

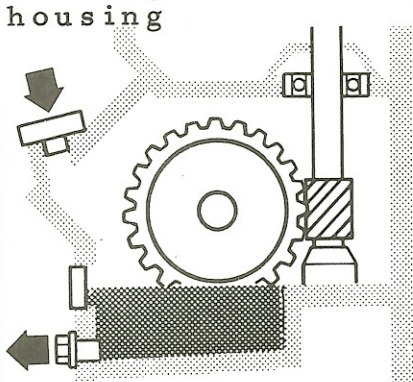
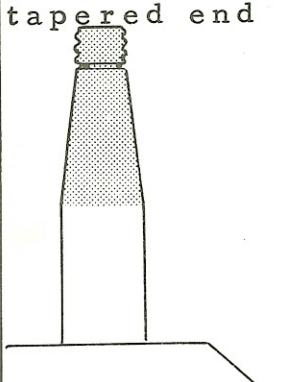
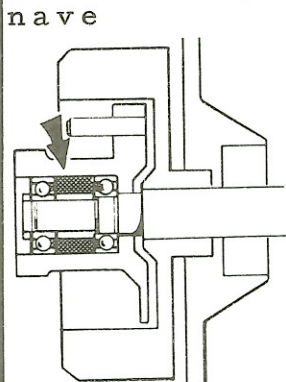
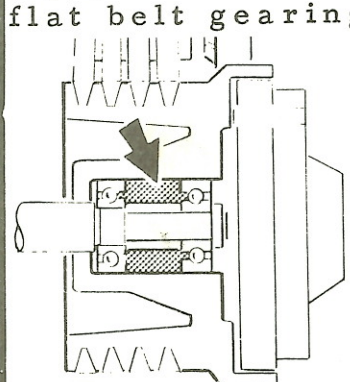
LUBRICATION

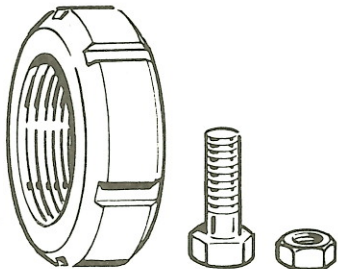
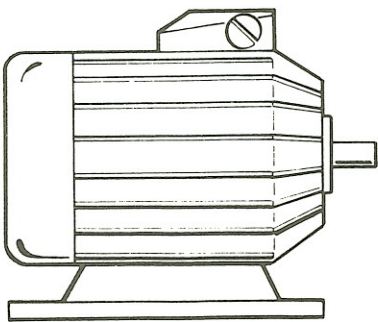
It should be understood that the mentioning of certain brands as examples of a suitable lubricant does not involve an exclusion of other brands with equivalent properties.

ABBREVIATIONS — see chapter A.

The machine is delivered without oil in the worm gear housing. It must NOT be started unless oil in the quantity and of the quality prescribed has been supplied. A change of the separating temperature can make it necessary to replace the oil by oil of a different type.

Lubricants, oil as well as grease, must be kept in clean, closed cans to prevent penetration of dust and moisture and to reduce the oxidizing effect to the air as far as possible. The storing room should be dry and cool.

LUBRICATION POINT	LUBRICANT	WHEN
<p>Worm gear housing</p> 	<p>Separating temp.: 15-70°C (60-160°F) = SAE 50</p> <p>70-95°C (160-205°F) = EP I</p> <p>Ambient temp.: lowest 10°C (50°F)</p> <p>Oil quantity: 12 l (2.6 UK gal)</p>	<p>Oil level in upper half of the gauge glass. Filling before first starting First oil exchange after 300 hours' operation, then after every period of 1500 hours' operation. In seasonal operation before every operating period. Cleaning before exchange.</p>
<p>Bowl spindle tapered end</p> 	<p>Molybdenum disulfide paste.</p> <p>Oil</p> <p>Grease</p>	<p>Always before putting the bowl body on the spindle, however at least once a month. Apply sparsely to avoid slipping but sufficiently to avoid seizing.</p>
<p>Clutch coupling nave</p> 	<p>Anyone of the recommended ball bearing greases.</p>	<p>Renewal of grease once a year, as well as cleaning of bearings and bearing seats. Grease the bearings and fill the space around the spacing sleeve to approx. one third.</p>
<p>Nave of V belt and flat belt gearing</p> 	<p>Anyone of the recommended ball bearing greases.</p>	<p>Renewal of grease once a year, as well as cleaning of bearings and bearing seats. Grease the bearings and fill the space around the spacing sleeve to approx. one third.</p>

LUBRICATION POINT	LUBRICANT	WHEN
<p>Other machine parts</p> 	<p>Parts of stainless steel: Molybdenum disulfide grease, EP-lubricating-grease or equivalent.</p> <p>Parts of steel: Oil as recommended for the worm gear housing.</p>	<p>Before every mounting.</p> <p>Observe, however, that the conveyor pulley must NEVER be lubricated.</p>
<p>Motor</p> 	<p>Follow motor supplier's recommendations.</p>	<p>Follow motor supplier's recommendations.</p>
<p>Bowl lock ring and other bowl parts</p>	<p>See special recommendations below.</p>	<p>See special recommendations below.</p>
<p>Feed pump</p>	<p>Lubricated by process liquid</p>	<p>Continuous lubrication during operation.</p>

LUBRICANTS

Lubricating oil
for worm gear
housing

For choice of lubricating oil type follow the recommendations given in the lubrication schedule.

The oil types mentioned in the table must meet the demands on quality stated below. When in doubt consult an authorized ALFA-LAVAL representative.

Always use a high grade lubricating oil.

SAE-oils

Oil type	Max. viscosity		Min. viscosity index	Pour point °C (°F)
	SSU at 210°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

Examples	
EP - 1	BP Energol Gear 300 EP Caltex Meropa Lubricant 3 Gulf EP Lubricant 75 Mobil Compound DD Shell Macoma 72
EP - 2	BP Energol Gear 425 Caltex Meropa Lubricant 3 Gulf EP Lubricant 115 Mobil Compound EE Shell Macoma 75
EP - 3	Mobil Mobilube HD 80 - 90 Gulf Transgear EP 80 - 90

Observe

- Special Diesel cylinder lubricating oils containing amine type additives (generally intended for heavy-oil-burning marine diesel engines) and "multigrade" motor-car lubricating oils should not be used.
- Never intermix oils of different makes, as they may contain different components.

(Lubricants, page 2)

Molybdenum di-sulfide paste

Examples:

Molykote Paste G

Rocol Anti-Scuffing Paste

Molybdenum di-sulfide grease

Examples:

Molykote BR-2

Molykote BR-3

Polyethylene-castor oil paste or polytetrafluoro ethylene-castor oil paste is recommended for machines used in the food industry or where dark-coloured lubricants are unsuitable.

Ball bearing grease

Always use a high grade lithium soap type ball bearing grease according to NLGI-class 2 or 3 and usable at temperatures above 100°C (212°F). Drop point about 180°C (356°F) according to 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 grease.
Consistent grease.

Always use one of the recommended ball bearing greases.

Oil

Use the oil recommended for the worm gear housing

Bowl

Before every assembly wipe clean the threads of lock rings, bowl body and bowl hood as well as the contact surfaces between these parts. If necessary, they should be cleaned with a clean cloth moistened with cleaning agent (see chapter L). After wiping, lubricate them according to 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 the bowl hood are of stainless steel, the lock ring carries the symbol shown in the adjoining drawing. The following lubrication procedure is recommended:

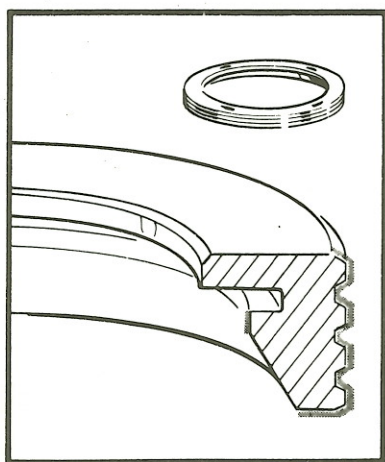
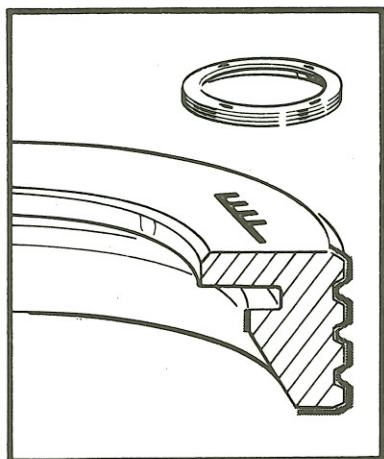
1. PRIMING with molybdenum disulfide paste. Rub or brush in the paste sparsely all over the surface — follow the directions printed on the wrapping, if any. Always prime new parts as well as parts which have lost their previously applied primer due to e.g. thorough cleaning or machining.
2. LUBRICATION with molybdenum disulfide grease after priming, and before assembly after routine dismantling as well. Polyethylene-castor oil paste, polytetrafluoroethylene-castor oil paste or some other equivalent lubricant can be used for machines employed in the food industry or where dark-coloured lubricants are unsuitable.

Alternative 2

When the lock ring is made of carbon steel priming is normally unnecessary, lubrication alone will do — for lubricant see above.

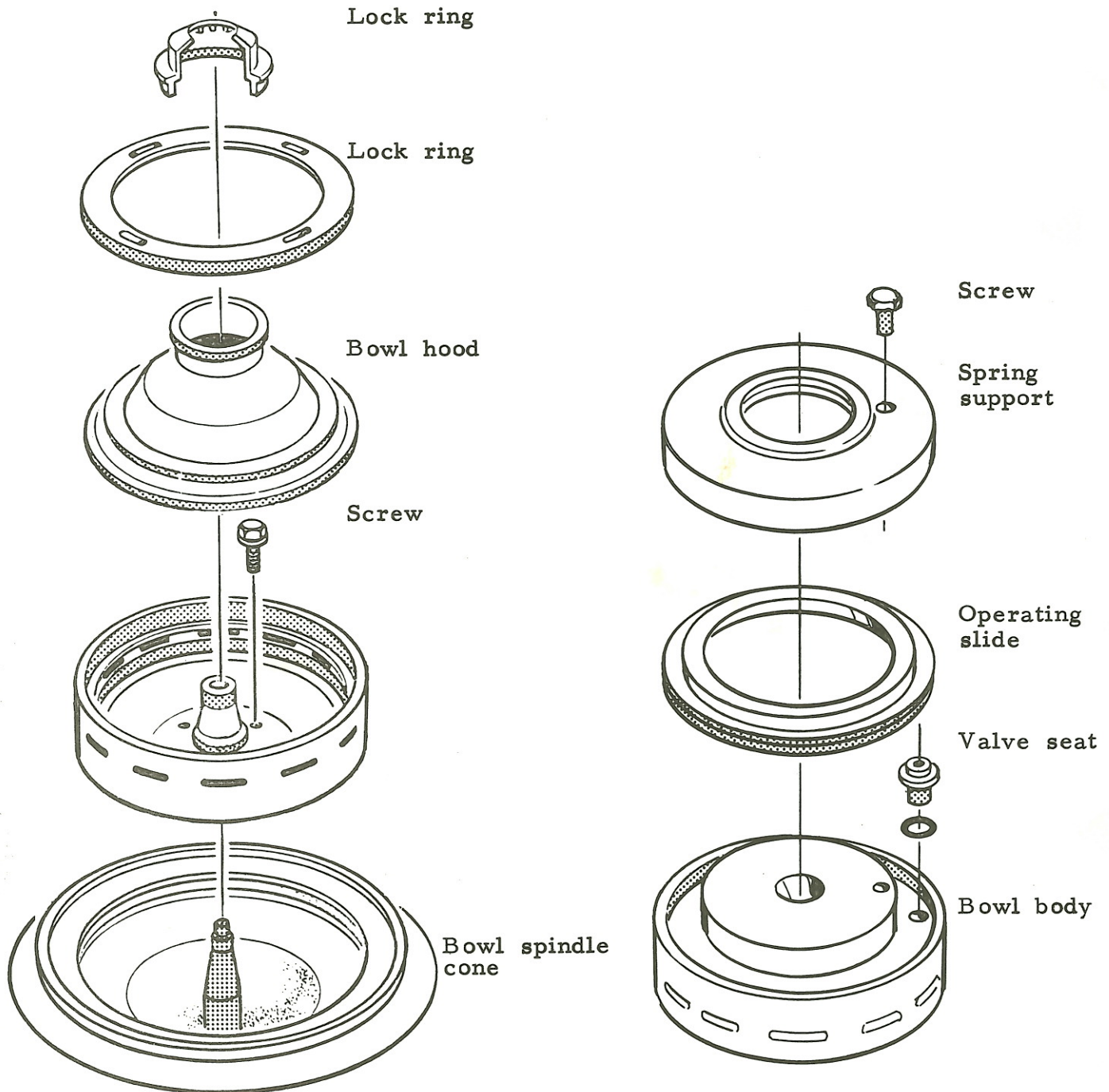
If practical experience shows that no inconveniences occur, consistent grease, oil as prescribed for the worm gear housing, castor oil, tallow or liquid paraffin may be used as lubricant.

However, if a tendency to seizing is observed, alternative 1 must be applied.



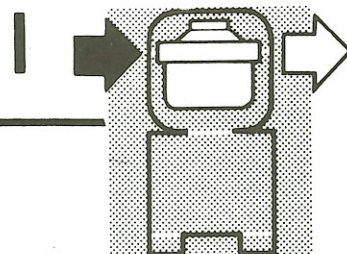
(Lubrication Directions, page 3)

Bowl (cont.)



All surfaces spotted on the drawing must be cleaned and lubricated before the parts are mounted.
Notify the special lubricating directions on foregoing page.





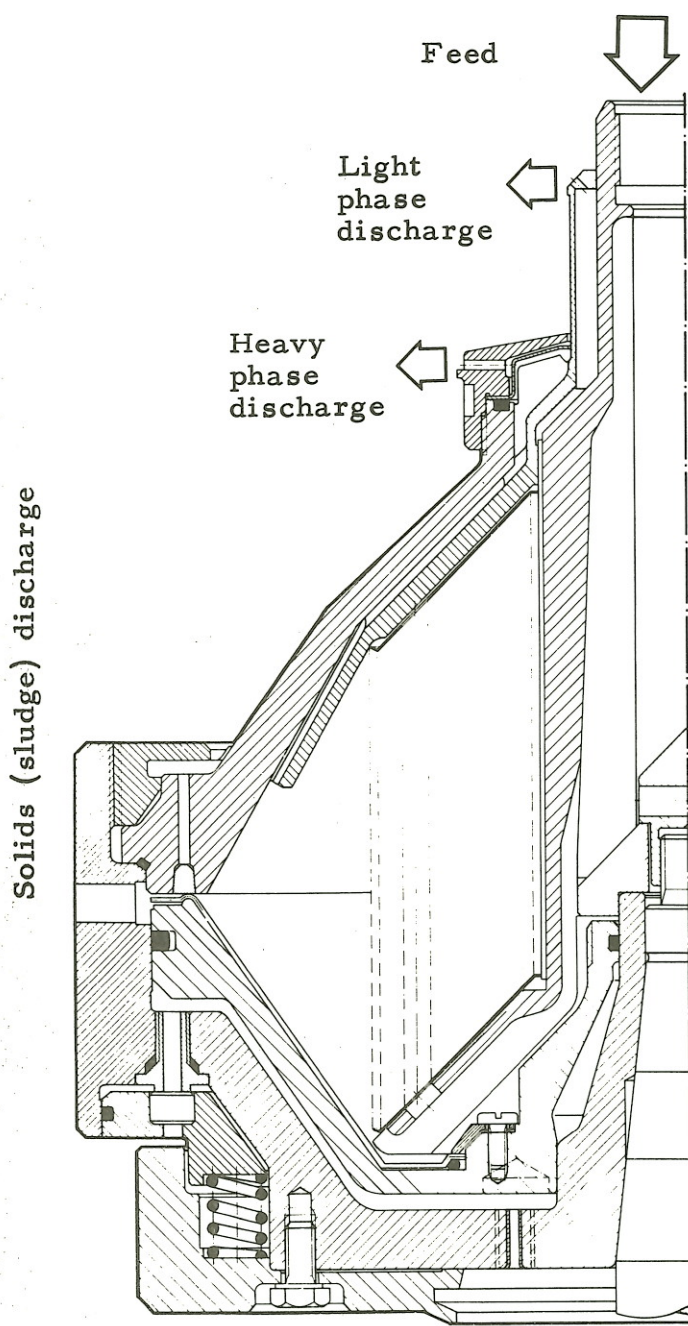
INLET. BOWL. OUTLET.

General Drawings - Perspective Drawings with Part Numbers

- Dismantling - Assembling.

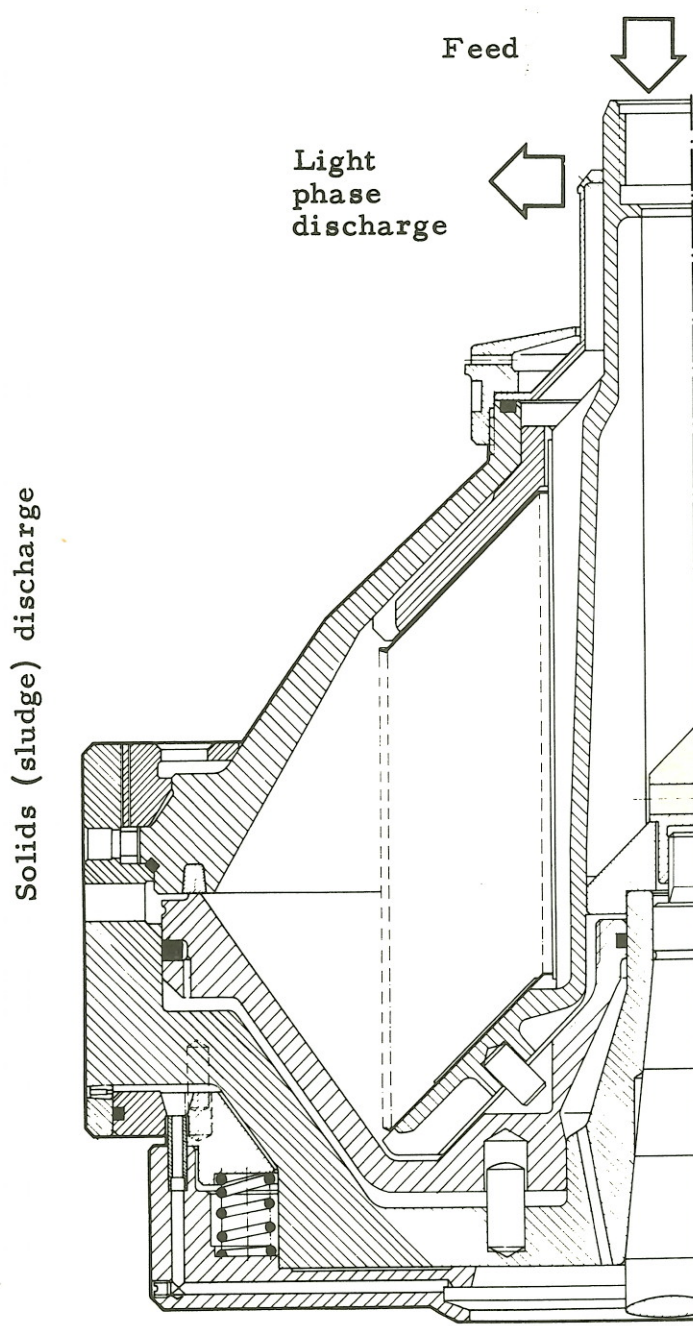
SPECIAL TOOLS see chapter F - LUBRICATION see chapter

H - CLEANING see chapter L - ORDERING ROUTINE - see chapter A.



PURIFIER

BOWL (two liquid outlets)



CLARIFIER

BOWL (one liquid outlet)

INLET and OUTLET PARTS

Normally, the parts need not be dismantled in connection with routine attendance.

The bowl MUST be at rest before the covers are released and opened.

Stud bolt (2)
- 70485

Cap nut (2)
- 221854-3

Fixing ring
- 71134

Glass
- 67676

Packing
- 67677

Cap nut (4)
- 221854-3

Washer (4)
- 20758

Top cover - see chapter X

Stud bolt (4)
- 71143

Feed cover
- 67648

Seal ring
- 67675

Collecting cover (upper)
- 67615

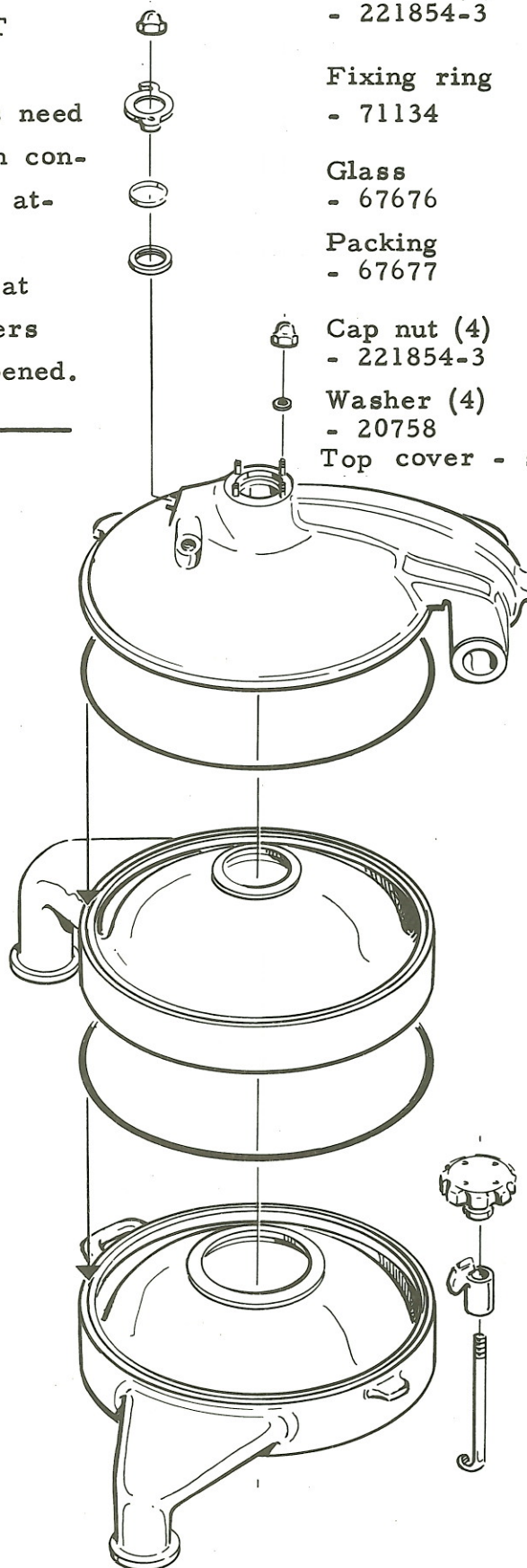
Seal ring
- 67675

Hand wheel (2)
- 71110

Clamping shoe (2)
- 71391

Hook bolt (2)
- 67678

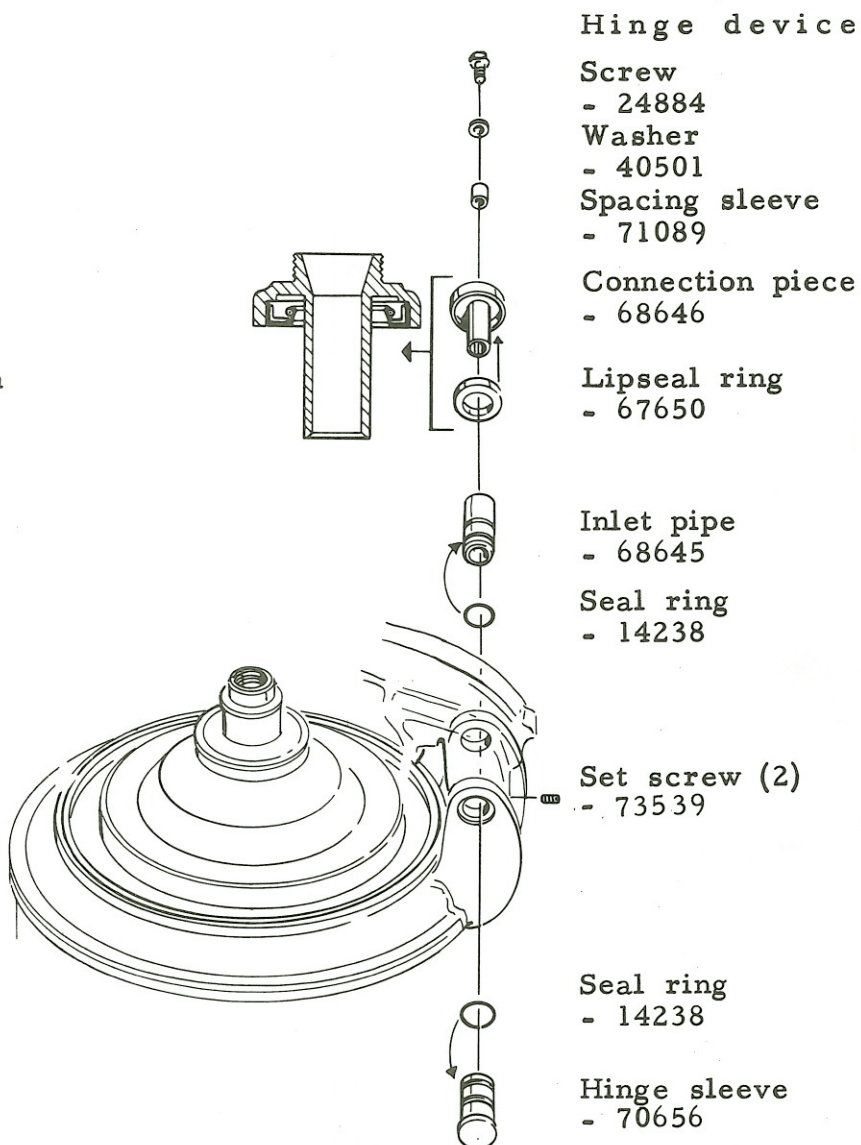
Collecting cover (lower)
- 70621

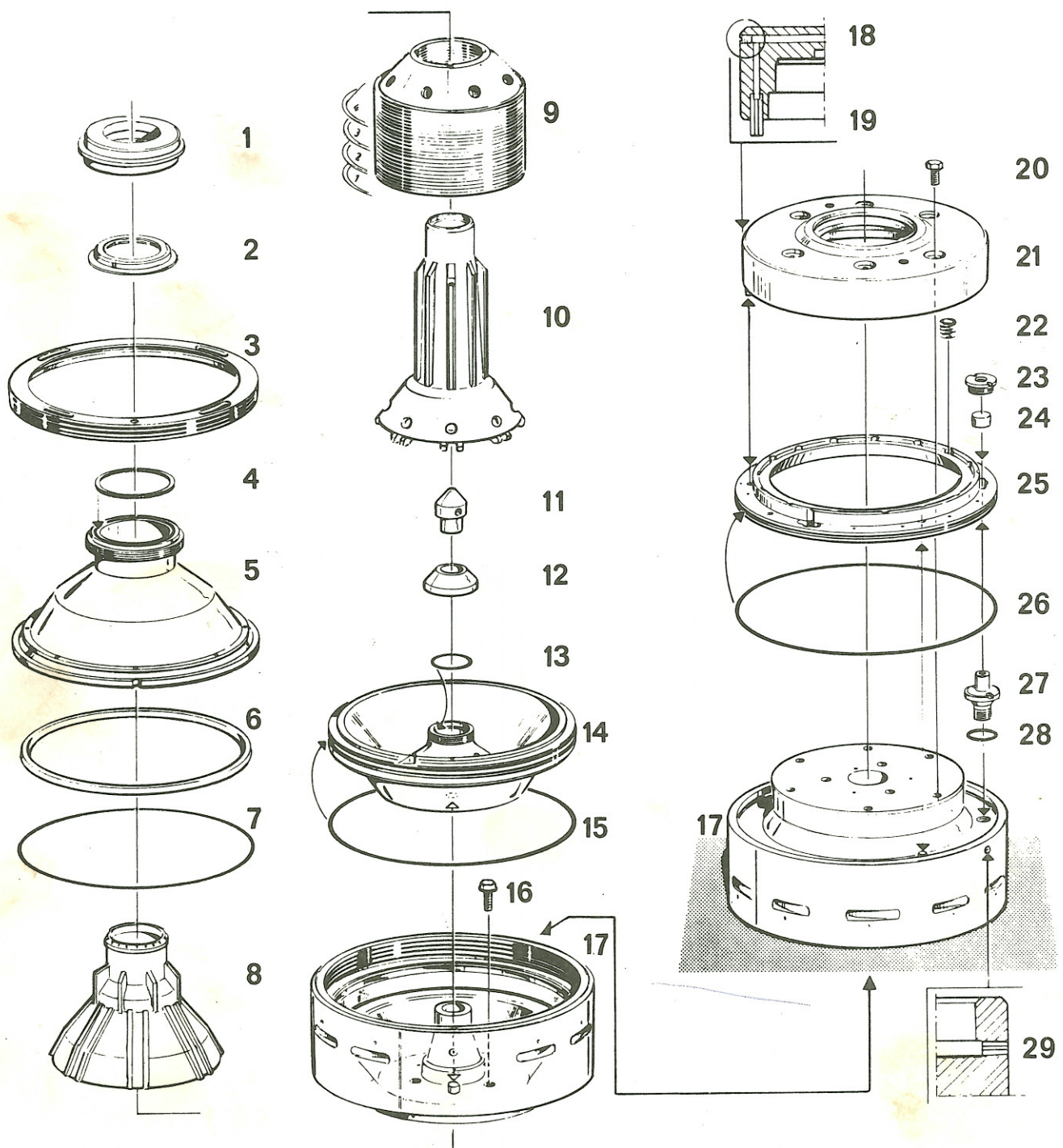


(Inlet and Outlet Parts, page 2)

When mounting take care to direct the lipseal ring as shown in the illustration.

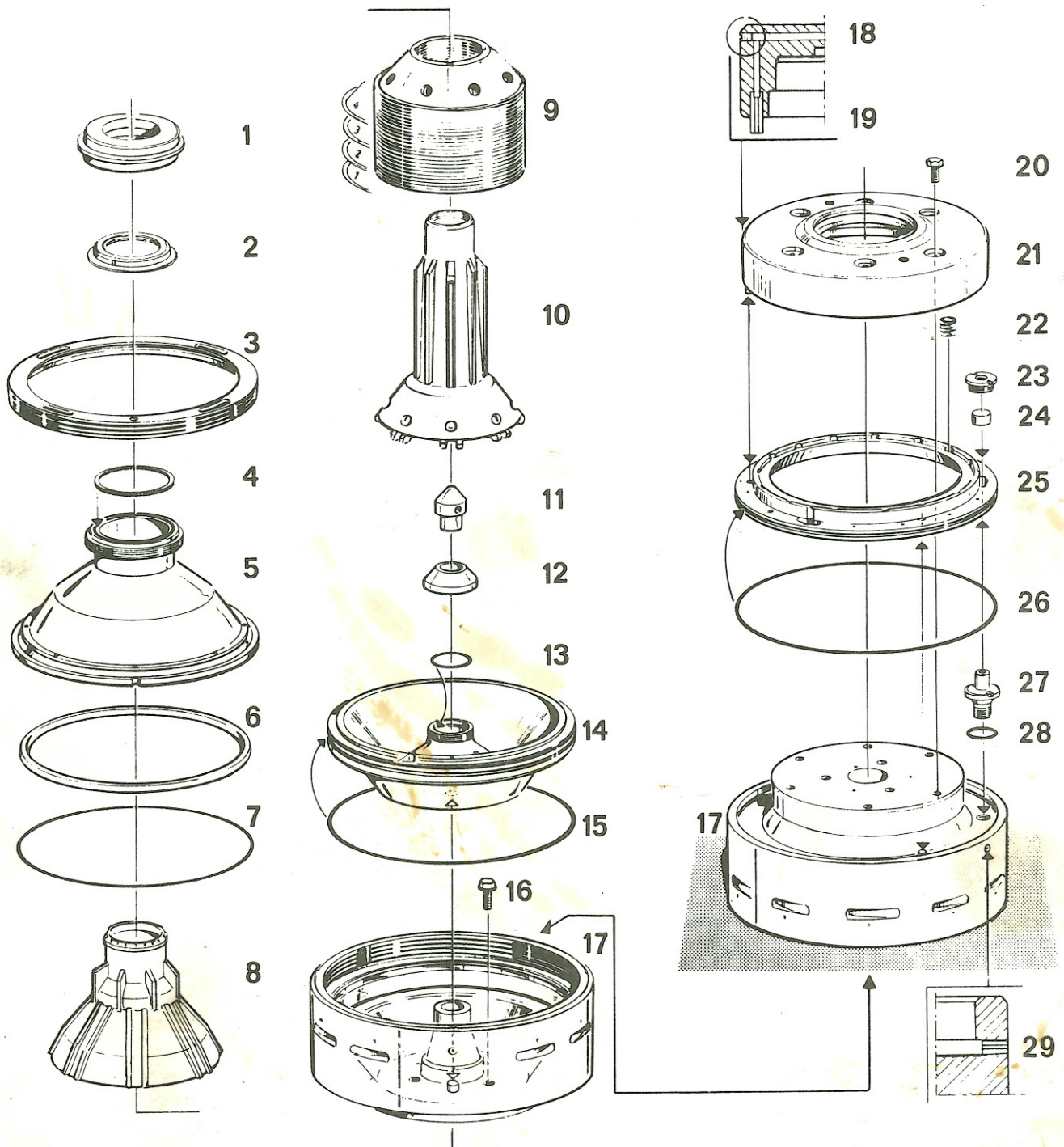
Frame top part
- see chapter S.





