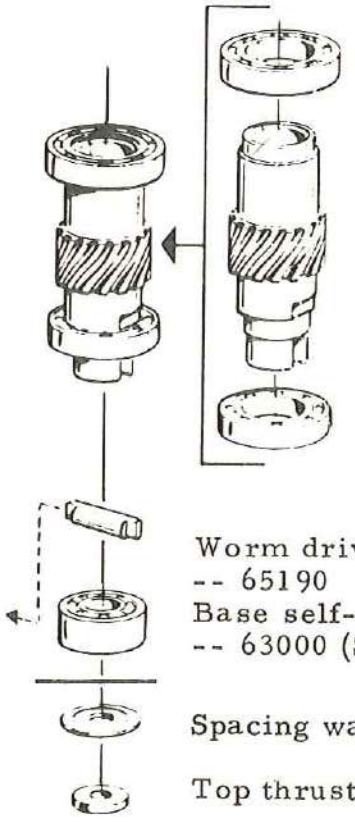
Deflector -- 65194

Collar ball bearing -- 60992 (SKF 6213M7)*

Bowl spindle -- 7005966-02

Bowl fixing nut -- 7005971-01 (lefthand thread for screwing on to bowl spindle)

Spacing tube -- 65188



Top ball bearing -- 65186 (SKF 6015 M)*

Worm screw
1420-1500 rpm -- 7005967-02
1700-1800 rpm -- 7005967-03

Bottom ball bearing -- 65187 (SKF 6014 M)*

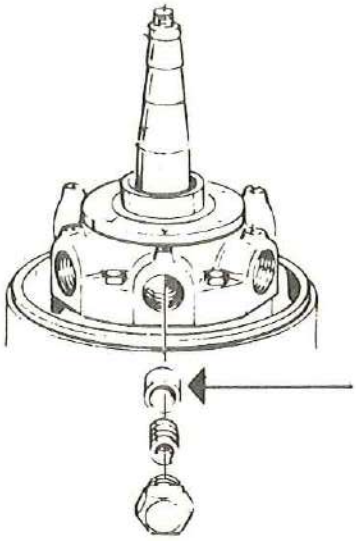
Worm driver -- 65190

Base self-aligning bearing* -- 63000 (SKF 2308 M)*

Spacing washer **

Top thrust bearing ring **

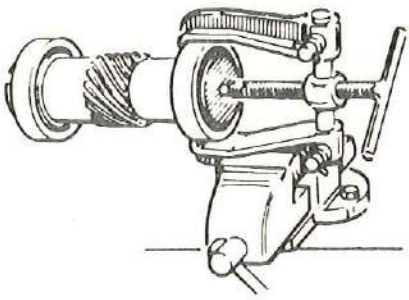
* Or equivalent bearing of other make
** Part of bottom bearing



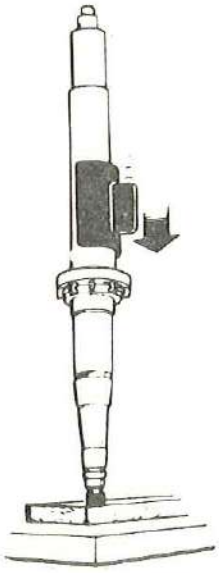
DISMANTLING AND REASSEMBLY OF COMPLETE BOWL SPINDLE

For dismantling, press the upper part of the spindle outwards. This releases the buffers from the collar housing, so that they can be withdrawn.

When assembling, make sure that the buffers are pressed against the flat surfaces of the housing of the bearing.



If the worm is replaced, it is important to inspect the worm wheel, and if necessary to replace this as well. To remove the ball bearings from the worm, use the extractor and proceed as indicated in the illustration. Heat the ball bearings before the assembly.



If the ball bearing has to be removed, first dismantle the other parts of the spindle. Lift the spindle up, place it on a flat piece of wood or similar material, and push the ball bearing off by striking the inner ring of the bearing with the extractor.
Heat the bearing before assembly.

ASSEMBLY of MOTOR

General procedure - Perspective drawings with list numbers of parts - Assembly.

For SPECIAL TOOLS, see chapter F - for LUBRICATION, see chapter H - for CLEANING, see chapter L - for MOTOR, see special manual.

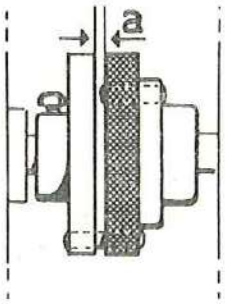
GENERAL HINTS

Motor

The specified speed for the horizontal shaft of the machine (the worm wheel shaft), which must never under any circumstances be exceeded, is indicated on the plate showing the type of machine.
The worm drive-worm wheel ratio and the friction blocks are designed for this speed.

Check the number of revolutions with the revolution counter after installation or replacement of the motor.
For details of the motor's power requirements, see chapter C.

Coupling pulley



When the machine is delivered with the motor, the pulley has already been fixed in its correct position on the motor shaft.
Mark the position of the pulley before detaching it from the motor shaft.
The axial play of the flexible coupling - measurement 'a' in the illustration - should be about 2 mm.

For keying a pulley, use the ISO tolerances (H7 - J6).

Electric cable

The motor's electric cable should preferably be longer than necessary, so that if the motor is removed this can be done without disconnecting the cable from the terminals.

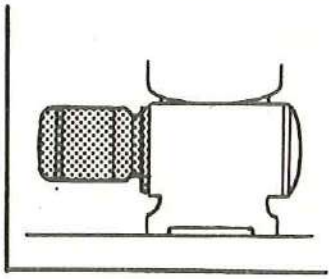
Connection to mains

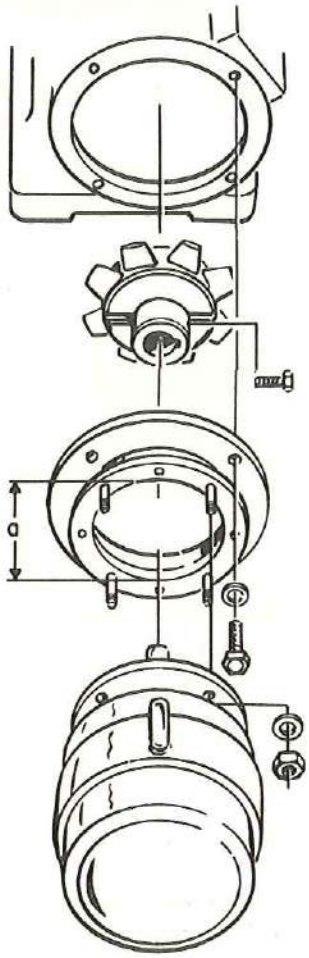
Connect the motor to the mains so that the bowl rotates CLOCKWISE.