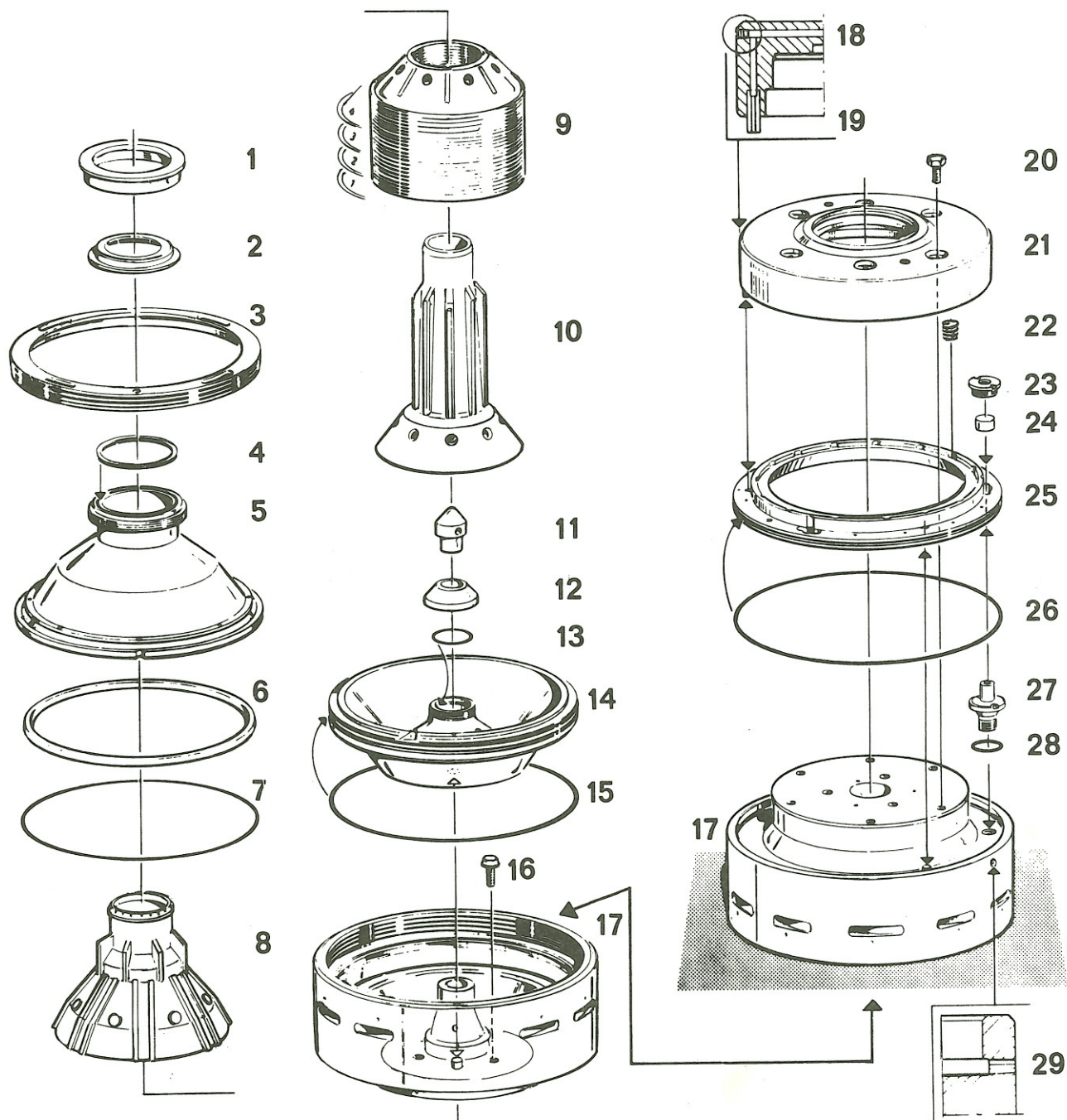
PURIFICATOR BOWL Disc set with caulks 2.0 mm 526661-82
 PURIFIKATOR KULA Plåtsats med klammer 2.0 mm

Pos.	Part No	Description	Benämning	Qty.
1	71481	Lock ring *	Låsring	
2	75124	Gravity disc	Regleringsbricka	
	517242-08	Hole diameter in mm 95	mm håldiameter	
	74171	" 98	"	
	74174	" 102	"	
	74177	" 107	"	
	74180	" 116	"	
	75126	" 127	"	
		" 140	"	
3	518782-01	Lock ring * / ***	Låsring	
4	65594	O-ring	O-ring	
5	71438	Bowl hood ***	Kulhuv	
6	71440	Seal ring	Tätningarring	
7	67587	O-ring	O-ring	
8	520333-02	Top disc ***	Överplåt	
9	520220-84	Disc set *** Bowl disc	Plåtsats Insatsplåt	-
10	67576	Distributor ***	Fördelare	
11	See chapt. P	Cap nut * / **	Kapselmutter (Kap. P)	
12	72588	Nave cap	Navkapsel	
13	65201	O-ring	O-ring	
14	69172	Sliding bowl bottom	Slidvallrik	
15	67575	O-ring	O-ring	
16	68918	Screw **	Skruv	3
17	539970-80	Bowl body ***	Kulkropp	
18	62642	Screw plug	Skruvplugg	
19	67572	Guide sleeve	Styrhylsa	
20	73883	Screw	Skruv	6
21	71469	Spring support ***	Fjäderhållare	
22	68659	Spring	Fjäder	15
23	519369-01	Seat	Fäste	3
24	518549-03	Valve plug	Ventilpropp	3
25	520398-01	Operating slide	Manöverslid	
26	67566	O-ring	O-ring	
27	536562-01	Valve seat	Ventilsäte	3
28	223406-11	O-ring	O-ring	3
29	515133-03	Nozzle	Munstycke	
* Left-hand thread		* Vänstergängad		
** Not included in the complete-unit No. of the bowl.		** Ingår ej i kulans komplett-nummer.		
*** Exchange necessitates rebalancing — send the complete bowl to an authorized ALFA-LAVAL representative.		*** Utbyte nödvändiggör ombalansering — skicka in hela kulan till en ALFA-LAVAL representant.		



PURIFICATOR BOWL Disc set with caulks 1.0 mm
 PURIFIKATOR KULA Plåtsats med klammer 1.0 mm 526661-83

Pos.	Part No.	Description	Benämning	Qty.
1	71481	Lock ring *	Låsring	
2	75124 517242-08 74171 74174 74177 74180 75126	Gravity disc Hole diameter in mm " " " " " "	Regleringsbricka 95 mm håldiameter " 98 " 102 " 107 " 116 " 127 " 140	
3	518782-01	Lock ring * / ***	Låsring	
4	65594	O-ring	O-ring	
5	71438	Bowl hood ***	Kulhuv	
6	71440	Seal ring	Tätningssring	
7	67587	O-ring	O-ring	
8	520333-02	Top disc ***	Överplåt	
9	520220-83	Disc set Bowl disc	Plåtsats Insatsplåt	-
10	521712-81	Distributor ***	Fördelare	
11	See chapt. P	Cap nut * / **	Kapselmutter (Kap. P)	
12	72588	Nave cap	Navkapsel	
13	65201	O-ring	O-ring	
14	69172	Sliding bowl bottom	Slidallrik	
15	67575	O-ring	O-ring	
16	68918	Screw	Skruv	3
17	539970-80	Bowl body ***	Kulkropp	
18	62642	Screw plug	Skruvplugg	
19	67572	Guide sleeve	Styrhylsa	
20	73883	Screw	Skruv	6
21	71469	Spring support ***	Fjäderhållare	
22	68657	Spring	Fjäder	15
23	519369-01	Seat	Fäste	3
24	518549-03	Valve plug	Ventilpropp	3
25	520398-01	Operating slide	Manöverslid	
26	67566	O-ring	O-ring	
27	536562-01	Valve seat	Ventilsäte	3
28	223406-11	O-ring	O-ring	3
29	515133-03	Nozzle	Munstycke	
		* Left-hand thread	* Vänstergängad	
		** Not included in the complete-unit No. of the bowl.	** Ingår ej i kulans komplett-nummer.	
		*** Exchange necessitates rebalancing — send the complete bowl to an authorized ALFA-LAVAL representative.	*** Utbyte nödvändiggör ombalansering — skicka in hela kulan till en ALFA-LAVAL representant.	



PURIFIKATOR BOWL Disc set with caulks 1.0 mm
PURIFIKATOR KULA Plåtsats med klammer 1.0 mm

526661-84

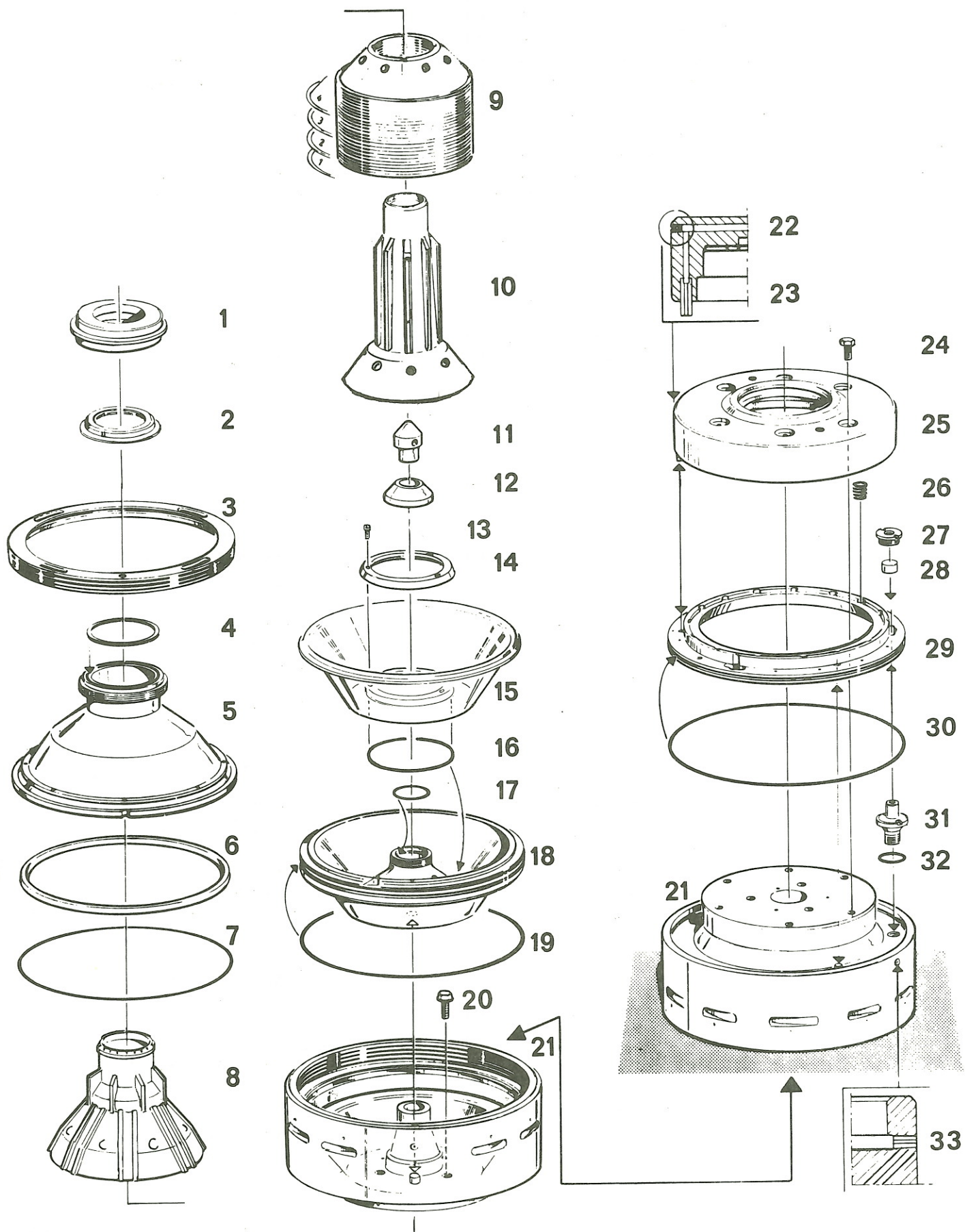
Ref.	Part No. Delnr.	Qty. Ant.	Part name	Benämning
1	71481	1	Lock ring*	Låsring*
2	75124	1	Gravity disc	Regleringsbricka
	517242-08	1	Hole diameter in mm 95	mm håldiameter
	74171	1	" 98	"
	74174	1	" 102	"
	74177	1	" 107	"
	74180	1	" 116	"
	75126	1	" 127	"
		1	" 140	"
3	518782-01	1	Lock ring*/***	Låsring*/***
4	65594	1	O-ring	O-ring
5	71438	1	Bowl hood***	Kulhuv***
6	71440	1	Seal ring	Tätningssring
7	67587	1	O-ring	O-ring
8	520333-02	1	Top disc***	Överplåt***
9	520220-83		Disc set	Plåtsats
			Bowl disc	Insatsplåt
10	521712-81	1	Distributor, stainless***	Fördelare, rostfritt***
11	See chapter P Se kapitel P	1	Cap nut*/**	Kapselmutter*/**
12	72588	1	Nave cap	Navkapsel
13	65201	1	O-ring	O-ring
14	69172	1	Sliding bowl bottom	Slidallrik
15	67575	1	O-ring	O-ring
16	68918	3	Screw	Skruv
17	539970-80	1	Bowl body***	Kulkropp***
18	62642	1	Screw plug	Skruvplugg
19	67572	1	Guide sleeve	Styrhylsa
20	73883	6	Screw	Skruv
21	71469	1	Spring support***	Fjäderhållare***
22	68657	15	Spring	Fjäder
23	519369-01	3	Seat	Fäste
24	518549-03	3	Valve plug	Ventilpropp
25	520398-01	1	Operating slide	Manöverslid
26	67566	1	O-ring	O-ring
27	536562-01	3	Valve seat	Ventilsäte
28	223406-11	3	O-ring	O-ring
29	515133-03	1	Nozzle	Munstycke

* Left-hand thread.

** Not included in the complete-unit
No. of the bowl.*** Exchange necessitates rebalancing
— send the complete bowl to an
authorized ALFA-LAVAL repr.

* Vänstergängad.

** Ingår ej i kulans komplett-
nummer.*** Utbyte nödvändiggör ombalansering
— skicka in hela kulan till en
ALFA-LAVAL representant.



CONCENTRATOR BOWL
KONCENTRATOR KULAErosion-protected sliding bowl bottom
Erosionsskyddad slidtallrik

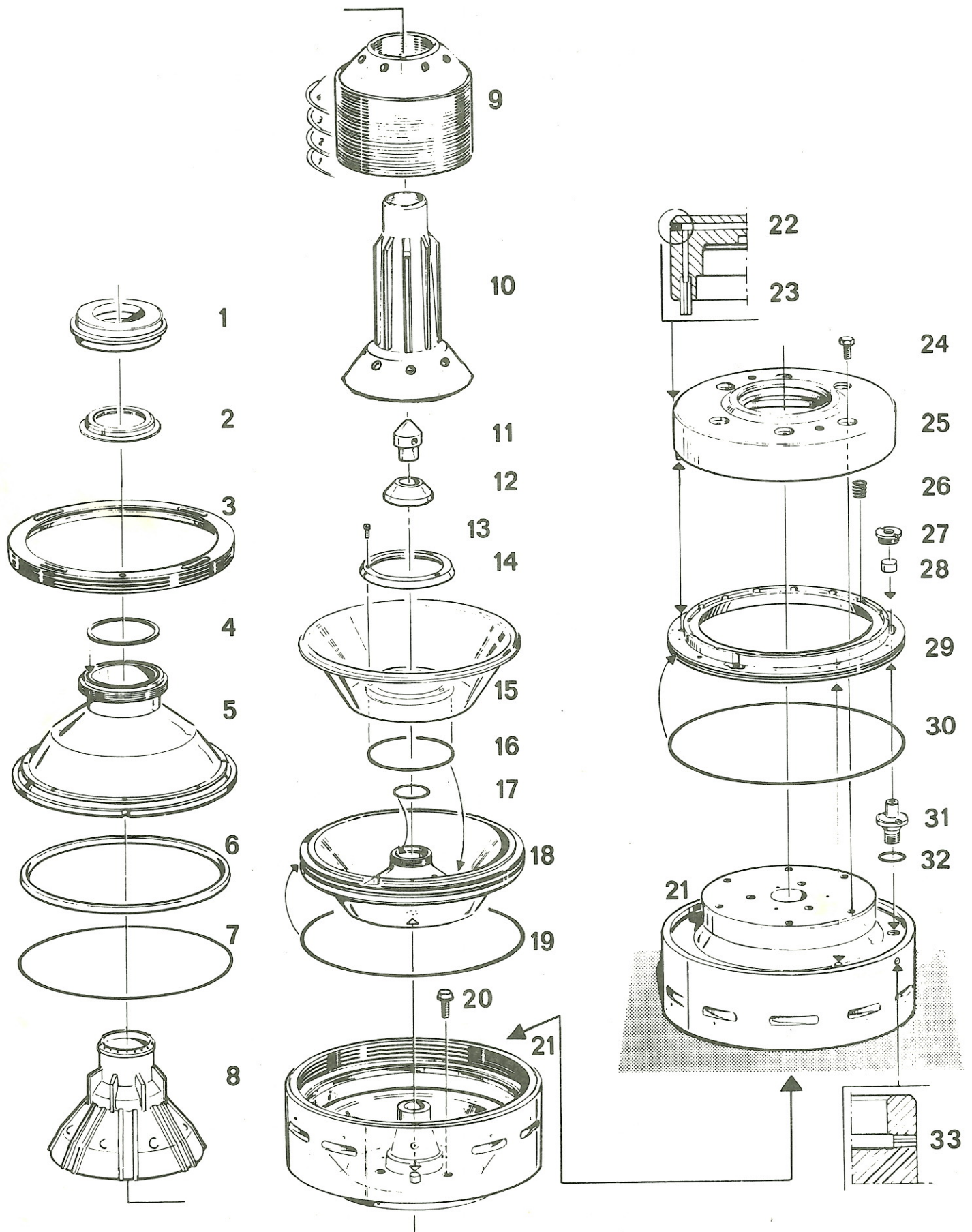
526661-85

Ref.	Part No. Delnr.	Qty. Ant.	Part name	Benämning
1	71481	1	Lock ring*	Låsring*
2	75124	1	Gravity disc	Regleringsbricka
	517242-08	1	Hole diameter in mm 95	mm håldiameter
	74171	1	" 98	"
	74173	1	" 102	"
	74174	1	" 105	"
	74175	1	" 107	"
	74176	1	" 110	"
	74177	1	" 113	"
	74178	1	" 116	"
	74179	1	" 120	"
	74180	1	" 123	"
	74181	1	" 127	"
	75126	1	" 131	"
			" 140	"
3	518782-01	1	Lock ring*/***	Låsring*/***
4	65594	1	O-ring	O-ring
5	71438	1	Bowl hood***	Kulhuv***
6	71440	1	Seal ring	Tätningssring
7	67587	1	O-ring	O-ring
8	71122	1	Top disc***	Överplåt***
9	520220-83	1	Disc set***	Plåtsats***
			Bowl disc	Insatsplåt
10	524377-04	1	Distributor***	Fördelare***
11	See chapter P	1	Cap nut*/**	Kapselmutter*/**
12	72588	1	Nave cap	Navkapsel
13	2211724-23	6	Screw	Skruv
14	518513-01	1	Ring	Fästring
15	520558-01	1	Lining	Foder
16	65133	1	O-ring	O-ring
17	65201	1	O-ring	O-ring
18	520652-82	1	Sliding bowl bottom	Slidtallrik
19	67575	1	O-ring	O-ring
20	68918	3	Screw**	Skruv**
21	539970-80	1	Bowl body***	Kulkropp***
22	62642	1	Screw plug	Skruvplugg
23	67572	1	Guide sleeve	Styrhylsa
24	73883	6	Screw	Skruv
25	71469	1	Spring support***	Fjäderhållare***
26	68657	15	Spring	Fjäder
27	519369-01	3	Seat	Fäste
28	518549-03	3	Valve plug	Ventilpropp
29	520398-01	1	Operating slide	Manöverslid
30	67566	1	O-ring	O-ring
31	536562-01	3	Valve seat	Ventilsäte
32	223406-11	3	O-ring	O-ring
33	515133-03	1	Nozzle	Munstycke

* Left-hand thread.

* Vänstergängad.

** Not included in the complete-unit
No. of the bowl.** Ingår ej i kulans komplett-
nummer.*** Exchange necessitates rebalancing
— send the complete bowl to an
authorized ALFA-LAVAL repr.*** Utbyte nödvändiggör ombalan-
sering — skicka in hela kulan till
en ALFA-LAVAL representant.



PURIFICATOR BOWL
PURIFIKATOR KULAErosion-protected sliding bowl bottom
Erosionsskyddad sliddallrik

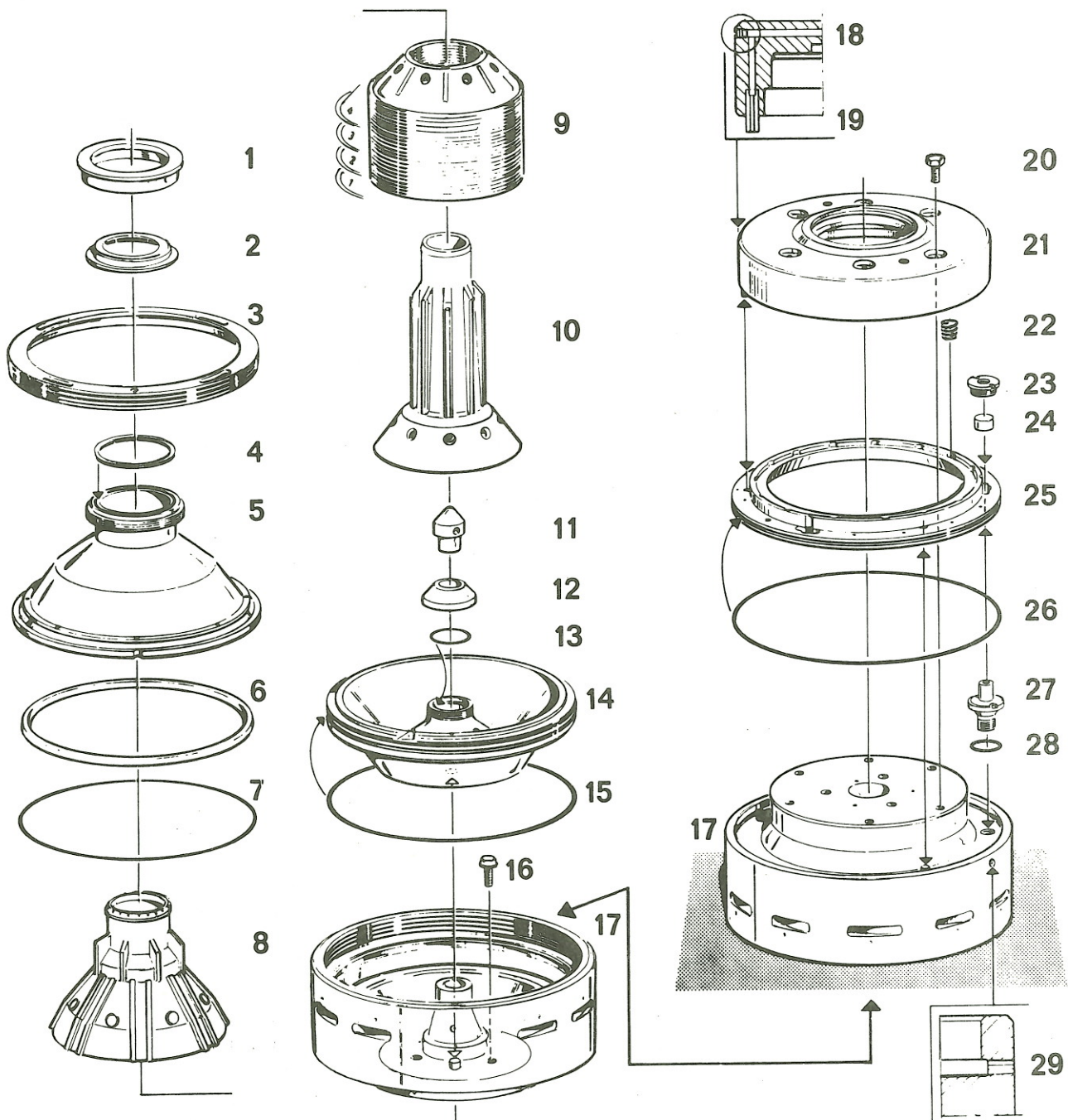
526661-86

Ref.	Part No. Delnr.	Qty. Ant.	Part name	Benämning
1	71481	1	Lock ring*	Låsring*
2	75124	1	Gravity disc	Regleringsbricka
	517242-08	1	Hole diameter in mm 95	mm håldiameter
	74171	1	" 98	"
	74174	1	" 102	"
	74177	1	" 107	"
	74180	1	" 116	"
	75126	1	" 127	"
			" 140	"
3	518782-01	1	Lock ring*/***	Låsring*/***
4	65594	1	O-ring	O-ring
5	71438	1	Bowl hood***	Kulhuv***
6	71440	1	Seal ring	Tätningssring
7	67587	1	O-ring	O-ring
8	72740	1	Top disc***	Överplåt***
9	520220-83	1	Disc set***	Plåtsats***
			Bowl disc	Insatsplåt
10	524377-04	1	Distributor***	Fördelare***
11	See chapter P	1	Cap nut*/**	Kapselmutter*/**
12	72588	1	Nave cap	Navkapsel
13	2211724-23	6	Screw	Skruv
14	518513-01	1	Ring	Fästring
15	520558-01	1	Lining	Foder
16	65133	1	O-ring	O-ring
17	65201	1	O-ring	O-ring
18	520652-82	1	Sliding bowl bottom	Sliddallrik
19	67575	1	O-ring	O-ring
20	68918	3	Screw**	Skruv**
21	539970-80	1	Bowl body***	Kulkropp***
22	62642	1	Screw plug	Skruvplugg
23	67572	1	Guide sleeve	Styrhylsa
24	73883	6	Screw	Skruv
25	71469	1	Spring support***	Fjäderhållare***
26	68657	15	Spring	Fjäder
27	519369-01	3	Seat	Fäste
28	518549-03	3	Valve plug	Ventilpropp
29	520398-01	1	Operating slide	Manöverslid
30	67566	1	O-ring	O-ring
31	536562-01	3	Valve seat	Ventilsäte
32	223406-11	3	O-ring	O-ring
33	515133-03	1	Nozzle	Munstycke

* Left-hand thread.

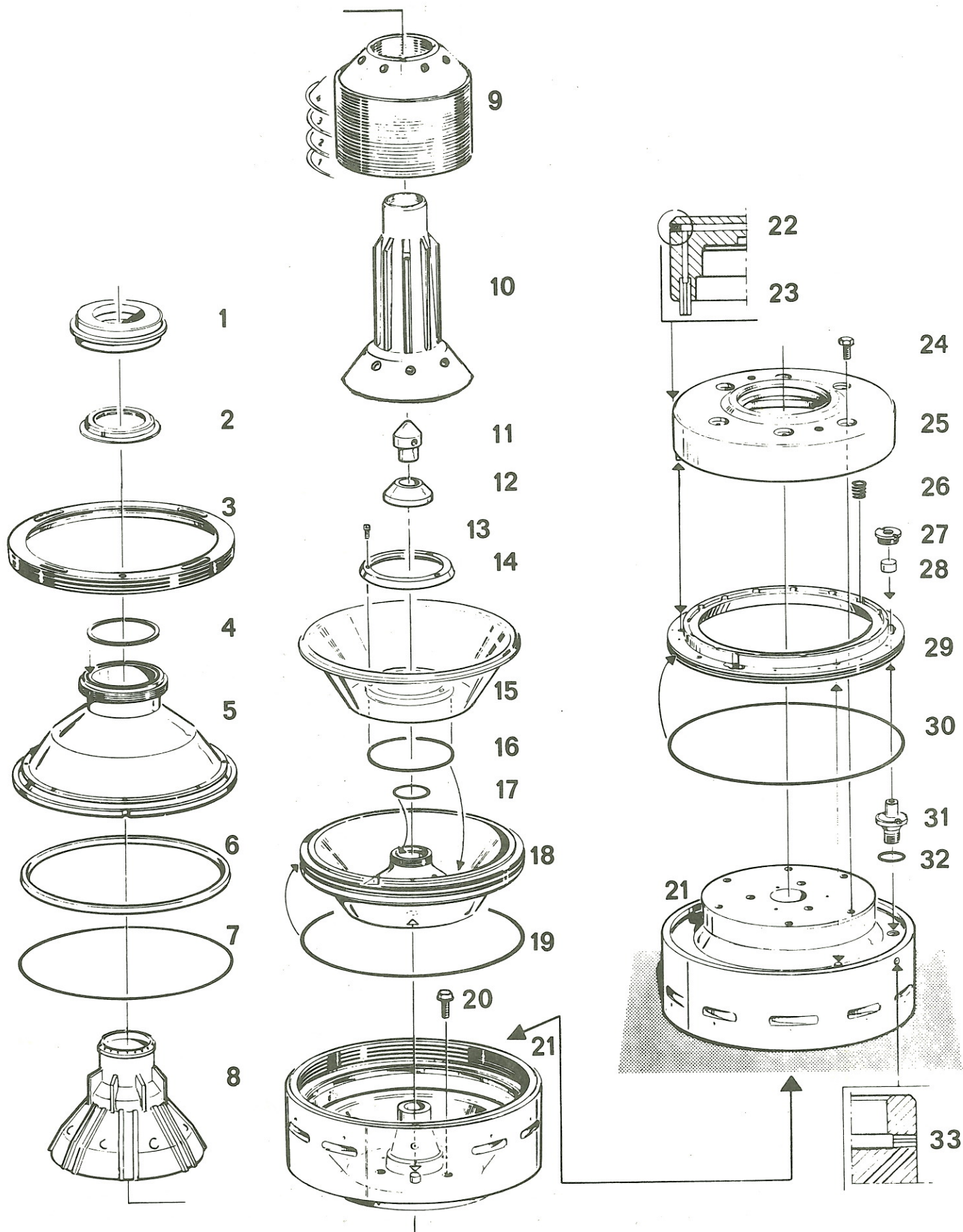
* Vänstergängad.

** Not included in the complete-unit
No. of the bowl.** Ingår ej i kulans komplett-
nummer.*** Exchange necessitates rebalancing
— send the complete bowl to an
authorized ALFA-LAVAL repr.*** Utbyte nödvändiggör ombalan-
sering — skicka in hela kulan till
en ALFA-LAVAL representant.



CONCENTRATOR BOWL Disc set with caulks 2.0 mm 528228-83
 KONCENTRATOR KULA Plåtsats med klammer 2.0 mm

Pos.	Part No.	Description	Benämning	Qty.
1	71481	Lock ring *	Låsring	
2	75124	Gravity disc	Regleringsbricka	
	517242-08	Hole diameter in mm 95	mm håldiameter	
	74171	" 98	"	
	74173	" 102	"	
	74174	" 105	"	
	74175	" 107	"	
	74176	" 110	"	
	74177	" 113	"	
	74178	" 116	"	
	74179	" 120	"	
	74180	" 123	"	
	74181	" 127	"	
	75126	" 131	"	
		" 140	"	
3	518782-01	Lock ring * / ***	Låsring	
4	65594	O-ring	O-ring	
5	71438	Bowl hood ***	Kulhuv	
6	71440	Seal ring	Tätningssring	
7	67587	O-ring	O-ring	
8	71122	Top disc ***	Överplåt	
9		Disc set ***	Plåtsats	
	520219-83	Bowl disc	Insatsplåt	-
10	71869	Distributor ***	Fördelare	
11	See Chap. P	Cap nut * / **	Kapselmutter (Kap. P)	
12	72588	Nave cap	Navkapsel	
13	65201	O-ring	O-ring	
14	69172	Sliding bowl bottom	Slidallrik	
15	67575	O-ring	O-ring	
16	68918	Screw **	Skruv	3
17	539970-80	Bowl body	Kulkropp	
18	62642	Screw plug	Skruvplugg	
19	67572	Guide sleeve	Styrhylsa	
20	73883	Screw	Skruv	6
21	71469	Spring support ***	Fjäderhållare	
22	68657	Spring	Fjäder	15
23	519369-01	Seat	Fäste	3
24	518549-03	Valve plug	Ventilpropp	3
25	520398-01	Operating slide	Manöverslid	
26	67566	O-ring	O-ring	
27	536562-01	Valve seat	Ventilsäte	3
28	223406-11	O-ring	O-ring	3
29	515133-03	Nozzle	Munstycke	
* Left-hand thread		* Vänstergängad		
** Not included in the complete-unit No. of the bowl		** Ingår ej i kulans komplett-nummer.		
*** Exchange necessitates rebalancing — send the complete bowl to an authorized ALFA-LAVAL representative.		*** Utbyte nödvändiggör ombalansering — skicka in hela kulan till en ALFA-LAVAL representant.		



CONCENTRATOR BOWL Erosion-protected sliding bowl bottom 528228-84
KONCENTRATOR KULA Erosionsskyddad slidtallrik

Pos.	Part No.	Description	Benämning	Qty
1	71481	Lock ring *	Låsring	
2	75124	Gravity disc	Regleringsbricka	
	517242-08	Hole diameter in mm 95	mm håldiameter	
	74171	" 98	"	
	74173	" 102	"	
	74174	" 105	"	
	74175	" 107	"	
	74176	" 110	"	
	74177	" 113	"	
	74178	" 116	"	
	74179	" 120	"	
	74180	" 123	"	
	74181	" 127	"	
	75126	" 131	"	
		" 140	"	
3	518782-01	Lock ring * / ***	Låsring	
4	65594	O-ring	O-rin	
5	71438	Bowl hood ***	Kulhuv	
6	71440	Seal ring	Tätningarring	
7	67587	O-ring	O-ring	
8	71122	Top disc ***	Överplåt	
9		Disc set ***	Plåtsats	
	520219-83	Bowl disc	Insatsplåt	-
10	71869	Distributor ***	Fördelare	
11	See Chap. P	Cap nut * / **	Kapselmutter (Kap. P)	
12	72588	Nave cap	Navkapsel	
13	2211724 -23	Screw	Skruv	6
14	518513-01	Ring	Fästring	
15	520558-01	Lining	Foder	
16	65133	O-ring	O-ring	
17	65201	O-ring	O-ring	
18	520652-82	Sliding bowl bottom	Slidtallrik	
19	67575	O-ring	O-ring	
20	68918	Screw **	Skruv	3
21	539970-80	Bowl body ***	Kulkropp	
22	62642	Screw plug	Skruvplugg	
23	67572	Guide sleeve	Styrhylsa	
24	73883	Screw	Skruv	6
25	71469	Spring support ***	Fjäderhållare	
26	68657	Spring	Fjäder	15
27	519369-01	Seat	Fäste	3
28	518549-03	Valve plug	Ventilpropp	3
29	520398-01	Operating slide	Manöverslid	
30	67566	O-ring	O-ring	
31	536562-01	Valve seat	Ventilsäte	3
32	223406-11	O-ring	O-ring	3
33	515133-03	Nozzle	Munstycke	

* Left-hand thread.

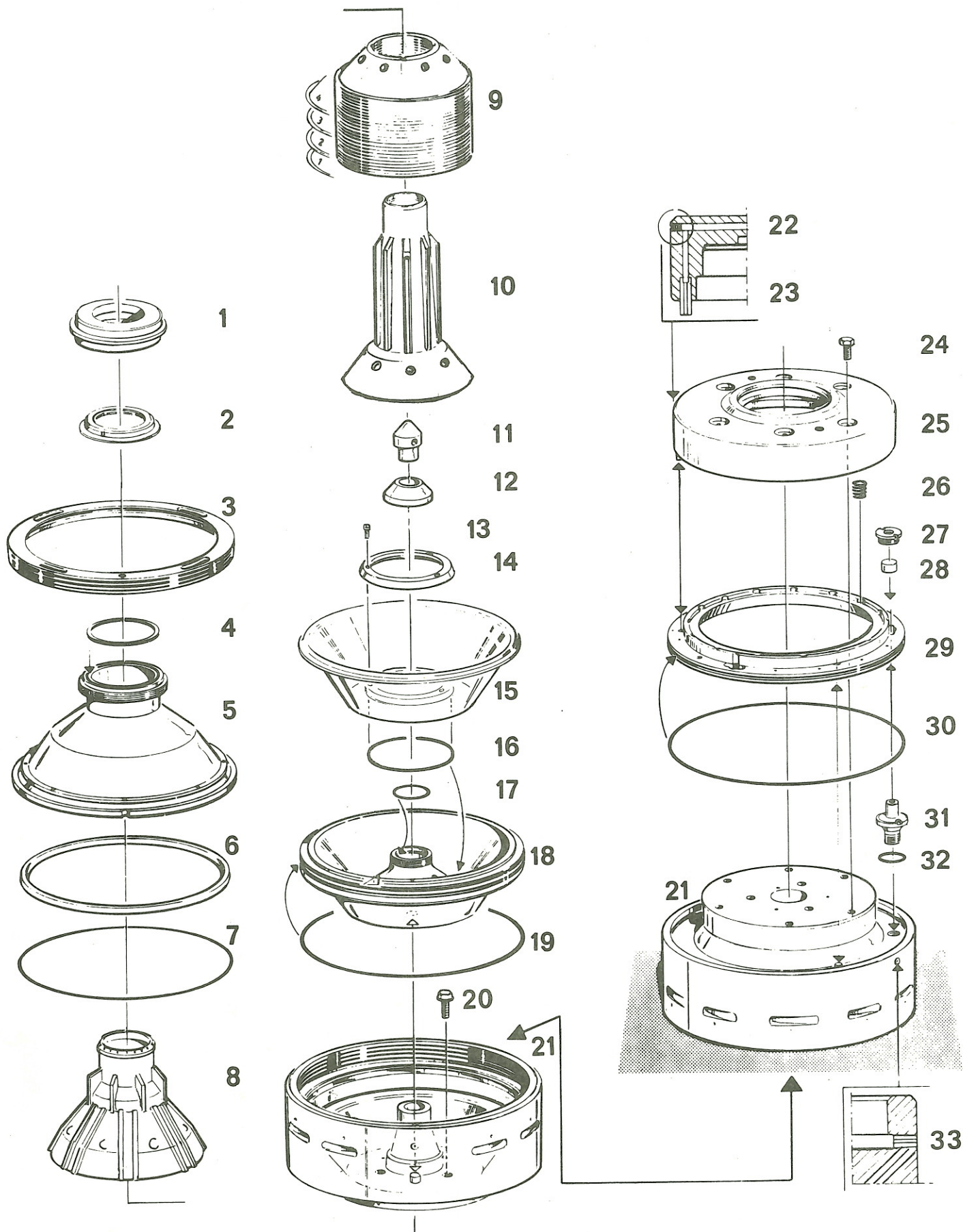
** Not included in the complete-unit No. of the bowl

*** Exchange necessitates rebalancing — send the complete bowl to an authorized ALFA-LAVAL repr.

* Vänstergängad.

** Ingår ej i kulans komplett-nummer.

*** Utbyte nödvändiggör ombalansering — skicka in hela kulan till en ALFA-LAVAL representant.



CONCENTRATOR BOWL Erosion-protected sliding bowl bottom 528228-85
KONCENTRATOR KULA Erosionsskyddad slidtallrik

Ref.	Part No. Delnr.	Qty. Ant.	Part name	Benämning
1	71481	1	Lock ring*	Låsring*
2	75124	1	Gravity disc	Regleringsbricka
	517242-08	1	Hole diameter in mm 95	mm håldiameter
	74171	1	" 98	"
	74173	1	" 102	"
	74174	1	" 105	"
	74175	1	" 107	"
	74176	1	" 110	"
	74177	1	" 113	"
	74178	1	" 116	"
	74179	1	" 120	"
	74180	1	" 123	"
	74181	1	" 127	"
	75126	1	" 131	"
		1	" 140	"
3	518782-01	1	Lock ring*/***	Låsring*/***
4	65594	1	O-ring	O-ring
5	71438	1	Bowl hood***	Kulhuv***
6	71440	1	Seal ring	Tätningssring
7	67587	1	O-ring	O-ring
8	71122	1	Top disc***	Överplåt***
9			Disc set***	Plåtsats***
	520219-83	1	Bowl disc	Insatsplåt
10	523240-80	1	Distributor, stainl. s.***	Fördelare, rostfr. st.***
11	See chap. P	1	Cap nut*/**	Kapselmutter*/**
12	72588	1	Nave cap	Navkapsel
13	2211724-23	6	Screw	Skruv
14	518513-01	1	Ring	Fästring
15	520558-01	1	Lining	Foder
16	65133	1	O-ring	O-ring
17	65201	1	O-ring	O-ring
18	520652-82	1	Sliding bowl bottom	Slidtallrik
19	67575	1	O-ring	O-ring
20	68918	3	Screw**	Skruv**
21	539970-80	1	Bowl body***	Kulkropp***
22	62642	1	Screw plug	Skruvplugg
23	67572	1	Guide sleeve	Styrhylsa
24	73883	6	Screw	Skruv
25	71469	1	Spring support***	Fjäderhållare***
26	68657	15	Spring	Fjäder
27	519369-01	3	Seat	Fäste
28	518549-03	3	Valve plug	Ventilpropp
29	520398-01	1	Operating slide	Manöverslid
30	67566	1	O-ring	O-ring
31	536562-01	3	Valve seat	Ventilsäte
32	223406-11	3	O-ring	O-ring
33	515133-03	1	Nozzle	Munstycke

* Left-hand thread.

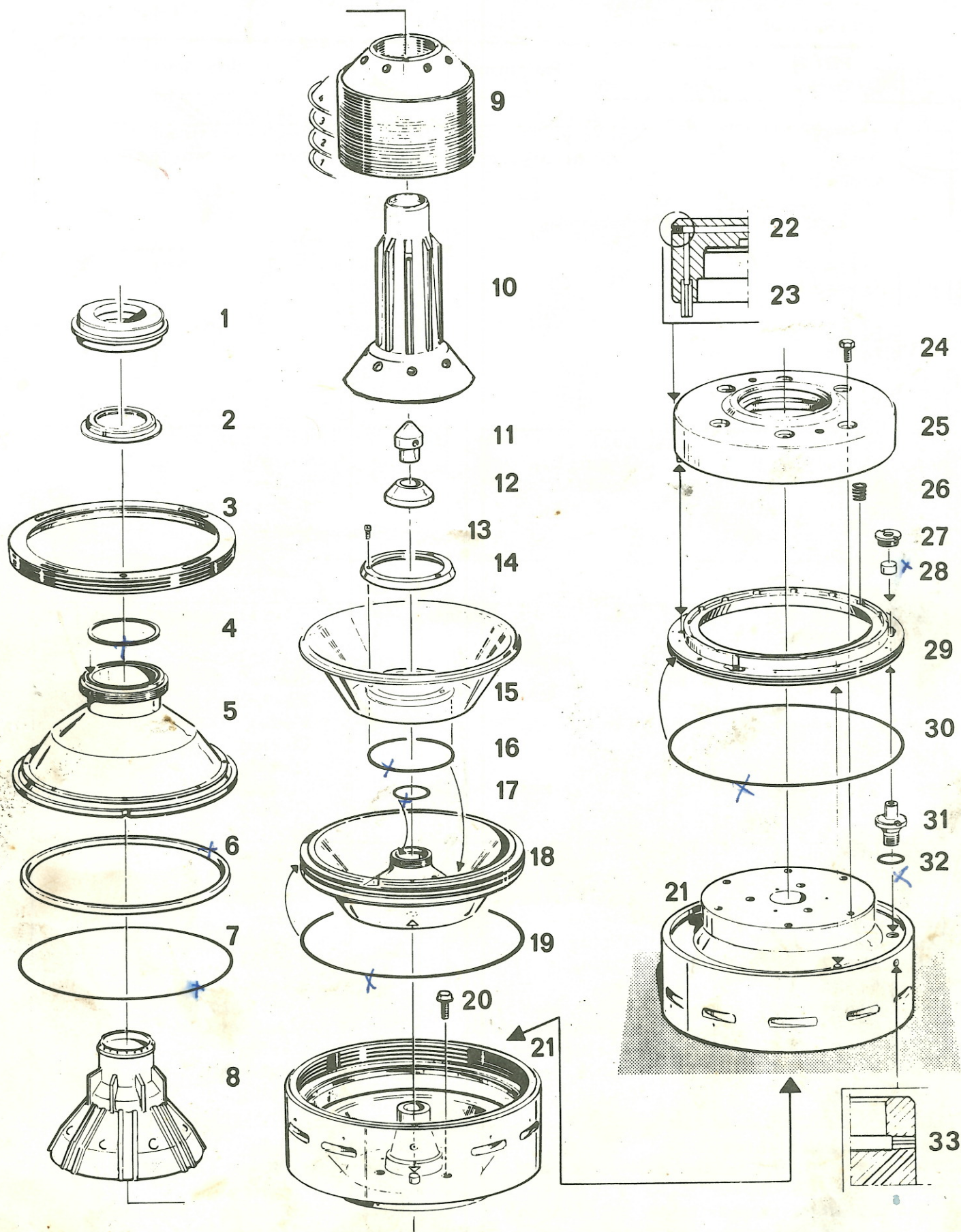
** Not included in the complete-unit No. of the bowl.

*** Exchange necessitates rebalancing — send the complete bowl to an authorized ALFA-LAVAL repr.

* Vänstergängad.

** Ingår ej i kulans komplett-nummer.

*** Utbyte nödvändiggör ombalansering — skicka in hela kulan till en ALFA-LAVAL representant.



CONCENTRATOR BOWL Erosion-protected sliding bowl bottom 528228-87
KONCENTRATOR KULA Erosionsskyddad slidtallrik

Ref.	Part No. Delnr.	Qty. Ant.	Part name	Benämning
1	71481	1	Lock ring*	Låsring*
2	75124	1	Gravity disc	Regleringsbricka
	517242-08	1	Hole diameter in mm 95	mm håldiameter
	74171	1	" 98	"
	74173	1	" 102	"
	74174	1	" 105	"
	74175	1	" 107	"
	74176	1	" 110	"
	74177	1	" 113	"
	74178	1	" 116	"
	74179	1	" 120	"
	74180	1	" 123	"
	74181	1	" 127	"
	75126	1	" 131	"
		1	" 140	"
3	518782-01	1	Lock ring*/***	Låsring*/***
4	65594	1	O-ring	O-ring
5	71438	1	Bowl hood***	Kulhuv***
6	71440	1	Seal ring	Tätningssring
7	67587	1	O-ring	O-ring
8	520212-01	1	Top disc***	Överplåt***
9			Disc set***	Plåtsats***
	520219-83	1	Bowl disc	Insatsplåt
10	523240-80	1	Distributor, stainl. s.***	Fördelare, rostfr. st.***
11	See chap. P	1	Cap nut*/**	Kapselmutter*/**
12	72588	1	Nave cap	Navkapsel
13	2211724-23	6	Screw	Skruv
14	518513-01	1	Ring	Fästring
15	520558-01	1	Lining	Foder
16	65133	1	O-ring	O-ring
17	65201	1	O-ring	O-ring
18	520652-82	1	Sliding bowl bottom	Slidtallrik
19	67575	1	O-ring	O-ring
20	68918	3	Screw**	Skruv**
21	539970-80	1	Bowl body***	Kulkropp***
22	62642	1	Screw plug	Skruvplugg
23	67572	1	Guide sleeve	Styrhylsa
24	73883	6	Screw	Skruv
25	71469	1	Spring support***	Fjäderhållare***
26	68657	15	Spring	Fjäder
27	519369-01	3	Seat	Fäste
28	518549-03	3	Valve plug	Ventilpropp
29	520398-01	1	Operating slide	Manöverslid
30	67566	1	O-ring	O-ring
31	536562-01	3	Valve seat	Ventilsäte
32	223406-11	3	O-ring	O-ring
33	515133-03	1	Nozzle	Munstycke

* Left-hand thread.

** Not included in the complete-unit
No. of the bowl.*** Exchange necessitates rebalancing
— send the complete bowl to an
authorized ALFA-LAVAL repr.

* Vänstergängad.

** Ingår ej i kulans komplett-
nummer.*** Utbyte nödvändiggör ombalan-
sering — skicka in hela kulan till
en ALFA-LAVAL representant

CLEANING. OVERHAUL. LUBRICATION Satisfactory functioning cannot be ensured unless the parts in contact with liquid are carefully cleaned before assembly. This applies particularly to seal rings, sliding surfaces, guiding and contact surfaces, and threads. Also take care that no burrs are knocked up on the metal parts when handling them.

Follow the directions given in chapter L and H.

EXCHANGE of PARTS Each bowl constitutes a balanced unit which will get out of balance if any parts having an "*" added to their part number in the general drawing are exchanged without the bowl being rebalanced. To prevent confusion of parts, for instance when a plant consists of several machines of the same type, these main parts are stamped either with the complete manufacturing number or its three last digits.

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

SEAL RINGS. PACKINGS Check seal rings and packings for defects and make sure that the corresponding grooves and sealing surfaces are well cleaned.

After mounting check:

... that the ring lies properly (not twisted) in the groove.

... that it fills the groove evenly all around.

THREADS. PRESSURE IN DISC SET Check the lock ring threads and the pressure in the disc set at regular intervals — see chapter L.

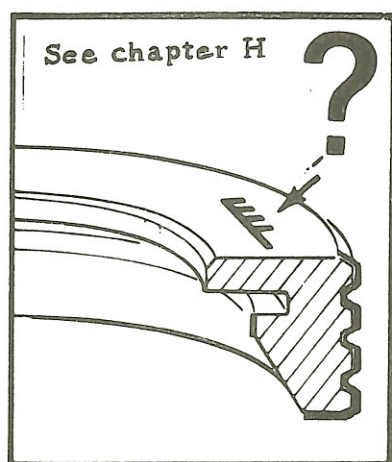
CORROSION. EROSION Aggressive liquids as well as liquids containing very hard particles may cause corrosion and erosion damage. If rapidly growing or advanced damage is noticed, consult an ALFA-LAVAL/DE LAVAL representative.

DISMANTLING.
ASSEMBLY

Dismantle and assemble the bowl with the help of the special tools in the order indicated by the exploded drawing. Place the parts on a clean, soft surface.

The bowl should rotate clockwise. The principal components therefore have left-hand threads where indicated in the text.

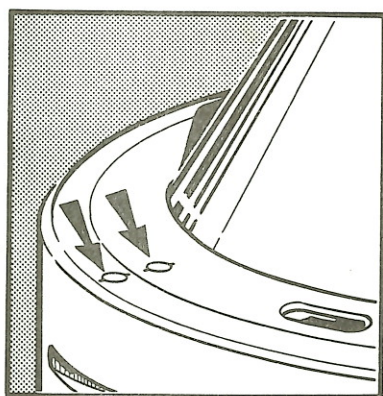
Lock rings



The lock rings have left-hand threads and are unscrewed **CLOCKWISE**. The large lock ring is loosened by blows of a lead mallet or similar on the handle of the spanner.

Clean and lubricate the threads of the lock rings and their contact surfaces with bowl hood and bowl body before every assembly. Seizing may be the result, especially in new machines, if this lubrication is neglected or an unsuitable lubricant is used. Careful lubrication of these surfaces will prevent unnecessary wear on threads and contact surfaces.

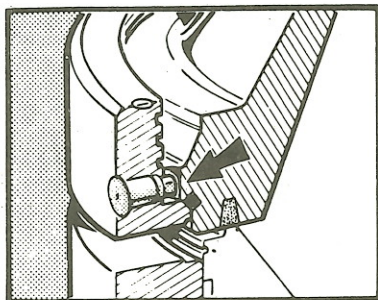
Tighten the lock rings **ANTI-CLOCKWISE** — the small lock ring until a tight seal is obtained and the large lock ring until the bowl hood lies **TIGHTLY** against the bowl body.



In a new bowl the marks ϕ will now be in line with each other. The best way to use the spanner is to move the handle clockwise and check the movement with a heavy jerk. The lock ring should press the bowl hood against the bowl body so that perfect sealing is obtained at the seal ring and should also keep the distributor pressed against the bottom of the bowl body, firmly clamping the disc set. For final tightening it may thus be necessary to hit the spanner handle with a lead mallet or similar (**NEVER** extend the spanner handle).

Note: See chapter L for checking pressure in disc set and inspecting threads.

Bowl hood



Lift the bowl hood off and on with the lifting tool. To ease the hood off the bowl body, the central screw of the tool is screwed down.

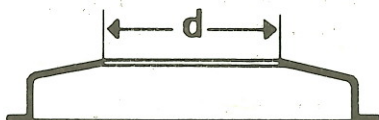
If the hood does not engage on assembly, this means that one of the locating pieces is out of position — check this.

The sealing ring at the lower edge of the hood should not be removed except when being exchanged — see Chapter L, Overhaul of Bowl.

Bowl insert parts

The design of the insert parts determines whether the bowl is of CLARIFIER, PURIFIER or CONCENTRATOR type. The bowl may be intended for one of these processing methods or may be equipped and balanced with parts for two of them so that either can be chosen as needed. In the latter case it is important that the bowl is correctly assembled with the parts designed for the processing method chosen. The exploded drawing shows how the various insert pieces are assembled even when the bowl is provided with alternative sets of parts.

Gravity disc or discharge collar



A PURIFIER or CONCENTRATOR bowl is provided with a gravity disc, the aperture diameter of the disc being chosen according to the directions given in Chapters B and K.

A CLARIFIER bowl is fitted with a discharge collar.

Top disc with or without neck

A PURIFIER or CONCENTRATOR bowl is fitted with a top disc with a neck.

A CLARIFIER bowl is fitted with a top disc with no neck.

Distributor.
Disc set

Lift the distributor in and out with the disc set on it. If the discs have been removed, make sure that they are replaced in the correct order with No. 1 at the bottom.

When a purifier or clarifier bowl is also intended for use as a CONCENTRATOR, the alternative insert pieces generally include a separate disc set together with a distributor of the same type as that used in a bowl intended for concentration only. These parts too are thus balanced for the bowl — see the appropriate exploded drawing with complete and parts numbers.

Cap nut

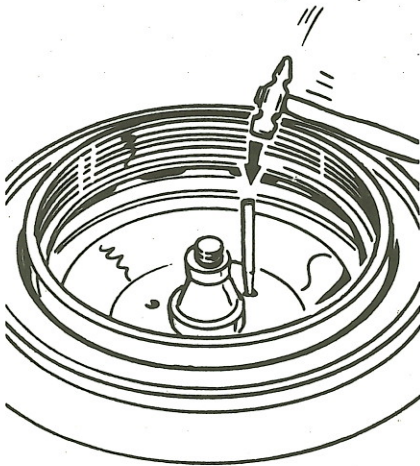
The cap nut has a left-hand thread and is unscrewed **CLOCKWISE**. Lubricate the thread and contact surface before putting on. Tighten the cap nut securely.

Sliding bowl bottom

Lift the sliding bowl bottom in and out with the tool. Handle with care to avoid damaging the sealing edge. If the surface that seals against the bowl hood needs improving, it can be adjusted by turning provided that the sliding bowl bottom does not have an anti-erosion lining — see Chapter L, Overhaul of Bowl.

If an anti-erosion lining is provided, check that it shows no traces of wear. To avoid permanent erosion attacks against one and the same spots, the lining should be loosened, turned by 5 - 10°, and fastened again.

Bowl body

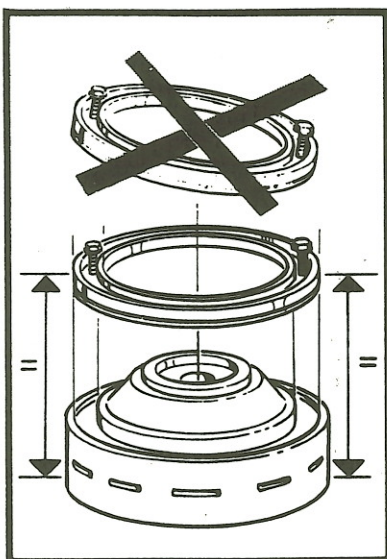


The bowl body need not normally be removed except for protective lubrication of the spindle cone — see Chapter L, Bowl Cleaning — or for disassembly of the discharge mechanism.

The screws in the bottom of the bowl must be unscrewed and removed before the lifting tool is positioned. It is also advisable to knock off the distributing ring with a drift. The bowl body is eased off the spindle cone with the central screw of the lifting tool.

Lubricate the nave opening, the nave and the top of the spindle sparingly before mounting the bowl body — excessive lubrication may cause the bowl to slip.

Discharge mechanism



When the bowl body is dismantled, it is also advisable to dismantle the discharge mechanism for lubrication and for cleaning of the passages and nozzle.

The operating slide is lifted by two of the spring support screws. The slide must be handled with great care. Skew and uneven insertion or removal and the use of force lead in most cases to deformation and consequently to breakdowns. When placed in position the slide should be lowered perfectly level, and it should then be possible to lift it slightly by hand all the way round.

Valve plugs, fastenings and valve seats should not be removed except to be exchanged. The nozzle in the bowl body and the passages should be cleaned with special tools, or failing that with a soft iron wire.

Lubricate the outer edge surface of the operating slide as well as the surface in the bowl body over which the slide moves.

Tighten the spring support screws evenly and firmly.

1. The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that proper record-keeping is essential for the transparency and accountability of the organization. This section also outlines the specific procedures for recording and verifying financial data.

2. The second part of the document addresses the issue of budgeting and financial planning. It provides a detailed overview of the budgeting process, including the identification of needs, the allocation of resources, and the monitoring of expenditures. The goal is to ensure that the organization operates within its financial means while achieving its strategic objectives.

3. The third part of the document focuses on the management of human resources. It discusses the importance of recruiting, training, and retaining a skilled workforce. The text also covers topics such as employee performance, compensation, and the creation of a positive work environment. The emphasis is on developing a team that is capable of driving the organization's success.

4. The fourth part of the document deals with the management of physical resources. It outlines the procedures for acquiring, maintaining, and disposing of tangible assets. This section also addresses the importance of ensuring the safety and security of the organization's facilities and equipment. The goal is to optimize the use of physical resources and minimize waste.

5. The fifth part of the document discusses the management of information resources. It highlights the importance of collecting, organizing, and disseminating information effectively. The text also covers topics such as data security, information technology, and the use of information in decision-making. The emphasis is on ensuring that the organization has access to the information it needs to operate efficiently and effectively.

6. The sixth part of the document addresses the issue of legal and regulatory compliance. It provides an overview of the various laws and regulations that may apply to the organization's operations. The text also discusses the importance of staying up-to-date on changes in the legal and regulatory environment and the need to implement appropriate controls to ensure compliance.

7. The seventh part of the document discusses the management of risk. It outlines the process for identifying, assessing, and mitigating risks that may threaten the organization's ability to achieve its goals. This section also covers topics such as risk appetite, risk tolerance, and the role of risk management in the overall strategic planning process.

8. The eighth part of the document deals with the management of the organization's reputation. It discusses the importance of maintaining a positive public image and the role of communication in achieving this goal. The text also covers topics such as crisis management, stakeholder engagement, and the use of social media to enhance the organization's reputation.

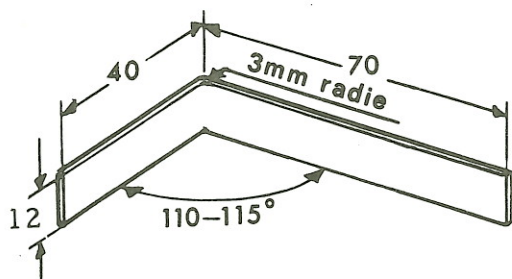
9. The ninth part of the document discusses the management of the organization's culture. It outlines the process for defining, developing, and sustaining a strong organizational culture. This section also covers topics such as the role of leadership in shaping culture, the importance of values, and the use of culture as a tool for driving organizational change.

10. The tenth part of the document provides a summary of the key points discussed in the previous sections. It emphasizes the importance of integrating all of these management functions into a cohesive and effective overall management system. The text also provides some final thoughts on the challenges of management and the need for continuous improvement.

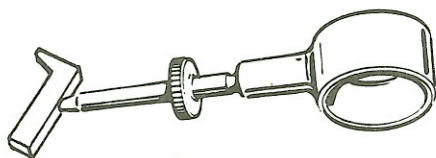


MOUNTING WEAR LINERS IN SEDIMENT PORTS OF BOWL WALL

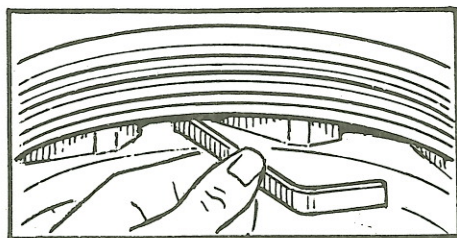
When fitting the liners keep in mind that they will be subjected to a very high service stress. Forces up to 10.000 G are not unusual at the bowl periphery. It is essential, therefore, that the liners should be mounted carefully and in full agreement with the following instructions.



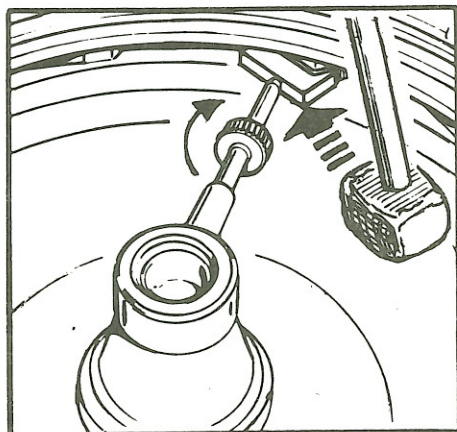
The wear liners are made of 1 mm stainless, cold-rolled sheet metal according to the adjoining dimensioned sketch.



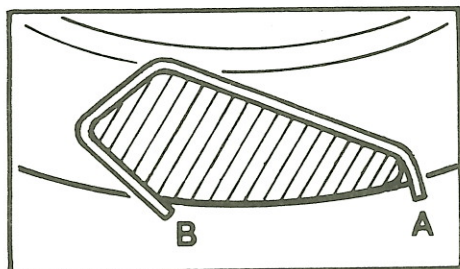
To fit the wear liners use the special mounting tool, which should be placed on the bowl body nave.



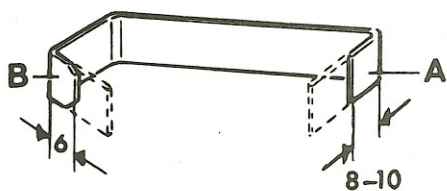
Place the liner blank in the sediment port.



Put the tool on the bowl body nave as shown in the illustration and clamp the liner blank with the tool. Knock lightly with a lead hammer on the clamp shoe and follow up with the clamping screw.

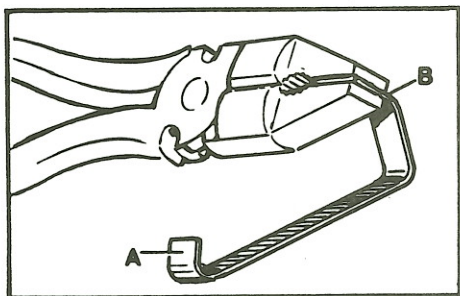


Bend the shank A at right angles to the outside of the bowl wall, using a drift. Knock shank B towards the sediment port wall so that it fits closely to it.