Note. The machine must never be started up without having fitted the bowl on to the spindle, and without the housing of the worm wheel drive having the specified quantity and quality of lubricating oil.

See that the brake is desengaged.

MOTOR COUPLING FLANGE
(Type 4 drive)





Frame

Motor coupling disc
-- 533507-80*

Screw
-- 2210941-18

Motor coupling flange

Stud bolt

Washer

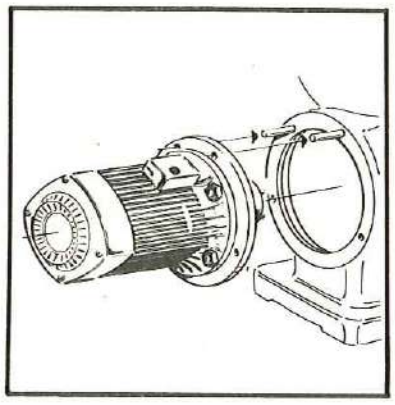
Screw

Washer

Nut

Electric motor

a = 250 mm	a = 350 mm
520411-01	72663
70489	66765
70492	70492
72926	2210947-16
70528	70490
2218043-04	2218043-04



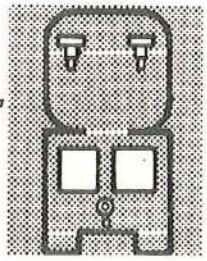
It is not normally necessary to detach the motor from the coupling flange when assembling or dismantling the motor. Push the flexible coupling on to the pins in the machine's coupling disc.

Screw the two guide pins (see chapter F) into the two upper holes in the frame flange.

Suspend the motor on the guide pins (with the coupling flange already fixed), push it into the correct position, and fit the disc pins into the holes in the flexible coupling. Secure the motor and replace the guide pins with screws. Tighten the screws alternately and see that the motor flange is correctly inserted into the seating of the frame.

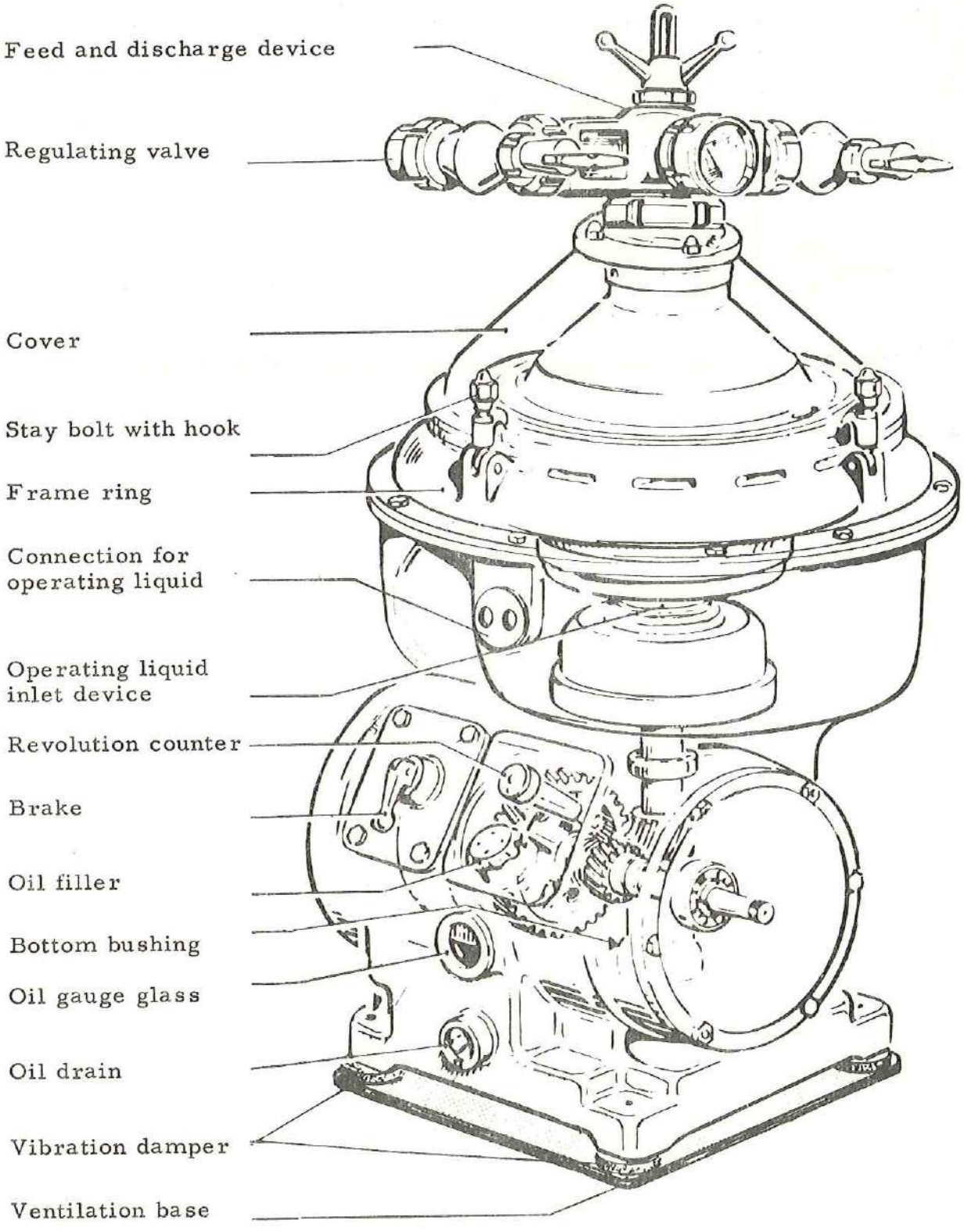
When dismantling, take care that the electric cable does not work loose from the terminal box.

* For the ordering routine, see chapter A.