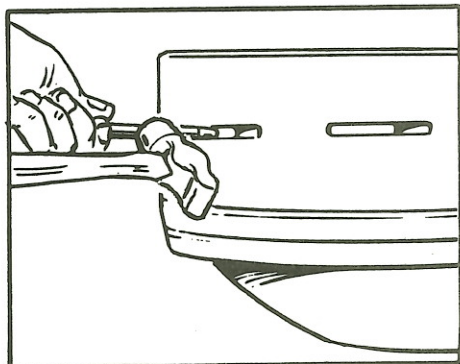


Back off the clamping screw of the tool, turn the latter aside and remove the wear liner.

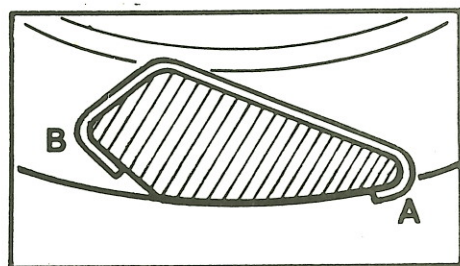
Cut shank A to a length of 8-10 mm and shank B to a length of 6 mm.



Bend shank B a little.



Fit the wear liner in the sediment port and clamp it with the tool. Knock shank A flat against the wall of the port. Then knock the shank in against the bowl wall outside so that it fits closely thereto.



Remove the tool and check that the wear liner is well attached. If this is not the case, bend shank B a little more.

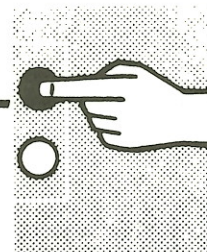
Fit the other liners as described above.

Spare parts:

536802-01 Wear liner (12)

Tool:

74375 Mounting tool



OPERATION

DATA see chapter C.

SPECIAL EQUIPMENT see chapter X.

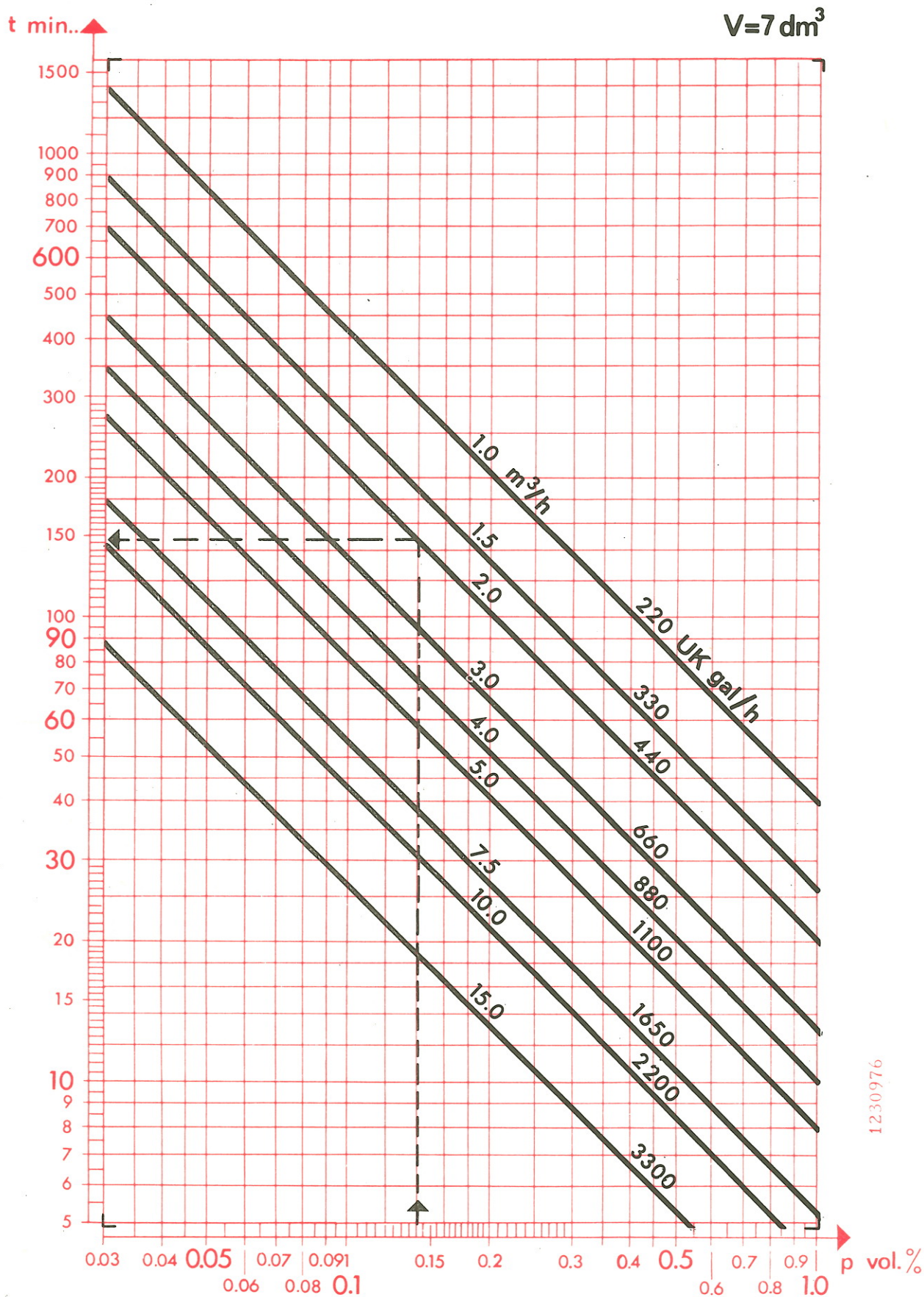
SAFETY

REGULATIONS

In all centrifugal separators the bowl rotates at a very high speed, normally between 100 and 150 revolutions per SECOND. Thus, very great forces are released and it is essential, therefore, to follow strictly the directions given in the Instruction Book concerning assembly of parts, starting, stopping and overhaul.

In this connection remember particularly:

- ... to tighten the bowl lock ring (lock rings),
- ... to fasten carefully the frame hood as well as the inlet and outlet parts,
- ... to check the speed,
- ... that no machine part must be loosened until the bowl has topped rotating,
- ... that bowl body, bowl hood and lock ring must never be heated by means of a flame,
- ... that the machine must never be used for processing liquids with a higher density (temperature, sludge nature etc.) than that for which it was originally intended. Thus, always consult an ALFA-LAVAL representative before using the machine beyond its proper range of separation.



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INTERVAL between
SOLIDS EJECTIONS
(not for self-triggering
machine)

$$t = V \cdot \frac{100 \cdot 60}{p \cdot Q}$$

When the solids content of the process liquid is known in percent by volume of moist solids or it can be established (e.g. in a test glass centrifuge), suitable intervals between solids ejections can be chosen with the guidance of the adjoining nomogram. The nomogram, which refers to homogeneous distribution of the solids in the process liquid and total emptying of the bowl solids space is based on the adjoining formula, in which

t = theoretical maximum time in minutes between two solids ejections

p = percent by volume of moist solids in process liquid

Q = throughput, in l/h

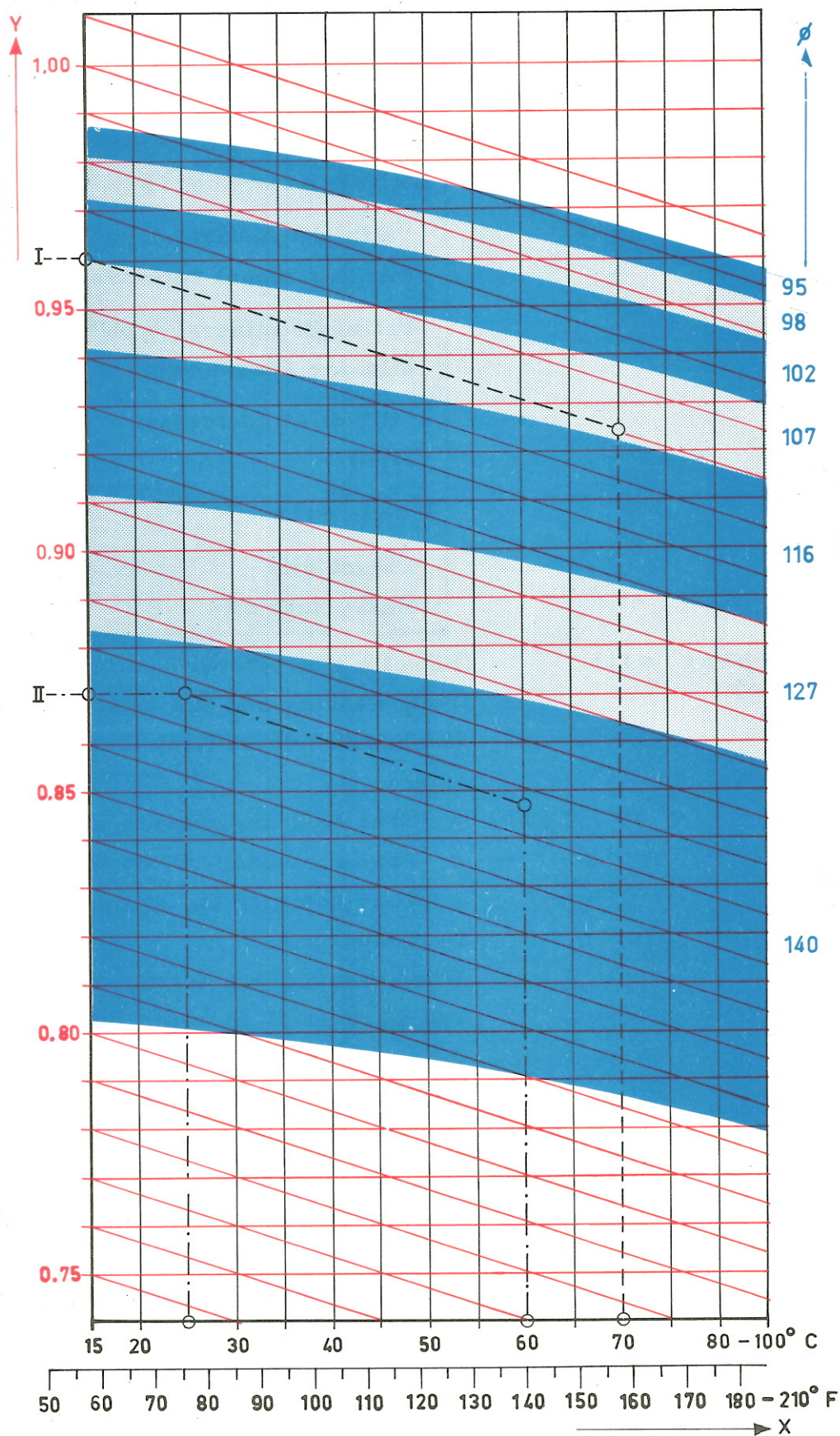
V = bowl space available for solids deposit, in dm³

After test separation and check of the solids concentration correct the time so as to obtain the discharge consistency that is best suited for the process and the type of solids. If the solids are liquid, the interval between ejections can normally be extended. However, the solids space must not be overfilled, as otherwise a part of the process liquid could remain untreated.

With total ejection the whole bowl is emptied, whereas with partial ejection only the solids space "V" is emptied, entirely or partly.

In partial ejection the discharge quantity is usually adjusted so that only a part of the available solids space "V" is emptied. To calculate the interval between ejections when those should take place at a filling degree of for instance 50%, 25% or 20% divide the stated solids space volume "V" by 2, 4 and 5 respectively. The time "t" thus obtained is used as a guiding value for setting the solids ejection interval on the timer of the timing unit (control unit).

Note. With bowl arranged exclusively for partial ejection the discharge quantity is regulated by turning off the level ring, which is located under the sliding bowl bottom – see Sludge (Solids) Blockage in chapter B. Only total ejections will take place if the level ring is removed. In bowls arranged for combined programme the partial discharge quantity is regulated by adjusting the operating liquid pressure for this function – see Operating Liquid System in chapter B.



SEPARATION of
MINERAL OILS
(MARINE OILS)

Working temperature

A high working temperature is generally favourable when processing marine and other mineral oils. The temperature should be kept constant throughout operation.

Lubricating oils	°C	°F
"straight mineral type" oils for steam turbines	approx. 65	approx. 150
"straight mineral type" oils for Diesel engines	approx. 75	approx. 165
"HD-oils" (detergent type)	approx. 80	approx. 175
Fuel oils		
Diesel oils	approx. 40	approx. 105
Heavy fuel oils	70-95	160-205

Washing with
water

(HD-oils see below).

With washing and the bowl arranged for purification (i.e. with two outlets) the following advantages are obtained:

- o That acid components are washed out of the oil
- o That the water of the liquid seal is renewed
- o That some of the sludge separated off is continuously discharged.

When treating lubricating oil of "straight mineral type" add an amount of water corresponding to 3-5% of the oil quantity.

Washwater temperature:

When possible about 10°F (5°C) above the working temperature.

The washwater is supplied through the valve for the liquid seal.

HD-oils
(detergent type)

Normally, water washing should not be applied, and at all events the oil supplier should first be consulted about the most suitable method in each special case. For treatment of HD-oils the bowl may be arranged either as a purifier or a clarifier (in the latter case with one outlet).

BEFORE STARTING

For machine equipped for programmed sludge discharge — see special instructions.

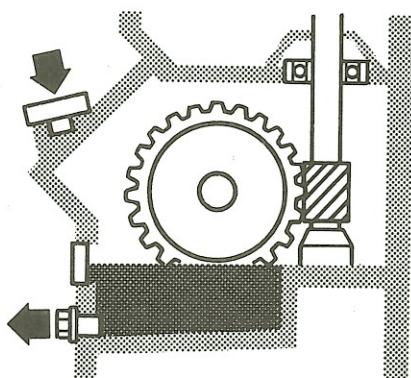
The bowl should be well cleaned and assembled as directed in chapter I.



Check particularly: that brake is released — that collecting covers (frame hood respectively) are clamped with the hinged bolts — that oil level in worm gear housing is somewhat above the middle of the gauge glass* — that operating liquid tank is full — that control valve is in position 2 (operating liquid feed turned off; bowl open).

* Note. The oil level must never be allowed to sink below the lower edge of the gauge glass. If the glass is provided with corrugations they should be vertical. Keep the gauge glass clean, otherwise a line, which could be mistaken for the oil level, will in time build up on the inside of the glass.

If the machine has been idle (for instance during a night), screw out the drain screw some turns and drain off any water.



START and RE-CIRCULATION

Start the motor. If the process liquid is to be pre-heated or cooled, circulate it through the preheater, or the cooler respectively, until suitable temperature is reached.

ACCELERATION PERIOD

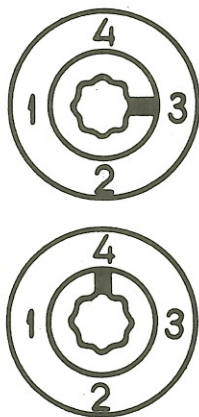
Shortly after starting it may occur that the bowl begins to vibrate more than normal. The cause is generally lack of balance due to bad cleaning of the bowl. Stop the machine and clean the bowl if the vibrations are very heavy.

Heat is always generated in the clutch coupling during the running-up period. This will be noticeable, especially when the pads on the friction blocks are new, through smoke and a smell of burning. Like the sliding sound, this is quite normal and has no importance.

During acceleration the power consumption is higher than in normal operation.

The acceleration time stated in chapter C may vary somewhat depending for instance on the condition of the friction pads in the clutch coupling.

CLOSING THE BOWL



The bowl is to be closed when it has attained the prescribed speed. The closing operation is executed manually also when the machine is provided with automatic control device. Before initiating the closing operation compare the speed indication with the speed table in chapter C. The acceleration time stated in chapter C can vary somewhat e.g. depending on the state of wear of the friction pads.

- o Close the bowl by setting the control valve to position 3. Now wait until liquid flows out through the indicator pipe, indicating that the bowl has closed.
- o Set to operative position by turning the control valve to 4. In this position any losses of liquid in the discharge mechanism are made up for.

FILLING

The filling procedure varies with the type of process to be performed (purification, clarification or concentration), i.e. whether the machine is equipped and assembled with a purifier, clarifier or concentrator bowl. The filling is operated manually even if the machine is provided with automatic control device.

Clarification
(clarifier bowl)

- o Open fully the outlet.
- o With automatically controlled machine connect the automatic control device.

Note. Make sure the timer is set to give sufficiently long intervals so that sludge discharge is not initiated during the trimming.

- o Open for the process liquid and adjust to suitable throughput. This must not exceed the permissible value and must be suited to the separability of the process liquid.

Purification
(purifier bowl)

For selection of gravity disc see chapter B, Purification, Disposition of Interface.

o If the content of heavy phase in the process liquid is too small: Supply liquid — normally water — to build up the liquid seal. This liquid should preferably have the same temperature as the process liquid and must be fed in quickly. Interrupt the feed of sealing liquid when it begins to flow out through the outlet for heavy phase.

o Open fully both outlets.

o With automatically controlled machine connect the automatic control device.

Note. Make sure the timer is set to give sufficiently long intervals so that sludge **discharge** is not initiated during the trimming.

o Open for the process liquid and adjust to suitable throughput. This must not exceed the permissible value and must be suited to the separability of the process liquid.

A certain amount of sealing liquid will discharge through the outlet for heavy phase until balance has been obtained.

Check that light phase does not discharge together with the heavy phase. If this occurs, the throughput must be reduced and/or the gravity disc must be replaced by a disc with smaller hole diameter.

Generally the best separating result is obtained by using a gravity disc with the largest possible hole diameter. When trimming the machine the discs should, therefore, be tried succesively, beginning with the largest one.

Note. Every change in temperature, throughput or specific gravity of the process liquid implies readjustment or trial of an other gravity disc.

Concentration
(concentrator bowl)

The liquid seal builds up automatically. Adjust to wanted throughput — see Purification above.

RUNNING

Check particularly: That throughput and working temperature are constant — That oil does not leak from the worm gear housing (oil level at operative height) — That, in purification, light phase is not escaping together with the heavy one, thereby indicating that the bowl is clogged or the liquid seal is broken. If so, a sludge discharge must be carried out immediately and henceforth the interval between discharges be reduced. If sludge has packed between the bowl discs it may, besides, be necessary to stop the machine for manual cleaning of the bowl.

Washing

In a purifier bowl the process liquid can be washed.

RECOVERY

Besides sludge (and in purification, heavy liquid phase) the bowl contains a certain amount of treated liquid (in purification: light liquid phase). When desired, this can be recovered instead of being discharged together with the sludge at sludge discharge. Practical experiments will show how far the recovery can be carried on.

For recovery, first interrupt the process liquid feed by closing the feed valve. Then proceed as follows:

Purification
(purifier bowl)

Supply water briefly through the pipe for the liquid seal, so that the major part of the liquid is forced out of the bowl. When heavy phase flows out through the light phase outlet the recovery has been overdone. Effect the sludge discharge — see below.

Clarification
(clarifier bowl)

Supply water carefully. Observe the liquid forced out. Shut off the water feed as soon as the liquid shows traces of water admixture. Effect the sludge discharge — see below.

CLEANING BY
RINSING

The bowl need not be dismantled after every run if it can be adequately cleaned by rinsing before being stopped.

In some cases it is sufficient to shut off the process liquid feed and supply a rinsing liquid, e.g. water, instead and work the sludge discharge mechanism a few times. In other cases, a suitable detergent must be added to the rinsing liquid and a longer series of discharges performed. It is particularly important to rinse the bowl thoroughly if the process liquid contains active substances that may cause corrosion or sludge of an adhesive type. Residues of corrosive liquids can often be neutralized by the addition of suitable agents before the last rinse. A suitable procedure can be worked out by practical trials and its effectiveness checked when the bowl is dismantled.

The check should be concentrated in the first instance on the discs near the bottom of the disc set, as it has been found by experience that these are the most difficult to get clean. If detergents are used, the last discharge or the last few discharges should always be performed with pure rinsing liquid without any additives. Where there is a long standstill between runs, the bowl should be cleaned manually — see Chapter L.

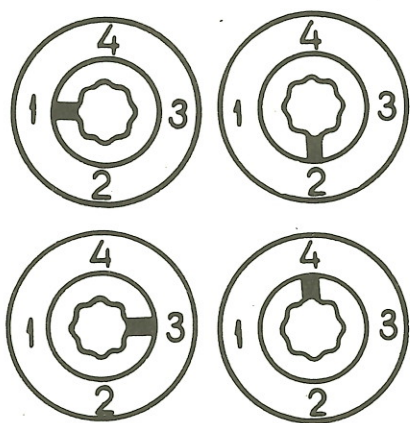
Note: If the machine begins to vibrate abnormally, this means that the bowl has not been properly cleaned. The machine must then be stopped for manual cleaning and a different rinsing programme worked out.

Flushing the frame
hood (or set of
covers respectively)

When the bowl is provided with discharge pump so-called paring disc), the inside of the frame hood (or set of covers respectively) and the outside of the bowl can be flushed either by raising the back pressure above the highest permissible value or by entirely shutting off discharge pipe. The flushing liquid will now be thrown out at the bowl top and discharge through the draining device of the bowl casing. Check the drainage.

SLUDGE DISCHARGE

Bowl designed for total discharge (Fig. A)



Bowl designed for total discharge -- automatic control (Fig. B)

Bowl designed for rapid total and partial discharge -- automatic control (Fig. C)

Bowl designed for combined programme -- automatic control (Fig. D)

Shut off the feed; open the bowl by turning the control valve to position 1. Hold this position until the "shot" is heard, i.e. the noise made when the sludge is thrown out of the bowl.

Empty the bowl discharge mechanism by turning the control valve to position 2. Hold this position for 5-6 seconds.

Close the bowl by turning the control valve to position 3. Hold this position until operating liquid escapes through the indicator pipe, showing that the bowl has closed.

Set to operating condition by turning the control valve to position 4 to compensate for any liquid losses during operation.

Refill the bowl -- see Filling.

Occasionally, especially if the sludge is corrosive, the discharge operation should be repeated. This also applies if the sludge space has become over-full. Between discharges it is advisable to flush the bowl, e.g. by admitting flushing water.

The steps described above are performed automatically. If no provision is made for automatic interruption of the feed, this must be shut off manually.

Sludge discharge takes place automatically but the feed is not interrupted. This is generally accompanied by flushing of the sludge cover.

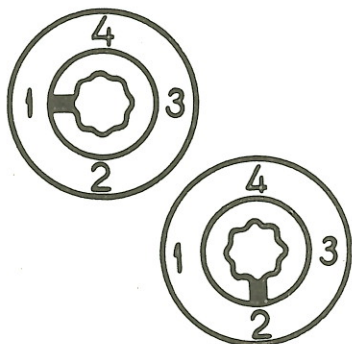
Sludge discharge takes place automatically and is either total or partial (optional). In partial discharge the feed is not interrupted, but the sludge cover is usually flushed. If no provision is made for automatic interruption of the feed, this must be done manually for total discharge.

Note: For manual operation of automated machines, see Chapter B.

STOPPING

The brake must always be applied to stop the bowl. Bowl designed for total discharge should be kept closed and filled with liquid during the run-down period if heavy vibration occurs; bowls for partial discharge and combined programme must ALWAYS be kept closed and filled during the run-down.

Bowl designed for total discharge - manual control (Fig. A)



Shut off the feed and open the bowl - control valve to position 1. Hold this position until the discharge is effected.

Shut off the operating liquid feed - control valve to position 2. Then shut off the supply of operating liquid to the control valve.

Switch off the motor and apply the brake.

Do not release the brake until the bowl has stopped. The collecting cover hinged bolts must not be undone or any other parts dismantled until the bowl has come to a complete standstill.

Bowl designed for total discharge - automatic control (Fig. B)

Shut off the feed. Empty the bowl by operating the control unit. Shut off the feed of operating liquid. Switch off the control unit. Turn control valve to position 2. Switch off the motor, etc. - see above.

Bowl designed for rapid total and partial discharge or combined programme - automatic control (Fig. C and D)

Empty the bowl by operating the control unit. Wait until the bowl has closed and refilled, then shut off the feed. Switch off the control unit. Switch of the motor, etc. - see above. Turn the control valve to position 2 when the bowl speed has decreased to about half the full speed.

FORCING OUT REMAINING LIQUID

A small quantity of liquid will collect in the bottom of the bowl after the machine has stopped. To expel this liquid, proceed as follows: release the brake when the bowl has stopped after the last rinse; switch on the motor and without feeding in any liquid, let the bowl run up to about 10% of full speed; then switch off the motor and apply the brake (see Stopping).

MANUAL CLEANING

See Chapter L.

Control system

Before any other actions are taken, a control cycle should be accomplished in accordance with the directions given in the Instruction Book.

In case the bowl does not close after discharge, does not open after a discharge impulse, or opens unintentionally during operation the operating liquid supply should be checked. Trace the trouble systematically, following the path of the operating liquid stage by stage beginning with the operating liquid tank or feed pipe. Nothing should be done with the machine or the bowl until it has been ascertained that operating liquid at correct pressure is supplied.

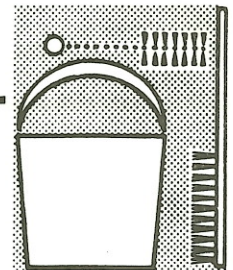
If there is no fault in the liquid supply continue the examination in the first hand with the control valve, then the

paring device and finally with the discharge mechanism of the bowl. With automatically controlled machines follow the trouble tracing chart for the automatic control device.

In most cases the trouble is caused by wrong mounting, careless handling of parts resulting in burrs being knocked up, poor lubrication or deformed seal rings. If, on the other hand, the cause lies in obstructed channels or nozzles, the insertion of a more close-meshed gauze in the filter of the operating liquid line may prevent a repetition. When obstruction is caused by lime or salt deposits it may in many cases be necessary to use a suitable dehardening filter, dehardening liquid, or condensation water.

Indication	Cause	Remedy
Machine vibrates	<ol style="list-style-type: none"> 1. Moderate vibrations normally occur at the critical number of revolutions during the running-up and retardation periods. 2. Bowl out of balance due to: bad cleaning — wrong assembling — badly tightened lock ring — bowl assembled with parts from different machines. 3. Vibration damping rubber washers have lost elasticity. 4. Top bearing spring broken. 5. Foundation too weak. 	<p>None.</p> <p>Stop immediately and establish cause. Badly tightened lock ring involves fatal danger.</p> <p>Renew rubber washers.</p> <p>Exchange all springs.</p> <p>Reinforce foundation.</p>
Speed too high	<ol style="list-style-type: none"> 1. Tachometer reading wrong. 2. Wrong transmission. 3. The motor speed is not appropriate. 	<p>Check by means of revolution counter. Stop immediately. Check that proper transmission or belt pulley is used in view of motor speed.</p> <p>Stop immediately and provide a motor with correct speed.</p>
Speed is too low. Running-up time too long.	<ol style="list-style-type: none"> 1. Brake applied. 2. Pads of clutch are worn or oily. 3. Voltage drop in mains. 4. Ball bearing damage. 5. Other machine defects. 6. Motor defect. 	<p>Release the brake.</p> <p>Exchange or clean all pads.</p> <p>Check mains voltage (D.C.)</p> <p>Locate and exchange defective bearing.</p> <p>Stop immediately. Check that bowl can be rotated by hand.</p> <p>Exchange or repair motor.</p>
Starting power too low.	<ol style="list-style-type: none"> 1. Ammeter reading wrong. 2. Clutch pads worn or oily. 	See -- Speed is too low.
Starting power too high.	<ol style="list-style-type: none"> 1. Ammeter reading wrong. 2. Motor defect. 3. Ball bearing damaged. 4. Other machine defects. 	<p>Exchange or repair motor.</p> <p>Locate and exchange defective bearing.</p> <p>See -- Speed is too low.</p>
Retardation time too long.	Brake lining worn or oily.	Exchange or clean lining.
Water in worm gear housing.	<ol style="list-style-type: none"> 1. Condensation. 2. Axial seals not tight or turned wrongly. 3. Leakage via top bearing. 	<p>Drain water.</p> <p>Exchange rings and turn correctly.</p> <p>Exchange seal rings and adjust axial seal.</p>
Noise from worm gear housing.	<ol style="list-style-type: none"> 1. Oil quantity wrong. 2. Worm wheel or worm worn. 3. Ball bearing worn or damaged. 	<p>Check quantity and quality.</p> <p>Exchange worn parts. Exchange of complete gear is generally advisable.</p> <p>Exchange bearing.</p>
Noise from clutch coupling.	<ol style="list-style-type: none"> 1. Normal when starting and stopping due to sliding of friction blocks. 2. Wrong play between coupling pulley and elastic plate. 3. Speed too low. 	<p>None.</p> <p>Adjust.</p> <p>See -- Speed too low.</p>
Smell	<ol style="list-style-type: none"> 1. Normal at start and stop when friction blocks are sliding, thus causing burnt smell. 2. V belts or flat belts are sliding. 3. Bearing running hot. 4. Motor overheated. 	<p>None.</p> <p>Clean belts. Adjust belt tension.</p> <p>Feel over machine and locate spot. Exchange bearing.</p> <p>Trace cause. Adjust overcurrent relay, if any provided.</p>
"Scraping" sounds	Wrong height position	Stop and adjust -- see Chapter L.

Indication	Cause	Remedy
Purification and concentration: Outgoing heavy phase contains light phase.	<ol style="list-style-type: none"> 1. Liquid seal has broken or is close to breaking due to: <ul style="list-style-type: none"> o filling too fast at start o too little seal liquid 2. Closed valve in light phase outlet. 3. Gravity disc too large. 4. Throughput too high. 5. Seal ring under gravity disc missing or damaged. 6. Changed separation temperature resulting in changed density ratio. 7. For bowl with paring disc: Back pressure too high. 	No separate filling of seal liquid is needed for concentration (see chapter B) or if the heavy phase constitutes at least 25 % of the process liquid. Open valve. Change to smaller disc. Reduce rate of feed. Check and rectify. Change to smaller disc. Reduce the back pressure in light phase outlet.
Purification and concentration: Outgoing light phase contains heavy phase.	<ol style="list-style-type: none"> 1. Gravity disc too small. 2. Closed valve in heavy phase outlet. 3. Throughput too high. 4. Sludge space overfull. 	Change to larger disc. Open valve. Reduce rate of feed. Empty bowl more often.
Purification and concentration: Light and heavy phases fail to separate.	<ol style="list-style-type: none"> 1. Purifier bowl assembled with clarifier bowl parts. 2. Sludge space overfull. 3. Closed valves. 	Check. Exchange parts. Empty bowl. Check. Open valves.
Clarification: Poor clarification	<ol style="list-style-type: none"> 1. Unsuitable separation temperature. 2. Sludge space overfull. 3. Throughput too high. 4. Water present in feed. 5. Clarifier bowl assembled with purifier bowl parts. 	Empty bowl more often. Reduce rate of feed. Run the machine as a purifier. Check. Exchange parts.
Bowl clogs with sludge.	<ol style="list-style-type: none"> 1. Water washing unsuitable or incorrectly applied. 2. Sludge too viscous. 3. Frame filled with sludge. 4. Sludge tank overfull. 5. Defective strainer. 	Empty bowl more often. Clean frame and shorten interval between discharges. Flush sludge cover during discharge cycle. Empty sludge tank and clean bowl casing in frame. Check whether solid particles are stuck between the bowl discs.
Too much process liquid in sludge.	<ol style="list-style-type: none"> 1. Feed not shut off during total discharge. 2. Leakage between bowl hood and sliding bowl bottom. 3. Bowl not fully closed. 	Check. Exchange seal ring. If necessary, turn the sliding bowl bottom smooth. Check the operating liquid system and automatic controls if any.
Gas is liberated (only for bowl with paring disc).	Back pressure is too low.	Increase the back pressure.



CLEANING. OVERHAUL

It has proved very difficult in practice to prescribe how often cleaning should be carried out and how thorough the overhaul should be. However, aided by the directions given in this chapter it should not be difficult to make up a suitable working routine with regard paid to special local conditions. The ALFA-LAVAL/DE LAVAL representative will always be glad to provide further advice and information.

GENERAL HINTS

When cleaning and overhauling always follow strictly the directions given in this book concerning the dismantling, lubrication and assembling.

Set of spares

Make it a habit to inspect and replenish the set of spare parts (and tools) once a year. It pays to keep the consuming parts in stock.

Service interruptions

If the machine is to be put out of service for some time, the parts in contact with liquid should be oiled. Preferably, the bowl should be removed from the spindle. The seal rings should be taken out and kept flat, not hanging.

The time intervals stated below relate to continuous operation. If the mentioned number of operating hours is not obtained during the period, the latter can be extended, but a thorough overhaul at least once every third year is imperative.

OPERATING HOURS	<u>Operation check</u>	
Every 24th (every day*)	Machine run (speed). Power consumption. Oil level in worm gear housing. Observation of discharged liquids. Temperature.	Throughput. Sludge tank. Pressure. Level in operating liquid tank. Automated control device, if any (signal lamps).
Every 200th (every week*)	<u>Worm gear housing</u> Check and if necessary replenish oil.	<u>Further actions</u> Speed check. Leakage tracing.
Every 750th (every month*)	<u>Bowl</u> Dismantling of bowl and thorough cleaning of bowl inset parts. Thorough cleaning and lubrication of lock rings and oiling of bowl body nave bore. Check on seals.	<u>Power transmission</u> Cleaning and oiling of bowl spindle cone. <u>Control system</u> Check flow of operating liquid. Check solids discharge interval of automated control device. <u>Strainers and filters</u> Cleaning and checking.
Every 1500th (every second month*)	<u>Worm gear housing</u> Cleaning and oil change. (In case of new installation, however, after 300 operating hours and in seasonal operation before every working period).	<u>Bowl</u> Dismantle and clean solids discharge mechanism of bowl. Check springs, seals and solids ports. Check erosion.
Every 9000th (every year*)	Thorough overhaul, cleaning and lubrication. <u>Bowl check</u> Pressure in set of discs. Lock ring joint. Corrosion and other material attacks. <u>Power transmission.</u> Dismantle bowl spindle, clutch coupling and worm wheel shaft. Check particularly ball bearings and gear as well as top bearing springs and buffers. Exchange friction pads. Renew grease in nave.	<u>Control system</u> Clean operating liquid tank and check pipes and valves. <u>Height positions</u> Check and adjust. <u>Frame</u> Renew brake lining. Touch up the paint. Check elasticity of vibration dampers and mounting of machine. <u>Motor</u> - see special manual for motor.

* In continuous operation.

CLEANING AGENTS

Metallic machine
parts

Use cleaning kerosene, white spirit, mineral spirit or another solvent with equivalent properties.

If the cleaning agent is unsuitable in view of the product of the process, the bowl, inlet and outlet parts in contact with liquid can normally be cleaned with a soda or trisodiumphosphate solution, or with any current technical defatting agent on an alkaline basis. A certain care should be exercised when cleaning light metal parts, as these may be attacked by strong alkaline solutions.

Benzine or benzol may also be used for the metal parts, but if so, the cleaning should be done in the open air due to the risk of explosion, and because benzol vapours are dangerous to inhale.

Seal rings

Wipe seal rings with a cloth moistened with some of the above cleaning agents.

Coupling pads and
brake lining

Trichlorethylene should be used for cleaning these parts and the corresponding friction surfaces. Note that it should be done under safe control (ventilation), and preferably in the open air.

Discharge
mechanism

Any deposits on the parts of the control device are to advantage dissolved in an approx. 10 percent solution of acetic acid heated to about 80°C (175°F).

Note.

All metallic parts EXCEPT the friction surfaces in clutch coupling and brake must be oiled after cleaning - see chapter H.

BOWL CLEANING

How often the bowl should be stopped, dismantled and cleaned must be learned by experience. It depends, among other things, on the type of sludge contained in the process liquid and on the condition of strainers and filters as well. Defective or wrongly mounted strainers letting through particles so big sized that they get stuck between the bowl discs will cause sludge blockage. If this occurs, the discs must be cleaned one by one. Any tendency of the lock ring to stick to the bowl body must also be considered when determining the intervals between dismantlings. It is difficult to prescribe how often the lock ring must be unscrewed for lubrication, as this depends partly on the lubricant used, partly on the care exercised in lubricating. During the first time the bowl spindle cone must be lubricated at least once a month to prevent the bowl body from sticking to the spindle. In time the interval between lubrications may be extended according to experience.

If the process liquid contains salt water or the sludge is corrosive (because it contains acids or salts), the bowl must be cleaned thoroughly through feed of flushing liquid and repeated discharges immediately after the operation is finished, however, at least once in a 24-hour-period. This is of particular importance when treating lubricating oils or heavy fuel oils.

Discharge parts

Clean the control parts every time the bowl is removed from the spindle.

Clean all channels and nozzles in bowl body, operating slide, control paring disc, and control valve. The hardness of the water decides how often cleaning must be carried out.

ACCESSORIES

(e.g. pumps)

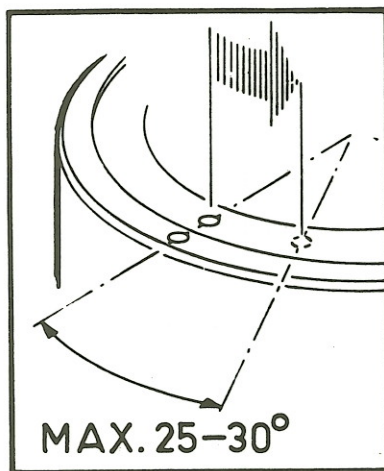
See chapter X.

BOWL OVERHAUL

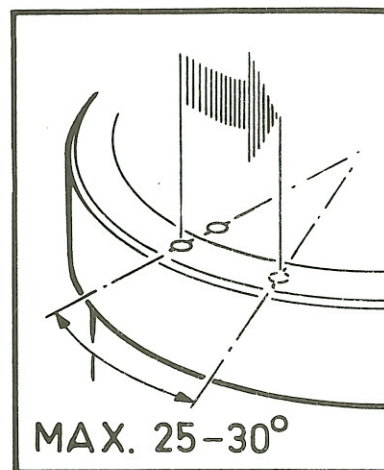
Exchange of parts

Bowl parts marked "*" on the perspective drawing in chapter I can be exchanged only in an authorized ALFA-LAVAL/DE LAVAL workshop, as the exchange necessitates rebalancing — thus the COMPLETE bowl must be sent in. Other parts can be exchanged on the spot.

Thread checking



Lock ring with external thread



Lock ring with internal thread

In a new bowl, the guide marks (ϕ) should be right in front of each other. In time, these marks can be drawn past each other due to wear of the threads. When the ϕ -mark of the lock ring can be drawn past the other ϕ -mark by more than $25-30^\circ$, an authorized ALFA-LAVAL/DE LAVAL representative should be consulted.

Thread checking should be done at least once a year. The checking is carried out as follows:

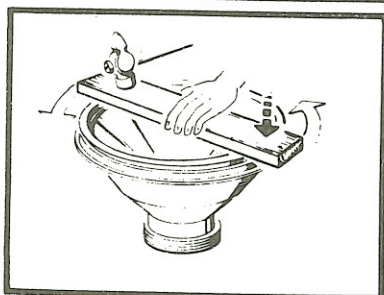
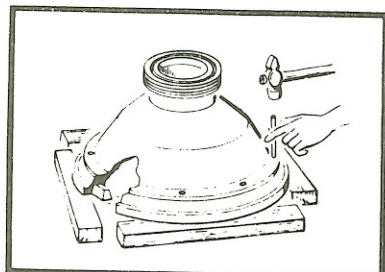
Unscrew the large lock ring, remove the distributor with disc set. Remove the outer seal ring of the bowl hood, put on the hood and screw on the lock ring.

Tighten the large lock ring anti-clockwise till tight contact is obtained between the contact surfaces of bowl body and bowl hood.

Pressure in disc set

If the lock ring can be tightened without resistance by means of the spanner till the hood lies tightly against the bowl body, the pressure should be increased by adding the extra bowl disc (included in the set of spares) on top of the set of bowl discs. Make sure the seal ring lies in its groove in the bowl hood.

Seal ring of bowl hood



Sliding bowl bottom

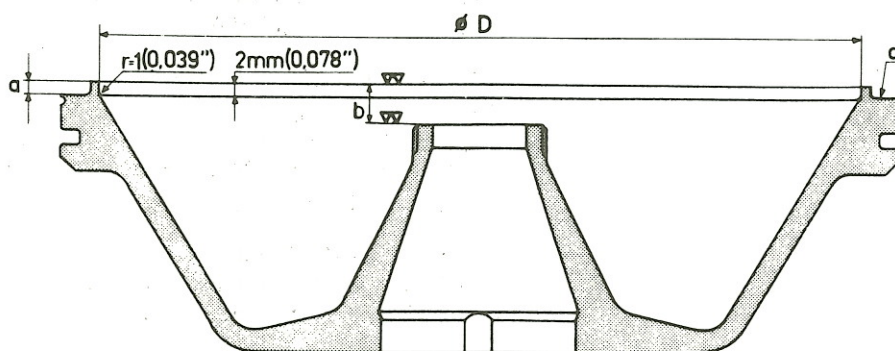
When exchanging the seal ring drive it out of the hood by means of the pin, which should be inserted alternately in the holes provided for this purpose.

The seal ring is pressed into the groove in the lower edge of the bowl hood by means of a planed board (1"x5"), which should be placed across the ring. Knock carefully on the board right above the ring, first on one side and then on the other. Turn the board around successively and drive the ring into the groove as evenly as possible.

If a new seal ring of nylon (polyamide) turns out to be too wide when mounted, this is due to absorption of moisture - it will recover correct dimensions after drying for about 24 hours at a temperature of 80°-90°C (175°-195°F) (heating chamber).

If the ring is too narrow, put it in hot water, 70°-80°C (160°-175°F), for about 8 hours.

A sliding bowl bottom provided with erosion liner must not be trimmed by turning in a lathe. Other sliding bowl bottoms can be turned for improvement of the sealing surface as exemplified below:



- a = permissible minimum measurement 0.5 mm (0.0195"). The planes of these surfaces should be parallel within a tolerance of 0.1 mm (0.0039"). Remove least possible material to allow repeated adjustments.
- b = 12.5 - 13 mm (0.0493 - 0.512").
- c = indicating surface for setting up in the lathe.
- Ø D = 405 mm (15.945")

ACCESSORIES (e.g. pumps)

See chapter X.

SLUDGE DISCHARGE MECHANISM

Set the control valve to position 2 and pull the valve out of the frame. Set to the other positions and check that operating liquid can pass through unimpeded.

Refit the valve and check the paring disc device:

- o Lift out the bowl body. Turn on the feed from the operating liquid tank.

- o Set the valve to position 1. Liquid should now spurt through all holes in the upper side of the paring disc.

- o Set the valve to position 3. Liquid should now flow out through the same holes as above, but in smaller quantities.

- o Set the valve to position 4. Liquid should now flow out at the periphery of the paring disc.

If this does not occur:

Dismantle - see chapter S.

Clean - see chapter L.

Filter

Clean the filter in the pipe to the operating liquid tank once a month. When the installation is new it is better to clean at shorter intervals.

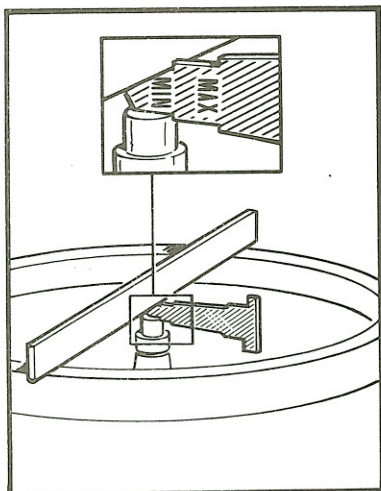
POWER TRANSMISSION

- Bowl spindle** When overhauling the bowl spindle, check particularly the nave bore in the bowl body, the conical portion of the bowl spindle, and the height position.
- Clutch coupling.** Clean the conveyor pulley, pads of friction blocks and brake lining. Roughen up the wearing surfaces of pads and lining with a coarse file. Remember that all pads must be exchanged at the same time even if only one of them is worn.
- Brake**
- Worm wheel shaft.** When exchanging the worm wheel check the worm. If it is heavily worn or its tooth flanks are scratched, renew it.
- Worm**
- Oil pan** Clean the oil pan in the worm gear housing. Supply fresh oil.
- FRAME** Check the rubber washers of the anchoring parts. Renew them every second year.

HEIGHT ADJUSTMENT

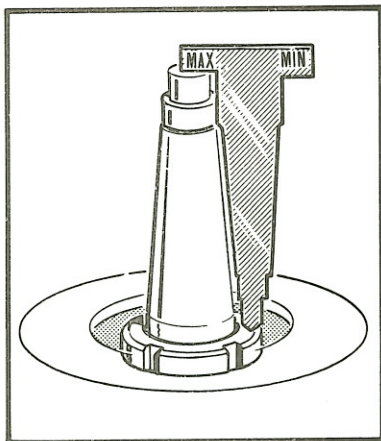
The height positions should be checked both in connection with the yearly inspection and after exchange of parts which can affect the height position. The tolerances are narrow and it is essential, therefore, that all parts are well cleaned and free from burrs.

Bowl spindle



Remove the seal ring from the frame ring. Place a ruler across the frame ring. Push the narrow tongue of the templet, marked MIN (10 mm), between the ruler and the spindle top. There should be a small play between the templet and the ruler, however not so large that the wide templet tongue marked MAX (12 mm) can be inserted. The height position is adjusted by means of height adjusting rings - see chapter P.

Control paring disc



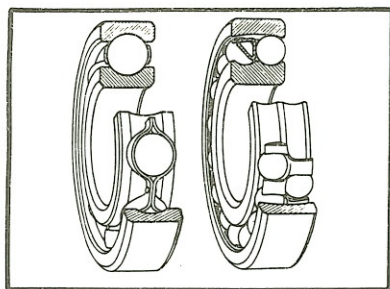
Put the templet on the spindle top with the measurement indication 175.5 facing the spindle. There should be a small play between the lower end of the templet and the top face of the ring nut, otherwise the paring disc is positioned too high. Turn the templet so that the measurement indication 176.5 faces the spindle. Now there should be a small play between the templet tongue and the spindle top, otherwise the paring disc is positioned too low. The height position of the control paring disc is adjusted by means of height adjusting rings under the distributing cover - see control paring disc in chapter S.

Check

After every height adjustment loosen the brake cap and turn the worm wheel shaft by hand. If it turns heavily or a scraping noise is heard, wrong adjustment may be the cause - recheck.

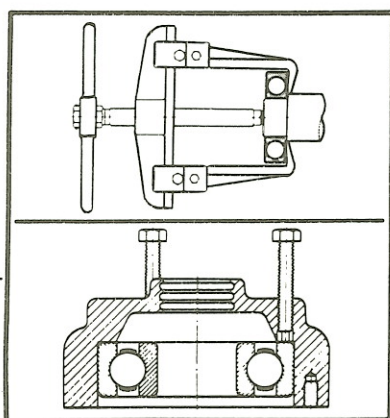
GENERAL ADVICE

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.

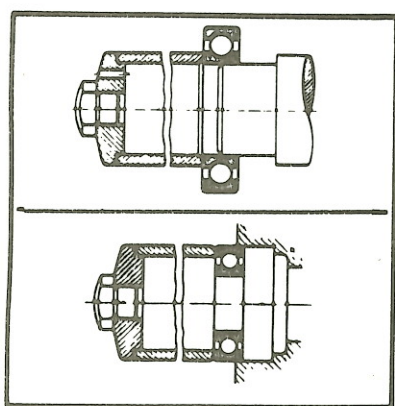


Dismounting

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.

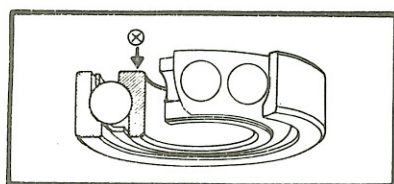


Fitting

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

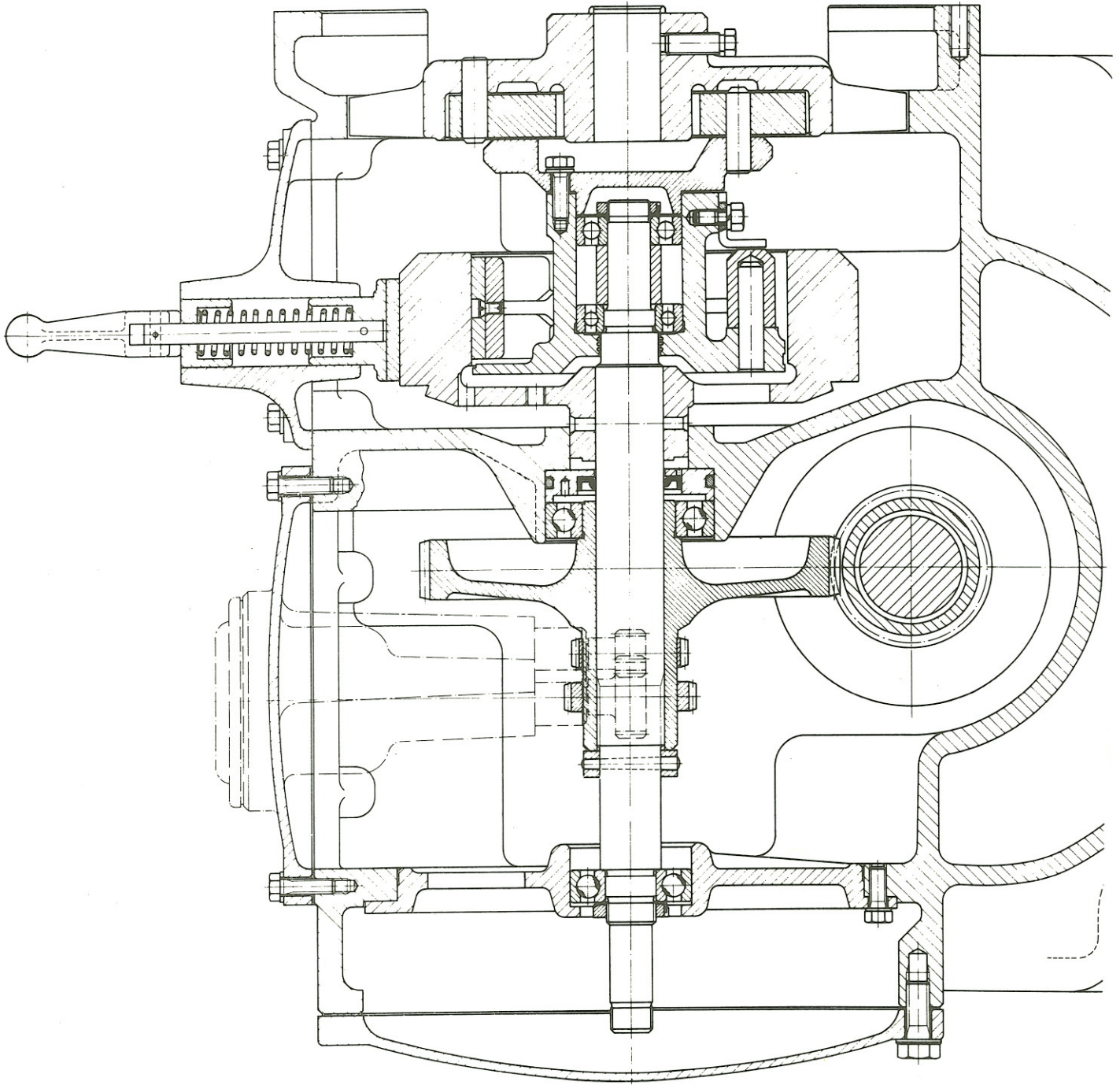
Fit a bearing on a shaft by pressure applied to the inner race and in a housing by pressure applied to the outer race. Use a suitable piece of pipe or a metal drift and a hammer. Never strike the bearing directly.

Bearings sitting with tight fit on a shaft should be heated in oil before assembly. The oil temperature should not exceed 100 °C. Never leave the bearing in the oil bath longer than required for thorough 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.



POWER TRANSMISSION

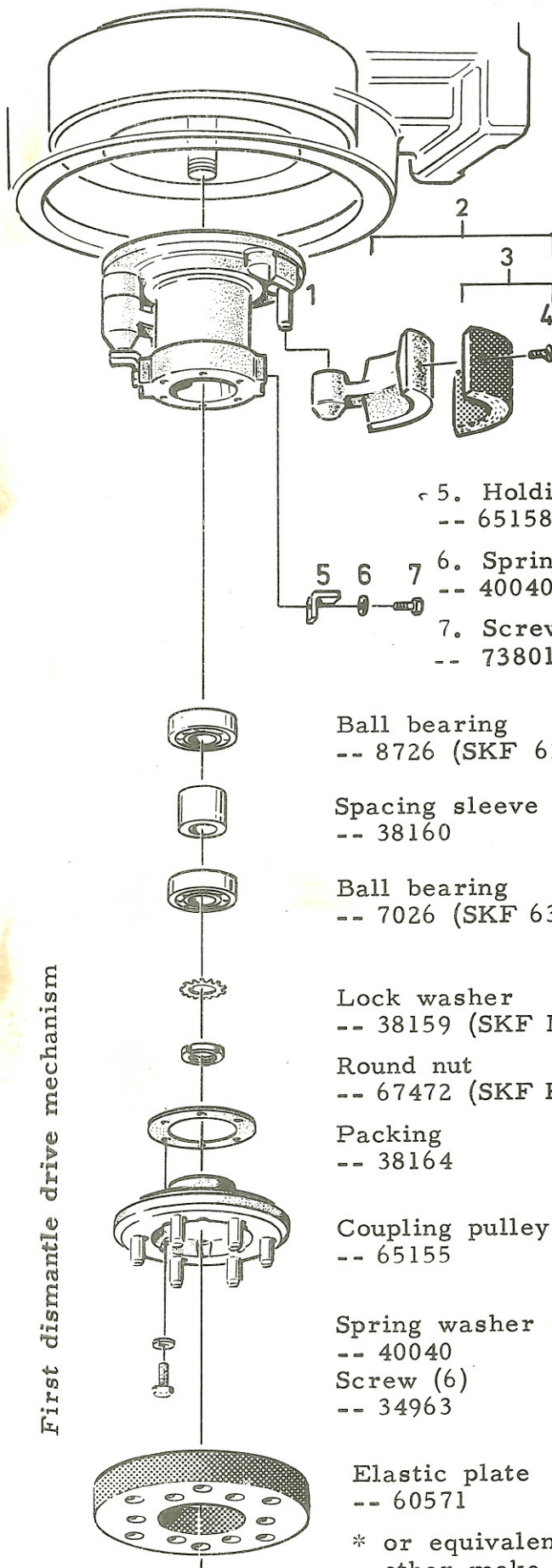
Dismantle and assemble the parts in sequence shown in the illustrations on the following pages, using the special tools supplied.

In addition to the specific instructions, remember the following points at all times...

- ... cleanliness and neatness are essential
- ... make sure that all seal rings and gaskets are intact
- ... exchange spring washers whenever necessary
- ... exchange all clutch pads, even if only one of them is worn
- ... oily clutch pads should be degreased according to the directions in chapter L, Cleaning Agents, and roughened with a coarse file
- ... take care to avoid getting oil or grease on the clutch and the friction surface of the conveyor pulley
- ... avoid unnecessary dismantling of ball bearings
- ... follow the directions given in chapter L for assembly of ball and roller bearings
- ... round nuts should be tightened with a spanner and locked with lock washers
- ... the worm-gear housing should be cleaned and filled with clean oil after any work that may have introduced dirt
- ... follow the directions for cleaning and overhaul in chapter L and the directions for lubrication in chapter H.

Machine without clutch coupling

If the machine is delivered with fixed coupling and special motor, the clutch coupling parts, except the elastic plate, are omitted. The conveyor pulley of the worm wheel shaft is provided with threaded holes in the flange for fastening the special coupling pulley. The other parts in the power transmission are not concerned.



1. Nave
-- 65152
2. Friction block (3)
-- see chapter F
3. Pad (3)
with screws
-- 71627
420843-81
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

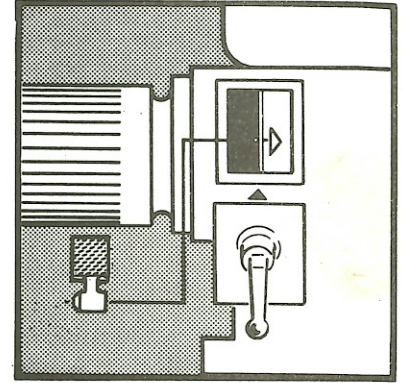
Coupling pulley
-- 65155

Spring washer (6)
-- 40040
Screw (6)
-- 34963

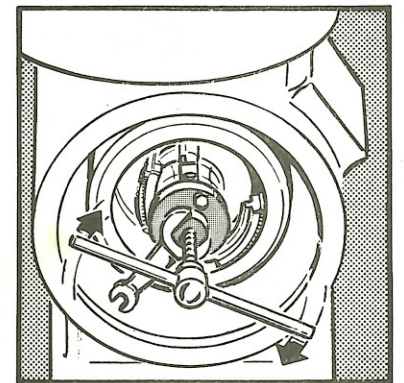
Elastic plate
-- 60571

* or equivalent bearing of
other make

The friction blocks can be removed without the necessity of dismantling the rest of the clutch.



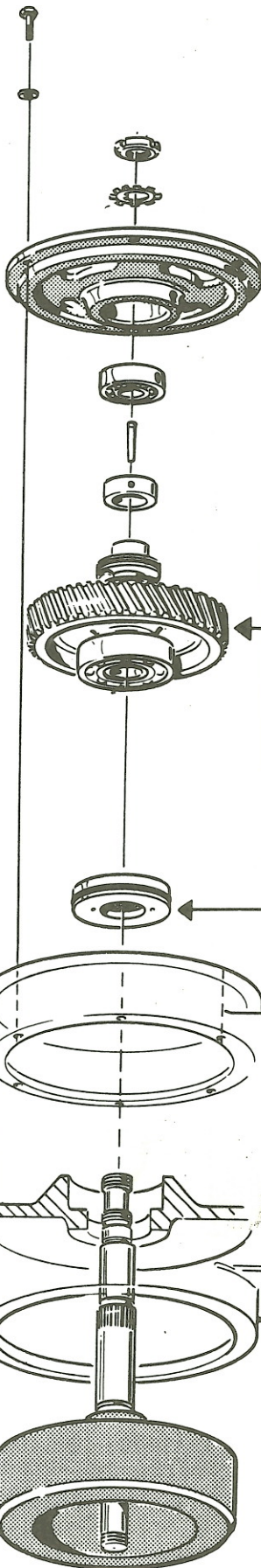
When the blocks are assembled they should move freely, and the holding brackets should be mounted so that they engage the groove in the nave and prevent the blocks from slipping off their pivots.



The illustration shows how the nave is eased off the shaft. To assemble, first fit the nave on the shaft and then the inner ball bearing. Pack one-third of the space about the spacing sleeve with ball bearing grease. Use the drive-on sleeve to drive the bearings into position.

First dismantle drive mechanism

First dismantle motor, clutch and frame shield (pump)



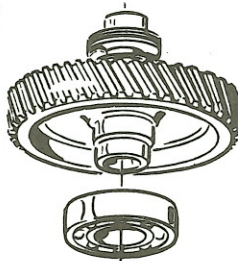
Screw (4)
-- 65231
Spring washer (4)
-- 62094
Round nut
-- 67473 (SKF KM 6)
Lock washer
-- 37992 (SKF MB 6)

Bearing shield
-- 528172-2

Ball bearing
-- 6525 (SKF 6306)*

Pin -- 64729

Stop ring
-- 65170



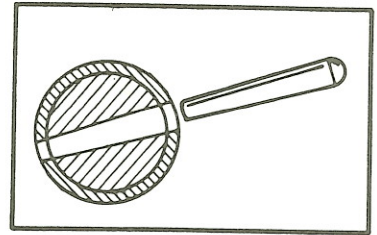
Worm wheel
-- see Chapter F

Ball bearing
-- 68827
(SKF 6211)*

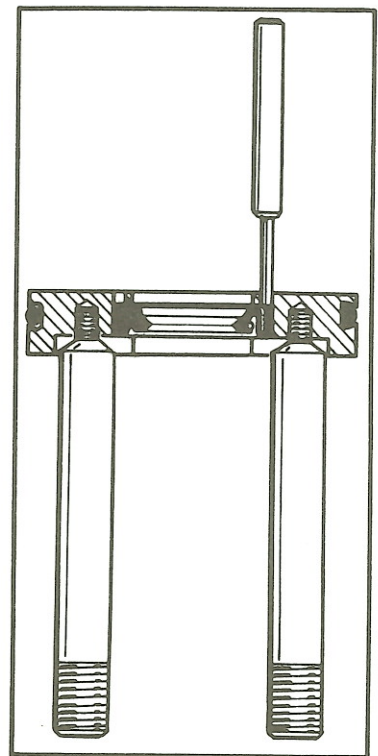
Lipseal ring
-- 73547
Seal washer
-- 528098-1

Seal ring
-- 223412-21

Worm wheel shaft with
conveyor pulley, lock
washers (2) and round
nuts (2)
-- 65165

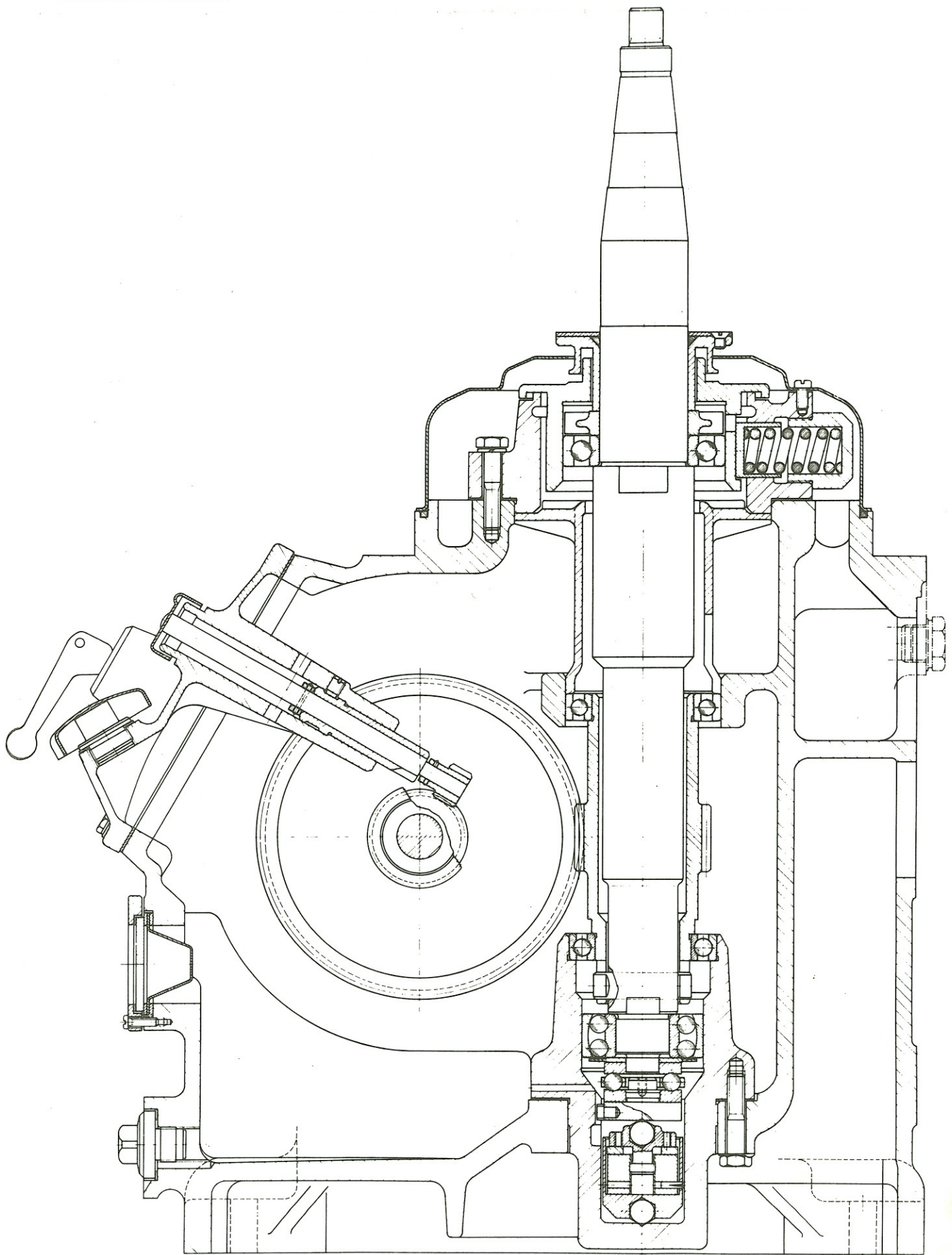


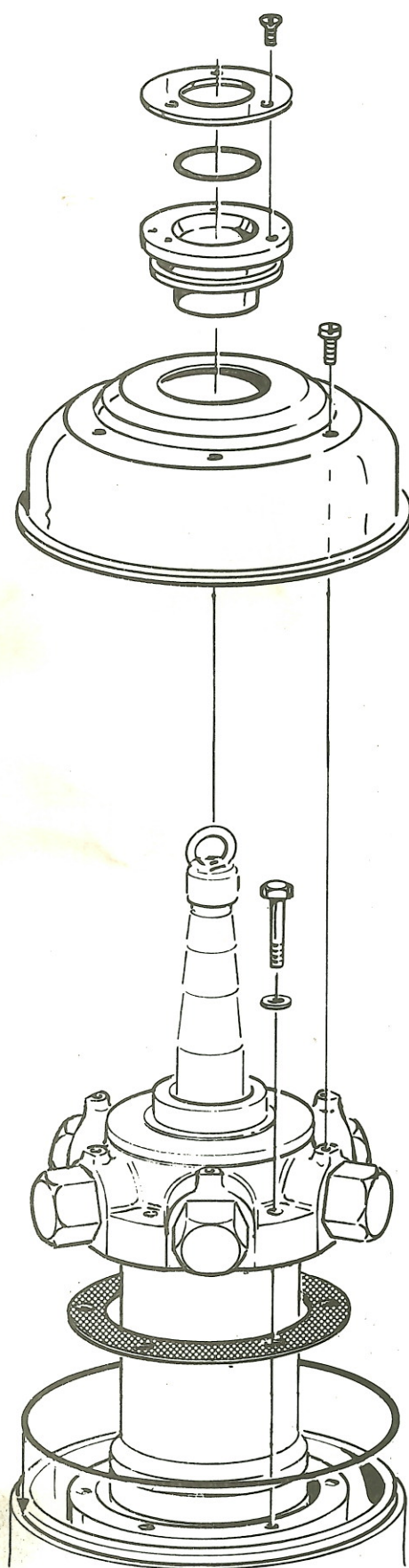
Align the stop ring correctly when fitting -- both the hole and the pin are tapered Taper 0.02). If there is any play, the hole must be reamed.