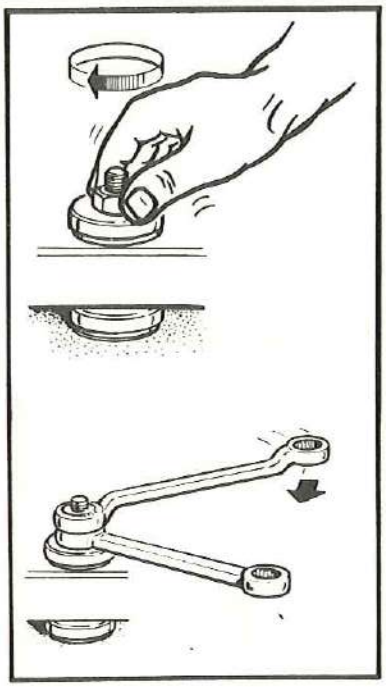


FRAME PARTS

For special equipment, see chapter X.



INSTALLATION OF FRAME



Place the frame on the vibration dampers, as indicated in the illustration on the preceding page, and check:

- that the bolts are not pressing against the edges of the anchor holes.

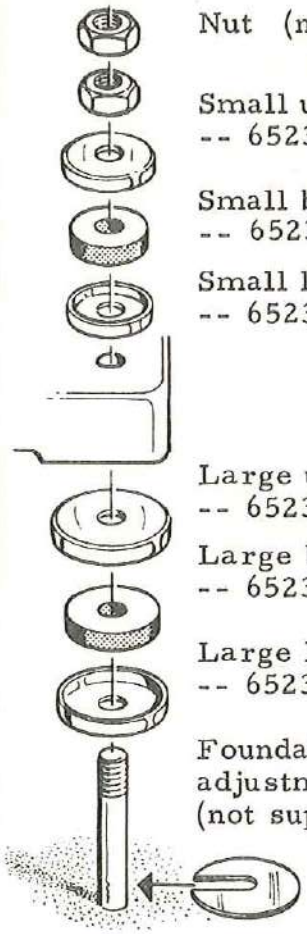
  If one or more of the bolts are pressing against these edges, flexible mounting of the frame will be impeded.

- that the frame is horizontal, and that its feet are lying level. If adjusting washers are needed, these MUST have the same diameter as the base cushions.

Screw down the nuts until they touch the washers, and tighten with one further turn.

Hold the nuts firmly and secure with lock nuts.

VIBRATION DAMPER (4)



Nut (not supplied)

Small upper cap
-- 65237

Small base rubber
-- 65235

Small lower cap
-- 65236

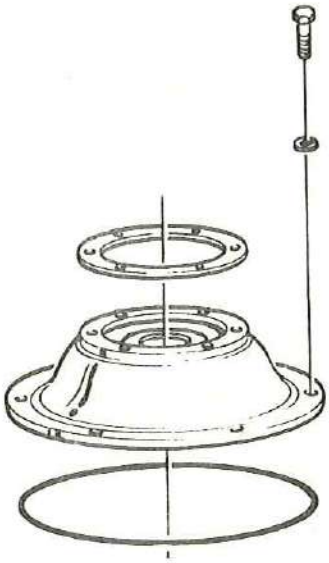
Large upper cap
-- 65234

Large base rubber
-- 65232

Large lower cap
-- 65233

Foundation screws and adjustment ring
(not supplied)

DIAPHRAGM



Screw (6)
-- 2210942-36

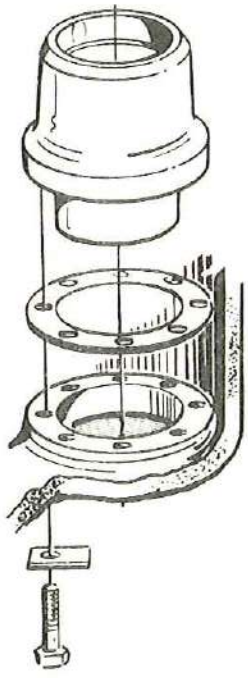
Washer (6)
-- 22405

Height adjustment ring (1-5)
-- 530208-01

Diaphragm
-- 535812-01

Rubber ring
-- 67566

BOTTOM BUSHING FOR BOWL SPINDLE



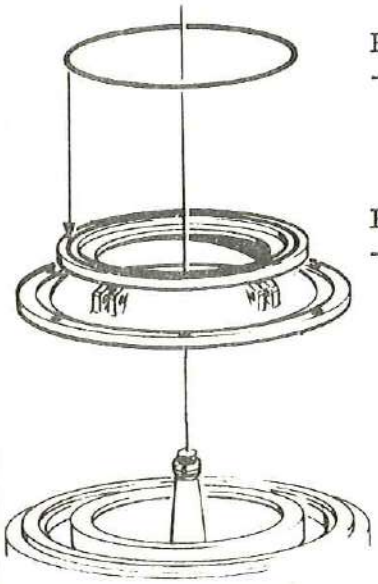
Bushing
-- 541220-01

Packing
-- 65211

Washer (8)
-- 63256

Screw (8)
-- 72936

FRAME RING



Rubber ring
-- 67675

Frame ring
-- 7006555-80

STAY BOLT WITH HOOK AND HAND-WHEEL (4)

Nut
-- 536704-01

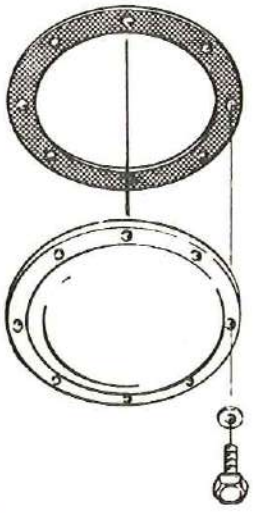
Hook
-- 70279

Stay bolt
-- 69086

Notch pin
-- 67783

Small pin
-- 67789

LATERAL FRAME FLANGE



Packing
-- 37490

Lateral frame cover
-- 38714

Washer (6)
-- 70492

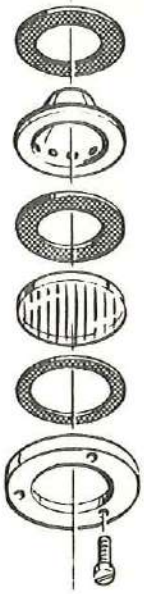
Screw (6)
-- 72926

OIL DRAIN

Packing
-- 35607

Screw
-- 62467

OIL GAUGE GLASS



Packing
-- 38967

Oil level stabiliser
-- 61899

Packing
-- 38967

Glass
-- 38685

Packing
-- 37167

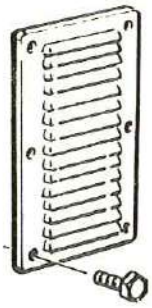
Fixing ring
-- 65457

Screw
-- 2211721-11

WATER DISCHARGE

Rubber pipe connection
-- 7002716-03

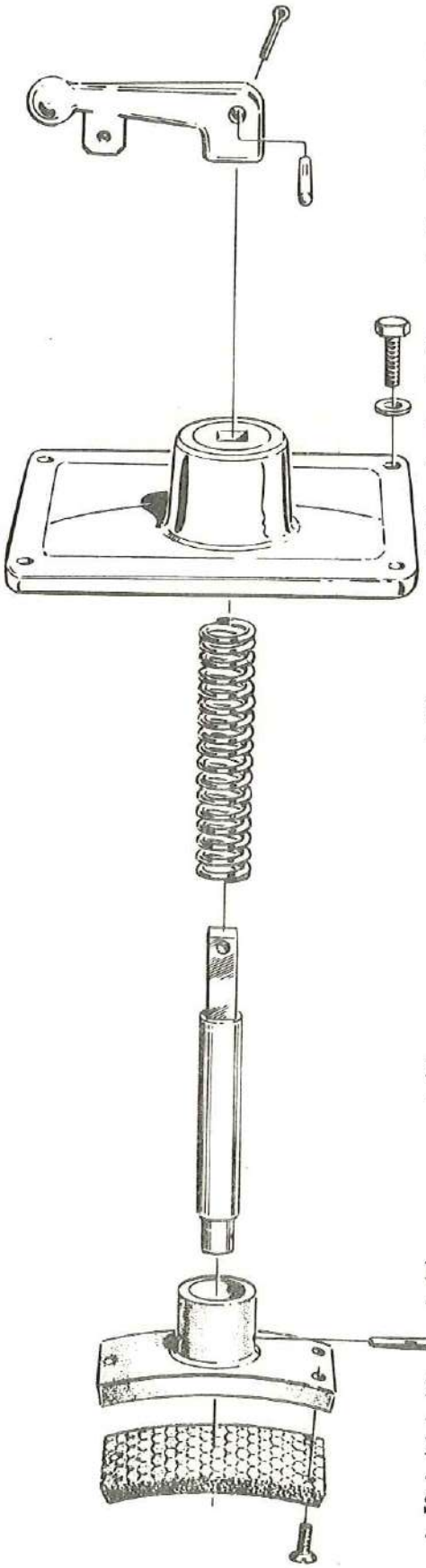
GRATING - with slots



Grating
-- 65445

Screw (6)
-- 2210936-43

BRAKE -- 65221 (the parts marked * are not included in the set)



Cotter pin
-- 8199

Handle
-- 533513-01

Pin
-- 39098

Screw (4)*
-- 72933

Washer (4)*
-- 20758

Housing
-- 67786

Spring
-- 39096

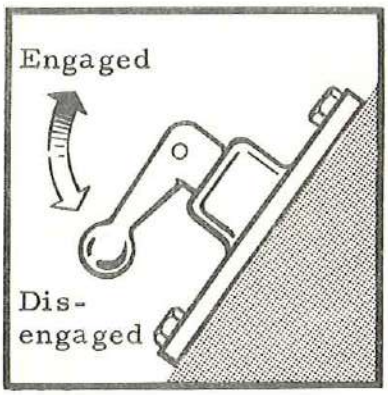
Rod
-- 39095

Notch pin
-- 67960

Brake shoe
-- 65226

Brake lining
-- 65228

Screw (3)
-- 8341

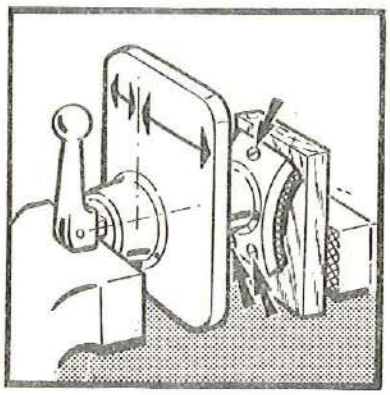


Re-lining

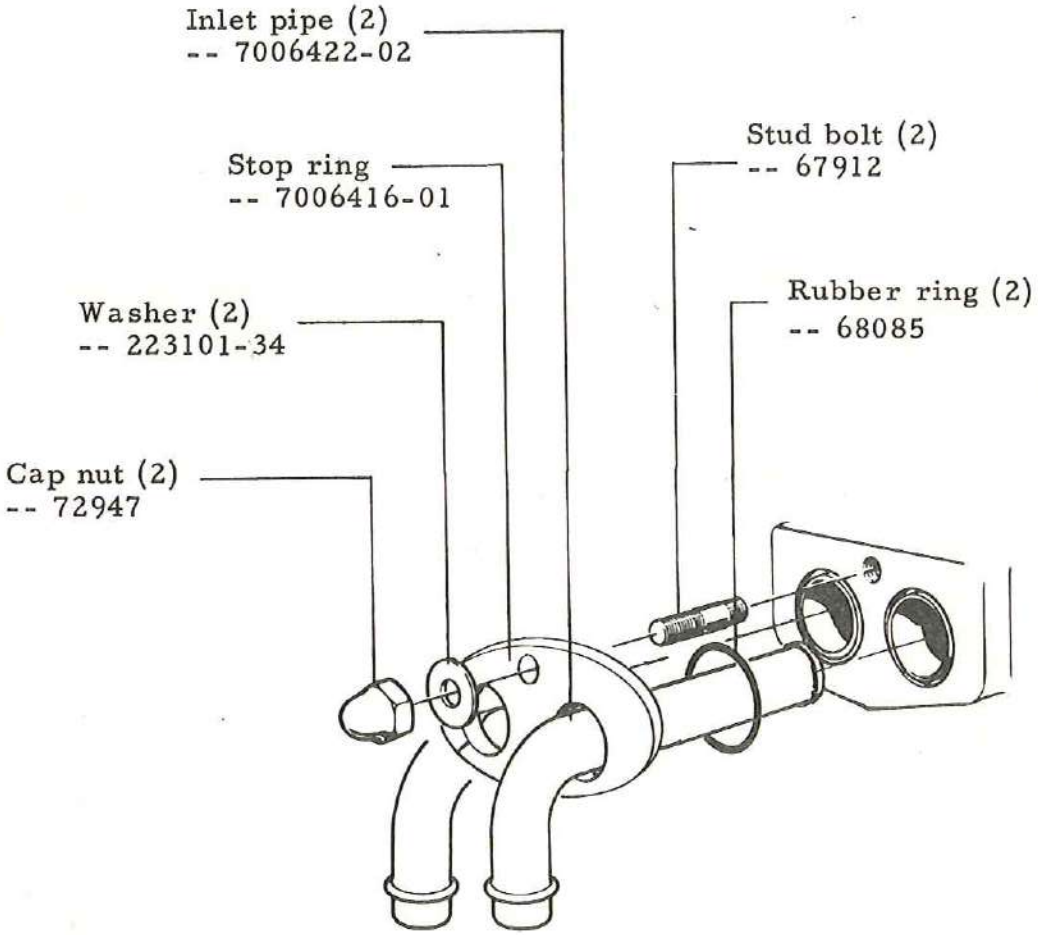
Disengage the brake and remove the housing. Change the lining. See that the screws are grooved at both ends (use the angular screwdriver).