Use the motor guide bolts to draw out the seal washer. When assembling, make sure that the lipseal ring is turned as shown in the illustration. Warm the ball bearing before fitting it on the worm wheel.

* or equivalent bearing of other make





Screw (3)
-- 68920
Top shield
-- 68919

Seal ring
-- 65201
Throw-off
collar
-- 67622

Screw (6)
-- 12172

Protecting
cap
-- 65199

Lifting tool
Screw (6)
-- 65193

Washer (6)
-- 62094

Packing
-- 65192

Seal ring
-- 64104

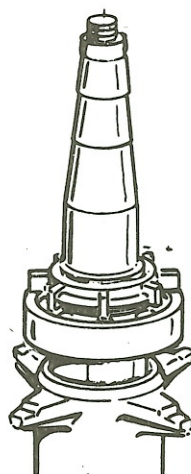
DISMOUNTING and MOUNTING of the COMPLETE BOWL SPINDLE

To render the bowl spindle accessible for dismounting the bowl body, control valve and paring disc device for operating liquid must be removed.

The plugs in the top bearing are preferable loosened, while the spindle is still in the frame.

Before the spindle can be lifted out the worm wheel must be displaced on the worm wheel shaft in order to disengage the worm. This can be done through the aperture covered by the revolution counter cap.

To facilitate lifting screw on the lifting tool.

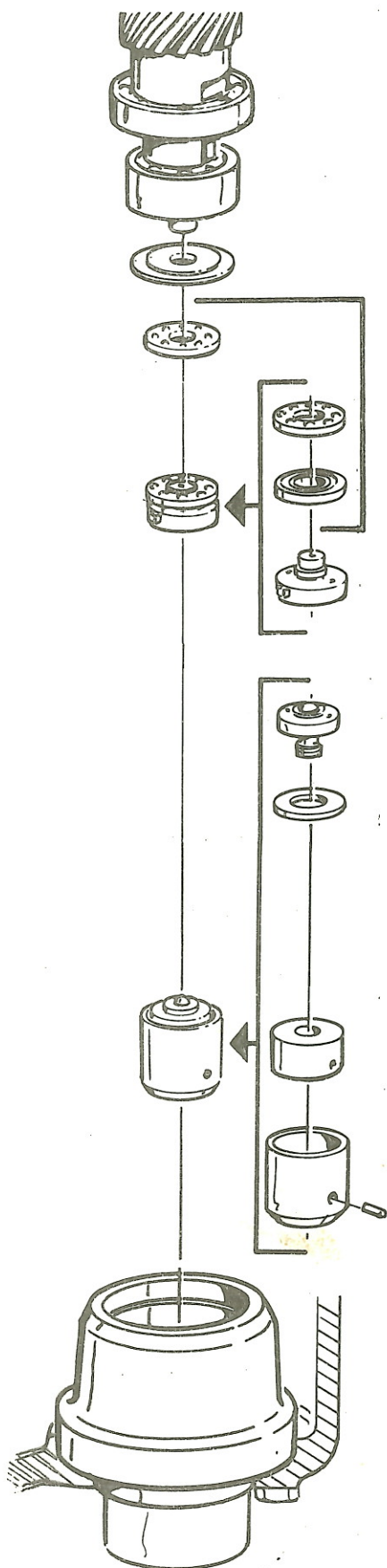


When the bowl spindle is being mounted in the frame, the ball bearing housing and spring casing should not be fitted on it — see illustration.

Make sure that the lower ball bearing of the worm is correctly seated in the bottom bushing. Knock some times on the stop sleeve to bring it into the proper position.

The planed surfaces of the ball bearing housing must be right in front of the buffers.

After mounting check that the bowl spindle rotates when the worm wheel is revolved. Check the height position (see chapter L).



Complete bowl spindle

Guide washer
-- 65189

Upper ball race of thrust ball bearing

Thrust ball bearing
-- 8419
(SKF 225147M)*

Thrust washer
-- 65181

Support plug
-- 65179

Height adjusting ring (1-3)
2 mm -- 37481
4 mm -- 37482
6 mm -- 37483

Spacing sleeve
-- 65178

Bottom bearing housing
-- 65176
Slotted pin
-- 65391

Bottom bushing for bowl spindle

DISMOUNTING and MOUNTING of BOWL SPINDLE BOTTOM BEARING

To make the parts accessible for dismantling the complete bowl spindle must be dismounted.

Normally the parts need not be dismantled unless they should be exchanged or the height position of the bowl spindle should be adjusted.

For dismantling use the lifting tool provided with a hook.

Note. The upper ball race of the thrust ball bearing as well as the guide washer are tightly fitted on the bowl spindle. Remember to turn the ball race the right way when mounting.

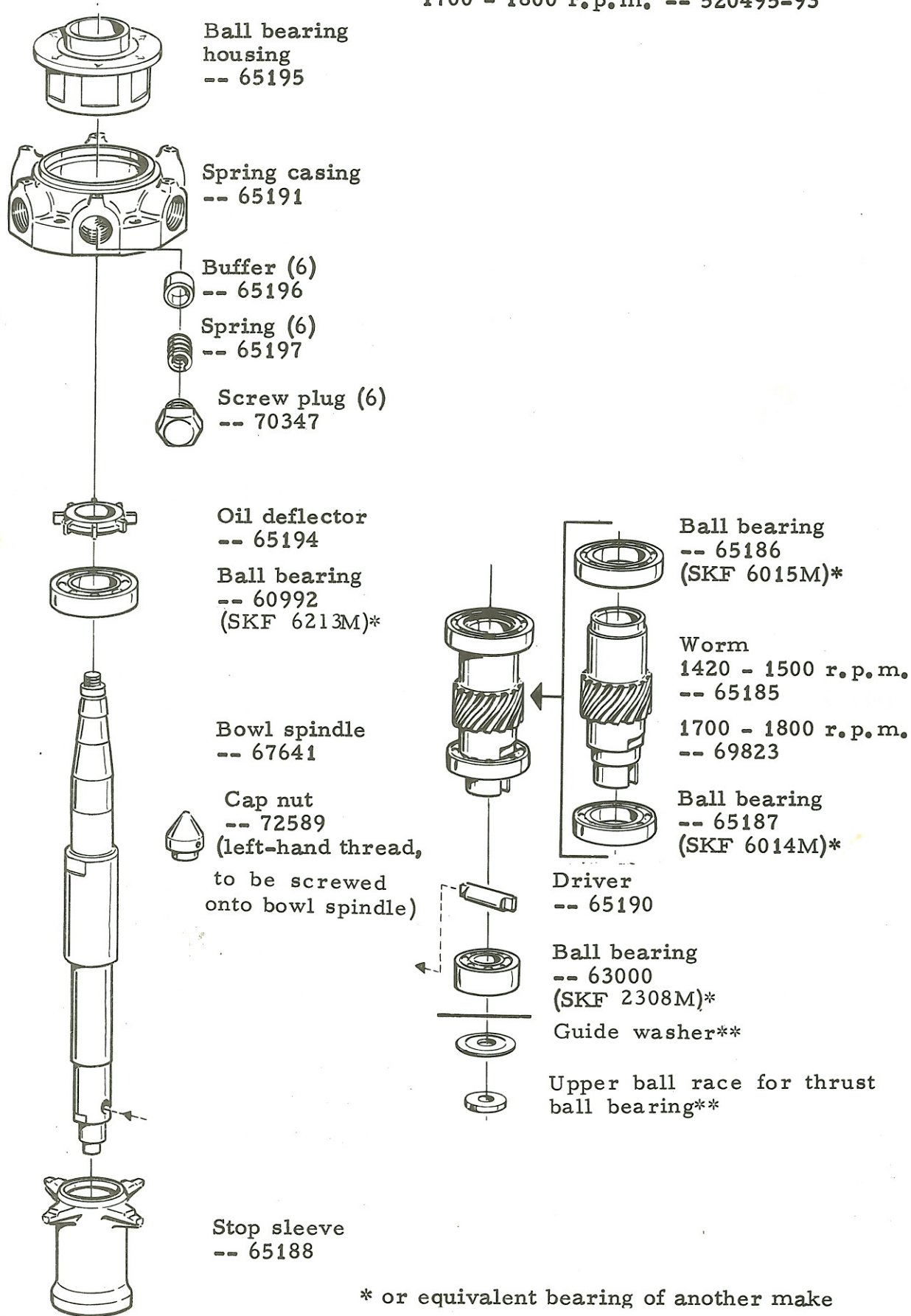
The lower ball race of the thrust ball bearing is tightly fitted on the thrust washer. To detach the race use a drift, inserting it alternately into the holes provided in the washer for this purpose.

To loosen the spacing sleeve from the bottom bearing housing press the slotted pin into the interior of the housing.

Turn the ball race of the ball bearing the right way and make sure that the guide pin of the thrust washer engages the groove in the bottom bearing housing.

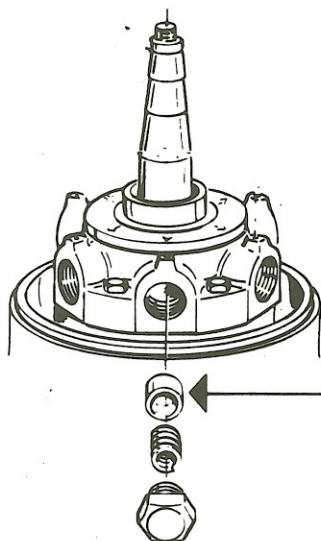
* or equivalent bearing of other make.

COMPLETE BOWL SPINDLE for: 1420 - 1500 r.p.m. --520495-92
1700 - 1800 r.p.m. -- 520495-93



* or equivalent bearing of another make

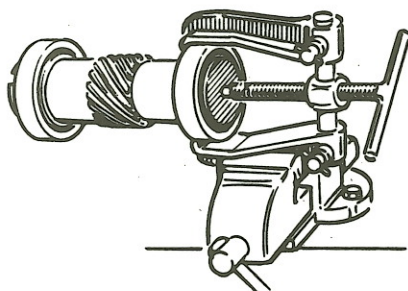
** belongs to bottom bearing



DISMANTLING and ASSEMBLY of the COMPLETE BOWL SPINDLE

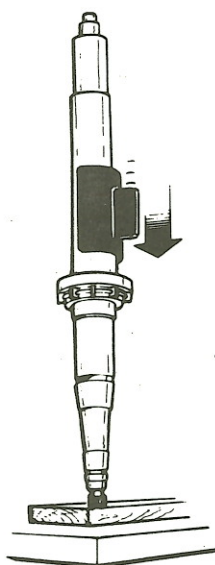
For dismantling move the spindle top in a circle while pressing it outwards. This releases the buffers from the ball bearing housing so that they can be removed.

When assembling, make sure that the buffers butt against the planed surfaces of the ball bearing housing.



If the worm is exchanged, it is important that the worm wheel be checked and likewise replaced when necessary.

To pull off the ball bearings of the worm proceed as shown in the sketch. Use the thrust piece (included in set of tools) as a support for the jack screw of the puller. Heat the ball bearings before assembly.



If the ball bearing should be loosened, first remove the other spindle parts. Support the spindle on a soft base (wooden or similar) and force off the ball bearing by knocking with the drive-off tool on the inner ball race of the bearing.

Heat the ball bearing before assembly.

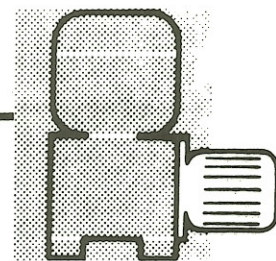
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MOUNTING the MOTOR

General Drawing - Perspective Drawing with Part Numbers - Mounting.

SPECIAL TOOLS see chapter G - LUBRICATION see chapter H - CLEANING see chapter L - MOTOR see special manual.

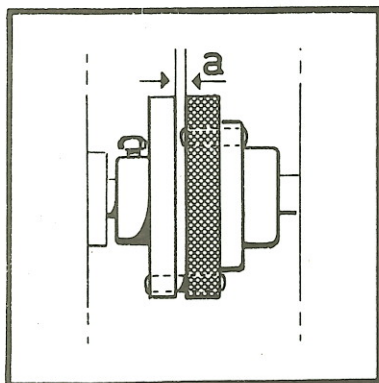
GENERAL HINTS

Motor

The speed prescribed for the ingoing shaft of the machine (the worm wheel shaft) and which must on no conditions be exceeded, is stamped on the type plate of the machine. The worm gear ratio and the friction blocks of the clutch are suited to this speed. Check the number of revolutions by means of the revolution counter after installation and after exchange of motor.

For particulars concerning power requirement and speed see chapter C.

Coupling pulley or belt pulley



When the machine is delivered with motor, the pulley has been fastened in its correct position on the motor shaft. Score the position of the pulley before loosening it from the motor shaft. The axial play for the elastic plate - measurement "a" in illustration - should be about 2 mm (5/64").

When finishing a predrilled coupling pulley or belt pulley, the tolerance H7-J6 according to ISO should be applied.

Electric cable

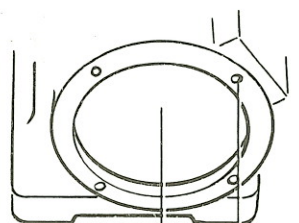
The electric cable to the motor should preferably have a free length allowing the removal of the motor without disconnecting the cable from the terminals.

Connection to mains

Connect the motor to mains so that the bowl will rotate CLOCKWISE.

Note. The machine must never be started unless the bowl is placed on the spindle and the worm gear housing contains the prescribed quantity and quality of lubricating oil.

FLANGE MOTOR (drive "4")



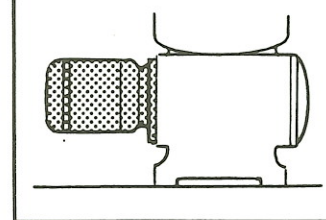
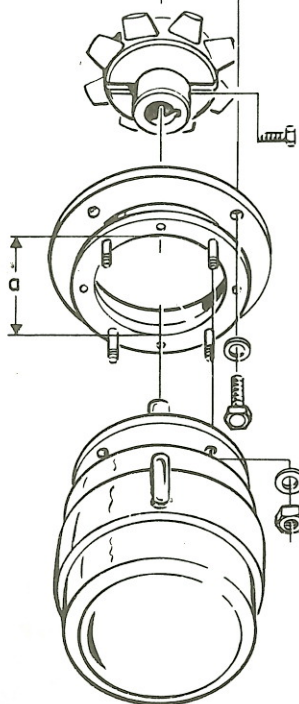
Frame

Coupling pulley

- 65148*

Set screw

- 65347



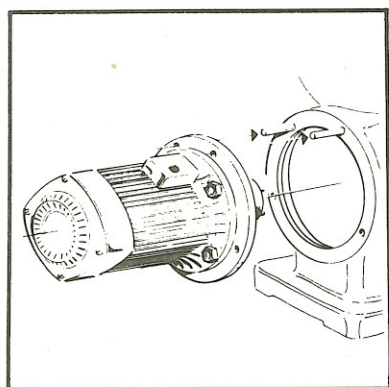
	a = 250 mm	a = 350 mm
Motor adapter	67190	72663
Stud bolt	70489	66765
Washer	70492	70492
Screw	65231	70494
Washer	70528	70490
Nut	70493	2218043-4

Note that, as a rule, it is not necessary to loosen the motor and motor adapter from each other when mounting and dismounting.

Push the elastic plate on to the pins in the coupling pulley of the separator.

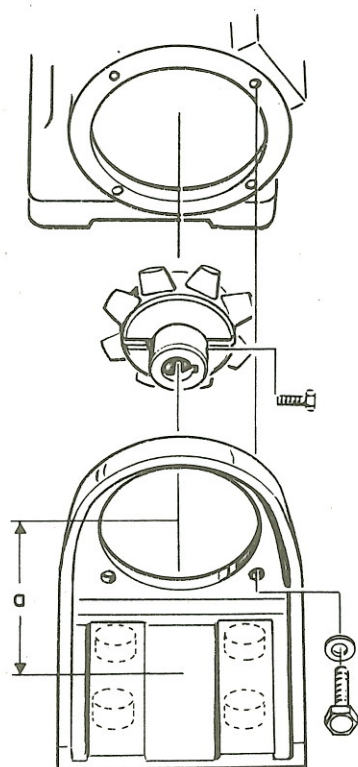
Screw the two guide bolts (see chapter F) into the two upper, opposed screw holes in the frame flange. Hang the motor (with adapter attached) on the guide bolts and push it into correct position, fitting the pins of the coupling pulley into the holes in the elastic plate. Fasten the motor and replace the guide bolts by screws. Tighten the screws alternately and check that the motor adapter enters the seat in the frame.

When dismounting note that the electric cable must not be disconnected in the terminal block.



* When ordering - follow the instruction given in chapter A.

MOTOR on BRACKET (drive "9")



Frame

Nave lenght

75 mm	115 mm
-------	--------

Coupling pulley

65148*	74291*
--------	--------

Set screw

- 65347

Shaft height a

230 mm	260 mm
--------	--------

Motor bracket

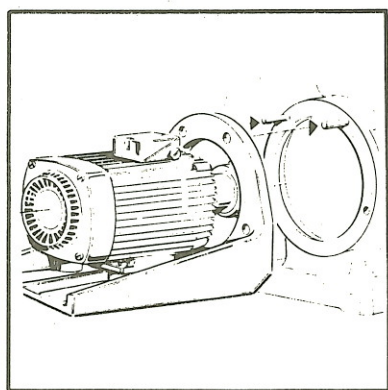
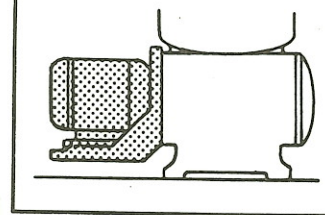
72661	72668
-------	-------

Washer (5)

- 70492

Screw (5)

- 65231



Motor and motor bracket are marked with the manufacturing number of the machine to which they belong. Make sure that they are mounted together when installing several machines at the same time.

Note that, as a rule, it is not necessary to loosen the motor and motor bracket from each other when mounting and dismounting.

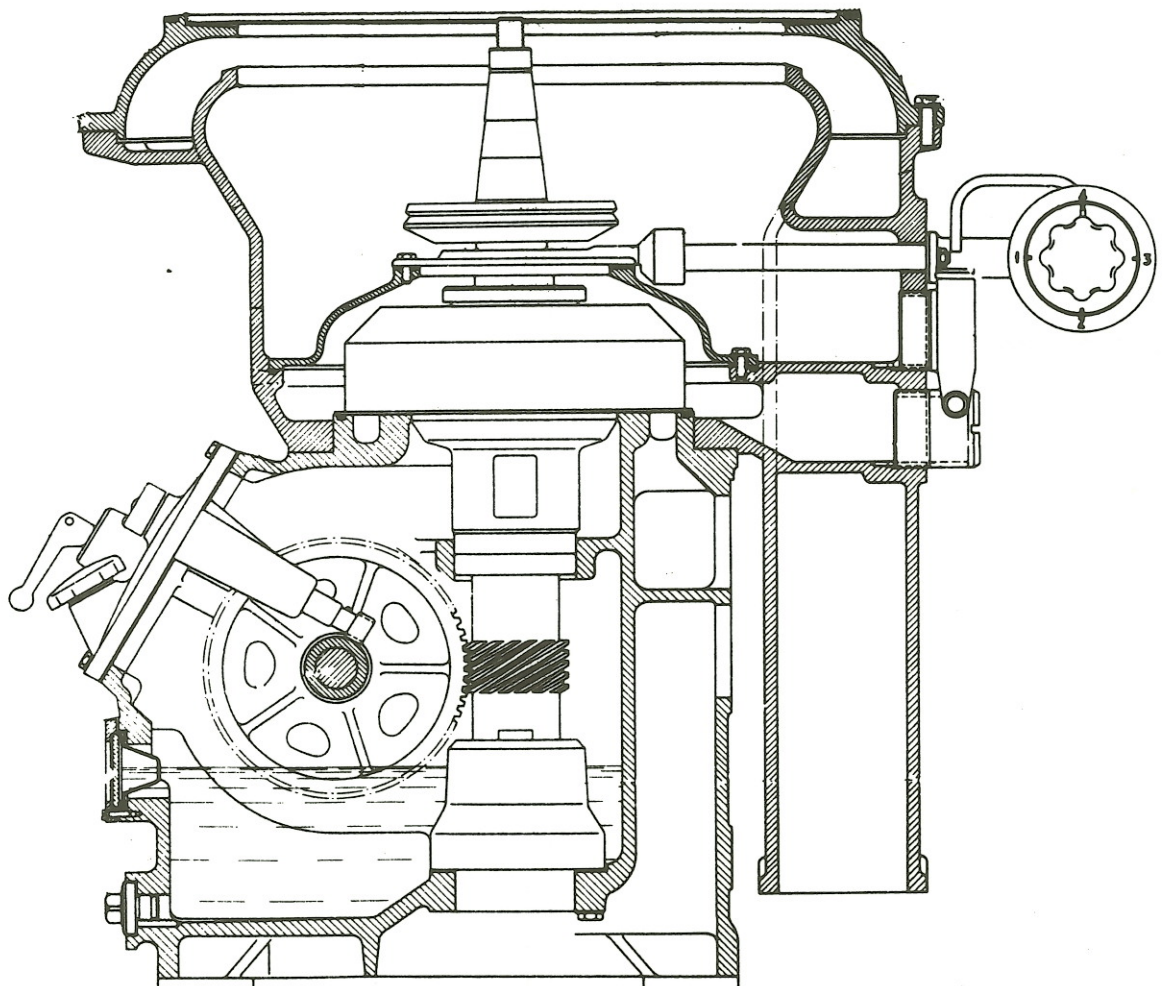
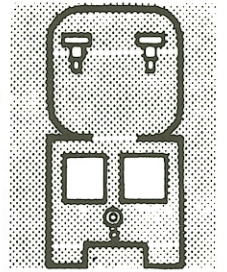
If the motor is not fastened to the bracket when delivered, put it on the base blocks, fix its position with the guide pins and fasten it with the screws.

Push the elastic plate on to the pins of the coupling pulley of the machine and screw the two guide bolts (see chapter F) into the two upper, opposed screw holes in the frame flange.

Hang the bracket with motor attached on the guide bolts and push it into correct position, fitting the pins of the motor coupling pulley into the holes in the elastic plate. Fasten the bracket and replace the guide bolts by screws. Tighten the screws alternately and check that the bracket enters the seat in the frame.

* When ordering - follow the instruction given in chapter A.





FRAME ERECTION

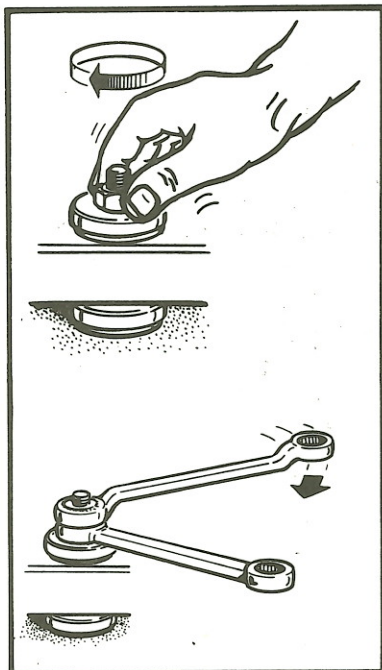
Mount the frame, or the base plate if included in the delivery, on VIBRATION DAMPERS as illustrated on next page.

First put the frame (base plate) without cushions in its place and check:

- o that the bolts do not press against the edges of the holes, otherwise the resilient mounting of the frame will be impeded.

- o that the frame (base plate) is horizontal and that all feet rest on the base. If adjusting washers are needed, they should have the same diameter as the base cushions.

Then lift the frame (base plate), fit the vibration dampers in the sequence shown in the illustration, lower, and check that the bolts do not press against the edges of the holes.



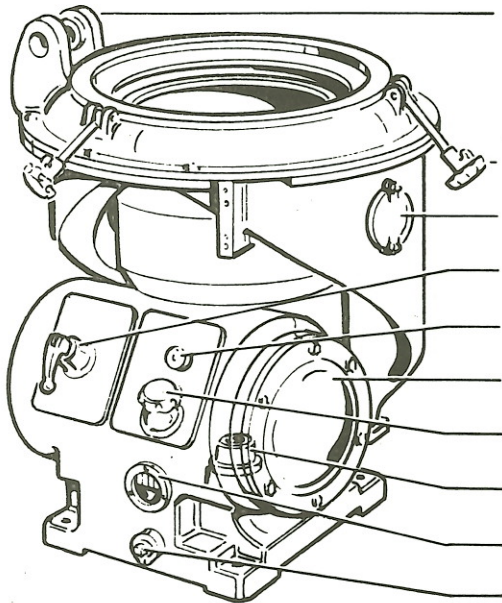
Screw down the nuts till they touch the cup covers and tighten a further half-turn.

Hold the nuts firmly and secure with lock nuts.

Mounting the
frame on base
plate

In this case the frame and motor are mounted on a common base plate. This plate is predrilled and like the motor marked with the manufacturing number of the machine to which it belongs. Place the frame on the base plate, fix its position with the guide pins and fasten the frame rigidly (without cushions) to the base plate.

The part numbers of base plate, screws and guide pins are given in chapter R.



Pawl - Buffer

Frame ring

Hinged bolt

Raking door

Brake

Revolution counter

Frame cap

Oil supply

Bottom bearing

Oil gauge glass

Oil drain

For part number and
name of the parts
see below.

OIL DRAIN

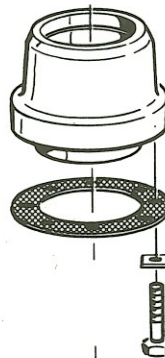


Packing
- 35607



Screw
- 62467

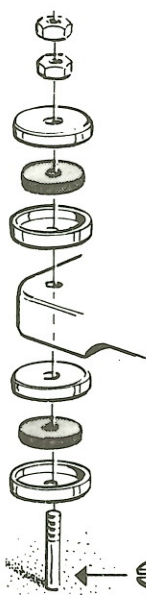
BOTTOM BEARING



Sleeve
- 65210

Packing
- 65211
Lock washer (8)
- 63256
Screw (8)
- 65193

VIBRATION DAMPER (4)



Nut (8)*

Cup cover
- 71126
Rubber washer
- 65235
Cup
- 71125
Frame, or base
plate respectively
Cup cover
- 71124
Rubber washer
- 65232
Cup
- 71123

Stud bolt*
Adjusting washer*

* Not included in delivery

OIL GAUGE GLASS



Packing
- 38967
Stabilizer
- 61899

Packing
- 38967

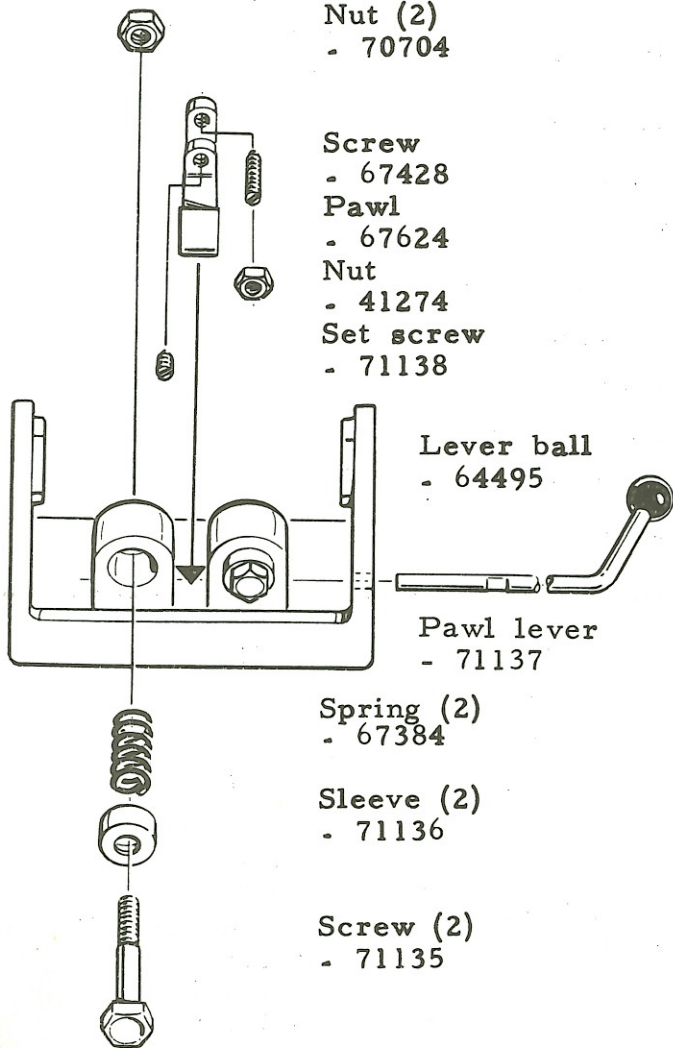
Glass
- 38685

Packing
- 37167

Fixing ring
- 65457

Screw (3)
- 65458

PAWL. BUFFER



Nut (2)
- 70704

Screw
- 67428

Pawl
- 67624

Nut
- 41274

Set screw
- 71138

Lever ball
- 64495

Pawl lever
- 71137

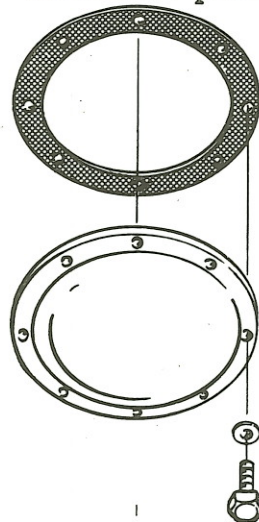
Spring (2)
- 67384

Sleeve (2)
- 71136

Screw (2)
- 71135

FRAME CAP

(replaced by pump adapter in machines provided with pump)



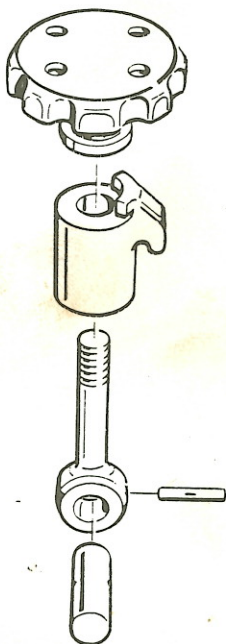
Packing
- 37490

Cap
- 38714

Washer (6)
- 70492

Screw (6)
- 65231

HINGED BOLT (3)