Fix the housing to the machine with the handle facing downwards.

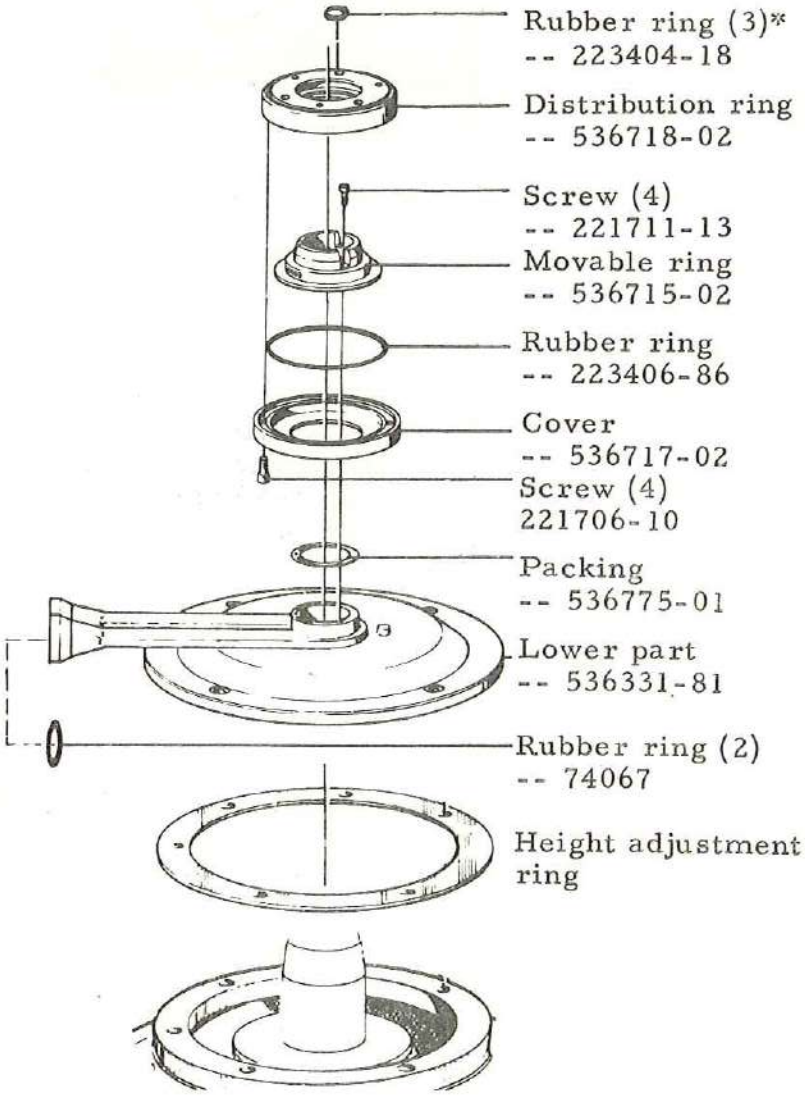
Dismantling. Assembly



Clamp the housing in a vice, engage the brake and remove the handle. See that the housing, brake shoe and handle are turned as shown in the illustration. Fix the housing to the machine with the handle turned downwards.


Inlet pipe (2)
-- 7006422-02
Stop ring
-- 7006416-01
Washer (2)
-- 223101-34
Cap nut (2)
-- 72947
Stud bolt (2)
-- 67912
Rubber ring (2)
-- 68085

OPERATING LIQUID DISTRIBUTION MECHANISM -- 536779-80
(the parts marked with an asterisk /*/ are not included in the set list.)



Dismantling

For dismantling the bowl, see chapter I. The upper part of the device is fixed to the bowl body with screws. These should be removed before the bowl body can be detached from the spindle. Detach the operating liquid piping. Take out the lower part of the control device and dismantle the parts in the sequence shown in the illustration.

Cleaning

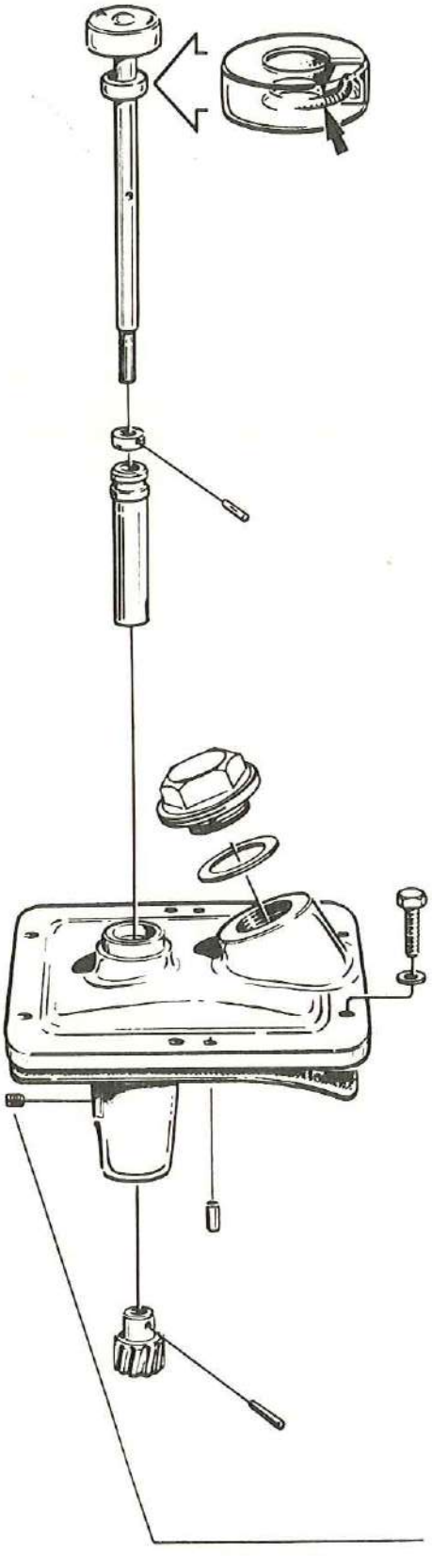
Make sure that the parts have been thoroughly cleaned (especially all the holes and channels). For detergents, see chapter L.

Assembly

Fit the parts into the lower part of the control mechanism. Make sure that the adjustment rings are in place, that the parts are placed in the positions defined by the guides, and that the holes inserted in the packings and in the lower part of the control mechanism lie opposite each other. Assemble the operating liquid piping system and check the height position (see chapter L).

Feed in the operating liquid and check the flow in accordance with the instructions in chapter L.

REVOLUTION COUNTER -- 71128 (the parts marked with an asterisk /*/ are not included in the set of parts)



Seal ring
-- 38710

Revolution counter spindle
-- 71130

Stop ring
-- 69211

Notch pin
-- 69212

Bushing
-- 70321

Oil bath filler plug
-- 526686-02

Packing
-- 38324

Screw (6)*
-- 72933

Washer (6)*
-- 20758

Case
-- 71129

Packing *
-- 65220

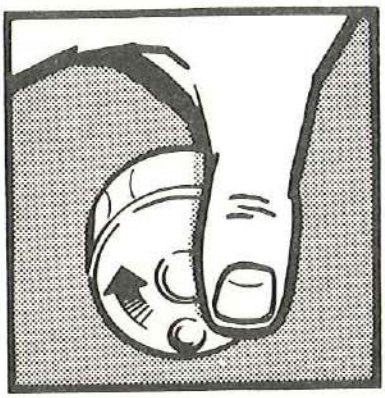
Guide pin (2)*
-- 64226

Pinion
-- 69214

Pin
-- 69226

Set screw
-- 221585-13

Speed checks



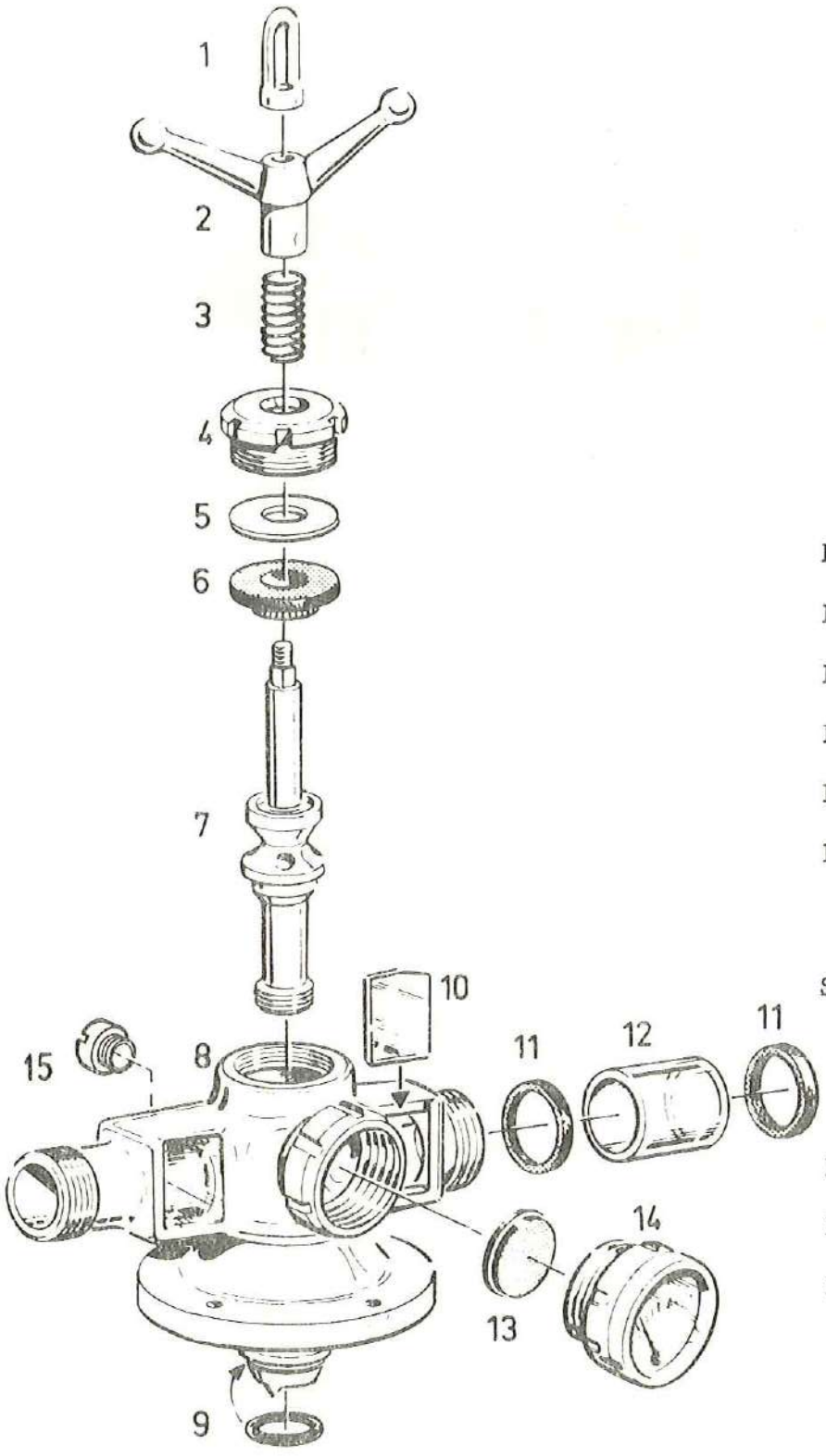
For details regarding speeds, see chapter C. Count the revolutions per minute.