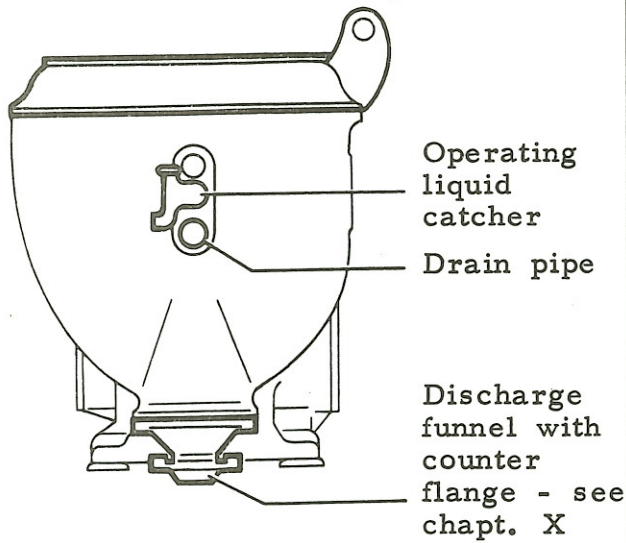
Hand wheel
- 71110

Clamping shoe
- 71391

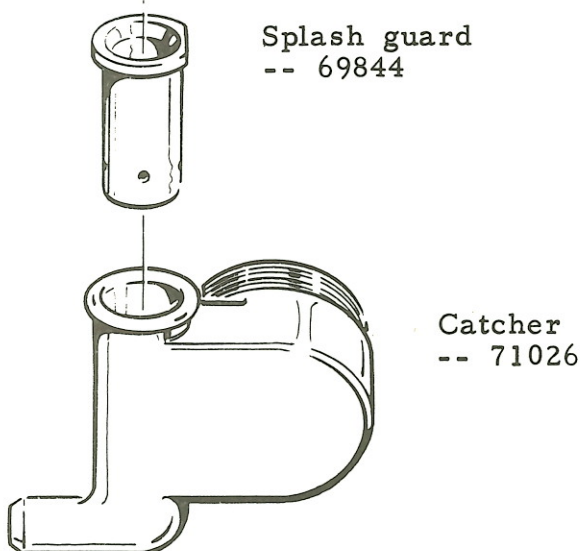
Hinged bolt
- 67639

Pin
- 72474

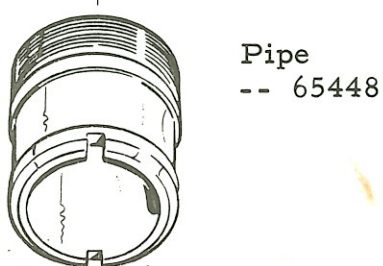
Pivot
- 72680



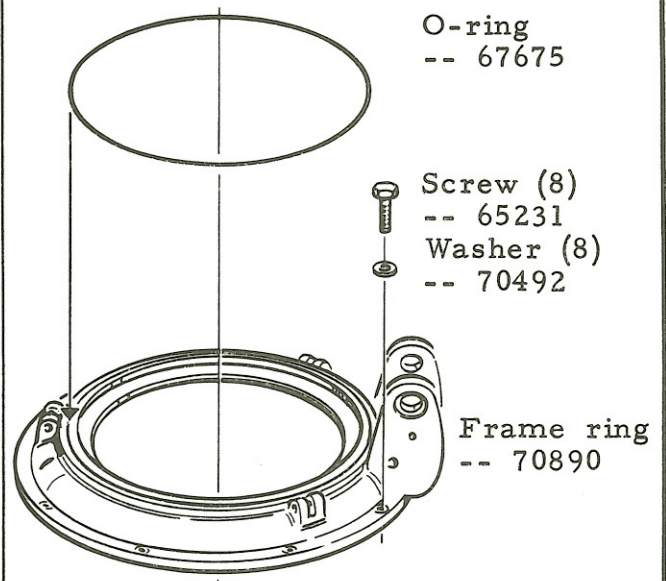
CATCHER



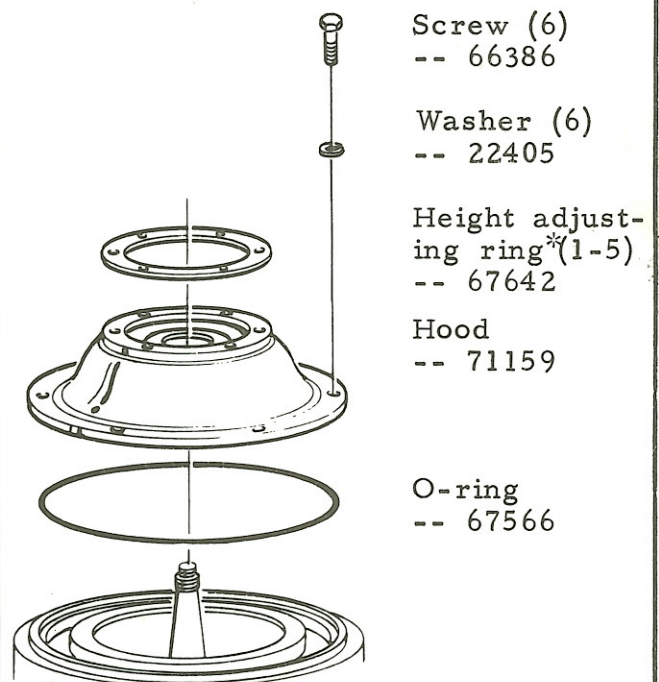
DRAIN PIPE



FRAME RING

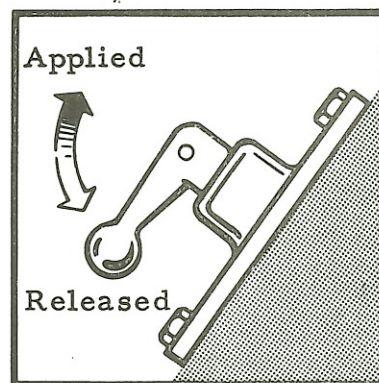
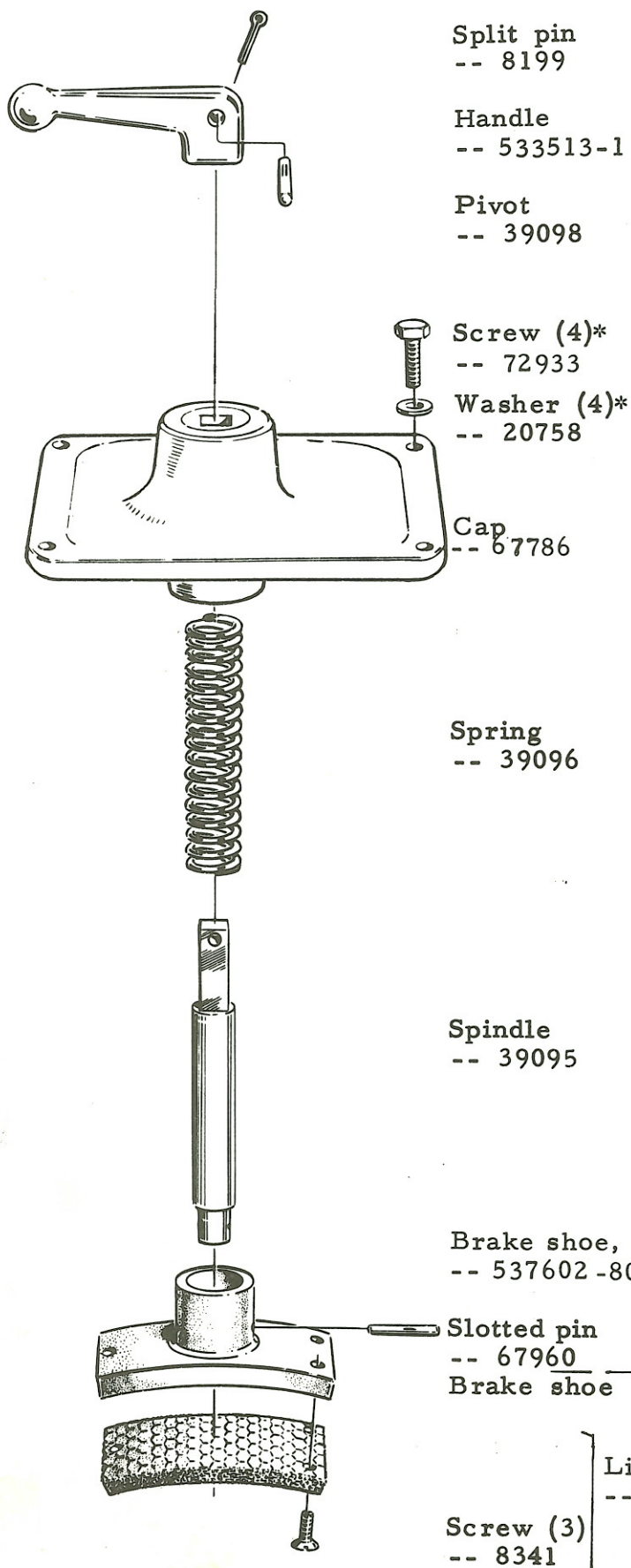


HOOD FOR PARING DISC DEVICE



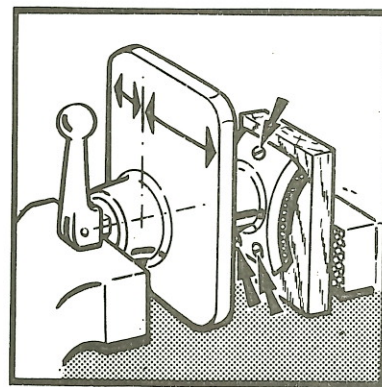
* Unmounted rings are packed with the set of spares.

BRAKE -- 65221 (*-marked parts are not included in the complete-unit No.)



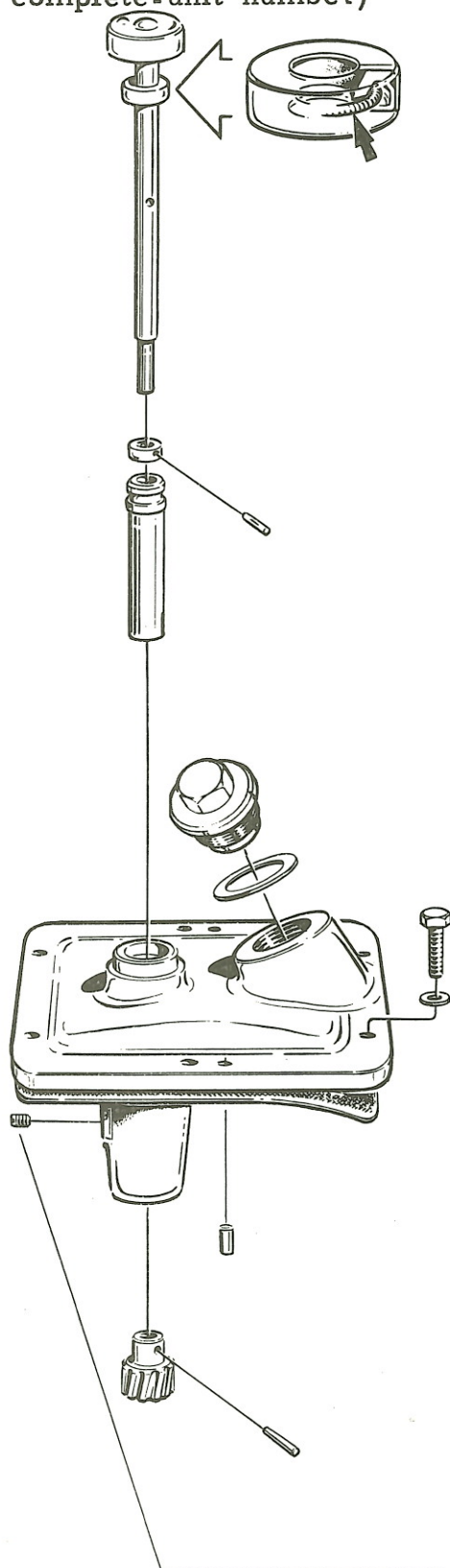
Exchange of lining
Release the brake and remove the cap. Exchange the lining. Note that the screws are slotted at both ends (use an angle driver). Fasten the cap to the machine with the handle pointing downward.

Dismantling. Assembling



Clamp the cap in a screw vice, apply the brake, and remove the handle. See that cap, handle, and brake shoe are turned as shown by the arrows in the figure. Fasten the cap to the machine with the handle pointing downward.

REVOLUTION COUNTER . 71128 (*-marked parts are not included in the complete-unit number)



Lipseal ring
- 38710

Shaft
- 71130

Stop ring
- 69211

Slotted pin
- 69212

Bushing
- 70321

Oil supply
screw
- 526686-02

Packing
- 38324

Screw (6)
- 72933* - 2210942-38 **

Washer (6)
- 20758* - 65451**

Cap
- 71129

Packing
- 65220*

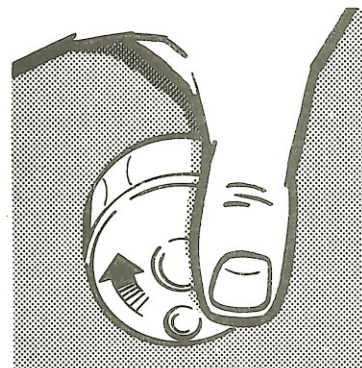
Guide pin (2)
- 64426*

Gear wheel
- 69214

Taper pin
- 69226

Set screw
- 221585-13

Speed checking



Speed particulars - see chapter C. Count the number of revolutions during one minute.

Assembling

When mounting lubricate shaft and gear wheel with oil of the same type as used in the gear housing. Direct the gear wheel correctly - hole and pin are tapered.

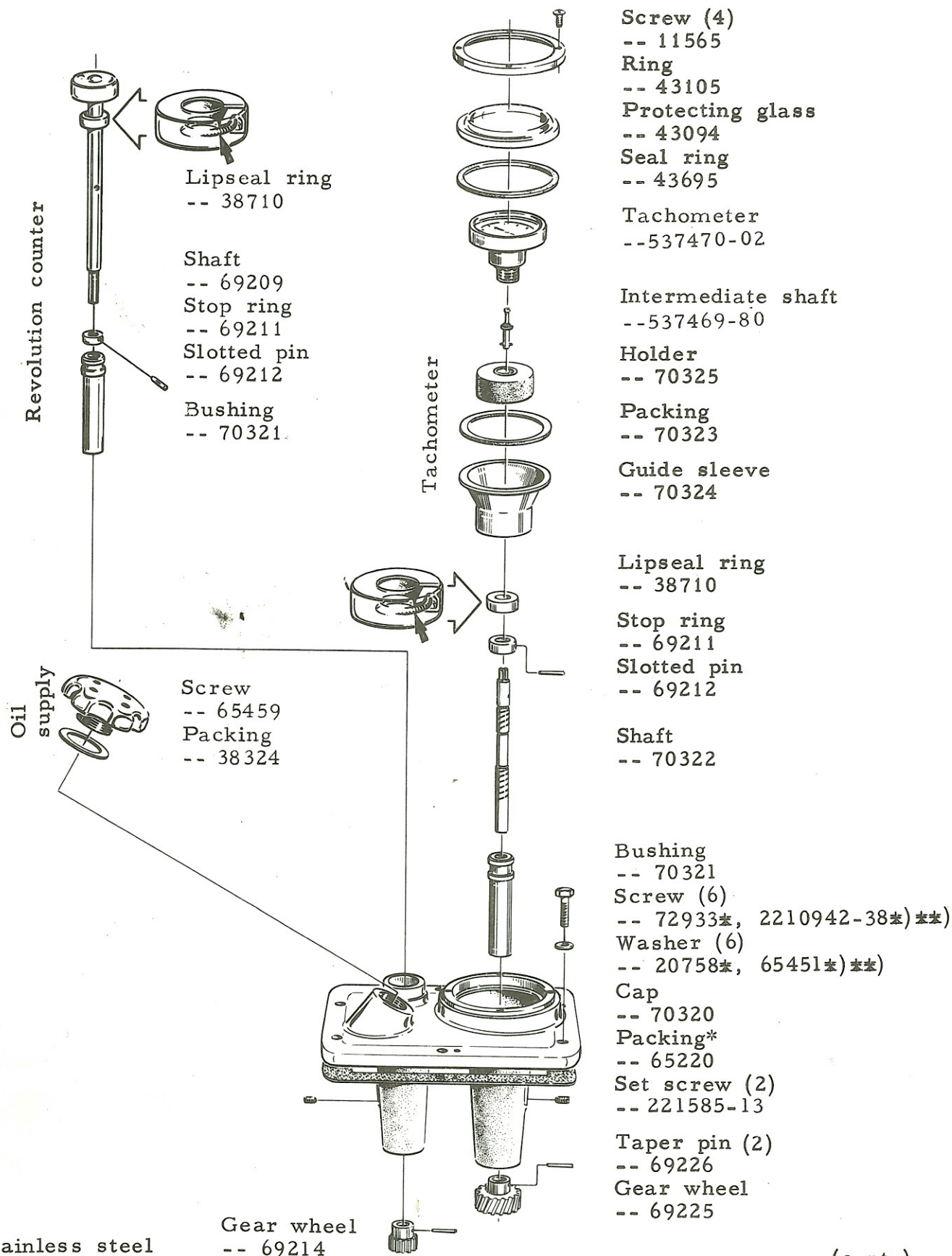
In case of play ream the hole (conicity 0.02).

Make sure the lipseal ring is directed according to the illustration.

Note. The part numbers do not apply to machines equipped with combined revolution counter and tachometer - in the latter case see special page.

** Stainless steel.

REVOLUTION COUNTER and TACHOMETER -- 519678-80 (*-marked parts are not included in the complete-unit number)

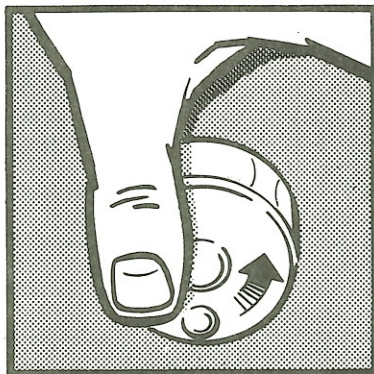


(cont.)

(Revolution Counter and Tachometer, page 2)

REVOLUTION COUNTER

Speed checking



Speed particulars - see chapter C. Count the number of revolutions during one minute.

Assembling

When mounting lubricate shaft and gear wheel with oil of the type used in the gear housing. Direct the gear wheel correctly - pin and hole are tapered. In case of play ream the hole (conicity 1:50).

Make sure the lipseal ring is directed according to the illustration.

TACHOMETER

Dismantling

Speed particulars - see chapter C.

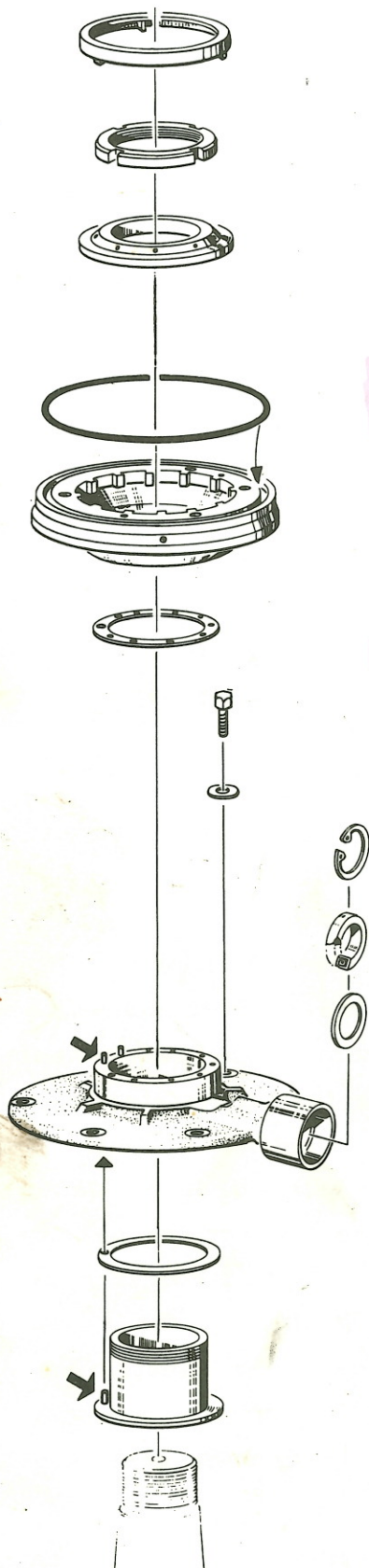
Remove the ring and the protecting glass with packing. Lift out the tachometer and unscrew it from the holder. Take out the intermediate shaft in the same direction as the tachometer. Remove the gear wheel and knock out the shaft towards the tachometer side.

Assembling

Lubricate shaft and gear wheel with oil of the same type as used in the gear housing. Direct the gear wheel correctly - pin and hole are tapered. In case of play ream the hole (conicity 1:50).

Direct the lipseal ring according to the illustration, slip it onto the shaft and knock it carefully into its seat. Push home the shaft and secure the gear wheel with the taper pin.

PARING DISC DEVICE for OPERATING LIQUID -- 515170-81 (*-marked parts are not included in the complete unit number)



Collar
-- 515172-80

Nut
-- 71324

Paring disc
-- 71323

Seal ring
-- 38259

Distributing ring
-- 515171-1

Packing
-- 71322
418003-02

Screw* (6)
-- 2210942-36

Washer* (6)
-- 22405

Snap ring
-- 223642-1

Lip seal ring
-- 60739

Guide ring
-- 68917

Distributing cover
-- 524434-80

Packing
-- 71320

Sleeve
-- 71317

Bowl spindle

The distributing ring rotates, the other parts are non-moving.

Dismantling

For dismantling the bowl see chapter I. The distributing ring is fastened to the bowl body by screws. These screws must be removed before the bowl body can be lifted off from the spindle. Remove the control valve.

Take out the distributing cover and dismantle the parts in the sequence appearing from the illustration. Use the special tools.

Cleaning

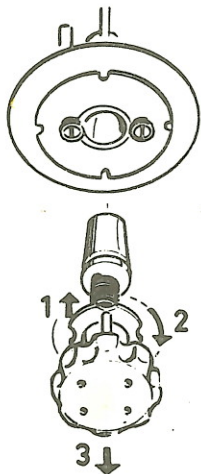
Make sure the parts (particularly all holes and channels) are carefully cleaned - for cleaning agents see chapter L.

Assembling

Fit the parts in the distributing cover. Make sure that the height adjusting rings are put in place, that the parts are placed in the positions defined by the guides, and that the holes in packing and distributing cover face each other. Check the height position (see chapter L) and fit the control valve. Supply operating liquid and check throughflow according to directions in chapter L.

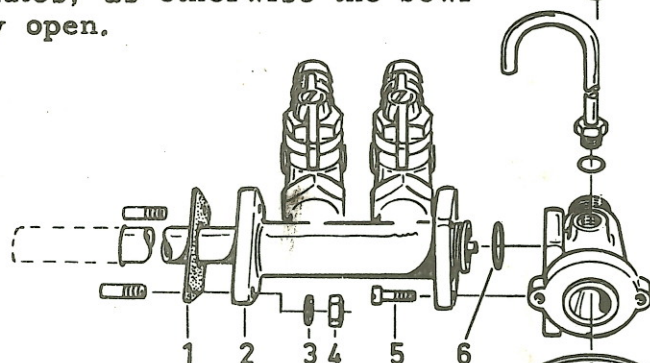
CONTROL VALVE - 71805 (*-marked parts are not included in the complete-unit number)

Plug cock For dismantling depress the disc and turn it a quarter revolution so that the recesses face the lock discs. Pull the hand wheel outwards. For cleaning see chapter L.



Grease the plug before mounting. Check the liquid flow - see chapter L.

NOTE. The plug can be removed from the housing during operation. The feed of operating liquid from the tank must, however, be shut off. The plug must be reinserted within 3 minutes, as otherwise the bowl may open.



- 1 Packing*
- 71923
- 2 Connection piece
- 71806
- 3 Washer (2)*
- 65451
- 4 Nut (2)*
- 41380
- 5 Screw (4)
- 11677
- 6 Seal ring
- 64708
- Stud bolt (2)*
- 64367

Hose nipple (3)
- 69527

Ball valve (3)
- 70889

Nipple
- 523127-3

Strainer
- 515482-8

Nut (3)
- 71343

Nipple (3)
- 71342
Packing (3)
- 223310-04

Pipe
- 71338

Packing
- 39518

Cock housing
- 71329

Dial
- 71053

Lock disc (2)
- 71331
Screw (2)
- 11677

Plug
- 71332

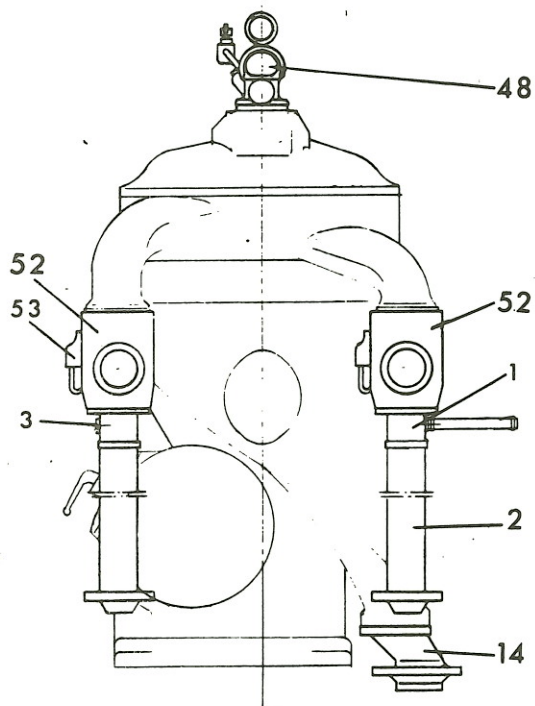
Spring
- 71333

Disc
- 71334

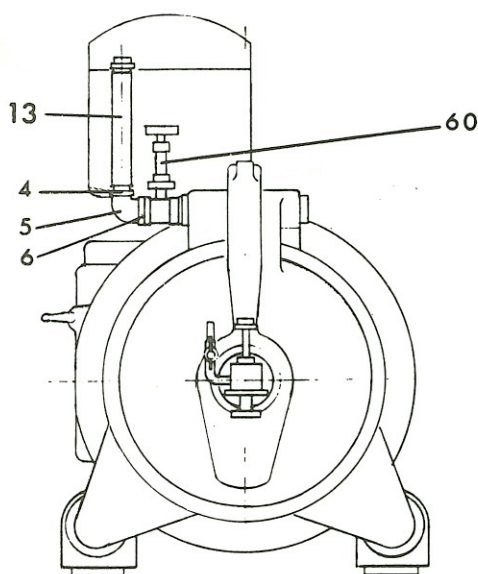
Taper pin
- 71424

Hand wheel
- 71335

SET OF FITTINGS FOR MACHINE WITHOUT FEED PUMP and DISCHARGE PUMP
(e. g. MAPX 309B) --537753-80.

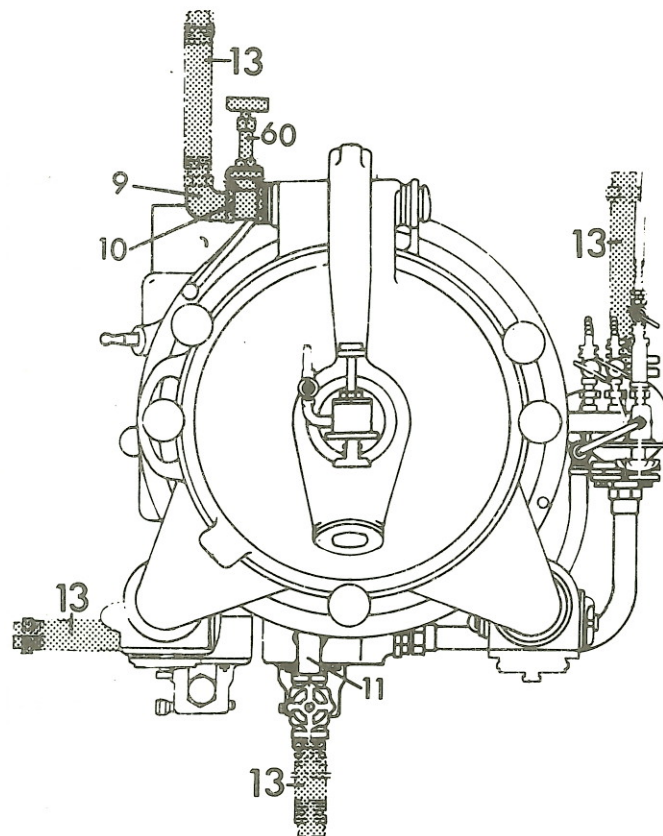
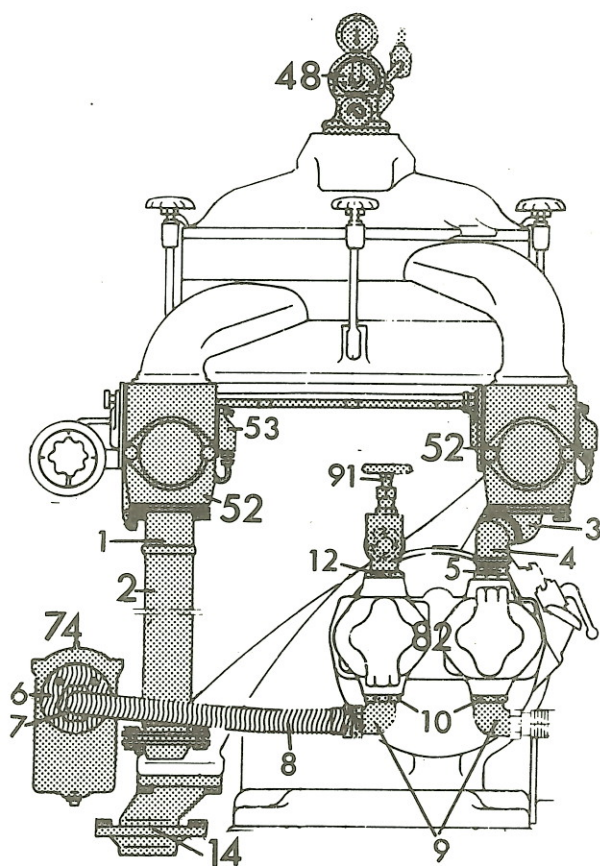


- 1 Discharge pipe
--71962
Hose nipple
--68956
Hose
--68955
Hose clip (2)
--69167
- 2 Connection hose *
--72128
Hose clip
--2245101-1
- 3 Plug
--2522303-04
- 4 Packing
--68592
- 5 Elbow pipe (1)
--65476
- 6 Tube nut (1)
--65484
- 13 Flexible steel hose (1) *
--534115-81
- 14 Discharge funnel *
--72169
- 48 Flow regulator *
--69831
- 52 Inspection box *
--71160
- 53 Electrical connection
--69697
- 60 Shut-off valve
--2543109-18



* See special parts list.

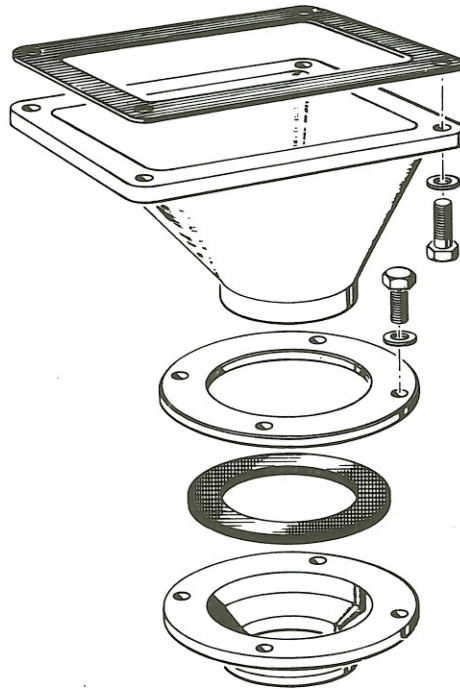
SET OF FITTINGS FOR MACHINE WITH FEED PUMP and DISCHARGE
PUMP -- 531897-82 (e.g. MAPX 309B)



- | | | |
|--------------------------------|---|------------------------------------|
| 1 Discharge pipe
-- 71962 | Washer (8)
-- 70492 | 60 Shut-off valve
-- 2543109-18 |
| Hose nipple
-- 68956 | 7 Packing
-- 223318-05 | 74 Strainer*
-- 71949 |
| Hose
-- 68955 | 8 Pipe
-- 531816-80 | Stud bolt (2)
-- 2216281-2 |
| Hose clip (2)
-- 69167 | 9 Elbow pipe
-- 65476 | Washer (2)
-- 70492 |
| 2 Connection hose*
-- 72128 | 10 Tube nut (3)
-- 65484 | Nut (2)
-- 41330 |
| Hose clip
-- 2245101-1 | 11 Elbow pipe
-- 65476 | 82 Pump*
-- not included |
| 3 Outlet piece
-- 524265-2 | 12 Nipple
-- 69016 | 91 Regulating valve
-- 531749-2 |
| 4 Elbow pipe
-- 531814-2 | 13 Flexible steel hose*
-- 526561-81 | Set of spares |
| Seal ring (2)
-- 42153 | 14 Discharge funnel*
-- 72169 | 4 Seal ring (2)
-- 42153 |
| 5 Nipple
-- 531813-1 | 48 Flow regulator
-- 69831 | |
| 6 Flange (2)
-- 68598 | 52 Inspection box*
right -- 71160
left -- 71160 | |
| Packing (2)
-- 68595 | 53 Electrical connection
-- 69697 | |
| Screw (8)
-- 70494 | | |

* See special parts list.