Assembly

Before assembly, lubricate the spindle and the gear mechanism with the type of oil used for the gear housing.

Make sure that the packing is properly fitted, as shown in the illustration.

FEED AND DISCHARGE DEVICE
(with pressure gauge) -- 7005779-80



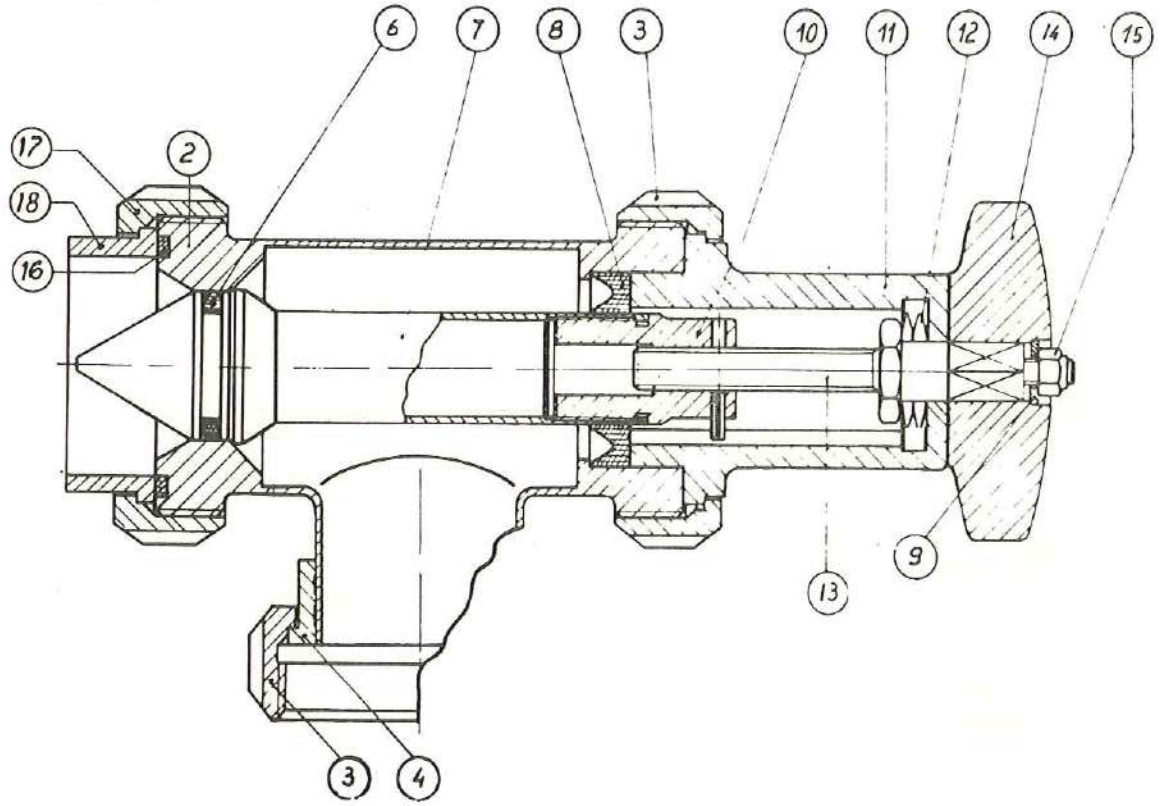
1 Lifting ring
-- 527976-02
2 Hand-wheel
-- 70636
3 Spring
-- 70634
4 Threaded plug
-- 70635
5 Washer
-- 70633
6 Seal collar
-- 75020
7 Inlet pipe
-- 7005762-80
8 Body
-- 7005778-80
9 Seal ring
-- 71866
10 Protecting glass (2)
-- 523339-01
11 Packing (4)
-- 71068
12 Sight glass (2)
-- 74565
13 Membrane
-- 74384
14 Pressure gauge
-- 74386
15 Plug
-- 99350332-01

Set of spare parts:

6 Seal collar
-- 75020
9 Seal ring (2)
-- 71866
11 Packing (4)
-- 71068
12 Sight glass (2)
-- 74565
13 Membrane
-- 74384

REGULATING VALVE -- 7006701-80 (without connecting parts)

Parts marked * not included in parts set.



2 Valve housing
-- 7006704-81

3 Tube nut
-- 190616

4 Male plug
-- 190630

6 Rubber ring
-- 7006707-01

7 Shutter
-- 7006708-01

8 Packing
-- 7006709-01

9 Washer
-- 223101-53

10 Female thread
-- 7006711-80

11 Guide sleeve
-- 7006714-01

12 Spring
-- 7006713-02

13 Regulating screw
-- 7006712-01

14 Hand-wheel
-- 7006723-01

15 Nut
-- 221891-13

16 Packing
-- 71028*

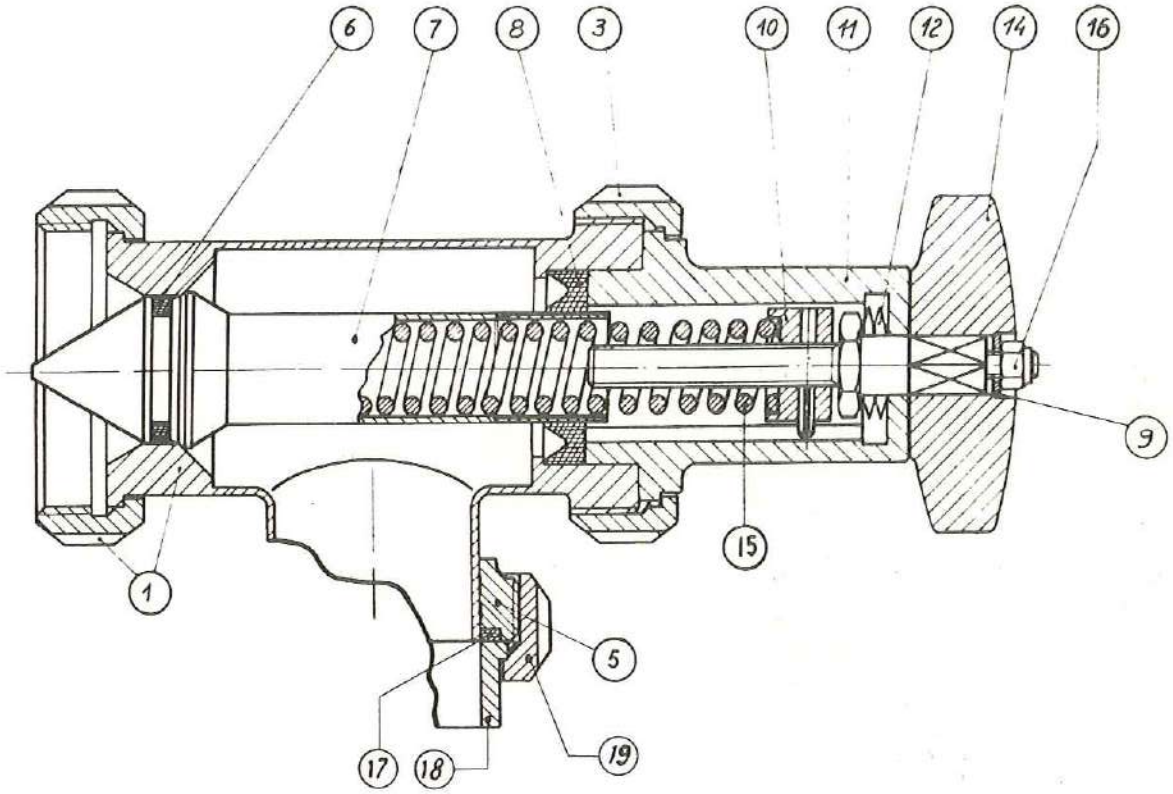
17 Tube nut
-- 190616*

18 Male plug
-- 190630*

SPARE PARTS

Rubber ring -- 7006707-01
Packing -- 7006709-01

CONSTANT PRESSURE REGULATING VALVE -- 7006702-83 (without connecting parts) Parts marked * not included in parts set.



1 Valve housing
-- 7006704-80

3 Tube nut
-- 190616

5 Female plug
-- 190644

6 Rubber ring
-- 7006707-01

7 Shutter
-- 7006708-01

8 Packing
-- 7006709-01

9 Washer
-- 223101-53

10 Female thread
-- 7006710-80

11 Guide sleeve
-- 7006714-01

12 Spring
-- 7006713-02

13 Regulating screw
-- 7006712-01

14 Hand-wheel
-- 7006723-01

15 Spring
-- 7006716-01

16 Nut
-- 221891-13

17 Packing
-- 71028*

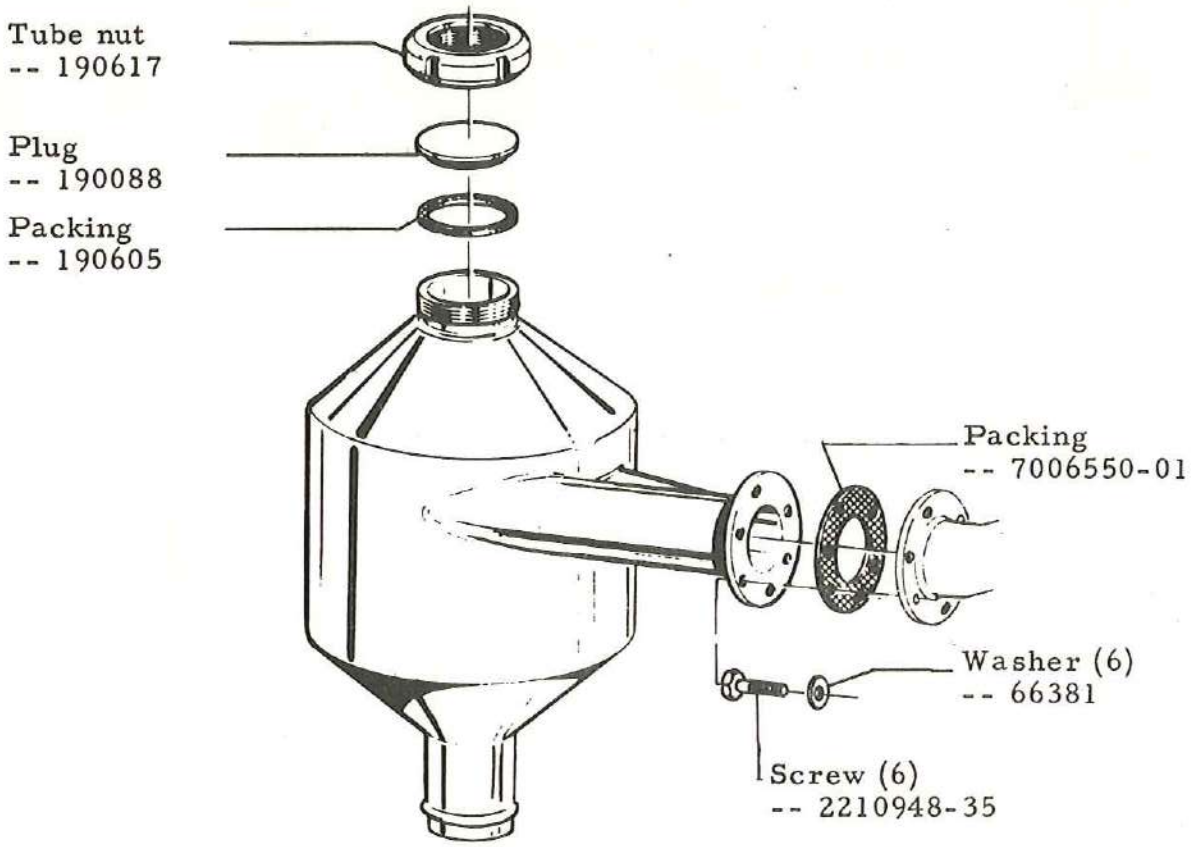
18 Male plug
-- 190630*

19 Tube nut
-- 190616*

SPARE PARTS

Rubber ring -- 7006707-01
Packing -- 7006709-01

DISCHARGE CYCLONE FOR SOLID SUBSTANCES -- 7006487-80



The object of the cyclone is to reduce the speed of the solid phase discharged from the bowl.

To avoid clogging of the frame, and to enable the separator to operate satisfactorily, it is advisable to let the cyclone discharge into an underlying container allowing free access to the air.

It is not desirable to fit piping for drawing off the solid phase in a horizontal direction, which would lead to clogging up the whole of the solid phase discharge system.

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