SLUDGE DISCHARGE FUNNEL - 72169



Packing - 69025

Discharge funnel - 69024

Screw (4) - 60377

Screw (4) - 70494

Washer (8) - 70492

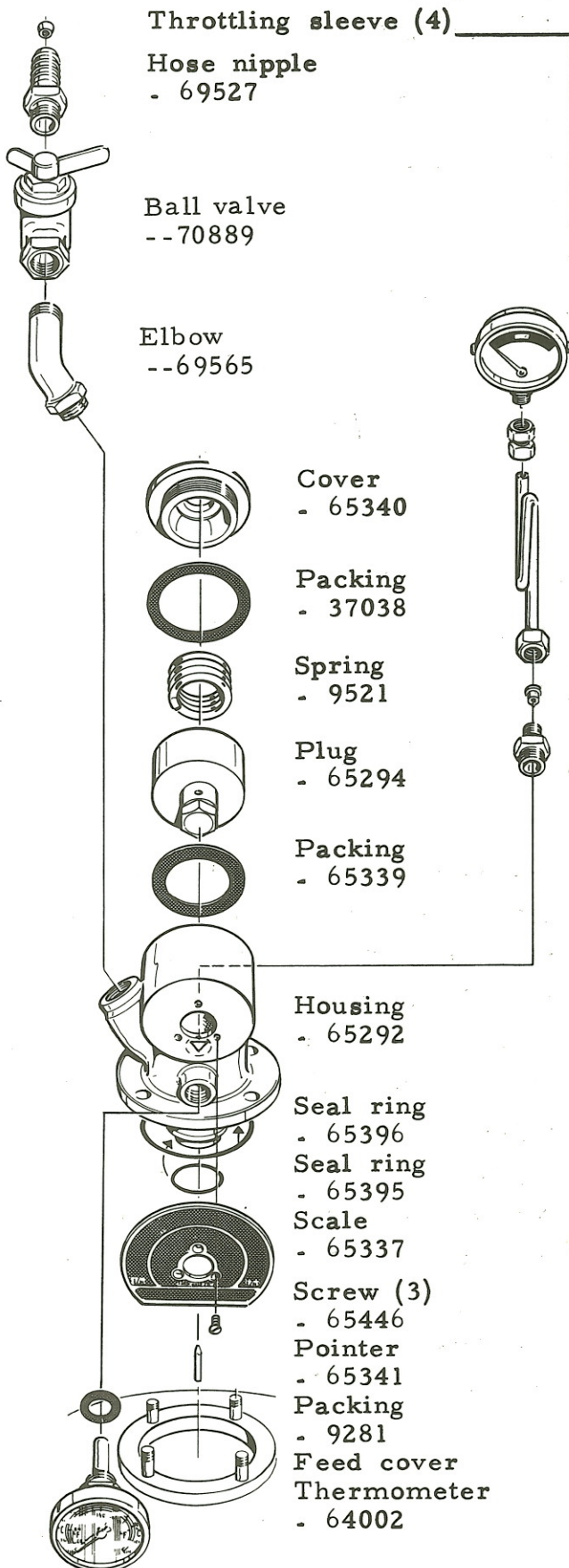
Flange - 69026

Packing - 69027

Counter flange - 69028

TOP COVER with FLOW REGULATOR - 69831

Supply of sealing, flushing or washing liquid



Throttling sleeve (4)

Hose nipple
- 69527Ball valve
--70889Elbow
--69565Cover
- 65340Packing
- 37038Spring
- 9521Plug
- 65294Packing
- 65339Housing
- 65292Seal ring
- 65396Seal ring
- 65395Scale
- 65337Screw (3)
- 65446Pointer
- 65341Packing
- 9281Feed cover
Thermometer
- 64002

Hole diameter (mm)

Part number

3

69523

4

69524

5

69525

6

69526

Pressure gauge
- 65346Coupling
- 73012Pipe
- 73011Seal ring
- 69142Nipple
- 69139

The size of throttling sleeve to be chosen depends on the water supply pressure and the wanted water quantity. With an automatically controlled machine the feed must be adapted to the cam time for the supply of the liquid seal.

The set throughput is obtained when the pointer lies in the white area (approx. 1 kg/sq.cm.)

Note. The machine may be provided with a top cover lacking the flow regulator - if so see special page in this chapter.

Spares:

Seal ring - 65396

Seal ring - 65395

TOP COVER -- 70383

Supply of sealing, flushing or washing liquid

Throttling sleeve (4)

Hole diameter (mm)	Part number
3	69523
4	69524
5	69525
6	69526

Hose nipple
-- 69527Ball valve
-- 70889Elbow
-- 69565Packing
-- 33787Top cover
-- 65440Seal ring
-- 65396Packing
-- 9281Thermometer
-- 64002

Feed cover

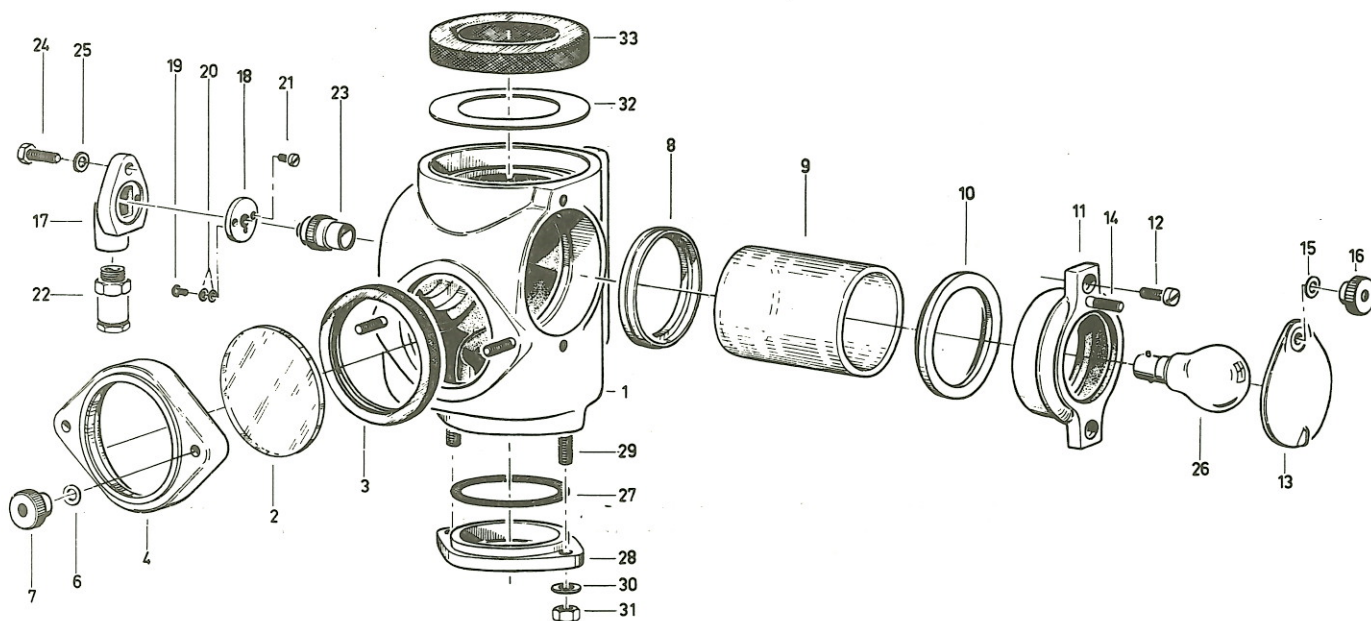
The size of throttling sleeve to be chosen depends on the water supply pressure and the wanted water quantity. With an automatically controlled machine the feed must be adapted to the cam time for the supply of the liquid seal.

Note. The machine may be provided with a top cover with flow regulator — if so see special page in this chapter.

Spare:

Seal ring -- 65396

INSPECTION BOX with ILLUMINATION - 71160



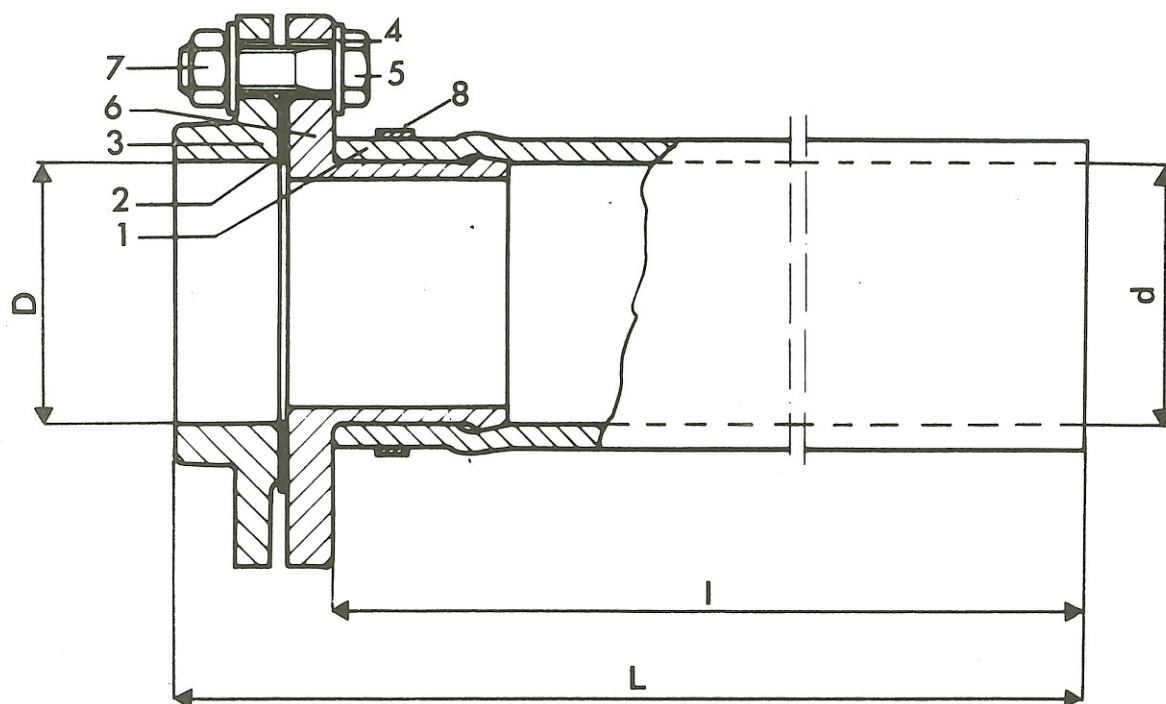
- | | | | |
|----|-------------------------------|----|-------------------------------------|
| 1 | Inspection box - 77161 | 22 | Cable fitting - 68624 |
| 2 | Sight glass - 68075 | 23 | Lamp socket - 65252 |
| 3 | Seal ring - 68076 | 24 | Screw - 38544 |
| 4 | Fixing ring - 71163 | 25 | Washer - 20758 |
| 5 | Stud bolt (2) - 71353 | 26 | Lamp 25W/140V - 63264 |
| 6 | Washer (2) - 20758 | | 25W/250V - 62678 |
| 7 | Knob (2) - 71349 | 27 | Packing - 68882 |
| 8 | Seal ring - 65247 | 28 | Flange - 71171 |
| 9 | Protecting glass tube - 65246 | 29 | Stud bolt (2) - 70488 |
| 10 | Seal ring - 71167 | 30 | Washer (2) - 70492 |
| 11 | Gland - 71164 | 31 | Height adjusting ring (1-4) - 69584 |
| 12 | Screw (2) - 14999 | 32 | Nut (2) - 41330 |
| 13 | Cover - 71166 | 33 | Seal ring - 71162 |
| 14 | Stud bolt - 37547 | | |
| 15 | Washer - 20758 | | |
| 16 | Knob - 71349 | | |
| 17 | Angle flange - 68621 | | |
| 18 | Holder - 68622 | | |
| 19 | Earthing screw - 24846 | | |
| 20 | Washer (2) - 25357 | | |
| 21 | Screw (2) - 68623 | | |

Spares

- | | |
|----|-------------------------------|
| 9 | Protecting glass tube - 65246 |
| 2 | Sight glass - 68075 |
| 3 | Seal ring - 68076 |
| 8 | Seal ring - 65247 |
| 10 | Seal ring - 71167 |

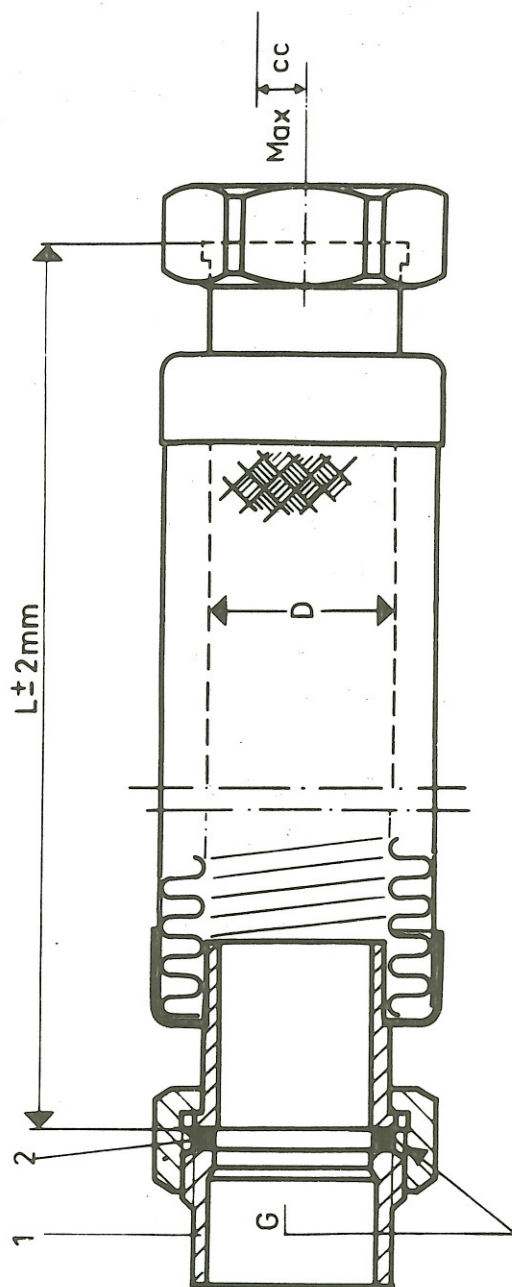
Note that the electric cable must be earthed.

OIL RESISTANT SYNTHETIC RUBBER HOSE with FLANGE and COUNTER FLANGE



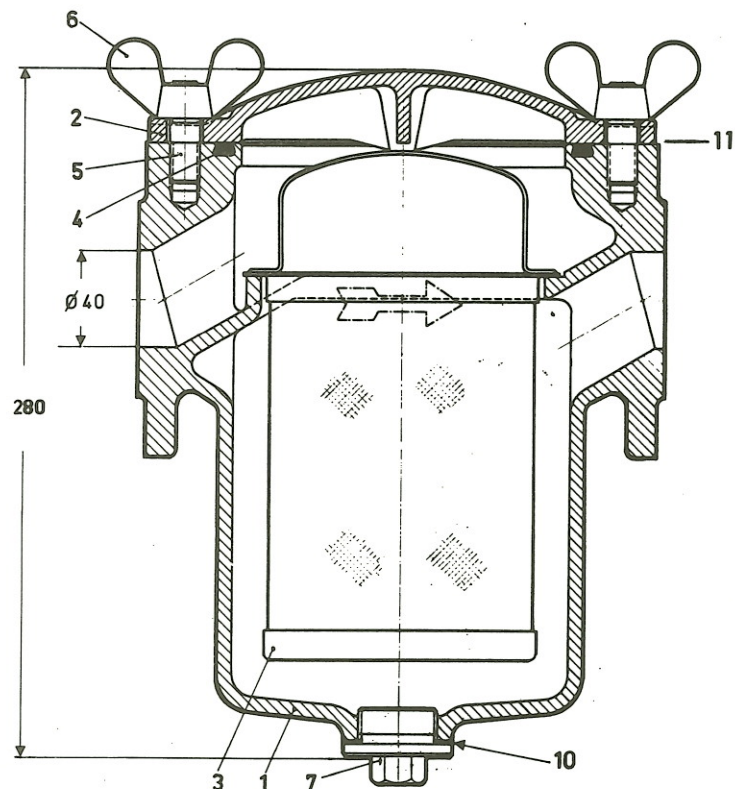
COMPLETE HOSE (L mm)	72128 (490)	521848-82 (490)	524016-81 (315)
1 Hose (d x l mm)	68981 (3" x 435)	68981 (3" x 435)	73467 (4" x 250)
2 Packing	68987	68987	69584
3 Counter flange (D)	68988 (2 3/4")	2532201-19 (2 3/4")	2532201-22 (4")
4 Washer (8)	70492	70492	70490
5 Screw (4)	72130	72130	2210949-02
6 Flange	68986	521850-2	521897-2
7 Nut (4)	41330	41330	2218043-04
8 Hose clip	2245101-1	2245101-1	73466

FLEXIBLE STEEL HOSE FOR OIL



COMPLETE HOSE	Packing (2)	Nipple (1)	Hose, only	Length (L)		Inner diameter (D)		Thread (G)	Max. cc	
				mm	inch	mm	inch		mm	inch
526560-81	223433-12	526566-1	526560-80	400	15 3/4	32	1 1/4	R 1 1/8	13	1/2
526561-81	68592	526567-1	526561-80	400	15 3/4	38	1 1/2	R 1 1/2	13	1/2
526860-81	223435-12	527944-1	526860-80	400	15 3/4	50	2	R 2	13	1/2
538270-81	223318-06	526566-1	538270-80	400	15 3/4	25	1	R 1 1/8	13	1/2
534115-81	68592	525667-01	534115-80	400	15 3/4	38	1 1/2	R 1 1/2	13	1/2

STRAINER of CAST IRON with STRAINER INSET of BRASS (12 meshes per 1")
 -- 520683-80

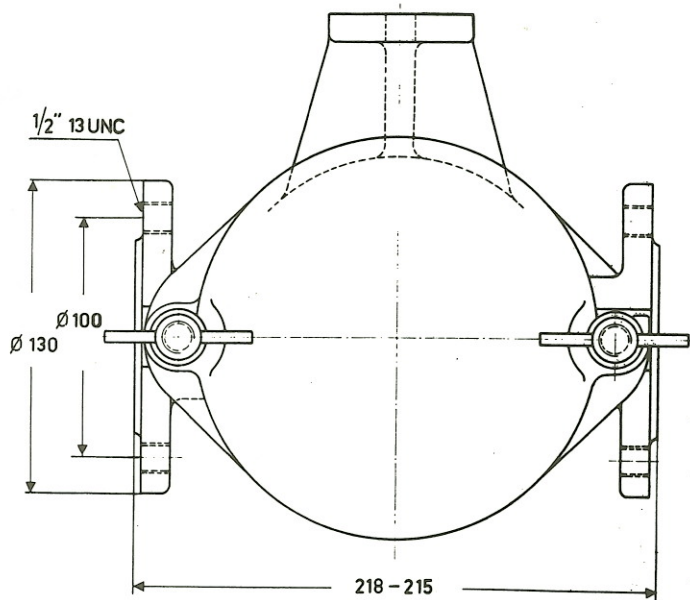


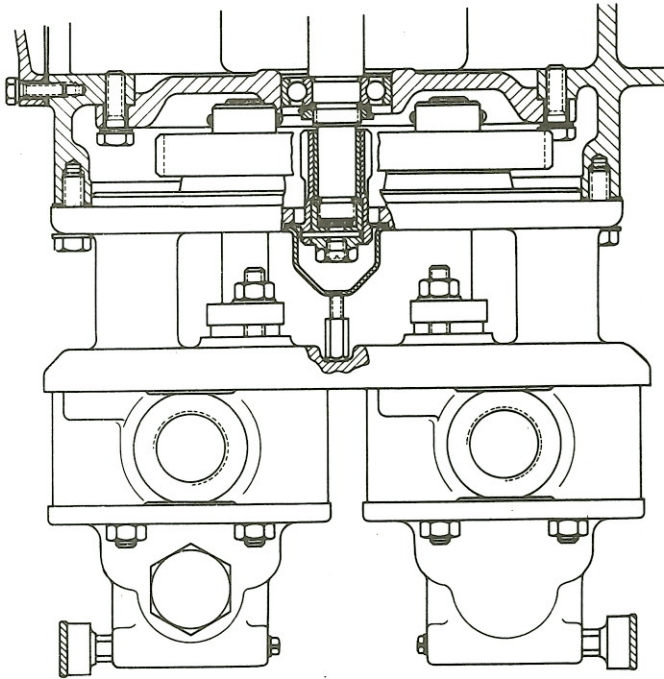
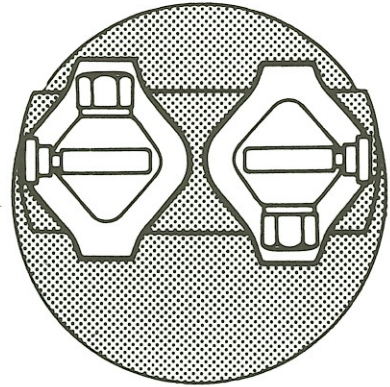
Mount the strainer as near the pump as possible, and so that the liquid flows in the direction indicated by the arrow.

- 1 Strainer housing
-- 520684-02
- 2 Cover
-- 71947
- 3 Strainer inset
-- 62208
- 4 Seal ring
-- 64100
- 5 Stud bolt (2)
-- 2216281-3
- 6 Wing nut (2)
-- 221832-13
- 7 Plug
-- 526686-2
- 10 Packing
-- 223316-5
- 11 Washer (2)
-- 70492

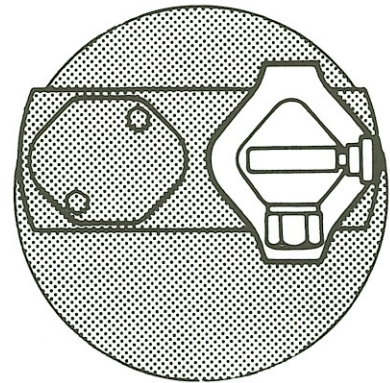
Spare parts:

- 4 Seal ring
-- 64100
- 10 Packing
-- 223316-05

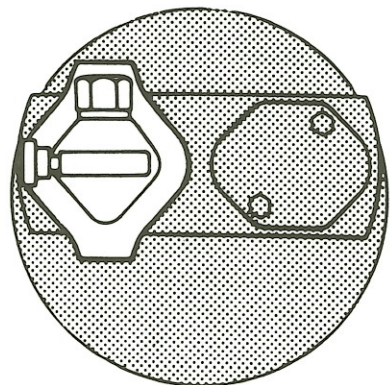


FEED and DISCHARGE
PUMP

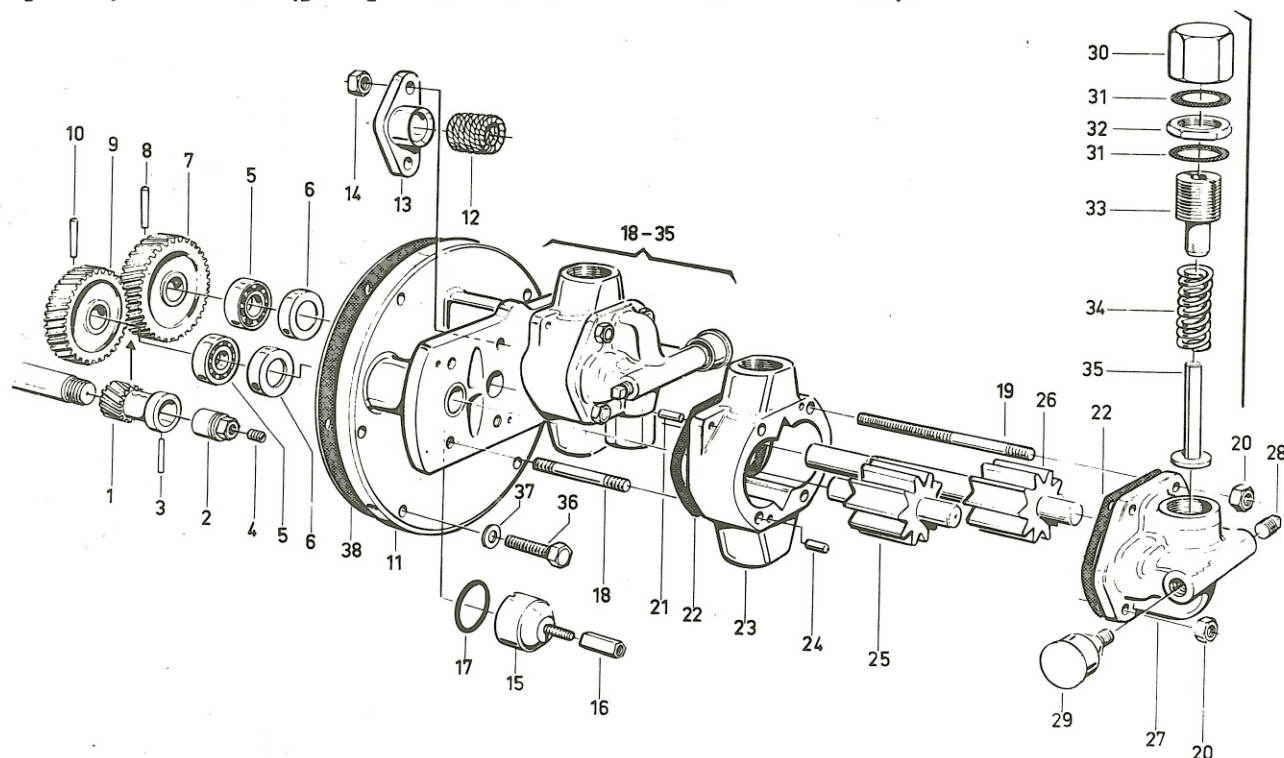
FEED PUMP



DISCHARGE PUMP



FEED and DISCHARGE PUMP - 65492, Feed Pump only - 65490, Discharge Pump only - 65491 (pump marked with relevant number).



- | | |
|---------------------------------------|--|
| 1 Gear wheel - 62525 | 26 Pump wheel (2) - 62188 |
| 2 Coupling nut - 65307 | 27 Shield (2) - 60925 |
| 3 Shear pin - 62527 | 28 Screw plug (4) - 35121 |
| 4 Set screw - 33411 | 29 Grease cup (2) - 36430 |
| 5 Ball bearing (2) - 7026 (SKF 6305*) | 30 Cap nut (2) - 36540 |
| 6 Oil retaining washer (2) - 62857 | 31 Packing (4) - 37819 |
| 7 Gear wheel (feed) - 65304 | 32 Lock nut (2) - 36542 |
| 8 Pin - 62656 | 33 Adjusting screw (2) - 36541 |
| 9 Gear wheel (discharge) - 65303 | 34 Spring (2) - 36543 |
| 10 Pin - 62656 | 35 Valve cone (2) - 36544 |
| 11 Adapter - 65301 | 36 Screw (6) - see chapter S, Frame Cap |
| 12 Packing thread - | 37 Washer (6) - see chapter S, Frame Cap |
| 13 Gland (2) - 62190 | 38 Packing - see chapter S, Frame Cap |
| 14 Nut (4) - 41330 | |
| 15 Hood - 65308 | |
| 16 Clamping nut - 62555 | |
| 17 Packing - 65310 | |
| 18 Short stud bolt (4) - 71752 | |
| 19 Long stud bolt (4) - 71210 | |
| 20 Nut (8) - 41330 | |
| 21 Guide pin (4) - 62195 | |
| 22 Packing (4) - 36545 | |
| 23 Pump housing (2) - 62194 | |
| 24 Guide pin (4) - 60900 | |
| 25 Pump wheel (2) - 36536 | |
- Spare:
- 3 Shear pin (3) - 62527
- Sealing parts for single-pump design
- Plug for ball bearing seat - 62193
- Cover - 61191
- Screw (2) - 36724

* or equivalent bearing of another make.

GEAR PUMP

The pump is driven by the worm wheel shaft at stepped-down speed. In the double-pump design the capacity of the feed pump slightly exceeds that of the discharge pump (smaller pump shaft gear).

Lubrication

If the process liquid is itself sufficiently lubricative, replace the grease cup of the pump by the accompanying screw plug. Otherwise fill the grease cup with ball bearing grease. Tighten the grease cup a quarter turn from time to time. Make sure the cup always contains grease so that air is not sucked into the pump.

Strainer

It is essential to prevent solid objects from entering the pump. The suction pipe should, therefore, be provided with a strainer placed as near the pump as possible. As strainer inset a brass gauge with at least 12 meshes per inch or a perforated brass plate with 1 mm holes can be used.

Resetting of max.
pump pressure

The relief valve serves as a safety and overflow valve and prevents abnormal pressure rise on the delivery side. The valve is adjusted for a maximum outlet pressure of approx. 2 bar (2 kg/sq.cm, 28.5 psi), which is normally sufficient.

If a total delivery and suction height of more than 20 - 25 meters is required (for either pump), the spring can be tightened by means of the adjusting screw till the necessary pressure is obtained.

Unnecessary tightening of the spring, i.e. unnecessary increase of the outlet pressure results in an increased power consumption and wear.

Cleaning

Remove the shield, take out a pump wheel and clean it. Revolve the other pump wheel by turning the worm wheel shaft and clean it.

Check the shield packing for defects before refitting the shield. It is important to use genuine packings. If for some reason packings must be made on the spot, they must not be made too thick and never be knocked out against the pump housing.

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Repacking of,
stuffing box

The packing thread should have circular cross-section with a diameter of $1/4"$, and be oil resistant (equivalent to the original packing). Unscrew the nuts and push up the gland on the pump shaft.

Before insertion clean the box, polish the part of the shaft to be received in the box and lubricate it with oil of the type used in the worm gear housing. Insert the packing material in the form of cut rings with the cuts displaced by 120° relative to each other. Cut the packing thread with a sharp knife. Clean cuts are obtained by winding adhesive tape around the thread in the cutting place and cutting in the middle of the tape.

Never tighten the gland too firmly, as the packing material swells and thus the box adjusts itself. If the box gets warm through friction, slacken off the gland so that necessary lubrication is provided between the packing material and the shaft.

Exchange of
shear pin

If the shear pin has broken, loosen the shield, clean the pump and revolve the pump wheels before inserting a new shear pin. Check the strainer inset for defects.

Loosen the clamping nut (16) and remove the hood (15). Apply the brake and unscrew the coupling nut (2). Pull off the gear wheel (1). Back off the set screw (4) in the coupling nut and force out the part of the shear pin left in the nut. Push the coupling nut into the gear wheel so that the hole in the nut registers with the hole in wheel. Insert the new shear pin and tighten the set screw. Fasten the gear wheel to the shaft. Make sure the packing (17) is put in place and clamp the hood with the nut.

Primarily, a broken shear pin should be replaced by one of the spare pins, but as an emergency a soft iron wire (low carbon content) can be used.

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TROUBLE TRACING

Indication	Cause	Remedy
No suction	Tank is empty. Closed valves in suction pipe Clogged strainers Broken shear pin Feed pump is dry	Exchange the shear pin. Check pump and strainer Charge pump with liquid. In case of large suction height it may be preferable to fit a check valve in the suction pipe
Pump output is too low	Air leakage in suction pipe or stuffing box Partly obstructed strainers Check valve open due to: impurities broken spring leakage Back pressure exceeding the setting of the relief valve	Hydrostatic testing of the suction pipe may be necessary. Tighten the stuffing box gland Tighten the relief valve spring
Pump runs hot	Pump is dry Stuffing box gland tightened too much Mechanical defects Wrong mounting	See "No suction" Slacken off the gland Check strainer. Tighten grease cup at shorter intervals Check that all guide pins have been fitted

